



AUSTRALIAN CAPITAL TERRITORY

SUBMISSION TO THE COMMONWEALTH GRANTS COMMISSION'S STAFF DISCUSSION PAPER 2007/24-S: *Assessing Roads Expenses in the 2010 Review*

August 2007



IEWS ON THE COMMISSION'S ASSESSMENT PROPOSALS

DEFICIENCIES WITH THE PROPOSED MODEL AND A WAY FORWARD

It is acknowledged that the current proposal to assess disabilities based on road length, road use and traffic management costs will capture most of the major determinants of providing road maintenance. However, the ACT considers the approach to be overly simplistic and that it is unlikely to achieve equalisation as currently framed, unless major changes are made reflecting the correct interaction between the disabilities.

This view is predicated on the basis that Commission staff are still required to address a range of complex conceptual issues, such as determining:

- the underpinning drivers, such as light or heavy vehicles, and their relative impact on the cost of providing road maintenance;
- what proportion of road maintenance expenditure relates to each of the cost and demand drivers?;
- what measures and data should be used to assess the pertinent factors?;
- how do these cost and demand drivers interact and how should they be combined?;
- how might double-counting be removed?; and
- how would any assessment be updated annually.

In regard to these issues, there are a number of problematic issues.

For example, the question of how to combine road length and road use (currently there is a weighting of 60% / 40% respectively) continues to remain and is a contentious issue.

Commission staff have also noted that traffic management costs (for example, the need for street lights, traffic lights, sign posts etc) should be assessed, however, it is still unclear as to whether these costs relate to load or non-load expenses.

Commission staff have also queried whether using road length twice as a measure of road length, and then again as a measure of road use, will result in double-counting?

These are just a few of the issues that need to be addressed if the roads assessment is to achieve equalisation.

As a way forward, independent and impartial evidence and analysis undertaken by an expert body is required to overcome these issues. Research undertaken by the ACT has revealed that the National Transport Commission (NTC) has already distilled the major cost and demand drivers underpinning State arterial road maintenance via the confines of determining and recommending to the Australian and State roads Ministers, the annual charges for heavy vehicles.

The NTC analysis and underpinning calculations for heavy vehicle charging captures and reflects the cost and demand drivers associated with State arterial roads maintenance and addresses all of the difficult issues identified above. It is rigorous and is based on considerable research in conjunction with a range of expert roads bodies. For example, the cost attribution parameter template used by the NTC has been derived from estimates developed by AustRoads and research by ARRB Group Ltd.

The NTC's outcomes demonstrate that 10.8% of road maintenance costs are attributable to road length, not 60% as currently used in the current roads assessment.

Additionally, for the costs relating to road use (totalling 89.2%), approximately 76% is attributable to light vehicles and 24% to heavy vehicles. These assessed costs and underpinning evidence are provided later in this submission.

The work of Commission staff regarding a more policy-neutral measure of rural road length (MapInfo based synthetic rural road length) and the work undertaken on road use (light and heavy vehicle weights) is still important as these disabilities are not measured by the NTC, although the framework to which they should be applied is provided.

In this context, the ACT thinking is that the work of Commission staff could be readily combined, and would complement, the NTC framework. Such an approach represents a progression of the work undertaken to date and allows the broad indicators developed by Commission Staff to be used. As such, the proposed model is still consistent with the simplified approach being adopted for the 2010 Review.

The ACT proposes that Commission staff use the NTC report as a way of developing a robust and reliable arterial roads assessment. Importantly, as the NTC report is Ministerially endorsed, the report is completed to the highest standards. It is also contemporary as we understand that it is updated annually.

Indeed, the possible use of the NTC report was flagged with Commission staff at a meeting in Canberra on 21 August 2007 in conjunction with Victoria. Commission staff welcomed both parties outlining their views on the NTC report in their roads submissions, and noted that they had perused various NTC reports and would revisit them as a result of the discussions.

The NTC's report, an explanation of its workings that are relevant to a roads assessment from the Commission's perspective, and a proposed model are provided in the following paragraphs.

THE NATIONAL TRANSPORT COMMISSION'S TECHNICAL REPORT

The NTC is the expert organisation in the field of road maintenance expenditure cost attribution analysis and submits policy and legislation recommendations to the Australian Transport Council of Federal, State and Territory Transport Ministers for approval.

The objective of the NTC's *The Third Heavy Vehicle Roads Pricing Determination: Technical Report* October 2005 provided at **Attachment A** (referred to as the *Technical Report* from this point onwards) is to substantiate the impact of heavy vehicles on road maintenance costs relative to light and passenger vehicles, and recommend a heavy vehicle pricing determination that is supported and signed off by roads Ministers of all jurisdictions.

The *Technical Report's* recommendations and underlying analysis are subject to critical review by a number of independent agencies, such as the Productivity Commission, and as such should be considered the pre-eminent source of reference on the issue of road maintenance expenditure cost and demand drivers; .

The NTC *Technical Report*:

- largely addresses most of the current issues facing the Commission. Namely, the most problematic issues of what drives arterial road maintenance expenditure; how the underlying drivers interact and relate to each other; and their relative importance; and

- highlights the following underlying road maintenance costs factors, and their drivers:
 - road length - driven by length, age and the physical environment;
 - road use - driven by all vehicles, but particularly heavy vehicles; and
 - traffic volume – driven by all vehicles, but particularly passenger vehicles.

OVERVIEW AND EXPLANATION OF THE TECHNICAL REPORT IN THE CONTEXT OF DEVELOPING A STATE ARTERIAL ROADS ASSESSMENT

Background

The NTC is currently undertaking its *Third Heavy Vehicle Road Pricing Determination* which has Terms of Reference to:

“... [recommend] national heavy vehicle charges to recover costs of heavy vehicle road use,... [subject to] a set of Road Use Pricing Principles (approved by ATC in August 2004). The Pricing Principles are:

National heavy vehicle road use prices should promote optimal use of infrastructure, vehicles and transport modes. This is subject to the following:

- *full recovery of allocated infrastructure costs while minimising both the over and under recovery from any class of vehicle; and*
- *the need to have regard to other pricing applications such as light vehicle charges, tolling and congestion.”*¹

Given the aim of determining the proportion of arterial road costs which are driven by heavy vehicles, the NTC’s analysis categorises the road maintenance costs that are attributable to heavy vehicles, light vehicles, and those generally incurred by road users, regardless of vehicle weight and type. The NTC is also required to determine the proportion of road maintenance costs that are attributable to non road-use factors.

The report disaggregates the differing drivers of road maintenance costs into three components:

- costs related to road length which can be viewed as the fixed or capital related costs of arterial roads, namely those costs which would be incurred irrespective of road usage, and are driven by length, age and the physical environment. These costs are referred to in the report as non-attributable costs;
- costs related to the weight and volume of traffic, such as pavement degradation. These expenditures are found to be related to the weight and volume of vehicles using the road and are referred to as attributable costs; and
- costs related to the volume of traffic, such as road safety and traffic management costs, which are not affected by the weight of the vehicles using the road – also called attributable costs.

¹ National Transport Commission, 2005, *Third Heavy Vehicle Road Pricing Determination: Technical Report*, Page 1.

NTC Road Maintenance Expenditure Categories

Not unlike the Commission's own processes, in order to determine the cost drivers of differing expenditure categories, the report provides a breakdown of expenditure by broad category. The following table demonstrates how the NTC has broken down total road expenditure into individual expenditure categories.

NATIONAL TRANSPORT COMMISSION ARTERIAL ROAD EXPENDITURE ESTIMATES

Expenditure Category	Current ¹	Second Determination ²		Change ³	
	(\$million 05/06)	(\$million 97/98)	(\$million 05/06)	Real (per cent)	Nominal (per cent)
A Servicing & Operating Expenses	629	303	399	58	108
B Road Pavement & Shoulder Maintenance					
B1. Routine Maintenance	400	260	341	17	54
B2. Periodic Maintenance of Sealed Roads	285	244	321	-11	17
C Bridge Maintenance & Rehabilitation	152	95	126	21	60
D Road Rehabilitation	465	505	665	-30	-8
E Low Cost Safety / Traffic Improvements	290	196	257	13	48
F Asset Extension / Improvements					
F1. Pavement Components	936	553	727	29	69
F2. Bridges	286	242	318	-10	18
F3. Land Acquisition, Earthworks, Other Extension / Improvement Expenditure	1536	1052	1384	11	46
G Other Miscellaneous Activities					
G1. Corporate Services	226	175	229	-1	29
G2. Enforcement of Heavy Vehicle Regulations	93	74	97	-5	26
G3. Vehicle Registration	313	191	252	24	64
G4. Driver Licensing	193	158	207	-7	22
G5. Loan Interest	157	162	213	-26	-3
Total	5961	4210	5536	8	42
Total allocated to vehicle use⁴	5206	3625	4767	9	44

1. Average of 2002/03, 2003/04, and 2004/05 (budget) expenditure in 2005/06 prices.

2. Average of 1994/95, 1995-96 and 1997/98 (budget) – in 1997/98 prices (used to calculate Second Determination charges), and in 2005/06 prices (based on RCMPI) for comparison with current.

3. Percentage change in current estimates compared to previous estimates.

4. Total allocated to vehicle use does not include G3, G4, and G5. In the Second Determination G2 was also excluded from the cost allocation.

Note: Figures may not add to totals due to rounding.

August 2005. *Third Heavy Vehicle Road Pricing Determination: Technical Report*, Table 5, page 16.

These expenditure figures used by the NTC are generally comparable to those used by the Commission in the 2007 Update (noting that marginal differences result due to the above figures being based on a three year average in 2005-06 prices).

Given the focus of the roads assessment is on maintenance, rather than capital expenditure, a number of the expenditure categories in the above table can be disregarded for the Commission's purposes. Such categories include:

- road rehabilitation (D). For the 2004 Review the Commission decided to include depreciation expenses on roads within the equalisation budget and allocate it to the roads category. As such, road rehabilitation expenses (the National Road Transport

Commission's 'Category D' expenditure) were removed from the equalisation budget to avoid double counting;²

- asset extensions / improvements (F). These expenses are related to increasing the size and capacity of the road network and are capital in nature, and as such, should be removed from the consideration of the roads assessment which is seeking to equalise the recurrent roads maintenance task across jurisdictions; and
- other miscellaneous activities (G). Activities within this category include the enforcement of road rules, and the collection of registration/licensing revenues. As these expenses are related to mainly revenue raising activities, and areas of expenditure which are likely to be captured in the 'law and order' category, they should not be considered in the roads assessment as they are already equalised elsewhere.

The following table provides an extract of the applicable expenses that should be included within the Commission's arterial roads assessment premised on the NTC Report.³

NATIONAL TRANSPORT COMMISSION ARTERIAL ROAD EXPENDITURES OF INTEREST TO THE ROADS MAINTENANCE EQUALISATION TASK

Expenditure Category	Expenditure (Australia)	
	\$m	%
A. Servicing & Operating Expenses	629	35.8%
B. Road Pavement & Shoulder Maintenance		
B1. Routine Maintenance	400	22.8%
B2. Periodic Maintenance	285	16.2%
C. Bridge Maintenance and Rehabilitation	152	8.7%
E. Low Costs Safety / Traffic Improvements	290	16.5%
Total	1,756	100.0%

Source: National Transport Commission, 2005, *Third Heavy Vehicle Road Pricing Determination: Technical Report*.

Attributing Road Maintenance Costs to Disabilities

The NTC *Technical Report* provides an analysis of the cost / demand drivers affecting each of the above expenditure categories. In the case of 'road pavement and shoulder maintenance' expenses, for example, cost attribution analysis provides the proportion of expenses related to road use by heavy vehicles (relative to passenger vehicles). That is, what proportion of expenditure is related to vehicle volumes and weight, relative to the costs of maintaining a road in the absence of road use.

Such analysis complements the Commission's processes which are seeking to determine the relative proportion of costs which can be attributed to road use versus road length.

² Commonwealth Grants Commission, 2004 Review Working Papers, Volume 5, Roads assessment, page 128.

³ Extract from Table 5 of the *Third Heavy Vehicle Road Pricing Determination: Technical Report*. Figures are averages of 2002/03, 2003/04 and 2004/05 (budget expenditure in 205/06 prices). Those costs related to capital expenditure have been excluded.

Adding to this, the report highlights that the cost impact of traffic volumes (irrespective of vehicle weight) contributes an important part to road maintenance costs. A number of States, such as the ACT, consider that the current methodology and the discussion paper understates the impact of traffic volumes (urbanisation) on the size of the roads maintenance task. This view is supported by the work conducted by the NTC.

The *Technical Report* notes that a significant component of road maintenance expenditure relates to the volume of traffic (all vehicles), which the NTC classifies as non-pavement costs:

“ Much of the debate surrounding the impact of vehicles on roads relates to pavement wear or damage from heavy vehicles. However, a considerable amount of road expenditure is invested on other forms of road work, that is, non pavement costs.

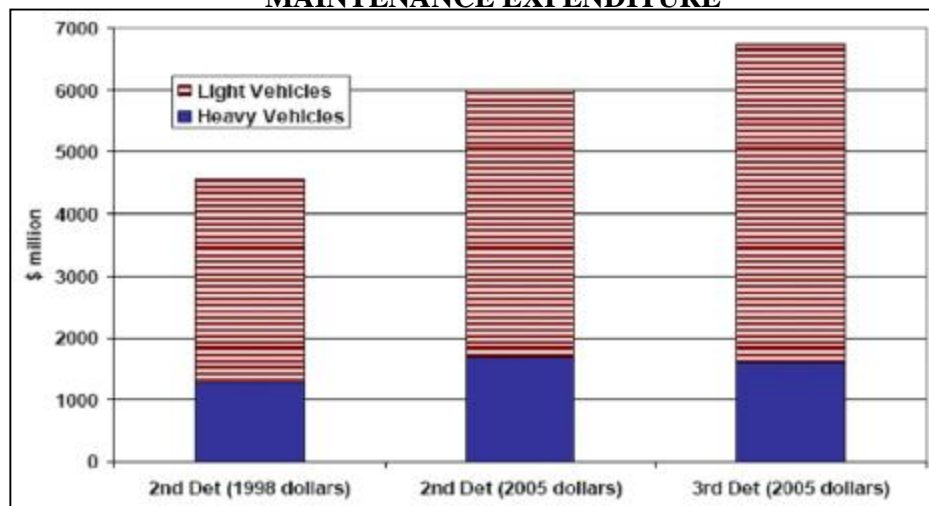
The cost attribution parameter template used by the NTC has been derived from estimates developed by Austroads and research by ARRB Group Ltd.

There are five categories of non-pavement activities:

- 1. Servicing and operating expenses. These include: cleaning and repairs to drains, maintenance of street lighting, line markings and traffic signals, grass mowing, and pavement sweeping.*
- 2. Low-cost safety/traffic improvements. e.g. installation of traffic signals, roundabouts and pedestrian crossings.*
- 3. Bridge maintenance and construction: e.g. bridge maintenance and repairs and construction of new bridges.*
- 4. Non-pavement asset extensions/improvements: e.g. land acquisition costs associated with road improvements.*
- 5. Other costs: e.g. project planning and survey costs.”*⁴

The following chart demonstrates that urbanisation effects, driven in the main by passenger vehicle use, are significant, and represent approximately 76% of total road maintenance expenditure for the third pricing determination.

NTC ASSESSED LIGHT AND HEAVY VEHICLE SHARES OF ROAD MAINTENANCE EXPENDITURE



Source: NTC, *Third heavy vehicle road pricing determination draft regulatory impact statement*, Oct. 2005.

⁴ National Transport Commission, 2005, *Third Heavy Vehicle Road Pricing Determination: Technical Report*, page 33.

Using the methodology outlined in the NTC report, the following table provides the apportionment of attributable and non-attributable road maintenance costs to each expenditure category contributing to total roads expenditure, as well as the major cost/ demand driver (road length and road use due to volume and/or weight).

NATIONAL TRANSPORT COMMISSION ATTRIBUTABLE AND NON-ATTRIBUTABLE ROAD MAINTENANCE COSTS BY EXPENDITURE CATEGORY

Expenditure Category	Attributable to Road Length	Attributable to Volume and Weight of Vehicles	Attributable to Traffic Volume
	X.	Y.	Z.
	\$m	\$m	\$m
A. Servicing & Operating Expenses	-	-	629.0
B. Road Pavement & Shoulder Maintenance			
B1. Routine Maintenance	104.0	296.0	-
B2. Periodic Maintenance	85.5	199.5	-
C. Bridge Maintenance and Rehabilitation	-	152.0	-
E. Low Costs Safety / Traffic Improvements	-	-	290.0
Category totals (A + B1 + B2 + C + E)	189.5	647.5	919.0
Total of all categories (X + Y + Z)	1,756.0	1,756.0	1,756.0
Proportion of total maintenance expenditure	10.8%	36.9%	52.3%

Source: NTC, 2005, *Third Heavy Vehicle Road Pricing Determination: Technical Report*.

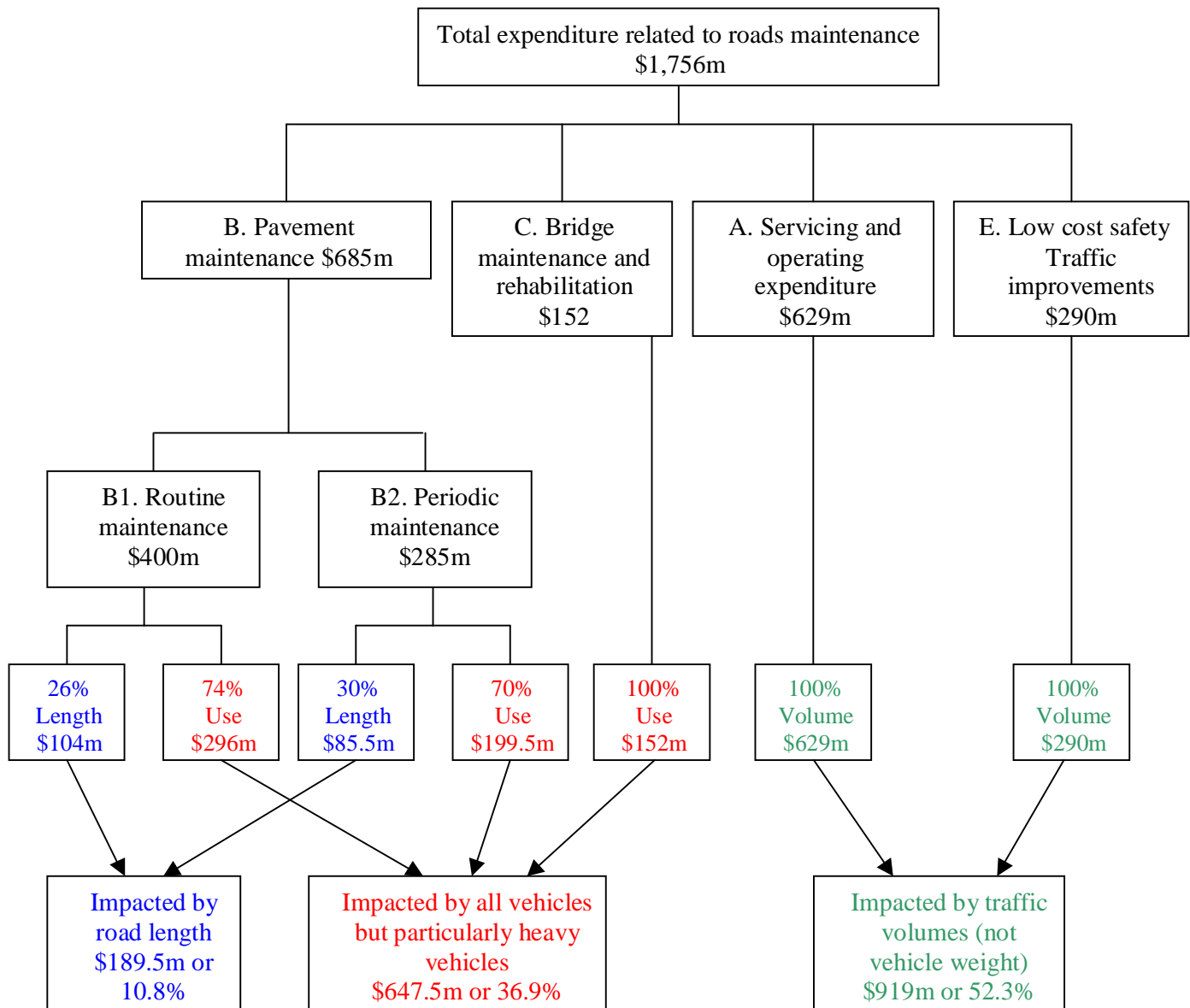
The same table is replicated in proportional terms so that the main expenditure disabilities can be readily seen.

NATIONAL TRANSPORT COMMISSION ATTRIBUTABLE AND NON-ATTRIBUTABLE ROAD MAINTENANCE COSTS BY EXPENDITURE CATEGORY

Expenditure Category	Attributable to Road Length	Attributable to Volume and Weight of Vehicles	Attributable to Traffic Volume
	X.	Y.	Z.
	\$m	\$m	\$m
A. Servicing & Operating Expenses	0%	0%	100%
B. Road Pavement & Shoulder Maintenance			
B1. Routine Maintenance	26%	74%	0%
B2. Periodic Maintenance	30%	70%	0%
C. Bridge Maintenance and Rehabilitation	0%	100%	0%
E. Low Costs Safety / Traffic Improvements	0%	0%	100%
Proportion of total maintenance expenditure	10.8%	36.9%	52.3%

Source: NTC, 2005, *Third Heavy Vehicle Road Pricing Determination: Technical Report*.

The following diagram summarises the technical report’s findings with respect to the cost drivers of arterial road maintenance expenditure.



A more detailed explanation of how the proportion of costs attributable to road length and road use, and the underpinning cost and demand drivers are provided in the following paragraphs, premised on expenditure categories A, B, C and E.

Costs related to Pavement Maintenance Expenditure (B)

The *Technical Report* outlines that:

“...some costs of providing and maintaining roads have little relation to road use and are known as non-attributable costs. Examples of a non-attributable costs are the costs of repairing storm or flood damage. Some pavement wear occurs because road building materials deteriorate with age. This wear would

*occur regardless of whether vehicles used the road or not, and consequently cannot be attributed to vehicle usage.*⁵

*“...non-attributable costs... would be incurred regardless of the level of use of the road network. They are the costs of providing a minimum standard of infrastructure regardless of the traffic that is to use it, having decided that there should be a road.”*⁶

The NTC developed and tested a number of statistical models in order to determine the relationship between costs that are attributable to road use and those that are related to road length. **Such analysis indicated that almost all pavement maintenance expenditure could be related to road use.**

When the national heavy vehicle pricing system was first developed, the analysis suggested that all pavement expenditure could be related to road use (measured by tonne-km and passenger car unit km). This, however, did not accord with general engineering understanding and experience, which suggests that road building materials deteriorate with age and weather regardless of the presence of traffic.

Consequently, the NTC noted that it might be expected that some maintenance expenditure would be incurred regardless of the traffic level. The likelihood that some pavement expenditure is related to weather or the impacts of ageing is supported by research into refining pavement deterioration models by ARRB Transport Research Ltd. This indicates a theoretical basis behind the climatic causal relationship is generally accepted.

Given these arguments, The NTC's Scenario B (which allocates 100% of both routine maintenance and periodic maintenance costs to vehicle use, based solely on the statistical analysis discussed above), did not appear to be an appropriate option.

In order to reconcile the engineering experience that weather and the impacts of aging also contribute to pavement expenditure (road length impacts), the NTC took the consistent under-estimation of the model to be an indicator of non-attributable expenses. These amounted to around 26% for routine pavement maintenance (B1) and 30% for periodic pavement maintenance (B2) across a time series of 15 years.

This analysis indicates that the expenditure on pavement maintenance (referred to as *road pavement and shoulder maintenance* in the report) should be allocated between road use and road length by the above mentioned proportions.

Given pavement maintenance expenditure (B) accounts for 39%⁷ of total State road arterial maintenance expenditure, the total costs driven by road length (unattributable costs) amounted to around 10.8%. **On the basis of the NTC findings, road length disabilities should be applied to 10.8% of the assessment.**

The *Technical Report* also found that those attributable costs related to pavement and shoulder maintenance were influenced by use factors which were a function of the volume of vehicles travelling on the road and the weight of those vehicles. By combining the value of the pavement maintenance expenditure for B1 and B2, the *Technical Report* indicates that a road use

⁵ National Transport Commission, 2005, *Third Heavy Vehicle Road Pricing Determination: Technical Report*, Page 9.

⁶ *Ibid.*

⁷ Total pavement maintenance costs (\$685m) as a proportion of total maintenance expenditures (\$1,756m).

component, which captures the disproportional impact of heavy vehicles, represents (including bridge related expenditure – see following section) **36.9%** of total maintenance expenditure.

The use of a broad measure suggested by Commission staff that would capture these effects, such as the proposed annual vehicle tonne kilometres weighted by Equivalent Standard Axle, is supported. However, it is important that the heavy vehicle weights be struck relative to light vehicles (as Commission staff have done), and that the impact of light vehicles are included as the NTC (and other) evidence suggests that passenger cars impact on road maintenance pavement costs:

*“This work indicated that both routine and periodic pavement maintenance were related to tonne-km of traffic and, to a lesser extent, passenger car equivalent units (which are closely related to the number of axle passes).”*⁸

The NTC has noted that some may question why the statistical analysis might show a link between passenger car equivalent units and pavement maintenance. In this regard it is noted that passenger car equivalent units will be very highly correlated with the number of axles and therefore tyres passing over the pavement. Some pavement maintenance expenditure is associated with restoring surface texture, which is in part lost with the passage of tyres.⁹

Some localised pavement wear, such as around potholes, also appear to be linked to passage of tyres. As this parameter appears to have little theoretical basis as a measure of road wear, it is likely that the link found between passenger car equivalent units and pavement maintenance is approximating these factors.¹⁰

Weighting heavy vehicles

Determining the most appropriate weight for heavy vehicles is dependant upon the broad indicator chosen and whether the impact of heavy vehicles is captured by the data. Overall, the technical report found that heavy vehicles drove around **25%**¹¹ of the arterial road maintenance expenditure across Australia.

Such a determination is scheduled to be endorsed by the Australian Transport Council (ATC) later in the year, and as such, should be considered the most accurate estimate of the impact heavy vehicles have on the arterial road network.

In the view of developing an assessment methodology, **a robust method would be to use the Commission staff developed ESA based vehicle weights for heavy vehicles relative to passenger and light vehicles within the road use component (volume and vehicle weight) with a view that the total disability does not exceed the 25% benchmark.**

Costs related to Bridge Maintenance and Rehabilitation expenses (C)

The *Technical Report* outlines the proportion of expenditure outlaid on bridge maintenance and rehabilitation to be **\$152 million** and found that bridge maintenance expenses were driven by vehicle use and that heavy vehicle had a small differential impact, relative to passenger vehicles. Specifically, the *Technical Report* outlined that:

⁸ National Transport Commission, 2005, *Third Heavy Vehicle Road Pricing Determination: Technical Report*, page 30.

⁹ *Op Cit*, page 31.

¹⁰ *Op Cit*, page 31.

¹¹ *Op Cit*, page 39.

“There is evidence that heavy vehicles contribute to the deterioration of bridges, and construction and strengthening costs would be lower if fewer or no heavy vehicles existed.

*Bridges designed for non-heavy vehicle traffic would be smaller and cheaper to build than existing structures. **However, most of the costs of bridge construction are related to the costs of holding the bridge up, regardless of the loads it is to carry.**”¹²*

The costs related to ‘bridges maintenance’ are combined with the attributable ‘pavement maintenance’ expenditures (as outlined in the preceding section) as they are road use driven. The road use disabilities (with differential weights for heavy vehicles relative to light vehicles) should receive a **36.9%** weighting in the roads assessment.

There is a case that bridge related costs could equally be combined with traffic volume related use that is not related to heavy vehicles. This is one area where further consideration maybe needed.

Costs related to Servicing and Operating Expenditure (A)

The NTC *Technical Report* finds that:

“Servicing and operating expenditure is considered to be related to road use but not strongly linked to different vehicle types.”¹³

In urban areas, the bulk of this expenditure is related to the operation and maintenance of traffic management equipment including traffic signals, traffic calming, roundabouts, crossings, bicycle lanes, line marking and delineation etc.

In rural areas most of the expenditure is related to drainage maintenance and roadside maintenance work, such as litter collection and grass mowing.

The NTC report states that:

“In both cases [urban and rural] a greater level of effort is needed for roads with higher volumes of traffic.”¹⁴

The costs related to servicing and operating accounted for around **35.8%** of total arterial road maintenance costs (traffic volume related use, not related to heavy vehicles, totalled **52.3%** of the road maintenance costs). In the context of developing an arterial roads assessment, the ACT supports the *Technical Report’s* findings that ‘servicing and operating’ expenses are driven by the volume of traffic on a road, irrespective of the weight of vehicles.

Following this, the ACT proposes a broad measure to capture the costs of above average traffic volumes such as:

- proportion of total road length with Average Annual Daily Traffic (AADT) that exceed 40,000; or
- passenger vehicles per capita; or

¹² *Op Cit*, page 34.

¹³ *Ibid.*

¹⁴ *Ibid*

- persons per km of road.

We consider that the first measure is the most appropriate as it is more fit-for-purpose and is consistent with what the Commission does now.

Costs related to Low Cost Safety / Traffic Improvements expenditure (E)

Around half of the expenditure in the Low Cost Safety / Traffic Improvements category (E) is related to safety improvements, and the other half to traffic management programs and works.

Similar to ‘servicing and operating’ expenses:

“All expenditure related to safety improvements is considered to be attributable to road use, but not to particular vehicle types.”¹⁵

The costs related to Low Cost Safety / Traffic Improvements accounted for around 16.5% of total arterial road maintenance costs (traffic volume related use, not related to heavy vehicles, totalled 52.3% of the road maintenance costs).

The ACT considers such expenses are part of ongoing maintenance to existing arterial roads and as such should be considered as an ongoing maintenance requirement within the roads assessment.

The *Technical Report* concluded that the cost drivers of this component are solely a function of the number of vehicles who use the road, vehicle weight did not play a role in increasing these types of cost.

Given the NTC’s conclusion that Safety / Traffic Improvements expenses are related to traffic volume rather than vehicle weight, the assessment of this component using a broad indicator which captures traffic volume is supported. Again, the following measures are suggested (with the AADT measure being the preferred option):

- proportion of total road length with AADT that exceed 40,000; or
- passenger vehicles per capita; or
- persons per km of road.

SPECIFIC QUERIES POSED IN THE COMMISSION STAFF DISCUSSION PAPER

Road Length

How should the Commission proceed if further work using the mapping approach to define a simplified road network for urban areas does not improve the NSW – Victoria split for urban road lengths?

The use of the current State provided road length data is preferred. Thus far it has not been demonstrated that the current urban road length data are materially incomparable, and as such, the current approach represents the most accurate method of determining the size of the urban roads maintenance task.

¹⁵ Op Cit, page 30.

An adjustment was made under the simplified road network model for the number of lanes. Are other adjustments required and are they likely to be material? For example, should an adjustment be made for sealed roads versus unsealed roads?

The ACT supports the Commission adopting an adjustment for sealed roads within the road length component given that in the absence of road use the cost of maintaining sealed roads are significantly higher than unsealed roads. Assessing the differences in the proportion of each State’s road network that is sealed is pertinent given the large variances between jurisdictions.

It appears that Commission staff will assess the full extent of remote and rural related costs associated with maintaining roads, and to be equitable, the urbanisation related costs should also be fully reflected within the roads assessment.

Higher maintenance costs for urban sealed roads relative to other road types have been established by various bodies and experts.

The following table contains the results of the ARRB report on Victorian Road Preservation Costs and the typical distribution of maintenance costs for various road types.

AUSTRALIAN ROAD RESEARCH BOARD ANALYSIS OF VICTORIAN ROAD PRESERVATION COSTS

Road Type	Road Preservation Costs (\$/km)	Weight (Rural natural surface as base)
<i>Rural</i>		
Rural Roads: natural surface	\$300	1
Rural Sealed Roads: AADT ¹⁶ <100	\$2,000	6.7
Rural Sealed Roads: AADT 100-500	\$4,000	13.3
Rural Sealed Roads: AADT 500-1000	\$4,900	16.3
Rural Sealed Roads: AADT >1000	\$5,400	18.0
<i>Urban</i>		
Urban Sealed Roads: AADT <500	\$2,700	9.0
Urban Sealed Roads: AADT 500-1000	\$4,000	13.3
Urban Sealed Roads: AADT 1000-5000	\$5,500	18.3
Urban Sealed Roads: AADT >5000	\$9,000	30.0

Source: Review of Asset Preservation Costs: ARRB for the Victoria Grants Commission, April 2003, page 11.

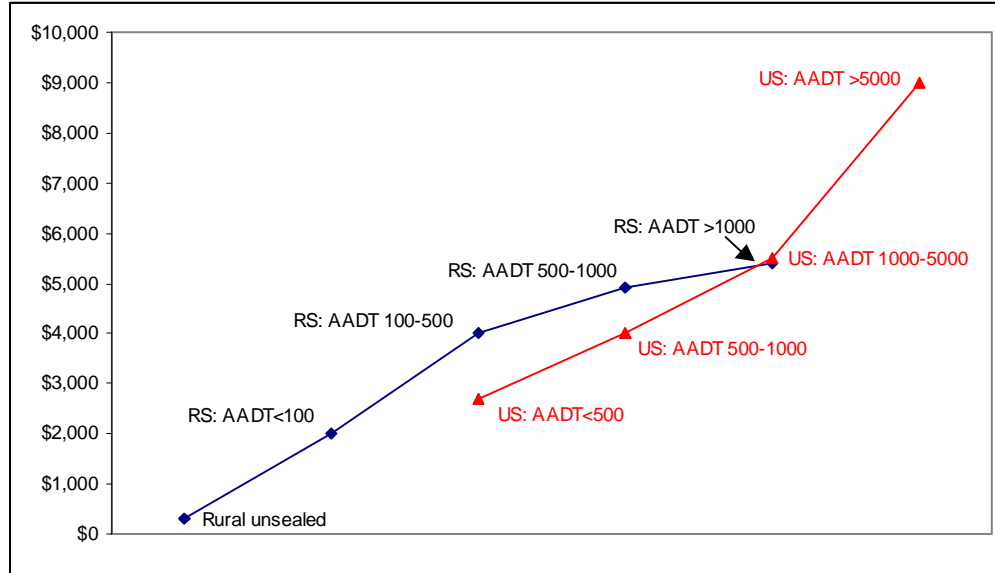
The following figure illustrates the difference in maintenance costs for different road types at different use rates.

It is clear that natural road surface maintenance costs are relatively low, and that for low average annual daily traffic (AADT) levels (up to 5,000 AADT), the maintenance costs for rural and sealed roads are fairly similar.

¹⁶ Average Annual Daily Traffic (AADT)

However, once traffic levels increase above 5,000 AADT, maintenance costs increase dramatically. That is, for urban sealed roads the costs increase substantially when AADT is above 5,000. Maintenance costs are around 67% higher than for urban sealed roads where AADT is less than 5000.

MAINTENANCE COST PER KILOMETRE FOR VARIOUS TRAFFIC VOLUMES (AVERAGE ANNUAL DAILY TRAFFIC), BY ROAD TYPE



RS = rural sealed, US = urban sealed.

This increase in maintenance costs associated with highly used sealed local roads (those greater than 5,000 AADT) should be reflected in the local roads assessment. The ARRB road preservation cost weights as outlined above could be used as the basis of assessing the surface type disability.

The following table and data also support the case for an assessment of urban influences costs for kerbed/more high trafficked roads.

ACT ASSET PRESERVATION COSTS FOR LOCAL ROADS

<i>Local Roads Type</i>	<i>Daily Traffic Volume (AADT)</i>	<i>Road Length Lane-Kilometres</i>	<i>Standard Asset Preservation Cost per Lane-Kilometre¹</i>	<i>Weight (unkerbed as base weight)</i>	<i>Total Cost (\$)</i>
<i>Kerbed</i>	<i><500</i>	<i>3,626</i>	<i>\$ 2,700</i>	<i>1.4</i>	<i>\$ 9,790,200</i>
	<i>500-1000</i>	<i>10</i>	<i>\$ 4,000</i>	<i>2.0</i>	<i>\$ 40,000</i>
	<i>1000-5000</i>	<i>50</i>	<i>\$ 5,500</i>	<i>2.8</i>	<i>\$ 2,750,000</i>
<i>Unkerbed</i>	<i><500</i>	<i>20</i>	<i>\$ 2,000</i>	<i>1.0</i>	<i>\$ 40,000</i>
<i>Total</i>		<i>3,706</i>			<i>\$12,620,200</i>

1. Asset Preservation costs based on Victoria Grants Commission costs.

The data show that asset preservation costs for kerbed local roads with less than 500 AADT are 1.4 times that of unkerbed roads with the same traffic volume. Importantly, for the highest trafficked roads, the road preservation costs are nearly treble that for unkerbed roads. The ACT has the highest proportion of kerbed roads of any State, reflective of its urbanised setting.

Additionally, the proportion of each State's road network that is sealed varies considerably. The ACT, as the most urbanised State (the ACT has 120 persons per kilometre of road, considerably higher than any other State - NSW, with 37 persons per kilometre of road is the second highest¹⁷), faces the need to seal a greater proportion of its roads given the volume of traffic.

The extent of the variation in sealed roads from the Australian average, and the relationship with urbanisation can readily be seen in the following table. Those States that are more highly ranked in terms of a greater proportion of sealed roads generally have a higher number of persons per kilometre of road, demonstrating the relationship between the two variables.

COMPARISON OF THE PROPORTION OF SEALED AND UNSEALED ROADS AND RELATIONSHIP WITH URBANISATION IMPACTS

Surface type	NSW	Vic	Qld	WA	SA	Tas	ACT	NT	Aust
	Km	Km	Km	Km	Km	Km	Km	Km	Km
Bitumen / concrete	90,905	75,600	68,482	50,057	28,231	10,485	2,556	6,547	332,863
Gravel, crushed stone	91,169	53,700	51,482	55,464	40,868	13,129	128	6,607	312,547
Formed only	-	26,700	43,209	29,644	18,480	639	-	7,601	126,273
Cleared only	-	-	15,117	13,140	9,005	-	-	1,291	38,553
Total	182,074	156,000	178,290	148,305	96,584	24,253	2,684	22,046	810,236
Proportion sealed	49.9%	48.5%	38.4%	33.8%	29.2%	43.2%	95.2%	29.7%	41.1%
Ranking	2	3	5	6	8	4	1	7	
Persons per km of road	36.7	31.5	21.3	13.2	15.8	19.7	120.3	9.0	24.5
Ranking	2	3	4	7	6	5	1	7	

Source: RoadFacts 2005, Austroads.

Should national highway road lengths be included in the mapping approach?

Assessing the expenses related to State National Highways in the same manner as any arterial road expense is supported. This is the most appropriate method of assessing the national highways network given the change in:

- the method used to capture rural road lengths, which when national highways are included represents a more policy neutral method of determining rural road lengths. However, the removal of national highway road lengths (either ex-ante or ex-post to running the mapping algorithm) fails to reflect the relative size of the entire roads maintenance task faced by States; and

¹⁷ RoadFacts 2005, p58.

- SPP funding agreements, which have effectively broadened the scope of how and where such funds can be used. This broadening has changed the nature of the SPP payments to a more general form of revenue assistance, which allows State policy to dictate a larger degree of funding allocation, albeit with a restriction that the funds are to be used on roads:
 - Ø given such a change, it is now appropriate to treat the SPP for National Highways (and Auslink funding) by the inclusion approach, as the Auslink payments reduce each States' total financial assistance requirements, their relative impact needs to be taken into account. This approach would be consistent with the approach adopted by the Commission for services such as government schools, national public health payments, a range of welfare and housing assistance et; and
 - Ø as the road length and use associated with national highways will determine relative State disabilities, there is a need to treat the underlying Commonwealth payments by inclusion given the Auslink program finances a portion of State expenses and States have discretion in allocating these funds to individual projects. .

Road Use

Do States agree that the proposed assessment is the direction the Commission should be taking with the roads assessment?

The use of the NTC's *Technical Report* as a guide to determining the appropriate weightings between road length, road use (impacted by vehicle volume and weight), and traffic volume (not impacted by vehicle weight) is supported.

Given the NTC is the specialist agency responsible for determining the cost recovery model for heavy vehicle use of roads, and all the difficult work has already been undertaken by the NTC with regard to a robust framework which overcomes a range of problems and contentious issues, to which Commission staff can apply their developed disabilities, the ACT supports the findings and the cost allocation analysis of the *Technical Report*.

Is it appropriate to include a weight for traffic management expenses in the use assessment, as we have done in the proposed assessment, or is it more appropriate to adjust road length to account for these expenses?

Traffic management expenses and servicing and operating expenses consist of around 57% of total road maintenance expenditures and are driven by traffic volumes. Such expenses are distinct from the impact of road use where vehicle weight plays a role.

In this sense, following the NTC's model, the ACT proposes that the impact of traffic volumes on traffic management, servicing and operating expenses be captured via broad indicators that reflect the impact of traffic volumes (suggested approaches were listed previously).

Incorporating such expenses into the road length or road use components fails to recognise the distinct cost drivers related to this category of expenditure, and as currently proposed, will not achieve equalisation.

Does using tonne-kilometres in combination with road length double count the impact of road length? If so, what can be done to eliminate the double count?

The question regarding the double counting of road length and the interrelation between road length measures and road use (tonne-kilometres measures) was undertaken and largely unresolved during the 2004 Review. The ACT acknowledges that this is a difficult issue that requires further examination with the help of roads experts.

This problem appears to be partly a result of the language used to determine the cost drivers for road maintenance expenditures. It should be recognised from the outset that measures of road use implicitly capture road length, given that road use is a function of the number of vehicles and their distance travelled, and on this basis, there is double-counting.

In this context, AADT is a road use measure by itself and it should not be multiplied by road length as this appears to lead to double counting. Conceptually, if road use was aggregated for each State's entire road network, there would be no need to multiply this by the road length to derive a use measure. However, AADT does need to be weighted by the proportion of the road network that each road represents.

For example, in the following table, for two States with the same road length and use, if the proportion of road length to which the AADT is attributable is not taken into account (State A), the Total AADT would be 30,000. However, for State B, the correct total road use is calculated as the AADT attributable to road length is taken into account (weighted by road length).

HYPOTHETICAL ROAD USE (AADT) CALCULATIONS

	State A (unweighted)	State B (weighted relative to road length)	Road length (km)	Proportion
Road 1	20,000	20,000	200	83.3%
Road 2	40,000	40,000	40	16.7%
Total AADT	30,000	23,340	240	

In any regard, while there is a need to get to the bottom of this matter, this issue may not be too significant if the NTC approach is adopted.

The NTC also faced a similar problem in their *Technical Report* which they effectively circumvented by taking a bottom up approach to analysing how differing data sets explained road maintenance costs. Such analysis found that around 31% of road maintenance costs could be explained by a measure of AVKT weighted for Equivalent Standard Axles, and another 57% is explained by unweighted AVKT.

Although at first appearance it appears that the weighting of 12% for road length understates its impact on road maintenance expenses, such a component weight appears justified when it is considered that the measure of AVKT also captures the impact of road length.

Is traffic volume a driver of road maintenance expenses? Do States have data which shows the impact of traffic volume on road maintenance expenses?

The NTC's *Technical Report* found that traffic volume accounts for around 57% of road maintenance expenditure. Such expenditures include traffic management, traffic lights, traffic calming, roundabouts, crossings, bicycle lanes, road safety equipment etc, as well as road operation expenditures. The disaggregation of expenditures related to traffic volume is material, and as such, these disabilities need to be reflected within the roads assessment.

The ACT has provided evidence on traffic volume in the earlier sections of this submission.