REPORT OUTLINE

Date: November 2008

ISBN: 

Title: Performance Based Standards

Address: National Transport Commission
Level 15/628 Bourke Street
MELBOURNE VIC 3000

E-mail: ntc@ntc.gov.au
Website: www.ntc.gov.au

Type of report: Discussion Paper

Objectives: To provide an opportunity for further public input and feedback, confirmation of areas of concern and proposed solutions to identified issues. The identification and development of these issues will form the basis of the NTC’s review of the Performance Based Standards scheme's effectiveness, in terms of measures such as its implementation to date, ability to sustain further growth and broader adoption.

NTC Programs: Productivity

Key Milestones: Regulatory impact statement due to be released September 2009.

Abstract: This paper discusses the Performance Based Standards heavy vehicle access scheme. It addresses past, current and future operation of the scheme, from a perspective and focus of its major objective in improving road freight productivity. As such, this paper is intended to communicate the range of issues identified by stakeholders to date, as pertinent to the scheme achieving its objectives. Stakeholders have been invited to suggest options for how and where improvements to the scheme may be made.

Key words: Performance Based Standards, heavy vehicle access scheme, freight productivity.

Comments by: 16th February 2009

Comments to be addressed to: Chief Executive
National Transport Commission
L15/628 Bourke Street
MELBOURNE VIC 3000
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FOREWORD

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.

It is often said that trucks and buses help carry the nation; they are a key component of the Australian economy. Improved transport productivity can, therefore, reduce the cost of moving people and freight and, ultimately, the cost to consumers for goods and services. But productivity cannot be allowed to compromise the safety of other road users.

The Performance Based Standards (PBS) reform promised a win-win for governments, industry and the community: Better and safer heavy vehicles.

The Australian Transport Council (ATC) supported the development of a performance-based standards approach to heavy vehicle regulation as an alternative regulatory system to the current prescriptive regulations. It approved the completed Performance Based Standards 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.

ATC asked NTC to review the operation of the Performance Based Standards scheme after 12 months of operation. This discussion paper acts as the first part of that review, which may eventually lead to the submission to ATC of a Regulatory Impact Statement in 2009 with the aim of promulgating the Performance Based Standards system into legislation.

This paper discusses the Performance Based Standards heavy vehicle access scheme. It addresses past, current and future operation of the scheme from the perspective of its major objective – improving road freight productivity and safety. As such, this paper is intended to canvass a range of issues identified by stakeholders to date.

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

Feedback and proposed solutions to identified issues are invited to ensure this important national reform delivers the goods for all Australians.
The NTC acknowledges the work of Paul Sullivan, Meena Naidu, Kristian Cook, Julian Del Beato and Jose Arredondo in preparing this report.

Greg Martin
Chairman
SUMMARY

In its *Twice the Task*\(^1\) report, NTC identified the need to increase freight productivity through a number of strategic measures, including the enhanced use of existing land infrastructure. Early efforts to increase productivity were focussed on relaxing prescriptive regulations (mass and dimension “creep”). However, the ability to continue with a one-size-fits-all approach to mass and dimensions is limited by the worst case infrastructure capacities and therefore productivity gains have stagnated. The concept of matching more productive vehicles to appropriate infrastructure can overcome this problem.

Performance Based Standards 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. The scheme was approved in its current form by ATC in October 2007. It represents a world leading approach to the regulation of heavy vehicle access, focussing on how a vehicle performs on the road (“what it can do”), rather than prescriptive measures such as dimensions and mass (“what it looks like”).

The Performance Based Standards Review Panel (the Panel) has reviewed applications to operate SMART\(^2\) heavy vehicles under the Performance Based Standards scheme for almost one year. An Australian Transport Council (ATC) requirement exists to review the operation of the Performance Based Standards scheme after one year.

Since its inception, the Performance Based Standards scheme has been subjected to an extensive and rigorous development process. Yet it is acknowledged that the scheme has not yet delivered to its potential. As a voluntary, alternative certification scheme, its success may be measured in significant part by the extent of its adoption by industry. To date, this has been below expectations.

The overwhelming issue which will dictate the success or failure of the Performance Based Standards scheme is certainty of road network access. Under the Performance Based Standards principle of “matching roads to vehicles”, it was intended that a vehicle approved as compliant with the safety and infrastructure standards (a so-called SMART vehicle) would be granted access to the corresponding, approved Performance Based Standards road network level. While this remains the principle, in practice states and territories consider access on a case-by-case basis.

Industry members have identified the lack of certainty for road access as by far the major roadblock to wider adoption of Performance Based Standards.

Designing, developing, testing and constructing new high productivity vehicles is costly and time consuming. Therefore, for a company to consider investing in a SMART vehicle it needs assurance that it will be given access to the road network. It is simply not possible

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\(^2\) SMART vehicles are higher productivity heavy vehicles which have been approved as conforming to the Performance Based Standards.
to put forward a business case for deploying SMART vehicles if there is no certainty that the vehicle will be allowed to run on appropriate routes.

Unless a more robust approach to road network access can be agreed, then business confidence in the Performance Based Standards scheme will remain low. In this scenario it is wholly probable that the scheme will remain a niche scheme and will not have a measureable impact on overall road transport productivity.

After issues of access, an important aspect of ensuring the scheme is successful is to match the requirements and processes to its objectives. As Performance Based Standards has had a long gestation period, the objectives of the reform have evolved. Performance Based Standards was initially developed in response to what were broadly agreed as inflexible, prescriptive heavy vehicle regulations. This objective has progressively evolved into the current vision of facilitating productivity improvements for the road transport sector as noted by COAG (Feb 2006):

“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.”

This paper discusses the requirements and processes that have been developed to support this objective with an emphasis on moving the scheme from one which approves less then ten vehicle applications per month to one which is suitable for broad industry adoption.

Key areas of concern include an approval system geared towards servicing small volumes of highly innovative vehicles, the inability to manage generic and modular high productivity vehicles, and the lack of qualified assessors and certifiers, operational information and resources.

The paper also reviews the current vehicle and infrastructure standards with a view to ensuring the standards are appropriate and meet the objective of being a technology and productivity enabler. NTC remains committed however to supporting better safety and environmental outcomes.

Feedback from this paper, along with information gathered from other stakeholder communication, will be used to inform a review. Following consultation on the options available NTC intends to detail the best options for improving the Performance Based Standards scheme in a Regulatory Impact Statement in late 2009.
LIST OF TABLES

Table 1. Performance Based Standards - road network length limits........14
Table 2. Safety and infrastructure standards..................................................24

LIST OF FIGURES

Figure 1. Projected growth and distribution of the domestic freight task\(^5\) ....6
Figure 2. Projected growth in freight domestic freight\(^5\) .....................................6
Figure 3. Performance based assessment - fleet coverage objectives ..........9
Figure 4. Case study results - 4 axle rigid parcel vehicle ..............................15
Figure 5. Case study results - B-triple and Super B-double ..........................20
Figure 6. Ideal compliance burden for vehicle types ...................................29
Figure 7. Example 1 - Restricted network .....................................................33
Figure 8. Example 2 - Trade-off condition ....................................................33
1. INTRODUCTION

This paper identifies and discusses the major issues facing the Performance Based Standards heavy vehicle access scheme in meeting its required objectives. It comprises the first stage of a formal review of the scheme, a precursor to the development of legislation governing the vehicle assessment standards rules, administration and operation of Performance Based Standards. In doing so, it will consider the ability of Performance Based Standards to meet current and future needs of providing safe access to productive and innovative vehicles.

Performance Based Standards has been identified by 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. It represents a world-leading approach to the regulation of heavy vehicle access, focusing on how a vehicle performs on the road, rather than prescriptive measures such as dimensions and mass.

Since its inception, Performance Based Standards safety standards have been subjected to an extensive and rigorous development process. Yet it is acknowledged that the scheme has not yet delivered to its potential. As an alternative certification scheme, its success may be measured in significant part by the extent of its adoption by industry. To date, this has been below expectations.

The purpose of this discussion paper is to draw on the views of stakeholders, to highlight which areas of Performance Based Standards are, and which are not, operating as efficiently as they should. Stakeholders have also been invited to suggest options for how and where improvements to the scheme may be made.

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

2. A BRIEF HISTORY OF PERFORMANCE BASED STANDARDS

Heavy vehicle productivity has been on the reform agenda of governments for decades. The key driver for reform has been the increasing demand for, and Australia’s reliance on, land-based freight transport. Since the early 1960s, the national freight task has increased from under 20 billion-tonne-kilometres (btk) to about 200 btk today.

Early efforts to increase productivity were focussed on relaxing prescriptive regulations (mass and dimension “creep”). For example, between the 1970s and the 1990s, the permissible gross mass of a semi-trailer and prime-mover increased from around 35 to 42.5 tonnes. The maximum length increased from 16 to 19 metres.

Further gains were achieved by the introduction of B-double combinations in the early 1990s, which substantially replaced the use of semi-trailers on line haul routes.

However, the ability to continue mass and dimension “creep” is limited by the existing infrastructure. Furthermore, prescriptive standards are, by their nature, limited by the worst performing vehicles that may comply with them.
As mass and dimension “creep” became unsustainable, states and territories began to offer concessions and exemptions for better-performing vehicle designs, or those with special needs (e.g. when transporting an over-dimensional load).

The utilisation of permit and general notice schemes has continued to grow in size, to the point where road agencies struggle to keep pace with demand and the resulting administrative load. Furthermore, different approaches by states and territories have inhibited cross border transport.

Today, heavy vehicle access arrangements of the states and territories differ markedly. Where 53 metre long road trains have been granted access to a substantial proportion of the road networks of Western Australia and the Northern Territory, only B-doubles up to 26 metres long are granted significant access to Victorian roads.

Infrastructure limitations imposed on heavy vehicles by states and territories are broadly justified. However, different processes and inconsistent methods of assessment frustrate operators and manufacturers operating in a national market.

In response to these pressures, the Performance Based Standards concept was conceived in 1998. It had an objective of applying nationally uniform assessment methods, while accounting for different constraints imposed by the state and territory road networks.

In May 2001, ATC endorsed the policy framework for the development of a performance-based approach to heavy vehicle regulation and in December 2003 voted to adopt the performance based standards.

The Performance Based Standards project was divided into six phases. They were:

**Phase A:** Performance Measures and Standards – identifying the appropriate performance measures and standards and surveying the performance of the current heavy vehicle fleet;

**Phase B:** Regulatory and Compliance Processes – establishing a regulatory system in which Performance–Based Standards can operate as a seamless national alternative to existing prescriptive regulations including national compliance and enforcement arrangements;

**Phase C:** Guidelines – preparing guidelines detailing the procedures and processes for the consistent application of Performance Based Standards;

**Phase D:** Legislation – developing the legislative arrangements for Performance Based Standards to operate as an alternative to prescriptive regulations;

**Phase E:** Case Studies – assembling work previously conducted and demonstrating the practical application of Performance Based Standards to nationally agreed priorities; and

**Phase F:** Implementation – putting in place the necessary legislative and administrative systems to allow Performance Based Standards to operate nationally and providing the training and information to support these changes.
Most of these phases in practice represented ongoing tasks and were to be addressed concurrently. At the time of writing, most were well advanced, with the major uncompleted tasks being Phases D (Legislation) and F (Implementation).

During the final stages of reform development, the Performance Based Standards Interim Review Panel was established to “road test” the reform by reviewing “case study” applications. While not empowered to approve access for SMART vehicles, it could make recommendations to the road agency on whether to grant a permit.

The first meeting of the Interim Review Panel was held on 20-21 April 2005. In total, the Interim Review Panel reviewed 27 SMART vehicle designs (a SMART vehicle is the public name for a Performance Based Standards compliant vehicle).

In February 2006, COAG recognised the potential of the reform and agreed that³:

“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.”

In October 2007, ATC approved a refined Performance Based Standards package, including further developed vehicle standards and assessment rules, business rules governing administration of the scheme and network classification guidelines. This package represented a significant step towards the development of a nationally agreed, robust and autonomous scheme.

Under the revised scheme, the responsibility for reviewing Performance Based Standards applications shifted from the Interim Review Panel to the Performance Based Standards Review Panel, which continues to operate today. It was agreed that the Performance Based Standards scheme would be reviewed after 12 months of operation, with a view to developing legislation. This discussion paper begins the review process.

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3. PERFORMANCE BASED STANDARDS SCOPE AND OBJECTIVES

**Summary**

- Performance Based Standards has potential to help deliver the productivity gains needed to service a growing freight task safely and sustainably.
- COAG has formalised the objective of Performance Based Standards as an enabler of productivity (while managing safety and infrastructure risks).
- Both Performance Based Standards and prescriptive regulatory frameworks are failing to enable access for more generic high productivity vehicle types.
- Performance Based Standards needs to manage greater scale, modularity and certainty of access to meet COAG’s objectives.

3.1 Regulatory alternatives to Performance Based Standards

In defining the scope and objectives of Performance Based Standards, it is important to consider the regulatory alternatives. Broadly, two alternative frameworks exist for granting heavy vehicles access to the road network:

- **Prescriptive regulations**, including “as of right” access and by gazettal notice, in which certain pre-conditions for access are specified. The majority of heavy vehicles are included in this category.

- **The permit system**, in which individual applications for access are made and assessed by regulators. Included in this category are over-dimensional and heavy loads, which are considered by regulators to pose an inherent or potentially higher risk to other road users and/or infrastructure. Individual assessment of the vehicle and imposition of permit conditions allows such risks to be mitigated.

Performance Based Standards was intended to fill the regulatory “gap” between those two frameworks, by providing a nationally uniform safety and infrastructure risk assessment framework for innovative and/or higher productivity vehicles.

3.2 Defining Performance Based Standards objectives

Performance Based Standards is a regulatory tool that exists to serve policy objectives. In defining those objectives, it is important to draw the distinction between Performance Based Standards objectives and principles.

Performance Based Standards offers an alternative approach to traditional, prescriptive heavy vehicle regulation, simply described as “matching vehicles to roads”. Under Performance Based Standards, vehicles demonstrated to comply with minimum safety and infrastructure protection standards may be granted access to a suitable road network.

It is not proposed to amend these underpinning principles of the scheme, nor would it be practical to do so. However of crucial importance to the success of Performance Based Standards is how these fundamental principles are applied, through the various standards and rules, to serve the broader policy objectives. As these objectives have evolved since inception of the scheme, so must the standards and rules.
3.2.1 Original objectives of Performance Based Standards

The objectives of Performance Based Standards have previously been stated as the development of:

1. more sustainable transport systems through improved road vehicle regulations controlling heavy vehicle safety and infrastructure impacts; and

2. more flexible road transport regulations that provide for increased innovation and more rapid adoption of new technologies, while providing seamless operations nationally.

As discussed earlier, Performance Based Standards was developed in response to what were broadly agreed as inflexible, prescriptive heavy vehicle regulations. It aimed to provide objective and transparent national standards for non-prescriptive vehicle types and reduce the administrative load on road agency permit schemes and their staff.

3.2.2 Meeting the demand on a growing freight task

The national freight task is projected to double in size between 2000 and 2020. 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.

Doing nothing will result in approximately another 50,000 trucks on Australian roads, with one in four vehicles in cities carrying freight. The impact of freight growth will be greatest in urban areas; particularly around ports, inter-modal terminals and distribution centres.

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 higher productivity vehicles, Performance Based Standards can help meet this objective.

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Figure 1. Projected growth and distribution of the domestic freight task.

Figure 2. Projected growth in freight domestic freight.
3.3 A higher productivity heavy vehicle fleet

Formalising the objective of Performance Based Standards as a key enabler for a more productive heavy vehicle fleet serves to inform the context of the current review. A focus of this review will be on identifying the restrictions on a more broad-based Performance Based Standards scheme and how these may be lifted.

3.4 The role of performance regulation

Delivering national productivity reforms through existing prescriptive regulations has become increasingly difficult. For many years, NTC has been working on productivity reforms to align truck-trailer mass limits; increase axle mass limits for twin-steer prime mover and semi-trailer combinations, increase axle mass limits for quad axle semi-trailers and B-doubles; and develop a wider road network for B-triples.

It has become clear that governments are looking to the Performance Based Standards scheme as the framework for delivering those productivity gains, safely; particularly for combination vehicles, where performance can vary depending on the equipment used.

The question of which types of vehicles and combinations should fall within the scope of the Performance Based Standards scheme is a matter of great significance for both the scheme and, more broadly, national heavy vehicle productivity.

For example, in agreeing to increase the axle mass limits for twin steer prime mover and semi-trailer combinations, the Australian Transport Council informed the NTC that the intent of the model regulation drafted by NTC would be implemented through Performance Based Standards.

Quad axle groups in semi-trailers and B-doubles can carry heavier loads more safely and efficiently. Despite agreeing to a national policy to encourage the take-up of these vehicles, no government has mapped a network. Applicants have instead been asked to apply through Performance Based Standards and routes are assessed on a case-by-case basis.

State and territory governments currently have different permit schemes for truck-trailers. Road agencies have been unable to agree on a national policy for truck-trailers, due to differing views on matters such as mass limits and their effect on vehicle stability.

Performance Based Standards is already providing a potential solution for truck-trailers: operators can design more stable vehicles with no artificial gross mass “cap”, while regulators gain greater confidence in their safety performance. Many applications for Performance Based Standards truck-trailers are being received.

The Australian Transport Council agreed in May 2007 to “extend” the B-triple network to include national road train routes and parts of the AusLink National Network. Upgrading inter-capital routes for a wider “prescriptive” B-triple network, where the major demand for B-triple operation and increased productivity has been identified by industry, will (based on road agency estimates) be costly. A capital works program for B-triples would compete with, or form part of, other projects; and may take many years to construct.

Plans mooted to extend the operation of B-triples and other high productivity combinations are often met with community outrage, council opposition and front page newspaper
headlines. It is a politically sensitive issue. Governments, therefore, want assurance that large vehicles are safe, pay their way and are matched to an appropriate road network.

COAG (February 2006) opened the door to implement quad axle group and B-triple reforms through Performance Based Standards. The Australian Trucking Association (ATA) has, however, expressed a clear and consistent view that the B-triple reform should not be implemented through Performance Based Standards.

By providing a defined, objective performance envelope for B-triples, Performance Based Standards provides infrastructure managers with a significantly enhanced ability to assess the suitability of existing roads and better determine the nature and extent of any necessary upgrades. Better performing B-triples can also secure wider access to the Performance Based Standards road network.

There are also strong views from some in industry that government reforms for higher productivity vehicles should not “pick winners”. A network suitable for B-triples could unfairly disadvantage other high performing combinations such as AB-triples, super B-doubles and high performance road trains (e.g. those using steerable axle technology).

By designating approved routes for heavy vehicles able to meet an agreed performance standard, the Performance Based Standards approach allows the market to determine the best high productivity vehicles for the freight task.

Performance Based Standards in its current form (with an inflexible performance envelope) limits the ability of industry to use the B-triple as a truly modular vehicle; or provide the flexibility to migrate existing trailer stock, such as those currently used in B-doubles.

If Performance Based Standards is to facilitate productivity gains for high productivity vehicles, the scheme needs to effectively manage modularity, scale and access.

### 3.5 Performance Based Standards scope

The scope and coverage of the Performance Based Standards scheme needs to be considered in the context of its defined objective. The design of the scheme should be cognisant of the need to encourage uptake, while not over reaching in a way that leads to over regulation.

#### 3.5.1 Coverage of the fleet

One of the most critical factors in enabling the Performance Based Standards scheme to achieve its productivity and safety objectives is adequate, or optimum, take-up of the heavy vehicle fleet.

At the present rate of applications, the proportion of the vehicles operating under the Performance Based Standards scheme will be small. This is perhaps a legacy of the scheme’s early focus on more innovative vehicle designs. Performance Based Standards provides a technically robust framework for assessing the performance of bespoke, innovative vehicles.
However, in laying down such stringent requirements, necessitating individual assessments of each application undertaken by a handful of experts, the scalability and potential of the scheme to improve productivity and safety is severely constrained.

In order to achieve COAG’s objective for a more productive heavy vehicle fleet, it is clear that the scheme must be improved to encourage wider take-up, of not only innovative vehicles, but also address more generic high productivity vehicles, as per Figure 3. The challenge is to identify means of reforming Performance Based Standards to build on its strengths, while removing the inbuilt blockages and inefficiencies.

![Figure 3. Performance based assessment - fleet coverage objectives](image)

**Performance Based Standards Scheme - Feedback Questions:**

- Do you agree that the current Performance Based Standards and prescriptive schemes are unsuitable for more generic high productivity vehicles?

- What changes are needed to prescriptive or Performance Based Standards frameworks to include generic high productivity vehicle types (while managing safety and infrastructure risks)?
4. FLEXIBILITY THROUGH PERFORMANCE BASED STANDARDS

Summary

- Performance Based Standards allows more flexible designs and gross mass concessions.
- Performance Based Standards can deliver greater (customised) access to the network.
- The economic, safety, environmental and amenity benefits are significant.
- The lack of legislative status “binding” access to the road network limits the adoption of Performance Based Standards.

By managing safety and infrastructure risks through a performance assessment, SMART vehicles and combinations can be granted more flexibility than prescriptive regulations.

Under current legislative and administrative arrangements, flexibility granted to vehicles under Performance Based Standards may be categorised broadly in two ways:

- **More extensive network access** for a vehicle compliant with prescriptive standards, not specifically seeking approval for design modifications. Approval for such access to the performance standards may, nevertheless, require vehicle design modifications.

- **Standards (ADR and mass) concessions** granted to a vehicle performing a given transport task or operating on a given road network. An example is a “super” B-double combination, operating in a port district, granted length and mass concessions to the prescriptive B-double standards.

The Performance Based Standards scheme allows the assessment of applications incorporating a combination of both types of flexibility.

4.1 More extensive road network access

As evidenced by stakeholder views and feedback, there is strong or perhaps even greater demand for extensive road network access. An example may be a B-triple combination, compliant with all applicable Australian Design Rules and mass limits, but seeking access to suitable inter-capital and outer metropolitan routes.

As discussed further in Section 5 – Road Network Access, a broader extent and greater certainty for road network access is a primary demand of transport industry members.

4.2 Australian Design Rules concessions

The principal requirement for new vehicle certification is compliance with the Australian Design Rules. It is these rules that specify, amongst many other requirements, dimensional limits on vehicles, including heavy trailers.

Continued compliance with the Australian Design Rules is regulated by in-service Australian Vehicle Standards Rules, administered by the individual states and territories.
While those standards provide some regulation over the on-road performance of individual heavy vehicles, the performance of combination vehicles is mostly unaccounted for. Performance Based Standards addresses this through performance parameters such as low speed swept path and dynamic behaviour standards.

This is fundamental to the Performance Based Standards approach: by regulating a combination vehicle’s performance and the extent of access granted to the road network, concessions to prescriptive limits, such as vehicle length or width, may be justified.

4.3 Mass concessions

Unlike the regulation of vehicle dimensions, mass limits are regulated solely by the states and territories. This is done in a similar manner to the in-service vehicle standards, under the national model Mass and Loading Regulations.

There are three main types of mass limits: maximum allowable mass transmitted by any given axle group to the road pavement, gross vehicle or combination mass, and compliance with an applicable axle spacing mass schedule (also known as the bridge formulae).

Furthermore, there are two primary reasons for imposing vehicle mass limits: the preservation of road infrastructure and vehicle dynamic performance and stability.

To date, due to the importance placed on preservation of road infrastructure, it has generally proven difficult to provide further mass concessions to vehicles. In general, therefore, SMART vehicles are subject to the same mass limits as prescriptive vehicle types.

However, due in part to the demonstrated dynamic performance and stability of SMART vehicles, limited concessions to gross vehicle/combination mass were granted.

A critical limitation on granting mass concessions is the lack of information on the nature and location of vulnerable road infrastructure. Performance Based Standards provides a framework for granting vehicles tailored or intelligent access to the road network, such as by restricting access for heavier SMART vehicles to vulnerable points on the road network. However, this framework can only be properly utilised if those vulnerable points are identified and rated.

4.4 Long-term benefits of Performance Based Standards

The Performance Based Standards approach will allow industry additional opportunities to innovate, use longer combinations and/or use existing equipment in new ways; resulting in improved productivity for a given freight task and safer performance to the least detriment of infrastructure.

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6 As per the Intelligent Access Program (www.tca.gov.au)
In the context of a growing freight task, Performance Based Standards has the potential to:

- Reduce the socio-economic impact of freight transport effort (less resource consumption, noise, emissions, road congestion etc.);
- Increase freight transport efficiency (reducing the number of trips and kilometres travelled required for any given task);
- Improving road safety by encouraging the use of better performing vehicles; and less truck trips reduces crash exposure.

Melbourne University Associate Professor Kim Hassall has conducted over 20 case studies of Performance Based Standards applications and has predicted that “Performance Based Standards can save industry 5% of truck kilometres, nationally and deliver benefits of $250 million dollars per annum ongoing for at least the next 20 years. This also delivers a greenhouse benefit.”

Improving the efficiency, capacity and productivity of the existing and planned vehicle fleet has obvious benefits; servicing the freight tasks with fewer resources. Productivity is a driver and facilitator of economic growth.

### 4.5 Performance Based Standards legislative status

In February 2006, COAG agreed to:

“[The] implementation of Performance Based Standards regulation... including binding and effective national decision-making processes.”

The statement clarifies the requirement for development of national, binding Performance Based Standards regulations. As discussed in section 2 - A Brief History of, operation of the scheme to date has been under administrative (permit) arrangements. Such arrangements are by policy agreement and are not bound by the force of legislation.

Particularly while still in the policy development phase, administrative operation has allowed regulators a degree of flexibility for amending rules and processes as experience has been gained for which elements of Performance Based Standards have worked effectively and which have not.

However, an inherent shortcoming of administrative arrangements is the lack of certainty afforded to participants. The development of binding Performance Based Standards regulations, to which this paper is a precursor, is intended to provide prospective applicants with a greater degree of confidence for the operation and outcomes of the Performance Based Standards assessment process.

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7 Hassall, K, 2008, Submission to Garnaut Issues Paper 5 Transport, Planning & The Built Environment

4.6 Supporting other heavy vehicle access schemes

The current process for a SMART vehicle gaining access to the road network is described in section 7.2 - *Current performance based standards process*. However, it is important to recognise the broader influence of Performance Based Standards, beyond only the vehicles that have participated in full.

Particularly in lieu of a fully operational Performance Based Standards scheme, the individual Performance Based Standards requirements themselves have served as a benchmark for state and territory governments in assessing the performance of heavy vehicles, such as for permit applications.

In this context, Performance Based Standards has delivered significant (if inconsistent) productivity gains.

**Performance Based Standards Scheme - Feedback Questions:**

- What other concessions and/or productivity gains could be achievable through performance based regulation?
- What are the potential benefits available through increased flexibility?
5. ROAD NETWORK ACCESS

Summary

- 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.
- Industry wants a standardised approach (procedure and documentation) to requesting access for all states and territories.

5.1 Overview of network levels and maps

A key objective in developing the Performance Based Standards 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 Performance Based Standards road network levels.

Currently there are four network levels, referred to by numbers one through to four. These four levels roughly equate to existing networks for prescriptive vehicles, in ascending order, for general access, B-double routes, and type one and two road trains.

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<thead>
<tr>
<th>Vehicle Performance Level</th>
<th>Network Access by Vehicle Length, L (m)</th>
<th>Previous class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Access Class ‘A’</td>
<td>Access Class ‘B’</td>
</tr>
<tr>
<td>Level 1</td>
<td>L \leq 20</td>
<td>General Access*</td>
</tr>
<tr>
<td>Level 2</td>
<td>L \leq 26</td>
<td>26 &lt; L \leq 30</td>
</tr>
<tr>
<td>Level 3</td>
<td>L \leq 36.5</td>
<td>36.5 &lt; L \leq 42</td>
</tr>
<tr>
<td>Level 4</td>
<td>L \leq 53.5</td>
<td>53.5 &lt; L \leq 60</td>
</tr>
</tbody>
</table>

General Access is subject to a 50 tonne gross mass limit, posted local restrictions and restrictions or limitations specified by the jurisdiction (for example under the Higher Mass Limits scheme).

Table 1. Performance Based Standards - road network length limits

The initial development of these levels not only looked at existing vehicles but also the risks involved in different driving environments. For example, level one or general access vehicles operate in urban environments, sharing busy roads with a range of other road
users, with inclines and tighter corners. Performance Based Standards aims to fit vehicles to this network by requiring higher levels of vehicle safety and dynamic performance.

Performance Based Standards allows relatively minor modifications to mainstream general access vehicles to provide significant increases in productivity. Hassall (2006) investigated the productivity gains, primarily through better vehicle utilisation, that may be realised via using SMART vehicles in a general access (level 1) environment. The results of this study are shown in Figure 4.

<table>
<thead>
<tr>
<th>Case Study Results – 4 Axle Rigid Parcel Vehicle – Urban Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Productivity increases via twin steer and additional rear overhang)</td>
</tr>
</tbody>
</table>

1. Whole trip savings: 16.6% per day

2. Kilometre savings: 3780 km to 2768 km per daily shift
   26.7% per day

3. Cost savings: 19.4% per day

4. Vehicle fleet reduction: 44 Vehicles to 28 Vehicles
   36% of Fleet

Figure 4. Case study results - 4 axle rigid parcel vehicle

The level two network was conceived for larger vehicles (similar to B-doubles) which would operate on the urban fringes or main thoroughfares where lane widths are wider and corners have larger radii.

5.2 Granting of road network access

Under the Performance Based Standards principle of “matching roads to vehicles”, it was intended that a vehicle approved as compliant with the safety standards of a given Performance Based Standards level would be granted access to the corresponding, approved Performance Based Standards road network. While this remains the agreed

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9 Hassall, K., 2006, Impacts of Performance Based Standards in Australian Road Freight Networks: Selected Case Studies.
national policy, in practice 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 that required to meet their business needs.

Industry members have identified this lack of certainty for road access as by far the major roadblock to wider uptake of Performance Based Standards. Designing, developing, testing and constructing new high productivity vehicles is costly and time consuming. Therefore, for a company to consider investing in a SMART vehicle, it must be granted access to the road network.

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 desired routes. In addition, the access assessment is time sensitive given that industry often responds to customer contract tenders within defined time limits.

The Performance Based Standards customer focus group made it absolutely clear that network information (maps, levels and bridge specifications) and assured access were the main factors affecting Performance Based Standards take-up. Regardless of all other possible improvements in the Performance Based Standards scheme, if the network access issues are not resolved, then Performance Based Standards will not be successful in its goal of providing a more productive road freight system.

5.2.1 Overview of the current process for access approval

A clearer understanding of some of the issues associated with the granting of road network access may be gained by an analysis of the process. A more detailed explanation of the full Performance Based Standards application process is given in Appendix 2 and 3.

Under current arrangements, primary responsibility for negotiating road network access falls on the Performance Based Standards applicant. Applicants are strongly advised to consult with relevant road agencies about road network access at an early point and before building vehicles. In addition to advice from road agencies, applicants may now also check the recently published, initial Performance Based Standards maps.

Under current arrangements, approval for the extent of road network access is only granted by road agencies after final approval for a SMART vehicle is given. Despite approval of the vehicle design and its certification, there is no binding rule (as required by COAG) that guarantees access approval.

Transport industry members have expressed strong dissatisfaction with the lack of transparency in that process. The potential for a vehicle, issued a Performance Based Standards design approval, to subsequently be declined access to part or all of the designated Performance Based Standards road network has served to discourage transport operators from committing to a Performance Based Standards assessment.

5.2.1.1 Bridge assessments

The Performance Based Standards bridge loading standard outlines requirements, agreed by ATC, which are essentially the same as those applied to corresponding prescriptive vehicles. However, in the case of SMART vehicles, at least some road agencies have indicated that they may not automatically accept compliance with this standard.
It is understood there is a perception that some SMART vehicles, despite compliance with the Performance Based Standards 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.

In practice, the only alternative to the current Performance Based Standards bridge loading standard is a regime of states and territories imposing different procedures and performance levels, on a vehicle-by-vehicle, bridge-by-bridge basis. This violates the principle of granting a SMART vehicle access to the Performance Based Standards network and would severely undermine viability of the scheme as a whole.

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.

Indeed, there is an argument for more favourable assessment of SMART vehicles. Due to uncertainty for the mass compliance status of most prescriptive vehicles and the potentially severe damage from overloading, it is standard practice for bridge assessments to be conducted with an assumption (or factor of safety) that the subject vehicle has been overloaded.

NTC believes developments in compliance systems – in particular, technological developments supporting the Intelligent Access Program (IAP) and its potential extension to include an on-board mass monitoring function – will provide road agencies with greater confidence in managing overloading risks. This may justify bridge assessments for applicable (Performance Based Standards) vehicles being conducted under more relaxed assumptions or terms.

NTC has been working with road agency bridge engineers to achieve a resolution to this problem. Possible options include:

- development of a Performance Based Standards bridge standard or policy that accounts for the concerns of road agencies, while not unduly penalising SMART vehicles;
- pre-assessments of “generic types” of Performance Based Standards vehicles (e.g. truck-trailers) to improve confidence in the design and its impacts; and
- a recognition that SMART vehicles operating under mass compliance programs reduce the risk of bridge and pavement damage, and should be encouraged.

5.2.1.2 Concerns with vehicle design

Road agencies have, to some extent, adopted a “wait and see” approach to access approval for SMART vehicles. Some agencies remain hesitant about relinquishing control over any “unforeseen anomalies” in vehicle design. By retaining the discretionary authority to approve access, road agencies can monitor and control the perceived risk.

5.2.2 Road ownership and authority for granting road network access

Responsibility for granting access to Australian roads is distributed between the state and territory road agencies for main roads, and the hundreds of local governments for minor roads. While the publication of initial Performance Based Standards maps has gone some
way to clarifying the nature and extent of road network access, SMART vehicles often require access to other roads on (and often adjacent to) approved main roads.

Under current arrangements, the responsibility for negotiating access to those other roads falls on the applicant. Stakeholders have frequently reported great difficulty in negotiating such access. This has particularly applied to roads managed by local governments, who are often reported to possess little knowledge of heavy vehicle access schemes such as Performance Based Standards.

### Kirowin Case Study: Local road access

Rick Taylor is an owner-driver who carries fuel to farms and businesses in central Queensland. He had a good idea for a better vehicle design.

The truck can be broken-up – its modular. The front half is used for deliveries to farms and sites where access is poor. The rear trailer can be unhooked and used as a storage tank. An extra 6 tonne payload also helps absorb cost increases and stay viable.

The Performance Based Standards reform allowed Mr Taylor to get the truck assessed against performance standards – to prove its safe and won’t damage bridges – and its now up and running on a permit.

He approached the 15 local councils armed with his Performance Based Standards assessment and State government support, but found many were unaware of the reform.

“Some were good and some just didn't want to know,” he told *Australasian Transport News.*

“Hopefully Performance Based Standards will get up to a stage where once the truck goes through the NTC’s Review Panel it's able to get on the road.”

In an *Australian Financial Review* article published in May 2008, Mr Taylor said he subsequently purchased another truck, but this time opted to comply with prescriptive regulations to avoid the red tape associated with negotiating road access.

“The local governments were less helpful … they are scared of the regulations,” he said.

In broad terms, state and territory governments possess relatively greater expertise and resources to manage the demand for enquiries on and approval of heavy vehicle access, than do local governments.

Although state or territory road agencies, on occasion, may act as an effective intermediary or advisor between applicants and local governments, they have no formal role or authority and in many cases claim not to possess sufficient resources to support such a function.

In the Performance Based Standards stakeholder workshop, held on 28 August 2008, stakeholders proposed that a nationally coordinated body of state and territory heavy vehicle access officers may better support applicants and local governments in the assessment of applications for access to minor or local roads. In effect, each road agency would provide customer support for Performance Based Standards applications.
5.3 Publication of network maps

State and territory transport ministers committed to the delivery of extensive Performance Based Standards networks, based on the principle of migrating corresponding, existing road networks (e.g. existing B-double routes to the Performance Based Standards level 2 network). Ministers further agreed that more extensive networks, in particular the declaration of ‘B’ networks (refer to Table 1), would subsequently be developed.

An initial, national set of Performance Based Standards road networks was published in October 2008 (excluding Victoria, Tasmania and the Australian Capital Territory). These maps provide guidance for transport operators in planning Performance Based Standards applications; however access to the network remains dependent on approval of the vehicle design and permits issued by states and territories.

The current Performance Based Standards networks are not sufficiently extensive. In particular, the current circumstance in which the Performance Based Standards level 2A (refer to Table 1) network is more restrictive than the B-double networks upon which it is based is incongruous (level 2 approved SMART vehicles generally perform better than prescriptive B-doubles).

NTC will continue to work with state and territory road agencies in the development of comprehensive Performance Based Standards networks. Further development will also focus on the interfaces of roads at different state and territory borders, to ensure consistency in their ratings.

The publication and development of Performance Based Standards maps will significantly boost confidence in the viability and attractiveness of the Performance Based Standards scheme. However, full confidence can only be secured by providing greater assurance of access to the mapped networks.

5.4 Length limits

Vehicle length limits have historically been used as an indirect means of regulating a vehicle’s on-road performance, particularly its low speed swept path. Prescriptive regulations impose a limit of 19 metres for general access vehicles (i.e. semi-trailers and truck-trailers) and 25 or 26 metres for B-doubles.

The maximum length limit is a significant constraint on heavy vehicle productivity.

An important underpinning principle of Performance Based Standards is that, by explicitly controlling for aspects of vehicle performance indirectly linked to vehicle length, the need for a specific restriction on vehicle length (and other prescriptive limits) is greatly reduced.

However, in practice, the removal of such restrictions has proven difficult. Road agencies have placed explicit restrictions on vehicle length, citing limitations of the existing road network. These includes stacking distance at intersections (which refers to the front of a vehicle held up at one intersection) and rear overhang.

As the nature and extent of such restrictions on vehicle length are not well understood, NTC is commissioning a study to assess the road network’s ability to safely accommodate extended length limits for SMART vehicles. The results of this investigation should be released prior to the development of the Performance Based Standards regulatory impact
statement and its recommendations will be incorporated into the regulatory impact statement.

5.5 Network for high productivity vehicles

Larger high productivity vehicles such as Super B-doubles, capable of carrying two 40 foot long containers, are accommodated by splitting the level two network into two categories, 2A and 2B (refer to Table 1). Level 2B applies the same Performance Based Standards as level 2A, but would allow access to a subset of the level 2A road network only, deemed suitable for accommodating longer vehicles (up to 30m long, instead of 26).

Under existing arrangements, Performance Based Standards designates “B” networks for each of levels 2 to 4. It was agreed that such networks would form subsets of the corresponding “A” network. The ”B” network has not yet been mapped by road agencies. Industry feedback suggests significant productivity gains could be unlocked by assessing and mapping this network.

The four road network levels were originally developed around defined networks for existing types of heavy vehicle combinations. However, they do not properly account for new types of vehicles such as the B-triple (see the following box: B-triples: falling through the cracks).

B-triples and Super B-doubles are key vehicles in increasing road freight productivity and an example of their capacity to increase productivity is demonstrated in the results of the case study conducted by Hassall (2006) which looked at the effect of introducing these vehicles to a line haul operator’s fleet which would otherwise be using semi-trailers (figure 5).

<table>
<thead>
<tr>
<th>Case Study Results – B-Triple and Super B-Double – Line Haul Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Whole trip savings: 24.5% per annum</td>
</tr>
<tr>
<td>2. Kilometre savings: 17.498 m km to 13.80 m km per annum (21.6% per annum)</td>
</tr>
<tr>
<td>3. Cost savings: 21.9% per annum</td>
</tr>
<tr>
<td>(Note this is a conservative cost saving as travel was based on a uniform C/km Cost. In actuality some corridors will be cheaper and others more expensive to operate over.)</td>
</tr>
<tr>
<td>4. Vehicle fleet reduction: 60 Vehicles to 42 Vehicles (30% of Fleet)</td>
</tr>
<tr>
<td>5. Percent B-triple (S B-double) adoption: 42.5% new fleet makeup.</td>
</tr>
</tbody>
</table>

Figure 5. Case study results - B-triple and Super B-double

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10 Hassall, K, 2006, Impacts of Performance Based Standards in Australian Road Freight Networks: Selected Case Studies.
Options for how these restrictions may be lifted, such as by refining the Performance Based Standards levels and networks, will be investigated as part of ongoing Performance Based Standards policy development.
5.6 Operating conditions

Operating conditions for SMART vehicles include requirements additional to those specified in the various Performance Based Standards requirements. The intention is to mitigate any increase in risk profile associated with the vehicle by (for example):

- participation in the National Heavy Vehicle Accreditation Scheme to ensure integrity in managing mass compliance and vehicle maintenance;
- Participating in the Intelligent Access Program to provide route compliance assurance, where vulnerable infrastructure is a potential issue; or
- fitment of front, side and/or rear underrun protection devices to the vehicle.

Under the Performance Based Standards business rules, operating conditions are imposed at the discretion of the Panel according to the principles outlined in the document approved by ATC as part of the current Performance Based Standards package: The Guidelines for Determining National Operating Conditions.

NTC believes that it is important these principles are adhered to; in particular, that the imposition of operating conditions are justified in a nationally consistent, transparent and objective manner.

Industry is concerned that governments can impose onerous operating conditions that are not linked to a change in risk profile (such as mass compliance conditions where the risk of overloading is negligible).

It is also important that any conditions are flagged and discussed with the applicant as early in the process as possible. In particular, NTC is keen to avoid circumstances in which individual road agencies are tempted to impose additional requirements, subsequent to final approval of the Performance Based Standards application but made conditional for registration of the vehicle.

**Road Network Access - Feedback Questions:**

- What are the factors (such as evidence of increased infrastructure damage) which limit automatic access to the network for approved SMART vehicles?
- How can genuine concerns be effectively managed through the Performance Based Standards scheme?
- Should road agencies provide more “customer support” to assist applications and facilitate road access negotiation?
- Is there a case for SMART vehicles to be granted more favourable terms for bridge loading assessment than other types of vehicles?
- Can the Performance Based Standards network be further improved/refined, including the availability of networks for safer and more productive vehicles?
6. STANDARDS AND ASSESSMENT RULES

Summary

- Governments often do not apply the standards consistently.
- The lack of certainty and national consistency reduces industry confidence in the Performance Based Standards scheme.
- Application of the standards and assessment rules is inflexible, which adds cost to the assessment of individual vehicles/applications.
- The standards are difficult to apply to generic types or “families” of vehicles and modular trailers.
- Standards should keep pace with modern vehicle technology (e.g. advanced braking/stability systems mitigate rollover risks).

6.1 Introduction

Performance Based Standards requirements have been developed over a significant period of time and have generally been shown to provide effective assurances of vehicle safety and infrastructure protection for more productive vehicles. While industry is generally accepting of the current standards, the Performance Based Standards customer focus group held in August 2008 raised a number of concerns with the applicability of standards to various types of vehicles.

In certain instances, Performance Based Standards requirements are a barrier to vehicle safety and productivity. For example, a Performance Based Standards assessment can fail a design that is demonstrably better performing than its prescriptive alternative.

Appendix 1 includes an in-depth discussion on the Performance Based Standards requirements and the perceived issues with particular requirements. This section provides an overview of the standards and details some of the issues faced by applicants, the secretariat and the Panel.

The need for a more flexible, risk based approach to accommodate future incremental pricing schemes, generic vehicle types and modular combinations is essential to meet COAG objectives.

6.2 Standards

Performance Based Standards requirements had their genesis as a tool to objectively assess vehicles for whose on-road performance characteristics were unknown or uncertain. Table 2 lists the vehicle and infrastructure standards required to be assessed when applying for a SMART vehicle approval.
<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
<th>Not currently assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle stability standards</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATIC ROLLOVER THRESHOLD</td>
<td>Ensures that geometry and suspension provide a set level of vehicle stability</td>
<td></td>
</tr>
<tr>
<td>DIRECTIONAL STABILITY UNDER BRAKING</td>
<td>Ensures that vehicles remain controllable when braking in a turn</td>
<td></td>
</tr>
<tr>
<td>YAW DAMPING COEFFICIENT</td>
<td>Ensures that vehicles do not suffer excessive roll oscillation after manoeuvres</td>
<td></td>
</tr>
<tr>
<td><strong>Trailer dynamic performance standards</strong></td>
<td></td>
<td></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>
<td></td>
</tr>
<tr>
<td>REARWARD AMPLIFICATION</td>
<td>Ensures that trailers of multi-articulated vehicles do not swing excessively after avoidance manoeuvres</td>
<td></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>
<td></td>
</tr>
<tr>
<td><strong>Vehicle powertrain standards</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STARTABILITY</td>
<td>Ensures that the fully laden vehicle may start on a hill of set grade</td>
<td></td>
</tr>
<tr>
<td>GRADEABILITY</td>
<td>Ensures that the fully laden vehicle may maintain speed on a hill of set grade</td>
<td></td>
</tr>
<tr>
<td>ACCELERATION CAPABILITY</td>
<td>Ensures that a vehicle may accelerate at an appropriate rate to clear traffic lights etc</td>
<td></td>
</tr>
<tr>
<td><strong>Vehicle manoeuvrability standards</strong></td>
<td></td>
<td></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>
<td></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>
<td></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>
<td></td>
</tr>
<tr>
<td><strong>Vehicle ride and handling standards</strong></td>
<td></td>
<td></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>
<td></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>
<td>X</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>
<td>X</td>
</tr>
<tr>
<td><strong>Infrastructure Standards</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRIDGE LOADING</td>
<td>Ensures that vehicle mass is compatible with bridge infrastructure for set route</td>
<td></td>
</tr>
<tr>
<td>PAVEMENT VERTICAL LOADING (INTERIM STANDARD)</td>
<td>Ensures that vehicle mass as transferred to the pavement is compatible with road infrastructure for set route</td>
<td></td>
</tr>
<tr>
<td>TYRE CONTACT PRESSURE DISTRIBUTION</td>
<td>Ensures that pressure transferred to the road surface by the tyres is compatible with road infrastructure for set route</td>
<td></td>
</tr>
<tr>
<td>PAVEMENT HORIZONTAL LOADING</td>
<td>Ensures that horizontal force transferred to the road surface by the tyres is compatible with road infrastructure for set route</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Safety and infrastructure standards
6.3 Flexibility of vehicle standards

A key finding of the Performance Based Standards customer focus group was that the current Performance Based Standards system is too inflexible and a barrier to innovation. Many vehicles which perform more safely than equivalent prescriptive vehicles are ineligible for the Performance Based Standards scheme because they do not meet all standards.

In some cases, the same “improved” vehicle is granted road access anyway through state-based permit schemes. This would tend to indicate that, in some circumstances, Performance Based Standards requirements are excessive as individual states are willing to have these vehicles run on their network (having assessed the vehicles as sufficiently safe for operation).

The current scheme, therefore, is failing to reduce the administrative load or provide nationally consistent decisions.

The Performance Based Standards scheme’s objective, as stated by COAG is to “…enable continuous productivity gains and technological improvement, whilst meeting reasonable safety, road asset protection and environmental standards”. There is an argument that Performance Based Standards should not impose a higher standard than prescriptive regulation.

The Performance Based Standards customer focus group and a Municipal Association of Victoria meeting held in August 2008 confirmed that local government and the community acceptance of “safer and more productive” SMART trucks was critical. Road access is vital to the viability of the Performance Based Standards scheme.

A key marketing message for Performance Based Standards is its ability to service a growing freight task safely and sustainably. To preserve this message there should be no intention of reducing or removing Performance Based Standards requirements and limits that provide quantifiable safety improvements.

In addition, vehicle design, development and construction organisations require stable Performance Based Standards requirements, test methods and limits to efficiently develop vehicles which meet the requirements of the scheme. However, there may be an opportunity to evaluate whether certain standards should be applicable to certain types of vehicles or certain road networks.

If certain standards do not have a quantifiable effect of increasing road safety for a particular class of vehicle, a case can be made that the expense and possible negative effects to a vehicle design required to meet the standard are a barrier to increased Performance Based Standards uptake and increased road transport productivity.

The recently approved discretionary powers (see business rules, section 7.5 for further detail) should move the Performance Based Standards system towards a greater level of flexibility regarding alternative methods of proving a vehicle’s fitness for operation under Performance Based Standards. The discretionary powers will be evaluated and any changes required to further enhance the process will be explored in the proposed regulatory impact statement.
6.4 Risk assessment of vehicle standards

There appears to have been limited data available to link the Performance Based Standards requirements with empirical vehicle accident data and the root cause of heavy vehicle accidents. As a result it is difficult to objectively take a risk-based approach to assessing vehicles which may not meet all of the Performance Based Standards requirements. Should there be enhancements in accident reporting and data collection there may be scope to address the relative importance of each Performance Based Standards requirement in the future.

6.5 Applicability of the vehicle standards

Under current arrangements, Performance Based Standards approval is only available for vehicles demonstrated to comply with the Performance Based Standards requirements in full. Some industry members have argued that in at least some circumstances, full compliance is unnecessary.

An example may be a heavy vehicle already operating legally under prescriptive regulations, but modified in a manner that would not comply with a specific provision of the Australian Design Rules or Australian Vehicle Safety Rules. Under existing arrangements, approval of the vehicle/modification via the Performance Based Standards scheme would only be possible if compliance with all the Performance Based Standards requirements was demonstrated (even those standards not impacted by the modification). This approach may require other unrelated modifications.

Industry has argued that this requirement is excessive and unjustified. Although it is possible for an application for “partial Performance Based Standards compliance” to be made through state and territory permit schemes, it is not recognised by the national Performance Based Standards scheme.

Sanctioning “partial Performance Based Standards compliance” presents significant challenges. In particular, it is incompatible with the Performance Based Standards principle of granting access to a road network assessed on the basis of full compliance at a given Performance Based Standards level. Yet, in practice, non-complying prescriptive vehicles operate on similar road networks (e.g. B-doubles on the equivalent Level 2 network).

6.6 Standard vehicle configurations and incremental pricing

Currently 37% of Performance Based Standards applications are for generic truck-trailers, especially in Victoria, to increase gross weights and improve stability (by using a longer wheel base). It is an “improved” mainstream vehicle, with well-known performance characteristics, which already services a major part of the freight task.

Another example are those generic vehicle types which will require Performance Based Standards approval to participate in the incremental pricing scheme (if approved by ATC). Incremental pricing will allow trucks to operate at higher than regulated axle and gross mass limits by compensating the road owner for the cost of additional road wear.
Performance Based Standards assessment is essential because operating at higher mass can impact on the stability of a vehicle (such as the rollover threshold). However, incremental loads will not influence the vehicle’s low speed off-tracking performance.

Requiring a generic vehicle type to undergo a full assessment imposes a high administrative load and assessment cost burden for no benefit (its safety performance is well understood). A reduced set of applicable standards for generic vehicle types would streamline the evaluation process.

6.7 Blueprints

A blueprint vehicle is a generic design that can easily be repeated. Performance Based Standards blueprints were developed as a method of providing pre-assessed designs for common Performance Based Standards combinations so that industry may develop Performance Based Standards compliant vehicles without requiring costly assessment of their particular vehicle design.

In 2007, ARRB group ltd. were contracted to produce a number of blueprints for standard types (B-triple, quad axle semi-trailer and quad axle B-double). Industry feedback regarding those blueprints indicates the designs are over-specified, impractical and unable to be replicated using standard manufacturing techniques.

More useable blueprint designs are seen as a viable method of meeting a key customer demand of reducing the cost of Performance Based Standards compliance and encouraging broader usage of Performance Based Standards to increase productivity in the road transport sector. It is therefore an objective of the Performance Based Standards system to have available a set of flexible blueprints which can be adopted by industry.

A possible improvement to the blueprint design is to decouple the prime mover specifications such as power, torque drive ratios and gearbox specifications from the dimensional requirements and require a separate (possibly manufacturer’s) assessment of the prime mover’s acceleration, startability and gradeability performance at the specified gross combination mass.

Additionally blueprints may be further enhanced by providing a “limits” type of specification for the dimensional data rather than nominal dimensions with a tolerance. Such a specification would allow greater scope for customisation and build tolerance.

For example, instead of specifying the centre of an axle group as 7900 +/- 10mm from the front of the trailer, a specification may be derived by modelling worst case variants to produce acceptable limit values of say 7800mm to 8000mm.

Re-developing blueprints by evaluating compliant dimensional limits will require significant time and funding to develop. However, a more flexible set of blueprint designs could save industry many times more than the development costs if the blueprints are broadly adopted for manufacture.

Sufficiently flexible blueprint designs may also accommodate modularity within combinations. For example, it may allow different lead trailers to be used on a Performance Based Standards approved B-triple (by ensuring the performance envelope is wide enough to accommodate common trailer sizes). Modularity will also allow
incremental pricing to be applied to the largest number of vehicles at the lowest possible cost.

### 6.8 Generic high productivity vehicles

There is a perceived gap in the coverage of certification schemes for the more generic high productivity vehicles which are not being addressed sufficiently through prescriptive regulations or the rigorous, single vehicle certification method used in Performance Based Standards. Such vehicles include truck and dog combinations, Super B-doubles, etc.

By using the Performance Based Standards principles to rigorously assess known generic configurations, the main controlling characteristics of vehicle performance may be derived for that type. These controlling characteristics, if limited to those values which ensure compliance with Performance Based Standards performance requirements, may be able to be rolled out as prescriptive regulations for that vehicle type. This would be analogous with the development of 26 metre B-double regulations (which were based on performance testing).

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**Generic B-Triple Investigation**

In 2007, the NTC commissioned a study\[^1\] to assess the performance of a range of common B-triple configurations. The objective was to determine the degree of compliance of a prospective B-triple fleet assembled from existing prime mover and (B-double) trailer stock, with the PBS standards.

The study found a generally high level of compliance with the PBS Level 2 standards (except for the low speed swept path standard). Importantly, compliance was improved by imposing controls on vehicle design to a few key dimensional and mass parameters.

Findings of the study highlighted an important dilemma and key point of difference between existing regulatory policy, and the view of some industry members; namely, how stringently should PBS compliance be assessed and regulated? On the one hand, the current scheme requires strict compliance with all of the standards on the basis of an individual, vehicle-by-vehicle assessment; while on the other, a more relaxed approach may be to impose controls on key design parameters known to influence PBS compliance (such as those identified by the B-triple study).


More innovative vehicles with less known performance characteristics would still be required to be evaluated against every applicable Performance Based Standards requirement.
6.9 Parked standards

During the development of Performance Based Standards, 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.

These standards were “parked” and remain in the scheme even though they have no test or acceptable criteria. It may be considered that, for the purpose of clear and effective Performance Based Standards legislation, these requirements should be removed until effective tests and limits can be determined.

6.10 Generic data usage

Current Performance Based Standards applications use very specific equipment performance data to populate numerical models for the purpose of evaluation against Performance Based Standards 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 re-assessment using improved models of tyre as technology advances).

An improvement would be to develop a range of generic data for use in Performance Based Standards applications. 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.

**Performance Based Standards requirements - Feedback Questions:**

- Can a more flexible and simplified application of the Performance Based Standards requirements, as applied by some road agencies, be formally integrated into the national Performance Based Standards scheme?

- Is there scope to apply only relevant Performance Based Standards requirements where vehicles are modified or breach only certain parts of the prescriptive requirements (including incremental pricing vehicles)?

- Identify/comment on standards which should be enhanced, relaxed, parked or removed from the scheme.

- What is an appropriate framework to approve more generic high productivity vehicle types?

- How is modularity best accommodated, while managing overall vehicle combination safety performance?

- NTC seeks stakeholder feedback on a holistic approach to setting axle mass standards through the prescriptive and performance based schemes.
7. PROCESS

Summary

- The current Performance Based Standards process is unsuitable to manage volume applications and lacks certainty for applicants.
- There is a lack of assessors and certifiers to process Performance Based Standards applications.
- Business rules regarding ‘conflict of interest’ do not improve accountability.

7.1 Introduction

The processes for Performance Based Standards 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 Performance Based Standards scheme by industry it is crucial that business, assessor and certification rules can deal with large volumes of vehicle applications. Generic vehicles, including those applying for Performance Based Standards approval to take advantage of the incremental pricing scheme, may need to be treated in a different manner than those applying for a standard Performance Based Standards approval.

Currently, the number of Performance Based Standards applications and approvals are low; primarily due to previously identified issues regarding road access. However, customers have also indicated dissatisfaction with elements of the Performance Based Standards compliance process. These include, but are not limited to the following:

- inflexible business rules to address new technologies or alternative procedures;
- lack of clear information about the Performance Based Standards compliance process;
- inadequate customer support available for a first time applicant;
- high costs associated with the vehicle combination assessment process;
- high costs associated with certification (verification against approved design); and
- responsiveness of the process.

7.2 Current performance based standards process

Appendix 2 includes a detailed discussion of the current Performance Based Standards process and its perceived weaknesses. A flowchart which documents the current Performance Based Standards approval process is found in Appendix 3. The following sections review the strategic issues apparent in the current Performance Based Standards approval process.
7.3 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 Performance Based Standards Review Panel, the panel’s secretariat and the governments operate. In addition, the rules specify how vehicles can participate and become approved under the Performance Based Standards scheme.

There are three major issues that restrict the effectiveness and take-up of the scheme, from the business rules point of view, they are:

1. The rules specify that only vehicles that meet all of the scheme’s performance standards can be reviewed by the panel, thus removing any flexibility to prove adequate performance by alternative means.

2. As vehicle technology and knowledge of the current Australian infrastructure network increase, the applicability of some of the standards ceases to be practical.

By only reviewing vehicles that pass all the standards, the rules may exclude vehicle technologies that can be demonstrated to be safer and more productive than fully compliant SMART vehicles.

7.4 The Performance Based Standards Review Panel

The role of the Performance Based Standards Review 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.

In limiting the Panel’s discussions to applications which already meet all the standards, the process does not appear to be an effective use of such skills. Its time could be better employed to discuss and evaluate new technologies and vehicles which do not fully comply with Performance Based Standards but are demonstrably safer and more productive.

7.5 Panel discretionary powers

ATC approved discretionary powers for the Performance Based Standards Review Panel in November 2008 to address many of the shortcomings of the current business rules. There are a number of circumstances in which an applicant may wish for the panel to apply discretion.

- **Trade-off conditions**: where a related standard or event may offset the breach of a standard.

- **Restricted network**: where the standard is not applicable for access to part of the network being sought.

- **Prescriptive constraint**: where the standard is prescriptive in nature and not consistent with the intent of the Performance Based Standards reform.
Discretionary powers may be applied with the unanimous agreement of the panel to approve the application. Some conceivable examples of where an applicant may request discretion are discussed in figure 7 and 8.

Additionally, it is expected that vehicles wishing to participate in the Incremental Pricing scheme will require Performance Based Standards approval to operate for stability assurance when operating with increased mass. These vehicles will, by definition, exceed the current infrastructure standards imposed by the Performance Based Standards system.

NTC surveys indicate that a large number of operators wish to run vehicles under the Incremental Pricing scheme. It is not the intention of the NTC to use the discretionary powers to approve vehicles for this purpose, therefore a modified application process must be included to progress these applications.

Figure 7. Example 1 - Restricted network

An operator may wish to run a particular vehicle combination solely in an area that includes road inclines with a grade of less than 2% on a network classified as L4. Performance Based Standards L4 network standards require the combination to meet startability requirements on a grade no less than 5%. However, for this particular application, the vehicle’s performance is adequate for the grades that the vehicle will be operating on. In this case the applicant may ask for discretion to be exercised in return for operating conditions that restrict the vehicle’s usage to grades in which its startability is adequate.

Figure 8. Example 2 - Trade-off condition

Electronic Brake System (EBS) technology – which integrates antilock braking system (ABS) technology, automatic traction control (ATC) and other key vehicle control system features – will prevent the vehicle from roll-over as the brakes will intervene before reaching the point at which the wheels may leave the road surface.

Dynamic roll-over testing is often replaced by “static rollover testing” and a value is assigned to the threshold (SRT – Static Rollover Threshold) at which a vehicle will tip over when placed on a tilt-table. Both the dynamic and static tests methods do not adequately assess the susceptibility to rollover for a vehicle fitted with electronic vehicle stability systems.

In this case an applicant may wish to apply for discretion to be exercised with respect to susceptibility to rollover requirements as electronic braking including vehicle stability system offers better stability, braking, and manoeuvrability performance than a vehicle not fitted with such systems.
7.6 Certifier and assessor rules

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

For the Performance Based Standards 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.

7.7 Barriers to high volume Performance Based Standards certification

A significant barrier to broad industry adoption of Performance Based Standards requirements is the number of available Performance Based Standards assessors and certifiers. At the time of writing this report there are two companies authorised to conduct assessments of Performance Based Standards applications. A lack of competition could have a negative impact on the cost of certification, responsiveness and availability of applications. Similarly, the number of approved Performance Based Standards certifiers is quite limited and not resident in all states.

The current number of approved assessors and certifiers appear insufficient to service higher volume of assessments should Performance Based Standards be adopted by a significant proportion of the freight transport industry. 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 may limit the number of organisations capable of responding to demand for Performance Based Standards assessments.

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

The vast bulk of experience, simulation and test capacity resides within the vehicle manufacturers’ test and development organisations. Unlocking this capacity could provide a relatively low cost method of increasing the number of vehicle assessors and certifiers available to produce Performance Based Standards applications and certify vehicles.

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 vehicle certification rules). The rules constrain Performance Based Standards from using this valuable resource.

Suitable employees within the same organisations are, however, not precluded from providing evidence of Australian Design Rules compliance. There is little justification for imposing much higher levels of scrutiny on Performance Based Standards applications than for Australian Design Rule applications.
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 Performance Based Standards certification they may be in a position to offer their service to third parties.

Manufacturers wishing to certify their own products would still need to apply for and be granted assessor/certifier accreditation (as per the existing vehicle certification rules); ensuring a minimum level of competence and quality of assessment. Accreditation ensures that assessors/certifiers have, and maintain compliance to, 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 Performance Based Standards scheme, the Performance Based Standards secretariat could be called on to conduct regular conformity of production audits.

**Performance Based Standards Process - Feedback Questions:**

- What other opportunities exist to streamline the Performance Based Standards process?
- What are the benefits and concerns around manufacturer self certification?
- Should the Panel be used only to assess novel designs and new technology where interpretation and clarification of the rules is necessary?
8. SUPPORTING THE GROWTH OF THE SCHEME

**Summary**

- Better delivery of information is needed to support decision-making.
- Customer support at a local level would assist applicants through the process and improve liaison with local government.
- Broad uptake of the Performance Based Standards scheme would require additional resource in government.

In operational terms, the Performance Based Standards scheme remains in its infancy. To date, the major focus has been on utilising experience gained from early participants in the scheme for assisting policy development. For this reason, many of the operational or secretarial tasks have been conducted by NTC and road agency policy development staff.

However, as Performance Based Standards progressively enters a more mature stage in which the policy is increasingly settled, it is expected that the role of policy development staff in Performance Based Standards operational matters will diminish.

Stakeholders have highlighted a lack of available support and information “on the ground” which they believe is necessary for making an informed decision about Performance Based Standards participation. Stakeholder concerns have included difficulty in:

- understanding whether participation in the Performance Based Standards scheme would cost-effectively deliver the desired solution or outcome for a given transport task;
- gaining an indication of and, eventually, ascertaining the nature and extent of road network access; and
- estimating the likelihood of a design concept being approved (complying with the standards).

It should be noted that responsibility for such support is distributed between government agencies and Performance Based Standards assessors.

### 8.1 Better and more accessible information

NTC believes that confidence and understanding of Performance Based Standards can be significantly enhanced through improvements to the availability, publication and distribution of relevant information. Many transport operators will remain reluctant to participate in Performance Based Standards without first gaining a proper understanding of the implications, cost and benefits.

A shared, clearer understanding between all stakeholders for the scope, costs, benefits and process for obtaining final approval for a vehicle would contribute to a more efficient Performance Based Standards scheme and allow transport operators to make a more informed decision about whether to participate.

At present, there is a lack of any substantial “front end” or customer support function for the Performance Based Standards scheme. Such support is currently provided by a mixture of the Performance Based Standards secretariat, nominated road agency staff and
Performance Based Standards assessors. Most of the government staff, both NTC and road agencies, are focussed on policy development matters and are unable to dedicate sufficient time and attention to the individual needs of applicants.

NTC has developed an extensive national information resource for Performance Based Standards on its website, including hard copy kits with interactive software developed for industry and local government. This information is available for stakeholders, such as road agencies, to re-brand and distribute as part of its operational reform implementation efforts. It also ensures consistent information is available nationally. So far no government has used this information kit to communicate the reform to operators and local government.

The provision of better information on the Performance Based Standards scheme is not a particularly novel concept. However its delivery requires more careful consideration. Options include an enhanced Performance Based Standards website and greater availability of “customer support” for potential and current applicants to the scheme.

### 8.2 Additional resources for the secretarial function

Some stakeholders have reported great difficulty in negotiating road access with local governments. This has been due to matters such as a lack of clarity about who was responsible for a given road, as well as a reported lack of awareness or support on the part of local government traffic officers for the Performance Based Standards scheme.

At present, applicants are required to negotiate access with the agency responsible for a given road. For a given transport route, this may require that the applicant negotiate with numerous state road agencies and local governments.

While the NTC has been proactive in enhancing awareness and knowledge of the Performance Based Standards scheme by local governments, it acknowledges that there are limits to the effectiveness of this approach and that sufficient “buy in” from local governments is necessary for long term viability of the scheme.

In the Performance Based Standards workshop held on 28 August 2008, stakeholders proposed the formation of specialised heavy vehicle access taskforces that would liaise between industry and different levels of government and agencies.

Additionally, the greater uptake of Performance Based Standards would require more local resources; including the accreditation of Performance Based Standards assessors and certifiers, periodic auditing and handling general enquiries from applicants and other Performance Based Standards stakeholders.

Several options exist to enhance customer support. These include an expanded national Performance Based Standards secretariat, maintained under current arrangements. However there is some justification for such resources to be made available in geographic proximity to customers of the scheme. An alternative to a central Performance Based Standards secretariat (such as that currently operated by the NTC) is a delegated model distributed between states and territories.

The need for additional resources and any restructuring of the Performance Based Standards secretariat will be considered as part of the broader review of Performance Based Standards and subsequent policy development process.
Supporting The Growth Of Performance Based Standards - Feedback Questions:

- What are the obstacles to government in rolling out national communication plans for Performance Based Standards?
- What is the best model to support Performance Based Standards applications and liaise with local governments and stakeholders?
- What other information is needed to support stakeholder communication efforts? (Refer to Performance Based Standards website resource at www.ntc.gov.au)
9. CONCLUSION

The Performance Based Standards scheme has been viewed as having different purposes to different people at different times as it has evolved. This discussion paper has documented the evolution of Performance Based Standards to its current COAG defined objective as an enabler to improved freight productivity whilst retaining reasonable safety, environmental and asset protection standards.

This paper has attempted to identify issues and options, with the aim of aligning stakeholders’ expectations with community, industry and road network benefits. A rigorous yet flexible path to migrating from current prescriptive heavy goods vehicles and buses to more productive vehicles is needed to do this.

The next step in the process towards developing a regulatory impact statement is to conduct a in-depth review of the Performance Based Standards scheme and operations; including feedback from this discussion paper and the length limit review (to be conducted by NTC). From this work, possible enhancements to the Performance Based Standards scheme will be developed and assessed.
APPENDIX 1 – DETAILED DISCUSSION – STANDARDS

1.1 Intent of vehicle standards

While the current Performance Based Standards requirements and assessment rules group the Performance Based Standards requirements as either infrastructure or safety standards, it is useful for discussion purposes to group the safety standards by their intended function as shown in the chart below. When the Performance Based Standards requirements are grouped by like function and intent we can see that there are five groups of requirements assessing vehicle stability, trailer dynamic performance, powertrain performance, manoeuvrability, ride and handling.
<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
<th>Not currently assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATIC ROLLOVER THRESHOLD</strong></td>
<td>Ensures that geometry and suspension provide a set level of vehicle stability</td>
<td></td>
</tr>
<tr>
<td><strong>DIRECTIONAL STABILITY UNDER BRAKING</strong></td>
<td>Ensures that vehicles remain controllable when braking in a turn</td>
<td></td>
</tr>
<tr>
<td><strong>YAW DAMPING COEFFICIENT</strong></td>
<td>Ensures that vehicles do not suffer excessive roll oscillation after manoeuvres</td>
<td></td>
</tr>
<tr>
<td><strong>HIGH-SPEED TRANSIENT OFFTRACKING</strong></td>
<td>Ensures that trailers follow the path of the prime mover during unbraked avoidance manoeuvres</td>
<td></td>
</tr>
<tr>
<td><strong>REARWARD AMPLIFICATION</strong></td>
<td>Ensures that trailers of multi-articulated vehicles do not swing excessively after avoidance manoeuvres</td>
<td></td>
</tr>
<tr>
<td><strong>TRACKING ABILITY ON A STRAIGHT PATH</strong></td>
<td>Ensures that trailers do not deviate from intended straight line path when driven on a rough road</td>
<td></td>
</tr>
<tr>
<td><strong>STARTABILITY</strong></td>
<td>Ensures that the fully laden vehicle may start on a hill of set grade</td>
<td></td>
</tr>
<tr>
<td><strong>GRADEABILITY</strong></td>
<td>Ensures that the fully laden vehicle may maintain speed on a hill of set grade</td>
<td></td>
</tr>
<tr>
<td><strong>ACCELERATION CAPABILITY</strong></td>
<td>Ensures that a vehicle may accelerate at an appropriate rate to clear traffic lights etc</td>
<td></td>
</tr>
<tr>
<td><strong>LOW-SPEED SWEPT PATH</strong></td>
<td>Ensures that a vehicle may safely manoeuvre around corners typical of those found on its compatible network without cutting the corner</td>
<td></td>
</tr>
<tr>
<td><strong>FRONTAL SWING</strong></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>
<td></td>
</tr>
<tr>
<td><strong>TAIL SWING</strong></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>
<td></td>
</tr>
<tr>
<td><strong>STEER-TYRE FRICTION DEMAND</strong> (UNDERSTEER/OVERSTEER)</td>
<td>Ensures that steering axle will be effective in changing the course of the vehicle as required by driver input</td>
<td>X</td>
</tr>
<tr>
<td><strong>HANDLING QUALITY</strong> (DRIVER COMFORT)</td>
<td>Ensures that the vehicle does not show any adverse handling properties with respect to steering inputs</td>
<td>X</td>
</tr>
<tr>
<td><strong>BRIDGE LOADING</strong></td>
<td>Ensures that vehicle mass is compatible with bridge infrastructure for set route</td>
<td></td>
</tr>
<tr>
<td><strong>PAVEMENT VERTICAL LOADING (INTERIM STANDARD)</strong></td>
<td>Ensures that vehicle mass as transferred to the pavement is compatible with road infrastructure for set route</td>
<td></td>
</tr>
<tr>
<td><strong>TYRE CONTACT PRESSURE DISTRIBUTION</strong></td>
<td>Ensures that pressure transferred to the road surface by the tyres is compatible with road infrastructure for set route</td>
<td></td>
</tr>
<tr>
<td><strong>PAVEMENT HORIZONTAL LOADING</strong></td>
<td>Ensures that horizontal force transferred to the road surface by the tyres is compatible with road infrastructure for set route</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Safety and infrastructure standards
1.2 Vehicle stability requirements

A vehicle travelling along a curved path is subjected to an outward force and an overturning moment that is proportional to the lateral (or sideways) acceleration. Rollover occurs when the lateral acceleration that causes the overturning moment is sufficient to exceed the vehicle’s rollover stability threshold.

Rollover stability is the most significant safety issue and arguably the most important performance measure for heavy vehicles because it has been strongly linked to rollover crashes. Crashes that involve heavy vehicle rollover are strongly associated with severe injury and fatalities.

The 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 around a corner (directional stability under braking), or as a result of excessive sway (yaw damping coefficient).

Vehicle stability is a critical component in ensuring that Performance Based Standards approved vehicles are safe when operating on their respective networks, however there are a number of issues with the requirements as they stand.

The static rollover threshold is very sensitive to centre of mass height and therefore sensitive to how a vehicle is loaded. In practice it may be difficult to maintain the correct load centre of mass when carrying non-homogeneous freight.

Static physical testing or numerical modelling does not take into account vehicle systems developed to reduce vehicle rollover propensity. Example devices include electronic braking aids such as electronic stability program which has shown to be highly effective in preventing vehicle rollover and loss of vehicle control.

Static rollover requirements may 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.

The stated purpose of the directional stability under braking requirement is “to manage safety risk of vehicle instability when braking in a turn or on pavement cross slopes.” However the test procedure for this requirement does not actually require a test of braking in a turn or on a cross slope (the test is conducted in a straight line on a flat surface). Therefore it could be argued that the required test does not match the safety concern that it is supposed to address.

The Performance Based Standards review will aim to understand whether the current stability standards can be enhanced by allowing and encouraging the uptake of advanced braking and stability systems.
1.3 Trailer dynamic performance standards

Trailer dynamic performance is covered by three standards. The primary purpose of the high speed transient offtracking standard is to manage safety risk by limiting the sway of the rearmost trailers of multi-articulated vehicles in avoidance manoeuvres performed without braking, at highway speeds.

The rearward amplification requirement is similar to the high speed transient offtracking requirements however is aimed at limiting the lateral directional response of multi-articulated vehicles in similar manoeuvres.

Finally the tracking ability on a straight path requirement aims to manage safety risk associated with lane width and lateral clearance by ensuring that a vehicle remains within its traffic lane when travelling at high speed on straight roads with uneven surfaces.

Stability and control of vehicle trailers is imperative for the safety of not only the vehicle in question, but also for other road users and road infrastructure. Therefore these requirements are necessary to assess, particularly for multi-combination vehicles.

While the physical tests required to prove compliance with these requirements would adequately assess vehicles with advanced braking and control systems, a numeric model would not provide an accurate assessment of the vehicle performance due to the complex feedback and control loops generated by advanced electronic braking systems. Thus it could be argued that the simulation method of compliance does not encourage or reward the uptake of new safety technology, which can provide superior performance. This could be a barrier to entry as the costs required to build a development vehicle to assess physically may be prohibitive. Further study should be conducted to assess whether vehicles with advanced electronic control systems could be deemed to automatically comply with these requirements.

1.4 Vehicle powertrain standards

Performance Based Standards powertrain standards have been designed to ensure that vehicles have sufficient power, torque and traction to avoid becoming a safety risk on the networks for which they are approved. Safety and amenity risks may arise from vehicles not being able to commence forward motion on grades, maintain speed on hills and not having acceleration capability to clear traffic lights or railway crossings or overtake slower vehicles in an effective manner.

The startability requirement requires that, when operating at maximum laden mass, a vehicle must be able to commence and maintain steady forward motion from a standing start on a pavement section of specified upgrade. A combination vehicle that is stopped on a grade beyond its capability will either require that its units be separated and moved or require the use of heavy haulage equipment to move it to a location where it can restart.

As the startability requirement requires only a single start on a prescribed hill it could be seen as a very low test of capability, which if a vehicle could not perform in the field would render the vehicle useless for the prescribed task. To an extent this requirement would be assessed by any operator who was intending to employ a particular vehicle to a
particular route as they would very quickly find it not profitable to use a vehicle in an environment where it had a consistent risk of requiring recovery operations. It could be argued that this standard is therefore setting a lower performance requirement than any operator would require from their vehicle.

Additionally, the test does not require multiple starts within a specified amount of time (such as that required by EU directive 97/27/EC as amended by 2003/19/EC\textsuperscript{11}) and is therefore inadequate for assessing clutch thermal performance. Thus a vehicle which may easily pass the Performance Based Standards hill start requirement may not have adequate hill starting capability in stop-start traffic which is common in urban areas.

The gradeability standard requires a vehicle operating at maximum laden mass to maintain steady forward motion on a road section of specified upgrade. The purpose of this requirement is to minimise traffic congestion or delays to other vehicles travelling in the same direction. Further, heavy vehicles travelling on grade that impede traffic are known to increase accident rates on two lane rural highways.

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 Performance Based Standards level. This would reduce the need to prove compliance each time the same unit is used in a different combination.

\subsection*{1.5 Vehicle manoeuvrability standards}

The vehicle manoeuvrability standards address how much space a vehicle requires to negotiate turns on a particular network.

When a long vehicle makes a low-speed turn at an intersection, the rear of the vehicle will follow a path that is inside the path taken by the front of the vehicle. This is known as low-speed offtracking. A high value of offtracking is undesirable because the vehicle, sweeping a wider path, will require more road space for turning than may be available. This may cause the vehicle to encroach into adjacent or opposing lanes, collide with parked or stopped vehicles, damage roadside furniture, endanger pedestrians, or the rear wheels may climb the kerb or fall off the edge of the pavement. This propensity for low speed offtracking is assessed and limited via the low speed swept path requirement.

Similarly in a low-speed turn the front overhang of the hauling unit (rigid truck, prime mover, bus and coach) will generally cause the path of the front outside corner to track outboard the path of the front outside steered wheel. This behaviour is known as frontal swing. A large amount of frontal swing is undesirable because the vehicle will require more road (and/or kerbside) space for turning than may be available.

In addition to the above, on the exit side of the turn, the path of the front outside corner of a semi-trailer with large front overhang may track outboard of the path of the front outside corner of the hauling unit. For these vehicles, the road space and safety implications are similar to those for the hauling unit described above.

\textsuperscript{11} EU directive 97/27/EC controls mass and dimensions for non-M1 vehicles operating in the EU
Both of these aspects of frontal swing are controlled by the frontal swing standard, and they are particularly important in situations where a vehicle operates in an environment and traffic situations where tight turns are frequently required to be performed.

The tail swing standard limits the amount that the rear outside corner of a heavy vehicle may swing-out during the commencement of a turn. For conventional vehicles tail swing is only significant during commencement of a turn, but it must be tested on the entry approach and exit to the turn when a vehicle is towing trailers with steerable axles.

In urban operations, vehicles with significant rear overhang (such as route buses or semi-trailers), and/or coupling rear overhangs (such as car carriers with the turntable located behind the drive axle) will exhibit significant amounts of tail swing when negotiating tight manoeuvres (such as buses and coaches exiting kerbside pickup areas). Collisions with vehicles in adjacent lanes (including cyclists) and roadside objects may result.

There is some contention that the vehicle manoeuvrability standards limits for particular networks may be set at a level that is too restrictive in practice. For example there are quite a number of B-double vehicles which enjoy better road network access than Performance Based Standards level 2 vehicles whilst having manoeuvrability characteristics that would not meet the Performance Based Standards level 2 requirements. Whilst this is the case a move to vehicles that meet the Performance Based Standards requirements is not advantageous for the operators of this type of vehicle. This restriction will have the effect of encouraging the use of vehicles which may have worse performance than Performance Based Standards requirements in a number of areas including vehicle stability which is not controlled on prescriptive vehicles. The Performance Based Standards review will aim to understand how this issue may be addressed.

1.6 Vehicle ride and handling standards

The vehicle ride and handling standards include requirements to assess the vehicle’s low speed turning ability (steer tyre friction demand), its high speed handling (understeer/oversteer) and ride comfort. Currently only one of these standards has been defined which is the steer tyre friction demand.

The steer friction tyre demand standard has been developed to manage safety risk by limiting the likelihood of a vehicle losing steering control when making a tight turn at low speed. This phenomenon has been observed to occur on the hauling units of multi-combination vehicles (road trains) featuring tri-axle drive systems that have a widely spread axle layout.

The Performance Based Standards requirements and vehicle assessment rules states that “this is generally not an issue for prime movers with single-axle (or tandem-axle) drive systems, and less of an issue for prime movers equipped with twin-steer axles.” It could also be surmised that this is even less of an issue for rigid vehicles with generally long wheelbases and no more than tandem drive axles. Therefore an argument could be made that evaluating this requirement has very little value when applied to vehicles other than tri-axle drive prime movers. There may be scope to transfer this requirement to the pavement horizontal loading requirement and then only apply it to vehicles which are susceptible to this steering failure mode.
High speed handling has been identified as a vehicle characteristic that should be measured and limited by the Performance Based Standards requirements, thus the oversteer/understeer requirement has been added to the Performance Based Standards regulations. At this time, no test exists to evaluate this property and acceptable limits are not known.

Understeer and oversteer conditions generally occur when a vehicle exceeds its tyre friction demand at speed. Currently there are no known requirements in force anywhere in the world for light or heavy vehicle handling under these conditions. This would tend to indicate that this condition is either too difficult to objectively quantify or not a significant safety factor when a vehicle is driven in a reasonable manner. This requirement is an example of a “parked standard” (see section 6.9). A case could be built for excluding this requirement from the Performance Based Standards system until an appropriate objective test method can be established, as subjective measures are too dependent on particular drivers and test conditions to make assessments which are nationally consistent.

The primary purpose of the ride comfort standard is to manage safety risk by limiting driver whole-body vibration, especially on uneven roads where travel speeds are high and vibration levels are expected to be significant. The primary reason for vibration control is due to a perceived need to ensure that vibration does not affect driver fatigue levels.

The Performance Based Standards requirements and vehicle assessment rules concede that there is currently insufficient data that directly links vibration as a causal factor of driver fatigue. In addition to this the requirement to limit whole-body vibration in SMART vehicles is doubly redundant in that occupational health and safety requirements already require employers and employees to assess this risk in the workplace posed by exposure to vibrations regardless of the vehicle being approved to Performance Based Standards or not, and there are also mandated driver fatigue laws currently in force to directly control fatigue.

ISO 2631-1997 is likely to be considered the most appropriate standard for assessing vibration related risks in the workplace and thus there is an argument to say that a similar standard should not be replicated in the Performance Based Standards requirements. Additionally there must be some acknowledgement of the role of customer demands and satisfaction in areas such as ride comfort in that operators will not buy or use vehicles which have severely compromised comfort.

1.7 Infrastructure standards

There are four infrastructure standards that SMART vehicles are assessed against to ensure that they are compatible with the road network assets and do not cause any more damage to these assets than a similar prescriptive vehicle. The infrastructure standards are: pavement vertical loading (interim standard), pavement horizontal loading, bridge loading and tyre contact pressure distribution.
1.8 Pavement vertical loading

The basis of the pavement vertical loading standard is to limit individual axle group\(^{12}\) loads to those that presently apply under:

- General Mass Limits\(^ {13}\);
- Concessional Mass Limits\(^ {14}\); or
- Higher Mass Limits\(^ {15}\).

Total gross mass is not limited by this standard, but may be limited indirectly by the bridge loading standard and the safety standards. The Performance Based Standards Network Classification Guidelines presently limit general access vehicles to a gross mass of 50 tonnes.

The main advantage that vehicle operators derive from this standard is in being able to prescribe a gross vehicle mass or gross combination mass that is the sum of the allowable axle masses. The original intent of the Performance Based Standards scheme was to develop a performance based standard for pavement vertical loading, however following much debate the scheme decided to fall back to a prescriptive standard as a consensus could not be reached on an appropriate outcomes based requirement. This position is unlikely to be resolved in the near future, therefore Performance Based Standards will most likely retain the current standard.

The incremental pricing scheme being developed by NTC will allow Performance Based Standards approved vehicles to breach this standard in return for paying extra charges to repair any additional road damage that will be caused by exceeding the current limits. The Performance Based Standards approval system will need to be modified to accept this breach as an enabler to incremental pricing. Theoretically, the maximum infrastructure capacity would be set by infrastructure providers as the level at which road pavement and bridge infrastructure can no longer safely bear additional mass, and/or the point at which severe road infrastructure damage begins to occur. This would need to take into account the risk level that the infrastructure provider is willing to bear.

1.8.1 Pavement vertical loading standard: a journey

NTC had sought to establish a performance based pavement vertical loading standard to realise mass productivity gains from the reform. The standard used a formula to determine the overall road wear in “equivalent standard axles” caused by SMART heavy vehicles.

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\(^{12}\) As defined in the Australian Design Rules or otherwise permitted by a jurisdiction (e.g. tandem axle group). Note that the listings of exempt prescriptive provisions in Section 4.2 of this document do not provide for exemptions to be sought for axle configuration at this time.

\(^{13}\) As per Table 1 of Schedule 1 of the National Transport Commission (Road Transport Legislation – Mass and Loading Regulations) Regulations 2006.

\(^{14}\) See NTC web site (www.ntc.gov.au).

\(^{15}\) See NTC web site (www.ntc.gov.au).
In 2006, Austroads developed the “blue-line” approach based on the concept of no additional road wear. In essence, it proposes a “base” level of wear for the performance based pavement vertical loading standard.

NTC identified significant flaws in the “blue line” approach, which restricted SMART vehicles from accessing even current (prescriptive) levels of mass productivity.

Instead, NTC proposed an interim performance based pavement vertical loading standard based on existing “prescriptive” axle group mass limits. It also allows gross vehicle or combination mass for compliant SMART vehicles up to the sum of individual axle group mass limits.

Some governments also indicated they wanted a vehicle charging regime to be in place to recover any additional costs of pavement wear above current levels. This is being investigated via the Optimum Mass Project. It is on this basis the 2007 Heavy Vehicle Charges Determination (cost recovery by vehicle class) and incremental pricing reforms (charges for additional road wear) for heavy vehicles have been developed.

It was also determined that the effectiveness of the above approach should be considered in the context of the Performance Based Standards review.

At the same time, the trucking industry has identified several issues with the inflexible nature of prescriptive axle weights. Operators are often fined for minor breaches of axle group mass limits resulting from cases of unintentional, uneven loading.

Industry proposed an axle mass offset provision for heavy trucks which are mass compliant overall but over mass on one or two axle groups. Road agencies rejected the proposal because of increased road wear concerns.

NTC subsequently received a similar proposal from NatRoad, which allows small concessions in axle group mass limits provided there was no resulting increase in road wear. In essence, it is a performance based approach to mass limit compliance.

Significant challenges exist in revisiting the concept of more flexible performance based approach to a vertical loading standard that meets COAG’s objectives of “reasonable” asset protection.

For a performance based pavement vertical loading standard to address NatRoad’s concerns, the policy would also need to apply widely to subsets of the existing vehicle fleet, rather than through the full Performance Based Standards Scheme. A prescriptive axle mass offset provision using “caps”, or the wide use of incremental pricing are alternative approaches.

1.9 Pavement horizontal loading

There are growing concerns that the horizontal forces generated by heavy vehicles are causing excessive surface wear for bituminous chip-seal pavements and asphalt pavements. Horizontal forces have a direct influence on pavement wear and are particularly important for bituminous chip-seal pavements in areas of road-train operation. The pavement horizontal loading standard aims to limit this damage by reducing horizontal forces.
The standard controls horizontal forces by requiring axle groups over a set distance to have steerable axles and sets a minimum number of drive axles for different vehicle mass limits for each road network level.

This performance based standard is however not consistent with the aims of outcomes based regulation as it is prescriptive with respect to the configuration of steerable axles and allowable mass per drive axle. This prescriptive requirement may limit the type of innovation that Performance Based Standards was developed to encourage.

While the standard prescribes that certain axles are required to be steerable there is no definition of what will be considered as an acceptable steerable axle. The angle through which a steerable axle needs to be able to turn is not defined in the standard, which may raise issues regarding the compliance of axles with limited steering capacity.

1.10 Tyre contact pressure distribution

The purpose of the tyre contact pressure distribution standard is to restrict road wear by setting minimum tyre widths and by limiting the local contact pressure between the tyre and the road within the tyre contact patch. As noted below, this is one of three “parked standards” and should be deleted until an appropriate performance based test method can be devised. Currently this Performance Based Standards requirement achieves its goals by applying existing prescriptive requirements relating to minimum tyre width and maximum pressure. This reference to a prescriptive requirement is not necessary to include in the Performance Based Standards scheme as it would apply regardless of a Performance Based Standards application or not and therefore adds no value.

1.11 Bridge loading

The intent of the bridge loading standard is to address the issue of bridge strength and ensure that a vehicle in the scheme does not induce effects on bridge structures that exceed accepted limits as specified by the bridge owner. The protection of bridges is primarily an infrastructure issue but becomes a safety issue when a bridge component fails or an entire bridge collapses.

The bridge loading standard is divided into three tiers, where tier 1 relies on formulae applicable to Performance Based Standards Levels 1 to 4 depending on the mass and axle spacing; tier 2 is applicable when the vehicle combination does not meet tier 1 criteria and it is based around the comparable damage caused by the vehicle against an existing similar vehicle combination; and tier 3 in which the bridge is assessed on a case by case basis.

Most vehicles going through Performance Based Standards will fall within tier 1 and 3 (tier 2 is very conservative and does not take into account new types of vehicles).

This standard is tightly linked to the network. It was developed to ensure that, in the case of tier 1 applications, the result of the bridge formula addresses the effect on the most “at risk” bridges.
Bridges are a critical element of the road network, however realising quantifiable improvements in road freight productivity will require asset owners to move from an “asset protection” to an “asset utilisation” approach. Whether this requires further study on the status of the current bridges and the current safety margin is debateable. In any case, unlocking productivity will depend heavily on the effort put on reassessing and upgrading this key aspect of the Australian road network.
APPENDIX 2 – CURRENT APPROVAL PROCESS

1.1 Road network access and assessment

Vehicles that obtain Performance Based Standards approval have been branded as SMART trucks. The first step towards operating a SMART truck is to discuss road access with relevant road agencies at the design concept stage to obtain a level of confidence before proceeding with the application.

Performance Based Standards has classified the road network into four levels:

<table>
<thead>
<tr>
<th>Vehicle Performance Level</th>
<th>Network Access by Vehicle Length, L (m)</th>
<th>Previous class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Access Class ‘A’</td>
<td>Access Class ‘B’</td>
</tr>
<tr>
<td>Level 1</td>
<td>L ≤ 20</td>
<td>General access*</td>
</tr>
<tr>
<td>Level 2</td>
<td>L ≤ 26</td>
<td>26 &lt; L ≤ 30</td>
</tr>
<tr>
<td>Level 3</td>
<td>L ≤ 36.5</td>
<td>36.5 &lt; L ≤ 42</td>
</tr>
<tr>
<td>Level 4</td>
<td>L ≤ 53.5</td>
<td>53.5 &lt; L ≤ 60</td>
</tr>
</tbody>
</table>

General Access is subject to a 50 tonne gross mass limit, posted local restrictions and restrictions or limitations specified by the jurisdiction (for example under the Higher Mass Limits scheme).

Table 1. Performance Based Standards - road network length limits

This step is a very important step that can facilitate the eventual operation of the SMART vehicle on the road.

This step will not “assure” or provide certainty of access. Historically this step was developed to allow the applicant to review the road classification and match the vehicle to the network. With the publication of Performance Based Standards network maps this step may also be conducted by the applicant by assessing the route using the online maps if they are present. At the time of writing the above process still needed to be conducted in Victoria, ACT and Tasmania as no network maps had been supplied for these areas.

Possible issues with this consultation with road authorities could be:

- Local government may not know if the road in question is their responsibility.
- Local government may not know what Performance Based Standards is.
- Local government may not know how to classify their roads.
- Applicant may not know what Performance Based Standards is.
- Applicant may not know where to start.
- Applicant may not know whom to contact.
Performance Based Standards maps, where published, can be of great assistance in this respect. Additional confusion may arise due to the length restrictions placed on the network which may limit a particular route to the smallest common denominator. For example, a road section may be categorised as Level 2A, and a vehicle that complies with all the performance based standards for Level 2 may be longer than 26m rendering the vehicle combination ineligible to access a Level 2A road.

1.2 Assessing the vehicle

The second step consists of contacting a Performance Based Standards accredited assessor. An assessor’s job is to verify that the vehicle combination (SMART vehicle) meets all the performance based standards and to submit a SMART vehicle application to the Performance Based Standards Review Panel for approval.

At the assessment stage the vehicle combination can be either a concept or an existing vehicle for which there is an operational desire to use the existing assets in a more productive manner than allowed under prescriptive requirements. The engineering assessment can use mathematical computer models, physical testing, or a combination of these two methods. In addition, the assessor is required to guide the applicant through the Performance Based Standards application process and act as an interface with the Performance Based Standards Review Panel secretariat.

SMART truck assessment can be complicated. The heavy vehicle knowledge and technical skill of assessors must be high in order to adequately assess the validity of numerical models and/or testing. In addition, some of the software packages and the knowledge required to use them properly are not easily accessed within the Australian market.

The requirement for highly specialised knowledge about heavy vehicle construction, development and testing has limited the development of third party approved Performance Based Standards assessors which in turn has led to high costs associated with vehicle assessments.

At this time there are five approved Performance Based Standards assessors in the scheme and they are distributed between only two companies, both of which are based in Victoria.

1.3 Design approval

The third step is to obtain design approval. Once the design has been assessed as meeting all of the Performance Based Standards requirements for the proposed level of access, an application form should be lodged with the Performance Based Standards Review Panel Secretariat. The application will then be submitted to the Performance Based Standards Review Panel for approval (within 20 business days).

The panel consists of an independent Chairperson and Deputy Chairperson and at least one representative from each state and territory and the Commonwealth. A set of approved business rules, performance standards, vehicle assessment rules and other governing documents ensure the panel operates in a transparent and nationally consistent manner.

If the application is approved, the panel will inform the applicant and specify any national operating conditions.
Exemptions to ADR 43 - Vehicle Configuration and Dimensions are also addressed in this step. SMART heavy vehicles approved by the panel may require an Australian Design Rule exemption from the Department of Infrastructure, Transport, Regional Development and Local Government. The approval of road access from at least one road agency is a prerequisite for a Conditional Non-Standard Vehicle under the Motor Vehicle Standards Act.

In the event of an application being rejected, the applicant will be advised in writing of the reasons.

If the approved SMART design is significantly novel in any way, and presents a potential road safety risk, the panel may require physical testing to confirm the vehicle complies with Performance Based Standards requirements. This should be conducted by an accredited Performance Based Standards assessor once the vehicle is built.

The final action in this sub process is for the panel secretariat to issue a design approval to the applicant, including information about the vehicle design and any operating conditions like signage or maintenance management.

At this stage, for vehicle designs which are in the concept phase, the applicant may seek access to the network and is entitled to a response from the relevant road authorities even though the vehicle is yet to be built.

The panel meets as needed, usually when there are enough applications to warrant the meeting, so if the number of applications presented within the timeframe is insufficient to warrant a panel meeting there is chance that the applicant may have to wait until the next meeting. There is however a provision for out-of-session voting on applications.

During the first twelve months of operation the Performance Based Standards Review Panel has reviewed a large number of relatively standard vehicle combinations, with very few innovative trucks being presented to the panel. It may be argued that the panel should only review applications in which novel and unusual vehicle combinations pose a challenge to the interpretation of the existing standards.

1.4 Construction and certification

The fourth step is the actual manufacturing of the SMART vehicle. This step requires the applicant to contract a Performance Based Standards approved certifier. Certification is required to ensure the vehicle is built in accordance with the design specifications approved by the panel. If the certifier deems the vehicle to be compliant with the approved design, the applicant will be issued with a certificate. If not, a notice of non-compliance will be issued. The applicant will have an opportunity to rectify identified areas of non-compliance before re-submitting the vehicle for another inspection.

The certifier will issue a document of conformance to the applicant and the Performance Based Standards Review Panel Secretariat. Upon receipt of this document the Secretariat will issue a final approval including the vehicle identification numbers of the prime mover and trailers. This document is required to obtain vehicle registration from the road authorities.
Again, due the limited number of approved certifiers, the costs of certification can be high. In addition, all the currently approved certifiers are based on the east coast of Australia, including South Australia. Western Australia, Northern Territory and some parts of inland Australia have problems accessing certifiers.

1.5 Road access

The final step is to register the vehicle with the road authorities. Once the vehicle has been approved and certified, the applicant should formally confirm the level of road network access and apply to register the vehicle in their home state or territory. Road agencies are required to consider access to their networks within 20 business days on a “best endeavours” basis. If access is denied, the applicant will be notified of the reasons in writing.

The biggest concern in the process is that the applicant has to continuously seek approval to access the road network. From an applicant point of view, having the application approved by the Performance Based Standards Review Panel does not provide certainty of access. This in effect, means that the applicant is risking the assessing, manufacturing and certification costs, including the time to process the application and approvals on jurisdictions granting access.

It is hoped that, with the classification of the road network into Performance Based Standards levels, applicants and jurisdictions can have a more solid knowledge where vehicles can be operated.

Once the migration of the existing network into Performance Based Standards road access levels is completed, and the applicant has been granted final approval by the panel, it is expected that certainty of access will be given.