

Growing pains: Challenges for Australia's PBS Scheme



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ABSTRACT

The Australian PBS Scheme has been very successful in certain sectors of the road transport industry, with a large proportion of new vehicles entering service in those sectors now PBS-approved. In other sectors, however, the level of take-up by the industry has been much lower than expected. This is thought to be due to a number of policy and operational impediments, which are discussed in this paper. The key impediments are bridge load capacity, overall vehicle combination length and administrative processes. Together, the bridge load capacity and overall vehicle combination length issues effectively preclude any mass and dimension increases under the PBS Scheme unless operations are limited to a very small number of pre-approved roads where infrastructure capacity is known to be sufficient. The administrative process issues result in unduly long approval timeframes and constant uncertainty around the likelihood and level of road access for a PBS vehicle, seriously undermining industry confidence in the Scheme.

INTRODUCTION

Australia's Performance Based Standards (PBS) Scheme has been a success story of the National Heavy Vehicle Regulator (NHVR) and has experienced an increase in its rate of growth in recent years. Data from the NHVR demonstrates that the number of PBS Design Approval applications increased by 169 per cent between 2013 and 2016 and the number of PBS Vehicle Approvals increased by 130 per cent in the same period. While the details of these approvals are not in the public domain, growth is generally known to be attributable to a few parts of the industry where PBS has been popular, rather than all parts of the industry.

After nine years of the Scheme's operation, PBS-approved heavy vehicles represent only one per cent of the Australian heavy vehicle fleet (National Transport Commission 2016). If, however, one considers that not all categories of heavy vehicle in the national fleet are suitable for PBS approval, then the proportion of suitable vehicles that are PBS approved is greater.

In 2015 the NHVR issued 749 PBS Vehicle Approval certificates covering 929 combinations made from 3,818 individual vehicle units. To date in 2016 the NHVR had issued 744 PBS Vehicle Approval certificates, covering 1,061 PBS combinations made from 3,565 individual units. These figures represent a 34 per cent increase in PBS Vehicle Approvals, a 67 per cent increase in the number of PBS combinations and a 23 per cent increase in the number of units for 2016 compared with the same period in 2015. If this growth continues, the fleet will eventually contain a large proportion of PBS-approved vehicles, but it is unlikely that growth will continue at this level under current impediments.

That the PBS scheme has been popular in certain parts of the industry has brought attention to what is causing it to be unpopular elsewhere. Truck and dog combinations are still the most popular combinations under the PBS framework. Based on new registration data from the Australian Road Transport Suppliers Association (ARTSA 2016), 92% of all new 4-axle dog trailers registered in the first 6 months of 2016 were PBS approved. Industry-wide growth beyond the truck and dog combination is being limited by impediments that were expected to have been resolved years ago. This is affecting the industry's confidence in the Scheme and threatening the future of the Scheme itself.

This is not the sort of PBS market that was envisaged when the Scheme was initially conceived. The authors are of the view that, without current impediments, PBS vehicles are capable of forming a majority of new vehicles and a majority of the Australian heavy vehicle fleet in the long term. In this potential future scenario, unprecedented increases in transport efficiency and safety would be observed.

KEY ISSUES

The key issues discussed in this paper are:

- Bridge loading
- Overall length
- Administrative processes.

Together, the bridge loading and overall length issues effectively preclude any mass and dimension increases under the PBS Scheme unless operations are limited to a very small number of pre-approved routes where infrastructure capacity is known to be sufficient.

The continual growth in applications has also meant that despite the NHVR's efforts in looking for ways of improving the assessment and approval processes for both Design Approvals and Vehicle Approvals, the administrative process issues could result in unduly long approval timeframes. The constant uncertainty around the likelihood and level of road access for a PBS vehicle is seriously undermining industry confidence in the Scheme.

A critical problem for a number of PBS applicants is the issue of obtaining access for approved vehicles. This issue is a reflection of a number of problems with the access regime, the primary one being the declaration and publication of approved PBS Networks that would provide 'as-of-right' access through a notice rather than by seeking a permit.

The lack of uniformity and certainty of road and bridge access for compliant PBS vehicles has continued to be a major impediment to PBS take-up. The productivity and safety losses will continue to be substantial without this vital element being completed.

DISCUSSION

Bridge loading

The PBS Scheme does not allow an axle or axle group to carry more mass than what is allowed in the regulations. The Scheme does, however, waive existing limits on overall mass. An applicant can achieve PBS Design Approval for a vehicle configuration having a greater overall mass by incorporating either: (a) more axles in one or more axle groups; (b) more axle groups; or (c) a combination of both, provided the vehicle can satisfy the safety standards at the higher mass. It should be noted, however, that PBS Design Approval does not equal PBS Access Approval.

Adding mass to a heavy vehicle configuration in this way may not directly affect pavement wear but it may pose increased loading on some bridge infrastructure. Therefore road managers will not automatically grant access to a heavier PBS vehicle without first conducting an assessment of its bridge loading effects, even if it has been issued a PBS Design Approval. This kind of work has not been done in a preemptive way except for a small number of key roads in some jurisdictions, so most applications in which higher mass is involved will be subject to some kind of special bridge loading assessment in the course of access approval.

At present there are very few avenues via which higher-mass PBS vehicles can be examined for bridge loading effects and granted substantial road access in an efficient and timely manner.

A common scenario is the transport company that regularly operates at maximum legal mass over long distances. This may include travel through more than one state, and each end of the journey may involve a different local road manager. If this transport company was to develop a PBS design that added several tonnes of payload by way of an additional axle group or larger axle groupings, the various road managers involved in determining whether access could be granted would be faced with the challenge of establishing whether that increased mass would be problematic for any bridge infrastructure under their control.

To respond to such access requests requires a number of steps:

- (1) Each road manager must determine which structures under their control may be vulnerable to the proposed vehicle.
- (2) Each road manager must conduct a technical assessment of the proposed vehicle, considering its particular axle spacings and axle loads, against each structure identified in (1).
- (3) If one or more structures is unable to accommodate the proposed vehicle, a reduced mass must be determined or access must be refused.

The means to conduct this sort of assessment is held within each state road authority, but systems are not streamlined and priorities are not in favour of the PBS vehicle. Bridge engineers within the state road authorities are generally more concerned with determining access for irregular heavy loads such as mobile cranes, low-loaders and multi-line load platforms, and conducting other project work. Some jurisdictions have struggled to adequately resource the road and bridge assessments needed to create approved PBS networks. Access decisions for proposed PBS vehicles are generally seen as speculative and therefore are given low priority, often taking weeks, if not months, to resolve.

Local road managers, on the other hand, generally do not have the expertise with which to respond to such requests. This necessitates the employment of a consulting bridge engineer by the transport operator, which comes with significant cost and uncertainty.

If an applicant was to persist with the process, the outcome of such scenarios is, in many cases, a disappointing one after many months of waiting.

In the state of Victoria, efforts have been directed at increasing the mass available to certain PBS configurations. Some basic axle spacing envelopes have been published alongside a colour-coded road network indicating the mass that will be granted to each configuration on that network if the vehicle meets the defined envelope. Some parts of the network are approved for less mass than others, based on the capacity of specific bridges. Details of funding status are shown for such bridges, so that the user knows when the structure is likely to be upgraded to allow full mass. Vehicles that do not meet the axle spacing envelopes may still be granted access based on a special assessment. Under this approach a number of 30-metre configurations are being operated at well above the mass normally approved outside of the PBS Scheme.

In the state of Queensland, links from the remote area road train network to the Port of Brisbane have been approved for high-mass configurations and these links now carry around 100 PBS-approved 30-metre configurations.

Austrroads, a body that undertakes public-interest research on behalf of the state-based road authorities, is presently developing recommendations to improve bridge loading assessment for PBS vehicles.

Overall length

The PBS Scheme is based on matching vehicles to roads. If a vehicle meets a set of performance standards to a particular level, then it should be granted access to the corresponding level of the road network. Although the PBS standards had been

developed considering the on-road performance of the prescriptive fleet, the establishment of corresponding PBS networks has been incomplete and sometimes more restrictive than equivalent prescriptive networks.

A problem faced by PBS applicants is that the only road networks to have been substantially published are those that offer little to no productivity benefits. Those that offer significant productivity benefits appear to have been in a state of development for many years, with no transparency.

For example, where regulation vehicles up to 19 metres long enjoy General Access, the equivalent PBS vehicles may be up to 20 metres long but only receive access to the Level 1 network, which currently excludes many local roads.

In another example, where regulation vehicles (B-doubles) up to 26 metres long enjoy access to a broad but restricted B-double network, the equivalent PBS vehicles may be up to the same length but only receive access to the Level 2A network, which may not incorporate all of the existing B-double network. Even if the Level 2A network was the same as the B-double network, there is no geometric benefit to be gained.

There is supposed to be a Level 2B network for PBS vehicles meeting Level 2 standards but having an overall length more than 26 metres and up to 30 metres. This is where substantial productivity improvements can be found. The Level 2B network should ideally be that portion of the Level 2A network that can accommodate the additional 4 metres of overall length. Reports from officers of two state road authorities have indicated that there is an appetite for the Level 2B network to ultimately be a substantial proportion of the Level 2A network.

The Level 2B network is presently limited to a fraction of the number of roads that would be suitable. The only technical impediment to a Level 2B network is anything directly related to overall length. That is, intersection stacking distance, storage lane length, rest area markings, overtaking provision, etc. Other matters such as swept path and lane width are already covered by the fact that the vehicle satisfies Level 2 standards. Yet to this day some road managers quote swept path and lane width as reasons not to grant Level 2B status to roads that are currently Level 2A.

Administrative processes

For various legacy reasons, the PBS Scheme has been setup in such a way that:

- (a) The PBS Review Panel (the panel) is a group, established under the Heavy Vehicle National Law (HVNL), tasked with providing expert advice to the NHVR on PBS applications. The Panel (consisting of representatives of each state-based road authority) must be consulted before the NHVR can issue a Design Approval for a PBS configuration even though the decision making power lies with the NHVR. This consultation is only to determine (by majority vote) whether the Panel agrees that the vehicle meets the PBS safety and infrastructure standards. The issue of vehicle access, although implicit in the design and build of the vehicle and the applicants' needs, is not the primary concern of the Panel. The decision on whether the vehicle complies with the standards or not is actually made in advance on the basis of complex engineering calculations by a suitably qualified and experienced engineer who was accredited by the NHVR for that express purpose. There are questions about what value the PBS Review Panel adds to this part of the approval process, and suggestions that it may be time to allow the NHVR to issue Design Approvals without input from the Panel; This

simplified process would have significant benefits to processing times which would flow directly onto applicants.

- (b) Although vehicles that are approved by the NHVR have an expectation of access to the networks mapped for that vehicle level or to a requested and approved route, each state-based road authority and local road manager has the final say on whether a vehicle with a PBS Design Approval may be granted access to a road that they manage, even if they voted in support of the Design Approval in (a). This has led to a number of Design Approvals being issued for vehicles that were not able to ultimately gain the access that they were seeking;
- (c) The HVNL does not specify a formal process for determining in advance what attitude a particular state-based road authority or local road manager will take towards road access for a particular PBS configuration. At this time, the best approach appears to be to submit a formal application for road access without specifying any Design Approval number. The NHVR then seeks “In-Principle Access Support” from the relevant road managers, which is a written statement outlining each road manager’s position. This can take anywhere from one to six months.

Issue (a) results in a Design Approval timeframe of four to six weeks, when it could be handled in less than one week if the NHVR acted independently of the Panel on the advice of the accredited PBS Assessor.

Issue (b) results in vehicle designs with PBS Design Approval being ‘orphaned’ when no jurisdiction will grant road access, even if every jurisdiction voted to issue the Design Approval.

Issue (c) results in very lengthy delays to applications, which in many cases cannot be accommodated due to equipment procurement timeframes, contract tendering timeframes, etc.

PROPOSED SOLUTIONS

Bridge loading

PBS vehicles that are approved by the NHVR and are Tier 1 or 2 bridge compliant (bridge formula or network based assessment) should be granted as-of-right access to the networks that match or exceed their PBS compliance level (e.g. a Level 3A vehicle shall have as-of-right access to all mapped networks classified as 3A, 3B, 4A, 4B). PBS vehicles that are not covered by the conditions (which require bridge-by-bridge suitability assessment) should seek assessment of, and be granted access to, requested routes unless the jurisdiction or road managers can show, within a reasonable timeframe, that the approved vehicle is not suitable for the requested route.

It is common knowledge within bridge engineering circles that an appropriately resourced road manager can determine access for a heavy vehicle using any of a number of automated bridge engineering tools. These tools currently exist in most Australian jurisdictions. They vary in complexity and therefore in the degree to which they can provide increased mass for a given configuration. For example, some tools use broad-brush engineering principles while others go into more detail to extract the maximum from the structure.

These tools are used regularly for the assessment of over-size/over-mass loads such as mobile cranes and low loaders when granting single trip permits for those movements. Those permits can typically be issued within 24-72 hours of an application being made. It follows that similar tools could be developed and put to use for PBS vehicle route assessment. Importantly, there needs to be cost-recovery to encourage the authorities to develop and maintain the tools, and to assign the correct number of staff to their application. PBS vehicle applicants are prepared to pay for assessments if they are timely and conclusive.

Overall length

The PBS Scheme has two classes of road network (A & B) within each of the four Levels (1-4). For example, as discussed earlier, Level 2A is for vehicles meeting Level 2 standards that are not longer than 26 metres, and Level 2B is for vehicles meeting Level 2 standards that are longer than 26 metres but not longer than 30 metres. In all cases the 'A' class corresponds in-principle with an existing non-PBS network, as follows:

Level 1A (20.0 metres maximum) \cong General Access
Level 2A (26.0 metres maximum) \cong 26.0-metre B-double network
Level 3A (36.5 metres maximum) \cong 36.5-metre road train network
Level 4A (53.5 metres maximum) \cong 53.5-metre road train network

The 'A' class networks could easily be populated by a concerted effort to migrate virtually all roads from the existing non-PBS networks. The 'B' class networks require some additional investigation based on overall length only, because Level 2A and Level 2B vehicles will meet the same safety standards. It is only the additional physical length of the vehicle that needs to be considered, for example, when assessing the vehicle's ability to fit between two intersections or between an intersection and a nearby railway line.

It is known that assessing roads from a geometric perspective only (setting aside bridge loading issues) is a fairly straightforward exercise. Some jurisdictions have made significant progress on this type of assessment but the results have not been published because the bridge loading assessment either has not been done or has proven to not provide significant mass benefits. This is an unfortunate outcome. It is not necessary for all 'B' class vehicles to have more mass than the corresponding 'A' class vehicle. Even without a mass benefit there is a benefit to be gained by allowing high-cube vehicles to operate at current mass limits.

'B' class networks should be published based on geometric assessment only, and they should nearly match the corresponding 'A' class networks except for where issues arise due to the additional overall length.

Then when an applicant seeks access for a 'B' class vehicle at a higher mass, this will trigger a bridge assessment. At the same or less mass, access will be able to be granted without that extra step.

Administrative processes

It is time that the NHVR made a change to the PBS Business Rules that will allow a PBS Design Approval to be issued without the need to consult the PBS Review Panel. The Scheme is mature enough, after nine years of operation, for this to occur without issue. At the very least, it could be achieved for vehicle configurations that have previously been seen by the Panel. This should allow most Design Approval Applications to be

turned around within several days, allowing for the usual processing time within the Regulator.

A perceived risk is that errors could be made in assessments and that erroneous Design Approvals could then be issued, or that Design Approvals might be issued for vehicles the panel would not have accepted. The NHVR has developed significant expertise and experience in the management of PBS applications. A review of recent PBS applications has illustrated that NHVR has maintained a high standard of accuracy and that no significant items for change have been raised by the Panel.

There is a 28-day statutory timeframe within which PBS road access is supposed to be determined by a road manager. This is rarely met, especially when bridge loading assessment or additional length is involved for the first time on a particular route. Furthermore, there is no legal recognition of access requests made prior to Design Approval, despite many such requests being made. Road managers tend to respond to those requests within several months. Resources need to be assigned to road access determination for PBS vehicles, so that requests can be dealt with in a timely manner. Improvement in the 'in-principle support' process whereby access decisions equate to consent, contingent on the vehicle approval matching the original design, is required.

CONCLUSIONS

Bridge loading

Road managers should fully deploy existing automated tools for conducting bridge loading assessments for proposed PBS configurations. There should be an appropriate level of cost recovery to enable the systems to be properly maintained and resourced for fast turnaround time (e.g. access requests determined within several days).

Overall length

PBS networks for Level 1-4 (including Class A/B) should be fully determined and published on the National Heavy Vehicle Regulator's Journey Planner. Access should be rubber-stamped when mass does not exceed current limits for non-PBS vehicles. When mass is higher, the previously mentioned bridge loading assessment method should be used.

Administrative processes

The PBS Review Panel should no longer be consulted for Design Approval of vehicle configurations, at least for those configurations that have been approved before, but preferably for all applications. The system is sufficiently mature to enable this. It must be noted that the final decision regarding PBS Design Approvals, PBS Vehicle Approvals and national operating conditions rests with the NHVR. It would be essential for the NHVR to have an established audit regime for PBS Assessors and PBS Certifiers and an adequate assurance framework in place.

REFERENCES

Australian Road Transport Suppliers Association (2016), Heavy Vehicle Registration Data, ARTSA, Melbourne.

National Transport Commission (2016), *PBS Marketplace Consultation Paper*, National Transport Commission, Melbourne.