

HIGHER PRODUCTIVITY VEHICLE INDUSTRY CASE

HPV Case Study Examples

November 2008



HIGHER PRODUCTIVITY VEHICLES TASKFORCE
VICTORIAN FREIGHT AND LOGISTICS COUNCIL

Case studies confidentiality: in relation to 'commercial in confidence' agreements for information and data supplied by companies and organisations the case study detail has been set out generically with no company names. All companies involved have been open and generous in preparedness to supply and share this information, but many are commercially sensitive at this time.

Acknowledgements

Various VFLC members offered sources of potential hpv data from their own fleets and or contract fleets as well as additional information from HPV equipment providers. This information has been gratefully received and has been used to highlight the wide range of elements that can and should be taken onto account or sometimes not fully considered when submitting an application for approval to operate an HPV.

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AN INDUSTRY CASE FOR HIGHER PRODUCTIVITY VEHICLES

Executive Summary – HPV Case Studies

The case studies represent a range of freight tasks and vehicle types from across Victoria. They demonstrate the calibre of productivity and safety gains that can be achieved through deployment of higher productivity vehicles.

In summary, the case studies represent the potential to require an estimated 300,000 fewer truck journeys each year to complete the freight tasks outlined. Reduced kilometres travelled will also equate to reduced accidents and associated road trauma costs. The HPVs case studies represent payload (deadweight or cube) improvements of between 12 and 50% per vehicle.

They represent a productivity gain of between 20 and 30 percent on current costs, which include drivers, fuel, equipment overheads and compliance costs. These cost savings will be shared between suppliers, customers and ultimately reflect in the price of the goods moved.

The table (left) summarises the findings from the case study companies.

If the deployment of these vehicles is combined with a higher mass limit, the capacity gains would be taken up by at least half of the vehicles, and this would result in even higher benefits flowing. This is particularly the case for metropolitan wharf cartage and distribution tasks with high volume tasks from one major facility to another node, eg: port to distribution centre. The majority of case study movements run on arterial roads and freeways and can be completed in off-peak hours.

The case studies deliver three additional key findings - Higher productivity vehicles are not only B-triples. The case studies demonstrate the wide variety of vehicle types, some no longer or larger than passenger coaches. They are inherently safer vehicles and many demonstrate advanced safety features and innovation. They are generally designed for a specific freight task and this influences their design features.

Higher productivity vehicles do not all require higher mass limits (HML). Many can be deployed without generating more wear than B-double vehicles. In fact, a number produce less impact than this vehicle type. Many are useful for volumetric tasks, where light but bulky products are to be transported.

Regulation of higher productivity vehicles is confusing and inconsistent. There is confusion about the regulatory frameworks for Performance Based Standards (PBS) versus Incremental Pricing versus Higher Mass Limits

	Fewer Truck Trips PA	% Productivity Gain	% Payload Gain
A	31,000	30%	Up to 50%
B	6,000	22%	22%
C	4,200	25%	40%
D	43,000	15%	23%
E	1700	25%	34%
F	6000	20%	42%
G	80	15%	25%
H	100,000	30%	Up to 50%
I	5000	25%	Up to 30%
J	3500	20%	25%
K	No data	12%	18%
L	1600	82%	20%
M	Not available	33%	Up to 50%
N	1000	33%	Up to 50%

Also see the transport of 1000 tonnes productivity table, page 10

regulation and additional permit requirements associated with vehicles post-approval through PBS. These processes create frustration for industry, especially companies operating nationally. Consistent national regulation would save considerable costs to business.

Background

The Federal Government has highlighted the need to improve the capacity of the road infrastructure and efficiency of the transport services to meet the growing freight task and to strengthen the Australian economy.

Improving the productivity of our existing freight transport is one means to increase capacity. Performance Based Standards (PBS) provides a national alternative to the current system of heavy vehicle regulation as it relates to mass, dimensions, safety and vehicle configuration. This more flexible approach includes an agreed set of performance criteria that can be objectively measured and delivered. Each of these criteria defines a boundary between what is acceptable and what is not acceptable.

Australian Transport Ministers have agreed that vehicles complying with the PBS requirements should be considered for deployment by State Governments. In Victoria approvals to operate 31 HPV design types have been granted, including some access approvals. These cover truck and trailer combinations, mini B-doubles, car carriers, extendable semi-trailer, omnibus and inter-terminal combinations.

There are concerns expressed by some government agencies in relation to:

- Congestion, safety, fuel efficiency and emissions;
- Infrastructure capacity, in particular bridges and their ongoing maintenance costs;

- Reduced traffic congestion, better fuel efficiency, lower emissions and improved safety;
- Whether the revenue from these vehicles is sufficient to upkeep the infrastructure they use; and
- Whether the community will accept longer vehicle configurations.

Having information on hand regarding these Higher Productivity Vehicles and their benefits will assist in portraying a more accurate picture of what the transport industry are seeking, the potential benefits from their introduction and communicating true benefits of these vehicle types.

Case Study Objectives

To provide a documented concise case demonstrating the benefits of the next tranche of Higher Productivity Performance Based Standard (PBS) Vehicles for the road transport industry, as applied to the freight tasks over the next 5-10 years in Victoria.

The case studies will cover different freight task examples in Victoria, including bulk, containerised cargoes, primary production including urban and regional freight movement. Each of the case studies summarises in general terms, the operating location, the road class and route, design approval and access approval status and vehicle configuration.

The case studies will outline the business efficiencies and productivity improvements identified by the case study participants. The studies will also outline the important details of how the vehicles will be controlled and managed by the transport operator. It should be noted that some of the cases are not yet PBS approved and therefore cannot currently operate in Victoria. These cases provide a broad cross section of potential vehicle operations and their benefits.

HIGHER PRODUCTIVITY VEHICLE BENEFITS

The Productivity Commission Inquiry Report (2006) viewed the full implementation of PBS as; 'a priority reform in achieving a shift to a cost-effective regulatory framework for heavy vehicles with the potential to enhance the productivity of road transport'.

Safety - HPV applications can offer to include many of the latest safety technologies available including Electronic Braking System (EBS), Anti-lock Braking Systems (ABS), on board driver's electronic work diary and log book options. HPV drivers will be suitably qualified and will receive specific training as may be required. Driver training has advanced in parallel with the advancements in vehicle design, through such technology as a driving simulator.

Social & Economic Benefits – It is imperative that Australia remains cost competitive in all areas of commercial enterprise. The HPV process must include all regional industries such as minerals, grain, primary production, dairy, forestry and other export sectors as well as the traditional manufacturing sectors. In today's competitive world every small operating cost option benefit must be vigorously pursued.

Fleet Productivity Gains – HPVs have the potential to deliver higher mass or volumes per trip, with fewer vehicles, and up to 30% less trips for a given task. [see 1000t ATA graph p 10] HPVs will help to manage a growing freight task and the impact of driver shortages.

Improved HPV Utilisation – One of the supporting benefits of HPVs will be the extra effort made to ensure that return trips are loaded, which will deliver major productivity benefits. Higher investment leads to HPV operators ensuring high vehicle utilisation to deliver the optimum return on investment (ROI) for example using web-based load-matching systems. Flexibility in vehicle design can allow HPVs greater operational benefits such as breaking down multi-combinations and converting them to semi-trailers.

Regulatory Compliance – HPVs will meet all regulatory requirements, including investment in the latest technologies along with the regular GPS, IAP, accreditation audits, and driver training standards that may be a required condition for obtaining operating approvals.

Energy Efficient & Environment Friendly - All new HPVs will be fitted with the latest Euro 4 and Euro 5 engine technologies. Other energy and fuel efficiency features often depend on the availability of alternative fuels on particular routes. A point often overlooked is that current vehicles consume more fuel, produce more emissions and take up more road space than HPVs. Reporting options as above include alternative fuels if available along specific routes. Green house gas emissions and energy reporting facilities are also an option if required. The overall HPV benefit is to achieve fewer emissions from fewer vehicles.

Vehicle Design – Vehicle designs comply with all PBS standards required to meet a particular road class. Many new HPV designs incorporate additional design features not required for the PBS assessments that deliver extra operating, loading, unloading performance, load restraint and safety efficiencies.

Infrastructure Compliant – HPVs must meet each of the PBS standards required to meet a particular road class. This will ensure that all HPVs will impart equal or less pavement and bridge wear than existing prescriptive vehicles.

Community Friendly – The benefits to the community include fewer trucks to complete the task, fewer vehicle trips, less noise and route specific conditions. The transport industry has sought to widely communicate that HPVs can deliver benefits for the whole community. Specific HPV routes can be planned and developed allowing for the provision of suitable infrastructure to minimize traffic and noise.

Key Elements of PBS

PBS measures are designed to operate in conjunction with existing Australian Design Rules (ADRs) and Heavy Vehicle Standards and call up certain international standards and Australian Standards.

The measures are in two groups:

Safety

Including - startability, gradeability, acceleration capability, trailing fidelity in a straight path, low-speed swept path, frontal swing, tail-swing and high-speed transient offtracking.

Infrastructure

Pavement and bridge effects – current prescriptive axle mass and bridge loading limits.

A vehicle design which maximises volume or mass and is configured to meet the PBS measures allows gains in many aspects of transport productivity including operating flexibility, operating costs, and logistics efficiency benefits.

Performance Standards are:

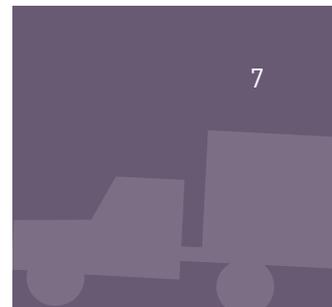
Values of the figures of merit that must be met: Compliance with the standard must be capable of being objectively determined. It must be possible to establish that the standard is met or not met. The means of determining whether the standard is met must be reasonably within the limits of existing technical and operational capabilities.

Road Classes

Performance standards of the vehicle will be matched to road conditions, assisted by the definition of road classes as follows:

Network Classification Guidelines have been developed for four levels of road network, as part of the PBS project. Some of the performance standards have different measures for the different levels of access. The toughest measures are for general access with the measures becoming less onerous for the more restricted routes. The levels have also been divided into A and B classifications, with vehicle length and height limits to assist jurisdictions in classifying their roads. The dimension limits were meant as a guide. However, some jurisdictions are taking these limits as absolutes. The below table summarises the different levels.

Some performance measures require the same standards for all road classes while other performance measures apply standards that may vary with road class. Such variations are based on assessment of safety and infrastructure risks.



Vehicle Performance Level	Network Access by Vehicle Length, L (M)		Victorian Classifications
	Access Class 'A'	Access Class 'B'	
Level 1	L < 20	General Access*	As of right, 50t GCM limit, subject to any local restrictions as may be specified by jurisdiction.
Level 2	L < 26	26 < L < 30	B-double network. Access to arterial roads with support from Local Government.
Level 3	L < 36.5	36.5 < L < 42	B-triples. Very restricted access on a case by case basis of approval.
Level 4	L < 53.5	53.5 < L < 60	Road train. Possible application for a 44m long three trailer road train to operate in the Melbourne Port area.

*General Access is subject to a 50 tonne gross mass limit and posted local restrictions. Source NTC.

Administrative Process

The same systems that administer the present prescriptive rules will be adapted to include these key elements:

Applications

An applicant identifies an innovation that could be used to improve transport efficiencies or safety.

Assessments

An application is analysed and assessed by an accredited PBS Assessor against relevant performance measures, on various classes of routes and taking into account the methods of ensuring compliance.

Approvals

An application is approved by the national PBS Review Panel if it meets all the safety and infrastructure standards following assessment. Physical features of the vehicles or units will be identified and appropriate operating conditions set for that approval.

Certifications

Vehicle(s) or unit(s) are certified and need to match the physical features set out in the approval.

Recording

All operating conditions associated with an approval and vehicles certified to operate under it are recorded and monitored.

Jurisdictional Approval

Operators of successful PBS vehicle applications must seek approval to travel in each jurisdiction.

Prescription

Does it meet present ADR's ?

Yes

Standard size & weights apply for each vehicle type

Some permit or gazettal conditions available

Concessional &/or accreditation schemes

Normal regulatory compliance conditions apply

PBS Scheme

Specific exemptions or modifications must be noted



PBS Criteria & Assessment measures

Carrier / OEM Vehicle



Assessor checks & performance confirmed



Features listed & application approved

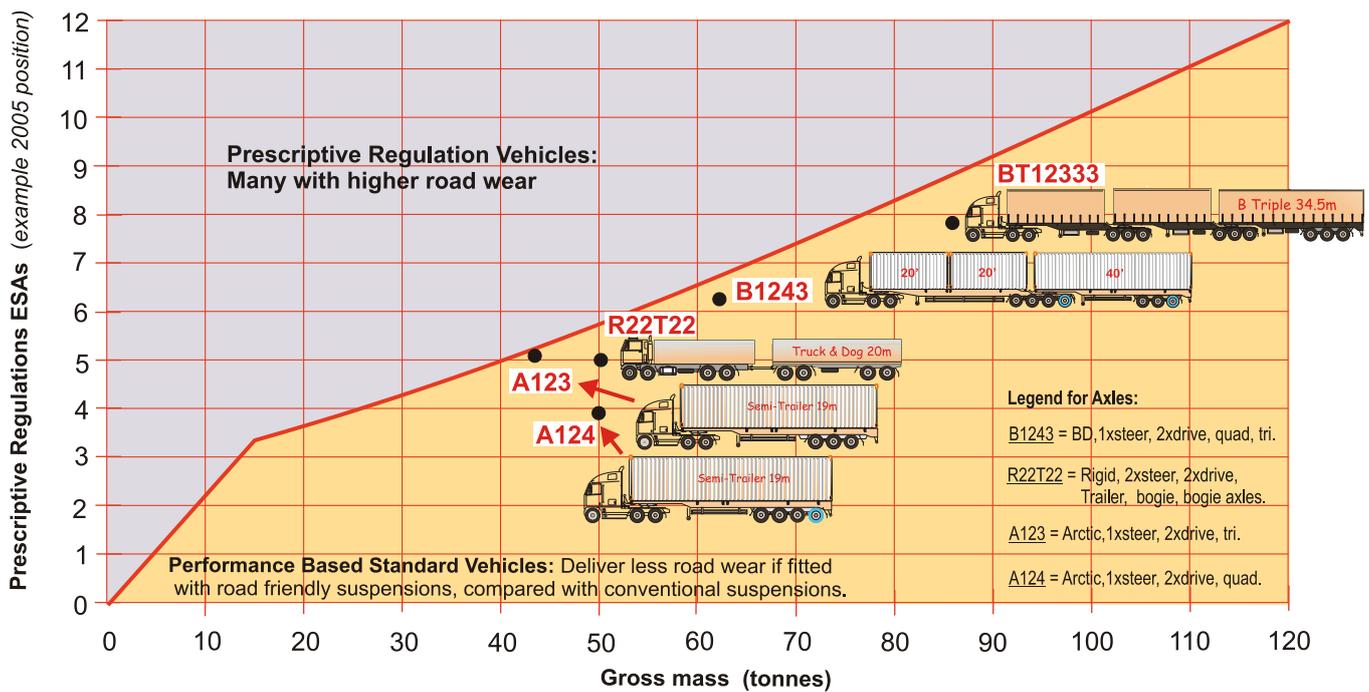


Certification

Operating conditions to be followed

Compliance with jurisdictional approval for State access

Ongoing operating compliance & audit conditions



Source VFLC 2008, based on earlier research conducted by ARRB 2005-06

Infrastructure Standards Impacts

Refer to NTC PBS Scheme – The Standards and Vehicle Assessment Rules 2007.

For full details - Web address: <http://www.ntc.gov.au/fileview.aspx?page=a02225505300850020/&M=1&T=0>

Background:

Various studies have been carried out setting out methods of measuring and describing road wear across the range of road freight vehicles. The PBS objective is to facilitate productivity increases, while not increasing the road wear for the overall freight task compared to present axle weights under prescriptive General Mass Limits (GML).

The diagram below above out the benefits of HPVs (below the line) that meet PBS pavement measures also improve vertical pavement loading compared to prescriptive General Mass Limits (CML) and Higher Mass Limits (HML) vehicles, which would be above the line.

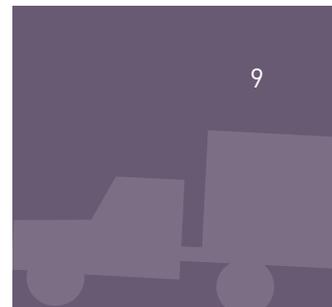
NTC Interim Standard:

The purpose of the PBS pavement vertical loading standard is to limit the stress on the pavement layers below the surface of the road.

The basis of the standard is to limit individual axle group loads to those that presently apply under: General Mass Limits (GML); Concessional Mass Limits (CML); or Higher Mass Limits (HML).

Total gross mass is not limited by this standard, but may be limited indirectly by the Bridge Loading standard and the safety standards. The Network Classification Guidelines presently limit General Access vehicles to a gross mass of 50 tonnes.

Jurisdictions reserve the right to refuse access to their road network, or to exclude vulnerable assets from a vehicle's access arrangements, if they have a reasonable concern that the vehicle's intended operation would cause unacceptable pavement wear. This is until such time as a pricing regime that fully recovers the pavement wear costs of PBS and other high productivity vehicles is operational.





HPV - Swept Path Example

PBS - Swept path is the maximum width of the road required for the vehicle to complete a low-speed turn.

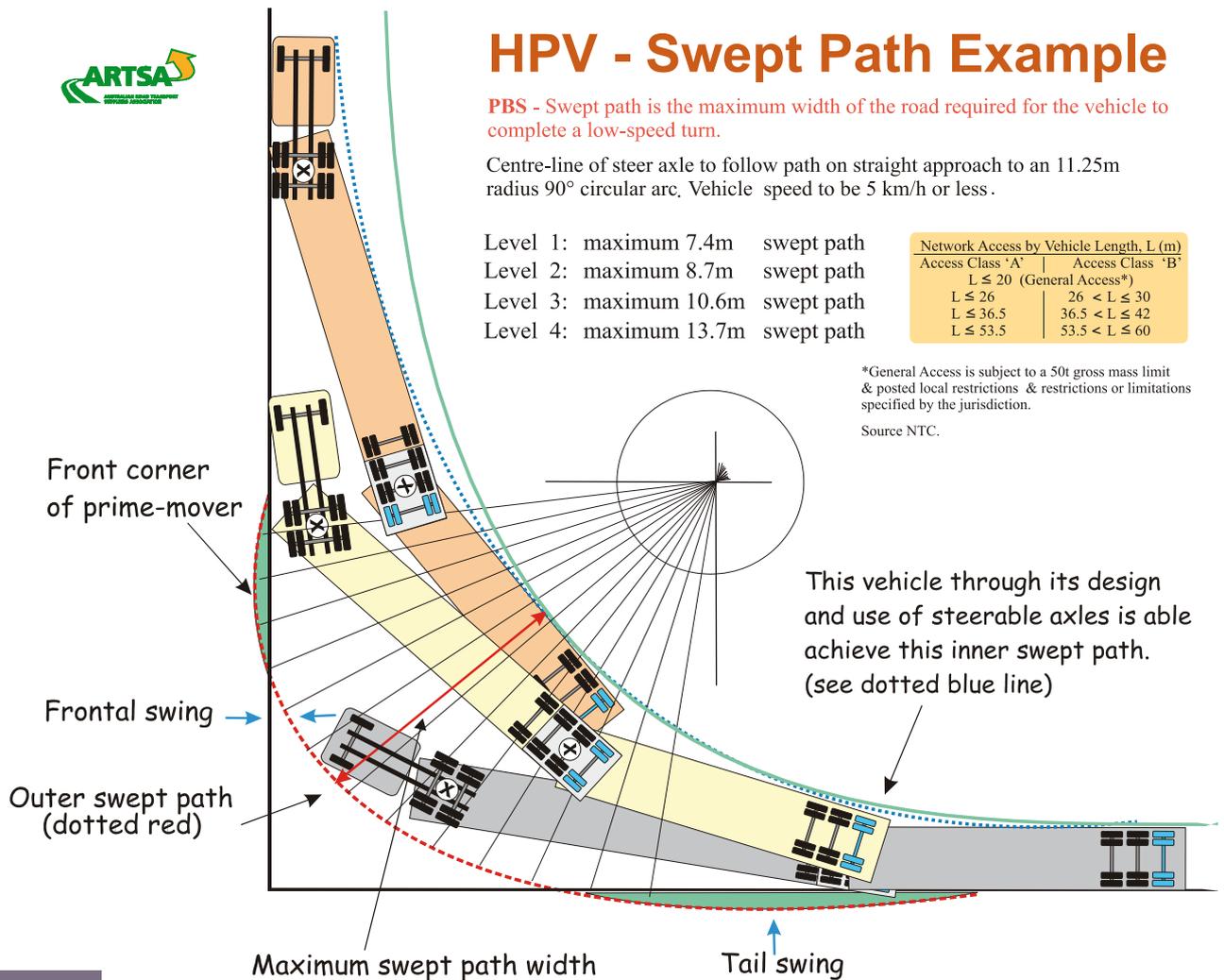
Centre-line of steer axle to follow path on straight approach to an 11.25m radius 90° circular arc. Vehicle speed to be 5 km/h or less.

- Level 1: maximum 7.4m swept path
- Level 2: maximum 8.7m swept path
- Level 3: maximum 10.6m swept path
- Level 4: maximum 13.7m swept path

Network Access by Vehicle Length, L (m)	
Access Class 'A'	Access Class 'B'
L ≤ 20 (General Access*)	
L ≤ 26	26 < L ≤ 30
L ≤ 36.5	36.5 < L ≤ 42
L ≤ 53.5	53.5 < L ≤ 60

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

Source NTC.



This vehicle through its design and use of steerable axles is able to achieve this inner swept path. (see dotted blue line)

An Example of Infrastructure Safety Assessment:

Performance Base Standard – Swept Path Measure

The National Transport Commission has developed an HPV 'blueprint' vehicle specification. The diagram below sets out the existing performance measures for the four levels of road classification.

As an example a proposed 30m container carrying vehicle will require at least one rear steerable axle on each trailer to achieve a swept path turn that equates to a Level 3 route.

The swept path performance criteria is one of the most important performance capability features for access to all approved sites and routes. The blue axles on the diagram are the required steer axles for 30m HPV. A vehicle similar to this blueprint vehicle can achieve the necessary levels of performance through its design and use of steerable axles.

Higher Productivity & Efficiency:

Comparisons to Transport - 1000 tonnes

The following table developed by the Australian Trucking Association illustrates the higher productivity achieved by the use of HPVs to shift 1000 tonnes of freight over a number of trips. (Cubic or deadweight) Each of the comparative factors show how the high capacity vehicles can also deliver lower emissions, fewer trucks, fewer drivers as well as less road damage than some of the current prescriptive vehicles.

Note ¹ Two other vehicle categories not set out in the above table are the two and three axle rigid trucks. Compared to the larger combination vehicles the 2 and 3 axle rigid trucks are not considered HPVs but are in the national data sets of freight movements. As can be seen at the bottom of the above table the 2 axle rigid carries a total of 11.5% of the annual laden kilometres of travel in Australia. The 3

axle rigid truck carries a total of 10.2% of the annual laden kilometres of travel. These very similar vehicles are the third and fourth most productive transport vehicles in Australia as shown by the blue numbers on the right.

In 2007 the NTC published a case study about the productivity benefits of using B-triples on inter-capital routes. The study pointed out that a national line-haul operator with 60 B-doubles and semi-trailers could use B-triples to reduce the number of trips by one in four, reduce operating costs by 22% and save 3.7 million kilometres of truck travel per year.

Through reduced fuel consumption the productivity gains have a tremendous potential to reduce greenhouse gas emissions. The ATA has calculated that by saving 3.7 million kilometres of B-double and semi-trailer truck travel the line-haul operator could reduce fuel consumption by in excess of 2 million litres of diesel per year and direct greenhouse emissions by more than 5,900 tonnes of CO2 equivalent per year. (See fuel required column in table below and fuel graph page 13)

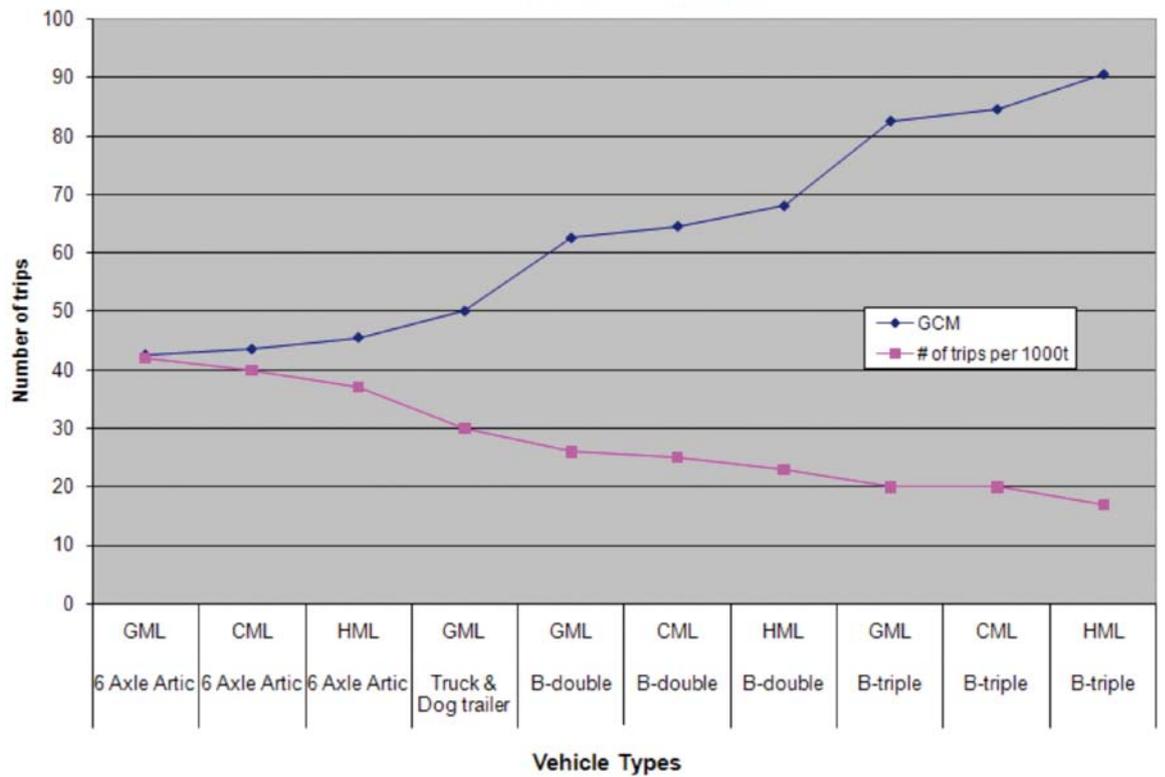
Australia - Annual Laden Kms of Travel (Million-Km) % x Group

Prescriptive vehicle approved for use in Victoria	GCM	Payload	Load Status		No Trips per 1000 Tonnes	ESAs per 1000 tonnes	Fuel per 100 Kms	Fuel required per 100 km Load	Driver Requirement	2005
			50%	100%						
 6 Axle Semi	GML	42.5	24.13	2.03	4.96	42	257	47	3948	162%
	CML	43.5	25.13	2.27	5.29	40	258	48	3840	154%
	HML	45.5	27.13	2.18	6.05	37	267	50	3700	142%
 Truck & Dog Trailer	GML	50.0	34.19	1.89	5.57	30	201	51	3060	115%
	CML	62.5	38.93	2.24	6.43	26	195	62	3224	100%
	HML	64.5	40.93	2.34	7.00	25	204	63	3150	96%
 B-double	GML	68.0	44.43	2.50	8.26	23	217	65	2990	88%
	CML	82.5	52.44	2.51	7.72	20	178	68	2720	77%
	HML	84.5	54.44	2.60	8.34	19	181	69	2622	73%
 B-triple	GML	90.5	60.44	2.88	10.47	17	198	72	2448	65%
	CML									
	HML									
General, Concessional & Higher Mass Limits										Rigid 2 Axle 11.5% 3rd Rigid 3 Axle 10.2% 4th

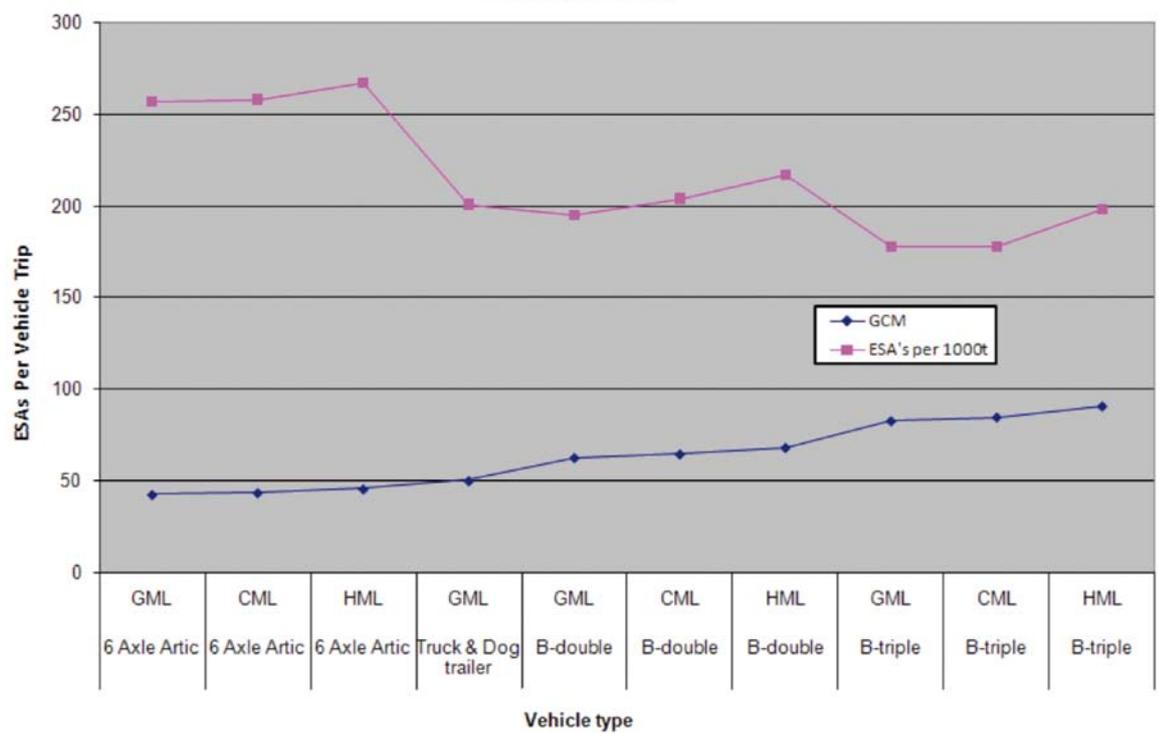
ATA
AUSTRALIAN TRUCKING ASSOCIATION

¹ ESA calculations in the table do not make allowances for road friendly suspensions.

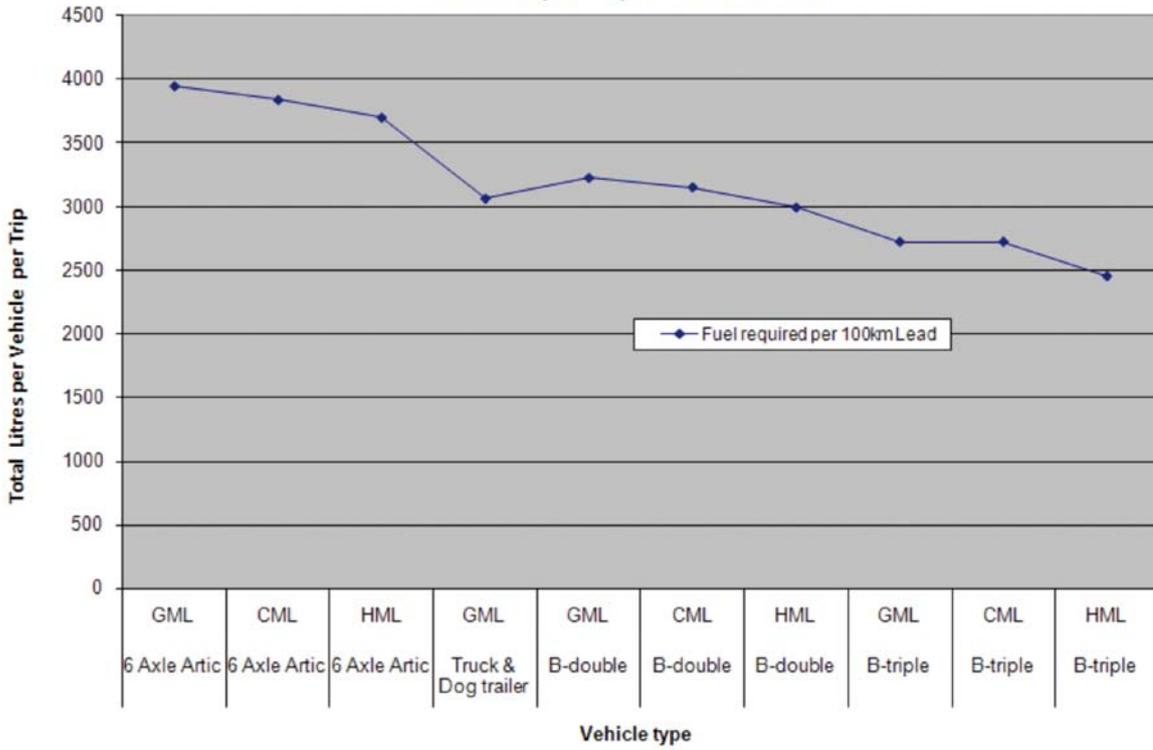
Trips per 1000tonnes



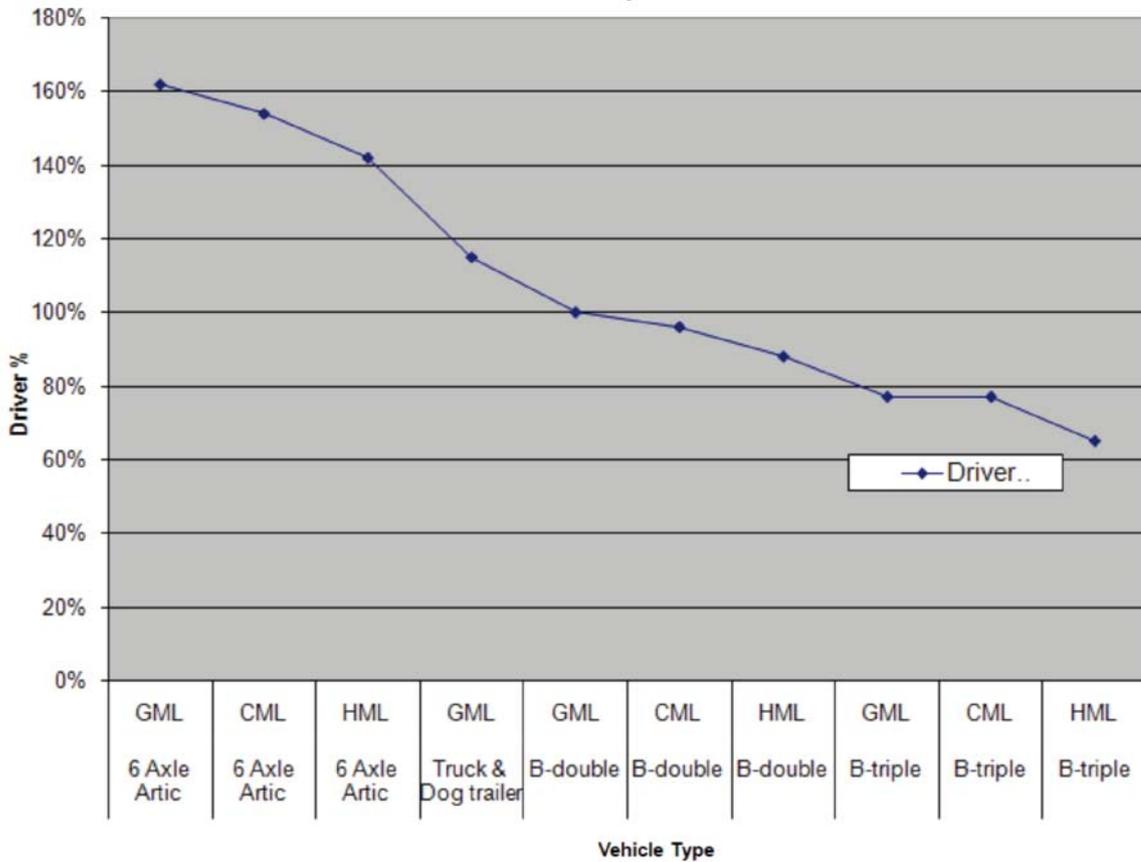
ESAs per 1000t



Fuel required per 100km Lead

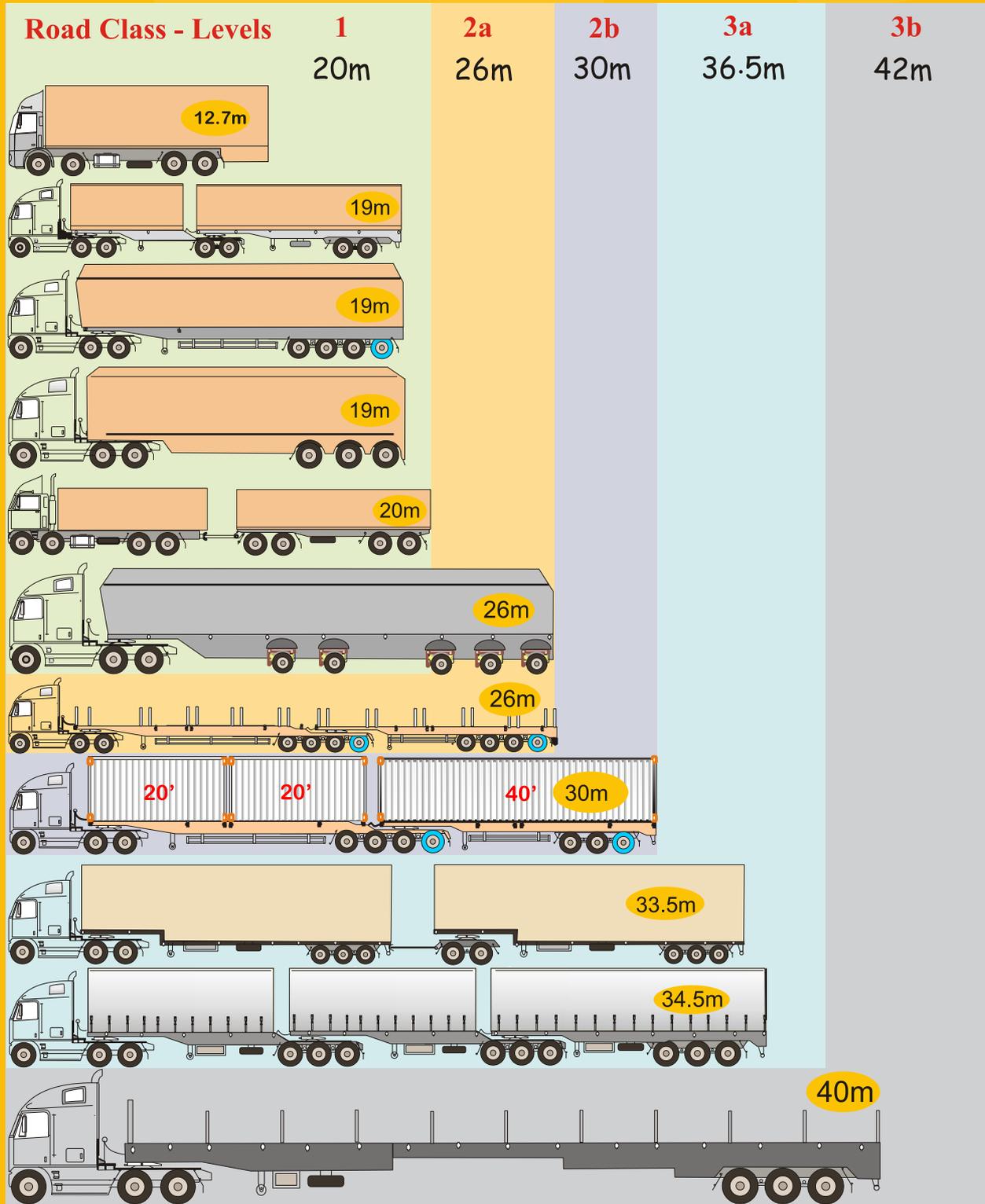


Driver Requirement



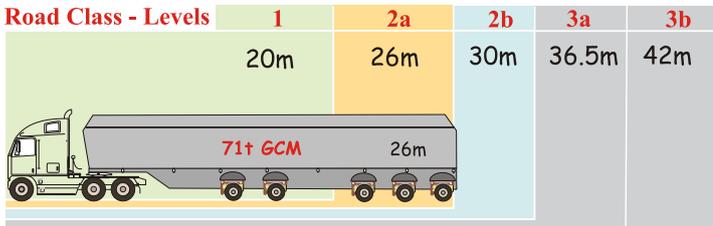
HIGHER PRODUCTIVITY VEHICLE CASE STUDIES: EXAMPLES A TO N.

Performance Based Standards Road Class Clasifications:



Company A

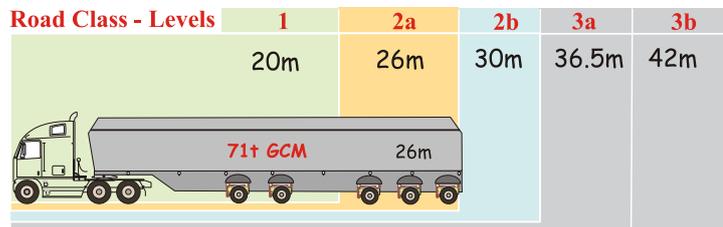
PBS Application in Progress.



Location: Widespread regional areas across 2 States to wharf facility in Victoria. Freight task will increase from the current 0.5 million tonnes per annum to about 3.5 million tonnes per annum in the next three years and is expected to continue at that level over several decades. Rail transport is currently not a viable option due to de-commissioned rail lines, infrastructure deficits and the location of fixed rail assets in relation to the production sites.

Road Class & Route: Presently using Class 2 B-double and general access routes with an average haul distance of about 120 km. Critical infrastructure includes some older bridges and road access corners that are planned for upgrade.

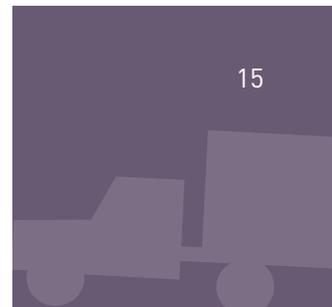
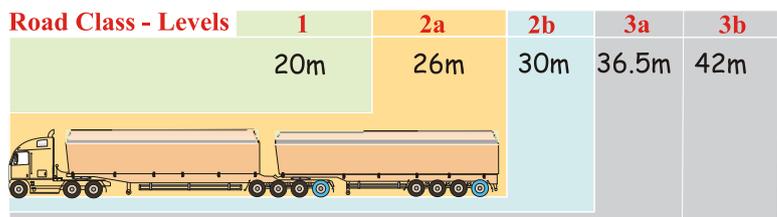
Status of Approval to Operate in Victoria: Present configurations meet national prescriptive Multi-Combination-Vehicle (MCV) standards. In relation to local access permission, affected local governments are supportive, in principle, of the proposed High Productivity Vehicles (HPV) configuration up to 27m in length and 80t GCM provided infrastructure and public safety are not compromised. Consideration has been made for the HPVs with respect to bus routes and community facilities passed on the routes. Local Police and local councils are being consulted and have been receptive to the HPV proposal for this freight task.

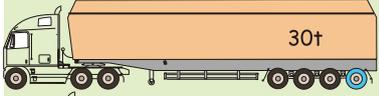
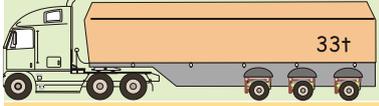


Vehicle Configuration:

Current configurations are:

- Semi-trailers 19 m long with a payload of 27t for about 18% of the freight task
- B-doubles 25 m long with a payload of 40t for about 82% of the freight task. (blue steering axle)



Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m
					
					

The proposed HPVs for normal road access include:

- A quad semi trailer 19 m long with a payload of 30t
- A semi-trailer with new steer wheel technology 19 m long with a payload of 33t

(See diagram above)

The proposed HPVs for B-double routes include:

- A prime-mover and trailer with new steer wheel technology 26m long with a payload of 52t
- A quad B-double configuration 27m long with a payload of 52t
- A prime-mover and trailer with new steer wheel technology 26m long with a payload of 60t

(See diagram at top of previous page)

Business Productivity & Economic Benefits:

The forestry industry is Australia's second largest manufacturing industry employing over 86,000 people, and producing over 1% of GDP. For every \$1 million spent by the plantation sector between 8.3 and 15.7 jobs are created. The sector makes a major contribution to the economic growth of regional areas. Local government can experience a rural population growth and or a lower rate of rural decline than areas dependent on broad acre agriculture.

The use of HPV vehicles can improve the international competitiveness for this important industry by reducing the cost of transport up to 30% as a result of up to a 50% increase in payload. For the local region, a real benefit will be up to 31,300 less heavy vehicle trips on the roads per annum.

Safety & Environment Benefits: The proposed HPVs will be fitted with modern new Euro 4 fuel efficient engines and operate as quieter trucks with auditable onboard systems. There will be numerous other new safety features throughout.

HPV Operator Management System: This primary production group has planned competency based management, operator training, accreditation and audit programs, together with a range of auditable on-board data recording systems able to verify driving hours & speed records. This will ensure all travel conditions on approved routes can be monitored while ensuring high level of compliance in all aspects of the operation.

Company B

PBS Criteria met.
Application not successful.

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m

Location: The task would cover the main interstate routes from Melbourne's northern and western industrial outskirts to adjoining borders, plus some local city routes adjoining these interstate routes.

Road Class & Route: The application has not been successful as current HPV policy at the time of application could not accommodate a vehicle of this configuration. Many of the routes requested are 4 lane highways which are considered to be suitable for this HPV application. Routes are between industrial facilities at the outer northern and western edge of Melbourne to the State borders.

Status of Approval to Operate in Victoria: Present vehicles meet national MCV standards. The application was submitted to be assessed for compliance with all PBS criteria and was approved by the national interim review panel. A couple of areas put the process into doubt. Firstly local Police and Shire councils and town councils approached have shown various levels of concern with the HPV proposal notwithstanding meeting agreed operating standards as well as understanding the HPV permit approval process had been attained. Secondly with time taken to develop the vehicle, ongoing PBS approval process and the final application all involved in the project lost the will and intensity to continue. The project was then shelved.

Proposed Vehicle Configuration: The proposed high-cube HPV configuration is comprised of a prime mover pulling 2 conventional drop-deck 45' high-cube trailers linked by a self steering dolly. The HPV unit could best be described as a modified road train configuration with an overall length of 33.5m running on tandem axle groups for such light-weight loading at GCM 57t.

Business Productivity & Economic Benefits: The use of HPV type B-double vehicle offers efficiency gains of 22% or 6000 less vehicle movements per year. By carrying 44 pallets on the deck there is a 22% productivity gain over a 36 pallet B-double, whilst this freight is predominately of grocery retail origin, it accounts for an estimated 10%-15% of all grocery freight. The task requires approximately 35,000 B-double movements per annum and increasing at 3% - 4% per year.

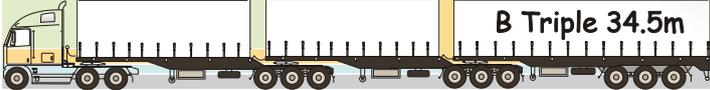
Safety & Environment Benefits: The proposed HPVs will be fitted with modern new Euro 4 fuel efficient engines and operate as quieter trucks with auditable onboard operating log records. There will be numerous other new safety features throughout.

HPV Operator Management System: This manufacturing sector supply chain services group has planned competency based management, operator training, accreditation, audit programs, together with a range of auditable on-board data recording systems able to verify driving hours & speed records. This will ensure all travel conditions can be monitored while ensuring high compliance and roadworthy standards are maintained at all times.

Company C

PBS Criteria met.
Application under trial.

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



An operating fleet

Location: The present task covers a divided highway route for much of the journey between a provincial city and manufacturing site on the outskirts of Melbourne. The HPV fleet has been running 12 hours per day in a B-triple configuration since February 1998. The fleet travels some 1.116 million kilometres per annum. The task involves some 286,000 cubic tonnes travelling 4200 return trips per annum.

Road Class & Route: The approved main highway route is a 4 lane divided highway going into suitable local area roads.

Status of Approval to Operate in Victoria: Initially 18 semis were replaced by 9 B-doubles which were eventually replaced by the current fleet of 6 B-triples which have also met the current national MCV and PBS standards. The application was submitted to be assessed by the NTC for compliance with all PBS criteria, and was approved by the VicRoads approval process for trial operations. Local Police and local government also approved and support the operation. The original B-triple application in 1998 met all State jurisdiction criteria and local government approvals.

High Productivity Vehicles Configuration: The high-cube HPVs configuration comprises 6 prime movers set up in B-triple configurations carrying 217 cubic metres of load each trip. Units are 34.5m long and 72t in gross vehicle mass.

Business Productivity & Economic Benefits:

The use of this HPV B-triple vehicle delivers some 25% less cost of transport 40% increase in HPV payload compared with a 19m semi-trailer. There are some 36 less semi-trailer and or 12 B-double journeys per day for this regular task. Present freight volumes deliver some 144 loads per week (4200 trips per annum)

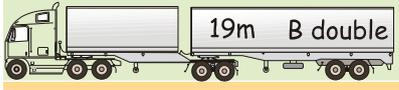
Safety & Environment Benefits: The B-triple HPVs are fitted with modern fuel efficient engines and operate like normal trucks. They are also fitted with speed limiters, onboard recording systems for record keeping and electronic braking that slows the entire vehicle down once the driver removes his foot from the accelerator. Other safety features include reinforced load restraining trailer curtains, GPS that reports the vehicle identity, location, speed, kilometres driven and fuel consumed to the base station.

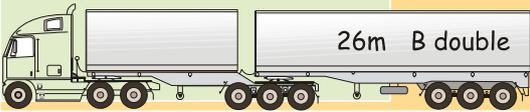
HPV Operator Management System:

This contract HPV transport service has competency based B-triple driver operator training, accreditation and audit programs, together with the on-board data recording systems to verify driving hours & speed records. All travel history can be monitored while ensuring high compliance and vehicle roadworthy standards are maintained at all times. It should be noted that the B-triple HPV have been blame worthy accident free since commencing over ten years ago.

Company D

PBS Criteria met.
Application successful
& operating

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m
					

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m
					

160 vehicle fleet

Location: This HPV task covers a State wide range of 'general access' rural roads as well as some major city suburban routes. This manufacturer operates some 8 regional processing facilities.

Road Class & Route: Application has been successful and the current HPV fleet is running much of the fleet in a B-double configuration all over the State of Victoria. The fleet travels some 25 million kilometres per year.

Status of Approval to Operate in Victoria:

Present vehicles meet the regular national MCV and PBS standards. The particular application was submitted to be assessed for compliance with a mix of PBS criteria as well as the many site access assessments that were determined and approved by VicRoads and local councils. Local Shire councils & town councils also approved the trial operation and supplied some government funding subsidies for some of the site access modifications required.

High Productivity Vehicles Configuration:

The HPVs configuration comprises of standard prime movers set up in 19m B-double configurations carrying primary production loads for collection and processing for export via our State ports. The 19m B-double configuration is versatile for farm pick-up and delivery work, while the 26m B-double is preferred for the freight task moving product

from manufacturing site to distribution centre. While using a conventional length B-double configuration all routes and route access were assessed to ensure total compliance could be guaranteed.

Business Productivity & Economic Benefits:

The use of HPV B-double units are able to deliver much improved efficiency as all units are of a similar dimension and load capacity which allows much improved load planning improvements. With the site access subsidies for some entrances greater efficiencies have been achieved for all parties. The overall exported product is now exceeding some 360,000 metric tonnes per annum from Victoria.

Safety & Environment Benefits: The B-double units include a range of modern alternative fuel efficient engines, where refueling allows. This has been an ongoing effort and is producing some additional economic benefits for the fleet. Local community benefits have been enhanced from the improved site access clearance and visibility improvements put in place.

HPV Operator Management System: This modern HPV transport service uses regular training providers to run competency based driver operator training, accreditation and renewals system.

Company E

PBS Criteria met.
Application not successful.

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



Location: This task covers a rural road route of 60km as well as a regional urban route.

Road Class & Route: The application has not been successful and the current regulatory transport options are not considered to be economically viable for this export product at this time.

Status of Approval to Operate in Victoria:

The application was submitted to be assessed for PBS analysis which was attained in 2005. Following the PBS Interim Review Panel (IRP) approval the application sought and received support from the Victorian Road Freight Advisory Council. There was one bridge that required upgrading that has since been upgraded. Notwithstanding these facts, the application was not approved on the basis that such a configuration was not current policy. All local council approvals and support were obtained.

High Productivity Vehicle Configuration:

The HPVs configuration is a 26m B-triple configuration and was the result of reducing the length from approximately 36.5m to be accepted in Victoria. The B-triple configuration is 26m long with an 89t gross vehicle weight.

Business Productivity & Economic Benefits:

The use of an HPV B-triple unit would have delivered some 1700 less trips per year on the local roads. The payload productivity benefit is in the order of 34% per trip. Such productivity would greatly assist another of Australia's exporter's to compete on the world market.

Safety & Environment Benefits: The B-triple combination units would have a positive road safety impact on local road congestion by reducing the annual number of heavy vehicle trips delivering export production to the nearest port. Euro 4 engines and other environmental efficiency features would be included in the HPV specification for this application.

HPV Operator Management System: Regular training providers would continue to run competency based driver operator training, accreditation and renewals for the long established contract transport services provider.

Company F

PBS Criteria met.
Application in progress.

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



Location: This HPV task covers all metropolitan, regional city and suburban routes as a 'general access' urban HPV delivery truck.

Road Class & Route: The HPV application is in the final stages of approval (mid-August 2008). As above, it will be an HPV delivery vehicle only slightly longer than a standard prescriptive vehicle.

Status of Approval to Operate in Victoria:

The application has been assessed for PBS analysis which it is expected it will attain. Being a slightly longer rigid vehicle at 12.7m (12.5m is the prescriptive regulatory standard) various static and dynamic modeling has been carried out and shown to meet all PBS measures. One of the key application points for local government and councils will be the significant reduction in overall delivery vehicle numbers if this HPV can be introduced. The particular fleet's rigid truck numbers may be reduced by up to 20% or 25% and operating kilometres by 16% per annum.

High Productivity Vehicle Configuration: The 12.7m long rigid HPV has a 10.5m loading deck length and is 4.3m in overall height. Three of the new vehicles will replace four of the present existing rigid vehicles. The gross vehicle mass will be up to 28t.

Business Productivity & Economic Benefits:

The use of the redesigned HPV rigid truck will greatly increase payloads and particular modular units used across a busy national network will increase productivity by some 20% pa. The uniform cubic nature of the containers used in this national network greatly increases the productivity gain of this vehicle in all areas and is not restricted in any way. One of the hidden benefits will be the environmental benefit of less fuel consumption and tyre wear gained from fewer vehicles for the given task.

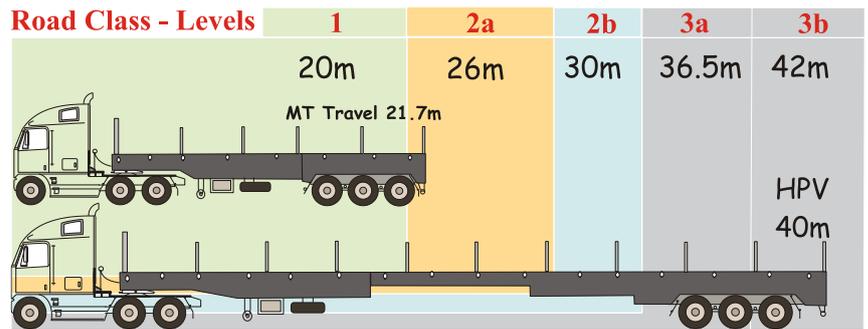
Safety & Environment Benefits: The rigid vehicle will not exceed the normal vehicle height of 4.3 metres. All new vehicles will be powered by Euro 4 engines and other safety design features of the required standards meeting all new best practice environmental and braking objectives.

HPV Operator Management System: The operator will continue using the regular training frameworks with specific training developed and delivered for drivers using the new rigid vehicle configuration.



Company G

PBS Criteria met.
Application successful.



Location: This task covers all metropolitan over-dimensional (OD) and approved long vehicle routes. Some regional routes may be applied for as required and or requested by potential clients.

Road Class & Route: The vehicle application has been approved as a special HPV for the delivery of extremely long loads of building materials. All of the delivery operations have the oversize and over-mass travel conditions applied. This includes such things as travel times and conditions which typically include pilots and escorts as may be required for particular dimensions and routes.

Status of Approval to Operate in Victoria: The application went through some rigorous design testing before being checked by the PBS set of measures which the configuration met. Local council and other local body approvals and permissions need to be obtained for each loaded trip with this unit.

High Productivity Vehicle Configuration: This special HPV configuration is an extreme extendable trailer with a 35m loading deck length and overall maximum length of 40m, and is fitted with an active steer system. The HPV is able to carry normal loading on the return trips as the closed length of 21.7m as the trailer performs within normal 'general access' turning requirements for road class level 1. This is achieved by the use of the PBS active steer system.

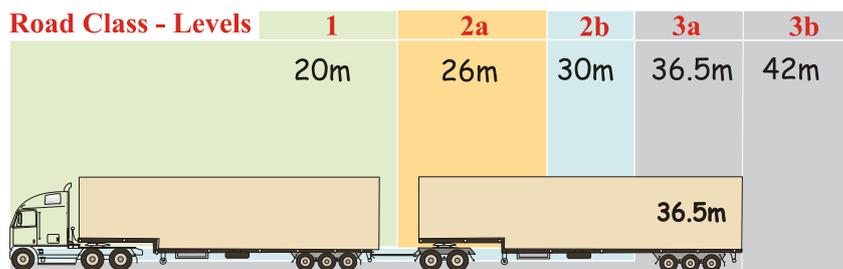
Business Productivity & Economic Benefits: The HPV extreme extendable has been able to greatly increase long loads of building materials and increase building productivity and site safety for large factory and distribution centre construction. (Indirect issues such as the construction safety benefits are not considered in any HPV applications) This also leads to lower construction costs as new more cost effective roofing designs become available with the 15% longer line roofing sheets.

Safety & Environment Benefits: The extreme extendable HPV operates at a very low load height keeping the centre of gravity down to meet the strict static roll threshold performance requirements. The vehicle is powered by the latest designed engines of the required standards that meet all environmental objectives.

HPV Operator Management System: The contract services company operates in-house training and will continue to run competency based driver operator training, accreditation and renewals for all transport services.

Company H

Standard prescriptive configuration.
Application not successful.



Location: Main routes 'between capital cities'. These routes typically have 4 divided lanes or are good alignment 2 lane highways. For example Melbourne Western Ring Road to Wodonga is physically able to now take B-triples as a complete route for significant freight tasks, eg; to supply grocery distribution centres.

Road Class & Route: As above, the routes will be the main corridors to and from capital cities that have major inland freeways and highways. The intention is to deploy a "modular multi combination" HPV made up of present standard trailer units. The vehicles will travel between outer industrial centres/freight hubs where the HPVs could then be uncoupled (at approved sites with adequate facilities) and deliveries made in standard prescriptive configurations, such as semi-trailer and lead trailers.

Status of Approval to Operate in Victoria:

As this HPV is focused on line haul, interstate operations, the application process has been lodged through several state-based regulators, whose focus has been on new designs (accredited through the national PBS process) or requirements for participation in the Intelligent Access Program. This has created industry frustration, as these vehicles already operate in the same configurations in some States and with approved remote areas in other States and Territories. When the PBS measures were applied to assess the 'worst case' modeling of B-triples, modular vehicles were demonstrated to perform at the same or better than existing combinations.

High Productivity Vehicle Configuration: This HPV is made up of standard vehicles coupled together in a B-triple, AB-triple, BAB Quad and innovative road train combinations.

Business Productivity & Economic Benefits:

Modular HPV combinations are a very simple and cost effective way to greatly reduce present interstate truck numbers by a possible 500 per day (100,000 pa) and to achieve immediate productivity gains at a low cost. B-triple or AB-triple combinations, using present trailing equipment, would provide an immediate reduction in heavy vehicle numbers traveling on the interstate routes and greatly benefit our whole community. Uptake of this family of HPVs will vary a great amount depending on the specific route corridor volumes and suitable make up and break up sites available. Once such HPVs are operating, more suitable industrial sites and transport hubs would rapidly develop. Many operators would share such facilities.

Safety & Environment Benefits: The approval for modular combination HPVs on selected interstate routes reduces the total heavy vehicle numbers by a very significant amount. The potential estimate of reduced numbers has been considered to be upwards of 1000 trucks plus per day on some routes. The typical vehicle replacement cycle is 2 to 4 years for such prime movers and a little longer for trailers. New advanced safety features will be in all HPV fleets earlier with the current replacement cycles. Crash avoidance warning radar, adaptive cruise control, ABS, EBS braking systems are already common in replacement prime movers.

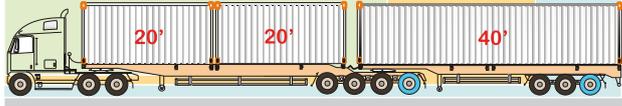
HPV Operator Management System:

Accreditation and regular competency-based driver training will expand with the use of these vehicles for line haul tasks.

Company I

PBS Criteria met.
Application still pending.

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



Steerable Axle B-double

Location: This task covers all metropolitan Location: This container transport task covers specific Melbourne import and export routes to and from container wharves to container parks or a container hub located in one outer suburb.

Road Class & Route: The application is still being considered for operation to some metropolitan delivery points. VicRoads has assessed the routes and destinations to some delivery points in respect to entry and exit turning access requirements for the HPV at a 30m overall length.

Status of Approval to Operate in Victoria: The application process was part of a transport industry association submission in 2007 for HPV operating approvals to carry 2 x 40' containers to and from the Melbourne port area to what could be called the central geographic container transport centres that exist around the city. One of the main items of concern with this application process is limiting the HPV gross vehicle mass to 68 tonnes. This severely limits productivity by approximately 50% as heavier containers must still be carried in fewer numbers, including one at a time. Present infrastructure limit constraints will reduce preferred gross vehicle mass on some routes.

High Productivity Vehicle Configuration: The HPVs configuration is a 30m long B-doubles fitted with a rear steering axle on one or two of the trailer axle groups. The load carried could be 1 x 40' container and 2 x 20' containers or say 2 x 40' containers. The current B-double payload limits mean a relatively slow adoption as the low container load weights are a serious transport operator limitation as the main benefits at these weights will be for light containers and empty containers.

Business Productivity & Economic Benefits: The 30m B-double HPV even at the same load limits and the standard 26m B-double will produce some significant productivity gains 30% for those carriers delivering empty containers or very light containers. The number of fewer trips would be in the order of 5000 per annum. Major productivity increases will not be achieved until the gross vehicle weights can be lifted to 77.5 tonnes.

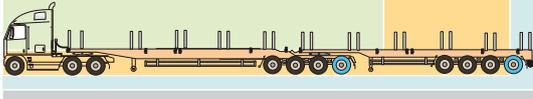
Safety & Environment Benefits: The safety benefits for operating 30m B-doubles to carry containers includes a big reduction of heavy vehicle numbers on metropolitan roads as well as the reduction in vehicle emissions. All HPVs would include the newest safety systems of vehicle design and engine fuel efficiencies.

HPV Operator Management System: The company presently uses a regular training provider and will continue with competency training and trial conditions that may be applied during the trial period.

Company J

PBS in progress.
Application not submitted as yet.

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



Dual Trailer Configuration

Location: This task covers a processing plant site located in an outer suburb. The use of HPVs would allow for better planning of the expected increase in throughput volumes without any increase in vehicle movements.

Road Class & Route: The application is in the initial stages of submission. The task involves movements to a single specific delivery point from the one dispatch location. Early assessment of the route requirements for the HPV at a 27m overall length are considered feasible.

Status of Approval to Operate: The application submission is still being prepared and will be submitted later this year. Preliminary PBS assessments indicate the configuration will meet all of the standard measures.

High Productivity Vehicle Configuration: The HPV configuration is a dual trailer configuration with 11 axles and approximately 27m long. Maximum pavement loading is 8.5t per axle. The vehicle meets the level 1 swept path PBS measures and has now been approved through the PRP review process.

Business Productivity & Economic Benefits:

The increased capacity of the vehicle allows for a reduction in vehicle trips of approximately 25% and CO₂ emission reductions of 295 tonnes over 5 years.

Safety & Environment Benefits: The vehicle provides an opportunity to implement electronic braking systems, front, side and rear under-run protection, sliding canopies to prevent working at heights plus engineered error tolerant restraint systems.

HPV Operator Management System: Route IAP systems are planned for use with the vehicle to ensure that route compliance is maintained. Task specific competency training will be provided to drivers to ensure systems compliance.

Vehicle Features	Driver Safety Benefits	Road user safety Benefits	Environmental Benefits
Reduced CO ₂ Emissions		✓ Yes	✓ Yes
Reduced Noise Emissions		✓ Yes	✓ Yes
Reduced Road Congestion – fewer vehicle trips		✓ Yes	✓ Yes
Best Practice Diesel Engine Technology		✓ Yes	✓ Yes
Road Friendly Air Bags Springs Suspensions	✓ Yes	✓ Yes	
Improved Braking Systems (EBS, ABS)	✓ Yes	✓ Yes	
Improved Load Restraint (Robbo Racks)	✓ Yes	✓ Yes	
Automatic Gearing reducing driver fatigue	✓ Yes	✓ Yes	
Front, Rear and Side under run protection	✓ Yes	✓ Yes	
GPS Load tracking	✓ Yes	✓ Yes	
Sliding Canopies eliminating working at heights	✓ Yes		

✓ IAP – intelligent Access Programs – Track and Log vehicle + Mass Management on vehicle in real time to confirm compliance to route and mass limits.

Company K

PBS Criteria met.
Application successful
& operating.

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



Location: This task covers specific regional quarry products and their transport routes to and from quarries and crushing plants.

Road Class & Route: The application is in the final stages of PBS level 2 routes (B-double routes). VicRoads has assessed each of the destinations in respect to entry and exit turning access requirements for the truck and dog trailer HPV at a 20m overall length.

Status of Approval to Operate in Victoria:

The application process has been part of a full PBS assessment study. This included Council applications for each area concerned.

High Productivity Vehicle Configuration:

Existing vehicles in this fleet presently carry 50t in 19m truck and 4 axle dog tipper vehicles.

Business Productivity & Economic Benefits:

The 20m truck and dog HPV units will produce some significant productivity gains for this industry sector up to some 12%. One of the background economic reasons is the severe shortage of suitable drivers and this was the main reason to seek higher productivity vehicles.

Safety & Environment Benefits: The safety benefits listed include a reduced number of quarry trucks in the area. With fewer trucks comes the reduction in vehicle emissions as all the replacement HPVs are fitted with Euro 4 engines. All HPVs would include the newest braking safety systems such as ABS/EBS, FUPS and crash protection features.

HPV Operator Management System: The company presently uses a regular training provider and will continue with competency training and trial conditions that may be applied during the trial period.

Company L

**PBS Criteria met.
Application successful
& operating.**

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



Operating HPVs

Location: This task covers a particular Melbourne manufacturing site and has approved transport routes for travel under permit. These are typically to a small number of distribution centres in metropolitan areas.

Road Class & Route: The vehicle has now been operating for one year after meeting all the required HPV assessment measures. The units operate under annual permits with agreed travel conditions, including approved routes.

Status of Approval to Operate in Victoria: The application process was commenced some 3 years ago and met some difficulties of what and how some of the design features and variations could be measured under the PBS assessment criteria. These were finally accepted and the vehicle's operation has been performing to all expectations in Victoria. Substantial OH&S benefits derived from vehicle design, although not a PBS measure was a consideration in the approval process for the improved safety in the loading, unloading and load restraint it provides for the high risk product transported.

High Productivity Vehicle Configuration:

The HPV configuration is a variation of a standard 19m semi-trailer with some imported vehicle body designs which are specific to the manufactured product being carried. One of the key features is the ability to load and unload the vehicle more safely and quickly resulting in faster vehicle turnaround times without the use of traditional site handling equipment. The visual appearance does not look very different from other semi-trailers.

Business Productivity & Economic Benefits:

The HPV semi-trailer variation has its major productivity benefit in being able to more safely be loaded and unloaded with a critically sensitive and high risk loading product with less mechanical handling equipment and the associated risk exposures. This feature has delivered the planned delivery efficiencies and safety gains at both the manufacturer's loading site and the customers unloading sites.

Safety & Environment Benefits: As set out above the key safety benefits have been attained at the manufacturer's loading site and customers unloading sites. Safety benefits of new and innovative HPV design were seen as an OH&S and load restraint priority and were considered and taken into account during the application process. Other regular vehicle safety design, engine type, lower fuel consumption features are standard with this fleet.

HPV Operator Management System: Regular company operator training is augmented by competency based training, the requirements of which are being met, as are all of the VicRoads operating requirements that apply, including approved routes, design rule standards, braking standards, particular product (as nominated) that can only be carried and vehicle accreditation scheme mass management.

Company M

PBS Criteria met.
Application in
wharf areas

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



Vehicle now operating

Location: This task covers specific Melbourne import export container transport routes to and from the Melbourne Port precinct to both nearby rail and container terminals adjacent to the port area.

Road Class & Route: The application is now operating to the specific nominated delivery points. VicRoads assessed each of these destinations in respect to entry and exit turning access requirements for the HPV B-double at a 30m overall length.

Status of Approval to Operate in Victoria: The application process included a full and comprehensive assessment to evaluate all the HPV against the PBS measures. A full and comprehensive engineering analysis was submitted with the application.

High Productivity Vehicle Configuration: The HPVs configuration is a 30m long B-doubles fitted with an active steering axle group on each of the trailer axle groups. The load carried could be 1 x 40' container and 2 x 20' containers or say 2 x 40' containers. Current maximum loaded HPV weights are 68t GCM.

Business Productivity & Economic Benefits:

The 30m B-double HPV at the same load limits and the standard 26m B-double produce significant productivity gains for those carriers delivering empty containers or very light containers. The additional container volumes carried increase by some 33% using this vehicle configuration.

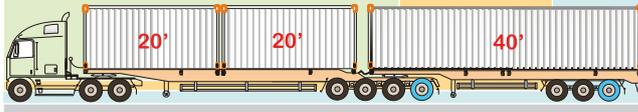
Safety & Environment Benefits: The safety benefits in operating 30m B-doubles to carry containers include the reduction of heavy vehicle numbers on port precinct roads. Other benefits include the reduction in vehicle emissions. The container carrying HPVs include the newest safety systems of vehicle design and engine fuel efficiencies. The key active steering system of these HPVs greatly improves the vehicle's ability to enter and exit all sites as well as having a better swept path at all intersections. Lower infrastructure costs for pavements also apply due to reductions in peak tyre scrubbing forces almost being eliminated with this particular active steering system.

HPV Operator Management System: The company presently uses a regular training provider and will continue with competency training and trial conditions that may be applied during the trial period.

Company N

PBS Criteria met.
Application not successful

Road Class - Levels	1	2a	2b	3a	3b
	20m	26m	30m	36.5m	42m



The diagram shows a truck with three containers. The first two containers are labeled '20'' and the third is labeled '40''. The truck is positioned below the table, with the container lengths corresponding to the '20m', '26m', and '30m' columns.

Location: This task covers Melbourne port areas for export containers and one transport route to a major rural city serviced by divided highway roads.

Road Class & Route: The application has not been approved owing to the limited capacity of some old bridges to carry the proposed high gross load weights on the route requested. A gross combination weight limit of 68.5t would be the current maximum as well as a more detailed list of roads to be included with the route as well as container parks in the request detail.

Status of Approval to Operate in Victoria:

The application process had been a transport industry association submission in 2007 for HPV operating approvals to carry 2 x 40' containers or the 20' equivalent loading to and from the Melbourne port areas. An alternative suggestion was made to consider and submit an application at the present B-double gross load weight limit of 68.5 tonnes. (as above) An approach will now be made to each of the councils involved along the particular route.

High Productivity Vehicle Configuration: The HPVs configuration was for 30m long B-doubles fitted with a rear steering axle on one or two of the trailer axle groups as may be required. The load carried could be 1 x 40' container and 2 x 20' containers or say 2 x 40' containers. The current B-double payload limits of 68.5t GCM as suggested mean a serious productivity limitation as the low container load weights would only be available for light containers and empty containers.

Business Productivity & Economic Benefits:

The 30m B-double HPV even at the same load limits and the standard 26m B-double will not be able to produce significant productivity gains for this regional export application of primary products that is now moving more and more towards exporting 40' containers to overseas markets. Productivity increases will not be achieved until the gross vehicle weights can be lifted.

Safety & Environment Benefits: The safety benefits in operating 30m B-doubles to carry containers includes the big reduction of heavy vehicle numbers on the regional roads, estimated to be about 30% less vehicles, as well as the reduction in vehicle emissions. Vehicle safety systems, cab strength, self steering axle on each tri-axle group, and engine fuel efficiencies would apply. Additional features listed as 'ideal' included a forward radar to monitor the gap between the B-double and other traffic while travelling at slow speed, plus a lane recognition device that warns the driver if the vehicle deviates from its lane.

HPV Operator Management System:

Company driver training standards and current practices will continue along with other expected conditions that may be applied to the applications. These include mass management compliance and the likely hood of the incremental pricing regime developed by the NTC to recover costs for additional HPV road damages.

GLOSSARY OF TERMS

ABS

The portion of a brake system that automatically controls the degree of rotational wheel slip relative to the road at one or more road wheels of the vehicle during braking.

Australian Design Rule (ADR)

An Australian Design Rule for motor vehicle safety and emissions as endorsed by the Australian Transport Council

Articulated vehicle

Combination vehicle made up of a prime mover and semi-trailer.

Axle

One or more shafts, positioned in a line across a vehicle, on which one or more wheels intended to support the vehicle turn.

Axle group

A set of closely spaced axles acting as a load sharing unit.

Axle load

That portion of the total vehicle load transmitted to the road through a single axle.

Axle mass

The total mass axle load transmitted to the road by all the tyres fitted to an axle group.

B-double

An articulated vehicle hauling two semi-trailers with the rear semi-trailer superimposed onto the front semi-trailer of the articulated vehicle. This is achieved by the use of a fifth wheel permanently located towards the rear of the front semi-trailer.

Concessional Mass Limits (CML)

The Gross Vehicle Mass limit of vehicles operating under the National Heavy Vehicle Accreditation Scheme (NHVAS). Tandem and triaxle groups are set at 5% above General Mass Limits subject to certain conditions, with a maximum mass increase of 1.0 tonne for a vehicle up to 55.0 tonne mass and 2.0 tonne for a vehicle exceeding 55.0 tonne mass.

FUPS

'Front under-run protection system' device to reduce damage to other vehicles in case of an accident.

Equivalent standard axle(s) (ESA)

The number of standard axle loads that are equivalent in damaging effect on a pavement to a given vehicle or axle loading.

General Mass Limits (GML)

The heavy vehicle axle mass limits that apply to 'general access vehicles' on public roads in Australia unless otherwise limited by load restriction signs.

Global positioning system (GPS)

A system based on satellite signals, for identifying the x, y, z coordinate location of object(s).

Gross combination mass (GCM)

1. The maximum designed laden mass of a motor vehicle combination as specified by the manufacturer.
2. The maximum of the sum of the gross vehicle mass of the drawing vehicle plus the sum of the axle mass of any vehicle capable of being drawn as a trailer.

Gross vehicle mass (GVM)

Tare weight (unladen weight) of the motor vehicle plus its maximum legal load carrying capacity.

Higher mass limits (HML)

The heavy vehicle axle mass limits available on approved routes provided the axles have certified 'road friendly' suspensions and the vehicle operates under an approved mass management scheme.

Intelligent access program (IAP)

In Australia, the IAP provides for improved heavy vehicle access to the road network in return for monitoring, by vehicle telematics of their compliance with specific route access conditions.

Load capacity

The difference between the legal gross vehicle mass (GVM) and legal gross combination mass (GCM) of the vehicle and its tare mass.

Multiple combination vehicles

The full range of truck, prime mover and semi-trailers and road trains.

National Transport Commission (NTC)

Develops and coordinates regulatory reform for nationally consistent road transport policies and laws. In developing reforms the NTC gives consideration to impacts on infrastructure, regional and remote areas by providing a vision of how challenges may be met.

Performance Based Standards (PBS)

Standards that describe the acceptable safety performance and infrastructure effects for heavy vehicles permitted to operate as PBS vehicles.

PRP

The NTC-appointed Performance Based Standards Review Panel

Quad axle group

A group of four axles in which the horizontal distance between the centre-lines of the outermost axles is more than 3.2 m but not more than 4.9 m.

Rigid trucks

Motor vehicles exceeding 3.5 tonnes GVM, constructed with a load carrying area. This includes normal rigid trucks with a tow bar, draw bar or other non-articulated coupling on the rear of the vehicle.

Road train

A heavy vehicle combination, not including a B-double, consisting of a motor vehicle towing at least two trailers (counting as a single trailer a converter dolly supporting a semi-trailer).

Single axle group

A group of at least two axles in which the horizontal distance between the centre lines of the outermost axles is less than 1 m.

Standard axle (standard axle load)

Single axle with dual wheels loaded to a total mass of 8.2 tonne (80 kN).

Tri-axle group

An axle group of at least three axles, in which the horizontal distance between the centre-lines of the outermost axles is more than 2.0 m, but not more than 3.2 m.

Turntable

Rotating device normally used as part of a trailer or between a semi-trailer and towing vehicle with the semi-trailer not readily detachable from the towing vehicle. It includes upper and lower rotating elements.

Twin steer axle group

A group of two axles with single tyres fitted to a motor vehicle and connected to the same steering mechanism; the horizontal distance between the centre-lines is at least 1 m, but not more than 2 m.

Tare Weight

The weight of a vehicle in running order, equipped with all standard equipment and with all fuel and other fluid reservoirs filled to nominal capacity, but unoccupied and without any other load.

