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# SIZE DOES MATTER – BUT WHEN IS BIG TOO BIG?

**ABSTRACT:**

New vehicle designs offer significant advantages to commercial freight operators in terms of volume and payload and for this reason it is inevitable that the industry will continue to call for a change to the rules and regulations that govern them. With the advent of larger and heavier vehicles, the pressure is mounting on the various state road authorities and enforcement agencies to continue to modify their standards and guidelines with respect to the operation of those vehicles and the impacts they are having on driver behaviour, associated minimum safety standards and the condition of our roads. As a way forward, it is imperative that we as traffic engineers become more familiar with the requirements of the ever-changing heavy vehicle fleet and learn to assist in accommodating these larger vehicles on our busier road corridors. Their impact on road capacity and road safety continues to evolve and therefore this also needs to be better understood.

**KEY WORDS:**

Heavy vehicle productivity, Freight, B-double, Road train, PBS, Performance Based Standards. Improved Vehicle Safety, Intersection geometry, Pavement loading, Bridge loading, Road width requirements, Road wear.

# 1. Introduction and background

Since the 1990s Australia's freight challenge has been growing at rate that will see it double every 15 to 20 years. Access to and use of infrastructure by efficient freight vehicles is a priority not merely to immediately boost productivity, but to ensure that design of future infrastructure allows realisation of Australia's freight potential. A snapshot of the Australian trucking industry suggests that there are:

- more than 500,000 registered trucks on our roads
- approximately 41,000 businesses in constant operation
- more than 250,000 people employed in the industry
- more than $13 billion in annual wages earned
- approximately 17,000 million kilometres travelled each year.[1]

Improving vehicle productivity is one way that the growing road freight task can be addressed. High-productivity vehicles such as conventional 'road trains' are now used in a number of countries including Argentina, Mexico, the United States, and Canada. Australia, however, has the largest and heaviest road-legal vehicles in the world, with some configurations topping out at close to 200 tonnes in the case of vehicles being used on the mines in WA. The cost-effectiveness of these larger vehicles has played a significant part in the economic development of some of the most remote areas in Australia with some communities being almost totally reliant on the economic benefits these vehicles bring.

PBS is an alternative regulatory scheme for heavy vehicles that was developed throughout the 2000s in order to meet the demands of the growing road freight task and allow more widespread adoption of higher productivity vehicles. It was initially trialled by jurisdictions and subsequently formally adopted by the National Transport Commission (NTC) in a regulatory sense in 2011. The scheme seeks to achieve:

- a more sustainable transport system through improved road vehicle regulations controlling heavy vehicle safety and infrastructure impacts, and
- a more flexible road transport regulatory environment that allows for greater innovation in vehicle design and the more rapid adoption of new technologies.

PBS provides the industry with opportunities to increase heavy vehicle productivity through the modification of conventional configurations (e.g. 30-metre quad-tri B-doubles), or the development of entirely new, innovative vehicle combinations (e.g. 26-metre tri-tri road trains).

The National Heavy Vehicle Register (NHVR) was established in 2013 as Australia's independent regulator for all vehicles over 4.5 tonnes. The National Heavy Vehicle Regulator (NHVR) manages the access of heavy vehicles to ensure a safe, efficient and sustainable road network for industry, and administers the PBS scheme. The NHVR is not a road owner, but rather coordinates a range of access applications from start to finish, liaising directly with road managers (both state and territory road authorities and local government) to manage applications and issue permits.

Through the PBS scheme, vehicle designers and operators now have significantly greater flexibility with respect to the overall mass, physical dimensions and possible vehicle combinations. However, the most significant impact of PBS on our industry in turn has been the range of upgrades and

[1] IBISWorld Industry Report 14610, July 2015

modifications required to our roads. On-site trials would suggest that these could range from simple changes to an intersection line marking layout through to major intersection upgrades and even grade separation in some instances. Counter-measures include truck bans, neighbourhood curfews and restricting access to our airports, ports and industrial freight parks.

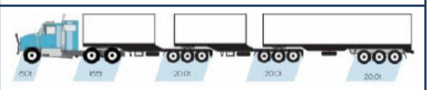
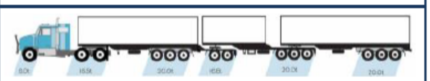
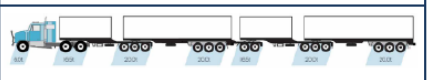
## 2. How big is Big?

A number of government publications provide guidelines for classifying what a multi-combination vehicle may look like. So in essence, a 'multi-combination vehicle' means a vehicle combination that is permitted to operate under the guideline, irrespective of size. Vehicles covered under existing guidelines include:

- B-double – a combination consisting of a prime mover towing 2 semi-trailers, with 1 semitrailer supported at the front by, and connected to, the other semitrailer.
- A-double – a combination consisting of a prime mover towing 2 semi-trailers connected by a converter dolly, generally up to 36.5 metres overall length, and up to 85 tonnes gross mass
- A-triple – a combination consisting of a prime mover towing 3 semi-trailers connected by converter dollies, generally up to 53.5 metres overall length, and up to 124.5 tonnes gross mass.

These larger vehicle combinations offer important increases in heavy vehicle productivity and freight transport efficiency for transport operators, produces and consumers in rural and remote areas. Using the individual units that comprise those combination, a number of other configurations are possible, including B-triple, AB-triples, and BAB-quads. Table 1 shows the national mass and length limits for multi-combination vehicles.

**Table 1 - Allowable Mass Limits**

| Vehicle Configuration | Vehicle Length | GML* | CML** | HML*** | Picture |
|---|---|---|---|---|---|
| Common Road Train (Type 1) ^ | 36.5m | 79.0t | 81.0t | 85.0t |  |
| Common B Triple Road train ^ | 36.5m | 82.5t | 84.5t | 90.5t |  |
| Common AB Triple Road train ^ | 36.5m | 99.0t | 101.0t | 107.5t |  |
| Common Road train (Type 2) ^^ | 53.5m | 115.5t | 118.5t | 124.5t |  |
| Common BAB Quad Road train ^^ | 53.5m | 119.0t | 121.0t | 130.0t |  |

*Source: National Heavy Vehicle Mass and Dimension Limits, NHVR, February 2014*

A key action of the state government's Moving Freight a strategy for more efficient freight movement (TMR December 2013) is to "improve regional rail for agricultural and general freight". The industry's response to this challenge has been to call for development of bigger and longer trucks to keep up with the road component of this projected future integrated freight task. Based on the strategy of "Moving

More with Less," this new approach addresses both volume and mass limited freight because of their different impact on infrastructure and also gives industry more flexibility to select the most suitable vehicle configuration to transport their goods.[2] Through initiatives such as this it is hoped that the wide spread introduction of B-triple and AB-triple road trains and the introduction of quad road trains in some areas will provide:

- a modern, safer, more productive option for freight transport
- increased payload capacities in comparison to existing road train combinations;
- the ability to transport increased payloads of higher density loads such as minerals and grains (AB-Triples).

It is predicted by 2030 that AB-triples could be carrying up to 3% of the total road freight across Australia though it is likely to be attracted from the current double road train share. B-triples could have as much as 17% of the total road freight market and again this is most likely to be gained from the B-double share.

# 3. Road access arrangements

In relation to access to the road network, there are two key types of heavy vehicle classes.

- General Access Vehicles that comply with all mass and dimension requirements and have unrestricted access to the public road network unless sign-posted otherwise
- Restricted Access Vehicles that can generally only access certain parts of the road network with the appropriate or notice or permit issued by the NHVR.

Under the Heavy Vehicle National Law (HVNL), road managers are responsible for granting access for heavy vehicle to use their roads. This is because local governments have to be able to manage and maintain their roads by protecting them from unnecessary and preventable damage.

General freight carrying vehicles that are longer than 19m have to travel along specially designated routes that have been checked and declared as capable of handling these larger vehicles. To streamline this process, reduce the administrative burden for local councils and reduce turnaround times, the NHVR works with road managers to gain pre-approved consent for a range of heavy vehicle routes.

All of the State Road Controlling Authorities provide websites which display authorised heavy vehicle routes within each state. Key freight routes represent the key road and rail routes that connect the major cities in Australia and places of significance such as ports, airports and freight related agglomerations in Australia.

As a rule, Austroads provides the primary source of guidance on the relationship between the functional classification of our roads and the most appropriate vehicle type check. However, in most cases it is still the actual physical dimensions and performance capability of the design vehicles that are the key design criteria upon which road and intersection design is based. Whilst the road network hierarchy has both functional and descriptive definitions, it is important that the land use, and hence the vehicle types

[2] https://www.nhvr.gov.au/

that will be negotiating the intersections, be considered when determining the most appropriate design standard to apply. Table 2 provides an outline of Austroads' advice in relation to the suitable design and checking vehicles for different road types.

Table 2 - Guide to selection of the appropriate design and checking vehicle (Austroads 2009)

| Intersecting road types | Design | Checking |
|---|---|---|
| Arterial/Arterial | Prime mover and semi-trailer (19 m) (1)<br>Radius 15 m | Appropriate vehicle e.g. B-double (25 m) (2) **or**<br>Prime mover and long semi-trailer (25 m) **or**<br>Road train (3) |
| Arterial/Collector | Single unit truck/bus (12.5 m)<br>Radius 12.5 m | Prime mover and semi-trailer (19 m)<br>Radius 15 m |
| Arterial/Local (residential) | Service vehicle (8.8 m)<br>Radius 12.5 m | Single unit truck/bus (12.5 m)<br>Radius 12.5 m |
| Collector/Collector (industrial) | Prime mover and semi-trailer (19 m) (1)<br>Radius 15 m | Prime mover and semi-trailer (19 m) (1)<br>Radius 15 m |
| Collector/Collector (residential) | Single unit truck/bus (12.5 m)<br>Radius 12.5 m | Prime mover and semi-trailer (19 m) (1)<br>Radius 15 m |
| Collector/Local (residential) | Service vehicle (8.8 m)<br>Radius 9 m | Single unit truck/bus (12.5 m)<br>Radius 12.5 m |
| Local/Local (industrial) (4) | Prime mover and semi-trailer (19 m) (1)<br>Radius 12.5 m (5) | Appropriate vehicle e.g. B-double (25 m) (2) **or**<br>Prime mover and long semi-trailer (25 m) **or**<br>Road train (3) |
| Local/Local (residential) | Service vehicle (8.8 m)<br>Radius 9 m | Single unit truck/bus (12.5 m)<br>Radius 12.5m |

Select the appropriate vehicle for the design of sites that are frequently used by such vehicles.
B-double length may vary between jurisdictions.
Select appropriate road train from the *Guide to Road Design – Part 3: Geometric Design* (Austroads 2010b) or from relevant jurisdiction guide.
Also for intersections with industrial land use for collector/local intersections.
Simulations show that for this radius the maximum steering angle occurs at the exit of the turn and not applied at the crawl speed.

# 4. Treatment of high-productivity vehicles in Queensland

The Department of Transport and Main Roads publishes a set of maps via their website to indicate the roads that are approved for PBS access.[3] The PBS scheme has four levels of performance requirements, each corresponding to a level of road access.

The provision of upper bounds for vehicle lengths for each vehicle type provides jurisdictions with a tool for classifying and mapping the national road network and a performance envelope within which to classify each vehicle type. The levels of road access range from general access (Level 1) to remote areas with low traffic volumes (Level 4). Table 3 provides a comparison between road classification levels and equivalent routes.

[3] http://www.tmr.qld.gov.au/Business-and-industry/Heavy-vehicles/Performance-based-standards.aspx

Table 3 - PBS Road Classification versus current heavy vehicle routes

| PBS Road Classification Level | Maximum Vehicle Length | Equivalence to current heavy vehicle routes |
|---|---|---|
| Level 1 | 20m | General access* |
| Level 2A | 26m | B-double ‘as of right’ network access |
| Level 2B | 30m | Longer PBS level 2 vehicles |
| Level 3A | 36.5m | Type 1 Road Train network access |
| Level 3B | 42m | Longer type 1 road trains |
| Level 4A | 53.5m | Type 2 Road Train network access |
| Level 4B | 60m | Longer type 2 road trains |

**General Access is subject to a 50 tonne gross mass limit, posted local restrictions and restrictions or limitations specified by the jurisdiction.*

Because of the strong influence of combination length on gazetting existing networks for PBS, the NTC decided to split three of the four PBS levels into two sub-levels, defined by the maximum lengths of the vehicles that could be operated on those networks. This created ‘Class A’ and ‘Class B’ categories within PBS Level 2, 3 and 4.

**Class A Network**

Following a call from former Local Government and Transport and Main Roads districts for a direct translation between the existing general access Level 1, Level 2A, Level 3A and Level 4A network access conditions, many of Queensland’s roads are now also classified under PBS. Transport and Main Roads has reviewed of all the 'as of right' B-double and road train networks in Queensland and endorsed the adoption of all of the equivalent PBS Level 1, Level 2A, Level 3A and Level 4A access classifications respectively. This meant that as compared to the performance of B-double and road train combinations, PBS vehicle performance characteristics such as swept path, braking, acceleration, stability and on-road dynamic on-road performance be assumed to be the same, or improved upon. Similarly, pavement and bridge impacts can be considered to be the same so in theory there should not be any adverse road infrastructure impacts or traffic safety implications emerging out of this process.

**Class B Network**

Maximum vehicle lengths in the PBS Class B categories are longer than current general access, B-double, Type 1 and Type 2 road train combinations. As such, the increased vehicle length will potentially affect road design aspects such as:

- storage lane length at intersections;
- signal timing for left or right turns at intersections;
- overtaking provisions on rural roads;
- enforcement bays and rest area sizes;
- stacking distances at railway level crossings;
- overtaking provision and opportunities.

So as more heavy vehicle routes are being opened up to PBS Level 2B and above, State Road Controlling Authorities and Councils are under increasing pressure to respond with additional infrastructure upgrades to comply. For this reason, the assessment and classification of relevant road segments into PBS Level 2B, Level 3B and Level 4B will only be undertaken on an 'as requested' basis and be implemented only where a higher standard road is assessed as being capable of safely carrying these longer vehicles types.

# 5. Understanding the impact of these larger vehicles on our roads

## 5.1 Improved vehicle safety

It is a common misconception that larger and heavier vehicles are less safe. The B double is currently Australia's safest and most efficient mainstream heavy freight vehicle. Developed in the 1990s, it has single-handedly managed to keep up with the rate of growth of Australia's national freight task. Similarly, all PBS vehicles are subject to sixteen stringent safety-related and four infrastructure-related performance standards.

As a result of this rigorous accreditation process, vehicles satisfying these criteria are known to have a higher level of safety than the average non-PBS vehicle of earlier years. Preliminary research conducted by Austroads has produced some interesting results. Based on crash data compiled by National Transport Insurance since 2005, Austroads found that with the larger size vehicles there is actually a greater level of safety. Table 4 below is an extract from this report.

**Table 4 -Truck size versus crash history comparison**

| | Crashes per 100 million kilometres | Crashes per 10,000 vehicles |
|---|---|---|
| **Single Semi-trailer** | 20.6 | 146 |
| **B-double** | 7.3 | 121 |
| **B-triple** | 4.3 | 99 |

One reason cited for this significant improvement in the crash history is the safer performance of larger vehicles in comparison with the older standard vehicle configurations. An alternative view is that this is simply due to increased levels of enforcement. A significant number of these larger and heavier vehicles also participate in the Intelligent Access Program (IAP) whereby heavy vehicle operators agree to remotely track the movement and location of their vehicles using GPS in return for access or less restrictive access to the road network.

## 5.2 Intersection geometry

In 2014, a number of Councils in northern NSW decided to open up the majority of their rural road networks to AB-triples to improve freight productivity across the region. It was agreed that because the network had already been assessed for a comparable vehicle in terms of length (i.e. Type 1 road train) that this concession should be extended to other vehicle types of a similar length. To its credit, this approach has allowed the region to open up the majority of its roads AB-triples within a relatively short period of time. The next natural step for the Councils is to assess the network in more detail for Type 2 road trains and quads.

From a design perspective however, this approach may lead to a number of secondary issues with respect to the actual geometry of the road, bridge structural capacity and accessibility to other approved routes. One of the most difficult issues to overcome is the impact on existing intersection layouts as these larger vehicles have a significantly larger turning circles (especially along the inside turning path) as compared to the previous B-doubles for which the road network was originally designed. Before a route can be declared as being suitable for any larger vehicle type, a detailed geometric assessment of each intersection along the route needs to be undertaken to which the usual response is a pavement widening or roadside furniture setback of some sort. Table 5 illustrates the impact of these larger vehicles on the inside edge of their swept path as they navigate around tight curves.

**Table 5 – Low speed swept path comparison with the B-double design vehicle benchmark**

| Vehicle | B-double | PBS A-Double | PBS Super B-double | B-triple | Type 1 Road Train | AB triple |
|---|---|---|---|---|---|---|
| LSSP | 8.2 m | 8.7 m | 8.7 m | Between 9.5 m and 10.6 m* | 8.8 m | Between 9.1 m and 9.5 m |

* *depending upon the configuration.*

## 5.3 Pavement loading

The aim of this performance standard is to limit the damage caused to pavements by the vertical load of each vehicle axle on the pavement and bridge structures. Combined axle group loadings are restricted under General Mass Limits, Concessional Mass Limits or Higher Mass Limits. General Access vehicles are limited to a gross mass of 50 tonnes. However, a 50.5 tonne mass limit is also possible by having 6.5 tonnes on the steering axle, providing the motor vehicle complies with certain additional conditions. If vehicles have tri-axle groups, are fitted with certified road friendly suspension, and are using an authorised HML route, then higher mass entitlements could apply. Table 6 shows the various payload limits across the different vehicle types.

**Table 6 – Vehicle Payload limits across the different vehicle types**

| | B-double | PBS A-Double | PBS Super B-double | B-triple | Type 1 Road Train | AB triple |
|---|---|---|---|---|---|---|
| Payload | 40 t | 58 t | 46 t | 54 t | 58 t | 68 t |

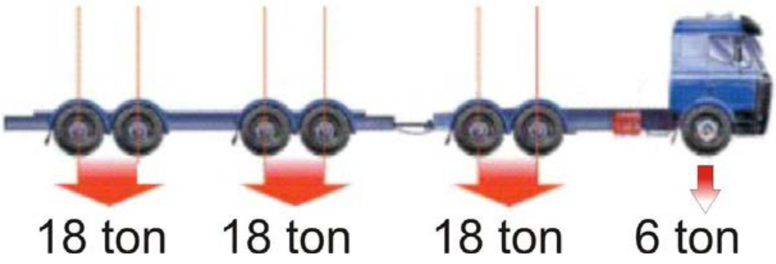
Table 7 shows the standard axle mass limit increases for vehicles fitted with certified road friendly suspensions. Not surprisingly, under HML there is a significant increase in the productivity of road freight transport for each axle group.

Table 7 – Type of axle group

| | Maximum mass (tonnes) permitted under GML | Maximum mass (tonnes) permitted under HML |
|---|---|---|
| Tandem axle group | 16.5 t | 17.0 t |
| Tri-axle group | 20.0 t | 22.5 t |
| Single drive axles on buses | 9.0 t | 10.0 t |
| Six-tyred tandem axle groups | 13.0 t | 14.0 t |

Another way of looking at the impact of an ever-increased payload on our roads is the way in which this additional HML allowance is spread across the various vehicle axles or axle combinations. For this reason, heavy vehicles designers are constantly looking for ways to optimise the distribution of the payload to maximise the benefits of HML. An example is provided in Figure 1 below.

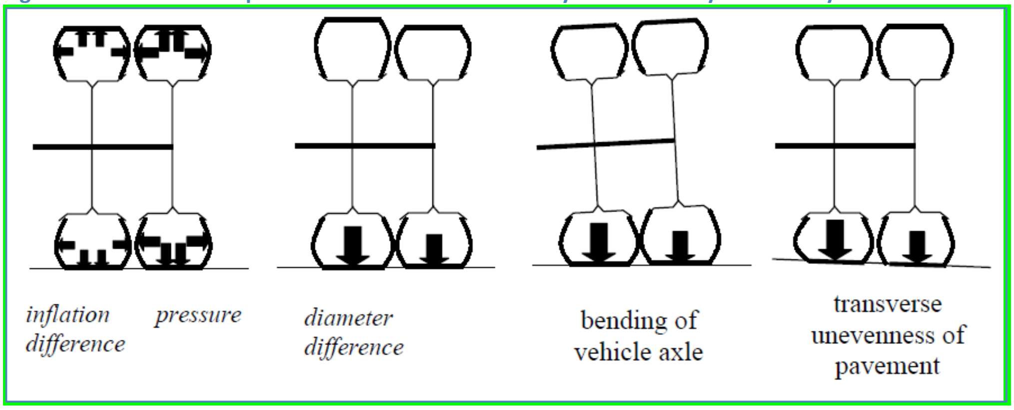
Figure 1 - Axle weight distribution with the gross mass limit




*Source: NVF committee (2008) Report nr. 08/2008 - Vehicles and Transports, Road wear from Heavy Vehicles*

Another important aspect to take into account when comparing single versus multi-tyre axle assemblies is the potential for unequal load distribution. For example, when comparing dual and single tyre assemblies, the general assumption is that the wheel load is shared equally between both. However, there are a number of reasons why this may not necessarily be the case. Figure 2 provides some examples of how unequal load distribution can occur.

Figure 2 - Causes of unequal load distribution between tyres in a dual tyre assembly




*Source: NVF committee (2008) Report nr. 08/2008 - Vehicles and Transports, Road wear from Heavy Vehicles*

## 5.4 Bridge loading

There is significant pressure on road authorities to improve freight productivity throughout Australia. A key response to this need is to address the current limitations of the road network for heavy vehicle operators. Bridge capacity is perceived as being one the most critical issues to be addressed. Rating of existing bridges (2004) and the BAG (Bridge Assessment Group) Guidelines for bridge load capacity assessment (1997) are currently the principal documents for detailed bridge capacity assessment. The purpose of these guidelines is to limit the maximum effect on a bridge whilst at the same time seeking to provide a greater level of access.

From a structural perspective, heavier payloads do not necessarily relate to greater relative bridge impacts. This is because in some instances the longer vehicle types are able to spread their axle loads more evenly across the structure or even bridge a short span length. Conversely, it should be noted that for most studies involving the use of the BAG, it is very difficult to analyse the dynamic cumulative effects of a platoon of heavy vehicles in one lane or a pair of heavy vehicles (of the same or different length) travelling side by side. Therefore, the best approach to assess these extreme load effects is to use any available medium to long term Weigh in Motion (WIM) data preferably lane by lane and then extrapolate this to determine the most appropriate static load case to analyse. A range of typical maximum static loads is shown in Table 8 below.

**Table 8 - Bridge Loading (GCM)**

| | B-double | PBS A-Double | PBS Super B-double | B-triple | Type 1 Road Train | AB triple |
|---|---|---|---|---|---|---|
| Bridge loadings (GCM) | 62.5 t (68 t on HML routes) | 79 t (85 t on HML routes) | 66.5 t (72 t on HML routes) | 82.5 t (90.5 t on HML routes) | 79 t (85 t on HML routes) | 99 t (107 t on HML routes) |

Bridges also need to withstand the amplified effects of dynamic loading, over-loading, vertical and horizontal shock forces such as in areas where heavy vehicle braking occurs, and safely respond to crashes with the concrete barriers and piers. In many cases these loads are far greater than anything likely to be observed from analysing WIM data, even if collected over an extended period of time.

## 5.5 Road width requirements

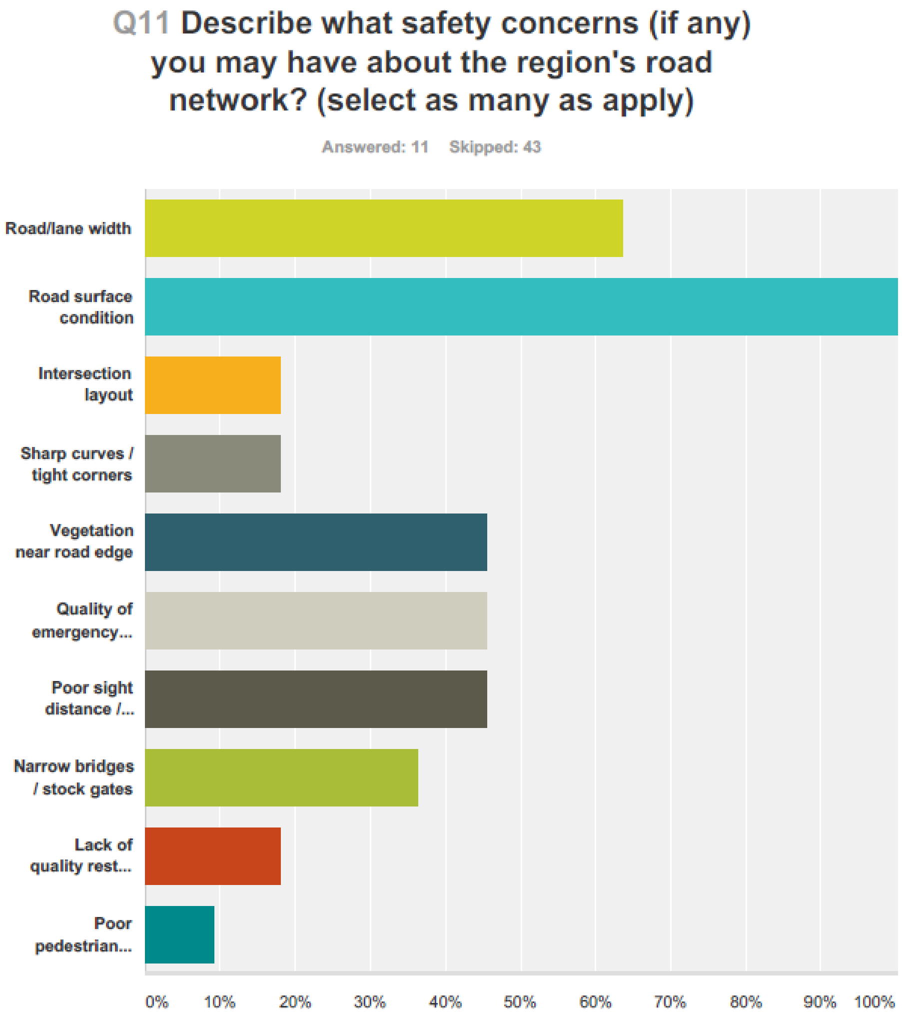
This measure considers the vehicle's ability to remain within the available traffic lane width while travelling along a straight road. This measure is influenced by variations in the road surface due to cross-fall, unevenness and localised failures on occasion. The smaller the number, the less road width the vehicle requires. From a road design perspective the only response to this measure is to increase the available lane width or construct a surfaced shoulder by adding to the overall road cross section width.

Table 9 -Vehicle tracking ability on a straight path (TSAP results)

| | B-double | PBS A-Double | PBS Super B-double | B-triple | Type 1 Road Train | AB triple |
|---|---|---|---|---|---|---|
| Tracking ability on a straight path | 2.9 – 3.0 metres | 3.0 – 3.2 metres | 3.0 – 3.2 metres | 3.1 – 3.3 metres | 3.2 – 3.4 metres | 2.9 – 3.3 metres |

As further evidence in support of the importance of this measure, it is useful to reflect on some recent survey results obtained from a study undertaken by SMEC in NSW. The consultant team identified a range of issues that were perceived as being deficient on our regional road network. These survey results are consistent with previous studies undertaken by the company and highlight the importance that is being attached to road lane width and road surface condition by the motoring public. Figure 3 provides a summary of the safety concern results as obtained from the survey.

Figure 3 - Survey results: main road safety concerns



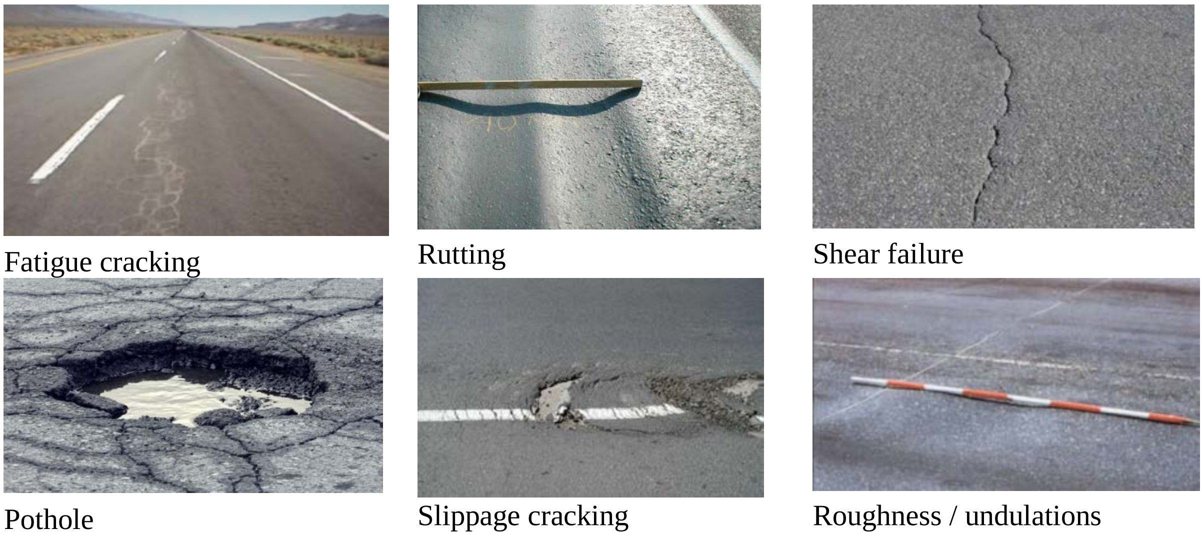
## 5.6 Actual road wear

The degree of road wear from heavy vehicles is not caused only by those factors highlighted above. That is because the maximum permissible gross weight and axle loads are not always reached by all heavy vehicles such as in the case where a large proportion of the freight task is volume based. Actual road wear can therefore only be determined from the actual weight of the heavy vehicle, including the prime mover and the semi- trailers, etc. in actual traffic flow and traffic composition. This road wear does however manifest itself in a number of very clear ways where is does occur. These failure mechanisms when combined with water can lead to rapid pavement failures and in turn severe and expensive heavy vehicle damage. The main distress modes, especially from the point-of-view of traffic loadings are:

- fatigue cracking which occurs mainly on the surface of relatively weak or thin pavement structures;
- primary rutting which occurs mostly on thick bituminous asphalt pavements and is confined to the upper pavement layers;
- secondary rutting which occurs mainly on relatively weak / thin pavements and is primary linked to severe subbase failure, i.e. all pavement layers are affected
- ravelling being the loss of stone in the surface of the pavement usually caused by a great number of horizontal shear loading cycles, i.e. heavy turning movements
- potholes resulting either from localised pavement failures or from water ingress (often through open cracks)
- roughness also referred to as unevenness of the pavement due to many factors including rutting, cracking, potholes and uneven settlement.

The reason why it is important to know about these various types of failure mechanisms is because it tells a lot about what the primary cause for the failure might be. Where the failure occurs near the pavement surface, this can be strongly influenced by contact stresses and their distribution at the tyre-pavement interface. When pavement deformation occurs deeper in the pavement structure this is most often caused by too heavy loads. Figure 4 provides examples of the types of failures of flexible pavements which can occur (Civilblog 2015).

**Figure 4 - Types of failure of flexible pavements**



# 6. So what can traffic engineers and planners do about this?

To begin with it is important to realise that the current design guidelines are constantly needing to be updated. The advent of larger vehicles have the potential change many of the previous assumptions about vehicle performance and how they impact on our roads. This applies to both safety and design.

Secondly, at some point there must be a limit to how heavy and how long these heavy vehicles can be allowed to become. Road Controlling Authorities and Councils are under severe pressure to maintain the condition of our roads and without some sort of physical limitation being placed on our roads the trucking industry will continue to eke out whatever commercial advantage can be gained from the rules as they currently apply.

Finally, in pursuit of the stated goal of the Federal Government and numerous State Road Controlling Authorities regarding moving more freight from road onto rail, more needs to be done towards encouraging the use of the right size of vehicle for the right size of job, including placing restrictions on roads that compete directly with rail.

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