HIGH PRODUCTIVITY MOTOR VEHICLES – NEW ZEALAND’S APPROACH

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Outline

• Overview of the country and freight task
• Current HV fleet
• Legislative change for HPMVs
• Pro-forma design approach
• Implementation
• Future directions
Aotearoa - New Zealand

- Population 4.4m
- Area 268,000 sq km
- Economy substantially based on primary production
- Very dependent on international trade
The NZ Freight Task

- Approx 70% of freight moved by road (t-kms)
- 15% by rail and 15% by coastal shipping
- Road network ~ 94,000km including 11,000km of state highway
- More than half of the network is classified as hilly or mountainous
Heavy Vehicle Fleet

- Approx 120,000 heavy vehicles
- Approx 20,000 combination vehicles
- Maximum size, 20m OAL, 44 tonnes GCW
- About 60% of combs are truck and full trailers
- About 25% tractor-semis
- About 15% B-trains
Heavy Vehicle Fleet – cont’d

- Truck and trailers predominantly R22T22 with some R12T22. Small numbers of R22T12 and R12T12
- B-trains predominantly B1232. Some B1233 and B1222
- Semis mostly A123, some A124 and A224, few A122
- Most popular combinations have more axles than needed to support weight – based on axle weight limits
- Driven by Road User Charges
HPMV Legislation

- 2010 Amendment to the VDAM Rule
- Vehicles are allowed to exceed standard size and weight restrictions on routes that can accommodate them.
- Permit-based regime - HPMV vehicles
- Small increases in some axle weight limits
- Revised and extended “Bridge formula”
Pro-forma Designs

• To facilitate uptake of HPMVs NZTA proposed a pro-forma design concept
• General access at standard legal weights
• Higher weights possible on approved routes
• Criterion: road space requirements should be no greater than worst case standard legal vehicle (19m quad semitrailer)
Low Speed Turning Criterion

- 120 degree wall-to-wall turn
- 12.5m outside radius
- 4.9m minimum inside radius
Pro-forma Design Development (1)

• Trailer builders (through NZTTMF) invited to submit design proposals
• Proposed designs assessed for low speed turning performance by computer simulation
• Based on designs that passed (or nearly passed) low speed turning criterion, dimensional envelopes for pro-forma designs were developed
Pro-forma Design Development (2)

• Designs sent back to industry for comment
• Limit cases of the pro-forma designs simulated and assessed for a range of performance measures for both low speed and high speed characteristics (using Australian PBS system)
• Designs approved by NZTA and disseminated to industry
• Issues identified and modified/new designs developed
Pro forma B-train (1)

22m B-train

Note 1: Axle groups can be replaced with alternate groups at the same axis points
Note 2: Tractor can be 3-axle or 4-axle with twin steer
Note 3: 1900 (min). Max. is lesser of 4300 or 50% of forward distance
Pro forma B-train (2)

Note 1 Tractor can be 3-axle or 4-axle with twin steer
Note 2 Tandem axle groups can be replaced with tri-axle groups at the same axis points
Pro forma B-train (3)

Note 1: Tractor can be 3-axle or 4-axle with twin steer.

Note 2: Tandem axle groups can be replaced with tri-axle groups at the same axis points.
Pro forma Truck Trailer

23m Truck and full-trailer

8200 (max)

1600 (min)

45% of wheelbase (max)

2500 (min)

10,400 (max)

23,000 (max)

Note 1: Axle groups can be replaced with alternate groups at the same axis points

Note 2: Max. is lesser of 4300 or 50% of forward distance
Issues with Pro Forma Design Process

- Ad hoc consultation process and speed of implementation produced some unusual outcomes
- Some policy implications were not foreseen (truck-trailer vs B-trains)
- Reasonably good uptake with more than 1000 vehicles permitted
- Particularly useful for volume constrained freight
Issues with Pro Forma Design Process

- Vehicle performance is not the only constraint and traffic engineering considerations exist.
- Uptake of weight increases on approved routes has been limited for various reasons:
  - Bridges
  - Road User Charges
  - Lack of local road controlling authority support
  - Operational issues relating to enforcement
Non Pro Forma HPMVs

- HPMV provisions are not limited to pro forma designs
- Vehicles can be approved on a one-off basis either for general access at standard weights or on specific routes at higher weights
25m 62t HPMV
Future Directions

• Impediments to route-specific higher weight operations are being addressed

• Lower Bound Pro Forma HPMVs
  – General access at higher weights
  – No increase in bridge or pavement wear compared to standard vehicles

• Eventually popular designs will be integrated into VDAM Rule and permits eliminated
Conclusions

• NZ HPMV policy is performance-based but standards have not been formalised
• By constraining dimensions, longer vehicles with adequate performance can be achieved
• Vehicle performance is not the only limitation to larger vehicles. Enforcement, operations, infrastructure funding, road user charging and traffic engineering are all influences