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F u t u r e V e h i c l e s

**A COMPARISON OF THE AUSTRALIAN AND
NEW ZEALAND APPROACHES TO PBS**

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Performance Based Standards for Regulating Size and Weight



Origins in the 1980s RTAC Study – Results presented at “HVTT1” in 1986

- Size and weight regulated by individual Provinces resulting in a lack of compatibility
- Aim of the RTAC study was to identify vehicle configurations and size and weight limits that were acceptable to all Provinces.
- PBS was used to quantify the safety performance characteristics of the various options
- Performance assessments were done both by computer simulation and by physical testing
- Implementation through an MoU with several vehicle configuration endorsed in 1988
- MoU has subsequently been extended with ten amendments expanding the range of vehicles and changing some size and weight limits.
- Some provinces also use PBS for permitting larger vehicles

PBS in New Zealand -1980s



- 1984 Industry submissions to increase GCM limit from 39t to 44t
- PBS measures used in the RTAC study were applied to NZ vehicle configurations
- Due to poor high-speed dynamic performance:
 - A-trains (A-doubles) limited to 39t
 - 3-axle truck and 3-axle full trailer combinations limited to 42t
 - Truck and full trailer combinations with more axles and B-trains allowed 44t
- Already implemented before “HVTT2” in 1989
- Individual PBS assessments used to permit some 44t A-trains

PBS in New Zealand 1990s-2000s



- Heavy Vehicle Limits Project 1999-2004
 - Scenario A - unchanged dimensions but higher weights with access to entire network
 - Scenario B – longer and heavier vehicles with access limited to the major highway network
 - Seven separate work streams with PBS being fundamental to the safety and geometric components
- Vehicle Dimensions and Mass (VDAM) Rule 2002
 - Some prescriptive requirements based on performance analysis
 - PBS requirement (Static Rollover Threshold $> 0.35g$) for most large heavy vehicles

High Productivity Motor Vehicles



- 2010 amendment to the VDAM Rule introduced High Productivity Motor Vehicles (HPMVs)
 - Operate under permit on approved routes
 - No explicit dimensional or gross combination weight limits
 - Small increases in some axle group weight limits and revised bridge formula table of axle spreads and weight limits
 - Required to be safe and to fit on the infrastructure





Implementation of HPMVs

- Approach used by New Zealand Transport Agency (NZTA)
 - New low speed turning performance requirement based on worst case standard legal vehicle. RTAC standards for high-speed performance characteristics
 - Pro-forma design templates specifying acceptable ranges for critical dimensions were developed
 - Non pro-forma design vehicles were also approved based on an individual PBS assessment
 - Uptake very strong but mostly longer vehicles at standard weights because of difficulties with route access to local roads and bridges
 - 50MAX vehicles introduced in 2013. 9-axle 23m combinations at 50t GCW as an alternative to standard 7 and 8-axle 20m combinations at 44t. Increased productivity with no increase in pavement wear per tonne of payload and comparable bridge loadings

PBS in New Zealand Today



- NZ PBS standards were reviewed and formalized in 2017
- HPMVs and 50MAX vehicles are required to meet 13 PBS
- Also required to comply with a set of prescriptive requirements including length, width, height, axle load limits and spacings
- Currently 17 pro-forma designs available (see NZTA website)
- Industry demand for a configuration not included in current pro-forma designs leads to the development of a new pro-forma design
- Permits for non pro-forma design HPMVs are still possible but only for specialized applications on restricted routes



Australian Heavy Vehicles

- Federal government structure – 6 states and 2 territories. Vehicle size and weight under state control
- Rules reasonably standardised nationally
- Four level of access with three levels of mass limits in each
 - General access: Maximum length 19m, GCW 42.5t - 57t
 - B-double routes: Maximum length 26m, GCW 59t - 68t
 - Type 1 Road Trains: Maximum length 36.5m, GCW 82.5t -113t
 - Type 2 Road Trains: Maximum length 53.5m, GCW 122.5t -135.5t

Standard Legal Vehicles



Development of Australian PBS



- Large scale research programme to develop PBS system commenced in late 1990s
- Original concept very fundamentalist
 - No prescriptive requirements
 - Set of PBS requirements should be complete
 - Four levels of pass/fail criteria aligned to four levels of infrastructure access
 - All PBS measures able to be evaluated by both computer simulation and physical measurement
- Final set of PBS implemented in 2008
 - Four infrastructure standards and sixteen safety standards



Implementation of PBS in Australia



- PBS system included in National Heavy Vehicle Law in 2014
- Mapping between PBS levels and existing infrastructure access levels was not seamless. State roading authorities undertook PBS route assessments.
- PBS did not eliminate some prescriptive requirements. Length, width, height, axle loads and bridge formula.
- Some “blue print designs” have been developed
- PBS not fully accepted in all states – Western Australia



Implementation of PBS in Australia



- Greatest uptake of PBS is for truck and full (dog) trailer combinations because of the productivity gains available for these vehicles.
- Strong uptake by 30m A-doubles at level 2 also with significant productivity gains
- Overall uptake has been quite strong – by 2020 10,000 vehicles or approximately 10% of the combination vehicle fleet were PBS vehicles. The current figure is 17,000 vehicles.
- Excellent safety performance has been reported. A 2020 study showed that PBS vehicles had 46% fewer crashes. A 2021 study found 60% fewer crashes.



Australia vs New Zealand

- Australian PBS approach is more rigorous. Each PBS design is required to undergo a full PBS assessment with results specific to detailed vehicle parameters. This allows the maximum possible productivity gains to be extracted from the design but is significantly more costly.
- New Zealand PBS approach uses proforma design templates which were developed using conservative values for the vehicle parameters. Vehicles that fit the design templates are not required to undergo a PBS assessment to obtain a permit. This approach is significantly cheaper but may not always maximise the productivity gains.



Australia vs New Zealand - Uptake

- Australia – after 10 years, PBS vehicles were 10% of the articulated vehicle fleet.
- Possible contributing factors:
 - High productivity standard legal vehicles already operating
 - Relatively high cost of PBS assessments
 - Route access determined by State road controlling authorities
- New Zealand – after 5 years PBS vehicles were 25% of the articulated vehicle fleet.
- Possible contributing factors:
 - Low cost of PBS assessments
 - Route access issues for local roads



Conclusions

- Significant differences between the two approaches taken – why?
- Differences between the two operating environments
 - Political structure
 - Operating environment
 - Infrastructure
 - History
- Hard to say whether the New Zealand approach would have worked well in Australia or vice versa.