

# **Adoption of more general use of quad axle groups in semi-trailers and B-Doubles Policy Paper**

March 2007

*National Transport Commission*

**Adoption of More General Use of Quad Axle Groups in Semi-Trailers and B-Doubles**

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## REPORT OUTLINE

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<b>Abstract:</b>	<p>This paper sets out the National Transport Commission's policy for implementation of a directive by the Council of Australian Governments to permit more general use of quad axle groups in semi-trailers and B-doubles. The policy uses the findings of recent research by Queensland Main Roads and Queensland Transport, which compared the pavement effect of various triaxle and quad axle loadings against that of a reference standard 8.2 tonne single axle and determined an equivalency for the standard axle group load and proposed operational mass limits for quad axle groups. This policy defines a quad axle mass limit and corresponding gross vehicle mass limits, together with a number of operating conditions. Jurisdictions will be able to implement the policy using existing provisions to provide road access for quad axle groups, taking account of pavement and bridge protection and community considerations. It is intended that model legislation to replace this approach will be prepared for submission to the Australian Transport Council (ATC) for voting in mid 2008.</p>
<b>Purpose:</b>	Approved policy for implementation by jurisdictions from 1 July 2007.
<b>Key words:</b>	quad axle, semi-trailer, B-double, mass limit, equivalency, General Mass Limits, Higher Mass Limits



## FOREWORD

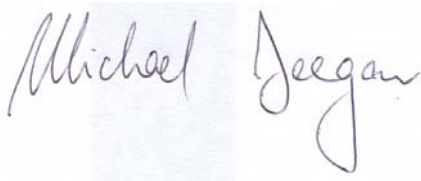
The National Transport Commission (NTC) is a body established under an intergovernmental agreement with a charter to develop, monitor, and maintain uniform or nationally consistent regulatory and operational reforms relating to road transport, rail transport, and inter-modal transport. The Australian, State and Territory Governments jointly fund the NTC.

The Council of Australian Governments February 2006 communiqué indicated the need to permit the more general use of quad axle groups in semi-trailers and B-doubles, and required the NTC to prepare a proposal for voting by the Australian Transport Council (ATC) in December 2006 for implementation by July 2007. The purpose of this reform is to increase productivity and more efficiently manage the national freight task.

The NTC responded by conducting discussions with interested parties and gaining in-principle endorsement of the policy direction from the NTC's Performance Based Standards Policy Steering Committee, Transport Agency Chief Executives (TACE) and the ATC. Following in-principle endorsement of the policy direction, a discussion paper was issued in November 2006 setting out the details of the NTC's proposal for stakeholder comment recognising that there are wide-ranging views relating to the use of quad axle groups. The November 2006 discussion paper, which was prepared with significant stakeholder input, sought to focus on the balance between providing the widest possible network access and meeting the need for heavy vehicle safety and infrastructure protection outcomes, while minimising the regulatory burden on industry.

The policy proposal was revised on the basis of the comments received and was then submitted to the Australian Transport Council for voting. The Office of Best Practice Regulation advised that a Regulatory Impact Statement was not required to be prepared at that stage of the project as a Regulatory Impact Statement will form part of the process of developing legislation to fully implement the reform after an initial period of implementation and monitoring through existing arrangements in each jurisdiction. The Australian Transport Council approved the policy in March 2007.

I wish to acknowledge the contribution by industry and road agencies and the efforts of John Edgar Consulting and the NTC project team, led by Rob Di Cristoforo, in preparing this policy within a tight timeframe.

A handwritten signature in blue ink that reads "Michael Deegan". The signature is written in a cursive style and is positioned over a light blue rectangular background.

Michael Deegan

Chairman



## SUMMARY

The purpose of this document is to set out a national policy position to support the adoption and initial implementation of more general use of quad axle groups in semi-trailer and B-double combinations, subject to appropriate safety, community and infrastructure considerations.

The policy has been developed taking into account:

- existing arrangements by some jurisdictions allowing the use of quad axle groups above existing mass limits;
- recent research to determine load equivalencies for quad axle groups, indicating appropriate quad axle group mass limits;
- Performance Based Standards and implementation processes;
- the need for jurisdictions to determine road access, taking account of pavement and bridge protection and community considerations;
- the Intelligent Access Program as a potential tool to enhance access compliance; and
- stakeholders' comments received on the November 2006 discussion paper.

The policy presents national maximum gross combination mass limits and axle group mass limits for quad axle semi-trailers and quad axle B-doubles. Operating conditions have been defined to account for safety, community and infrastructure considerations.

Initially, quad axle group combinations will need to be assessed to Performance Based Standards. To facilitate implementation at lower cost to industry, the NTC has developed a set of generic 'blueprint' Safer Management of Australian Road Transport (SMART) truck designs for quad axle semi-trailers and quad axle B-doubles to assist truck operators who wish to apply directly for state-based permits. Vehicle designs that differ from the blueprint vehicles will require approval through the governance framework for assessing Performance Based Standards applications.

It is intended that legislation for the generic designs, once proven on the road network, would be developed to create new prescriptive vehicle classes for ATC approval by mid 2008. The details of this approach will be developed through public consultation in the interim.

In order to meet the deadlines imposed by the Council of Australian Governments, pricing considerations for quad axle groups have not been able to be presented. It is intended that quad axle groups will be considered as part of the 2007 pricing determination, which will be completed by mid 2007.





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## **1. INTRODUCTION**

The Council of Australian Governments February 2006 communiqué outlines the need to permit more general use of quad axle groups in semi-trailer and B-double configurations. The driver of this reform is the increased mass benefits for heavy vehicles and the more efficient management of the national freight task.

The National Transport Commission (NTC) was required to submit a policy proposal for a vote by the Australian Transport Council (ATC) in December 2006 and implementation by July 2007. The Australian Transport Council approved the policy in March 2007.

The policy direction has been endorsed by the NTC's Performance Based Standards Policy Steering Committee<sup>1</sup>, Transport Agency Chief Executives (TACE) and ATC.

This policy has been developed recognising the following general considerations:

- existing arrangements by some jurisdictions allowing the use of quad axle groups;
- results of the recent research undertaken by ARRB Group for Queensland Main Roads and Queensland Transport to determine appropriate quad axle group mass limits for a typical pavement;
- Performance Based Standards and implementation processes;
- the Intelligent Access Program national implementation by Transport Certification Australia, or interim Intelligent Access Program approval procedures approved by some jurisdictions;
- existing Road Friendly Suspension certification requirements suitably adapted for quad axle groups, and the adoption of pending in-service Road Friendly Suspension performance standards when available;
- implementation using permit or notices under arrangements to be put in place by jurisdictions;
- proposals prepared for the NTC by ARRB Group for the development of quad axle group semi-trailers and B-doubles as blueprint vehicles in the Performance Based Standards 'Safer Management of Australian Road Transport' (SMART) project; and
- discussions with stakeholder peak bodies and their responses to the November 2006 discussion paper.

The carriage of heavy containers by semi-trailers has been a concern for many years. Current Mass and Loading Regulations set the General Mass Limit for a quad axle group to 20 tonnes (i.e. the same as for a triaxle group). However, permits of up to 27 tonnes for triaxle groups are available in some jurisdictions for the carriage of heavy containers.

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<sup>1</sup> The Performance Based Standards Policy Steering Committee consists of representatives of the following organisations: Queensland Department of Main Roads, Queensland Transport, Roads and Traffic Authority of New South Wales, Austroads (via Commissioner of Main Roads Western Australia), Department of Transport and Regional Services, Australian Trucking Association, Truck Industry Council, Australian Local Government Association, National Transport Commission.

With the growth in numbers of heavy containers, quad axle groups have been seen by some as a more efficient solution, provided that pavement and bridge impacts are managed.

In the case of semi-trailers, significant productivity benefits are expected to be derived from the use of quad axle groups on specific routes for high-mass commodity transport (for example as currently approved for certain existing intermodal container operations around Melbourne and Brisbane) as well as in mass-constrained long distance and interstate operations.

Quad axle semi-trailer combinations induce fewer 'Standard Axle Repetitions' on pavements than existing triaxle semi-trailer combinations. When increased payload capacity is taken into account, the effect on a 'per tonne' basis is further reduced through the use of a quad axle group.

Quad axle semi-trailers, with up to 27 tonnes on the quad axle group, have been operating successfully in Queensland for approximately four years in intermodal heavy container applications around the Brisbane metropolitan area and, more recently, in the Rockhampton area. These vehicles have operated without incident and have been well accepted by local councils where they have been permitted to operate. Quad axle semi-trailers are unlikely to replace triaxle semi-trailers in the majority of general freight operations because general freight is mostly volume-constrained.

In the case of B-doubles fitted with one or two quad axle groups, high-efficiency container transport is identified as being a major outcome of this policy. B-double combinations are able to be configured to carry the equivalent of two forty foot containers (i.e. four twenty foot equivalent units, or TEU). While the defined limits cannot accommodate maximum mass containers, industry has indicated that significant operating advantages are available under the policy. It is expected that these combinations will operate on a mass-constrained basis on a limited number of approved routes. This policy does not exclude quad axle B-double operation for other transport tasks including the use of higher quad axle mass limits by permit on specific routes, or in areas such as terminal precincts for container and general goods transport.

## **2. AXLE GROUP MASS LIMITS**

Research was undertaken by Queensland Main Roads and Queensland Transport on behalf of Austroads in March/April 2006 using ARRB Group to determine load equivalencies for quad axle groups for a representative pavement type. The testing procedure compared the pavement effect of triaxle groups and quad axle groups against that of a reference standard 8.2 tonne single axle to determine an equivalency for the standard axle group load and two proposed operational axle group mass limits for quad axle groups.

The ARRB Group testing determined the load equivalencies for the axle groups at the reference load, the General Mass Limit (GML) and the Higher Mass Limit (HML) for the representative pavement tested. Table 1 presents the findings from the research.

**Table 1. Load equivalencies for a common pavement type**

	<b>Single Axle Dual Tyres</b>	<b>Triaxle Group Dual Tyres</b>	<b>Quad Axle Group Dual Tyres</b>
Reference Load	8.2 tonnes	18.5 tonnes	22.5 tonnes
GML	9.0 tonnes	20.0 tonnes	24.0 tonnes
HML	NA	22.5 tonnes	27.0 tonnes

On the basis of the above research findings, the November 2006 discussion paper proposed the adoption of quad axle group mass limits of 24 tonnes and 27 tonnes respectively on road networks that are subsets of the general access and existing/future Higher Mass Limits networks, based on pavement and bridge assessments concerned with the increased effects associated with quad axle groups. Pavement and bridge assessments shall be performed in accordance with the requirements of jurisdictions.

The November 2006 discussion paper noted that it is unlikely that there will be widespread take-up of quad axle groups at 24 tonnes, because triaxle groups at Higher Mass Limits (22.5 tonnes) offer similar productivity when their reduced tare mass is taken into account. Twenty-four tonne quad axle groups were included in the November 2006 discussion paper because it was considered they may gain access to a marginal number of routes that are not open to Higher Mass Limits vehicles. However, the consultation process identified persuasive views that the likely level of take-up of quad axle groups at 24 tonnes would be low and indicated that the added complexity of including the additional network levels in the proposed regime would not be justified.

Quad axle mass limit 'A' (QML-A) as proposed in the November discussion paper has therefore not been included in this policy.

It should be recognised that the policy has the potential to encourage relatively high numbers of quad axles on certain routes (e.g. between ports and rail heads or for specific shuttle operations for high density commodities). This may result in increased structural fatigue effects on structures along those routes. It is therefore critical that new routes of strategic importance to the freight task are opened up to quad axle operations under the national policy through a process of assessment, upgrading (if required) and gazetting/mapping of routes.

### 3. QUAD AXLE SEMI-TRAILERS

The national maximum gross combination mass limits for quad axle semi-trailers is 50 tonnes<sup>2</sup>. Maximum axle group loads are:

- steer axle – 6 tonnes (6.5 tonnes pursuant to steer axle mass provisions of the safety and productivity package);
- tandem drive axle group – 17 tonnes; and
- quad axle group – 27 tonnes.

Quad axle semi-trailers shall be subject to the operating conditions listed in Section 3.1.

ARRB Group has conducted an assessment of a proposed quad axle semi-trailer design with a view to introducing the configuration as a blueprint vehicle under the Performance Based Standards 'SMART' heavy vehicle scheme.

Attachment A contains a draft layout drawing of the proposed vehicle. The level of detailed specification of the blueprint vehicle, including the acceptable range of axle spacing variations and other design details, were subject to final recommendation by the Performance Based Standards Interim Review Panel. These details can be obtained from the National Transport Commission.

#### 3.1 Operating conditions for quad axle semi-trailers

- (a) The vehicle must meet the Level 1 safety-related Performance Based Standards, or comply with the Interim Review Panel approved blueprint specifications.
- (b) The vehicle must meet the infrastructure-related Performance Based Standards except for Pavement Vertical Loading and Bridge Loading.
- (c) Axle loads, aggregate trailer mass and gross combination mass must be within the manufacturers' ratings.
- (d) Quad axle groups must be fitted with a certified Road Friendly Suspension if they are to be operated at more than 20 tonnes. Certification of Road Friendly Suspensions used in quad axle groups shall be undertaken using the Vehicle Standards Bulletin 11 certification procedures at a quad axle group load of 27 tonnes  $\pm$  5% or a single axle load of 6.75 tonnes  $\pm$  5%.
- (e) All axles in the quad axle group must be fitted with dual tyres.
- (f) The effectiveness of the load sharing system of the quad axle group during travel over typical surface profile irregularities must be no worse than that of an acceptable triaxle group.
- (g) If the quad axle group is fitted with a retractable axle, the retractable axle must operate in accordance with Australian Design Rule (ADR) 43/04, *Vehicle configuration and dimensions*, Section 9, with a prescribed transition mass (from three to four axles) of 15 tonnes.

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<sup>2</sup> The maximum gross combination mass limit for vehicles which qualify for the additional 0.5 tonne steer axle mass under the package recently approved by ATC to accelerate the delivery of safety, environment and productivity improvements for heavy vehicles is subject to the corresponding gross mass limit increase when the increased steer axle limit is implemented.

- (h) The quad axle group must be fitted with either:
1. a steerable rear axle with no less than  $\pm 12$  degrees of steering articulation and an effective automatic centring mechanism; or
  2. another system that is acceptable to the registration authority as proven to be effective in mitigating road scrubbing impacts.
- (i) Access shall be provided for semi-trailers with quad axle group mass up to 27 tonnes and gross combination mass up to 50 tonnes (see footnote 2) on routes determined by the road agency.
- (j) Vehicle operators will be required to gain approval for access to local government roads.
- (k) Compliance with the Intelligent Access Program is not an operating condition. The jurisdiction *may* require that vehicle tracking is installed on quad axle vehicles in compliance with all Intelligent Access Program requirements (or be party to an interim tri-partite agreement with the jurisdiction and a third party tracking service provider) to ensure compliance with route access conditions.
- (l) The vehicle must be subject to National Heavy Vehicle Accreditation Scheme or equivalent mass management and maintenance management accreditation to ensure compliance with axle group mass limits and continued effective function of the quad axle group suspension and steering systems.

#### **4. QUAD AXLE B-DOUBLES**

The national maximum gross combination mass limits for quad axle B-doubles are:

- 72.5 tonnes (or 73.0 tonnes – refer to footnote 2) if one quad axle group is fitted; and
- 77.0 tonnes (or 77.5 tonnes – refer to footnote 2) if two quad axle groups are fitted.

Maximum axle group loads are:

- steer axle – 6 tonnes (6.5 tonnes pursuant to steer axle mass provisions - refer to footnote 2);
- tandem drive axle group – 17 tonnes;
- triaxle group – 22.5 tonnes; and
- quad axle group – or 27 tonnes.

Quad axle B-doubles shall be subject to the operating conditions listed in Section 4.1.

ARRB Group has conducted assessments of proposed quad axle B-double designs with a view to introducing the configurations as blueprint vehicles under the Performance Based Standards heavy vehicle scheme.

Attachment B contains draft layout drawings of the proposed vehicles. The level of detailed specification of the blueprint vehicles, including the acceptable range of axle spacing variations and other design details, were subject to final recommendation by the

Performance Based Standards Interim Review Panel. These details can be obtained from the National Transport Commission.

#### 4.1 Operating conditions for quad axle B-doubles

- (a) The vehicle must meet either the Level 2 or Level 3 safety-related Performance Based Standards (see Clause (i) below), and shall operate only on routes approved at the corresponding Performance Based Standards access level.
- (b) The vehicle must meet the infrastructure-related Performance Based Standards except for Pavement Vertical Loading and Bridge Loading.
- (c) Axle loads, aggregate trailer mass and gross combination mass must be within the manufacturers' ratings.
- (d) Quad axle groups must be fitted with a certified Road Friendly Suspension if they are to be operated at more than 20 tonnes. Certification of Road Friendly Suspensions used in quad axle groups shall be undertaken using the Vehicle Standards Bulletin 11 certification procedures at a quad axle group load of 27 tonnes  $\pm$  5% or a single axle load of 6.75 tonnes  $\pm$  5%.
- (e) All axles in a quad axle group must be fitted with dual tyres.
- (f) The effectiveness of the load sharing system of the quad axle group during travel over typical surface profile irregularities must be no worse than that of an acceptable triaxle group.
- (g) If a quad axle group is fitted with a retractable axle, the retractable axle must operate in accordance with Australian Design Rule (ADR) 43/04, *Vehicle configuration and dimensions*, Section 9, with a prescribed transition mass (from three to four axles) of 15 tonnes.
- (h) A quad axle group must be fitted with either:
  1. a steerable rear axle with no less than  $\pm$ 12 degrees of steering articulation and an effective automatic centring mechanism; or
  2. another system that is acceptable to the registration authority as proven to be effective in mitigating road scrubbing impacts.
- (i) Access:
  1. For B-doubles with one quad axle group, routes shall be provided with access classification equivalent to the level of performance demonstrated in Clause (a) for quad axle group mass up to 27 tonnes and gross combination mass up to 72.5 tonnes (or 73.0 tonnes – refer to footnote 2).
  2. For B-doubles with two quad axle groups, routes shall be provided with access classification equivalent to the level of performance demonstrated in Clause (a) for quad axle group mass up to 27 tonnes and gross combination mass up to 77 tonnes (or 77.5 tonnes – refer to footnote 2).
- (j) Vehicle operators will be required to gain approval for access to local government roads.
- (k) Compliance with the Intelligent Access Program is not an operating condition. The jurisdiction *may* require that vehicle tracking is installed on quad axle vehicles in compliance with all Intelligent Access Program requirements (or be party to an



interim tri-partite agreement with the jurisdiction and a third party tracking service provider) to ensure compliance with route access conditions.

- (1) The vehicle must be subject to National Heavy Vehicle Accreditation Scheme or equivalent mass management and maintenance management accreditation to ensure compliance with axle group mass limits and continued effective function of the quad axle group suspension and steering systems.

## **5. ACCESS AND MONITORING**

Quad axle semi-trailers and B-doubles are heavier and, in the case of B-doubles, larger than vehicles currently allowed by jurisdictions on approved routes. Limited approval has been given to similar vehicles after detailed route evaluation, community consultation and vehicle performance approval, as well as ongoing monitoring of compliance and safety outcomes.

It was noted in the November 2006 discussion paper that jurisdictions currently provide network access for 49.5 tonne low loaders with quad axle groups of 27 tonnes or more under permit arrangements for heavy indivisible loads. However, it was noted in the consultation that low loader access is generally determined on the basis that any additional community and safety impact is minimal because such loads are relatively infrequent, practical alternatives are not available, and additional operating conditions are specified as necessary. Axle loadings considered acceptable for infrastructure on low loader routes may not be acceptable for the potentially higher numbers of vehicles with quad axles on proposed quad axle semi-trailer and B-double routes. While jurisdictions may take account of existing low loader routes when assessing routes for suitability for quad axle combinations, the functional differences between quad axle low loaders and quad axle semi-trailers and B-doubles are such that jurisdictions may determine that different networks are required.

Jurisdictions have indicated that they are expected to demonstrate a high level of accountability and the ability to provide safety assurance to communities when providing access for quad axle vehicles. The NTC will, with the assistance of road agencies, monitor the issuing of state-based permits and the operation of quad axle groups with respect to the safety and productivity outcomes during the first 12 months of operation and provide a report to ATC in mid 2008 on any issues arising.

## **6. IMPLEMENTATION**

For the reasons discussed above, this policy shall be implemented using permit or notice approval powers and procedures that already exist in road agencies legislation, supported by intelligent access (if required by the jurisdiction) and existing Performance Based Standards vehicle assessment procedures. These arrangements provide for local government sign-off for new routes and enable sensitive infrastructure to be evaluated according to the jurisdiction's requirements taking account of cost and community impacts.

The NTC has developed generic 'blueprint' SMART truck designs for quad axle semi-trailers and quad axle B-doubles to assist truck operators who wish to apply directly for state-based permits. Indicative blueprint configurations are shown in Attachments A and B. The blueprint vehicle designs were subject to further discussion with industry to confirm their functionality and formal determination by the Performance Based Standards Interim

Review Panel that they meet the performance requirements. Vehicle designs that differ from approved blueprint vehicles will require Performance Based Standards compliance approval through the governance framework for assessing Performance Based Standards applications.

It is intended that model legislation to replace the approach recommended in this policy will be prepared by mid 2008 on the basis of monitoring quad axle vehicle operations during the first 12 months, and the emerging research in the areas of pavement vertical loading, pavement horizontal loading, bridge loading and tyre technology.

The classification and mapping of the quad axle vehicle networks in each jurisdiction could not be completed in time for implementation commencing on approval of this policy. Jurisdictions are encouraged to classify in the immediate future at least a strategic network, taking into account key freight system elements such as ports, rail heads and major freight corridors, with a view to expanding the network over time as industry seeks wider access.

## 7. CONSULTATION

The November 2006 discussion paper was developed on the basis of endorsement in-principle by the NTC's Performance Based Standards Policy Steering Committee<sup>3</sup>, Transport Agency Chief Executives (TACE) and ATC, and detailed discussion at officer level with jurisdictions and industry peak bodies. The discussion paper was issued in November 2006, together with a news release by the NTC's Chief Executive Officer, for public comment.

Formal comment on the discussion paper was received from the following organisations and individuals, and informal comment was received from officers of various organisations:

- ACT Government Territory and Municipal Services
- Australia Trucking Association
- Commonwealth Department of Transport and Regional Services (DoTaRS)
- New South Wales Roads and Traffic Authority (NSW RTA)
- New South Wales Ministry of Transport
- New Zealand Ministry of Transport
- Northern Territory Department of Planning and Infrastructure
- Queensland Transport
- Queensland Main Roads
- Department for Transport, Energy and Infrastructure, South Australia

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<sup>3</sup> The Performance Based Standards Policy Steering Committee consists of representatives of the following organisations: Queensland Department of Main Roads, Queensland Transport, Roads and Traffic Authority of New South Wales, Austroads (via Commissioner of Main Roads Western Australia), Department of Transport and Regional Services, Australian Trucking Association, Truck Industry Council, Australian Local Government Association, National Transport Commission.

- Truck Industry Council
- VicRoads
- Western Australia Department of Main Roads
- Western Australia Department for Planning and Infrastructure
- Dr Philip Laird, University of Wollongong
- Dr Arnold G McLean, University of Wollongong

The responses from the above organisations and individuals are summarised in the table in Attachment C, together with NTC comment.

As a result of the comments received on the November 2006 discussion paper, this policy was amended as indicated in Attachment C.

## **8. CONCLUSION**

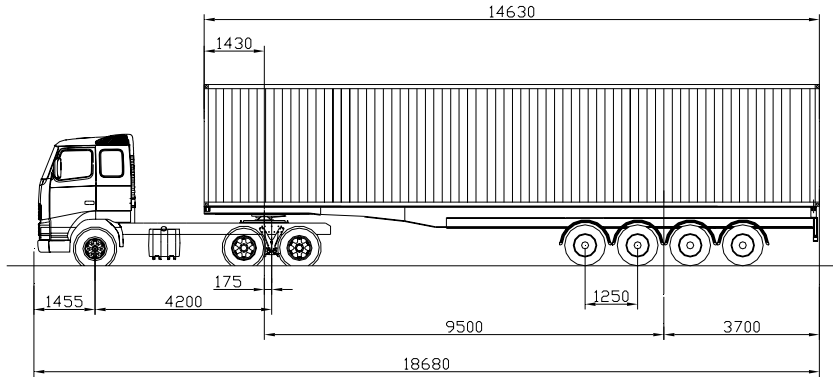
This policy enables the adoption of more general use of quad axle groups in semi-trailers and B-doubles from July 2007 as required by Council of Australian Governments February 2006 communiqué.

It is intended that legislation for the generic vehicle designs, once proven on the road network, would be developed to create new prescriptive vehicle classes by the end of 2008. The details of this approach will be developed through public consultation in the interim.

In order to meet the deadlines imposed by the Council of Australian Governments, pricing considerations for quad axle groups have not been able to be presented. It is intended that quad axle groups will be considered as part of the 2007 pricing determination, which will be completed by mid 2007.

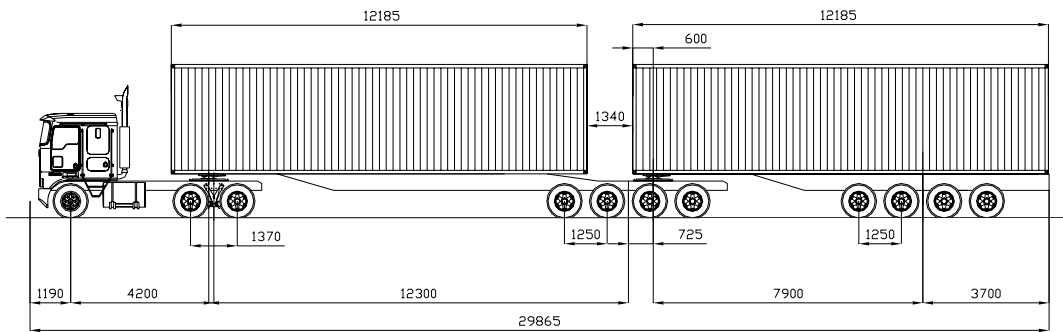
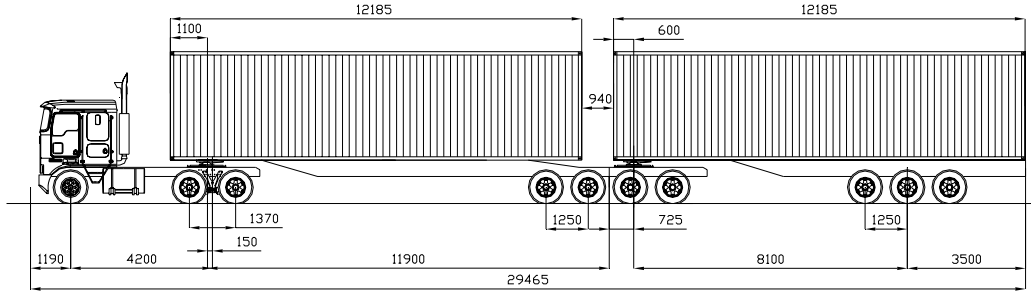


### ATTACHMENT A: DRAFT PROPOSED BLUEPRINT QUAD AXLE SEMI-TRAILER





**ATTACHMENT B: DRAFT PROPOSED BLUEPRINT QUAD AXLE B-DOUBLES**







### ATTACHMENT C: SUMMARY OF COMMENTS RECEIVED ON THE NOVEMBER 2006 DISCUSSION PAPER

Respondents	Summary of comments	NTC Response and action taken
<p><b>ACT Government Territory and Municipal Services</b></p>	<p>Route assessment with respect to pavements, bridges and community issues will be required for all quad axle routes in ACT.</p> <p>ACT would be required to issue an exemption notice because the ACT legislation does not provide for the use of permits under the proposal.</p>	<p>The proposal provides for such route assessments.</p> <p>Road agencies are expected to use the approval processes which they have available.</p>
<p><b>Commonwealth Department of Transport and Regional Services</b></p>	<p>No specific concerns.</p> <p>In-principle support for 24 tonne and 27 tonne for GML and HML.</p> <p>Grave concerns in relation to the detailed dimensions given in attachments A and B.</p>	<p>Proposal has been amended to remove 24 tonne option.</p> <p>The proposal has clarified that at this stage the blueprint vehicles are indicative, and are subject to consultation with respect to operational utility, confirmation of PBS compliance and specification of maximum and minimum dimensional limits prior to approval by the Interim Review Panel.</p>
<p><b>Roads and Traffic Authority New South Wales</b></p>	<p>Strongly welcomes national focus on this issue, and State arrangements are well progressed in NSW.</p> <p>NTC proposals are insufficiently developed in some areas and are not yet supported.</p> <p>Strongly opposed to the suggestion that existing low loader routes could form the basis of quad semi-trailer and quad B-double networks. Access determination is the role of jurisdictions and a wide range of issues are considered in doing so.</p> <p>A set of generic axle spacing rules are required to support bridge assessment across State borders; a bridge formula is proposed.</p> <p>The blueprint vehicles proposed in the discussion paper would require reduced axle loads under proposed RTA bridge formula.</p>	<p>Issues presented in the November 2006 discussion paper have been amended and clarified.</p> <p>Agree access to be determined by jurisdictions and may differ from low loader access arrangements, due to different functional route hierarchy requirements. Proposal will enable road agencies to determine quad axle routes according to functional and infrastructure requirements. Also see ATA comments (below) and the NTC response.</p> <p>Bridge assessment will be undertaken according to existing road agency requirements for bridge assessment. Proposals for the Performance Based Standards bridge protection measure may include a bridge formula as proposed by the RTA. The NTC will consider specific axle spacing requirements when the blueprint quad axle vehicles are finalised, and will consult on the RTA's proposed formula during this process.</p>

Respondents	Summary of comments	NTC Response and action taken
	<p>NSW adopts rigorous compliance measures for 19m semi-trailers on HML routes above 43.5t and on B-doubles above 64.5t and will not accept lesser compliance measures of vehicles operating above these thresholds.</p> <p>The ARRB Group study which supports the proposed quad axle group limits has not been made available to TACE/SCOT, involves near-static tests of empirical load equivalents, and makes no conclusions regarding load sharing performance and is poor research on which to base policy reform.</p> <p>The proposal lacks an evaluation framework and pricing policy. A comparative trial of load sharing arrangements is proposed. In-service safety performance needs to be monitored.</p> <p>Any pricing proposals delivered in 2007 should be interim and revisited after a robust empirical evaluation.</p> <p>Access approvals should sunset on 1 July 2008 if pricing issues have not been addressed.</p> <p>The 24 tonne axle mass limit (QML-A) should be dropped, because the marginal advantage of including this option does not justify the complexity.</p> <p>Not clear whether 27 tonne quad group is sufficient to meet industry need to carry fully loaded containers.</p> <p>The load sharing performance of quad groups should be objectively demonstrated via type testing. With regard to load-sharing coefficients, dynamic load coefficients and dynamic pavement wear factors.</p> <p>Lift axle transition load should be 15 tonnes, not 20 tonnes as proposed.</p>	<p>Noted.</p> <p>NTC has used advance release of results from part of a larger ongoing Austroads study conducted with road agencies in order to meet the COAG timeframe. The results are consistent with theoretical predictions and are considered robust, consistent with best research practice and exceed the amount and quality of information previously available in Australia or internationally.</p> <p>NTC will seek jurisdiction feedback on in-service issues during the proposed regulation amendment process.</p> <p>Road pricing issues are noted, and will be addressed by the appropriate NTC road pricing projects. Infrastructure and external costs should be considered by road agencies in determining quad axle access.</p> <p>The NTC agrees that the additional mass and access available under QML-A for 24 tonne quad axle groups would be marginal compared to existing HML B-double (tri axle group) access. Taking account of additional tare mass and compliance costs and additional complexity, the proposal is amended to delete this option.</p> <p>This proposal does not propose that the recently established load equivalencies for a quad axle group should be exceeded under national policy. The proposal does not provide for two fully loaded 40 foot containers to be carried by a B-double. Jurisdictions may continue existing local permit operations of substantially heavier quad axle group combinations which can carry massed-out 40 foot containers. These arrangements are able to meet industry requirements.</p>

Respondents	Summary of comments	NTC Response and action taken
	<p>Locking behaviours should be specified for steerable axles.</p> <p>There is no national provision to determine ‘satisfactory alternative’ to steering axle performance pending completion of the PBS horizontal pavement loading measure.</p> <p>Higher gross mass may increase stopping distance under braking, which could be an issue in heavily trafficked urban environments.</p> <p>Braking performance of steerable axles need to be expressly considered.</p> <p>Advance braking technologies and speed limiting and reporting should be mandated.</p> <p>An evaluation framework should include consideration of safety outcomes achieved.</p> <p>Provision is required for the new FUPS-Cab strength- Euro IV steer axle mass increase of 0.5 tonne.</p> <p>A ride quality standard based on British Standard 6841 should be imposed.</p> <p>The suggested blue-print vehicles could allow short prime movers, and a kingpin-to-rear minimum length limit might be required.</p>	<p>Manufacturers provide various methods to ensure satisfactory high speed and reversing performance of steerable axles. No safety risk has been identified with the inclusion of up to two steerable axles in a quad axle group.</p> <p>Pending the completion of current work by Austroads and the PBS horizontal pavement loading measure, the performance of alternative steering arrangements will be considered for approval by the authority registering the vehicle.</p> <p>Additional axles are required to be braked so quad axle combinations will have braking power proportional to the increased mass. ADR 38 is not specific to the number of axles in groups and quad axle vehicles must be ADR compliant. In Australia, heavy vehicle stopping distance issues tend to be associated with factors other than braking capacity. The proposed NTC braking strategy will address a range of braking issues (including proposed requirements for advanced technologies) across the fleet. Quad axle vehicles should introduce no braking issues that do not already apply to existing heavy vehicles.</p> <p>The policy contains proposals for evaluation of outcomes in preparation for the proposed legislation.</p> <p>The front axle mass and gross mass limits discussed in the paper will increase by 0.5 tonne for eligible vehicles when the safety package is implemented. The proposal has been clarified in this regard.</p> <p>This proposal is unable to develop a PBS ride quality standard. It is not known if adopting the BS 6814 vibration levels would achieve the expected outcomes or whether there could be contrary effects. The NTC propose to address this question in the PBS project.</p> <p>Wheelbase limits and a kingpin-to-rear dimension will be considered in finalising the PBS blueprint vehicles.</p>

Respondents	Summary of comments	NTC Response and action taken
	All quad axle semi-trailers and B-doubles (not just those with HML-equivalent loads) should be subject to jurisdictions requiring IAP as a condition of access as both an infrastructure and safety management issue.	The proposal provides that quad axle vehicles may be subject to IAP requirements determined by the road agency providing access. It is not proposed as a national requirement.
<b>New South Wales Ministry of Transport</b>	Refer to NSW RTA response.	
<b>New Zealand Ministry of Transport</b>	<p>NZ requires 2 steering axles capable of a 15 degree steering angle in quad groups.</p> <p>NZ previously required steering axles to effectively lock at speeds over 40km/h, but this is no longer a requirement. Industry is considering developing a code of best practice for the use of steering axles.</p>	<p>Noted.</p> <p>NZ officials have advise that no safety issues have been identified during extensive operation of quad axle semi-trailers with two steerable axles, at the NZ mass limits. Approximately 500 quad axle semi-trailers are used in line haul operations.</p>
<b>Queensland Transport and Queensland Main Roads</b>	<p>Most comfortable with the proposed policy direction.</p> <p>Access for the combinations proposed is still under evaluation, but T-44 bridge structures are likely to be capable of safely carrying quad axle B-doubles.</p> <p>Further policy review is sought after the blueprint vehicles are finalised.</p> <p>The regime proposed for quad axle semi-trailers (46.5 and 50 tonnes) is complex, and could be simplified to 50 tonnes on assessed routes, 45.5 tonnes on HML and 42.5 tonnes on general access.</p> <p>Worst case axle spacing requirements will be specified for quad axle semi-trailers.</p> <p>Revised wording suggested for 4.1 (j) in the November discussion paper.</p> <p>IAP will be a requirement for all quad axle semi-trailers and quad axle B-doubles.</p> <p>Railway level crossing stacking distance may be an issue for 29.5m blueprint vehicle.</p> <p>PBS L3 quad b-doubles will be limited to L3 routes (5a refers).</p>	<p>Access is to be determined by the road agency. The likely suitability of T44 bridges in Queensland is noted.</p> <p>Agreed – see response above regarding blueprint vehicles.</p> <p>Refer to NSW RTA comments – 24 tonne option has been removed from the proposal.</p> <p>Proposal allows jurisdictions to specify IAP technology as a condition for access approval.</p> <p>The length of blueprint vehicle is subject to finalisation. Level crossing issues will be considered by road agencies in determining access.</p> <p>The proposal requires PBS vehicle compliance at the PBS level of the approve quad axle routes.</p>

Respondents	Summary of comments	NTC Response and action taken
<p><b>Department for Transport, Energy and Infrastructure South Australia</b></p>	<p>Clarify impact of 0.5 tonnes safety package decision. Implies semi-trailer mass limit would be 50.5 tonnes not 50 tonnes.</p> <p>There are potentially 4 networks for access, not 2 as implied by the discussion paper.</p>	<p>The proposal clarifies that quad axle vehicle gross mass limits would increase by 0.5 tonne with the implementation of the safety package for eligible vehicles.</p> <p>The proposal for a 24 tonne quad axle network has been removed.</p>
<p><b>VicRoads</b></p>	<p>Bridges and culverts will require assessment on arterial and local roads.</p> <p>A net reduction in pavement and bridge wear is a requirement.</p> <p>Combinations exceeding 26m long will require DoI approval for railway level crossings.</p> <p>The low loader comparison is problematic for local roads.</p> <p>Access would be considered on a case by case basis.</p>	<p>Road agencies will determine quad axle vehicle access and will require appropriate assessment to be undertaken.</p> <p>Quad axle load equivalencies and the proposed mass limit are intended to ensure that pavement damage is not increased for the productivity increase available. Refer to the WA Main Roads comment.</p> <p>The length of blueprint vehicle is subject to finalisation. Level crossing issues will be considered by road agencies in determining access for quad axle vehicles.</p> <p>Low loader networks may be used to inform network determination by jurisdictions.</p> <p>Jurisdictions will determine quad axle access according to the operating conditions contained in the proposal, using their existing access approval arrangements.</p>
<p><b>Department for Planning and Infrastructure and Main Roads Western Australia</b></p>	<p>Little industry interest in quad groups because of other concessional loading arrangements.</p> <p>MR analysis shows the proposed quad axle limits would not cause any more pavement wear than currently allowed tri-axle groups i.e. 20t GML and 23.5t concessional loading in WA.</p> <p>Almost all WA bridges will cope with the proposed GML loading, subject to confirmation of the actual axle spacings.</p>	<p>Blueprint vehicles will have specified axle spacings. Other quad axle vehicles will require infrastructure and PBS assessment.</p>

Respondents	Summary of comments	NTC Response and action taken
	<p>HML 27 t will cause significantly higher bridge loading and will be restricted to proposed networks. Vehicles with one 27 t quad axle would be expected to allowed to travel on the network currently approved for import/export containers with 27 t tri axle groups. Any expansion of this network would be subject advance compliance assurance measures (IAP tracking).</p> <p>The blueprint vehicles use 14.6m trailers to achieve load distribution between the quad group and the tandem drive. This trailer length is not popular in WA operational reasons. 40 foot units should also be evaluated.</p> <p>Retracting an axle affects either the s-dimension or rear overhang compliance with ADR limits. Potential conflict between ADR limits and those achievable under PBS is still subject to resolution at national level.</p> <p>The blueprint B-double would be excluded from much of the network due to the overall length. It is also likely the lead trailer would be excluded from general access when run without the B trailer.</p> <p>PBS assessment should be conducted with the retractable axle retracted as well down, and the single trailer condition and unladen condition also needs to be evaluated for the blueprint vehicles.</p>	<p>The road agency determines access and operating conditions including IAP tracking if necessary.</p> <p>The blueprint vehicles are subject to review. It should be recognised that the draft proposed blueprint vehicle is also suitable for 40 foot containers.</p> <p>PBS performance levels appropriate to the network PBS access level must be achieved in all approved operating configurations including the worst case conditions (in accordance with existing PBS policy).</p> <p>Access for all quad axle vehicles is determined by the road agency, otherwise existing regulation limits and access arrangements apply.</p> <p>Under the rules for PBS vehicle assessment quad axle vehicles require PBS compliance in all operating conditions, including worst case loading.</p>
<p><b>Dr Philip Laird</b> <b>University of Wollongong</b></p>	<p>The number of trucks on roads will not necessarily reduce for the same freight task due to possible inroads into freight previously moved by rail or sea. This would result in more road fatalities, noise and air pollution.</p> <p>Questions whether there is too much emphasis on truck productivity as opposed to rail transport and overall land transport productivity. NTC appears to be emphasising truck productivity without seeking improvements elsewhere.</p> <p>Proposal should be deferred pending resolution of the 3<sup>rd</sup> determination of heavy vehicle charges. The ESA charge for special purpose vehicles should be increased.</p>	<p>Comment on the allocation of NTC resources have been noted for input to next round of the NTC's structured strategic planning process.</p> <p>This proposal is in response to a COAG directive which the NTC is required to comply with. The proposal cannot be deferred pending charges determinations.</p>

Respondents	Summary of comments	NTC Response and action taken
	<p>There should be more consideration of the safety outcomes.</p> <p>Several productivity road transport reforms have been implemented by the NTC without consideration to cost recovery. Further reforms should be placed on hold pending an actual improvement in road cost recovery from B-doubles and other trucks.</p> <p>NTC recommended to direct more resources to improving rail freight productivity.</p>	<p>Quad axle vehicles are required to meet all of the PBS safety performance measures, which require a higher level of safety performance than generally achieved by regulation vehicles. The proposal is intended to improve safety and productivity outcomes, while protecting infrastructure assets.</p> <p>The proposal notes pricing issues will be addressed in the NTC's pricing projects.</p>
<p><b>Dr Arnold McLean</b> <b>University of Wollongong</b></p>	<p>Roll over frequency will increase due to increased CoG height with sub-frame and ball race turntable systems, and torque frame rise. Low pressure in prime mover drive axle air springs due to torque rise may increase rollover risk. Quad axle subframe pitching requires provision of working clearances. Speed limits should be imposed.</p> <p>Sub-frame/turntable quad axles increase roll over risk. Testing has not been conducted.</p> <p>Increased torque demands may cause deviations in driveline geometry leading to vibrations and increased risk of system failures and increased driver fatigue.</p> <p>Quad groups demand the use of an additional turntable, with associated additional maintenance issues.</p>	<p>All PBS safety standards, which include Static Rollover Threshold, must be met under all loading conditions. Vehicles fitted with ball race and sub-frame systems must be PBS compliant.</p> <p>Sub-frame/turntable technology is likely to be used less frequently in quad systems than other steering systems, however, and PBS approval procedures provide for field testing and monitored operation when necessary.</p> <p>Approximately 500 quad axle semi-trailers are operating successfully in New Zealand. These exclusively use castoring axle systems rather than turntable and sub-frame based systems.</p> <p>Industry already has considerable experience with the design and operation vehicles in range of mass limits proposed. Quad axle vehicles will be required to participate in maintenance management scheme.</p> <p>Most quad groups do not use an additional turntable. All quad axle vehicles must participate in an approved maintenance assurance scheme.</p>

Respondents	Summary of comments	NTC Response and action taken
	<p>Steering linkages between quad axle sub-frames and turntables are crude and are subject to various engineering design, maintenance and operational problems.</p> <p>Quad axle turntables and related components require exacting levels of maintenance, and subframe lock-up speeds need to be determined.</p> <p>Tare mass will increase disproportionately.</p> <p>Highway speed quiver will increase.</p> <p>Locking of sub-frames at other than low speed causes certain adverse operational effects.</p> <p>Only limited testing has been undertaken and published. PBS testing and results should be public information.</p> <p>Quad axle groups exhibit inadequate dynamic load sharing performance.</p> <p>The vehicles proposed in the policy are not SMART. Ideally SMART trucks would be driverless.</p> <p>Existing heavy vehicle simulation is grossly deficient and, for example, fails to account for various time variant parameters.</p> <p>Vehicles with low speed steerable axles should not be introduced on the grounds of safety and infrastructure concerns. Other options for high productivity vehicles exist.</p>	<p>Please refer to the above responses.</p> <p>Please refer to the above responses.</p> <p>Low tare mass systems are available.</p> <p>Current quad axle operations in New Zealand, and vehicles approved in Australia to date, do not indicate this problem.</p> <p>Refer to above responses regarding the use of sub-frames.</p> <p>There is existing experience with quad axle group operations, and the proposed policy includes an implementation monitoring and reporting process. The PBS Interim Review Panel is required to operate under rigorous confidentiality requirements to protect the intellectual property rights of all parties.</p> <p>Quad axle groups will be required to meet all infrastructure protection requirements that satisfy road agencies.</p> <p>SMART is an acronym for Safer Management of Australian Road Transport.</p> <p>International peer review has confirmed the rules for PBS computer simulation modelling are state of the art. The PBS approval process also provides for field verification of performance and additional field testing if necessary.</p> <p>COAG requires the introduction of the more general use of quad axle groups in semi-trailers and B-doubles. This proposal provides safe and effective means to comply with the COAG requirement.</p>
<p><b>Australian Trucking Association</b></p>	<p>A 24 tonne limit on quad axles is a backward step from agreed national policy. Industry has no incentive to take-up this option compared to existing access for 22.5 tonne tri groups with fewer conditions.</p>	<p>The 24 tonne option has been removed from the proposal.</p>



Respondents	Summary of comments	NTC Response and action taken
	<p>Network access less than that currently provided of low-loaders at 49.5 tonne (at 27 tonnes on the trailer group) will fail to meet COAG's intentions. Benefits only really flow at 27 tonnes on quad axles with widespread network access, as provide now for low loaders.</p> <p>There are no safety impacts with quad groups at 27 tonnes in semi-trailer combinations, and community issues should be low.</p> <p>Higher quad axle masses should be available on a restricted access basis.</p> <p>Do not accept IAP linkage to this reform as IAP is not agreed national policy.</p> <p>The NTC discussion paper proposal is a backward step compared to access already allowed for certain vehicle. The NTC proposed axle spacing of 1.250 m is not appropriate.</p> <p>Some states already allow wider quad access at 27 tonnes than that proposed, without a steerable axle or road friendly suspension.</p> <p>Increased frequency concerns are addressed by the road friendly suspension and steerable axle provisions, and existing tri axle groups will not be replaced as most freight is volume constrained not mass constrained. Road wear effects of 27 quad groups in terms of equivalent standard axles are less than for other common axle groups.</p> <p>Access determined by local councils may lead to dis-uniformity.</p> <p>Quad axles have a determined charge and the Pay Go system will adjust that charge as use changes.</p>	<p>Quad axle networks must take account of infrastructure, safety and community issues. Low loader operations are considered to be sufficiently different in these respects from quad axle semi-trailer and B-double operations that different networks may be appropriate. Existing low loader networks may be used to inform jurisdictions' determination of quad axle networks.</p> <p>The proposal includes provision for this.</p> <p>IAP is not a mandatory condition. Jurisdictions require the ability to specify IAP technology to ensure access compliance when necessary.</p> <p>The blueprint vehicles shown in the discussion paper are subject to further development and final specification through consultation prior to Interim Review Panel approval.</p> <p>See earlier responses.</p>
<b>Northern Territory</b>	<p>Generally support the policy proposals.</p> <p>Pavement testing was limited to low speed – more work needed on dynamic impacts, remote highway pavement types and bridge effects of 27 tonne quad groups.</p>	<p>The information used to develop the proposal is the best available in Australia and internationally. PBS infrastructure standards are subject to further development.</p>

Respondents	Summary of comments	NTC Response and action taken
	<p>Quad groups could migrate to large multi combination and innovative vehicles. Research is required to access pavement and bridge impacts of these vehicles fitted with quad axle groups at 27 tonne.</p> <p>NT would also have to restrict quad axle routes on a seasonal basis, due to the ability of pavements to perform under wet conditions.</p> <p>Research and PBS standards which support the proposal are not applicable to large combination vehicles other than those proposed.</p> <p>Permit conditions for quad axle vehicles noted in the policy proposal are supported.</p>	<p>The proposal is limited to the conditional use of quad axle groups in semi-trailers and B-doubles.</p> <p>Jurisdictions may determine access subject to appropriate conditions.</p> <p>The proposal applies only to semi-trailers and B-doubles.</p>



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