

Section 4

Milletts Rd - Gisborne Full freeway (complete late 1997)

Planning studies completed / in progress:

Section 6

Black Forest (Macedon) (complete mid 1996)

Section 7

Woodend Bypass (Planning Scheme Amendment gazetted, December 1994)

Section 8

Carlsruhe (complete mid 1996)

A7.4 Construction Priorities

Priorities are based on improvements necessary to meet future traffic, accident and road condition requirements and to maintain continuity of standards between sections. Economic benefits were also taken into account in determining investment priorities and are presented in Technical Supplement No 2.

A. The highest priority would be to:

- complete committed projects between Keilor and Gisborne as part of upgrading to freeway standard out from Melbourne (Sections 1-4)
- proceed with progressive upgrading to freeway standard from Gisborne to Kyneton.

Sections 3 and 4, from Diggers Rest to Gisborne Bypass are being constructed as a freeway and will be open to traffic late 1997. Construction has started on Section 3, Diggers Rest to Milletts Road which is expected to be open to traffic by autumn 1996. Work is scheduled to commence on Section 4, Milletts Road to Gisborne mid 1996. These projects will return very high benefits to the community. (NPV \$271 million and BCR of 6.4 at 8% discount rate, benefits include Vehicle Operating Cost savings \$3 million, Travel Time savings \$303 million, Accident savings \$14 million).

The first two sections of freeway from Keilor to Diggers Rest have some "at grade" intersections remaining. Providing an interchange at the Bulla-Diggers Rest Road and Calder Highway intersection (Section 2) is a high priority safety issue and would be funded from the first available Federal Black Spot program.

Kyneton Bypass (Section 9) was open to traffic in April 1995. The southern freeway terminal is immediately north of the two Campaspe River crossings on the Carlsruhe Section (Section 8). The alignment over the existing bridges at Carlsruhe is not to freeway standard. Accident rates on the Carlsruhe Section are higher than average for two-lane, two-way rural highways (24 casualty accidents / 100 million vehicle - kilometres versus 15 casualty accidents / 100 million vehicle - kilometres). While measures would be taken to improve the safety of the bridges in the interim, the alignment can only be improved by construction of the Carlsruhe Section as a freeway. Early construction would result in an acceptable economic return to the community (NPV \$23 million and BCR 2.0 at 8% discount rate, benefits include Vehicle Operating Cost savings \$1 million, Travel Time savings \$40 million, Accident savings \$4 million).

The Black Forest Section is a four lane undivided highway while most of the Woodend Section is two-lane, two-way.

The estimated growth in traffic volumes on the Black Forest Section can be catered for by the existing 4 lane undivided road to beyond 2020, whereas Woodend is already experiencing congestion.

The accident rate is high over both the Black Forest Section (22 casualty accidents / 100 million vehicle kilometres), and the adjoining Woodend Section (34 casualty accidents / 100 million vehicle kilometres) over the same 5 year period.

The Woodend Section would return higher economic benefits (NPV \$26 million and BCR 1.6 at 8% discount rate, benefits would include Vehicle Operating Cost savings \$13 million, Travel Time savings \$52 million, Accident savings \$8 million). The low economic return for the Black Forest Section is indicative of the low gain in operating benefits by replacing the existing four-lane road by a freeway. However, in view of its accident record and the need for continuity in road standard between Melbourne and Kyneton, its replacement by a freeway would be required.

Construction priorities will be determined when planning issues have been resolved.

B. The next priority would be to :

- complete the freeway from Gisborne to Kyneton (Sections 6 - 8)
- duplicate the highway from Kyneton to Bendigo working north from Kyneton and south from Bendigo (Sections 10 -16) with provision in planning scheme reservations to upgrade to freeway standard in the long term (Sections 10-18)
- provide full access control on the Keilor - Diggers Rest freeway (Section 1).

Construction of the four lane divided highway north from Kyneton would continue the development of the Calder Highway out from Melbourne. The exact sequence of works would depend on the outcome of the proposed planning studies. However, in order to maintain adequate capacity for the expected growth in commuter and freight traffic between Castlemaine and Bendigo it is likely that duplication from Harcourt to Ravenswood (Sections 14, 15, 16) would take place within a similar time frame.

Upgrading Sections 10 - 16 to four lane divided standard would result in acceptable economic returns to the community (NPV \$40 million and a BCR of 2.0 at 8% discount rate, benefits include Vehicle Operating Cost savings \$15 million, Travel Time savings \$57 million, Accident savings \$6 million). Construction of bypasses will reduce this return. Planning studies would determine whether Malmsbury (Section 10, NPV \$8 million, BCR 1.4 at 8% discount rate), Taradale (Section 11, NPV -\$7 million, BCR 0.4 at 8% discount rate) and Harcourt (Section 14, NPV -\$6 million, BCR 0.3 at 8% discount rate) should be bypassed. Bypasses north of Kyneton would be planned to ultimate freeway standard but may be staged constructed with limited access control at first.

Traffic volumes reduce significantly between the Elphinstone and Harcourt (Section 13) as traffic turns off the highway to Castlemaine. This section would be duplicated last.

Conversion of the Keilor - Diggers Rest freeway section to full access control by provision of interchanges would follow completion of freeway construction between Melbourne and Kyneton. Individual intersection upgradings would be timed to complement planned development of the local road network.

A practical construction program would take about 12 - 13 years to complete at an average expenditure of about \$30 million per year. This expenditure profile will generate about \$535 million in discounted benefits to the community for an outlay of about \$350 million (\$205 million discounted project costs) assuming all possible bypasses are built. Benefits could be realised earlier with an accelerated program at a higher expenditure rate. The details of this analysis and the resulting indicative program are set out in Technical Supplement No 2.

A7.5 Planning Studies

All current and future planning studies would provide Planning Scheme reservations for ultimate freeway conditions, i.e. interchanges and full access control, except where duplication through an existing town is adopted as the ultimate solution. Sections already constructed would be reviewed to evaluate additional local access and interchange requirements.

A. The highest priority would be to complete planning studies already in progress. The program for the completion of existing planning studies is:

- Karlsruhe Section - resolution of Planning Scheme Amendment mid 1996
- Black Forest Section - resolution of Planning Scheme Amendment mid 1996.

The Woodend Bypass study has been completed and the Planning Scheme Amendment gazetted December 1994.

B. The next priority would be to complete all remaining planning studies for the corridor within the next five years (2000). This would resolve any land requirements early and assist local government in their future planning. Proposed studies include:

- Kyneton - Elphinstone (Sections 10, 11 and 12) - investigation of options for ultimate freeway alignment with duplication through the towns or one or more bypasses with limited access as a first stage

- Harcourt to Ravenswood (Sections 14, 15 and 16) - investigation of options for ultimate freeway alignment with duplication through Harcourt or a bypass with limited access as a first stage, review need to upgrade Calder Alternative Highway intersection with Calder Highway
- Elphinstone -Harcourt (Section 13) investigation of ultimate freeway alignment with duplication at first stage
- Review of access provision on divided highway from Ravenswood to Bendigo (Sections 17 and 18).

Provision of full access control on Section 1 (Keilor - Diggers Rest) is dependent on the development of appropriate links within the local area network. It is proposed that planning for local access and associated local network planning with Council and developers proceed in the same time frame.

An Environment Effects Statement (EES) is being prepared for the Black Forest Section (Section 6) and is proceeding with full community consultation. The need for an EES would be considered for all sections where a town bypass is being considered. For the sections where duplication is proposed in the first instance, full consultation with landowners and others likely to be directly affected would take place and an explanatory planning report would accompany the Planning Scheme Amendment reserving the land required. This process is currently being used at Carlsruhe (Section 8)

A7.6 Rehabilitation

Rehabilitation would be programmed in accordance with the Stitch-in-Time Strategy and the outcome of the Linking Victoria Strategy. Where bypasses are to be constructed responsibility for the existing highway may be transferred to local government. In this event, the highway would be left in a satisfactory condition for the projected traffic levels.

A number of sections, particularly north and south of Elphinstone are high on the regional priority listing for rehabilitation. Progressive rehabilitation of about 2 km each year of poor pavement sections over the next 10 years is proposed to hold the highway condition to a reasonable level. The estimated cost is \$600,000 per annum.

Rehabilitation would assist the reduction of freight movement costs and maintenance costs.

A7.7 Local Safety and Access Improvements

Opportunities to provide some localised safety improvements in conjunction with rehabilitation prior to construction would be taken. Where possible these should complement ultimate development plans.

Traffic management improvements in Woodend will commence in 1995 as part of the Better Roads program, including additional traffic signals, intersection improvements and turning lanes. This would have a BCR of 12.4 for a cost of \$300,000.

North of Kyneton, all remaining sections of the highway, outside of towns, with unsealed shoulders (approximately 50 km shoulders) would be sealed over the next 5 years and tactile edge lines provided in areas away from buildings for a cost of \$3 million over 5 years. The BCR of shoulder sealing is 3 on average. This would ensure additional road safety benefits during the interim period before construction of the four lane divided highway.

Access control other than in the Black Forest Section would generally be determined in the planning studies and addressed as part of the major projects.

Overtaking lanes would be provided between Kyneton and Ravenswood for a cost of \$1.5 million at sites to be determined.

A8 Investment Priorities

An investment priority program for the Melbourne to Bendigo sector of the Calder Highway, is attached. The indicative construction program would extend beyond this period into the next two five year periods. The total management program includes minor works such as shoulder sealing, rehabilitation, local safety and access improvements. An expenditure rate of about \$20 million per year accelerating to \$30 million per year from 1997 on, would result in the completion of the program within 10-15 years. This amount has been assumed to enable an economic analysis to be carried out to determine the economic return on government investment. It does not necessarily imply any committed funding level. Recent expenditure rates on the Calder Highway from Melbourne to Bendigo vary from \$18 to \$30 million per annum. Clearly greater levels of funding would allow more rapid progress and conversely lesser funding would extend the time frame.

SECTION (km)	5 YEARS 1995/96 - 1999/00	5 YEARS 2000/01 - 2004/05	5 YEARS 2005/06 - 2009/10
1 Keilor to Diggers Rest (21-29.5)	<ul style="list-style-type: none"> Complete interchange/local access planning 	<ul style="list-style-type: none"> Construct planned interchanges 	
2 Diggers Rest Bypass (28.2-35.0)	<ul style="list-style-type: none"> Construct Bulla-Diggers Rest Road Interchange 	<ul style="list-style-type: none"> Construct additional service roads for local access 	
3 Diggers Rest to Milletts Road (35.0-43.7)	<ul style="list-style-type: none"> Complete construction Freeway duplication 		
4 Milletts Road to Gisborne (43.7-50.2)	<ul style="list-style-type: none"> Full access control Rehabilitation of existing carriageway as required 		
5 Gisborne Bypass (50.2-56.7)	<ul style="list-style-type: none"> Minor rehabilitation 		
6 Black Forest * (56.7-64)	<ul style="list-style-type: none"> Complete Freeway Environment Effect Statement (EES) and Planning Scheme Amendment (PSA) Start construction of freeway * 	<ul style="list-style-type: none"> Complete construction of Freeway* Full access control 	
7 Woodend Bypass* (64.0-75.9)	<ul style="list-style-type: none"> Traffic Management improvements in Woodend Start construction Freeway bypass* Full access control 	<ul style="list-style-type: none"> Complete construction Freeway Bypass* 	
8 Carlsruhe* (75.9-82.0)	<ul style="list-style-type: none"> Complete freeway planning study and PSA Construct Freeway* Full access control 		
9 Kyneton Bypass (82.0-90.8)	<ul style="list-style-type: none"> Landscaping & minor works 		
10 Malmsbury (90.8-100.0)	<ul style="list-style-type: none"> Freeway planning study/EES and/or PSA Shoulder sealing and tactile edge lining Rehabilitation where required Overtaking lane(s) as required 	<ul style="list-style-type: none"> Start construction four lane divided highway/ bypass(es) Limited access control 	<ul style="list-style-type: none"> Complete construction four lane divided highway/ bypass(es) Limited access control
11 Taradale (100.0-105.0)			
12 Elphinstone (105.0-107.5)			
13 Elphinstone - Harcourt (107.5-118.0)	<ul style="list-style-type: none"> Freeway planning Study and PSA Shoulder sealing and tactile edge lining Rehabilitation 	<ul style="list-style-type: none"> Start construction duplication for four lane divided highway Limited access control 	<ul style="list-style-type: none"> Complete construction duplication for four lane divided highway Limited access control
14 Harcourt (118.0-122.0)	<ul style="list-style-type: none"> Freeway planning study/EES and PSA Shoulder sealing and tactile edge lining Rehabilitation where required Overtaking lane(s) as required 	<ul style="list-style-type: none"> Start construction four lane divided highway/ bypass Limited access control 	<ul style="list-style-type: none"> Complete construction four lane divided highway/ bypass Limited access control
15 Harcourt to Porcupine Hill (122.0-126.0)			
16 Porcupine Hill to Ravenswood (126.0-131.8)			
17 Ravenswood (131.8-133.6)	<ul style="list-style-type: none"> Review local access requirements for full access control 		
18 Ravenswood to Bendigo (133.6-145.0)	<ul style="list-style-type: none"> Review local access requirements for full access control Shoulder sealing and tactile edge lining Rehabilitation 		

CALDER HIGHWAY INVESTMENT PRIORITIES

Table 2

Melbourne to Bendigo

* Indicative only, construction priorities to be determined



B. Bendigo to Murray River

(northern sector)

B1. Strategic Function of the Highway

The Calder Highway north of Bendigo is a significant freight route and is one of the main feeder routes to the Calder Highway south of Bendigo. It provides access between Melbourne and the agricultural regions of Victoria's north west, parts of western New South Wales as far as Broken Hill, and the Riverland area of South Australia. Regional access to the cities of Bendigo and Mildura forms a major role and tourism remains an important function of the Highway. Towns along this 420 km sector of the Calder Highway include Marong, Inglewood, Wedderburn, Charlton, Wycheproof, Sea Lake, Ouyen, Red Cliffs and Irymple. The Calder Alternative Highway (20km) acts as a bypass of Bendigo for through traffic to the north west and is included in this strategy as an integral part of the Calder Highway.

B2. Strategies Relevant to the Corridor

The importance of the Calder Highway to the State and the need to upgrade it is reflected in various government policies and initiatives. Specific strategies relevant to the northern section of the Highway include:

- Development Framework for Victoria, September 1994. This report draws on other recent government strategies and initiatives. It highlights the need to ensure that infrastructure capacity is maintained, recommends a growth strategy for Mildura which amongst other things would focus on its comparative advantage and strategic positioning for tourism.
- A strategic overview of the regional economy has been prepared by TBA Planners (Trevor Budge and Associates), March 1994 and is included as Technical Supplement 1.

This report supports the Loddon-Campaspe Regional Planning Authority strategy for the development of the corridor proposed in the Final Report of the Bendigo-Melbourne Corridor and Infrastructure Study, March 1994 prepared by TBA Planners, Andrew O'Brien & Associates and Planning Australia Consultants.

- The strategic importance of this corridor to the transportation of export freight to Tullamarine Airport and the Ports of Melbourne and Geelong was identified in VICROADS 2000 (1990).

B3. Current and Future User Needs

This sector of the strategy considers user needs on the Calder Alternative Highway, between Ravenswood and Marong, as well as the Calder Highway from the north-western approaches of Bendigo to the Murray River north of Mildura.

Transport of freight on the northern part of the corridor is expected to grow. Export products include grain, table grapes, citrus fruits, vegetables and wine. This is the most significant part of the Calder corridor in terms of agricultural production.

Products carried on part of the route include salt, sheep and cattle on their way to regional markets in Bendigo or to Geelong for export. The Bendigo saleyards is one of Australia's largest sheep markets.

The Calder Highway provides tourist access to the gold fields area between Bendigo and Wedderburn and the tourist region centred on Mildura.

Passenger rail services to Mildura have been discontinued and long distance travel is serviced by bus from Melbourne and Bendigo. The Calder Highway, therefore, provides the infrastructure for public transport linking the towns along it to the larger centres.

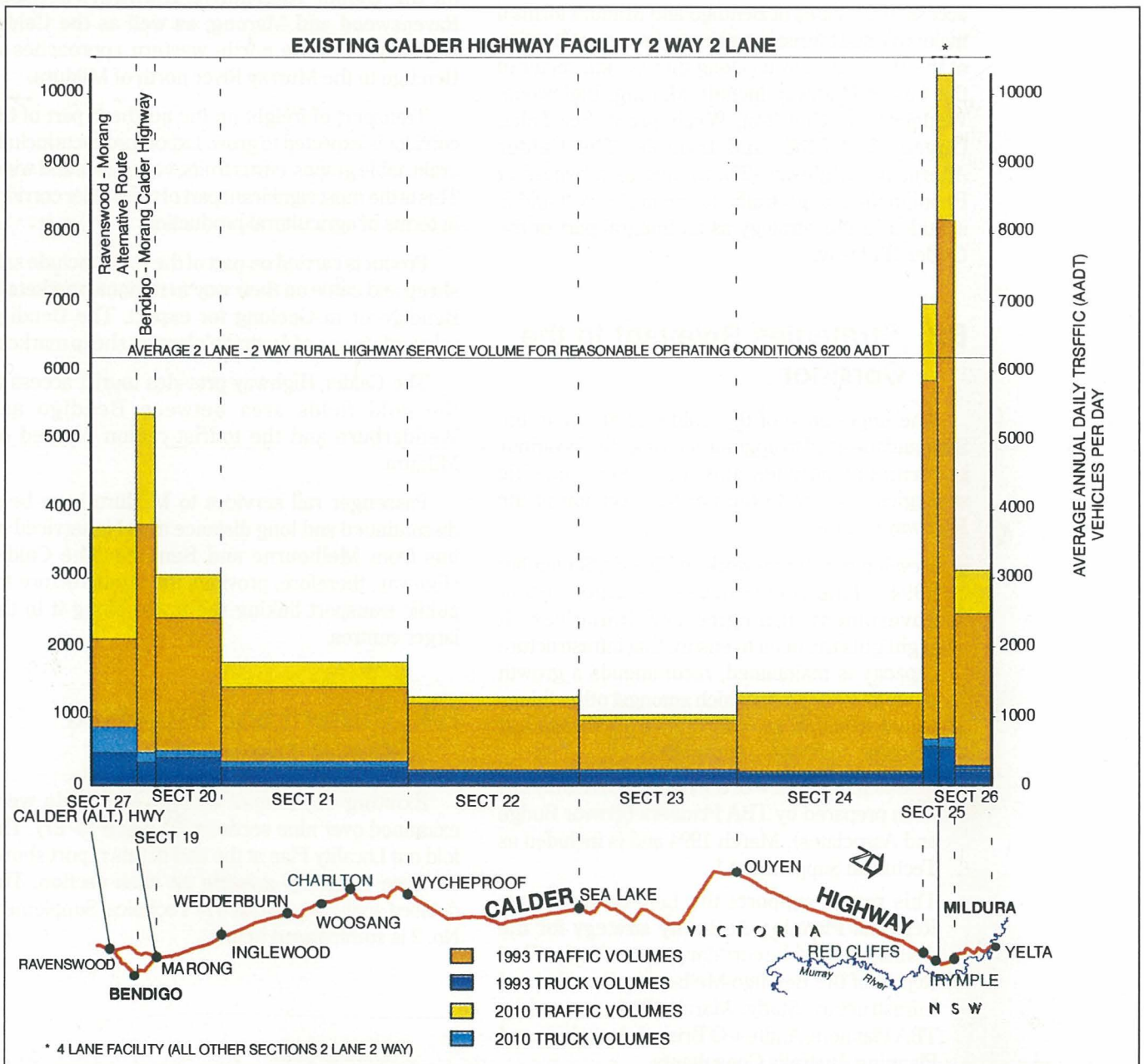
B4. Current and Projected Travel Demand

Existing conditions and future needs were examined over nine sections (Sections 19-27). The fold out Locality Plan at the end of this report shows the type of facility existing on each section. The detailed analysis presented in Technical Supplement No. 2 is summarised below.

B4.1 Traffic Growth

Traffic volumes are expected to grow annually by about 0.5- 1.5% along most of the northern sector of the Calder Highway. Higher growth is anticipated on the Calder Alternative Highway (4.5%) and between Bendigo and Marong (2.5%). Traffic volumes decline markedly compared with the traffic volumes south of Bendigo. Traffic volumes for 1993 are shown on Figure 4. (Please note the ten fold vertical exaggeration when comparing with traffic volumes on the southern sector).

Traffic analysis indicates that all sections will provide reasonable operating conditions for estimated future traffic volumes for the foreseeable future. This analysis assumes completion of the 2.5 km section of duplication currently under construction between Irymple and Mildura.



TRAFFIC VOLUMES (1993 - 2010)

FIGURE 4

B5. Performance Standards

Minimum performance standards used in identifying deficiencies are based on current VicRoads practice. Some minor review of needs may be required if alternative performance standards are established by the Linking Victoria Strategy.

B6. Deficiencies

B6.1 Travel Delay

Travel delays on the northern sector of the highway generally relate to limited passing opportunities (refer 6.3 Road Conditions) and flooding. The area most prone to flooding is between Woosang, south of Charlton and Wycheproof where the highway crosses the Avoca River flood plain. An alternative route exists for flood events north of Charlton when the Highway is impassable for about 3 days every 12 - 18 months which adds 6 km and 4 minutes to the journey. Charlton is essentially isolated by flooding on the Highway south of the town about once every 20 years. The alternative route in this event adds 50 km and around 35 minutes to the journey for access to Charlton and 70 km and around 50 minutes to the journey for through traffic. Major interruptions of traffic occurred in 1973 and 1995.

B6.2 Road Safety

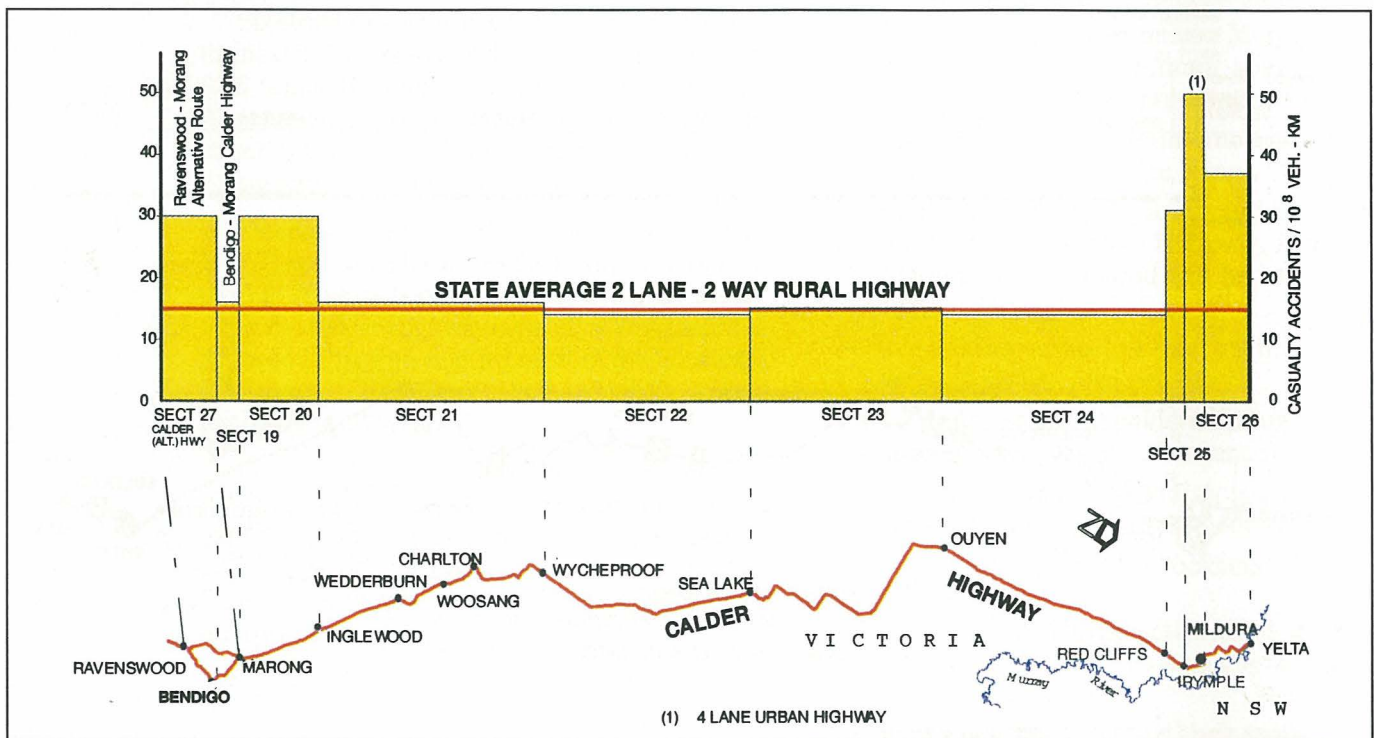
Accident rates over the 5 year period 1988 - 1992, shown in Figure 5, indicate unacceptably high accident rates on the Calder Alternative Highway (Section 27) and on the Calder Highway between Marong and Inglewood (Section 20), and from Red Cliffs to the Murray River (Sections 25 and 26). The highest accident rates are around Mildura. The remaining sections have casualty accident rates consistently close to the State average of 15 casualty accidents per 100 million vehicle/kilometres.

Works completed within the 5 year analysis period (1988-1992) such as shoulder sealing (Sections 20, 24 and 25) and works currently under construction (Section 25) are expected to result in a significant reduction in accidents over time. This reduction is not yet reflected in the data.

Poor curves with advisory speeds of 55 kph are of particular concern near Merbein. There were 10 casualty accidents over this 5 km stretch of highway in the 5 years 1988-1992.

Intersection operations being monitored as a result of community concerns include:

- Verdon Street, Inglewood (Section 21)
- Nullawill - Birchip Road (Section 22)



ACCIDENT RATE (1988-1992)

FIGURE 5

- Sutcliff Street, Sea Lake (Section 22)
- Hattah - Robinvale Main Road, Hattah (Section 24)

and as a result of rationalisation of traffic from proposed railway crossing closures:

- Fitzroy Avenue - Red Cliffs (Section 25).
- There are thirteen railway level crossings along the Highway. Active protection is not provided at:
- both ends of Wycheproof, where the railway line runs along the centre of the Highway (2 crossings) and
 - Merbein.

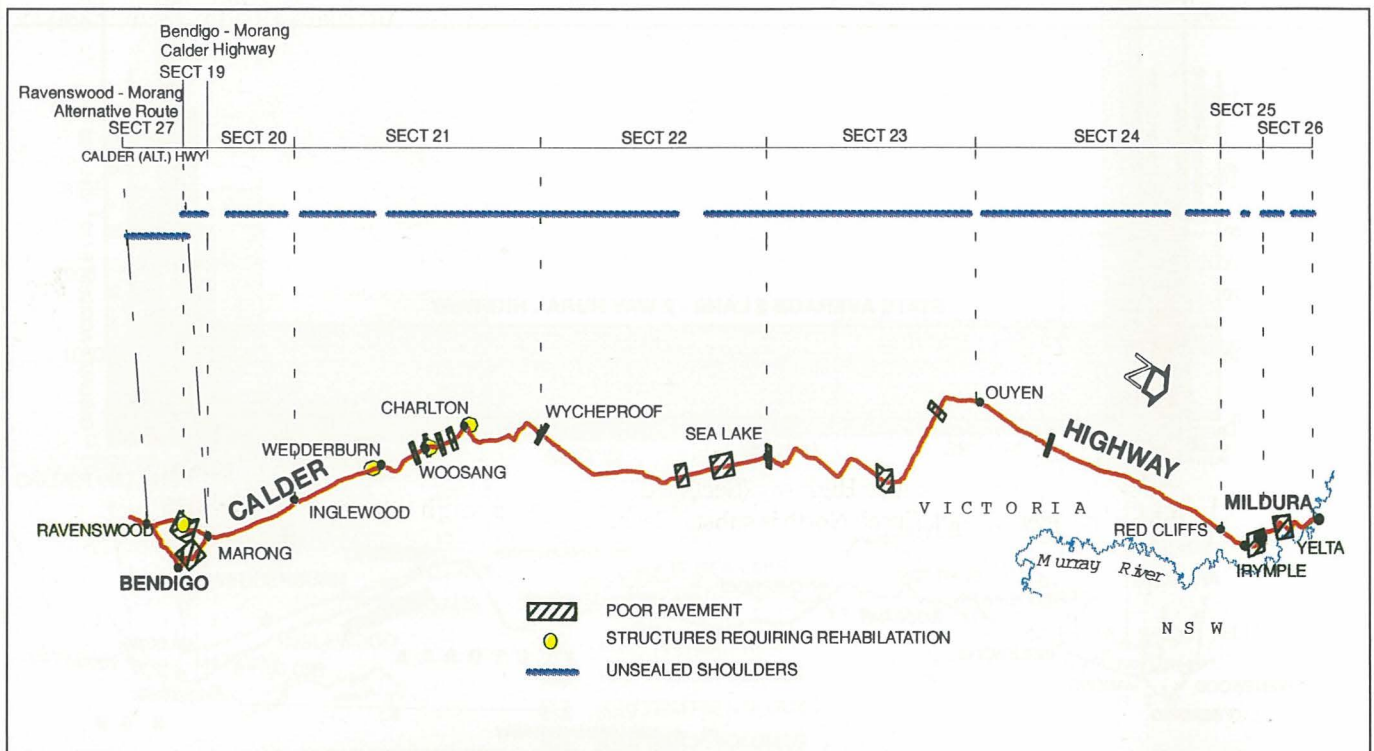
The population of the smaller rural centres is generally declining, resulting in a higher proportion of older residents. Pedestrian facilities to assist those with slower responses to cross the Highway will need to be reviewed. This is particularly so in towns like Inglewood, Wedderburn and Charlton that have very wide reservations with shops fronting the Highway. Pedestrian facilities are also required at Red Cliffs and Merbein because of higher traffic volumes.

B6.3 Road Conditions

Road Conditions are shown on Figure 6. The condition of the road pavement was examined and the need for rehabilitation established. The marginal quality road materials previously used combined with thin pavements result in a higher requirement for road maintenance north of Bendigo. The parameters used in determining rehabilitation are roughness which indicates poor and distressed pavement condition, and rutting due to heavy vehicle use. These are discussed in Technical Supplement No 2. The combination of these factors indicates that 44 km will require rehabilitation in the next 5 years and 43 km in the following 5 years.

Delineation standards are reasonable along most of the Highway but could be improved. Edge line marking is currently less than 150mm wide on all sections. Sections with high accident rates and isolated curves would benefit from tactile edge marking in association with shoulder sealing.

Apart from isolated lengths shown in Figure 6, there are no sealed shoulders on either the Calder Alternative Highway or the Calder Highway. Sealing shoulders would assist in reducing accidents and maintenance costs.



CALDER HIGHWAY EXISTING CONDITIONS

FIGURE 6

Carriageway seal widths are less than 7m over 4 km on the Calder Alternative Highway and about 84 km at various locations between Inglewood and Sea Lake (Sections 20 - 22) on the Calder Highway. Seal widths may require widening as a result of the Linking Victoria Strategy. This would occur in association with rehabilitation. In the interim shoulders would be sealed. Sections with high accident rates would have wider shoulder seals (2 m) compared with other sections (1 m).

Overtaking opportunities are limited by insufficient sight distance. Unsafe overtaking conditions are indicated by continuous line marking in one or both directions. About 48% of the Calder Alternative Highway (Section 27), 43% of the Highway between Red Cliffs and Irymple (Section 25), 38% between Ouyen and Red Cliffs (Section 24) and 21% of the Highway between Bendigo and Ouyen (Sections 19 - 23) is constrained. Poor alignment is a contributing factor along the Calder Alternative Highway. A feature of the section of the Highway between Ouyen and Red Cliffs is the limited sight distance resulting from a series of crests and troughs through rolling terrain.

There are 5 isolated sections of the Calder and Calder Alternative Highways where curve radii and/or grades could result in lowering truck speeds but this is not generally a problem.

Six structures are in need of rehabilitation within the next 2 - 5 years so that they can continue to carry 62.5 tonne B-Doubles, a culvert on the Calder Alternative Highway (Section 27), 3 floodway structures between Wedderburn and Charlton and 2 structures at Charlton (Section 21).

Flooding around Charlton, discussed in section B6.1 Travel Delays, isolates the town of Charlton in the 1 in 20 years flood event. This generally occurs when the Calder Highway is cut off at Woosang. It is estimated that with improvement of the floodways at Woosang, Charlton would be essentially isolated only once in 100 years.

On the Calder Alternative Highway (Section 27) the bridge over Bullock Creek North is substandard with respect to the alignment of the road approaches to the bridges. In the five years 1988-1992 there were 7 casualty accidents over the 4 kilometres requiring improvement.

B7. Management and Development Strategy

B7.1 Objectives

This strategy seeks to maintain and manage the northern sector of the Calder Highway in a manner appropriate to its role as a major State highway.

The cities of Bendigo and Mildura have separate transportation studies. These are:

- Bendigo 2020 Transportation Study, July 1993
- Mildura Traffic Study, February 1991

This strategy does not include recommendations with respect to the urban sections of the Calder Highway in Bendigo.

B7.2 Development Strategy

As the northern sector of the Calder Highway is well able to cater for current and projected traffic volumes for the foreseeable future on completion of current works, a major development program is not required.

The strategy is to:

- ensure that safety and operating conditions on the Calder Alternative Highway and Calder Highway between Bendigo and the Murray River achieve at least the minimum appropriate performance standards by providing:
 - high standards of delineation through improved centre and edge lining;
 - overtaking lanes as required, particularly on the Calder Alternative Highway, between Marong and Inglewood and between Red Cliffs and Irymple;
 - overtaking opportunities by improved linemarking and road geometry
 - 1-2 metre sealed shoulders throughout to reduce accidents and maintenance costs;
 - a high standard of riding surface by rehabilitating sections in poor condition focusing priorities on the most distressed sections;
 - rehabilitation of bridges/structures to carry 62.5 tonne B- Doubles and upgrading to improve road safety;
 - improvements to accident black spots
 - all weather access south of Charlton; and

- improve urban travel conditions south of Mildura by completing construction of a divided highway between Irymple and Mildura.

B7.3 Major Works Progress

Works under construction :

- Section 25 Irymple - Mildura
4-lane divided highway over a total length of 2.5 km (complete late 1997)
Duplication at Mildura will cost \$5.5 million and would provide a Benefit Cost Ratio of 1.1 and Net Present Value of \$0.7 million at 8% discount rate based on 1995 unit rates.

B7.4 Planning Studies

No planning studies are required.

B7.5 Rehabilitation

Rehabilitation expenditure of around \$2.1 million per year would be required over the next 10 years to upgrade 80 km of highway to achieve "Stitch-in-Time" standards with priority for sections:

- Calder Alternative Highway (Section 27)
- Bendigo - Marong (Section 19)
- Wycheproof - Sea Lake (Section 22)
- Mildura - Murray River (Section 26)

The timing and funding level for rehabilitation work depends upon the relative priority for the Calder Highway in the Statewide "Stitch-in-Time" program. Rehabilitation would assist the reduction of freight movement costs and maintenance costs.

B7.6 Local Safety Improvements

Opportunities to provide some localised safety improvements in conjunction with rehabilitation would be taken, notably shoulder sealing and widening.

A program of improved delineation including provision of 150 mm edge lines, reflective marking, tactile edge lining where appropriate and consistently installed port mounted delineators would be developed at a cost of \$1 million.

Sealed shoulders would be provided throughout. Generally 1m wide, sealing would be extended to 2 m on the Calder Alternative Highway (Section 27), and on the Calder Highway from Marong - Inglewood (Section 20) and Red Cliffs to the Murray River (Sections 25 and 26) over the next 5 - 15 years for a cost of \$11 million with an average benefit cost ratio of 3.

Intersection improvements would be carried out at Fitzroy Avenue for a total cost of \$250,000 as part of a rationalisation of railway crossings in Mildura. All other intersections will continue to be monitored with respect to road safety.

Pedestrian islands are proposed within Inglewood, Wedderburn, Charlton, Red Cliffs and Merbein at a cost of \$250,000.

Railway crossing improvements are installed in accordance with State wide priorities. Merbein is low and Wycheproof very low in priority. The provision of flashing lights and warning bells at the Wycheproof and Merbein railway crossings is therefore beyond this program.

Accidents associated with curves near Merbein will continue to be monitored after installation of shoulder sealing, tactile edge lines and other mass safety treatments.

B7.7 Local Improvements

The Avoca River bridge at Charlton will be repaired in 1995/96 and it is proposed to rehabilitate four other structures between Wedderburn and Charlton to maintain this B-Double route. Costs would be about \$250,000.

Floodway and culvert augmentation works at Woosang are proposed to provide all weather access to Charlton for a cost of \$390,000. Timing of this work depends on the availability of funds. Access north of Charlton would continue to be provided by the alternative route.

Overtaking lanes are proposed for a total cost of \$1.4 million on the Calder Alternative Highway, Section 27 (benefit cost ratio 4.2), between Marong and Inglewood, Section 20 (benefit cost ratio 1.5) and between Red Cliffs and Irymple, Section 25 (benefit cost ratio 6.2). Further consideration will be given to overtaking lanes between Wedderburn and Charlton, Section 21 and Ouyen and Red Cliffs, Section 23. The low traffic volumes on these sections

would not result in a favourable benefit cost ratio, however these two sections have relatively long lengths of poor vertical and horizontal alignment and there are passing constraints on 38% of the Highway between Ouyen and Red Cliffs as reflected by the percentage of continuous line marking in one or both directions.

A package of works is proposed on the Calder Alternative Highway between Lockwood and Marong over 4km to reduce accidents by:

- improving the alignment of Bullock Creek North bridge
- rehabilitating the pavement and seal the shoulders
- replacing a small bridge at Lockwood South
- improving intersections along the length.

The cost would be \$2.2 million and would provide a benefit cost ratio of 1.7 at 8 % discount rate.

B8. Investment Priorities

Investment priorities to achieve minimum performance standards and address known accident problems along the 440km northern sector of the Calder and Calder Alternative Highways are shown in Table 3. Estimated costs for program components are:

- Major works \$5.6 million
- Maintenance and other bulk works \$2.3 million p.a.
- Rehabilitation \$2.1 million p.a.
- Local safety improvements \$2.1 million
- Improved line marking \$1 million
- Shoulder Sealing \$11 million
- Local improvements \$4.3 million

Recent expenditure rates on the Calder Alternative Highway and the Calder Highway between Bendigo and the Murray River vary from \$3 to \$6 million per year. To achieve this program within 10 - 15 years would require the maintenance of funding at the higher level.

SECTION (km)	
27 Calder Alternative Highway (134.3-154.3)	<ul style="list-style-type: none"> • Overtaking lanes • Minor Improvement Works • Shoulder Sealing • Rehabilitation • Delineation • Routine Maintenance
19 Bendigo- Marong (154 - 165)	<ul style="list-style-type: none"> • Shoulder Sealing • Rehabilitation • Delineation • Routine Maintenance
20 Marong - Inglewood (165 - 195)	<ul style="list-style-type: none"> • Overtaking lanes • Shoulder sealing • Rehabilitation • Widening • Delineation • Routine Maintenance
21 Inglewood - Wycheproof (195 - 285)	<ul style="list-style-type: none"> • Essential Minor Improvements to Structures • Floodway Improvements • Shoulder Sealing • Rehabilitation • Minor road safety improvements • Widening • Delineation • Routine Maintenance
22 Wycheproof - Sea Lake (285 - 362)	<ul style="list-style-type: none"> • Rehabilitation • Shoulder Sealing • Widening • Delineation • Routine Maintenance
23 Sea Lake - Ouyen (362- 450)	<ul style="list-style-type: none"> • Rehabilitation • Shoulder Sealing • Delineation • Routine Maintenance
24 Ouyen - Red Cliffs (450 - 535)	<ul style="list-style-type: none"> • Rehabilitation • Shoulder Sealing • Delineation • Routine Maintenance
25 Red Cliffs - Mildura (535- 550)	<ul style="list-style-type: none"> • Complete Duplication south of Mildura • Overtaking Lanes south of Irymple • Shoulder Sealing • Rehabilitation • Minor road safety • Delineation • Routine Maintenance
26 Mildura - Murray River (550 - 573.4)	<ul style="list-style-type: none"> • Shoulder Sealing • Rehabilitation • Minor road safety and traffic management • Delineation • Routine Maintenance

CALDER HIGHWAY INVESTMENT PRIORITIES

Bendigo to Murray River

Table 3