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An efficient road transport system is vital to the economic and social prosperity of Victoria.

Road transport costs in a country as large as Australia are an important economic consideration and impact on our ability to compete in international markets. It is therefore important that we continue to improve the efficiency of our road transport and facilitate the movement of freight.

Roads make a significant contribution to the quality of life in our communities. Improved access and mobility for all road users depends on a safe and reliable road network, which is environmentally friendly, provides good value for money and is sustainable.

Bridges are critical links in the road network. They carry roads over any obstacles in their path, such as rivers, rail lines or other roads. But if they are not managed properly they can become an obstruction to movement along a route – the weak link in the chain. This can result in road closure, disrupting peoples travel plans, or lead to restrictions on fully laden freight vehicles, causing longer freight routes to be taken with consequential increased costs of goods and damage to the environment.

Like all engineering structures, bridges require careful design, quality construction and on-going maintenance to ensure that they are fit for their intended purpose and give a long trouble-free life.

Victoria’s Arterial Bridges aims to:
- optimise accessibility, mobility and freight efficiency in a safe and environmentally friendly manner for the Victorian community
- ensure that the bridge assets are managed in a manner that balances road transport needs with maintenance funding.

These aims will be delivered through a framework for improving the performance of bridges across the following outcome areas:
- carrying 21st century vehicles
- life cycle management for maximum benefit
- ensuring safety
- protecting our heritage.

This strategy will assist VicRoads and Local Government in the management of structures on the declared arterial roads system. The principles may also be applied by Local Government to the management of structures on local roads.

DAVID ANDERSON
CHIEF EXECUTIVE
Victoria’s Arterial Bridges

Strategy Framework

Victoria’s Arterial Bridges is a management strategy that aims to:

- optimise accessibility, mobility and freight efficiency in a safe and environmentally friendly manner for the Victorian community
- ensure that the bridge assets are managed in a manner that balances road transport needs with maintenance funding

The strategy dovetails with National actions, in particular the transport reforms being delivered by the National Road Transport Commission and the strategic directions of the Austroads Bridges Strategy.

Victoria’s Arterial Bridges:

- continues to improve the understanding of our bridges through measurement, monitoring and research
- sets performance criteria for bridges
- provides a performance based framework for identifying and prioritising bridge maintenance, replacement and new construction needs
- identifies the best approach to asset management.

Figure 1 shows the strategy in schematic form. The strategy establishes key outcome areas, which become the focus of delivery through an ‘Asset Management Framework’.
Asset Systems

To achieve the key objectives of Victoria’s Arterial Bridges requires an understanding of the performance of bridges and the maintenance costs over their useful life. Asset systems will continue to be an essential part of bridge management. There are four elements:

Inventory

A bridge inventory was the first component of the management information system, introduced as part of the Bridge Strategy in 1995. It records the location, condition, heritage status, load capacity, and other information regarding all of VicRoads’ bridges and culverts.

Condition

Every bridge is monitored through a two level inspection program consisting of a six monthly inspection by maintenance teams and a periodic structure condition inspection. The structural condition inspection is undertaken on a two to five year cycle depending on the condition at the previous inspection. Information is used to update the bridge inventory, which also records all bridge maintenance activities and costs enabling more accurate assessment of future maintenance needs and costs, and benchmarking. Where a structure condition inspection identifies a major structural problem, a qualified and experienced engineer will carry out further investigations, which may include material testing and analysis of the structure. For bridges that contain intricate structural details requiring expert interpretation, detailed inspection of those elements are carried out on a periodic basis.

Research

Significant research has been undertaken to establish the load carrying capacity of different bridge types, providing a wider range of cost effective bridge strengthening options.

Decision making

Information from the inventory, condition monitoring and research is analysed to set clear priorities, make cost effective decisions and arrive at the optimum intervention level between maintenance, rehabilitation and replacement of structures.

The information from these four elements combines to assist in the development of maintenance programs that seek the best combination of different maintenance and improvement options.

Routine bridge maintenance

The objective of routine bridge maintenance is to ensure the operational safety of structures and address minor defects that could develop to affect the long-term serviceability of the structure. Maintenance personnel attend to the minor issues
that arise on bridges from time to time such as clearing of drainage, localised repairs of the road surface, cleaning and adjusting deck joints, graffiti removal, repairs to accident damage and removal of debris.

**Periodic bridge maintenance**

The objective of periodic bridge maintenance is to maintain structures to a serviceable condition, by carrying out preventative maintenance. These treatments are more significant and expensive, and may include the painting of a steel structure, or the treatment of concrete cracking to avoid rusting of reinforcement.

**Bridge rehabilitation**

The objective of bridge rehabilitation is to ensure that bridges maintain their intended functional performance, usually by restoring the structure to its original functional condition. These works are usually extensive and expensive. Inability to carry out bridge rehabilitation when necessary often leads to the imposition of load limits on the bridge with consequent costs to road users, particularly the road transport industry.

**Bridge replacement**

An alternative to major rehabilitation is the total replacement of the structure, and this is the most cost effective solution in some cases, particularly when a structure is functionally obsolete.

**Performance criteria for bridges**

To achieve the outcomes of *Victoria’s Arterial Bridges* decisions on needs and priorities must apply to the performance criteria for each bridge, assess the consequences of each bridge to the performance of the road system and use cost effective treatments based on sound asset management principles and robust information.

Performance criteria are used to define the level of service that will be provided for road users. This level of service will depend on the function and level of use of the route, particularly by heavy vehicles, and will be dependent on factors such as: load capacity, width, height clearance, alignment and susceptibility to flooding.
A Performance Based framework

Bridge maintenance and replacement needs will depend on how well the structure performs relative to the performance criteria of the route. The current and future performance characteristics of the bridge can be determined using a variety of data, including design and inventory data, condition reports, maintenance records, traffic and accident data. Bridge maintenance, rehabilitation and replacement works will be progressively addressed, within the constraints of available funding and resources, after taking into account the following considerations:

- Strategic importance of the route
- How well the bridge is functioning for all users
- Volume of freight carried
- Condition of the bridge and the rate of deterioration
- Capacity and performance of the bridge
- Availability of alternative routes
- Assessed risks
- Consultation with users and local communities
- Cost benefit ratio of the works
- Fit with other strategies and business plans.

An important part of the process will be a risk management approach that assesses the competing demands for resources, the consequences if those demands are not met, and prioritisation of work to achieve a properly balanced program.
Delivering a Better Service

Implementation of the original *Victoria's Bridges* strategy in 1995 resulted in a significant improvement in the condition and load capacity of Victoria's bridges. This has made movement around our road network easier, cheaper and more reliable for both people and goods.

Since the original strategy was written Victoria has adopted increased Mass Limits for commercial vehicles, and there has been a significant improvement in the quality of bridge information and assessment techniques. In response to these challenges and opportunities, the new strategy builds upon its predecessor to guide the efficient delivery of a better service to all road users. It focuses on four key areas:

- Carrying 21st century vehicles
- Life cycle management for maximum benefit
- Ensuring safety
- Protecting our heritage.

**Achievements Since 1995**

Since 1995, an average annual budget of $22 million has funded a prioritised program of work based on improved management information. More effective targeting in the maintenance and replacement of bridges has allowed Victoria to lead other States in opening up the arterial road network to heavy and high productivity vehicles. The overall improvement in condition of the structures has benefited all users, reduced the burden of future maintenance costs and minimised disruption caused by maintenance and improvement work.

A bridge inventory and condition system has been developed which provides access across the organisation to bridge details, including photographs and location maps, condition information, heritage status and load capacity. A systematic and consistent state-wide bridge inspection and condition rating program has been established. Condition data is used to identify defects and assist in development of preventive maintenance programs. All bridge maintenance activities are now separately identified from other road activities. Specific periodic and rehabilitation maintenance treatments are recorded and costed against individual bridges. This has enabled a more accurate analysis of maintenance needs and costs, and better use of available funds.
The Challenges Ahead

There is an on-going requirement to ensure that bridge maintenance, rehabilitation and replacement programs address the right structures and provide the most cost effective mix of treatments to deliver appropriate performance of structures at minimum long-term cost to the community.

There is potential to increase the benefit of our bridges to people and industry and reduce the overall cost of maintenance through a targeted and cost effective program of work. This strategy will help to meet the challenges of moving more people and freight in a safe and efficient manner, whilst obtaining the most from an ageing bridge stock.

Bridges are some of the largest and most visible man-made objects and it is important that they look good and fit well with their surroundings. A well integrated bridge design will take account of appearance, function, buildability, durability and cost, and will endeavour to achieve the right balance between these (sometimes conflicting) demands according to the specific site and context of each bridge. The amenity value of new structures can be addressed by consideration of architectural issues such as:

- Balance and integration of form
- Simplicity and smooth lines
- Visual obstruction
- Slenderness and elegance.

Existing structures can be affected by vandalism, peeling paint, vegetation, grime and other ageing effects. The bridge inspection and maintenance regime can address these problems of appearance as well as structural performance.

Better Management Information

A further challenge is to continually improve management information systems so that inspection and condition monitoring data is integrated with other road data, bridge financial data and program development information. This enables: estimation of deterioration rates and the remaining service life of bridges and their components; modelling and forecasting of conditions and maintenance needs; and more streamlined development of work programs. As a result, funds would be more efficiently managed and more effectively targeted.

Research and development to improve our understanding of bridge performance will continue. This research and development will be in conjunction with Austroads, other State Road Authorities and private partners. Topics to be considered include fatigue of bridges, the impact of various traffic loads and electronic monitoring of performance.
A system of gazetted routes has been established for the operation of B-Doubles, Higher Mass Limits vehicles and other restricted access vehicles. Specific approvals (permits) may be issued for oversize and overweight vehicles to operate on specific routes. Existing bridge assessment information, relating to oversize and overweight vehicle approvals, is currently held in a hard copy system. This information will be transferred to an electronic system, linked to the bridge inventory and condition databases.

Many bridges also carry utilities. Understanding what utilities are on a bridge can assist in the management and maintenance of that bridge. Inventory systems will be expanded to include information on the utilities carried on the bridge.
Carrying 21st Century Vehicles

**Aim**
- Allow unimpeded movement across the declared arterial network, where the geometry allows, of all road legal trucks.

**Performance Criteria**
- Existing bridges, where the geometry allows, able to carry Higher Mass Limit vehicles, and able to carry up to 68 tonne B-Doubles.
- Existing bridges able to meet height and width requirements.
- New bridges designed in accordance with the revised Australian Bridge Design Code.
- Adequacy of structure for flood conditions consistent with the overall route.
- Appropriate ride quality to reduce vehicle operating costs and adverse impact on the structure.

Significant increases in road transport efficiency are being achieved through increasing the loads that are carried on our road system. Vehicle mass limits have more than tripled over the past sixty years. Historically the load a truck could carry was limited by the power of the engine. Today the limiting factor is not engine capacity, but the loads our roads and bridges can carry. Load capacity, operating speeds and changes in the dimensions of road transport vehicles have resulted in the need to upgrade bridge performance and improve safety standards. There is continuing pressure to increase transport efficiency by increasing legal vehicle mass and dimension limits.

**Achievements Since 1995**

In 1995, more than 300 bridges were not available to carry our heaviest freight vehicles, either because they had not been designed to do so, or because they were no longer capable of doing so. Since then that number has been reduced to less than 100 bridges. This has been achieved by tackling the problem on two fronts. The first approach was through a program of strengthening or replacement together with carriageway widening, increasing height clearance and upgrading barriers. The second approach was through research. For example, research into new methods for assessing the load capacity of Victoria’s older reinforced concrete flat slab bridges has shown that many of these structures have the capacity to carry today’s heavy freight vehicles. This has saved the State more than $20m in bridge strengthening and reconstruction costs.

**The Challenges Ahead**

Data indicates that of the 4990 structures on arterial roads, some 200 structures have suspected functional deficiencies relative to the recommended performance criteria for load capacity, height clearance or width. Around 90 of these structures are expected to require attention over the next 5 years to avoid restrictions to fully laden freight vehicles, see Table 1.

Historically, bridges have been designed for the loads carried by road transport at the time. This has resulted in significant bridge rehabilitation and strengthening costs to catch up with the increase in road transport capacity that has occurred. All
new bridges are now designed in accordance with the revised Australian Bridge Design Code. Meeting this Code is expected to increase the initial bridge construction costs by 2-3%, which is offset many times by the benefits of carrying future loads and reduced maintenance costs.

Height clearance and bridge widths shown in Table 1 are the minimum desirable standards for unrestricted use. For new structures, and when modifying existing structures where this is cost effective, higher standards may be adopted than current design standards. For example, for major freight routes a preferred minimum height clearance would be 5.5m, and greater bridge widths are recommended as part of Victoria’s “Rural Arterial Road Network Strategy”.

There is likely to be continuing pressure to increase transport efficiency through increased vehicle weight and dimensions. Road authorities need to be able to readily assess the economic worth of such proposals through comparison of transport benefits and infrastructure costs, and determine implications for the program of bridge maintenance, rehabilitation and replacement.

Recent research has highlighted the benefits to road users in terms of reduced vehicle operating costs from smooth pavements. Research has also shown that poor ride quality at the approach to bridges and at joints can adversely affect the load-carrying capacity of the bridge. Detailed performance criteria for ride quality across structures need to be defined.

The interstate links across the Murray River are vital for rural production and the social/economic well being of the adjoining communities. The bridges are owned and managed by New South Wales, but are jointly funded with Victoria. Performance of these bridges must be consistent with the standards of the routes in NSW and Victoria.

### Table 1 - Intervention Standards (v) Deficiencies

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>INTERVENTION STANDARD</th>
<th>DEFICIENCIES</th>
<th>COST OF UPGRADE (estimated)</th>
</tr>
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<tr>
<td>Load capacity</td>
<td>Current legal vehicle mass limits, including Higher Mass Limit road friendly vehicles</td>
<td>90 bridges have Higher Mass Limit restrictions*</td>
<td>$48m</td>
</tr>
<tr>
<td>Height clearance Width</td>
<td>AADT (vpd) ** Min. width between kerbs</td>
<td>75 bridges have a clearance &lt; 4.9m 25 bridges do not meet desirable minimum width requirements</td>
<td>Not estimated $8m</td>
</tr>
<tr>
<td></td>
<td>&lt;300</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>300-4000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4000-6000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;6000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flooding</td>
<td>Adequacy of structure for flood conditions consistent with rest of route</td>
<td>250 bridges are estimated to be subject to flooding</td>
<td>Network implications to be assessed</td>
</tr>
</tbody>
</table>

Note: AADT = Annual Average Daily Traffic, vpd = vehicles per day
* = Additional bridges are monitored to assess performance
** = National Association of Australian State Road Authorities 1984, for 2 lane 2 way carriageways.
Life Cycle Management for Maximum Benefit

Aim
- Keep bridges open and functioning safely for all users at minimum cost over the whole life of the structure

Performance Criteria
- That the most cost effective maintenance regimes are used to ensure that bridges function satisfactorily for all road users and do not compromise load carrying performance.

All structures on roads must be adequate to safely carry the volume and mix of legal traffic, including trucks, cars, cyclists, pedestrians and equestrians, appropriate to the strategic function of the road. Victoria’s concrete, steel, masonry, and timber bridges require ongoing maintenance to ensure that they are safe and fit for purpose.

All structures deteriorate under the combined effects of repeated vehicle loading, and environmental factors. Structures corrode (caused by water and salt), crack, deform, spall (peeling off of concrete), etc. This gradual structural decay is termed physical obsolescence. Other structures, while they may be in good condition, do not provide the level of service expected of today’s bridges because they were built to old, less demanding, design standards, which are now out of date. The need for bridge replacement or improvement in these circumstances is termed functional obsolescence.

Achievements Since 1995

Over the last five years, the condition of arterial bridges has been improved as shown in Table 2.

<table>
<thead>
<tr>
<th>Condition</th>
<th>1995</th>
<th>2000</th>
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<tr>
<td>Good</td>
<td>62%</td>
<td>90%</td>
</tr>
<tr>
<td>Fair</td>
<td>17%</td>
<td>9%</td>
</tr>
<tr>
<td>Poor</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>Data Limited</td>
<td>18%</td>
<td>-</td>
</tr>
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Table 2 - Improvement in Condition of Arterial Road Bridges

The Challenges Ahead

The current condition and age profile of bridges indicates that over the next 5 years a further 100 to 120 bridges are likely to require attention. These are additional to the 90 bridges expected to require attention to avoid load capacity restrictions. Bridges with deficient widths, height restrictions and subject to flooding are to be assessed and prioritised on the basis of economic analysis and safety audits. Peaks in the age profile of VicRoads’ bridges mean that there will probably be peaks in the demand for future rehabilitation and replacements as structures reach the end of their economic service life. This requirement is expected to increase in the next decade when significant rehabilitation is required on the large number of structures built in the 1960s, see Figure 2.
Recent research has developed a methodology for using the historic structure inspection data to calculate, for a particular structure type, a deterioration model. This will enable a calculation to be made, for each bridge type, of the probability of the proportion of the inventory to be in a particular condition state at a particular age. When the analysis is complete a better understanding of future rehabilitation and replacement needs will be available.

Many older bridges will also require upgrading for safety standards and/or geometry to match the needs of current traffic.

The bridge condition surveys provide early identification of issues and enable preventative maintenance to be undertaken. Various projects undertaken as part of the research program are identifying new ways to undertake repairs in a cost effective manner. The challenge is to use the best available information with the most appropriate treatment techniques to raise the overall condition of the bridge stock.
Ensuring Safety

**Aim**
- Minimise the risk and severity of accidents on, or approaching, bridges

**Performance Criteria**
- Bridge width appropriate to traffic volume
- Desirable minimum height clearance for vehicles passing under structures of 4.9m
- Alignment consistent with safe travel speed of the route
- Barriers and guardrails maintained in operational condition, but upgraded to current design standards at the same time as other bridge improvement work is carried out.

The safety of all road users has always been a top priority and the Government is committed to reducing deaths and serious injuries from crashes on Victorian roads by 20% over the next five years. Assuring the structural integrity of structures is a fundamental safety objective and bridges must be able to safely carry all legally loaded traffic.

In addition to structural performance, road users require appropriate road alignment and signage to allow ease of movement. They also need safety barriers to stop out of control vehicles from colliding with bridge end posts, or leaving the carriageway completely.

**Achievements Since 1995**

Bridges are a major contributor to safe routes as they remove the need for intersections where one road meets another road or railway line. The number of serious accidents on, or approaching, bridges is very small, but improvement work continues to minimise the risk and severity of crashes. A systematic approach to inspection and condition rating has helped to identify problems and target the most urgent cases first. In the last 5 years, about 130 bridges have had remedial works carried out to improve width, alignment and height clearance. At the same time bridge barriers and approach barriers were upgraded on 275 bridges as part of the Accident Blackspot program.
The Challenges Ahead

The systematic state-wide bridge inspection and condition rating program has so far identified over 1100 bridges that may require work to upgrade barriers. General road safety issues are identified through road safety audits, which consider risks to all road users. These include any problems such as road layout, width, height clearance, road surface quality, signage and barriers. Risk analyses are carried out to assess priority treatments within available funds. For the five years 1997-2001 there were 38 crashes into bridge end posts and 142 crashes (including 12 fatal) into barriers on declared road bridges. A significant challenge is to prepare a prioritised program for upgrading bridge barriers, and approach barriers, based on audit findings. Bridge barriers will generally be upgraded to current design standards at the same time as other bridge improvement work is carried out.

Although the number of incidences of objects being thrown from bridges is small, the consequences can be quite severe. The issue is being monitored and consultation regarding ways to reduce the incidence will continue with relevant stakeholders.
Protecting our Heritage

Aim

- Retain the best examples of historic bridges on the road network

Performance Criteria

- All heritage bridges managed in accordance with conservation plans and heritage legislation.

Victorians value our natural and built environment. A bridge heritage policy has been implemented to identify and conserve bridges of historic value subject to statutory requirements and other community, environmental and social responsibilities. Heritage bridges that are open to vehicular traffic are maintained to the same performance standards as equivalent non-heritage bridges and in a manner that ensures the heritage characteristics of each bridge are preserved.

Achievements Since 1995

Heritage bridges are now cared for under the “Management of Heritage Bridges” policy, which recognises the value of certain structures to the community and environment. The policy covers all bridges on declared roads that are included on registers of the National Estate, Victorian Heritage Council, National Trust or Environment Conservation Council, or are being considered for registration. This register will also be supplemented with a record of other bridges of significance, including bridges of regional or local significance that are protected by Council Planning Schemes. Registered bridges will be maintained to the same standards as equivalent non-heritage bridges. Additionally, VicRoads has assisted the National Trust in researching the history of timber and steel bridges in Victoria.

The Challenges Ahead

Work will continue with Heritage Victoria and the National Trust to identify and document the heritage significance of nominated bridges. These structures will be covered under the normal bridge inspection program, even if they are not used by traffic. Details of aspects of each bridge, which are deemed by heritage authorities to be essential to maintaining the heritage value, will also be recorded. This information will be used to prepare conservation management plans for individual heritage-registered bridges.

A heritage bridge located on the Bonang-Gelantipy Road (McKillops Road) over the Snowy River
Implementing the Strategy

Implementation Plan

Implementation of this strategy will involve continuous improvement, consultation and feedback.

- Information Management
  - Continue the program of regular inspections of bridge condition and expanding the program to develop individual management plans for a number of the elements of the more complex bridges – on-going.
  - Establish a capability for modelling and forecasting conditions and maintenance needs – by the end of 2003.
  - Continue to integrate information management systems for bridge inventory, records, condition, load capacity, inspections and works history data and improve accessibility to this data – by end 2003.
  - Continue a program of load rating of all declared structures and progressively review draft performance standards in line with traffic, road safety and structural implications – by the end of 2004.
  - As part of structure condition inspections, collect and record information related to utilities carried on bridges – methodology and systems developed by the end of 2003.

- Program Development
  - Progressively increase the length of network accessible for vehicles operating at increased mass limits – by the end of 2006 for main freight routes and on a needs basis the for remaining freight routes.
  - Identify and prioritise needs for upgrading bridge barriers and approach barriers and approach guardrail in response to safety audits – by the end of 2004.
  - Continue to establish the needs and priorities for annual bridge maintenance, rehabilitation and replacement programs within a performance management framework – on-going.
  - Identify and prioritise needs and options for improving height clearance under structures, including improved warning systems at key locations – end 2004.
• Identify and prioritise structures requiring improved alignment consistent with the safe travel speed of the route – by the end 2006.

• Identify and prioritise structures where the adequacy for flood conditions is not consistent with the rest of the route – by the end of 2006.


<table>
<thead>
<tr>
<th>Delivery</th>
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<tr>
<td>• Prepare improved guidance to assist in developing treatment options where major works are required. The options to include economic and risk analysis for both rehabilitation and replacement options – by mid 2005.</td>
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<th>Monitoring</th>
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<tr>
<td>• Prepare annual reports indicating structure condition at a network level – on-going.</td>
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| • Report the progress of actions arising from the strategy and review projected funding needs derived from improved data and analysis – by early 2004. |

**The Benefits**

As a result of this strategy, Victorians will see:

<table>
<thead>
<tr>
<th>Carrying 21st Century Vehicles</th>
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<tr>
<td>• Unimpeded movement of all road legal vehicles across the declared arterial network, where the geometry allows, by upgrading the remaining bridges with inadequate strength (approximately 90).</td>
</tr>
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</table>

| • All new bridges designed to carry the greater vehicle loads predicted to arise over the next 25 years. |

| • Lower freight costs to industry by utilisation of more efficient vehicle configurations permitted to travel over bridges. |

| • More efficient processing of applications to move over-size vehicles. |

| • Improved ride quality across bridges, leading to reduced vehicle operating cost and reduce adverse loading on the structure. |
Life cycle management for maximum benefit
- Bridges kept operational and working safely at a lower overall cost by appropriate maintenance to improve the condition of ageing structures.

Ensuring Safety
- Reduced risk and severity of crashes by upgrading road, bridge and barriers in response to inspection data and road safety audits.

Protecting our heritage
- Well-preserved heritage bridges cared for under special management plans.

Efficient and Effective Service Delivery
- Improved levels of service per dollar spent, through better use and availability of information, prioritisation and improved maintenance and construction techniques.

Resource Needs
To achieve the benefits listed above would require:

- $8 million per year to upgrade bridges with deficient load capacity. Based on estimated costs for upgrading 90 structures, refer Table 1

- $11 million per year to upgrade ageing bridges and widen bridges based on rehabilitating between 100-120 structures in poor condition to avoid growth in the number of structures pending replacement.

- $6 million per year for routine and periodic maintenance. Based on past resource levels required to keep structures in a serviceable condition and reduce the rate of deterioration.

Expenditure associated with West Gate Bridge and the Murray River crossings would be additional.
Annex – VicRoads’ Bridge Stock

- There are 4990 major structures on Victoria’s arterial road network, comprising 2950 bridges and 2040 major culverts.
- The current replacement value of Victoria’s arterial road bridge assets (at 30 June 2002) is $3.44 billion dollars less an accumulated depreciation of $1.03 billion dollars.
- Annual expenditure on maintenance, rehabilitation and replacement of these bridges over the last seven years has been $22 million per annum.
- A bridge or culvert for the purposes of this strategy is defined as having a waterway area (or equivalent) of 3 square metre.
- The establishment of a single Victoria wide asset register has resulted in a more accurate inventory of structures, containing an additional 1000, previously unrecorded, structures.
- New bridges are continually added to the inventory as major new road projects are completed. For example, in the two years between 2000/2001 and 2001/2002, 108 new structures were completed or in progress on major projects around Victoria.
The structures inventory is being extended to include major sign gantries and other designated structures such as major noise walls.

Irrigation Structures on the declared road network will soon be transferred to VicRoads from the Victorian Water Authorities under a Memorandum of Understanding that is being finalised. The 230 structures will cost approximately $0.5m per year to maintain and are accounted in the strategy.

Road over Rail Bridges on arterial roads became the management responsibility of VicRoads in 1995.

West Gate Bridge is a unique major structure and a separate strategy has been developed for it.

Murray River Bridges and Punts are not covered by this strategy. The RTA – NSW, in accordance with an agreement between New South Wales and Victoria, manages these crossings. The Murray River Crossings Strategy provides information about each crossing.
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