

AUDITOR-GENERAL'S REPORT

PERFORMANCE AUDIT

Condition of State Roads

Roads and Traffic Authority of NSW



The Legislative Assembly
Parliament House
SYDNEY NSW 2000

The Legislative Council
Parliament House
SYDNEY NSW 2000

In accordance with section 38E of the *Public Finance and Audit Act 1983*, I present a report titled **Condition of State Roads: Roads and Traffic Authority of NSW**.

A handwritten signature in black ink, appearing to read 'R J Sendt'.

R J Sendt
Auditor-General

Sydney
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Foreword

Highways and major arterial roads are arguably the most critical transport link between major population centres. They are the State's biggest asset with a replacement value of around \$69 billion.

Something so important and valuable must be managed well.

The Roads and Traffic Authority (RTA) is responsible for maintaining and developing this critical public asset, for which it receives an annual budget allocation of more than \$2 billion.

This report examines the condition of the State Road network, the maintenance program the RTA currently has in place and the plans it has to maintain it in the long term.

Road users and taxpayers need assurance that roads are kept in an appropriate condition at the lowest possible lifetime cost.

Roads are difficult assets to manage in that they may be rebuilt but are rarely 'retired'. Their traffic and load demands are also often above their original design parameters. Therefore they present a special challenge to asset managers in achieving the right balance between maintenance and renewal while achieving satisfactory service levels well into the future.

This report builds on our work over the last few years in asset management. I believe it will encourage greater transparency regarding the condition of the road network and contribute to debate regarding the appropriate balance between spending on new roads and maintaining existing routes.

Bob Sendt
Auditor-General

August 2006

Executive summary

The focus of our audit

The Roads and Traffic Authority (RTA) is responsible for managing NSW's arterial road network (State Roads). The State Road network is valued at \$69 billion, including land underneath roads.

This audit sought to determine how well the RTA is meeting the Government's objective of maintaining roads and bridges at minimum whole of life cost to ensure reliability, safety and retained value. We wanted to find out what:

- condition State Roads are in
- condition State Roads should be in
- the RTA is doing to address any gap.

Audit opinion

The RTA has improved the overall surface condition of State Roads in the last decade. Country road surfaces are now generally much better. Ride quality has improved and cracking has been reduced. The RTA has also achieved a substantial reduction in the number of structurally deficient bridges over the same period.

Ride quality on Sydney roads, however, has been falling and is worse than it was ten years ago. And about 15 per cent of the network is very rough or very cracked, although the RTA advises that no State Road is closed or subject to load or speed restrictions due to its condition.

While the RTA has standards for road maintenance, it has not specified appropriate condition standards. In the absence of these, it is difficult for the Government, Parliament and public to judge how well the RTA is maintaining road assets.

Despite a significant increase in the State's contribution to maintenance since 1999-2000, the RTA has deferred road rebuilding projects. The RTA is rebuilding at less than half its long term target, and has not met this target at any time this decade. As a consequence, the structural condition and expected life of State Roads is declining. This presents a risk that roads may become unsafe or unreliable, and is likely to lead to higher repair costs. While the RTA says it has deferred rebuilding to manage more immediate risks to safety, it acknowledges the current rate of rebuilding is not sustainable in the long term and needs to increase.

The RTA has not identified how it will address deferred rebuilding, although it advises it is developing a new road network management plan which will address this.

We recognise that tension exists between the need to develop new roads while maintaining the existing network. Yet the Government's priority is maintenance, including rebuilding. Despite the need to rebuild more existing roads, the RTA has been increasing its spending on new work. While it advises that Commonwealth funding arrangements reduce its capacity to redirect funds to rebuilding, it needs to do so. Otherwise it will continue to push the problem onto future generations.

Recommendations

We recommend that the RTA:

- | | |
|---|--|
| Determine the gap between actual and appropriate condition | <ul style="list-style-type: none">▪ complete by 2008 its work on specifying appropriate condition standards for roads, and by 2009 for bridges (p28)▪ assess if a gap exists between the actual condition of roads and bridges and appropriate condition standards (p29)▪ determine what it needs to do to lift the network to appropriate condition standards, and long term funding needs (p29) |
| Improve methods and systems | <ul style="list-style-type: none">▪ finalise its current research and develop by 2008 a more rigorous and reliable method to assess the expected remaining life of roads (p19)▪ develop by 2009 a more rigorous and reliable method to assess the future structural condition of bridges (p22)▪ ensure regions use a consistent approach to assess risks and determine maintenance priorities and treatments (p34)▪ investigate and implement improved systems to help staff identify the best maintenance solutions (p36)▪ prepare a submission to the Minister outlining the costs and benefits to the community of closing roads or lanes for an extended period to allow rebuilding, compared to the current approach of undertaking work in the middle of the night (p36) |
| Address deferred rebuilding | <ul style="list-style-type: none">▪ extend the planning horizon for asset management and maintenance to at least ten years (p37)▪ investigate and implement potential models to quantify the risks to current and future road safety and reliability of travel, as well as the cost of repair, for various funding levels (p37)▪ give higher priority to the rebuilding program to achieve long-term sustainability at minimum whole of life cost (p39) |
| Improve advice to Government, Parliament and the public | <ul style="list-style-type: none">▪ complete its new road network management plan, setting out the funding required to maintain the road network at minimum whole of life cost, including risks, any gap between appropriate and actual condition and rebuilding needs, and report this to the Minister and Treasury (p40)▪ report in its Annual Report any gap between appropriate and actual condition, and how it plans to address it (p40)▪ report in its Annual Report deferred rebuilding, the progress of its road rebuilding efforts, the proportion of the network past the end of its expected life, and the risks this represents (p40). |

Key audit findings

Chapter 1: What condition are State Roads in?

The RTA uses leading edge technology to collect road surface condition data. This data shows that the RTA has improved the overall ride quality on State Roads in the last decade, despite substantial increases in traffic levels and heavier vehicle loads. The ride quality on country roads is much better than ten years ago and is now similar to Victoria and Queensland, and country roads are also much less cracked. No bridges on State Roads were structurally deficient in 2005-06, compared to 34 in 1996-97.

During the same period, however, ride quality on Sydney roads has fallen and is below other capital cities and country roads. And around 15 per cent or 2,800 kilometres of State Road is very rough or very cracked. The RTA advises these road segments are mainly in urban low-speed areas, are made of less moisture-sensitive materials, and no State Road is closed or subject to load or speed restrictions due to condition.

More important in the long term, but less obvious than ride quality, is the underlying structural condition of State Roads. While more difficult to assess than surface condition, the RTA has done well to recognise the importance of measuring structural condition and progressively improve its methods to do so. In our opinion, however, the structural condition and expected life of State Roads is declining as a consequence of the RTA deferring road rebuilding works.

While the level of rebuilding may fluctuate around the long term target, the RTA has not achieved its target at any time this decade. The average expected life of State Roads is 40 years, but the current rebuilding rate means the RTA will need to get 83 years out of them on average. While still in service, 16 per cent or 3,000 kilometres of the network has reached its expected life and its future performance is unpredictable.

Chapter 2: What condition should State Roads be in?

The RTA ranks State Roads according to function and use with the aim of keeping the more important roads and bridges in better condition. It also has intervention standards for maintenance, including minimum standards for the timely repair of potholes, edge breaks and other routine maintenance.

Specifying appropriate condition standards is essential for good asset management, but the RTA has yet to do this for State Roads. It therefore cannot judge if a gap exists between actual and appropriate condition, nor can the Government, Parliament or the public. The absence of condition standards also makes it difficult for the public and the Government to judge if the condition the RTA is aiming for is adequate or how well the RTA is managing State Roads. The RTA has started work on developing appropriate condition standards, and should give priority to completing this work.

**Chapter 3:
What is the RTA
doing to address
any gap?**

The RTA allocates its maintenance money on the basis of risk, giving priority to availability and safety of roads and bridges. Its approach balances head office control and local decision making. The RTA needs, however, to ensure all its regions adopt a consistent risk assessment method and to improve its systems to help staff identify the best maintenance solutions.

The RTA has not identified how it will address deferred rebuilding, but advises it is developing a new road network management plan which will address this risk.

The RTA's 2003-2008 Infrastructure Maintenance Plan acknowledges that it is not doing enough rebuilding to ensure the long-term viability of the network, thereby presenting a risk to safety and reliability, and of higher repair costs. The RTA needs to examine and model the relationship between spending, safety and condition so that it can give its Minister and Treasury more detailed advice on the implications of funding decisions. The RTA should also report publicly on its progress in addressing deferred rebuilding.

Total maintenance spending has grown by 20 per cent in real terms since 1995-96, but spending on developing the network has grown by more than 50 per cent. During this period, NSW's contributions to maintenance and to development have each grown by about a third. The Commonwealth's contribution to development more than doubled whereas its contribution to maintenance has fallen by a fifth.

The RTA also faces a problem rebuilding very busy, worn State Roads. Traffic flow and congestion means crews can only work on them for a few hours at a time, usually in the middle of the night. The RTA advises this is not an optimal approach, but it assumes the disruptions caused by closing a road or lane for an extended period would be unacceptable to the community. The RTA should put these options and their respective costs and benefits to the Minister to decide.

Response from the Roads and Traffic Authority

I enclose the RTA's response to the Final Report of the subject audit for consideration.

The RTA appreciates the cooperative and constructive approach adopted by the Audit Office and its staff during the progress of the audit. This approach reflects well on the role of the Audit Office in contributing to improved delivery of services.

In this respect the RTA is already moving to refocus on our core road maintenance task. This audit report provides significant assistance in progressing these reforms.

(signed)

*Les Wielinga
Chief Executive*

Dated: 4 August 2006

Attachment

The RTA thanks the Audit Office for the opportunity to comment on this report.

The RTA regards the report as a useful contribution as we refocus on our core tasks of maintenance, construction and service.

And we welcome the Audit Office's acknowledgement of the RTA's good practice in:

- *improving the overall surface condition of roads over the last decade;*
- *risk management;*
- *automated data collection;*
- *cost effective design guidelines and flexible management structures;*
- *and*
- *keeping State Roads open and available to road users.*

We also welcome the Audit Office's acknowledgment of the challenges faced by the RTA in maintaining the State Road network.

Other major challenges include the facts that over the last decade:

- *An extra one million vehicles now use the 20,738 kilometres of roads in New South Wales; and*
- *There are now 600,000 more licensed drivers in NSW.*

In recognition of the challenges facing the organisation the RTA is currently evaluating the most effective organisational structure and maintenance plan for maximising our maintenance effort.

To date, planning has relied on trends in surface condition data, condition intervention standards, age and renewal considerations.

Effective asset management, however, leading to the setting of appropriate condition standards, needs reliable forecasts of the structural condition of road pavements. This has not been available due to the absence of technology to assess the structural condition across a large road network.

In this respect, the Report notes that the RTA has “done well to recognise the importance of measuring structural condition and progressively improve its methods to do so” (page 4).

The Report also notes that the RTA:

- *“in conjunction with the CSIRO, developed and patented new mobile technology (‘RoadCrack’) to assess pavement cracking” (page 23) to “help plan maintenance” and “identify where a visual inspection by RTA staff is needed to determine the appropriate maintenance treatment;” (page 22)*
- *integrates road rebuilding with maintenance, measuring and reporting its rate of rebuilding against its long term target; (page 20) and*
- *is already improving its modelling capabilities by “leading research into the latest models” to improve asset management and maintenance planning (page 18).*

The Report recognises the need for a long term perspective when examining the maintenance of road infrastructure. Many road pavements last longer than 50 years and bridges even longer. The Report acknowledges that “the level of rebuilding may fluctuate around the long term target” (pages 4 and 12). Short term variations in the rate of rebuilding can be accommodated provided all State Roads are kept open without constraints on road users due to their condition, and provided that the rate of rebuilding increases in the longer term. Variations may occur from time to time due to other priorities such as re-opening Lawrence Hargrave Drive following its closure from rockfalls, infrastructure security upgrades and natural disaster repairs.

The Report notes that the RTA receives \$2 billion pa for maintaining and developing the major arterial network. However, a significant part of this funding is from the Commonwealth and is tied to specific development projects.

One of the constraints facing the RTA is the reduction in Commonwealth funding for maintenance (page 5, 32 and 38).

Indeed under the Auslink agreement the State must contribute funds to many Commonwealth projects. The overall effect is that the untied part of the State development program is only about \$420 million pa. Despite these limitations, the State has increased its funding of maintenance in real terms by one third since 1995-96 (pages 5, 32, 37 and 38).

The Report acknowledges as good practice, the RTA's ranking of its State Roads by function and use (page 26), with the aim of keeping the higher ranked roads in a better condition. For best use of public funds, it is important that those roads classified as State Roads continue to fulfil arterial road functions, and a panel of Local Government and RTA representatives is currently finalising a review to ensure that roads are appropriately classified.

In summary then, the RTA will use this report in developing our maintenance plans and most appropriate organisational structures.

More specifically, in addition to the above remarks the following table details the RTA's response to the Audit Office's individual recommendations

Recommendations and RTA Comments

| | |
|--|---|
| <p>Determine the gap between actual and appropriate condition</p> | <ul style="list-style-type: none"> ▪ <i>Complete by 2008 its work on specifying appropriate condition standards for roads, and by 2009 for bridges (p28)</i> ▪ <i>Assess if a gap exists between the actual condition of roads and bridges and appropriate condition standards (p29)</i> ▪ <i>Determine what it needs to do to lift the network to appropriate condition standards, and long term funding needs (p29)</i> <p>Agreed.</p> <p>The RTA has commenced this process. It must be noted that implementation is linked to improvements in methods and systems recommended below.</p> |
| <p>Improve methods and systems</p> | <ul style="list-style-type: none"> ▪ <i>Finalise its current research and develop by 2008 a more rigorous and reliable method to assess the expected remaining life of roads (p19)</i> ▪ <i>Develop by 2009 a more rigorous and reliable method to assess the future structural condition of bridges (p22)</i> <p>Agreed.</p> <p>The RTA will continue its work on structural assessment methods. This is necessary to achieve the above recommendations.</p> |
| | <ul style="list-style-type: none"> ▪ <i>Ensure regions use a consistent approach to assess risks and determine maintenance priorities and treatments (p34)</i> ▪ <i>Investigate and implement improved systems to help staff identify the best maintenance solutions (p36)</i> <p>Agreed.</p> |
| | <ul style="list-style-type: none"> ▪ <i>Prepare a submission to the Minister outlining the costs and benefits to the community of closing roads or lanes for an extended period to allow rebuilding, compared to the current approach of undertaking work in the middle of the night (p36)</i> <p>Agreed.</p> |

| | |
|---|---|
| <p>Address deferred rebuilding</p> | <ul style="list-style-type: none"> ▪ <i>Extend the planning horizon for asset management and maintenance to at least ten years (p37)</i> <p>Agreed.</p> <hr/> <ul style="list-style-type: none"> ▪ <i>Investigate and implement potential models to quantify the risks to current and future road safety and reliability of travel, as well as the cost of repair, for various funding levels (p37)</i> <p>Agreed. The RTA will investigate potential models of this type.</p> <hr/> <ul style="list-style-type: none"> ▪ <i>Give higher priority to the rebuilding program to achieve long-term sustainability at minimum whole of life cost (p39)</i> <p>Agreed. Rebuilding of pavements will need to be increased for long term sustainability.</p> |
| <p>Improve advice to Government, Parliament and the public</p> | <ul style="list-style-type: none"> ▪ <i>Complete its new road network management plan, setting out the funding required to maintain the road network at minimum whole of life cost, including risks, any gap between appropriate and actual condition and rebuilding needs, and report this to the Minister and Treasury (p40)</i> <p>Agreed.</p> <hr/> <ul style="list-style-type: none"> ▪ <i>Report in its Annual Report any gap between appropriate and actual condition, and how it plans to address it (p40)</i> ▪ <i>Report in its Annual Report deferred rebuilding, the progress of its road rebuilding efforts, the proportion of the network past the end of its expected life, and the risks this represents (p40).</i> <p>Agreed. The reports are linked to improvements in methods and systems and the implementation of appropriate standards and models recommended above.</p> |

1. What condition are State Roads in?

At a glance

The key question we wanted to answer was:

What condition are State Roads in?

Our assessment:

Both surface and structural condition should be considered when judging road condition. The former is important for assessing road user experience today, while the latter gives some insight into likely future surface condition and costs.

The RTA uses leading edge technology to collect road surface condition data. This data shows that the overall ride quality on State Roads has improved in the last decade, despite substantial increases in traffic levels and heavier vehicle loads. The ride quality on country roads is much better than ten years ago and is now similar to Victoria and Queensland, and country roads are also much less cracked. No bridges on State Roads were structurally deficient in 2005-06, compared to 34 in 1996-97.

During the same period, however, ride quality on Sydney roads has fallen and is below other capital cities and country roads. And around 15 per cent or 2,800 kilometres of the State Road network is very rough or very cracked. The RTA advises these road segments are mainly in urban low-speed areas, made of less moisture-sensitive materials, and no State Road is closed or subject to load or speed restrictions due to condition.

More important in the long term, but less obvious than ride quality, is the underlying structural condition of State Roads. While more difficult to assess than surface condition, the RTA has done well to recognise the importance of measuring structural condition and progressively improve its methods to do so. In our opinion, however, the structural condition and expected life of State Road pavements is declining as a consequence of the RTA deferring road rebuilding works. This presents a risk that roads may become unsafe or unreliable, and is likely to lead to higher repair costs.

While the level of rebuilding may fluctuate around the long term rebuilding target, the RTA has not achieved its target at any time this decade. And while the RTA says it has deferred rebuilding to manage more immediate risks to safety, it acknowledges the current rate of rebuilding is not sustainable in the long term and needs to be increased. The average expected life of roads is 40 years, but the current rebuilding rate means the RTA will need to get 83 years out of them on average. Around 16 per cent of State Road has reached its expected life and, while still in service, its future performance is unpredictable.

The RTA manages nearly 18,000 km of State Roads

1.1 What is the State Road network?

State Roads are NSW's major arterial roads. The RTA manages 17,724 kilometres of State Roads. The rest of the 183,000 kilometre NSW road system is made up of:

- 3,000 km of RTA-managed regional and local roads
- 18,500 km of council-managed regional roads, which receive RTA grants
- 143,600 km of council-managed local access roads, funded by local ratepayers and Federal road assistance grants.

The RTA is the agency responsible for improving road safety and managing the State Road network. Head office determines the allocations to types of maintenance (eg routine, resurfacing, rebuilding) in the RTA's six regions. The regions are responsible for maintaining roads and bridges in accordance with local needs.

The Government's first priority is to maintain roads

The 1998 policy document *Action for Transport 2010* stated that the NSW Government's first priority for road spending is to maintain roads and bridges at minimum whole of life cost to ensure reliability, safety and retained value. The objective of this audit is to assess how well the RTA is doing this.

In this audit, we considered both surface and structural condition when judging road condition. The former is important for assessing driver and passenger experience, while the latter gives some insight into asset life and the need for replacement.

Many factors influence road condition, including how well and to what design standard the roads were built in the first place, the wear they have experienced from traffic, how frequently they have been dug up to install and repair public utility services (e.g. telephone or electricity lines, water or gas pipes), weather conditions, and how they have been maintained.

The RTA faces a number of challenges in maintaining State Roads

Modern traffic loads are generally much higher than many roads and bridges on State Roads were designed to cope with. For example:

- legal load limits for trucks have increased by 40 per cent since the 1960s
- travel on NSW roads has almost doubled in the last 25 years, and heavy vehicle travel is growing at a faster rate than other travel
- lower-profile, high pressure tyres on newer trucks cause more damage than conventional tyres.

Commercial vehicle traffic loads have the most impact on condition. Heavy vehicles have much higher axle loads and cause most of the damage to roads.

1.2 What is the surface condition of State Roads?

Our assessment

The RTA has good information on the surface condition of State Roads. This information shows that the RTA has improved overall road surface condition in the last decade. The improvement has been on country roads. The surface condition of Sydney roads is worse.

The RTA collects and analyses data on key surface condition indicators

Important measures of surface condition include:

- ride quality, measured by smooth travel exposure
- roughness
- cracking.

The RTA collects data on other indicators, such as rutting and skid resistance. It uses this data to inform regional decision-making, but does not undertake a statewide analysis of it.

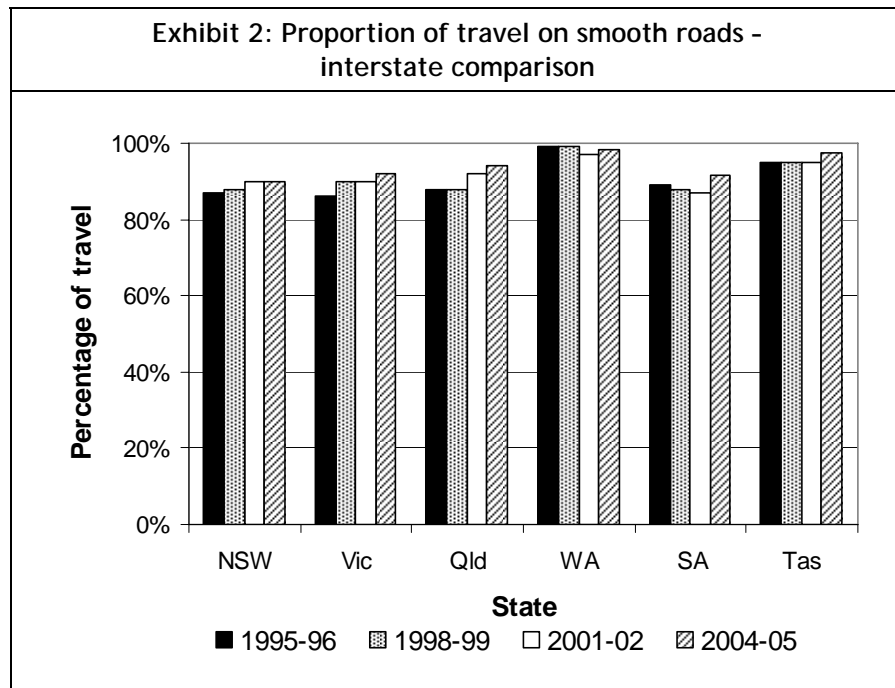


Source: The Audit Office of NSW 2006.

Ride quality has improved

A measure of ride quality is the proportion of travel on smooth roads. Smoother roads are more comfortable to drive and ride on. Ride quality also affects road user costs. Smoother roads cause less damage to vehicles and save fuel.

The proportion of travel undertaken each year on smooth roads has improved since 1995-96 but is currently below all other States. Smooth roads have a surface roughness less than 110 NRM (NAASRA Roughness Meter). NAASRA was the National Association of Australian State Road Authorities, a predecessor of Austroads. Austroads is the association of Australasian road authorities.

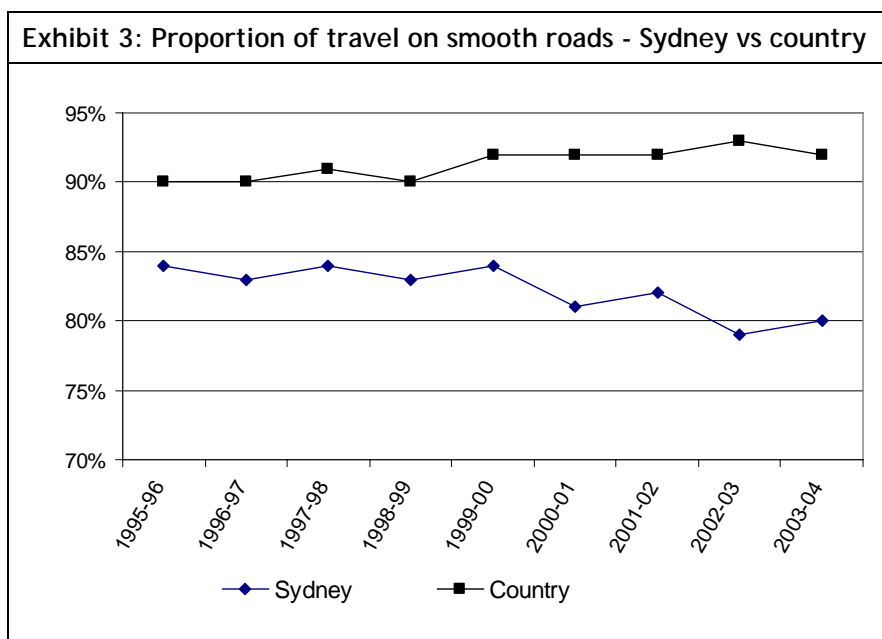


Source: Austroads 2006

Ride quality on Sydney roads has declined

Ride quality on country roads increased over the last decade, and is now similar to Victoria and Queensland. Yet ride quality on Sydney roads has fallen during this period, and is below other state capitals.

The RTA advises this reflects its strategy to give high priority to improving smoothness and sealing on high-speed rural roads made from moisture sensitive materials.



Source: Austroads 2006.

Roughness on Sydney roads is worse than country roads

The RTA rates how rough its roads are. Overall, it rates about 88 per cent of State Road length as 'good'. Yet, it rates only 77 per cent of Sydney's State Road length as 'good' and more than nine per cent as 'poor'.

Exhibit 4: Roughness ratings for road network by region

| RTA region | Good (%) | Fair (%) | Poor (%) |
|--------------|-------------|------------|------------|
| Sydney | 77.2 | 13.3 | 9.5 |
| Northern | 90.8 | 6.6 | 2.6 |
| Hunter | 89.8 | 7.4 | 2.9 |
| Southern | 94.6 | 3.8 | 1.6 |
| South West | 91.1 | 6.7 | 2.2 |
| Western | 88.5 | 8.3 | 3.2 |
| Total | 88.5 | 7.8 | 3.6 |

Source: The RTA 2006.

Note: Good roughness is less than 70 NRM, fair is between 70 and 110, and poor is more than 110.

Some road segments have structurally unsatisfactory roughness

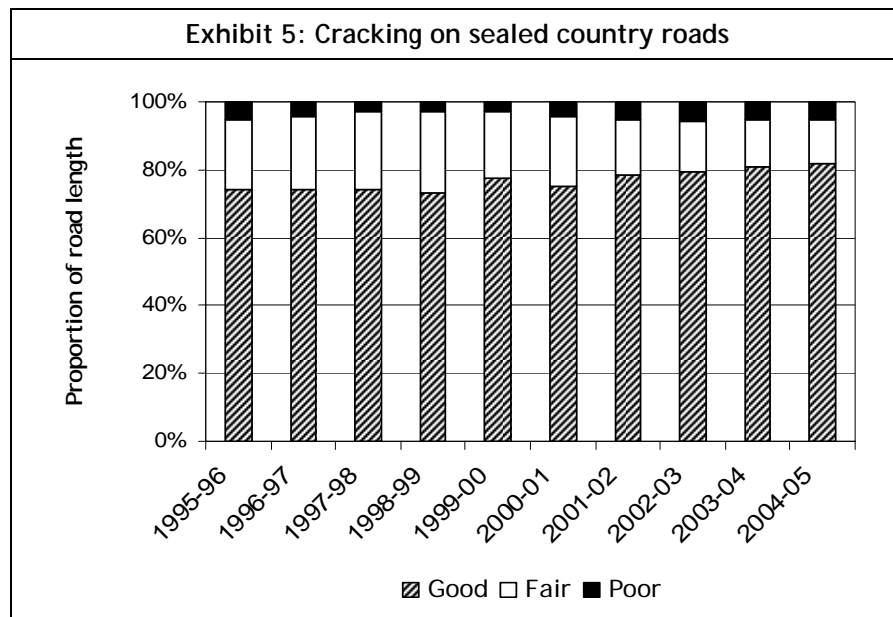
Some segments of State Roads have been identified by the RTA as having 'structurally unsatisfactory roughness'. The RTA defines structurally unsatisfactory roughness as 110 NRM or above for major routes (ranked 4, 5, and 6) and all concrete pavements, and 140 NRM or above for other routes (ranked 1, 2, and 3) with flexible pavements. Chapter 2 discusses the RTA's road ranking system.

The RTA estimates that about seven per cent or 1,500 kilometres of the network has 'structurally unsatisfactory roughness'. This has been relatively constant this decade.

Cracking on country roads has improved

Cracking on sealed roads is an indicator of road durability. Cracks let water in, which can cause the road to deteriorate prematurely. Trend data on cracking is only available for country roads because it was too dangerous and costly to collect data in Sydney before the RTA introduced automated data collection in the late 1990s.

The RTA rates roads as 'good', 'fair', or 'poor' for cracking. The percentage it rates 'good' has grown since 1995-96 (i.e. improved), but the percentage it rates 'poor' has also grown since 1999-2000 (i.e. worsened).



Source: The RTA 2006.

1.3 What is the structural condition of State Roads?

Our assessment

The structural condition of roads and their remaining expected life is difficult to estimate, and the RTA is working on a better method for this. The structural condition and expected remaining life of State Roads is declining as a consequence of the RTA deferring road rebuilding works. While the level of rebuilding will fluctuate, the RTA acknowledges the rate of rebuilding so far this decade is not sustainable.

Roads wear out and need to be rebuilt

The State Road network is NSW's largest public asset and is valued at \$69 billion, including the value of land under roads.

The early part of the maintenance cycle of a road pavement involves routine pothole patching, heavy patching of larger failures, and resurfacing.

Even with this, pavements need to be rebuilt from time to time to ensure their continued safety and reliability. In this report, we use the term rebuilding to refer to both rehabilitation and reconstruction. Reconstruction is the replacement or upgrading of an existing asset generally in the same location and on the same alignment as the asset being replaced.

Rehabilitation involves structural enhancement to extend the service life of an existing asset or improve its load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.

Remaining life is difficult to predict

An indicator of the structural condition of a road or bridge is its expected remaining life. Remaining life is important to:

- estimate long-term future funding needs
- determine appropriate intervention options and timing
- estimate asset depreciation.

Expected remaining life (also sometimes referred to as remaining functional life or residual life) is the period before the structure of a pavement reaches an 'investigatory' condition. Past this point, even though the road may be serviceable it is not possible to predict how long it will remain so. Expected remaining life is a similar concept to supermarket 'shelf-life'.

Understanding the underlying structural condition of roads and their remaining life is a challenge for all road agencies. These factors are difficult to measure and predict. They depend on how the road was built, and its exposure to water penetration and heavy vehicle traffic over time.

Surface indicators do not always reflect remaining life well. For example:

- rough roads are not necessarily weak and falling apart
- cracks can be sealed over so the surface looks good without improving structural condition.

Current methods to assess remaining life are not adequate

The RTA estimates the remaining life of road segments using:

- expert evaluation and peer review
- data from sites where rebuilding has been needed to address structural fatigue
- information about pavement age and traffic estimates.

The RTA is working on a better method to estimate remaining life

The RTA agrees that a better method is needed. The RTA reports it is leading research into the latest models to forecast remaining life and the effects of different treatments on this. These models use:

- samples of current pavement strength
- the thickness and stiffness of materials in the sampled pavements
- information on moisture conditions
- projections of traffic volumes and types.

This research project is likely to take two to three years to complete.

The RTA says that if the project succeeds in developing a more robust method to estimate remaining life, it will provide:

- more accurate assessments of road condition
- critical input to asset management and maintenance planning.

The RTA is using similar technical theories to those used in the United Kingdom.

Exhibit 6: Estimating the remaining life of a road

A model capable of predicting the future performance of individual sections of road within the road network is being used in the United Kingdom. The model takes into account:

- the deflection of the road surface
- heavy traffic loading, recognising the fourth power law and that heavy vehicles are responsible for almost all pavement wear
- the construction thickness of the road and traffic borne over the pavement's life.

This is used to estimate the life of a road which in turn is used for maintenance planning and public reporting on road structural condition.

Source: UK Department of Transport 2005

Recommendation

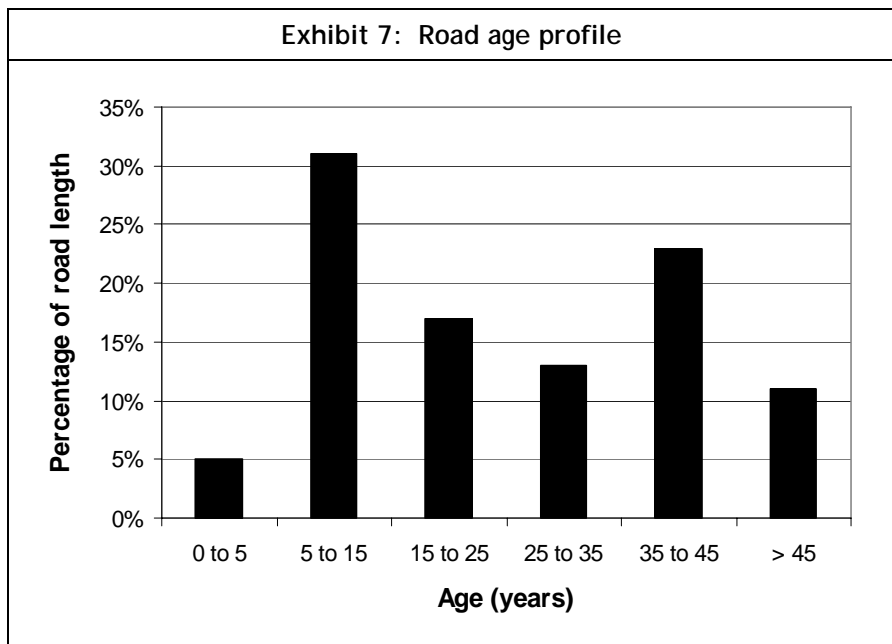
We recommend that the RTA finalise its current research and develop by 2008 a more rigorous and reliable method to assess the expected remaining life of roads.

The RTA has deferred road rebuilding

The RTA's *2003-08 Infrastructure Maintenance Plan* indicates that:

- roads are an ageing asset
- rebuilding has been below target
- ageing roads and deferred rebuilding present a risk to safety, reliability and future costs.

Although considerable rebuilding work was done in the 1990s, about one-third of the State Road network was built (or rebuilt) in the 1960s or earlier. Another 13 per cent was built in the 1970s. Many roads built in the 1950s and 1960s are approaching the end of their expected life and are unlikely to continue providing a reasonable level of service.

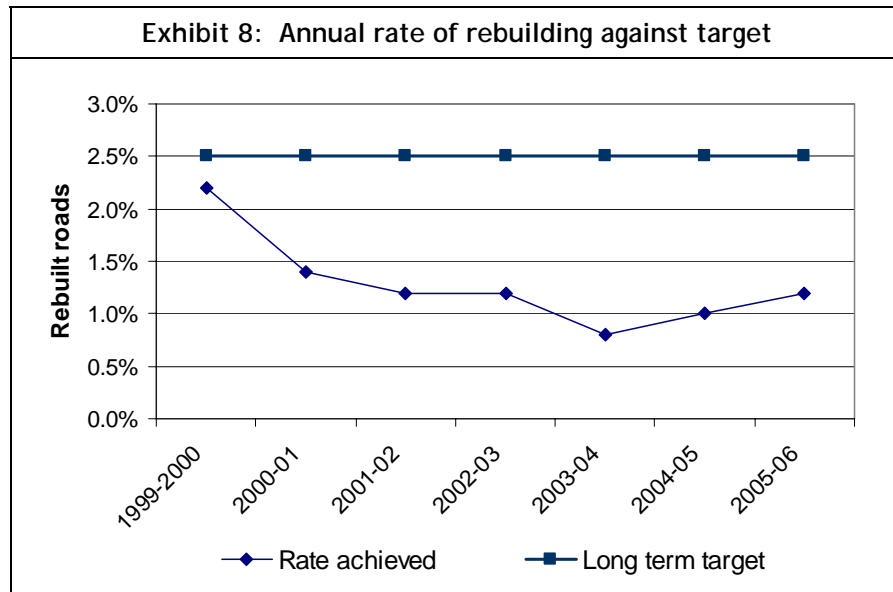


Source: The RTA 2006.

The average expected life of the RTA's roads is about 40 years, based on its current estimating method. Roads need to be rebuilt at around 2.5 per cent (about 475 kilometres) each year on average, and the RTA has adopted this as its long term target.

The RTA has been unable to meet its rebuilding target

The RTA has been unable to meet this target since 1999-2000. The rebuilding rate in 2005-06 was 1.2 per cent. It has been between 0.8 and 1.2 per cent since 2001-02.



Source: The RTA 2006.

The rebuilding rate is not sufficient to ensure the network will remain serviceable

The RTA considers the current rebuilding rate is not sufficient to ensure the long-term viability of the network, and it needs to be increased.

At the current rate, roads will reach an average age of 83 years before they are rebuilt, exceeding the RTA's target of rebuilding roads every 40 years on average.

Recent RTA technical research suggests around 16 per cent or 3,000 kilometres of State Road has reached its expected life making its future performance unpredictable. The RTA advises:

- these road segments are mainly in urban low-speed areas and made from more moisture resistant material
- no State Road is closed or subject to load or speed restrictions due to condition.

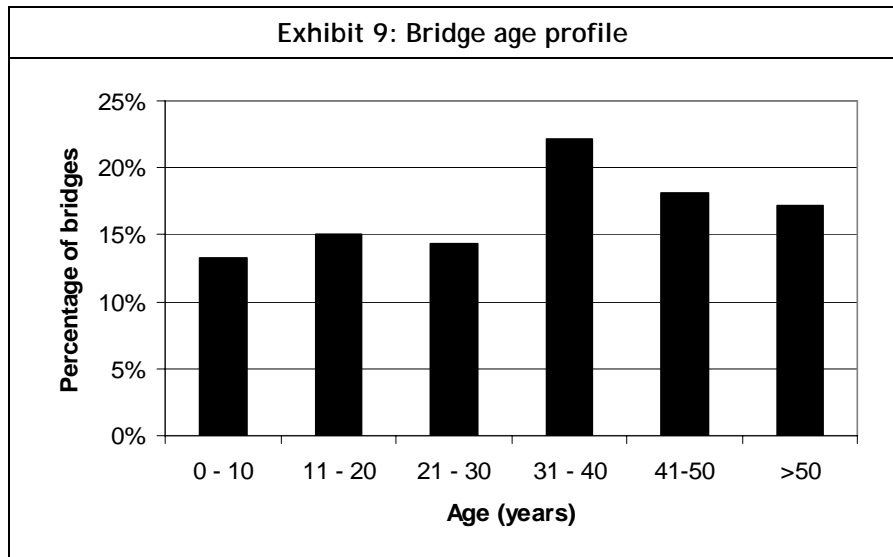
1.4 What is the condition of bridges on State Roads?

Our assessment

The RTA has good information on the current condition of bridges, but as with roads it needs better information to predict their future structural condition. The RTA has improved bridge condition over the last decade, but condition may be starting to decline again.

There are almost 5,000 bridges on State Roads

The RTA controls almost 5,000 bridges on State Roads. Bridge design standards have changed over time. The standard for bridges today is higher than those for bridges designed before 1976, and much higher than for bridges designed before 1948. The RTA is evaluating bridges built before 1948 to determine whether they are able to carry heavy vehicle loads with an adequate safety margin. Many of its old bridges are heritage listed, and many are made of timber.



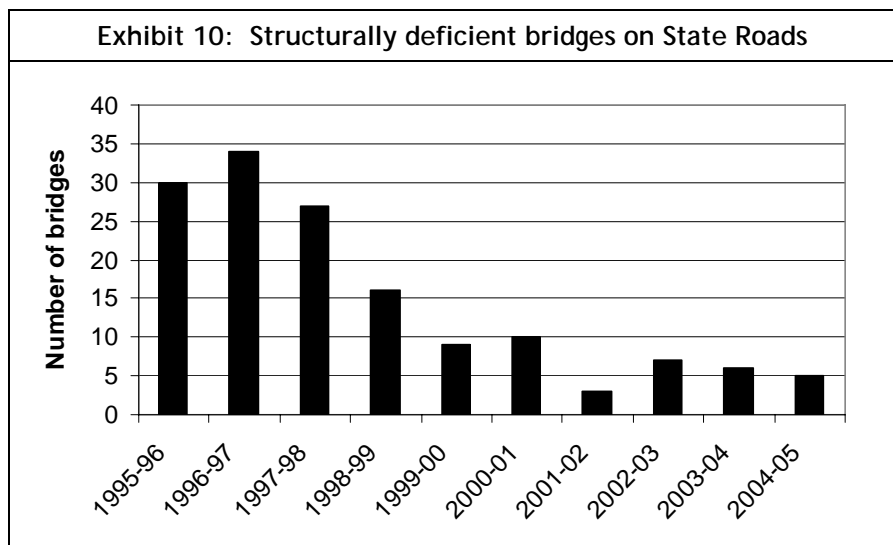
Source: The RTA 2006

Today, there are fewer structurally deficient bridges

A bridge is structurally deficient if it has:

- load or speed limits
- been closed or washed away
- been temporarily strengthened.

The RTA has reduced the number of structurally deficient bridges since the mid 1990s. By the end of 2005-06 there were no structurally deficient bridges on State Roads.



Source: The RTA 2006

The RTA's strategy to at least hold overall bridge condition has not been entirely successful

The RTA uses the results of regular bridge inspections to judge bridge condition.

The RTA rates only two per cent of its bridges as poor, a considerable improvement since 2003. But the RTA's current strategy to at least hold the condition of its bridges, as outlined in its *2003-08 Infrastructure Maintenance Plan*, has not been entirely successful.

The number in fair condition has been growing as a result of bridges declining from good to fair. The number of good bridges has also been increasing because the RTA has been building new bridges. In 2003, 58 per cent of its bridges were in good condition compared to 56 per cent in 2006.

| Exhibit 11: Bridge Condition Index | | | | | | | | |
|------------------------------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|
| Year | 2002-03 | | 2003-04 | | 2004-05 | | 2005-06* | |
| | No. | % | No. | % | No. | % | No. | % |
| Good | 2,454 | 58 | 2,526 | 55 | 2,507 | 55 | 2,680 | 56 |
| Fair | 1,654 | 39 | 1,936 | 42 | 1,964 | 43 | 2,044 | 42 |
| Poor | 137 | 3 | 98 | 2 | 98 | 2 | 95 | 2 |
| Total | 4,245 | 100 | 4,560 | 100 | 4,569 | 100 | 4,819 | 100 |

Source: The RTA 2006.

Note: * Data up to February 2006 only.

While the RTA's bridge inspection program provides good information on the actual condition of its bridges, as with roads it needs to improve its assessment of the future structural condition of bridges. Currently the RTA relies on professional judgement, although this is an industry-wide problem being considered by AustRoads.

Recommendation

We recommend that the RTA develop by 2009 a more rigorous and reliable method to assess the future structural condition of bridges.

1.5 How well does the RTA assess condition?

Our assessment

The RTA uses leading edge technology and visual inspections to assess surface condition. As discussed earlier, the RTA needs to improve its method of assessing structural condition and remaining life.

The RTA collects data on several condition indicators

The RTA collects road condition data such as skid resistance, roughness, rutting, texture and cracking across the network each year using automated means.

The RTA uses this data to:

- assess the overall surface condition of the network
- help plan maintenance
- identify where a visual inspection is needed to determine the appropriate maintenance treatment.



Exhibit 12: RoadCrack automated data collection

The RTA, in conjunction with the CSIRO, developed and patented new mobile technology ('RoadCrack') to assess pavement cracking. The RTA and CSIRO have won innovation awards for this technology. It is now being used in other States.



Source: The RTA 2005.

The RTA inspects bridges regularly

The RTA visually inspects all bridges on a two yearly cycle except:

- timber bridges, which are inspected every 12 months
- bridges in poor condition, which are inspected at least every 12 months until rectified.

Specialists inspect bridges in poor condition or those that present a risk to safety or reliability.

2. What condition should State Roads be in?

At a glance

The key question we wanted to answer was:
 What condition should State Roads be in?

Our assessment:

The RTA ranks State Roads according to function and use with the aim of keeping the more important roads and bridges in better condition. The RTA has specified maintenance intervention standards for State Roads including minimum standards for the timely repair of potholes, edge breaks and other routine maintenance.

Specifying appropriate condition standards is essential for good asset management, but the RTA has yet to do this for State Roads. It therefore cannot judge if a gap exists between actual and appropriate condition, nor can the Government, Parliament or the public.

The absence of condition standards also makes it difficult for the public and the Government to judge if the condition the RTA is aiming for is adequate or how well the RTA is managing State Roads.

The RTA has started work on developing appropriate condition standards, and should give priority to completing this work.

2.1 Has the RTA determined the service levels required of State Roads?

Our assessment

The RTA ranks each road based upon its strategic importance, freight use, traffic volumes and travel speed. It aims to keep higher ranked roads in better condition, so that they can provide higher service levels.

The RTA ranks its roads

The RTA ranks State Roads according to their function and use.



| Exhibit 13: Road ranking | |
|--------------------------|--|
| Ranking | Description |
| 1 | Low significance, typically with low volumes of traffic |
| 2 | Moderately low significance, with fairly low traffic volumes or providing a minor freight task |
| 3 | Moderate significance, with moderate traffic volumes or providing an intermediate level of freight movement |
| 4 | High significance, with moderately high traffic volumes or providing a major level of freight movement |
| 5 | Major significance linking major centres with high volumes of vehicles or major intra-state freight routes |
| 6 | Most significant roads in the state, typified by extremely high volumes of vehicles or major national freight routes |

Source: The RTA 2005.

Exhibit 14: Road rebuilding

John Renshaw Drive near Kurri Kurri, before rebuilding.



John Renshaw Drive, after rebuilding



Source: The RTA 2006.

2.2 Has the RTA specified appropriate condition to deliver required service levels?

| | |
|--|---|
| Our assessment | The RTA has identified the need to develop and specify appropriate condition standards for the network and each route, but is yet to do so. |
| Appropriate condition is important for planning and for monitoring performance | <p>Appropriate condition standards are needed to determine deficiencies, and to decide what work is needed and when to address these deficiencies. A route should not be developed to better than its appropriate condition, and a route which is better than the appropriate condition may be allowed to deteriorate towards it.</p> <p>Indicators and measures are then used to monitor asset performance against the appropriate condition standards.</p> |
| The RTA guidelines refer to appropriate condition | <p>The RTA's <i>Guidelines for Developing Route Strategies (2002)</i> say that:</p> <ul style="list-style-type: none">▪ head office should develop and specify appropriate condition for the State Road network as a whole▪ regions should establish an appropriate condition for each route. <p>The RTA is yet to establish appropriate condition standards for the network or for each route.</p> <p>The 2002 guidelines also indicate that appropriate condition should include standards for:</p> <ul style="list-style-type: none">▪ lane width, shoulder width and sealed shoulder width▪ bridge width and the number of bridges with restrictions on use▪ roughness and rutting▪ speed zones▪ pavement marking▪ crash rates▪ horizontal and vertical alignment, and stopping sight distance. <p>In addition, appropriate condition standards should be set for ride quality and structural condition.</p> |
| Recommendation | We recommend that the RTA complete by 2008 its work on specifying appropriate condition standards for roads, and by 2009 for bridges. |
| The RTA has implemented initiatives which should help it determine appropriate condition | <p>The RTA has already implemented a number of initiatives which should help it define appropriate condition. These include:</p> <ul style="list-style-type: none">▪ limiting the exposure of road users to unexpected defects, such as potholes, broken edges and slippery surfaces through its routine maintenance contracts▪ minimum condition standards which it uses to trigger inspections and prioritise maintenance work (eg roughness, rutting, cracking)▪ guidelines which have been developed by each region and which they use to specify new works▪ new draft pavement rebuilding guidelines, which the RTA believes will deliver greater safety benefits per dollar spent. |

The RTA's work to develop pavement remaining life models described in Chapter 1 may also help it define appropriate condition.

2.3 Has the RTA determined the gap between actual and appropriate condition?

Our assessment The RTA has not determined if a gap exists between actual and appropriate condition, because it has not determined what the appropriate condition standards should be.

There are, however, indications of a gap, including that about 15 per cent of the network is either very rough, very cracked or both (see Chapter 1).

Recommendation We recommend that the RTA:

- assess if a gap exists between the actual condition of roads and bridges and appropriate condition standards
- determine what it needs to do to raise the network to appropriate condition standards, and long term funding needs.

3. What is the RTA doing to address any gap?

Of At a glance

The key question we wanted to answer was:

What is the RTA doing to address any gap between actual and appropriate condition?

Our assessment:

The RTA allocates its maintenance money on the basis of risk, giving priority to availability and safety of roads and bridges. Its approach balances head office control and local decision making. The RTA needs, however, to ensure all its regions adopt a consistent risk assessment approach and to improve its systems to help staff identify the best maintenance solutions.

The RTA has not identified how it will address deferred rebuilding. It needs to document when rebuilding will catch up, what the increase in long term costs will be, and how it will get the money needed. The RTA advises that it is developing a new road network management plan which will address deferred rebuilding.

The RTA's 2003-2008 Infrastructure Maintenance Plan acknowledged that it was not doing enough rebuilding to ensure the long-term viability of the network, thereby presenting a risk to safety and reliability, and of higher repair costs. The RTA needs to examine and model the relationship between spending, safety and condition so that it can give its Minister and Treasury more detailed advice on the implications of funding decisions. The RTA should also report publicly on its progress in addressing deferred rebuilding.

We recognise that tension exists between the need to develop new roads while maintaining the existing network. Yet the Government's priority is maintenance, including rebuilding. Total maintenance spending has grown by 20 per cent in real terms since 1995-96, but spending on developing the network has grown by more than 50 per cent. During this period, NSW's contributions to maintenance and to development have grown by about a third. The Commonwealth's contribution to development more than doubled whereas its contribution to maintenance has fallen by about a fifth.

The RTA advises that Commonwealth funding arrangements reduce its capacity to redirect funds to rebuilding, but it may need to do so to ensure the future viability of the network.

The RTA also faces a problem rebuilding very busy metropolitan roads and bridges. Traffic flow and congestion means crews can only work on them for a few hours at a time, usually in the middle of the night. The RTA advises this is not an optimal approach, but it assumes the disruptions caused by closing a road or lane for an extended period would be unacceptable to the community. The RTA should put these options and their respective costs and benefits to the Minister to decide.

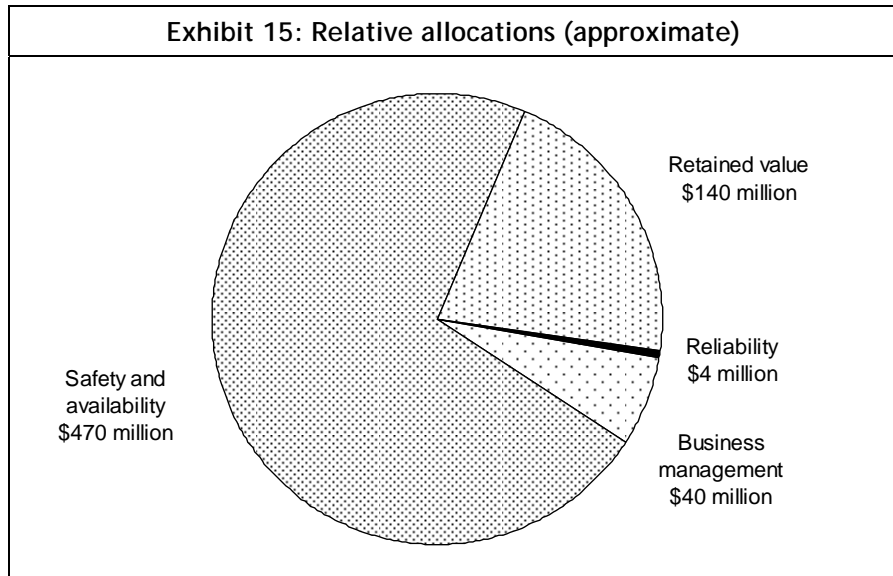
3.1 Does the RTA allocate its maintenance money well?

Our assessment

The RTA allocates its maintenance money on the basis of risk, giving priority to safety and availability. But the RTA needs to do more to ensure consistent assessment of priorities between regions and to assist staff to identify the best maintenance solutions.

The RTA gives priority to ensuring route availability and safety

The RTA's head office gives funding priority to maintenance programs which mitigate risks to route availability and the safety of roads and bridges. It allocates remaining funds to retaining the value of the network, and finally to reliability.



Source: The RTA's Infrastructure Maintenance Plan 2003-2008, Interim funding projection for 2004-05.

| Exhibit 16: Maintenance programs by objective | |
|---|--|
| Objective | Key programs |
| Safety and availability | <ul style="list-style-type: none"> ▪ Routine pavement (eg pothole filling, edge repair) ▪ Routine bridge and minor rehabilitation ▪ Heavy pavement patching ▪ Pavement resurfacing ▪ Bridge structural capacity |
| Retained value (rebuilding) | <ul style="list-style-type: none"> ▪ Pavement rehabilitation ▪ Pavement reconstruction ▪ Major bridge rehabilitation ▪ Major repainting |
| Reliability | <ul style="list-style-type: none"> ▪ Pavement formation widening and shoulder sealing ▪ Improve bridge clearances ▪ Initial pavement sealing |

Source: The RTA's Infrastructure Maintenance Plan 2003-2008.

The RTA's head office allocates money to regions in accordance with its maintenance plan for each key program. The amount each region receives is based on need. Regional asset managers then decide how to allocate money to projects within each program based on their assessment of local risks.

Head office approval is required:

- for major rebuilding (reconstruction) projects
- if regional asset managers want to move money between programs.

Each region uses its own method to determine priorities

Each region uses its own method to determine priorities within a broad framework established in the Maintenance Plan and set by head office. While we are satisfied this ensures reasonable consistency within a region, there is a risk that assessments may be inconsistent between regions. As a consequence, there is a risk that the highest priority projects from a statewide perspective may not always be given highest priority by regions.

Recommendation

We recommend that the RTA ensure regions use a consistent method to assess risks and determine maintenance priorities and treatments.



Allocating resources based on risk is a good asset management practice. The RTA's current approach provides a good balance between central control to manage network-wide risks and allowing local managers to make decisions based on their local knowledge.

The RTA has been working on some enhancements to help it to:

- better analyse risks and determine program allocations
- more objectively and transparently allocate funds to regions
- improve consistency in the way in which regions assess priorities.

| Exhibit 17: Improving the maintenance resource allocation process |
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|--|

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|---|
| The RTA's planned improvements to the allocation process include: |
|---|

- | |
|--|
| <ul style="list-style-type: none">▪ regions reporting on the annual works program, including reporting on accomplishments against plans▪ preparing a 'state of the assets' report▪ introducing more sophisticated funding distribution algorithms which better reflect need▪ introducing a more transparent, consistent and rigorous project ranking process. |
|--|

| |
|---|
| The RTA expects these to be implemented in 2006-07 and 2007-08. |
|---|

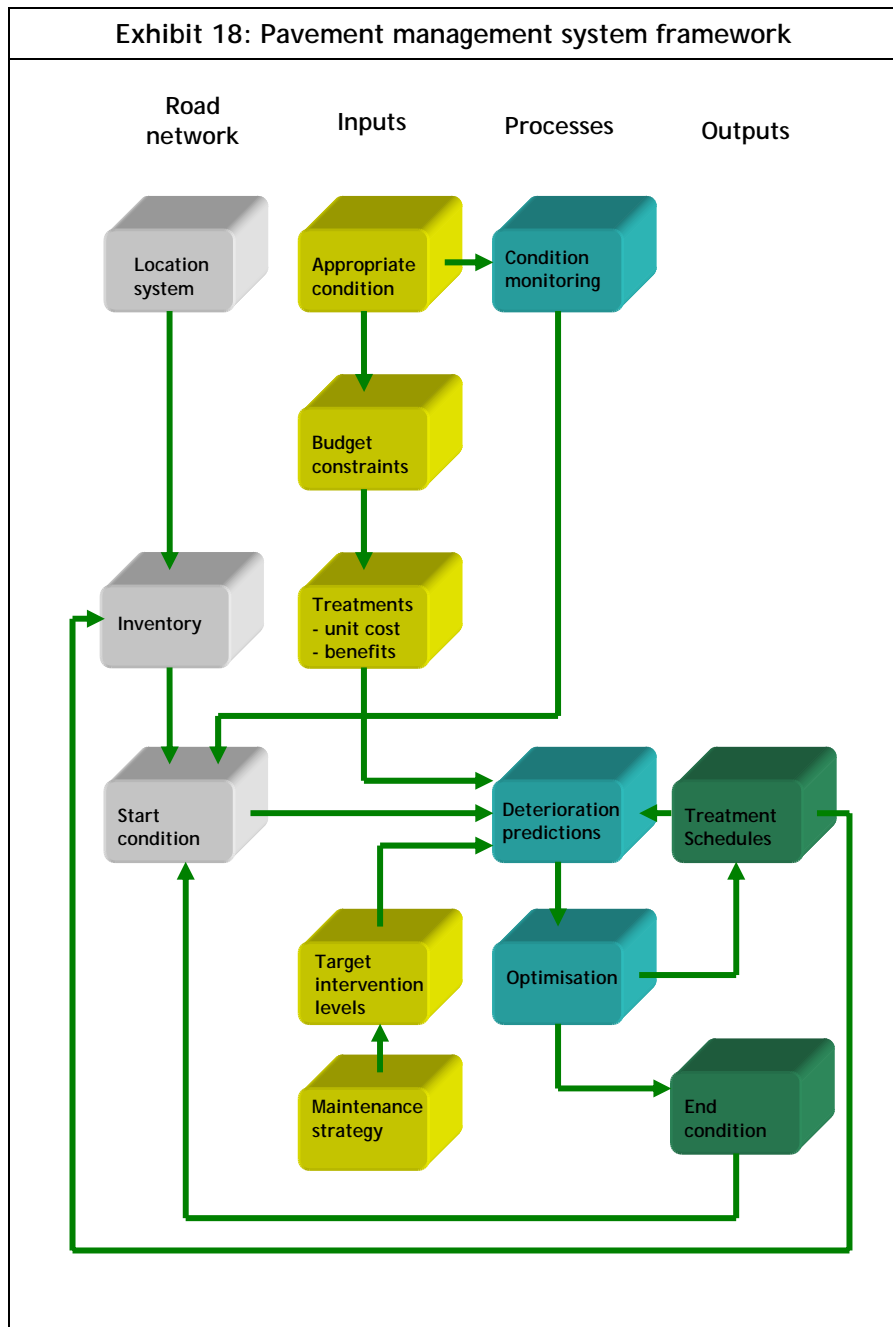
Source: The RTA 2005 and 2006.

The RTA needs to improve its modelling capability

The RTA currently does not have a state-wide computerised road Pavement Management System (PMS) with predictive and modelling capability.

We expected that the RTA would use a computerised system for scenario planning ie to simulate the effect of different funding scenarios on the life of the asset, future condition and costs. This would help it determine maintenance strategies and prepare network plans and regional work programs.

The RTA does, however, have a pavement management system comprising many of the components in Exhibit 18.



Source: Adapted from AustRoads 2006.

At present these components are largely separate, and analysis of the data in them is generally paper based and manual. As a result, the RTA's capacity to model different investment scenarios and predict future condition is limited. For example, the RTA is not able to determine accurately the optimal maintenance solutions to minimise long term costs, or work out what condition different funding levels will deliver over time.

Pavement management systems which predict road deterioration are used by road authorities in other Australian States and overseas to help develop their maintenance programs. However, the extent to which these are used to determine maintenance priorities is less clear.

Computerised modelling systems were used by the RTA's predecessor, the Department of Main Roads, in the late 1980s but were later abandoned due to high operating costs and poor modelling outcomes.

We recommended in 1999 that the RTA consider implementing a computerised PMS. The RTA agreed and carried out an investigation in 2002, but did not find any suitable system. The RTA considered the available systems relied too heavily on surface condition measurements and did not take sufficient account of structural fatigue. Sydney region has continued to use one it had trialled but other regions have adopted their own less sophisticated systems.

The RTA has since proceeded with research and development of structural fatigue models to determine remaining life (see Chapter 1) as a precursor to reconsidering pavement management systems.

Recommendation

We recommend that the RTA investigate and implement improved systems to help staff identify the best maintenance solutions.

The RTA needs a strategy for rebuilding busy roads and bridges

The RTA also faces a problem rebuilding very busy, worn metropolitan roads and bridges. Large sections of Victoria Road, Parramatta Road, Anzac Parade and the like need to be rebuilt.

Traffic flow and congestion means crews can only work on them for a few hours at a time, usually in the middle of the night. The RTA advises this is not an optimal approach, but it assumes the disruptions caused by closing a road or lane for an extended period would be unacceptable to the community.

We recognise this would be very unpopular with some, even if it was in the best interests of the community as a whole. So the RTA cannot make these decisions on its own. The RTA should put these options and their respective costs and benefits to the Minister to decide.

Recommendation

We recommend that the RTA prepare a submission to the Minister outlining the costs and benefits to the community of closing roads or lanes for an extended period to allow rebuilding, compared to the current approach of undertaking work in the middle of the night.

3.2 Has the RTA identified any funding shortfall and clarified its implications?

| | |
|---|---|
| Our assessment | <p>Despite a one-third increase in the NSW Government's contribution to maintenance in the last decade, the RTA has not been meeting its rebuilding target. The RTA has identified a funding shortfall and reported to the Government that this presents a risk to future service levels and repair costs. It does not yet have the modelling capability, however, to quantify accurately the potential consequences for safety, reliability and repair costs.</p> |
| Maintenance funding has increased | <p>The NSW Government has increased its contribution to road maintenance by about one-third in the last decade. This has helped the RTA achieve the overall improvements to ride quality and bridge condition discussed in Chapter 1.</p> |
| The RTA is not spending enough on rebuilding roads | <p>The recent increase in maintenance spending has not been enough to stop rebuilding being deferred. The RTA's <i>2003-08 Infrastructure Maintenance Plan</i> indicates that it has not been spending enough on rebuilding to ensure the long-term viability of the network.</p> <p>The <i>Plan</i> includes an estimate of what the RTA needs to spend in the short term (five years) to start to address deferred rebuilding. The RTA has not estimated, however, what it needs to do after 2008 to ensure the long term viability of the network. The RTA advises that it is preparing a new road network management plan which will address this and consider ten and 20 year horizons.</p> <p>If rebuilding is left too long, lower order treatments such as heavy patching need to continue longer than they should, increasing maintenance costs in the long term. There is also a risk on some roads that deferring rebuilding for too long may lead to damage in the sub-structure of the road. In such cases, the option of rehabilitation may be lost with more costly total reconstruction becoming the only viable option.</p> <p>The RTA's <i>Plan</i> states that under-funding and deferral of rebuilding represents a risk to safety and reliability and a high risk to future costs. The RTA has not, however, quantified the:</p> <ul style="list-style-type: none">▪ risks to safety and reliability▪ the impact on future repair costs▪ the rebuilding rate required in future years. <p>The RTA advises that it does not yet have the modelling capability to do this.</p> |
| Recommendation | <p>We recommend that the RTA:</p> <ul style="list-style-type: none">▪ extend the planning horizon for asset management and maintenance to at least ten years▪ investigate and implement potential models to quantify the risks to current and future road safety and reliability of travel, as well as the cost of repair, for various funding levels. |

3.3 Does the RTA have a viable plan to address the gap?

| | |
|---|--|
| Our assessment | <p>The RTA has not identified how it will address deferred rebuilding. The RTA may need to consider redirecting funds to rebuilding to ensure the long-term viability of the network.</p> |
| The RTA has not identified how it will achieve a sustainable level of rebuilding | <p>The RTA acknowledges that current and planned spending will result in further deferral of rebuilding.</p> <p>The RTA has not identified how it will obtain funding to address deferred rebuilding and ensure the long-term viability of the network.</p> <p>In the absence of sufficient maintenance funding for an adequate rate of rebuilding, we expected that the RTA would have sought to redirect funding from elsewhere in its budget given that:</p> <ul style="list-style-type: none">▪ the NSW Government's statement in <i>Action for Transport 2010</i> that its first priority (for road spending) is to maintain roads and bridges at minimum whole of life cost to ensure reliability, safety and retained value▪ Treasury's <i>Total Asset Management Guidelines</i> say that maintenance (including rebuilding) should take precedence over the acquisition of new assets when funds are limited. <p>Rather, despite rebuilding being deferred, the RTA's annual spending on new roads since 1995-1996 has increased by 51 per cent in real terms and has been well above spending on rebuilding each year.</p> |
| The RTA says Commonwealth funding practices limit flexibility | <p>The RTA advises that the Commonwealth's funding arrangements favour new work and reduce its capability to move funding from new work to rebuilding. It says that the Commonwealth Government:</p> <ul style="list-style-type: none">▪ has reduced its contribution to maintenance in NSW by almost 19 per cent since 1995-96 while doubling its contribution to new work▪ requires NSW to contribute funds to new work, tying up about 20 per cent of State road development funding over the last ten years and 35 per cent on average over the next three years▪ recently rejected recommendations of the National Transport Commission to increase heavy vehicle charges which would have allowed States to better recover the costs of road damage caused by heavy vehicles. |
| The RTA is responsible, however, for ensuring the long-term viability of the network | <p>Despite any limitations Commonwealth funding arrangements may impose, the RTA is ultimately responsible for ensuring a sufficient rate of rebuilding. Even if there are limitations, we think there may be scope to redirect funding to rebuilding given:</p> <ul style="list-style-type: none">▪ the RTA's budget for maintaining and developing the network of over \$2 billion▪ the State's contribution to developing the network grew by 36 per cent between 1995-96 and 2005-06 in real terms▪ the untied State-funded component of the RTA's development program was about \$600 million in 2005-06, and will be about \$420 million on average over the next three years. |

Recommendation We recommend that the RTA give higher priority to the rebuilding program to achieve long term sustainability at minimum whole of life cost.

3.4 Has the RTA been transparent about any condition or funding shortfall and the associated risks?

Our assessment The RTA has advised the Government that it is currently not spending enough on road rebuilding to ensure the long term viability of the network. It has not, however, stated clearly enough the extent and consequences of the shortfall. It has also not reported deferred rebuilding and its implications to Parliament or the public.

The RTA provided three funding options to the Government The RTA reported in its *2003-08 Infrastructure Maintenance Plan* that it has been deferring road rebuilding and needs to address this.

The RTA included in its *Plan* three different funding scenarios:

- maintaining approved funding: the funding committed by the Government at the time the *Plan* was prepared (2002-03)
- proposed funding: which would start to address deferred rebuilding
- interim funding: as a means of holding the surface condition of the network in the short term without addressing all the emerging needs of the ageing infrastructure.

The RTA recommended funding levels for 2003-2008 which deferred more rebuilding In 2004, the RTA recommended to its then Minister the 'interim' strategy in order to mitigate safety concerns as it considered Treasury was unlikely to fund its proposed rebuilding program. The RTA advised us that this recommendation was also designed to minimise demands on scarce funds while it improved its understanding of remaining life and hence its capability to predict future need.

It told the Minister that the recommended level would lead to further deferral of the rebuilding program, and that this presented a risk to future safety and reliability and a high risk to future repair costs. It said, however, that it would result in enough rebuilding to enable a sustainable level to be achieved some time in the future.

The RTA could have been clearer about the implications of funding shortfalls The RTA, however, has not quantified how much higher whole of life costs and the risks to safety and reliability will be under this 'interim' level of funding compared to the 'proposed' funding level. It has also not said when rebuilding will revert to a sustainable level or how it will resource the catch up.

It is important that agencies clarify for the Government the implications of under-spending so that the Government can allocate resources on a priority basis.

| | |
|--|---|
| Recommendation | We recommend that the RTA complete its new road network management plan, setting out the funding required to maintain the road network at an appropriate condition at minimum whole of life cost, including risks, any gaps between actual and appropriate condition, and rebuilding needs, and report this to the Minister and Treasury. |
| The annual report does not talk about the extent or implications of deferred rebuilding | <p>The RTA's 2004-05 annual report says that ride quality is high but gradually declining and that roads are ageing.</p> <p>It does not, however, include interstate or city/country comparisons.</p> <p>The report also does not discuss:</p> <ul style="list-style-type: none">▪ appropriate condition, or any gap between it and actual condition▪ the extent of deferred rebuilding. |
| Recommendation | <p>We recommend that the RTA report in its annual report:</p> <ul style="list-style-type: none">▪ any gap between appropriate and actual condition, and how it will address it▪ deferred rebuilding, the progress of its road rebuilding efforts, the proportion of the network past the end of its expected life, and the risks this represents. |

Appendices

Appendix 1 About the Audit

Audit objective To assess how well the RTA is meeting the Government's policy objective to maintain roads and bridges as the first priority at minimum whole of life cost to ensure reliability, safety and retained value.

Lines of inquiry In reaching our opinion against the audit objective, we sought to answer the following questions:

1. What is the condition of the State Roads?
2. What condition should they be in?
3. What is the RTA doing to address any difference?

In answering the lines of inquiry, we used the following audit criteria (the 'what should be') to judge performance. We based these standards on our research of current thinking and guidance on better practice. They have been discussed, and wherever possible agreed, with those we are auditing.

Audit criteria For line of inquiry 1, we assessed the extent to which:

- the RTA has determined the actual condition and rate of deterioration of its roads and bridges
- the RTA collects road condition data effectively.

For line of inquiry 2, we assessed the extent to which the RTA has determined the:

- current and future service levels required of its roads
- condition required of its roads to deliver these service levels
- current and likely future gap between the actual and required condition of its roads.

For line of inquiry 3, we assessed the extent to which the RTA has:

- determined optimal solutions to close the gap
- determined the priority works it will undertake with available funding
- determined the difference between available and needed funding and the implications for costs and service delivery
- developed various funding and/or demand management scenarios and the risks and benefits of each
- communicated to Treasury, the Minister and Parliament any funding gap, the consequences of the gap for current and future costs and service quality, and alternative scenarios to address any gap.

Audit scope The audit focused on the maintenance of State Roads, including pavements, bridges and earthwork structures.

It examined how work is planned, both strategically and tactically, rather than how work is undertaken or contracts awarded or administered.

Because the State Road network should be managed as a long-term, renewable asset, we defined maintenance to include rebuilding the State Road network to maintain its serviceability to road users.

Where available, we reviewed performance data for the last 5 - 10 years. The audit did not examine:

- local and regional roads
- toll roads
- roadside structures (such as rest areas) and equipment (such as traffic lights and signs)
- how road design and construction methods affect maintenance costs.

The audit also did not seek to undertake an independent assessment of road condition.

Audit approach

The audit acquired subject matter expertise through:

- engaging the services of a consultant
- interviewing staff involved in determining allocations to programs and regions
- interviewing staff involved in monitoring maintenance performance
- interviewing staff involved in determining maintenance priorities and treatments
- interviewing stakeholder representatives
- reviewing the RTA's documentation and asset management systems, both head office and regional
- reviewing the Government's asset management guidance
- analysing performance data.

We also researched practices in other jurisdictions and the work of important road research bodies to identify good practices. These included:

- Australian states
- New Zealand
- United Kingdom
- United States
- AustRoads (the association of Australasian road authorities)
- the World Road Association (PIARC)
- the OECD
- journal articles and conference papers.

We visited three of the RTA's six regions, that is, Sydney, Southern and Western regions. They represented a cross-section of metropolitan and rural regions.

Audit selection

We use a strategic approach to selecting performance audits which balances our performance audit program to reflect issues of interest to Parliament and the community. Details of our approach to selecting topics and our forward program are available on our website.

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| Audit methodology | Our performance audit methodology is designed to satisfy Australian Audit Standards AUS 806 and 808 on performance auditing, and to reflect current thinking on performance auditing practices. We produce our audits under a quality management system certified to International Standard ISO 9001. Our processes have also been designed to comply with the auditing requirements specified in the Public Finance and Audit Act 1983. |
| Acknowledgements | We gratefully acknowledge the co-operation and assistance provided by the Roads and Traffic Authority. In particular, we wish to thank our liaison officers Bob Sharpe and Neil Walker, and staff who participated in interviews, assisted with document review or provided other material relevant to the audit. |
| Audit team | <p>Our team leader for this performance audit was Rod Longford, who was assisted by Neil Avery. Jane Tebbatt provided direction and quality assurance.</p> <p>Mr Geoff Youdale, Consulting Engineer, provided expert advice throughout the audit.</p> |
| Cost | Including staff costs, printing costs and overheads the estimated cost of the audit is \$325,000. |

Appendix 2

Glossary

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| Algorithm | A set of ordered steps for solving a problem, such as a mathematical formula or the instructions in a program. |
| Arterial road | A road that predominantly carries traffic from one region to another, forming a principal avenue of traffic movement. |
| Asset management | A systematic process of effectively maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing the tools to facilitate a more organised and flexible approach to making decisions necessary to achieve the public's expectations. |
| Carriageway kilometre | The length of road formation being managed, including the sum of both carriageways in a divided carriageway section as well as ramps. |
| Cracking | A pavement defect signified by vertical splitting of the pavement due to the action of traffic or environmental loading or material characteristics, not necessarily extending through the entire thickness of a course or pavement. |
| Deferred rebuilding | Rebuilding which should have been carried out by the current year, but has not been funded. |
| Deflection | The elastic (recoverable) vertical movement at the surface of a pavement due to the application of a load. |
| Deterioration rate | The rate of change in asset condition from one year to another. The rate typically varies over time and may also be referred to as the 'deterioration curve'. |
| Edge break | A pavement surface defect in which the edge of the bituminous surface is fretted, broken or irregular. |
| Expected remaining life | The expected period before the structure of a flexible or flexible composite pavement reaches an 'investigatory condition'. At this point further deterioration is no longer predictable, so that even though the road may be serviceable it is not possible to predict how long it will remain so. Residual life is therefore a similar concept to supermarket 'shelf life'. |
| Flexible pavement | Generally any pavement in which concrete is not used as a construction layer. |
| Fourth power law | Pavement wear and tear follows the 'fourth power law', that is, road wear per axle is proportional to the fourth power of the axle load. |
| Full-depth asphalt pavement | The process of constructing an asphalt pavement structure using asphalt products for all components. The base material and surface courses are all made up of appropriately specified grades of hot-mix asphalt in contrast to conventional paving using crushed stone materials etc. |

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| Level of service (service level) | A generic term used to describe the quality of services provided by the asset under consideration. Road agencies usually define levels of service in terms of the convenience of travel and safety performance of the road network. Depending upon various factors such as demand or importance, a higher level of service may be required for some assets compared to others. |
| Load or speed restrictions due to road condition | A reduction in the availability of the major arterial (State) Roads for travel involving mass, lane restriction or speed limits arising from the condition of the asset. This applies to all general access vehicles together with specially permitted heavy vehicles allowed on that specific route. This excludes sites where roadworks are being undertaken, sections damaged by declared natural disasters, or sections where speed limits have been imposed due to other reasons such as alignment and built-up areas. |
| Maintenance | All actions necessary for retaining an asset as near as practicable to its original configuration and condition, or reducing its deterioration. Any activity carried out on an asset to ensure that the asset continues to perform its intended function, or to repair the asset. In this audit, we define maintenance to include asset rebuilding. |
| NAASRA roughness meter | A standard mechanical device used extensively in Australia and New Zealand since the 1970s for measuring road roughness by recording the upward vertical movement of the rear axle of a standard station sedan relative to the vehicle's body as the vehicle travels at a standard speed along the road being tested. A cumulative upward vertical movement of 15.2 mm corresponds to one NAASRA Roughness Count (1 NRM/km). |
| Patch | An area where the pavement has been removed and replaced with a new material. |
| Pavement | The portion of the road placed above the subgrade for the support of and to form a running surface, for vehicular traffic. A pavement usually comprises subbase, base and wearing surface layers. |
| Pavement management | A systematic method of information collection, analysis and decision-making, designed to permit the optimal use of resources for the maintenance, rehabilitation and reconstruction of pavements. |
| Pothole | A bowl-shaped depression in the pavement surface. |
| Preventative maintenance | Maintenance activity before or at an early stage in the development of one or more defects, aimed at preventing occurrence or progression of the defect(s), usually undertaken on a proactive rather than reactive basis. |
| Project level | A type of road condition survey or data analysis where the main purpose is to assist with decisions about proposals for a specific project on a short length of road, as distinct from network decisions. |
| Rebuilding | In this audit, rebuilding includes both reconstruction and rehabilitation. |

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| Reconstruction | Construction of a new asset which replaces or upgrades an existing asset generally in the same location and at essentially the same alignment as the asset being replaced - the existing asset will no longer be in service. Examples include formation or bridge widening, pavement or bridge strengthening, and local improvements such as at curves and intersections. The cost of reconstruction is a capital cost. |
| Rehabilitation | Structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays. |
| Reseal | A sprayed seal applied to a surface which has an existing seal. |
| Rigid pavement | A pavement with a Portland cement concrete base. |
| Road base | Generic term for material installed prior to asphalt paving. May be a crushed stone or asphalt product. The base material provides the load bearing characteristics of the finished pavement. Lack of adequate base material is a primary cause of pavement failures. |
| Road kilometre | The end to end length of a route, excluding ramps etc. |
| Roughness | A condition parameter to characterise deviations from the intended longitudinal profile of a road surface, with characteristic dimensions that affect vehicle dynamics (and hence road user costs), ride quality and dynamic loading on pavements and bridges. In Australia, it is usually reported in NAASRA Roughness Meter counts (NRM, counts per kilometre). |
| Routine maintenance | Small mainly reactive works which are normally anticipated within a budget timeframe, but their precise nature, location and timing are not known in advance. Routine maintenance mainly consists of minor activities planned on a short term basis, usually about two weeks or less. |
| Rutting | A condition parameter to characterise the transverse profile of a road surface. Rutting is a form of pavement deformation being a longitudinal depression in a road surface, usually but not always in a wheelpath, with a length/width ratio greater than 4:1. |
| Segment | A section of road within which the road service level standard is consistent. Segments are defined on the basis of uniformity of inventory, treatment history, condition and use. Most pavement management systems rely on dividing a road network into a manageable number of segments to simplify analysis. A segment for pavement management purposes is generally between 500 m and 5 km long in rural areas (much shorter in urban areas). |
| Shoulder | The portion of the carriageway beyond the traffic lanes, and contiguous and flush with the surface of the traffic lanes. |
| Skid resistance | A condition parameter to characterise the contribution that a road makes to the friction between a road surface and a vehicle tyre. Skid resistance is usually measured on wet surfaces. |

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| Smooth travel exposure | The proportion of travel undertaken each year on all roads with surface roughness less than 110 NRM (NAASRA Roughness Meter), the national standard that provides acceptable travel conditions for passenger car users. |
| Sprayed seal | A thin layer of binder sprayed onto a road surface with a layer of aggregate incorporated (usually rolled in), intended to be impervious to water. |
| State Roads | Arterial roads within NSW including National Highways. |
| Structurally deficient bridges | Bridges with deteriorated or inadequate structural components, which require restrictions to be placed on usage by traffic since they have inadequate load carrying capacity. |
| Surfacing (wear surface) | The uppermost part of the pavement or bridge deck specifically designed to resist abrasion from traffic and to minimise the entry of water. Sometimes referred to as the wearing surface. |
| Whole of life cost | The cost, to the owner, of an asset over its entire life. It includes costs associated with planning, design, acquisition, maintenance (including rehabilitation) and disposal. Road agencies should maintain roads in an appropriate condition to minimise whole of life cost and maximise the economic benefits to the community, given that smoother roads cost more to provide but offer savings to vehicle operators. |

Performance Audits by the Audit Office of New South Wales

Performance Auditing

What are performance audits?

Performance audits are reviews designed to determine how efficiently and effectively an agency is carrying out its functions.

Performance audits may review a government program, all or part of a government agency or consider particular issues which affect the whole public sector.

Where appropriate, performance audits make recommendations for improvements relating to those functions.

Why do we conduct performance audits?

Performance audits provide independent assurance to Parliament and the public that government funds are being spent efficiently and effectively, and in accordance with the law.

They seek to improve the efficiency and effectiveness of government agencies and ensure that the community receives value for money from government services.

Performance audits also assist the accountability process by holding agencies accountable for their performance.

What is the legislative basis for Performance Audits?

The legislative basis for performance audits is contained within the *Public Finance and Audit Act 1983, Part 3 Division 2A*, (the Act) which differentiates such work from the Office's financial statements audit function.

Performance audits are not entitled to question the merits of policy objectives of the Government.

Who conducts performance audits?

Performance audits are conducted by specialist performance auditors who are drawn from a wide range of professional disciplines.

How do we choose our topics?

Topics for performance audits are chosen from a variety of sources including:

- our own research on emerging issues
- suggestions from Parliamentarians, agency Chief Executive Officers (CEO) and members of the public
- complaints about waste of public money
- referrals from Parliament.

Each potential audit topic is considered and evaluated in terms of possible benefits including cost savings, impact and improvements in public administration.

The Audit Office has no jurisdiction over local government and cannot review issues relating to council activities.

If you wish to find out what performance audits are currently in progress just visit our website at <www.audit.nsw.gov.au>

How do we conduct performance audits?

Performance audits are conducted in compliance with relevant Australian standards for performance auditing and operate under a quality management system certified under international quality standard ISO 9001.

Our policy is to conduct these audits on a "no surprise" basis.

Operational managers, and where necessary executive officers, are informed of the progress with the audit on a continuous basis.

What are the phases in performance auditing?

Performance audits have three key phases: planning, fieldwork and report writing.

During the planning phase, the audit team will develop audit criteria and define the audit field work.

At the completion of field work an exit interview is held with agency management to discuss all significant matters arising out of the audit. The basis for the exit interview is generally a draft performance audit report.

The exit interview serves to ensure that facts presented in the report are accurate and that recommendations are appropriate. Following the exit interview, a formal draft report is provided to the CEO for comment. The relevant Minister is also provided with a copy of the draft report. The final report, which is tabled in Parliament, includes any comment made by the CEO on the conclusion and the recommendations of the audit.

Depending on the scope of an audit, performance audits can take from several months to a year to complete.

Copies of our performance audit reports can be obtained from our website or by contacting our Office Services Manager.

How do we measure an agency's performance?

During the planning stage of an audit the team develops the audit criteria. These are standards of performance against which an agency is assessed. Criteria may be based on government targets or benchmarks, comparative data, published guidelines, agencies corporate objectives or examples of best practice.

Performance audits look at:

- processes
- results
- costs
- due process and accountability.

Do we check to see if recommendations have been implemented?

Every few years we conduct a follow-up audit of past performance audit reports. These follow-up audits look at the extent to which recommendations have been implemented and whether problems have been addressed.

The Public Accounts Committee (PAC) may also conduct reviews or hold inquiries into matters raised in performance audit reports. Agencies are also required to report actions taken against each recommendation in their annual report.

To assist agencies to monitor and report on the implementation of recommendations, the Audit Office has prepared a Guide for that purpose. The Guide, *Monitoring and Reporting on Performance Audits Recommendations*, is on the Internet at www.audit.nsw.gov.au/publications/better_practice/better_practice.htm

Who audits the auditors?

Our performance audits are subject to internal and external quality reviews against relevant Australian and international standards. This includes ongoing independent certification of our ISO 9001 quality management system.

The PAC is also responsible for overseeing the activities of the Audit Office and conducts reviews of our operations every three years.

Who pays for performance audits?

No fee is charged for performance audits. Our performance audit services are funded by the NSW Parliament and from internal sources.

For further information relating to performance auditing contact:

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Performance Audit
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email: jane.tebbatt@nsw.gov.au

Performance Audit Reports

| No | Agency or Issues Examined | Title of Performance Audit Report or Publication | Date Tabled in Parliament or Published |
|-----|--|--|--|
| 78 | State Rail Authority (CityRail) State Transit Authority | <i>Fare Evasion on Public Transport</i> | 6 December 2000 |
| 79 | TAFE NSW | <i>Review of Administration</i> | 6 February 2001 |
| 80 | Ambulance Service of New South Wales | <i>Readiness to Respond</i> | 7 March 2001 |
| 81 | Department of Housing | <i>Maintenance of Public Housing</i> | 11 April 2001 |
| 82 | Environment Protection Authority | <i>Controlling and Reducing Pollution from Industry</i> | 18 April 2001 |
| 83 | Department of Corrective Services | <i>NSW Correctional Industries</i> | 13 June 2001 |
| 84 | Follow-up of Performance Audits | <i>Police Response to Calls for Assistance The Levying and Collection of Land Tax Coordination of Bushfire Fighting Activities</i> | 20 June 2001 |
| 85* | Internal Financial Reporting | <i>Internal Financial Reporting including a Better Practice Guide</i> | 27 June 2001 |
| 86 | Follow-up of Performance Audits | <i>The School Accountability and Improvement Model (May 1999) The Management of Court Waiting Times (September 1999)</i> | 14 September 2001 |
| 87 | E-government | <i>Use of the Internet and Related Technologies to Improve Public Sector Performance</i> | 19 September 2001 |
| 88* | E-government | <i>e-ready, e-steady, e-government: e-government readiness assessment guide</i> | 19 September 2001 |
| 89 | Intellectual Property | <i>Management of Intellectual Property</i> | 17 October 2001 |
| 90* | Intellectual Property | <i>Better Practice Guide Management of Intellectual Property</i> | 17 October 2001 |
| 91 | University of New South Wales | <i>Educational Testing Centre</i> | 21 November 2001 |
| 92 | Department of Urban Affairs and Planning | <i>Environmental Impact Assessment of Major Projects</i> | 28 November 2001 |
| 93 | Department of Information Technology and Management | <i>Government Property Register</i> | 31 January 2002 |
| 94 | State Debt Recovery Office | <i>Collecting Outstanding Fines and Penalties</i> | 17 April 2002 |
| 95 | Roads and Traffic Authority | <i>Managing Environmental Issues</i> | 29 April 2002 |
| 96 | NSW Agriculture | <i>Managing Animal Disease Emergencies</i> | 8 May 2002 |
| 97 | State Transit Authority Department of Transport | <i>Bus Maintenance and Bus Contracts</i> | 29 May 2002 |
| 98 | Risk Management | <i>Managing Risk in the NSW Public Sector</i> | 19 June 2002 |

| No | Agency or Issues Examined | Title of Performance Audit Report or Publication | Date Tabled in Parliament or Published |
|-----|---|--|--|
| 99 | E-Government | <i>User-friendliness of Websites</i> | 26 June 2002 |
| 100 | NSW Police Department of Corrective Services | <i>Managing Sick Leave</i> | 23 July 2002 |
| 101 | Department of Land and Water Conservation | <i>Regulating the Clearing of Native Vegetation</i> | 20 August 2002 |
| 102 | E-government | <i>Electronic Procurement of Hospital Supplies</i> | 25 September 2002 |
| 103 | NSW Public Sector | <i>Outsourcing Information Technology</i> | 23 October 2002 |
| 104 | Ministry for the Arts Department of Community Services Department of Sport and Recreation | <i>Managing Grants</i> | 4 December 2002 |
| 105 | Department of Health Including Area Health Services and Hospitals | <i>Managing Hospital Waste</i> | 10 December 2002 |
| 106 | State Rail Authority | <i>CityRail Passenger Security</i> | 12 February 2003 |
| 107 | NSW Agriculture | <i>Implementing the Ovine Johne's Disease Program</i> | 26 February 2003 |
| 108 | Department of Sustainable Natural Resources Environment Protection Authority | <i>Protecting Our Rivers</i> | 7 May 2003 |
| 109 | Department of Education and Training | <i>Managing Teacher Performance</i> | 14 May 2003 |
| 110 | NSW Police | <i>The Police Assistance Line</i> | 5 June 2003 |
| 111 | E-Government | <i>Roads and Traffic Authority Delivering Services Online</i> | 11 June 2003 |
| 112 | State Rail Authority | <i>The Millennium Train Project</i> | 17 June 2003 |
| 113 | Sydney Water Corporation | <i>Northside Storage Tunnel Project</i> | 24 July 2003 |
| 114 | Ministry of Transport Premier's Department Department of Education and Training | <i>Freedom of Information</i> | 28 August 2003 |
| 115 | NSW Police NSW Roads and Traffic Authority | <i>Dealing with Unlicensed and Unregistered Driving</i> | 4 September 2003 |
| 116 | NSW Department of Health | <i>Waiting Times for Elective Surgery in Public Hospitals</i> | 18 September 2003 |
| 117 | Follow-up of Performance Audits | <i>Complaints and Review Processes (September 1999) Provision of Industry Assistance (December 1998)</i> | 24 September 2003 |

| No | Agency or Issues Examined | Title of Performance Audit Report or Publication | Date Tabled in Parliament or Published |
|------|--|---|--|
| 118 | Judging Performance from Annual Reports | <i>Review of Eight Agencies' Annual Reports</i> | 1 October 2003 |
| 119 | Asset Disposal | <i>Disposal of Sydney Harbour Foreshore Land</i> | 26 November 2003 |
| 120 | Follow-up of Performance Audits NSW Police | <i>Enforcement of Street Parking (1999) Staff Rostering, Tasking and Allocation (2000)</i> | 10 December 2003 |
| 121 | Department of Health NSW Ambulance Service | <i>Code Red: Hospital Emergency Departments</i> | 15 December 2003 |
| 122 | Follow-up of Performance Audit | <i>Controlling and Reducing Pollution from Industry (April 2001)</i> | 12 May 2004 |
| 123 | National Parks and Wildlife Service | <i>Managing Natural and Cultural Heritage in Parks and Reserves</i> | 16 June 2004 |
| 124 | Fleet Management | <i>Meeting Business Needs</i> | 30 June 2004 |
| 125 | Department of Health NSW Ambulance Service | <i>Transporting and Treating Emergency Patients</i> | 28 July 2004 |
| 126 | Department of Education and Training | <i>School Annual Reports</i> | 15 September 2004 |
| 127 | Department of Ageing, Disability and Home Care | <i>Home Care Service</i> | 13 October 2004 |
| 128* | Department of Commerce | <i>Shared Corporate Services: Realising the Benefit including guidance on better practice</i> | 3 November 2004 |
| 129 | Follow-up of Performance Audit | <i>Environmental Impact Assessment of Major Projects (2001)</i> | 1 February 2005 |
| 130* | Fraud Control | <i>Current Progress and Future Directions including guidance on better practice</i> | 9 February 2005 |
| 131 | Follow-up of Performance Audit Department of Housing | <i>Maintenance of Public Housing (2001)</i> | 2 March 2005 |
| 132 | Follow-up of Performance Audit State Debt Recovery Office | <i>Collecting Outstanding Fines and Penalties (2002)</i> | 17 March 2005 |
| 133 | Follow-up of Performance Audit Premier's Department | <i>Management of Intellectual Property (2001)</i> | 30 March 2005 |
| 134 | Department of Environment and Conservation | <i>Managing Air Quality</i> | 6 April 2005 |
| 135 | Department of Infrastructure, Planning and Natural Resources Sydney Water Corporation Sydney Catchment Authority | <i>Planning for Sydney's Water Needs</i> | 4 May 2005 |
| 136 | Department of Health | <i>Emergency Mental Health Services</i> | 26 May 2005 |
| 137 | Department of Community Services | <i>Helpline</i> | 1 June 2005 |

| No | Agency or Issues Examined | Title of Performance Audit Report or Publication | Date Tabled in Parliament or Published |
|------|--|--|--|
| 138 | Follow-up of Performance Audit State Transit Authority Ministry of Transport | <i>Bus Maintenance and Bus Contracts (2002)</i> | 14 June 2005 |
| 139 | RailCorp NSW | <i>Coping with Disruptions to CityRail Passenger Services</i> | 22 June 2005 |
| 140 | State Rescue Board of New South Wales | <i>Coordination of Rescue Services</i> | 20 July 2005 |
| 141 | State Budget | <i>In-year Monitoring of the State Budget</i> | 28 July 2005 |
| 142 | Department of Juvenile Justice | <i>Managing and Measuring Success</i> | 14 September 2005 |
| 143 | Asset Management | <i>Implementing Asset Management Reforms</i> | 12 October 2005 |
| 144 | NSW Treasury | <i>Oversight of State Owned Electricity Corporations</i> | 19 October 2005 |
| 145 | Follow-up of 2002 Performance Audit | <i>Purchasing Hospital Supplies</i> | 23 November 2005 |
| 146 | Bus Transitways | <i>Liverpool to Parramatta Bus Transitway</i> | 5 December 2005 |
| 147 | Premier's Department | <i>Relocating Agencies to Regional Areas</i> | 14 December 2005 |
| 148 | Department of Education and Training | <i>The New Schools Privately Financed Project</i> | 8 March 2006 |
| 149 | Agency Collaboration | <i>Agencies Working Together to Improve Services</i> | 22 March 2006 |
| 150 | Follow-up of 2000 Performance Audit | <i>Fare Evasion on Public Transport</i> | 26 April 2006 |
| 151 | Department of Corrective Services | <i>Prisoner Rehabilitation</i> | 24 May 2006 |
| 152 | Roads and Traffic Authority | <i>The Cross City Tunnel Project</i> | 31 May 2006 |
| 153 | Performance Information | <i>Agency Use of Performance Information to Manage Services</i> | 21 June 2006 |
| 154 | Follow-up of 2002 Performance Audit | <i>Managing Sick Leave in NSW Police and the Department of Corrective Services</i> | 29 June 2006 |
| 155 | Follow-up of 2002 Performance Audit | <i>Regulating the Clearing of Native Vegetation</i> | 19 July 2006 |
| 156* | Fraud Control | <i>Fraud Control Improvement Kit: Meeting Your Fraud Control Obligations</i> | 20 July 2006 |
| 157 | Roads and Traffic Authority | <i>Condition of State Roads</i> | August 2006 |

* Better Practice Guides

Performance audits on our website

A list of performance audits tabled or published since March 1997, as well as those currently in progress, can be found on our website www.audit.nsw.gov.au. If you have any problems accessing these reports, or are seeking older reports, please contact our Office Services Manager on (02) 9275 7116.