COUNTRY ROADS BOARD

VICTORIA

FIFTY-SEVENTH ANNUAL REPORT

FOR YEAR ENDED 30TH JUNE, 1970

PRESENTED TO BOTH HOUSES OF PARLIAMENT
PURSUANT TO ACT No. 6229

COUNTRY ROADS BOARD

Chairman	**I. J. O'Donnell**
Deputy Chairman	**R. E. V. Donaldson**
Member	**J. D. Thorpe**

PRINCIPAL OFFICERS AS AT 30TH JUNE, 1970

Head Office

Chief Engineer	**H. S. Gibbs**
Secretary	**N. L. Allanson**
Accountant	**R. G. Cooper**
Deputy Chief Engineer	**T. H. Russell**
Deputy Chief Engineer—Works . .	**R. C. Handley**
Deputy Chief Engineer—Road Design . .	**W. S. Brake**
Deputy Chief Engineer—Bridges . .	**K. G. E. Moodie**
Deputy Chief Engineer—Mechanical . .	**G. M. Langham**
Deputy Chief Engineer—Planning . .	**N. S. Guerin**
Deputy Secretary	**C. C. Liddell**
Deputy Accountant	**R. J. C. Bulman**

DIVISIONAL OFFICES

Division	*Divisional Engineer*
Bairnsdale	**W. H. Dolamore**
Ballarat	**L. Upton**
Benalla	**A. J. Pryor** (until 18.3.70)
Bendigo	**T. M. Glazebrook**
Dandenong	**F. W. Docking**
Geelong	**G. W. Marshallsea**
Horsham	**L. M. Jones**
Metropolitan	**H. W. P. Hobbs**
Traralgon	**A. Jacka**
Warrnambool	**F. G. Lodge**

60 Denmark Street
Kew

14th January, 1971

The Honourable R. J. Hamer, E.D., M.L.C.

Minister for Local Government

61 Spring Street

Melbourne 3000

Sir,

In accordance with the requirements of Section 128 of the Country Roads Act 1958, No. 6229, the Board has the honour to submit to you for presentation to Parliament the report of its proceedings for the year ended 30th June, 1970.

The Board thanks you, Sir, for your support and interest in its activities and wishes to place on record its appreciation of the continued co-operation and assistance of other State Ministers, Government Departments, State instrumentalities and municipal councils.

The Board also pays tribute to the continued loyal co-operation and work done by its staff and employees throughout the year.

We have the honour to be,

Sir,

your obedient servants

I. J. O'DONNELL, O.B.E., E.D., B.C.E.,
F.I.E.Aust., F.A.I.M., M.Inst.T.,
Chairman.

R. E. V. DONALDSON, A.A.S.A. (Senior),
A.I.M.A., M.Inst.T., J.P.,
Deputy Chairman.

J. D. THORPE, C.E., F.I.E.Aust., M.I.T.E.
(U.S.), Member.

N. L. ALLANSON, A.A.S.A. (Senior), J.P.,
Secretary.

COUNTRY ROADS BOARD

FIFTY-SEVENTH ANNUAL REPORT, 1969-70

CONTENTS

During 1969/70 the Board:

- **Expended $70,464,000 on new roads and bridges and the maintenance and improvement of existing roads and bridges.**
- **Constructed 33 miles of additional dual carriageways.**
- **Commenced the construction of 163 new bridges.**
- **Sealed or resealed with bitumen 3,300 miles of road.**
- **Eliminated in conjunction with the Victorian Railways Department 4 railway level crossings by the construction of road overpasses or underpasses.**
- **Constructed 4 pedestrian overpasses to serve schools.**
- **Planted 60,000 trees and shrubs on road reserves.**

ANNUAL REPORT 1969/70

REVIEW

FREEWAYS AND DUAL CARRIAGEWAY ROADS

During the year ended 30th June 1970 the Board constructed 5·3 miles of new freeways and converted 11·9 miles of single carriageway State highways to dual carriageway roads. Approximately 16 miles of declared main roads were also converted to dual carriageway roads by municipal councils with financial assistance from the Board.

In addition construction plans were completed for 24·5 miles of new freeways and detailed planning proceeded for a further 31·6 miles of freeways.

The construction of strategically located freeways in both urban and rural areas is a vital requirement in the achievement of an efficient road system. Freeways allow through traffic to by-pass centres of population and specially designed interchanges with the ordinary street system permit fast, safe connections between centres of population. Quicker movement of goods reduces rising freight costs and commercial areas free from the dangers of heavy volumes of through traffic grow stronger and more efficient.

Besides the undoubted contribution made by freeways and dual carriageway roads towards road safety the number of motor vehicles in Victoria, 1,380,176 at 30th June, 1970, has demanded that some completely new modern roads be built and the capacity of other important roads in the State be increased.

The Board believes that an efficient freeway system combined with dual carriageway State highways emanating from Melbourne is expected by Victoria's 1,502,000 licensed drivers in the interests of economy and safety. Victoria's citizens, commerce and industry invested more than $250,000,000 excluding sales tax in the purchase of motor vehicles during 1969/70. This investment is likely to increase in the future rather than reduce and the planning of modern safe road facilities to cater for the motor vehicle population is the Board's prime responsibility.

Tullamarine Freeway

On 3rd February, 1970, the Hon. Sir Henry Bolte, M.L.A., Premier of Victoria, officially opened the eleven miles long Tullamarine Freeway. The Board constructed the two miles long east-west Strathmore section from Bell Street, Pascoe Vale South, to the southern boundary of the Essendon Airport and the five miles long north-south section from Essendon Airport to Melbourne (Tullamarine) Airport at a total cost of $14·94 m. The work included the three level Bell Street interchange and the construction of thirteen other bridges. More details of this project appear on page 20.

During June 1970 the Strathmore section of the freeway carried approximately 16,600 vehicles per 12 hour day.

The Tullamarine Freeway at the Bell Street interchange.

Mulgrave Freeway and Eumemmerring Freeway

Work commenced on the construction of 3·9 miles of dual carriageways of the Mulgrave Freeway and the Eumemmerring Freeway from just west of Stud Road, Dandenong North, to the Princes Highway at Hallam. Interchanges will be constructed at Stud Road, Heatherton Road and the Princes Highway. The work is expected to be completed by July 1972 at a cost of approximately $6 m.

Construction of a further section of 4½ miles of the Mulgrave Freeway from Springvale Road to Stud Road will commence in the financial year 1970/71. When the third section of the Mulgrave Freeway between Waverley Road, Chadstone, and Springvale Road is completed in 1975, 13½ miles of freeway from Waverley Road, Chadstone, to Princes Highway East at Hallam will be available for traffic.

Mornington Peninsula Freeway

Work commenced during the year on the 5 miles long Dromana section of the Mornington Peninsula Freeway at an estimated cost of $3·4 m. The section should be completed by the end of 1972. The full length of the Mornington Peninsula Freeway will extend for approximately 43 miles from the Dingley Freeway at Keysborough to Canterbury Jetty Road south of Sorrento.

Further information about the Mornington Peninsula Freeway appears on page 19.

Frankston Freeway

A single carriageway by-pass of Frankston joining Wells Road with the Frankston-Flinders Road was completed in 1962-3.

During this financial year work commenced on the provision of a second carriageway and grade separation with the Dandenong-Frankston Road.

Completion of the Frankston Freeway at an estimated cost of $3 m. is planned for 1973 when 4.5 miles of divided freeway will be available from Eel Race Road, Seaford, to the Frankston-Flinders Road.

Western Freeway

Work commenced during the year on the construction of the Gordon section and Bacchus Marsh section of the Western Freeway.

The 5½ mile Bacchus Marsh section will by-pass the township of Bacchus Marsh to the north, leaving the existing Western Highway at Coimadai Creek and rejoining the highway at Korkuperrimul Creek. It is expected that this project will be completed by the end of 1971 at an estimated cost of $3½ m.

The Gordon Section of the freeway will by-pass Gordon township to the north of the present Western Highway, eliminating a poorly aligned section of the highway and reducing the present route length by almost one mile. The estimated cost of this 5·6 miles of freeway is $2 m., and should be completed by April 1971.

Earthworks in progress on the Western Freeway (Bacchus Marsh Section).

At the close of the financial year proposals were being developed in conjunction with the Councils concerned to determine the alignments for the Pentland Hills section (four miles), Myrniong section (three miles) and Ballan section (five miles) of the Western Freeway.

When the construction of the above sections of freeway is completed, continuous freeway conditions will be available from east of Bacchus Marsh to east of Gordon, a distance of 27 miles.

Lower Yarra Freeway

Construction of four miles of freeway between the Princes Highway and Williamstown Road to provide the main western approach to the West Gate Bridge continued during the year.

Temporary arrangements for through traffic were necessary during the construction of road over road bridges at the interchange with the Princes Highway. Other bridge structures to take the freeway over streams and the railway and over or under existing roads were either completed or well advanced.

The freeway roadworks, consisting of earthworks and pavement construction for two carriageways, each of two or three lanes, progressed well and should be completed early in 1971.

Hume Freeway

The Board initiated a preliminary proposal for the construction of a 20 mile deviation of the Hume Highway between Wallan and Broadford which will cross the Dividing Range to the east of Pretty Sally Hill at an elevation 400 feet lower than at present. The proposal was agreed to in principle by the municipal councils concerned.

Consideration was given to whether or not the alternative of further developing the existing Hume Highway between Wallan and Broadford should be adopted but detailed investigations indicated clearly that the 20 mile deviation would provide a more satisfactory solution for traffic.

At this stage the exact location of the new freeway has not been determined but a more detailed investigation will be carried out by the Board in conjunction with the municipal councils concerned. Construction of the freeway is expected to be completed in the 1973/74 financial year at an estimated cost of $14 m.

Hume Highway

Improvements to the Hume Highway were further advanced by the completion of the dual-carriageway deviation at Beveridge, and the construction of four-lane dual carriageways south of Beveridge to connect with the earlier works north of Craigieburn. This now provides 18 miles of four-lane dual carriageways between North Coburg and Beveridge, with generally restricted access.

Further north, at Tallarook, work proceeded on the construction of a by-pass of the town, providing a four-lane divided facility for a distance of 5½ miles. The work should be completed in the financial year 1970/71 at an approximate cost of $14 m.

Princes Highway West

Traffic flow in the vicinity of Separation Street, North Geelong, has been greatly assisted by the completion of four road over rail bridges, which, together with approach roads, provide an additional half mile of dual carriageways. The cost of the project with associated intersection improvements was approximately $1·7 m.

Maroondah Highway

Work proceeded on the construction of an additional 2·2 miles of dual carriageways between Brushy Creek, North Croydon, and Hull Road, Lilydale. When completed, this work will extend the total length of continuous dual carriageways east of Box Hill to 13 miles.

Burwood Highway

Reconstruction of the Burwood Highway in the City of Knox extended the dual carriageways for a further 1½ miles from Morack Road to east of the Wantirna-Sassafras Road, with associated bridgeworks at the crossing of Dandenong Creek.

A further extension of one mile of dual carriageways easterly to Stud Road was also completed.

Princes Highway East

Reconstruction of the highway between Waverley Road, Caulfield, and Ferntree Gully Road, Oakleigh, was still in progress. The estimated cost of the work is $2 m. and will provide a six-lane divided facility over a length of four miles, together with improvements at major intersections.

Nepean Highway

The construction of an additional 2 miles of dual carriageways between Tower Road and Tanti Creek, Mornington, was in progress.

Reconstruction of three-quarters of a mile to provide a six-lane divided facility between the Moorabbin Overpass and Wickham Road also proceeded.

METROPOLITAN TRANSPORTATION COMMITTEE REPORT

The Board's Chairman, Mr. I. J. O'Donnell, is a member of the Metropolitan Transportation Committee which during the year produced a plan of Melbourne's transport needs in the year 1985. Over the next 15 years the population of metropolitan Melbourne is expected to reach 3·75 million persons. To cater for Melbourne's road needs over the same period the Transportation Committee has recommended the construction of 307 miles of freeways, 103 miles of new arterial roads and 189 miles of widening of arterial roads.

TRANSPORTATION STUDIES

During the year the Board initiated plans for transportation studies to be carried out in the urban areas of Geelong, Ballarat and Bendigo. The aim of each study is to determine the public requirements for transportation facilities both now and in the future. The studies will be carried out by consultants supervised by a committee acting on behalf of the Board.

It is expected that the studies will be carried out over a period of two years at a total cost of approximately $440,000. The Board will meet seven-eighths of the cost, and the balance will be met from local contributions.

Further information about these transportation studies appears on page 34.

PHILLIP ISLAND BRIDGE

A new 2,100 feet long concrete bridge linking Phillip Island with the mainland at San Remo was officially opened on Friday, 21st November, 1969, by the Hon. M. V. Porter, M.L.A., Minister of Public Works.

The new bridge replaces the old suspension bridge constructed in 1938.

The cost of the new bridge was $3¼ m. Further details of the new bridge and the opening ceremony appear on page 27.

PROCLAMATION OF FOREST ROADS

From time to time the Board initiates the proclamation of certain roads, or sections of roads, as forest roads under the provisions of the Country Roads Act. Such roads must be located within or adjacent to any State forest or in areas which are considered to be timbered, mountainous or undeveloped. These areas produce little or no rate revenue to the municipality in which they are located. The proclamation of a road as a forest road removes from the municipal council the financial obligation for the maintenance and improvement of the road. This responsibility is taken over by the Board.

The following four roads in East Gippsland used extensively by logging traffic were proclaimed as forest roads during the year:

1. Buchan-Esnay Road in Tambo Shire between Bruthen-Buchan Road and Gillingall Road (12·3 miles).

2. Bendoc-Orbost Road in Orbost Shire between the Bonang Highway and Bendoc (13 miles).

3. Dargo 'B' Main Road in Avon Shire between Cobbannah and a point two miles north of Dargo (23·25 miles).

4. Benambra-Limestone Road in Omeo Shire between Hollands Road and the logging track east of Stony Creek (8·9 miles).

On 30th June, 1970, the Governor-in-Council also proclaimed the 92·2 miles of road between Heyfield in Maffra Shire and Jamieson in Mansfield Shire as the Heyfield-Jamieson Forest Road. This road includes the 33·2 miles length of the former Licola Forest Road between Heyfield and Licola, and the 59·0 miles of the Licola-Jamieson (unclassified) Road. A 10·6 mile section of the latter road was recently completed by the Board, as Special Project No. 15, and links previously constructed sections of road on the northern and southern sides of the Dividing Range.

This last section presented a number of problems in its construction, being located in mountain country on the Great Dividing Range, which is crossed by the new road in the vicinity of Mount Skene at an elevation of 5,100 feet. The road was officially opened by the Hon. M. V. Porter, M.L.A., Minister of Public Works, at a ceremony held near Mount Skene on 11th December, 1969.

CAPTAIN COOK BI-CENTENARY

In Victoria, the Captain Cook Bi-Centenary was officially celebrated with a ceremony held at Cape Everard on 20th April, 1970. The point was renamed Point Hicks, a memorial plaque was unveiled, and an area in the vicinity was proclaimed the Captain Cook National Park.

To provide access to the area, approximately 30 miles of unclassified roads between Cann River and the coast were widened and improved where necessary, to permit the buses and cars attending the ceremony to make the trip in safety and reasonable comfort.

The roadworks were carried out by the Orbost Shire Council under the direction of the Board's Divisional Engineer—Bairnsdale, with special funds provided by the State Treasury.

The road improvements will be maintained and be of permanent future benefit to tourists.

OVERDIMENSIONAL ROUTE SIGNS

Under the provisions of the Motor Car Act the Board is the authority charged with the responsibility of issuing permits for the movement of vehicles and loads in excess of the prescribed legal weights or dimensions.

Such permits for travel in or through the Melbourne metropolitan area are issued by the Board in respect of certain selected routes having regard to their suitability for the passage of vehicles which are larger than normal, e.g. the strength of bridges crossed, the height of overhead objects, particularly overhead railway bridges, and the movements required by long or wide vehicles turning at intersections.

Although the permit specifies which of the five selected routes must be taken, it is often difficult for drivers to follow road or street name signs or to have advance warning of a change in route direction.

To assist drivers, particularly country and interstate drivers, to observe the correct route in the Melbourne metropolitan area the Board, following full discussion with the councils concerned, erected special route markers bearing the letters O.D., and the number of the route in a distinguishing colour for each route.

These signs are for the guidance of drivers of overdimensional vehicles and loads only. Other motorists should continue to use the now familiar national or metropolitan route numbering systems, designated by the small white or blue shields, to assist navigation across the metropolitan area.

MINISTRY OF LOCAL GOVERNMENT

The Premier of Victoria, on 12th June, 1970, designated the Minister for Local Government as the responsible Minister of the Crown to accept responsibility as the Minister in accordance with the terms of the Country Roads Act.

Prior to that date the Board had operated under the jurisdiction of the Minister of Public Works.

ELIMINATION OF RAILWAY LEVEL CROSSINGS

Since the inception of the State Government's scheme in 1954 to improve or replace railway level crossings with grade separated crossings, 52 level crossings throughout Victoria have been replaced by overpasses or underpasses constructed by the Board or the Victorian Railways. These works represent a total expenditure of $21 m.

Road under rail grade separation which replaces the level crossing at Canterbury.

During the year four level crossing elimination projects were completed, and at the end of the year a further four projects were under construction. Further details of these projects appear on page 29 of this report.

COMMONWEALTH AID ROADS ACT 1969

Under the provisions of the Commonwealth Aid Roads Act 1969, Victoria received from the Commonwealth during the year an amount of $38,160,000 for expenditure on roads. This amount was approximately $5,000,000 more than the amount made available to Victoria in the financial year 1968/69 under the terms of the Commonwealth Aid Roads Act 1964.

Financial year 1969/70 was the first year of operation of the Commonwealth Aid Roads Act 1969 and under the terms of the Act the funds made available to Victoria were required to be expended on the following categories of roads:

Urban arterial roads	$21,260,000
Rural arterial roads	$2,420,000
Rural roads other than arterial roads	$13,910,000
Planning and research	$570,000

No similar requirements were included in previous Commonwealth Aid Roads Acts.

The 1969 Act states inter alia:

" 'urban arterial road' means a road or proposed road in an urban area that is for the time being declared by the Minister to be an urban arterial road, or urban sub-arterial road, for the purposes of this Act," and

" 'rural arterial road' means a rural road that is for the time being declared by the Minister to be a rural arterial road for the purposes of this Act."

The roads declared to be urban arterial roads by the Commonwealth Minister for Shipping and Transport included all the Board's State highways and main roads situated within the Melbourne statistical division of 2,368 square miles and the urban areas of Geelong, Ballarat and Bendigo. The mileage of the Board's roads so declared was 1,114 miles. The roads declared to be rural arterial roads included 2,419 miles of the Board's State highways and 29 miles of main roads.

The Act restricts expenditure on urban arterial roads and rural arterial roads to that incurred on construction works. Expenditure on maintenance works is not permitted to be charged to the funds made available by the Commonwealth except on roads in the category known as "rural roads other than arterial roads".

REORGANIZATION OF CHIEF ENGINEER'S BRANCH

The increase in the Board's road construction and maintenance activities in recent years brought about the need for organizational changes to deal more adequately and efficiently with both immediate and long range planning aspects of the Board's work.

During the year two major organizational changes were effected in the Chief Engineer's Branch.

A Planning Sub-branch headed by a Deputy Chief Engineer (Planning) was established to carry out and expand the detailed and co-ordinated long range planning previously carried out by sections of the Road Design Sub-branch and the Advance Planning Division as well as several new aspects to be integrated into the planning of the general road system of the State.

The recent increase in new freeway construction projects has demanded that the special skills required for this type of work be centrally controlled by a specialist group of engineers headed by one experienced senior engineer. In the Works Sub-branch a Major Works Division was established with the appointment of an Engineer for Major Projects and three Project Engineers.

FINANCE

The total funds available for expenditure by the Board during the year including the allocation from the Board's (Special Projects) Fund was $88,316,319. This amount was $7,815,070 or 10% more than the funds available in financial year 1968/69.
The funds available were derived from:

State sources	$47,107,015
Commonwealth Aid Roads Act	$38,160,000
Balance brought forward from financial year 1969/70	$3,049,304
	$88,316,319

RECEIPTS

The Board's receipts are obtained from the following main sources:

1. Fees under the Motor Car Act:
   (a) Motor registration fees less cost of collection (metropolitan bus registration fees and the specified proportion of registration fees paid to the Roads (Special Project) Fund are excluded).
   (b) Two-thirds of additional Motor registration fees levied on first registration and subsequent change of ownership.
   (c) Trailer registration fees less cost of collection other than the amount paid to the Roads (Special Projects) Fund.
   (d) One-quarter drivers' licence fees, less one-quarter cost of collection.
   (e) Drivers' licence testing fees, less cost of collection.
   (f) One-half of driving instructors' licence fees less one-half cost of collection.
   (g) Examiners' licence fees—motor car roadworthiness examinations.
   (h) All fees from the issue of authorized log books less cost of collection.
2. All moneys received under Part II of the Commercial Goods Vehicles Act (ton mile tax).
3. Municipal contributions to expenditure on declared main roads as provided for in the Country Roads Act.
4. Small amounts of loan money.
5. Receipts under the Commonwealth Aid Roads Act.

The following table shows the receipts by the Board for the financial year 1969/70 compared with those in financial year 1968/69.

STATE SOURCES	1968/69	1969/70
Motor Car Act	$28,888,595	$30,868,165
Commercial Goods Vehicles Act	7,841,757	8,555,278
Municipalities Repayments	1,931,449	1,903,641
Loan Funds	3,389,000	900,000
Special Grant from State Treasury	783,650	849,000
General Receipts	519,513	498,345
	$43,353,964	$43,574,429

COMMONWEALTH AID ROADS ACT	1968/69	1969/70
General Purposes	$19,478,253	
Rural Roads	13,245,212	
Urban Arterial Roads		$21,260,000
Rural Arterial		2,420,000
Rural Roads other than Arterial		13,910,000
Planning and Research		570,000
	$32,723,465	$38,160,000
Total	$76,077,429	$81,734,429

COMMONWEALTH AID ROADS ACT 1969

The Commonwealth Aid Roads Act 1969 covers the period from 1st July, 1969, to 30th June, 1974. The Act provides for the distribution to the States out of consolidated revenue over the five year period, of a total sum of $1,252,050,000 for expenditure on road construction and maintenance and on road planning and research.

The total amount allocated to Victoria is $254,400,000 as under:

Financial Year	Amount
1969/70	$38,160,000
1970/71	$43,460,000
1971/72	$49,820,000
1972/73	$57,240,000
1973/74	$65,720,000
	$254,400,000

The grants consist of principal grants payable to each State and supplementary grants payable to South Australia, Western Australia and Tasmania. The principal grants are allocated for expenditure on specified categories of roads and on road planning and research.

The specified categories of roads are:

(i) Urban Arterial Roads:

These are roads or proposed roads in urban areas that are for the time being declared by the Minister of Shipping and Transport to be urban arterial roads or urban sub-arterial roads for the purposes of the Act.

(ii) Rural Arterial Roads:

These are rural roads that are for the time being declared by the Minister of Shipping and Transport to be rural arterial roads for the purposes of the Act.

(iii) Rural roads other than arterial roads:

For the purposes of the Act—

"Urban Area", in Victoria, means an area designated by the Commonwealth Statistician for the purposes of the Census taken in 1966 as:

Melbourne Statistical Division
Urban Geelong
Urban Ballarat
Urban Bendigo

"Rural Road" means a road or proposed road not in an urban area.

The following table shows the amounts allocated to the State of Victoria for expenditure on the various categories of roads and on road planning and research, for the five year period:

Financial Year commencing 1st July	Category of Roads			Planning and Research	Total
	Urban Arterial	Rural Arterial	Rural Roads other than Arterial Roads		
	$'000	$'000	$'000	$'000	$'000
1969	21,260	2,420	13,910	570	38,160
1970	25,330	2,880	14,600	650	43,460
1971	30,300	3,440	15,330	750	49,820
1972	36,170	4,110	16,100	860	57,240
1973	42,950	4,870	16,910	990	65,720
	$156,010	17,720	76,850	3,820	254,400

Grants for Urban Arterial and Rural Arterial roads are available for expenditure on the construction of roads declared as Urban Arterial and Rural Arterial roads respectively by the Minister of Shipping and Transport.

Grants for rural roads other than arterial roads are available for expenditure on the construction and maintenance of roads in rural areas other than arterial roads.

Grants for planning and research are available for expenditure on selected items of planning and research approved by the Minister of Shipping and Transport.

Moneys paid to a State under the Act in a year are required during that year, to be expended or set aside for expenditure. Moneys not spent but set aside for expenditure are required to be expended during the period of eighteen months, commencing on the first day of the year during which the moneys are set aside or such further period as the Commonwealth Treasurer with the concurrence of the Minister of Shipping and Transport approves.

The receipt by each State of the full amount of the annual grants provided for in the Act is dependent upon each State expending on road construction and maintenance from its own resources, an amount at least equal to a "quota". The "quota" for a year is an amount which bears to the base amount specified in the Act, the same proportion as the number of motor vehicles that were on the register of the State on the 31st day of December preceding that year, bears to the number of motor vehicles registered on the 31st December, 1966. The base amount specified for Victoria in the Act is $48,317,786 and the number of motor vehicles registered at the 31st December, 1966, was 1,109,817.

Expenditure from Victoria's own resources for the year 1969/70 was in excess of the "quota", which enabled Victoria to receive in full the grant from the Commonwealth of $38,160,000.

EXPENDITURE

Expenditure in the form of cash payments during the financial year 1969/70 amounted to $83,582,495, leaving a cash balance of $1,201,238 to be carried forward into the financial year 1970/71. The receipts under the Commonwealth Aid Roads Act were fully expended.

The following table compares expenditure from the Board's funds in the year 1969/70 with 1968/69.

Item	1968/69	1969/70
Construction and maintenance of roads and bridges	$61,992,156	$70,464,378
Capital Expenditure (plant, workshops, offices, etc.)	2,193,639	2,436,404
Salaries, operating accounts and other administration expenditure	6,460,035	6,180,665
Statutory payments to Tourist Fund, Transport Regulation Fund, Traffic Commission Fund, etc.	1,445,529	1,337,163
Planning and Research		720,469
Interest and Sinking Fund Payments	2,306,042	2,443,416
	$74,397,401	$83,582,495

SHARING THE COSTS OF ROADWORKS

The Country Roads Act provides that no more than one-half of the amount expended on permanent works and one-third of the amount expended from the Country Roads Board Fund on main roads during the preceding financial year shall be apportioned between the various municipalities benefited thereby. The Act also provides that the amount apportioned to a council in respect of expenditure charged to the Country Roads Board Fund may be reduced where the cost of maintenance is excessive due to motor traffic not of local origin or to timber traffic. The revenue, valuation and rating of the municipality and its financial obligations for loan expenditure on permanent works are taken into account in deciding the elvel of contribution by a council.

In September 1969, expenditure on main roads in financial year 1968/69 was apportioned in accordance with the Country Roads Act resulting in the following distribution of expenditure other than Loan Fund expenditure:

Expenditure from Country Roads Board Fund	$10,392,656
Expenditure from Commonwealth Aid Road moneys	3,578,597
Expenditure from proceeds of ton/mile tax (Commercial Goods Vehicles Act)	2,375,768
TOTAL	$16,347,021
Amount apportioned to councils	$1,820,310

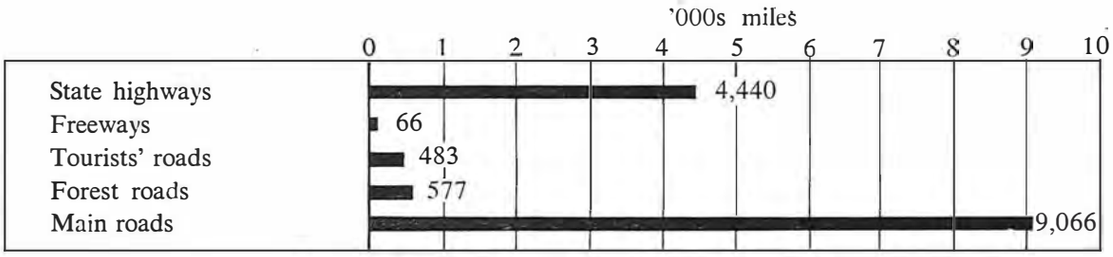
Within the limits of funds available the Board made allocations to municipal councils for works on unclassified roads. The expenditure incurred from the allocations made by the Board in financial year 1969/70 compared with 1968/69 was as follows:

	1968/69		1969/70	
	C.R.B.	Council Contribution	C.R.B.	Council Contribution
Construction and reconstruction	$12,394,163	$3,071,729	$14,318,452	$3,525,823
Patrol maintenance	1,574,782	734,563	1,732,957	808,343
TOTALS	$13,968,945	$3,806,292	$16,051,409	$4,334,166

ROAD CONSTRUCTION AND MAINTENANCE

THE DECLARED ROAD SYSTEM

The total length of roads declared or proclaimed under the Country Roads Act as at 30th June, 1970, was 14,632 miles, consisting of:



The following table shows the increasing expenditure from the Board's funds on each class of road in financial years 1959/60, 1964/65 and 1969/70.

$'000

	1959/60	1964/65	1969/70
State highways	11,704	17,081	19,887
Freeways	534	4,854	12,401
Tourists' roads	1,102	1,422	3,112
Forest roads	384	15,189	798
Main roads	12,518	714	17,783

State Highways

At 30th June, 1970, there were 32 declared State highways in Victoria. State highways are the principal road arteries forming interstate connections and links between provincial centres of importance. The more important State highways are also part of the National Route system of inter-State highways. The Board bears the full cost of all works on State highways required to meet the needs of through traffic.

The total expenditure of $20,522,000 on State highways during the year included an amount of $635,000 made available from the Roads (Special Projects) Fund.

Details of the more significant works completed during the year are listed in Appendix 1.

Realigned section of the Princes Highway East near the New South Wales border.

Freeways

One of the amendments included in the Country Roads (Amendment) Act 1969 provided for a change in title from "by-pass roads" to "freeways". The term "freeways" is widely understood and accepted as a road facility offering the highest standards of safety, traffic capacity, and directness of route. The term "by-pass road" was introduced by legislation in 1956, but because of the connotation that such a road is simply one that by-passes a town, the more modern term "freeway" is now preferred. A distinguishing feature of freeways is that access is controlled and restricted to properly designed interchanges. Traffic crossing a freeway at other points is taken directly over or under the through carriageways.

The major freeway project completed during the year was the Strathmore section of the Tullamarine Freeway, which together with the section previously constructed by the Board north of Essendon Airport, and the section built by the Melbourne and Metropolitan Board of Works, provides a dual carriageway route from Flemington to the Tullamarine (Melbourne Airport). This project is referred to in more detail on page . . of this report.

Other significant works on freeways are included in Appendix 1.

Tourists' Roads

Tourists' roads proclaimed under the provisions of the Country Roads Act provide access to places of special attraction to tourists both in summer and winter. The Board is responsible for the construction, improvement and maintenance of tourists' roads which at present number 21.

Details of the more significant works carried out on tourists' roads during the year are listed in Appendix 2.

Reconstructed section of the Marysville-Woods Point Tourists' Road east of Marysville.

Forest Roads

Forest roads proclaimed under the Country Roads Act are situated within or adjacent to any State forest or in areas which are considered to be timbered, mountainous, or undeveloped. The cost of all construction and maintenance on forest roads is met by the Board. During the year 116·5 miles of additional forest roads in eastern Victoria were proclaimed. Further details of the newly proclaimed forest roads appear on page 4 of this report. At present there are 28 proclaimed forest roads in Victoria.

Appendix 2 lists the more important works completed during the year.

Main Roads

Main roads form the secondary network of roads, providing access between important local centres of industry, commerce or settlement. Main roads are generally constructed and maintained by municipal councils to the satisfaction of and with financial assistance from the Board, although the Country Roads Act provides that the Board may carry out such works with the consent of the Minister for Local Government.

Yackandandah-Wodonga Road, Yackandandah Shire. One mile of this main road was reconstructed, realigned, and sealed.

The following table shows the applications, allocations, and expenditure on main roads for the financial years 1968/69 and 1969/70, illustrating that the Board is not able to allocate sufficient funds to satisfy the applications for funds received from municipal councils:

Item	1968/69	1969/70
	$'000s	$'000s
A Applications	32,262	33,305
B Allocations	22,576	23,550
C Expenditure	16,940	17,783
	%	%
B as percentage of A	69·8	70·71
C as percentage of B	75·0	75·71

A summary of the more important works completed during the year on main roads is contained in Appendix 3.

Unclassified Roads

The term "unclassified road" is used by the Board to describe any public road in Victoria which is not declared or proclaimed under the provisions of the Country Roads Act. Unclassified roads are under the care and management of municipal councils, and each year the Board provides financial assistance towards the cost of construction and maintenance works on unclassified roads within the limits of the funds available, and generally in accordance with the priorities given by the councils to the works proposed to be carried out.

Shown below are the applications received, allocations made, and expenditure incurred on unclassified roads in the 1968/69 and 1969/70 financial years:

Item	1968/69	1969/70
	$'000s	$'000s
A Applications (gross)	44,195	47,959
B Allocations (Board's funds only)	18,857	19,776
C Expenditure (Board's funds only)	13,969	16,051

A list of the more significant unclassified roadworks carried out with financial assistance from the Board and which were completed during the year appears in Appendix 4.

LINE-MARKING

During the year the Board maintained traffic lines and pavement markings on a total of 6,252 route miles of road comprising 3,890 miles of State highways, 1,872 miles of other declared roads and 490 miles of unclassified roads.

In order to meet the demands for line-marking the Board employs two large striping machines for centre line, lane line and edge line work, and two smaller machines for intersection marking and other miscellaneous marking. A third large striping machine was under construction at the Board's Central Workshops at Syndal.

While the increase in the line-marking of route miles of road was only 85 miles more than in financial year 1968/69 the work output expressed as miles of "standard stripe" (i.e. 10 ft. x 3 inch line, 30 ft. gap) increased by approximately 20% to a length of 19,430 miles. This increase was mainly due to the number of miles of standard stripe used on newly constructed freeways and other multilane facilities. Edge lines were maintained on approximately 130 miles of road where weather conditions, steep grades, or appreciable curvature may restrict driver visibility.

The year's programme of line and pavement marking cost a total of $319,437 and required the use of 53,270 gallons of paint and 171 tons of glass spheres. The glass spheres are used to reflectorize the markings. The average cost of painting each mile of standard stripe was $11.40.

BITUMINOUS SURFACING

The total length of bituminous surfacing, including both sprayed work and plant mix work, completed during the year amounted to 3,300 miles at a cost of $10,595,971.

The Board's 23 mobile bituminous surfacing units, together with plant owned by municipal councils and contractors completed 3,191 miles of sprayed work at a cost of $7,711,853.

Contractors operating from fixed asphalt plants completed 109 miles of plant mix work on heavily trafficked roads, mainly in urban areas, using 265,671 tons of bituminous concrete at a cost of $2,884,118.

The types of work completed during the year were:

309	miles of sealing widened pavements.
34	miles of initial sealing on dual carriageways.
507	miles of restoration of seal coats on reconstructed sections.
1,556	miles of maintenance retreatments.
108	miles sealed on behalf of other State and municipal authorities.
786	miles of extensions to the bituminous sealed road system of the State including 100 miles of roads declared or proclaimed under the Country Roads Act.

The sprayed work carried out by the Board necessitated the purchase of 30,084 tons of bitumen of which 66 per cent was transported by rail. Contractors performing plant mix work used a further 15,000 tons of bitumen in the production of bituminous concrete used on the Board's works.

305,442 cubic yards of aggregate was purchased and used for sprayed work and 200,000 cubic yards of aggregate was used by contractors in the manufacture of bituminous concrete for the Board's works.

The Board also purchased approximately 14,500 tons of various bituminous materials such as bitumen emulsion, cutback bitumen, tars and adhesion agents for sprayed work and for the maintenance of sealed roads.

The total length of sealed roads in the Board's declared road network was increased during the year to 13,101 miles or 90 per cent of the total length of roads declared or proclaimed under the provisions of the Country Roads Act.

ROADSIDE DEVELOPMENT

To add beauty to the Board's declared roads, and for shade, shelter, and reduction of headlight glare on dual carriageways, more than 60,000 trees and shrubs were planted on road reserves during the year at a cost of $45,000.

Most of the seedling trees and shrubs used by the Board are obtained from the nurseries of the Forests Commission and the Natural Resources Conservation League. The Board prefers to use native species because of their greater adaptability to the climate of Victoria, and their more pleasing blend with the landscape.

The Board noted with pleasure than 1,470 sugar gum trees damaged by the 1968 bushfires which swept across the Princes Highway near Lara have been saved from dying. These trees would certainly have died had it not been for the action taken to cut them to three

or four feet in height very soon after the fire to encourage regeneration. Apart from a few trees which did not survive, and which will be replaced in the spring, the trees now look healthy and are showing a good growth of new foliage.

Following the completion of the new Phillip Island Bridge and approaches, landscaping of the batters and the foreshore was carried out to improve the appearance of the area. The work included extensive grassing and plantations of native trees and shrubs. To complement the existing Norfolk Island pine and cypress trees, additional seedling trees of similar type have been planted. The batters on the Westernport side of the approach road were protected from erosion by a covering of straw and the establishment of ground cover plants. On the area of reclaimed land adjacent to the bridge abutment a surfaced parking area has been provided. Attractive treated pine barrier fencing was used where necessary.

Batter treatment on Wilsons Promontory Road south of Darby River.

An example of median planting carried out by the Board in the metropolitan area during the year is on the Burwood Highway in the City of Nunawading where 2,500 native shrubs and small trees have been planted to reduce headlight glare from approaching vehicles and to improve the appearance of the road.

Roadside plantation on the Western Highway at the Wail overpass.

The provision of water supply and toilets at rest areas continued during the year, and these facilities are now available to motorists at the rest area sites at:

Boundary Bend on the Murray Valley Highway.

Garfield on the Princes Highway East.

Blind Joe's Creek near Rosedale on the Princes Highway East.

Cherrypool on the Henty Highway.

Box's Cutting west of Beaufort on the Western Highway.

Lochiel near Dimboola on the Western Highway.

Warby Springs near Wangaratta on the Hume Highway.

Albert River near Alberton on the South Gippsland Highway.

The extensive use by the motoring public of these and other rest areas and wayside stops, particularly in the holiday season, is an indication that the provision of such facilities is much appreciated. Unfortunately there have been incidences of vandalism which cause inconvenience and additional maintenance expenditure.

Roadside development and improvement is undertaken within the Board's Divisional organization, generally by patrols under the supervision of a Roadmaster and under the general guidance of the Horticultural Officer.

CONTRACTS

Contracts under Board's Direct Supervision

Details of the types of contracts entered into and their respective values, together with a comparison with those of financial year 1968/69, are shown in the following table:

Type of Contract	Number of Contracts		$ Value	
	1968/69	1969/70	1968/69	1969/70
Road Construction—Major works (over $60,000)	17	22	5,975,235	10,440,434
Road Construction—Minor works (under $60,000)	11	23	234,568	593,563
Supply of Roadmaking Materials	68	64	1,507,786	2,373,012
Bituminous Treatment and Supply of Materials	85	106	3,604,850	4,534,411
Bridge Construction	30	33	2,000,367	1,984,551
Manufacture of Bridge Components and Fabricated Steel	21	18	688,491	722,499
Supply of Reinforced Concrete Pipes and Box Culverts	21	24	670,000	727,000
Supply of Road and Bridge Construction Equipment	46	41	1,400,133	1,678,655
Divisional Facilities	4	13	37,690	137,547
Miscellaneous Services and Stores	18	18	1,010,909	1,267,318
	321	362	$17,130,029	$24,458,990

The above figures include contracts being financed from the Roads (Special Projects) Fund, which for the year 1968/69 amounted to 13 having a value of $1,280,047 and for 1969/70 amounted to 23 having a value of $7,200,595.

Contracts under Councils' Supervision

During the year, the Board approved the acceptance by municipal councils of 378 tenders for a total amount of $6,945,001 for road and bridge works for which the Board allocated funds in whole or in part.

The Board also approved the use of 116 municipal contracts for the supply of materials for works partly financed from funds provided by the Board.

SNOW CLEARANCE

The clearing of snow to maintain vehicular access to winter snow resorts in the Victorian Alps has become an important part of the Board's activities. Experienced operators with specialized equipment are stationed in well equipped accommodation throughout the winter months often working long hours to keep alpine roads open, particularly for week-end skiers.

The following snow clearing operations were undertaken by the Board during the 1970 winter:

Mount Buller

Access as far as the car park 0·4 miles from the village was maintained by operators using a Rolba 400 snow blower and a power grader. A utility with radio was in direct communication with the Benalla Divisional Office. After the 1969 winter the Board sealed a further 2½ miles of the Mount Buller Tourists' Road below the village.

Mount Hotham

From both Bright and Omeo the Alpine Tourists' Road gives access to the popular skiing areas around Mt. Hotham. The heavier snow falls in this area require the use of more powerful equipment such as Rolba 1500 snow blowers. Two teams, one on each road approach to Mt. Hotham, each operated a Rolba 1500 and a grader to ensure continuous access to the snowfields (except in blizzard conditions). In the event of a plant breakdown, the other team takes over on the full length until repairs are effected. Plant operators are in contact with each other and the Benalla Divisional Office through a radio-equipped four-wheel drive land rover. Seven-tenths of a mile of the narrow section of the Alpine Road at Blowhard has been widened since the 1969 winter.

Snow patrol quarters at Mount Wills, Omeo Highway.

Falls Creek

The ski village of Falls Creek is situated some 19 miles from Mt. Beauty on the Bogong High Plains Tourists' Road, which extends to the Omeo Highway near Shannonvale. During the winter it is not possible to reach Falls Creek from the Omeo Highway approach.

Snow clearing was carried out on the Mt. Beauty side of Falls Creek only, using two power graders and a radio-equipped land rover. Widening and some curve improvements were carried out on a one mile section between Howmans Gap and Falls Creek.

Mt. Buffalo

From Porepunkah the Mt. Buffalo Tourists' Road climbs for a distance of almost 24 miles on to the Mount Buffalo plateau where the road divides left to the Chalet and right to Lake Catani, Cresta and The Horn. On the latter fork the sealed pavement has been extended for 1½ miles from Lake Catani to Dingo Dell car park since the 1969 winter. This assisted snow clearing operations. A Rolba 400 snow blower, a power grader, and a radio-equipped land rover maintained access to the Chalet and Cresta.

Lake Mountain

The turn-off to Lake Mountain from the Marysville-Woods Point Road is about halfway between Marysville and Cumberland Junction and can be reached from Melbourne either through Marysville or through Warburton and McMahons Creek.

Immediately east of Marysville the Board reconstructed two miles of the Marysville-Woods Point Road to give a better alignment and a wider pavement. This work, including sealing, will progressively continue over the next few years in the direction of the Lake Mountain turn-off.

Maintenance patrol personnel used graders to clear snow from the Marysville-Woods Point Road and the Lake Mountain Road whenever necessary.

Mt. Wills

Improvements to the Omeo Highway in recent years have increased the popularity of the snow fields at Mount Wills, particularly among skiers from the north-east corner of the State. North of Glen Wills the highway rises to 4,200 feet and is subject to snow for a distance of about 10 miles. This section was cleared of snow by a power grader and two operators stationed at Mt. Wills, where new modern quarters and plant shelter have recently been provided at a cost of $30,000.

Mount Donna Buang

From Melbourne winter access to Mount Donna Buang is through Warburton. A sealed road is available to the 10 mile turntable where the parking area has been extended and sealed to accommodate day visitors. Snow was cleared by grader early each morning.

SPECIAL PROJECTS

The Roads (Special Projects) Fund, administered by the Treasurer of Victoria, has enabled the State's road construction programme to be accelerated beyond that which would have been possible from the normal funds available to the Board for road purposes.
Works carried out by the Board and financed from the Roads (Special Projects) Fund include the construction of new freeways, dual carriageways on heavily trafficked State highways radiating from Melbourne, and new roads of tourist interest throughout the State. Special Projects which were completed by the Board and opened to traffic prior to 30th June, 1969, are shown below:

Project No.	Project	Length (Miles)
6.	**Princes Highway East**—Extension of the four lane divided highway from Doveton to east of Narre Warren.	4·6
7.	**Western Highway**—Construction of a four lane divided highway from west of Myrniong to east of Ballan (including a new deviation at Pykes Creek Reservoir and a second bridge over the reservoir).	4·0
9.	**Princes Highway East**—Construction of the Princes By-pass Road (Moe Section).	3·6
10.	**Princes Highway East**—Construction of a two lane deviation and a bridge at Hospital Creek near Orbost.	5·5
11.	**Maroondah Highway**—Extension of the six lane divided highway from Stirling Road, North Croydon, to Brushy Creek.	2·0
12.	**Taylor Bay Road**—Construction of a new road from Taylors Road to Maintongoon Road.	9·7
13.	**Nepean Highway**—Extension of four lane divided highway from beyond Old Mornington Road to south of the turn-off to Manyung including a four lane by-pass of Mt. Eliza.	2·0
14.	**Marlo-Cape Conran Road**—Construction of a new road for tourists to Cape Conran.	11·0
15.	**Jamieson-Licola Road**—Construction of a new road to link Licola in Maffra Shire with Jamieson in Mansfield Shire.	10·6

Special Projects which were completed or on which work commenced or continued during the year are detailed below:

Project No.	Project	Length (Miles)	Progress of Works
2.	**Hume Highway**—Extension of duplicate pavement from Craigieburn, including a deviation at Beveridge, to provide four lanes, generally with limited access.	11·0	Work completed.
5.	**Western Highway**—Extension of the four lane divided highway from Deer Park to west of Bacchus Marsh (including the Bacchus Marsh section of the Western Freeway).	23·3	12·5 miles of divided highway already constructed. Construction of the Bacchus Marsh section of Western Freeway has commenced.
8.	**Hume Highway**—Extension of the four lane divided highway from south to north of Tallarook, including a by-pass of Tallarook.	4·5	Two miles of dual carriageway already constructed south of Tallarook. Work on the remaining sections of the project nearing completion.
16.	**Western Highway**—Construction of a four lane divided highway from east of Gordon to east of Ballarat, including the by-pass of the townships of Gordon, Wallace and Bungaree.	11·0	A length of approximately 5 miles under construction to provide a by-pass of Gordon.
17.	**Hume Highway**—Construction of a four lane divided highway from south of Wallan to north of Broadford.	19·5	Detailed investigation proceeding.
18.	**Peterborough - Childers Cove Road**—Construction of a road for tourists between Peterborough and Childers Cove.	14·0	Construction of the 3 mile section from Peterborough to the Bay of Islands completed.
19.	**Mt. Abrupt Road**—Construction of a road for tourists from north of Dunkeld to join the Grampians Road south of Mirranatwa Gap.	16·0	Construction almost complete.
27.	**Mulgrave Freeway** — Construction of a four lane freeway from west of Stud Road to and including the interchange with Eumemmerring Freeway.	2.7	Construction of 3.7 miles commenced.
28.	**Eumemmerring Freeway** — Construction of a four lane freeway from the interchange with the Mulgrave Freeway to south of the Princes Highway East interchange.	1.0	
29.	**Mornington Peninsula Freeway**—Construction of four lane freeway for a length of 5 miles from the Nepean Highway near Palmerston Avenue, Dromana, to Eastbourne Rd.	5·0	Work being carried out by contract and direct labour.

TULLAMARINE FREEWAY

On 3rd February, 1970, the Premier of Victoria, the Hon. Sir Henry Bolte, K.C.M.G., officially opened the Tullamarine Freeway at a ceremony held near Flemington Bridge. The freeway was built in three sections.

The Board, in April 1968, completed and opened the five mile section from Essendon Airport to Melbourne (Tullamarine) Airport. The two mile section from Bell Street, Pascoe Vale South, to Essendon Airport, was also constructed by the Board and was completed during the 1969-70 financial year. The 3½ mile section from Flemington Bridge to the Bell Street interchange was built by the Melbourne and Metropolitan Board of Works.

The new facility provides a fast and safe route of the most modern design standards connecting the city area with the Melbourne (Tullamarine) Airport, and also opens up a much needed east-west crossing over the Moonee Ponds Creek and the railway line between the north-eastern and north-western suburbs of Melbourne.

The 11·1 mile freeway is of four-lane construction with sealed shoulders forming an emergency lane on the left side. Provision has been made for additional lanes to be constructed in the future.

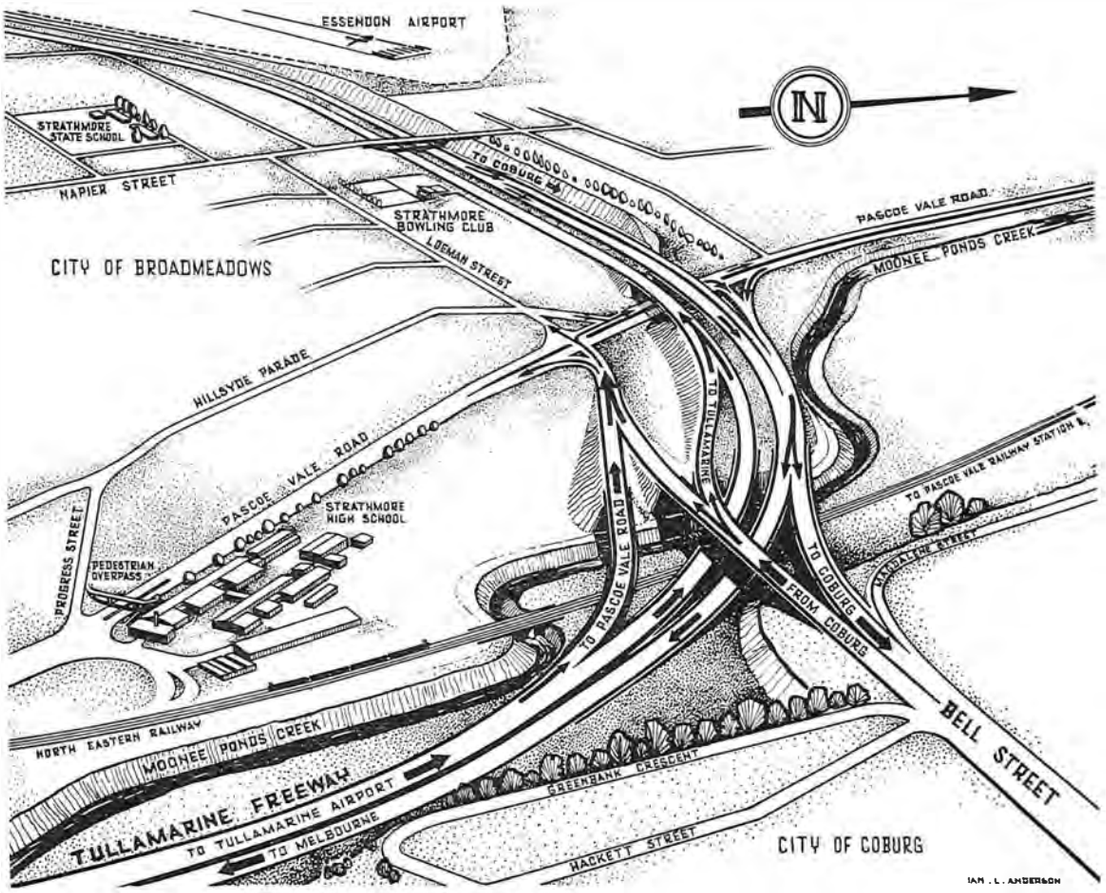
The Bell Street interchange, built by the Board, is a relatively complex feature of the project providing for the connection of both Bell Street and Pascoe Vale Road to the freeway and to each other. This interchange contains six bridges of a combined length of half a mile. The narrowest bridge, 28 feet between kerbs, carries the off-ramp from the north-bound freeway carriageway to Pascoe Vale Road over the Broadmeadows railway line. A second bridge carries the north-bound carriageway, and a third the south-bound carriageway and collector-distributor road over the railway. The longest bridge, 650 feet in length and 28 feet between kerbs with one footway, is a third level structure which carries Bell Street west-bound traffic over both freeway carriageways and the railway. Two 250 feet long bridges with 70 feet spans carry the freeway carriageways and the collector-distributor road over Pascoe Vale Road. The need for a separate set of structures over Moonee Ponds Creek was obviated by relocating the creek alongside the railway and extending the bridges over both.

By agreement with the Melbourne and Metropolitan Board of Works the cost of the Bell Street interchange is being shared as follows:

Country Roads Board—estimated cost of an earlier proposal to link Pascoe Vale Road and Bell Street without connection to the Tullamarine Freeway	$2·240 million
Country Roads Board—half additional cost of present interchange over earlier proposal	$1·505 million
Melbourne and Metropolitan Board of Works—half additional cost of present interchange over earlier proposal	$1·505 million
Total cost of Bell Street interchange	$5·250 million

The total cost of constructing the Board's sections of the Tullamarine Freeway was $14·94 million.

The Tullamarine Freeway, Bulla Road interchange.



The Tullamarine Freeway, Bell Street Interchange

THE NEPEAN HIGHWAY

Traffic on the Nepean Highway has doubled over the past 14 years, with increasing beach traffic, and that generated by the great industrial and residential development in Dandenong, Frankston and the Westernport area.

The latest traffic census shows that between 25,000 and 30,000 vehicles per 12 hour weekday use the section of Nepean Highway between St. Kilda and Mordialloc, 15,000 per day travel between Mordialloc and Mile Bridge, 12,000 travel through Frankston, and 6,000 through Mornington.

In 1913 the first Chairman of the newly constituted Country Roads Board, Mr. W. Calder, made a four-day trip from Melbourne to Portsea in the Board's new motor car. Mr. Calder reported:

"In all probability, Pt. Nepean Road will be the main road from Melbourne to Mordialloc."

"The road from Mordialloc to Frankston is very uneven, with ti-trees so close to the edge of the road as to be dangerous."

"We found the newly deviated road at Oliver's Hill very steep—probably 1 in 15."

"Past Mt. Martha Hotel a new deviation is being formed along the foreshore—about 50 chains long, 16 feet wide."

"One-and-a-half gauge road metal is delivered to Mornington Railway Station at 6/- a cubic yard."

"We passed a blacks' camp and later saw many Chinese market gardeners at work—land at Red Hill sells at about £14 an acre and up to £22 in Flinders."

It was in the wartime years from 1915 that the Board began taking over some sections of Point Nepean Road from the local municipalities, declaring them part of a main road.

But there were parts not taken over as such. For example, on November 24, 1915, the Board refused a request from a Flinders Shire deputation that the Dromana-Sorrento section be taken over as a main road. The refusal was based on a lack of money.

Earlier that year, the Good Roads Association of Victoria had complained to the Board of the bad state of the road between Dromana and Portsea. Patching this section was costing ratepayers £700 a year.

It is interesting to recall that there was a time within the memory of many when the most important access to Sorrento and Portsea was by the popular bay steamers, notably the "Ozone", "Hygeia" and "Weeroona". During summer week-ends, day-trippers crowded onto the paddle steamers at Port Melbourne, to disembark at Sorrento for a day's pleasure. Holiday-makers on extended vacation also travelled by steamer, accompanied by their baggage. From Sorrento Pier many travelled to the Back Beach by the steam tram that ran from the bay to the ocean along the roadway.

With the growing popularity of the motor car, and improvements to what is now known as the Nepean Highway, the day of the bay steamer waned, and today's holiday-makers travel to the bayside beaches by car and bus.

The Nepean Highway was declared a State highway under the provisions of the Country Roads Act in October, 1947. The section in the City of St. Kilda was declared in 1960.

For administrative purposes the Board divides the Nepean Highway into two parts—that coming under its Metropolitan Division—an 11-mile stretch commencing at Dickens Street, Elwood, and finishing at Mordialloc Creek, and the section under the control of the Dandenong Division from Mordialloc Creek to Portsea Quarantine Station, approximately 44 miles.

Metropolitan Division's Section

About 10 years ago, the Board foresaw the need for greatly increased capacity of the section of the highway from Dickens Street, Elwood, to the Mordialloc Creek. In 1958 the road over rail overpass at Moorabbin was completed, and the construction of dual carriageways between South Road and the Mordialloc road under rail underpass was finally completed in August, 1966.

During financial year 1969/70 the Board, in conjunction with the Victorian Railways, agreed to substantial improvements to the present overhead railway bridge at Gardenvale, where accidents have taken place involving high loads on motor vehicles. Design work proceeded during the year, in consultation with the Victorian Railways' engineers and the result will be greater over-head clearance and greater width of pavement to provide for four traffic lanes. Work is expected to commence in 1971.

Work was in progress during the year on the reconstruction of the highway between Moorabbin Overpass and Wickham Road to provide dual carriageways each of three lanes from the Moorabbin Overpass to Chesterville Road. The extension of this work from Chesterville Road to Mordialloc underpass, a length of 4·88 miles in the next two to three years will include reconstruction of the heavily trafficked Warrigal Road intersection. Improvements through Mordialloc including the provision of additional carriageways over the Mordialloc Creek bridge will follow.

As part of the Government scheme for the provision of grade separated school crossings, two pedestrian overpasses have been constructed by the Board over the highway—one at Dane Road, Moorabbin, and the other, near Elm Grove, Mordialloc.

Reconstruction of Nepean Highway at Moorabbin.

Dandenong Division's Section

In view of the proposals for the Mornington Peninsula Freeway, further duplication or development of the Nepean Highway between the Mordialloc Creek bridge and Portsea will not go beyond the work which is in hand or immediately proposed.

Between Mordialloc and Carrum for a distance of approximately 5 miles plans are being developed to widen the highway from three traffic lanes to four plus a parking lane on the seaward side.

The three miles section between Carrum and Mile Bridge over the Kananook Creek near Frankston will also be widened to four lanes.

Dual carriageways have already been constructed on the 6¼ miles section from the Mile Bridge, Frankston, to Tower Road, Mt. Eliza. This work was being extended during the year to Dava Drive, just south of Mornington.

Between Dava Drive and Dromana the present 24 feet wide pavement will remain, but dual carriageways have been constructed on a 1·2 miles section through Rosebud. An additional traffic lane will be provided eventually between Rosebud and Rye.

From Rye to Sorrento the pavement, widened and strengthened in recent years, is now considered adequate for the traffic it carries, and no further improvements are contemplated in the forseeable future.

The 2½ miles section from Sorrento to the Quarantine Station at Point Nepean, is sealed 18 ft. to 20 ft. This may eventually be widened to 24 feet to allow safer passing, but the section is a scenic drive and the Board is anxious not to disturb the beauty of the natural growth by extensive widening or other work.

BRIDGES

NEW BRIDGES COMMENCED

During the year the construction of 163 new bridges estimated to cost a total of $8,080,000, commenced either under the Board's direct supervision or under municipal supervision with financial assistance from the Board. A comparison with the number and estimated cost of bridge projects commenced in the financial year 1968/69 is given in the table below:

Description	1968/69		1969/70	
	Number	Estimated cost	Number	Estimated cost
Bridges commenced under the Board's supervision	71	$4,640,000	83	$6,451,000
Bridges commenced under municipal supervision with financial assistance from the Board	108	$2,050,000	80	$1,629,000
Total bridges commenced	179	$6,690,000	163	$8,080,000

The construction of freeways has necessitated the erection of steel gantries to provide structures capable of supporting large overhead direction signs. Approximately $70,000 was expended on such structures during the year.

LARGE BRIDGES COMPLETED IN RURAL AREAS

Included amongst some of the larger bridges completed in rural areas during the financial year under the supervision of the Board's staff were:

(a) **Phillip Island Bridge—Shires of Bass and Phillip Island:** A nineteen span prestressed and reinforced concrete bridge 2,100 feet long with a roadway 28 feet wide and a footway 6 feet wide to provide an improved crossing to Phillip Island between San Remo and Newhaven.

(b) **Separation Street Overpass—Princes Highway West, North Geelong:** Four steel plate girder and reinforced concrete structures providing

(i) three openings for rail traffic and two for road traffic under the highway overpass;

(ii) two overpass carriageways for separate north bound and south bound traffic. The overpass carriageways are approximately 540 feet long by 40 feet between kerbs plus footways each 6 feet wide.

(c) **Moorabool River Bridge—Hamilton Highway, Shire of Corio:** A five span prestressed concrete beam and reinforced concrete bridge 320 feet long by 28 feet between kerbs plus a footway 6 feet wide.

(d) **Hughes Creek Bridge, Avenel—Hume Highway, Shire of Seymour:** An eight span prestressed and reinforced concrete bridge 238 feet long by 28 feet between kerbs.

(e) **Road over rail overpass near Tallarook—Hume Freeway (Tallarook Section), Shire of Seymour:** Dual three span steel plate girder and reinforced concrete bridges, each 205 feet long by 28 feet between kerbs over the standard and broad gauge railway lines.

(f) **Yarra River Bridge—Maroondah Highway, Shire of Lillydale:** A three span prestressed concrete beam and reinforced concrete bridge 188 feet long by 28 feet between kerbs.

(g) **Road over rail overpass at Elphinstone—Calder Freeway (Elphinstone Section), Shire of Metcalfe:** A three span steel girder and reinforced concrete bridge 270 feet long by 28 feet between kerbs.

New five span bridge on the Hamilton Highway over the Moorabool River at Fyansford.

Some of the larger bridges completed during the year under municipal supervision with financial assistance from the Board included:

(a) **Tambo River Bridge—Tambo Upper Road, Shire of Tambo:** A six span prestressed concrete beam and reinforced concrete bridge 481 feet long by 24 feet between kerbs plus a footway 5 feet wide.

(b) **Loddon River Bridge—Eddington Road, Shires of Maldon and Tullaroop:** An existing fifteen span reinforced concrete bridge 680 feet long by 18 feet between kerbs was reduced to twelve spans 545 feet long, and widened to 28 feet between kerbs using reinforced concrete and precast high strength reinforced concrete beams.

(c) **Mills Bridge over Werribee River—Ballan-Greendale Road, Shire of Ballan:** A two span prestressed concrete beam and reinforced concrete bridge 121 feet long by 26 feet between kerbs, built on a curve.

Buffalo River Road, Myrtleford and Oxley Shires. Bridge over Buffalo River (McGuffies Bridge).

(d) **McGuffies Bridge over Buffalo River—Buffalo River Road, Shires of Myrtleford and Oxley:** A five span precast high strength reinforced concrete beam bridge 200 feet long by 28 feet between kerbs.

(e) **Barnadown Bridge over Campaspe River—Goornong - Barnadown Road, Shires of Waranga and Huntly:** A five span prestressed concrete beam and reinforced concrete bridge 225 feet long by 22 feet between kerbs.

(f) **Faux's Bridge over Wimmera River—Horsham-Wal Wal Road, Shire of Stawell:** A six span precast high strength U slab and reinforced concrete bridge 210 feet long by 24 feet between kerbs.

Goornong-Barnadown Road, Waranga and Huntly Shires. Five span bridge built over the Campaspe River.

METROPOLITAN BRIDGES AND OVERPASSES

Some of the major structures in the metropolitan area on which work proceeded or was completed under the direct supervision of the Board's staff included:

(a) **Tullamarine Freeway—Down Ramp from Bell Street, Coburg:** A five span precast and post tensioned concrete box girder structure, 692 feet long by 28 feet between kerbs plus a footway 6 feet wide, carrying traffic over the railway, the Tullamarine Freeway and the Moonee Ponds Creek at Strathmore.

(b) **Calder Freeway—Matthews Avenue, City of Keilor:** A three span continuous prestressed and reinforced concrete overpass structure 186 feet long by 40 feet between kerbs plus a footway 6 feet wide.

(c) **Calder Freeway—Matthews Avenue Tramway Bridge, City of Keilor:** A three span steel girder and reinforced concrete tramway bridge 188 feet long by 24 feet between kerbs over the Calder Freeway at Matthews Avenue.

(d) **Maribyrnong River Bridge—Canning Street (Cordite Avenue), Cities of Keilor and Sunshine:** A four span prestressed and reinforced concrete bridge 310 feet long by 44 feet between kerbs plus two footways each 5 feet 8 inches wide.

(e) **Princes Freeway (Laverton Section)—Bridge over Kororoit Creek Road, Shire of Werribee:** A four span continuous steel box girder and reinforced concrete bridge 419 feet long by 28 feet between kerbs plus a footway 5 feet wide.

GRADE SEPARATED PEDESTRIAN CROSSINGS

1. **Restoration of Access across Freeways**

The following structures were substantially completed during the year, the full cost being borne by the Board:

(a) **Lower Yarra Freeway—Pedestrian Overpass at Rosala Avenue, Altona:** A prestressed and reinforced concrete overpass 495 feet overall length by 6 feet clear width over the Lower Yarra Freeway.

(b) **Lower Yarra Freeway—Pedestrian Overpass at Wembly Avenue, Spotswood:** A prestressed and reinforced concrete structure 442 feet long by 6 feet clear width over the Lower Yarra Freeway.

(c) **Princes Freeway (Laverton Section)—Pedestrian Overpass at 13·75 m. (Fitzroy Street):** A prestressed and reinforced concrete overpass, 509 feet long by 6 feet clear width.

2. **Assistance to Municipal Councils**

(a) **City of Broadmeadows—Pascoe Vale Road, Pedestrian Overpass at Peck Street:** The Board made an allocation towards the cost of constructing this pedestrian overpass in conjunction with the reconstruction of the intersection. The overpass was designed by Consultants on behalf of the Council and will be 410 feet long by 5 feet clear width.

(b) **City of Caulfield—Grange Road, Pedestrian Overpass at Glenhuntly State School:** The Board is preparing the plans and specifications on behalf of the Council for a prestressed and reinforced concrete overpass of 58 feet clear span by 6 feet clear width plus staircases at each end.

3. **State Government's Scheme for grade separated crossings to serve schools.**

Further progress was made during the year on the Government's scheme for the construction of grade separated pedestrian crossings to serve schools. The cost of the crossings is shared equally by the State Government, the municipal council concerned, and the Board.

Priorities for the crossings are determined by the Traffic Commission in conjunction with the Board and are assessed on the basis of a formula which takes into account the following factors:

(a) traffic volumes;
(b) average speed of traffic during the period children are travelling to and from the school;
(c) the number of children crossing the road during this period;
(d) the age range of the children;
(e) the type of road to be crossed (single or divided carriageway and their widths).

In addition to the six overpasses completed to 30th June, 1969, as listed in last financial year's Annual Report the Government has approved the construction of fourteen other crossings to serve schools. The approximate location and progress of work on the approved projects are shown below:

Municipality	Road	Approximate Location	Progress to 30th June, 1970
Mordialloc City Essendon City	Nepean Highway Buckley Street	Parkdale State School Leslie Road near St. Columba's Girls' College, Lowther Hall Girls College and Penleigh Girls' School	Completed May 1970 Alternative plans for overpass or subway to be considered in conjunction with Essendon City Council
Collingwood City	Johnston Street	Clarke Street near St. Euphrasia Roman Catholic School	Preliminary plans being prepared
Heidelberg City	Heidelberg Road	Silk Street, Rosanna, near Rosanna Golf Links, State School and Roman Catholic School	Plans and specifications completed
Box Hill City	Burwood Highway	Bennettswood State School	Preliminary investigation completed
Box Hill City	Canterbury Road	St. Leo's College	Preliminary investigation completed
Frankston City	Frankston-Flinders Road	Davey Street near Frankston State School and Roman Catholic School	Preliminary investigation completed and plans of two alternative proposals being considered in conjunction with the Frankston City Council
Melbourne City	Boundary Road	North Melbourne State School	Preliminary plans being considered in conjunction with the Melbourne City Council
City of Coburg	Sydney Road	Catholic Girls' Regional School	Government approval given June 1970. No detailed planning carried out
City of Box Hill	Belmore Road	Koonung Heights State School	Government approval given June 1970. No detailed planning carried out
City of Doncaster and Templestowe	Manningham Road	Bulleen State School and St. Clements	Government approval given June 1970. No detailed planning carried out

Municipality	Road	Approximate Location	Progress to 30th June, 1970
City of Moorabbin	South Road	Tucker Road State School, Moorabbin Tech. School and St. Catherine's	Government approval given June 1970. No detailed planning carried out
City of Oakleigh	Warrigal Road	Oakleigh State School	Government approval given June 1970. No detailed planning carried out
City of Oakleigh	Princes Highway East	Oakleigh High School	Government approval given June 1970. No detailed planning carried out

BRIDGE AND CULVERT MATERIALS

Reinforced concrete box culvert sections used during the year amounted to 36,200 lineal feet at a cost of $386,000. This represented an increase of 35% in length over last financial year. Reinforced concrete pipes to the value of $386,443 were also purchased during the year.

The use of corrugated steel pipes and culverts increased over previous years. Such units costing approximately $126,000 were used during the year compared with units costing $88,000 last year.

Approximately 157,000 lineal feet of corrugated steel guard rail valued at $165,000 was used during the year. A new feature was the use of sections twice as long as previously used. Twelve hundred and eighty sections each 25 feet long were erected on various freeway projects.

Approximately 4,000 tons of fabricated reinforcing steel valued at $615,000 and over 1,100 tons of rolled steel girders and attachments were supplied to bridge projects during the year.

Following the considerable increase in the previous year, the production of precast reinforced concrete U slabs and piles in the Board's precasting yards again increased by 22% to 17,100 tons estimated at $534,000.

Due to the completion of several major bridges incorporating precast prestressed concrete units only 4,300 tons of such units estimated at $280,000 were used during the year. This corresponded with 8,100 tons valued at $442,000 used in financial year 1968/69.

PHILLIP ISLAND BRIDGE

Completion of the $3¾ million Phillip Island Bridge and approach roads was marked by a ceremony at San Remo on 21st November, 1969, at which the Minister of Public Works, the Hon. M. V. Porter, M.L.A., officially opened the bridge to traffic.

The original bridge linking San Remo and Phillip Island was constructed at a cost of $100,000 to cater for loads up to 6 tons. Work started in 1938 on a bridge 1,765 feet long and 18 feet wide between kerbs with no footway, but with six pedestrian refuges along its length. The 550 feet long suspension span crossed the section of deep and fast tidal water which would otherwise have entailed costly foundations. The main cables were previously used on the North Shore bridge in Sydney. Tramway cable hangers supported the wooden deck.

The suspension bridge gave good service but its load limit caused some difficulty, as for example some larger buses had to off-load passengers who were then required to walk over the bridge. The decision to replace the old bridge with a modern and more permanent structure led to a great deal of investigation as to the most suitable location.

The main problems at the site were deep water and the very strong tidal current which has been measured at 8 knots and is reputed to reach 10 knots at times. Soundings and underwater inspections indicated scouring and deepening of the main channel on the ocean side of the suspension bridge. The location chosen for the new bridge was further into Westernport where turbulence and depth of water are reduced and the sea bed is more stable.

The contract for construction of the bridge was awarded to John Holland and Company Pty. Ltd. in April, 1966, and work commenced soon after.

The foundations are spread footings, cylinders, or piles, depending on ground conditions which at the site generally consist of basaltic clay covering decomposed basalts with hard jointed basalts at the lower levels. Piles were capped at or below seabed level to minimise

scouring problems which might have been severe with clusters of piles. Special arrangements were made to counter the corrosive effect of salt water.

The 18 piers are reinforced concrete portal frames with sloping column legs, and were constructed inside sheet pile coffer dams positioned by a steel frame.

The superstructure of 19 spans, each having five longitudinal beams, is 2,100 feet long. Sixteen approach spans each 100 feet long, consist of five pre-tensioned T beams with the deck formed by infill concrete placed between the beams. The suspended centre navigation span is similar, but with beams 92 feet long. The anchor spans either side of centre carry over into the centre navigation span as cantilevers of post-tensioned segmental construction totalling 204 feet in length.

Navigational clearance height at high tide is 40 feet.

The bridge is 28 feet wide between kerbs with a five feet wide footway on the ocean side. Handrails are of aluminium.

MIDLAND HIGHWAY—NEW GOULBURN RIVER CROSSING

Between Shepparton and Mooroopna, a distance of 2 miles, the Midland Highway is on a causeway above the flood plain of the Goulburn River. Immediately west of Shepparton the highway crosses the river on a 6-span reinforced concrete bridge (Bridge No. 1) designed by Sir John Monash in 1912. About ¼ mile further to the west is Bridge No. 2 over a natural flood channel cutting across a horseshoe bend in the Goulburn River.

Construction of new approaches to Shepparton at Bridge No. 2 on the Midland Highway.

Traffic between Shepparton and Mooroopna has increased considerably over the last few years and the Board considered several proposals to improve conditions for traffic between these centres. The scheme chosen required the flow of water in the Goulburn to be diverted from its old course by widening and deepening the natural floodway under Bridge No. 2. This enabled an entirely new additional approach to Shepparton to be provided by an embankment leading to High Street. A new embankment leading to Fryers Street replaced Bridge No. 1 on the same alignment as the present bridge.

In April, 1967, underpinning of Bridge No. 2 commenced. Steel shell piles 60 feet long, later filled with concrete, were driven below the existing pier piles. These were connected to the existing piles to support the bridge when the new deep channel was excavated to carry the full flow of the river. This stage of the project was completed in December 1968 and the river was diverted to its new course. Two stockpiles of earth were then pushed into the old course of the river by heavy bulldozers to form cofferdams A and B, and the estimated 3 million gallons of water held between them was pumped out. A similar process was used by forming cofferdam C near the point of diversion.

The project was suspended for the winter of 1969 and completed this financial year at a cost of $252,000.

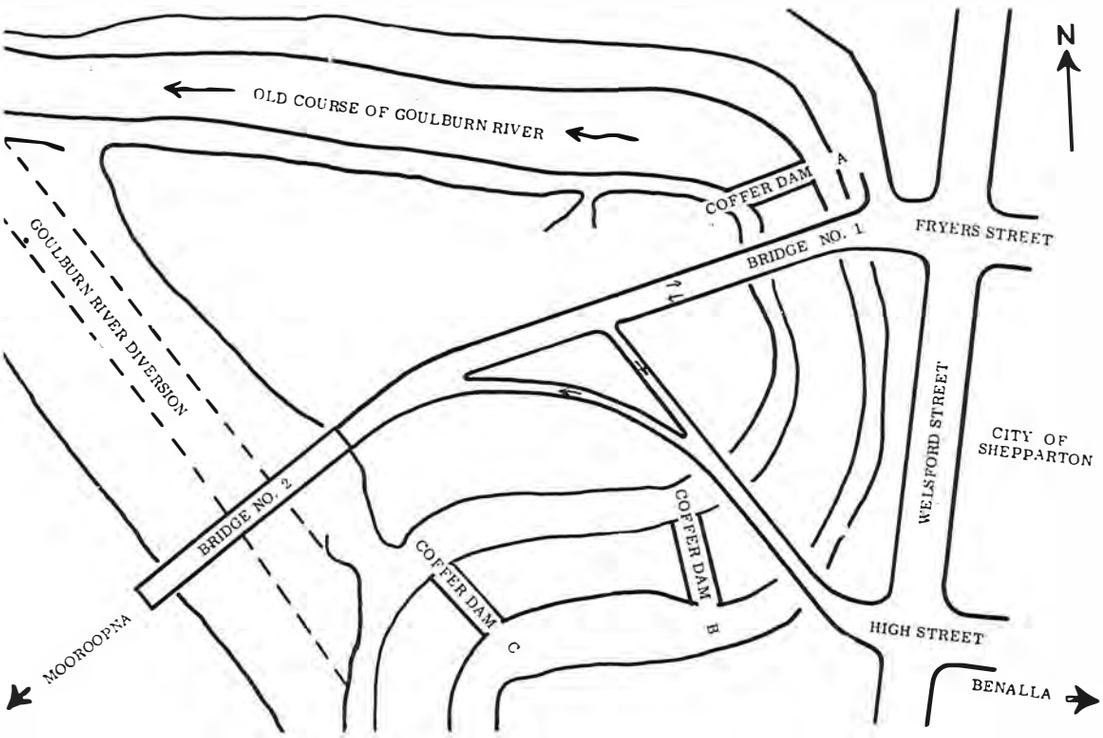


Diagram of the new Midland Highway approach to Shepparton

ELIMINATION OF RAILWAY LEVEL CROSSINGS

Evidence of the progress in the programme to improve traffic conditions and remove dangers at railway level crossings can be seen in many parts of Victoria. The more spectacular works involving grade separation, which is the placing of the road and rail surfaces on different levels, provide the most effective permanent improvements where it is not possible to abolish level crossings by road deviations.

These works are costly, and with the limited funds available investigations are required to determine which level crossings have the highest priority for abolition. This task falls to the Abolition of Level Crossings Committee, which consists of three members, the Chief Engineer of the Country Roads Board, the Chief Civil Engineer of the Victorian Railways and the Assistant Chief Engineer (Civil) of the Public Works Department.

In December, 1953, the Committee, then known as the Inter-departmental Committee on Abolition of Level Crossings, was appointed by the Government to report on the order in which works should be undertaken, the nature and estimates of the costs of such works, and the manner in which the costs should be apportioned to the authorities concerned. A grant of $500,000 was made from Consolidated Revenue to establish the Level Crossings Fund, which has been subsequently maintained from a fixed proportion of motor registration fees, viz. one-third of additional registration fees levied on first registration and subsequent change of ownership.

The purposes for which the Level Crossings Fund may be used are:

(a) the elimination of level crossings or the provision of alternative routes to enable road traffic to avoid level crossings;

(b) the provision of lights, signs and lighting at level crossings, and improved approaches to level crossings;

(c) any other works calculated to improve the flow of traffic across or to reduce the danger at level crossings.

Generally, expenditure on abolition projects is borne in the following proportions:

Level Crossings Fund	35%
Country Roads Board	45%
Victorian Railways	20%

In determining priorities for the abolition of crossings, the Committee considers many factors, including:

(a) the existing protection of a crossing, e.g. gates, flashing lights or signs;

(b) the accident record of a crossing;

(c) volumes and speeds of road and rail traffic, and anticipated increases;

(d) existing conditions near level crossings, e.g. major intersections which might offset the benefits from grade separation;

(e) consistency of treatment along a given section of State highway or railway line;

(f) proposals for other road or railworks which could affect conditions at a particular crossing;

(g) retention and improvement of a level crossing to improve traffic flows as an alternative to abolition;

(h) the benefits to road traffic, i.e., delays avoided if gated crossings are abolished;

(i) the cost of proposed abolition, relative to the anticipated benefits.

The following projects eliminating railway level crossings were completed or under construction during the year:

Canterbury Road—Canterbury—City of Camberwell

A steel and reinforced concrete rail over road overpass bridge 71 feet between abutments was completed by the Victorian Railways. Lowering of the road surface under the bridge and improvements to adjacent streets were carried out by the Board.

Somerville Road—Yarraville—City of Footscray

A road over rail overpass to provide for four lanes of traffic in Somerville Road was completed by the Victorian Railways. The Board was responsible for constructing the approaches and associated roadworks.

Four lane road over rail overpass at Somerville Road, Yarraville.

South Gippsland Highway—Loch—Korumburra Shire

A combined overpass structure spanning Alsops Creek and the south-eastern railway line was completed by the Board. The project eliminated the old railway level crossing and a narrow timber bridge over Alsops Creek.

Overpass structure spanning Alsops Creek and the railway line on the South Gippsland Highway east of Loch.

Princes Highway West—Garvoc—Shire of Warrnambool

A road over rail overpass of the Melbourne-Warrnambool railway line was completed by the Board.

Princes Highway East—Traralgon

Work continued on the construction of a two-lane road bridge 50 feet wide over the Traralgon-Maffra railway line. Provision has been made for future duplication of the bridge. The Victorian Railways is the constructing authority.

Calder Highway—Elphinstone—Metcalfe Shire

Work continued on the construction of a road over rail overpass on a deviation of the Calder Highway to replace the present level crossing in Elphinstone township. The Country Roads Board is the constructing authority.

Horsham

Work commenced on the construction of a road over rail overpass structure between Kalkee Road and Urquhart Street, Horsham, to eliminate two level crossings of the Melbourne-Adelaide railway at McPherson and Wawunna Streets. The Board is the constructing authority.

Elgar Road—Box Hill

Work commenced on the construction of a rail over road overpass on the Box Hill railway at Elgar Road. The Victorian Railways is the bridge constructing authority, and the Board will be responsible for lowering the level of Elgar Road under the bridge.

NATIONAL PARKS AUTHORITY

As at 30th June, 1970, the Government had provided $700,000 for work on roads and associated purposes in or adjacent to National Parks. The amount of $100,000 made available in 1969/70 was allocated in conjunction with the National Parks Authority for works on roads in or near:

The Bulga National Park in Alberton Shire

The Ferntree Gully National Park in Sherbrooke Shire

The Fraser National Park in Alexandra Shire

The Glenaladale National Park in Bairnsdale Shire

The Hattah Lakes National Park in Mildura Shire

The Lind National Park in Orbost Shire

The Mt. Buffalo National Park in Bright Shire

The Mt. Richmond National Park in Portland Shire

The Port Campbell National Park in Heytesbury Shire

The Wilsons Promontory National Park in South Gippsland Shire

The Wyperfeld National Park in Karkarooc Shire.

The work consisted of the construction and sealing of access roads to National Parks, internal roads, parking areas, and the maintenance of roads already constructed. The work was carried out either by the Board or the municipal council concerned.

At the 30th June, 1970, $632,000 had been expended from the total provision of $700,000 made available by the Government since 1st July, 1963.

MINISTRY OF TOURISM

As at 30th June, 1970, the Government had provided a total amount of $2,000,000 for expenditure by the Board in conjunction with the Ministry of Tourism on roads of a tourist nature other than proclaimed tourists' roads. The public has benefited greatly by the projects on which these funds have been spent in providing roads of access to many of the tourist attractions of the State.

The allocations made from the $200,000 available in financial year 1969/70 included amounts for work on the Dargo High Plains Road in Avon Shire, the Cape Patterson-Inverloch Road in Woorayl Shire, and the access road to Moorabbee foreshore of Lake Eppalock in McIvor Shire.

At the 30th June, 1970, $1,951,000 had been expended from the total provision of $2,000,000 made available by the Government since 1960/61.

The Board is required to make an annual payment into the Tourist Fund amounting to two per cent of the amount credited to the Country Roads Board Fund from receipts under the Motor Car Act. An amount of $577,772 was paid by the Board during the year. The Tourist Fund is administered by the Ministry of Tourism.

MUNICIPALITIES FOREST ROADS IMPROVEMENT FUND

In 1951, the Board and the Forests Commission conducted a State-wide survey to assess the needs of access roads to forest areas. In 1955 the State Treasury established the Municipalities Forest Roads Improvement Fund, to be used to assist muinicipalities in the improvement and protection of roads adjacent to State forest areas, to facilitate the extraction of forest produce.

Applications from municipal councils for grants from the fund have always exceeded the moneys available, and grants are made in the order of urgency of the works submitted. The priorities allotted by the Board's Divisional Engineers are considered by the Board, and those considered to be the most urgent, on a State-wide basis, are recommended to the Forests Commission. Following agreement by the Board and the Commission on priorities, the allocations are recommended to the Minister for approval.

Grants are generally made on a contributory basis, the amount of the council's contributions being determined by the Board. Various factors are considered in determining the amount a council shall contribute, but the major considerations are the location of the road, and the amount of rateable land adjoining the road.

In financial year 1969/70 a further $50,000 was paid into the fund increasing the total contributions by the Government to $430,000.

The total expenditure from the fund to the 30th June, 1970, was $380,000.

CONTROL OF HEAVY TRAFFIC

The Board has on its staff 21 Traffic Officers who patrol the State's principal road system to ensure as far as possible that commercial vehicles comply with the provisions of the Motor Car Act relating to weight, height, length, width and speed. Twelve Traffic Officers are based at Head Office, two at each of the Board's Benalla and Bendigo Divisional Offices, and one at each of the Divisional Officers located at Bairnsdale, Geelong, Horsham, Traralgon and Warrnambool.

Traffic Officers appointed by the Board have power to prosecute for offences under the Motor Car Act relating to weight, height, length, width and speed where such offences occur:

(a) on State highways, main roads, tourists' roads, forest roads, and freeways, declared or proclaimed under the provisions of the Country Roads Act; and

(b) on a journey which includes travelling over unclassified roads in two or more greater metropolitan municipalities. The greater metropolitan municipalities for the purposes of the Motor Car Act are defined as the cities of Box Hill, Brighton, Broadmeadows, Brunswick, Camberwell, Caulfield, Chelsea, Coburg, Collingwood, Dandenong, Essendon, Fitzroy, Footscray, Hawthorn, Heidelberg, Keilor, Kew, Malvern, Melbourne, Moorabbin, Mordialloc, Northcote, Nunawading, Oakleigh, Port Melbourne, Prahran, Preston, Richmond, Ringwood, St. Kilda, Sandringham, South Melbourne, Springvale, Sunshine, Waverley, and Williamstown, and the shires of Altona, Berwick, Cranbourne, Croydon, Doncaster and Templestowe, Eltham, Fern Tree Gully, Flinders, Frankston, Hastings, Lillydale, Mornington and Whittlesea.

A total of 8,582 offence reports during the year resulted in $347,897 in fines and costs payable into Consolidated Revenue.

The Board is also responsible for the issue of permits to enable vehicles and loads which exceed the legal weights or dimensions to travel on State highways, freeways, main roads, tourists' roads and forest roads, or on a journey which includes travelling over unclassified roads in two or more greater metropolitan municipalities. The total number of permits issued for the movement of over-dimensional vehicles with or without loads was 29,271. Of this number 13 single trip permits were issued for loads in excess of 220 tons for the transport of large transformers to the Latrobe Valley or for movement in the metropolitan area.

The following table sets out the number and type of permits issued in the financial year 1969/70 compared with those issued in financial year 1968/69:

	1968/69	1969/70
Single trip permits issued at Head Office	17,653	18,725
Single trip permits issued at Divisional Offices	6,582	6,949
Annual permits issued at Head Office	2,808	3,076
90-Day permits issued	389	459
Container permits issued	56	62
Total number of permits issued	27,488	29,271
Included in this total were permits for:		
70 tons gross and over	393	503
100 tons gross and over	29	58

A telex link was installed on an experimental basis between Head Office and Benalla Divisional Office with a view to assessing the advantages of centralising the issue of permits in the interests of uniformity and improved co-ordination between the divisions and Head Office. Following an analysis of the results of the experiment, consideration will be given to the installation of further telex links.

LEGISLATION AFFECTING THE BOARD

The following legislation affecting the Board was enacted during the year:

Country Roads (Amendment) Act 1969, No. 7931

This Act made provision for:

(a) the title of "by-pass road" to be changed to "freeway";

(b) the declaration of a freeway to be varied or revoked;

(c) the clarification of the Board's powers to construct and maintain pedestrian overpasses and subways;

(d) the Country Roads Board Fund to be part of the Trust Fund in the Public Account at the State Treasury;

(e) the Board to contribute $20,000 "to any person body or fund engaged in or established to promote research into matters relevant to efficient transportation in Victoria or to the system of roads in Victoria";

(f) the Board to make by-laws relating to advertisements and hoardings on or in the vicinity of main roads;

(g) appropriate Board's personnel to impound and generally control stock on the road reserves of proclaimed tourists' roads;

(h) appropriate Board's personnel to remove abandoned motor vehicles and dead animals from the area of a freeway between the carriageways and the freeway reserve boundary;

(j) the Board to establish roadside reserves for the use and enjoyment of persons using declared or proclaimed roads;

(k) the Board to place and maintain traffic lines and other marks on the carriageways of proclaimed forest roads;

(l) the Board, after consultation with the Traffic Commission to purchase, construct, instal and maintain traffic control signals on a road which it is constructing or has constructed or on which the Board is carrying out or has carried out works of permanent improvement if the Board considers that as a result of that construction or carrying out of works it is necessary or expedient to instal traffic control signals. The Board may also purchase, construct, instal and maintain traffic control signals on any road approaching a road on which the Board is constructing or has constructed or carried out works of permanent improvement;

(m) the Board to expend the Country Roads Board Fund on the construction, permanent improvement and maintenance of unclassified roads without the consent of the Governor-in-Council.

(n) the clarification of the Board's procedures relating to the amounts payable by municipal councils towards expenditure incurred from loan funds on permanent works on main roads.

Motor Car Act 1969, No. 7916

This Act provided amongst other things for:

(a) an increase in the maximum legal length of passenger buses from 33 feet to 36 feet provided that where the length of the bus is greater than 33 feet, the distance between the front of the bus and the centre line of the rear axle of the bus, or where there is more than one rear axle the distance between the front of the bus and the line that is equidistant between the two rearmost axles, shall not exceed 27 feet and the distance between the centreline of the rearmost axle or where there is more than one rear axle the line that is equidistant between the two rearmost axles and the back of the bus, shall not be less than nine feet nor more than ten feet six inches;

(b) the gross weight that may be carried by a motor car or trailer on any one axle fitted with two tyres, being limited to four tons ten hundredweight;

(c) the imposition of a gross weight limit of eleven tons that may be carried by a motor car or trailer on two axles which are more than forty inches and eight feet or less apart (measured in a horizontal plane) and one axle is fitted with two tyres and one axle with four or more tyres.

Tourist Act 1969, No. 7930

Amongst other things, this Act established a Ministry of Tourism and abolished the Tourist Development Authority of which the Chairman of the Board was a member.

REGIONAL TRANSPORTATION STUDIES

During the year the Board made preliminary arrangements for transportation studies to be carried out in the urban areas of Geelong, Ballarat and Bendigo.

The aim of the studies is to determine in each centre the public requirements for transportation facilities, both present and future. Each study will be carried out by a firm of consultants well experienced in transportation and urban planning. The required co-ordination and technical supervision of the consultants' work will be supervised by a committee acting on behalf of the Board.

The study in the Geelong urban area will be carried out by constultants Wilbur Smith and Associates, and supervised by a committee consisting of the Board's Deputy Chief Engineer—Planning, and Divisional Engineer—Geelong, representatives of the Transport Regulation Board, and an engineer nominated by the Geelong Regional Planning Authority.

The study in the Ballarat urban area will be carried out by consultants Harris, Lange-Voorlees and supervised by a committee consisting of the Board's Deputy Chief Engineer—Planning, and Divisional Engineer—Ballarat; a representative of the Transport Regulation Board, the City Engineer Ballaarat, and the Authorized Officer of the Ballarat and District Joint Town Planning Committee.

The study in the Bendigo urban area will be carried out by consultants Rankine and Hill, under the supervision of a committee consisting of the Board's Deputy Chief Engineer—Planning and Divisional Engineer—Bendigo, a representative of the Transport Regulation Board, and a municipal engineer.

Municipal engineers will be co-opted for tasks relating to their municipalities.

The three studies, although smaller than the recently completed Melbourne Metropolitan Transportation Study, will however involve many similar tasks. Existing traffic movements will be related to the ways in which land in the study area is used for housing, commerce, and industry.

Changes in land use affect traffic requirements, and changes in road conditions in turn influence land use. Plans developed from the studies will attempt to forecast such changes and should be of great value to local Regional Planning Committees, the councils, the Town and Country Planning Board, and those engaged in the planning of public transport routes.

The cost of the three urban studies is estimated to be $440,000 in all. The Board will meet seven-eighths of the cost of the studies and local bodies in each study area will bear the remaining one-eighth.

It is expected that the studies will be carried out over a period of about two years.

LAND PURCHASE

The construction of new roads and the widening of existing road reserves cannot be accomplished without the purchase of land.

The Board realizes that land which is used for housing, agriculture, industry or commerce can rarely be made available for road purposes without affecting the personal and pecuniary interests of the owner. The Country Roads Act provides that the Board shall make full compensation for the value of the lands taken or used, and for all damages sustained. The main principle adopted by the Board in the assessment of compensation is to ensure as far as possible that the owner is placed in the same financial position after the acquisition of land as prior to the acquisition.

An accurate measure of compensation expressed in monetary terms is in some instances difficult to obtain. To assist in the consideration of land owners' claims for compensation the Board engages independent qualified valuers to furnish a current market valuation of land, buildings, and other improvements required for road purposes. The valuer is also requested to assess, where applicable, any compensation which should be paid for the reduction in value of the balance of the property retained by the owner due to the Board's acquisition or caused by the works to be carried out on the acquired land. The Board also permits an owner to obtain a valuation at the Board's cost from an independent qualified valuer of his own choice.

Other types of expenses incurred by the owner which are taken into account by the Board in assessing the amount of compensation to be paid include legal costs for the discharge of mortgages; legal costs incurred in the actual transfer to the Board of the land concerned and the production of the relevant title; removal costs; costs involved in the transfer of a telephone; other necessary incidental expenses relating to the owner's reinstatement in another home.

The Board endeavours to treat every owner with sympathetic consideration in the special circumstances of each particular case. Where it is not possible to reach agreement with the owner on the amount of compensation to be paid, either the owner or the Board may refer the case to the Land Valuation Board of Review or the Supreme Court for determination. In practice, however, this course of action has been necessary in very few cases. The following table illustrates the number of land purchase transactions completed and the amount of compensation paid over the last five years.

Year	Number of transactions completed	Compensation paid $'000s
1965/66	1,154	4,153
1966/67	1,017	5,112
1967/68	1,080	5,600
1968/69	987	5,969
1969/70	1,117	4,957

In order to prevent hardship accruing to owners of property affected by future roadworks it is necessary for the Board in some cases to purchase properties well ahead of the time they are required for road construction purposes. Following the purchase of such properties the Board rents or leases them through local estate agents. During the year the Board received revenue amounting to $358,000 from such rentals.

When the properties are eventually required for road construction purposes they are advertised for sale by removal and auctioned. During the year 62 houses were sold for removal for an amount of $86,000.

In some cases in rural areas owners prefer the Board to purchase the whole of their properties where the portion required for road purposes affects the owner's economic use of the land. When the exact area of land required for road purposes is known the surplus areas are advertised for sale. Thirty-one such areas were sold during the year realising $362,000.

FILMS AND DISPLAYS

During the year the Board's film unit produced several films, the major productions being titled "Melbourne's Roads", "Lime Stabilization", and "Crack Arrest Tests".

Films, colour transparencies, and photographic prints in colour and black and white were displayed at the Royal Agricultural Show and the International Motor Show. The theme of the Board's exhibitions on both of these occasions was the many stages of road construction from design to landscaping. Examples of recently completed works were shown in photographs. Of great interest to the public were displays of automatic traffic counters in operation. Printed information consistent with the theme was readily available to

visitors, and included brochures describing the construction of the Tullamarine Freeway and the Lower Yarra Freeway, a book suitable for school projects, and a map of the Board's declared road system. At the Royal Agricultural Show the Board's films "Special Projects" and "Signs for Safety" were screened for a total of 120 hours.

Screenings of the Board's films were given on 23 occasions during the year to clubs and organizations.

MUNICIPAL INSPECTIONS

The Board continued its practice of visiting as many municipalities as possible during the year to keep informed of the road conditions and developments throughout the State. Roads and bridges in all municipalities are inspected by the Board at six yearly intervals.

Official visits to thirty-six municipalities took place during the year. The municipalities were the Shires of Alexandra, Arapiles, Avoca, Broadford, Bulla, Colac, Daylesford and Glenlyon, Goulburn, Hampden, Healesville, Kilmore, Melton, Metcalfe, Minhamite, Mornington, Mortlake, Newstead, Oxley, Seymour, Tullaroop, Upper Yarra, Walpeup, Wimmera, Winchelsea, Woorayl, and Yackandandah, the Borough of Koroit, the Town of Camperdown, and the Cities of Castlemaine, Colac, Geelong, Geelong West, Horshaw, Keilor, Maryborough, and Newton.

The Board observed the marked improvement in local road systems since the previous visits and the accompanying development of the areas which had taken place.

The Board greatly appreciates the ready co-operation given by Councils in arranging these municipal inspections.

DEPUTATIONS

During the year the Board received 28 deputations from municipal councils and local organizations relating to road problems.

The discussions which take place at the deputations are valuable to the Board and the members of the deputations in reaching a mutual understanding of each other's problems. Immediate solutions to the problems raised are not always possible but the information obtained by the Board enables it to provide technical and financial assistance in deserving cases.

TWENTY-SIXTH CONFERENCE OF MUNICIPAL ENGINEERS

The Twenty-sixth Annual Conference of Municipal Engineers convened by the Board was held on 10th, 12th and 13th February, 1970.

Approximately 240 engineers attended, including representatives of most municipal councils in Victoria, several municipal engineers from Tasmania and South Australia, and engineers representing various State Government and Commonwealth Departments. The Members of the Board and senior engineers on the Board's staff also attended.

There was a wide variety of papers presented. Overseas road and bridge construction was the subject of papers presented on visits to the European Alps and to Japan. Other papers were presented on planning and development in Victoria including regional planning and growth patterns for the Melbourne metropolitan area; road and bridge construction techniques including the use of large precast crown sections, testing of materials and compaction control, use of primer seals, depth of asphalt pavements, spill-through type bridge abutments, pavement design and private street layout; the design of municipal swimming pools; office equipment and administrative procedures.

Mr. G. N. Macdonald, the Chief Engineer, Melbourne Harbour Trust, addressed the conference on port developments in Melbourne and provided information for the inspection of the Swanson Dock facilities (container terminal) and dock construction work.

The Board expresses appreciation to the engineers, planners and administrators who presented papers or gave addresses and to the Melbourne Harbour Trust for its valuable co-operation.

MUNICIPAL ASSOCIATION CONFERENCES

The Board extends its appreciation for the opportunity of again being represented at the annual conferences of the Municipal Association and the five regional associations in Victoria. The conferences provide a valuable point of contact for the Board and its Divisional Engineers in maintaining the close co-operation which exists between the Board and municipal councils.

The following conferences were attended:

1. Municipal Association of Victoria: 77th Annual Session held at the City Hall, Geelong, on 8th and 9th October, 1969, attended by the Chairman, Mr. I. J. O'Donnell, who presented an address on the historical development and organization of the Board.

2. Western District Municipal Association: Conferences were held at Portland on 18th September, 1969, and at Penshurst on 1st April, 1970; both meetings were attended by Mr. F. G. Lodge, Divisional Engineer—Warrnambool.

3. Goulburn North-East Municipalities Association: Annual conference at Beechworth on 16th April, 1970; attended by Mr. A. J. Pryor, Divisional Engineer—Benalla.

4. Gippsland Municipalities Association: Annual conference held at Drouin on 29th April, 1970; attended by the Deputy Chairman, Mr. R. E. V. Donaldson.

5. Northern District Municipal Association: Annual conference held at Boort on 23rd April, 1970; attended by Mr. T. M. Glazebrook, Divisional Engineer, Bendigo.

6. North-Western Municipalities Association: Annual conference held at Ouyen on 29th May, 1970; attended by the Chairman, Mr. I. J. O'Donnell, Deputy Chairman, Mr. R. E. V. Donaldson, and Mr. L. M. Jones, Divisional Engineer—Horsham.

NATIONAL ASSOCIATION OF AUSTRALIAN STATE ROAD AUTHORITIES

The National Association of Australian State Road Authorities comprises the road authorities of the six Australian States and the Commonwealth Department of Works. The Association holds two scheduled meetings each year at which reports of the various specialist committees are considered and decisions on policy made.

The thirty-ninth meeting was held in Melbourne on 11th August, 1969, at the Board's Head Office. This was a special meeting to enable consideration to be given to the revised administrative and accounting procedures necessary to conform to the requirements of the Commonwealth Aid Roads Act 1969.

The fortieth meeting was held in Perth from 10th to 14th November, 1969, under the chairmanship of Mr. D. H. Aitken, Commissioner of Main Roads, Western Australia. The meeting was preceded by an inspection of roads and transport serving the iron ore extractive industry in the Pilbara region. The Board's Chairman, Mr. O'Donnell, attended the meeting on behalf of the Board. Items on the agenda included the production of N.A.A.S.R.A. publications and technical manuals; study courses in Australia for African and Asian engineers; services on roads, operation of equipment; testing procedures; road research; axle loadings; development of national routes; traffic operations; job costing; publicity; and reports from various committees of the Standards Association of Australia on which N.A.A.S.R.A. is represented concerning materials, plant and equipment, vehicles and street lighting.

The forty-first (intermediate) meeting was held at the offices of the Commonwealth Department of Works, Melbourne, on 15th May, 1970, and was attended by Mr. I. J. O'Donnell, Mr. R. E. V. Donaldson and Mr. J. D. Thorpe. In addition to the items continuing from previous meetings, alterations to P.M.G. services, policy on pipelines and the use of computers were considered at this meeting.

AUSTRALIAN ROAD RESEARCH BOARD

The Australian Road Research Board is composed of the heads of the State Road Authorities and the Director General, Commonwealth Department of Works. Mr. I. J. O'Donnell, Chairman of the Country Roads Board, is at present also the Chairman of the Australian Road Research Board.

An Advisory Council of specialists in various fields connected with roads and transport gives general guidance on the Board's research programme. In addition nine specialist committees: Pavements—Structural Analysis and Design, Bituminous Materials, Structures, Compaction, Soil Stabilization, Road Transport Planning, Traffic Engineering, Human Factors, and Local Government Enginers, and four panels—Traffic Capacity, Economic Axle Load—Pavements, Economic Axle Load-Bridges and Brittle Fracture, give more detailed advice on specific areas of study.

Research is directed to two broad aims:

(a) ensuring the most economic overall use of roads, including maximum utilization of existing facilities, as part of the transportation system. Research is carried out into the planning, design, construction, maintenance and operation of roads and road systems; and

(b) ensuring the proper value of the road to the community. Research is carried out into

road safety, the design of vehicles, the behaviour of road users, and the sociological and environmental impact of roads and road transport.

In 1969/70 the Board's expenditure was approximately $1,045,000. Since its inception in 1960 the Board has approved some eighty research projects. Sixty are at present in hand, some continuing in a different form after completion of the original research project.

Preliminary plans have been prepared for the new Australian Road Research Centre to be built in the City of Nunawading. The whole field of activity of the Board will be facilitated by completion of the Centre in 1972. In addition to providing better office and laboratory accommodation, the buildings will incorporate a lecture hall equipped for seminars and conferences.

Symposia on compaction of materials in roads were held at Wagga Wagga, N.S.W. and Hobart, Tasmania, during the year. Increased attention is being given to the dissemination of research information and to the practical application of the results of research.

CO-OPERATION WITH CITIZEN MILITARY FORCES

The Country Roads Board, with other Government instrumentalities, sponsors units of the Australian Army Supplementary Reserve to provide specialist engineering construction capacity for the Citizen Military Forces. These units form part of 6 Construction Group which, until 30th June, 1970, was commanded by Col. R. C. Handley, the Board's Deputy Chief Engineer (Works).

Within the Construction Group the Board's special interest lies in Headquarters 22 Construction Regiment, 104 Construction Squadron, and 107 Plant Squadron.
The Board encourages suitable members of its staff to serve with these units and grants normal military leave with pay to the limit prescribed by the regulations for training purposes.

The Regiment's 1969 Annual Camp, which was held at Puckapunyal during the first fortnight in October, was attended by a total of 330 unit members, including 140 members of the staff and employees of the Board.

The principal topics included in the camp training programme were weapon training, battlecraft, demolitions and water supply.

A significant improvement in the standard of training was achieved by the conduct of special courses for instructors over a period of six months prior to the Camp, and by the organisation of the camp training on a "wing" basis, with teams of selected instructors allocated to particular topics. The standard of instruction was also improved by the attendance during the year of a number of Regimental Officers and N.C.O.'s at appropriate courses conducted by Regular Army Schools and training establishments.

The Regiment continues to derive its strength from a solid core of loyal and hard-working officers and N.C.O.s. It is notable that the number of members of the unit receiving decorations and awards for long and efficient service is increasing from year to year.

PERSONNEL

The Board's employment strength at 30th June, 1969, and 30th June, 1970, was as follows:

	1969	1970
Salaried Staff	1,337	1,414
General Staff	870	886
Employees	2,285	2,302
	4,492	4,602

Recruitment

During the year 255 new officers were recruited to the Board's staff to fill approved additional positions and vacancies caused by resignations and retirements.

Officers of the Board's Personnel Section visited more than 50 secondary schools and senior technical colleges during the year to recruit officers for both professional and subprofessional positions. The Board was also represented at more than 20 careers nights conducted throughout the State.

Arrangements were made for final year Civil Engineering students from the University of Melbourne and Monash University, and senior secondary school students to visit Head Office to obtain a better understanding of the Board's work and the career opportunities available.

As a result of the recruitment activities little difficulty was experienced in obtaining professional and non-professional staff of a high standard.

Cadetships

At 30th June, 1970, the Board had 46 cadets at the Universities and at the Royal Melbourne Institute of Technology. The cadets are studying civil engineering, mechanical engineering, science, economics and surveying.

The following table shows the number of cadets in training for the various courses during the 1970 academic year:

Course	Year of Training				Total
	1st	2nd	3rd	4th	
Civil Engineering	4	8	14	10	36
Mechanical Engineering	1		1		2
Surveying			3	1	4
Science	1	2			3
Economics	1				1
	7	10	18	11	46

Two special cadetships were awarded to officers of the Board to enable them to complete the Diploma of Civil Engineering on a full-time basis.

Apprentices

During the year the Board recruited 11 apprentices for training in Motor Mechanics. At 30th June, 1970, the total number of apprentices under training was:

Fitting and Turning	1
Motor Mechanics	60
Painter	1
Welders	3
Total	65

Retirements

During the year the following officers retired after substantal service with the Board:

Staff		Years of Service
Barnes, E. R.	Administrative Officer	32
Clark, A. F. (Miss)	Machinist Accounting (Senior)	37
Cikalov, G. A.	Engineer	20
Elms, L. W. P.	Assistant Divisional Engineer—Geelong	37
Evitt, C. E.	Divisional Accounts Clerk	22
Gawith, A. H.	Materials Research Engineer	40
George, H. P.	Deputy Chief Engineer	46
Hosking, F.	Advance Planning Engineer	43
Joyce, J. R.	Horticultural Officer	49
Macdowall, A. J.	Engineering Surveyor	24
Townley, J. H.	Deputy Chief Engineer—Road Design	35
General Staff		
Baker, J. H.	Overseer	35
Craig, W. G.	Machinist	28
Drury, W. C.	Depot Foreman	37
English, M. B.	Tool Storeman	22
Fawcett, E.	Patrolman	28
Haydon, U. W. T.	Roadmaster	26
Heard, T. H.	Patrolman	31
Lawdorn, F. A.	Patrolman	22
Muller, L. E.	Overseer	22
Reeves, H. A.	Welder	22
Roy, W. R. E.	Skilled Builders Labourer	26
Shurdington, F. E.	Roadmaster	28

It is with regret that the death of the following personnel of many years service is recorded:

Staff		Years of Service
Guthrie, A. E.	Engineering Assistant	22
Renz, E. F. A.	Engineer	21
Silvers, F.	Paying Officer	27
Evans, R.	Patrolman	34
McDougall, K. D.	Motor Mechanic	39
Williams, T.	Overseer	21

Industrial Relations

The Board was affected by several arbitrated decisions and negotiated agreements during the year. Those of greatest significance to the Board were:

(a) the National Wage Case of 1969 which increased total salaries and wages by 3%;

(b) the case brought by the Association of Professional Engineers which resulted in the salaries of professional engineers being increased by 11% to 15%.

(c) the agreement reached between the State Government and the Victorian Trades Hall Council to increase substantially the level of payments made under the State Incremental Payments Scheme.

Training

During 1969/70 the Board as a member of the National Association of Australian State Road Authorities agreed to a request by the Commonwealth Department of External Affairs to provide a three month training programme for Asian and African engineers.

Thirteen Asian and African engineers from Cambodia, South Vietnam, the Philippines, Thailand, Indonesia, Territory of Papua and New Guinea, Afghanistan, India, Nepal, Ghana and Uganda attended the course which commenced in March 1970.

The course was designed for qualified engineers with between three years and ten years experience after qualification and consisted of:

One week of induction by the Board in conjunction with the Department of External Affairs and the Department of Education and Science.

Three weeks of technical lectures and inspections of the Board's works..

Six weeks attachment to regional Division.

Two weeks attachment to a specialist Division at Head Office.

One week of review conducted by the Board in conjunction with the Department of External Affairs, the Department of Education and Science and observers from other Australian State Road Authorities.

Mr. G. Hunt, Construction and Maintenance Engineer, and Mr. R. Billinge, Principal Training Officer, combined to administer the course and attend to the personal welfare of the Asian and African visitors.

In addition to conducting the special three months course, the Board provided short periods of training for Colombo Plan engineers from Malaysia, Thailand and Indonesia.

A comprehensive in-service training programme was conducted for staff and employees in many areas of employment. A total of 31 courses were held, ranging in duration from 7½ hours to 22½ hours. All were aimed at increasing supervisory, technical, or administrative skills.

The following external courses were attended by selected officers of the Board:

The Australian Administrative Staff College:

Advanced course (Dr. K. G. E. Moody)
Intermediate course (Mr. D. B. McKenzie);

The University of New South Wales:

Traffic Planning and Control course (Mr. A. Jacka, Mr. A. Noble and Mr. I. Rennick);

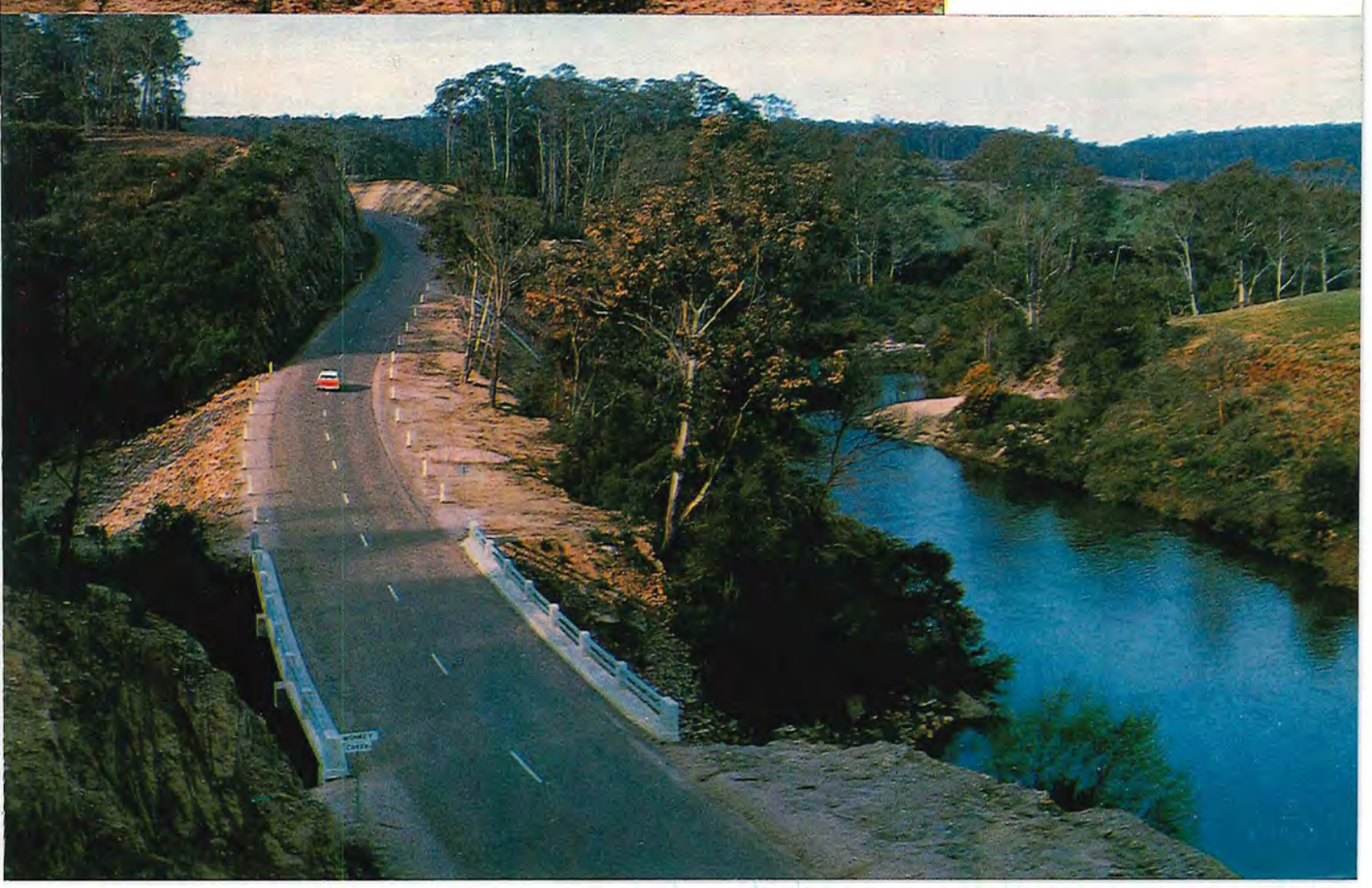
The University of Melbourne:

Master of Engineering Science Degree in Structures (Mr. J. D. Thomas).

As in past years the Board provided lecturers and administrative assistance for the Road Foreman and Works Superintendents course conducted by the Royal Melbourne Institute of Technology.

The Burwood Highway looking east towards Dandenong Creek showing recent planting of shrubs in the median.

Omeo Highway - deviation and new bridge over Monkey Creek, north of Bruthen.

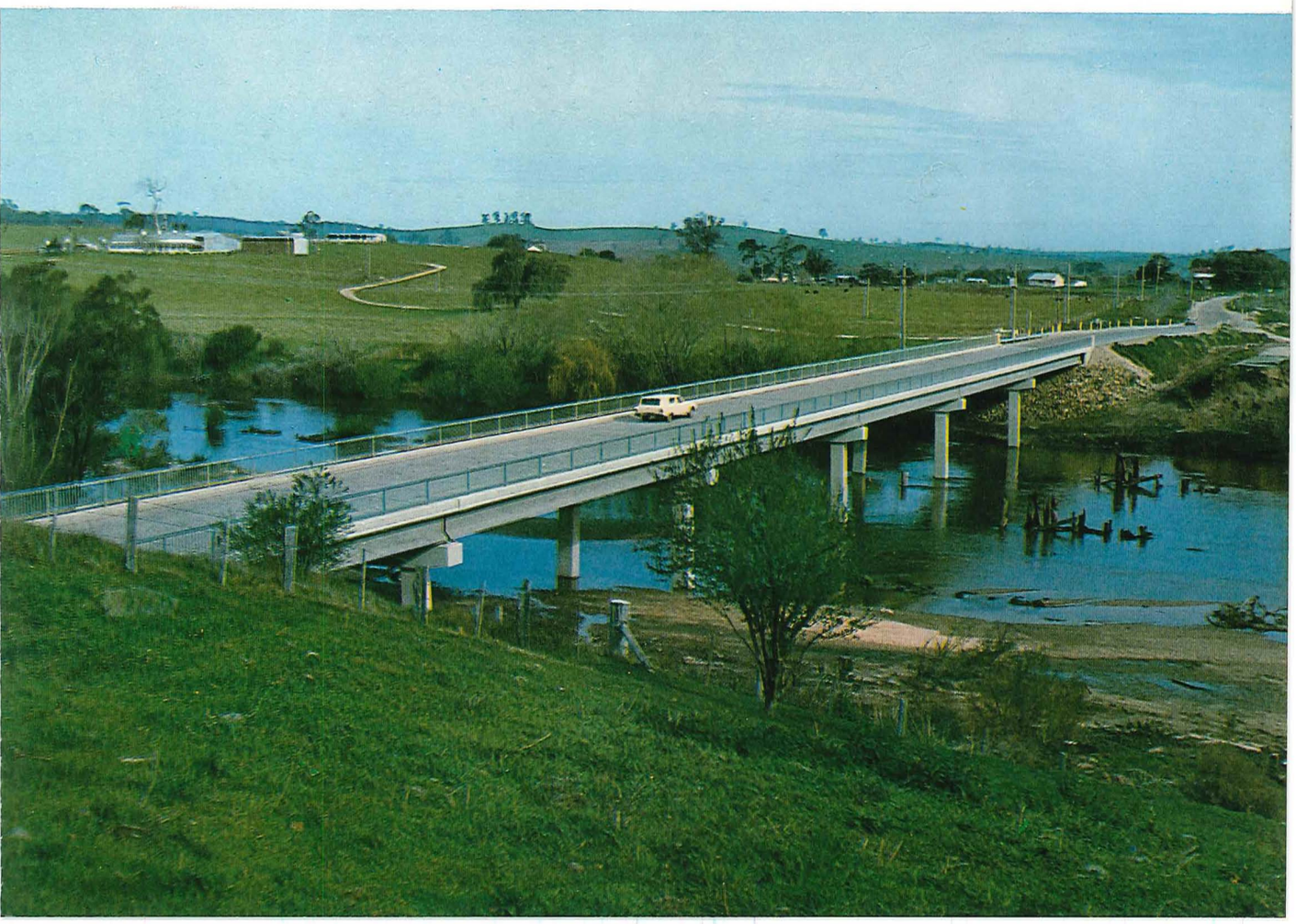


The new Phillip Island Bridge linking San Remo and Newhaven.

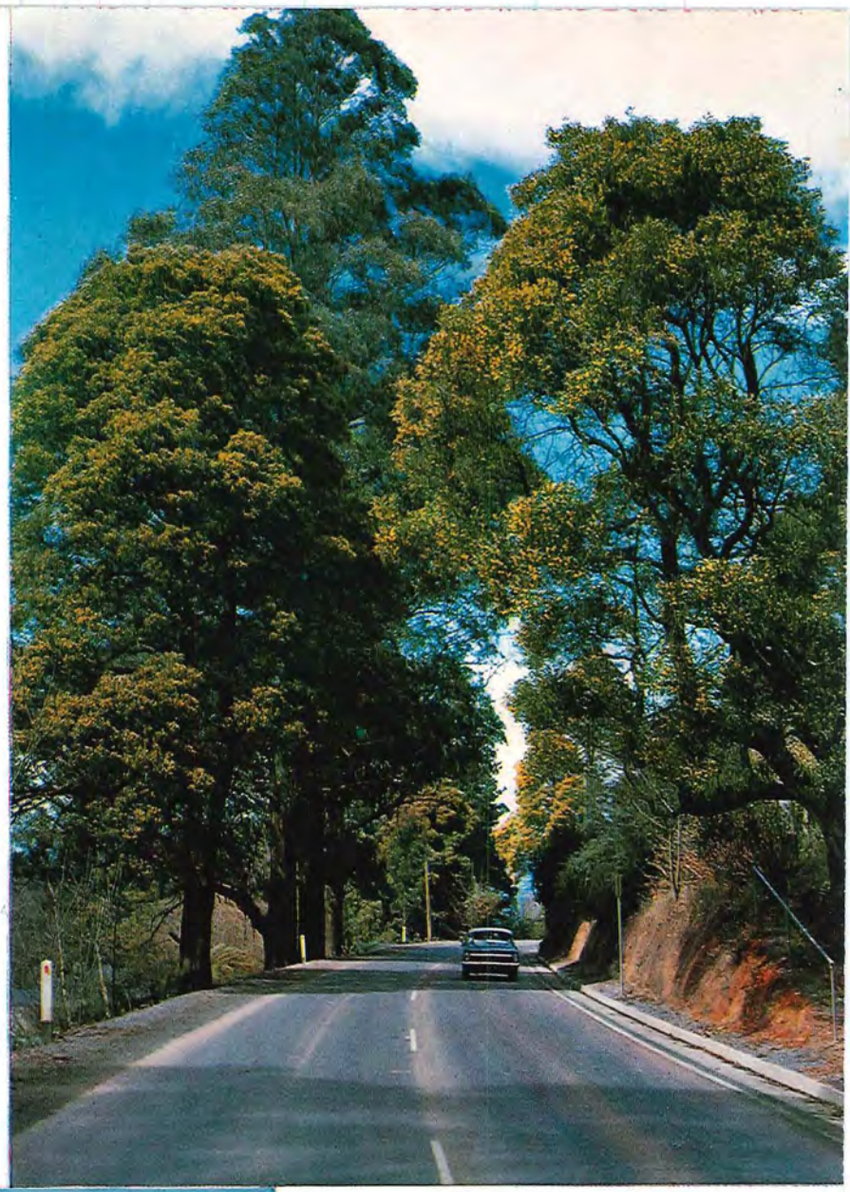
Batter treatment on the Nepean Highway at Mount Eliza.

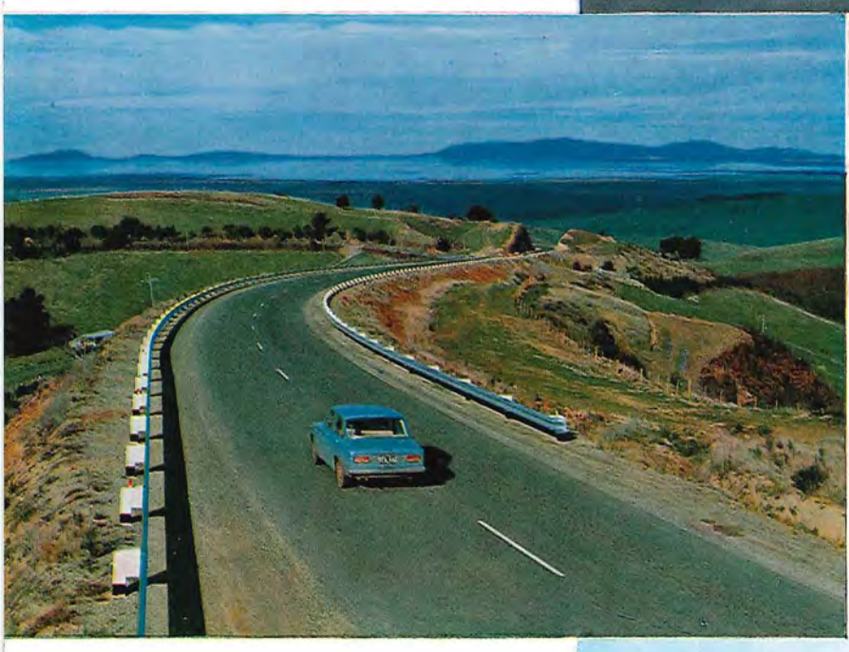
Dismantling the old suspension bridge built in 1938.

Tambo Upper-Road, Shire of Tambo. New bridge over Tambo River near Bruthen.



Mount Dandenong Tourists' Road between Tremont and Beauty Bend.





Realigned section of the South Gippsland Highway north of Foster.

Scenic viewpoint on the South Gippsland Highway at Foster North.

APPENDIX 1

STATE HIGHWAYS AND FREEWAYS

SIGNIFICANT WORKS COMPLETED DURING FINANCIAL YEAR 1969/70

BASS HIGHWAY

BASS SHIRE — Reconstruction of 1·4 miles through the township of Grantville to provide a sealed pavement 24 feet wide.
Widening and resheeting 3·7 miles, including some minor reconstruction, south of Grantville, to provide a sealed pavement 24 feet wide.

Reconstructed section of the Bass Highway near Grantville

BELLARINE HIGHWAY

BELLARINE SHIRE — Construction of 0·9 miles of dual carriageways between Wilsons Road and Twitts Road, to provide a sealed pavement 31 feet wide for the Queenscliff-bound carriageway and a sealed pavement 24 feet wide for the Geelong-bound carriageway.

BONANG HIGHWAY

ORBOST SHIRE — Widening and sealing 2·0 miles north of Orbost to provide a sealed pavement 20 feet wide and replacement of a timber bridge with a steel pipe culvert over Wallaby Creek.

BORUNG HIGHWAY

WARRACKNABEAL SHIRE — Widening and sealing 6·5 miles east of Warracknabeal, including shoulder strengthening to provide a sealed pavement 24 feet wide.

Widened section of the Bonang Highway north of Orbost.

BURWOOD HIGHWAY	
KNOX AND NUNAWADING CITIES	Construction of 1·5 miles of dual carriageways each 24 feet wide, between Morack Road and Templeton Street.
KNOX CITY	Construction of 0·9 miles of dual carriageways each 24 feet wide, between Templeton Street and Tyner Road and reconstruction of the intersection with Stud Road.
CALDER HIGHWAY	
METCALFE SHIRE	Construction of 2·7 miles of climbing lanes, south of Heathcote.
MARONG SHIRE	Reconstruction of 4·5 miles, south of Bridgewater.
CHARLTON AND WYCHEPROOF SHIRES	Resheeting and sealing 6·8 miles, north of Teddywaddy to provide a sealed pavement 24 feet wide.
WYCHEPROOF SHIRE	Widening, resheeting, realignment and sealing 1·8 miles, south of Wycheproof to provide a sealed pavement 24 feet wide.
	Reconstruction and sealing of 3·2 miles south of Nyarrin to provide a sealed pavement 24 feet wide.
MILDURA SHIRE	Widening and sealing 4·0 miles south of Hattah to provide a sealed pavement 24 feet wide.
CANN VALLEY HIGHWAY	
ORBOST SHIRE	Reconstruction of 2·0 miles north of Cann River to provide a sealed pavement 20 feet wide.
GLENELG HIGHWAY	
GRENVILLE SHIRE	Construction of 0·3 miles of dual carriageways through the township of Linton.
WANNON SHIRE	Widening and resheeting 2·0 miles west of Coleraine to provide a sealed pavement 24 feet wide.
GLENELG SHIRE	Reconstruction of 2·3 miles between Casterton and the Penola Road intersection to provide a sealed pavement 24 feet wide.
	Reconstruction of 4·5 miles, including curve improvement, east of Strathdownie to provide a sealed pavement 24 feet wide.
GOULBURN VALLEY HIGHWAY	
SHEPPARTON SHIRE	Widening and sealing 3·7 miles north of Shepparton to provide a sealed pavement 24 feet wide.
NUMURKAH SHIRE	Widening and sealing 5·4 miles between Katunga and Strathmerton to provide a sealed pavement 24 feet wide.
HAMILTON HIGHWAY	
BANNOCKBURN AND CORIO SHIRES	Construction of a reinforced concrete bridge 270 feet long, 28 feet between kerbs to replace a concrete arch bridge over the Moorabool River at Fyansford.
COLAC SHIRE	Widening and resheeting 2·6 miles near Wingeel to provide a sealed pavement 24 feet wide.
HAMPDEN SHIRE	Reconstruction of 1·9 miles of bridge approaches to provide a sealed pavement 24 feet wide.
	Construction of a 4 span reinforced concrete bridge over Gnarkeet Creek.
MORTLAKE SHIRE	Reconstruction of 2·7 miles west of Darlington to provide a sealed pavement 24 feet wide.
MOUNT ROUSE SHIRE	Reconstruction and regrading of 0·8 miles east of Mustons Creek to provide a sealed pavement 24 feet wide.
	Reconstruction of 3·1 miles, including curve improvement, between Mustons Creek and Penshurst to provide a sealed pavement 24 feet wide.
DUNDAS SHIRE	Resheeting 0·9 miles west of Tarrington to provide a sealed pavement 22 feet wide.

HENTY HIGHWAY

ARAPILES SHIRE	Regrading and sealing 3·5 miles at Mockinya to provide a sealed pavement 24 feet wide.

HUME HIGHWAY

BROADMEADOWS CITY	Widening and resheeting the western carriageway between the Drive-In Theatre and Barry's Road.
SEYMOUR SHIRE	Replacement of the superstructure of the road over rail bridge north of Seymour.
BENALLA SHIRE AND BENALLA CITY	Resheeting and sealing 5·1 miles between Baddaginnie and Benalla to provide a sealed pavement 24 feet wide.
BENALLA CITY	Construction of 0·3 miles of traffic channelisation at the intersection with the Midland Highway.

McIVOR HIGHWAY

McIVOR SHIRE	Reconstruction of the existing pavement through the township of Knowsley to provide a sealed pavement 24 feet wide.

Reconstruction of the McIvor Highway near Knowsley.

MAROONDAH HIGHWAY

LILLYDALE AND HEALESVILLE SHIRES	Reconstruction of 1·9 miles, including the Maxwell Hill deviation and a 10 feet wide climbing lane for Melbourne-bound traffic, to provide a sealed pavement 24 feet wide.
HEALESVILLE SHIRE	Reconstruction of 2·8 miles between Myers Creek Road and the M. & M.B.W. watershed to provide a sealed pavement 24 feet wide.
ALEXANDRA SHIRE	Reconstruction of 1·4 miles of the Acheron Cutting.

The Maroondah Highway reconstructed at Acheron Cutting.

MIDLAND HIGHWAY

CRESWICK SHIRE	Widening the bridge over the Bullarook Creek to 28 feet between kerbs, at Newlyn.
	Reconstruction of 0·7 miles at Blampied to provide a sealed pavement 24 feet wide.
DAYLESFORD AND GLENLYON SHIRE	Reconstruction of 2·1 miles north of Mount Franklin, to provide a sealed pavement 22 feet wide.

Reconstructed section of the Midland Highway north of Mount Franklin.

CASTLEMAINE CITY	Widening 0·9 miles to provide a sealed pavement 40 feet wide.
SHEPPARTON CITY	Construction of embankment and excavation of new channel for Goulburn River at Shepparton.
BENALLA SHIRE	Reconstruction, realignment and sealing of 0·5 miles through the township of Swanpool to provide a sealed pavement 22 feet wide.

MURRAY VALLEY HIGHWAY

TOWONG SHIRE	Construction of a concrete bridge 150 feet long, 28 feet between kerbs, to replace a timber bridge over the Tallangatta Creek, and construction of approaches.
YARRAWONGA SHIRE	Widening and sealing 2·6 miles to provide a sealed pavement 24 feet wide.
COHUNA SHIRE	Reconstruction of 2·6 miles south of Cohuna to provide a sealed pavement 24 feet wide.
SWAN HILL CITY AND SHIRE	Construction of dual carriageways and realignment of 4·5 miles, including an intersection treatment over the railway crossing at Swan Hill.

Dual carriageways and intersection treatment on the Murray Valley Highway at Swan Hill.

MILDURA SHIRE	Reconstruction, realignment and sealing of 4·6 miles of gravel road east of Hattah to provide a sealed pavement 18 feet wide.
	Widening and sealing 4·4 miles east of Hattah to provide a sealed pavement 18 feet wide.

NEPEAN HIGHWAY

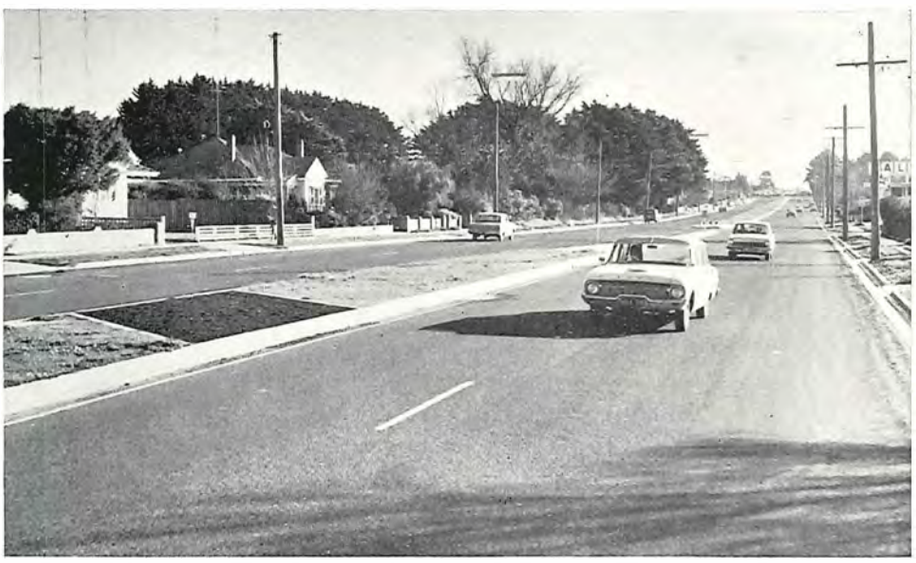
MOORABBIN CITY	Widening dual carriageways to six lanes between Wickham Road and Bay Street.

NORTHERN HIGHWAY

PYALONG AND McIVOR SHIRES	Reconstruction of 2·0 miles south of Tooborac to provide a sealed pavement 24 feet wide.
ROCHESTER SHIRE	Reconstruction and raising formation level of 2·2 miles north of Rochester to provide a sealed pavement 24 feet wide.

NORTH WESTERN HIGHWAY

BALLARAT SHIRE	Construction of 1·6 miles of dual carriageways each 36 feet wide, in Howitt Street, Wendouree.
LEXTON AND AVOCA SHIRES	Maintenance and sealing of 30·1 miles of shoulders between Lexton and Redbank.
AVOCA SHIRE	Sealing 12 miles between Avoca and Redbank to provide a sealed pavement 20 feet wide.



Dual carriageways constructed on the North Western Highway (Howitt Street), Wendouree.

OMEO HIGHWAY

OMEO SHIRE	Widening 3·5 miles north of Mt. Wills to provide a sealed pavement 22 feet wide.
TAMBO SHIRE	Construction of 1·4 miles on a new alignment to provide a sealed pavement 22 feet wide and a 3 span reinforced concrete bridge over Monkey Creek, north of Bruthen.

PRINCES FREEWAY

WERRIBEE SHIRE	Construction of the Kororoit Creek Road interchange, including an overpass bridge 416 feet long and 28 feet between kerbs.
PORTLAND SHIRE	Construction of 2·0 miles of bridge approaches near Dartmoor to provide a sealed pavement 24 feet wide.

PRINCES HIGHWAY EAST

OAKLEIGH CITY	Reconstruction, strengthening and sealing of dual carriageways between Ferntree Gully Road and Garden Street. Widening each carriageway to three lanes between Castlebar Road and Ferntree Gully Road, including reconstruction of intersection with Warrigal Road.

SPRINGVALE CITY	Reconstruction of the intersection with Corrigan Road and construction of 1·4 miles of kerbing and underground drainage.

Princes Highway East—widened section between Warrigal Road and Ferntree Gully Road.

BULN BULN SHIRE	Reconstruction of the western approach to the township of Drouin between Jindivick Road and Viaduct Place, including island treatment to provide a sealed pavement 44 feet wide.
BAIRNSDALE SHIRE	Widening and strengthening 3·8 miles west of Bairnsdale to provide a sealed pavement 24 feet wide.

Widened section of the Princes Highway East to the west of Bairnsdale.

BAIRNSDALE SHIRE	Reconstruction of 0·5 miles east of Bairnsdale to provide a sealed pavement 24 feet wide.
TAMBO SHIRE	Reconstruction of 1·6 miles west of Nowa Nowa to provide a sealed pavement 24 feet wide.
ORBOST SHIRE	Reconstruction of 4·0 miles on a deviated alignment south of N.S.W. border to provide a sealed pavement 24 feet wide.

PRINCES HIGHWAY WEST

ALTONA CITY	Reconstruction of the intersection with Blackshaws Road.
CORIO SHIRE	Construction and channelisation of Cox's Road-Bacchus March Road intersection at Norlane.

Intersection of the Princes Highway West, Bacchus Marsh Road, and Cox's Road, Norlane.

HAMPDEN SHIRE	Reconstruction and realignment of 2·0 miles to provide a sealed pavement 24 feet wide. Reconstruction of 3·0 miles east of Camperdown, including curve improvement, to provide a sealed pavement 24 feet wide. Widening and resheeting 3·5 miles between Gnotuk and Boorcan to provide a sealed pavement 24 feet wide. Experimental section of 0·7 miles of foam bitumen stabilization at McKinnons Bridge to provide a sealed pavement 24 feet wide. Reconstruction of 4·8 miles and curve improvement between Terang and Garvoc to provide a sealed pavement 24 feet wide.
WARRNAMBOOL SHIRE	Widening and resheeting 6·2 miles, between Garvoc and Panmure to provide a sealed pavement 24 feet wide.
PORTLAND SHIRE	Construction of a road over rail overpass at Lyons.

The Princes Highway West, reconstructed west of Terang.

PYRENEES HIGHWAY

ARARAT AND LEXTON SHIRES	Widening 18·7 miles between Amphitheatre and Dunneworthy to provide a sealed pavement 20 feet wide.

SOUTH GIPPSLAND HIGHWAY

CRANBOURNE SHIRE	Reconstruction of 2·9 miles south east of Cranbourne to provide a sealed pavement 24 feet wide.
KORUMBURRA SHIRE	Reconstruction and realignment of 0·7 miles east of Loch to provide a sealed pavement 24 feet wide.
	Construction of a 6 span overpass and deviated approaches to eliminate an open railway level crossing east of Loch.
	Realignment of 2·0 miles between Loch and Bena to provide a sealed pavement 24 feet wide.
	Construction of dual carriageways each 30 feet wide separated by a median 13 feet wide in Commercial Street, Korumburra.
SOUTH GIPPSLAND SHIRE	Construction and realignment between Stony Creek and Foster to provide a sealed pavement 22 feet wide.
ALBERTON SHIRE	Realignment of curve approaches to a railway level crossing at Alberton to provide a sealed pavement 24 feet wide. Reconstruction of 1·0 mile at Woodside to provide a sealed pavement 24 feet wide.

STURT HIGHWAY

MILDURA SHIRE	Reconstruction and sealing of 3·9 miles east of Cullulleraine to provide a sealed pavement 24 feet wide.

Reconstructed section of the Sturt Highway east of Cullulleraine.

TULLAMARINE FREEWAY

COBURG, BROADMEADOWS AND KEILOR CITIES	Construction of 2·0 miles of dual carriageways and interchanges at Pascoe Vale Road and Bulla Road.

WESTERN FREEWAY

BALLAN SHIRE	Bituminous concreting 3·5 miles east of Ballan.
MELTON SHIRE	Bituminous concreting 4·8 miles of the Ballarat-bound carriageway near Rockbank to provide a sealed pavement 24 feet wide.
BACCHUS MARSH SHIRE	Sealing 2·1 miles of dual carriageways each 24 feet wide at Anthony's Cutting.

WESTERN HIGHWAY

SUNSHINE CITY	Widening the southern carriageway to 3 lanes and sealing between Duke Street and Anderson Road.
ARARAT SHIRE	Construction of a box culvert 40 feet wide and approaches to replace a timber bridge, over Green Hills Creek, east of Ararat, to provide a sealed pavement 24 feet wide.
WIMMERA SHIRE	Realignment and sealing of 1·0 mile at Green Lake to provide a sealed pavement 24 feet wide.
	Reconstruction and sealing of 1·1 miles at Burnt Creek, including the replacement of a timber bridge with a concrete bridge 28 feet between kerbs to provide a sealed pavement 24 feet wide.
LOWAN SHIRE	Widening, resheeting and sealing 8·9 miles between Nhill and Kaniva to provide a sealed pavement 24 feet wide.
KANIVA SHIRE	Reconstruction and sealing of 2·4 miles west of Lillimur to provide a sealed pavement 24 feet wide.

APPENDIX 2

TOURISTS' ROADS AND FOREST ROADS

SIGNIFICANT WORKS COMPLETED DURING FINANCIAL YEAR 1969/70

TOURISTS' ROADS

DONNA BUANG ROAD	Reconstruction of 2·2 miles between the Maroondah Highway and Badger Creek to provide pavement widths of 20 feet and 24 feet.

Reconstruction and widening of Donna Buang Road east of Healesville.

GRAMPIANS ROAD	Reconstruction and sealing of one mile between Delly's Bridge and Halls Gap to provide a sealed pavement 24 feet wide.
	Widening the bridge over Stony Creek to provide a sealed pavement 28 feet wide between kerbs.
	Construction of a 7 span reinforced concrete bridge 210 feet long, 24 feet between kerbs over the Wannon River together with the necessary approaches.
MARYSVILLE-WOODS POINT ROAD	Reconstruction and realignment of 1·9 miles between Kerami Guest House, Marysville, and Robley's Saddle, to provide a pavement 22 feet wide.

MT. BUFFALO ROAD	Construction, widening and sealing of 2·4 miles between Lake Catani and Dingo Dell car park to provide a sealed pavement 24 feet wide.
MT. BULLER ROAD	Resheeting and sealing 2·3 miles to provide a sealed pavement 25 feet wide.
MT. DANDENONG ROAD	Reconstruction of 1·1 miles between Tremont and Beauty Bend to provide a sealed pavement 24 feet wide.
OCEAN ROAD	Reconstruction of one mile between Sheoak River and Cumberland River to provide a sealed pavement 24 feet wide.
	Construction of 0·4 miles of bridge approaches to Cumberland River bridge to provide a sealed pavement 24 feet wide.
	Reconstruction of 1·2 miles between Sugarloaf Creek and Whalebone Creek near Apollo Bay to provide a sealed pavement 24 feet wide.
	Reconstruction and sealing of 3·0 miles west of Lavers Hill to provide a sealed pavement 20 feet wide.
WILSON'S PROMONTORY ROAD	Reconstruction and realignment of 2·4 miles between Darby River and Tidal River to provide a sealed pavement 22 feet wide.

FOREST ROADS

BAIRNSDALE-DARGO ROAD	Widening the bridge over Iguana Creek to provide a pavement 22 feet wide between kerbs and gravelling one mile north of Iguana Creek.
DARGO ROAD	Widening, curve improvement and gravelling of 1·7 miles north of Cobbannah.
HEYFIELD-JAMIESON ROAD	Construction of a 4 cell corrugated steel pipe culvert to replace an old bridge over Warragul Creek together with 0·4 miles of approaches.
	Construction of 10·6 miles of new road between Jamieson and Licola, in the vicinity of Mount Skene to provide a pavement 24 feet wide.
WALHALLA ROAD	Widening one mile, including curve improvement between Erica and the Thomson River to provide a sealed pavement 22 feet wide.

APPENDIX 3

MAIN ROADS

SIGNIFICANT WORKS COMPLETED DURING FINANCIAL YEAR 1969/70

BAIRNSDALE DIVISION

ORBOST SHIRE	Buchan-Orbost Road—Reconstruction of 1·5 miles, including widening, pavement strengthening and sealing, to provide a sealed pavement 18 feet wide.
TAMBO SHIRE	Tambo Upper Road—Construction of a 6 span reinforced concrete bridge 480 feet long, to replace an old timber bridge in the township of Bruthen.
	Gelantipy Road—Widening, gravelling and partly realigning 0·9 miles at Murrindal.

Gelantipy Road, Tambo Shire. Widened section at Murrindal.

BALLARAT DIVISION

ARARAT SHIRE	Ararat-Halls Gap Road—Construction of a 3 span reinforced concrete bridge 137 feet long, 28 feet between kerbs, over Salt Creek, north west of Moyston.

Ararat-Halls Gap Road, Ararat Shire. New bridge over Salt Creek.

BALLAN SHIRE	Geelong-Ballan Road—Reconstruction and widening of 1·9 miles at Mt. Wallace to provide a sealed pavement 20 feet wide.
RIPON SHIRE	Beaufort-Amphitheatre Road—Reconstruction of 1·8 miles north-west of Beaufort to provide a sealed pavement 22 feet wide.

TULLAROOP SHIRE	Eddington Road—Widening the 678 feet long bridge over the Loddon River at Eddington to provide a sealed pavement 28 feet wide between kerbs.
	Construction of 1·3 miles of bridge approaches to provide a sealed pavement 22 feet wide.

BENALLA DIVISION

BEECHWORTH SHIRE	Beechworth Road—Reconstruction and sealing of 1·1 miles to provide a sealed pavement 20 feet wide.
BRIGHT SHIRE	Bright-Tawonga Road—Resheeting and sealing 3·0 miles to provide a sealed pavement 20 feet wide.
	Harrietville Road—Construction of a 2 span reinforced concrete bridge 92 feet long, 28 feet between kerbs and reconstruction and sealing of approaches.

Bright-Tawonga Road, Bright Shire. Section resheeted and sealed.

GOULBURN SHIRE	Heathcote-Nagambie Road—Reconstruction of 2·0 miles to provide a pavement 20 feet wide.
MANSFIELD SHIRE	Mansfield-Whitfield Road—Reconstruction, realignment and sealing of 2·0 miles to provide a sealed pavement 20 feet wide.
	Mansfield-Woods Point Road—Widening and resheeting 0·7 miles and widening selected sections over 5·0 miles to provide a pavement a pavement 20 feet wide.
	Merton-Strathbogie Road—Reconstruction of 1·0 mile to provide a sealed pavement 18 feet wide.
MYRTLEFORD SHIRE	Buffalo River Road—Construction of a 5 span reinforced concrete bridge 201 feet long, 28 feet between kerbs, and construction of approaches to provide a pavement 24 feet wide.
OXLEY SHIRE	Mansfield-Whitfield Road—Reconstruction, realignment and sealing of 3·6 miles to provide a sealed pavement 18 feet wide.
SEYMOUR SHIRE	Highlands Road—Reconstruction and sealing of 2·3 miles to provide a sealed pavement 18 feet wide.
TOWONG SHIRE	Tallangatta-Corryong Road—Construction of a reinforced concrete bridge 62 feet long, 28 feet between kerbs, over the railway line at Darbyshire to eliminate two railway level crossings.
	Tallangatta Creek Road—Reconstruction and realignment of 1·8 miles to provide a sealed pavement 18 feet wide.
TUNGAMAH SHIRE	Benalla-Yarrawonga Road—Reconstruction, realignment and sealing of 1·8 miles at Lake Rowan to provide a sealed pavement 20 feet wide.

UPPER MURRAY SHIRE	Upper Murray Road—Reconstruction, realignment and sealing of 3·4 miles to provide a sealed pavement 18 feet wide.
YACKANDANDAH SHIRE	Yackandandah-Wodonga Road—Reconstruction, realignment and sealing of 1·1 miles to provide a sealed pavement 20 feet wide.

Tallangatta-Corryong Road, Towong Shire. New bridge over the railway at Darbyshire.

Tallangatta Creek Road, Towong Shire. Reconstruction to provide a sealed pavement 18 feet wide.

BENDIGO DIVISION

CHARLTON SHIRE	St. Arnaud Road—Widening and sealing 4·7 miles to provide a sealed pavement 22 feet wide.
BROADFORD SHIRE	Strath Creek Road—Widening and sealing 1·0 mile to provide a sealed pavement 20 feet wide.
DEAKIN SHIRE	Echuca-Kyabram Road—Widening and sealing 3·1 miles to provide a sealed pavement 20 feet wide.
EAST LODDON SHIRE	Dingee Road—Widening and sealing 3·0 miles to provide a sealed pavement 22 feet wide.
ECHUCA SHIRE	Echuca-Kyabram Road—Reconstruction and sealing of 1·4 miles to provide a sealed pavement 24 feet wide.
KILMORE SHIRE	Broadford-Wallan Road—Reconstruction and sealing of 0·7 miles to provide a sealed pavement 20 feet wide.
KORONG SHIRE	Serpentine Road—Construction of a bridge over Bullabul Creek to provide a pavement 28 feet wide between kerbs.

PYALONG SHIRE	Lancefield-Tooborac Road—Reconstruction and sealing of 1·5 miles to provide a sealed pavement 22 feet wide.
ROCHESTER SHIRE	Heathcote-Rochester Road—Reconstruction and sealing of 1·9 miles to provide a sealed pavement 22 feet wide.
	Rochester-Bamawm-Prairie Road—Reconstruction and sealing of 1·1 miles to provide a sealed pavement 22 feet wide.
WARANGA SHIRE	Goornong-Murchison Road—Construction and sealing of 1·0 mile to provide a sealed pavement 22 feet wide.
	Tatura-Rushworth Road—Widening and sealing 1·7 miles to provide a sealed pavement 22 feet wide.

DANDENONG DIVISION

BASS SHIRE	Wonthaggi-Loch Road—Reconstruction of 3·0 miles to provide a pavement 19 feet wide.
BERWICK SHIRE	Healesville-Koo-Wee-Rup Road—Reconstruction of 2·1 miles north of Cockatoo, to provide a sealed pavement 18 feet wide.
CRANBOURNE SHIRE	Cranbourne-Frankston Road—Reconstruction of 1·8 miles to provide a sealed pavement 24 feet wide.
DONCASTER AND TEMPLESTOWE CITY	Doncaster Road—Reconstruction and channelisation of Doncaster Road and Heidelberg-Doncaster Road, including the provision of dual carriageways on adjacent sections of these roads and short sections of reconstruction of Tram Road and Elgar Road.

Doncaster Road, Doncaster and Templestowe City. Reconstruction at intersection with Heidelberg-Doncaster Road.

ELTHAM SHIRE	Whittlesea-Kinglake Main Road—Reconstruction of 2·8 miles near Pheasant's Creek at Kinglake Central to provide a sealed pavement 24 feet wide.
FRANKSTON CITY	Dandenong-Frankston Road—Construction of 0·7 miles of dual carriageways, each 25 feet wide, between Seaford and O'Grady's Road.
HASTINGS SHIRE	Frankston-Flinders Road—Reconstruction of 0·8 miles to provide a sealed pavement 22 feet wide.
KNOX CITY	Wantirna-Sassafras Road—Construction of 0·2 miles of dual carriageways each 24 feet wide at the Bayswater railway crossing.

Whittlesea-Kinglake Main Road, Eltham Shire. Reconstructed section near Pheasant's Creek.

Dandenong-Frankston Road, Frankston City. Dual carriageways constructed south of O'Grady's Road.

Wantirna-Sassafras Road, Knox City. Dual carriageways constructed at Bayswater.

LILLYDALE SHIRE	Lilydale-Monbulk Road—Widening and reconstruction of 1·5 miles to provide a sealed pavement 24 feet wide.
NUNAWADING CITY	Springvale Road—Construction of 1·4 miles of dual carriageways, each 33 feet wide, between Canterbury Road and Burwood Road.
SPRINGVALE CITY	Springvale Road—Construction of 2·0 miles of dual carriageways and construction of intersection with Heatherton Road. Dandenong-Frankston Road—Reconstruction of 2·0 miles to provide a sealed pavement 24 feet wide.
WAVERLEY CITY	Springvale and Waverley Roads—Construction of intersection. Wellington Road—Construction of 1·5 miles of dual carriageways each 24 feet wide.

Wellington Road—dual carriageways constructed east of the Princes Highway.

WHITTLESEA SHIRE	Whittlesea-Yea Road—Reconstruction of 1·0 mile in the township of Whittlesea to provide a sealed pavement 24 feet wide.
YEA AND HEALESVILLE SHIRES	Healesville-Kinglake Road—Reconstruction and realignment between Mount Slide and the Yarra Glen-Yea Road to provide a sealed pavement 21 feet wide.

GEELONG DIVISION

BACCHUS MARSH SHIRE	Diggers Rest-Coimadai Road—Reconstruction and widening of 4·7 miles to provide a sealed pavement 20 feet wide.
BELLARINE SHIRE	Barwon Heads-Ocean Grove Road—Widening 4·5 miles to provide a sealed pavement 24 feet wide.
COLAC CITY	Colac-Beech Forest Road—Reconstruction and widening of 1·0 mile to provide a sealed pavement 20 feet wide. Colac-Forrest Road—Widening 0·9 miles to provide a sealed pavement 20 feet wide.
GEELONG CITY	Geelong-Portarlington Road—Construction of 0·9 miles of dual carriageways each 24 feet wide.

SOUTH BARWON SHIRE	Lower Duneed Road—Widening 3·2 miles to provide a sealed pavement 18 feet wide. Torquay Road—Construction of 0·6 miles of dual carriageways each 24 feet wide.
WINCHELSEA SHIRE	Birregurra-Forrest Road—Construction of a single span concrete bridge over Dewings Creek to provide a sealed pavement 24 feet between kerbs and construction of approaches to provide a sealed pavement 20 feet wide.

HORSHAM DIVISION

KOWREE SHIRE	Coleraine-Edenhope Road—Reconstruction and sealing of 5·0 miles to provide a sealed pavement 22 feet wide. Kaniva-Edenhope Road—Widening and sealing 2·9 miles to provide a sealed pavement 20 feet wide.
STAWELL SHIRE	Horsham-Wal Wal Road—Construction of a reinforced concrete bridge 210 feet long, 24 feet between kerbs, to replace Faux's Bridge.
WYCHEPROOF SHIRE	Donald-Swan Hill Road—Widening and sealing 5·0 miles to provide a sealed pavement 20 feet wide.

METROPOLITAN DIVISION

BRIGHTON CITY	North Road—Construction of dual carriageways between Nepean Highway and Asling Street, including channelisation at the intersection with Nepean Highway and alterations to the Victorian Railways bridge to provide an increased vertical clearance of 15 feet 4 inches.
BULLA SHIRE	Melbourne-Lancefield Road—Construction of 0·5 miles of climbing lanes on each side of Deep Creek.
DIAMOND VALLEY SHIRE	Heidelberg-Kinglake Road—Construction of dual carriageways between Edmonds Street and Diamond Creek.
DIAMOND VALLEY SHIRE AND PRESTON CITY	Whittlesea Road—Construction of dual carriageways between Curtain Street and Settlement Road, including channelisation at the intersection with Grimshaw Street.
NORTHCOTE CITY	Heidelberg-Eltham Road—Reconstruction and widening at the intersection with State Street.
OAKLEIGH CITY	Wellington Road—Construction of dual carriageways between Princes Highway East and Blackburn Road, including channelisation at the intersection with Blackburn Road and the entrance to Monash University. Warrigal Road—Widening the dual carriageways to three lanes between Allen Street and Dalgetty Street.

TRARALGON DIVISION

ALBERTON SHIRE	Port Albert Road—Construction of a 6 cell reinforced concrete culvert to replace a timber bridge over Tarra River Overflow and realignment of approaches to new stream crossing.
BULN BULN SHIRE	Longwarry-Drouin Road—Reconstruction and realignment of 1·3 miles south of Drouin. Main South Road—Reconstruction and realignment of 1·0 mile south of Drouin, to provide a sealed pavement 22 feet wide.
KORUMBURRA SHIRE	Korumburra-Wonthaggi Road—Reconstruction and realignment of 1·2 miles south of Korumburra to provide a sealed pavement 22 feet wide.
MIRBOO SHIRE	Mardan Road—Construction of a reinforced concrete bridge 46 feet long, 24 feet wide between kerbs, to replace a timber bridge over Berry's Creek south of Mirboo North.

NARRACAN SHIRE	Trafalgar-Thorpdale Road—Reconstruction and realignment of 2·2 miles south of Trafalgar to provide a sealed pavement 18 feet wide.
ROSEDALE SHIRE	Gormandale-Stradbroke Road—Reconstruction of 2·3 miles to provide a sealed pavement 20 feet wide.

Gormandale-Stradbroke Road, Rosedale Shire.

WARRAGUL SHIRE	Bona Vista Road—Reconstruction and realignment of 0·9 miles south of Nilma to provide a sealed pavement 20 feet wide.

WARRNAMBOOL DIVISION

BELFAST SHIRE	Hamilton-Port Fairy Road—Reconstruction and realignment of 0·9 miles to provide a sealed pavement 20 feet wide.
DUNDAS SHIRE	Mt. Napier Road—Reconstruction and widening of 2·1 miles to provide a sealed pavement 20 feet wide. Dartmoor-Hamilton Road—Widening 2·2 miles to provide a sealed pavement 20 feet wide.
HAMPDEN SHIRE	Foxhow Road—Reconstruction and realignment of 2·2 miles to provide a sealed pavement 20 feet wide.

APPENDIX 4

UNCLASSIFIED ROADS

SIGNIFICANT WORKS COMPLETED DURING FINANCIAL YEAR 1969/70

BAIRNSDALE DIVISION

OMEO SHIRE	Little River Road—Reconstruction, widening, alignment improvement and sealing of 1·9 miles at Ensay to provide a sealed pavement 18 feet wide.
ORBOST SHIRE	Cape Everard-Point Hicks Road—Widening and gravelling including bridge strengthening and new culverts in preparation for the Captain Cook Bi-centenary celebrations at Point Hicks.
TAMBO SHIRE	Snowy River Road—Construction of a 2 span concrete bridge over Goodwin Creek and bridge approaches.

Snowy River Road, Tambo Shire. New bridge over Goodwin Creek.

BALLARAT DIVISION

ARARAT SHIRE	Muirhead Road—Reconstruction of 1·5 miles north of Lake Muirhead to provide a pavement 14 feet wide.
BALLAARAT CITY	Burnbank Street—Construction of 0·3 miles of dual carriageways each 20 feet wide.

BENALLA DIVISION

GOULBURN SHIRE	Nagambie-Locksley Road—Reconstruction and sealing of 2·2 miles to provide a sealed pavement 12 feet wide.
MANSFIELD SHIRE	Graves Lane—Reconstruction and sealing of 0·7 miles to provide a sealed pavement 18 feet wide.
UPPER MURRAY SHIRE	Briggs Gap Road—Reconstruction and sealing of 3·1 miles to provide a sealed pavement 18 feet wide.
WANGARATTA CITY	Williams Road—Construction of a reinforced concrete bridge 90 feet long, 28 feet between kerbs over Three Mile Creek and construction of approaches.
WANGARATTA SHIRE	Boorhaman-Springhurst Road—Reconstruction, realignment and sealing of 1·5 miles to provide a sealed pavement 18 feet wide.
YACKANDANDAH SHIRE	Sandy Creek Road—Reconstruction and realignment of 1·1 miles to provide a pavement 20 feet wide.

BENDIGO DIVISION

DEAKIN SHIRE	Kyvalley-Yambuna Road—Construction and sealing of 1·3 miles to provide a sealed pavement 18 feet wide.
	Tongala-Rushworth Road—Construction and sealing of 2·0 miles to provide a sealed pavement 18 feet wide.
ECHUCA CITY	Sturt Street—Construction and sealing of 1·2 miles to provide a sealed pavement 36 feet wide.
KERANG BOROUGH	Boundary Street—Construction and sealing of 0·5 miles to provide a sealed pavement 40 feet wide.
KERANG SHIRE	Murrabit West Road—Construction and sealing of 2·2 miles to provide a sealed pavement 20 feet wide.
PYALONG SHIRE	Pyalong-Nulla Vale Road—Construction and sealing of 1·3 miles to provide a sealed pavement 12 feet wide.
RODNEY SHIRE	Kialla Settlement Road—Construction of Kialla Bridge 256 feet long, 12 feet between kerbs over the Goulburn River.

DANDENONG DIVISION

CRANBOURNE SHIRE	Clarke Road—Reconstruction of 2·4 miles to provide a sealed pavement 24 feet wide.
DONCASTER AND TEMPLESTOWE CITY	Old Warrandyte Road—Construction of 0·5 miles to provide a sealed pavement 24 feet wide including realignment of Mullum Mullum Creek and construction of steel culvert.
FLINDERS SHIRE	Boundary Road—Reconstruction of 1·0 mile to provide a sealed pavement 24 feet wide.
HASTINGS SHIRE	Coolart Road—Construction of 1·3 miles to provide a sealed pavement 20 feet wide.
KNOX CITY	Boronia Road—Construction of 0·9 miles to provide a sealed pavement 24 feet wide.
NUNAWADING CITY	Blackburn Road—Construction of 0·6 miles of dual carriageways each 30 feet wide.
RINGWOOD CITY	Wonga Road—Reconstruction and sealing of 0·5 miles to provide a sealed pavement 24 feet wide.
SPRINGVALE CITY	Centre Road—Reconstruction of 0·8 miles to provide a sealed pavement 40 feet between kerbs.
WAVERLEY CITY	Waverley Road—Reconstruction of 0·3 miles to provide a sealed pavement 42 feet between kerbs.

GEELONG DIVISION

BACCHUS MARSH SHIRE	Woolpack Road—Construction of a 2 span steel girder and reinforced concrete bridge 116 feet long, 24 feet between kerbs to replace a timber bridge over the Werribee River and construction of approaches to provide a sealed pavement 18 feet wide.
BANNOCKBURN SHIRE	Gheringhap-Hopes Bridge Road—Construction of a 2 span reinforced concrete bridge 62 feet long, 20 feet between kerbs over the Moorabool River.
LEIGH SHIRE	Rokewood-Skipton Road—Widening 2·3 miles to provide a sealed pavement 18 feet wide.

HORSHAM DIVISION

DIMBOOLA SHIRE	Nhill-Jeparit Road—Construction of a bridge over the Wimmera River and 1·1 miles of approaches to provide a sealed pavement 20 feet wide.

HORSHAM CITY	Stawell Road—Construction and sealing of 0·5 miles to provide a sealed pavement 20 feet wde.

Nhill-Jeparit Road, Dimboola Shire. New bridge over the Wimmera River.

KANIVA SHIRE	Serviceton North Road—Reconstruction and sealing of 2·4 miles to provide a sealed pavement 20 feet wide.
KARA KARA SHIRE	Cope Cope-Marnoo East Road—Reconstruction, realignment and sealing of 2·0 miles to provide a sealed pavement 12 feet wide and 18 feet wide on curves.
	Scollary's Road—Construction of two bridges each 75 feet long, 20 feet between kerbs, over Avoca River and backwater.
	Swan Water North Road—Reconstruction and sealing of 3·0 miles to provide a sealed pavement 12 feet wide and 18 feet wide on curves.
KARKAROOC SHIRE	Hopetoun-Yaapeet Road—Construction and sealing of 2·0 miles to provide a sealed pavement 12 feet wide and 18 feet wide on curves.
	Rosebery East Road—Construction and sealing of 3·0 miles to provide a sealed pavement 12 feet wide.
	Woomelang South Road—Construction and sealing of 2·1 miles to provide a sealed pavement 12 feet wide and 18 feet wide on curves.
	Wyperfeld National Park Access Road—Construction and sealing of 5·1 miles to provide a sealed pavement 12 feet wide.
KOWREE SHIRE	Harrow-Kanagulk Road—Reconstruction and sealing of 3·8 miles to provide a sealed pavement 12 feet wide.
	Powers Creek Road—Reconstruction and sealing of 2·9 miles to provide a sealed pavement 12 feet wide.
MILDURA SHIRE	Red Cliffs-Colignan Road—Reconstruction, widening and sealing of 4·0 miles to provide a sealed pavement 20 feet wide.
	Red Cliffs-Morkalla Road—Resheeting and sealing 5·9 miles to provide a sealed pavement 12 feet wide.
MILDURA CITY	Eighth Street—Construction and sealing of 0·3 miles to provide a sealed pavement 48 feet wide.

METROPOLITAN DIVISION

FOOTSCRAY AND MELBOURNE CITIES	Dynon Road—Construction of a bridge 483 feet long over the Maribyrnong River, involving dual carriageways and footways.

TRARALGON DIVISION

ALBERTON SHIRE	Darriman-Seaspray Road—Reconstruction and sealing of 1·6 miles to provide a sealed pavement 12 feet wide.
KORUMBURRA SHIRE	Kardella-Fairbanks Road—Reconstruction and realignment of 0·8 miles to provide a gravel pavement 21 feet wide.
TRARALGON SHIRE	Old Melbourne Road—Reforming and gravelling 2·3 miles to provide a pavement 19 feet wide.
TRARALGON CITY	Argyle Street—Reconstruction of 0·6 miles to provide a sealed pavement 28 feet wide.

WARRNAMBOOL DIVISION

GLENELG SHIRE	Casterton-Dartmoor Road—Reconstruction and realignment of 2·6 miles to provide a sealed pavement 12 feet wide.
HAMPDEN SHIRE	Racecourse Road—Reconstruction of 1·4 miles to provide a sealed pavement 20 feet wide.
MINHAMITE SHIRE	Stoneyfields Road—Resheeting 4·9 miles to provide a sealed pavement 13 feet wide.
WARRNAMBOOL CITY	Morriss Road—Construction of 1·0 mile to provide a sealed pavement 24 feet wide.

APPENDIX 5

MOTOR REGISTRATIONS

Registrations under the Motor Car Act made during the year 1969/70 totalled 1,549,279, an increase of 6·2% over the total for the previous year. Excluding trailers from the calculation, the increase was 5·0%.

Vehicle	Financial Year 1968/69		Financial Year 1969/70		Increase	Decrease
Private—						
New	102,766		112,230			
Secondhand:						
Re-registered	33,898		35,570			
Renewed	940,563		990,896			
		1,077,227		1,138,696	61,469	—
Commercial and Hire—						
New	15,659		16,555			
Secondhand:						
Re-registered	4,668		4,448			
Renewed	112,487		113,327			
		132,814		134,330	1,516	—
Primary Producers' Trucks—						
New	4,262		3,566			
Secondhand:						
Re-registered	4,576		4,007			
Renewed	77,927		78,914			
		86,765*		86,487†	—	278
Licences under the Motor Omnibus Act		692		685	—	7
Trailers		145,212		169,103	23,891	—
Motor Cycles		16,655		19,978	3,323	—
TOTALS		1,459,365		1,549,279	90,199	285

* Includes 44,956 no-fee tractors.

† Includes 45,147 no-fee tractors.

APPENDIX 6

COUNTRY ROADS BOARD

STATEMENT OF RECEIPTS AND PAYMENTS (TO NEAREST DOLLAR) FOR THE YEAR ENDED 30TH JUNE, 1970

	Country Roads Board Fund		Loan Funds	Commonwealth Aid Roads Act 1969						Total
	Act 6229	Act 6222 Rd. Mtce. A/c		Sec. 4(1)	Sec. 4(2)	Sec. 4(3)	Sec. 4(4)			
	$	$	$	$	$	$	$	$	$	$
RECEIPTS										
Balance as at 1st July 1969	3,049,304	..	..	..	..	..	..	..	..	3,049,304
Motor Car Act 1958 (No. 6325)										
Motor Car Registration Fees 30,471,679										
Additional Registration Fees 2,034,370										
Drivers' Licence Fees 789,644										
Drivers' Licence Testing Fees 274,340										
Trailer Registration Fees 674,606										
Examiners' Licence Fees 7,616										
Sale of Log Books 10,831										
34,263,086										
Less Cost of Collection 3,394,921	30,868,165	..	..	..	..	..	..	..	30,868,165	
Municipalities Contributions—										
Permanent Works—Main Roads 105,703										
Maintenance Works—Main Roads 1,797,938	1,903,641	..	..	..	..	..	..	..	1,903,641	
Commercial Goods Vehicles Act No. 6222	..	8,555,278	..	..	..	..	..	..	8,555,278	
Public Works Loan Application Act No. 7746	849,000	..	..	..	..	..	..	..	849,000	
Fines—*Country Roads Act* No. 6229	8,670	..	..	..	..	..	..	..	8,670	
General Receipts	489,675	..	..	..	..	..	..	..	489,675	
State Loan Funds Act No. 6229	..	..	900,000	..	..	..	..	..	900,000	
Commonwealth Aid Roads Act 1969	..	..	..	21,260,000	2,420,000	13,910,000	570,000			43,574,429 38,160,000
	37,168,455	8,555,278	900,000	21,260,000	2,420,000	13,910,000	570,000			84,783,733
PAYMENTS										
Road Expenditure										
Main Roads—										
Construction and Reconstruction	8,162,326	..	31,631	2,079,021	2,284	2,309,551	..	12,584,813	..	
Maintenance	2,579,216	2,618,965	..	..	..	..	..	5,198,181	..	17,782,994
State Highways—										
Construction and Reconstruction	8,951,845	..	868,369	2,327,845	1,607,274	..	..	13,755,333	..	
Maintenance	294,643	5,837,454	..					6,132,097		19,887,430
By-pass Roads—										
Construction and Reconstruction	838,371	..	..	10,864,082	547,252	..	..	12,249,705	..	
Maintenance	52,501	9	..	..	..	..	..	151,360		12,401,065
Tourists' Roads—										
Construction and Reconstruction	2,147,322	..	..	361,928	..	..	..	2,509,250	..	
Maintenance	602,715	..	..	..	..	..	..	602,715		3,111,965
Forest Roads—										
Construction and Reconstruction	139,653	..	..	..	..	367,536	..	507,189	..	
Maintenance						290,673	..	290,673		797,862
Unclassified Roads—										
Construction and Reconstruction	1,664,942	..	..	3,878,907	18,418	7,976,903	..	13,539,170	..	
Maintenance	242,771	..	..	..	..	2,269,468		2,512,239		16,051,409
Murray River Bridges and Punts	112,216	..	..	..	..	..	..	..	112,216	
Traffic Line Marking	319,437	..	..	..	..	..	..	..	319,437	70,464,378
Statutory Payments										
Interest and Sinking Fund 2,443,416										
Traffic Commission Fund 288,886										
Tourist Fund 577,772										
Transport Regulation Fund 470,505										
	3,780,579	..	..	..	..	..	..	..	..	3,780,579
Planning and Research	150,469	..	..	..	..	..	570,000	..	..	720,469
Capital Expenditure										
Plant Replacement and Additions 1,818,046										
Buildings, Workshops, etc. 618,358										
	2,436,404	..	..	..	..	..	..	..	..	2,436,404
Management and Operating Expenditure	3,491,807	..	..	1,748,217	244,772	695,869	..	..	..	6,180,665
	35,967,217	8,555,278	900,000	21,260,000	2,420,000	13,910,000	570,000	..	..	83,582,495
Balance at 30th June 1970	1,201.238	..	..	..	..	..	..	..	..	1,201,238

NOTE: Relief to Municipalities granted under Act 6229 Section 32 amounted in 1969/70 to $28,656.20.

R. G. COOPER,
Accountant,
14th January, 1971.

AUDITOR-GENERAL'S CERTIFICATE

The accounts of the Country Roads Board for the year ended 30th June, 1970, have been audited. In my opinion the above Statement of Receipts and Payments fairly presents in summary form the transactions during that period.

B. HAMILTON,
Auditor-General,
19th January, 1971.

APPENDIX 7

COUNTRY ROADS BOARD

LOAN LIABILITY AS AT 30TH JUNE, 1970

	Main Roads, etc.	Developmental Roads	Total
	$	$	$
Permanent Works			
Main Roads	16,706,781.15		16,706,781.15
State Highways	16,539,845.21		16,539,845.21
By-pass Roads	3,000,000.00		3,000,000.00
Tourists' Roads	227,316.44		227,316.44
Forest Roads	2,167.89		2,167.89
Developmental Roads		12,851,515.09	12,851,515.09
Discount and Expenses	709,889.77	576,727.86	1,286,617.63
Total Amount Borrowed	37,186,000.46	13,428,242.95	50,614,243.41
Less Redemption of Loans			
Redemption Funds	170,438.11	1,292,772.73	1,463,210.84
Main Roads Sinking Fund	571,376.76		571,376.76
Developmental Roads Sinking Fund		110,166.02	110,166.02
State Loans Repayment Fund	3,029,898.30		3,029,898.30
National Debt Sinking Fund	5,660,355.53	5,853,948.72	11,514,304.25
	9,432,068.70	7,256,887.47	16,688,956.17
Loan Liability at 30th June, 1970	27,753,931.76	6,171,355.48	33,925,287.24

APPENDIX 8

WORKS EXECUTED ON BEHALF OF COMMONWEALTH AND STATE GOVERNMENT AUTHORITIES, ETC. FOR THE YEAR ENDED 30th JUNE, 1970

(Adjusted to nearest Dollar)

Departments	Description of Works	Expenditure	
		$	$
Commonwealth—			
Department of Works ..	Access roads to various Commonwealth establishments.	2,729	
			2,729
Victoria—			
Lower Yarra Crossing Authority	Authority's share of costs of acquiring land in connection with Williamstown Road Interchange as part of Lower Yarra Crossing Project.	219,858	
State Rivers and Water Supply Commission	Construction of various bridges over Commission Channels, completion of road works in connection with Lake Nillahcootie deviation.	25,369	
Rural Finance and Settlement Commission	Roads in Commission land settlement projects throughout the State.	23,778	
Lands and Survey Department	Roadworks in Kaniva and Lowan Shires.	3,189	
Public Works Department ..	Bituminous sealing at Ararat Gaol, Dookie Agricultural College and Langi Kal Kal Prison Farm.	23,760	
Melbourne City Council ..	Roadworks and bridgeworks on Dynon Road Bridge over railway line and approaches.	82 Cr.	
Forests Commission	Construction of Car Park at Mt. Donna Buang.	10,626	
Melbourne and Metropolitan Board of Works	Roadworks in Healesville Shire, Sherbrooke Shire and Whittlesea Shire.	44,052	
Premier's Department ..	Roadworks—Wonderland and Sundial Roads—Stawell Shire.	300	
Ministry of Tourism	Development of Rest Areas on State Highways at selected locations throughout the State.	27,200	
			378,050
State Treasury	Kings Bridge—land compensation and other sundry expenditure less proceeds of rental of properties acquired in connection with the construction of Kings Bridge.	5,329 Cr.	
,, ,, ...	Grade Separation Projects, etc., charged to Level Crossings Fund ($560,372.71) and Railways Department ($296,316.67).	856,689	
,, ,, ...	Improvements to various roads adjacent to State Forests to facilitate the extraction of timber and charged to the Municipalities Forest Roads Improvement Fund.	50,868	
,, ,, ...	Construction of roads and bridges charged to the Roads (Special Projects) Fund.	3,532,586	4,434,814
			4,815,593

APPENDIX 9

SENIOR OFFICERS AS AT 30th JUNE, 1970

(Engineers, Class 5 or above; Administrative and other officers Class 6 or above)

Chief Engineer's Branch

Advance Planning Engineer	Mr. J. H. Pittard
Asphalt Engineer	Mr. S. B. Deany
Assistant Deputy Chief Engineer—Bridges	Mr. N. C. Haylock
Assistant Deputy Chief Engineer—Road Design	Mr. R. T. Underwood
Assistant Deputy Chief Engineer—Works	Mr. W. F. Neville
Assistant Divisional Engineer, Ballarat	Mr. E. T. Oppy
Assistant Divisional Engineer, Dandenong	Mr. R. W. Angus
Assistant Divisional Engineer, Metropolitan	Mr. S. H. Hodgson
Assistant Materials Research Engineer	Dr. D. T. Currie
Assistant Mechanical Engineer	Mr. T. Ashcroft
Assistant Traffic and Location Engineer	Mr. D. Pritchard
Engineer for Major Projects	Mr. A. J. Pryor
Engineer for Plans and Survey	Mr. N. S. Guerrin (until 7/11/69)
Materials Research Engineer	Mr. A. H. Gawith (until 3/3/ (until 3/3/70)
Member, Traffic Commission	Mr. A. A. Strempel
Principal Title Survey Officer	Mr. T. C. Lester
Project Engineer	Mr. G. R. Hunt
Project Engineer	Mr. W. N. Thomas
Project Engineer	Mr. M. L. Williams
Right of Way Engineer	Mr. A. M. Noble
Senior Construction Engineer (Bridges)	Mr. B. A. Watson
Senior Design Engineer, Direct Works (Bridges)	Mr. K. N. Opie
Senior Design Engineer, Municipal Works (Bridges)	Mr. B. Addis
Traffic and Location Engineer	Mr. R. T. Underwood (until 18/3/70)

Secretary's Branch

Administration Officer	Mr. M. R. Clarke
Administration Officer (Personnel)	Mr. F. E. Williams
Assistant Principal Traffic Officer	Mr. E. J. Moncrieff
Assistant Secretary (Administration)	Mr. E. C. Howlett
Assistant Secretary (Personnel)	Mr. G. C. Rodgers
Deputy Estates Officer	Mr. F. L. O'Brien
Estates Officer	Mr. D. T. Veitch
Industrial Officer	Mr. R. C. S. Howard
Legal Officer	Mr. D. Carty-Salmon
Personal Assistant to the Chairman	Mr. C. E. W. Porritt
Principal Methods Officer	Mr. W. Murray
Principal Traffic Officer	Mr. W. S. Steel
Principal Training Officer	Mr. R. C. Billinge

Accountant's Branch

Assistant Accountant	Mr. D. G. Proudfoot
Budget Officer	Mr. S. K. Gavin
Controller of Stores	Mr. E. J. King
Costing Officer	Mr. J. L. White
Officer-in-Charge, Claims	Mr. R. H. Holt

Principal Officers of the Board are listed in a preface to this report.

APPENDIX 10

CHIEF ENGINEER'S REPORT

Country Roads Board
Melbourne

THE CHAIRMAN,

I have the honour to submit the Chief Engineer's Report for 1969/70. The report covers those activities within the Chief Enginner's Branch, which are considered to be of special technical and general interest.

T. H. RUSSELL,
Chief Engineer

1. DESIGN

Bell Street Bridge, Strathmore By-Pass Road

The construction of the Bell Street bridge is expected to be completed by mid-July 1970 (Plate 1). The structural research programme on the bridge which was described in the 1968/69 Report was continued during 1969/70. The purposes of the research were to measure the friction losses in the post-tensioning tendons and also to check assumptions made in the design.

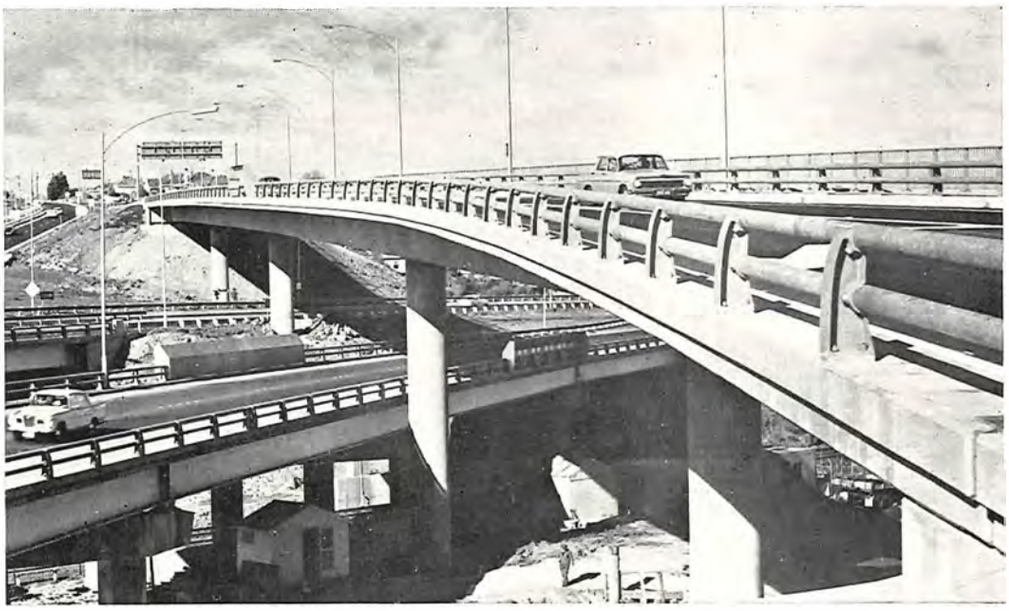


Plate 1—Bell Street Bridge, Strathmore Interchange, Tullamarine Freeway.

It will be some time before the complete results of this research programme have been obtained and analysed, but indications at this date are that the design assumptions were generally on the conservative side. This has resulted in a satisfactory completed structure.

Results obtained by June, 1970, were as follows:

(i) Short-term and long-term tendon load losses.

Twenty-three load cells, the accuracy of which had been found during calibration tests to be within plus or minus 3%, were installed in certain prestressing tendons. Four of the load cells failed to operate, probably because the connecting wires were broken during stressing when caught on mortar leaks or the surrounding casing.

The load cells were installed to enable measurement of the forces in the tendons. The actual forces could then be compared with the calculated forces, for which friction factors of 0·17 for curvature, and 0·000255 for wobble effects, were used.

The initial and short-term measurements were completed in 1969/70. The actual loads varied from the design values by between plus 8% and minus 15%. Eleven of the load cells indicated higher forces in the tendons than the calculated forces, and eight indicated lower values.

Five of the eight lower values occurred in construction stages 1 and 2. In these two stages the ducting was bright steel which rusted when the segments were steam cured. The rusted ducting was cleaned by wire brushing, but the friction losses were still higher than in stages 3, 4 and 5, where zinc-coated ducting, which remained in good condition during steam curing, was used. The average of the percentage variations of the measured loads from the calculated loads for stages 1 and 2 was down by 7%, and for stages 3, 4 and 5 was up by 2%. The results show that during design of the structure the friction losses were slightly over-estimated for zinc-coated ducting and under-estimated for slightly rusted bright steel ducting.

It was also noted that for tendons with the same profile and jacking forces, and in the same stage, variations of up to 10% of the design forces occurred. This was probably due to slight variations in the quality of workmanship in placing and sealing the ducting.

Tests during 1969/70 on the resistance strain gauges used on the load cells showed that the gauges had sufficient stability to enable the measurement of long-term variations in tendon loads. Measurements will be taken at regular intervals for two years or longer, until the readings are constant.

(ii) Differential thermal effects in the spine beam.

Sixty-eight thermocouples were installed in the bridge specifically to measure the temperature distribution. Four of these thermocouples failed to operate, probably due to the connecting wires being damaged during casting of the segments.

The maximum temperature differential between the top and bottom surfaces of the bridge which had been recorded to June 1970 was 36°F. The maximum temperature recorded in the bridge was 107°F. and the minimum was 46°F. It is expected that wider ranges of temperature may be recorded in the future.

(iii) Deflections, settlements and longitudinal variations due to thermal and post-tensioning effects.

Deflection readings were commenced during construction of the bridge. The readings were taken within the centre cell of the segments, using a theodolite mounted at a pier diaphragm and sighting to an adjacent pier diaphragm. Measurements were taken from this line of sight to fixed points on the underside of the deck within the centre cell of the bridge, using a small staff. Difficulty was encountered in obtaining a line of sight in several stages of construction because of the internal formwork used for the construction joints between the segments, and several sets of readings could not be obtained.

In each span for which readings were obtained the readings corresponded reasonably well with the calculated values, between mid-span and the Bell Street end (refer Figure 1). However, in the region of the connections of the cantilevers to the subsequent stages, the actual deflections were approximately half the originally calculated values. It was concluded that there was a need to make an adjustment to the calculated elastic deflection/creep profiles for the adjacent stages (also refer to Figure 1). The adjustment was required due to the differing creep factors applicable to the adjacent stages during the course of construction.

Further deflection readings will be taken in the future to determine the effects of creep.

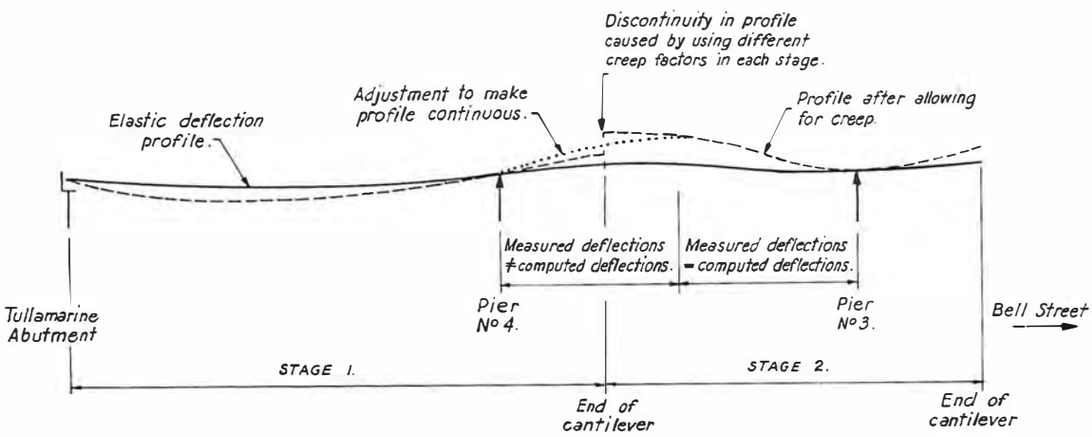


Figure 1—Bell Street Bridge, Method of adjusting deflection profile.

Settlements were and are being measured at all piers and both abutments. At June 1970 the maximum settlement recorded was $\frac{3}{8}$ in. at pier 3. The other piers and the abutments had settled approximately $\frac{1}{8}$ in. The bridge was designed for a differential settlement between any supports of up to one inch.

The equipment installed to measure variations in the length of the superstructure did not function satisfactorily. This was due to dust and moisture fouling the dial gauges, and also to difficulty in installing and maintaining the piano wires which were to be used in measuring the change of length of the superstructure. After several unsuccessful attempts to correct the faults in the system, this section of the project was abandoned.

Devices for measuring the longitudinal movement of the bridge at the abutments due to temperature variations will be installed in the near future. The longitudinal movements and temperature variations will be read and recorded automatically on a long-term basis to assist in finding a relationship between the expansion and contraction of the bridge and the temperature variations. The automatic recording equipment is shown in Plate 2.

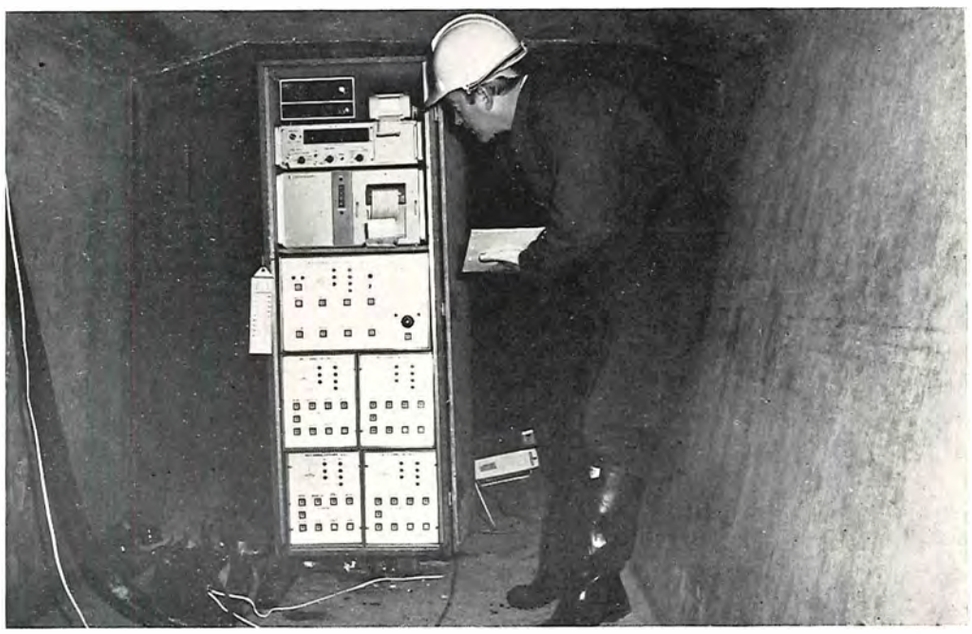


Plate 2—Bell Street Bridge, Automatic recording equipment used during the structural research programme.

(iv) Load distribution to the various elements of the superstructure.

Static and dynamic loading of the bridge was carried out using a loaded truck with a gross weight of 41·5 tons and also concrete blocks placed at various points on the deck.

A preliminary analysis was made of the readings taken during the loading tests. The results showed that the structure was stiffer than the elastic analysis indicated, i.e. the maximum deflection measured at mid-span was 0·19 in. compared with the computed value of 0·23 in.

One of the cantilevers on the side of the spine beam was loaded, firstly by using the back wheels of the truck, and secondly by using concrete blocks stacked on the edge of the cantilever. Deflections taken along the outside of the cantilever during the tests indicated that the cantilever had been considerably stiffened by the kerb and the crash barrier. The deflections were almost constant for 25 feet either side of the loaded point.

The frequency of vibration was measured during the dynamic loading of the bridge. The loaded truck was driven at approximately 20 m.p.h. over a timber plank placed transversely on the deck. The measured frequency of vibration was 2·5 cycles per second compared with the calculated value of 1·75 cycles per second, which also indicated that the structure was stiffer than anticipated.

Readings from the loading tests which are yet to be analysed include distribution of cantilever loads into the spine beam, distribution of loads into the pier diaphragms, and the effect of shear lag.

Computer Usage for Bridge Design

(a) Use of the C.R.B. 1620 Computer.

The Board's computer was used for 545 hours of running time during 1969/70 in the design of 85 projects.

The following extract of the usage of individual computer programmes illustrates the variety of work processed:

Programme Type	Number of Runs
Bridge Geometry (Bridges on Curves)	90
Continuous Beam Analysis	
(a) Deflections	44
(b) Moments and Shear	150
Two-Column Pier Analysis	20
Three-Column Pier Analysis	7
Analysis of R.C. Columns	
(a) Circular	14
(b) Rectangular	165
(c) Unsymmetrical	30
Prestressed Concrete Beam Analysis	18
Specifications	100
Structural Programme Packages	10

(b) Development of New Computer Programmes.

Developmental work is continuing on the comprehensive design systems for both superstructure and substructure design as described in the 1968/69 Report.

(c) Use of Computers other than the Board's.

A continual review is made of the programming systems developed by other organizations. Where applicable these systems are utilized by the Board. The systems are in two categories, either groups of interrelated programmes called programme packages, or programmes.

Programme packages may be hired from Service Bureaux. They invariably require the use of larger computers than the Board's present IBM 1620. The most useful programme packages are general purpose structural packages featuring linear elastic analysis methods. These are well suited to the analysis of unusual structures for which it would not be economic to write a programme specifically. In 1969/70 the Board began to investigate and to use a number of these packages.

These packages cannot replace the Board's design systems since the latter were tailored to the Board's particular needs. However, they complement the Board's systems and their increasing use is envisaged. Typical uses of the packages have been in the more unusual analyses such as:

(i) the lateral stiffness of wide multi-cell box girders;

(ii) the effects of large skews;

(iii) freestanding staircases;

(iv) prestressed concrete rigid framed structures;

(v) differential temperature stresses through bridge decks.

The Board has also adapted for its own use programmes devised by other organizations, including:

(i) a method of evaluating the load distribution co-efficients for bending in bridge decks;

(ii) a programme to distribute the loads in pile groups with vertical and raked piles by a method which considers the lateral stiffness of the piles and the soil.

Programmes now under examination include one which designs pretensioned precast single span composite beam and slab bridges on the basis of minimum cost.

2. CONSTRUCTION

Lower Yarra Freeway Bridge Construction

The construction of the West Gate Bridge over the River Yarra has required the construction by the Board of an extensive approach route, the Board's sections of which are known as the Lower Yarra Freeway. The western section runs through a highly developed industrial and residential area. Heavily trafficked roads intersected the route of the western section and it was necessary to grade separate these from the freeway.

The freeway will be overpassed by the westbound carriageway of the Princes Highway West, and by Dohertys Road and Grieve Parade. The freeway will overpass Millers Road, the Newport-Sunshine railway and Kororoit Creek by dual bridges.

The design of each structure was dependent on its purpose and the locality. In some instances, e.g. at the Newport-Sunshine railway, structures of composite steel and reinforced concrete construction were the most suitable. In other cases the use of designs employing prestressed concrete were adopted. A factor favouring the use of prestressed concrete in some cases was the desirability of carrying out as much of the work as possible away from the bridge sites. This procedure reduced interference by the bridge construction with the road construction and, where the bridges were constructed over existing roads, reduced delays to road traffic.

Aspects of the construction of the Princes Highway West westbound carriageway overpass of the freeway, one of the examples of the use of prestressed concrete, are described below. This overpass will carry two lanes of traffic, and will form part of the interchange between the Princes Highway West and the freeway. It is being constructed by Lewis Construction Co. Pty. Ltd. under contract and post-tensioning is being carried out by V.S.L. Prestressing (Aust.) Pty. Ltd.

The structure is a five-span continuous segmental post-tensioned concrete box girder bridge (Figure 2). The overall length is 561 ft., the spans being 84 ft., 100 ft. 6 in., 137 ft., 137 ft., and 100 ft. There are seventy-four precast segments, of which fifty-two are 7 ft. 6 in. long, twelve are 7 ft. 1½ in. long, and four are 4 ft. long. The width of the segments is 31 ft., the depth is 5 ft. 5in., and the weights vary between 18 and 33½ tons. The superstructure is supported on four single-column cylindrical concrete piers. Piers 1 and 4 allow for longitudinal movements and piers 2 and 3 provide fixed supports. The bearings used are pot type bearings at the piers and steel roller bearings at the abutments.

The segments were cast on the site, using a combination of steel and plywood moulds. A concrete casting bed was constructed and its surface was carefully levelled and ground to a smooth finish. This surface was then used to form the soffit of the precast segments. The exterior sides of the segments and the cantilever projecting from each side were cast in place against steel forms held in place by the casting bed (Plate 3). The inside surfaces of the segments were formed by using hinged plywood cores which could be released and withdrawn after the concrete had set. The casting technique differed from the generally accepted method of casting segments on end and, in this case, it proved most successful. Very little remedial work was required after casting.

Post-tensioning was done in three stages. The first stage comprised span 5, span 4 and a cantilever. The results of stressing, i.e. friction losses, elongation, and draw-in of cables, of the stage 1 post-tensioning, were used as a basis for the stage 2 and stage 3 operations. After stage 1 was stressed, the second stage was coupled to the first stage and stressed. The third stage was then coupled to the completed second stage and the post-tensioning was finalized. The concrete joints between segments were 6 inches wide and cast *in situ*, with a recessed joint.

During design, careful consideration was necessary regarding any horizontal loads which might be transferred to the bearings and piers in the course of stressing. Allowance had to be made for any longitudinal movement of the superstructure during the stressing operation. This was achieved by the following measures:

(a) the scaffolding used for the falsework was sufficiently flexible to allow elastic shortening of the spine beam to take place;

(b) during stage 1 stressing—

  (i) piers 4 and 3 were propped with 10 in. x 10 in. x 49 lb. universal column sections placed along the centreline of the bridge (the pier 3 propping acted for stages 2 and 3 stressing also);

  (ii) sand jacks, with bearings on top of them, were located at the top of each side of pier 4 so as to support the spine beam ½ in. clear of the pot bearings;

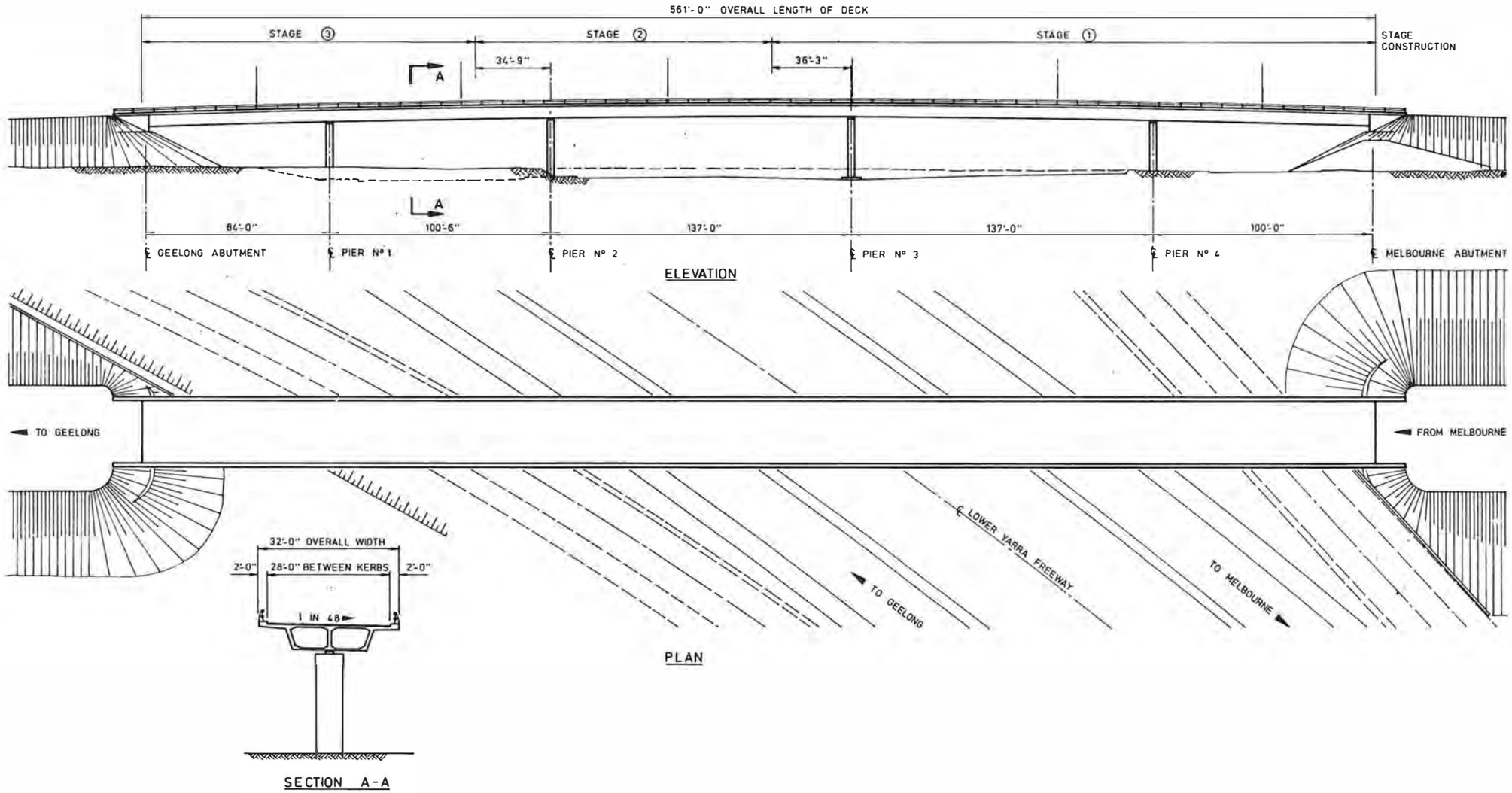


Figure 2—Princes Highway West overpass of the Lower Yarra Freeway.

(iii) the segments were firmly anchored to pier 3 by embedding two steel sections vertically into the pier and concreting the protruding ends in the joint between the segments at this point (after completion of the stage 3 stressing, these steel sections were cut off and removed).

The above arrangements meant that longitudinal movement resulting from elastic shortening could take place without affecting pier 4 in any way, and longitudinal movement of the spine beam at the Melbourne abutment was allowed. After the stage 1 stressing was completed the spine beam was lowered on to the pot bearing at pier 4 by releasing the sand from the jacks, and the prop was removed.

Similar procedures were used at piers 2 and 1 for the stage 2 and stage 3 stressing.

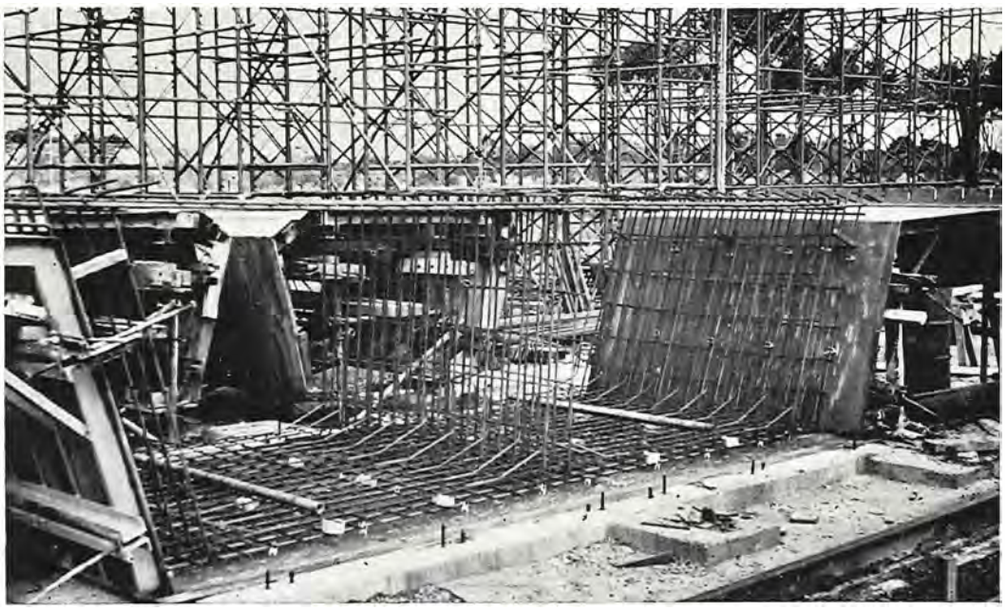


Plate 3—Princes Highway West overpass, Production of concrete segments.

MECHANICAL SUB-BRANCH

1. DESIGN AND DEVELOPMENT

The following design, development and construction work has been completed or is in progress:

(a) Pavement striping machine.

This machine will be used for painting short lengths of centre lines after pavement reseals, and also miscellaneous markings at intersections. Plates 4, 5 and 6, respectively, show the machine in position for painting centre lines; painting broad lines (these can be painted on either side of the machine); and hand painting and bead application (pavement arrows, etc., with the use of stencils).

The machine will replace some imported machines of similar size. Its control system is based on fluidics (the interaction of streams of air at low pressures). The unit will travel on a special small trailer which is designed for fast towing and is complete with features which will enable the rapid loading and unloading of the striping machine.

(b) Line marking machine.

The purpose of this machine will be to paint long lengths of edge lines and centre lines on roadways. The machine is under construction in the Central Workshops and is scheduled to go into operation in October 1970. It is a larger, more elaborate and faster version of an earlier Board-designed model which has been in operation for two years. It will be self-propelled and capable of line marking at speeds up to 15 m.p.h. The unit is powered by a Holden engine and incorporates a hydrostatic transmission, and will enable the application of glass beads over the painted lines.

Plate 4—
Pavement striping machine.

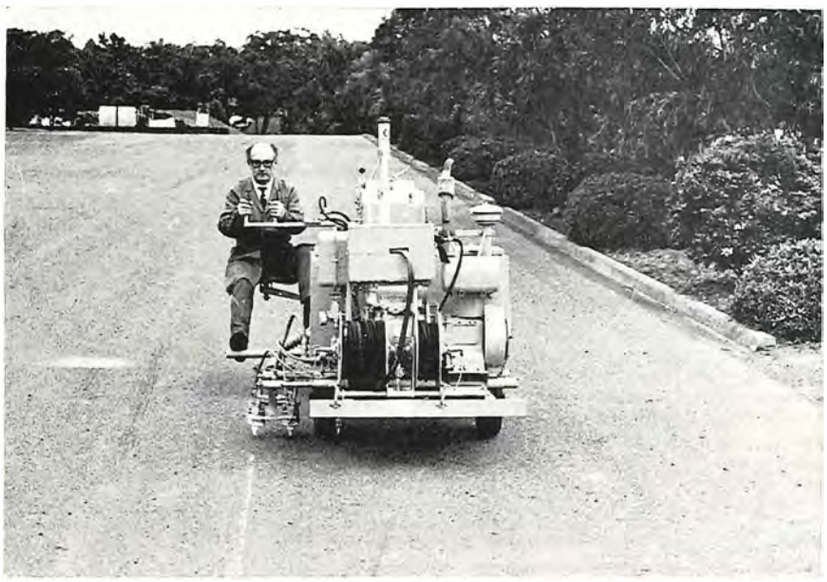


Plate 5—
Pavement striping machine set for painting broad lines.

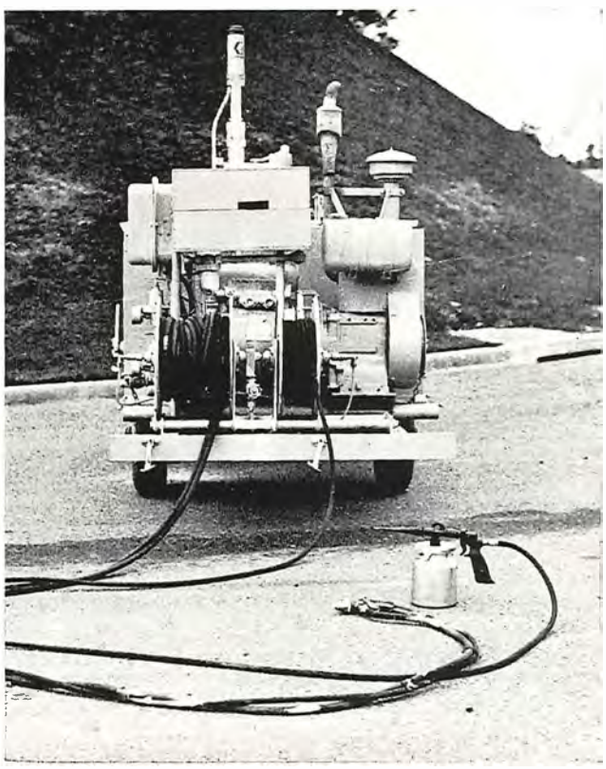


Plate 6—
Pavement striping machine ready for hand painting and glass bead application. The hand painting hoses are in foreground and the glass bead application equipment is behind them.

(c) Bitumen sprayer.

Design and drawings are approaching completion for the manufacture under contract of a number of 1,000 gallon semi-trailer type bitumen sprayers in the 1970/71 financial year. Hydrostatic drives to the bitumen pumps will be incorporated. The design will allow the rapid field replacement of the bitumen pump, valving and associated piping on each sprayer with a jig-assembled replacement unit which will be held in readiness in the event of mechanical breakdown.

(d) Machine for testing paint spray guns and paints.

A machine is being designed for two aspects of testing in connection with line marking, as follows:

(i) for testing the paint spray guns used on the line marking machines. The machine will enable the adjustment of the guns to ensure accurate control of the spray patterns;

(ii) the various line marking paints tendered to the Board are subjected to extensive acceptance testing including their suitability for spraying. For this purpose the machine will be able to duplicate under standardized and controlled conditions the air-paint system of any of the Board's line marking machines.

2. NEW TYPES OF PLANT

The following items of major plant and machinery, not previously owned by the Board, were acquired:

(a) Crawler tractors.

(i) Komatsu model D85A-12 powered by a 6 cylinder 180 h.p. diesel engine driving through a torque convertor power shift transmission. The machine is equipped with a hydraulically operated dozer tilt blade and a hydraulically operated integral ripper.

(ii) Case model 850 powered by a 4 cylinder 66 h.p. diesel engine driving through a torque convertor power shift transmission, and fitted with hydraulically powered angle dozer blade.

(b) Pneumatic tyred tractors.

(i) John Deere model JD760A powered by a 6 cylinder 152 h.p. diesel engine driving through an 8 speed power shift transmission. The unit is used for the towing of grid rollers.

(ii) International Harvester model 21256 powered by a 6 cylinder 120 h.p. diesel engine driving through an 8 speed conventional transmission and complete with a power shift torque amplifier which provides a 22% torque increase with a corresponding speed reduction in all gears. The unit will tow 10½ ton drum rollers.

(iii) John Deere model 1020 powered by a 3 cylinder 43 h.p. diesel engine driving through an 8 speed conventional transmission and fitted with a 10 cubic foot bucket-capacity Robot front-end loader. The unit is used for patrol maintenance work.

(iv) Howard model 2000 powered by a single cylinder 10 h.p. petrol engine and fitted with a rear-mounted 43 inch rotary mower for mowing medians.

(c) Power graders.

(i) Clyde-Galion model 118B tandem drive powered by a 6 cylinder 122 h.p. Cummins diesel engine and fitted with a hydraulically operated rear-mounted ripper-scarifier combination.

(ii) Allis Chalmers model DD light tandem powered by a 6 cylinder 57 h.p. diesel engine complete with rear-mounted windrow eliminator attachment in addition to the ordinary grader blade. This unit is used for patrol maintenance work.

(d) Scraper.

John Deere model JD760A motorised elevator-type scraper, towed and powered by a John Deere JD760A pneumatic tyred tractor. The heaped capacity of the scraper bowl is 9½ cubic yards and the elevator is reversible to assist the removal of rocks. The rear of the tractor is fitted with a hydraulically operated scarifier attachment which assists in the breaking up of surface material.

(e) Compressor.

C.P.T. model 250A-RO-Z rotary vane type compressor powered by a Perkins model 6-354, 6 cylinder 84 h.p. diesel engine. The unit, which is mounted on a single axle trailer, has a free air output of 250 cubic feet per minute at a delivery pressure of 100 p.s.i.

(f) Trucks.

(i) Atkinson model T466 tandem drive chassis and cab powered by a General Motors model 6-71N diesel engine of 238 h.p. driving through a Fuller model RT915 transmission which provides 15 forward gears. The unit will be used with a Steco low loading folding gooseneck tandem axle semi-trailer for the transport of heavy plant items.

(ii) Dodge model AT4-60 chassis and cab powered by a 212 h.p. petrol engine and fitted with a 12 ft. 6 in. Evans tray body. This unit is used for general cartage.

(g) Land conditioner—mower.

Grasslands "Yeomans Tritter" land conditioner which is a two wheel trailer-type device for pulverising stones, softer rocks, small stumps, saplings, bricks, etc. The unit can also be used for mowing grass. The unit is tractor drawn. The pulverising equipment is driven from the tractor power take-off and consists of a rotor fitted with twenty-eight hammers which weigh 6 lb. each and provide a total pulverising width of 60 inches. The rotor height above the ground is adjustable hydraulically from the towing tractor.

(h) Pump.

Everflow "Dewatering" 1½ inch pump driven by a small vertical-crankshaft petrol engine and mounted on a floating cradle. The unit floats on the water from which it pumps and its inlet is submerged. Pumping is possible if the depth of water is in excess of 3 inches. The unit weighs 50 lb. and has a maximum output of 80 gallons per minute against a total head of 10 feet.

(i) Concrete breaker.

Wacker model "Picador" BFH25K concrete breaker powered by a 1¾ h.p. 2 stroke petrol engine. The unit, which has a percussion rate of 1,150 blows per minute, weighs 55 lb.

3. PLANT MAINTENANCE

During 1969/70 there was a marked increase in the cost of spare parts, materials and labour employed by the Board in the maintenance of its plant. There was also a continuing shortage of suitable skilled and experienced personnel not only in the Board's organization but throughout the industry involved in the maintenance and repair of machinery used for road and other construction purposes. Further, the Board continued to lose a large proportion of its apprentices after their training was completed. They left for higher paid positions with private industry, thus depriving the Board of the returns of the special training given to apprentices.

Despite the shortage of skilled labour, an increased amount of plant was made available for field work compared with previous years, although a considerable amount of overtime work was necessary to have bituminous surfacing plant ready for the bituminous spraying season.

ADVANCE PLANNING

Accident Location Project

Work proceeded during the year in co-operation with the Computer Section and the Traffic Commission on the development of a new system for recording road traffic accidents by their locations. A group of programmes (Traffic Accident System, or "TAS") has been written by the Computer Section to process accident data on the Board's IBM 1620-40K computer. At present TAS will handle accidents for only one calendar year at a time; but even in this relatively early stage of development it can produce a detailed summary of traffic accidents as well as a State-wide summary of their occurrence by location.

These results will be of considerable value to the Board in assessing road needs in terms of the frequency of occurrence of accidents. It will also enable the assessment of the benefits gained, relative to funds expended, on works aimed at reducing traffic accidents, by means of "before and after" studies.

The basis of the system is the identification of the location of each accident on a standard map. The accidents are located at or between intersections, each of which is assigned a grid reference. The grid reference for an accident is recorded on the Traffic Commission's accident report form. The reference, together with part of the standard information from the form, including street names, road user movements, type of accident, etc., is then coded and punched on a card which forms the input to TAS.
The listings produced by the TAS package are as follows:

(i) a master list of intersection names and mileages with type of traffic control in map order for each statistical division;

(ii) detailed lists of all intersection accidents grouped by Local Government Area (L.G.A.) and then by intersections in map order;

(iii) detailed lists of all mid-block accidents grouped by L.G.A. and then by mid-blocks in map order;

(iv) summary lists of accident frequencies at intersections in each L.G.A. ranked in order of frequencies;

(v) summary lists of accident frequencies at mid-block locations in each L.G.A. ranked in order of frequencies;

(vi) summary lists of right-angle accident frequencies at intersections for metropolitan Melbourne;

(vii) summary lists of accident frequencies for selected roads (e.g. State highways) in mileage order;

(viii) summary lists of accident frequencies at intersections grouped by type of traffic control;

(ix) summary lists of accident frequencies grouped by road user movement.

The accidents for the calendar year 1968, some 30,000 in number, are being processed at present. The Traffic Commission plans to publish a book titled "State Traffic Accident Record—Accidents by Location—1968" containing the listings (ii), (iii), (iv), (v) and (vii) above. Arrangements are being made by the Advance Planning Division for the production of the book. This should be available about September 1970, and will be the first in an annual series of publications.

ROAD DESIGN SUB-BRANCH

1. TRAFFIC ENGINEERING AND FREEWAY INVESTIGATIONS

Traffic Studies

The annual traffic census was conducted on Wednesday, 18th March, 1970. Twelve-hour (7 a.m. to 7 p.m.) classification counts were taken manually at 2035 stations, 827 of which were on State highways. Augmented counting was undertaken in Ballarat and Benalla Divisions.

The Rural Highway Traffic Index (100 in the base year 1933) rose from 1035 1062 in 1970, an increase of about 2·6%, which is considered normal. The index indicates the growth of traffic volume and is calculated from the results of traffic counts carried out during the annual traffic census at seventy-six selected rural counting stations throughout the State.

Progress was made with the automatic continuous counting programme which was begun in 1968/69 to give a basis for estimating A.A.D.T.s and D.H.V.s from short-term counts at specified rural locations on State highways. From the programme, basic traffic volume patterns are obtained for the highways. Counts taken over a few days at the specified locations can then be scaled by factors obtained from the basic traffic volume patterns, to provide design information. The possibility of applying similar procedures to roads other than State highways is being investigated.

In addition to the above, numerous other traffic studies were carried out, including turning movement studies, speed studies, railway level crossing delay studies, origin and destination studies, and speed-volume studies. The turning movement studies included the "before" part of a "before and after" study to determine the changes in traffic patterns associated with the recently opened Tullamarine Freeway. The "after" part of this study will be conducted in the near future when traffic patterns have stabilized.

Line Marking

During the year 1969/70 the Board maintained traffic lines and pavement markings on a total of 6,252 route miles of road comprising 3,890 miles of State highways, 1,872 miles of other declared roads and 490 miles of unclassified roads. For this purpose the Board employed two large line marking machines for centre, lane and edge line work, and two smaller machines for intersection and miscellaneous marking. A third large machine is under construction and a third small machine is nearing completion at the Board's Central Workshops at Syndal.

Whilst there was little increase in the route miles of road on the line marking programme, the work output, expressed as miles of equivalent standard stripe (i.e. 10 ft. x 3 in. line, 30 ft. gap), increased some 20% to 19,430 miles. This was brought about by a substantial increase in the number of miles of standard stripe per route mile, as freeways and other multilane facilities were constructed and other roads were edge lined and added to the programme. The Board now maintains edge lines on approximately 130 miles of road.

Line and pavement marking cost a total of $319,437 for the year, including work to the value of $57,059 carried out by the Board's regional divisions. The work required a total of 53,270 gallons of paint and 171 tons of glass spheres with which all markings are reflectorized.

In addition to painted markings, a total of approximately 9,500 raised pavement markers were placed on roads, the majority being on urban freeways in accordance with the Board's practice of replacing painted lane lines on these facilities with groups of raised markers.

Vehicle Performance Study

A study of vehicle behaviour at semi-mountable kerbs was conducted during 1969/70, at a site on the outbound carriageway of the Tullamarine Freeway. The study was required because it was proposed to use semi-mountable kerbs in conjunction with guardrail near the outer edges of the shoulders of certain freeway projects and it was desired to know whether the presence of the kerbs would adversely affect the performance of guardrail placed close behind them.

The objects of the study were to determine:

(a) if a 5 in. semi-mountable kerb would cause light or medium size cars to jump significantly at speeds up to 70 m.p.h. and;

(b) if there was a significant jump, what would be the trajectory of the cars at various speeds and angles of approach?

The tests were carried out at the following nominal speeds and impact angles:

Impact speed (miles/hour)	30	40	50	60	70
Impact angle (degrees)	40	35	28	23	20

The series of tests showed that no significant dynamic jump was imparted to the test cars at any of the impact speeds and corresponding angles tested at the test site, for the given type of kerb.

The study was sponsored by the Australian Road Research Board. The Human Factors Research Group, Department of Mechanical Engineering, University of Melbourne, conducted the tests, with the assistance of the Board's Traffic and Location Section.

Transportation Studies—Provincial Cities

The Board was authorized to carry out transportation studies for the provincial cities of Ballarat, Bendigo and Geelong on the basis of a $\frac{7}{8}$ contribution by the Board and a $\frac{1}{8}$ contribution by the relevant local authorities. The aim of the studies is to develop long-range road transport and parking plans to guide future expenditures on roads in the three cities. The inaugural meetings of the nominated Study Committees have been held at Ballarat and Geelong. Arrangements have been completed for the inaugural meeting at Bendigo.

Freeway Investigations

During 1969/70 the Board approved the following freeway projects which had been developed to the preliminary layout stage:

Calder Freeway—Gisborne section
Calder Freeway—Kyneton section
Hume Freeway—Wodonga section
Western Freeway—Pentland Hills section
Western Freeway—Ballan section
Western Freeway—Myrniong section

The above group of projects totals approximately 24 miles of rural freeway design.

The Calder Freeway projects by-pass two country towns and include interchanges and grade separations to facilitate movements to and from the towns and to restore local access. The Wodonga section of the Hume Freeway by-passes to the north of Wodonga. With the approval of the three sections of the Western Freeway referred to above, the overall situation is that a continuous length of approximately 27 miles of this route has been approved, constructed, or is under construction, to freeway standards (Figure 3).

The Board also approved the general location of the following freeway projects:

Latrobe Valley Freeway—by-passes of Drouin and Warragul;
Mornington Peninsula Freeway—from south of Frankston to Dromana;
Hume Freeway—Wallan-Broadford section.

The total mileage of these freeway locations is approximately 48 miles.

The Wallan-Broadford section of the Hume Freeway, approximately 21·3 miles in length, is the longest single section of freeway approved by the Board.

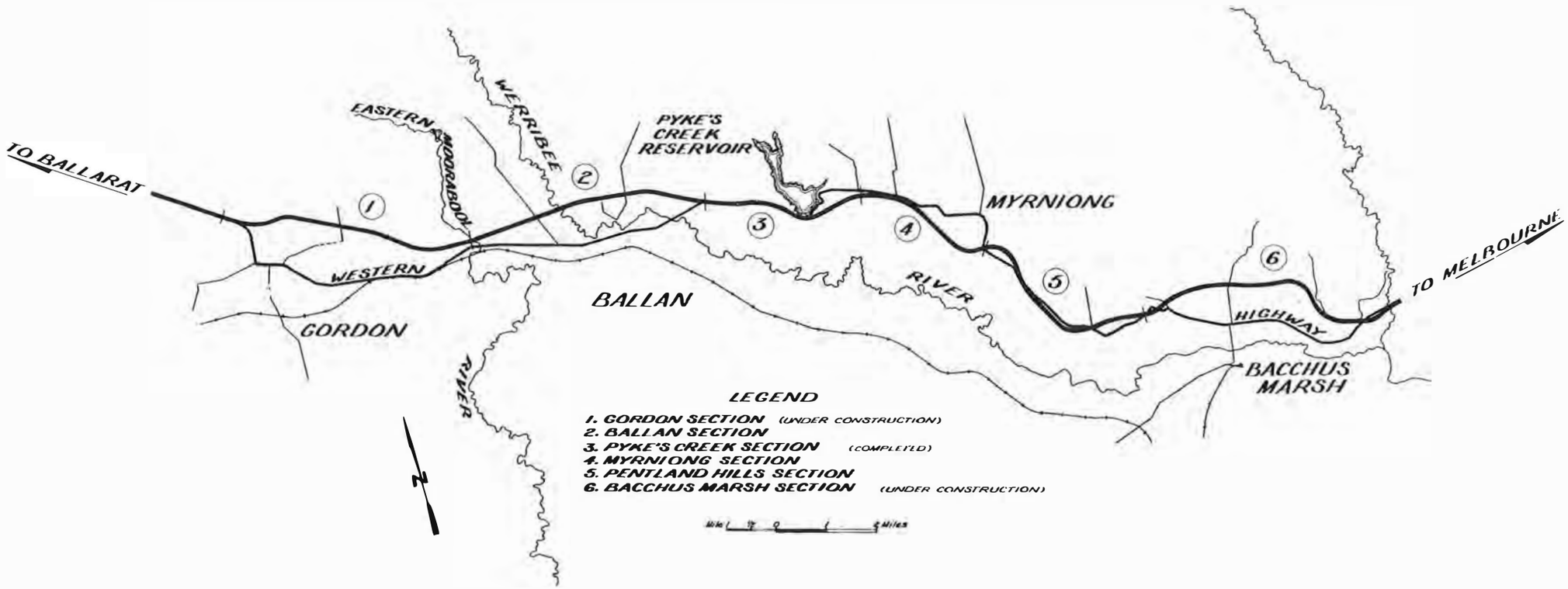


Figure 3—Western Freeway Route between Bacchus Marsh and Gordon.

2. ENGINEERING PLANS AND SURVEY

Engineering Surveys

Head Office survey parties completed a total of 284 miles of survey during 1969/70, as follows:

Freeways	45 miles
State highways	43 miles
Other roads	58 miles
Ground control for photogrammetry	138 miles

Survey parties from regional divisions completed a considerable amount of survey for road and bridge works, and consultants also completed 5 mles of survey work.
Late in the 1969/70 year, the Plans and Survey Section took delivery of a Wild Distomat DI 10 electronic distance measuring unit. The unit will have the following particular uses on surveys:

traverses for horizontal control for photogrammetry;

traverses for establishment of control points defined by co-ordinates;

direct measurements between points which would otherwise need to be connected by indirect survey methods; and

measurements across difficult terrain.

It is considered that use of this equipment will bring substantial savings of survey time.

The establishment of bench marks over the Board's road system for the Department of Crown Lands and Survey is continuing. Provisional values of these marks are available and the Department expects that final values will be available during 1971.

Photogrammetric Mapping

Considerable use was again made of photogrammetry, especially for preliminary investigation work. Projects on which photogrammetry was used by the section during the year included an investigation for a proposed road in the Wonnangatta Valley, and the Ocean Road (Peterborough to Bay of Islands section). In addition, photogrammetry was obtained for a large number of freeway route investigations.

Colour and infra-red photographs were obtained over a twenty-mile long strip of the Mallacoota-Wingan Inlet road project. The photographs are at present being studied by the Monash University Geography Department for interpretation of soil and vegetation types on the project. This was the first time that colour mapping photography has been used by the Board to assist in route location.

Plans for Road Construction

Final construction plans completed during 1969/70 are as follows (the figures in brackets indicate the considerable amount of work carried out by consultants):

(a) Route miles

Freeways	25	(4)
Other divided roads	11	
Undivided roads	35	
	71	(4)

(b) Estimated cost of roadworks

Freeways	$9,240,000	($3,617,000)
Other divided roads	$2,054,000	
Undivided roads	$1,926,000	
	$13,220,000	($3,617,000)

Contract Specifications

The number and value of specifications advertised during 1969/70 were as follows:

Contracts for which specifications for road works and for supply of materials were prepared	136
Total estimated value (contract price only)	$16,200,000
Road construction contracts advertised (included in above)	35
Total estimated value (contract price only)	$10,800,000

Computer Usage

(a) Perspective Plotting.

A system of perspective plotting is under development in co-operation with the C.S.I.R.O. Building Research Station, and some trial plots have been carried out with promising results. The system requires a large computer complex, with facilities to manipulate large volumes of data and to make use of sub-routines to eliminate the joining of hidden points.

(b) Programmable Desk Calculator.

A Hewlett-Packard 9100B programmable desk calculator with printer attached was installed in the section in May 1970. Its use and versatility have exceeded expectations.

Prior to installation, programmes were written for the solution of a number of geometric problems in order to make the machine immediately operational and a short course was held to familiarize staff with the machine. Staff are encouraged to produce programmes applicable to their work.

(c) Computer Users' Instructions.

Work has commenced on the preparation of a set of instructions for computer users to cover the available programmes for road design.

3. TITLE SURVEY AND PRINTING

Title Surveys

A total of 450 survey plans were produced during the year, including 38 for freeway proposals and 7 control surveys for large projects. All except 56 of the survey plans were produced by Board's staff.
The Board's computer processed some 375,000 survey lines, again exceeding considerably the number for the previous year.

Drafting

A total of 897 Gazette plans were drawn, consisting of 454 for Declarations and 443 for Approving Orders in Council. Transfer documents totalled 1,350, an increase of 250 over last year.

Printing

The machine runs for offset printing totalled 5,100,000, a slight decrease from the previous year. The engineering publications which were printed included a bound reprint of the Drafting Manual—Roadworks, for sale to the public, and Technical Bulletin No. 26, "The Design of Flexible Pavements". A wide variety of publications for other purposes was also printed.

Plan printing and Statfile reproduction both increased from the 1968/69 level.

4. RIGHT OF WAY

Plans

(a) Right of Way Plans.

During 1969/70, right of way plans showing, in pictorial form, such aspects as land tenure, access details, subdivisional development, and leased and surplus land, were compiled for:

the Princes Freeway (Moe section);

the Western Freeway (Pykes Creek section);

the Hume Freeway (Broadford-Tallarook section);

the Calder Freeway (Elphinstone section);

the Heidelberg-Kinglake Main Road (Heidelberg Road to Greensborough Road);

the Heidelberg-Eltham Main Road (Merri Creek to Greensborough Road).

(b) Access Authorization Plans.

Plans were prepared for five freeway projects to enable the Board to authorize the necessary points of access to the freeways. Small scale plans were also prepared to enable the Board to publicise by advertisements the regulations controlling the usage of the freeways.

(c) Tenure Plans.

Tenure plans were compiled for ten new projects to assist regional divisions and design sections in determining the effects of the projects on land usage and ownership. These plans were also used to determine the necessary alternative road access required.

(d) Highway Record Survey Plans.

Highway record survey plans were completed for:

the Calder Highway, Sections 1 and 2	114 miles
the Princes Highway East, Section 3	42 miles

Strip aerial mosaics were prepared for:

the Princes Highway East, Sections 3 and 4	102 miles
the Grampians Tourists' Road	71 miles

Odometer Surveys

Odometer surveys were carried out on:

the Omeo Highway, Sections 1 and 2	75 miles
the Alpine Tourists' Road, Omeo to Mt. Hotham	35 miles
the Bruthen-Buchan Forest Road	23 miles
the Bruthen-Buchan Main Road	8 miles
the Gelantipy Main Road	15 miles
the Princes Highway East, Section 3	59 miles
	215 miles

Town Planning Schemes

Two sets of coloured plans were prepared for each of seven statutory planning schemes on exhibition. These new schemes and amendments to existing schemes were examined in detail to ensure that the Board's interests were not adversely affected by the proposals.

1. ROAD CONSTRUCTION AND MAINTENANCE

Basaltic Clay Fills at the Lower Yarra Freeway

The major road works contract associated with the Lower Yarra Freeway project included the placing of the approach embankments to two overpass structures. These embankments, with maximum heights of approximately 24 feet above natural surface and base widths of 240 feet, have volumes of nearly 110,000 cubic yards each. The total volume of earth fill required in this contract was 439,000 cubic yards; and as the cuts provided only 154,000 cubic yards the balance of 285,000 cubic yards had to be imported.

The Board has no specification relating to the quality of materials to be used as earth fill. The British Ministry of Transport suggests that earth fill should have a Liquid Limit not greater than 80 and a Plasticity Index not greater than 55. There was little, if any, natural soil which would satisfy these requirements within a reasonable hauling distance of the construction sites. The cost of suitable quarry by-products was prohibitive. The cheapest and most abundant material was found to be the basaltic clay overburden from two local quarries, similar to the natural material won from the site. This clay occurred in a 10 ft.-20 ft. deep layer and had the following properties:

Liquid Limit	77 - 100
Plasticity Index	60 - 77
Passing No. 200 sieve	97% - 99%
Standard Optimum Moisture Content	28% - 38%
Standard Maximum Dry Density	79 lb./cu. ft. - 90 lb./cu. ft.

The job specification required the clay to be compacted at a moisture content within the range of 85%-125% of the Standard Optimum Moisture Content, and fortunately the natural moisture contents of the clay were within this range. Compaction was therefore completed as soon as possible after placing the basaltic clay.

Compaction was achieved by means of a forty ton static tamping roller (Plate 7). This unit could satisfactorily compact up to 2,000 cubic yards solid per day when the clay was spread in 8 in.-12 in. loose layers and given six passes with the roller. Field density tests were performed on each compacted layer and generally results ranged between 94% and 110% of the Standard Maximum Dry Density, with the most common value around 102%. The specification required a minimum of 95%.

Plate 7—Forty ton static tamping roller, used in compacting Lower Yarra Freeway embankments.

It is interesting to note that on the average each cubic yard of material after compaction contained approximately 73 gallons of water and therefore each embankment contained nearly 8,000,000 gallons. The behaviour of the embankments will be determined by whether or not this quantity of water remains constant. Changes in the moisture content will result in either shrinkage or swelling of the clay, which in turn could produce a poor riding

surface on the freeway or could even damage the pavement and disrupt underground drainage. To restrict the changes in moisture content to a minimum the Board has provided a select fill layer between the clay and the pavement material, and has also taken special precautions with regard to loaming the fill batter surfaces and planting suitable ground cover plants.

As the Board had never before constructed such large embankments using highly plastic basaltic clay it was decided to invite the Soil Mechanics Division of the C.S.I.R.O. to participate with the Board's Materials Research Division in a joint project to study the behaviour of two of the embankments over a period of years. By examining samples of clay taken from the embankments during construction, as well as undisturbed samples from the borrow areas and areas beneath the embankments, the Board hopes to be able to predict the moisture content that the clay will ultimately attain. The C.S.I.R.O. will be installing sensing devices in the embankments so that the actual moisture content (or more precisely the soil suction) can be measured periodically. The Board has installed a number of settlement markers at various depths in the embankments and these will be periodically levelled to detect any movements.

The knowledge gained from this project will be useful in developing construction methods to be employed in the future, when the use of expansive clays in large embankments may be again needed in the areas to the north and west of Melbourne.

Direct Labour Road Construction Costs

Tables 1 to 4 set out analyses of the costs of 110 road construction or reconstruction jobs carried out by direct labour by the Board during 1969/70.

TABLE 1—

DISTRIBUTION OF EXPENDITURE

	1969/70	Five Year Average 1965/66 to 1969/70
	%	%
Plant	35·1	35·7
Labour	31·0	32·5
Materials	25·7	23·3
Stores	8·2	8·5

TABLE 2—

WORKS OVERHEAD EXPENDITURE

(Percentage of productive costs)

	1969/70	Five Year Average 1965/66 to 1969/70
	%	%
Construction overhead expenses	10·0	10·2
Camp expenses	13·2	13·2
	23·2	23·4

TABLE 3—FORMATION COSTS

(Including distributed overhead expenditure)

	Rock		Earth unclassified		Total	
	Quantity	Unit Cost	Quantity	Unit Cost	Quantity	Unit Cost
	Cu. Yds.	$	Cu. Yds.	$	Cu. Yds.	$
1969/70	279,312	1·70	1,922,031	1·10	2,201,343	1·17
Five year average 1965/66 to 1969/70	201,302	1·42	1,428,120	1·06	1,629,422	1·09

TABLE 4—PAVEMENT COSTS

(Consolidated in place, including distributed overheads)

	Fine Crushed Rock		Coarse Crushed Rock		Gravel, etc.		Total	
	Quantity	Unit Cost	Quantity	Unit Cost	Quantity	Unit Cost	Quantity	Unit Cost
	Cu. Yds.	$	Cu. Yds.	$	Cu. Yds.	$	Cu. Yds.	$
1969/70	112,174	4·03	54,899	3·59	1,291,970	2·32	1,459,043	2·50
Five year average 1965/66 to 1969/70	89,607	4·89	41,976	4·52	986,657	2·12	1,118,240	2·44

2. TESTING OF MATERIALS AND RESEARCH

Quality of Road Aggregate

During 1969/70 further investigation was carried out on the problem of deterioration, due to weathering, of certain crushed basalt products. The deterioration of these products had been known to be related to their comparatively high secondary mineral content (secondary minerals result from the alteration or reconstruction of primary minerals, e.g. in basalts the feldspars, which may form up to 60% of the rock, can become kaolin type clays and calcite; and primary iron bearing minerals may change to limonite, chlorite and serpentine). Secondary minerals, which are already clay or liable to change to clays, are indicative of unsatisfactory stone.

Several methods have been used to control the acceptance of basaltic materials containing secondary minerals. A direct secondary mineral count by a petrologist gives an accurate measurement, but cannot be employed as a routine control method through being too time-consuming. Also, only a small proportion of the stone can be tested.

Extensive experiments have been conducted with the objective of designing a rapid test, the results of which could be consistently related to the rate of deterioration of the stone due to weathering. The possibilities of using the Washington Degradation Test, the Idaho Degradation Test, and an Extended Sand Equivalent Test (developed by the Board), as routine quality controls, were investigated. In all of these tests the quality of the aggregate is assessed from a simulation of the weathering process, particularly the effects of water. The amount of mineral present which is susceptible to the effects of water becomes a factor in the result. Time considerations suggest that the Washington Degradation Test should be used for clean aggregates, and the Extended Sand Equivalent Test for products with appreciable fines.

As a result of the experiments the specification limits set out in Table 5 have been adopted by the Board. They are primarily applicable to stone of igneous and metamorphic origin from the metropolitan area of Melbourne.

TABLE 5—QUALITY OF ROAD AGGREGATE

Test Title	Test Values for Acceptable Aggregate			
	Base Materials		Sub-base Materials	
	Class 1 (see note (a))	Class 2 (see note (b))	Top 6 in.	Below 6 in.
(i) Washington Degradation "D" (spalls only—see note (c))	Min. 70	Min. 60	Min. 40	Min. 20
(ii) Extended Sand Equivalent "E" (spalls only—see note (c))	Min. 35	Min. 30	Min. 20	Min. 15
(iii) Secondary Mineral Content (spalls only—see note (c))	Max. 20%	Max. 25%	Max. 30%	Max. 35%
(iv) Sand Equivalent, 45 secs.	Min. 60	Min. 55	Min. 40	Min. 30
(v) Los Angeles Abrasion Loss				
Basalts	Max. 25%	Max. 25%	Max. 30%	Max. 30%
Granites	Max. 30%	Max. 30%	Max. 35%	Max. 35%
(vi) Visual inspection indicating unsound stone, e.g. soft or "green" stone etc.	Max. 3%	Max. 5%	Max. 10%	Max. 20%
(vii) Liquid Limit	Max. 25	Max. 25	Max. 25	Max. 40
Plasticity Index	Max. 3	Max. 3	Max. 10	Max. 20

(a) Class 1 base material is to be used on all metropolitan freeways, heavily trafficked urban arterial roads (more than 15,000

(b) Class 2 base material or better is to be used for all other roads and (at this stage) for bituminous concrete binder courses.

(c) The reference to "spalls only" has regard to the fact that consistent results for tests (i) (ii) and (iii) have required that the material tested be obtained from spalls.

Brief descriptions of tests (i) (ii) and (iii) are as follows:

(i) Washington Degradation Test ("D").

One thousand (1,000) grams of aggregate ($\frac{1}{2}$ in. to B.S. No. 8) is placed in a plastic bowl with water and shaken for 20 minutes. The minus 200 material is washed into a sand equivalent tube with sand equivalent stock solution and the sediment height "H" is read after 20 minutes.

$$D = \frac{15 - H}{15 + 1{\cdot}75H} \times 100$$

which gives a scale of values from 0 to 100.

(ii) Extended Sand Equivalent Test ("E").

Two samples are prepared as for the normal sand equivalent test. One of the two samples is then tested in the normal manner using 45 seconds agitation in the mechanical sand equivalent shaker. The second sample is shaken for 10 minutes in the same shaker.

$$E = \frac{(\text{S.E.}_{\ 10 \text{ minutes}})^2}{(\text{S.E.}_{\ 45 \text{ seconds}})}$$

(iii) Secondary Mineral Content.

Quantitative determination of secondary minerals is accomplished with a counting device by either a continuous line measurement or equally spaced point counts on a series of equally spaced traverses, across the surface of the sample (thin rock sections), under the petrological microscope.

$$\text{Secondary minerals } \% = \frac{\text{Secondary mineral count}}{\text{Total count}} \times 100$$

Use of Scoria-tuff as a Road Base Material

An investigation was made into the use of scoria-tuff materials for the construction of roads in the Board's Warrnambool Division, in the south-west of Victoria. These materials have been widely used in the area, owing to their ready availability and cheapness. Scoria-tuff materials have given satisfactory service on lightly trafficked municipal roads, but their performance on major roads such as the Princes Highway West has varied widely. Considerable lengths constructed from scoria-tuff materials have given poor service.

The investigation consisted of:

(i) a survey of municipal roads and the Princes Highway West, covering lengths of road with good and poor performance records (the poor lengths were indicated by general map cracking in both wheelpaths);

(ii) the sampling of the scoria-tuff materials from roads to establish—

(a) the variation, and critical limits, of grading,

(b) the Atterberg limits,

(c) the *in situ* moisture contents;

(iii) the determination, at four selected sites on the Princes Highway West, of the *in situ* dry density and the moisture content of the scoria-tuff. In conjunction, large scale samples of the scoria-tuff were taken for detailed laboratory testing to establish their compaction and strength characteristics.

It was found that the pavement depths were generally adequate. The difference in performance was due to the characteristics of the scoria-tuff materials used.

The following factors were of importance, viz.,

(a) Materials.

Scoria-tuff which had properties within the following limits, was generally associated with the satisfactory performance of lengths of the Princes Highway West under the traffic conditions (i.e. 150 to 250 heavy vehicles per 12 hour day) which have existed in the past ten years—

(i) Effective Maximum Size: 3/16 in. or greater,

(ii) Grading: between the limits set by Fuller curves with the exponent "n" equalling 0·50 and 0·33;

(iii) Liquid Limit: less than 30;

(iv) Plasticity Index: less than 6.

(b) Construction conditions.

Scoria-tuff materials are relatively absorbent. Also, extensive watering of the materials during construction may be necessary to alleviate the dust nuisance. These facts, and the difficulty of estimating moisture content in the field, have led to the tendency to construct scoria-tuff bases at high moisture contents at which the materials have been too resilient, producing pavement deflections of a magnitude detrimental to good performance. The intensity of traffic is therefore a more critical factor in pavement life with scoria-tuff bases than with other materials because of these relatively large deflections.

The dry density of the scoria-tuff base was found to be generally less than 95% of the Modified Maximum Dry Density.

In the lengths of the highway with bad performance records the scoria-tuff had *in situ* moisture contents equal to or wetter than the Modified Optimum Moisture Content; but the moisture contents of the scoria-tuff in the sound lengths of road were drier than 90% of the Modified Optimum Moisture Content.

The elastic modulus, at moisture content and dry density conditions close to those existing in the pavement, was measured in triaxial tests on the samples of scoria-tuff taken from the highway. It was found that the elastic modulus reflected the performance record of the sampled length. Overall, scoria-tuff exhibits an elastic modulus in the range 5,000 p.s.i. to 20,000 p.s.i. as moisture content moves from wet of optimum to dry of optimum. Over similar moisture content conditions the elastic modulus of crushed rock materials ranges from 15,000 p.s.i. to 30,000 p.s.i.

It appears that for municipal roads the above factors might be less critical in view of the lower traffic intensities and less difficult conditions for construction. In this case, if materials meeting the test values indicated in (a) above could be obtained economically then they would obviously be specified. However, if such materials were not available, it might be necessary to extend the specification for Plasticity Index and/or Liquid Limit slightly. It would seem advisable to maintain the gradings indicated above as the larger sizes in the mix are an indication of the amount of scoria present. With regard to construction conditions a dry density of more than 90% of Modified Maximum Dry Density, and moisture content at the time of construction of the order of 95% Modified Optimum, is suggested.

The prospects for consistent satisfactory construction by conventional methods with scoria-tuff on heavily trafficked highways seem limited to sub-base (the specification requirements would generally be similar to those for municipal roads except that a dry density of more than 95% of Modified Maximum Dry Density might be set). A length of scoria-tuff pavement on the Princes Highway West has been stabilized using foamed bitumen and first indications are that this may provide a satisfactory base material for highway construction.

Laboratory Manuals

The methods of test employed by the Board are usually based on national standard methods, Australian if these exist, otherwise British or U.S.A. Where a suitable national standard method does not exist the Board creates its own standard method. For both the national standard methods and its own tests, the Board has written detailed procedures to ensure uniformity within all Board laboratories.
The detailed procedures have been incorporated into Laboratory Manuals which are in the final stages of printing. The manuals will be in a loose-leaf form so that additional test methods and amendments to existing methods can be inserted. As well as providing definitive procedures for the Board's staff, the manuals will also serve as a useful guide to municipal engineers, consultants and contractors who may be in doubt as to the precise performance of specified tests.

Technical Committees

Staff of the Materials Research Division often represent the Board on committees dealing with technical matters. Important projects involving some Board staff in 1969/70 were the commencement of a complete revision of AS A89—"Testing Soils for Engineering Purposes", for the Standards Association of Australia; and the preparation of "A Guide to Stabilization in Roadworks", for the National Association of Australian State Road Authorities.

Technical Bulletin No. 26, "The Design of Flexible Pavements"

During 1969/70 Technical Bulletin No. 26, "The Design of Flexible Pavements", was issued. This document embodies the latest thoughts and practices in this important field, and constitutes a further refinement on the processes outlined in Technical Bulletins Nos. 4 and 21, which it supersedes.

3. ROADSIDE DEVELOPMENT

Rest Areas

Three more toilet blocks have been established during the year as part of the approved initial programme of ten units throughout the State, viz.:

Warby Springs—Hume Highway, Benalla Division

Box's Cutting—Western Highway, Ballarat Division

Lochiel Bridge—Western Highway, Horsham Division.

Planting Activities

In each of three major contracts let during the year the treatment of all disturbed and newly formed areas has been included in the prime contract. The projects involved are:

Mulgrave By-pass Road—Section C

Western By-pass Road—Bacchus Marsh section

Western By-pass Road—Gordon section.

Previously work of this nature was carried out by the Board's direct labour staff, or by awarding small contracts to landscaping contractors.

The programme of tree and shrub planting proceeded during 1969/70. Approximately 60,000 trees and shrubs were planted, the species used being predominantly Australian natives. Approximately 400 trees and shrubs were planted along the San Remo approaches to the new Phillip Island Bridge.

4. BITUMINOUS WORK

Extent of Work

The mileages of all types of bituminous surfacing completed during 1969/70 and 1968/69 are compared in Table 6, which shows that 3,300 miles were completed in 1969/70 compared with 2,925 miles in 1968/69, an increase of 12·8%.

TABLE 6—BITUMINOUS SURFACING WORK COMPLETED

Type of Road and Plant Used	1968/69		1969/70	
	Miles		Miles	
Work on roads to which the Board contributed funds:				
(a) C.R.B. declared roads—				
(i) Board's Plant	1633		1709	
(ii) Municipal Plant	50		61	
(iii) Contractors' Plant	90		193	
		1773		1963
(b) Undeclared roads—				
(i) Board's Plant	948		1101	
(ii) Municipal Plant	47		57	
(iii) Contractors' Plant	26		71	
		1021		1229
Sub-totals		2794		3192
(c) Work done for other Authorities by Board's Plant (no Board contributions for these works)—				
(i) Municipalities	118		101	
(ii) State Instrumentalities	13		7	
(iii) Commonwealth Works	—		—	
		131		108
Totals		2925		3300

The length of sealed pavements on the Board's declared road system was increased by 100·3 miles in 1969/70 and the length on unclassified roads was increased by 685·4 miles, as shown in Table 7. The lengths of construction of existing sealed pavements and restoration of the seal coat amounted to 431·2 miles of the declared road system, 3·3% of the sealed length, compared with 2·6% in 1968/69 and 3·0% in 1967/68. Retreatments amounted to 1,147·1 miles or 8·8% of the sealed length, compared with 8·8% in 1968/69.

Types of Work

Sprayed work (initial treatments and retreatments) was again the main type of work, amounting to 96·6% of the total length of work completed.

A length of 109 miles of plant mix work was completed during the year, that is, 3·4% of the bituminous surfacing programme, compared with 116 miles or 3·9% in 1968/69 (for further details see Table 7). For the plant mix work completed during the year, a total of 265,671 tons of bituminous concrete was supplied and spread by contractors operating fixed plants near Melbourne and Geelong.

TABLE 7—BITUMINOUS SURFACING WORK ON VARIOUS ROAD CATEGORIES

(On roads to which the Board contributed funds during 1969/70)

Type of Work	State Highways	By-pass Roads	Tourists' and Forest Roads	Main Roads	Total Board's Declared System	Unclassified Roads	Totals
	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Initial Treatments:—							
Extensions to sealed system—							
(a) Sprayed work	14.0	8.2	15.1	57.0	94.3	679.4	773.7
(b) Plant mix work	—	6.0	—	—	6.0	6.0	12.0
Reconstruction of lengths of previously sealed pavements—							
(a) Sprayed work	187.7	1.0	15.0	214.8	418.5	62.9	481.4
(b) Plant mix work	5.5	—	1.0	6.2	12.7	12.5	25.2
Widening of existing sealed pavements—							
(a) Sprayed work	65.4	9.7	6.0	171.9	253.0	54.7	307.7
(b) Plant mix work	—	—	—	0.3	0.3	1.4	1.7
Duplication of existing sealed pavements—							
(a) Sprayed work	14.5	—	—	5.4	19.9	0.7	20.6
(b) Plant mix work	3.5	—	—	7.8	11.3	1.8	13.1
Retreatments:—							
(a) Sprayed work	462.6	2.4	26.0	602.8	1093.8	405.7	1499.5
(b) Plant mix work	43.3	—	—	10.0	53.3	3.8	57.1
Totals	796.5	27.3	63.1	1076.2	1963.1	1228.9	3192.0

Cost of Work

The average unit cost of sprayed work completed by the Board's 23 bituminous surfacing units during the year is shown in Table 8. The average costs of sprayed work increased only slightly compared with those for 1968/69.

The average cost per ton of bituminous concrete supplied and spread during the year was $10·85 compared with $11·56 for 1968/69.

Sprayed work accounted for 72% of the total cost of the bituminous surfacing programme and plant mix work accounted for 28%.

Materials

(a) Aggregate.

A total quantity of approximately 305,000 cubic yards of covering aggregate was used on sprayed work done by the Board's plant, 36,400 cubic yards of aggregate was used on sprayed work done by municipalities and contractors, and 200,000 cubic yards of aggregate was used in bituminous concrete.

Table 9 sets out the average cost of aggregate over the past 5 years and shows that the 1969/70 average rose 2·8% above the 1968/69 average.

(b) Bitumen.

During 1969/70 the Board purchased directly 30,084 tons of bitumen which was distributed by road and rail by four marketing companies. All the bitumen used was produced from Kuwait crude petroleum.

(c) Primers.

Due to the continuing reduction in the production of crude vertical retort tar in Victoria greater quantities of special bituminous primers and petroleum tar primers were used.

(d) Experimental work.

During the year experimental work was done in the field to determine the efficiency of an antioxidant in bitumen. The antioxidant used was zinc diethyl dithiocarbamate (Z.D.C.).

The field trial involved an initial treatment prime and seal on a limestone pavement between 233·05 and 234·24 miles on the Calder Highway north of Sea Lake. The pavement was primed with crude horizontal retort tar; and Class R90 (Grade 85/100) residual bitumen fluxed and cut back was used for the binder.

The work was divided into five sections. The first and fifth were control sections on which the binder did not contain Z.D.C., and the second, third and fourth had 1%, 2% and 3% respectively of Z.D.C. in the binder.

The Z.D.C., in the form of a fine white powder, was totally and uniformly dispersed through the binder in 20 minutes due to the efficiency of the circulating system within the Board's bitumen sprayers. The use of the antioxidant, at the concentrations used, had no effect on the actual spraying of the binder.

This work will be inspected at yearly intervals and samples of the binder will be taken and tested from each section to determine the effect of the antioxidant on the particular bitumen which was used.

TABLE 8—AVERAGE COST OF SPRAYED BITUMINOUS SURFACING DONE BY C.R.B. PLANT

(On roads to which the Board contributed funds during 1969/70)
(Cost in cents per square yard)

Item	Nature of Work																			
	I.T.P. & S. ⅝" & Over		I.T.P. & S. ½"		I.T.P. & S. ⅜"		I.T.P. & S. ¼" & Sand		Primerseals		Two Application Seals		I.T.S.O. and Reseals ⅝" & Over		I.T.S.O. and Reseals ½"		I.T.S.O. and Reseals ⅜"		I.T.S.O. and Reseals ¼" & Sand	
Square Yards Costed	80,498		2,396,995		1,786,141		598,966		1,481,778		157,889		274,746		5,831,032		8,330,990		7,056,208	
	cents	%	cents	%	cents	%	cents	%	cents	%	cents	%	cents	%	cents	%	cents	%	cents	%
Material	22.8	51.4	17.9	51.7	16.8	55.4	14.0	57.3	10.3	49.7	25.4	50.1	14.0	45.2	14.2	54.6	11.5	57.5	9.6	59.6
Stores	2.1	4.7	1.3	3.8	0.9	3.0	0.6	2.5	0.6	2.9	1.4	2.8	0.9	2.9	0.7	2.7	0.5	2.5	0.4	2.5
Plant Hire	8.6	19.4	6.6	19.1	5.4	17.8	4.2	17.2	4.4	21.3	9.6	18.9	6.4	20.6	4.6	17.7	3.3	16.5	2.7	16.8
Labour	10.9	24.5	8.8	25.4	7.2	23.8	5.6	23.0	5.4	26.1	14.3	28.2	9.7	31.3	6.5	25.0	4.7	23.5	3.4	21.1
TOTALS	44.4	100.0	34.6	100.0	30.3	100.0	24.4	100.0	20.7	100.0	50.7	100.0	31.0	100.0	26.0	100.0	20.0	100.0	16.1	100.0

I.T.P. & S. indicates "initial treatment prime & seal"
I.T.S.O. indicates "initial treatment seal only"

TABLE 9—AVERAGE PRICE OF AGGREGATE FOR SPRAYED BITUMINOUS SURFACING

(In roadside stacks)

Material	Prices per cubic yard				
	1965/66	1966/67	1967/68	1968/69	1969/70
	$	$	$	$	$
Screenings	5.04	5.04	5.19	5.01	5.12
Gravel	4.20	4.04	4.57	4.30	4.61
Sand	2.50	2.93	2.32	2.13	2.82
Scoria	2.78	2.90	2.80	2.93	2.90
Average price all aggregates	4·70	4.76	4.89	4.79	4.93

ENGINEERING COMPUTER SECTION

Use of the Board's IBM 1620 Computer During 1969/70

(a) Use by Board's staff.

A summary of computer time used by the Board's own staff during 1969/70 is shown in Table 10. Additional details of the work processed and programming work undertaken are contained elsewhere in this report.

TABLE 10—IBM 1620 COMPUTER USE BY BOARD'S STAFF

User	Productive Hours	Developmental Hours	Total Hours
Bridge Sub-branch	598	53	651
Advance Planning Division	326	165	491
Computer Section	252*	143	395
Plans & Survey Section	344	48	392
Traffic & Location Section	237	49	286
Title Survey Section	177	3	180
Materials Research Division	132	14	146
Dandenong Division	47	16	63
Secretary's Branch	427	21	448
Accountant's Branch	10	—	10
Totals for 1969/70	2,550	512	3,062

*Includes work processed by Computer Section for other Sections, and computer maintenance.

(b) Use by Other Organizations.

Computer time was made available to Government departments and other bodies including:

Department of Crown Lands & Survey
Australian Road Research Board
Melbourne Metropolitan Transportation Study
Shire of Whittlesea
Lower Yarra Crossing Authority

These other organizations used a total of 118 hours of the 1620 computer time during 1969/70, a decrease of 14% from the previous year.

Use of Other Computer Facilities

Increasing use is being made by the Board of outside computer facilities. This is due to the heavy workload on the IBM 1620 and also the availability of specialised equipment and computer programmes not available on the Board's own computer.

External facilities used included:

C.S.I.R.O. Computer Network for automatic plotting;
S.E.C.V. Computer for large survey traverse adjustment;
C.D.C. Service Bureau for structural analyses;
I.B.M. and COMPUTEC service bureaux;
General Electric Computer Time-sharing Service.

A teletype terminal, connected by telephone line to the General Electric Computer Time-sharing Service, was installed in the Computer Section in September 1969. This facility provides immediate access to a large computer located in Melbourne. Its use has enabled a considerable reduction in job turnaround time for certain of the smaller types of design computations.

Trends in Computer Use

The overall use of computers by Board staff was 13% higher in 1969/70 than in 1968/69. Productive use increased by 21% and developmental use decreased by 17%.

The overall use of the IBM 1620 computer was 6% higher than in 1968/69; productive use increased by 12%.

A detailed assessment is currently being made by all branches of their future computer processing requirements. These assessments will be used as a basis for the preparation of a specification for computer equipment to replace the IBM 1620.

Computer Programming

The section continued to provide advice and assistance in the use of computers to other members of the Board's staff. Computer programmes were developed for production of bar charts for the CPM/PERT System, updating the Linemarking Programme, and recording and analysing road traffic accidents (the road traffic accidents programme is described in detail in this report under the heading PLANNING SUB-BRANCH).

SAFETY

There was again a slight reduction in the number of lost time injuries in 1969/70 in comparison with 1968/69. Details of the injuries are set out in Table 11.

TABLE 11.—INJURIES TO BOARD'S EMPLOYEES

Type of Injury	1969/70	1968/69	Changes from 1968/69	
			Decrease	Increase
Back strains	50	50	—	—
Burns and scalds	29	20	--	9
Burns to eyes	13	11	—	2
Foreign bodies in eyes	42	51	9	—
Fatal injuries	—	3	3	—
Fractures	18	34	16	—
Head injuries	19	15	—	4
Lacerations and wounds	55	40	—	15
Miscellaneous	66	49	—	17
Multiple injuries	—	1	1	—
Occupational diseases	25	51	26	—
Sprains and strains	52	50	—	2
Totals	369	375	Nett decrease = 6	

	1969/70	*1968/69*
Total man-hours worked	8,757,080	8,423,000
Lost time accidents	369	375
Accident Frequency Rate per million man-hours	42·1	44·5
Days lost	2,058	22,113
Days lost per million man-hours	235	2,563

The large decreases in "days lost" and "days lost per million man-hours", from 1968/69 to 1969/70, were due mostly to there being no fatal accidents in 1969/70 (each fatal accident is assessed as being equivalent to 6,000 days lost, in accordance with Australian Standard CZ6-1966, "Recording and Measuring Work Injury Experience"). The three fatal accidents in 1968/69 were the result of a traffic accident in which three of the Board's enginers were killed.

Activities to promote safety during 1969/70 included the display of National Safety Council of Australia posters, and the design and printing by the Board of safety posters. Safety films and first aid lectures were presented. A practical demonstration on fighting bitumen fires were arranged by the Asphalt Division. Board's staff designed and assembled a display stand for the public utility authorities, with the title "Service with Safety to the Public", in connection with the Victorian Industrial Safety Convention.

TRAINING

Training for Afro-asian Engineers

In March 1970, thirteen African and Asian engineers were attached to the Board to undertake a three-month training programme in road and bridge engineering work. The engineers were all qualified civil engineers with a range of experience from three to twelve years.

The programme comprised lectures, attachments to regional divisions and attachments to specialist sections at Head Office. This group programme was arranged through the Department of External Affairs and the National Association of Australian State Road Authorities. Similar group courses have been conducted by the Department of Main Roads (N.S.W.) and the Main Roads Department (Queensland), and further courses will be conducted by the State Road Authorities during 1971.

The visiting engineers were:

Mr. A. S. Zada (Afghanistan)
Mr. H. E. Prou (Cambodia)
Mr. L. S. Yeboa (Ghana)
Mr. S. R. Tambe (India)
Mr. D. Marjadi (Indonesia)
Mr. D. Basnet (Nepal)
Mr. B. Jha (Nepal)
Mrs. V. Apostol (Philippines)
Mr. V. Q. Thong (South Vietnam)
Mr. L. T. Trang (South Vietnam)
Mr. S. Santi (Thailand)
Mr. P. J. Woods (T.P.N.G.)
Mr. P. L. T. Fernandes (Uganda)

The engineers who attended were confident that the course had been suited to their needs. They were particularly interested in bituminous surfacing work, the use of local materials, quality control of materials, project management, patrol maintenance practices and the control of overloading and dimensions of vehicles.

Training for Board's Staff

The Board's practice is to provide training to meet clearly defined needs. Training is a continuous process and takes place both on the job and under formal conditions such as in-service and external training courses. Members of the Chief Engineer's Branch attended a considerable number of both of these types of courses during 1969/70. The in-service courses covered such subjects as computer appreciation, communications, induction, industrial relations, road design, materials testing and job instruction techniques, and the external courses were concerned with a wide variety of topics of a technical and administrative nature.

Training of Young Engineers

The Board provides training for young engineers who have had at least eighteen months' engineering experience. Each engineer who enters this training scheme receives twelve months' training to give him a variety of experience in the Board's work. The programme for each engineer makes allowance for the nature of his previous experience or lack of experience in particular fields. For example, a young engineer without any road construction experience would work for six months in one of the Board's regional divisions to obtain such experience.

PUBLICATIONS

The following papers were presented during 1969/70 in connection with the Board's engineering work:

Paper	Author
Use of the Benkelman Beam in Pavement Evaluation Presented to the Highways and Traffic Branch of the Victorian Division of The Institution of Engineers, Australia, September 1969.	D. T. Currie, Ph.D., B.C.E., M.I.E.Aust.
Compaction of Road Pavement Materials Presented to an Australian Road Research Board Symposium on Compaction, Hobart, April 1970.	D. T. Currie, Ph.D., B.C.E., M.I.E.Aust.

General Criteria Required of Road Pavement Materials Published in Australian Road Research Bulletin No. 5, October 1969.	D. T. Currie, Ph.D., B.C.E., M.I.E.Aust.
Predictions of Future Travel Presented at the Symposium on Balanced Urban Transportation, conducted by The Institution of Engineers, Melbourne, April 1970.	D. G. Ferguson, B.E. (Civil)
Brittle Fracture Performance of Bridge Steels Presented to a Seminar on Steel Bridges, B.H.P. Research Laboratory, June 1970.	R. S. Gilmour, B.Sc., A.R.C.S.T.
Proposed Road Network Presented at the Symposium on Balanced Urban Transportation, conducted by The Institution of Engineers, Melbourne, April 1970.	N. S. Guerin, B.C.E., C.E., Cert. H.T. (Yale), M.I.E.Aust. A.M.I.T.E.
Design of Steel Highway Bridges Presented to a Seminar on Steel Bridges, B.H.P. Research Laboratory, June 1970.	I. J. Jones, B.C.E., M.I.E.Aust., L.S.
Welding of A.S.A. 149-1965 Structural Mild Steel under Limit Conditions, and Pre-heating Requirements Published in Australian Welding Research, Vol. 1, No. 6, February 1970.	R. S. Gilmour, B.Sc., A.R.C.S.T. R. P. Martin, B.C.E., Dip.Ed., of Swinburne Technical College
An Evaluation of the Performance of a Lime Stabilized Montmorillonitic Clay as a Freeway Subbase Presented at the Second South-East Asian Regional Conference on Soils Engineering, Singapore, June 1970.	A. Ratnarajah, B.Sc.
Safety Within Utilities—The Country Roads Board Presented to the Public Utilities session of the Victorian Industrial Safety Convention 1970, held at Monash University, 3rd June, 1970.	R. T. Underwood, M.E., B.C.E., Dip.T. & R.P., C.H.T. (Yale), C.E., M.I.E.Aust., M.A.P.I., A.M.I.T.E.

The following paper was inadvertently not mentioned in the 1968/69 Report:

Common Types of Driven Piles Presented at a Symposium on Piled Foundations, conducted by the Civil and Municipal Engineering Branch of the Victorian Division, The Institution of Engineers, Melbourne, May 1969.	J. E. Wilson, B.C.E., M.I.E.Aust.

One issue of Engineering Notes, No. 92, "Terms—Flexible Pavement Structure", was published in 1969/70, and one issue of Construction News, No. 17, was published.

STAFF

At 30th June, 1970, the total staff of the Chief Engineer's Branch was 1,098.

Mr. H. S. Gibbs was Chief Engineer of the Board during the 1969/70 financial year, but retired in July 1970 before this report was prepared. Mr. Gibbs had served the Board for nearly 42 years, and rendered outstanding service during this long period of time.

During 1969/70 Mr. H. P. George retired as Deputy Chief Engineer after nearly 44 years' service with the Board; Mr. J. H. Townley retired as Deputy Chief Engineer—Road Design, after nearly 36 years' service; Mr. F. Hosking retired as Advance Planning Engineer, after 42 years' service; and Mr. A. H. Gawith retired as Materials Research Engineer, after nearly 41 years' service. These officers all made very valuable contributions to the Board's activities during their long service.

The total cost of work performed in 1969/70 by the Board on its own direct works and for other authorities, and by municipalities with funds made available by the Board, was $79,413,000.

The Board's engineering activities have continued to increase in size and complexity. I wish to thank the staff for their dedicated and capable contribution to these activities.

T. H. RUSSELL, M.Eng.Sc., B.C.E., Dip.C.E., C.E., F.I.E.Aust.

Chief Engineer

Brown Prior Anderson Pty Ltd 5 Evans Street Burwood 3125

COUNTRY ROADS BOARD

VICTORIA

SHOWING BOARD'S ROAD SYSTEM

SCALE OF MILES
10 5 0 10 20 30 40 50 60 70 80 90

MELBOURNE
SHOWING C.R.B. ROADS WITHIN MELBOURNE & METROPOLITAN BOARD OF WORKS PLANNING AREA

BENDIGO

BALLARAT

GEELONG

SCALE OF ENLARGEMENT MILES
0 ½ 1 2 3 5

SCALE OF ENLARGEMENT
0 1 2 3 4 5 6 7 8 9 10

METRO

GEELONG

DANDENONG

HORSHAM

BENDIGO

BALLARAT

BENALLA

WARRNAMBOOL

GEELONG

METRO

DANDENONG

TRARALGON

BAIRNSDALE

PORT PHILLIP BAY

NEW SOUTH WALES

TASMAN SEA

SOUTHERN OCEAN

BASS STRAIT

COUNTRY ROADS BOARD
PRUDENS FUTURI
1913
VICTORIA

LEGEND

- MUNICIPAL BOUNDARIES
- STATE HIGHWAYS (31)
- DECLARED BY-PASS ROADS
- MAIN ROADS
- FOREST ROADS
- TOURISTS ROADS
- C.R.B. DIVISIONAL BOUNDARIES AS FROM 1ST JAN, 1970