National Transport Commission

Performance Based Standards Scheme Review

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         Level 15/628 Bourke Street
         MELBOURNE VIC 3000
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Abstract: This paper discusses the Performance Based Standards heavy vehicle access scheme. It reviews the initial operation of the scheme against its major objective in improving road freight productivity. This paper highlights a range of issues identified by stakeholders which may affect ability of the scheme to deliver its objectives and makes recommendations for modifications to improve the viability of the scheme.
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Key words: Performance Based Standards, PBS, heavy vehicle access scheme, freight productivity.
The National Transport Commission (NTC) is an independent body established under the National Transport Commission Act 2003 and Inter-governmental Agreement for Regulatory and Operational Reform in Road, Rail and Intermodal Transport. It has an ongoing responsibility to develop, monitor and maintain uniform or nationally consistent regulatory and operational reforms relating to road, rail and intermodal transport.

Due to Australia’s low population density and spread out major population centres, road freight constitutes a more important component of the total freight task than in many other countries, with many freight tasks being incontestable by other means. Likewise bus transport is key part of the public transport network which contributes significantly to facilitating the movement of people to and from work and around cities and urban communities. Improved transport productivity can, therefore, reduce the cost of moving people and freight and, ultimately, the cost to consumers for goods and services.

To allow industry to implement and benefit from improvements to road freight productivity, without sacrificing road safety, the Australian Transport Council (ATC) supported the development of a performance based approach to heavy vehicle regulation as an alternative regulatory system to the current prescriptive regulations. It approved the Performance Based Standards (PBS) package in October 2007.

Significant challenges remain to ensure this important national productivity reform, endorsed by the Council of Australian Governments and the Productivity Commission, delivers on its true productivity and safety potential.

The ATC requested that the NTC review the operation of the PBS scheme after 12 months of operation. This paper was written in response to that request and may eventually lead to the submission to ATC of a regulatory impact statement in 2010 with the aim of improving and promulgating the PBS system into legislation.

Extensive consultation has been undertaken between the NTC and representatives of all Commonwealth, state and territory transport agencies, industry, the community and other relevant stakeholders, in order to identify issues with the current PBS scheme and identify some possible directions for further development.

The NTC acknowledges the work of Kristian Cook, George Konstandakos, Meena Naidu, Julian Del Beato, Marcus Coleman and Jose Arredondo in preparing this report.

Greg Martin
Chairman
SUMMARY

Freight productivity enhancement is critical to maintaining Australia’s economy and standards of living. This is particularly so within a slowing global economy where profit margins are reduced and where waste and inefficiency become significant factors in business sustainability. Performance Based Standards (PBS) has been identified by the Council of Australian Governments (COAG) and the Productivity Commission as an important enabler of productivity growth for the road freight sector.

“Performance Based Standards is seen as an important element in a regulatory approach to road transport which will enable continuous productivity gains and technological improvement, whilst meeting reasonable safety, road asset protection and environmental standards.”

The scheme was approved in its current form by the Australian Transport Council (ATC) in October 2007. It has been developed as a world-leading approach to matching vehicles to appropriate road networks by focussing on vehicle performance levels rather than a ‘one size fits all’ approach.

PBS provides an alternative approach to heavy vehicle regulation which can provide productivity gains whilst achieving minimum safety requirements. It focuses on how well the vehicle behaves on the road, rather than its dimensions and mass, through a set of safety and infrastructure standards. This ensures that a vehicle’s performance is matched to its level of road network access.

This report is a review of the scheme’s effectiveness during its first year of operation as requested by the ATC. The report focuses on developing a sustainable alternative compliance scheme for broad-based productivity gains by evaluating the scheme’s current operation and its capacity to expand beyond the current level of participation.

Progress to date

As of June 2009 there have been 52 approved SMART vehicles. Although this number is low, particularly when reviewed against a backdrop of sales volumes of around 15,000 heavy trucks per year, it represents a scheme that in operational terms, remains in its infancy. The majority of industry members have taken a ‘wait and see’ approach to participation, largely because early adopters have not realised the desired network access. This scheme is also regarded as being costly, complex and time consuming.

There is evidence that the attitude of industry members towards PBS is improving as approved (and more productive) vehicles are granted access to the road network. It is reasonable to expect that even under existing arrangements the rate of participation would continue to rise.

Network access and bridge assessment

Industry members have identified the lack of certainty for road access as by far the major obstacle to wider adoption of PBS. The NTC believes that this situation is improving with

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2 SMART is the name given to Performance Based Standards approved vehicles
3 Federal Chamber of Automotive Industries VFACTS data for Heavy Trucks (>15T) sales 2007 (15,370 units)
evidence that states are beginning to put into place policies that assure access for SMART vehicles. In particular, South Australia and Queensland have developed public policy to allow as of right access to conforming vehicles on mapped networks. However, there is clearly more work to be done in improving the access arrangements and information available in all states.

The demand for bridge assessments for higher productivity vehicles has been identified as a key issue in granting vehicle access. Given the legacy issues of an ageing bridge stock built to varying standards and strengths that will undoubtedly remain for some years, it is unlikely that such demand will decrease. Some road agencies have responded more effectively than others, by reforming how bridge assessments are undertaken and the availability of necessary resources.

NTC recommends that a transparent customer service charter for network assessments be developed by road agencies, clearly outlining the respective responsibilities of both road agencies and applicants. It could include matters such as assessment time frames, any associated costs to applicants, technical guidelines for enhancing applicants’ prospects of receiving approval and service standards explaining how and to what extent road agencies can cooperate with applicants in developing and refining their applications.

**PBS process**

Industry has identified that the current process for vehicle applications is geared towards servicing small volumes of highly innovative vehicles, and is unable to manage generic and modular high productivity vehicles. In addition there appears to be a lack of qualified assessors and certifiers, operational information and resources to service larger numbers of vehicle applications. This has highlighted the potential for industry led development of PBS ‘blueprint’ vehicles.

While early development of PBS policy and standards was undertaken on the basis of uniformly conducting assessments of all applicant vehicles to each of the standards, as experience with PBS assessments grows, compliance with different standards for different types of heavy vehicles and combinations can be predicted with a progressively higher degree of reliability. Therefore, it is proposed to identify options for a more strategic application of the PBS standards (not to be confused with a relaxing of requirements) and to understand how the need for their application varies with different types of heavy vehicles and modes of access.

A key concern with the current business rules is that only a complete vehicle combination may be submitted for approval. This means that a trailer that has been fully approved with a certain prime mover must be completely reassessed if used with a different prime mover even if they are of a very similar configuration. Conversely a prime mover which is shown to be capable of towing a trailer of certain mass must be reassessed if towing a different trailer even if they are of the same mass. This situation restricts real world flexibility and reduces the productivity potential.

The NTC recommends developing a system where trailer groups and prime movers may be assessed individually, in some cases by the manufacturer of the vehicle, so that there is a degree of flexibility and modularity achieved when forming compliant combinations. This process will facilitate the development of more flexible and useful blueprint designs which form a low cost entry method for operators of standard configuration vehicles.
PBS requirements

Through consultation and feedback received from the Performance Based Standards Discussion Paper (NTC, 2008), NTC has noted a desire from both operators and regulators to maintain a level of stability around the current safety standards. NTC agrees with this general principle, however there are some areas that have been identified as problematic.

Vehicle stability is a critical component in ensuring that SMART vehicles are safe when operating on their respective networks. However static physical testing or numerical modelling does not take into account active vehicle systems developed to reduce the likelihood of vehicle rollover. This could be seen as inconsistent with the scheme’s stated objectives of evaluating actual vehicle performance as opposed to prescriptive dimensional constraints and enabling continuous technological improvement. It is therefore recommended to investigate how existing stability requirement test methods may be modified to properly evaluate the on-road performance of vehicles equipped with new safety technology.

Queensland and the Northern Territory argue that restrictive PBS level 4 requirements^4 disadvantage operators seeking to improve productivity and safety through PBS. This results in operators using less safe alternatives such as older style road trains. The NTC recommends forming a working group to reassess the requirement limits for level 4 vehicles and that proposals for new limits be assessed as an element of any future regulatory impact statement.

To allow for greater innovation and productivity in the bus and coach sector, NTC recommends developing a bus level. This level could be based on migrating existing permitted bus routes and developing appropriate performance requirements based on the conditions appropriate to these routes. A bus level may also be complemented with an appropriate industry derived blueprint.

Likewise, the NTC proposes to investigate an appropriate network and limits for high performance multiple combination vehicles of which a B-triple is a typical configuration. COAG has previously requested that states map appropriate networks for B-triples. This would form the basis of a Performance Based Standard level with the development of appropriate performance, length and swept path requirements. This would achieve the aim of a nationally consistent access framework for these generic high productivity vehicles in order to provide jurisdictions with the confidence that a vehicle’s safety performance is appropriate to the level of access.

Next steps

The NTC proposes a staged introduction of the recommended changes to the PBS scheme (refer Table A). Consideration has been give to the changes that will deliver the greatest improvements in scheme performance and these items are proposed to be actioned in the regulatory impact statement due in the first quarter of 2010. Options, costs and benefits will be put forward in a draft regulatory impact statement which will be available for public consultation and refinement prior to the final document submission to ATC.

^4 PBS level 4 requirements and network are designed to cater for vehicles roughly equivalent to larger (type 2) road trains.
### Table A. Summary of issues and action items:

<table>
<thead>
<tr>
<th>Item</th>
<th>Issue</th>
<th>Action</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Industry members have identified the lack of certainty around road access as the major roadblock to the wider uptake of PBS. Other issues such as the differing application of the PBS scheme in each jurisdiction have resulted in inconsistencies in network access.</td>
<td>NTC to develop a regulatory impact statement and model legislation in order to provide a national PBS scheme which offers transparency in relation to network access.</td>
<td>Stage 1 - RIS</td>
</tr>
</tbody>
</table>
| Process improvements | Industry members have highlighted the need to amend business rules in order to improve the operation of the PBS review panel in terms of operation, access arrangements, how generic vehicle designs are handled, assessment and certification rules and nationally consistent operating/access conditions. | - Allow for self assessment and self certification to approved manufacturers.  
- Develop national access conditions.  
- Develop an out of session PBS Review Panel process.  
- Develop improved blueprints and a modular certification process. | Stage 1 - RIS |
| B-triple compatible level | COAG has requested states to map appropriate networks for B-triples which should form the basis of a Performance Based Standard level. | Develop a B-triple compatible level of appropriate performance length and swept path requirements. | Stage 1 - RIS |
| Standards improvements | State authorities and industry members have advised that the safety standards require review as some standards do not take into account new technologies, do not align with current arrangements and do not adequately cater for buses. | The NTC recommends the reassessment of certain standards as identified by the review as not meeting the objectives of PBS. These include level 4 limits, standards applicability to certain vehicle designs, the use of generic data and the use of stability control for the adherence to static roll-over stability standards. | Stage 2 |
| Infrastructure      | Bridge access is a major contributor to the lack of certainty around network access. | The NTC is recommending an establishment of a bridge working group to develop an improved bridge assessment process. | Stage 3 |

Following the regulatory impact statement, NTC proposes to continuously improve the scheme by implementing further improvements to safety and infrastructure standards in stages.

The PBS scheme can play an important part in improving transport productivity, but it must be able to do so on a broad base to have a national effect. It is hoped that the modifications to the existing scheme, as recommended within this review, will provide a quicker, cheaper and more streamlined pathway to unlocking productivity within an increased proportion of road freight operations whilst maintaining appropriate levels of safety and asset protection.

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5 Refer section 8, Implementation Timeframe
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1. INTRODUCTION

This paper identifies, discusses and makes recommendations regarding the major issues facing the Performance Based Standards (PBS) scheme in meeting its objective of providing a voluntary access framework for higher productivity vehicles. This paper intends to set the direction for further enhancements to the existing scheme and forms a precursor to the development of legislation governing the vehicle assessment standards rules, administration and operation of PBS. In doing so, it will consider the ability of PBS to meet current and future needs of providing safe access to more productive and innovative vehicles.

PBS has been identified by Council of Australian Governments (COAG) as an important element in enabling productivity growth for the road freight sector. The scheme was approved in its current form by the Australian Transport Council in October 2007. In February 2006, COAG recognised the potential of the reform and agreed that:

“Performance Based Standards is seen as an important element in a regulatory approach to road transport which will enable continuous productivity gains and technological improvement, whilst meeting reasonable safety, road asset protection and environmental standards.”

The national freight task is projected to increase significantly over the next decade, with a high proportion of freight being ‘non-contestable’ by alternative modes such as rail and sea, road transport is expected to increase its share of freight by 6 per cent to 42 per cent by 2020. The increase in freight demand comes under further pressure from growing levels of urban congestion in Australian cities. Unlocking constraints on freight productivity has been identified by government and industry alike as necessary for maintaining downward pressure on the price of goods, as well as contributing to improved road safety and meeting targets for reduced levels of greenhouse gases produced by the transport sector.

In its Twice the Task report, NTC identified the need to increase freight productivity through a number of strategic measures, including the enhanced use of existing land infrastructure. By providing a framework for the assessment of SMART vehicles, PBS can help meet this objective. However to have a measurable effect on the national freight task requires that the PBS scheme deliver productivity benefits for a sizeable proportion of the vehicle fleet and not just for one-off innovative vehicles. It is with this objective in mind that this paper investigates the capacity for the current scheme to deliver the required outcomes.

A comprehensive national information resource on the PBS scheme is available at www.ntc.gov.au.

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3 SMART vehicles are higher productivity heavy vehicles which have been approved as conforming to the Performance Based Standards.
2. PBS AND EXISTING HEAVY VEHICLE ACCESS ARRANGEMENTS

Under national model legislation, heavy vehicles are categorised in the following four classifications (refer Appendix 2 for more detail):

- General access vehicles, which are those complying with the vehicle standards and mass and loading regulations (e.g. rigid trucks, semi-trailers, standard type truck-trailers).

- Class 1 vehicles are engaged in ‘special purpose’ transport operations, which include oversize and over mass, agricultural and mobile plant vehicles (e.g. low loaders, concrete mixer trucks).

- Class 2 vehicles are specific types and combinations, which are compliant with applicable model regulations. As a result of their size and/or mass they are subject to restricted access (e.g. B-doubles, road trains and long buses).

- Class 3 vehicles are non-standard heavy vehicles which do not fall within the class 1 or 2 categories. These are typically higher productivity vehicles which operate under concessional access/permit schemes or under the PBS scheme (e.g. super B-doubles and under existing legislation, all PBS vehicles). Their access to the road network is either restricted or in accordance to the PBS access levels.

The classes are divided based on the freight task, taking into consideration the demands on payload mass and volume, as well as the extent of access required.

In classes 1 to 3, a risk-based approach is applied to prescriptive standards in order to strike a balance between allowing the productivity concession and maintaining an adequate level of safety and protection of road infrastructure.

In the case of state and territory-specific permit schemes, variations with corresponding state, territory or national schemes may sometimes account for specific local circumstances. However, they often tend to also reflect more subjective differences, such as in the judgment of road agency staff. It is between these schemes that the greatest degree of variation between states and territories exists.

2.1 Scope of PBS

Achieving the COAG directive of PBS contributing to continuous productivity gains unavoidably depends on broadening the scope and reach of the scheme, beyond that under existing arrangements.

In the spectrum of heavy vehicle on-road performance, at one end is as-of-right access for standard (prescriptive) heavy vehicles, and at the other are highly innovative vehicles, for which there is uncertainty about on-road performance and therefore more comprehensive assessment is required. This is illustrated in Figure 1.

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8 Non-standard heavy vehicles refers to those that do not comply with applicable vehicle standards and/or mass and loading regulations, and therefore do not qualify for ‘as of right’ access to the road network.
Between both ends of the spectrum are non-standard (class 3) heavy vehicles, which vary in the degree to which they may be considered non-standard. How these heavy vehicles are assessed and regulated has significant implications for determining the scope of PBS.

Increasing the reach of PBS is not restricted to just increasing the rate of participation in the existing scheme. In fact, with industry members judging the existing scheme as only partially effective in unlocking productivity, greater participation alone would be unlikely to contribute to the scheme achieving its objectives.

Instead, the focus will be on identifying options for broadening the scope and reach of PBS to leverage its strengths (the most obvious being the Vehicle Safety Standards, as distinct from how they have been applied), such as by bolstering existing state and territory heavy vehicle access arrangements and moving closer to a national heavy vehicle access framework.

PBS was developed as an alternative heavy vehicle compliance scheme. It was intended to provide an alternative compliance path for vehicles that did not fit within the existing (prescriptive) heavy vehicle access schemes, as well as a more robust means of assessing the types of vehicles already falling within such schemes.

An underpinning principle applied to the development of the PBS scheme was that the performance standards would be set at a level at least equivalent to that of corresponding prescriptive schemes. Despite the higher costs resulting from achieving and demonstrating compliance with the PBS standards, the attractiveness to industry was intended to be drawn from the ability to operate more productive vehicles on an extensive road network.

### 2.2 Developing prescriptive regulations using PBS

Significant discussion on the evolution of PBS designs to prescriptive standards in “The role of performance regulation” section of the Performance Based Standards Discussion Paper (NTC, 2008). In theory, the development of prescriptive regulations offers a more simple and practical alternative to the current PBS scheme. However, in practice, gaining national agreement on prescriptive regulations for higher productivity vehicles has been a particularly difficult objective to achieve.
“... why have a PBS scheme? If the aim is to provide access to a greater number of high performance generic vehicles meeting the prescriptive regulatory standards why not use that framework?... Vehicles built and operated under the current prescriptive framework would seem to provide the most economic approach to higher vehicle productivity”.

NSW Roads and Traffic Authority – response to PBS Discussion Paper

“Prescriptive and PBS processes are parallel paths and both must continue to develop for the delivery of productivity. We note also that the prescriptive standards actually codify accepted performance and there is accounting of the performance of combinations through this process.”

Australian Trucking Association response to PBS Discussion Paper

In fact, the PBS scheme was developed with the purpose of codifying accepted performance. The provision of PBS blueprints was intended to facilitate broader adoption of compliant SMART vehicle designs.

There are precedents for the utilisation of PBS standards and assessments in the development of prescriptive regulations. This was the approach taken by the NTC in developing the 26 metre B-double policy in 2005. Utilising the PBS standards, a prescriptive rule for this combination type was developed to provide a degree of compliance assurance to the PBS standards.

In effect, PBS blueprints are a type of prescriptive standard. The key differences between them and prescriptive regulations are their degree of prescription and availability. PBS blueprints require more comprehensive specification than equivalent prescriptive regulations. They are also not always available for broader adoption, particularly if they were developed by a private applicant.

In summary, the NTC supports PBS being utilised as a tool for proving and codifying accepted performance. Some options for precisely how this may best be done are discussed further in section 4.

2.3 PBS as a national heavy vehicle access framework

The objective of PBS is to provide operators with a more transparent national heavy vehicle access framework with a greater degree of objective information, forward knowledge and certainty of compliance and network access.

Figure 2 describes the relationship of the PBS scheme to existing notice and permit schemes in terms of vehicle performance and network access. The PBS scheme attempts to reduce the range of ad hoc, inconsistent access arrangements for non-standard heavy vehicles. It is not proposed to repeal existing access schemes with high levels of national uniformity, such as for B-doubles. Instead, the focus would be on leveraging agreed PBS principles to achieve national uniformity for vehicle types and access schemes, for which agreements on national arrangements have proven difficult to achieve.
Therefore, in further development of PBS policy, it is proposed to:

1. Identify options by which PBS may move beyond merely serving as an assessment tool, to being better integrated into a national heavy vehicle access framework, including by working with road agencies to identify how PBS may be better embedded within their broader heavy vehicle access schemes.

2. Better clarify the role and linkages between PBS and the development of prescriptive regulations.

3. REVIEW OF PBS SCHEME EFFECTIVENESS SINCE ADOPTION

This section reviews the effectiveness of the current scheme since its October 2007 commencement using the PBS Review Panel. The main objective of the section is to assess key components of the scheme and identify any constraints on wider adoption of the PBS Scheme within industry to provide broad based productivity improvements.

Key elements in reviewing the scheme to date include:

- Volume and mix – review of the number of applications to date and the vehicle types to better understand current volumes and uses of the scheme.
• State implementation of the scheme – how have states provided access to higher productivity vehicles?

• Review panel effectiveness – is the current model of panel review of all applications able to cope with the current and future volume of applications?

• Assessor and certifier effectiveness – are the assessors and certifiers capable of servicing the market for PBS assessment?

• Blueprint effectiveness – have the NTC developed blueprints served their intended purpose of providing a low cost method of entry into the scheme?

• Mapping – has mapping of state road networks been effective at providing a planning tool and access assurance for higher productivity vehicle operators?

• Customer satisfaction – what has been the early customer responses to the process?

3.1 Volume of PBS applications

As of April 2009 there have been 52 successful PBS design approvals, allowing for translation rate of approximately three vehicles built per approved application equates to approximately 140\(^9\) PBS vehicles. Although this number is low, particularly when reviewed against a backdrop of sales volumes of around 15,000 heavy trucks per year\(^10\), it represents a scheme that, in operational terms, remains in its infancy. The majority of industry members have taken a wait and see approach to participation, largely because early adopters have not realised the desired network access. This scheme is also regarded as being costly, complex and time consuming.

There is evidence that the attitude of industry members towards PBS is improving as approved (and more productive) vehicles are granted access to the road network. It is reasonable to expect that, even under existing arrangements, the rate of participation would continue to rise.

3.2 Vehicle types

To date, over forty per cent of applications have been for truck-trailers. The most common reason for truck-trailer operators submitting PBS applications is to qualify for increased mass limits or to overcome state-based inconsistencies in allowable mass limits. PBS has provided the possibility to operate above 50 tonnes on level 2 routes and also 20m overall length on level 1 routes. However, these productivity gains are not realised in all states and territories.

PBS has also proven effective as an access enabler for more innovative high productivity vehicles (for example, 30m B-doubles which transport two forty foot containers around the ports). It has also inspired the development of new technologies that improve both low speed directional and high speed dynamic performance.

In one sense, the proven ability of PBS in serving as an assessment framework for conventional heavy vehicles, as well as the more innovative designs, serves as evidence in

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\(^9\) Based on current translation rate to date (PRP data).

\(^10\) Federal Chamber of Automotive Industries VFACTS data for Heavy Trucks ( >15T) sales 2007 (15,370 units)
favour of its achieving the goal of “govern[ing] what a vehicle can do, not what it should look like.”


Figure 3. Heavy vehicle types approved under the PBS scheme to date

In terms of vehicle types, current applications to the PBS scheme can be categorised broadly in two ways:

- those with a generic transport task, seeking productivity improvements, e.g. 30m B-double and 20m truck-trailers; and
- those with a specialised transport task that makes compliance with prescriptive regulations difficult, e.g. the Floatliners (Veridian glass transporter).

Measured in terms of successfully facilitating access to the road network, PBS is most effective as a compliance path for the latter category of vehicle. In the view of some stakeholders, providing access for the latter category of more innovative vehicle designs was the major rationale for early development of the PBS scheme.

However, for large scale productivity improvement across the fleet it is in the former category of more conventional vehicles where gains in productivity must be realised.
3.3 State and territory implementation

Whilst the PBS scheme has been operating as a nationally consistent method for assessing vehicles, it still requires states and territories to issue permits in order to gain road access. For the process to be effective it is critical that each state implements the reform in a consistent manner. Stakeholder feedback indicates that so far this has not been the case, thus leading to an industry perception that the PBS process does not guarantee road access for fully compliant vehicles.

The bulk of existing applications submitted to the PBS Review Panel have been from operators based in Victoria. While no data exists to show how many of these applications include vehicles which operate across state borders, it is believed to be a relatively low proportion based on the types of vehicles being approved.

**Figure 4. PBS applications by state of applicant**

<table>
<thead>
<tr>
<th>State</th>
<th>Applications %</th>
</tr>
</thead>
<tbody>
<tr>
<td>QLD</td>
<td>12%</td>
</tr>
<tr>
<td>NSW</td>
<td>20%</td>
</tr>
<tr>
<td>SA</td>
<td>4%</td>
</tr>
<tr>
<td>Tas</td>
<td>2%</td>
</tr>
<tr>
<td>Vic</td>
<td>62%</td>
</tr>
</tbody>
</table>

3.3.1 Networks made available

A key objective in developing the PBS scheme was to develop a system that would match vehicles to appropriate road networks. As a result, a stratified road network classification was devised which became known as PBS road network levels.

In approving development of a PBS scheme under administrative arrangements, COAG directed jurisdictions to develop and publish a PBS network by the end of 2007. Table 1 lists the networks that have been made available in each state and territory as of March 2009. In general most ‘a’ level networks have been mapped while ‘b’ level access is by route assessment or only available in special trial areas.
### Table 1. Network level access by state and territory

<table>
<thead>
<tr>
<th>Network Level</th>
<th>ACT</th>
<th>NSW</th>
<th>NT</th>
<th>QLD</th>
<th>SA</th>
<th>TAS</th>
<th>VIC</th>
<th>WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes* (map not yet available)</td>
<td>Yes*</td>
<td>Migration#</td>
<td>Migration#</td>
<td>Yes*</td>
<td>Migration#</td>
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<td>Migration#</td>
</tr>
<tr>
<td>2a</td>
<td>Yes* (map not yet available)</td>
<td>Yes*</td>
<td>Migration#</td>
<td>Migration#</td>
<td>Migration#</td>
<td>Not available at this time</td>
<td>Migration#</td>
<td>Migration#</td>
</tr>
<tr>
<td>2b</td>
<td>Not available</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In progress</td>
<td>no</td>
<td>Trial</td>
<td>No</td>
</tr>
<tr>
<td>3a</td>
<td>Not available</td>
<td>Migration#</td>
<td>Migration#</td>
<td>Migration#</td>
<td>Migration#</td>
<td>no</td>
<td>No</td>
<td>Migration#</td>
</tr>
<tr>
<td>3b</td>
<td>Not available</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In progress</td>
<td>no</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4a</td>
<td>Not available</td>
<td>Migration#</td>
<td>Migration#</td>
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<td>No</td>
<td>No</td>
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<tr>
<td>4b</td>
<td>Not available</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>In progress</td>
<td>no</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

* Does not include council owned roads

# Migration refers to translation of existing networks levels to PBS levels, e.g. B-double network is migrated to become the PBS level 2a network.

The network level maps are intended to provide certainty for prospective PBS vehicle developers and operators. In practice, they have not provided the certainty that industry desires. Under the PBS principle of “matching roads to vehicles”, it was intended that a vehicle approved as compliant with the safety standards of a given PBS level would be granted access to the corresponding, approved PBS road network. While this remains the agreed national policy, in practice some states and territories determine the level of access for approved SMART vehicles on a case-by-case basis. Under such an arrangement, an applicant may receive an insufficient level of road access than required to meet their business needs. In addition, some states have regarded the mapped levels as indicative only and require further route assessments and bridge assessments on a per vehicle basis for the mapped routes, with associated costs and time.

It is simply not possible to put forward a business case for deploying SMART vehicles if there is no certainty that the vehicle will be allowed to run on the routes which have been indicated as suitable for a particular level of performance. In addition, the access assessment is time sensitive given that industry often responds to customer contract tenders within defined time limits.

#### 3.3.2 Local Government and last mile issues

‘Last mile’ issues have been strongly highlighted by road authorities and have been a cause of frustration within industry as generally, local government roads have not been included in the mapped levels. This has generally been due to local government concerns regarding asset protection and safety. It is understood that state road authorities have been working with local governments to improve access for improved freight vehicles, however it is clear that more work needs to be done in this area to dispel incorrect perceptions of high productivity goods vehicles and educate local government on the principals and benefits that can be derived by mapping parts of their network as suitable for PBS vehicles.
Therefore NTC suggests that a renewed focus on improving the level of understanding of PBS by local governments and local government associations, through engagement with road authorities and industry, backed up with suitable information, will form a crucial element of effective implementation of the reform.

Technical issues faced by local governments in making route assessments will be helped by the recent publication of Austroads guides on network and bridge assessment (AP-R333/09 “Guidelines for Assessing Heavy Vehicle Access to Local Roads” Austroads, 2009). These documents provide local governments with a set of nationally consistent guides on assessing the suitability of their road networks. However these guides can only be of use if local governments are sufficiently resourced, in terms of expertise and capacity to conduct network assessments.

It is expected that, with improved information and comfort regarding asset protection, the mapping of non-state-owned roads will become more extensive as local governments understand the safety and productivity benefits that the scheme has to offer.

Local government perceptions of high productivity goods vehicles

- High productivity heavy goods vehicles are increasing in size
- High productivity heavy goods vehicles will deteriorate local roads
- There is an over/under cost recovery to maintain assets
- High productivity heavy goods vehicles are less safe
- Poor maintenance of road friendly suspension leads to adverse pavement impacts
- Local communities do not benefit from high productivity vehicles
- Performance Based Standards are unclear and will not be effective in controlling inappropriate vehicles
- The freight industry is not regulated enough to ensure safety of our community

3.3.3 **State policy for vehicle access**

States and territories have implemented the PBS policy in different ways. As yet no state or territory has published notices to allow streamlined (as-of-right) access for fully compliant PBS vehicles, although a number of states have indicated that they are in the process of drafting such a policy.

**Table 2. Network access policy by state and territory**

<table>
<thead>
<tr>
<th>Network Access Arrangements</th>
<th>ACT</th>
<th>NSW</th>
<th>NT</th>
<th>QLD</th>
<th>SA</th>
<th>TAS</th>
<th>VIC</th>
<th>WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public policy in place for PBS vehicle access</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Draft for as of right access for Tier 1 and class A vehicles.</td>
<td>No</td>
<td>Drafting</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Access process (flowchart) publicly available</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>As of right access for fully compliant (non tier 3 bridge assessment vehicles)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Proposed for class A vehicles</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mandatory route assessment</td>
<td>No</td>
<td>Yes, for each vehicle/route application</td>
<td>No</td>
<td>Only for routes not already mapped</td>
<td>Only for routes not already mapped</td>
<td>Yes</td>
<td>Only for routes not already mapped</td>
<td>Only for routes not already mapped</td>
</tr>
<tr>
<td>Mandatory road authority bridge assessment</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Only for routes not already mapped</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

As detailed previously, the main difference between states regarding implementation is the acceptance of the PBS as being appropriate for road access. For example, the New South Wales access process includes a step that assesses whether the vehicle design is supported by the Roads and Traffic Authority, which in effect negates the concept of vehicle acceptance based on a common set of nationally agreed performance profiles.

In the case of SMART vehicles, a number of road agencies have indicated that they do not automatically accept compliance with the bridge loading standard. The PBS bridge loading requirements, agreed by ATC, are essentially the same as those applied to corresponding prescriptive vehicles. It is understood there is a perception that some SMART vehicles, despite compliance with the PBS bridge loading standard, may impose unacceptably high loads on certain bridges. Complicating the matter is the lack of an alternative, nationally uniform bridge assessment method.

While acknowledging the importance of preserving bridge infrastructure and the complex nature of related assessments, NTC believes that SMART vehicles should not be subjected to more stringent bridge loading standards or assessment methods than for corresponding, prescriptive vehicles.
The NTC has received feedback from a number of operators that the process of applying to some road agencies and local governments for pre-approval for access (prior to submitting a formal PBS application) has proven frustrating and lacks transparency. A contributing factor is that PBS is not yet a one stop shop and requires applicants to negotiate with road agency permit officers and local governments, as well as the PBS Review Panel Secretariat. One operator reported to the NTC that he had waited almost two years for a route assessment to be completed and was yet to receive a response.

“There is a need for a communication strategy to be able to manage industry expectations on what is possible for any given route as the ability to increase the length and mass of vehicles for example is limited by the capacity of the infrastructure and not just the vehicle’s ability to meet the [safety] standards.”

Queensland Transport – response to PBS Discussion Paper

The NTC supports the development of a national implementation strategy and agrees that a lack of effective communication has led to frustration and delays, on the parts of both industry and government. It is therefore likely that potential exists for the volume of heavy vehicle access applications to be rationalised through the provision of better education to industry, such as on what does and does not have a realistic chance of being approved.

This issue was discussed in some detail in the section: Better and more accessible information of the Performance Based Standards Discussion Paper (NTC, 2008). In addition to previous publications, such as the PBS kit distributed to all Australian local governments and industry, the NTC understands that some road agencies are currently preparing comprehensive PBS guidelines for applicants. The NTC supports the proposal by Queensland and believes that, from the applicant’s perspective, their availability in each state and territory would contribute to making the PBS process more transparent.
3.3.4 State specific access conditions

The PBS Scheme issued guidelines for determining the national operating conditions that are to be imposed on vehicles participating in the PBS scheme. The guidelines state: “As a general principle, a national condition should not be imposed on a vehicle unless the imposition of the condition will eliminate or significantly reduce a significant risk or harm that might arise from the operation of the vehicle”.

Operating conditions can be imposed by the assessor or the vehicle manufacturer or as a result of suggestions made by the operator and the PBS review panel. The guidelines also state that road agencies may impose additional conditions on the operation of a vehicle in that particular jurisdiction.

Recent documents produced by state road authorities and other agencies have proposed that SMART vehicles should have operating conditions applied which include design requirements that are not related to the PBS standards. This is inconsistent with the PBS operating condition guidelines which require that operating conditions only be applied to control an identified risk that a vehicle design will not meet one or more of the PBS standards.

Table 3. Additional network access conditions by state and territory

<table>
<thead>
<tr>
<th>Network Access Conditions (in addition to PRP assigned operating conditions)</th>
<th>NSW</th>
<th>QLD</th>
<th>SA</th>
<th>TAS</th>
<th>VIC</th>
<th>WA, ACT, NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHVAS’ mass management</td>
<td>Yes</td>
<td>Risk-based approach</td>
<td>Yes</td>
<td>Yes for quad axles</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>NHVAS maintenance management</td>
<td>Yes</td>
<td>Yes for active steer systems</td>
<td>Yes</td>
<td>Yes for quad axles</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Intelligent access program (IAP)</td>
<td>Yes</td>
<td>Risk-based approach</td>
<td>Yes, all levels</td>
<td>Yes for quad axles</td>
<td>Yes for L2 or greater</td>
<td>No</td>
</tr>
<tr>
<td>Side underrun</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Risk-based approach</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>As per guidelines available on request from NSW RTA</td>
<td>Migration of operating conditions from equivalent vehicle levels (e.g. B-double conditions for level 2)</td>
<td>No</td>
<td>Onboard mass monitoring and fatigue accreditation for quad axles</td>
<td>Risk based approach. Special provisions for trial areas as per Freight Futures document. Details to be released by May ’09.</td>
<td>No</td>
</tr>
</tbody>
</table>
While it is acknowledged that states and territories have different road environments, NTC opposes any additional design and operating requirements imposed on a state-by-state basis without any risk or cost/benefit analysis, as this will jeopardise PBS as a nationally consistent scheme for vehicle access.

Operating conditions must not be confused with design requirements. For example, requiring that the prime mover complies with Australian Design Rule 80/02 (Euro IV Emissions) (as per Victoria’s Freight Futures trial requirements) is not an operating condition but a design requirement. To comply, an operator would need to utilise compliant, approved engines (in effect a different prime mover) rather than simply operating the approved vehicle in a particular manner. In this particular case, and in many other additional design requirement access conditions, the fitting of the particular feature may invalidate the operator’s PBS approval if it was not considered during the design and assessment process. For example, an approval which utilises a Euro III prime mover is not able to substitute a Euro IV prime mover to comply with this access condition, as the equipment will be different to that assessed for at least the gradability, hill start and acceleration capacity assessment.

Australian Design Rules (ADRs) are mandatory requirements that apply to new vehicles and as such, they progressively raise the level of safety as standards become more stringent. The process for amending ADRs is well established and should not be subverted by applying additional design requirements as conditions of PBS access, especially on existing vehicles.

Operating conditions represent a safety guard against a vehicle’s risk of harm while operating. However, if not administrated correctly they could quickly hinder the uptake of PBS.

3.4 Review panel effectiveness

The PBS scheme was approved by ATC in October 2007 with the first PBS Review Panel (the Panel) meeting held in November 2007. The role of the Panel consists of evaluating and approving SMART vehicle designs with the assistance of a technical adviser and the executive officer. The Panel is constituted by an experienced policy-maker from each Australian state and territory.

The Panel has met on eight occasions between October 2007 and February 2009. In this time the Panel has reviewed 52 SMART vehicle applications. Of the vehicle applicants who responded to NTC’s PBS customer satisfaction survey (see Appendix 1), only 10% were unhappy with the responsiveness of the Panel and secretariat. The Panel has processed 98% of applications within the business rules performance target of less than 40 days, with the average time taken from submission to approval being 27 days and the longest being 49 days. It must however be recognised that the maximum number of applications reviewed in a single meeting stands at ten. In the current meeting format, ten applications appears to be the practical limit for in-session review. State authorities have also noted that there is a practical limit on the number of applications that can be reviewed by policy staff before each Panel meeting and that they are currently reaching this limit. This could become a significant barrier to the volume of applications able to be assessed on a per year basis using the current business rules and meeting format.

Of the 52 applications received, only one has been rejected by the Panel (for an incorrect drawing). This application was later amended, resubmitted and approved. This result is not surprising as the business rules require the secretariat to ensure that all vehicles fully meet the required standards before vehicles are put before the Panel. In limiting the Panel’s discussions to applications which have been confirmed by both the assessor and secretariat as having met
all the required standards, the process does not appear to be the most effective use of Panel resources.

States, Victoria in particular, have commented that, by reviewing each application, the Panel is gaining better understanding of the risks posed by each vehicle, however to date more than half of all applications being put before the panel are generic vehicle types such as truck trailers and semi-trailers. While each of these applications may have differences in freight task, the vehicle is largely the same, the risks are becoming well understood and thus the need to evaluate each application in depth should be progressively reduced.

The volume of relatively generic vehicles applying for PBS approval is likely to grow as operators identify the additional productivity that may be derived from existing equipment under the PBS scheme. In most cases there would be little value added in having the Panel review all of these common applications. The Panel’s time could be better employed to discuss and evaluate new technologies and vehicles for which panel discretion is required. This would allow for much greater throughput of the more generic types and allow greater time for the Panel to assess vehicles which may pose unique risk profiles.

To ensure that the Panel process does not become an overwhelming burden on road authority resources and a constraint to approval volumes, NTC suggests that a process be developed which would inform road authorities of all of the approvals submitted within the approval period and would designate only vehicles which may pose unique risk profiles, or vehicles for which panel discretion is requested, for the Panel to formally review. Panel members may however add any vehicle from the list of applications to formally review if they feel there may be concerns with a particular application.

### 3.5 Certifiers and assessors

Assessors and certifiers play a vital role in the PBS system by assessing vehicle designs and certifying that actual vehicles are built according to approved designs and specifications. Currently all PBS assessors and certifiers are third parties to the manufacture and operation of SMART vehicles.

For the PBS scheme to achieve its goals of having a significant positive impact on freight transport productivity within Australia, assessors and certifiers will need to be capable of assessing and approving very significant numbers of heavy vehicles in a timely and cost effective manner.

#### 3.5.1 Assessors

Assessors form a critical component of the PBS approval process and are commonly one of the first points of contact that potential applicants have with the PBS process. Assessors perform engineering assessment of the vehicle combination against the required standards for safety and infrastructure. In addition they have the function of guiding the applicant through the PBS approval process, including dealing with the secretariat, Panel and jurisdictions. Assessors are required to have a good understanding of Australian Design Rules, Australian Vehicle Standards Rules (AVSRs) as well as international standards.

Customers have indicated that from a competency perspective, assessors range from theoretical to practical based experience. They claim that assessors which have good academic and simulation skills are missing some of the hands on knowledge that would allow them to grasp some of the practical, ‘real world’ experience that would make them exceptional assessors.
The work that the assessors produce feeds into the certification process, in which the vehicle combination is certified as being built to the approved design.

There have been incidents in which a breakdown in communication between the assessor and the applicant has resulted in vehicles presented for certification that do not match the design. This could be due to poor dimensional tolerancing of design drawings and a lack of manufacturing capacity to exactly match the vehicle to the design limits.

Issues like these tend to show that even though there is a certain degree of maturity and expertise among the assessors, there is some room for improvement in the areas of communication among applicants, assessors and road authorities.

It is expected that as the PBS scheme progresses, and through the support of the panel and the panel’s secretariat, the assessors will increase their level of knowledge on how the scheme works. It will also assist with the assessors gaining a better understanding on how to assess vehicles so the panel spends less time discussing the application and the certifiers have good data to work with.

Due to the high standards of professional knowledge required to perform this function and the high cost of entry (public/professional liability insurance, software packages and/or test facilities) there have been a limited number of assessors that have become accredited under the PBS scheme and hence there is little competition to drive their fees down. This is seen as a potential weakness of the scheme from a customer perspective (see responses to customer satisfaction survey in Appendix 1).

3.5.2 Certifiers

The role of certifiers is to ensure that the vehicle, as built, matches the design approved by the Panel. The certification activities range from taking actual measurements of the vehicle to confirming manufacturer specification and performance to ensure conformance. The latter is frequently used when checking power train requirements (or subsystems, like braking) in which the certifier is not able to independently verify the performance of the component.

Operators must ensure that the information used in their applications is accurate and sufficient to accommodate variations so when the vehicle is certified, it falls within the approved limits (length, height and general vehicle combination characteristics).

Certifiers can use their judgement in assessing the results of their inspection but cannot make technical judgements on issues that may affect the performance of the vehicle.

The certification step represents the last practical appraisal of the vehicle combination before registration (in most states). This process has been generally effective in ensuring the quality of registered vehicles.

As previously noted, the lack of available assessors and certifiers throughout Australia can make the process more time consuming and expensive. While most certifiers can operate in all states and territories, they are currently based in Victoria, South Australia and New South Wales. As the majority of the PBS applications are for vehicle combinations in Victoria and New South Wales, the lack of certifiers has not greatly affected the certification process. However, as more road authorities request that certain vehicle combinations must be put through the PBS system, the need for more certifiers in different parts of the country will become more acute. Other issues limiting the number of certifiers is the high cost of public and professional liability insurance and the conflict of interest clauses listed in the PBS
scheme business rules precluding them from certifying vehicles where they had design and development involvement in.

### 3.5.3 Availability of assessors and certifiers

The current number of approved assessors and certifiers appears insufficient to service higher volume of assessments should PBS be adopted by a significant proportion of the freight transport industry.

**Figure 5. Number of approved assessors and certifiers by jurisdiction**

![Number of Approved Assessors by Jurisdiction](chart)

Of the existing customers in the scheme who responded to NTC’s survey of customer satisfaction, 50% were unhappy with the availability of assessors and certifiers (see Appendix 1) to process their applications. The responses below are typical of those received from applicants.

**Customer responses to the availability of assessors:**

- “It may be easy to find a assessor but there is a limited number available.”
- “We do not have much to choose from.”
- “There are no assessors to actively service the Queensland or Northern NSW sector.”
- “There are too few and their fees are high.”

**Customer responses to availability of certifiers:**

- “There are no certifiers to actively service customers in Queensland or Northern NSW. Due to shortage of certifiers I am still waiting for final reports to be sent to the PBS panel for final processing.”
- “There are not enough certifiers available.”
- “If another certifier was available closer I would contemplate using them to avoid unnecessary travel costs etc.”

It is currently extremely difficult for a new organisation to fulfil the requirements required to become an approved assessor. High barriers to entry into the third party assessment market include expensive simulation software, access to adequate test facilities, professional
insurance and staff experience requirements. These factors will limit the number of organisations capable of responding to demand for PBS assessments.

### 3.5.4 Improving the availability, cost and responsiveness of assessment and certification

For the PBS scheme to work effectively in all states it is clear that an increase in the number of certifiers and assessors, and better distribution of those resources around the country, is necessary.

An alternative is to have the PBS assessments driven by vehicle and trailer manufacturers, thus requiring the majority of assessors and certifiers to be co-located with these manufacturers. This process is possible if the partial certification of vehicle elements concept is adopted. An extension to this idea is to allow suitable representatives from technically competent vehicle manufacturers to apply for assessor or certifier status. This concept has been raised by industry as an effective way to increase the availability, responsiveness of assessment whilst reducing the cost.

An obvious advantage of manufacturer assessment of a vehicle design is that the manufacturer can amortise the cost of assessment over the entire production run of the vehicle in question, whereas an operator may only amortise the cost of assessment over the number of vehicles in their fleet. Manufacturers are also in a position to change the configuration of their designs to better meet the performance requirements than an operator who has little leverage to change a vehicle design.

Organisations are currently banned from assessing or certifying designs which they have helped develop or produce due to the rules around conflict of interest (clause 6a and 6b of the Performance Based Standards Vehicle Certification Rules). The rules constrain PBS from using this valuable resource.

Removing the conflict of interest rules would allow acceptable personnel within vehicle design and manufacturing companies to provide evidence of compliance for their own vehicles; opening the door to enhanced test and simulation. Once these companies establish the facilities, processes and experience for PBS certification they may be in a position to offer their service to third parties.

Road authorities have approached the concept of manufacturer self assessment and certification with mixed views. The outstanding issues appear to revolve around the acceptance of responsibility, quality of assessment/certification, trustworthiness and enforcement.

Under a scheme where a manufacturer is able to certify its own vehicles, it must be made clear that the responsibility and liability for correct certification rests with the certifying entity.

Manufacturers wishing to certify their own products would need to apply for, and be granted assessor/certifier accreditation (as per the existing business rules); ensuring a minimum level of competence and quality of assessment. Accreditation ensures that assessors/certifiers have, and maintain compliance with, a quality system, documentation system, continual training and appropriate insurance.

Current vehicle certification rules have provision for Conformity of Production audits which ensures that manufacturer’s assessments can be audited for quality and consistency with production. Should manufacturer self-certification be accepted into the PBS scheme, the PBS
The secretariat could be called on to conduct regular conformity of production audits for vehicle assessors while state jurisdictions are able to audit certifiers. This will require the secretariat to be sufficiently resourced to carry out this work.

The NTC suggests that the conflict of interest rules in the business rules be revised to allow manufacturer self-assessment and certification and that rules to adequately safeguard the quality of assessment and certification be developed in consultation with state road authorities.

### 3.6 Blueprints

In 2007, ARRB Group Ltd. generated PBS blueprints at the request of the NTC. The specifications for these blueprints were chosen with assistance from industry representatives, and agreed to by the NTC. A similar project was undertaken later in 2007 by ARRB to generate a blueprint design for modular B-triples. The NTC commissioned the following blueprints:

- Blueprint B-triple
- Blueprint Quad Axle Semi-trailer Specification Sheet
- Blueprint Quad Quad B-double (Standard)
- Blueprint Quad-Quad B-double (Steering)
- Blueprint Quad-Tri B-double (Standard)
- Blueprint Quad-Tri B-double (Steering)

The blueprints commissioned by the NTC have not produced the outcome that was intended, that is, a high application rate for vehicle combinations that were built around these blueprints. To date there have been no final approvals issued for vehicles built to the published blueprints.

Customers have commented that instead of developing ranges of dimensions or general drive train characteristics, the blueprints were over specified in their requirements. To facilitate higher numbers of vehicles through PBS, there must be a simpler approach for generic vehicles. Operators will first look to their existing equipment for PBS benefits as opposed to building new equipment. For example, generic PBS designs or blueprints should be developed to provide broad ranges of dimensions and components for generic combinations such as quad dogs. These generic designs must avoid the shortcomings of the current NTC blueprints, which are extremely narrow in specification and therefore virtually unworkable. It should therefore be an objective of the PBS system to have available a set of flexible blueprints which can be adopted by industry.

The NTC believes that it can best serve industry by supporting the industry led development of blueprints by considering and implementing common sense changes to the business rules and standards that will support the implementation of blueprints (see section 4.4 Partial certification).
The NTC considers that the best way to develop quality blueprints efficiently is to have the process be demand driven, i.e. led by industry and for the product to be compliant with the following principles:

1. Blueprints must be fully PBS compliant.
2. Design incorporates increased productivity over prescriptive alternatives.
3. The blueprint must have a degree of modularity (This refers to both the desire to have elements interchangeable between different combinations, i.e. Semi-trailer, B-double, B-triples, Road trains, but also in terms of compliance i.e. trucks certified by truck manufacturer, and trailer certified by trailer manufacturer).
4. Designs to be publicly available at low cost.
5. Designs to be adequately safe.
6. Designs to provide a degree of comfort to local governments and the community with regards to safety, environment and asset protection.
7. Blueprints must have certainty of access to a suitable road network (i.e. the blueprint package should document both vehicle design and a network access).

NTC’s intention is to redevelop blueprints with a much higher level of input from the industry, with manufacturers driving the creation of new PBS compliant designs that are achievable, realistic and hence, will be endorsed and used by the heavy vehicle industry (including buses).

3.7 Mapping

The PBS maps are a crucial component of the PBS scheme because they are the basis on which industry can develop appropriate higher productivity vehicles for a given a freight task.

States and territories committed to provide mapping data by the end of 2007. Most states had provided mapping data by January 2009. At the time of writing, Tasmania and the ACT have not yet published their network maps.

The publication of the early PBS maps started to show the gaps in the national road network and disconnects at state boundaries. This highlights the increased need for road authorities to work collaboratively on projects to ensure a high degree of integration. It is expected that the mapping of the national higher performance road network can become an enabler for identification of weak points in the road network and provide a method of prioritisation for road and bridge improvement programs.

Currently, the PBS map data is displayed on the NTC web site in the form of PDF files. While the NTC recognises this as an important achievement, the current data is missing significant map information required by heavy vehicle operators to evaluate routes (i.e. road names and secondary roads).
“It is critical that PBS network maps are introduced and regularly updated for the entire network.”

“Uncertainty of access to the nominated Performance Based Standards road network for SMART vehicles is a barrier to entry.”

“The initial Performance Based Standards maps are incomplete, mismatched and more restrictive than equivalent prescriptive networks.”

“More comprehensive route assessment and mapping, particularly a wider Level 3A network and 2B network, could deliver significant productivity gains.”

“More responsive 'customer support' is needed to assist applicants and facilitate route assessment requests.”

“The HML\textsuperscript{13} experience has taught us that the access to the vast majority of sites is via local council roads – not the approved main roads. The PBS networks must include local roads – refer to current General Access arrangement”

“Queensland is currently developing a bridge assessment framework supported by maps that could be used at a national level to provide transparency and a higher degree of certainty to industry.”

**Customer feedback on the initial mapping of PBS network levels.**

There is a clearly identifiable need to make publicly available a set of comprehensive PBS maps including bridge capacities. It is understood, however, that applicants/operators need to be aware of the road agencies’ rights to change the network and to exercise common sense when reviewing map data.

Further cooperation is required from Australian road agencies to develop a system that will allow operators to determine which roads they can use for a given freight task and have a high degree of certainty that these roads are available once PBS approval is obtained.

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\textsuperscript{13} Higher Mass Limits scheme
The publication of these maps can only be possible with the collaboration of states and territories and the outcomes should:

- assist operators in selecting the best route for a given freight task
- provide a consolidated, robust and auditable repository of PBS network classification data
- assist the NTC with its efforts in coordinating the delivery of PBS network classification data
- provide an enhanced mapping user interface beyond simple PDF file format maps
- potentially reduce costs for jurisdictions, by providing a single, centralised portal for PBS road classification
- enhance ability of the NTC and jurisdictions to address cross-border interconnectivity (i.e. the same road being assessed at a different PBS access level on either side of the border).

3.8 Customer satisfaction

As an element of the PBS review, NTC undertook a customer satisfaction survey. This survey was sent to all current participants in the scheme and had approximately 50% participation rate. Results of this survey are found in Appendix 1.

As the PBS scheme is voluntary, customer perception of the scheme and perceived benefits are critical to its success. To ensure future customers, it is important that the scheme rewards early adopters and that this group become ambassadors for the scheme, promoting the benefits and encouraging wider industry adoption. To date the customer feedback from the early adopters has been generally negative.

Operators’ expectations, when committing to go through the PBS process, are to have their vehicle on the road when the Panel PRP issues a PBS final approval. The reality is that operators are made to go through a further process of access evaluation from the road authorities that are lengthy and onerous, especially if bridge assessments are involved.

Road agencies need to release information on what they expect a PBS applicant to comply with up front. These requirements should be as nationally consistent as possible, whether they are operating or access conditions.

An aim of the review is to improve the way in which vehicles are processed through the PBS scheme and eventually granted approval to be on the road. Reduction of costs, access to qualified and experienced assessors and certifiers, certainty of access, responsiveness and road agencies implementation are important factors in increasing customer satisfaction and uptake.
4. PROCESS IMPROVEMENT

The processes for PBS certification is documented in the following rules:

1. Performance Based Standards scheme – Standards and vehicle assessment rules
2. Performance Based Standards scheme – Network classification guidelines
3. Performance Based Standards scheme – Assessor accreditation rules

In order to encourage the broad-based uptake of the PBS scheme by industry, it is crucial that business, assessor and certification rules can deal with large volumes of vehicle applications.

Currently, the number of PBS applications and approvals are low which is primarily due to issues regarding road access. However, customers have also indicated dissatisfaction with elements of the PBS compliance process. These include, but are not limited to the following:

- “Inflexible business rules to address new technologies or alternative procedures.”
- “One size fits all approach to vehicle safety standards where all vehicles must be assessed against all rules.”
- “Inflexible approach to vehicle combinations which can only approve an exact vehicle combination.”
- “Lack of clear information about the Performance Based Standards compliance process.”
- “Lack of approved assessors and certifiers especially for customers not located in NSW or Victoria.”
- “Expensive vehicle combination assessment process.”
- “Expensive certification process.”

Customer feedback to the PBS compliance process.

4.1 Business rules

The Performance Based Standards Business Rules are intended to provide operating parameters for participants in the scheme; this includes state and territory road authorities, customers and manufacturers. The rules establish how the PBS Review Panel, the Panel’s secretariat and the governments operate. In addition, the rules specify how vehicles can participate and become approved under the PBS scheme.

Whilst the current business rules have facilitated the approval of 52 vehicle applications over a 12 month period, it is clear that for the scheme to be successful the number of applications needs to be orders of magnitude higher than the current throughput. As the current process is hitting volume constraints there will need to be some streamlining of the process.

4.2 New technologies or alternative procedures

Participants and industry have noted that the business rules are inflexible with regards to new technologies which may invalidate current test procedures and require alternative methods of assessment. Participants, industry and even road authorities have also expressed concern that the current PBS system is too inflexible and a barrier to innovation. Many vehicles which perform more safely than equivalent prescriptive vehicles are ineligible for the PBS scheme because they do not meet all standards.
In an effort to allow some flexibility to evaluate new technologies and innovative designs, ATC approved a submission from NTC to provide discretionary powers for the PBS Review Panel in November 2008 (these were described in some detail in the Performance Based Standards discussion paper). Discretionary powers may be applied with the unanimous agreement of the panel to approve the application.

Due to the short time in which the discretionary powers have been available there has only been one application for panel discretion in relation to the pavement vertical loading standard. The NTC recommends no changes to the discretion rules which are already part of the business rules.

4.3 Scalable PBS

This section details whether there may be circumstances in which a more flexible assessment is more appropriate, including implications for the extent of network access. It discusses the concept of a ‘scalable’ PBS, as described in Figure 6.

![Figure 6. Ideal compliance burden versus level of innovation](image)

While early development of PBS policy and standards was undertaken on the basis of uniformly conducting assessments of all applicant vehicles to each of the standards, as experience with PBS assessments grows, compliance with different standards for different types of heavy vehicles/combinations can be predicted with a progressively higher degree of reliability. Therefore, it is proposed to identify options for a more strategic application of the PBS standards and how the need for their application varies with different types of heavy vehicles and modes of access.

It is not proposed to simply relax the PBS standards, or their application, to ease the burden of compliance. However, there are specific circumstances in which the need for comprehensive assessments to some PBS standards may be unnecessary:

- where the only modification made to the vehicle is its operation at increased mass levels (i.e. under a Mass/Distance/Location pricing scheme)
• for specific vehicle types, which may reasonably be deemed to comply with some of the PBS safety standards

• where emerging vehicle technologies may be capable of assuring compliance with some of the PBS safety standards.

4.3.1 Deeming vehicles to comply with certain standards

The current PBS scheme requires that a SMART vehicle be assessed against all of the safety standards. It was intended that a more detailed understanding of a heavy vehicle’s on-road performance would allow a more precise assessment of its suitability for operation on a given road.

However, the NTC believes that there may be some circumstances in which cost savings, particularly those incurred in the process of being assessed to the safety standards, may be achieved. In particular, it is proposed to investigate whether:

• rigid vehicles may be deemed to comply with some or all of the dynamic safety standards

• there may be circumstances in which the fitting of emerging technologies, in particular electronic stability control and rollover avoidance systems, may be sufficiently effective to justify deeming a vehicle or combination compliant with some or all of the dynamic safety standards, as well as the static rollover threshold standard.

The NTC understands that a major determining factor in the cost of a PBS assessment is the level of sophistication for the virtual truck model that is required to accurately assess it against each of the applicable standards. In turn, the level of sophistication for the model is understood to be determined by the need to assess it to, in descending order:

• the dynamic standards (i.e. tracking ability on a straight path, rearward amplification, high speed transient offtracking and yaw damping coefficient)

• the static rollover threshold standard

• the low speed manoeuvrability standards (low speed swept path, frontal and rear tail swing), and

• driveline standards (startability, gradeability and acceleration capability).

Therefore, cost savings are only likely to be available if, in the first instance, an application may be deemed to comply with all of the dynamic standards. An exception would be if physical testing to the ‘remaining’ standards represents a practical and cost effective option.

For example, a rigid truck or bus is almost certain to comply with the dynamic standards, as well as some others, such as that for steer tyre friction demand. It is therefore possible to build an applicability table that represents the tests for which performance needs to be assessed and those for which specific vehicle types may be deemed to comply.
For vehicle applications matching a standard type an applicant should only require assessment against the standards that are applicable to that generic vehicle. For example Figure 7 plots the results of yaw damping coefficient by generic vehicle type. This shows that testing a rigid bus for yaw damping is not necessary to ensure compliance (as the fact that it has no points of articulation ensure that it will always have a value around one), while an assessment is necessary for truck-trailers.

"While applying only the relevant standards might save resources, it has the potential of undermining one of the key advantages of the PBS process. Through PBS, jurisdictions have gained a greater understanding of the performance of vehicle types and configurations... through a series of case studies, the PBS process has demonstrated that truck and dogs, at over 19.0 metres and loaded with dense quarry product, are dynamically stable vehicles."

VicRoads - response to the PBS Discussion Paper

The NTC agrees that comprehensive assessments to all of the PBS standards have enhanced regulators’ understanding of vehicle performance, particularly for more generic types. However, there is a limit to the amount of testing for a given vehicle type or configuration, beyond which its value in terms of such learning diminishes. It is at this point its performance may be codified, rather than continuously and repeatedly tested.

It is worth noting that how this principle is applied may differ, depending on the circumstances. For example:
- it may be determined that rigid vehicles, by their very nature, can be deemed to automatically comply with certain safety standards

- the assessment of a number of similar (or generic) vehicle types, such as truck-trailers, may equip policy makers with sufficient evidence to codify their performance.

In the latter case, the appropriate mechanism for such codification, whether through blueprints or otherwise, is a matter for further consideration.

**Figure 8. Example of possible applicability table for known types**

<table>
<thead>
<tr>
<th>Safety Standards</th>
<th>Bus</th>
<th>Rigid truck</th>
<th>Truck-trailer</th>
<th>Semi-trailer</th>
<th>B-double</th>
<th>B-triple</th>
<th>A-double</th>
<th>2A-triple</th>
<th>BAB-quad</th>
<th>ABB-quad</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Startability</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
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<tr>
<td>2. Gradeability:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Maximum grade</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>b) Speed on a 1% grade</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Acceleration capability</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Overtaking Provision</td>
<td></td>
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<tr>
<td>5. Tracking Ability on a Straight Path</td>
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<td></td>
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<td>X X X X</td>
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<tr>
<td>6. Ride Quality (Driver Comfort)</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>7. Low-Speed Swept Path</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>a) Maximum Frontal Swing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>b) Difference of Maxima</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>c) Maximum of Difference</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9. Tail Swing</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10. Steer-Tyre Friction Demand</td>
<td>Only required for tri-drive prime movers</td>
<td></td>
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<tr>
<td>11. Static Rollover Threshold</td>
<td>Type approval / Assessor check</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>12. Rearward Amplification</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
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<td>#</td>
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<tr>
<td>13. High-Speed Transient Offtracking</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>14. Yaw Damping Coefficient</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
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</tr>
<tr>
<td>15. Handling Quality</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>16. Directional Stability Under Braking</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Infrastructure Standards</th>
<th></th>
<th></th>
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<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>17. Pavement Vertical Loading</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>18. Pavement Horizontal Loading</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>19. Tyre Contact Pressure Distribution</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>20. Bridge Loading</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

O - Manufacturer’s letter
X - Blueprint specification or assessor
# - Deemed to comply with technology

An example of an applicability table for known vehicle types is shown in figure 8. Further work needs to be carried out to develop robust applicability tables for generic types. Whilst
road authorities have commented that this system may discourage innovative types due to increased test burden over standard types, it must be noted that the system is not increasing stringency on innovation, it is however removing redundant requirements from known types which make up the bulk of applications.

4.4 Modular certification

A key concern with the current business rules is that only a complete vehicle combination may be submitted for approval. This means that a trailer that has been fully approved with a certain prime mover must be completely re-assessed if used with a different prime mover even if they are of a very similar configuration. Conversely a prime mover which is shown to be capable of towing a trailer of certain mass must be re-assessed if towing a different trailer even if they are of the same mass.

The current process prevents truck, bus and trailer manufacturers from being able to drive the market towards improved productivity vehicles as the number of combinations that would need to be assessed to ensure that a particular vehicle component (truck or trailer) is always compliant with the scheme is far too vast.

This system has resulted in a scheme where vehicle operators are the majority of applicants for vehicle assessment and approval whilst generally leaving manufacturers, who have greater experience and knowledge of vehicle design and certification, unable to provide this service to their customers. Clearly it is in the interest of the industry to have the manufacturers primarily involved with the certification of supplied components so that operators, who may know little about vehicle design and testing, can concentrate on the business of running efficient fleets.

An alternative to the current process is to allow partial certification of vehicle components (see Figure 9). In general it would be possible for prime mover, bus or truck chassis suppliers to provide compliance assurances for all of the driveline requirements at a specified mass for each PBS level. This would reduce the need to prove compliance each time the same unit is used in a different combination. Additionally it would be possible for trailer manufacturers to show that, when connected to a prime mover, with certain generic specifications, the trailer will perform in a compliant manner. In this manner a customer would be able to select a PBS compliant trailer and an appropriate prime mover, each of which may be partially approved and promoted by their respective manufacturers, to build a compliant vehicle which requires no further testing. In this case it may only require a certifier to check that the components have compatible approvals and then a final approval may be issued based on a certifier’s advice.

Along with addressing some of the perceived weaknesses of the current blueprint vehicle designs, the concept of partial certification for each vehicle combination unit may allow the future development of a modular approval, which would allow more flexible use of existing trailer stock by operators being able to connect compliant combinations on the fly.
It is therefore recommended that studies be undertaken to understand which areas of specification need to be stated to allow the matching of separately approved vehicle components and that the business rules be changed to allow manufacturers to certify vehicle components against requirements that are applicable to that component. A process for approving a combination built up using partially approved components should also be developed.
4.4.1 Existing vehicles

Development of the PBS assessment process was predicated on the assumption that most applicants would submit a new design concept, assessed and refined to comply with the PBS standards before the physical vehicle was built and certified to the approved design.

However, the scheme is not limited to new vehicles. Industry members believe that there is a potential for the PBS scheme to more effectively address existing vehicles, particularly when they may be assessed as better performing than the fleet average, but not fully compliant with all of the PBS standards.

Their concerns may be summarised as: A vehicle need only be assessed to the PBS standards that are known to be substantially affected by those aspects of its design or loading that have contributed to its non-compliance with prescriptive standards.

A common example is for low speed swept path, which is not specifically regulated under prescriptive standards. It is understood that many prescriptive B-doubles, while perhaps complying with the majority of PBS level 2 standards, would nevertheless be ineligible for participation in the PBS scheme, due to their swept path performance.

Under current access arrangements, operators of such vehicles are not necessarily penalised. However, as the implementation of PBS progresses and particularly as the extent of PBS network access grows beyond that available to prescriptive vehicles, operators of existing vehicles may be progressively penalised (i.e. in relative terms, compared to SMART vehicles).

This issue has, in part, led some road agencies, notably Queensland, to implement policies for more ‘risk-based’ assessments of higher productivity vehicles. Such a test may include whether operation of the applicant vehicle, in a holistic sense, represented a lower risk than the prescriptive alternative.

This type of approach was investigated by the NTC in the early stages of developing PBS policy. However, it proved difficult to develop an objective framework for how such an assessment may be conducted and as a result, did not receive a sufficient degree of support for inclusion as part of the scheme.

However, the NTC continues to support the principle of ‘risk-based’ assessments forming part of PBS policy.
5. VEHICLE SAFETY STANDARDS REVIEW

PBS requirements have been developed over a significant period of time to provide effective assurances of vehicle safety and infrastructure protection for more productive vehicles (see Table 4). However when considering the appropriateness of standards applying to SMART vehicles it is important that the standards act to fulfil the objectives of the scheme and thus promote improvements in productivity and vehicle technology whilst maintaining reasonable safety.

The PBS requirements and assessment rules are either infrastructure or safety standards. Breaking these rules further into the five groups shown below for the purposes of closer investigation, these requirements assess vehicle stability, trailer dynamic performance, powertrain performance, manoeuvrability, ride and handling.
<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATIC ROLLOVER THRESHOLD</td>
<td>Ensures that geometry and suspension provide a set level of vehicle stability</td>
</tr>
<tr>
<td>DIRECTIONAL STABILITY UNDER BRAKING</td>
<td>Ensures that vehicles remain controllable when braking in a turn</td>
</tr>
<tr>
<td>YAW DAMPING COEFFICIENT</td>
<td>Ensures that vehicles do not suffer excessive roll oscillation after manoeuvres</td>
</tr>
<tr>
<td>HIGH-SPEED TRANSIENT OFFTRACKING</td>
<td>Ensures that trailers follow the path of the prime mover during unbraked avoidance manoeuvres</td>
</tr>
<tr>
<td>REARWARD AMPLIFICATION</td>
<td>Ensures that trailers of multi-articulated vehicles do not swing excessively after avoidance manoeuvres</td>
</tr>
<tr>
<td>TRACKING ABILITY ON A STRAIGHT PATH</td>
<td>Ensures that trailers do not deviate from intended straight line path when driven on a rough road</td>
</tr>
<tr>
<td>STARTABILITY</td>
<td>Ensures that the fully laden vehicle may start on a hill of set grade</td>
</tr>
<tr>
<td>GRADEABILITY</td>
<td>Ensures that the fully laden vehicle may maintain speed on a hill of set grade</td>
</tr>
<tr>
<td>ACCELERATION CAPABILITY</td>
<td>Ensures that a vehicle may accelerate at an appropriate rate to clear traffic lights etc</td>
</tr>
<tr>
<td>LOW-SPEED SWEPT PATH</td>
<td>Ensures that a vehicle may safely manoeuvre around corners typical of those found on its compatible network without cutting the corner</td>
</tr>
<tr>
<td>FRONTAL SWING</td>
<td>Ensures that a vehicle may safely manoeuvre around corners typical of those found on its compatible network without contacting the rear of the vehicle</td>
</tr>
<tr>
<td>TAIL SWING</td>
<td>Ensures that a vehicle may safely manoeuvre around corners typical of those found on its compatible network without contacting the rear of the vehicle</td>
</tr>
<tr>
<td>STEER-TYRE FRICTION DEMAND</td>
<td>Ensures that steering axle will be effective in changing the course of the vehicle as required by driver input</td>
</tr>
<tr>
<td>HANDLING QUALITY (UNDERSTEER/OVERSTEER)</td>
<td>Ensures that the vehicle does not show any adverse handling properties with respect to steering inputs</td>
</tr>
<tr>
<td>RIDE QUALITY (DRIVER COMFORT)</td>
<td>Ensures that vehicle ride quality does not have adverse whole-body vibration effects on driver</td>
</tr>
</tbody>
</table>
Through consultation and feedback received from the Performance Based Standards Discussion Paper (NTC, 2008), NTC has noted a desire from both operators and regulators to maintain a level of stability around the current safety standards. NTC agrees with this general principle, however there are some areas that have been identified as problematic. The main requirements that need reassessment are:

- stability and dynamic requirements to take into account modern vehicle brake systems
- manoeuvrability requirements have been identified as being too restrictive, in particular for vehicles with steerable rear axles and vehicles which require long front overhangs such as wheelchair access buses
- reassessment of level 4 performance values to encourage improved very high productivity vehicle design in preference to alternative lower safety access schemes
- generic data usage to ensure continued compliance through the life of the vehicle and simplify vehicle assessment
- development of “parked” standards to a level suitable for critical evaluation of vehicle performance.

The following sections address each of the points listed above.

### 5.1 Roll stability standards

The main aim of the PBS scheme is to increase road freight productivity. This generally requires that a vehicle is allowed to carry more mass or volume of freight than a standard vehicle of similar configuration. Particularly for a mass constrained, existing heavy vehicle or combination, any concession to mass will typically be achieved by increasing the height to which it is loaded and thus, the centre of gravity. As the centre of gravity is raised, so does the risk of vehicle rollover. Thus to ensure that additional productivity is gained while maintaining safety, controls must be placed on vehicle rollover propensity.

An important objective of the PBS vehicle stability requirements is to limit the risk of vehicle rollover. Whilst recent statistical data for heavy vehicle fatality causation is lacking in Australia, the National Highway Traffic Safety Administration in the USA found that during 2007, 13.9% of all fatal heavy vehicle crashes included vehicle rollover. While other factors such as driver fatigue may be greater contributors to the risk of heavy vehicle crash involvement, rollover is understood to increase the severity of outcome and in some circumstances is an indicator that poor dynamic characteristics of the vehicle or combination were a causative factor. Encouraging vehicle designs that reduce the risk of rollover therefore falls within the scope of the PBS objective of providing reasonable vehicle safety.

The PBS vehicle stability requirements aim to limit a vehicle’s propensity to roll over, exceed lane widths or lose control, either in a simple turning manoeuvre (static rollover threshold), during braking, or as a result of excessive sway (yaw damping coefficient).
Existing PBS fleet

Existing vehicle applications show that most higher productivity vehicles perform at or close to the static rollover threshold requirement’s limit value of 0.35g, (figure 10 & 11) with 22% of existing applications operating at the minimum limit. With the possible exception of rigid bus applications, it is not possible to state that any particular design is particularly stable and thus should be exempted from this requirement.

**Figure 10. Static rollover threshold value by percentage of applications**

Requirement: \( \text{SRT} \geq 0.35 \)

![Figure 10. Static rollover threshold value by percentage of applications](image)

**Figure 11. Static rollover threshold value by generic vehicle type**

![Figure 11. Static rollover threshold value by generic vehicle type](image)
Vehicle stability is a critical component in ensuring that PBS approved vehicles are safe when operating on their respective networks, however there are a number of issues with the requirements as they stand.

Static physical testing or numerical modelling does not take into account vehicle systems developed to reduce vehicle rollover propensity. This could be seen as inconsistent with the scheme’s stated objectives of evaluating actual vehicle performance as opposed to prescriptive dimensional constraints and enabling continuous technological improvement. Example devices include electronic braking aids incorporating stability programs, shown to be highly effective in preventing vehicle rollover and loss of vehicle control. In addition, static rollover requirements may unnecessarily limit productivity by requiring vehicles with less favourable geometric properties from carrying full loads or using available vertical payload space even if these vehicles are fitted with active rollover countermeasures.

Taking account of, and encouraging, the safety benefits that advanced braking systems offer is consistent with the aims of the PBS scheme, so investigation of a method for evaluating the performance these systems should be considered for incorporation into the safety standards. It is reasonable to suggest that if a particular technology can provide similar rollover protection to that offered by limiting static rollover threshold then it should be accepted as meeting the same performance standard.

Feedback from Vicroads notes “It is recommended that technology not be used to compensate for deficiencies in a vehicle configuration or allow operators to load above a vehicle’s appropriate centre of gravity.” However systems engineering shows that optimising parts of the system do not optimise the whole. Requiring that a vehicle meets static rollover threshold without the use of complementary technology may result in worse on-road performance than optimising the complete system.

It is recommended that an investigation be completed to understand whether current test methods for roll stability can be modified to be able to evaluate electronic stability aids which may provide an equivalent level of rollover protection when compared to vehicles which meet the static rollover threshold requirements. In addition to the static rollover threshold requirements, a number of the dynamic assessments such as rearward amplification were developed for the PBS assessment, as excessive trailer sway is considered to be a precursor to vehicle rollover. These standards should also be assessed by taking into account any active devices which are fitted to a vehicle to control this risk, as ignoring these systems will give a false impression of how the actual vehicle will operate.

5.2 Manoeuvrability requirements for buses and B-triples

A number of industry representatives including the Bus Industry Confederation and road authorities including Queensland Main Roads, have noted that the manoeuvrability requirements for certain vehicle types is too restrictive and thus not providing appropriate levels of access for vehicles which have been shown to improve productivity and safety.

“A 14.5 metre coach with standard steerable axle settings, although fulfilling the PBS performance measure of level one for frontal swing, swept path and steer axle friction demand fails level two restricted access because of its tail swing being 20mm greater than the allowable 350mm. This results in the vehicle being classed as a level 4 vehicle which is only able to operate on road train routes. We have in effect a 14.5 metre coach being placed in the same category as a 53.5m road train.”

Bus Industry Confederation – response to PBS discussion paper
Controlled access buses fulfil a different role in society to freight vehicles and generally have a different public perception of risk and social reward. NTC suggests the development of a public transport (bus) level be developed within the scheme which would be migrated from existing controlled access bus routes. Vehicles using these routes would need to be primarily for the transport of people and meet all level 1 requirements with the exception of low speed swept path, frontal and tail swing requirements. Limits for these manoeuvrability requirements could be derived by reviewing the fleet of vehicles currently using the controlled access bus routes, thereby ensuring that approved PBS buses will be no worse than current vehicles operating on these routes. An accompanying industry derived blueprint may further enhance this proposal by providing assurance of the configuration and characteristics of vehicles which will operate on this network level.

B-triples have also been identified as emerging high productivity vehicles, which while providing good on-road performance and safety, have not been able to secure appropriate levels of access due to low speed swept path requirements.

“The ATA believes that B-triples are not PBS vehicles as they are established ‘safe by use’ and have the benefit of being formed from the connection of standard components already in operation...”

Australian Trucking Association – response to Review of Performance Based Standards

Industry has expressed concerns with utilising the PBS scheme for established ‘safe by use’ vehicles such as B-triples, preferring instead the use of prescriptive regulations. NTC acknowledges that further work needs to be done to complete the COAG request to provide prescriptive access to B-triple vehicles, to at least the existing road train network, in a nationally consistent manner. However attempts at gaining national agreement for prescriptive access to broader, more urbanised, networks have not been successful.

As a future action an investigation may be commenced to develop an appropriate network and limits for high performance multiple combination vehicles, of which a B-triple is a typical configuration, within the PBS framework. The Australian Trucking Association and a number of operators have identified this type of vehicle as an important step in improving the productivity and safety of freight transport within Australia. COAG has previously requested that states map appropriate networks for B-triples and this work should form the basis of a Performance Based Standard level and should inform the development of appropriate performance, length and swept path requirements.

While this strategy has previously been derided as picking winners the development of a PBS level would allow any vehicle with similar performance to a B-triple to access a similar network level and thus does not restrict industry to a single appropriate design.

A possible solution to these issues, that will not have the effect of requiring redevelopment of the standards, is to develop networks which are appropriate and safe for these important types of vehicles to operate on and to set appropriate manoeuvrability limits to match what these networks will accept in practice.
5.3 Level 4 requirements

To date there have been no applications for level 4 vehicles under the PBS scheme. While these types of vehicles represent a very small proportion of the vehicle fleet, it is also these types of higher productivity vehicles that the scheme was developed to serve.

Figure 12. PBS applications by vehicle level

Queensland Main Roads and Queensland Transport have indicated through their feedback to the Performance Based Standards Discussion Paper (NTC, 2008), that the reason there has been a lack of applications for level 4 vehicles is that the limit values have been set at a level that is too restrictive and is thus driving operators into alternative road train schemes which offer lower levels of safety and infrastructure protection to the PBS Scheme.

“Advice from industry indicates that they have been able to design innovative high productivity vehicles that perform at levels equivalent to or better than existing vehicles but these vehicles are unable to meet all Level 4 performance values. Queensland believes this is because the Level 4 performance values are too conservative and disadvantage operators seeking to improve productivity and safety through Performance Based Standards. This situation is critically affecting industry take up and is restricting Performance Based Standards to a marginal role in the innovative design of heavy vehicles.

The Performance Characteristics of the Heavy Vehicle Fleet report (ARRB Group Ltd, 2002) showed that none of the test group vehicles, currently operating on Type 2 road train routes, were able to comply with all the Performance Based Standards Level 4 values and performance standards.

Issues with the current performance values also arise when attempting to move commodity specific tasks to safer, more productive vehicle combinations. For example, livestock is currently transported using Type 2 road trains, yet a more stable and better performing BAB quad would not be approved under the current Performance Based Standards scheme as it would not fall within the current Level 4 static rollover threshold performance values.”

Queensland Transport and Main Roads – response to PBS discussion paper
The objective of the scheme is to promote improved productivity while maintaining reasonable safety standards, however if the standards for approval have been set too high, as it appears in the case of level 4 vehicles, the scheme will have the effect of railroading operators into more established and less onerous schemes which will not improve productivity safely. Thus the NTC recommends that a working group be formed to reassess the requirement limits for level 4 vehicles and that proposals for new limits be assessed as an element of any future regulatory impact statement.

5.4 Generic data usage

Current PBS applications use very specific equipment performance data to populate numerical models for the purpose of evaluation against PBS requirements. An example is the specific brand, size and model of tyre. This creates a number of issues regarding cost and continuity of compliance throughout the life of the vehicle.

Continuing the tyre data example, the assessor/developer must obtain unpublished tyre performance data; requiring significant time and effort. By specifying a size, brand and model of tyre the operator is locked into fitting only that tyre for the life of the vehicle. This situation will ultimately lead to non-conformance as tyre models will become obsolete (or require reassessment using improved models of tyre as technology advances) and potentially creates competition issues as an operator becomes tied to a particular brand.

NTC suggests that, using existing knowledge of generic component performance, that a range of data for use in PBS applications should be developed. While generic data may not exactly match each tyre fitted to a particular vehicle, it is unlikely to be significantly different than current variability in performance (due to manufacturer specifications, new and in-service parts, under/over inflation, high or low operating temperature and high or low adhesion surface effects).

Generic data for numerical modelling would streamline the application process, provide flexibility in supplier choice, allow operators to update parts (such as tyres) when current models become obsolete or new improved models are available and would make checking of numerical model data more robust during audits.

To ensure that technological advances are not disadvantaged, developers and assessors should still be able to use specific data for their particular components in preference to the generic data. In this case the application must state the specific equipment used to achieve those results and the vehicle must continue to utilise those particular components throughout its operational life, unless the approval is revised.

5.5 “Parked” standards

During the early development of the PBS scheme, a number of vehicle attributes were identified as areas where performance characteristics should be controlled. This includes oversteer/understeer, ride and tyre contact pressure and distribution. A meaningful test method or prescriptive requirement was unable to be developed for these standards within the timeframe allowed.

Despite the significant difficulty in developing appropriate performance standards to control these vehicle attributes there is a strong feeling amongst some stakeholders that the purpose and intent of the standards are important. Therefore NTC will schedule these standards for a more comprehensive review. It must however be noted that input from the technical
community is required to develop appropriate standards and NTC will require significant support from jurisdictions to progress this item.

NTC has suggested, through its Heavy Vehicle Braking Strategy paper (NTC, 2008), that Vehicle Safety Standards mandate vehicle stability control on heavy vehicles through the Australian Design Rules. As this change would effectively render any oversteer/understeer standard redundant for new equipment, NTC suggests that it would be appropriate to delay consideration of the handling standard until changes to braking Australian Design Rules are clarified.
6. INFRASTRUCTURE STANDARDS

The PBS infrastructure standards regulate the loads imposed by SMART vehicles on road pavement and bridges, in order to maximise the safe and reasonable utilisation of existing infrastructure capacity. With a primary objective of PBS being the facilitation of productivity gains for heavy vehicle transport, the infrastructure standards and the limits they impose on heavy vehicle payloads are of key importance.

In their existing, approved form, the PBS infrastructure standards are undoubtedly the major limitation on PBS unlocking productivity. Considerable difficulties have been experienced in the course of lengthy and ongoing attempts to reach agreement on a set of performance-based infrastructure standards as an alternative to the more proven and understood prescriptive ones.

Much is at stake in determining such standards beyond just the PBS scheme. There is a need to recover the costs incurred by higher wearing heavy vehicles to road and bridge infrastructure.

The PBS principle of “matching the right vehicles to the right roads” is none more applicable than to the development of a set of performance-based infrastructure standards. While infrastructure managers are rightly concerned for the implications of any relaxation to general mass limits, the major advantage of a performance-based approach is the greater ability to vary and tailor mass limits to sections of the road network, according to its structural performance and properties.

An overarching objective may be described as “sweating the asset”: drawing the most out of existing infrastructure, without exceeding load limits beyond which maintenance and repair costs accelerate to levels that exceeding the economic benefits drawn from the productivity gains.

The major issues in developing such a set of performance-based infrastructure standards are discussed below.

6.1 Pavement vertical loading standard

The PBS pavement vertical loading standard regulates the vertical loads transmitted by the axle groups (wheels) of a SMART vehicle to the road pavement. It is this standard that is most directly related to the vehicle’s load carrying capacity.

Currently the PBS scheme is operating under an interim prescriptive standard that limits the scope for innovative vehicle design.

Currently PBS axle group mass limits are set to the same limits as those applying to prescriptive heavy vehicles. Productivity gains have been obtained in some jurisdictions by removing the current caps on gross mass limits that apply to truck-trailer combinations. This allows the gross vehicle/combination mass to be limited by the sum of the axle group mass limits. This has not been done in the past because of concerns about vehicle stability and bridge loading. The PBS framework has ensured that these heavier truck-trailers are configured to be dynamically stable and bridge loading is controlled. However, some road agencies have concerns about the increased vertical pavement loads imposed by heavier truck-trailers.

In response to the interim standard, the NTC and the Austroads Pavement Technology Review Panel have agreed upon a set of common objectives to guide future progress of the PBS Pavement Vertical Loading Standard:
• improve road freight efficiency
• best utilise road assets in a sustainable way
• do not stifle innovation
• simple rules for industry
• reduce assessment burden on road authorities
• recover cost of additional impacts.

It was agreed that a small cross-functional team would oversee the development of a Pavement Vertical Loading Standard that will better serve the needs of all stakeholders and align with COAG road reform objectives.

The project team will be required to consult with a wider stakeholder group that will act as a sounding board and establish broader consensus as the project develops.

6.2 Quad axle policy

In March 2007, ATC approved the national quad axle policy (Adoption of More General Use of Quad Axle Groups in Semi-trailers and B-doubles\textsuperscript{14}). Similar to how other reforms such as Higher Mass Limits have been integrated into the PBS scheme, the policy details the operating conditions for quad axle-equipped vehicles, including requirements to meet the PBS standards and route restrictions as determined by road agencies.

It is appropriate that the PBS pavement vertical loading standard now be amended to reference the national quad axle policy.

6.3 Bridge loading standard

The PBS bridge loading standard is a major limitation on the potential for PBS to deliver productivity gains. In simple terms, the bridge loading standard limits the total mass that may be transmitted by a heavy vehicle over a given length (of the vehicle, or bridge section). A heavy vehicle complying with the pavement vertical loading standard would not necessarily comply with the bridge loading standard and must comply with both to gain access to the road network.

The PBS bridge loading standard is divided into three tiers, the assessment process for which increases in complexity with each tier. Tier 1 assessments essentially correspond to those applying to prescriptive, “as of right” vehicles operating under General Mass Limits. They specify a linear relationship for maximum mass and the distance between the axle groups through which it is transmitted. The precise relationship (mathematical function) varies with the different PBS levels.

If a vehicle design does not pass with a Tier 1 assessment, it may be submitted for assessment under Tier 2. In simple terms, this assessment compares the applicant SMART vehicle design to other types of existing (prescriptive) vehicles granted similar access to the road (bridge) network. Compliance is determined according to whether the applicant SMART vehicle design is assessed as causing a level of stress to bridges the same or less than the reference (prescriptive) vehicles.

Compliance with a Tier 1 or 2 bridge assessment is the primary goal for PBS applicants. This is due to the fact that, in accordance with the approved PBS standards, such compliance does not restrict the extent of road network access granted to the vehicle/applicant.

However, experience with such assessments to date is that applications not complying with a Tier 1 assessment often also fail the Tier 2 assessment. In such cases, a Tier 3 assessment is required. This assessment is essentially the same as that applying to permit vehicles and includes an assessment of the vehicle’s suitability for operation over specific bridges. This in turn requires the applicant to nominate the precise routes they are seeking access to. There is a significant trade-off for a Tier 3 assessment, namely that while the probability of compliance is improved, the available extent of network access is typically severely restricted.

6.3.1 Effectiveness of the Tier 1 standard

Approximately 70 per cent of PBS applications to date have utilised Tier 1 bridge assessments. Most of these have been PBS Level 1 and 2 truck-trailer combinations. But while the Tier 1 assessment is the simplest and most practical option, it is also the most restrictive in terms of its potential for unlocking productivity.

Compliance with a Tier 1 assessment is impractical for many types of higher productivity vehicles seeking to operate at higher mass limits than ‘as of right’, prescriptive vehicles. For example:

- The Tier 1 standard does not accommodate vehicles equipped with quad axle groups (i.e. loaded to 27 tonnes and complying with the ATC-approved quad axle policy). Any such applications must automatically be assessed to the Tier 2 or 3 standards.

- Some road agencies have expressed concerns that the Tier 1 standard may not be applicable to the assessment of vehicles with non-standard axle configurations and with lengths more than standard (i.e. level 1 vehicles longer than 19 metres and level 2b vehicles longer than 26 metres).

The NTC understands that due to the relatively simplistic nature of the bridge formulae and in practice, that the physical characteristics of bridges vary, the Tier 1 standard is an imperfect means of assessing a vehicle’s suitability to operate on them. Tier 1 assessments are therefore more about risk management than precise scientific measurement.

For these reasons it is appropriate that a threshold is determined, beyond which Tier 2 or 3 assessments are required. Nevertheless, in recognition of the efficiencies achieved by maximising application of the Tier 1 standard, the NTC supports consideration of how the Tier 1 standards may be refined to better account for higher productivity vehicles.

6.3.2 Effectiveness of the Tier 2 and 3 standards

Although provision is made for assessments to the Tier 2 and 3 PBS bridge loading standards to be conducted by a qualified bridge engineer, the NTC understands that for state or territory government-owned bridges (essentially those located on main roads), all such engineers have in practice been road agency employees. From the applicant or PBS assessor’s perspective, this creates an important distinction between assessments to the Tier 1 standard

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and those for Tiers 2 and 3: in the case of the latter, with the applicant/PBS assessor as the customer and road agency as the service provider.

As the road agency determines the circumstances in which to apply the Tier 2 and 3 standards, the effectiveness of these standards have been assessed jointly.

The detailed nature and expertise required to conduct Tier 2 and 3 bridge assessments precludes any comprehensive or authoritative discussion of their methodology in this report. Discussion is therefore limited mainly to issues around how effectively the bridge loading standards and assessment procedures support and interface with the broader PBS scheme.

6.3.3 Live load factor

The live load factor (broadly representing the load imposed on a bridge and reflecting a range of factors, including the risk of overloading), significantly affects the outcome of bridge assessments.

The NTC acknowledges the need for road agencies to account for the risk of overloading in bridge assessments. Under current arrangements, the live load factor is an international standard which has also been determined partly on statistical analysis of heavy vehicle fleet overloading patterns. However, a more precise assessment of this risk for SMART vehicles may present an opportunity to conduct bridge assessments for higher productivity vehicles under more appropriate terms, whilst not compromising the protection of vulnerable infrastructure. Further consideration of this matter has received significant support from both industry and road agencies.

A major advantage of successfully applying this approach would potentially be an improved compliance rate for higher productivity SMART vehicles under Tier 2 assessments. This would in turn obviate the need for imposing more restrictive road network access, an unavoidable outcome of relying on a Tier 3 assessment.

6.3.4 Developing a more customer focussed bridge assessment process

Continuing pressure for freight productivity gains and associated responses, including reform to heavy vehicle regulations, has increased the demand for higher productivity vehicle bridge assessments. This places a greater need to better understand the legacy issues of an ageing bridge stock built to varying standards and strengths that will undoubtedly remain for many years to come.

A number of PBS applicants have discussed with the NTC perceived opportunities for streamlining bridge assessments. Many of the identified issues could be considered to fall within the category of providing a stronger customer focus and cooperative, working relationship between the applicant and road agency. Identified issue include:

- a lack of transparency in the bridge assessment process and methodology
- a lack of information or guidance available for how to optimise applications (and their odds of approval), including a reported lack of feedback to applicants in cases where access was denied about how to prepare and resubmit an improved application (i.e. road agencies approaching bridge assessments as binding and final)
- excessive amount of time taken by road agencies to complete bridge assessments
- road agencies control of bridge assessments, despite the potential availability of qualified commercial assessors.
Road agencies have indicated the difficulties and heavy resource demand in conducting bridge assessments for SMART vehicles. They have also stated that many of the problems experienced by applicants with bridge assessments could have been better resolved by applicants having sought advice at an early point in the application process, rather than after the vehicle was assessed to the PBS standards and/or built.

“Main Roads are currently developing a framework to provide transparency and a higher degree of certainty to industry, and at the same time, mitigate the current resource impost imposed by Performance Based Standards Tier 3 bridge assessments.

“The proposed framework includes development of guidelines on vehicle length/mass relationships supported by maps, indicating bridge class and capacity. We offer the services of Queensland officers to assist in the development and implementation of this model at a national level.”


The NTC and road agencies are proactively working on a more streamlined bridge assessment process through Austroads projects. It is importance that such efforts are properly supported and eventually adopted by all states and territories.

The NTC understands that road agencies conducting bridge assessments on behalf of applicants subsidise a majority of the often substantial cost. It is likely that this does little to effectively manage the demand for assessments, or provide an incentive for improving the quality of customer service. It should be noted that these issues have manifested to a point where they now represent a major blockage to broader adoption and successful implementation of the PBS scheme.

An important step in resolving these issues would be the development by road agencies of a transparent customer service charter for bridge (network) assessments, clearly outlining the respective responsibilities of both road agencies and applicants. It could include matters such as assessment time frames, any associated costs to applicants, technical guidelines for enhancing applicants’ prospects of receiving approval and service standards explaining how and to what extent road agencies can cooperate with applicants in developing and refining their applications.

Consultation with PBS applicants and road agencies has suggested that a more transparent model of cooperation on bridge (network) assessments would have significant benefits for applicants and resolve many of the identified issues with bridge assessments. It would also benefit road agencies by working to manage the demand for their resources and on occasions, the overly optimistic expectations of applicants.

6.3.5 Clarifying how existing mass concessions are applied

In its response to the PBS Discussion Paper, Queensland proposed that the PBS bridge loading standard be amended to clarify how additional mass granted by existing concessional schemes (e.g. Higher and Concessional Mass Limits, and the 6.5 tonne steer axle concession policy) is to be accounted for. The NTC will seek to clarify these matters, including proposing amendments to both the national model Mass and Loading Regulations and PBS bridge loading standard to reflect current practice.
6.3.6 Developing the PBS bridge loading standard

The current PBS bridge loading standard closely corresponds with standards applying to prescriptive vehicles. For reasons such as those outlined in this section, those standards are in some ways at least, not ideally suited to the assessment of higher productivity (including SMART) vehicles.

To help resolve these issues, the NTC and Austroads are jointly running a project (FS1580) to develop a refined bridge assessment method or standard. The project would account for issues including those discussed in this report. It is intended that outcomes of the project would be used as a substitute for, or to guide the development of a refined PBS bridge loading standard.

6.3.7 Identifying additional capacity in the national bridge network

To a significant extent, it is inevitable that (proposed) SMART vehicles will impose greater loads on infrastructure, with the limitation tending to be bridge capacity. A key purpose of the PBS bridge loading standard is to identify spare capacity in the bridge network, i.e. the ability of bridges to withstand loads greater than those imposed by existing heavy vehicle types. This is necessary to justify the granting of access to higher productivity SMART vehicles.

Road agencies have explained to the NTC that such spare capacity is, in broad terms, not at a premium. Evidence suggests that this has been a major limiting factor on successful implementation of the PBS scheme, to date.

Key influencing factors on the existence and identification of bridge capacity are:

- physical capacity of the bridge network
- effectiveness of the PBS bridge loading standard in identifying capacity, and
- the availability of up-to-date, pertinent bridge design and condition data, needed to conduct bridge assessments to the PBS bridge loading standard.

While this review has focussed on the second point above (the PBS bridge loading standard) it should be noted that arguably, the other two points are of even greater importance. With regards to bridge data, the NTC has received varying advice from road agencies: some have claimed to have robust systems in place to collect and store it in electronic databases that facilitate bridge assessments, while others have claimed to have relatively poorer knowledge of their bridge stock and no fully operational, centralised database.

The most important factor in unlocking heavy vehicle productivity is arguably physical capacity of the bridge network. While new bridges are built to accommodate heavier, higher productivity vehicles, the broader bridge stock was built over previous decades to varying standards. Without modifications to strengthen them, many older bridges are incapable of withstanding the higher loads imposed by SMART vehicles.

Some jurisdictions have ongoing programs of bridge strengthening to accommodate higher productivity vehicles. For example, Victoria released its Freight Futures report in 2009, which was supported by a strategy for bridge assessment and strengthening. The successful implementation of the PBS scheme is dependent on such programs of strategic bridge strengthening.

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7. RECOMMENDATIONS

7.1 General

7.1.1 Proceed to regulatory impact statement stage to develop PBS legislation

Whilst there has been considerable technical consultation, the absence of a public regulatory impact statement and consultation process has meant the broader community stakeholders have not always fully understood the reform. As a result the PBS reform has not been able to deliver the required productivity gains which are becoming increasingly important in markets which have to tighten financially. Furthermore, COAG has required legislation to support PBS and as a result a RIS is required. Legislation is required in order for jurisdictions to be committed to implementing nationally consistent PBS reform.

ATC formally adopted the PBS scheme in 2007. However, in practice, jurisdictions have failed to implement the reform in a meaningful way by delaying the publication of maps and exercising discretional authority over granting access to approved PBS vehicles that have already been approved by the PBS Review Panel. This has created a major impediment to PBS take-up in the freight community. This has led to a lack of uniformity and certainty of road and bridge access for compliant vehicles.

By developing PBS legislation, which is intended to be housed within the National Heavy Vehicle Law, PBS will become a clear, nationally consistent scheme for delivering improvements in the road freight industry. In this context the proposed National Heavy Vehicle Regulator (agreed on at ATC May 2009) would be the obvious and most preferred body to administer PBS legislation and the PBS Review Panel.

7.1.2 A more transparent process for the applicant and improved mapping

The NTC has received feedback from a number of operators that the process of applying to some road agencies and local governments for pre-approval for access (prior to submitting a formal PBS application) has proven frustrating and lacks transparency. A contributing factor is that PBS is not yet a ‘one stop shop’ and requires applicants to negotiate with road agency permit officers and local governments, as well as the Review Panel Secretariat.

Building on existing material such as the PBS kit distributed to all Australian local governments and information on the NTC website, the NTC understands that some road agencies are currently preparing comprehensive PBS guidelines for applicants. The NTC recommends that comprehensive guidelines be published by all states and territories, to provide a more transparent application process.

NTC has identified a need to make publicly available a set of comprehensive PBS maps containing sufficient detail to allow investment in PBS compliant equipment possible for operators. NTC is undertaking a project to improve the mapping portal to address this issue.

7.1.3 Better clarification of how PBS integrates and interfaces with other access schemes

The types of vehicles and access arrangements addressed by prescriptive notice and permit arrangements, and those that require participation in PBS, vary between the states and

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17 A Bridge Strategy for the Introduction of the Next Generation of Heavy Vehicles (Bouly et al), paper presented to the 7th Austroads Bridge Conference on May 26, 2009
territories. In addition, these arrangements sometimes lack transparency. The NTC recommends that the NTC and road agencies work towards:

- identifying options by which PBS may move beyond merely serving as an assessment tool, to being better integrated into a national heavy vehicle access framework, including by working with road agencies to identify how PBS may be better embedded within their broader heavy vehicle access schemes

- better clarifying the role and linkages between PBS and the development of prescriptive regulations.

7.2 Process improvements

7.2.1 Streamlining of the PBS Review Panel operation

To date more than half of all applications being put before the panel are of very common design such as truck-trailers and semi trailers. In most cases where fairly generic vehicle types are to be approved there would be little value added in having the panel review these applications.

NTC suggests that a process be developed which would inform road authorities of all of the approvals submitted within the approval period and would designate only vehicles which may pose unique risk profiles, or vehicles for which panel discretion is requested, for the panel to formally review. Panel members may however add any vehicle from the list of applications to formally review if they feel there may be concerns with a particular application.

7.2.2 Nationally consistent operating/access conditions

Operating conditions represent a safety guard against a vehicle’s risk of harm while operating. However, if not administered correctly they could quickly become a barrier to national consistency and a hindrance to the uptake of PBS.

NTC recommends developing a list of nationally consistent operating conditions based on a migration approach that is already in use in both Victoria and Queensland to provide up-front, nationally agreed and consistently applied requirements to bring PBS vehicle at least into line with currently operating equivalent vehicles. For example level 2 vehicle may have the same operating conditions applied as would be required for B-doubles.

7.2.3 Manufacturer self-assessment and certification

The current number of approved assessors and certifiers appear insufficient to service higher volumes of assessments should PBS be adopted by a significant proportion of the freight transport industry.

In order to ensure that there is an adequate supply of services at a reasonable cost, the PBS scheme may need to explore additional avenues to sole reliance on third party services. The PBS customer focus group raised the concept of manufacturer self-certification as a method of dealing with the lack of available third party assessors.

The NTC suggests that the conflict of interest rules in the business rules be revised to allow manufacturer self-assessment and certification and that rules to adequately safeguard the quality of assessment and certification be developed in consultation with state road authorities.
7.2.4 Streamlining standards to match vehicle performance risks

To reduce regulatory, test and evaluation burden for vehicle designers and operators, it is recommended to change from the current, one size fits all approach of applying all PBS requirements, regardless of vehicle design, to one which applies the correct standards to vehicles which may exhibit matching performance risks. This could take the form of an applicability table for each of the different standards against generic vehicle types.

An example of this principal is that for a rigid truck or bus with no trailer there is very little to be gained in assessing it against standards designed to control the behaviour of trailers in long multi-combination vehicles. Thus a rigid truck or bus should be exempted from requiring assessment against high-speed transient offtracking, rearward amplification and tracking ability on a straight path.

It is recommended that NTC develop an applicability table which would allow designers and assessors to understand the requirements that are appropriate to their configuration of vehicle. This change should help to address the issue of generic high productivity vehicles by using existing understanding of the performance of these vehicles to cover some of the PBS requirements and requiring the applicant to prove only that the particular vehicle specific characteristics are appropriate.

7.2.5 Modularity certification

Current business rules allow only a complete vehicle combination to be submitted for approval. This means that a trailer that has been fully approved with a certain prime mover must be completely re-assessed if used with a different prime mover, even if they are of a very similar configuration. Conversely a prime mover which is shown to be capable of towing a trailer of certain mass must be re-assessed if towing a different trailer, even if they are of the same mass.

It is therefore recommended that studies be undertaken to understand which areas of specification need to be stated to allow the matching of separately approved vehicle components, and that the business rules be changed to allow manufacturers to certify vehicle components against requirements that are applicable to that component. A process for approving a combination built up using partially approved components should also be developed.

7.2.6 Improved blueprints process

The blueprints commissioned by the NTC have not produced the outcome that was intended, that is, a high application rate for vehicle combinations that were built around these blueprints. This was due to unworkable tolerances and specifications with the requirements for very specific suspension parameters and the need to specify engine, gearbox and final drive ratio which made the ability to interchange trucks and trailers impossible.

A more effective blueprint process can be developed by implementing the recommendations made in sections 7.2.3 and 7.2.5 (modular certification and manufacturer self-assessment and certification). As part of this development process, the NTC will develop the first “template” blueprint in order to demonstrate the concept and prove its effectiveness. This will pave the way for future industry led development of further blueprints.

An equitable path for developing prescriptive regulations based on proven PBS vehicle will be investigated as a part of this process.
7.3 Standards improvements

7.3.1 Enhancing vehicle safety, performance and productivity through the use of current and emerging vehicle technology

Whilst the PBS standards have been developed as a world leading method of assessing vehicle performance, they have not made allowances for advances in vehicle system design, in particular enhanced vehicle braking systems such as dynamic stability control and roll stability systems. This is contrary to the stated objective of the scheme which is to encourage continuous improvements in vehicle technology. It is recommended that an investigation be completed to understand whether current test methods for roll stability can be modified to be able to evaluate electronic stability aids which may provide an equivalent level of rollover protection when compared to vehicles which meet the static rollover threshold requirements.

7.3.2 Review PBS levels and associated manoeuvrability performance limits

It is acknowledged that the PBS scheme was developed with freight vehicles as the primary concern. In particular, buses and B-triples, which have different design and operational requirements, do not align with the current PBS performance levels. The NTC recommends a review of these vehicle types within the PBS scheme framework.

7.3.2.1 Bus level

To allow for greater innovation and productivity in the bus and coach sector, it is recommended that a bus level be developed within PBS. This level could be based on migrating existing permitted bus routes and developing appropriate performance requirements based on the conditions appropriate to there routes. A bus level may also be complemented with an appropriate industry derived blueprint.

7.3.2.2 B-triple compatible level

Investigation the development of an appropriate network and limits for high performance multiple combination vehicles of which a B-triple is a typical configuration. COAG has requested that states map appropriate networks for B-triples, which should form the basis of a Performance Based Standard level with appropriate performance, length and swept path requirements.

Some industry groups have expressed concerns with utilising the PBS scheme as an access framework for B-triples, preferring instead the use of prescriptive regulations. However, while a limited number of prescriptive B-triples continue to operate on restricted, localised networks in mostly remote areas, previous attempts at gaining national agreement on this basis have failed.
7.3.3 **Review level 4 performance limits**

To date there have been no applications for level 4 vehicles under the PBS scheme. Industry has advised that while they are able to design innovative high productivity vehicles that perform better than current vehicles they are unable to meet all level 4 performance values. Queensland believes this is because the level 4 performance values are too conservative and disadvantage operators seeking to improve productivity and safety through PBS.

The NTC recommends that a working group be formed to reassess the requirement limits for level 4 vehicles and that proposals for new limits be assessed as an element of any future regulatory impact statement.

7.3.4 **Standard data sets for generic components**

Current PBS applications use very specific equipment performance data to populate numerical models for the purpose of evaluation against PBS requirements. An example is the specific brand, size and model of tyre. This creates a number of issues regarding cost and continuity of compliance throughout the life of the vehicle as these parts are replaced or reconditioned.

NTC suggests that using existing knowledge of generic component performance that a range of data for use in PBS applications be developed. Generic data for numerical modelling would streamline the application process, provide flexibility in supplier choice, allow operators to update parts (such as tyres) when current models become obsolete or new improved models are available and would make checking of numerical model data more robust during audits. To ensure that technological advances are not disadvantaged, developers and assessors should still be able to use specific data for their particular components in preference to the generic data if it is in their interest to do so.

7.3.5 **“Parked” standards**

During the early development of the PBS scheme, a number of vehicle attributes were identified as areas where performance characteristics should be controlled. This includes oversteer/understeer, ride and tyre contact pressure and distribution. A meaningful test method or prescriptive requirement was unable to be developed for these standards within the timeframe allowed.

Despite the difficulty in developing appropriate performance standards to control these vehicle attributes there is a strong feeling amongst some stakeholders that the purpose and intent of the standards are important and that best endeavours should be made progress the development of these standards. Therefore NTC will schedule these standards for a more comprehensive review following clarification of changes to the Australian Design Rules for heavy vehicle braking.

7.3.6 **Quad axle policy**

In March 2007, ATC approved the national quad axle policy. Similar to how other reforms such as Higher Mass Limits have been integrated into the PBS scheme, the policy details the operating conditions for quad axle-equipped vehicles, including requirements to meet the PBS standards and route restrictions as determined by road agencies.

It is recommended that the PBS pavement vertical loading standard be amended to reference the national quad axle policy.
7.3.7 PBS pavement vertical loading standard

Estimating the road wear of the existing fleet is a complicated task and needs to consider: existing vehicle configurations, consistency and interaction with road user charges, practical restrictions on vehicle design and transport operations and the vehicle kilometres travelled of a particular vehicle design.

In this context the NTC and the Austroads Pavement Technology Review Panel will review the proposed Pavement Wear Assessment Method; the Austroads Blue Line.

It is recommended that the outcome of this review be evaluated with a view to replacing the interim Pavement Vertical Loading Standard.

7.3.8 Redeveloping the PBS bridge loading standard

The NTC has proposed an Austroads project, with the principal objective of developing a replacement or refined PBS bridge loading standard. It is recommended that this project be utilised for the purpose of resolving the issues identified in this report and that it be properly supported by the NTC and road agencies.

7.3.9 Streamlining bridge assessment procedures

In addition to developing the PBS bridge loading standard, the NTC believes there is scope to streamline supporting processes, particularly by focussing on a more cooperative working relationship between applicants (including PBS assessors) and road agency staff.

It is recommended that a transparent customer service charter for bridge (network) assessments be developed by road agencies, clearly outlining the respective responsibilities of both road agencies and applicants. It could include matters such as assessment time frames, any associated costs to applicants, technical guidelines for enhancing applicants’ prospects of receiving approval and service standards explaining how and to what extent road agencies can cooperate with applicants in developing and refining their applications.

The NTC proposes to support the development of such procedures and policy, and acknowledges the similar, useful proposal by the Queensland government (as discussed in section 6.3.4 Developing a more customer focussed bridge assessment process).

7.3.10 Bridge strengthening

It is recommended that state and territory governments continue to support higher productivity freight schemes and specifically PBS by funding and undertaking programs of strategic bridge strengthening.
8. IMPLEMENTATION TIMEFRAME

The recommendations developed within this review are proposed to be handled in three stages as shown in Figure 13. Stage one consists of changes which will be integrated within the regulatory impact statement, medium and long term stages have been developed to allow enough time to fully develop and have broad consultation on the more difficult technical issues involved within the recommendations. In addition to the recommendations made within this report a separate request to investigate the possible increases in the acceptable length of PBS combinations is scheduled as a long term item.

Figure 13. Recommendation implementation stages

<table>
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<tr>
<td>A more transparent process for the applicant and improved mapping (7.1.2)</td>
<td>Streamline standards applicability (7.2.4)</td>
<td>Better clarification of how PBS integrates and interfaces with other access schemes (7.1.3)</td>
</tr>
<tr>
<td>Streamline Panel sign off procedure (7.2.1)</td>
<td>Enhancing vehicle safety, performance and productivity through the use of current and emerging vehicle technology (7.3.1)</td>
<td>“Parked” standards review (7.3.5)</td>
</tr>
<tr>
<td>Develop nationally consistent operating conditions (7.2.2)</td>
<td>Develop and map PBS Bus levels (7.3.2.1)</td>
<td>Redeveloping the PBS bridge loading standard (7.3.8)</td>
</tr>
<tr>
<td>Allow manufacturer self assessment and certification (7.2.3)</td>
<td>Re-evaluate level 4 limit values (7.3.3)</td>
<td>Streamlining bridge assessment procedures (7.3.9)</td>
</tr>
<tr>
<td>Develop modular assessment process for combination vehicles (7.2.5)</td>
<td>Standard data sets for generic components (7.3.4)</td>
<td>Length limits review</td>
</tr>
<tr>
<td>Develop improved blueprint process (7.2.6)</td>
<td>PBS pavement vertical loading standard (7.3.7)</td>
<td></td>
</tr>
<tr>
<td>Develop appropriate B-triple access levels (7.3.2.2)</td>
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<tr>
<td>Integrate quad axle policy (7.3.6)</td>
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Figure 14 below shows indicative milestones for the regulatory impact statement process to be carried out by the NTC.

**Figure 14. Regulatory impact statement milestones**

<table>
<thead>
<tr>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>Q2</td>
<td>Q3</td>
</tr>
<tr>
<td>Publish review document</td>
<td>Prepare draft RIS &amp; legislation</td>
</tr>
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</table>

The NTC is recommending participation in developing an implementation plan for PBS across the states and territories. This will encourage the delivery of a nationally consistent set of PBS guidelines. The strategy is for jurisdictions to engage industry and councils for reform implementation.

The NTC will play a coordination and facilitation role, including the production of PBS communication material to reflect the PBS regulatory impact statement outcomes.
APPENDIX 1 - CUSTOMER SATISFACTION SURVEY RESULTS

The PBS information on the NTC website is easy to understand

I am satisfied with the relevant knowledge of NTC staff in regards to the PBS scheme.

Finding an Assessor or Certifier on the NTC website is easy.

Typical textual response: “It maybe easy to find an assessor but there is a limited number available”
Typical textual response: “On the surface it looks good but when you get bogged down with some of the impractical illogical requirements you soon lose the will to do more.”

Typical textual response: “There are some things that the assessor is still learning through the PBS application process for easier processing of applications.”

Typical textual response: “There are too few and their fees are high.” “We do not have much to choose from.”
Assessors add value to the development of my vehicle design.

Typical textual response: “Our vehicles were already designed and built before application was submitted assessed.”

I would use the same Assessor again.

Typical textual response: “High fees are a deterrent.”

It is easy to find information about the PBS Review Panel’s role on the NTC website.

Typical textual response: “Information is far more accessible than it was when it first started.”
I am satisfied with the Certifiers level of knowledge on PBS.

Typical textual response: “There are no certifiers to actively service customers in Queensland or Northern NSW. Due to shortage of certifiers I am still waiting for final reports to be sent to PBS review panel for final processing.”

I am satisfied with the availability of Certifiers.

Typical textual response: “If another certifier was available closer I would contemplate using them to avoid unnecessary travel costs etc.”
The PBS Review Panel/Secretariat is responsive.

Typical textual response: “Should be able to respond quicker!”

I know who to contact in regards the status of my PBS application.

State road agencies have sufficient knowledge about PBS(VicRoads, RTA, etc).

Typical textual response: “Based on their decision not to observe or consider PBS they clearly don’t understand the purpose or benefits.”, ” They have the knowledge but they are not proactive to help get a vehicle over the line and approved. The local authorities are too scared to say you can run a different vehicle in case something goes wrong with it. They do not accept the PBS as being certification the vehicle is safe and you still have to go through their own worries about the vehicle despite having got through the PBS. It’s tiring to run a business and try and appease the multitude of people you come across.”
Local governments (councils) have good knowledge about PBS.

Typical textual response: “I find they are not well enough informed at present, however I believe overtime this will improve”, “Councils in general have limited knowledge and depend on the RTAs.”

It is easy to find a road agency contact for PBS related enquiries.

Typical textual response: “It’s done more through developing personal networks.”

I am satisfied with the overall service received from state road agencies.

Typical textual response: “Depends on who you deal with.”
APPENDIX 2 – HEAVY VEHICLE ACCESS CLASSES

Although the class categorisation included here is by heavy vehicle type, it corresponds strongly with the broad structure of heavy vehicle access schemes as they are classified in the relevant national model regulations. As there are too many schemes operating across the states and territories to list and discuss individually, a description of national heavy vehicle access arrangements has been provided in alignment with the broader national structure.

**General access vehicles**

These vehicles are those that comply with the prescriptive Australian Vehicle Standards Rules (including their continued compliance with applicable Australian Design Rules), and Mass and Loading Regulations (excluding class 2 vehicles). They are granted ‘as of right’, general access to the road network and make up the vast majority of the heavy vehicle fleet. Their performance is regulated by the prescriptive regulations which can vary from conservative to liberal, depending on vehicle type. For example, many heavy vehicles granted general access would not comply with the PBS stability (static rollover threshold) or low speed swept path requirements whereas others would comfortably meet all requirements.

**Class 1 vehicles**

Oversize and over mass vehicles include special purpose vehicles such as load carrying vehicles (low loaders), mobile plant (road building equipment), heavy cement mixer trucks, mobile agricultural equipment and heavy mobile cranes. Their design and on-road performance characteristics are predominantly determined by their function. Typically, this makes their on-road performance necessarily inferior to other types of ‘standard’ vehicles. They are generally unsuitable and would not comply with the PBS standards.

For this reason, their safe use on and access to the road network is regulated primarily by restrictions on their use, such as allowable routes, speed limits, time of day restrictions on their operation, the attachment and operation of warning signals, and the accompaniment of pilot and escort vehicles.

**Class 2 vehicles**

These are specific types of vehicles and combinations, complying with prescriptive regulations as for those operating under general access. However, as a result of their size and/or mass, their access to the road network is restricted.

Class 2 vehicles and combinations include B-doubles, road trains, long buses, multi-deck car carriers and 4.6 metre high livestock transport vehicles, all operating on gazetted routes. They may also include B-triples, A-B triples and B-A-B quad combination vehicles operating on designated routes, under permit or notice schemes.

Some types of class 2 combinations, e.g. 26 metre B-doubles, are subject to prescriptive regulations that were developed using PBS standards as a reference or benchmark. Therefore, while they are not required to participate in the PBS scheme-proper, they are substantially compliant with at least most of the PBS standards.

However, other types of class 2 combinations, such as road trains are known to operate within a broader performance envelope. To some extent, this is offset by their predominant operation on roads in more remote areas.
The major, nationally agreed mass concession schemes (Higher and Concessional Mass Limits) are categorised here as class 2.

**Class 3 vehicles**

These heavy vehicles include all of those not falling within the preceding classes. Predominantly, they include the broad range of higher productivity heavy vehicles and associated concessional access/permit schemes. Examples are:

- all current, approved PBS vehicles
- higher productivity road trains (i.e. those not complying with the prescriptive vehicle, mass and loading standards, such as those including 48 foot trailers)
- super B-doubles operating under permit in port areas
- higher productivity truck-trailers operating above prescriptive gross mass limits.

A defining feature of class 3 vehicles is their non-compliance with the prescriptive vehicle, mass and loading standards. For this reason, their on-road performance may differ to that of compliant vehicles (i.e. class 2 or general access vehicles).

There are broadly three methods by which class 3 vehicle regulations are developed:

- as nationally agreed policies. These include policies such as for 48 foot refrigerated and 27 tonne quad axle trailers, implemented and administered under permit or notice by road agencies
- as state and territory-specific permit schemes. These include the range of truck-trailer and road train permit and notice schemes administered by individual state and territory road agencies
- as PBS policy (i.e. the PBS Scheme).