WELLINGTON, NEW ZEALAND

PURSUANT to Section 152 of the Land Transport Act 1998

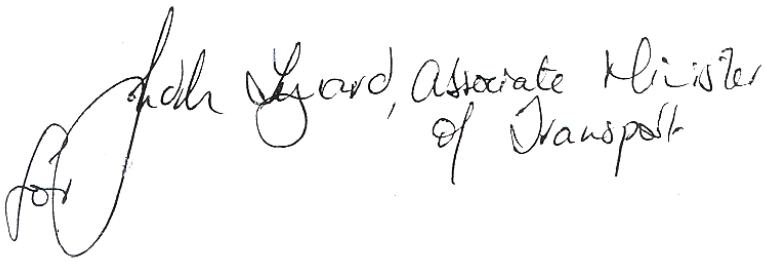
I, Mark Gosche, Minister of Transport,

HEREBY make the following ordinary rule:

Land Transport Rule: Vehicle Dimensions and Mass 2002

SIGNED AT Wellington

This 23rd day of May 2002



Mark Gosche

Minister of Transport

Land Transport Rule
Vehicle Dimensions and Mass 2002
Rule 41001

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Land Transport Rule

Vehicle Dimensions and Mass 2002

Rule 41001

Contents

Objective of the rule

Land Transport Rule: Vehicle Dimensions and Mass 2002 specifies requirements for dimension and mass limits for vehicles operating on New Zealand roads. The rule sets in place a regulatory regime so that vehicles, in particular, heavy truck and trailer combinations, are operated safely.

This rule clarifies, consolidates and rationalises the existing requirements for vehicle dimension and mass limits. It addresses the risks to land transport safety arising from the demands that the road network and the traffic environment place on the manoeuvrability and stability of vehicles. The rule includes new requirements aimed at improving vehicle stability and, thereby, reducing the incidence of rollover and loss-of-control crashes among heavy vehicles. The rule reduces the trailer:truck mass ratio so as to address the tendency of heavy vehicles with trailers to jack-knife while undertaking emergency manoeuvres, in particular, when braking into corners. The rule's provisions take into account recommendations of the 1996 Parliamentary Inquiry into Truck Crashes.

The rule largely carries over from the previous legislation the maximum envelope of dimensions and mass limits, namely, 20 metres and 44 tonnes respectively. It reduces the complexity of, and removes anomalies in, the limits and how they are administered. The overdimension policy has been rationalised in relation to road-space requirements, hazard warning systems, piloting and travel times for heavy vehicles. Where possible, requirements for overdimension and overweight vehicles that have been allowed to operate outside the limits prescribed by the legislation, by way of a special-permit regime, have been brought into the rule, and the special permit regimes have been ended.

The rule requires compliance with two approved standards. One of these relates to testing for Static Roll Threshold (which is used to determine the stability of a vehicle). The other is an approved standard with which retroreflective materials used for 'OVERSIZE' signs and hazard warning panels must comply if the overdimension vehicle is

operated at night. The approved vehicle standards are 'incorporated by reference' in accordance with *section 165* of the *Land Transport Act 1998* so that they are effectively part of the rule.

This rule applies to all vehicles in *Table A* in the rule, as well as to motor vehicles that are not in the table (such as motor scrapers and other vehicles that may operate on public roads) regardless of when they were manufactured or registered.

The rule states who is responsible for ensuring compliance with its requirements: operators, modifiers, vehicle inspectors and inspecting organisations, and manufacturers. This ensures that the rule is linked to relevant provisions of the *Land Transport (Offences and Penalties) Regulations 1999*.

Extent of consultation

Consultation on *Land Transport Rule: Vehicle Dimensions and Mass 2002* began formally with the release, on 30 June 2000, of the red draft for comment by industry and other interested organisations and individuals. Thirty-nine submissions were received.

The Land Transport Safety Authority (LTSA) released the public consultation (yellow) draft of the rule on 2 July 2001 and sent copies to around 600 organisations and individuals who had expressed an interest, or who were considered likely to be interested, in the rule. The availability of the yellow draft was publicised in metropolitan newspapers and in selected regional newspapers, the *New Zealand Gazette*, *Te Maori News* and in various industry publications. The draft rule and associated material were accessible on the LTSA's website and were sent to transport authorities and libraries overseas. 134 submissions were received on the yellow draft.

To assist with the production of the rule, the LTSA appointed a technical advisory group of experts, drawn

from the New Zealand Police, Transit New Zealand, the Road Transport Forum of New Zealand, Transport Engineering Research New Zealand Ltd, the Truck Trailer Manufacturers Federation, the Motor Industry Association, bus chassis importers and specialist heavy vehicle certifiers. The members of the technical advisory group provided advice as technical experts rather than as representatives of their respective organisations. They provided the LTSA with useful comments that were taken into account in drafting the rule.

Issues identified in submissions were taken into account in redrafting the rule, and when required, were resolved through discussion with the affected industry group, before the rule was submitted to Cabinet, and to the Minister of Transport for signature.

Part 1 Rule requirements

Section 1 Application

1.1 Title

This rule is *Land Transport Rule: Vehicle Dimensions and Mass 2002*.

1.2 Scope of the rule

1.2(1) This rule applies to:

(a) all motor vehicles, including motor vehicles in *Table A* in *Part 2*; and

(b) vehicles of Class AA in *Table A*.

1.2(2) Except as otherwise provided in this rule, reference to the dimensions and mass of a vehicle includes reference to its load, load restraints, fittings, attachments, equipment and accessories.

1.2(3) Except as provided in *sections 3*, *6* and *7* and *4.4*, a vehicle that was first registered in New Zealand before the date on which this rule comes into force and that complies with dimension and mass limits imposed by or under any enactment in force before the commencement of this rule, may continue to operate under the dimension and mass limits imposed by or under that enactment.

1.3 Date when rule comes into force

This rule comes into force on 1 July 2002, except for those provisions with different dates specified in the rule.

1.4 Application of rule provisions

1.4(1) If there is a conflict between a provision of this rule and the corresponding provision of a document incorporated by reference in the rule, the provision of this rule applies.

1.4(2) If there is a conflict between a provision of this rule and a provision of *Land Transport Rule: Vehicle Standards Compliance 2002*, the provision of *Land Transport Rule: Vehicle Standards Compliance 2002* applies.

1.5 Objective of the rule

1.5(1) The objective of the rule is to manage the risks to road safety resulting from the dimensions and mass of vehicles, and, in particular, to achieve a reasonable balance between the risks that heavy motor vehicles present to public safety, and the efficient operation of the heavy motor vehicle fleet within the constraints imposed by the road network.

1.5(2) The rule aims to achieve its objective by:

(a) specifying performance requirements with which vehicles must comply so as to operate on a road; and

(b) specifying dimension and mass limits for vehicles, and their towing requirements; and

(c) allowing vehicles and their loads that exceed the specified limits in *section 4*, to operate on a road under conditions imposed by *section 5* or *section 6*, as applicable, provided that the safety of road users and the protection of the road network are not compromised.

[Note: In this rule, dimensions less than one metre are expressed in millimetres (mm). Dimensions of one metre or more are expressed in metres (m).]

Section 2 General requirements for all vehicles

2.1(1) A vehicle and its load must comply with dimension requirements in this rule and must be manoeuvrable, fit safely on a road and interact safely with road users.

2.1(2) The distribution of the gross mass of a motor vehicle over its axles, and the position of the centre of gravity of the vehicle, must ensure that the dynamic handling characteristics of the vehicle remain safe in terms of stability and steering manoeuvres for the design speed of the road.

2.1(3) A vehicle must not be operated on a road if the vehicle or its load is likely to damage any wires, cables or construction lawfully on, over or alongside that road, unless the vehicle is an overdimension motor vehicle of excess height, in which case the operating requirements in *Table 6.2* must be complied with.

2.1(4) A load that is being transported on a motor vehicle and that extends more than 1 m to the rear, or more than 1 m forward from, or more than 200 mm out from the side of, the body of the vehicle must be indicated by:

(a) a clean white flag, or a red, orange or yellow fluorescent flag, which must be at least 400 mm long and 300 mm wide; or

(b) a frangible hazard warning panel, which must comply with the dimensions in *Figure 1* in *Schedule 4*.

2.1(5) A motor vehicle that is transporting a load specified in *2.1(4)* during the hours of darkness must, instead of a flag or frangible hazard warning panel, be fitted, and be operated, with the following lights:

(a) for a load exceeding 1 m in width extending from the rear of the vehicle, one red lamp fitted on each side of the load at the rear of the load;

(b) for a load that is 1 m in width or less extending from the rear of the vehicle, one red lamp fitted centrally at the rear of the load;

(c) for a load exceeding 1 m in width extending from the front of the vehicle, one white or amber lamp fitted on each side of the load at the front of the load;

(d) for a load that is 1 m in width or less extending from the front of the vehicle, one white or amber lamp fitted centrally at the front of the load;

(e) for a load that extends more than 200 mm beyond the side of the body of the vehicle:

(i) one red lamp fitted on each side of the load at the rear; and

(ii) one white or amber lamp fitted on each side of the load at the front.

2.1(6) A lamp in *2.1(5)* must be clearly visible in clear weather at a distance of at least 200 m during the hours of darkness.

2.1(7) *Subclause 2.1(4)* is subject to *2.1(5)*, *6.9* and *6.10*.

2.1(8) *Subclause 2.1(5)* is subject to *6.7*.

Section 3 Static Roll Threshold (SRT) performance requirements

3.1 Scope of this section

This section sets out Static Roll Threshold (SRT) performance requirements for heavy motor vehicles. These requirements are intended to ensure the stability of heavy motor vehicles when negotiating corners within posted advisory speeds, and when undertaking evasive manoeuvres to avoid a collision.

3.2 Minimum SRT values

Subject to *3.3(4)*, a vehicle of Class NC or Class TD, whether laden or unladen, must comply with an SRT of at least 0.35 g.

3.3 Compliance with SRT

3.3(1) A vehicle of Class TD, other than a vehicle in *3.3(4)*, that was first registered before 1 July 2002 must, by the first date of renewal of a certificate of fitness occurring after 1 July 2003:

(a) comply with the SRT specified in *3.2*; and

(b) if it has a body height or load height above the ground that exceeds 2.8 m, be certified for SRT in accordance with *3.4* to *3.6*.

3.3(2) A vehicle of Class TD, other than a vehicle in *3.3(4)*, that is first registered on or after 1 July 2002 must, by the first date of renewal of a certificate of fitness occurring on or after 1 January 2003:

(a) comply with the SRT specified in *3.2*; and

(b) if it has a body height or load height above the ground that exceeds 2.8 m, be certified for SRT in accordance with *3.4* to *3.6*.

3.3(3) A vehicle of Class NC, other than a vehicle in *3.3(4)*, must:

(a) on or after 1 January 2003, comply with the SRT specified in *3.2*; and

(b) if checked for compliance with SRT, have the SRT determined by one of the methods specified in *3.4*.

3.3(4) The following vehicles of Class NC and Class TD do not have to comply with the minimum SRT requirements:

(a) a vehicle of Class NC that does not have a deck or body on which to carry a load and is fitted with a turntable coupling to tow a semi-trailer;

(b) a vehicle operating under *section 6*, or with a vehicle axle index above 1.1 and operating under an overweight permit, or both, provided that the operator of the vehicle complies with the conditions of the permit and the applicable requirements in *section 6*;

(c) a vehicle that is being used on a road or portion of a road that is designated as a road construction zone under *regulation 12* of the *Heavy Motor Vehicle Regulations 1974*;

(d) a vehicle that is being used on a road or portion of a road that is a roadworks zone approved by the road controlling authority;

(e) a vehicle that is not normally used on a road and that a road controlling authority has authorised to cross a road;

(f) a vehicle that is designed exclusively for transporting earth or other bulk material and that may only be used unladen on a road;

(g) a vehicle with a tipping body, but only when the tipping body is raised for the purpose of discharging a load at a speed not exceeding 10 km/h;

(h) a vehicle recovery service vehicle that is principally designed to tow or transport a heavy motor vehicle;

(i) a vehicle first registered before 1 January 1940.

3.4 Methods for determining SRT

SRT must be determined by one of the following methods:

(a) a physical test of the vehicle on a tilt table according to the procedure in the *SAE J2180-DEC 1998 of The American Society of Automotive Engineers* and carried out using a procedure approved by International Accreditation New Zealand; or

(b) a calculation using the 'SRT Calculator' computer program approved by the Director; or

(c) a calculation using the method in *Schedule 1*; or

(d) a procedure, approved by the Director, other than that in *(a)*.

3.5 Determining the appropriate loading of a vehicle

3.5(1) The following procedures must be applied to determine the appropriate vehicle loading:

(a) for mixed freight loads and uniform density loads:

(i) if the vehicle is loaded to the maximum internal body height or to the maximum height specified in *section 4*, the maximum allowable gross mass must be determined;

(ii) if the vehicle is loaded to the maximum allowable gross mass specified in *section 4*, the maximum allowable load height must be determined;

(b) for all other loads, for a particular height above ground level of the centre of gravity of the load, the maximum allowable gross mass of the vehicle and its load must be determined.

3.5(2) The combination of load height and load mass in *3.5(1)* applies for a particular standard type of loading that must be appropriate for the particular type of deck or body with which a heavy motor vehicle is fitted, and must be one of the following types of load:

(a) mixed freight, where 70% of the load mass is in the bottom half of the load space and 30% of the load mass is in the top half of the load space;

(b) uniform density, where the load is uniformly distributed between the load bed and the top of the load so that the centre of gravity of the load lies midway between the load bed and the load height;

(c) 'other loads', where the height above ground of the centre of gravity of the load is entered in the calculation.

3.5(3) If the deck or body fitted on a heavy motor vehicle is changed to allow a different type of load to be carried, the SRT must be determined, and the vehicle recertified, for the new loading.

3.5(4) A motor vehicle with a retractable axle or axles must be assessed under the procedures in *3.5(1)* with its axles in a non-retracted position.

3.6 Certifying results of SRT test

3.6(1) SRT test results must be:

(a) verified for compliance with loading and mass specifications by a vehicle inspector or an inspecting organisation; and

(b) specified in a document of compliance that complies with a form approved by the Director.

3.6(2) SRT test results must be displayed on a vehicle's certificate of loading with the options for load height and gross mass specified on the certificate as follows:

'SRT 0.35 g X_1/Y_1, Y_2/X_2

where:

X_1 = maximum allowable load height above ground in metres to two decimal places

Y_1 = maximum safe gross mass to nearest tonne to meet SRT of 0.35 g

Y_2 = maximum allowable gross mass to nearest tonne

X_2 = maximum safe load height above ground in metres to two decimal places to meet SRT of 0.35 g'

[Note: X_1/Y_1 represents the maximum allowable load height (X_1) of the vehicle that is used to calculate the maximum safe gross mass (Y_1) of the vehicle to meet an SRT of 0.35 g.

Y_2/X_2 represents the maximum allowable gross mass (Y_2) of the vehicle when loaded that is used to calculate the maximum safe load height (X_2) of the vehicle to meet an SRT of 0.35 g.

The procedure is fully explained in *3.5*.]

Section 4 Requirements for specific types of vehicle and vehicle configuration

4.1 General requirements for dimension and mass limits

4.1(1) Except as otherwise provided in this section and in *1.2(3)*, a vehicle must comply with the applicable requirements in *Table 4.1*, and with other applicable requirements in this section.

4.1(2) An overdimension motor vehicle that does not comply with a dimension requirement in *Table 4.1* may comply instead with the equivalent requirement in *Table 6.1* or *Table 6.2*, and:

(a) if the width limit in *Table 4.1* is exceeded, the inter-vehicle spacing requirement in *4.1(8)* does not apply;

(b) if the length limit in *Table 4.1* is exceeded, the rear trailing unit distance requirement in that table may also be exceeded;

(c) if the width, forward distance or length limit in *Table 4.1* is exceeded, the outside turning circle for a 360-degree turn requirement in *Table 4.1* may also be exceeded.

4.1(3) A vehicle designed principally to transport overdimension or overweight loads, or both, does not have to comply with the ground clearance requirements in *Table 4.1* when the vehicle's suspension is lowered temporarily to enable the vehicle to clear an overhead obstruction.

Table 4.1 Dimension requirements[1] for vehicles and vehicle combinations

Dimension	Distance (metres except where indicated otherwise)
Width[2]	
Two-wheeled vehicles of Classes AA, AB, LA, and LC	1.0
All other vehicles	2.5, or 1.25 from each side of the longitudinal centre-line of the vehicle
Overall length (excluding collapsible mirrors)	
Towing vehicle, full trailer, simple trailer, pole trailer (excluding load)	11.5
Rigid vehicle (not towing)	12.6
Towing vehicle and semi-trailer, articulated bus	18.0
Towing vehicle and full trailer, towing vehicle and simple trailer, towing vehicle and pole trailer, A-train, B-train, towing vehicle and two trailers, towing vehicle in combination with a motor vehicle other than a trailer	20.0
Height[3]	
All vehicles	4.25
Forward distance (excluding collapsible mirrors)	
Rigid vehicle	8.5 if fitted with tow coupling; 9.5 otherwise
Full trailer, simple trailer, pole trailer with drawbar at full extension, articulated bus (both front and rear sections), semi-trailer	8.5

(continued)

Table 4.1 Dimension requirements[1] for vehicles and vehicle combinations (continued)

Dimension	Distance (metres except where indicated otherwise)
Rear overhang	
Heavy rigid vehicle	4.0 or 70% of wheelbase (whichever is less) for a vehicle whose rearmost axle is a non-steering axle 4.25 or 70% of wheelbase (whichever is less) for a vehicle whose rearmost axle is a steering axle
Articulated bus, heavy semi-trailer, heavy simple trailer, heavy pole trailer with one axle set	4.0 or 50% of forward distance (whichever is less)
Heavy full trailer, heavy pole trailer with two axle sets	4.0 or 50% of wheelbase (whichever is less)
All other vehicles	4.0
Minimum ground clearance[4]	
Heavy motor vehicle	The greater of 100 mm or 6% of the distance from the nearest axle to the point where the ground clearance is measured (except when vehicle is loading or unloading)
Light motor vehicle	No requirement
Front overhang	
Semi-trailer	2.04 radius arc ahead of kingpin centre
Simple trailer	2.04 radius arc ahead of tow coupling centre
Full trailer	2.04 radius arc ahead of turntable centre
Pole trailer	2.04 radius arc ahead of turntable centre on towing vehicle
All other vehicles	3.0
Rear trailing unit distance	
A-train, B-train, towing vehicle and two trailers	14.5

(continued)

Table 4.1 Dimension requirements[1] for vehicles and vehicle combinations (continued)

Dimension	Distance (metres except where indicated otherwise)
Articulated vehicle point of attachment (excluding articulated buses)	No further rearward than the rearmost axle of the towing vehicle or rearmost axle of the leading trailer, and if the towing vehicle is a rigid vehicle and has more than one axle in its rear set, not more than 300 mm rearward of the rear axis of the towing vehicle
Tow coupling position[5] (for towing heavy trailer)	
Full trailer	40% of wheelbase of towing vehicle
Simple trailer	At least 700 mm rearward of the rear axis of the towing vehicle and not more than a distance equal to 50% of wheelbase
Articulated bus	40% of wheelbase of the leading unit
Coupling point distance[6]	
A-train	30% of forward distance of semi-trailer
Inter-vehicle spacing (between towing vehicle and trailer, except for a laden pole trailer)[7]	4.0
Outside turning circle in either direction for 360-degree turn[8]	25.0 diameter (wall to wall, excluding collapsible mirrors)

Notes:
[1] Unless otherwise stated, the dimensions in *Table 4.1* are maximum dimensions.
[2] For items not included in determining whether a vehicle complies with width restriction, see *4.1(4)*.
[3] For restrictions on height, see *4.1(5)*; for items not included in determining whether a vehicle complies with height restrictions, see *4.1(6).*
[4] For items not included in determining the ground clearance for a heavy motor vehicle, see *4.1(7*).
[5] The tow coupling position is the distance rearward from the motor vehicle's rear axis to the centre of the tow coupling.
[6] The coupling point distance (for an A-train) is the distance between the rear axis of the semi-trailer and the tow coupling centre of the full trailer.
[7] For other requirements relating to the inter-vehicle spacing between a towing vehicle and a full trailer, see *4.1(8).*
[8] Includes all attachments to vehicles except collapsible mirrors. For requirements relating to turning circle, see *4.1(9)* and *4.1(10).*

Specific requirements for mass and dimension limits

4.1(4) The following items are not included in determining whether a vehicle complies with the width requirements in *Table 4.1*:

(a) side marker lamps and direction indicators;

(b) collapsible mirrors that extend not more than 240 mm beyond the side of the vehicle or its trailer;

(c) ropes, lashings, straps, chains, and related connectors or tensioning devices that extend not more than 25 mm from either side of the vehicle and are neither permanently nor rigidly fixed to the vehicle;

(d) J-hook assemblies that extend not more than 25 mm from either side of the vehicle, not more than 1.275 m when measured from the vehicle's longitudinal centre-line, and that comply with the ratings specified on the manufacturer's plate affixed to the stockcrate or bin that is being secured;

(e) central tyre inflation system hoses that extend not more than 75 mm beyond the outside of the tyre on the drive axles of a heavy motor vehicle;

(f) hubodometers that extend not more than 75 mm beyond the 2.5-m width limit from a non-lifting, non-steering axle whose outer casings are of a light colour, provided the hubodometer is fitted on the axle that causes the least overwidth;

(g) cab exterior grabrails that extend not more than 50 mm from either side of the vehicle;

(h) the bulge towards the bottom of a tyre;

(i) trolley bus poles and their safety cables, when extended to collect electric power from overhead conducting wires, provided there is a 2.5-m ground clearance outside the body of the bus.

4.1(5) The load height of a towing vehicle and of a trailer with an open deck may be restricted for reasons of stability, as specified in *3.5(1)(a)(ii)*.

4.1(6) The following items are not included in determining whether a vehicle complies with the height requirements in *Table 4.1*:

(a) load-restraining devices, such as ropes, lashings, straps, chains, covers and related connectors and tensioning devices, that extend not more than 25 mm above the body or load of the vehicle, and that are neither permanently nor rigidly fixed to the vehicle;

(b) trolley bus poles, when extended to collect electric power from an overhead conducting wire.

4.1(7) Ground clearance for a heavy motor vehicle does not include flexible mudflaps, wheels, tyres or devices designed to discharge static electricity.

4.1(8) The inter-vehicle spacing between a towing vehicle and a full trailer, when in a straight line, must not be less than the greater of 1 m or half the width of the foremost point of the trailer (including its load but excluding the drawbar and front dolly assembly).

4.1(9) An articulated bus must be able to complete a 360-degree turn in either direction without any part of the vehicle, except for collapsible mirrors, encroaching within a concentric internal radius of 5.3 m.

4.1(10) In carrying out a 360-degree turn at the 25-m diameter, as specified in *Table 4.1*, no part of a vehicle in a combination, other than its articulation mechanism, may come into contact with the other vehicle in the combination.

Drawbars and drawbeams

4.1(11) *Subclauses 4.1(12)* to *4.1(15)* apply to a drawbar or a drawbeam between a towing vehicle and a full trailer.

4.1(12) A drawbar may have only one operating position and must not be extendable, except if *4.1(13)* or *4.1(14)* applies.

4.1(13) A drawbar may be retractable only to facilitate the through loading or unloading of livestock or goods, provided that the drawbar has only one set of holes for locking pins and that the holes are positioned so that the drawbar is fully extended when locked.

4.1(14) A trailer that is used to transport logs may have a drawbar with up to three fixed positions and one sliding position, provided that the drawbar has:

(a) one sliding position for long logs; and

(b) one or two fixed positions for short logs; and

(c) a fixed position for storage of the drawbar when it is out of use while the trailer is being transported on a rigid vehicle or another trailer.

4.1(15) A drawbeam must not be sliding or adjustable.

4.2 Axle requirements for heavy motor vehicles

4.2(1) A heavy rigid motor vehicle must be supported by:

(a) one axle set towards the front of the vehicle, which must be either a single axle set or a twin-steer axle set; and

(b) one axle set towards the rear of the vehicle, which must be a single axle set, a tandem axle set or a tri-axle set.

4.2(2) Except as provided in *4.2(3)*, *4.2(4)* and *4.2(11)*, a heavy motor vehicle must not have any rear steering axles.

4.2(3) A forklift, the rear unit of an articulated bus, or a mobile crane may have one or more rear steering axles.

4.2(4) A rigid vehicle without a heavy tow coupling or a semi-trailer (other than a semi-trailer in an A-train combination or a B-train combination) may have steering axles in the rear axle set, if no more than half of the axles within the axle set steer at any time.

4.2(5) A mobile crane must have at least one rear axle locked so that it is non-steering, when the mobile crane is being operated on a road.

4.2(6) A rigid motor vehicle or semi-trailer, fitted with rear steering axles, must comply, in all configurations, with the rear overhang requirements and forward distance requirements in *Table 4.1*.

4.2(7) The axle sets, except a twin-steer axle set, of a heavy motor vehicle must be load sharing.

4.2(8) If a tandem axle set has a large single-tyred axle with a load-share ratio of 60%:40% or 55%:45%, the

manufacturer of the vehicle must securely affix to the vehicle an indelible plate, so that it is clearly visible to the person who is weighing the vehicle, that specifies the:

(a) load-share ratio of the axle set; and

(b) tyre size on each axle; and

(c) maximum individual axle ratings.

4.2(9) An A-train must have two motor-driven axles in a tandem axle set or a tri-axle set, or three motor-driven axles in a tri-axle set.

4.2(10) A semi-trailer must be supported by one axle set only, which must be set towards the rear of the vehicle and must be:

(a) a single axle set; or

(b) a tandem axle set; or

(c) a tri-axle set; or

(d) a quad-axle set (except if the semi-trailer is in an A-train combination or a B-train combination).

4.2(11) A semi-trailer with a quad-axle set must have two steering axles within the quad-axle set, provided that they are either:

(a) the two rearmost axles, which must be capable of turning in the same direction through an angle of at least 15 degrees; or

(b) the foremost axle and the rearmost axle, which must be capable of turning in opposite directions through an angle of at least 15 degrees.

4.2(12) A steering axle in *4.2(11)* must be certified for compliance with *4.2(11)(a)* or *(b)* by a vehicle inspector or inspecting organisation.

4.2(13) The axle set towards the front of a full trailer must connect all wheels for that part of the trailer to the drawbar steering system, and must be either a single axle set or a tandem axle set.

4.2(14) The axle set towards the rear of a full trailer must be one of the following:

(a) a single axle set;

(b) a tandem axle set;

(c) a tri-axle set, provided that the front axle set is a tandem axle set.

4.2(15) A simple trailer must be supported by one of the following:

(a) a single axle set;

(b) a tandem axle set;

(c) a tri-axle set.

4.2(16) A pole trailer with one axle set may only carry poles or long loads that are not part of the trailer, and must be supported by a single axle set, a tandem axle set or a tri-axle set.

4.2(17) For a pole trailer with two axle sets, the axle set towards the front of the trailer must connect all wheels for that part of

the trailer to the drawbar steering system, and must be either a single axle set or a tandem axle set.

4.2(18) The axle set towards the rear of a pole trailer with two axle sets must be one of the following:

(a) a single axle set;

(b) a tandem axle set;

(c) a tri-axle set, provided that the front axle set is a tandem axle set.

4.2(19) A heavy motor vehicle, other than an A-train or a B-train, may have a retractable axle, provided that the following requirements are complied with:

(a) the retractable axle is in a rear axle set;

(b) the retractable axle has an automated control that ensures the remaining axle or axles and axle set or axle sets in contact with the ground remain within the mass limits in *Schedule 2* and within all manufacturer's component ratings for all retracted axle configurations;

(c) the forward distance requirements and rear overhang requirements in *Table 4.1* are complied with, whether the axle is in contact with the road or is in a retracted position.

4.2(20) A retractable axle must be certified for compliance with *4.2(19)* by a vehicle inspector or inspecting organisation.

4.2(21) A specialist overdimension motor vehicle, or a motor vehicle designed principally to transport an overdimension load or an overweight load, or both, must comply with *4.2(7)*, but does not have to comply with other requirements in *4.2*.

4.3 Gross mass limits

4.3(1) The mass on the front axle set or twin-steer axle set of a heavy rigid vehicle must, at all times, be at least 20% of the sum of the axle mass of the heavy rigid motor vehicle.

4.3(2) The combined gross mass of an A-train must not exceed 39,000 kg.

4.3(3) The combined gross mass of a towing vehicle and a pole trailer, a towing vehicle and a semi-trailer, or a B-train must not exceed 39,000 kg, except if the towing vehicle has two motor-driven axles in a tandem axle set or tri-axle set, or three motor-driven axles in a tri-axle set.

4.3(4) The combined gross mass of a towing vehicle and a full trailer must not exceed 39,000 kg, except if the towing vehicle has:

(a) a twin-steer axle set, or a wheelbase of at least 4.25 m; and

(b) two motor-driven axles in a tandem axle set or tri-axle set, or three motor-driven axles in a tri-axle set.

4.3(5) The combined gross mass of a towing vehicle and a full trailer must not exceed 42,000 kg, except if:

(a) the towing vehicle has a twin-steer axle set or a tri-axle set; or

(b) the trailer is a four-axle trailer with two tandem axle sets; or

(c) the trailer is a five-axle trailer.

4.3(6) The combined gross mass of a towing vehicle and a simple trailer must not exceed 32,000 kg.

4.4 Trailer:truck mass ratio for heavy combination vehicles

4.4(1) For an A-train, a B-train or a rigid vehicle towing two trailers, the gross mass of the rearmost trailer must not exceed 1.5 times the gross mass of the towing vehicle and front trailer, that is:

$$\frac{\text{Gross mass of rear trailer}}{\text{Gross mass of towing vehicle + front trailer}} = 1.5 \text{ or less}$$

4.4(2) For all other heavy combination vehicles, except those operating under an overweight permit with a VAI exceeding 1.1, or those restricted to an operating speed of 40 km/h or less, the gross mass of the trailer must not exceed 1.5 times the gross mass of the towing vehicle, that is:

$$\frac{\text{Gross mass of trailer}}{\text{Gross mass of towing vehicle}} = 1.5 \text{ or less}$$

4.5 Road mass limits

4.5(1) A heavy motor vehicle, other than a vehicle that is operating in accordance with *section 5*, must not exceed the mass limits for road and bridge preservation applicable to axles, axle sets and gross mass in the relevant tables in *Schedule 2*.

4.5(2) For the avoidance of doubt, the road mass limits and the mass limits for axles, axle sets and gross mass in this rule import the equivalent weight limits.

4.6 Towing requirements

4.6(1) A trailer must be of one of the following types:

(a) a simple trailer;

(b) a semi-trailer;

(c) a full trailer;

(d) a pole trailer.

4.6(2) Except as provided in *4.6(3)*, a light motor vehicle may not tow more than one trailer.

4.6(3) Despite *4.6(2)*, a tractor may tow two light trailers, provided that the tractor manufacturer's ratings are not exceeded.

4.6(4) A heavy motor vehicle may not tow more than one trailer, except if that vehicle is:

(a) an A-train; or

(b) a B-train; or

(c) a rigid vehicle towing a converter dolly coupled to a semi-trailer; or

(d) a rigid vehicle towing two trailers whose total gross mass is less than 20,000 kg, provided the rearmost trailer is a light trailer; or

(e) a vehicle operating under *section 5* and *section 6*.

4.6(5) Except as specified in *4.6(6)*, a light motor vehicle may tow a trailer, provided that, if the light motor vehicle is towing

a heavy trailer, the gross mass of the trailer does not exceed 1.5 times the gross mass of the towing vehicle or the maximum towed mass specified by the manufacturer.

4.6(6) A light passenger service vehicle may not tow a trailer that has a gross vehicle mass of 2000 kg or more.

4.6(7) A heavy passenger service vehicle may not tow a trailer that has a gross vehicle mass exceeding 3500 kg.

4.6(8) An articulated bus may not tow a trailer.

Section 5 Permits for overweight vehicles

5.1(1) A road controlling authority may issue a permit to the operator of a heavy motor vehicle that exceeds the mass limits in *section 4*, with due consideration for the safety of the vehicle, road users and the durability of roads and bridges.

5.1(2) A vehicle in *5.1(1)* may not exceed the gross vehicle mass or maximum towed mass specified by the manufacturer of the vehicle.

5.1(3) A vehicle to which *5.1(1)* applies that is required under the *Road User Charges Act 1977* to have a road user licence must have a current licence issued under that Act, for the correct weight of the vehicle as specified in the permit.

5.1(4) A permit issued under this section must be issued in *Form 1* in *Schedule 3*, or in a form having the same effect, and must be signed by a duly authorised officer of the appropriate road controlling authority.

5.1(5) A permit issued by a road controlling authority must be for a road that is:

(a) under the control of that road controlling authority, or of another road controlling authority, if written permission to operate has been granted by the other road controlling authority; and

(b) classified as being unavailable for use by that heavy motor vehicle under normal operating conditions.

5.1(6) If a permit covers a journey on a road or roads under the control of more than one road controlling authority, the road controlling authority that issues the permit must obtain the consent of all the relevant road controlling authorities for travel on roads under their control. The provisions of this section apply to that permit.

5.1(7) If a road controlling authority issues a permit for a heavy motor vehicle to transport a divisible load for a continuous period exceeding three days, the road controlling authority must:

(a) publish in a newspaper circulating in the relevant district a notice in *Form 2* in *Schedule 3* within seven days after the permit has been issued; and

(b) on receiving an application from a person, issue a permit to allow that person to transport the same commodity on the same road and subject to the same conditions.

5.1(8) A permit issued under this section may specify conditions including the following:

(a) the heavy motor vehicle's maximum gross mass and axle mass;

(b) the period of travel;

(c) the number of trips the vehicle is allowed to make;

(d) restrictions on the vehicle's speed;

(e) restrictions relating to weather conditions;

(f) the roads or types of road on which the vehicle may operate;

(g) the type and amount of the load transported;

(h) the times of the day during which the vehicle may be operated;

(i) the circumstances under which the vehicle may be operated;

(j) any other condition the road controlling authority considers necessary.

5.1(9) The fee for the issue of a permit under this section is prescribed under *regulation 7(1A)* of the *Heavy Motor Vehicle Regulations 1974*, and specified in *Schedule 4A* of those regulations.

5.1(10) A road controlling authority may revoke a permit immediately because of adverse weather conditions, if, in its opinion, the continued operation of the heavy motor vehicle may cause extraordinary damage to the road.

5.1(11) The Director may revoke a permit, or may authorise the Commissioner to do so, if the Director considers there is a significant risk to public safety.

5.1(12) A road controlling authority may revoke a permit if it considers that any of the conditions of the permit have not been complied with.

5.1(13) A revocation under *5.1(11)* or *5.1(12)* must be made by notice in writing to the operator of the heavy motor vehicle

as soon as is practicable, giving reasons for its revocation, and the revocation takes effect immediately.

Section 6 Overdimension motor vehicles and overdimension loads

6.1 Scope of this section

This section applies to motor vehicles that exceed the dimension limits in *section 4* or to standard motor vehicles that transport overdimension loads. It specifies the criteria with which those vehicles must comply so as to operate on a road. They may be one of the following:

(a) a standard motor vehicle transporting an overdimension load;

(b) a specialist overdimension motor vehicle;

(c) a motor vehicle designed primarily to transport an overdimension load.

6.2 Standard motor vehicles transporting overdimension loads

6.2(1) A standard motor vehicle may transport an overdimension load that exceeds the dimension limits specified in *section 4*, provided that the load:

(a) is indivisible; and

(b) is loaded in a way that minimises its width, unless the height or instability of the load, or both, make it necessary to transport the load widthways.

6.2(2) A standard motor vehicle may transport an overdimension load as well as a divisible load, provided that the divisible load does not exceed:

(a) a width of 2.5 m;

(b) a height of 4.25 m;

(c) the appropriate requirements for length or rear overhang in *section 4.*

6.2(3) A standard motor vehicle may transport more than one overdimension load, provided that the loads:

(a) if loaded side-by-side, do not exceed a width of 2.5 m;

(b) if loaded one above the other, do not exceed a height of 4.25 m;

(c) if loaded one behind the other, do not exceed the appropriate requirements for length or rear overhang in *section 4.*

6.2(4) Despite *6.2(1),* a standard motor vehicle may transport:

(a) a divisible load of hay bales or wool bales, provided that the load does not exceed a width of 2.7 m; or

(b) concrete pipes with a minimum diameter of 400 mm that are loaded transversely on the deck, provided that the load does not:

(i) exceed a width of 2.7 m; and

(ii) project more than 1.35 m beyond either side of the longitudinal centre-line of the vehicle.

6.2(5) The following combination motor vehicles may not exceed the rear overhang or overall length limits in *Table 4.1* when transporting an overdimension load:

(a) a rigid vehicle towing a simple trailer;

(b) a rigid vehicle towing a full trailer;

(c) an A-train;

(d) a B-train.

6.3 Specialist overdimension motor vehicles

6.3(1) A motor vehicle that is not designed primarily to transport overdimension or overweight loads may exceed the dimension limits in *section 4*, if the vehicle's primary purpose is to carry out a specialist function that requires overdimension equipment, and:

(a) dismantling of the vehicle's equipment would make the equipment unusable for its intended purpose; or

(b) it would take more than four hours to dismantle the vehicle's equipment.

6.3(2) A specialist overdimension motor vehicle of a type specified in *6.3(1)* that is transporting a divisible load may not exceed the dimension limits in *section 4*, if those limits can be complied with by reducing the vehicle's divisible load.

6.3(3) A motor vehicle that is being operated on a road or a portion of a road that is designated as a road construction zone under *regulation 12* of the *Heavy Motor Vehicle Regulations 1974*, or that is a road works zone operated under a traffic management plan approved by a road controlling authority, may exceed the limits in *section 4*.

6.3(4) A motor vehicle that is being operated in accordance with *6.3(3)* does not have to comply with the requirements of *section 6* or *section 7*.

6.4 Motor vehicles designed primarily to transport overdimension and overweight loads

6.4(1) A motor vehicle designed primarily to transport an overdimension or overweight load, or both, may transport a load that exceeds the dimension limits in *section 4*, provided that the load:

(a) is indivisible; and

(b) is loaded in a way that minimises its width, unless the load's height or instability, or both, makes it necessary to transport the load widthways.

6.4(2) A motor vehicle in *6.4(1)* may transport more than one overdimension load, provided that the loads:

(a) if loaded side-by-side, do not exceed a width of 2.5 m;

(b) if loaded one above the other, do not exceed a height of 4.25 m;

(c) if loaded one behind the other, do not exceed the appropriate requirements for length, front overhang or rear overhang in *section 4*, unless they comply with *6.4(3)*.

6.4(3) If two or more overdimension loads have the same departure and destination points, and one of the loads exceeds 5 m in width, the loads may be carried one behind the other on a semi-trailer, provided that:

(a) the forward distance of the semi-trailer does not exceed 20 m; and

(b) the overall length does not exceed 35 m; and

(c) the rear overhang does not exceed 7 m.

6.4(4) A motor vehicle in *6.4(1)* must be reduced to the smallest dimension practicable, if it is not transporting an overdimension load.

6.4(5) A motor vehicle in *6.4(1)* may not transport a divisible load, except if:

(a) one direction of the vehicle's journey requires an overdimension vehicle to transport an indivisible load; or

(b) the weight or instability of the divisible load requires the use of an overdimension motor vehicle.

6.4(6) A motor vehicle to which *6.4(5)* applies may transport divisible loads provided that the loads, if loaded:

(a) side-by-side, do not exceed the width of the vehicle reduced to its smallest position;

(b) one above the other, do not exceed a height of 4.25 m;

(c) one behind the other, do not exceed the length of the vehicle reduced to its smallest position.

6.4(7) Two motor vehicles to which *6.4(1)* applies that have the same point of departure and the same point of destination may travel together, provided that:

(a) traffic volumes do not exceed 50 vehicles an hour; and

(b) the vehicles are escorted by at least one Class 1 pilot vehicle and three Class 2 pilot vehicles.

Table 6.1 Overdimension requirements dependent on width, length, forward distance, front overhang and rear overhang (Ref. *6.6(2)*)

Category[1]	**Size limits**[1]	**Operating requirements**		
		Hazard warning equipment	**Travel times**	**Minimum piloting requirements**
Category 1[1]	**Width/forward distance**[2]: exceeding limits in *section 4* up to and including 2.5 m/11.4 m, up to and including 3.1 m/10.5 m and up to and including 3.7 m /8.5 m AND/OR **Length**: up to and including 25 m AND/OR **Front overhang**: up to and including 7 m AND/OR **Rear overhang**[3]: up to and including 7 m	**Operations during daylight hours**: Excess projections delineated with flags or panels (see *6.9* and *6.10*) 'OVERSIZE' sign, if width exceeds 3.1 m and vehicle is piloted (see *6.11*) Headlights on low beam	Restriction Level 1 (see *6.12*)	**Operations during daylight hours**: One Class 2 pilot required, if: (a) exceeds 3.1 m in width and exceeds 40 km/h; or (b) required under *section 7*
		Operations during hours of darkness: Revolving amber light (see also *6.7*) Hazard panels (see *6.10*) 'OVERSIZE' sign, if width exceeds 3.1 m		**Operations during hours of darkness:** One Class 2 pilot, if width exceeds 3.1 m

Table 6.1 Overdimension requirements dependent on width, length, forward distance, front overhang and rear overhang (Ref. *6.6(2)*) (continued)

Category[1]	Size limits[1]	Operating requirements		
		Hazard warning equipment	**Travel times**	**Minimum piloting requirements**
Category 2(a)[1]	[**Width/forward distance**[2]: exceeding 2.5 m/11.4 m, exceeding 3.1 m/10.5 m, and exceeding 3.7 m/8.5 m up to and including 2.5 m/13.3 m and up to and including 4.5 m/8.5 m AND/OR **Length**[3]: exceeding 25 m, up to and including 35 m AND/OR **Front overhang**: exceeding 7 m, up to and including 10 m] **OR** [**Rear overhang**[4]**:** exceeding 7 m, up to and including 10 m]	Excess projections delineated with panels (see *6.10*) 'OVERSIZE' sign, if width exceeds 3.1 m (see *6.11*) Revolving amber light, if width exceeds 3.7 m or travelling during hours of darkness Headlights on low beam during daylight hours (see also *6.7*)	Restriction Level 2 (see *6.12*)	One Class 2 pilot

Table 6.1 Overdimension requirements dependent on width, length, forward distance, front overhang and rear overhang (Ref. *6.6(2)*) (continued)

Category[1]	Size limits[1]	Operating requirements		
		Hazard warning equipment	**Travel times**	**Minimum piloting requirements**
Category 2(b)[1]	[**Width/forward distance**[2]: exceeding 2.5 m/11.4 m, exceeding 3.1 m/10.5 m, and exceeding 3.7 m/8.5 m up to and including 2.5 m/13.3 m and up to and including 4.5 m/8.5 m AND/OR **Length**[3]: exceeding 25 m, up to and including 35 m AND/OR **Front overhang**: exceeding 7 m, up to and including 10 m] **AND** [**Rear overhang**[4]: exceeding 7 m, up to and including 10 m]	Excess projections delineated with panels (see *6.10*) 'OVERSIZE' sign, if width exceeds 3.1 m (see *6.11*) Revolving amber light, if width exceeds 3.7 m or travelling during hours of darkness Headlights on low beam during daylight hours (see also *6.7*)	Restriction Level 2 (see *6.12*)	Two Class 2 pilots

Table 6.1 Overdimension requirements dependent on width, length, forward distance, front overhang and rear overhang (Ref. *6.6(2)*) (continued)

Category[1]	Size limits[1]	Operating requirements		
		Hazard warning equipment	**Travel times**	**Minimum piloting requirements**
Category 3(a)[1]	**Width/forward distance[2]**: exceeding 2.5 m/13.3 m and exceeding 4.5 m/8.5 m up to and including 2.5 m/20 m, up to and including 5 m/20 m and up to and including 5 m/8.5 m MAY ALSO INCLUDE **Length[3]**: up to and including 35 m AND/OR **Front overhang**: up to and including 10 m AND/OR **Rear overhang[4]**: up to and including 7 m	Excess projections delineated with panels (see *6.10*) 'OVERSIZE' sign (see *6.11*) Revolving amber light Headlights on low beam during daylight hours (see also *6.7*)	Restriction Level 3 (see *6.12*)	One Class 2 pilot plus One Class 1 pilot (Additional pilots if required under *section 7*)

Table 6.1 Overdimension requirements dependent on width, length, forward distance, front overhang and rear overhang (Ref. *6.6(2)*) (continued)

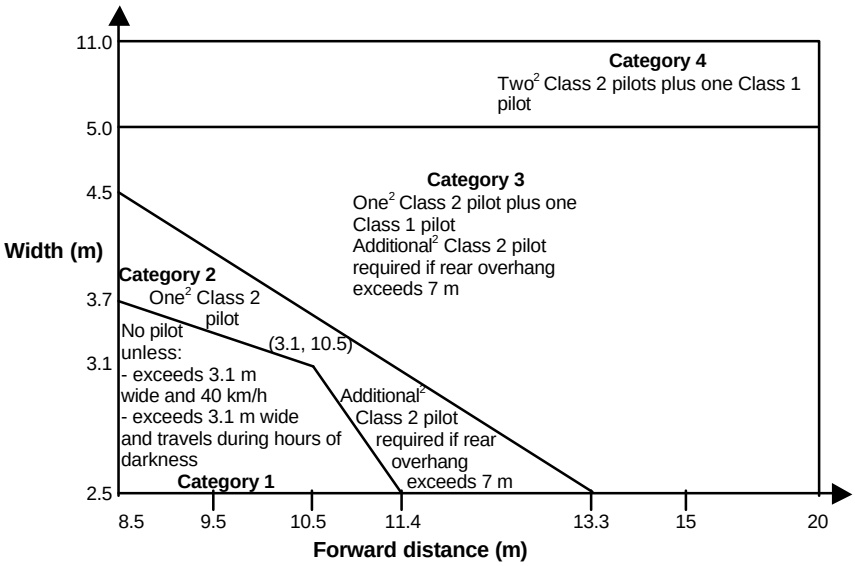
Category[1]	Size limits[1]	Operating requirements		
		Hazard warning equipment	**Travel times**	**Minimum piloting requirements**
Category 3(b)[1]	[**Width/forward distance[2]**: exceeding 2.5 m/13.3 m and exceeding 4.5 m/8.5 m up to and including 2.5 m/20 m, up to and including 5 m/20 m and up to and including 5 m/8.5 m MAY ALSO INCLUDE **Length[3]**: up to and including 35 m AND/OR **Front overhang**: up to and including 10 m] **AND** [**Rear overhang[4]**: exceeding 7 m, up to and including 10 m]	Excess projections delineated with panels (see *6.10*) 'OVERSIZE' sign (see *6.11*) Revolving amber light Headlights on low beam during daylight hours (see also *6.7*)	Restriction Level 3 (see *6.12*)	Two Class 2 pilots plus One Class 1 pilot (Additional pilots if required under *section 7*)

Table 6.1 Overdimension requirements dependent on width, length, forward distance, front overhang and rear overhang (Ref. *6.6(2)*) (continued)

Category[1]	Size limits[1]	Operating requirements		
		Hazard warning equipment	**Travel times**	**Minimum piloting requirements**
Category 4[1]	**Width/forward distance[2]**: exceeding 5 m/20 m and exceeding 5 m/8.5 m up to and including 11 m/20 m and up to and including 11 m/8.5 m MAY ALSO INCLUDE **Length[3]**: up to and including 35 m AND/OR **Front overhang**: up to and including 10 m AND/OR **Rear overhang[4]**: up to and including 10 m	Excess projections delineated with flags or panels (see *6.10*) 'OVERSIZE' sign (see *6.11*) Revolving amber light Headlights on low beam during daylight hours (see also *6.7*)	Restriction Level 3 (see *6.12*)	Loads up to and including 5 m wide and up to 7 m rear overhang: One Class 2 pilot plus One Class 1 pilot (Additional pilots if required under *section 7*) Loads exceeding 5 m wide and/or 7 m rear overhang: Two Class 2 pilots plus One Class 1 pilot (Additional pilots if required under *section 7*)

Notes:
[1] See *Figure 6.1*.
[2] Forward distance is defined in *Part 2*. However, for forward-distance requirements for vehicle combinations including a load-sharing trailer or a manned steering jinker, see *6.5(4)* and *6.5(5)*.
[3] For requirements for loads exceeding 25 m and 30 m in length, see *6.5(1)* and *6.5(2)*.
[4] Centre of gravity of the load must be forward of the rear axis. For rear overhang requirements for vehicle combinations including a manned steering jinker or pole trailer, see *6.5(3)*.

Figure 6.1 Swept path requirements for width/forward distance thresholds[1]



Notes:
[1] Refer to *Table 6.1* for limits and operating requirements.
[2] The piloting requirements are minimum requirements. Sufficient pilots must be used to comply with *section 7.*

Table 6.2 Overdimension requirements for excess height

Height (m)	Operating conditions
4.25 – up to and including 5	Written permission from the owner of an overhead obstruction that the vehicle cannot clear safely. Written approval from the relevant rail service operator, if the vehicle travels over a level crossing that does not cross a State Highway, and the vehicle exceeds the height shown on an electrified railway safe height sign. For loads exceeding 4.8 m, a vehicle with a deck height less than 1.3 m above the road must be used.
Greater than 5 – up to and including 6.5	A vehicle with a deck height less than 1.3 m above the road must be used. Written permission from the owner of overhead wires or cables that the vehicle travels under.
Greater than 6.5	Written approval from the Director.

6.5 Dimension requirements for overdimension motor vehicles

6.5(1) The operator of an overdimension motor vehicle must obtain written permission from the rail service operator, if the vehicle is to travel over a level crossing and its overall length exceeds 25 m.

6.5(2) A rear steering facility must be used on an overdimension motor vehicle transporting a load that exceeds 30 m in length.

6.5(3) If an overdimension motor vehicle is operated with a manned steering jinker or a pole trailer, the rear overhang is measured between the centre of the rear turntable load support and the rearmost part of the load.

6.5(4) If the vehicle combination includes a load-sharing trailer, the load-sharing trailer does not have to be included in forward-distance calculations if the forward distance is 3.5 m or less. If the forward distance exceeds 3.5 m, this distance must be added to the forward distance of the main trailer, less 3.5 m.

6.5(5) If the vehicle combination includes a manned steering jinker, the forward distance used for determining operating requirements in *Table 6.1* is half the distance between the two turntables supporting the load.

6.6 General operating requirements for overdimension motor vehicles

6.6(1) An overdimension motor vehicle must:

(a) when available, use a route designated by a road controlling authority as suitable for overdimension motor vehicles; and

(b) comply with the route restrictions in *Schedule 7*.

6.6(2) An overdimension motor vehicle must comply with the relevant requirements in *Table 6.1* for hazard warning equipment, travel times and piloting requirements, unless *6.6(11)* or *6.6(12)* applies.

6.6(3) A motor vehicle that exceeds 4.25 m in height must comply with the relevant requirements in *Table 6.2*.

6.6(4) Subject to *6.6(5)*, an overdimension motor vehicle must not interfere with or damage a traffic control device, bridge, tunnel or other structure, or trees or other foliage, without the road controlling authority's or owner's permission.

6.6(5) A traffic control device may be removed temporarily, with the road controlling authority's or owner's permission, to allow safe passage of an overdimension motor vehicle, provided that, when the vehicle has passed by the point on the road from which the traffic control device was removed, the traffic control device is immediately re-erected in its original position.

6.6(6) An overdimension motor vehicle must not travel on a road if fog, heavy rain, hail or any other factor restricts ambient visibility to less than 500 m. If, after the vehicle has begun its journey, ambient visibility is reduced to less than 500 m, the vehicle must, at the earliest opportunity, be stopped clear of moving traffic until ambient visibility is no longer less than 500 m.

6.6(7) An overdimension motor vehicle must be operated with due consideration for other road users and where it is safe to do so, other road users must be allowed to pass the vehicle at the earliest opportunity.

6.6(8) The operator of an overdimension motor vehicle must notify emergency services personnel who are operating in the area where the vehicle or its load is likely to restrict a

route in a way that would significantly delay emergency services personnel.

6.6(9) An enforcement officer, the Director or a road controlling authority may prohibit the use of a road by an overdimension motor vehicle at any time if that person believes on reasonable grounds that:

(a) the vehicle does not comply with a condition imposed under *section 6*; or

(b) a prohibition is necessary in the interests of safety or traffic management.

6.6(10) A person in *6.6(9)* may impose special conditions for an overdimension motor vehicle to be operated on a road, so as to minimise adverse safety effects on other road users.

6.6(11) A Category 1 motor vehicle whose performance dimensions have been verified by a person or organisation approved by the Director as meeting those of a maximum-sized standard motor vehicle, as specified in *Schedule 8*, does not have to comply with the travel time requirements specified in *6.12(3)*, provided it does not project outside the lane in which the vehicle is travelling.

6.6(12) A Category 2 motor vehicle whose performance dimensions have been verified by a person or organisation appointed by the Director as meeting the requirements of a Category 1 overdimension motor vehicle, as specified in *Schedule 9*, may be operated in accordance with the operating requirements for a Category 1 overdimension motor vehicle.

6.7 Lighting requirements for overdimension motor vehicles

6.7(1) The headlights of an overdimension motor vehicle must be operated on low beam during daylight hours.

6.7(2) During the hours of darkness, the lamps in *6.7(3)* must be fitted to, and operated on, an overdimension motor vehicle, and must be clearly visible in clear weather at a distance of at least 200 m during the hours of darkness.

6.7(3) The lamps to which *6.7(2)* refers are:

(a) steady white or amber lamps at the front, and steady red or amber lamps at the rear, of the vehicle's load that:

(i) have an area of at least 50 cm^2;

(ii) are spaced approximately 1 m apart at the extremities of the load that exceed the width of the vehicle, and at the extremities of the bottom of the load; and

(b) amber side marker lamps towards the front of the vehicle, spaced approximately 3 m apart; and

(c) red or amber side marker lamps towards the rear of the vehicle, spaced approximately 3 m apart.

6.7(4) A revolving amber light must be fitted to the cab roof of an overdimension motor vehicle and must operate:

(a) during the hours of darkness, if the vehicle's load is 3.7 m in width or less;

(b) at all times, if the vehicle's load exceeds 3.7 m in width;

(c) at all times, if the vehicle is being escorted by a pilot vehicle.

6.7(5) During the hours of darkness, two or more white scene lamps, each with a minimum power output of 100 W,

must be fitted to, and operate on, an overdimension motor vehicle whose load exceeds 5 m in width.

6.7(6) The scene lamps in *6.7(5)* must illuminate the front of the load, but must not be visible to following traffic.

6.8 Permits

Issue of permits

6.8(1) This clause applies to any of the following:

(a) a motor vehicle with a width and forward distance combination within Category 3 or Category 4 in *Table 6.1*;

(b) a motor vehicle with a height exceeding 5 m;

(c) a motor vehicle with a front overhang or rear overhang exceeding 7 m;

(d) a motor vehicle with an overall length exceeding 25 m;

(e) a motor vehicle whose dimensions exceed the limits specified in Category 4 in *Table 6.1*;

(f) a motor vehicle that, although complying with the size limits in *Table 6.1*, is unable, for a particular reason, to comply with the operational requirements in that table.

6.8(2) If travelling on a road, the operator of a motor vehicle to which this clause applies must:

(a) apply for, and be issued with, a permit by the Director; and

(b) pay a fee specified in *Schedule 1A* of the *Traffic Regulations 1976*; and

(c) if the vehicle or load exceeds 5 m in width, notify the Director at least 30 minutes before the journey is to begin.

6.8(3) The Director may include, in a permit, special conditions that the Director considers necessary for the safety and convenience of road users.

6.8(4) The Director may revoke a permit if the Director considers there is a significant risk to public safety.

6.8(5) A revocation under *6.8(4)* must be made in writing to the operator of the motor vehicle as soon as is practicable, giving reasons for the revocation, and the revocation takes effect immediately.

6.8(6) If aware of the presence on the road of another overdimension vehicle that may create a hazardous situation, or if advised by the Director of this, the operator of each overdimension vehicle must manage the operation of their vehicle's movement in relation to that other vehicle.

6.8(7) A road controlling authority may issue a permit only for the operation of a motor vehicle transporting an overdimension load that cannot otherwise be transported within the limits in *section 4*.

6.8(8) Evidence of permission given under *6.5(1)* and *6.6(4)* or a verification under *6.6(11)* and *6.6(12)* or a permit issued under *6.8(2)* or *6.8(7)* must:

(a) be produced for inspection on demand to an operator of a pilot vehicle or an enforcement officer; and

(b) be carried in the vehicle for the period of travel covered by the permit.

Special conditions and prohibitions

6.8(9) The Director may not issue a permit under *6.8(2)*, if a road controlling authority notifies the Director that it objects to the permit being issued.

6.8(10) Despite *6.8(2)*, an enforcement officer may:

(a) approve the immediate use of an overdimension motor vehicle on a road in an emergency or unforeseen circumstance; and

(b) impose any safety conditions that ensure that the overdimension vehicle is operated safely.

6.9 Hazard warning flags

6.9(1) A hazard warning flag displayed on an overdimension motor vehicle as required in *Table 6.1*:

(a) must be attached to the vehicle or its load:

(i) on each side of an overwidth load or vehicle at its front and rear;

(ii) at the front of a load with excess front overhang;

(iii) at the rear of a load with excess rear overhang;

(iv) at the rear of a load with excess length; and

(b) must be fluorescent yellow and at least 400 mm long and at least 300 mm wide.

6.9(2) An overdimension motor vehicle in Category 1 in *Table 6.1* that is required to display a hazard warning flag during daylight hours must display instead warning panels as specified in *6.10*, if it is travelling during the hours of darkness.

6.9(3) A motor vehicle or its load may not display a hazard warning flag in *6.9(1)* unless the vehicle is overdimension and is required under *Table 6.1* or *2.1(4)* to display the flag.

6.10 Hazard warning panels

6.10(1) A hazard warning panel required in *Table 6.1* to be displayed on an overdimension motor vehicle must:

(a) be attached:

(i) on each side of an overwidth load or vehicle at its front and rear, in the position specified in *Figure 2* in *Schedule 4*;

(ii) at the front of a load with excess front overhang;

(iii) at the rear of a load with excess rear overhang;

(iv) at the rear of a load for excess length; and

(b) comply with *AS/NZS 1906.1.1993, Retroreflective materials and devices for road traffic control purposes, Part 1: Retroreflective materials*; and

(c) consist of retroreflective material with a 200-mm-wide chevron pattern with alternate yellow-green, and orange retroreflective sheeting as specified in *Figure 1* in *Schedule 4*; and

(d) comply with the dimensions in *Figure 1* in *Schedule 4*; and

(e) be frangible.

6.10(2) A motor vehicle may not display a hazard warning panel unless the vehicle or its load is overdimension and is required under *Table 6.1* or *2.1(4)* to display the panel.

6.11 'OVERSIZE' signs

6.11(1) An overdimension motor vehicle exceeding 3.1 m in width that is escorted by a pilot vehicle must display an 'OVERSIZE' sign that complies with *6.11(2)*.

6.11(2) An 'OVERSIZE' sign that is displayed on an overdimension motor vehicle as required in *Table 6.1* must:

(a) comply with the dimensions specified in *Figure 3* in *Schedule 4*; and

(b) be mounted at the front and at the rear of the overdimension motor vehicle, so that the sign can be seen clearly by approaching drivers; and

(c) may be split into two parts, provided that:

(i) the word 'OVER' and the word 'SIZE' are on separate parts; and

(ii) both parts of the sign are mounted at the same height; and

(iii) the combined length of the parts is at least 1.1 m; and

(d) be frangible; and

(e) during daylight hours, have matt black lettering on a yellow-green background with a matt black border; or

(f) during the hours of darkness:

(i) consist of retroreflective material with black lettering on a yellow-green background; and

(ii) comply with *AS/NZS 1906.1.1993, Retroflective materials and devices for road traffic control purposes, Part 1: Retroreflective material*.

6.11(3) A motor vehicle may not display an 'OVERSIZE' sign in *6.11(2)* unless the vehicle is overdimension and is required by *Table 6.1* to display the sign.

6.12 Travel times

6.12(1) For the purposes of this clause and for *Schedule 6*, 'city area' means the urban areas of Auckland (between Albany and Drury), Christchurch, Dunedin, Hamilton, Hastings, Invercargill, Napier, Nelson, New Plymouth, Palmerston North, Tauranga, Wanganui, Wellington (including all areas south of McKay's Crossing on State Highway 1 and Te Marua on State Highway 2) and Whangarei.

'Level 1' restricted travel times

6.12(2) Except as provided in *6.6(11)* and subject to *6.12(9)* and *6.12(10)*, a motor vehicle whose dimensions are within

Category 1 in *Table 6.1* must comply with the travel restrictions in *6.12(3)*.

6.12(3) A motor vehicle in *6.12(2)* must not travel:

(a) between:

(i) 0700 hours and 0900 hours, or 1600 hours and 1800 hours, on Monday to Friday inclusive, in any city area;

(ii) 1000 hours and 1300 hours, or 1600 hours and 1900 hours, on Saturday or Sunday;

(b) at times (other than those specified in *6.12(3)(a)*), when there are unusually heavy traffic volumes.

'Level 2' restricted travel times

6.12(4) Except as provided in *6.6(12)* and subject to *6.12(9)* and *6.12(10)*, a motor vehicle whose dimensions are within Category 2 in *Table 6.1* must comply with the travel restrictions in *6.12(5)* and *6.12(6)*.

6.12(5) A motor vehicle in *6.12(4)* must not travel:

(a) between 23 December and 3 January inclusive;

(b) on a national public holiday, or after 1600 hours on the day preceding a national public holiday;

(c) in a province on its provincial anniversary holiday, or after 1600 hours on the day preceding that anniversary holiday.

6.12(6) A motor vehicle in *6.12(4)* must not travel:

(a) between:

(i) 0700 hours and 0900 hours, or 1600 hours and 1800 hours, on Monday to Friday inclusive, in any city area;

(ii) 1000 hours and 1300 hours, or 1600 hours and 1900 hours, on Saturday or Sunday;

(b) at times (other than those specified in *6.12(5)* and *6.12(6)(a)*) when there are unusually heavy traffic volumes, or when travel is likely to cause significant delay to other road users.

'Level 3' restricted travel times

6.12(7) Subject to *6.12(9)* and *6.12(10)*, a motor vehicle whose dimensions are within Category 3 or Category 4 in *Table 6.1*:

(a) must comply with the travel restrictions in *6.12(8)*; and

(b) may not travel at the times specified in *Schedule 5* within the areas specified in *Schedule 6*.

6.12(8) A motor vehicle in *6.12(7)* must not travel:

(a) between 22 December and 5 January inclusive;

(b) on a national public holiday, or for the rest of the day after the commencement of the earliest applicable morning travel restriction time specified in *Schedule 5* on the day preceding a national public holiday;

(c) in a province on its provincial anniversary holiday, or for the rest of the day after the commencement of the earliest applicable morning travel restriction time specified in *Schedule 5* on the day preceding that anniversary holiday;

(d) at times (other than those specified in *6.12(7)* and *6.12(8)(a)* to *(c)*) when there are unusually heavy traffic volumes, or when travel is likely to cause significant delay to other road users.

6.12(9) If there is an unforeseen delay in a journey for an overdimension vehicle to which travel restrictions in *6.12(8)* apply, and there is no place to safely park, the vehicle may continue its journey provided that the Police are notified and agree to the extended travel time.

6.12(10) An extended travel time in *6.12(9)* must not exceed 30 minutes, unless an extended travel time greater than 30 minutes is necessary for the vehicle to reach a destination where it can safely park, and the Police agree to this.

Section 7 Piloting requirements

7.1 Piloting of overdimension vehicles and overdimension loads

7.1(1) The operator of an overdimension motor vehicle must ensure that there is an adequate number of pilot vehicles to accompany the vehicle so as to provide adequate warning to approaching traffic throughout the journey.

7.1(2) An overdimension motor vehicle must be escorted by at least one Class 2 pilot vehicle, if:

(a) the overdimension vehicle or its load encroaches over the centre-line of the road by 500 mm or more, or over half the available road space where a centre-line is not marked; and

(b) the overdimension vehicle or its load does not allow sufficient remaining road space for another standard motor vehicle travelling in the opposite direction to pass without a significant reduction in speed; and

(c) the overdimension vehicle travels on a road where, without a pilot vehicle, there would be inadequate warning to approaching road users of the overdimension hazard.

7.1(3) *Subclause 7.1(2)* does not apply if the overdimension motor vehicle is travelling less than 500 m during daylight hours and the vehicle can travel safely without impeding other traffic.

7.1(4) An overdimension motor vehicle or overdimension load whose dimensions are within Category 1 in *Table 6.1*, and whose width exceeds 3.1 m, must be escorted by at least one Class 2 pilot vehicle, if operated:

(a) at a speed exceeding 40 km/h during daylight hours; or

(b) at any speed during the hours of darkness.

7.1(5) A motor vehicle whose dimensions are within Category 1 in *Table 6.1* and whose width does not exceed 3.1 m does not have to be escorted by a Class 2 pilot vehicle, provided that the vehicle's compliance with the swept path performance measures in *Schedule 8* has been verified by a vehicle inspector or inspecting organisation.

7.1(6) An overdimension load or overdimension motor vehicle whose dimensions are within Category 2 in *Table 6.1* must be escorted by at least one Class 1 pilot vehicle and one Class 2 pilot vehicle, if it is travelling on a road during the hours of darkness.

7.1(7) A motor vehicle in *7.1(6)* that has been certified as complying with the swept path performance measure in *Schedule 9* must be escorted by at least one Class 2 pilot vehicle.

7.1(8) An overdimension load or overdimension motor vehicle that is travelling in the lane for opposing traffic on a median-divided road or at a controlled intersection must be escorted by at least one Class 1 pilot vehicle and must have road controlling authority permission.

7.2 Responsibilities of operators of pilot vehicles

7.2(1) A person who, immediately before 1 July 2002, operated as an A-Grade or B-Grade certified pilot may continue to operate as a Class 1 certified pilot on or after 1 July 2002, provided that the person complies with the requirements in *7.2(3)*.

7.2(2) A person who, immediately before 1 July 2002, operated as a C-Grade certified pilot may continue to operate as a Class 2 certified pilot on or after 1 July 2002, provided that the person complies with the requirements in *7.2(3)*.

7.2(3) The requirements are:

(a) the completion of a pilot driver's course, approved by the Director, by 31 January 2004; and

(b) compliance with the requirements in this section.

7.2(4) The operator of a pilot vehicle must either be an enforcement officer or have completed a Class 1 or Class 2 pilot driver's course approved by the Director.

7.2(5) A pilot vehicle must display adequate warning and information concerning the overdimension hazard to approaching drivers.

7.3 Pilot vehicles

7.3(1) A pilot vehicle must have sufficient manoeuvrability and dynamic performance to enable it to carry out its primary duty of providing adequate warning to road users.

7.3(2) A pilot vehicle must be clearly identifiable as a vehicle that is providing a warning of the overdimension motor vehicle that it is escorting.

7.3(3) A pilot vehicle may not carry an overdimension load or tow a trailer with an overdimension load.

7.3(4) All pilot vehicles and overdimension motor vehicles in a convoy must be in radio communication with each other.

7.3(5) A Class 1 pilot vehicle must be substantially white in colour.

Front pilot vehicles

7.3(6) A Class 1 pilot vehicle must be a motor vehicle with a gross vehicle mass not exceeding 3500 kg.

7.3(7) A Class 2 pilot vehicle at the front of an overdimension motor vehicle must be a motor vehicle with a gross vehicle mass not exceeding 7000 kg and a wheel rim diameter not exceeding 17 inches.

7.3(8) A pilot vehicle at the front of an overdimension motor vehicle may not tow another vehicle.

7.3(9) A pilot vehicle at the front of an overdimension motor vehicle must display above its roof a warning sign as specified in *Schedule 4* describing the load behind it.

Rear pilot vehicles

7.3(10) Except as provided in *7.3(11)*, a pilot vehicle at the rear of an overdimension motor vehicle must be a rigid motor vehicle with not more than three axles.

7.3(11) A pilot vehicle at the rear of an overdimension motor vehicle may tow a simple trailer with a maximum of two axles.

7.3(12) A pilot vehicle (or its trailer) at the rear of an overdimension motor vehicle must display a warning sign as specified in *Schedule 4* that faces towards the rear of the vehicle (or the trailer, if the pilot vehicle is towing a trailer) and describes the load ahead of it.

7.3(13) The operator of an overdimension motor vehicle must ensure that appropriate measures are taken to minimise the risks to the safety of road users presented by a pilot vehicle that is operating at the rear of an overdimension vehicle, particularly when the pilot vehicle has stopped.

Pilot signs

7.3(14) A Class 1 pilot vehicle must clearly display on its front doors a pilot logo that is approved by the Director.

7.3(15) A Class 2 pilot vehicle may display on its front doors a pilot logo that is approved by the Director.

7.3(16) A pilot warning sign must comply with the size and colour specifications in *Schedule 4*, and must be frangible.

7.3(17) The pilot warning sign specified in *Schedule 4* may be displayed only when the vehicle is escorting an overdimension vehicle.

Lighting requirements for pilot vehicles

7.3(18) Except as provided in *7.3(23)*, the headlamps of a pilot vehicle must be operated on low beam when the pilot vehicle is escorting an overdimension motor vehicle during daylight hours.

7.3(19) The lighting in *7.3(20)* to *7.3(24)* may be operated only when a pilot vehicle is escorting an overdimension motor vehicle.

7.3(20) Except as provided in *7.3(21)*, a Class 2 pilot vehicle must have fitted to its roof one or two flashing or revolving amber beacons.

7.3(21) An overdimension motor vehicle whose load exceeds 5 m in width must be escorted by at least one Class 1 pilot vehicle and at least two Class 2 pilot vehicles, each of which has fitted to its roof and operates:

(a) during daylight hours, two amber flashing or revolving beacons on the right, and two purple flashing or revolving beacons on the left; and

(b) during the hours of darkness, one amber flashing or revolving beacon on the right, and two purple flashing or revolving beacons on the left.

7.3(22) In addition to the beacons required under *7.3(21)*, the pilot vehicle that is travelling furthest ahead of an overdimension motor vehicle whose width exceeds 5 m must display one pair of alternately flashing auxiliary lamps that emit a purple light.

7.3(23) During daylight hours, the pilot vehicle travelling furthest ahead of an overdimension motor vehicle whose width exceeds 5 m may operate with one pair of alternately flashing headlamps, which must be operated on low beam.

7.3(24) During the hours of darkness, a pilot vehicle must be fitted with one or two lamps that emit a white light to illuminate a roof-mounted warning sign, provided that the light is not directly visible from the rear of the vehicle.

7.4 Enforcement officers' vehicles

Nothing in *7.2* or *7.3* applies to an enforcement officer piloting an overdimension vehicle and load, provided the pilot vehicle displays blue and red flashing lights.

Section 8 Responsibilities

8.1 Responsibilities of operators

8.1(1) A person who operates a vehicle must ensure that the vehicle complies with this rule.

8.1(2) A person who operates an overdimension motor vehicle must comply with the applicable operating requirements in *section 6.*

8.1(3) A person who operates a motor vehicle under a permit that is issued under *section 5* must comply with all the requirements of that permit.

8.1(4) A person who operates a motor vehicle under a permit that is issued under *6.8* must comply with all the requirements of that permit.

8.2 Responsibilities of modifiers

A person who modifies a motor vehicle must:

(a) ensure that the modification does not prevent the vehicle from complying with this rule; and

(b) notify the operator if the vehicle must be inspected, and, if necessary, certified, because there is reason to believe it is:

(i) a light motor vehicle that has been modified to become a low volume vehicle; or

(ii) a heavy motor vehicle that has been modified to affect its safety performance or compliance with this rule.

8.3 Responsibilities of vehicle inspectors and inspecting organisations

A vehicle inspector or inspecting organisation must not certify a motor vehicle under *Land Transport Rule: Vehicle Standards Compliance 2002* if they have reason to believe that the vehicle does not comply with *sections 3*, *4* and *6* of this rule.

8.4 Responsibilities of manufacturers

A person who manufactures a motor vehicle, or installs fittings or attachments to that vehicle, must ensure that the relevant requirements of this rule are complied with.

[Note: A breach of a responsibility in this section is an offence, as provided in the *Land Transport (Offences and Penalties) Regulations 1999*, and is subject to a penalty as specified in those regulations.]

8.5 Functions of the Director

[Note: In addition to the functions of the Director as summarised in *8.5*, the Director has the authority under *section 166* of the *Land Transport Act 1998*, where circumstances justify this, to grant an exemption from a specified requirement in this rule.]

The Director may:

(a) issue a permit, as specified in *6.8*, to allow the operation of a motor vehicle that exceeds the dimension or load limits in *section 4*;

(b) set conditions in a permit issued under *6.8*;

(c) revoke a permit issued under *section 5* if the Director considers that there is a significant risk to public safety;

(d) revoke a permit issued under *6.8* if the Director considers that the conditions of the permit have not been complied with or there is a significant risk to public safety;

(e) approve computer programs and procedures, as specified in *3.4*, for testing the performance of a motor vehicle;

(f) approve a pilot driver's course for a Class 1 or Class 2 certified pilot;

(g) approve pilot logos for use on a Class 1 or Class 2 pilot vehicle;

(h) issue a permit, with any conditions to ensure the safety and convenience of road users, for a vehicle that exceeds the dimension limits in *section 4* and *section 6*;

(i) approve a form for the purposes of *3.6(1)(b)*, *6.6(11)* and *6.6(12)*;

(j) define the rear axis of a vehicle for the purposes of *paragraph (f)* of the definition of 'rear axis' in *Part 2*.

Part 2 Definitions

Articulated bus means a bus consisting of two or more rigid sections that:

(a) articulate relative to each other; and

(b) have interconnecting passenger compartments that allow passengers to move freely between them; and

(c) are not easily detachable from each other without specialist equipment.

Articulated vehicle means any motor vehicle with a semi-trailer attached, so that part of the semi-trailer is superimposed upon the motor vehicle and a substantial part of the weight of the semi-trailer and of its load is borne by the motor vehicle.

A-train means an articulated vehicle towing a full trailer.

Axle means 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, and:

(a) if two or more wheels of a motor vehicle are substantially in the same line transversely and some or all of them have separate axles, the axles of all those wheels are to be treated as one axle;

(b) if the longitudinal centre-line of an axle of a motor vehicle is less than 1 m distant from the longitudinal centre-line of another axle, the two axles are to be treated as one axle (‘a dual axle’);

(c) for the purposes of measuring the distance of a dual axle from any other axle, the measurement is taken from the longitudinal centre-line of the axle that is

nearer to the axle from which the distance is to be measured.

Axle set — means a single axle set, a tandem axle set, a twin-steer axle set, a tri-axle set, or a quad-axle set.

B-train — means a motor vehicle comprising a towing vehicle and two semi-trailers connected at two points of articulation where the forward distance of the longer trailer divided by the forward distance of the shorter trailer does not exceed 1.3.

Class — in relation to vehicles, means a category of vehicle of one of the Groups A, L, M, N and T, as specified in *Table A: Vehicle classes*.

Combination vehicle — means a towing vehicle in combination with one or more trailers or other motor vehicle that is being towed.

Commissioner — means the Commissioner of Police.

Converter dolly — means an individual trailer unit with a fifth wheel coupling used to convert a semi-trailer to a full trailer. A dolly must have either:

(a) a rigid drawbar associated with an oscillating fifth wheel and a single axle or a tandem axle set; or

(b) a tandem axle set with a hinged drawbar with a fixed fifth wheel.

Direction-indicator — means a lamp used for signalling an intention to change direction to the right or to the left.

Director — means the person who is the Director of Land Transport Safety appointed under *section 186* of the *Land Transport Act 1998*.

Emergency services personnel — means any member of the New Zealand Police, New Zealand Fire Service or an ambulance service.

Enforcement officer — means:

(a) a sworn member of the Police; or

(b) a non-sworn member of the Police who is authorised for the purpose by the Commissioner; or

(c) a person who is appointed to that office by warrant under *section 208* of the *Land Transport Act 1998* or who holds that office by virtue of the *Land Transport Act 1998*.

First registered — means first registered in New Zealand.

Forklift — means a motor vehicle (not fitted with self-laying tracks) designed principally for lifting, carrying and stacking goods by means of one or more tines, platens or clamps.

Forward distance — means:

(a) in relation to a rigid vehicle, or the front section of an articulated bus, the distance from the rear axis to the front of the vehicle or its load, whichever is foremost;

(b) in relation to a full trailer, the distance from the rear axis to the front of the trailer (excluding the drawbar and front axle set with its associated carriage) or its load, whichever is foremost;

(c) in relation to a simple trailer, or the rear section of an articulated bus, the distance from the rear axis to the centre of the point of attachment to the towing vehicle;

(d) in relation to a semi-trailer, the distance from the rear axis to the centre of the kingpin;

(e) in relation to a pole trailer with only one axle set, the distance, excluding load, from the trailer's rear axis to the centre of the point of attachment to the towing vehicle with the drawbar fully extended;

(f) for a pole trailer having two axle sets, the distance, excluding load, from the trailer's front axis to the centre of the point of attachment on the towing vehicle with the drawbar fully extended.

Frangible means breakable or readily deformable.

Front axis means:

(a) the centre point of the front axle set of a trailer that has two axle sets and is steered by the front axle set; or

(b) the centre of the foremost axle of a rigid vehicle with motive power.

Front overhang means the distance measured to the foremost point of the vehicle, including its load but in the case of a full trailer excluding the drawbar, from the following positions:

(a) for a rigid vehicle, from the front edge of the driver's seat, when in the rearmost position; or

(b) for a semi-trailer, the centre of the kingpin; or

(c) for a full trailer, the centre of the turntable; or

(d) for a simple trailer, the centre of the tow coupling; or

(e) for the load of a pole trailer combination, the centre of the turntable on the towing vehicle.

Full trailer — means a trailer with two axle sets, the foremost of which is steered by a drawbar; and includes a semi-trailer with non-steering axles coupled to a converter dolly.

Gross mass — in relation to any vehicle or combination vehicle, means the mass of that vehicle and its load, equipment, and accessories, which may be determined by adding the mass on the vehicle's axles or axle sets.

Gross vehicle mass — means either:

(a) the maximum permitted mass of the vehicle, which includes the mass of the accessories, the crew, the passengers and load, and is, unless *(b)* applies, the gross vehicle mass specified (subsequent to the latest modification, if any) by the manufacturer of the vehicle; or

(b) if a person approved for the purpose by the Director determines that the gross vehicle mass of a vehicle should differ from that specified by the manufacturer, taking into account evidence on the capability of the systems and components of the vehicle, or the effects of any modification, that mass determined by that person.

Heavy motor vehicle — means a motor vehicle that is either:

(a) of Class MD3, MD4, ME, NB, NC, TC or TD; or

(b) a vehicle (not of a class specified in *Table A: Vehicle classes*) with a gross vehicle mass that exceeds 3500 kg.

Heavy passenger service vehicle — means a passenger service vehicle whose gross vehicle mass exceeds 3500 kg.

Hours of darkness means:

(a) any period of time between half an hour after sunset on one day and half an hour before sunrise on the next day; or

(b) any other time when there is not sufficient daylight to render clearly visible a person or a vehicle at a distance of 100 m.

Indivisible load means a load that cannot reasonably (without disproportionate effort, expense or risk of damage to the load) have its size reduced or be divided into two or more sections for road transport; and includes customs-sealed import/export ISO containers.

Inter-vehicle spacing means the distance between a towing vehicle (excluding the tow coupling shroud) and trailer (excluding the drawbar or tow rope or front dolly but including the load).

J-hook assembly means a load-rated metal lashing that:

(a) consists of a bush, fastener, associated washer or washers, and 'J'-shaped bar including its threaded portion; and

(b) is used for the retention of a stockcrate or detachable bin to the vehicle load platform; and

(c) is vertically fixed either inside or outside the deck coaming rail and tensioned through a permanently fitted bush on the crate or bin structure by way of a threaded fastener.

Level surface	(including reasonably level surface) in relation to a road, means a road or weigh platform including weigh scale surfaces of such a minimal gradient that the heavy motor vehicle or combination vehicle on it does not move in a forwards or backwards direction after the enforcement officer has requested all brakes on such vehicle be released. The vehicle should not otherwise be restrained by any artificial restraining force, such as chocks, when the enforcement officer requests that the brakes be released.
Light motor vehicle	means a motor vehicle of any class except one defined as a 'heavy motor vehicle'.
Light passenger service vehicle	means a passenger service vehicle whose gross vehicle mass is 3500 kg or less.
Load	includes part of a load; and: (a) includes covers, ropes, ties, blocks, tackles, barrows, or other equipment or objects used in the securing or containing of a load on a vehicle or the loading or unloading of a vehicle, whether or not any other load is on the vehicle; but (b) does not include animal wastes discharged from animals being carried on a vehicle at the time.
Load-sharing axle set	means an axle set suspension system that has effective damping characteristics on all axles of the set and is built to divide the load between the tyres on the set so that no tyre carries a mass more than 10% greater than the mass it would carry if: (a) the load were divided in the axle set so that each tyre carries an equal load; or

(b) the axle set is a tandem axle set comprising a twin-tyred axle and a large single-tyred axle and is built to divide the load between the tyres on the set so that:

(i) 60% of the load is borne by the twin-tyred axle and 40% of the load is borne by the large single-tyred axle; or

(ii) 55% of the load is borne by the twin-tyred axle and 45% of the load is borne by the large single-tyred axle.

Load-sharing trailer — means a type of short, load-sharing semi-trailer, that is not designed to directly carry any goods, and that has one or more axles equipped with a kingpin, a fifth wheel and other parts necessary for attaching it to the rear end of a towing vehicle and the front portion of a second gooseneck trailer.

Manned steering jinker — means a specialised load-bearing vehicle that is steered by an operator and that is used to carry the rear of a long load.

Mass — in relation to a vehicle, means the quantity of material contained in or on the vehicle that, when subjected to acceleration due to gravity, will exert downwards on a level surface a force that can be measured as the weight of the vehicle.

Mobile crane — means a non-load carrying self-propelled vehicle designed solely or principally for lifting objects using a boom with lifting gear.

Modify — in relation to a vehicle, means to change the vehicle from its original state by altering, substituting, adding or removing any structure, system, component or equipment; but does not include repair.

Motor vehicle means a motor vehicle drawn or propelled by mechanical power; and includes a trailer; but does not include:

(a) a vehicle running on rails;

(b) an invalid carriage;

(c) a trailer (other than a trailer designed solely for the carriage of goods) that is designed and used exclusively as part of the armament of the New Zealand Defence Force;

(d) a trailer running on one wheel and designed exclusively as a speed-measuring device or for testing the wear of vehicle tyres;

(e) a vehicle designed for amusement purposes and used exclusively within a place of recreation, amusement, or entertainment to which the public does not have access with motor vehicles;

(f) a pedestrian-controlled machine.

Non-steering axle means any axle of a vehicle the wheels of which remain substantially parallel with the longitudinal centre-line of the vehicle while the vehicle is turning.

Operate in relation to a vehicle, means to drive or use the vehicle on a road, or to cause or permit the vehicle to be on a road or to be driven on a road, whether or not the person is present with the vehicle.

Oscillating axle means any axle that complies with the following provisions:

(a) the axle has four wheels and four or eight tyres attached to it, consisting of two pairs of wheels; and

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

(c) the centre of each such wheel is at least 500 mm distant from the centre of every other wheel fitted to the motor vehicle.

Overall length means the length of a vehicle or vehicle combination measured in a straight line; and includes:

(a) the length of any load; and

(b) the length of the drawbar in a fully extended horizontal straight ahead position measured to the towing eye centre of a full trailer when measured on its own.

Overdimension load means an indivisible load on a motor vehicle that exceeds the dimension limits in *section 4*.

Overdimension motor vehicle means a motor vehicle or combination vehicle (including any load) that exceeds one or more of the dimension limits in *section 4*.

Pilot vehicle means a motor vehicle that escorts an overdimension and/or overweight motor vehicle, and that warns road users of the potential hazard created by the overdimension and/or overweight motor vehicle, or its load, or both.

Pivot steer vehicle means a vehicle with a chassis that is split into two dependent parts that are connected by a permanent steering pivot.

Pole trailer means a trailer that is attached to a towing vehicle by a telescoping or sliding pole, and is designed to support a common long load spanning between the trailer and the towing vehicle.

Quad-axle set means a set of four axles where:

(a) the centres of the first and fourth axles are spaced not less than 3.75 m, and not more than 4 m, apart; and

(b) all axles contain an equal number of tyres of the same size; and

(c) none of the axles is a single standard-tyred axle; and

(d) the axles are a load-sharing set.

Rail service operator has the same meaning as in the *Transport Services Licensing Act 1989*.

Rear axis

(a) in relation to a vehicle with only one non-steering axle, means that axle;

(b) in relation to a vehicle with a non-steering axle set of two axles, means:

(i) midway between those axles, if each axle has an equal number of tyres on it;

(ii) two-thirds of the distance from the lesser-tyred axle towards the greater-tyred axle, if one axle has twice as many tyres on it as the other axle;

(c) in relation to a vehicle with a non-steering tri-axle set or a non-steering quad-axle set, or an overdimension vehicle with more than three axles, means midway between the extreme axles of the set;

(d) in relation to a vehicle whose rear axle set includes one or more steerable axles in conjunction with one or more non-steering axles, means midway between the extreme non-steering axles of the set;

(e) in relation to a vehicle whose rear axle set includes one or more retracted axles in conjunction with one or more non-retracted axles, means midway between the extreme non-retracted axles of the set;

(f) in relation to a vehicle that does not have an axle arrangement that is in paragraphs *(a)* to *(e)*, means a position determined by the Director.

Rear overhang

(a) for pole trailers transporting a long load, means the distance from the rear axis or centre of the bolster to the rear of the vehicle or its load, whichever is greater;

(b) for all other vehicles, means the distance from the rear axis to the rear of the vehicle or its load, whichever is the greater.

Rear trailing unit distance means the maximum distance from the centre of the fifth wheel or tow coupling on the towing vehicle to the rear of the combination.

Repair means to restore a damaged or worn vehicle, its structure, systems, components or equipment; and includes the replacement of damaged or worn structures, systems, components and equipment with equivalent undamaged or new structures, systems, components and equipment.

Retractable axle means an axle that has a convenient adjustment to allow the axle load distribution of the axle set to be varied substantially. An axle that is retracted is not considered to be part of the axle set.

Rigid vehicle means a vehicle with motive power, driver's position and steering system, that does not have any pivot points to

allow any part of the chassis of the vehicle to move or rotate in relation to any other part of the chassis of the vehicle; but includes a pivot steer vehicle.

Road includes:

(a) a street; and

(b) a motorway; and

(c) a beach; and

(d) a place to which the public have access, whether as of right or not; and

(e) all bridges, culverts, ferries, and fords forming part of a road or street or motorway, or a place referred to in *(d)*; and

(f) all sites at which vehicles may be weighed for the purposes of the *Land Transport Act 1998* or any other enactment.

Road controlling authority in relation to a road, means the authority, body or person having control of the road; and includes a person acting under and within the terms of a delegation or authorisation given by the controlling authority.

Roadworks zone means a road or part of a road approved by a road controlling authority as a site for carrying out road works, and that is protected by temporary warning signs as specified in *Part 1* of *Schedule 4* of the *Traffic Regulations 1976*.

Semi-trailer means a trailer with only one axle set where the point of attachment to the towing vehicle or leading trailer:

(a) is no further rearward than the rearmost axle of the towing vehicle or rearmost axle of the leading trailer; or

(b) if the towing vehicle is a rigid vehicle and has more than one axle in its rear axle set, is no more than 300 mm rearward of the rear axis of the towing vehicle.

Side lamp means a vehicle lamp of lower power than the head lamps used for the purpose of indicating the presence of the vehicle when seen from a distance and also of indicating the approximate width of the vehicle; and includes:

(a) a forward-facing side lamp, being a lamp indicating primarily the front end of the vehicle;

(b) a rearward-facing side lamp (rear lamp, red tail-lamp), being a lamp emitting a red light indicating primarily the rear end of the vehicle;

(c) a sideways-facing side lamp, being a lamp mounted between the front and rear extremities on the side to indicate primarily the side of the vehicle.

Simple trailer means a trailer (other than a semi-trailer) that has only one axle set.

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

Single axle set means either one axle or two axles having their centres spaced less than 1 m apart.

Single large-tyred axle means a single-tyred axle that is not a single standard-tyred axle.

Single standard-tyred axle	means a single-tyred axle fitted with tyres smaller than: (a) a manufacturer's designated tyre section width of 330 mm and a rim diameter of 24 inches at the bead seat; or (b) a manufacturer's designated tyre section width of 355 mm and a rim diameter of 19.5 inches at the bead seat.
Standard load	means a load that will fit on a motor vehicle within the dimension and mass limits in *section 4*.
Standard motor vehicle	means a motor vehicle whose dimension and mass limits comply with *section 4*.
Static Roll Threshold (SRT)	means the maximum level of steady turning lateral acceleration a vehicle can tolerate without rolling over, which is expressed as a proportion of 'g' where 'g' is the acceleration constant due to gravity (9.81 m/s/s).
Swept path	means the maximum road width required by a vehicle when it negotiates a turn.
Tandem axle set	means two axles having their centres spaced not less than 1 m and not exceeding 2 m apart and are load sharing.
Towing vehicle	means a rigid vehicle that tows a trailer or other motor vehicle.
Tractor	means a motor vehicle (not being a traction engine) designed exclusively for traction at speeds not exceeding 50 km/h.

Traffic control device — means a device used on a road for the purpose of traffic control; and includes any:

(a) sign, signal, or notice; or

(b) traffic calming device; or

(c) marking or road surface.

Trailer — means a vehicle without motive power that is capable of being drawn or propelled by a motor vehicle from which it is readily detachable; but does not include:

(a) a side-car attached to a motor cycle; or

(b) a vehicle normally propelled by mechanical power while it is being temporarily towed without the use of its own power.

Transit New Zealand — means the authority known as Transit New Zealand established under the *Transit New Zealand Act 1989*.

Tri-axle set — means three axles, where:

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

(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 set.

Twin-steer axle set — means a tandem axle set with single tyres, where both axles are connected to the same mechanism in order to steer similarly.

Twin-tyred axle means any axle, not being an oscillating axle, that has a wheel track of 1.3 m or more and is equipped with four or more tyres.

Vehicle means a contrivance equipped with wheels, tracks, or revolving runners on which it moves or is moved; and includes a hovercraft, a skateboard, in-line skates, and roller skates; but does not include:

(a) a perambulator or pushchair;

(b) a shopping or sporting trundler not propelled by mechanical power;

(c) a wheelbarrow or hand-trolley;

(d) a child's toy, including a tricycle and a bicycle, provided, in either case, no road wheel (including any tyre) has a diameter exceeding 355 mm;

(e) a pedestrian-controlled lawnmower;

(f) a pedestrian-controlled agricultural machine not propelled by mechanical power;

(g) an article of furniture;

(h) an invalid wheelchair not propelled by mechanical power;

(i) any other contrivance specified by any other rule not to be a vehicle for the purposes of this definition.

Vehicle axle index (VAI) means a system for indicating the extent to which the axles of a motor vehicle are loaded, so that the effect of the axle weights on roads and bridges can be determined, and that is established by a road controlling authority when the vehicle is issued with an overweight permit under *section 5*.

Vehicle inspector or inspecting organisation	has the same meaning as in *Land Transport Rule: Vehicle Standards Compliance 2002.*
Vehicle recovery service vehicle	means a vehicle used in a vehicle recovery service for towing or transporting on a road any motor vehicle; but does not include a vehicle that is not designed or adapted for the purpose of towing or carrying motor vehicles.
Visible	means visible under normal atmospheric conditions to a driver of normal vision.
Wheelbase	means the distance from a vehicle's rear axis to its front axis.

Table A Vehicle classes

Class	Description
AA (Pedal cycle)	A vehicle designed to be propelled through a mechanism solely by human power.
AB (Power-assisted pedal cycle)	A pedal cycle to which is attached one or more auxiliary propulsion motors having a combined maximum power output not exceeding 200 watts.
LA (Moped with two wheels)	A motor vehicle (other than a power-assisted pedal cycle) that: (a) has two wheels; and (b) either: (i) has an engine cylinder capacity not exceeding 50 ml and a maximum speed not exceeding 50 km/h; or (ii) has a power source other than a piston engine and a maximum speed not exceeding 50 km/h.
LB (Moped with three wheels)	A motor vehicle (other than a power-assisted pedal cycle) that: (a) has three wheels; and (b) either: (i) has an engine cylinder capacity not exceeding 50 ml and a maximum speed not exceeding 50 km/h; or (ii) has a power source other than a piston engine and a maximum speed not exceeding 50 km/h.
LB 1	A Class LB motor vehicle that has one wheel at the front and two wheels at the rear.
LB 2	A Class LB motor vehicle that has two wheels at the front and one wheel at the rear.
LC (Motor cycle)	A motor vehicle that: (a) has two wheels; and (b) either: (i) has an engine cylinder capacity exceeding 50 ml; or (ii) has a maximum speed exceeding 50 km/h.

Table A Vehicle classes (continued)

Class	Description
LD (Motor cycle and side-car)	A motor vehicle that: (a) has three wheels asymmetrically arranged in relation to the longitudinal median axis; and (b) either: (i) has an engine cylinder capacity exceeding 50 ml; or (ii) has a maximum speed exceeding 50 km/h.
Side-car	A car, box, or other receptacle attached to the side of a motor cycle and supported by a wheel.
LE (Motor tri-cycle)	A motor vehicle that: (a) has three wheels symmetrically arranged in relation to the longitudinal median axis; and (b) has a gross vehicle mass not exceeding one tonne; and (c) either: (i) has an engine cylinder capacity exceeding 50 ml; or (ii) has a maximum speed exceeding 50 km/h.
LE 1	A Class LE motor vehicle that has one wheel at the front and two wheels at the rear.
LE 2	A Class LE motor vehicle that has two wheels at the front and one wheel at the rear.
Passenger vehicle	A motor vehicle that: (a) is constructed primarily for the carriage of passengers; and (b) either: (i) has at least four wheels; or (ii) has three wheels and a gross vehicle mass exceeding one tonne.
MA (Passenger car)	A passenger vehicle (other than a Class MB or Class MC vehicle) that has not more than nine seating positions (including the driver's seating position).

Table A Vehicle classes (continued)

Class	Description
MB (Forward control passenger vehicle)	A passenger vehicle (other than a Class MC vehicle): (a) that has not more than nine seating positions (including the driver's seating position); and (b) in which the centre of the steering wheel is in the forward quarter of the vehicle's total length.
MC (Off-road passenger vehicle)	A passenger vehicle, designed with special features for off-road operation, that has not more than nine seating positions (including the driver's seating position), and that: (a) has four-wheel drive; and (b) has at least four of the following characteristics when the vehicle is unladen on a level surface and the front wheels are parallel to the vehicle's longitudinal centre-line and the tyres are inflated to the vehicle manufacturer's recommended pressure: (i) an approach angle of not less than 28 degrees; (ii) a breakover angle of not less than 14 degrees; (iii) a departure angle of not less than 20 degrees; (iv) a running clearance of not less than 200 mm; (v) a front-axle clearance, rear-axle clearance, or suspension clearance of not less than 175 mm.
Omnibus	A passenger vehicle that has more than nine seating positions (including the driver's seating position). An omnibus comprising two or more non-separable but articulated units shall be considered as a single vehicle.
MD (Light omnibus)	An omnibus that has a gross vehicle mass not exceeding 5 tonnes.
MD 1	An omnibus that has a gross vehicle mass not exceeding 3.5 tonnes and not more than 12 seats.
MD 2	An omnibus that has a gross vehicle mass not exceeding 3.5 tonnes and more than 12 seats.
MD 3	An omnibus that has a gross vehicle mass exceeding 3.5 tonnes but not exceeding 4.5 tonnes.
MD 4	An omnibus that has a gross vehicle mass exceeding 4.5 tonnes but not exceeding 5 tonnes.

Table A Vehicle classes (continued)

Class	Description
ME (Heavy omnibus)	An omnibus that has a gross vehicle mass exceeding 5 tonnes.
Goods vehicle	A motor vehicle that: (a) is constructed primarily for the carriage of goods; and (b) either: (i) has at least four wheels; or (ii) has three wheels and a gross vehicle mass exceeding one tonne. For the purpose of this description: (a) a vehicle that is constructed for both the carriage of goods and passengers shall be considered primarily for the carriage of goods if the number of seating positions multiplied by 68 kg is less than 50% of the difference between the gross vehicle mass and the unladen mass; (b) the equipment and installations carried on special purpose vehicles not designed for the carriage of passengers shall be considered to be goods; (c) a goods vehicle that has two or more non-separable but articulated units shall be considered to be a single vehicle.
NA (Light goods vehicle)	A goods vehicle that has a gross vehicle mass not exceeding 3.5 tonnes.
NB (Medium goods vehicle)	A goods vehicle that has a gross vehicle mass exceeding 3.5 tonnes but not exceeding 12 tonnes.
NC (Heavy goods vehicle)	A goods vehicle that has a gross vehicle mass exceeding 12 tonnes.

Table A Vehicle classes (continued)

Class	Description
Trailer	A vehicle without motive power that is constructed for the purpose of being drawn behind a motor vehicle.
TA (Very light trailer)	A single-axled trailer that has a gross vehicle mass not exceeding 0.75 tonnes.
TB (Light trailer)	A trailer (other than a Class TA trailer) that has a gross vehicle mass not exceeding 3.5 tonnes.
TC (Medium trailer)	A trailer that has a gross vehicle mass exceeding 3.5 tonnes but not exceeding 10 tonnes.
TD (Heavy trailer)	A trailer that has a gross vehicle mass exceeding 10 tonnes.

Part 3 Schedules

Schedule 1 SRT calculations [Ref. *3.4(c)*]

Simplified analytical solution for SRT

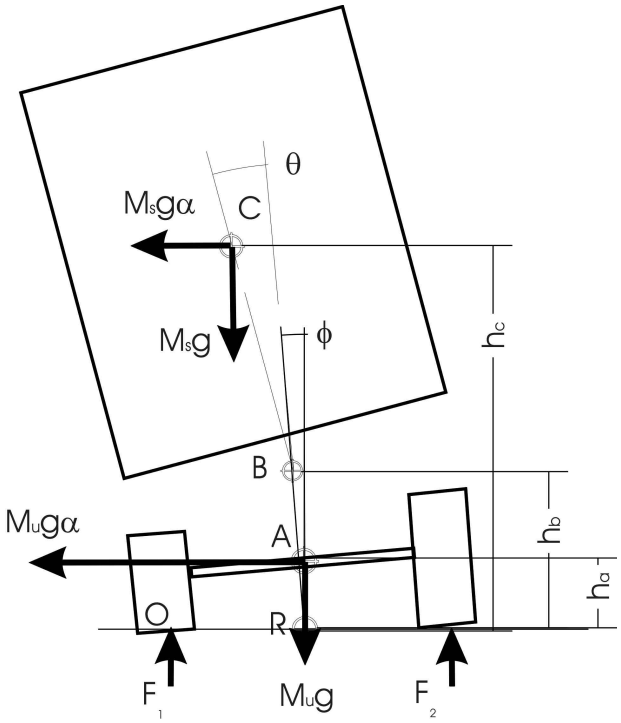


Figure 1 Vehicle Roll Notation

Notation:

M_s	Sprung Mass
M_u	Unsprung Mass
k_t	Tyre stiffness
k_r	Composite suspension roll stiffness
k_{aux}	Auxiliary roll stiffness
h_a	Axle Cg height from ground
h_b	Roll centre height from ground
h_c	Sprung Mass Cg height from ground
T	Wheel track width
φ	Axle roll angle
θ	Body roll angle relative to the axle
α	Static Roll Threshold as a proportion of Mass

Defining new variables M and H as follows

$$M = M_s + M_u \qquad \text{Total Mass}$$

$$H = \frac{M_s h_c + M_u h_a}{M_s + M_u} \qquad \text{Overall Cg height}$$

In the general case the suspension has some lash. At some value of the body roll angle, θ, the load on the right hand spring (based on the figure) becomes zero. As the vehicle body rolls through a further angle ζ, which is less than or equal to the lash divided by the spring spacing, no additional roll restoring force from the springs is generated. However, if the suspension has an anti-roll device this will still apply resisting moment. Once the full extent of the lash has been taken up further increments of θ are possible. At any stage the total body roll angle is θ+ζ.

Using the graphical approach presented in Winkler et al (2000), consider the rotation of the total mass about R. Assuming small angles, after rotation the co-ordinates of the Cg of sprung mass relative to a roll centre at R are ($- h_c\varphi$ - $(h_c-h_b)(\theta+\zeta)$, h_c) and the co-ordinates of the Cg of the unsprung mass relative to the same roll centre R are ($-h_a\varphi$, h_a).

Thus the co-ordinates of the overall Cg are $(-H\varphi - M_s(h_c-h_b)(\theta+\zeta)/M, H)$

and the rotation of the whole mass about R is

$$\varphi_T = \varphi + M_s(h_c - h_b)(\theta+\zeta)/MH \qquad (1)$$

Consider the sprung mass as a free body and take moments about the roll centre B

$$k_r\theta + k_{aux}\zeta = M_s g(h_c - h_b)\alpha + M_s g(h_c - h_b)\varphi + M_s g(h_c - h_b)(\theta + \zeta) \qquad (2)$$

Similarly consider the unsprung mass as a free body and take moments about B

$$k_r\theta + k_{aux}\zeta = -F_2(\frac{T}{2} + h_b\varphi) + F_1(\frac{T}{2} - h_b\varphi) + M_u g(h_b - h_a)\alpha + M_u g(h_b - h_a)\varphi - Mgh_b\alpha \qquad (3)$$

but $F_1 + F_2 = Mg$ and $F_1 - F_2 = k_t T\varphi$. Therefore substituting in (3) gives

$$k_r\theta + k_{aux}\zeta = k_t\frac{T^2}{2}\varphi - (M_s h_b + M_u h_a)g\alpha - (M_s h_b + M_u h_a)g\varphi \qquad (4)$$

Equations (2) and (4) can be used to eliminate α

$$k_r MH\theta + k_{aux} MH\zeta - M_s g(h_c - h_b)(M_s h_b + M_u h_a)(\theta + \zeta) = k_t \frac{T^2}{2} M_s (h_c - h_b)\varphi \quad (5)$$

The moment balance equation Winkler et al (2000) use in their graph is

Moment due to lateral acceleration = Restoring moment from ground – Moment from the offset due to compliance. All moments taken about R.

Rollover occurs when the right hand side of this equation reaches its maximum. From Winkler et al (2000) the Static Roll Threshold (SRT) is given by

$$SRT = \frac{T}{2H} - \varphi_T \quad (6)$$

Thus all we need to do is determine φ_T at the maximum roll resistance.

Restoring moment from the ground $= k_t T^2 \varphi/2$ up to a maximum of $MgT/2$ when the wheel lifts off.
The offset moment $= MgH\varphi_T$.

Consider now various cases.

Case 1
Basic case – suspension has no lash, i.e. $\zeta = 0$. The maximum moment occurs when $Mg = k_t T\varphi$,
i.e. $\varphi = Mg/k_t T$. Substituting this in equation (5) gives

$$\theta = \frac{MgT}{2} \frac{M_s (h_c - h_b)}{(k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))}$$

Substituting into equation (1) we can evaluate φ_T thus from equation (6)

$$SRT = \frac{T}{2H}\left[1 - \frac{M_s^2 g(h_c - h_b)^2}{k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a)}\right] - \frac{Mg}{k_t T} \quad (7)$$

Case 2

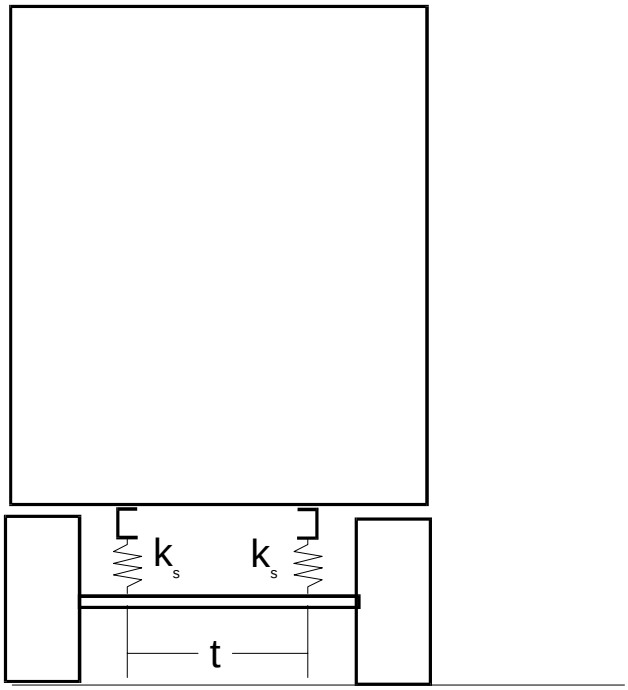


Figure 2 Suspension track width

Suspension has lash. There are two points where the resisting moment versus roll angle curve reduces slope and either of these could be the rollover point depending on which generates the highest resisting moment. The first is when the lash comes into play, i.e. when the right hand side spring (using the convention in the figure) becomes unloaded. This condition is that $M_s g = k_s t\theta$, i.e. $\theta = M_s g/k_s t$ where k_s is the spring stiffness and t is the suspension track width as shown in Figure 2. At this point $\zeta = 0$.

Substituting in equation (5) gives

$$\frac{(k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))2g}{k_s t k_t T^2 (h_c - h_b)} = \varphi$$

and then substituting all the angle values into equation (1) and then (6) gives

$$SRT = \frac{T}{2H} - \frac{M_s^2 g(h_c - h_b)}{k_s t MH} - \frac{2g(k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))}{k_s t k_t T^2 (h_c - h_b)} \qquad (8)$$

Alternatively the unsprung mass may still be sufficient to resist rollover once the lash has occurred and thus the vehicle can withstand a higher lateral acceleration before rollover. In this case the full extent of the lash is applied, i.e. $\zeta = l/t$ and wheel lift off occurs i.e. $\varphi = Mg/k_t T$. Substituting these values in equation (5) gives

$$\theta = \frac{MgTtM_s(h_c - h_b) - 2l(k_{aux}MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))}{2t(k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))}$$

As before substituting all the angle values into (1) and then (6) gives

$$SRT = \frac{T}{2H}\left[1 - \frac{M_s^2 g(h_c - h_b)^2}{(k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))}\right] - \frac{Mg}{k_t T} - \frac{M_s(h_c - h_b)l((k_r - k_{aux})}{t(k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))} \quad (9)$$

If the auxiliary roll stiffness is relatively high compared to the spring stiffness it is possible that rollover will occur after the onset of lash but before the lash is fully completed. In this case $\theta = M_s g/k_s t$ and $\varphi = Mg/k_t T$ but ζ is unknown. Substituting these values in equation (5) gives

$$\zeta = \frac{MgTk_s tM_s(h_c - h_b) - 2M_s g(k_r MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))}{2k_s t(k_{aux}MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))}$$

As before substituting all the angle values into (1) and then (6) gives

$$SRT = \frac{T}{2H} - \frac{Mg}{k_t T} - \frac{M_s^2 g(h_c - h_b)(Tk_s t(h_c - h_b) - 2(k_r - k_{aux})H)}{2Hk_s t(k_{aux}MH - M_s g(h_c - h_b)(M_s h_b + M_u h_a))} \quad (10)$$

The correct SRT value is the one that generates the greater resisting moment to rollover, although, in practice, dynamic effects will tend to favour the value given by equation (8) even if it is slightly lower.

The resisting moment less the overturning moment due to the offset is given by

$$\text{Moment} = k_t \frac{T^2}{2}\varphi - MgH\varphi_T \quad (11)$$

For each of the three conditions above φ and φ_T are known and so we can substitute in equation (11). The standard sequence of events is that as φ_T increases, first there is the onset of lash, the full extent of the lash occurs and finally there is wheel lift off. In this case the two potentially critical events are the onset of lash and wheel lift off and the one with the larger moment determines which situation is critical and gives the SRT value. With a relatively higher auxiliary roll stiffness it is possible for wheel lift off to occur before the onset of lash or alternatively after the onset of lash but

before full lash. In the first instance wheel lift off is the critical condition while in the second case the event which generates the maximum moment is critical.

Case 3

If the relative roll stiffnesses of the different axles of the vehicle are significantly different an axle may lift off without vehicle rollover or a suspension may take up its lash without rollover. For the purposes of this analysis we consider only the SRT of a single vehicle with a maximum of two axle groups. Winkler et al (2000) consider a tractor-semi trailer as a combination but for the Vehicle Dimensions and Mass Rule each vehicle unit must be assessed in a stand alone mode. For a vehicle unit that is normally part of a roll-coupled combination some assumptions need to be made regarding the characteristics of typical other unit(s) that could be coupled to the vehicle.

The vehicle sprung mass is considered a rigid body. Thus the angle of the sprung mass from the roll centre is the same all the way along the body. The roll centre height is not necessarily a constant along the vehicle.
This condition can be written as

$$\theta_{front} + \zeta_{front} + \varphi_{front} = \theta_{rear} + \zeta_{rear} + \varphi_{rear} = \theta_{general} + \varphi_{general} \qquad (12)$$

Note there is no $\zeta_{general}$ term in this equation because this angle in included within the $\theta_{general}$ term. The concept of lash relates to the suspension and has no real meaning in the general position.

Consider the position of the Cg of the sprung mass along the vehicle and using the subscript s to denote this point. At this location $h_{bs} = (M_{s\_front}h_{b\_front} + M_{s\_rear}h_{b\_rear})/M_s$, and $\varphi_s = (M_{s\_front}h_{r\_front}\,\varphi_{front} + M_{s\_rear}h_{r\_rear}\,\varphi_{rear})/M_s h_{bs}$. These two equations are derived from the rigid body assumption which requires that the roll centre lie along a straight line.

Consider now a moment balance for the sprung mass about the roll centre.

$$k_{r\_rear}\theta_{rear} + k_{aux\_rear}\zeta_{rear} + k_{r\_front}\theta_{front} + k_{aux\_front}\zeta_{front} = M_s g(h_c - h_b)\alpha + M_s g(h_c - h_b)(\varphi + \theta) \qquad (13)$$

and moment balances for the unsprung masses about centreline on ground

$$k_{r\_front}\theta_{front} + k_{aux\_front}\zeta_{front} = k_{t\_front}\frac{T_{front}^{\,2}}{2}\varphi_{front} - (M_{s\_front}h_{b\_front} + M_{u\_front}h_{a\_front})g(\alpha + \varphi_{front}) \qquad (14)$$

$$k_{r\_rear}\theta_{rear} + k_{aux\_rear}\zeta_{rear} = k_{t\_rear}\frac{T_{rear}^{\,2}}{2}\varphi_{rear} - (M_{s\_rear}h_{b\_rear} + M_{u\_rear}h_{a\_rear})g(\alpha + \varphi_{rear}) \qquad (15)$$

Define new coefficients as follows

$$MF_{front} = \frac{(M_{s\_front} h_{b\_front} + M_{u\_front} h_{a\_front})}{MH}$$

$$MF_{rear} = \frac{(M_{s\_rear} h_{b\_rear} + M_{u\_rear} h_{a\_rear})}{MH}$$

(15) + (14) – (13) gives

$$\alpha = \left(k_{t\_front} \frac{T_{front}^{\ 2}}{2MHg} - MF_{front} \right) \varphi_{front} + \left(k_{t\_rear} \frac{T_{rear}^{\ 2}}{2MHg} - MF_{rear} \right) \varphi_{rear} - \frac{M_s (h_c - h_b)}{MH} (\varphi + \theta) \qquad (16)$$

Using (16) with (14) and (16) with (15) we can eliminate α to give a pair of simultaneous equations

$$\left[\left(k_{t\_front} \frac{T_{front}^{\ 2}}{2MHg} - MF_{front} \right) \left(1 - \frac{1}{MF_{front}} \right) - \frac{k_{r\_front}}{MF_{front} MHg} \right] \varphi_{front} + \left(k_{t\_rear} \frac{T_{rear}^{\ 2}}{2MHg} - MF_{rear} \right) \varphi_{rear}$$
$$+ \left(\frac{k_{r\_front}}{MF_{front} MHg} - \frac{M_s (h_c - h_b)}{MH} \right) (\varphi + \theta) + \frac{k_{aux\_front} - k_{r\_front}}{MF_{front} MHg} \zeta_{front} = 0 \qquad (17)$$

$$\left(k_{t\_front} \frac{T_{front}^{\ 2}}{2MHg} - MF_{front} \right) \varphi_{front} + \left[\left(k_{t\_rear} \frac{T_{rear}^{\ 2}}{2MHg} - MF_{rear} \right) \left(1 - \frac{1}{MF_{rear}} \right) - \frac{k_{r\_rear}}{MF_{rear} MHg} \right] \varphi_{rear}$$
$$+ \left(\frac{k_{r\_rear}}{MF_{rear} MHg} - \frac{M_s (h_c - h_b)}{MH} \right) (\varphi + \theta) + \frac{k_{aux\_rear} - k_{r\_rear}}{MF_{rear} MHg} \zeta_{rear} = 0$$

Note that the restoring moments from the tyres, $k_{t\_front} \frac{T_{front}^{\ 2}}{2} \varphi_{front}$ and the corresponding term for the rear suspension reaches a maximum at wheel lift-off i.e. when $\varphi = Mg/k_t T$ and then stay at this value for all φ greater than this critical. This maximum moment is $MgT/2$. Equation (17) can be rewritten as follows to take this into account.

$$\left[A_{\text{front}}\left(1-\frac{1}{MF_{front}}\right)-B_{\text{front}}\right]\varphi_{\text{front}}+A_{\text{rear}}\,\varphi_{\text{rear}}+\left(B_{\text{front}}-C_s\right)(\varphi+\theta)+D_{\text{front}}\zeta_{\text{front}}=-\left(1-\frac{1}{MF_{front}}\right)\frac{M_{\text{tyre\_front}}}{\text{MHg}}-\frac{M_{\text{tyre\_rear}}}{\text{MHg}}$$

$$A_{\text{front}}\varphi_{\text{front}}+\left[A_{\text{rear}}\left(1-\frac{1}{MF_{rear}}\right)-B_{\text{rear}}\right]\varphi_{\text{rear}}+\left(B_{\text{rear}}-C_s\right)(\varphi+\theta)+D_{\text{rear}}\zeta_{\text{rear}}=-\frac{M_{\text{tyre\_front}}}{\text{MHg}}-\left(1-\frac{1}{MF_{rear}}\right)\frac{M_{\text{tyre\_rear}}}{\text{MHg}}$$

where $A_{\text{front}}=\left\{\begin{array}{ll} k_{t\_\text{front}}\dfrac{T_{\text{front}}^{\,2}}{2\text{MHg}}-MF_{front}, & \varphi_{\text{front}}\le\dfrac{M_{\text{front}}g}{k_{t\_\text{front}}T_{\text{front}}} \\ -MF_{front}, & \varphi_{\text{front}}>\dfrac{M_{\text{front}}g}{k_{t\_\text{front}}T_{\text{front}}} \end{array}\right\}$ $M_{\text{tyre\_front}}=\left\{\begin{array}{ll} 0, & \varphi_{\text{front}}\le\dfrac{M_{\text{front}}g}{k_{t\_\text{front}}T_{\text{front}}} \\ \dfrac{-M_{\text{front}}gT_{\text{front}}}{2}, & \varphi_{\text{front}}>\dfrac{M_{\text{front}}g}{k_{t\_\text{front}}T_{\text{front}}} \end{array}\right\}$

$$A_{\text{rear}}=\left\{\begin{array}{ll} k_{t\_\text{rear}}\dfrac{T_{\text{front}}^{\,2}}{2\text{MHg}}-MF_{rear}, & \varphi_{\text{rear}}\le\dfrac{M_{\text{rear}}g}{k_{t\_\text{rear}}T_{\text{rear}}} \\ -MF_{front}, & \varphi_{\text{rear}}>\dfrac{M_{\text{rear}}g}{k_{t\_\text{rear}}T_{\text{rear}}} \end{array}\right\}\quad M_{\text{tyre\_rear}}=\left\{\begin{array}{ll} 0, & \varphi_{\text{front}}\le\dfrac{M_{\text{rear}}g}{k_{t\_\text{rear}}T_{\text{rear}}} \\ \dfrac{-M_{\text{rear}}gT_{\text{rear}}}{2}, & \varphi_{\text{rear}}>\dfrac{M_{\text{rear}}g}{k_{t\_\text{rear}}T_{\text{rear}}} \end{array}\right\}$$

$$B_{\text{front}}=\frac{k_{r\_\text{front}}}{MF_{front}\text{MHg}},\qquad B_{\text{rear}}=\frac{k_{r\_\text{rear}}}{MF_{rear}\text{MHg}},\qquad C_s=\frac{M_s(h_c-h_b)}{\text{MH}}$$

$$D_{\text{front}}=\frac{k_{\text{aux\_front}}-k_{r\_\text{front}}}{MF_{front}\text{MHg}},\qquad D_{\text{rear}}=\frac{k_{\text{aux\_rear}}-k_{r\_\text{rear}}}{MF_{rear}\text{MHg}}$$

(18)

At each of the critical points on the solution path, three of the variables can be specified. Using equations (18) and (12) it is then possible to solve for the three remaining variables. In this way all the possible vertices on the solution path can be found. However, it is necessary to check each solution point for validity. At each valid solution point the SRT value can be determined using equation (16). The maximum SRT value calculated in this way is the SRT for the vehicle.

Vehicle parameters required

The equations derived above require the following vehicle parameters:

Mass:
- Unsprung mass by axle group
- Sprung mass by axle group

Geometry
- Centre of gravity (Cg) heights of the unsprung masses
- Cg height of the sprung mass
- Wheel track width for each axle group
- Roll centre height for each axle group
- Suspension track width for each axle group

Stiffness/Compliance
- Tyre stiffnesses
- Suspension spring stiffness for each axle group
- Composite/Auxiliary roll stiffness for each axle group
- Suspension lash for each suspension

Some of these parameters are readily obtained while others require specialised testing, which has probably already been done by the manufacturer. In this latter case manufacturer-supplied data can be used. The approach used in the SRT calculator software is to require a minimal set of user-supplied data which can be readily obtained and to include a conservative set of default values for the data that is more difficult to obtain. Where the parameters for which default values are supplied can vary substantially and have a significant impact on the resulting SRT value, an option for user input of manufacturer-supplied data is offered. A description of the data input process and the default values used follows.

Mass

The user inputs the vehicle type, the number of axles, the tyre configuration and size and the tare and laden mass for each axle group. The unsprung mass is calculated using default values for the axle and wheel masses. Currently the mass values used are as shown in Table 1 and column 2 of Table 2.

Table 1 Default axle masses without wheels

Axle type	Mass (kg)
Truck/ Tractor steer axle	350
Truck/Tractor drive axle	700
Trailer axle	400

Table 2 Parameter variations for different tyre size and configuration

Tyre size and type	Mass* (kg)	Cg height (m)	Width (m)	Dual spacing (m)	Tyre stiffness† (N/m)
17.5 single	50	0.36	0.275	0.26	700508
17.5 wide single	70	0.36	0.365		980711
19.5 single	75	0.40	0.275	0.28	700508
19.5 wide single	105	0.40	0.365		980711
22.5 single	100	0.49	0.275	0.30	700508
22.5 wide single	140	0.49	0.365		980711

* For a dual tyre configuration the mass is double the single tyre mass.
† For a dual tyre configuration the tyre stiffness is double the single tyre stiffness

The unsprung mass is equal to the sum of the axle masses and the wheel masses for the group while the sprung mass is equal to the laden mass minus these axle and wheel masses.

Geometry

The Cg heights for the unsprung masses are default values based on the tyre radius. The values used are shown in Table 2. Actual variations are relatively small and have only a minor impact because the sprung mass is generally much greater than the unsprung mass.

The Cg height of the sprung mass is calculated from the Cg height of the sprung mass component of the tare and the Cg height of the payload. Default values are used for the Cg height of sprung mass component of the tare. Currently this value is 0.56m above the unsprung mass Cg for tractors and trucks and 1.25m above the unsprung mass Cg for all trailers. While this

value probably varies significantly from vehicle to vehicle, the mass involved is generally relatively small so the impact on the overall Cg is small. The payload Cg height is calculated from the load bed height, the load height and the type of load. At present all load types except general freight and containers are assumed to be uniformly distributed vertically and thus the payload Cg height is midway between the load bed and the maximum load height. For general freight and containers it is assumed that the load is not uniformly distributed and can be regarded as being equivalent to two uniformly distributed layers with the lower layer containing 70% of the mass and the upper layer 30%.

For the wheel track width, default values are used based on the tyre size and configuration. It is assumed that for all large trucks under consideration the overall width is 2.5m and hence the width to the outer edges of the tyres is approximately 2.4m. For single tyres the track width is then set to 2.4m minus the tyre width (see Table 2), while for dual tyres the track width is set to 2.4m minus the tyre width minus the dual spacing. Because of geometric effects the centre for the reaction force on a dual tyre set is not at the midpoint of the tyre contact width but further outboard. The correction factor is $(1+ (\text{dual spacing/track width})^2)$.

The roll centre height and suspension track width are functions of the suspension and will be covered in the next section.

Stiffness/Compliance

Standardised tyre stiffness values are used and these are shown in Table 2. These values are typical and it is unlikely that a certifier can obtain better data. Furthermore the tyre characteristics will change over time as the tyres wear and there is no requirement for vehicles to be fitted with the same tyres when they are replaced. Thus there is a good case for using standardised realistic values.

The input of correct suspension characteristics is the most difficult aspect of using the SRT calculation algorithm. Details of the performance characteristics of the suspensions do have a significant impact on the resulting SRT value but data on these performance characteristics are not always readily available. The approach used is to incorporate default generic air and steel suspension characteristics into the calculator that are typical of the lower end of the scale so that for most vehicles using the default suspension will predict an SRT at or below its actual SRT. The certifier has the option of not using the default suspensions but instead inputting manufacturer-supplied data for the actual suspensions fitted to the vehicle.

The suspension spring stiffness, the auxiliary roll stiffness and the composite roll stiffness are related and, in theory, any two can be used to calculate the third. Typically, the manufacturer will supply the suspension spring stiffness (for each spring) and either the composite or the auxiliary roll stiffness. The inputs to the SRT calculator software are the suspension spring stiffness and the composite roll stiffness.

Referring back to Figure 1, the sprung mass has rolled through an angle, θ, about the roll centre B. The suspension will generate a resisting moment to this roll, M. The composite roll stiffness is the $M/\theta = k_r$. The value to be input to the software is per axle and units used are Nm/radian . If the values provided by the manufacturer are in any other units a conversion is required.

Part of this roll stiffness is generated by the vertical compression of the suspension. The spring stiffness value, k_s, required for input to the software is the value for one side of the axle (i.e. per spring) and is in N/m. Any other units require conversion. If the suspension track width is t, then the restoring moment generated by vertical compression of the suspension is $k_s t^2 \theta/2$ and hence the roll stiffness associated with vertical compression of the suspension is $k_s t^2/2$. All other roll stiffness generated by the suspension through anti-roll bars and other mechanisms is called the auxiliary roll stiffness, k_{aux}. Thus,

$$k_r = k_{aux} + \frac{k_s t^2}{2} \qquad (19)$$

Given the spring stiffness, suspension track and auxiliary roll stiffness we can calculate the composite roll stiffness.

The suspension track width is measured in metres and is the centre-to-centre distance between the connections of the suspension to the axle.

Steel suspensions typically have some "lash" in the suspension where, when the spring load changes from compression to tension, the axle moves through a small deflection with minimal resisting force. For the input to the software this lash is the distance moved by the axle measured in millimetres, which, often, will be smaller than the lash at the spring slipper. Figure 3 illustrates a steel leaf spring configuration with suspension lash at both ends of the spring. Other designs have one end of the spring attached with a pin joint and only have lash at the other end. To determine the lash it will usually be simpler to measure the free play of the spring at the slipper mount(s) and then to calculate the lash at the axle from the geometry of the suspension. For example, if the axle is mounted halfway between the spring hanger and the slipper, the lash at the axle will be the average of the suspension lash at the two ends of the spring. If one end of the spring has no lash the axle lash will

be half the suspension lash. For an air suspension the suspension generates very little restoring force in tension and so the system can be regarded as having a large lash value. Air suspensions always have substantial auxiliary roll stiffness so this does not mean that there is no additional resistance to roll once the suspension becomes unloaded.

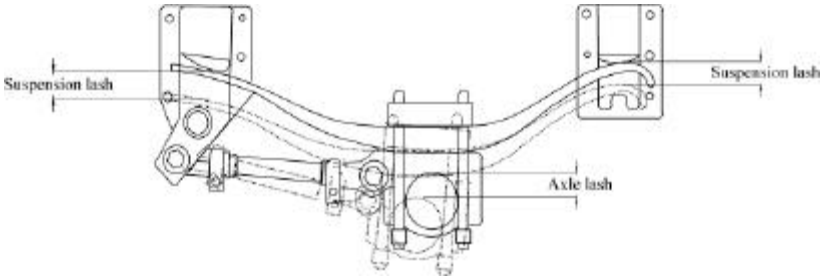


Figure 3 Illustration of suspension and axle lash

The other suspension parameter needed for the calculator is the roll centre height. For the purposes of the calculator this is measured in metres upwards from the axle centre. Thus if the roll centre is below the axle the value will be negative. Note that in the derivation of the equations the roll centre height was measured from the ground.

Generic steel and generic air suspensions with suitable parameters are included in the calculator. The values of those parameters are shown in Table 3.

Table 3 Suspension parameters used by SRT calculator

Suspension Name and Model Number	Suspension spring stiffness (N/m)	Suspension track width (m)	Auxiliary roll stiffness* per axle (Nm/ radian)	Composite roll stiffness per axle (Nm/ radian)	Axle lash (mm)	Roll centre height from axle (m)
Generic – steer axle	185000	0.8		130000	15	-0.02
Generic steel	1000000	0.97		520000	30	0.2
Generic air	350000	0.97		780000	300	0.2

*Not needed if composite roll stiffness is known

To use a user-specified suspension, values for each of the parameter columns in Table 3 except auxiliary roll stiffness need to be provided by the manufacturer. If auxiliary stiffness is given instead of composite roll stiffness, equation (19) can be used to calculate the composite roll stiffness.

Schedule 2 Maximum mass for heavy motor vehicles

[Ref. *4.5*]

Table 1 Maximum mass on individual axles

Type of axle			Mass (kg)
1	Single standard tyres:		
	(a)	in a twin-steer axle set, or in a tandem axle set with a twin- or single large-tyred axle	5400
	(b)	in any other axle set	6000
2	Single large-tyred:		
	(a)	in a twin-steer axle set	5400
	(b)	in a quad-axle set	5500
	(c)	in a tandem axle set with two single large-tyred axles or in a tandem axle set with a single standard-tyred axle or in a tri-axle set	6600
	(d)	in any other axle set	7200
3	Twin-tyred:		
	(a)	in a quad-axle set	5500
	(b)	in a tri-axle set	6600
	(c)	in any other axle set	8200
4	Oscillating axle, in any axle set		9500

Table 2 Maximum sum of axle mass on two axles in a tandem axle set

Type of axle	Mass (kg)
1 Two single standard-tyred axles:	
(a) in a twin-steer set	10,800
(b) not in a twin-steer set	11,000
2 Two single large-tyred axles:	
(a) in a twin-steer set	10,800
(b) not in a twin-steer set	13,000
3 Two twin-tyred axles:	
(a) spaced less than 1.3 m from the first axle to the last axle	14,500
(b) spaced 1.3 m or more but less than 1.8 m from the first axle to the last axle	15,000
(c) spaced 1.8 m or more from the first axle to the last axle	15,500
4 Twin-tyred axle:	
(a) with a single large-tyred axle and 60/40 load share	13,600
(b) with a single large-tyred axle and 55/45 load share	14,500
5 Single standard-tyred axle with an oscillating axle	13,000
6 Single standard-tyred axle with a single large-tyred axle or a twin-tyred axle	12,000
7 Two oscillating axles	15,000

Table 3 Maximum sum of axle mass in a tri-axle set

Type of axle	Mass (kg)
Three oscillating axles, three twin-tyred axles, or three large-tyred axles:	
(a) spaced 2.5 m or more from the first axle to the last axle	18,000
(b) spaced 2.4 m or more and less than 2.5 m from the first axle to the last axle	17,500
(c) spaced 2 m or more and less than 2.4 m from the first axle to the last axle	15,500

Table 4 Maximum sum of axle mass in a quad-axle set

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

Table 5 Maximum sum of mass 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 m or more but less than 1.8 m (including maximum gross mass)

Type of axle	Mass (kg)
1 Two single standard-tyred axles	10,800
2 Two single large-tyred axles	12,000
3 A single standard-tyred axle with a single large-tyred axle or a twin-tyred axle	12,000
4 Any other two or more axles	14,500

Table 6 Maximum sum of mass 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 m or more (including maximum gross mass)

Type of axle	Mass (kg)
Where the distance from the centre of the first axle to the centre of the last axle is:	
1.8 m but less than 2.5 m	15,500
2.5 m but less than 3.0 m	17,500
3.0 m but less than 3.3 m	19,000
3.3 m but less than 3.6 m	20,000
3.6 m but less than 4.0 m	21,000
4.0 m but less than 4.4 m	22,000
4.4 m but less than 4.7 m	23,000
4.7 m but less than 5.1 m	24,000
5.1 m but less than 5.4 m	25,000
5.4 m but less than 5.8 m	26,000
5.8 m but less than 6.4 m	27,000
6.4 m but less than 7.0 m	28,000
7.0 m but less than 7.6 m	29,000
7.6 m but less than 8.2 m	30,000
8.2 m but less than 8.8 m	31,000
8.8 m but less than 9.4 m	32,000
9.4 m but less than 10.0 m	33,000
10.0 m but less than 10.8 m	34,000
10.8 m but less than 11.6 m	35,000
11.6 m but less than 12.0 m	36,000
12.0 m but less than 12.5 m	37,000
12.5 m but less than 13.2 m	38,000
13.2 m but less than 14.0 m	39,000
14.0 m but less than 14.8 m	40,000
14.8 m but less than 15.2 m	41,000
15.2 m but less than 15.6 m	42,000
15.6 m but less than 16.0 m	43,000
16.0 m or more	44,000

Schedule 3 Permit to exceed mass limits

[Ref. *5.1(4)*]

Form 1

PERMIT TO EXCEED MASS LIMITS

Permit No. ……

UNDER *Land Transport Rule: Vehicle Dimensions and Mass 2002*……...

…… is hereby authorised to use [*Vehicle description*]……..

registered No. ……for ……trip(s) on/between [*Dates*]:……

……to transport [*Description of load*]: ……..

from……to……over the following route, subject to the conditions, restrictions and maximum mass limits in this permit.

ROUTE AND SPECIAL INSTRUCTIONS:……

……

CONDITIONS

1(a) The gross mass of the vehicle with the load must not exceed…kilograms

Axle number	1	2	3	4	5	6	7	8	9
*Axle type									
Mass (000 kg)									
Spacing									

1(b) The total mass on any set of axles must not exceed the sum of the mass limits shown for those axles in the table above.

2 This permit is void and of no effect if any of its conditions are breached or if the permit is altered or mutilated without authority.

3 This permit must be carried on the vehicle and must be surrendered for inspection or on the demand of any enforcement officer, or an authorised agent of Transit New Zealand or a road controlling authority.

4 [*Any other conditions*]……
Authorised Issuing Officer……[*Name*]
……[*Designation*]
……[*Controlling Authority*…….]……[*Location*]
Date:……

* S = Single standard-tyred axle
SL = Single large-tyred axle
T = Twin-tyred axle
(4) = 4-tyred oscillating axle
(8) = 8-tyred oscillating axle

[Ref. *5.1(7)(a)*]

Form 2

NOTICE OF INTENTION TO ISSUE OVERWEIGHT PERMIT

UNDER *Land Transport Rule: Vehicle Dimensions and Mass 2002*, operators of heavy motor vehicles are notified that overweight permits will be issued on application for the transportation described below, under the authority of an appropriate heavy traffic licence, namely:

1. Type of vehicle [*'All heavy motor vehicles' or set out type of heavy motor vehicle — eg, 'two-axled heavy motor vehicles'*.]
2. Commodity [*Set out description of commodity*.]
3. Period [*Set out period permits will cover*.]
4. Conditions [*Set out the maximum mass limits, eg, 'Class I weight limits must not be exceeded', and any other special conditions*.]
5. Road [*List roads or describe area permits will cover*.]

……

[*Name of authorised officer*]

……..

[*Designation of authorised officer*]

……..……

[*Name of authority*]

……..

[*Address of authority*]

Date issued……

Schedule 4 Specifications for signs

[Refs. *7.3(9)*, *7.3(12)*]

Table 1 Wording, size and colour specifications for warning signs

Wording of warning sign	Letter size and stroke width (all upper case)	Size of sign	Colour of background		Colour of wording	Size and colour of border
			Day	Night	Day or night	Day or night
'DANGER SLOW DOWN'	200 mm/ 28 mm 150 mm/ 21 mm	1100 mm x 600 mm	Fluorescent yellow-green	Fluorescent yellow-green retro-reflective	Matt black	None
'WIDE LOAD FOLLOWS' OR **'WIDE LOAD AHEAD'**	150 mm/ 21 mm 150 mm/ 21 mm	1100 mm x 520 mm	Fluorescent yellow-green	Fluorescent yellow-green retro-reflective	Matt black	Black 12 mm
'HOUSE FOLLOWS' OR **'HOUSE AHEAD'**	150 mm/ 21mm 150 mm/ 21 mm	1100 mm x 520 mm	Fluorescent yellow-green	Fluorescent yellow-green retro-reflective	Matt black	Black 12 mm
'LONG LOAD FOLLOWS' OR **'LONG LOAD AHEAD'**	150 mm/ 21 mm 150 mm/ 21 mm	1100 mm x 520 mm	Fluorescent yellow-green	Fluorescent yellow-green retro-reflective	Matt black	Black 12 mm
'PILOT VEHICLE'[1] **This face is to be displayed on the reverse side of all the above signs**	150 mm/ 21 mm 150 mm/ 21 mm	1100 mm x 520/600 mm	Matt black		White If used at night white retro-reflective	White 12 mm If used at night white retro-reflective

[1] Refer to *Figure 4* in this schedule.

[Refs. *7.3(9)*, *7.3(12)*]

Table 2 Order of display of pilot signs for various size loads

	Width		
	Greater than 3.1 m and up to and including 5 m wide	**Greater than 5 m wide**	**Less than 3.1 m wide, but requires pilot because of excess rear overhang or because it is greater than 25 m overall length**
First pilot	**'WIDE LOAD FOLLOWS'**	**'DANGER SLOW DOWN'**	**'LONG LOAD FOLLOWS'**
Second pilot (if required)	**'WIDE LOAD FOLLOWS'**	**'WIDE LOAD FOLLOWS'** OR **'HOUSE FOLLOWS'** AS APPROPRIATE	**'LONG LOAD FOLLOWS'**
Load			
Rear pilot (if required)	**'WIDE LOAD AHEAD'**	**'WIDE LOAD AHEAD'** OR **'HOUSE AHEAD'** AS APPROPRIATE	**'LONG LOAD AHEAD'**

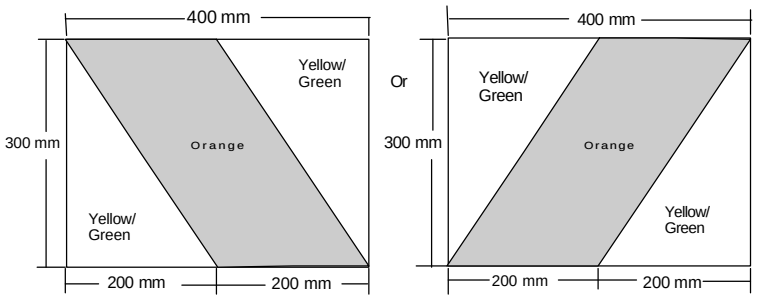


Figure 1 Minimum dimensions of hazard warning panel [Refs. *2.1(4)(b)*, *6.10(1)(c)* and *(d)*]

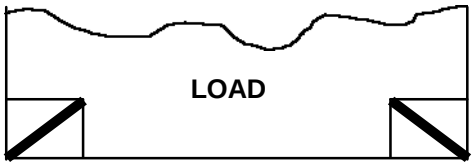


Figure 2 Orientation of hazard warning panels [Ref. *6.10(1)(a)(i)*]

Figure 3 Dimensions of 'OVERSIZE' sign for overdimension vehicles [Ref. *6.11(2)(a)*]

Figure 4 Warning sign for pilot vehicle [Refs. *7.3(9)*, *7.3(12)*]

Schedule 5 Prohibited travel

[Refs. *6.12(7)*, *6.12(8)*]

1 Prohibited travel (X) during weekday

(1) Loads up to and including 5 m wide (Nationwide[1])

Mon to Thu						X	X	X							X	X							
Fri						X	X	X							X	X	X	X	X	X	X	X	
	00				0630			09						16		18		20		22		24	

(2) Loads greater than 5 m wide

(a) Zone 1

Mon to Thu						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fri						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	00				0630			10		12		14		16		18		20			2230	24	

(b) Zone 2

Mon to Thu						X	X	X	X	X	X	X	X	X	X	X	X	X					
Fri						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	00				0630	08		10		12		14		16			19			22		24	

(c) Zone 3

Mon to Thu						X	X	X							X	X	X						
Fri						X	X	X							X	X	X	X	X	X	X	X	
	00				0630			09						16			19			22		24	

2 Prohibited travel (X) during weekend

(1) Loads up to and including 5 m wide (Nationwide[1])

Sat	X	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X	
Sun	X	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X	
	00				05					12		14		16		18		20			2230	24	

(2) Loads greater than 5 m wide (Nationwide[1])

Sat	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sun	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

00 04 06 08 10 12 14 16 18 20 2230 24

Note:

[1] The travel-period prohibitions for loads up to, and including, 5 m wide between 0630 and 0900 hours and 1600 and 1800 hours apply only to city areas as defined in *6.12(1).*

Schedule 6 Zones for restricted travel

[Ref. *6.12(1)*]

	Area	Boundary
Zone 1	Northland, Auckland, Bay of Plenty and Waikato	Kamo and south of Kamo
		Maungatapere and East of Maungatapere
		Mungaturoto and East of Mungaturoto
		North of the intersection of SH 2 and SH 33 Paengaroa
		North of the intersection of SH 5 and SH 1 Tirau
		North of the intersection of SH 3 and SH 31 Otorohanga
	Wellington	North to McKay's Crossing
		East to Te Marua including Te Marua
	Christchurch	South from Waimakariri River
		North of Templeton
		East of Dawsons Road Yaldhurst
Zone 2	Northland	North of Kamo
		West of Maungatapere
		West of Mungaturoto
	Southern Waikato and Eastern Bay of Plenty	The intersection of SH 2 and SH 33 Paengaroa and south of the intersection of SH 2 and SH 33 Paengaroa
		The intersection of SH 5 and SH 1 Tirau and south of the intersection of SH 5 and SH 1 Tirau
		The intersection of SH 3 and SH 31 Otorohanga and south of the intersection of SH 3 and SH 31 Otorohanga
		Opotiki and north of Opotiki
		Te Whaiti and north of Te Whaiti
		Rangitaiki and north of Rangitaiki
		North of Motuoapa
		North of the intersection of SH 32 and SH 41 at Kurutau, but excluding SH 41 and SH 32 (Kurutau to Tokoroa)
		North of the intersection of SH 43 and SH 4 Taumaranui
		North of Awakino

	Area	Boundary
Zone 3	Southern North Island (excluding Wellington as defined in Zone 1)	South of Opotiki
		East of Opotiki
		South of Te Waiti
		South of Rangitaiki
		Motuoapa and south of Motuoapa
		The intersection of SH 32 and SH 41 Kurutau including SH 41 and south of the intersection of SH 32 and SH 41
		SH 32 Kurutau to Tokoroa
		The intersection of SH 43 and SH 4 Taumaranui and south of the intersection of SH 43 and SH 4 Taumaranui
		Awakino and south of Awakino
		McKay's Crossing and north of McKay's Crossing
		North of Te Marua
	South Island and Stewart Island (excluding Christchurch as defined in Zone 1)	North from Waimakariri River
		Templeton and south of Templeton
		Dawsons Road Yaldhurst and west of Dawsons Road Yaldhurst

Schedule 7 Specific route restrictions

[Ref. *6.6(1)(b)*]

Auckland Harbour Bridge: Height 4.8 m, width exceeding 3.1 m contact Police Communications Centre. (Any load exceeding 3.1 m in width travelling over the Auckland Harbour Bridge must be accompanied by a Bridge Control Officer as authorised by Police Communications Centre.)

Auckland Motorway: No travel on Auckland Motorway (includes Northern, North Western, and Southern Motorways) if the width exceeds 3.1 m or the height exceeds 4.25 m. However, loads that exceed 4.7 m in height are permitted to travel from Ramarama Interchange to the end of the Auckland Southern Motorway.

Wellington Motorway: Maximum height 4.8 m, maximum width 3.7 m. However, an overdimension motor vehicle exceeding these dimensions may travel on the Wellington Motorway provided it complies with the road controlling authority's conditions.

McKay's Level Crossing North Island Main Trunk Line/SH 1 Paekakariki: Loads or vehicles exceeding 4.6 m in height require permission to cross under the wires from the rail operator.

Lyttelton Tunnel: Maximum height 4.27 m, maximum width 2.6 m, towing vehicle and semi-trailer maximum length 21 m, 2 m maximum for load overhanging front or rear of the vehicle. However, overdimension vehicles exceeding the above maximums may travel provided that the following conditions are met:

(a) the operator of the overdimension vehicle must obtain permission from the road controlling authority's agent (Tunnel Control);

(b) the operator of the overdimension vehicle must comply with any piloting or travel time restrictions required by the road controlling authority's agent (Tunnel Control).

Schedule 8 Swept path performance measures for maximum-sized standard vehicle

[Ref *7.1(5)*]

Low-speed Offtracking (LSO)

This manoeuvre is a right-angle turn, similar to an urban intersection turn and illustrated in *Figure 1* below. The vehicle travels at 8 km/h and the centre point of the first axle tracks a path describing a 90-degree arc of 9.8 m radius. This corresponds to an outside front wheel radius of approximately 11 m. LSO is the maximum lateral offset between the paths tracked by the rear axis of the rearmost trailer and the path tracked by the steer axle.

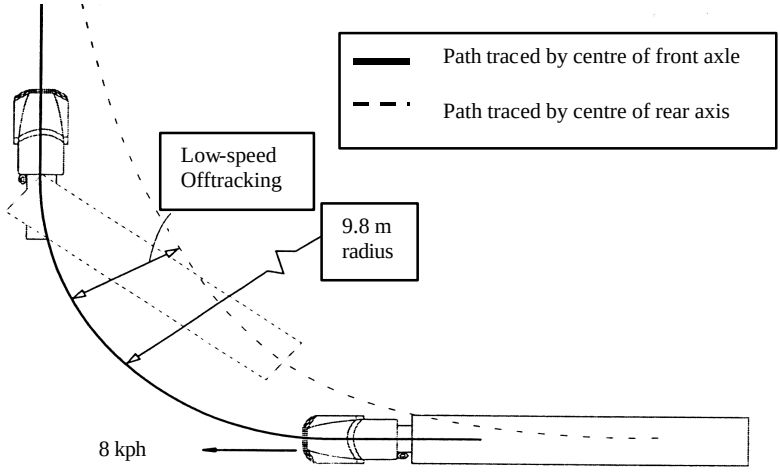


Figure 1 Low-speed Offtracking

Low-speed tracking measures

1. The vehicle must be able to turn through 360 degrees while staying within a circle of 25 m diameter (wall to wall) for both left and right turns. Alternatively, if the vehicle is an overdimension vehicle it must be able to turn through 90 degrees to the left or right within an outside radius of 15 m and without any part of the vehicle, except for

collapsible mirrors, encroaching within a concentric internal radius of 9.5 m.

2. Outswing of the front corners of the trailer must not be more than 350 mm beyond the path of the front of the towing vehicle when driven through a 180-degree turn of 12.5 m radius (scribed by the outside front of the vehicle) for both left and right turns. (See *Figure 2*)

3. Tailswing measured from the centre of the rear axis to the centre of the rear of the vehicle, for each vehicle in a combination, must not exceed 500 mm through a 90-degree turn of 12.5 m radius (scribed by the outside front of the vehicle) for both left and right turns. (See *Figure 3*)

4. The inter-vehicle spacing must not fall below 400 mm through a 270-degree turn of 12.5 m radius for both left and right turns. The 400-mm spacing may be reduced to 300 mm in the case of a conventional log truck and log full trailer.

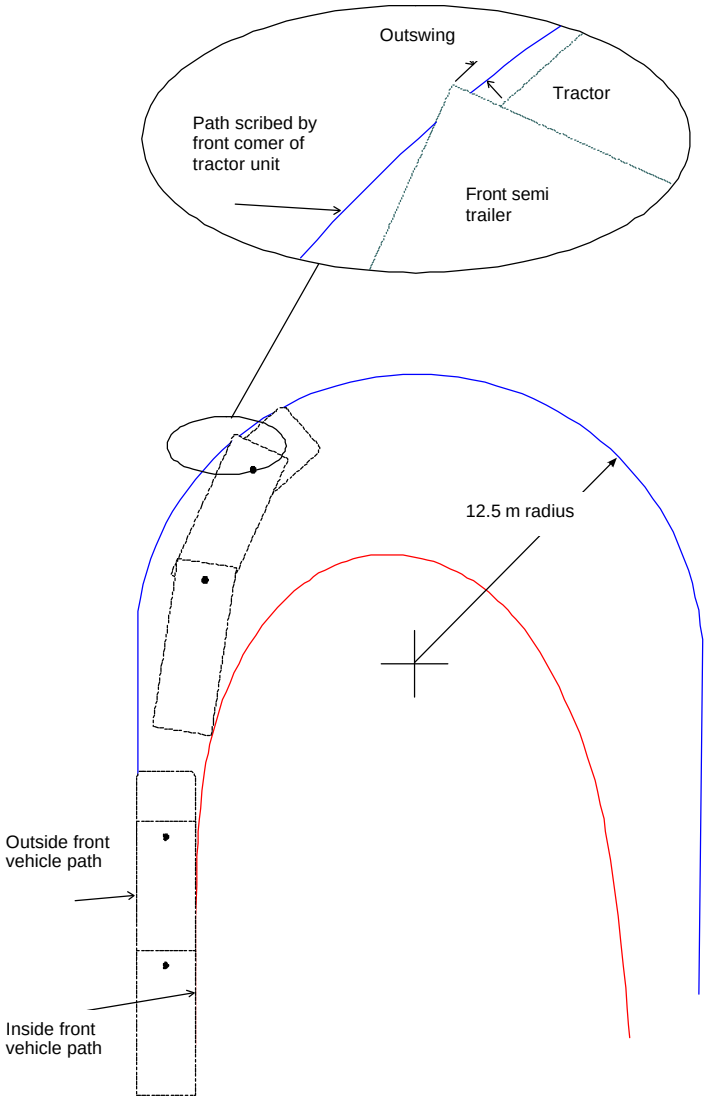


Figure 2 **Outswing of front semi-trailer of B-train combination in 12.5 m radius turn**

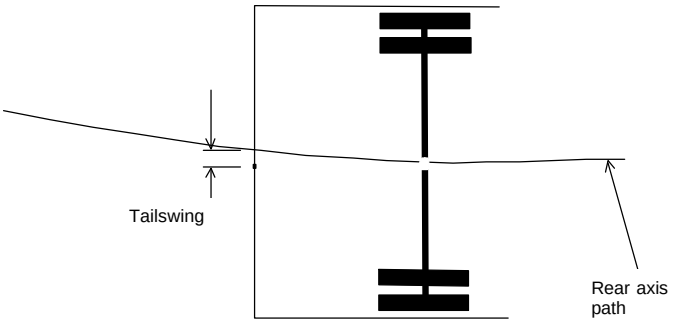


Figure 3 Tailswing of vehicle during 12.5 m radius turn

Schedule 9 Swept path performance measure for maximum Category 1 overdimension vehicle

[Ref. *7.1(7)*]

The 'maximum swept path' for a Category 1 level overdimension vehicle has been derived from the following combination:

Tractor: 4.35 m wheelbase, 5.5 m forward distance

Semi-trailer: tri-axle: 2.5 m, 11.4 m forward distance and travelling in steady state through a 90-degree turn inside a 50 m radius wall. The inside of the path is measured at the rear axis of the semi-trailer. The maximum width of this path must not exceed 4.7 m.

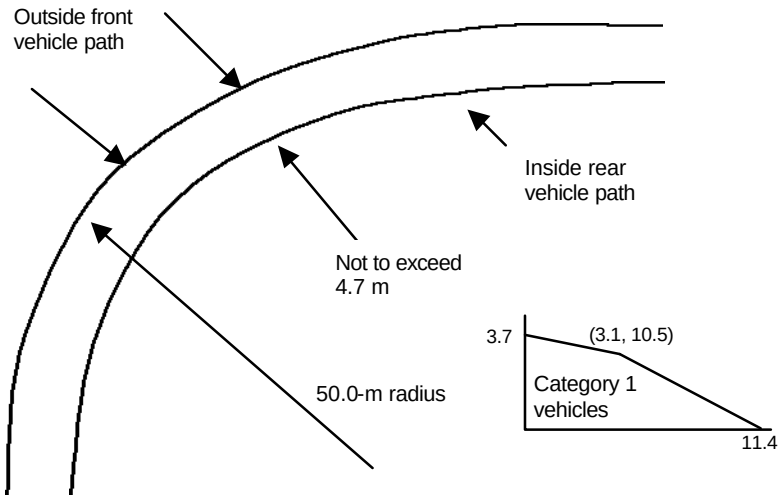


Figure 1 Swept path 50 m radius