

DRAFT LAND TRANSPORT RULE: VEHICLE DIMENSIONS AND MASS AMENDMENT [(NO. 2) 2009]

SUBMISSION TO THE RULES TEAM, NZ TRANSPORT AGENCY
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BACKGROUND TO IPENZ

The Institution of Professional Engineers New Zealand (IPENZ) is the lead national professional body representing the engineering profession in New Zealand. It has approximately 10,000 Members, including a cross-section from engineering students to practicing engineers to senior Members in positions of responsibility in business. IPENZ is non-aligned and seeks to contribute to the community in matters of national interest giving a learned view on important issues, independent of any commercial interest.

EXECUTIVE SUMMARY

IPENZ supports improving New Zealand's economic performance and productivity. IPENZ is unsure whether this Rule Amendment will achieve this end. The costs and benefits of this Rule Amendment need to be fully assessed. Without this analysis it is not possible to conclude that increased vehicle weights and dimensions will make a contribution to that goal.

It is our view that the analysis to date has been inadequate – particularly relating to damage to road pavements and bridges. This raises the issue of whether the Rule will comply with the requirements of the Land Transport Act 1998 – Section 164 (2)(ea) to assess the costs of implementation of the Rule.

We note that the material and research done to date are not publicly available. We are disappointed by this and consider that it should have been available for consideration by submitters.

This Rule Amendment will result in more loads over 44 tonnes, and on a wider roading network than is currently the case. This will result in increased pavement damage and shorter pavement lifespan. There are also many unknowns in assessing damage including the appropriateness of the fourth power law and the nature of many of New Zealand's pavements. Many bridges, particularly in rural areas, will require strengthening and the extent of this unknown.

There is concern with the “specified routes” proposals and if a large proportion of the network is specified we question the practicalities of specifying, assessing, and policing the use of these routes. We also suspect the claim in the Overview that the number of trips will decrease is incorrect as more freight may be diverted from rail transportation to road transportation. This may result in an overall increase in emissions, rather than a reduction.

Many of these costs will not be felt for some time and will fall not only on freight companies but also on other road users and ratepayers. There is no obvious mechanism for allocating the increased revenue from road user charges to the road controlling authorities who will incur the additional costs. Estimating future damage costs will be problematic for their financial planning processes. The proposed permit charging arrangements are inadequate to cover the costs of route assessment and the costs of pavement damage.

IPENZ also has considerable safety concerns with the potential for higher centres of mass increasing the risks of vehicle roll over. There are additional safety concerns with longer vehicles making some routes and intersections unsuitable, and increasing risks to pedestrians and cyclists.

Many of these issues can be analysed, assessed and addressed, but it is our view that this necessary work has not been undertaken and it is therefore inappropriate to adopt this Rule at this stage.

SUBMISSION

Proposals 1, 2 and 3

IPENZ generally supports Proposal 1, which would increase the maximum mass and certain dimension limits for vehicles operating up to 44 tonnes without the need for a permit as we are generally in favour of light-handed regulatory regimes.

We have considerable concerns with Proposal 2, which would provide for permits to be issued for standard-sized vehicles to operate above 44 tonnes and up to 53 tonnes. This is discussed at length below.

IPENZ is concerned with Proposal 3, which would enable the NZTA to issue permits for vehicles above and below 53 tonnes on specified routes assessed by the NZTA. It appears that this applies to both State Highways and to local roads. Clearly for accountability reasons it is inappropriate for the NZTA to issue permits for high productivity vehicles on roads they do not own – particularly as this will apply to a considerable proportion of the nation’s wider roading network, including many rural and unsealed roads. For the NZTA to issue permits for local roads raises liability issues – if there was a bridge failure, for example, would the NZTA be at least partially liable?

Our view is that this responsibility should remain with the relevant road controlling authority irrespective of the fact that clause 5.3 provides for the NZTA to obtain their written consent.

Compliance with the Land Transport Act 1998

This Rule is pursuant to the Land Transport Act 1998 – Section 164 (2)(ea). This section of the Act requires that the Minister must have regard to the cost of implementing the measures. It is our view that there has been insufficient analysis of the effects of the Amendment to this Rule and the cost of potential damage to pavements and bridges.

The Overview that accompanies the Rule states that “road controlling authorities will address the infrastructure issues in their submissions”. There is no doubt that road controlling authorities will express concerns about pavements, but it can’t be expected that local authorities’ concerns would consist of analysis, as is required by Section 164.

Therefore there is a real risk, based on the information available, that this Amendment to the Rule could be challenged in the courts if it passed without this analysis being undertaken.

Insufficient Evidence on Costs and Benefits

IPENZ is very concerned that the NZTA have initiated this consultation process with insufficient evidence to justify the Rule Amendment and thereby enable a quality submission process.

It has been noted that a press item says: “a spokesperson for Mr Joyce told the NBR that the costs of ongoing wear and tear is yet to be determined, but the benefits of the scheme are expected to far outweigh any additional maintenance costs”. This highlights our concerns.

IPENZ is aware of a report *Effect on Pavement Wear of Increased Mass Limits for Heavy Vehicles* – Land Transport New Zealand Research Report 281. While this has information and findings on different axle loads, it is not clear how this relates to the proposed Rule Amendments.

One of the findings in this Report was that increasing vehicle mass limits is likely to reduce the life of chip seal surfacing on New Zealand roads. It also indicates that the damage law exponent value (currently four) could increase for low-strength, low-volume roads.

It should also be noted that in reference to this report, IPENZ was very concerned to be advised that the Ministry of Transport have not made any conclusive decision as to what is the correct impact of heavy vehicles on pavements (personal correspondence, 2009).

The findings of this report need to be analysed in terms of the Rule Amendment, and the potential costs need to be assessed in economic terms to enable comparison with the economic benefits.

Regarding benefits, it is noted that the Ministry of Transport report *Review of the potential for increasing productivity through concessions on heavy vehicle mass and dimension characteristics* suggests that the Rule Amendment could have an overall positive effect on New Zealand’s gross domestic product of between \$250 and \$500 million per annum.

However, the Ministry of Transport has advised that this report contains commercially sensitive information from several companies and for this reason it cannot release detailed information from the trials. This is further cause for concern as there is insufficient information on costs and benefits in the public arena.

We are also aware that the South Island trials were very limited and did not consider pavement issues, including the quality of subgrades. IPENZ understands that this information is also commercially sensitive, but considers that access to this information would have assisted submitters to make more information submissions.

Concerns about Pavement Damage

The proposed change to the Rule provides for increases in the allowable mass of vehicles and IPENZ is concerned about the impact on road pavements and bridges. IPENZ's concern is the impact on all pavements – both State Highways and local roads, as integral parts of the nation's freight network. This Rule Amendment will result in more loads over 44 tonnes, and on a wider roading network than is currently the case. It understood that the extent of the load increases and wider network has not been assessed.

The proposal is to increase weight limits from 44 tonnes to 53 tonnes – an increase of 20 per cent. If we assume the damage to road pavements follows the fourth-power rule, and if axle loads are increased by 20 per cent, then the damage to road pavements by such a vehicle will increase 102 per cent – or double. This far outweighs the reduction in trips of 16 per cent.

Regarding the fourth-power rule a Member has advised that the common basis for pavement design in New Zealand (Austroads, 2004) puts the power law for mechanistic design of asphalt layers at five, design for rutting and shape loss at seven, and design for cemented layers at 12.

If these power laws are applied to pavements that include an asphalt layer (greater than 40 mm thickness of asphalt) or to pavements that include a cemented layer, then for a single-axle vehicle with dual tyres, the increase in pavement wear from each pass of an axle to the proposed limit compared to the current limit is:

- increase in wear for asphalt layers 42 per cent
- increase in wear for cemented layers 233 per cent.

In approximate terms, this suggests that for a pavement that would have a life of 20 years, the asphalt will crack after 12 years, while the same cemented layer will crack after only four years.

These power laws are empirical or apply to specific aspects of the pavement. Most of the road pavements in New Zealand include unbound basecourse. Research on the Canterbury Accelerated Pavement Testing Indoor Facility (CAPTIF) test track and using repeated load triaxial tests has shown that the sensitivity of basecourse to increased axle loads can vary widely, depending on the quality of the basecourse. Some basecourse may be relatively insensitive to increased axle loads, while other basecourse can be very sensitive.

The difficulty is in applying this research to New Zealand's roads. The CAPTIF research was quite limited in terms of basecourse properties and subgrade properties. Not enough is known about the quality of basecourse in many of New Zealand's existing roads. There are also other influences that are unable to be captured on the CAPTIF test track including the variable nature of New Zealand's topography and climate, which can have a profound effect on pavement lifespan.

Regarding bridges, we are aware that in the South Island trials it was concluded that most State Highway bridges have been designed with sufficient reserve strength to take the higher loads. Naturally this conclusion cannot be extended to the wider State Highway network or the local roading network.

Issues with Specified Routes

The proposal to allow increased loads on specified routes may not be practical. Every freight movement relies not only on the State Highway network, but for every origin and destination, trucks need to use local roads. With much more freedom of movement of larger trucks, how will it be practical to specify and assess a large number of routes, and how can it be guaranteed that trucks will use these routes?

We foresee the likelihood of truck drivers opting for the road less travelled, perhaps to avoid congestion, a slip or an accident site. Recognising that using these unauthorised routes would be illegal, we question what the monitoring regime might be and the costs of policing these routes.

Numbers of Vehicles

The Overview states that using bigger trucks will result in fewer vehicle movements based on the increased capacity of trucks. On the face of it this may seem true but is an oversimplification. Increased efficiency will enable competitive operators to reduce their costs and compete more fiercely with rail. IPENZ notes that if bigger trucks take freight from rail to road, then the number of road vehicle movements is likely to increase, not decrease. This may result in an increase in vehicle emissions.

Who Pays?

It is understood that the new regime will increase road user charges (RUC) for heavy vehicles but the costs of increased pavement wear will not just fall on heavy vehicles. Currently, freight vehicles contribute around 37 per cent of the government's revenue from road users (excluding vehicle registration fees) with fuel excise making up the remaining 63 per cent. Local government pays for half the costs of local roads – estimated at \$470 million in 2008/09. Therefore, increased road maintenance costs will fall not only on freight vehicles, but also increase the costs for fuel excise and rates.

By length, 88 per cent of roads in New Zealand are local roads and a third of New Zealand's roads are unsealed. There will be significant cost implications for local roads, unsealed roads and bridges as our growing agricultural and horticultural sectors increase rural freight.

IPENZ questions what mechanism will transfer the additional RUCs to territorial authorities. We also question how the additional revenue will align with the additional pavement wear. These questions raise the issue of introducing electronic RUCs and the widespread use of global positioning systems, with the associated back-office systems and costs. We question whether these costs have been taken into account in the implementation of the Rule.

As part of the proposal, territorial authorities will need to undertake route assessments. The Rule provides for the cost of these assessments to be recovered through the fee permit. However these fees are prescribed under regulation 7(1A) of the Heavy Motor Vehicle Regulations 1974 and these are set at a level that is inadequate to cover the costs of route assessments. It may also be feasible to use the permit fee to recover the costs of pavement damage, and this needs to be considered.

In addition, territorial authorities will have difficulty in predicting the future effects of the increased loads on assessed routes, both from the perspective of trying to predict future freight movements, but also in assessing the potential damage to their particular pavements. Therefore, they will have a great deal of difficulty in setting their maintenance and renewal

budgets. This is particularly so with the time horizon of 10 years of Long Term Council Community Plans. Territorial authorities will also need to face the costs of reviewing all their bridges and implement a strengthening programme where necessary.

Safety Concerns

The Overview states that longer vehicles will result in lower centres of mass, meaning they will be less likely to roll on corners or when overtaking. We understand that this comes from a rule change some years ago, in which logging trailers were permitted to be longer so logs could be stacked end-to-end, rather than on top of each other. For the same mass, this would lower the centre of mass.

However, for many loads the trucking companies would continue to load to the maximum permitted height, and so an increased length would not lower the centre of mass. In addition, many liquid tankers carry less than a full load and are constrained by the current Rule. This Amendment to the Rule will allow those tankers to be fuller – raising the centre of mass. This particularly applies to fuel, milk and wine tankers.

When a truck is driven along a curved path, the road exerts centripetal forces on the tyres at their contact points. These forces create a centripetal acceleration that exists even though the truck is moving at constant speed. The centre of mass, which is some distance above the road, tries to align itself with the centripetal force by rolling outwards, an action resisted by a greater upwards reaction on the outside wheels and a lesser reaction on the inside wheels, which may lift off the road. In the extreme case, the centre of mass will move beyond the outside wheels causing the truck to roll over. Static rollover test (SRT) is a parameter which denotes the centripetal acceleration, as a fraction of earth's gravitational acceleration, before all the weight is transferred to one side. The minimum permitted value of SRT is 0.35 g.

Some trucking companies set higher (safer) limits, and we note that ERMA's *Code of Practice for Flammable Gases and Oxygen Tank Wagons* and *Flammable Liquids Tank Wagon Code of Practice* both specify 0.45 g.

The SRT is usually determined by using a calculation procedure given in the existing Land Transport Rule 41001, and there is no present proposal to change it. Its effective impact is to limit the height of the load for a given length and gross vehicle mass (GVM).

The proposal is to increase the GVM without increasing length or width. For a homogenous load, the only way this can occur is to increase the height of the centre of mass. The increased height will reduce the SRT, thereby making it worse, but still above the lower limit.

At present, only trailers exceeding 10-tonne GVM and 2.8-metre overall height are certified for SRT and labelled accordingly. Trucks are not necessarily analysed for SRT and it does not appear on their Certificate of Loading.

IPENZ supports its technical interest group the Road Transport Certifying Engineers in recommending that in order to qualify for the increased mass limits **all** of the vehicles (trucks and trailers) must be certified for SRT and that the SRT limits be adjusted to gain the same or better fleet performance as at present. The present SRT calculator is not very effective in the case of tractor and semi-trailer combinations and chooses to ignore the front end of the semi-trailer and tractor. There has been much cost-benefit work done on SRT, and IPENZ recommends that this be reviewed.

There are additional safety concerns with longer vehicles having larger swept vehicle paths making some routes and intersections unsuitable, increasing risks to pedestrians and cycles. Increased mass also raises issues of more severe accidents and vehicle performance in wet or icy conditions.

SUPPORT FOR ROAD TRANSPORT CERTIFYING ENGINEERS SUBMISSION

Road Transport Certifying Engineers (RTCE) is a technical interest group of IPENZ. We fully support their submission which discusses the following issues in more detail.

- Brakes – heavier trucks will require better brakes, and the RTCE highlights the regulatory requirements.
- Load anchor points – heavier loads will require better load anchoring points and the RTCE has drawn our attention to the existence of a revised version of NZS 5444 *Load anchorage points for vehicles*.
- Headboards, sideboards, tailboards and body mountings – at present these parts do not require certification, but heavier loads are likely to require these parts to be more robust.
- Towing connections – the current Standard is NZS 5446:2007 *Heavy motor vehicle towing connections: drawbar trailers*. RTCE advises that this covers trailers up to 40,000 kg maximum towed mass and should therefore meet the proposed increases in gross combined mass (GCMs). RTCE suggest that the Heavy Vehicle Rule 31002 be updated to refer to NZS 5446:2007.
- King pin and fifth wheel certifications – the Heavy Vehicle Rule 31002, which will also cover High Productivity Motor Vehicles, requires king pins and fifth wheels to be certified to NZS 5450 and NZS 5451 respectively. RTCE notes that these Standards were written during the 39,000-kg era and so should not be considered appropriate for 53,000 kg.
- Chassis modifications – RTCE notes that the proposed GCM increase to 53,000 kg will require many existing vehicles to have their GVM ratings increased to be able to be used in a combination with the increased GCM ratings. The NZTA will not currently authorise the increase of a chassis rating unless the chassis is modified. RTCE advise that it is common practice to overdesign the chassis, and in many cases no chassis modification is needed to carry heavier loads.
- Lengths of simple trailers – an increase in the overall length of simple trailers to 12.5 metres should be considered in the modifications to Table 4.1.
- Under-run protection – the requirement for under-run protection be extended to vehicle combinations other than logging vehicles.
- Ratings of front steer axles – the rating for single-tyred axles should be increased to allow an extra class of higher rated single medium-tyred vehicles.

CONCLUSION

Many of the issues outlined in this submission can be analysed, assessed and addressed, but it is our view that this necessary work has not been undertaken to justify the adoption of this Rule Amendment at this stage.

Accordingly, we recommend that further consideration be given to the costs and benefits before this Rule Amendment progresses further.

IPENZ appreciates the opportunity to make this submission and is able to provide further clarification if required.

Tim Davin

Director – Policy

The Institution of Professional Engineers New Zealand