1952-53

VICTORIA

COUNTRY ROADS BOARD

THIRTY-NINTH ANNUAL REPORT

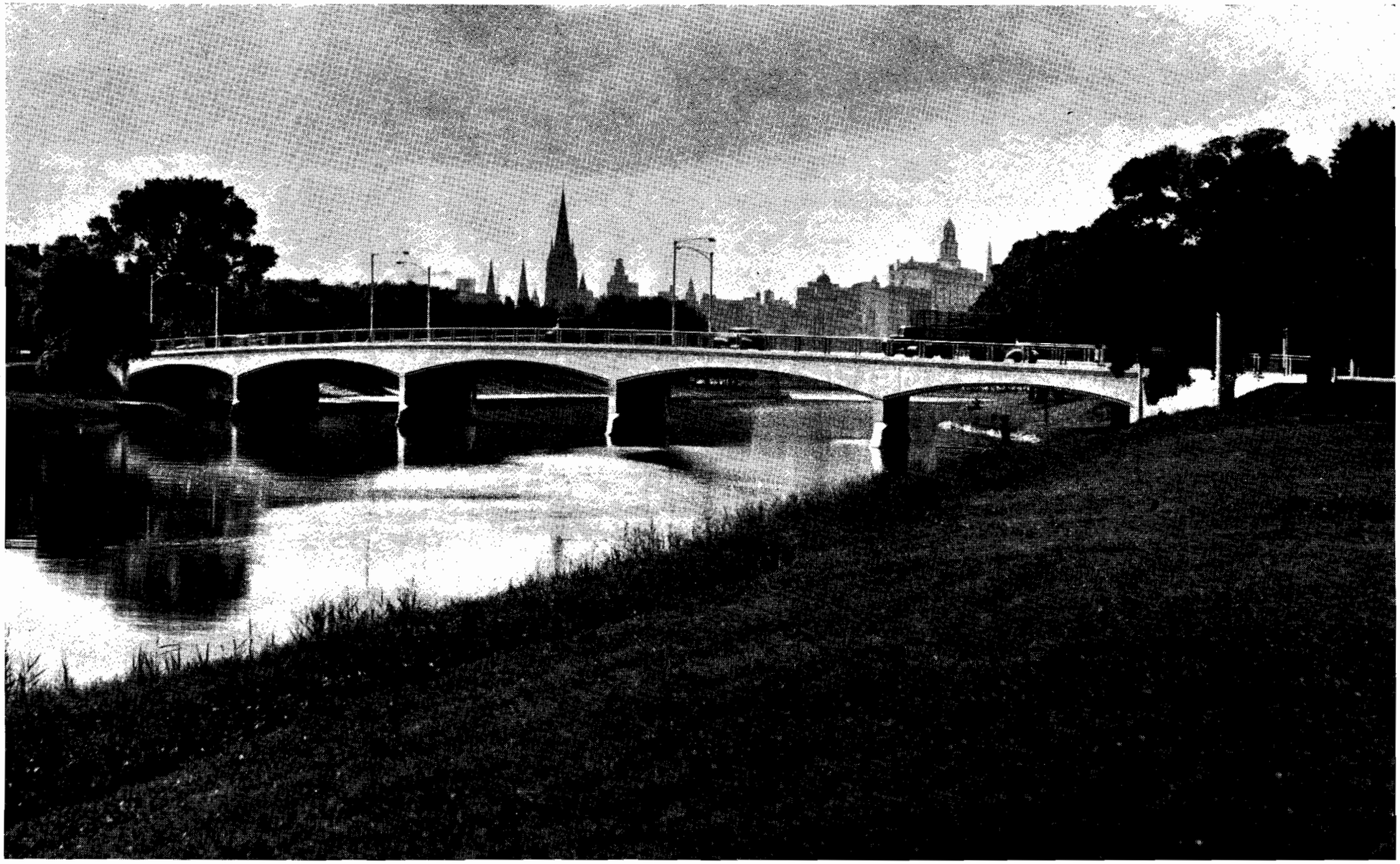
FOR YEAR ENDED 30TH JUNE, 1952.

PRESENTED TO BOTH HOUSES OF PARLIAMENT PURSUANT TO ACT No. 3662.

[*Approximate Cost of Report.*—Preparation, not given. Printing (1,058 copies), £525.]

By Authority:
W. M. HOUSTON, GOVERNMENT PRINTER, MELBOURNE.

No. 15.—[3s. 3d.]—481/53.



Bridge over the Yarra River at Swan-street, Melbourne.

COUNTRY ROADS BOARD

THIRTY-NINTH ANNUAL REPORT
1952

CONTENTS

COUNTRY ROADS BOARD

THIRTY-NINTH ANNUAL REPORT

Exhibition Building,
Carlton, N.3.
22nd December, 1952.

The Honorable S. Merrifield, M.L.A.,
Minister of Public Works,
Department of Public Works,
Melbourne, C.2.

SIR,

In accordance with the requirements of Section 96 of the *Country Roads Act* 1928 (No. 3662), the Board has the honour to submit to you, for presentation to Parliament, a report of its proceedings for the year ended 30th June, 1952.

FINANCE.

The year 1951–52 was notable for a lamentable shortage of funds with which to deal with sharply rising costs and meet the urgent needs of the State's road system, and it is regrettable that, from circumstances quite beyond its control, it was necessary for the Board to considerably restrict its allocations of funds for works both under the supervision of municipal councils and under its own direct control.

As a result of the financial stringency relating to road funds there is a progressive and serious deterioration of road pavements and bridges over the highway system of the State.

The position is reaching a critical stage and unless a substantial increase in road funds is made available the extensive failures occurring along the State highways and main roads must eventually lead to a serious dislocation of road transport facilities.

Lightly constructed pavements are breaking up because reconstruction cannot be undertaken and in addition many old sections of bituminous pavements have passed the end of their economic life. Transport conditions are thus rendered difficult with excessive cost in both road maintenance and vehicle operation. (Plates Nos. 1, 2, and 3.)

Hundreds of weak old timber bridges must be replaced. Many of these have load limits with consequent restriction on transport and are too narrow for today's traffic. (Plate No. 4.)

Load limitations on sections of important routes must remain because funds are not available to carry out the necessary strengthening work.

Inability to proceed with an essential reconstruction programme must seriously increase the cost and magnitude of works in future years. As the financial position deteriorated during the year, works had to be closed down or eliminated from the original programme in order to keep expenditure within the limits of the Board's resources.

As indicated in the 38th Annual Report, the total allocation by the Board for the financial year 1950–51 was the largest in the Board's history, and the total road expenditure of £5,362,023 also exceeded all previous figures. Many of the councils, whilst not being able to actually complete the whole of their programmes, had entered into large commitments which had to be provided for in the new financial year, and, following the record allocation, it was not surprising that the total of commitments carried forward to the 1951–52 financial year reached the substantial amount of £2,641,189. This amount was a first charge upon the funds available for the new financial year, and, as efforts to obtain additional funds for the Board had proved to be unavailing, it was inevitable that the allocations for the new financial year would need to be considerably reduced.

This restriction of funds for new works was most severely felt in relation to unclassified roads, as it was found to be impossible to make an allocation for new works, whilst only limited amounts could be provided for the maintenance of such roads.

This was a considerable set-back to many municipal councils which had built up extensive direct labour organizations on the strength of the substantial allocation of previous financial years. In order to make the position clear to the municipalities generally, a special statement prepared by the Board and covered by an explanatory letter by the Minister of Public Works was circulated to all councils throughout the State on the 11th January, 1952.

This statement laid stress upon the following matters:—

1. The estimated amount available to the Board for the financial year 1951–52 (inclusive of loan moneys) was £1,391,000 more than the previous year.
2. On the other hand, reserves which had accumulated during the war years were now depleted, the balance at the 1st July, 1950 (£1,132,000), having shrunk to £173,000 at the 1st July, 1951, a reduction of £959,000.
3. The net increase in funds for 1951–52 was thus only £332,000, which was more than offset by increased purchases of plant, higher interest charges, &c., which absorbed approximately £600,000 more than in the previous year.
4. Applications for grants for all types of works on all classes of roads had increased from £11,567,492 in 1950–51 to £15,543,701 in 1951–52, an increase of 34 per cent., whereas the estimated receipts had increased by only 4 per cent. over the receipts for the financial year 1950–51.

The receipts from motor registration fees and fines and drivers' licence fees paid to the Country Roads Board Fund during the year totalled £4,186,906, an increase of £688,910 over the amount received during the corresponding financial year. Refunds and the cost of collection amounted to £332,944, making the net revenue £3,853,962.

Under the terms of the *Commonwealth Aid Roads Act* 1950, which operates for five years from the 1st July, 1950, payment to the States of the proceeds of 6d. per gallon Customs duty on motor spirit imported into Australia and of 3½d. per gallon excise duty on motor spirit refined in Australia is divided among the States on the basis which has operated for many years, namely, in the proportion three-fifths as to population and two-fifths as to area. Collections in respect of spirit used in civil aircraft or for the purposes of civil aviation are excluded.

The Act provides that 65 per cent. of the amount set aside as above, less the sum of £600,000 per annum over the whole of the Commonwealth, is to be expended on the construction, reconstruction, maintenance, and repair of roads, on the purchase of road-making plant, or on other works connected with transport, either by road or water. The remaining 35 per cent. of the amount provided is to be expended on the construction, reconstruction, maintenance, and repair of roads in rural areas.

The amount of £600,000 mentioned comprises £500,000 to be expended by the Commonwealth on the construction, reconstruction, maintenance, and repair of strategic roads and roads of access to Commonwealth property and £100,000 to be expended on the promotion of road safety practices throughout Australia.

The total sum received by the Board during the financial year under the provisions of this Act was £2,501,150, so that the total amount available to the Board from State motor registration fees and fines, drivers' licence fees, municipal repayments, &c., and from Commonwealth sources was £6,642,725. This was £1,304,322 greater than the amount received from the same sources in the preceding financial year.

In addition, the Board was authorized to expend a total sum of £1,050,000 from loan moneys during the financial year. The Board's original request to the Government was for an authorization of £1,900,000, but this was reduced to £1,500,000 before submission to the Loan Council, and was subsequently reduced to £1,050,000 to accord with the average authorization of only 70 per cent. of the total amount submitted to the Loan Council by the State of Victoria.

DEFICIENCIES.

Plate No. 1.—Dust on worn out section of Pyrenees Highway near Elmhurst.

Plate No. 2.—Cobden–Warrnambool Road near Elingamite.

Plate No. 3.—Princes Highway West 195-200 miles, failed section West of Yambuk.

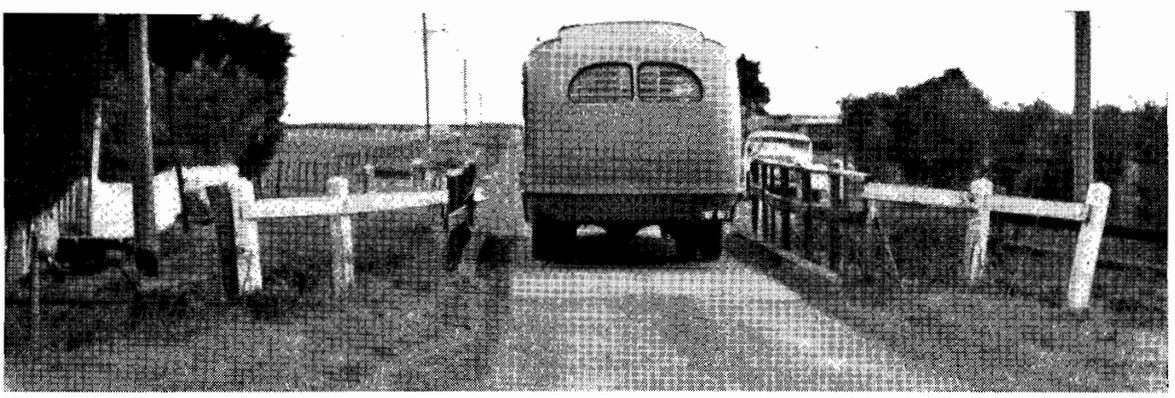


Plate No. 4.—Passenger Bus passing over old narrow bridge on the Koroit–Penshurst Main Road near Koroit.

Expenditure of these loan moneys is governed by (*a*) Acts Nos. 4188, 4414, and 4498, which were intended to provide for the construction and reconstruction of metropolitan roads and bridges, and (*b*) Act No. 5363, which covers the carrying out of permanent improvements and permanent works on State highways, tourists' roads, and forest roads. The amounts actually expended during the year under these headings were £100,461 and £949,539 respectively.

The amount standing to the credit of the Country Roads Board Fund at the 30th June, 1952, was £31,925. This amount is fully covered by commitments in respect of expenditure incurred by municipalities but not claimed by them to date, and liabilities entered into on account of works commenced but not completed. It represents an extraordinarily small residual working balance in comparison with the receipts of £4,141,575 under this heading.

COMMONWEALTH AID ROADS ACT 1950.

The amounts expended on roads, bridges, and purchase of road-making plant during the year from moneys available under the above Act were as follows :—

	£
Maintenance of classified roads to assist municipalities	1,801,962
Construction of roads of a developmental character and restoration and rebuilding of bridges on unclassified roads	574,357
Assistance on construction of Soldier Settlement roads	38,018
Construction, reconstruction, and maintenance of school bus routes	17,463
Roads to properties of isolated settlers	16,371
Repair of flood damage	25,784
Provision towards maintenance of roads previously constructed with moneys provided by the State and the Commonwealth ..	101,334
Removal of drift sand, bush fires restoration works, &c.	56
Purchase of road-making plant..	6,221
Total	2,581,566

On the 1st July, 1950, there were credit balances in the Commonwealth Aid funds amounting to £927,631. By the 30th June, 1951, these had been reduced to nil under Section 6 (1) of the *Commonwealth Aid Roads Act* 1950 and £100,514 under Section 7 of the same Act.

With the limited allocation for new works for the financial year 1951–52, it was inevitable that municipal councils generally would expend a higher percentage of the reduced funds available to them, and it is not surprising, therefore, that the balances at the 30th June, 1952, under Section 6 (1) and 7 respectively of the Commonwealth Aid Roads Act amounted to nil and £20,098. Such very small residual credits can be achieved only by extreme care in administering the funds throughout the year.

TOTAL WORKS ALLOCATIONS.

The total road allocation from all funds for the financial year 1951–52 for new works, i.e., not including revotes and commitments, was £4,223,319, as compared with £7,323,752 for 1950–51. Of the first-mentioned sum, £1,925,566 was allotted from the Country Roads Board Fund, £1,781,326 from Commonwealth Aid Roads funds, and £516,427 from loan moneys.

After taking into consideration revotes and commitments the comparable figures for the years 1950–51 and 1951–52 were £10,097,526 and £7,378,508.

MAIN ROADS.

Allocation of Funds.

An amount of £3,508,006 was allocated during the year for the maintenance and improvement of 9,792 miles of declared main roads, out of a total sum of £5,560,000 applied for. This sum covered such items as patrol and general maintenance, fire protection, bridge maintenance, resheeting, realignment, resealing, initial bituminous treatment, bridge construction, and improvements generally. The expenditure for the year was £2,526,214 or 72 per cent. of the amount allocated, and commitments amounting to £802,550 were

outstanding at the 30th June, 1952. Following its policy of relieving municipalities where possible of portion of their contribution, consistent with the funds available, the Board provided from Commonwealth Aid funds £1,296,871 of the total amount allocated and the balance of £2,211,135 from the Country Roads Board Fund. No contribution was required from the municipalities towards the sums allotted from the Commonwealth funds.

The total allocation compared unfavorably with the allocation for the previous financial year, and was an indication of the very limited funds available to the Board.

One hundred and eighty-eight municipalities participated in the allocation, and, in addition, funds were provided for the maintenance of a number of main roads which are maintained under the direct supervision of the Board. The portion of the total allocation which applied to these last-mentioned roads was £255,733.

Whereas in the financial year 1950–51, provision was made for 29 new bridges throughout the State and for the reconstruction of 35 existing bridges, the corresponding numbers of projects provided for last financial year were 33 and 17 respectively.

Apportionment of Costs.

Under the provisions of the Country Roads Act, not more than one-third of the amount expended on main roads from the Country Roads Board Fund during the preceding year shall be apportioned to the municipalities, their contributions being due and payable on the 1st January in the financial year next succeeding that in which the expenditure was incurred. Provision is also made in the Act for the municipal contribution to be reduced below one-third where the cost of maintenance of any particular road is deemed to be excessive and where such cost is due to motor traffic not of local origin or to timber traffic. In dealing with the apportionment of the cost of works, however, the Board must take into account the revenue, valuation, and rating of the municipality concerned.

In order to assist councils more generally by reducing their contribution to works, it has been customary for the Board for some years past, as indicated above, to supplement allocations for main roads from the Country Roads Board Fund by grants from Commonwealth Aid Road funds, these latter grants being free of contribution by the councils concerned. These supplementary grants of Commonwealth funds are usually made in relation to particular jobs or works or in special circumstances, and are intended to ease the burden on councils by providing certain amounts of "free" money for the carrying out of their works.

During the financial year 1950–51, the rates of contribution by municipal councils had been very carefully revised and, in many cases, still further reduced. Very little alteration was made in these rates during the financial year 1951–52, the rates which previously prevailed being generally adopted.

The position is as summarized hereunder:—

	£		
Expenditure from Country Roads Board Fund during 1950–51	1,370,112	0	7
Expenditure from Commonwealth Aid funds during 1950–51	654,007	0	5
Total Expenditure	2,024,119	1	0
Amount apportioned to councils, based only on expenditure from the Country Roads Board Fund	283,362	3	0
Percentage of apportionment to Country Roads Board Fund expenditure	21·58 per cent.		
Percentage of apportionment to total expenditure	13·99 per cent.		

The corresponding percentages in the previous financial year were 21·24 per cent. and 15·36 per cent. respectively, indicating that average contribution by the Councils to the total expenditure on main roads had been reduced by 1·37 per cent.

If the expenditure from the Country Roads Board Fund had been apportioned strictly on a one-third basis throughout, the total contributions would have been £437,521 17s. 3d. instead of £283,362 3s.

REPLACEMENT OF MAIN ROAD ASSETS.

Plate No. 5.—Ararat Shire : Ararat–Halls Gap Road. Re-alignment over very steep hill (Cope's Hill) West of Ararat, where old pavement was practically worn out.

Plate No. 6.—Tullaroop Shire : Natte Yallock Road, New bridge at Alma replacing worn out narrow bridge.

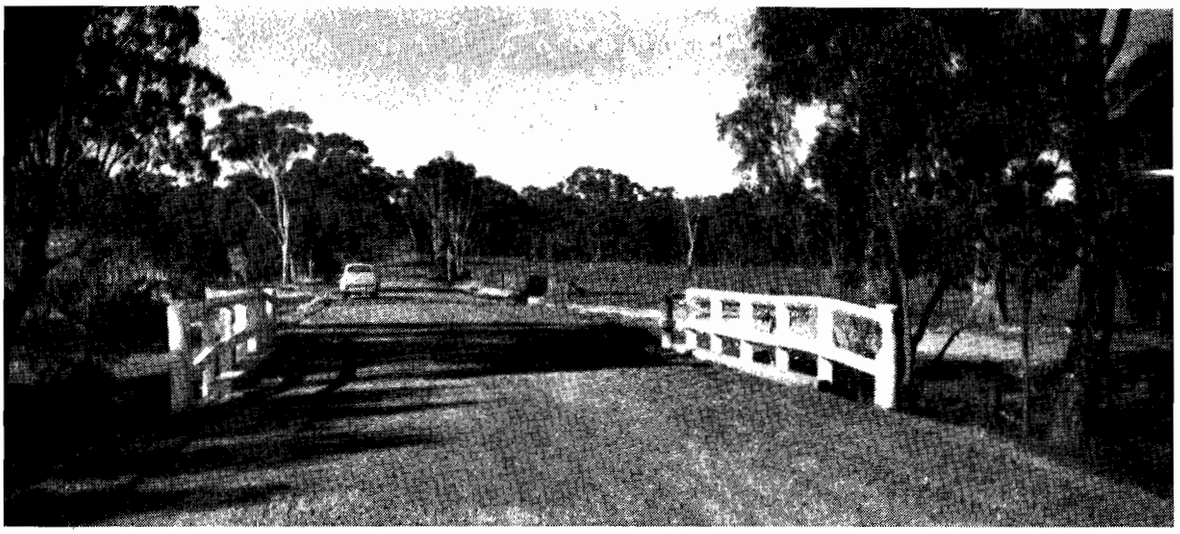


Plate No. 7.—McIvor Shire : Heathcote–Nagambie Road. New steel and reinforced concrete bridge replacing narrow old structure.

Principal Works on Main Roads.

Owing to the deplorable condition of many main roads, the allocation for their maintenance was kept as large as the restricted finances would allow. It was possible to carry out some reconstruction and improvements in addition to patrol and bridge maintenance and maintenance resheeting, but in most cases the extent of such new works and the number of items allowed to proceed were much reduced below applications made by councils, and did not represent an adequate effort in restoration of dwindling assets. Amongst the more important works carried out were the following :—

Bairnsdale Division.

Avon Shire.—Dargo Road, 6,600 lineal feet of reforming and resheeting and 13,200 lineal feet of sealing. This road connects Stratford and Briagolong and is the beginning of the long route to Dargo. It is being used extensively for timber and heavy stock transport.

Ballarat Division.

Ararat Shire.—Ararat–Hall's Gap Road, 14,000 feet of construction and realignment and 11,000 feet of initial seal west of Ararat, over a very steep hill (Cope's Hill) where the old pavement was virtually worn out. The road connects Ararat with Moyston and the surrounding very productive pastoral area and is also used by tourist traffic to the Grampians. (Plate No. 5.)

Buninyong Shire.—Colac–Ballarat Road, 3·47 miles of reconstruction, regrading, and realignment between Little Hard Hills at Enfield and the southern boundary of the Shire, together with priming and sealing 12 feet wide. This work, which was carried out under the direct supervision of the Board, completed an unsealed gap, and the important route between Colac and Ballarat is now sealed throughout.

Daylesford Borough.—Ballan Road, 1,100 feet of reconstruction and initial seal in Vincent Street, Daylesford, a badly worn section of road through the shopping centre.

Glenlyon Shire.—Malmsbury–Daylesford Road, 4,300 feet of reconstruction and initial seal on a section of road easterly from the township of Glenlyon. This was an extension of work carried out through the township during the preceding year.

Ripon Shire.—1. Beaufort–Amphitheatre Road, 2 miles of reconstruction on a section of road which carries heavy timber traffic from Mt. Cole State forest to the Beaufort Mills. 2. Skipton Road, 2·43 miles of initial seal of sections together with reconstruction, widening, and strengthening.

Talbot Shire.—Talbot–Avoca Road, construction of a three-cell reinforced concrete bridge to replace an old wooden bridge which was dilapidated and unsafe.

Tullaroop Shire.—Natte Yallock Road, construction of a three-span reinforced concrete flat slab bridge at Alma to replace a narrow decrepit timber bridge on a poor alignment. (Plate No. 6.)

Benalla Division.

Beechworth Shire.—Beechworth Road, 3·1 miles of reconstruction and initial seal west of Beechworth, and 1·39 miles of reconstruction and initial seal north of Beechworth. This road provides for Beechworth an important link with the towns of Wangaratta and Wodonga and with the Ovens and Hume Highways, the old gravel pavement being worn out and inadequate for post-war traffic using the route.

Benalla Shire.—1. Benalla—Tocumwal Road, 1 mile of primer seal and 2·4 miles of initial seal extension. This road carries considerable through traffic and branch roads serve the wheat and pastoral districts of Thoona, Boweya, Bungeet, and St. James. 2. Dookie–Devenish Road, 0·9 miles of initial seal on the approach to the township of Devenish. 3. Goorambat–Thoona Road, 1·4 miles of reconstruction and initial seal, providing a sealed road from Goorambat to the Benalla–Tocumwal Road and thence to Benalla. 4. Kelfeera Road, 2 miles of reconstruction and initial seal. This is the most heavily trafficked main road leading to Benalla and serves the closely-settled districts of Lurg, Upper Lurg, Upper Molyullah, Greta and Myrrhee.

Bright Shire.—1. Wandiligong Road, reconstruction and initial seal of two sections of 1·1 and 0·78 miles near Wandiligong, which was originally the main centre of the mining industry in the district. Mining interests have been largely replaced by large orchards, extensive nut groves, cattle, and sheep farms. The picturesque valley settlement served

by this road also attracts many tourists. 2. Bright–Tawonga Road, one mile of initial seal near Bright. This road is the direct link between Bright and Tawonga and with the Kiewa Hydro Electric scheme. The heavy traffic includes many passenger and tourist buses. 3. Myrtleford–Yackandandah Road, 1·95 miles of widening and initial seal near Myrtleford. This road, which is the main connecting link between Myrtleford and Wodonga, follows the rich Barwidgee Valley and carries daily passenger buses, school buses and tourist buses, logs and much local produce. 4. Happy Valley Road, 0·8 miles of resheeting and initial seal near Ovens. This road connects the rich Ovens and Kiewa Valleys, and is also used by the State Electricity Commission's passenger and goods traffic because of its easy grades.

Euroa Shire.—1. Euroa–Mansfield Road, 2 miles of surfacing and initial seal. This road serves the valuable pastoral lands of Gooram, and will eventually provide a through sealed road from Euroa to Alexandra and the Eildon Weir. 2. Merton—Strathbogie Road, 1 mile of resheeting and initial seal in the highly productive Strathbogie plateau.

Numurkah Shire.—Nathalia–Katamatite Road, 2·9 miles of initial seal on the main route from Numurkah towards Echuca and Kyabram.

Oxley Shire.—1. Tolmie–Whitfield Road, 6 miles of maintenance resheeting with granitic sand between mileages 00 and 6·00 near Tolmie. Work on this mountainous route is carried out under the direct supervision of the Board. 2. Bright Road, 1·18 miles of reconstruction and initial seal near Markwood. This road, which follows the well-developed Ovens Valley and connects Wangaratta to Whorouly and Myrtleford, carries heavy traffic including local produce, school and passenger buses. 3. Greta–Moyhu Road, 0·5 miles of reconstruction and initial seal near Moyhu. This road serves a closely settled dairying and pastoral area and also leads through to Glenrowan, and the Hume Highway. 4. Wangaratta–Kilfeera Road, 1·00 miles of reconstruction and initial seal near Wangaratta. This road serves an intensive farming area for a distance of 25 miles south of Wangaratta. 5. Wangaratta–Whitfield Road, 3·00 miles of reconstruction and initial seal near Wangaratta. This work comprises the extension of a previously sealed length of the most heavily trafficked main road in the Shire.

Towong Shire.—1. Murray Valley Road, 2 miles of reconstruction, strengthening, and initial seal near Bethanga bridge. The old gravel road was worn out and beyond satisfactory maintenance. 2. Tallangatta–Corryong Road, 0·8 miles of reconstruction and initial seal near Bullioh. 3. Tallangatta Creek Road, 0·6 miles of reconstruction and initial seal near Bullioh. 4. Yabba Road, 0·75 miles of reconstruction and initial seal near Spring Creek. These four projects in the Towong Shire marked the commencement of a long-range plan to seal all the heavily trafficked main roads, the maintenance of the gravel surfaces having become wasteful of materials, effort and funds.

Tungamah Shire.—1. Benalla–Yarrawonga Road, 1·3 miles of initial seal. This work was part of a progressive policy for the sealing of all main roads in the Shire, and was designed to reduce the heavy maintenance costs due to increasing traffic and recurring damages on sections subject to flooding. The road is the main feeder road for several small towns and rural districts. 2. Tungamah–Peechelba Road, 1·5 miles of initial seal. This is the main cross road through the Shire serving Tungamah and Wangaratta and connecting with the Benalla–Yarrawonga Road. It is also subject to flooding.

Violet Town Shire.—1. Harry's Creek Road, 1·04 miles of strengthening and sealing near Violet Town on a section of old waterbound macadam which it had been impossible to maintain satisfactorily. 2. Murchison–Violet Town Road, 1·22 miles of widening, strengthening and sealing near Violet Town. This was also a section of old waterbound macadam which had proved too narrow and impossible to maintain under present-day traffic conditions. 3. Violet Town–Dookie Road, 0·76 miles of widening, strengthening, and sealing near Violet Town, on an old narrow waterbound macadam section of this important connexion between the Midland and Hume Highways.

Wodonga Shire.—Beechworth Road, 2·90 miles of initial seal, being an extension of the existing seal from 2·80 miles to 5·70 miles. This is a main through road and also serves the farms along the valley of Middle Creek.

Yackandandah Shire.—Yackandandah–Wodonga Road, 2·2 miles of initial seal extension. This road serves a rich dairying and pastoral district and carries through traffic between Wodonga and Kiewa and the Ovens Valley.

Yarrawonga Shire.—1. Yarrawonga–Katamatite Road, 1·27 miles of reconstruction and initial seal near Yarrawonga. 2. Yarrawonga–Wangaratta Road, 2·36 miles of strengthening and sealing. This road serves as a main connecting link between Wangaratta and the Murray Valley, and carries heavy farm, timber and general traffic.

Bendigo Division.

Bet Bet Shire.—Dunolly–Eddington Road, 3 miles of reconstruction and initial seal. This road is the most direct route between Dunolly and Melbourne, and heavy through traffic is increasing. The section dealt with adjoins the Eddington end of the road, and was the section most difficult to maintain in an unsealed condition.

Birchip Shire.—Beulah–Birchip–Wycheproof Road, 1 mile of strengthening and sealing completed the sealing of this road in a westerly direction in this Shire from the Birchip–Tehum Lakes, the road carrying heavy wheat traffic. Owing to the scarcity of suitable roadmaking material in this area, the aggregate used on this work had to carted 40 miles to the site.

Charlton Shire.—1. Boort–Wycheproof Road, 6,000 feet of initial seal on a section adjacent to the Avoca River, including numerous floodways. 2. Charlton–Durham Ox Road, 6,034 feet of reconstruction and realignment, in preparation for completing the bitumen seal throughout the whole length of the road. 3. St Arnaud–Wycheproof Road, 1·24 miles of initial seal. This work was part of the Council's policy to have the road sealed to the Wycheproof Shire boundary as a more economical procedure than resheeting with gravel, which has to be carted 30 miles.

Cohuna Shire.—1. Cohuna–Koondrook Road, 1·01 miles of reconstruction and resheeting through a dairy farming area with heavy stock and feed traffic. 2. Cohuna–McMillan's Road, 4,500 feet of initial sealing serving a rich dairying area.

Deakin Shire.—Kyabram–Tongala Road, 0·5 miles of reconstruction and 1 mile of initial seal. This work was part of a progressive programme by the Council to reconstruct and seal the whole length of 10 miles of road, the original seal having failed under the increasing traffic. All narrow State Rivers and Water Supply Commission's bridges and culverts are being widened to provide a maximum width of 24 feet for bridges and 32 feet for culverts.

East Loddon Shire.—Bendigo–Pyramid Road, 2·5 miles of sealing north from the Marong Shire boundary. This was the first step in a plan to seal the whole of this road, which is the most important road in the Shire, leading to the markets in Bendigo.

Gordon Shire.—Charlton–Durham Ox Road, 10,300 feet of initial seal near the Loddon River, between Boort and Durham Ox, on the main outlet from the Boort district to stock markets at Bendigo.

Huntly Shire.—Bendigo–Tennyson Road, 1·75 miles of initial seal at the southern end of the road where it leaves the Midland Highway, a section which was previously severely corrugated and unduly costly to maintain.

Korong Shire.—1. Serpentine Road, 1·65 miles of extension of sealing on an important link between the Calder Highway at Bridgewater and the Loddon Valley Highway, and serving a closely settled area along the Loddon River. 2. Wedderburn–Logan Road, 1·13 miles of extension of sealing. 3. Wedderburn–Boort Road, 1·25 miles of extension of sealing.

Maldon Shire.—Baringhup Road, 1·19 miles of initial seal through the township of Baringhup.

Marong Shire.—1. Bendigo–Eddington Road, 2·36 miles of reconstruction and sealing, including regrading and curve improvements on a section of road which was previously rough gravel with numerous open crossings. 2. Bendigo–Pyramid Road, 3·52 miles of sealing near Sebastian. 3. Bendigo–St. Arnaud Road, 1·7 miles of realignment and reconstruction, including realignment and replacement of a timber bridge of two 24-foot spans.

McIvor Shire.—1. Heathcote–Bendigo Road, 2·80 miles of reconstruction, realignment, and initial seal between two sections previously sealed on the important route from Heathcote, to the market, and industrial centre of Bendigo. 2. Heathcote–Nagambie Road, construction of a new steel and reinforced concrete bridge, on a route serving principally the firewood industry in the district. (Plate No. 7.)

RECONSTRUCTION OF ROAD FROM BIG EILDON PROJECT TO RAILHEAD.

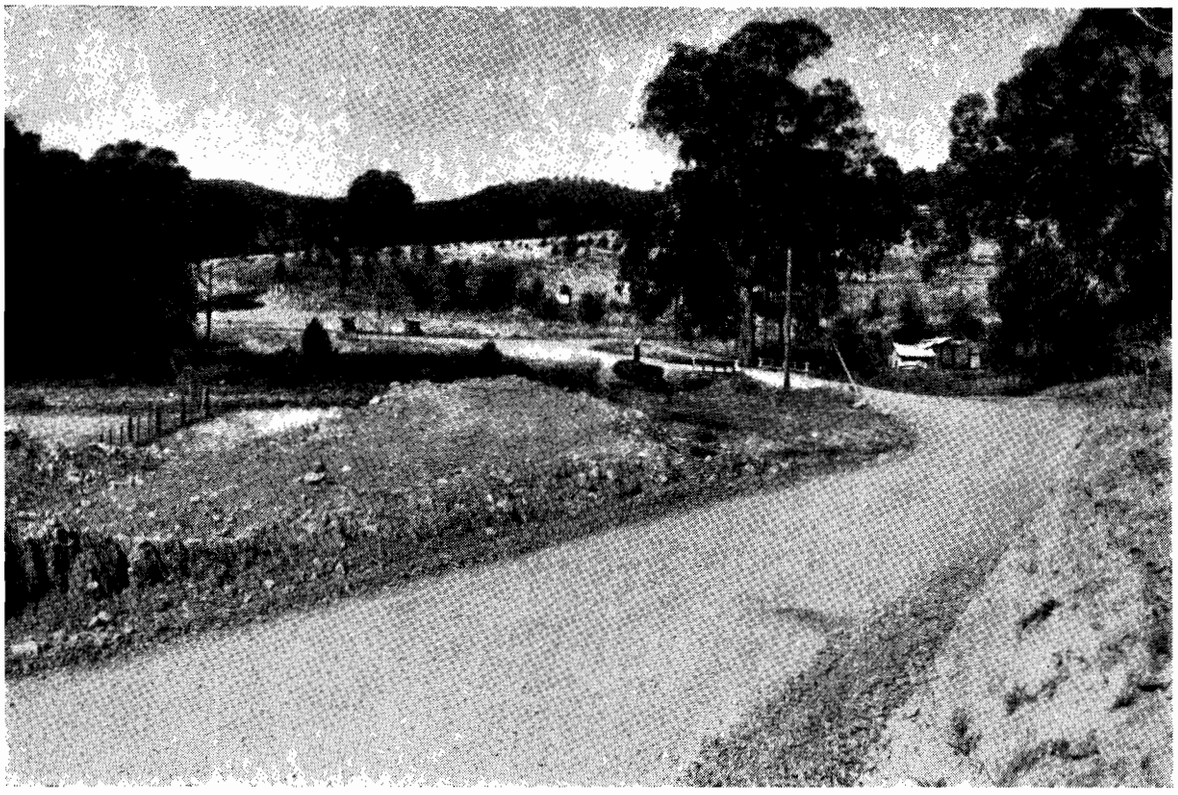


Plate No. 8.—Upper Goulburn Road. Old narrow bridge on road to Eildon Weir at Snob's Creek.

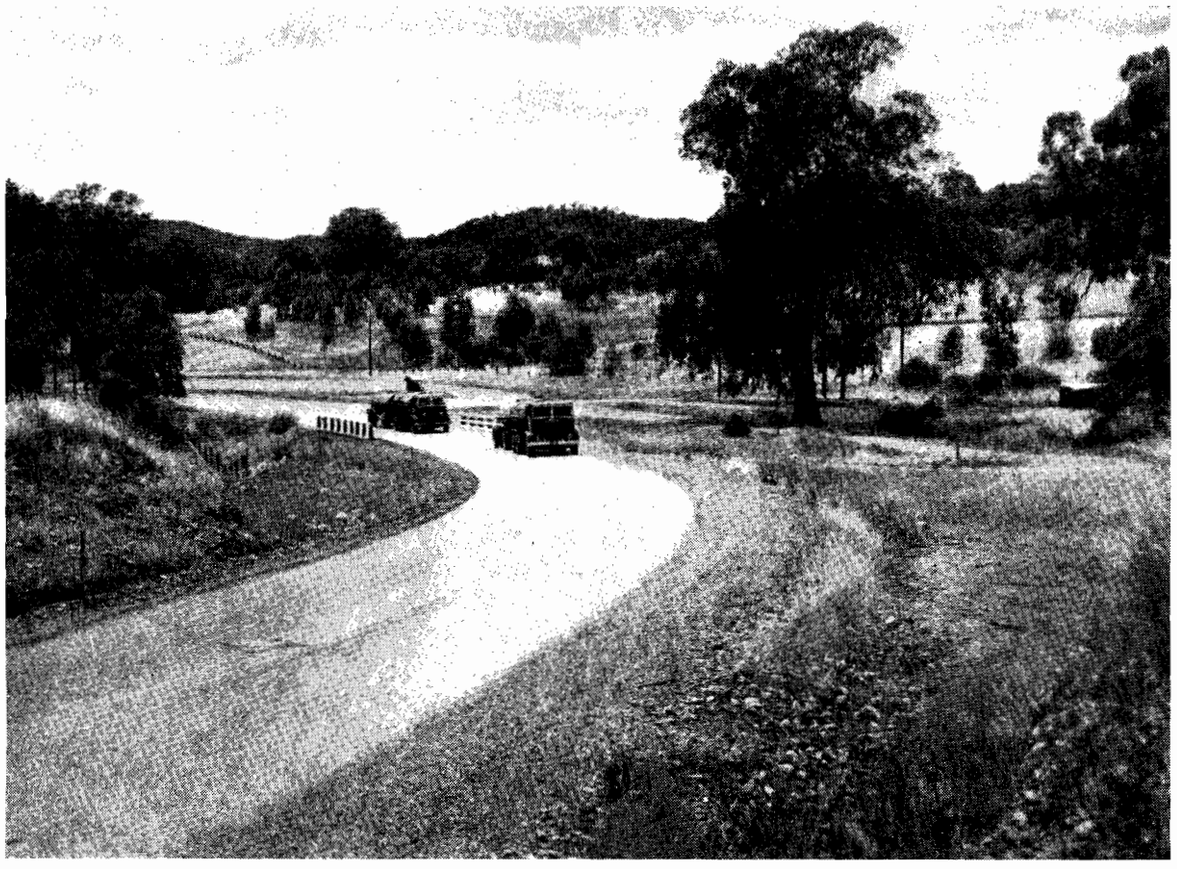


Plate No. 9.—Upper Goulburn Road. New structure replacing bridge shown above.

Rochester Shire.—1. Echuca–Mitiamo Road, 4·1 miles of initial seal in two sections. This was the culmination of a recent reconstruction programme of two sections which had been in a deplorable condition on the main outlet to Echuca from the prosperous irrigation areas of Bamawm and Lockington. 2. Bamawm North Road, 2·2 miles of initial seal, completing the sealing of this important feeder road.

Rodney Shire.—1. Mooroopna–Undera Road, 1·7 miles of strengthening and sealing and 1·5 miles of resheeting with gravel were carried out on this road, which carries heavy traffic and is the shortest link between Shepparton and Echuca. 2. Tatura–Murchison Road, 1·6 miles of strengthening and sealing and 1·4 miles of reconstruction was carried out. The road carries very heavy fruit traffic during the summer. 3. Tatura–Undera Road, 1·2 miles of strengthening and sealing.

Swan Hill Shire.—1. Nyah–Ouyen Road, 2 miles of bituminous surfacing on a section previously sealed which had worn out and was reconstructed and widened with limestone gravel. 2. Robinvale Road, 2 miles of bituminous surfacing on the route connecting the irrigation settlement of Robinvale with Swan Hill via the Murray Valley Highway. 3. Ultima Road, 1·6 miles of bituminous surfacing.

Waranga Shire.—1. Goornong–Colbinabbin Road, 0·63 miles of strengthening and sealing a section which was failing under the increasing traffic loads. 2. Tatura–Rushworth Road, 1·34 miles of strengthening and sealing near the Waranga–Mallee Channel outlet.

Dandenong Division.

Alexandra Shire.—Upper Goulburn Road. Further progress was made during the year with the road reconstruction and bridge replacement work required to provide adequate carrying capacity for heavy traffic during the enlargement of the Eildon Weir. Since commencement of the work in August, 1950, a total of 11 out of 14 miles has been reconstructed and sealed, and the balance of the reconstruction, with the exception of bridge approaches, has been completed in readiness for sealing during the financial year 1952–53. A new bridge over Snobs Creek was completed and work commenced on the U.T. Creek Bridge, Christie's Bridge, and the Goulburn River Bridge. The whole of this project is under the direct supervision of the Board. (Plates Nos. 8 and 9.)

Buln Buln Shire.—Main Neerim Road, commencement of approximately 2½ miles of realignment and reconstruction. This section had been reconstructed with a 12-ft. waterbound macadam pavement on a 22-ft. formation and sealed about 1935. Very heavy wartime and post-war timber and log traffic over the whole length of the road (22 miles) caused such deterioration as to necessitate reconstruction throughout. The work done during 1951–52 was to the standards laid down in the "Ten-year plan," namely a 28-ft. formation with a 21-ft. pavement, traffic in 1950 being 393 vehicles per day, of which 50 per cent. were heavy trucks and timber jinkers.

Chelsea City.—Springvale Road. The road pavement in a section of the road nearest the swamp drain was difficult and costly to maintain, and, even with moderate traffic, the pavement would gradually sink down in the wheel tracks. Investigation of the sub-grade revealed a particularly plastic clay of an average thickness of 20 inches. The reconstruction consisted of removing from 18 inches to 22 inches of plastic clay and replacing it with an approved sand filling, which was consolidated in layers. The salvageable portion of the old pavement was used to form shoulders for the new crushed rock pavement, which was spread on this new sand sub-grade and consolidated in two layers. The new pavement will be primed and sealed at a later date. This road is the main outlet to the farming districts east of Chelsea.

Eltham Shire.—Warrandyte–Kangaroo Ground Road, 4,950 feet of realignment and reconstruction, part of a programme of progressive improvement of the old road which was little more than an earth track, extremely dusty in summer, and impossible to maintain to a reasonable standard under the very heavy tourist traffic which uses it for the greater part of the year.

Ferntree Gully Shire.—Main Ferntree Gully Road, 1,100 feet of reconstruction at Upwey Township. Prior to reconstruction, this section of road consisted of a central bitumen strip with a high crown, with unsatisfactory approach and curves and insufficient space for parking. The road has been widened to 40 feet and sheeted from kerb to kerb in preparation for sealing.

REPLACEMENT OF MAIN ROAD ASSETS.

Plate No. 10.—Barrabool Shire : Anglesea Road. Reconstruction and enlargement of old inadequate culvert at Merrigig Creek.

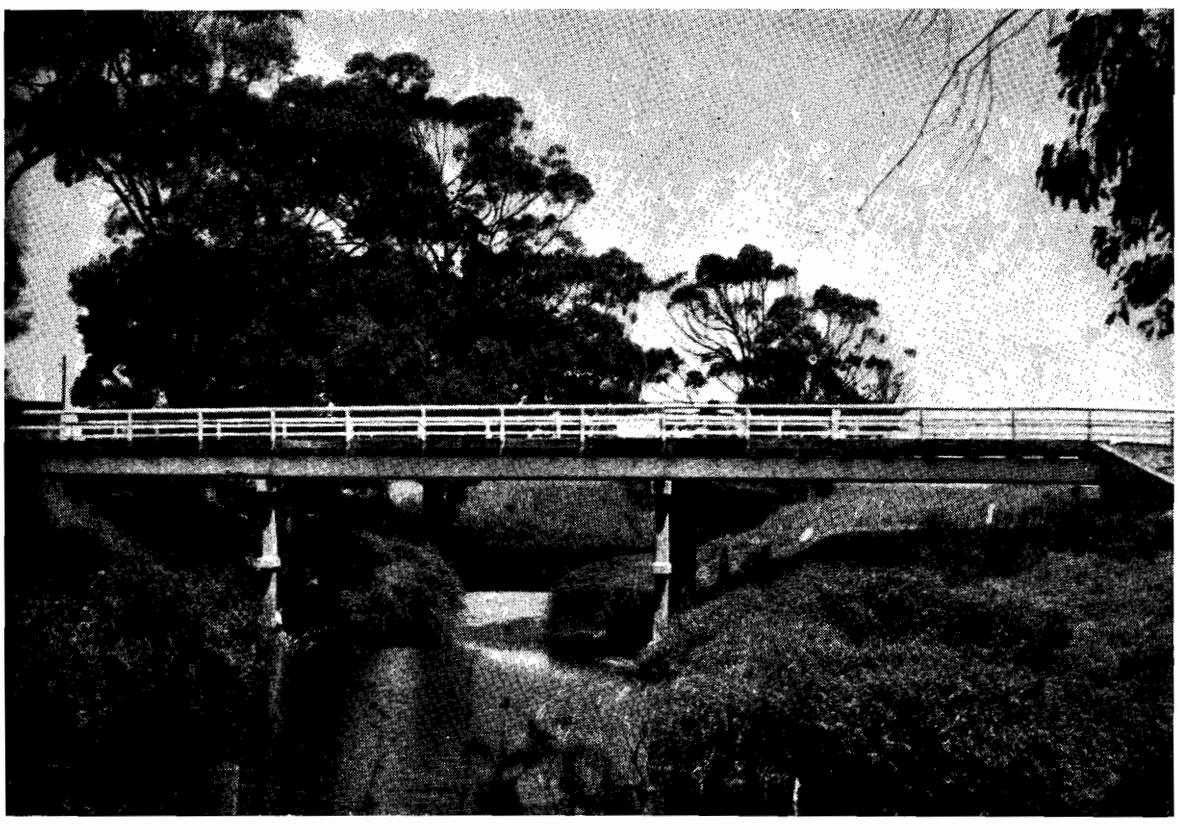


Plate No. 11.—Woorayl Shire : Nerrena Road Bridge over Tarwin River replacing worn out timber structure.

Lillydale Shire.—Ridge Road, 12,558 feet of realignment and reconstruction. This road is one of the best scenic roads in the Dandenong Ranges, and carries a large volume of traffic to the trigonometrical station on the highest peak in the Ranges, 2,070 feet above sea level, from which fine views are obtained over a large area.

Upper Yarra Shire.—Main Warburton Road, realignment and reconstruction of three short sections at Everard's, Riversdale, and Moreland. The work at Everard's involved a total length of construction of 1,074 feet and the acquisition of approximately three-quarters of an acre of land at an abrupt turn which had been the scene of a number of accidents, several of them fatal. The sealing was not completed owing to lack of aggregate, but traffic was enabled to use the new pavement. At the "Riversdale" section a failed pavement originally constructed in 1939 was reconstructed and strengthened in readiness for sealing. Work on the "Moreland" section in Yarra Junction, a length of 497 feet, was commenced but held up by wet weather.

Warragul Shire.—Brandy Creek Road, commencement of 5,000 feet of reconstruction, widening, and realignment between Bravington and Rokeby. This road carries timber trucks from mills in Rokeby and the Neerim district, together with quarry traffic, milk and farm produce, and to cope with this heavy traffic, the pavement was widened from 12 feet to 20 feet.

Geelong Division.

Bannockburn Shire.—Geelong–Hamilton Road, new superstructure on the Bruce's Creek bridge at Murgheboluc. The old substantial bluestone abutments and piers were in excellent condition but the superstructure comprising three spans of timber stringers with cross decking was in an advanced stage of decay. In 1930, longitudinal decking 2 inches thick was placed over the cross decking and sealed with bitumen, but decay has continued making further repairs impossible, so that reconstruction became essential. The new superstructure is of five lines of rolled steel joists with the standard timber deck. The abutments and piers were also strengthened and the abutments widened to enable the alignment of the bridge to be improved.

Barrabool Shire.—Anglesea Road, Merrigig Creek Bridge, precast concrete deck of four spans of 10 feet using U beam sections and kerbs carried on old masonry abutments and piers. (Plate No. 10.)

Bellarine Shire.—1. Portarlington–Queenscliffe Road, 2 miles of reconstruction and seal immediately south of the Portarlington township. Besides serving a mixed farming area, this road connects the Bellarine Highway and the Geelong–Portarlington (main) Road, thus providing a very attractive tourist drive around the Bellarine Peninsula. 2. Portarlington–St. Leonard's Road, 1·75 miles of reconstruction of the only unsealed length between Geelong and St. Leonard's was commenced, but had to be discontinued owing to wet weather.

Colac Shire.—1. Colac–Beech Forest Road, 2·37 miles of reconstruction and sealing. 2. Colac–Forrest Road, 1·73 miles of reconstruction and sealing. 3. Corangamite Lake Road, 1·04 miles of reconstruction and sealing.

Leigh Shire.—Rokewood–Shelford Road, 2·19 miles of reconstruction and seal on a very important and direct link between Geelong and Skipton, largely used for cartage of superphosphate and wool.

Newham and Woodend Shire.—Woodend–Lancefield Road, 5,472 feet of resurfacing with fine crushed rock and initial seal. This work completes the seal from Woodend to the rich potato growing district of Newham and facilitates tourist traffic to the Hanging Rock Reserve.

Romsey Shire.—Woodend–Lancefield Road, 1·92 miles of reconstruction and 1·14 miles of sealing. The section reconstructed connected two sealed sections, but the available funds would permit of the sealing of only 1·14 miles at this stage, in conjunction with 0·14 miles of resealing on an adjacent section.

Winchelsea Shire.—Birregurra–Forrest Road, 1,140 feet of reconstruction and seal. This section of road had to be reconstructed owing to pavement failure, the material now used being fine crushed rock from Colac. The road is the main outlet from Forrest for sawn and log timber and all farming produce.

Horsham Division.

Dimboola Shire.—1. Rainbow Road, 1 mile of construction and extension of seal. This work represents a further step towards providing a sealed road between Rainbow and Jeparit. 2. Warracknabeal Road, 1·25 miles of reconstruction, strengthening and sealing of a failed pavement. The original seal had broken up owing to the lightly constructed old pavement being unable to carry the heavy transport traffic to which it is now subjected.

Donald Shire.—1. Donald–Minyip Road, 1·6 miles of construction using 4 inches consolidated of gravel over 4 inches of a local non-plastic drift sand, sealed 12 feet wide. A 6-ton load limit is at present in force on this road because of the weakness of the sections. 2. Marnoo–Donald Road, 2·7 miles of sealing on a section constructed in previous financial year, thus completing the sealing of the Donald Shire portion of the cross-country link between Donald and Stawell.

Dunmunkle Shire.—1. Stawell–Warracknabeal Road, 2·5 miles of widening and reconstruction of the worst of the failed sections on an important connexion between the Western and Henty Highways, the shortest route from Melbourne to Rupanyup, Minyip, and Warracknabeal. 2. Murtoa–Minyip Road, 4·35 miles of reconstruction and sealing. Except for the first 2 miles from Murtoa, these towns were previously connected by a crushed rock road which in places was very low owing to table drains being filled with drift from adjoining agricultural land. The reconstruction work consisted of salvaging the existing stone, raising the formation on the lower sections, spreading fine crushed rock, and sealing. The road is one of the main feeders for the Grain Elevators Board's bulkheads at Murtoa, where most of the local wheat is stored when surrounding silos are filled.

Kaniva Shire.—1. Broughton Road, 1·61 miles of construction and extension of sealing. This road serves well populated farming areas at Miram and Broughton. 2. Kaniva–Edenhope Road, 1·5 miles of construction and extension of sealing. 3. South Lillimur Road, 0·4 miles of construction and extension of sealing, connecting a previously sealed section with the Western Highway.

Kara Kara Shire.—1. Charlton Road, 1·65 miles of construction and extension of sealing. 2. Marnoo–St. Arnaud Road, 2·5 miles of construction and extension of sealing.

Karkarooc Shire.—Rainbow–Beulah–Birchip Road, 2 miles of construction and extension of sealing on a section east from the Beulah Cemetery which had been constructed in limestone and was difficult to maintain.

Kowree Shire.—1. Apsley–Natimuk Road (*a*) 3 miles of construction and sealing on a section of road leading westerly from the Carpolac railhead, and (*b*) 9 miles of sealing of a primer seal constructed in the previous financial year. This latter section completes the sealing of the road to the Arapiles Shire boundary. 2. Natimuk–Hamilton Road, 3·2 miles of construction and primer seal. This road serves the newly settled Fulham Soldier Settlement Estate and is alternative route between Hamilton and Horsham. 3. Edenhope–Horsham Road, 2·5 miles of construction extending from the end of the seal at 10 miles from Edenhope towards Horsham. This is part of a project for eventually linking with the sealing in the Arapiles Shire and completing a sealed road to Horsham.

Lowan Shire.—1. Lorquon West Road, 0·83 miles of construction and sealing, thus extending the sealing to a point 5½ miles from Nhill. 2. Yanac Road, 0·95 miles of construction and sealing. This road is now sealed for approximately 7½ miles from Nhill.

Stawell Shire.—1. Marnoo–St. Arnaud Road, 1·25 miles of construction and extension of sealing immediately adjacent to the township of Marnoo, at the wheat silos and railway goods siding. The old pavement was almost completely worn away. 2. Navarre Road, 2·6 miles of construction and extension of sealing. The old road was practically worn out, and as it included sections with insufficient sight distance and sharp curves the opportunity was taken to include in the new work considerable improvement in alignment and visibility.

Warracknabeal Shire.—1. Warracknabeal–Rainbow Road, 1·42 miles of construction. This section, which was originally constructed in 1937 to a width of 16 feet with a consolidated depth of 6 inches was failing, due to inadequate depth, and reconstruction was undertaken to a width of 19 feet with a consolidated depth of 7 inches of limestone, with a view to sealing. The road serves a farming area, which includes soldier settlement. 2. Birchip–Warracknabeal Road, 1·75 miles of construction. This section, originally constructed in 1941 to a width of 15 feet and with a consolidated depth of 5 inches, was failing, and, as this was the only unsealed section of the road within the Shire, reconstruction was undertaken with a view to sealing as soon as possible. The pavement was reconstructed to a width of 15 feet and a consolidated depth of 8 inches in preparation for a 12 feet seal. The road traverses good farming and pastoral areas and is an important cross-country connexion.

Wimmera Shire.—1. Grampians Road, 2 miles of construction and 4 miles of sealing of section previously constructed. This road serves farmers in the foothills of the Grampians and is also a direct tourist link between the Western Highway near Horsham and Halls Gap. 2. Horsham–Murtoa Road, 1·57 miles of reconstruction and sealing, including realignment of curves, on a badly failed old sealed section.

Traralgon Division.

Traralgon Shire.—1. The Traralgon West Road, 1·70 miles of reconstruction and sealing. This road provides access to the Australian Paper Manufacturers Ltd. Maryvale Mill from Traralgon and Tyers, 60 per cent. of the traffic consisting of passenger buses and trucks carting pulpwood. 2. Traralgon–Gormandale Road, construction of five-span flat slab reinforced concrete bridge 75 feet long and 22 feet between kerbs at Flynn's Creek, together with 0·70 miles of approaches. This bridge replaces a very old timber structure on a poor alignment and in an advanced state of decay. 3. Traralgon–Maffra Road, 0·60 miles of reconstruction on the southern approach to the Latrobe River, where most of the old pavement had failed due to insufficient thickness over a saturated sub-grade.

Woorayl Shire.—Leongatha–Yarragon Road, construction of two triple-cell reinforced concrete culverts to replace two wooden culverts which had reached the end of their useful life. Nerrena Road, construction of a new bridge with reinforced concrete piers and abutments, rolled steel joist stringers, and a timber deck over the Tarwin River (Pearson's Bridge) to replace an old wooden truss type bridge in very bad condition. (Plate No. 11.)

Warrnambool Division.

Glenelg Shire.—1. Merino–Coleraine Road, 1·84 miles of reconstruction and realignment commencing at Merino township. This work in hilly country involved regrading, with cuttings up to 9 feet deep and fills up to 7 feet. A reinforced concrete flat slab bridge was also constructed (King's Bridge) over Miakite Creek. The road serves a closely settled dairying district and the Merino Butter Factory at 2½ miles from Merino. 2. Casterton–Penola Road, 2·02 miles of reconstruction and regrading, and 5 miles of seal, including sealing a section reconstructed in the previous financial year. This road serves the Lake Mundi and neighbouring grazing districts and also carries interstate traffic, including softwood timber.

Traralgon Division.

Works carried under the direct supervision of the Board in this Division included—

Morwell Shire.—1. Morwell–Mirboo Road, 0·50 miles of reconstruction through the Township of Boolarra. 2. Traralgon West Road, 1·50 miles of forming on deviation through the A.P.M. area at Maryvale, connecting the Traralgon West and the Morwell–Maryvale Roads.

STATE HIGHWAYS.

Notwithstanding the great volume of work required on the State Highways to overtake arrears of maintenance and effect much needed improvements, it was necessary to make a very restricted allocation, and, as the financial position deteriorated during the financial year, works had to be closed down or eliminated from the original programme in order to keep expenditure within the limits of the Board's resources.

Divisional Engineers were instructed to apply at the beginning of the year for commitments in hand and for such essential works as could reasonably be completed or well advanced during the year taking into account the manpower and materials available in their respective country areas and allowing for increasing costs. Their applications totalled £5,265,065, but an allocation of only £3,549,430 could be entertained by the Board, which was later reduced to £2,321,849 by postponement or curtailment of many items of works which it is really essential to put in hand if the road system is to afford economical transportation of produce in the localities served and if wastefully high road maintenance costs are to be avoided.

The expenditure actually incurred was £2,158,205 4s. 10d., including £949,539 9s. 2d. from loan moneys used in reconstruction of old, worn out and inadequate sections and bridges. The rate of reconstruction is, however, far below that which is really necessary to cope with the effects of intensified post-war traffic.

RECONSTRUCTION ON STATE HIGHWAYS.

Plate No. 12.—Omeo Highway. Grader and multi-tyred rollers preparing surface for sealing, North of Tambo Crossing.

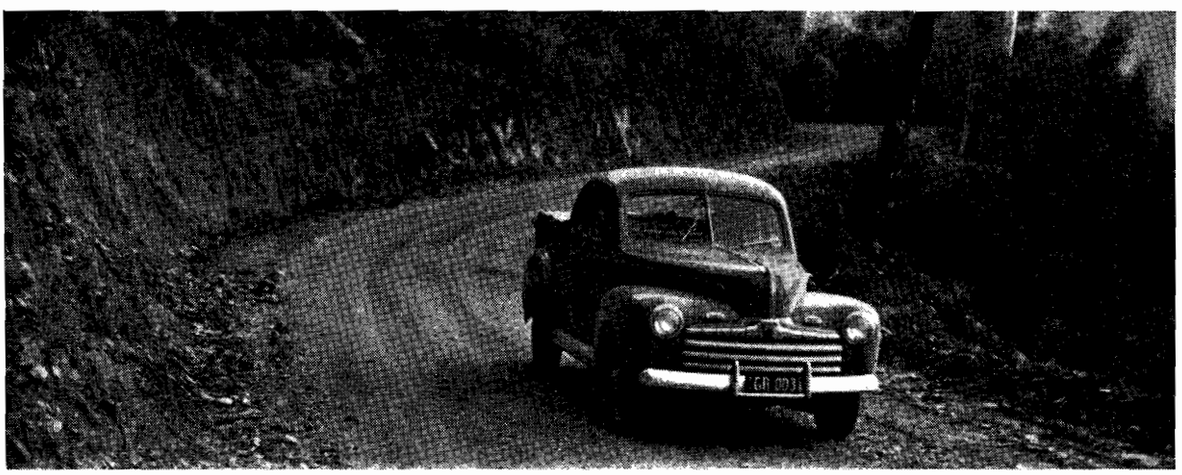


Plate No. 13.—Omeo Highway. Widening and gravelling on very narrow rock cutting near Tambo Crossing.

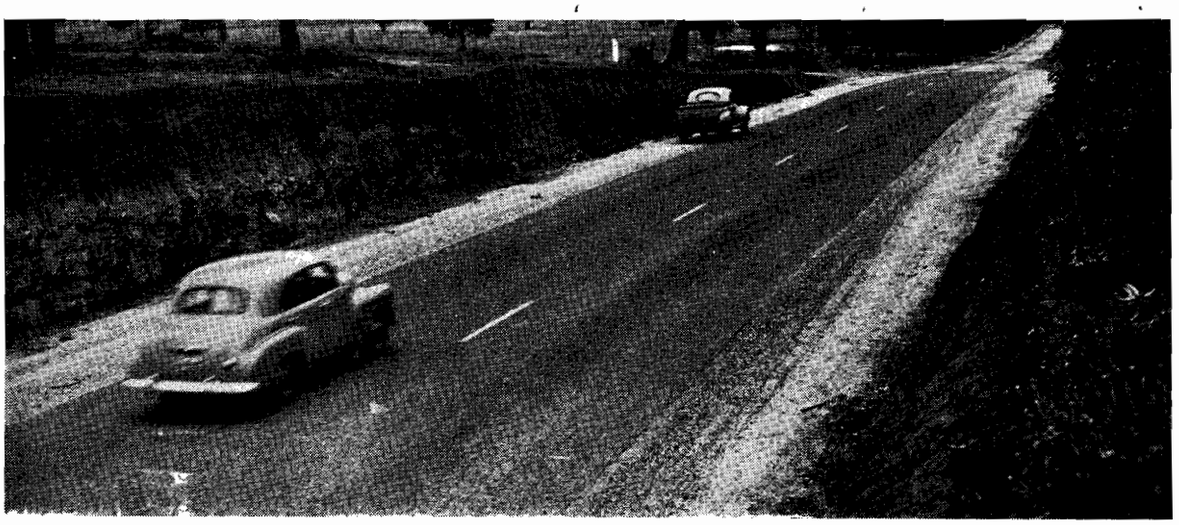


Plate No. 14.—Hume Highway. Reconstruction of failed section near Springhurst.

The more important works in progress during the year included the following :—

Bairnsdale Division.

Princes Highway East.—1. One mile of reconstruction through the township of Lakes Entrance. 2. Deviation at Mt. Raymond, east of Orbost. 3. Reconstruction of a 10-mile section between Mt. Raymond and Cabbage Tree (earthworks only). 4. Maintenance resheeting of approximately 8 miles between Cann River and the New South Wales border.

Omeo Highway.—1. Reconstruction of 1·1 miles between Bruthen and Ramrod Creek. 2. Replacement of old worn-out bridge at Swift's Creek. 3. Widening and improving curves between Omeo and Tambo Crossing. 4. 2·5 miles of initial seal. 5. The widening of a length of 5½ miles between Rocky Knob and Bogong Saddle, an extremely narrow section on a road which carries heavy timber traffic. (Plates Nos. 12 and 13.)

The restriction of funds hampered progress with vital improvements to this road, which is so important for the Omeo district and the Upper Tambo Valley.

South Gippsland Highway.—Erection of a bridge at Monkey Creek to replace the floodway which blocks traffic frequently.

Ballarat Division.

Western Highway.—Strengthening of a total length of 0·74 miles in two sections at Bradshaw and Gordon and sealing of the section at Bradshaw.

Midland Highway.—Widening, resheeting, and sealing of the narrow section of 1·99 miles north of Elaine.

Pyrenees Highway.—1. Bridge over the Wimmera River at Elmhurst and construction of approaches. 2. 5,500 feet of reconstruction near Warrayadin. 3. Construction and sealing of 0·92 miles north-east of Carisbrook. 4. A short section of 1,194 feet on the Cairn Curran deviation (completed except for sealing).

Benalla Division.

Hume Highway.—1. Reconstruction, realignment, and widening of a worn out section 3·78 miles in length near Avenel. 2. Reconstruction and widening of a very weak section of 8·83 miles between Springhurst and Chiltern (work closed down early in 1952 owing to the shortage of funds). (Plate No. 14.) 3. Reconstruction of 0·64 miles of the narrow old pavement through the town of Wodonga, in conjunction with a similar section of 0·3 miles of the Murray Valley Highway. (Plate No. 15.) These streets, which carry traffic as heavy and intensive as many metropolitan roads, were quite inadequate and beyond practicable maintenance.

Murray Valley Highway.—1. Reconstruction, widening, and sealing 0·73 miles near Lake Moodemere. 2. The sealing of a reconstructed section west of Yarrawonga (5·88 miles) together with a section of 3·23 miles east of Cobram. 3. Reconstruction of sections of 3·62 miles north of Nathalia and 2·00 miles south of Nathalia, with a view to sealing. All these sections were previously of the low-cost standard totally unable to withstand post-war traffic. Unfortunately there are still 29·38 miles between Strathmerton and McCoys Bridge awaiting similar work to enable loads up to legal limits to be carried along this vital artery. Meanwhile a 6-ton limit has to be enforced in an endeavour to make maintenance feasible but the patrol effort is frequently overwhelmed either in wet conditions or in dry and dusty months.

Goulburn Valley Highway.—Reconstruction of a length of 2 miles between Katunga and Strathmerton and sealing of 4 miles between these townships, including a section strengthened in the previous financial year. (Plate No. 16.)

Bendigo Division.

Calder Highway.—1. Sealing of length of 4·9 miles between Mittyack and Nunga. 2. Construction of Hattah deviation between Trinita and Nowingi, 14·6 miles in length, the completion of which will reduce the distance to Mildura by about 6 miles. It was, however, necessary to close down the work during the year owing to lack of funds.

Northern Highway.—1. Reconstruction and widening of a worn-out section of 2 miles south of Runnymede. 2. Extensive repairs to the bridge over the Campaspe River at Elmore.

RECONSTRUCTION ON STATE HIGHWAYS.

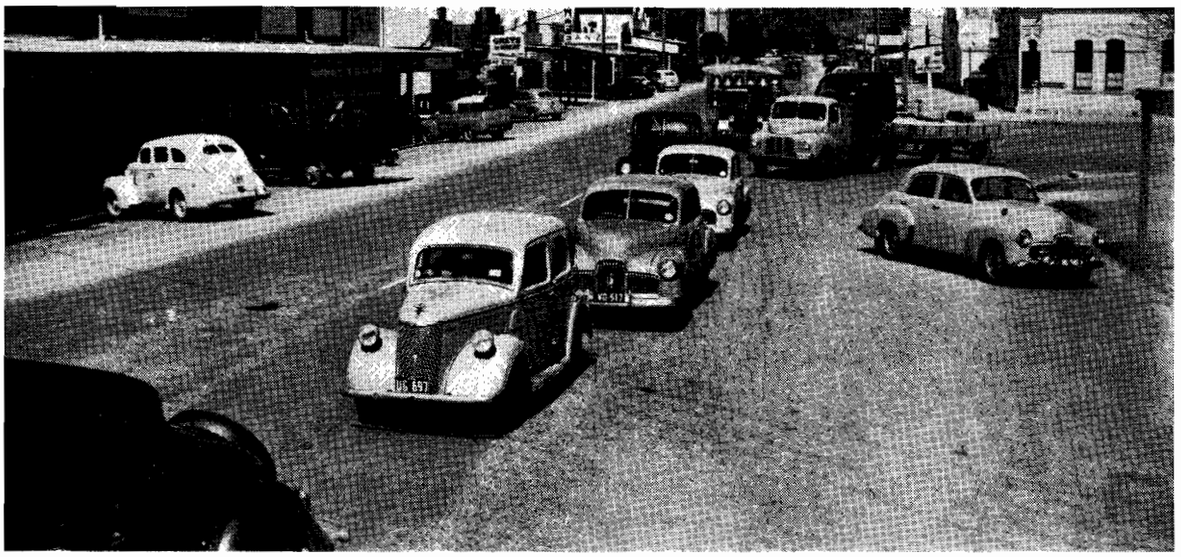


Plate No. 15.—Hume Highway and Murray Valley Highway. Reconstruction and widening of heavily-trafficked section in Wodonga.

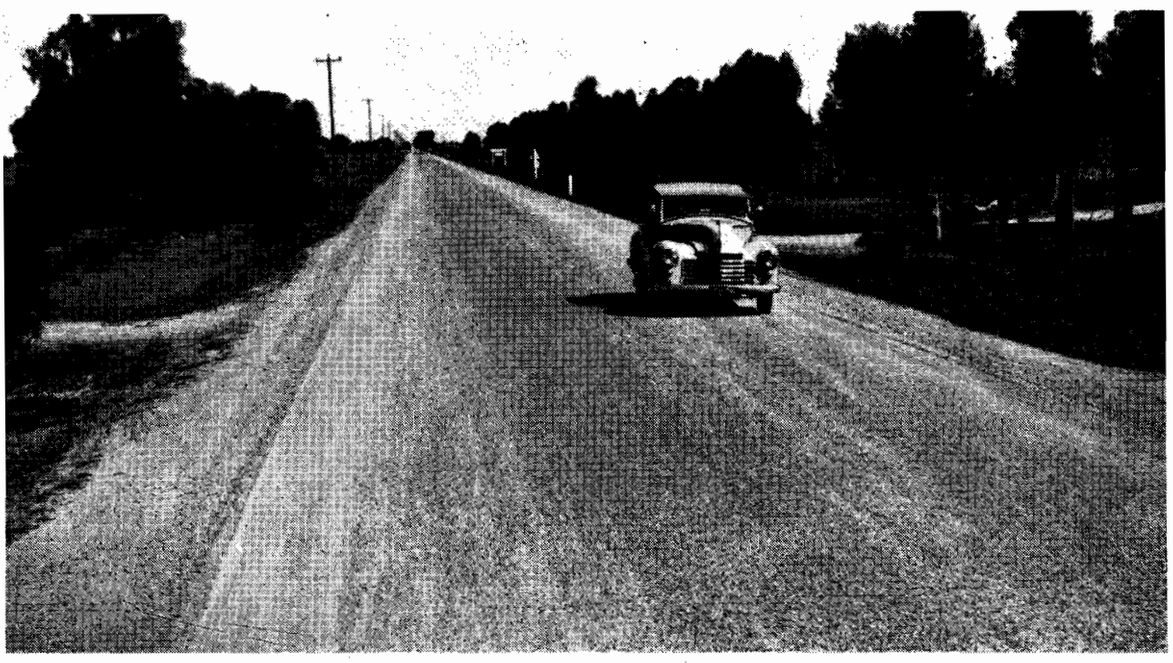


Plate No. 16.—Goulburn Valley Highway. Strengthening and sealing of weak rough section South from Strathmerton.

Plate No. 17.—Loddon Valley Highway. Reconstruction of failed section North of Durham Ox.

Murray Valley Highway.—Although this highway before the war was sealed from Echuca to Swan Hill, it had been built only to a very light standard, and in the post-war period one length after another has failed over the whole section, necessitating very heavy reconstruction. Work was commenced on the reconstruction and widening of 3·95 miles between Turrumberry and Gunbower, and at Kerang East similar work was commenced on a length of 2·07 miles. Between Kerang and Lake Charm two lengths totalling 3·10 miles reconstructed in the previous year were sealed, and between Mystic Park and Lake Boga a section of 2·75 miles was reconstructed, widened and sealed. There are still 138·5 miles to be strengthened and reconstructed between McCoy's Bridge over the Goulburn River and Lake Powell.

Midland Highway.—1. Sealing of a length of 1·93 miles westerly from Corop over the Mt. Camel Range, which was reconstructed in the previous financial year, together with (2) a section 2·8 miles in length west of Byrneside constructed in 1950–51.

Sturt Highway.—Sealing of a section of 4 miles reconstructed during 1950–51, together with reconstruction and sealing of a further length of 13 miles. Traffic carrying produce and passengers over this interstate route results in costly maintenance on the limestone sections 13 miles long not yet strengthened and sealed.

Loddon Valley Highway.—The reconstruction of failed sections north of Durham Ox, totalling 4·76 miles, was commenced, but in this case also, the work had to be drastically curtailed owing to shortage of funds. (Plate No. 17.) Work was continued on the reconstruction and widening of a gap in previous work 3·35 miles long at South Kerang, and 2·85 miles was completed and sealed. This highway is also subject to a 6-ton load limit pending a long programme of strengthening.

Dandenong Division.

Princes Highway East.—Construction of a culvert and approaches at Ti-Tree Creek near Bunyip.

Bass Highway.—Work was continued on the very rough worn out section between Anderson and Dalyston, a length of 4 miles, but could not be completed owing to lack of funds. (Plate No. 18.)

Hume Highway.—Widening of old 20-ft. pavement by 4 feet for two miles between Boundary Road, Coburg, and Camp Road, Broadmeadows, to accommodate very heavy truck traffic. It has been impossible to maintain the shoulders in reasonable condition under this traffic. Similar work was commenced on a further section north of Camp Road, but was closed down owing to the financial stringency. The narrow bridge at Kal Kallo was widened and redecked.

Nepean Highway.—1. Sealing of a length of 0·95 miles east of Dromana reconstructed in the previous financial year. 2. Reconstruction and improvement at Ballieu's corner, near Sorrento, over a length of 0·6 miles (work closed down owing to lack of funds). 3. Construction of reinforced concrete culvert with footway at Boneo Drain near Rosebud West, replacing an old timber bridge.

South Gippsland Highway.—1. Reconstruction of a weak length of 2·4 miles between Thompson Road and Cranbourne, commenced in the previous financial year, was completed, but work on two similar sections near Sherwood had to be left in an unfinished state owing to shortage of funds. 2. At Caldermeade a section which failed for 0·82 miles was reconstructed, widened, and sealed.

Geelong Division.

Princes Highway West.—1. Strengthening and sealing of failed sections totalling approximately 1 mile in length between Footscray and Geelong. 2. Strengthening and sealing of 1·95 miles near Buckley. 3. Extensive major patching of sections failing under brown coal traffic between Winchelsea and Geelong.

Calder Highway.—Completion of new deviation and culvert at Corkscrew Hill. (Plate No. 19.)

Western Highway.—Continuation of important reconstruction through the Pentland Hills, the total length completed in the financial year being 1½ miles.

REALIGNMENT OF DANGEROUS SECTIONS OF STATE HIGHWAYS.

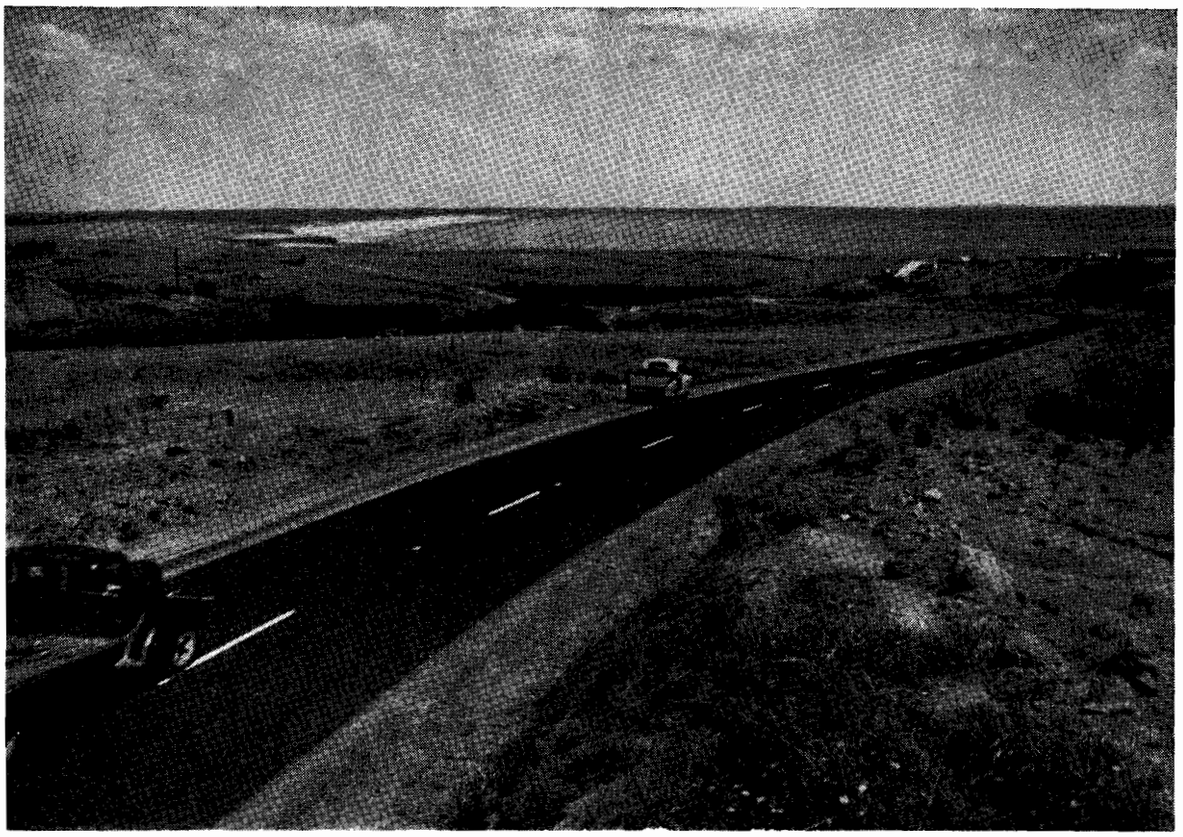


Plate No. 18.—Bass Highway. A reconstructed section south-east of Anderson.

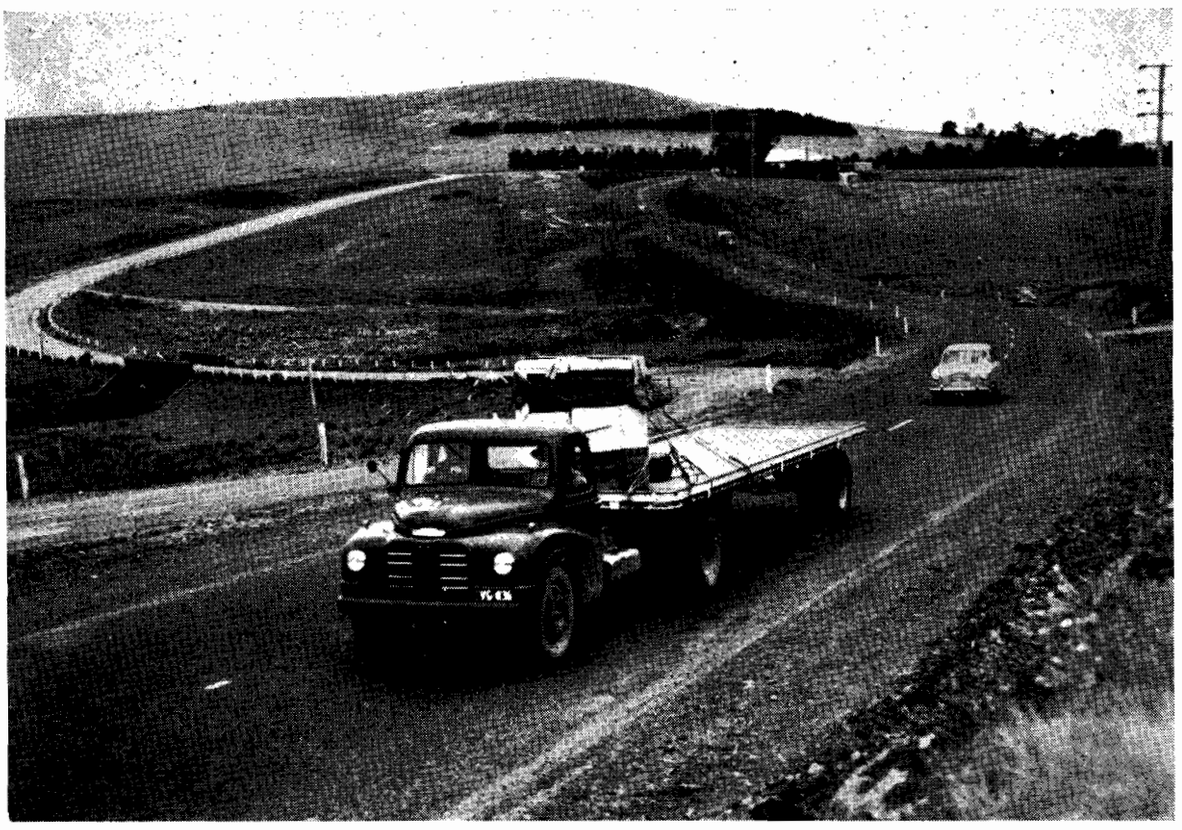


Plate No. 19.—Calder Highway. Reconstruction replacing old "Corkscrew" section, the scene of many serious accidents and fatalities.

HORSHAM DIVISION.

Western Highway.—1. Widening and reconstruction of a section of 1·1 miles through Green Park, near Horsham. 2. Reconstruction and primer seal between Gerang Gerung and Nhill over a length of 6·1 miles. 3. Reconstruction and primer sealing of 1·3 miles near Merwyn Swamp, east of Kaniva, and 3·3 miles between Kaniva and Lillimur.

Henty Highway.—1. Reconstruction of 5 miles at Mockinya together with half the length of 11 miles between Kellalac and Dooen, and application of a primer seal to these sections. 2. A quantity of 25,000 cubic yards of crushed sandstone was stockpiled between Kellalac and Dooen with a view to completing the reconstruction of that section in the following year.

Borung Highway.—Reconstruction of the section of 7 miles between Litchfield and Carron.

North Western Highway.—1. Reconstruction of 3·4 miles at Swanwater. 2. Reconstruction of 1·9 miles at Lake Nurrumbeet. Sealing of both sections had to be deferred for financial reasons.

METROPOLITAN DIVISION.

Nepean Highway.—Work was commenced on the reconstruction of the Warrigal Road intersection which involves complete channelization to improve conditions for the very heavy traffic on both the roads concerned.

TRARALGON DIVISION.

Princes Highway East.—1. Repair of extensive failures between Darnum and Trafalgar. 2. Widening of the approaches to the old Moe Railway Bridge, together with the completion of the approaches to the new railway bridge over the new Moe–Yallourn Railway. 3. Reconstruction of the section of the highway through the township of Morwell.

South Gippsland Highway.—The construction of the new bridge over the Agnes River.

WARRNAMBOOL DIVISION.

Princes Highway West.—1. Reconstruction and sealing through township of Port Fairy. 2. Construction of a new bridge over the Shaw River at Yambuk. 3. Reconstruction of 3·51 miles of failed sections west of Yambuk.

TOURISTS' ROADS.

The greater portion of the expenditure on tourists' roads during the year was for general maintenance, and only a limited number of improvements could be carried out. The total expenditure on tourists' roads for the financial year was £196,512, most of the work being under the direct supervision of the Board.

The total length of proclaimed tourists' roads at the 30th June, 1952, was 432 miles.

On Mt. Buller Road a small amount of widening was undertaken to accommodate the increasing traffic to the Alpine Village on the Mount. (Plates Nos. 20, 21, and 22.)

FOREST ROADS.

The expenditure during the year on this type of road was £69,150, the total length of proclaimed forest roads at the 30th June, 1952, being 375 miles.

Works were generally in the nature of patrol maintenance and maintenance resheeting, the limited funds at the Board's disposal being inadequate to permit of any substantial improvements being carried out.

Work under the Board's Direct Supervision:

Narracan Shire.—Walhalla Road, improvements to sharp curves and widening narrow sections of roadway between Thompson River and Walhalla. The formation was widened from 10 feet to 20 feet and passing places provided for traffic.

Plate No. 20.—Widened section Mt. Buller Road, providing for passing and parking.

Plate No. 21.—Mt. Buller Road, ungravelled section under winter conditions.

Plate No. 22.—Mt. Buller Road. Visibility improved by removal of bank at hairpin bend.

UNCLASSIFIED ROADS.

Following the procedure adopted in previous years, the municipal councils throughout the State had been invited to submit their applications for grants for the construction and maintenance of unclassified roads as well as for the construction of roads to serve the properties of isolated settlers.

The following amounts represent the total of the applications received :—

	£
Unclassified roads, construction	4,208,793
Unclassified roads, maintenance	540,000
Roads to properties of isolated settlers	140,579
..	4,889,372

After providing for commitments of councils as at the 1st July, 1951, and for limited maintenance on roads in particularly remote areas, generally under the Board's direct supervision, the Board was unable to make a general allocation for further work of the above types on unclassified roads. Only £1,017,999 could be allocated for construction and maintenance works on such roads, but this amount included £805,025 to meet commitments entered into in the previous year.

The inability of the Board to make its customary allocations for further works on unclassified roads reacted very harshly on councils generally, especially on those who had built up plant and gangs to cope with these works. Some councils had in fact already completed the considerable programme authorized for 1950–51 and in other cases works were well in hand and were completed in the first half of 1951–52. Assistance on the unclassified roads was thus confined to cleaning up the arrears of authorized works in some only of the municipalities. In the circumstances almost the whole of the available C.A.R. funds were expended, the balance of £20,098 on the 30th June, 1952, being negligible. It may be emphasized that there was no diversion of funds available from that portion of Commonwealth aid which in accordance with the statute must be utilized on other than main roads and State highways. In years gone by, the Board was able to swell the grants on unclassified roads by drawing on Federal aid funds generally, but today this money is all required in the battle to hold the assets of the declared roads, e.g., in assisting councils with maintenance of main roads.

The lack of funds was particularly felt in connexion with the maintenance of unclassified roads (" Federal Maintenance ") for which the Board had in previous years been able to make a fairly substantial allocation. In the absence of new grants from the Board for either construction or maintenance many councils have placed a considerable strain upon their financial resources in order to retain their direct labour organizations in the hope that further funds would be forthcoming in the new financial year.

ISOLATED SETTLERS' ROADS.

For the same reasons as applied in the case of unclassified roads generally, the Board was unable to make any allocation during the year for the construction of roads to serve the properties of isolated settlers.

BRIDGES.

The rate of bridge reconstruction throughout the State is still far from satisfactory. The amount of work undertaken was in fact considerably less than in the previous financial year. This was primarily due to the very limited funds available to the Board, and it is apparent that it will be quite impossible to keep the structures abreast of the requirements of modern traffic unless those funds are greatly augmented at a very early date.

Labour and materials were in short supply, and the shortage of professional officers able to undertake the preparation of plans and designs is again severely felt. The only redeeming feature of the year's operations was the fact that more contractors (including overseas firms) are coming into this field and keener competition might reasonably be anticipated in the future

During the year, 104 bridges of a total value of £371,352 were initiated, bringing the total number of structures erected or in course of erection by the Board, and by Municipal Councils with funds provided by the Board, to 3,767. Of the new projects, 34 of a total value of £242,169 were supervised by the Board and 70 of a total value of £129,183 were supervised by Municipal Councils.

REPLACEMENT OF BRIDGES.

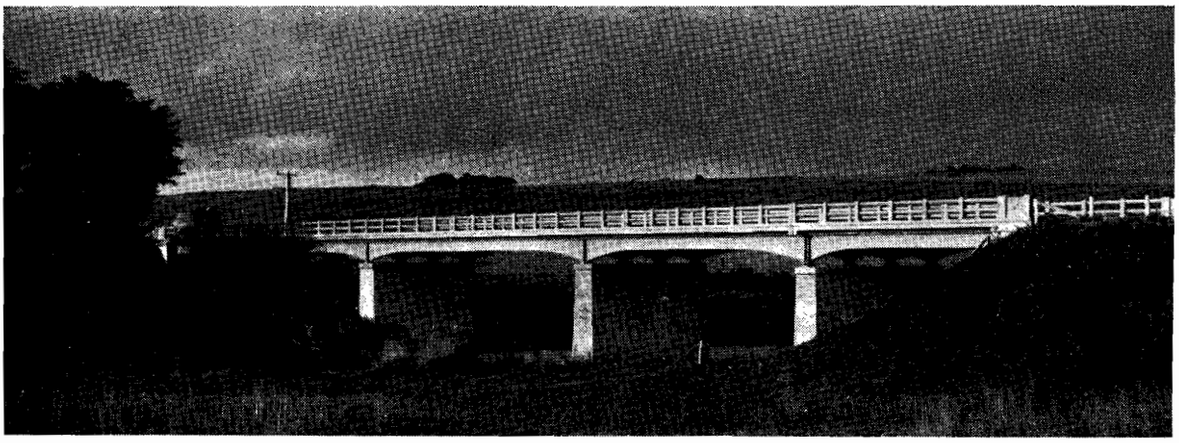


Plate No. 23.—Warrnambool Shire : Warrnambool–Caramut Road. Bridge over Merri River replacing structure washed away in floods of 1946.

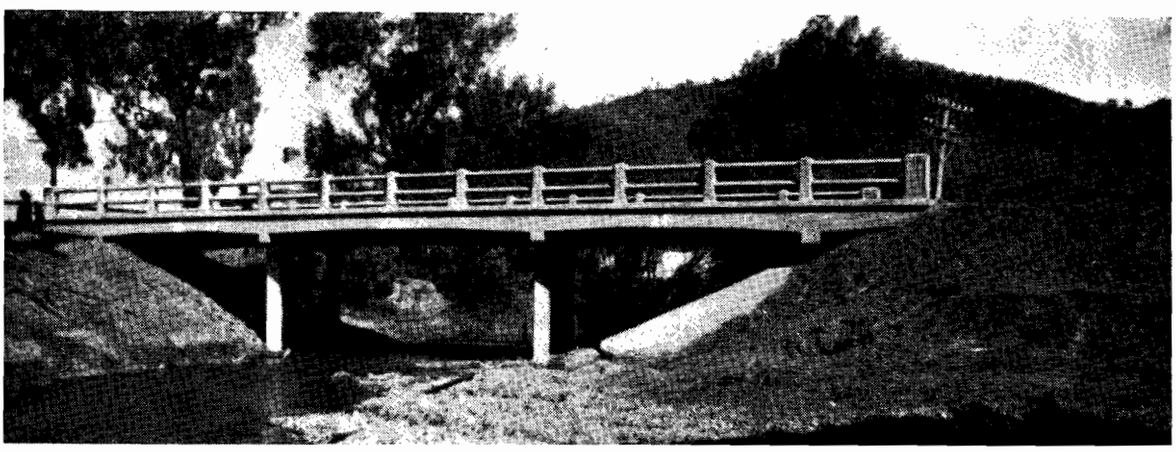


Plate No. 24.—Omeo Highway. Bridge over Swift's Creek replacing narrow, decrepit, old timber structure.

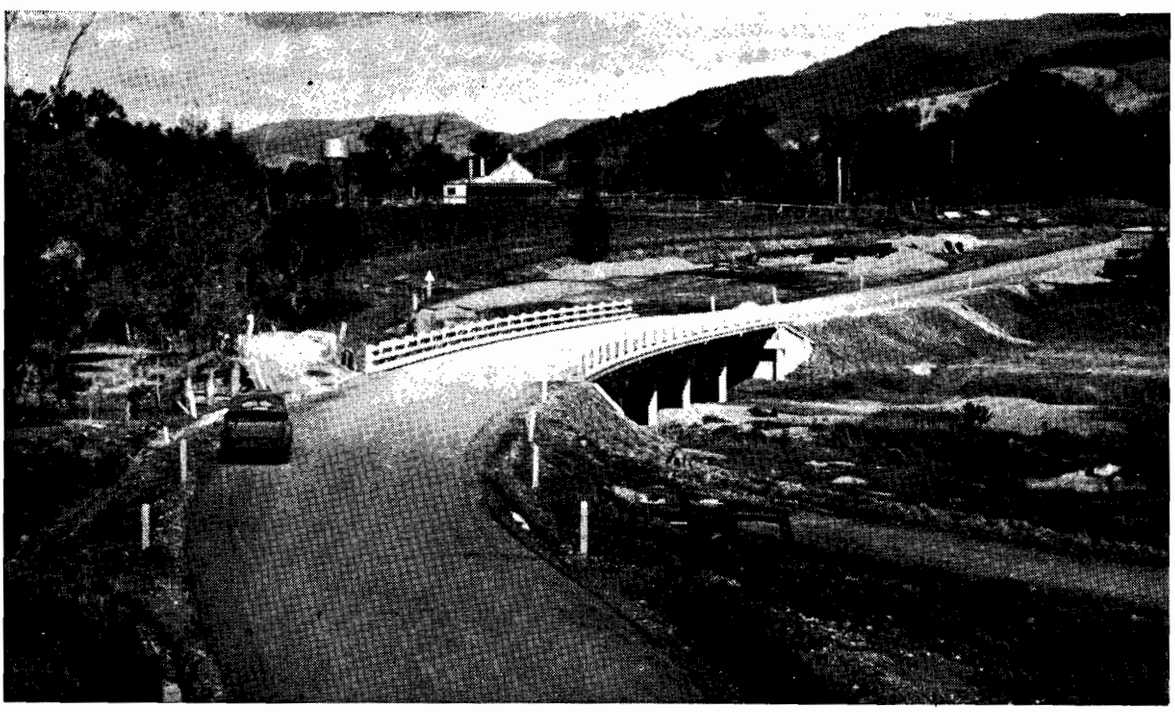


Plate No. 25.—Kiewa Valley Road. Bridge over Yackandandah Creek replacing two weak narrow bridges and improving the alignment and visibility.

Metropolitan Bridges.

Swan Street (*Yarra River*).—The superstructure of this metropolitan bridge, which was commenced in September, 1946, and on which there have been numerous interruptions was completed in April, 1952, after further delay caused by another industrial dispute. At the 30th June, the project had progressed to the stage that the only work remaining to be done was the placing of the handrails, the completion of the deck surface, and the removal of the falsework in the river.

Bell Street (*Darebin Creek*).—Progress on this bridge which is being carried out by contract, has not shown any improvement despite attempts to expedite the work, but by the end of June it had almost reached the stage of the casting of the superstructure. Considerable work has been done on the construction of the approaches, especially on the Heidelberg side.

Bell Street (*Merri Creek*).—Tenders were invited for a new bridge at this site, but in view of the very difficult nature of the work it was decided to carry it out by direct labour. A commencement was made late in May, 1952.

Structures on the Melbourne–Footscray Road.

The major portion of the temporary bridge over the Maribyrnong River was constructed, the work being carried out by contract with materials supplied by the Board. Arrangements have been made for the construction of the approaches to be put in hand with a view to the structure being available for traffic at an early date.

Pending the passing of the necessary legislation relating to the apportionment of the cost of the main bridge, no action has yet been taken other than certain preliminary work.

Northern Metropolitan Bridges.

Albion Street (*Moonee Ponds Creek*).—Plans for a reinforced concrete bridge 122 feet long, providing a roadway of 28 feet width with two 6-ft. footways have been completed with a view to tenders being invited and the work commenced early in the financial year 1952–53.

Moreland Road West (*Moonee Ponds Creek*).—Plans for a reinforced concrete bridge 121 feet long, providing a roadway 28 feet wide with two 9-ft. footways are well in hand. It will be necessary to construct a temporary bridge at this site to carry traffic during the construction of the main structure.

Arthurton Road (*Merri Creek*).—Plans for a bridge 112 feet in length, providing a 28-ft. roadway with two 6-ft. footways are in course of preparation.

Country Bridges.

Important bridge projects in country areas completed during the year included :—

Cassidy's bridge over the Merri River on the Warrnambool–Caramut Road in the Shire of Warrnambool. A rolled steel joist and timber bridge was built on this site in 1941, but, with the exception of the abutments, was completely washed away in the severe floods of March, 1946. A new structure built by the Council has now been completed consisting of five spans with reinforced concrete piers on sylinder foundations extending down to rock, the total length of the bridge being 286 feet and the width between kerbs 22 feet. (Plate No. 23.)

Swift's Creek Bridge on the Omeo Highway (Shire of Omeo). New bridge, of the reinforced concrete fiat slab type, has three spans and a total length of deck of 90 feet with a width of 22 feet. It replaces the old timber structure 86 feet long and 15 feet wide which had outlived its usefulness. The concrete piles of the new bridge were the only precast units, the whole of the superstructure and some of the foundations being cast *in situ*. (Plate No. 24.)

Bridge over Yackandandah Creek on the Kiewa Valley Road in the Shire of Yackandandah. The new reinforced concrete bridge replaces two bridges (one of timber and the other of concrete) on a very poor alignment. It consists of six spans each of 30 feet, and is 24 feet wide between kerbs. Apart from the improved alignment, the new bridge has been constructed to provide for the very heavy traffic which uses this road in connexion with the State Electricity Commission's project at Mt. Beauty. (Plate No. 25.)

FLOOD DAMAGE.

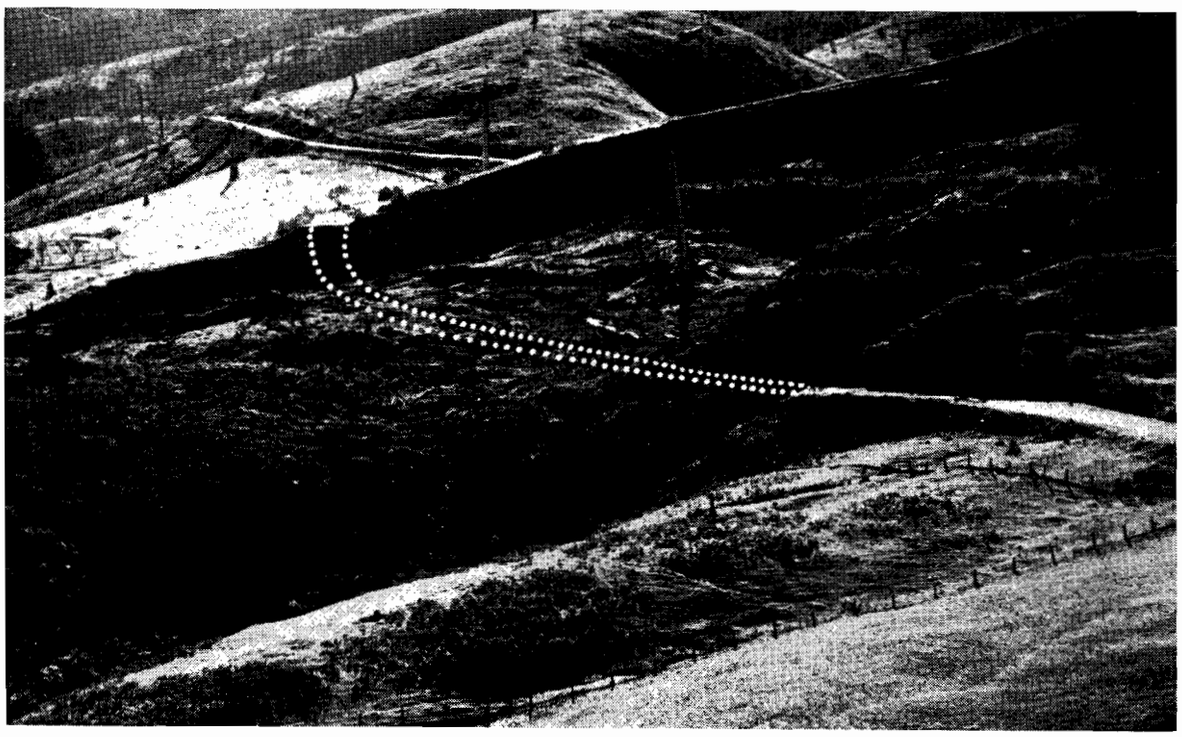


Plate No. 26.—Forrest–Apollo Bay Road. 1,000 feet of road carried down by slip.

Plate No. 27.—Ocean Road. Cleaning up after landslip between Lorne and Skenes Creek.

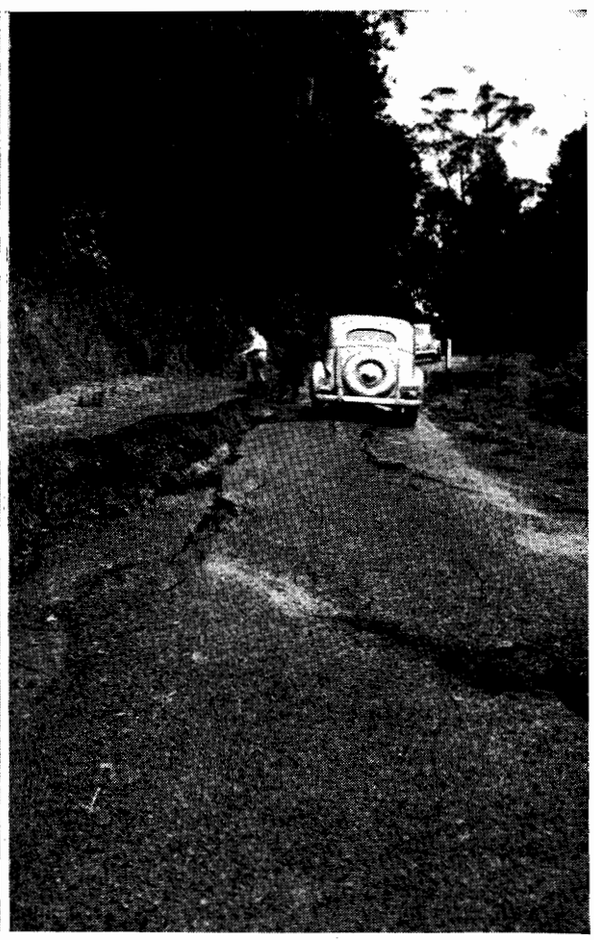


Plate No. 28.—Forrest–Apollo Bay Road. Subsidence destroying old permanent work.

FLOOD AND BUSH FIRE DAMAGE.

Serious floods occurred in certain parts of the State on several occasions during the financial year, and considerable damage was done to roads and bridges, both on classified and unclassified roads. In addition, bush fires in the north-eastern part of the State early in 1952 caused substantial damage to bridges and culverts.

In a statement submitted to the Minister of Public Works by the Board in February, 1952, it was indicated that the amount of damage involved as a result of the floods and fires was approximately £245,000, made up as under :—

Class of Road.	Flood Damage.	Fire Damage.	Total.
	£	£	£
Declared	103,976	16,400	120,376
Unclassified	100,972	23,600	124,572
Total	204,948	40,000	244,948

After consideration of the Board's report, the Government decided to make available an amount of £100,000 for assistance to municipalities for road and bridge works necessitated by floods and bush fires, on the following terms :—

1. The money was to be expended only on unclassified roads.
2. £60,000 of the amount was to be made available to Councils for bridge works and road blockages, free of contribution by the Councils.
3. The remaining £40,000 was to be allocated for other road repair works subject to a local contribution.

The total sum of £100,000 was subsequently allocated by the Board on the following basis :—

	Bridges and Road Blockages.	Other Road Works.	
		Government Contribution.	Council Contribution.
	£	£	£
Fire Damage	18,750	..	..
Flood Damage	41,250	40,000	7,130
Total	60,000	40,000	7,130

Whilst the provision of this sum by the Government was of great assistance to municipal councils, no special provision was made for declared roads, on which the cost of repairing damage was estimated at £120,376, so that it was necessary to provide for this work from the Board's own funds, already extremely short of the requirements for even normal maintenance. This could only be done by way of transfers from grants already made, as the Board had no reserve funds to which additional expenditure of this nature could be charged.

Later in the financial year, further severe floods occurred which caused extensive damage to roads and bridges in various parts of the State. An approximate estimate of £750,000 was submitted to the Minister at the end of June, 1952, for the consideration of the Government, and the total estimate of the cost of eventual repairs has since risen to nearly a million pounds. The matter of providing special assistance has been receiving the consideration of the Government.

The occurrence of floods emphasizes the need for more flexibility in the Board's finances. The road and bridge assets of the State have been damaged so seriously that transport is being forced to use very uneconomical detours, or is blocked for unduly long periods. The funds at the disposal of the Board are already inadequate for proper preservation of assets to cope with present day traffic, and additional funds to provide for such contingencies are a virtual necessity, especially as it is most unlikely that in subsequent years the State will be entirely free from the disastrous effects of floods and bush fires.

FLOOD DAMAGE.

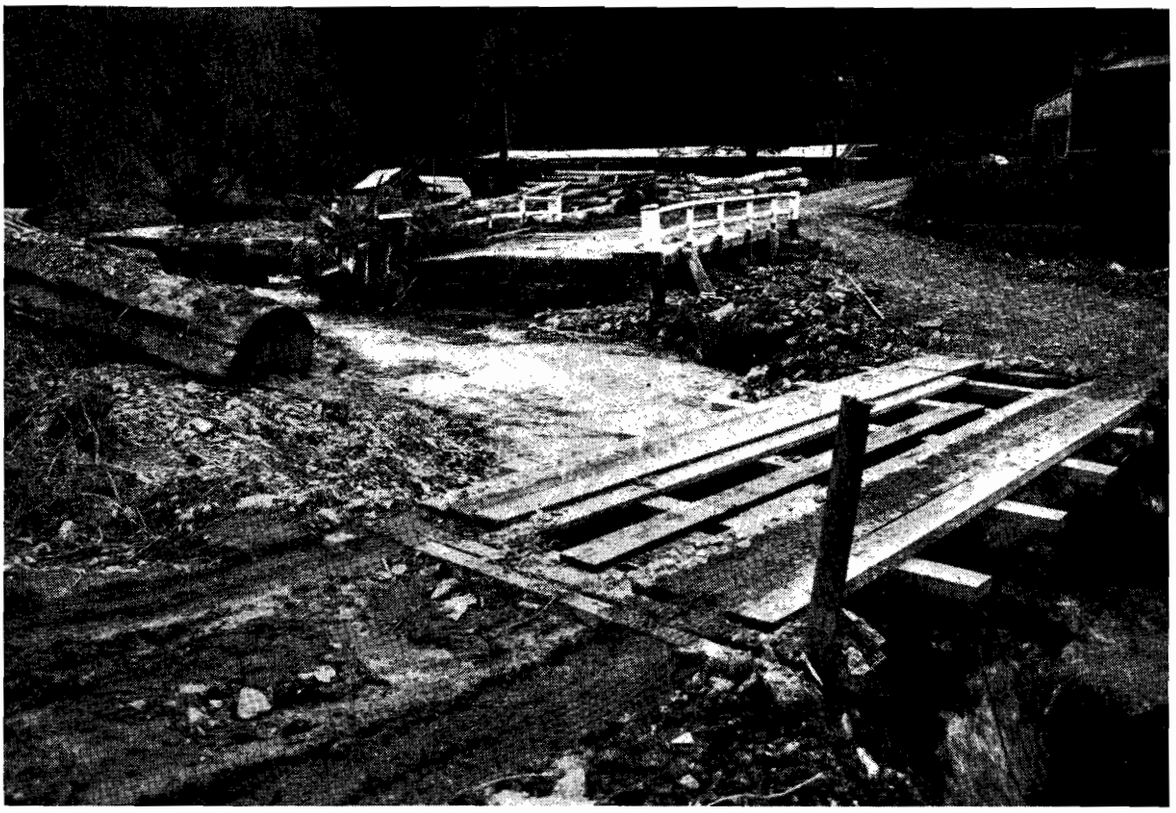


Plate No. 29.—Walhalla Road. Obstruction of bridge over Stringers Creek by debris with extensive scour behind abutment.

Plate No. 30.—Princes Highway East, washaway at Thompson River, Sale.

FLOOD DAMAGE.

Plate No. 31.—Princes Highway West, floodwaters scouring road at Little River.

Plate No. 32.—Princes Highway West at Winchelsea, showing maximum flow of water under old arch bridge.

During the severe floods in June, 1952, a landslip occurred on the Forrest–Apollo Bay (main) Road at its junction with Busty Road, approximately 4½ miles north of the Ocean Road. This slip was the largest of its kind experienced in this area since the Board's inception, and it has completely carried away about 1,000 feet of the Forrest–Apollo Bay Road and approximately 600 feet of the Busty Road practically at the junction of the two roads. The slip followed on torrential rains which in that area are said to have totalled 26 inches in two days and 32 inches in all in six days. It extended from the very top of the ridge above the main road very close to a house, and a huge mass of saturated earth and clay slid right down the hill and dammed up the Wild Dog Creek. The " damming " action was not, however, serious, and eventually the water soon cut a track through the slip material.

Plate No. 26 indicates the character of the slip and shows the remnants of both road pavements half-way down the hill and still in their relative positions, with trees and fence posts still standing upright after moving some 300 feet to 400 feet.

Inspection revealed no solid rock or hard material underlying the slip, and there appears to be every possibility of the slip extending and remaining unstable for a long period, especially as a great deal more rain could be expected in that area before the summer.

Ways and means of re-locating the section of the main road affected are being investigated, and it would appear that the only solution will be an extensive deviation about 1½ miles in length. (See also Plate No. 28.)

Other roads which were severely damaged by floods during the year included the following :—

Ocean Road in the Shires of Barrabool, Winchelsea, and Otway, where numerous landslips occurred, fillings were washed out and culverts damaged. (Plate No. 27.)

Carrajung–Gormandale Road in the Shire of Alberton where damage consisted generally of slips, scouring of pavement and abutments of bridges, and the destruction of 600 feet of road by a major landslip which commenced in April, 1950. An extensive deviation will be necessary to deal with the last-mentioned item.

Walhalla Road in the Shire of Narracan, where extensive landslips and scours occurred, together with the destruction of two bridges in Walhalla township. (Plate No. 29.)

Licola Road in the Shire of Maffra, where numerous slips, scours, and damage to culverts occurred. Extensive damage was also caused to many other main and unclassified roads in this Shire, the estimated cost of repair approximating £100,000.

Princes Highway East, in the Traralgon and Bairnsdale Divisions, where a number of scours and washaways occurred and serious damage was done to bridges and culverts. (Plate No. 30.)

Marlo Road in the Shire of Orbost, where fresh damage was done to the section of road at Gilbert's Gulch, resulting in the temporary isolation of the township of Marlo.

Princes Highway West, in the Shire of Corio, where flood waters crossed the highway at a number of points and caused a serious dislocation of traffic, and at the bridge over the Barwon River at Winchelsea, where extensive repairs were necessary. (Plates Nos. 31 and 32.)

South Gippsland Highway in the Shire of Rosedale, where serious shoulder scour and pavement failure occurred between Sale and Giffard West.

WORK FOR OTHER AUTHORITIES.

A great deal of work was carried out during the year by the Board on behalf and at the cost of other authorities, both State and Commonwealth, the total expenditure during the financial year being £1,239,107 11s. 1d. The principal works are summarized hereunder :—

SPECIAL WORKS FOR OTHER AUTHORITIES.

Plate No. 33.—Kiewa Valley Road. Bridge over Swamp Creek, designed for State Electricity Commission's heavy traffic.

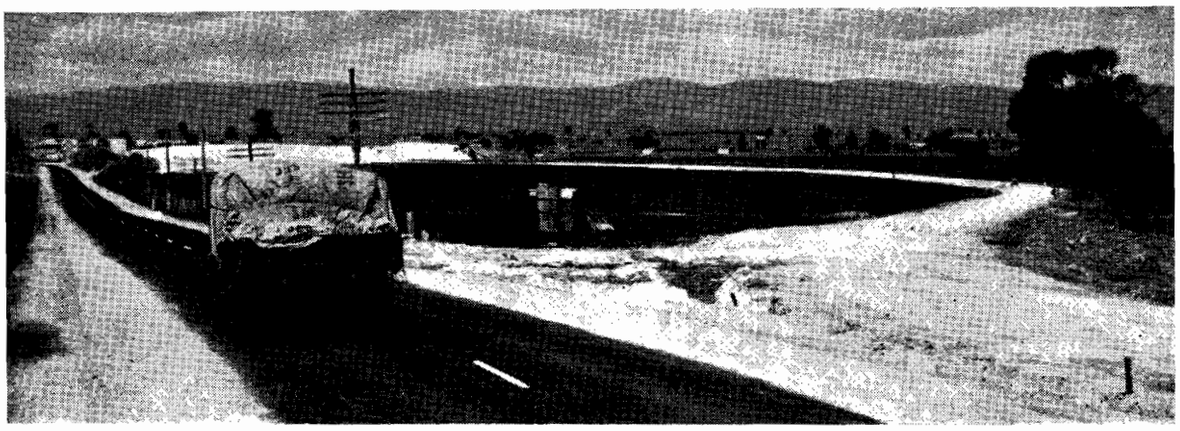


Plate No. 34.—Princes Highway East, commencement of deviation East of Morwell to underpass 90 c.m. railway of State Electricity Commission.

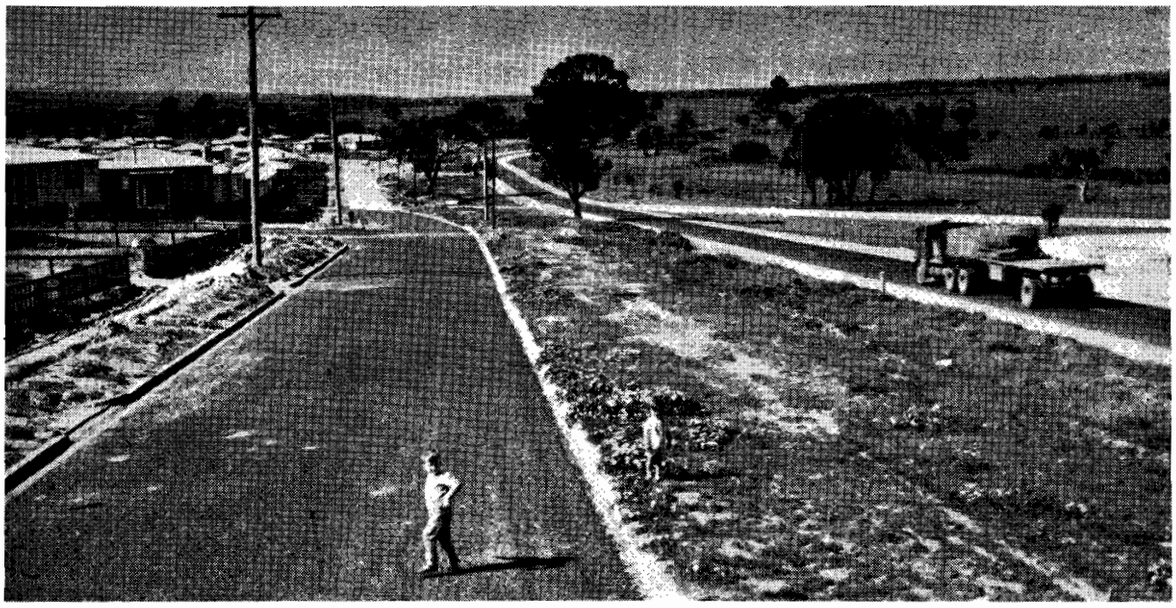
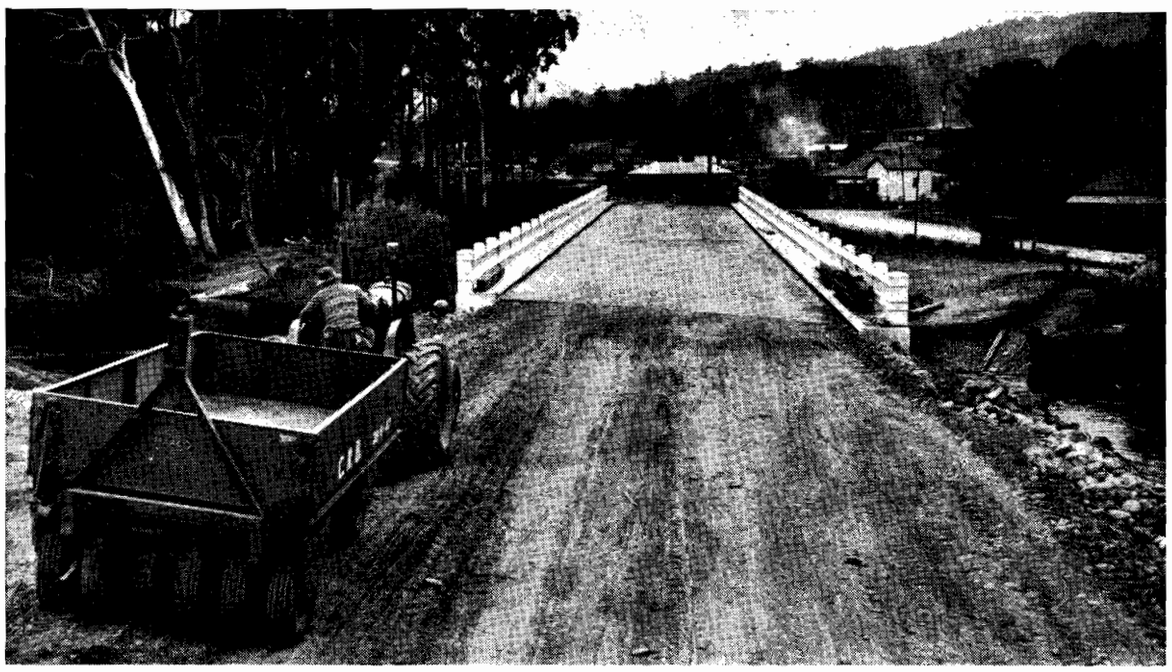


Plate No. 35.—Housing Commission Estate at Morwell. Service road adjoining Princes Highway East.

SPECIAL WORKS FOR OTHER AUTHORITIES.



Plates Nos. 36 and 37.—Warburton–Wood's Point Road. Deviation and new bridge over Yarra River to serve Melbourne and Metropolitan Board of Work's heavy construction traffic to McVeigh's Reservoir.

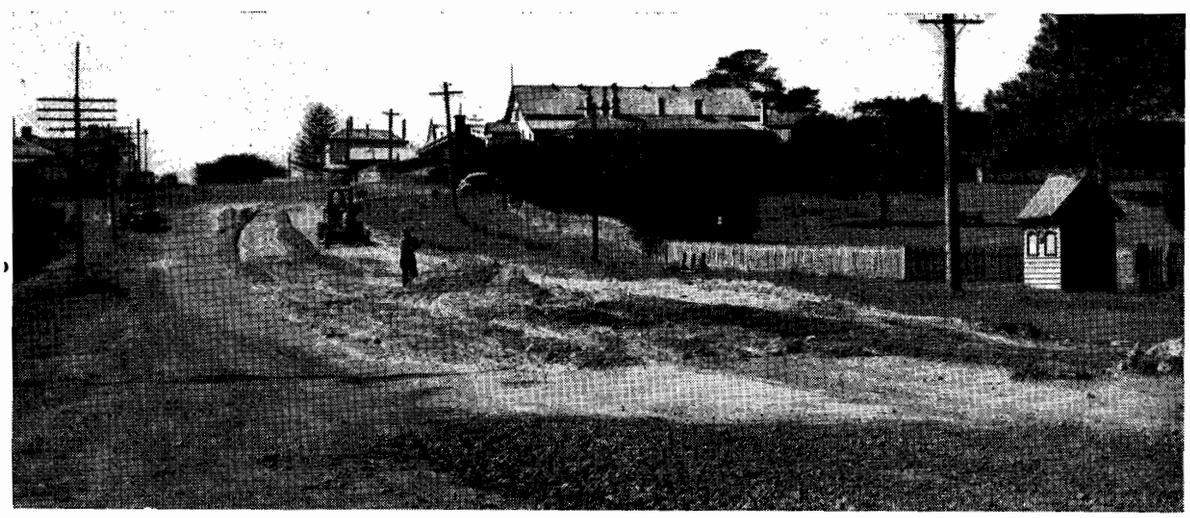


Plate No. 38.—Bentinck Street, Portland. Reconstruction and sealing of weak and worn out sections.

State Electricity Commission.

Further work was carried out on the reconstruction of the Kiewa Valley Road from Bandiana to the Commission's works at Mt. Beauty, a length of 53 miles, to carry very heavy traffic to the Commission's very extensive project at Kiewa. (Plate No. 33.)

Work was commenced during the financial year 1949–50, and substantial progress had been made, but in October, 1951, the major work was closed down at the request of the Commission for financial reasons. A total length of 22·48 miles had been completed to the date of closing down, leaving a balance of 30·52 miles still to be done.

Works carried out during the financial year 1951–52 included (*a*) completion of earth works and some gravelling of approaches to the new bridge at Middle Creek, mileages 3·7 to 4·0; (*b*) completion of earth works and 6-in. base course gravel on the Yackandandah Creek deviation, mileages 8·7 to 9·4; (*c*) completion of new precast reinforced concrete bridge at Yackandandah Creek at mileage 9·2; (*d*) completion of earth works and 6-in. base course gravel from Kiewa to Kergunyah, mileages 11·9 to 17·3, with the exception of ½ a mile; (*e*) completion of new precast reinforced concrete bridge over Gap Creek at mileage 17·8; (*f*) completion of base course gravel on reconstructed section from mileages 23·5 to 29·0 over the Dividing Gap; (*g*) completion of new precast reinforced concrete bridge at Swamp Creek, mileage 28·5; (*h*) earth works, base course, top course, and sealing south of Dederang between mileages 33 and 35; (*i*) partial construction of new precast reinforced concrete bridge at House Creek at mileage 32·0; and (*j*) partial completion of reconstruction between mileages 32·2 and 35·7. Only 1·6 miles of this last section was completed and sealed, and approximately 50 per cent. of the total earth works are now completed and sufficient crushed rock dumped to complete the pavement on the section.

In addition to the work on the Kiewa Valley Road, the Board carried out work for the Commission in the relocation of the Jeeralang West Road south of Morwell, and the deviation of the Commission's 90 c.m. railway west of Morwell. (Plate No. 34.) A timber bridge was also constructed over the Commission's light railway on the Midland Highway. Several bridges and culverts along the Princes Highway East between Dandenong and Morwell were strengthened to carry some particularly heavy loads which the Commission anticipates will have to be conveyed over the highway in the near future.

The total expenditure by the Board on the Commission's behalf during the financial year 1951–52 was £225,786 11s. 8d.

Housing Commission.

Works carried out for the Housing Commission included the provision of roads, channels, drains, and footpaths on the Ballarat Commission Estate, where £49,677 was expended, on sections 1, 2, and 3 of the Norlane Housing Estate in the Geelong area (total expenditure £32,000), and on Hourigan's Estate, Morwell (£102,434). An expenditure of £993 was also incurred in connexion with the construction of service roads for the Commission at Moe. (Plate No. 35.)

The total expenditure on all projects was £185,106 5s.

Soldier Settlement Commission.

A total expenditure of £138,038 17s. 2d. was incurred during the year on 116 projects associated with the provision of road facilities to soldier settlement estates. Particulars of works carried out are shown in a separate section of this Report.

Melbourne and Metropolitan Board of Works.

Good progress was made during the year with the provision of road facilities to the site of the proposed new dam at Walsh's Creek and the replacement of other facilities which will be submerged when the dam is constructed. The principal works carried out were the clearing and earthworks on the Marysville–Woods Point Road and various bridge works, including a bridge over the Yarra River near Big Pat's Creek. (Plates Nos. 36 and 37.)

The total expenditure for the year was £85,273 14s. 1d.

State Rivers and Water Supply Commission.

Of the total expenditure of £83,582 10s. 4d. on behalf of the State Rivers and Water Supply Commission during the year, over £70,000 was incurred on works relating to the Commission's Eildon Weir project, comprising the reconstruction and realignment of the Upper Goulburn Road and the construction of bridges thereon.

Work was also carried out on the bridge over Ti Tree Creek on the deviation of the Henty Highway at the Rocklands Reservoir, and road and bridge works on the deviation of the Pyrenees Highway at the Cairn Curran Reservoir.

Forests Commission.

The bulk of the expenditure by the Board on behalf of the Forests Commission (£7,705 15s. 5d.) was incurred on work on the Sunnyside Road in the Shire of Otway which is being constructed to assist in the extraction of timber from that area. Some small items of expenditure were also incurred on the Licola and Licola–Crescent Creek Roads in the Shire of Maffra and on the Benwerrin–Mt. Sabine Road in the Shires of Winchelsea and Otway.

Public Works Department.

Work was carried out on behalf of the Public Works Department in the town of Portland, where the reconstruction of Cliff and Bentinck Streets was in hand in anticipation of the Royal Visit. (Plate No. 38.) Further work was undertaken on the construction of an access road to the Dookie College land at the top of Mt. Major, in the College area. Repair work on the Chandler Highway in the Cities of Heidelberg and Kew, including repairs to the bridge over the Yarra, was also undertaken by the Board at the request of the Government. The total expenditure incurred during the year on these projects was £4,495 6s. 2d.

Gas and Fuel Corporation of Victoria.

At the request of the Corporation construction of Tramway and Porters Roads to link the Corporation's property south of Morwell with the main highway system was commenced, the expenditure incurred amounting to £2,863 11s. 6d.

Department of Lands and Survey.

Further work was carried out during the year on the road to the Buchan Caves Reserve, at a cost of £1,893 18s. 3d.

Victorian Inland Meat Authority.

At the request of this Authority, the Board undertook the construction of the road serving the Authority's works at Ballarat, an amount of £1,616 4s. 9d. being expended during the year.

Grain Elevator's Board.

Further work was carried out on the construction of gravel roadways and turning areas, concrete kerbs and channels, at the above Board's terminal silos and loading wharf at North Geelong, the expenditure during the year amounting to £741 8s.

State Coal Mine.

On behalf of the Mine Authorities, £196 11s. 9d. was spent on the maintenance of two roads in the Borough of Wonthaggi used by mine traffic.

Department of Works.

There was considerable activity during the year on works which the Board had been requested to undertake on behalf of the Commonwealth Government, the total expenditure during the financial year 1951–52 being £501,806 17s.

The main projects undertaken were as under :—

East Sale Aerodrome.—Construction of runways, extension of hardstanding area, laying of hangar floors, and construction of workshops.

Avalon Aerodrome (*Lara*).—Construction work and installation of field workshop.

Essendon Aerodrome.—Sealing of taxiway, &c.

Seymour Area.—Strengthening of bridges carrying particularly heavy military traffic.

Graytown.—Construction of access road, five concrete observation posts, and a low level bridge.

Mallacoota Aerodrome.—Clearing, fencing, and construction of road.

Mangalore Aerodrome.—Construction of aircraft parking bays and refuelling taxiway.

Longlea Explosives Depot.—Construction of mounds, tracks, and drainage associated with additional magazine accommodation.

Bandiana Army Ordnance Depot.—Sealing, resealing, resheeting, and drainage of roads.

Mulwala Explosives Factory.—Priming and sealing new gravel pavement.

Bendigo Migrants Hostel.—Construction of roads, paths, and storm water drains.

Bendigo Ordnance Factory.—Construction of access road and drainage over staff housing area and access road to dust extraction unit.

SOLDIER SETTLEMENT ESTATE ROADS.

Good progress was made during the year with the construction of roads desired by the Soldier Settlement Commission to serve estates purchased by the Commission. The works carried out included the extension of the roading commenced in previous years in some estates and the investigation and determination of the work required in other newer estates, the liaison between the municipal engineers and the Board's divisional engineers in carrying out the investigations being again most effective. The great majority of the works were done under municipal supervision.

It is a matter of regret that, owing to the restricted funds available to the Board, it was unable to contribute towards the cost of these works to the same extent as in previous years, with the result that the Commission was called upon to contribute a greater proportion of the cost. The total sum allotted during the year for new works for Soldier Settlement Estate roads was £249,926, of which £206,705 was provided by the Commission, £16,625 by the Board, and £26,596 by the Councils.

The Board desires to place on record its appreciation of the co-operation received from the great majority of municipal councils in connexion with the carrying out of these works. Notwithstanding the demands made upon the Councils' finances and upon the services of their officers, the Board found that almost invariably there was a ready response to its request for reports, estimates, &c., and in connexion with the supervision of the works themselves, and this greatly contributed to the smooth working of the scheme generally.

The progress made with the various projects is set out hereunder, works being completed unless stated otherwise.

Ararat Shire.

Yalla-Y-Poora Estate.—Work completed on Coburns Road and the Mt. William Road, which link with the Eurambeen–Streatham (main) Road. 6,000 feet of forming on the Yalla-Y-Poora Roads, known locally as " The Drive ".

Burrumbeep Estate.—42,400 feet of forming and culverts on the Burrumbeep Estate Road linking the Estate with the Ararat–Warrnambool (main) Road. Only some trimming and some minor jobs remained to complete the whole roading project.

Edgarley Estate.—8,448 feet of forming and construction of culverts on McCarthy's Road, joining the Ararat–Warrnambool (main) Road with the Council's road system.

Narrapumelap Estate.—Formation and culverts on the Narrapumelap Estate Road, between the Glenelg Highway near Wickliffe and the Mount Rouse Shire boundary.

Ballan Shire.

Beremboke Estate.—1·55 miles of forming and gravelling on the Beremboke Estate Roads, completed the total length of 2·17 miles of internal roads required. The forming and gravelling of the external connecting road to the Geelong–Ballan (main) Road, known as the Brisbane Ranges Road, was also completed.

Berwick Shire.

Gray's Estate.—2,370 feet of forming and surfacing on Coop Road provided an outlet for one settler to the Bald Hill Road.

Broadmeadows Shire.

Summerhill Estate.—No work was actually carried out, but a tender was let for £2,366 8s. 6d.

Buninyong Shire.

Larundel Estate.—4,700 feet of forming, grading, gravelling, and culverts on the road running southerly from the Elaine-Mt. Mercer (main) Road. 1,700 feet of forming, grading, and culverts on the road running north from the main road. 300 feet of forming, grading and gravelling on the road running south from the junction with Orell's Road.

Colac Shire.

Barunah Plains South Estate.—3·3 miles of construction and 0·8 miles of forming.

Dundas Shire.

Gerrigerrup Estate.—5,466 feet of forming, gravelling, sheeting, and culverts on the approach road from the Penshurst–Macarthur (main) Road to the Eumeralla Bridge.

Springwood Estate.—27,770 feet of forming, gravelling, sheeting, and culverts on three internal roads.

Nigretta Estate.—17,519 feet of forming, gravelling, sheeting, and culverts on two internal roads.

Ardachy Estate.—7,368 feet of forming and a 4-ft. by 3-ft. concrete culvert constructed.

Morgiana Estate.—32,439 feet of forming on three internal roads and culverts completed on one road.

Glenelg Shire.

Hindson's Estate.—11,826 feet of sheeting with fine crushed rock on the Ridge Road and 2,750 feet of similar work on the School Lane.

Talisker Estate.—1,365 feet of forming and gravelling on Berkeley's Road.

Hampden Shire.

Marida Yallock Estate No. 2.—2·11 miles of formation and 1·25 miles of gravelling on Vagg's Road ; 3·80 miles of formation and surfacing on Hose's Road and 0·66 miles of formation and gravelling on Bateman's Road.

Marida Yallock Estate No. 3.—0·56 miles of forming and gravelling on Leveritt's Road.

Marida–Yallock Estate No. 4.—0·80 miles of forming and gravelling on Rutter's Road.

Cloven Hills Estate.—5·21 miles of forming was completed on the Cloven Hills Road and the first course of gravel spread.

Ettrick Estate.—2·51 miles of forming completed on the Ettrick Road and a temporary pavement constructed with scoria.

Korumburra Shire.

D. M. Scott's Estate.—660 feet of reforming, widening, and gravelling on D. M. Scott's Road completed the roading required in this Estate.

Kowree Shire.

Fulham Estate No. 1.—2·2 miles of forming and gravelling on the Kanagulk Lake Road completed the roading for this Estate.

Fulham Estate No. 2.—4·4 miles of grubbing, clearing, forming, and gravelling on Jasper's Road.

Newland's Estate.—Grubbing, clearing, forming, and gravelling on Williamson's Road (4·5 miles), Border Road (1·1 miles), and Oliver's Road (3·9 miles).

Leigh Shire.

Barunah Plains Estate.—4 miles of forming and about 0·75 miles of gravelling (bottom course) on the Cressy Shelford Road, and 2½ miles of forming and 1 mile of gravelling on access roads, were completed before wet conditions caused suspension of the work. The approach road from the west from Cressy was also resheeted for 1·5 miles.

Lexton Shire.

Langi-Kal Kal Estate.—A large culvert was installed on the Emu Creek Road, completing the work on that road. The roading for the Estate is approaching completion.

Marong Shire.

Yarraberb Estate.—Work carried out during the year was confined to rubbling, filling, and some gravelling on the Yarraberb–Pyramid Road, together with the installation of a box culvert.

Melton Shire.

Mount Aitken Estate.—The only work carried out during the year was maintenance work on the Mt. Aitken Road and the relaying of a culvert washed out by floods.

Minhamite Shire.

Tarrone Estate.—26,885 feet of forming and gravelling was carried out on the north-south road through the Estate, 11,300 feet of gravelling on Tarrone Lane between the Moyne River and the north-south road, 15,500 feet of forming and gravelling on Mick Ryan's Road extension to meet the north-south road at the Shire boundary, and 3,180 feet of forming and gravelling on Mater's Road. In addition, the Council reshaped and resheeted 2½ miles of Tarrone Lane with its own funds.

Gerrigerrup Estate.—32,700 feet of forming and gravelling on the Gerrigerrup Road, including the access road to the Macarthur–Hawkesdale (main) Road. Formation of 3,500 feet of the northern access road to Young's Estate. Supply of fine crushed rock for surfacing the approach road to the latter Estate.

Young's Estate.—Formation work on roads in the Estate was commenced and fine crushed rock was supplied for the surfacing.

Moyne Falls Estate.—23,000 feet of forming and grading on Moyne Falls Road, from Stonefield Lane to the Moyne River, 6,400 feet of forming and grading on Gelbart's Road. 3,000 feet of forming on Jubb's Road.

Kangertong Estate.—5,144 feet of formation on the new road linking with the Warrnambool–Hawkesdale–Penshurst Road, as a first step in the roading of this Estate.

Mirboo Shire.

Lawton's Estate.—The construction of the Lawton's Estate Road, which links up through Peter's Road to the Mardan (main) Road, has been completed.

Mortlake Shire.

Merang Estate.—7,000 feet of forming, grading and gravelling in this Estate completed the whole of the work required.

Boonerah Estate.—24,827 feet of forming, grading, and gravelling on the road linking this Estate with the Geelong–Hamilton (main) Road.

Enerdale–Moyuna Estate.—21,272 feet of forming, grading, and gravelling was practically completed, and the council also gravelled an additional 2½ miles of access roads.

Connabar Estate.—2,050 feet was formed, and the gravelling commenced.

Mt. Hamilton Estate.—41,120 feet of forming was 80 per cent. completed and a contract let for the gravelling.

Barnie-Bolac Estate.—A contract was let for 22,427 feet of forming, grading, and gravelling.

Mount Rouse Shire.

Chatsworth House Estate.—The construction of 5,400 feet completed the road scheme for the Estate.

Boortkoi Estate.—The construction of 6,800 feet completed the necessary road work for this Estate.

Narrapumelap Estate.—The construction of a length of 18,800 feet of the Hopkins Ford Road was completed to a stage where the road was trafficable throughout, and a further length of 8,500 feet was also completed. 16,900 feet of construction was completed on Head's Road, and sufficient work carried out on the Wickliffe Outlet and Lovell's and Old Pushy Creek Roads to give the settlers an outlet.

Woodhouse Estate.—Works covering a total length of 68,591 feet were carried out on seven roads in this Estate, where the roads are now trafficable throughout.

Nareeb Estate.—13,610 feet of construction on two roads serving this Estate, rendered them trafficable throughout.

Numurkah Shire.

Murray Valley Estate.—Works completed during the year comprised the forming and gravelling of 1 mile of Lillicrapp's Road, ¾ mile of Fowler's Road, 2 miles of Collie's Road, and 1½ miles of Adam's Road, each of which run easterly from the Goulburn Valley Highway. Forming and gravelling of 5 miles of Lorenz's Road and 2 miles of Poundary Road, both of which run south from the Murray Valley Highway, and 1 mile of Hewitt's Road, and 1½ miles of the Katunga school road. These works covered a total of 14¾ miles of the first stage of the scheme, leaving 11¾ miles still to be completed. Of the second stage, 3 miles of forming and gravelling were completed on Christie's Road, 5·6 miles on Centre Road, and 4·15 miles on Sutcliffe's Road, a total of 12·75 miles.

Portland Shire.

Ardachy Estate.—One mile of heavy construction and gravel surfacing giving access to Branxholme.

Condah Estate.—Two and a half miles of construction and gravel surfacing, giving access from the Condah Mission to the Ettrick–Condah Road.

Ardgarton Estate.—With the completion of the culvert endwalls, all necessary road works to link this Estate with the Dartmoor–Hamilton (main) Road have been completed.

Rochester Shire.

Kamarooka Estate.—18,660 feet of forming and sanding on one road and a contract let for 7,980 feet of forming and sanding on a second road. The latter work was delayed owing to adverse weather conditions.

Rodney Shire.

Kiota Estate.—One and a quarter miles of gravelling on Kiota Estate Road, the only work still remaining to be done being the bituminous sealing of a floodway crossing.

Romsey Shire.

Clarkefield Estate.—9,900 feet of Webster's Road formed and 6,400 feet surfaced with gravel. Forming a gravelling of 5,960 feet of Draffins Road, including a connexion to Store's.

Rosedale Shire.

Evergreen Estate.—A tender was let for 1,800 feet of forming and grading on the Evergreen Estate Road.

Swan Hill Shire.

Robinvale Estate.—3·78 miles of forming and gravelling on various roads on the east side of the settlement. A further 8·82 miles commenced of which 4·82 miles is being carried out by contract and the balance by direct labour. Surveys have been made over a length of 8·4 miles out of 17 miles of roads to be constructed on the west side of the settlement.

Tungamah Shire.

Murray Valley Settlement.—Seven miles of forming and gravelling making a total length of 27·75 miles completed. The balance required to complete the roading of the Estate is 6·68 miles, of which 1·85 miles is in progress and a further 2·83 miles covered by contracts let.

Wangaratta Shire.

Naughtin's Estate.—10,900 feet of formation on the Three Chain Road (Section B–C), and five (5) pipe culverts. A tender was let for the supply of the necessary gravel.

Wannon Shire.

Fulham Estate.—4½ miles of grubbing and clearing.

Warragul Shire.

Blackwood Park Estate.—2,600 feet of forming and draining and the first coat of sanding.

Wimmera Shire.

Domaschenz Estate.—8,000 feet of reconstruction on the Domaschenz Estate Road and 1,100 feet of reconstruction on the approach road.

Woorayl Shire.

Timmins Estate.—4,445 feet of construction on two roads completed the road scheme.

Hudson's Estate.—1,257 feet of construction on Parrish's Road completed the roading for this Estate.

Yackandandah Shire.

Dederang Estate Road.—The road serving this Estate was formed and partially gravelled.

BRIDGE INSPECTIONS.

Despite the extremely large programme of bridge work that has been carried out by the Board since its inception, it is only in recent years that an engineer has been appointed full-time to examine and report on the condition of bridges throughout the State.

This officer, has, in his five years' service with the Board, covered a very wide field, and has made extensive examinations and prepared detailed reports on 582 structures. Whilst the greater portion of his time is spent in the field, the time occupied in the preparation of his reports is considerable. Typical reports comprise a sketch plan, up to ten sheets of minute details of the various particulars of the structure, and a number of photographs, from which it will be realized that the results of the inspections are very full and complete, and of great value for record purposes.

In general, the Bridge Inspection Engineer operates on routes or in specific areas rather than on individual bridges, although the latter may be necessary in special cases. He is equipped with a utility truck and a one-berth cabin for himself, and his assistants (usually one or two men) have been provided with a utility and a two-berth cabin. The equipment includes a boat, ladders, planks, ropes, axes, augers, and other hand tools.

The reports compiled on these bridge inspections are available for reference not only by the Board's own staff but also by municipal engineers if they so desire. They afford a basis for assessing the safe carrying capacity of old structures, the feasibility of repair or partial salvage, and the sufficiency of waterway provided. They are thus extremely useful in preparing preliminary estimates of the cost of works of maintenance and renewal and in establishing orders of priority for the various projects.

DECENTRALIZATION.

Some progress was made during the year with the development of the Board's divisional organizations in country centres, details of the major items completed or advanced being as set out hereunder :—

Bairnsdale.—Two prefabricated houses were delivered and erected during 1950–51, one for the Bairnsdale Roadmaster, and the other for the Divisional Accountant.

Ballarat.—The ends and doors of the workshop were completed and the machine tools installed An " Armco " hut (100 ft. x 30 ft.) was erected at the depot for use as a store and carpenter's shop, and the fabrication of steel storage bins in the store was completed. Erection of a plant shelter was commenced and the fencing of the depot was practically completed. A petrol bowser was also installed in front of the proposed site for the oil store.

Two prefabricated houses—one in Lydiard Street North, and the other at the Divisional Depot, were erected and occupied in October, 1951, by the Stock Inspector and a Fitter respectively, and a five-roomed brick veneer house in Adam Street was purchased and occupied by one of the Assistant Engineers in June, 1952.

Benalla.—At the depot, the new 60-ft. x 120-ft. workshop building frame was erected by contract and the roofing, walls, windows, and steel doors erected by direct labour. (Plate No. 39.) A temporary engineers' store building was erected and the old workshop moved to a new position to be later used as a carpenter's shop. One new plant shelter was also built.

Sufficient progress was made on the residence in Arundel Street to enable the Assistant Divisional Engineer to occupy it, and two prefabricated houses delivered in the previous financial year were completed and occupied by an Engineering Assistant and a Fitter respectively. Fencing, drainage, and filling work was completed on seven other sites in Benalla, and forming and grading of the Board's private street (Calder Street), which at present serves four houses and the future bridge casting depot, was also completed.

Bendigo.—An extension of the workshop building at the depot, which was built towards the end of the financial year 1950–51, was brought into use, the area of the fitting bay being now 113 ft. x 35 ft. An open-sided plant shelter 120 ft. x 44 ft. was also erected. (Plates Nos. 40 and 41.) Although some progress was made towards the planning for a permanent concrete precasting yard at the Depot, no progress was made towards the permanent project itself, but a single casting platform of a temporary nature was constructed, the necessary concrete piles, kerbs, and endwalls for a large concrete bridge on the Murray Valley Highway being manufactured there.

DECENTRALIZATION.

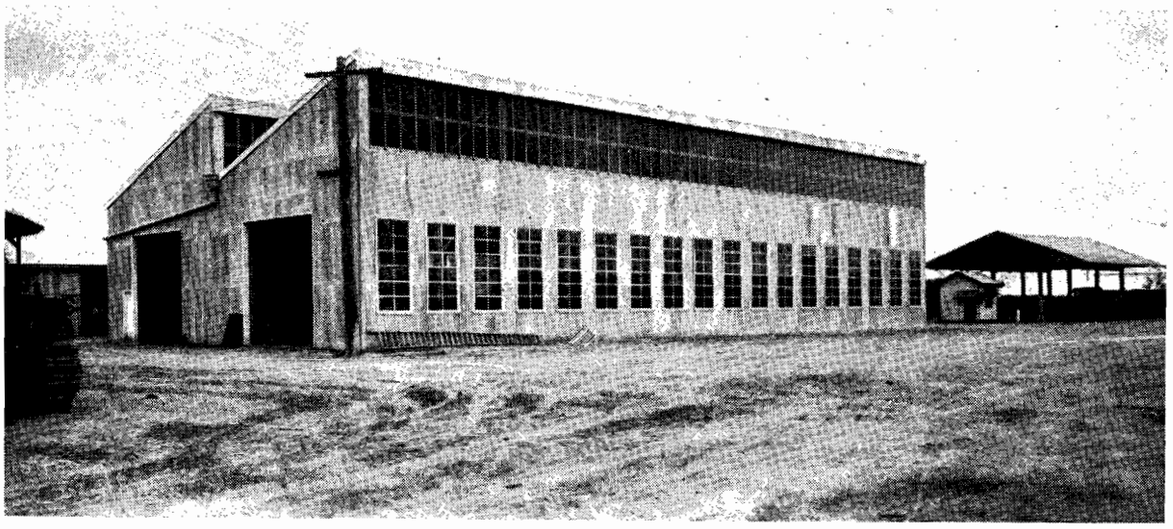


Plate No. 39.—Benalla. New workshop.

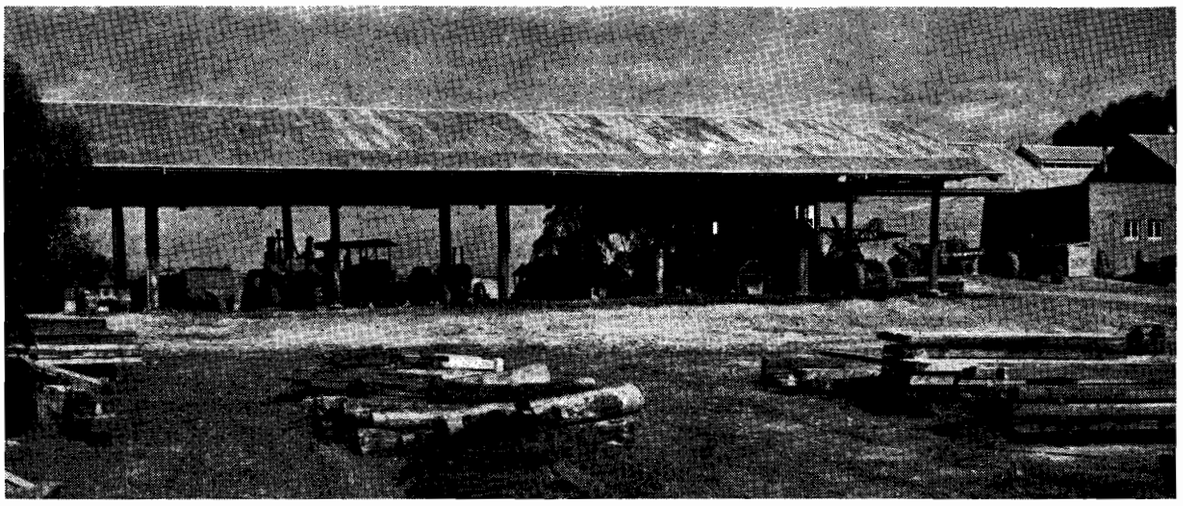


Plate No. 40.—Bendigo. Plant shelter.

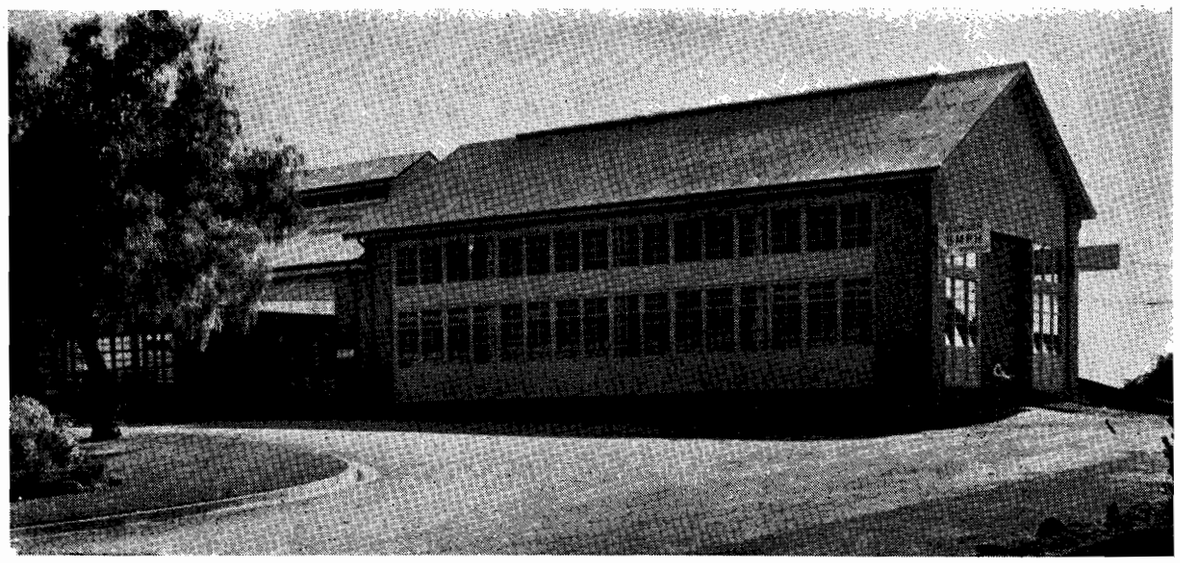


Plate No. 41.—Extension of workshop, Bendigo.

One brick veneer house in the housing area adjacent to the depot is still in course of erection.

Dandenong.—A weatherboard house, with land, was purchased at San Remo for use as a patrol residence and depot, and a prefabricated house was erected at Pakenham East as a residence for the patrolman.

Geelong.—A weatherboard house in High Street, Belmont, was completed and occupied by the workshop foreman. A commencement was made on the provision of a new workshop in the finally planned location in lieu of the small temporary building erected in 1947–48. This has become necessary to deal adequately with plant and vehicle maintenance. The new workshop will be 80 ft. x 60 ft., but owing to the limited funds available, it was only possible to provide foundations, concrete columns, concrete floor, and underground drainage, &c. towards the project. The plant shelter was erected and a hydraulic hoist for greasing and inspections of cars and trucks was installed and put into operation. A concrete precasting yard was developed along temporary lines to enable production of precast units for bridges and culverts, and put into full time production. Towards the end of the year, piles for metropolitan bridges, as well as piles, beams, and slabs for bridges and culverts within the Division, were being cast there.

Horsham.—Two prefabricated houses obtained in 1950–51 were completed and occupied by fitters and the residence constructed for the Divisional Engineer was finally completed and occupied in December, 1951. A prefabricated house for the Stawell patrolman was obtained and was in course of erection on land owned by the Board. In order to provide for a residence at Horsham for the patrolman, a block of land has been purchased near the depot which will be large enough for a patrol residence and also a patrol storage site in the area.

The additional land purchased for extension of the Horsham depot and allied operations was fenced in and some surfacing, draining, and road construction carried out thereon, whilst a commencement was made with the erection of open trussed-roof type plant shelters. The development of the carpenter's shop was continued by walling up the old plant shelter with timber and glass windows, thus providing a closed-in shop with ample light. The main workshop was completed by the erection of glass windows along both sides, and steel ribs were purchased to enable the workshop to be extended by a further 50 feet in length.

Traralgon.—Prefabricated houses were erected in Traralgon in Dunbar Road (2), Collins Street (2), and High Street (2) and four out of the six were occupied. The concrete floor and footings for the 100 ft. x 60 ft. workshop were also constructed.

Warrnambool.—A prefabricated house was erected during the year at Camperdown for the use of the patrolman, who is now in residence. At Warrnambool, the installation of platforms and casting and travelling gantry for lifting heavy sections was completed and the precasting yard put into operation.

PURCHASE OF PROPERTY IN DRUMMOND STREET, CARLTON.

In June, 1951, the Board purchased from Lester Bros. Pty. Ltd. a property in Drummond Street, Carlton, comprising a large two-storied factory and six houses, the houses having a frontage to Drummond Street and the factory to a lane at the rear of the houses. The purchase price was £33,500. The factory building is intended to be used for the provision of temporary office and laboratory accommodation, and should considerably relieve the present congestion in the Board's Head Office, and thereby tend at a later stage to facilitate reconstruction of the present offices. Considerable work will be involved in the re-modelling of the factory to meet the Board's requirements, and this is being handled by the Architects' Branch of the Public Works Department. The main building, which is approximately 8,230 square feet in area, can be made suitable for offices or laboratories, and a subsidiary building can be utilized as a garage. Difficulties due to building restrictions and finance have prevented immediate commencement of the necessary reconstruction.

One of the houses, which was partly gutted by fire shortly after purchase by the Board, has since been completely demolished. Four of the other five houses are still occupied by the same tenants as at the date of purchase by the Board, and the fifth house, which was previously used by Lester Bros. Pty. Ltd. as an "amenities" block, is being remodelled for eventual occupation by some officer of the Board. The property is convenient to the city from the point of view of the staff, and is only ¾ mile from the Board's head office.

PHOTOGRAPHY.

The Board's mobile film unit was fully availed of during the year, with numerous screenings both inside and outside the Board's organization, and it is evident that its films are becoming well and favourably known to the general public. This state of affairs is very gratifying to the Board, as an indication that the average man in the street is becoming more " road conscious " and, it is hoped, absorbing from the films the lessons of safe driving, road courtesy, and an appreciation of the problems of road and bridge construction and maintenance.

One of the primary objectives of the unit is to provide amenities for the Board's own employees housed in camps in areas remote from townships. The Board's own productions are supplemented by films hired from commercial sources, and the fare provided has been found to be very acceptable to the men concerned. One hundred and forty-eight screenings were made during the year at 50 different locations, several shows being presented at intervals at some of the larger and more remote camps.

Sixty-nine screenings were made for the benefit of Clubs, Societies, and Institutions outside the Board's organization, and its films were lent for ten other screenings. It is estimated that, through these screenings, it was possible to reach audiences totalling approximately 8,600 people, and the Board has been assured that the films have been much appreciated and that their educational value has not been lost upon the people to whom they were presented.

Seven programmes were presented to migrants located at the Exhibition transit camp, and it is estimated that 600 New Australians witnessed them. The Board very speedily availed itself of the opportunity of presenting its films to such audiences, where they should be of considerable educational value.

During the year, three new colour films with sound tracks were completed, while considerable field work was carried out on the production of a film dealing with the history and function of the Hume Highway.

The films completed during the year were :—

(1) *Gazette No.* 7 which shows floods in Gippsland and measures taken to provide traffic facilities where bridges have been damaged by flood waters. It also stresses the need for care in driving on the road by a series of graphic figures of damaged vehicles.

(2) *Gazette No.* 8 which emphasizes the services given to the community by roads in all seasons of the year, and under varied weather conditions.

(3) " *On Parade Again* " which shows the 22nd Construction Regiment, Supplementary Engineering Reserve, which is commanded by the Board's Engineer for Bridges, Lt.-Col. I. J. O'Donnell, O.B.E., B.C.E., A.M.I.E.Aust., and has many members of the Board's organization on its strength, building a timber bridge and erecting a stores building, including preparation of the site, during the annual camp at Seymour.

ROAD MATERIALS.

The possibility of using local materials for road works in order to reduce costs was further investigated during the year, but only in a few cases were deposits of any magnitude opened up and developed.

In the Benalla Division a new gravel pit, known as Silvester's pit, situated on Allotment 1A, Section 13, Parish of Yackandandah, was located. This is a dredge deposit containing approximately 100,000 cubic yards, of which approximately 8,000 cubic yards have been removed to date for the Board's operations.

In the Dandenong Division a new sandstone quarry was located on the Yarra Track section of the Marysville–Woods Point Road, and was opened up by a contractor to supply material for surfacing portion of that road. Approximately 3,000 cubic yards have been quarried, and it is anticipated that at least another 6,000 cubic yards will be required from this source.

Towards the end of the 1950–51 financial year a contract was entered into for the winning, washing, crushing, and screening of quartz pit gravel at Emu, near the Avoca River, and a quantity of approximately 10,000 cubic yards of mineral aggregate was produced from it during 1951–52.

MATERIALS RESEARCH.

Reference was made in the 38th Annual Report to investigations by the Board's Materials Research Division, in conjunction with a Committee of the Institution of Engineers, Australia, into the pavement thickness required for residential streets in the suburbs of Melbourne. This investigation has been completed, and the results collated in a comprehensive report which has been sent on to the Institution. A study was made of the conditions in sound and failed areas of nineteen streets in the Cities of Brunswick, Camberwell, Coburg, Essendon, Hawthorn, Moorabbin, and Northcote. The technical conclusions of this investigation are dealt with in the Chief Engineer's section of this Report.

CONTROL OF HEAVY TRAFFIC.

Some indication of the increasing volume of heavy traffic using the State's road system may be gauged from the fact that, during the financial year 1951–52, 4,005 special permits to exceed the limits of weight, height, length, or width imposed by the Motor Car Act were issued by the Board, as compared with 3,217 in the year 1950–51, an increase of 788, or 24½ per cent.

Examination of the permits granted during 1951–52 reveals that the greatest number of permits issued relate to excess width, due to number of indivisible loads carried, principally plant and machinery. Of the total number of permits issued, 2,992 were in respect of excess width, the next highest group being permits for excess weight (1,917). This latter figure included 17 loads exceeding 40 tons gross and 228 loads between 30 and 40 tons gross. Many of the permits issued, of course, covered more than one concession, e.g., excess weight, width, and length for the one indivisible load. In all, 7,911 excess dimensions were catered for, as compared with 7,169 in the previous year.

The 4,005 permits issued for the year consisted of 2,709 single-trip permits and 1,296 permits tenable for twelve months.

RESTRICTION OF LOADING ON ROADS.

There are many long weak sections on important main roads and State highways where it has been possible to provide funds for only a small annual quota of reconstruction and strengthening. It was again necessary, therefore, during 1951–52 to limit to 6 tons, under the provisions of the Motor Car Act, the gross weight to be carried on certain roads, in order to enable the Board to control the traffic thereon by the issue of permits based on the type of vehicle used and its tyre equipment.

One thousand one hundred and twenty-six (1,126) permits of this nature were issued during the year, as compared with 970 in 1950–51 and 1,235 in 1949–50. On the other hand, proceedings were instituted by the Board in the same period in 221 cases against the drivers of vehicles exceeding this limit, and fines totalling £3,970 were imposed, an average of £18 per case. This is one particular instance where it is felt that the fines imposed have not been a sufficient deterrent, as the Board is well aware that the freight rates charged by operators are such that, notwithstanding the fines imposed, they still operate at a profit.

Prior to 1951–52, permits to exceed 6-ton limits had been based on a schedule which allowed a gross weight of 11½ tons for conventional semi-trailers, but this schedule has now been amended to permit of a gross load of 13 tons on such vehicles.

During the year, the 6-ton limit on the Woods Point Road was lifted by the "demaining" of the section of that road from McVeigh's to the Junction of the Marysville–Woods Point Road. A 6-ton limit has, however, been imposed on the newly formed Marysville–Woods Point Road from the Reefton Spur Road to the Woods Point Road. Similar action was taken on the Buchan–Orbost Road.

PURCHASE OF PLANT.

At the end of the second world war, the Board was in possession of a quite inadequate fleet of crawler tractors and power graders, the units having been almost worn out on defence projects. In the years immediately following the war new crawler tractors were unobtainable. The complete tractors and the engines for power-graders were manufactured only in the United States, and dollar shortages absolutely precluded placing orders for new units in that country. During the Chief Engineer's mission abroad in 1947, arrangements were commenced in England for purchasing, after reconditioning, crawler tractors which previously had not less than 500 hours' use, and some 18 units from this source were imported. Orders were placed both in Australia and England for new power-graders. Eventually under the "dollar loan" of 1950–51 it was possible to enter into contracts for supply of badly-needed new heavy crawler tractors.

Deliveries for all new units were extremely slow, and there was keen competition between contractors, sawmillers, large private undertakings, Commonwealth and State Departments and Instrumentalities for such items as were coming forward. It was not until the middle of 1951 that the first " dollar loan " tractor was delivered to the Board. Thereafter the contracts began to be fulfilled, but, unfortunately, at that very time financial stringency intervened and necessitated action by the Board to defer deliveries of units so greatly needed. The Board desires to express its sincere appreciation of the co-operation and assistance received from the companies concerned, who agreed to hold the units, wait for payment until after the close of the financial year, or endeavour to dispose of the units elsewhere.

Despite the reduced works programme, a steady influx of new machines is necessary to replace those which are year by year reaching the end of their useful life. The retention of units of plant which have outlived their usefulness is false economy, and only dislocates the construction projects and clutters up the Board's workshops.

TRAFFIC LINE MARKING.

During 1951–52, traffic line marking was carried out on a slightly larger scale than in the previous year. One thousand two hundred and forty-five (1,245) miles of road were maintained in a " striped " condition, and, taking into consideration the fact that some sections had to be marked more than once during the year, this necessitated the painting of 2,399 miles of road, 2,349 miles being under the jurisdiction of the Board and the balance of 50 miles comprising other roads marked on behalf of and at the cost of municipal councils. In addition, 39 miles of road not previously painted were marked.

The total expenditure on the above work was £12,900, representing an average cost of £5 10s. per mile marked, and 6,243 gallons of lacquer were used, at an average rate of application of 2·64 gallons per mile.

TRAFFIC OFFENCES.

The number of offences against the Motor Car Acts during the year was considerably greater than the number in 1950–51, as the following comparison indicates :—

—	1950–51.	1951–52.
Speeding (freight vehicles)	429	506
Speeding (passenger vehicles)	4	5
Exceeding 17,000 lb. on one axle	372	504
Exceeding 7½ tons on one axle	191	..
Exceeding weight on axle group	..	158
Exceeding 6 ton limit	192	221
Exceeding conditions of special permit	36	43
Exceeding load capacity	30	30
Exceeding 5,000 lb. on one tyre	..	7
Exceeding 8 feet in width	21	62
Exceeding length limits	22	42
Exceeding 12 feet in height	..	5
Refusing to allow vehicle to be weighed	9	6
Other offences	5	..
Total	1,311	1,589

The total fines imposed in 1951–52 (£17,831 10s.) exceeded the previous year's record total of £14,255 5s. by £3,476 5s. (a 24 per cent. increase), but the average fines increased by only 2·3 per cent., viz., from £10 19s. to £11 4s. 5d.

It is obvious that, notwithstanding the fines inflicted, operators who are inclined to flout the law continue to do so with profit to themselves, and that only a substantial increase in the amounts of individual fines will remedy the position.

Sixteen drivers of commercial vehicles were charged for the second time with driving at excessive speed, and the mandatory cancellation of their drivers' licences became applicable. The majority of these cancellations were for a period of three months, but one was cancelled for twelve months and another for two years. By way of contrast, the licence of a driver of a passenger vehicle who was presented on a second charge of speeding was suspended for one day only.

Mention was made in the 38th Annual Report of the fact that, in the financial year 1950–51, increased fines, combined with a tightening up of controls in New South Wales and a more effective liaison between the authorities in that State and in Victoria, had resulted in a lessening of overloading offences, not only in number, but also in the degree of individual overloading. Unfortunately, this promise of a general improvement has not been maintained, as overloading offences increased from 785 in 1950–51 to 920 in 1951–52.

CONFERENCE OF STATE ROAD AUTHORITIES.

The Fourteenth Conference was held at the Board's office in Melbourne from 19th to 23rd November, 1951, and was attended by representatives of the other State Road Authorities and of the Commonwealth Department of Works and Housing. The Conference was opened by the Minister of Public Works (the Hon. P. T. Byrnes, M.L.C.) who pointed out that it was fitting that this 1951 conference should be held in Victoria in the year in which this State was celebrating its 100 years of progress as a separate State of the Commonwealth. (Plate No. 42.)

Amongst the many important items discussed were the bitumen requirements for 1952–53, Australian representation at the Course for Highway Engineers arranged by the Public Road Administration, United States of America, the training of Asian engineers brought to Australia under the Commonwealth Government's technical assistance programme, the preparation of an atlas of Australian resources, uniform road statistics, motor vehicle taxation, road safety, route numbering, investigation into moisture contents in sub-grades, standard specifications for soil tests and for bridges, standard methods for sampling and testing materials, and uniformity in various types of road signs. Reports from Committees of senior officers of the authorities were also considered, and arrangements made for the further meetings of these committees during 1952. Besides the Principal Technical Committee (i.e., the Chief Engineers of the several authorities) there are committees for bridge design and materials research, both of which are engaged on extensive Australia-wide co-ordination of effort, and a committee on plant and equipment which meets at longer intervals to exchange information on mechanization. (Plate No. 43.)

CONFERENCE OF MUNICIPAL ENGINEERS.

The Eighth Conference of Municipal Engineers convened by the Board was held in the Auditorium, Police Headquarters Building, Melbourne, on the 29th and 30th May, 1952, and the excellent attendance indicated that these conferences are proving to be of considerable value to the participants and are a very effective means of "pooling" and disseminating information on matters of vital importance both to municipal engineers and the engineers of the Board. (Plate Nos. 44 and 45.)

The Conference was opened by the Premier of Victoria, the Hon. J. G. B. McDonald, M.L.A., who in the course of his remarks gave a very clear picture of the financial difficulties with which the State was faced, especially in relation to road finances. An informative talk was also given by Mr. G. T. Thompson, Chairman of the Soil Conservation Authority, on "The Value of Soil Conservation to the Road Engineer," in the course of which he dealt with the use of trees for scour protection, which was the subject of one of the items of the agenda.

The twenty items on the agenda, some of which covered quite a wide field, formed the basis for some very fruitful discussions. The general procedure followed that adopted at previous conferences, viz., a reply to each specific question was given by a member of the Board's organization, and a general discussion then ensued.

The material which formed the basis of the replies by the Board's officers to the various questions is being circulated for general information as in the past.

NEW LEGISLATION.

The *Motor Car Act* 1951 (No. 5616) consolidated the law relating to motor vehicles generally, but, while it contained some new provisions, these did not directly affect the Board.

CONFERENCES.

Plate No. 42.—State Road Authorities Conference, Melbourne, 19th November, 1951. Opening address by Hon. P. T. Byrnes, M.L.C., Minister of Public Works.

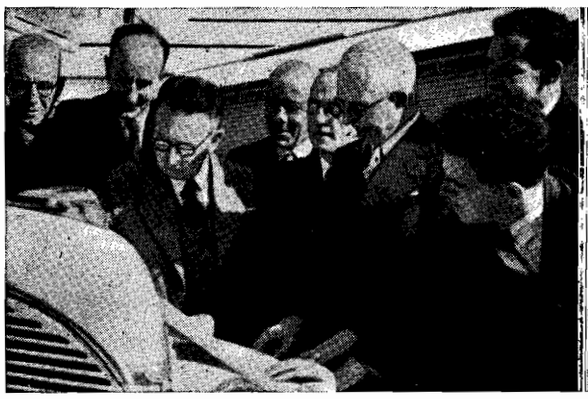


Plate No. 43.—Plant Committee, State Road Authorities Conference, Melbourne, 6th March, 1952.

Plate No. 44.—Premier, Hon. J. G. B. McDonald (right) with Chairman at Municipal Engineers Conference.

Plate No. 45.—Municipal Engineers Conference, Melbourne, 29th May, 1952.

VISITS FROM OVERSEAS ENGINEERS.

The Commonwealth Government is one of the participants in the Commonwealth Technical Co-operation Scheme, under which countries of the British Commonwealth are endeavouring to provide technical assistance to countries in South and South-east Asia. By arrangement with the Commonwealth Office of Education, two senior engineers nominated by the Government of India were attached to the Board's staff from 26th November, 1951, to 14th March, 1952, to enable them to study road administration and highway and bridge construction practice in this State.

During their period with the Board, these engineers (Mr. V. G. Ayyar, Executive Engineer, Public Works Department, India, and Mr. P. K. Vibhakar, of the same Department) inspected the Board's laboratories and workshops and visited road and bridge works being carried out in various Divisions.

DEVELOPMENT OF TRAFFIC ARTERIES.

In the Thirty-seventh Annual Report, reference was made to the fact that the Board had investigated schemes to facilitate traffic on various heavily trafficked highways in Victoria, some being in rural areas or new provincial cities and others in the outer metropolitan area.

Whilst in cases where the road improvements will require early occupation of additional width of road reserve action has been taken to acquire the land forthwith, in other cases where a relatively long-range project is to be provided for, it is sufficient to fix an alignment under the provisions of the *Country Roads Act* 1948 (No. 5290). By this Act the powers, functions and duties conferred upon the municipal councils by the *Local Government* (*Streets*) *Act* 1948 were conferred upon the Country Roads Board as far as relates to the declaration of the alignment, widening, and opening up of State highways, main roads, developmental roads, tourists roads and forest roads. The Board is thus enabled to fix a new alignment for either or each side of a road and to acquire from the owners the land between the old alignment and the new alignment.

Upon an alignment being fixed, the Board, in conformity with the above-mentioned legislation, will commence proceedings to acquire compulsorily all lands between the old alignment and the new alignment—

(*a*) In the case of land clear of buildings and other substantial improvements, within four months ; and

(*b*) In the case of any other land, within four months after notice in writing to the Board by the owner that the land is clear of buildings and other substantial improvements.

When such action renders economically unuseable and unsaleable any land which is not between the said alignments the Board may (either by agreement or compulsorily) at any time acquire that land and such further land contiguous thereto as the Board considers necessary to obtain an economically useable and saleable allotment of land.

For the purpose of such acquisition, the value of any land compulsorily acquired will be assessed as at the actual date of acquisition.

The effect of this legislation is, therefore, that the owner of a property on which, say, a residence is erected may retain the possession of that residence until the land is eventually required for road purposes, or until for other reasons the owner demolishes the buildings. When that stage is reached, the Board will take action to acquire the portion of the land needed for road purposes, and compensation will be based on the value of the land at that particular time.

Up to the 30th June, 1952, action had been taken to fix an alignment in the following cases :—

Broadmeadows Shire	Hume Highway
Camberwell City and Mulgrave Shire	Warrigal Road
Dandenong Shire	Springvale Road
Ferntree Gully Shire	Stud Road
Korong Shire	Calder Highway
Mornington Shire	Tyabb Road
Moorabbin City	South Road
Mulgrave Shire	Springvale Road
Numurkah and Shepparton Shires	Goulburn Valley Highway
Sandringham City	Beach Road
Woorayl Shire	South Gippsland Highway

The foregoing is not intended to imply that the fixing of the alignment applies to the whole length of the road in the particular municipality, but only for such lengths as include buildings which it is not proposed to move immediately. The schemes generally are long-range proposals which in all probability will not be fully implemented for a number of years.

DISTRIBUTION OF PETROL TAX.

The overall shortage of funds for the Board's operations, to which reference has been made elsewhere in this Report, made it imperative that representations be made to the Federal Government for the allocation to this State of a greater proportion of the proceeds of the petrol taxation, and the Premier (the Hon. J. G. B. McDonald, M.L.A.) made a very strong plea to the Commonwealth representatives at the Premier's Conference for a more equitable distribution of this money to the State of Victoria.

A broad outline of the States' viewpoint as submitted by the Premier is as under :—

1. A higher standard of road construction has become necessary to meet the requirements of heavy post-war traffic, with double the numbers of vehicles operating and the larger and heavier trucks which form such a considerable proportion of present-day traffic.

2. The great increase in the unit costs of road works, combined with the heavier type and greater width of construction required, have made the costs per mile of road from five to ten times as great as pre-war costs. Even between July, 1950, and June, 1952, most items of cost have increased 50 per cent., but the distribution of petrol tax has increased only 35 per cent.

3. From 1914 to 1929, Victorian roads were built with loan moneys amounting to £12,000,000, as a result of which the Board is now faced with an annual payment of more than £560,000 to cover interest and sinking fund.

4. Between 1929 and 1939, the Board developed a policy of low-cost construction for the Victorian roads, to provide as quickly as possible a service vital to primary producers. These low-cost roads are quite inadequate to carry post-war types of traffic.

5. Since 1949, £2,000,000 has been expended on the reconstruction of State highways, but £15,000,000 is still required to bring them to the legal load limit standard.

6. Since 1939, with the increased importance of many roads, additional main roads and State highways have been declared, greatly increasing the Board's statutory responsibilities for maintenance works. The total length of declared or proclaimed roads in Victoria has increased from 9,786 miles in 1939 to 14,457 miles in 1952.

7. The " ten-year plan " prepared by the Board for these roads and the 50,000 miles of unclassified roads in the State in regular use calls for an expenditure of £15,000,000 per annum, whereas the amount available to the Board, together with an estimated amount of £2,000,000 expenditure from Local Government rates on rural roads, falls short of that figure by more than £5,000,000.

8. Roads are deteriorating under the traffic, and patching gangs are so overwhelmed that they are unable to keep pace with even minimum requirements, with the result that assets are wasting instead of being improved.

9. Damage by floods to roads and bridges in June, 1952, amounting to £750,000, cannot be provided for from the funds available to the Board, and, with the possibility of further floods in the next twelve months, the assets are wasting away.

10. Petrol tax is a measure of wear and tear on existing roads, and approximately one-third of the total Australian road traffic is on Victorian roads. It is thus grossly unfair to tax Victorian vehicle-owners and use the proceeds continually in remote areas outside the State. Developmental works in Queensland and Western Australia should be a charge on the general taxpayer, and not on the Victorian vehicle owners.

11. The formula adopted by the Commonwealth authorities in 1926 as a basis of distribution of moneys from the petrol tax, viz., three-fifths population and two-fifths area, is no longer appropriate, and consideration should be given to the use made of roads in each State. Out of the existing distribution of the proceeds of 6d. per gallon, Western Australia already receives the whole of the amount applicable to petrol used in that State. Victoria considers that this basis should apply generally.

12. In view of the long history behind the "formula," Victoria does not at this stage propose to abandon it in relation to the distribution of the proceeds from the 6d. per gallon petrol tax which is the basis of existing legislation. It was suggested, however, that the Commonwealth should distribute the proceeds of an additional 3d. per gallon on the basis of the petrol actually used in each State. A further suggestion was made that, if the States which would receive less have the capacity to expend the funds, an amount of £1,665,000 should be supplied from Commonwealth consolidated revenue. By this means, the general taxpayer, and not the road users in Victoria and New South Wales, would pay for the assistance to the other States in developing their roads.

13. In view of the growth in the local refinery capacity, it is quite possible that the total revenue from the petrol tax may gradually be reduced, by reason of the increased use of local refined petrol (on which the proceeds of a duty of 3½d. per gallon are distributed) and a correspondingly decreased use of imported petrol (on which distributable duty is 6d. per gallon). At the present time, the total amount collected by the Commonwealth Government from this source is £27,000,000, of which £3,000,000 represents excise duty. In three or four years, however, the position may be very different, and the Commonwealth Act should be amended to increase the amount distributed from excise.

Notwithstanding the vigorous presentation by the Premier of the case for Victoria, the representatives of the Commonwealth Government intimated that they were not prepared to agree to any alteration in the existing procedure or to amend it during the currency of the *Commonwealth Aid Roads Act* 1950, which operates for a period of five years.

ROAD PLANNING.

Rate of Reconstruction.

In the absence of any definite means of assessment, it had been considered in the past that reconstruction of the "black" roads built during the 1920's and 1930's would be necessary after about 25 years life on an average, and that the provision for this should be included in any overall planning programme.

It has recently been considered, however, that this view is no longer sound for the following reasons :—

(*a*) Much of the sealing work carried out before the second world war was applied to lightly constructed pavements which were not intended to carry even the traffic of those days indefinitely. The work was, in fact, part of a definite policy of low-cost stage construction.

(*b*) The weight, size, and speed of vehicles has increased much more quickly than was anticipated.

The compilation of the ten-year plan (referred to on page 25 of the Board's Thirty-seventh Annual Report) has made it possible to determine quantitatively the mileage of black road which should be reconstructed in that period, on the basis of figures which represent the opinion of the engineers most familiar with the needs of the individual roads which made up the Board's system.

An examination of the ten-year plan shows that reconstruction of approximately 2,959 miles was considered necessary in the ten-year period 1949–59, an average rate of nearly 300 miles per annum. The annual distribution of this 2,959 miles of reconstruction is set out in the following tabulation :—

Year.	Miles of Reconstruction (Ten-year Plan).		
	State Highways.	Main Roads.	Total.
1	162	165	327
2	221	196	417
3	184	180	364
4	130	166	296
5	199	133	332
6	195	121	316
7	151	111	262
8	182	99	281
9	125	88	213
10	104	47	151
Totals in ten years	1,653	1,306	2,959

The figures indicate a desire to reconstruct a large mileage of unsatisfactory road in the early stages of the programme, based on the need for this work, but, in practice, this work would require to be spread differently over the period. In actual fact, reconstruction work carried out since 1945 has averaged only 100 miles per annum. To achieve the desired objective, however, provision should be made for reconstruction at a rate rising from 200 miles per annum in 1952–53 to about 400 miles per annum in 1961–62. It is obvious that the Board must be assured of a substantial increase in the moneys available to it before even the lower figure of 200 miles per annum can be reached. In the meantime, it is difficult to hold the roads in reasonable condition, far less to improve them.

EXPERIMENTAL WORK.

Treatment of Slippery Pavement.

During the summer of 1951, a section of the Hume Highway about 1½ miles north of Craigieburn, which carries very heavy traffic, became somewhat slippery, and investigations were made into possible methods of treatment to overcome this dangerous condition.

It was ultimately decided to incorporate additional screenings in the pavement after burning it with kerosene, and this experimental treatment was successfully carried out. In the first instance, flame throwers and a " Greco " burner hired from the Melbourne City Council were tried, but the results obtained were not comparable with those achieved from the method finally adopted.

The work was carried out by an overseer and six men, with two trucks, a " Fordson " roller, a low-down pump, and spray equipment. Half-inch screenings were spread on the pavement and the low-down pump mounted on a truck carrying kerosene was used to spray the kerosene over screenings and pavement. The kerosene ignited readily, and was kept burning by continuously spraying, sufficient heat being generated to melt the bitumen so that screenings could be rolled in. The heating was followed immediately by rolling.

A fairly dense black smoke screen was produced, and it was necessary to arrange operations so that the smoke blew away from traffic. The presence of a flagman was found to be essential. It was possible to reopen the road to traffic fifteen minutes after rolling. About 1½ miles of pavement northerly from the 10-mile post was treated, together with about 0·6 miles in patches between Somerton and Pretty Sally. Further details are given in the Chief Engineer's Report.

ACCIDENTS TO EMPLOYEES.

The number of accidents in which employees of the Board were involved during the financial year 1950–51 was 450, and in the financial year 1951–52 this number increased to 516.

The general nature of the accidents is shown in the following statement, which indicates that generally the accidents were not all serious. The loss of the lives of five of the Board's employees is, however, deeply deplored.

Fatal	5	Poison	4
Strains and sprains	52	Heart strain	1
Fractures	27	Head injuries	5
Eye injuries	88	Infections	20
Bruises, lacerations	111	Miscellaneous	87
Burns	29		
Injuries to limbs	87	Total	516

STAFF.

Since the 1st July, 1951, the total number of officers on the Board's staff has increased from 431 (comprising 229 males and 29 females on the permanent staff and 112 males and 61 females on the temporary staff) to 460, made up as under :—

Permanent Staff—		
Males	240	
Females	29	
		269
Temporary Staff—		
Males	121	
Females	70	
		191
Total		460

Whilst the net increase in numbers was 29, there were actually 74 new appointments made, as 45 officers resigned or retired during the year.

Difficulty is still being experienced in recruiting staff, especially professional officers, and the loss of a number of experienced officers has given the Board serious concern.

It is with deep regret that the Board records the death of Mr. W. T. Williams, its Chief Draughtsman, on the 10th September, 1951.

Mr. Williams joined the staff of the Board shortly after its inception in 1913, and gave the Board very loyal and efficient service for over 38 years. He had held the position of Chief Draughtsman since 1927.

STAFF ACTIVITIES.

Charities Fund.

For a number of years, members of the Board's staff have contributed to a Charities Fund, their voluntary contributions being deducted by the Board from their salaries at fortnightly intervals.

The total sum contributed by the staff during the financial year 1951–52 was £276 7s. 11d., which, with the balance of £125 8s. 8d. in hand on the 1st July, 1951, made a total sum of £401 16s. 7d. available for distribution. A total sum of £234 10s. was actually distributed to 21 charities throughout the State, including various metropolitan and country hospitals, the Institute for the Blind, and other similar organizations.

MOTOR REGISTRATION.

During the year 542,133 vehicles, including traction engines and motor cycles, were registered, as compared with 451,781 vehicles in the previous financial year, an increase of 90,532 or approximately 20 per cent. over the figures for 1950–51.

In comparing the figures for the respective years, however, it should be noted that, as from the 12th November, 1951, concessional registration of primary producers cars has been withdrawn. Only goods vehicles can now be registered under primary producers concession, passenger cars having reverted to "private" registration.

Details of registrations are set out hereunder :—

Vehicles.	Financial Year 1950–51.		Financial Year 1951–52.		Increase.	Decrease.
Private—						
New	36,565		42,258			
Second-hand—Re-registered ..	15,806		19,248			
Renewals	206,338		280,997			
		258,709		342,503	83,794	..
Commercial—						
New	12,132		13,378			
Second-hand—Re-registered ..	4,932		5,624			
Renewals	56,835		67,151			
		73,902		86,153	12,251	..
Primary Producers—						
New	6,528		8,461			
Second-hand—Re-registered ..	3,385		3,855			
Renewals	59,639		46,011			
		69,552		58,327	..	11,225
Hire		4,463		4,861	398	..
Licences under Motor Omnibus Act ..		878		810	..	68
Trailers		10,699		12,246	1,547	..
Traction Engines, &c.		47		37	..	10
Motor Cycles		33,531		37,196	3,665	..
Total		451,781		542,133	101,655	11,303

ACCOUNTS.

Statement of accounts for the year ended 30th June, 1952, appears in the Appendix.

The following statement shows the expenditure on road construction, maintenance, &c., from moneys at the disposal of the Board in the Treasury :—

—	Under Board's Supervision.			Under Council's Supervision.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.
1. State Highways—									
Construction	944,584	11	7	4,954	17	7	949,539	9	2
Maintenance and Reconditioning	1,115,319	4	0	93,346	11	8	1,208,665	15	8
2. Main Roads—									
Construction	95,942	19	1	4,517	11	9	100,460	10	10
Maintenance and Reconditioning	203,648	12	5	2,322,565	16	5	2,526,214	8	10
3. Unclassified Roads—									
Construction and maintenance	10,715	11	10	644,962	16	10	655,678	8	8
Roads for isolated settlers	..			16,371	8	0	16,371	8	0
Federal maintenance	26,606	7	6	74,727	19	7	101,334	7	1
4. Tourists' Roads—									
Maintenance	192,406	3	4	4,106	2	10	196,512	6	2
5. Forest Roads—									
Construction	8,929	17	11	..			8,929	17	11
Maintenance	39,262	1	0	20,958	9	0	60,220	10	0
6. Murray River Bridges and Punts—									
Maintenance	9,934	19	1	840	5	11	10,775	5	0
7. Roads adjoining Commonwealth properties ..	..			1,098	15	3	1,098	15	3
	2,647,350	7	9	3,188,450	14	10	5,835,801	2	7

In addition to the amounts shown in the above statement, the following expenditure was incurred during the year in respect of (*a*) works carried out on behalf of the Commonwealth Government and several State Instrumentalities, &c., and (*b*) flood and bush fire damage, for which special provision was made by the Government.

	£	s.	d.
Commonwealth Government	501,806	17	0
State Instrumentalities, &c.	737,300	14	1
Flood and Bush Fire Damage	23,490	11	10
	1,262,598	2	11

OFFICERS AND EMPLOYEES.

The Board wishes to express its keen appreciation of the loyalty of its officers and employees during the year, and of the efficient manner in which they responded to the many demands made upon them. Their ready co-operation has greatly assisted the Board in the difficult conditions which obtained during the year.

ACKNOWLEDGMENTS.

The sincere thanks of the Board are tendered to the Hon. P. T. Byrnes, M.L.C., who held office as Minister of Public Works throughout the year, for his help and interest in its work.

It is also desired to record the thanks and appreciation of the Board to officers of Government Departments and State Instrumentalities, and to the Road Authorities in other States for the assistance given by them.

The various municipal councils throughout the State and their officers have also been very co-operative and their help is greatly appreciated.

We have the honour to be,

Sir,

Your obedient servants,

D. V. DARWIN, Chairman.

F. M. CORRIGAN, Deputy Chairman.

R. F. JANSEN, Member.

W. H. NEVILLE, Secretary.

CHIEF ENGINEER'S REPORT.

Country Roads Board Office,
Melbourne,
18th December, 1952.

THE CHAIRMAN,

SIR,

I have the honour to submit the following details of matters of engineering interest included in work carried out during the year 1951–52.

MECHANICAL PLANT.

Efficiency.—The overall and mechanical efficiencies for crawler tractors and graders, from 1948–49 to 1951–52, are shown in Table A. The figures do not take into account the following units which did not work during the year in question.

Year.	Tractors.	Graders.
1948–49	14	1
1949–50	20	10
1950–51	13	2
1951–52	24	4

A number of the older units were sold during the year as costly to keep in good working order and because the provision of a fleet larger than that which can be properly maintained for effective work in the field fulfils no practical purpose.

Personnel, Major Overhauls, &c.—The total number of men employed at the Central and Divisional workshops, excluding storemen, transport drivers, and staff, increased from 205 to 229 during the year. Unfortunately the labour turnover in Central workshops was 25 per cent. in the year and detracted from efficiency. Table C shows the number of some of the principal items of plant which were given a major overhaul during the year.

TABLE "C."

Tractors—Crawler	25
Graders—Power	25
Shovels	2
Scoops	5
Loaders—	
Front End Crawler	4
Front End Wheel	20
Compressors	14
Mixers—Concrete	6

In addition, the construction of seven new aggregate loaders was undertaken.

TABLE "A."

Type of Plant.	Number of Units in Group.	Average Age of Units in Group.	Overall Efficiency.				Mechanical Efficiency.			
			1948–49.	1949–50.	1950–51.	1951–52.	1948–49.	1949–50.	1950–51.	1951–52.
		Years.	%	%	%	%	%	%	%	%
Crawler Tractors—										
Class 1	37	3·3	27	37	39	32	33	51	44	41
Class 2	41	5·7	33	35	41	26	45	44	47	31
Class 3	19	4·5	21	26	33	19	36	31	38	27
Class 4	24	4·2	33	38	43	23	47	51	48	29
Power Graders—										
Heavy—Tandem Diesel	72	5·2	54	74	67	64	76	77	70	67
Medium—Dual wheel, Diesel	23	5·1	64	66	72	63	76	77	79	67
Light—Single drive, hand control	..	..	28	33	29	..	42	38	34	..
Light—Single drive, power control	17	4·4	49	63	64	43	56	70	68	48
Patrol power graders	20	1·8	86	80	67	53	89	91	73	64
"Speed Patrols"	9	3·7	71	69	66	51	88	78	69	54

Records of the efficiencies of each class and make of the major items of plant, of which Table A is a summary, are proving of value when purchasing or disposing of machines.

Plant Strength.—The number of crawler tractors and power graders owned by the Board at 30th June, 1952, are shown in Table B.

TABLE "B."—TRACTORS AND POWER GRADERS OWNED BY THE BOARD AT 30TH JUNE, 1952.

Crawler Tractors—	
Class 1	46
Class 2	48
Class 3	25
Class 4	26
	145
Power Graders—	
Heavy—Tandem Diesel	74
Medium—Dual-wheel Diesel	23
Light—	
Single drive, hand control	..
Single drive, power control	19
Patrol Power Graders	20
Speed Patrols	9
	145

Additions to Central Workshops.—Three major additions have been made to the equipment; a shot-blasting machine for cleaning cylinder heads and castings, a horizontal boring machine for machining gearboxes, pumps, &c., and two 55 K.W. electric generating sets, one in each shop. The generating sets were installed to provide power for essential machines in the event of restrictions being imposed by the S.E.C., realizing that they would be very useful portable units for the field workshops essential for proper maintenance of plant on large works.

Developmental Works.—The following work of a developmental nature was carried out:—

(*a*) Investigation into the use of electric rotary drills in soft rock, power being supplied from a small portable electric generating set. This enables use to be made of the higher efficiency of electric motors compared with compressed air units.

(*b*) In co-operation with the Materials Research Engineer, the design and construction of an hydraulic soil loading machine for testing the bearing ability of soils and pavements.

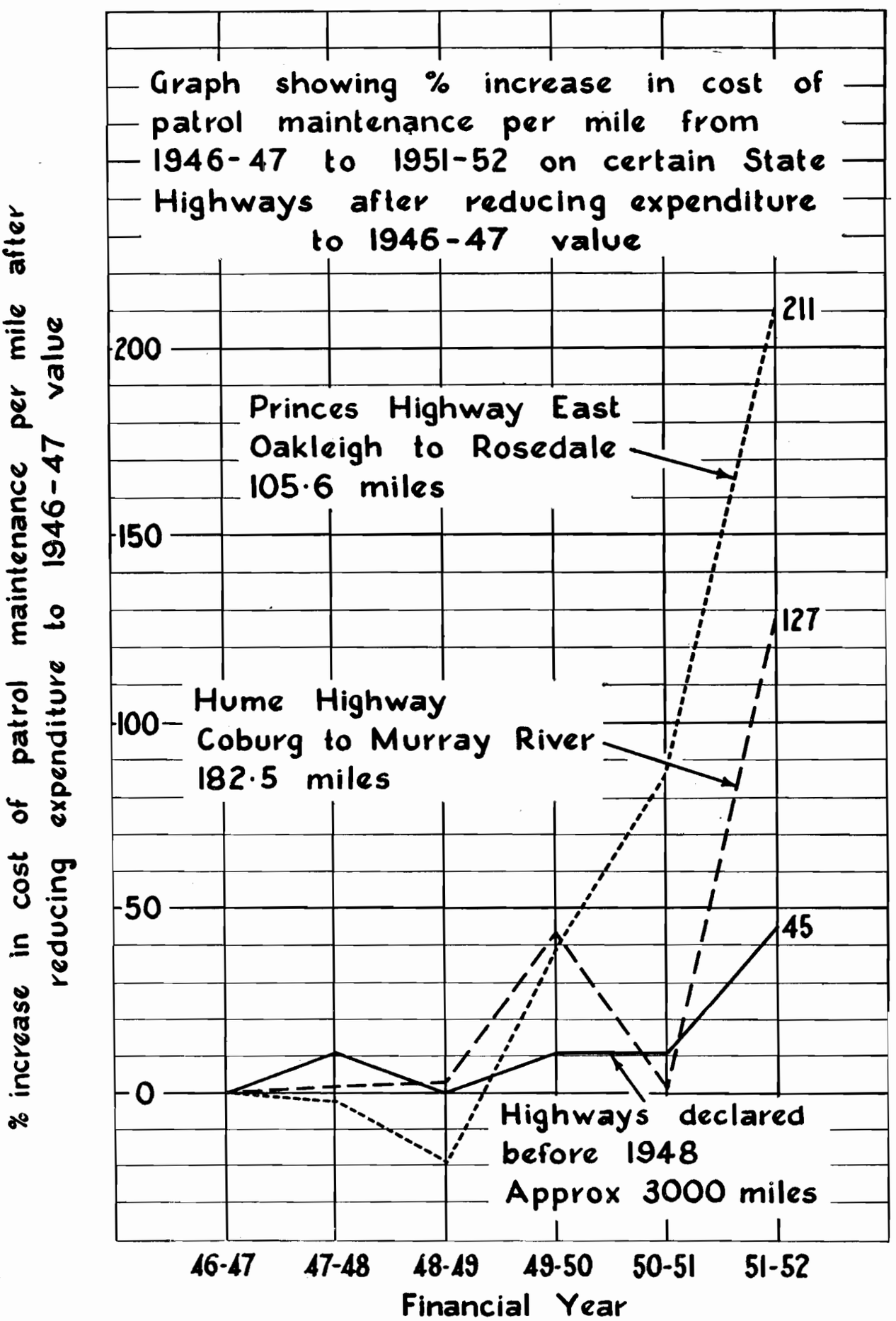

Graph showing % increase in cost of patrol maintenance per mile from 1946-47 to 1951-52 on certain State Highways after reducing expenditure to 1946-47 value
% increase in cost of patrol maintenance per mile after reducing expenditure to 1946-47 value
200
150
100
50
0
211
127
45
Princes Highway East
Oakleigh to Rosedale
105·6 miles
Hume Highway
Coburg to Murray River
182·5 miles
Highways declared
before 1948
Approx 3000 miles
46-47
47-48
48-49
49-50
50-51
51-52
Financial Year

Fig. 1.

(*c*) The development of a magnetic clutch, depending for its functioning on the properties of iron particles suspended in oil. While this unit appears to have promise as a simple clutch for many applications in the Board's work, further design and experimental work is needed to overcome faults.

(*d*) Syndal Workshops :—Preliminary work has been done on the general layout and design of workshops for the new depot at Syndal.

Divisional Workshops.—Further development of Divisional Workshops has been as follows :—

(*a*) Provision of an " Igloo " type workshop, 100 feet x 60 feet at Ballarat.

(*b*) Completion of similar accommodation at Horsham.

(*c*) Provision and erection of the steel frame for a 120 feet x 60 feet workshop at Benalla.

(*d*) Construction of concrete floor and supply of steelwork for a 100 feet x 60 feet workshop at Traralgon.

(*e*) Supply of the steel frame for a 100 feet x 60 feet workshop at Warrnambool.

(*f*) Construction of concrete floor for a 80 feet x 60 feet extension at Geelong.

RECONSTRUCTION OF " BLACK " ROADS.

During the period 1930–1939, the average rate of extension of bituminous surfacing was 383 miles each year. In accordance with a policy of stage construction this surfacing was, with few exceptions, applied to pavements built to carry the comparatively light traffic which was then using them and with the expectation that they would have a life of 15 to 20 years, at the most, before widening and strengthening became necessary.

Reference to the section of this Report dealing with bituminous surface treatment will show that, in 1950–51, only 104 miles of initial treatment was applied to sections of the Board's road system which were previously " black " and had been reconstructed. It is desired to invite attention to the fact that unless sufficient funds can be made available to provide for the reconstruction of " black " roads at the rate of about 400 miles per year over the next ten years, the Board's system must inevitably deteriorate.

The result of such deterioration, which is beginning to be felt, will be unsatisfactory service to the public and an increase in expenditure on efforts to maintain pavements which should have been reconstructed. The latter is indicated in Fig. 1, which shows the percentage increase in expenditure per mile on patrol maintenance of certain sections of State Highways from 1946–47 to 1951–52, after reducing the cost year by year to its 1946–47 value in work.

TREATMENT OF SLIPPERY BLACK PAVEMENT.

Sprayed bituminous surface treatment, if applied in accordance with the Board's requirements, provides a satisfactory non-skid surface under traffic conditions which prevail on the greater part of the Board's road system. Sometimes, due to the work being carried out in unfavourable weather or because the seal coat has been placed over a very rich surface applied in earlier years, bituminous binder is present in excess and a slippery surface results. Several attempts have been made over the years to devise a means of incorporating additional aggregate in such surfaces. Hitherto, none of them has been successful, but a procedure developed during the year in the Dandenong Division shows considerable promise.

Fig. 2.—Heating slippery road surface to incorporate screenings.

The method consisted in spreading ½-in. screenings on the pavement at the rate of 1 cubic yard to 200 square yards and spraying them with kerosene by means of a low down pump mounted on a truck. The kerosene was ignited and kept burning by spraying additional kerosene on to it. This generated sufficient heat to melt the bitumen on the surface and to heat the screenings so that they could be rolled into the pavement. It was found that an operator could be trained in a very short period to secure reasonably even heating of the stone. The quantity of kerosene applied was about 0·2 gallons per square yard in all, the cost for approximately 2,500 square yards of work carried out in September, 1951, being 1s. 4½d. per square yard. Fig. 2 shows this work in progress.

Further details are given in Technical Bulletin No. 9, issued on 11th August, 1952.

BITUMINOUS SURFACE TREATMENT.

Extent of Work.—The mileage of the various types of work carried out on declared roads is shown in Table E. The average rates of application were, binder 0·25 gallon per square yard and aggregate 1 cubic yard to 60 square yards for initial treatment; and binder 0·2 gallon per square yard and aggregate 1 cubic yard to 80 square yards for sprayed retreatments. The total mileage done in 1950–51 and 1951–52 is set out in Table D.

Table F sets out the average cost of the work carried out by Country Roads Board plant on declared roads during 1951–52 and Table G gives the average price of aggregate for bituminous surface treatment at per cubic yard, stacked by the roadside, for the years 1947–48 to 1951–52.

Of the 104 miles which had previously been "black" and were given "initial treatment" after reconstruction, 11·8 miles were only partly completed and will be given a final seal coat next year. This initial treatment on previously "black" pavements represents 1·5 per cent. of the total treated length at the 30th June, 1951, and is the same percentage as was carried out in 1950–51.

Extension of the System.—During the year the "black road" in the Board's road system, i.e., State highways, main roads, tourists' roads, and forest roads, was extended by 302·2 miles, 55·8 of which were on State highways. 6·8 miles were only given a light primer seal and the work will be completed by the application of a seal coat next season.

Rate of Retreatment.—The 518 miles retreated represents 7·5 per cent. of the total "black" road in the Board's system at the 30th June, 1951. The combination of initial treatment on previously treated lengths, and retreatments, 622 miles, represents a total rate of 9 per cent., and although this is an increase of 2 per cent. over the rate for last year, it is still very low having regard to the age of many of the pavements, their inadequacy for present traffic and earlier postponement of resealing.

Variation in Costs since 1939–40.—Complete and consistent records of the cost of bituminous surface treatment work carried out by the Board have been kept for many years, and Table H shows how the costs of various types of treatment have varied since 1939.

Table J gives the variation in cost of materials, labour, stores, and plant, over the same period.

TABLE "D."—LENGTH OF WORK CARRIED OUT IN 1950–51 AND 1951–52.

Type of Road and Plant Used.	Miles Done.	
	1950–51.	1951–52.
(a) Work on C.R.B. Declared Roads.		
(i) Board's plant	785	887
(ii) Municipal or hired plant	38	37
	— 823	— 924
(b) Work on Undeclared Roads to which the Board Contributed.		
(i) Board's plant	44	26
(ii) Municipal or hired plant	77	8
	— 121	— 34
(c) Work for Other Authorities done by Board's Plant.		
(i) Municipalities	39	56
(ii) State Instrumentalities	3	7
(iii) Commonwealth of Australia ..	23	17
	— 65	— 80
	1,009	1,038

TABLE "E."—MILEAGE OF EACH TYPE OF WORK CARRIED OUT ON C.R.B. DECLARED ROADS.

Type of Road.		Length in Miles.																
		Nature of the Work.															Summary of Work.	
		Initial Treatment.								Retreatments.								
										Reseals.								
Road.	Control.	Prime Only.		Seal Only.		Primerseal.		Prime and Seal.		Nominal Size or Gauge of Aggregate.					R.M.S.	P.M.S.	State Highways.	Main and Other Declared Roads.
		E.	R.	E.	R.	E.	R.	E.	R.	¾-in.	⅝-in.	½-in.	⅜-in.	¼-in.				
State Highways	Direct ..	..	..	..	2·43	..	11·74	38·84	47·10	2·50	39·32	80·08	56·55	21·52	..	..	300·08	..
	Municipal ..	..	..	..	..	..	..	17·00	0·20	..	..	3·06	4·11	..	..	..	24·37	..
Main Tourist and Forest Roads	Direct ..	0·86	0·13	..	..	..	..	9·49	4·27	..	7·74	7·02	..	..	..	..	..	29·51
	Municipal ..	0·35	..	14·56	3·31	5·58	..	215·53	34·83	3·06	54·44	125·63	102·13	8·22	1·69	0·92	..	570·25
		1·21	0·13	14·56	5·74	5·58	11·74	280·86	86·40	5·56	101·50	215·79	162·79	29·74	1·69	0·92	324·45	599·76
Totals		1·34		20·30		17·32		367·26		515·38					2·61		924·2	
		406·2								518								
		924·2																

The table does not include 17 miles of Initial Treatment (Extension 16 miles—Reconstruction 1 mile) and 17 miles of Retreatment, both on Unclassified Roads.

Abbreviations.—E., Extension to the Bituminous Surfaced System; R., Initial Treatment on Reconstructed length of previously sealed pavements; R.M.S., Retreatment with roadmix; P.M.S., Retreatment with plantmix.

TABLE "F."—AVERAGE COST OF WORK CARRIED OUT BY COUNTRY ROADS BOARD PLANT ON COUNTRY ROADS BOARD DECLARED ROADS DURING 1951–52 COST IN PENCE PER SQUARE YARDS.

Item.	Nature of the Work.																			
	Initial Treatments.								Retreatments.											
	Prime Only, 0·20 gall. per sq. yd.		Seal Only, 0·25 gall. per sq. yd.		Primerseal. Two Applications, Temporary Work.		Prime and Seal. Prime 0·20, Seal 0·25 galls. per sq. yd.		Reseals. Nominal Size or Gauge of the Aggregate Used.										Roadmix Seal. *	
									¾-in.		⅝-in.		½-in.		⅜-in.		¼-in.			
Square Yards Costed	20,130.		176,067.		191,947.		3,199,440.		58,826.		990,127.		2,051,794.		1,376,889.		285,800.		15,835.	
	*d.**	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%
Materials	4·25	43	15·55	67	8·41	65	20·11	64	17·76	65	13·70	66	12·38	66	9·76	64	6·40	63	9·37	56
Labour	3·59	37	4·23	18	2·30	18	6·49	20	5·41	20	4·03	19	3·52	19	3·21	21	2·00	20	4·52	27
Stores	0·27	3	0·60	3	0·51	4	0·87	3	0·57	2	0·55	3	0·50	3	0·40	3	0·37	4	0·52	3
Plant Hire	1·70	17	2·95	12	1·62	13	4·17	13	3·70	13	2·59	12	2·19	12	1·89	12	1·36	13	2·42	14
Totals	9·81	100	23·33	100	12·84	100	31·64	100	27·44	100	20·87	100	18·59	100	15·26	100	10·13	100	16·83	100

* Pence per square yard.

TABLE "G."—AVERAGE PRICE OF AGGREGATE FOR BITUMINOUS SURFACING AT PER CUBIC YARD IN STACKS BY THE ROADSIDE.

Material.	Price Per Cubic Yard in Shillings and Pence.				
	1947–48.	1948–49.	1949–50.	1950–51.	1951–52.
	s. d.	s. d.	s. d.	s. d.	s. d.
Screenings ..	26 0	30 0	30 6	35 9	39 11
Gravel	27 7	32 11	33 11	32 0	39 2
Sand	14 5	12 8	10 4	22 5	21 5
Scoria	10 8	12 5	10 5	7 8	18 2
Weighted Average	24 10	29 1	29 4	34 3	39 0

TABLE "H."—INDEX NUMBERS (INITIAL TREATMENT AND RESEAL).

TOTAL COST PER SQUARE YARD.

Base: Average of three years ending 30th June, 1939.

Year.	Initial Treatment.	Reseal 0·15.	Reseal 0·20.	Average.*
Base	1,000	1,000	1,000	1,000
1939–40 ..	1,112	..	..	1,112
1940–41 ..	1,305	1,128	1,371	1,277
1941–42 ..	1,397	1,436	1,388	1,404
1942–43 ..	1,488	1,778	1,579	1,583
1943–44 ..	..	..	..	..
1944–45 ..	1,778	1,744	1,742	1,760
1945–46 ..	1,910	1,799	1,808	1,857
1946–47 ..	1,997	1,884	1,992	1,968
1947–48 ..	2,261	2,268	2,250	2,260
1948–49 ..	2,563	2,467	2,570	2,541
1949–50 ..	2,792	2,752	2,691	2,757
1950–51 ..	3,245	3,026	2,731	3,062
1951–52 ..	3,826	3,617	3,417	3,671

* NOTE.—In computing the average, initial treatment has been given a weight of two relative to each Reseal.

TABLE "J."—INDEX NUMBERS (INITIAL TREATMENT AND RESEAL).

TOTAL COST PER SQUARE YARD.

Base: Average of three years ending 30th June, 1939.

Year.	Materials.	Labour.	Stores.	Plant.	Total.
Base	1,000	1,000	1,000	1,000	1,000
1939–40 ..	1,120	1,020	1,090	1,190	1,110
1940–41 ..	1,260	1,320	1,040	1,520	1,280
1941–42 ..	1,350	1,460	1,230	1,850	1,400
1942–43 ..	1,440	1,920	1,300	2,410	1,580
1943–44 ..	..	..	..	..	..
1944–45 ..	1,630	1,810	1,650	2,810	1,760
1945–46 ..	1,740	1,960	1,610	2,840	1,860
1946–47 ..	1,930	1,920	1,590	2,590	1,970
1947–48 ..	2,130	2,520	2,110	3,100	2,260
1948–49 ..	2,390	2,900	2,300	3,450	2,540
1949–50 ..	2,470	3,270	2,820	4,510	2,760
1950–51 ..	2,540	4,590	2,960	5,140	3,060
1951–52 ..	3,200	5,240	3,560	5,370	3,670

DIRECTION SIGNS.

In common with other State road authorities, the Country Roads Board follows the Standards Association of Australia (S.A.A.) Road Signs Code, 1946, when erecting direction and warning signs on its roads. This code provides for direction signs of the finger-post type to be erected at intersections, and for advance direction signs to be placed before an intersection in order to give drivers warning before the intersection is reached. The average speed of road vehicles is now so high that greater use of the advance type of sign has become necessary, and a limited number of the two types specified in the code has been erected. These are shown in Fig. 3 as Signs A and B. The map type (Sign A, Fig. 3) is expensive, and difficult to site in certain locations, on account of the size of the sign necessary, while Sign B has not proved very satisfactory, apparently owing to the difficulty experienced in realizing the significance of the arrows. Arrangements were therefore made to carry out a series of tests in an attempt to determine the relative value, to the ordinary driver, of the S.A.A. advance signs and alternative designs.

Signs Tested.—The most typical of the signs tested were those shown in Fig. 3, Signs C to E, being generally of the type recommended by the American Association of Highway Officials (A.A.S.H.O.). It was decided that scale model tests offered the only possibility for obtaining an answer at a reasonable cost and in a reasonable time. Experiments were therefore carried out with signs one-twentieth full size, using the apparatus shown in Fig. 4. This consisted of a green canvas strip on which the road pavement and shoulders, one-twentieth width, were represented by black and yellow stripes. Provision was made for winding the canvas strip towards the observer at any desired speed. The observer viewed the signs through a slit at the scale height of a driver's eye.

Arrows.—Before commencing tests on the signs an investigation was made to ascertain what type of arrow should be used, leading to the conclusion that the most discernable of those 11 inches long was that consisting of a plain triangular head with a 90 degrees apex angle and 8-in. wide base, with a 2-in. wide tail.

Summary of Test Procedure.—After inconclusive results from tests carried out in daylight, and later with high illumination at night, it was decided that best results would be obtained by illuminating the model signs with the same intensity as a sign normally illuminated by the headlights of a car. Observers were placed in a darkened room for ten minutes prior to commencing the test in order to accustom their eyes to the gloom.

Each sign in turn was placed on the model and brought up to the observer from 400 feet scale distance to zero at the scale equivalent of 10 m.p.h. The observer was asked to indicate in which direction he should proceed to reach a destination given him beforehand. The number of "misses" recorded for each sign was recorded. Each observer was given a written set of instructions before entering the dark room, and prior to commencing his tests were given sufficient "dummy" runs at slow scale speeds of approach to ensure that he was familiar with what was required of him. To lessen "guessing" two tests in the series asked each observer for a town NOT on that particular sign. Half the observers were given the signs in reverse order with no significant difference in results.

Fifty-one observers were tested. All were licensed drivers and the group comprised 2 engineers, 8 women, 9 works supervisors, and 32 members of the clerical staff. It was noted in this test, as in others, that engineers made practically no mistakes and were "poor subjects" for the purpose in mind.

Conclusions from the Tests.—

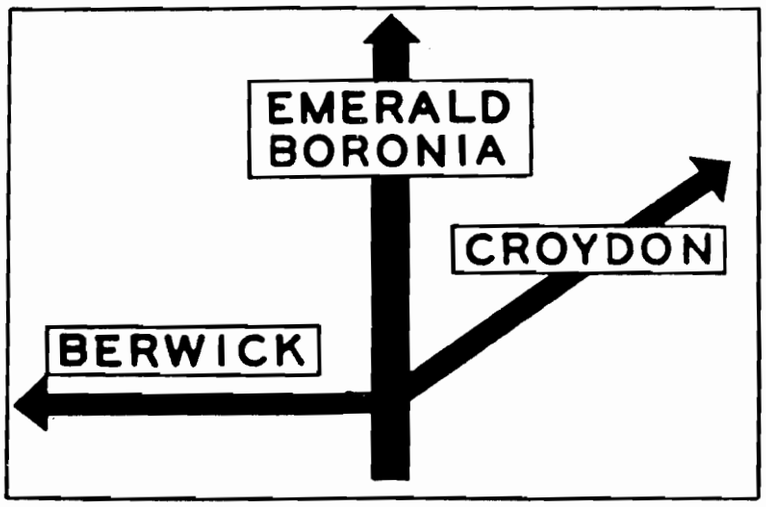
(*a*) The S.A.A. Standard Advance Direction Sign (Sign B, Fig. 3) confused some drivers when the required town name appeared in the top panel.

(*b*) The S.A.A. alternative Advance Direction Sign (Sign A, Fig. 3) was slightly more easily read than any other sign tested.

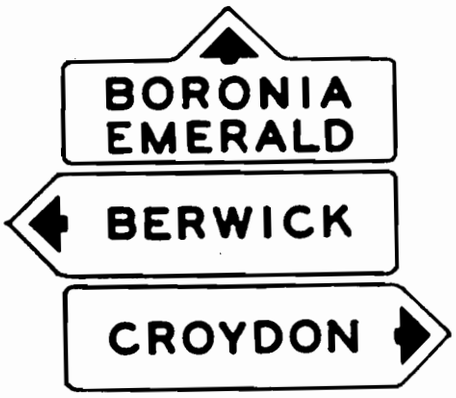
(*c*) Signs in lower case lettering (Sign C, Fig. 3) are more difficult to read than signs in capitals on boards of equal area.

(*d*) The A.A.S.H.O. type signs, D and E in Fig. 3, are almost as easily understood as the S.A.A. alternative sign, B in Fig. 3.

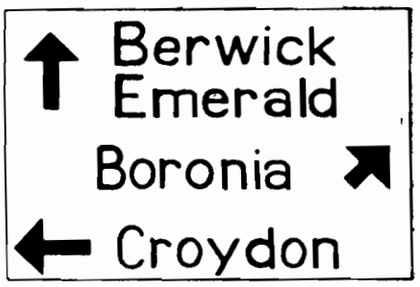
In view of the above, it is considered that the present S.A.A. Standard Advance Direction Sign, B in Fig. 3, should be replaced by the signs D or E. Signs of this type are being put up on the Board's roads, those of the map type, provided as an alternative in the S.A.A. Road Signs Code, being used for special cases.



SIGN A.

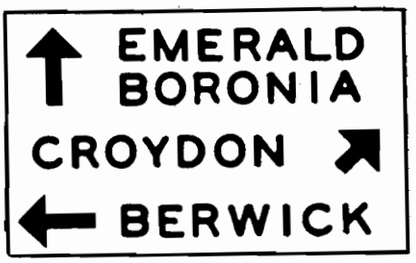


SIGN B



SIGN C

SIGN D



SIGN E

FIG. 3 TYPICAL ADVANCE DIRECTION SIGNS USED IN TESTS

AUTOMATIC TRAFFIC COUNTERS.

Automatic traffic counters are used very generally in the U.S.A., in order to reduce costs, and during the year the Board imported ten machines modelled on a unit developed by the Road Research Laboratory, Harmondsworth, England.

A rubber tube is laid across the road and led into the counter so that each pair of vehicle wheels crossing the tube forces a puff of air into the counter and closes a pair of contacts mounted on a copper diaphragm. A relay then actuates a revolution counter which records the total number of axles passing. The counters are accurate to within 5 per cent. to 10 per cent.

Trouble has been experienced with fouling of contacts so that the instruments have not as yet been placed into general service. It is expected that trial counts will be carried out with them in the year 1952–53.

BRIDGES.

Work Carried Out During the Year.—In addition to the normal design work associated with the structures on highways and main roads, the staff was engaged on the design and preparation of plans and specifications for several bridges in the northern section of the Metropolitan area, over Moonee Ponds and Merri Creeks. Investigation was also carried out for new structures on roads which would be submerged by the raising of the Eildon Weir. Principal among these was the bridge over the arm of the weir at Bonnie Doon where the Maroondah Highway and the existing bridge over Brankeet Creek will be submerged to a depth of approximately 100 feet. The bridge will be 1,260 feet long with a roadway of 24 feet plus a footway of 3 feet on one side. The average height of the piers will be approximately 80 feet. Investigation showed that it would be economical to change from bank to bridge where the height of the former reached the magnitude of 35–40 feet. The design of the bridge finally chosen consisted of piers of two rectangular columns founded on rock and carrying steel girders of 60 feet span with a concrete deck, the girders and deck being designed to act in a composite manner for live load only.

Concrete.—During the year, the plan for inproving the standard of concrete in the field was further implemented with the co-operation and help of the Materials Research Division and in conjunction with the Testing Laboratories operating in the different Divisions. Grading of preliminary samples, followed by the design of the mix and the casting of test cylinders, prior to the approval of materials, is now standard practice. The field concrete is checked by breaking test cylinders.

Tests carried out when the deck of the Swan Street Bridge was being cast showed that, with careful control of material, batching and mixing, consistent concrete of good quality can be obtained. This is illustrated by the following figures :—

(*a*) Number of cylinders cast, 73.

(*b*) Average strength of all cylinders at 28 days, 4,428 lb./sq. in.

(*c*) Coefficient of variation for all cylinders, 10·3 per cent.

(*d*) Cement content, 564 lb./c. yd. of concrete.

During the year considerable quantities of imported cement were used. No trouble was experienced, although most brands were slower in setting than Victorian cement. The 7-day strength of cylinders was generally low, but the 28-day strength was quite satisfactory and comparable with those obtained with local cement.

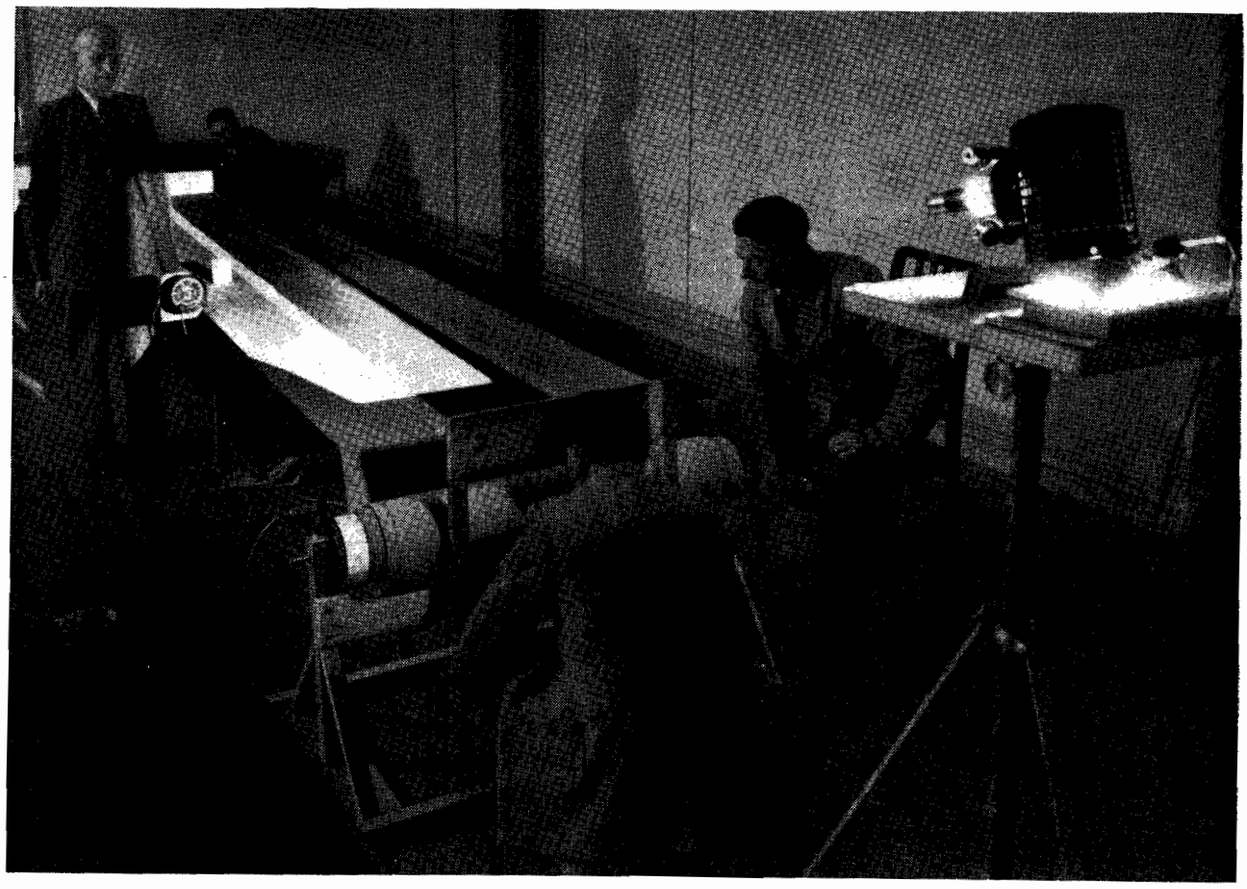


Fig. 4.—Testing models of road signs under simulated night conditions.

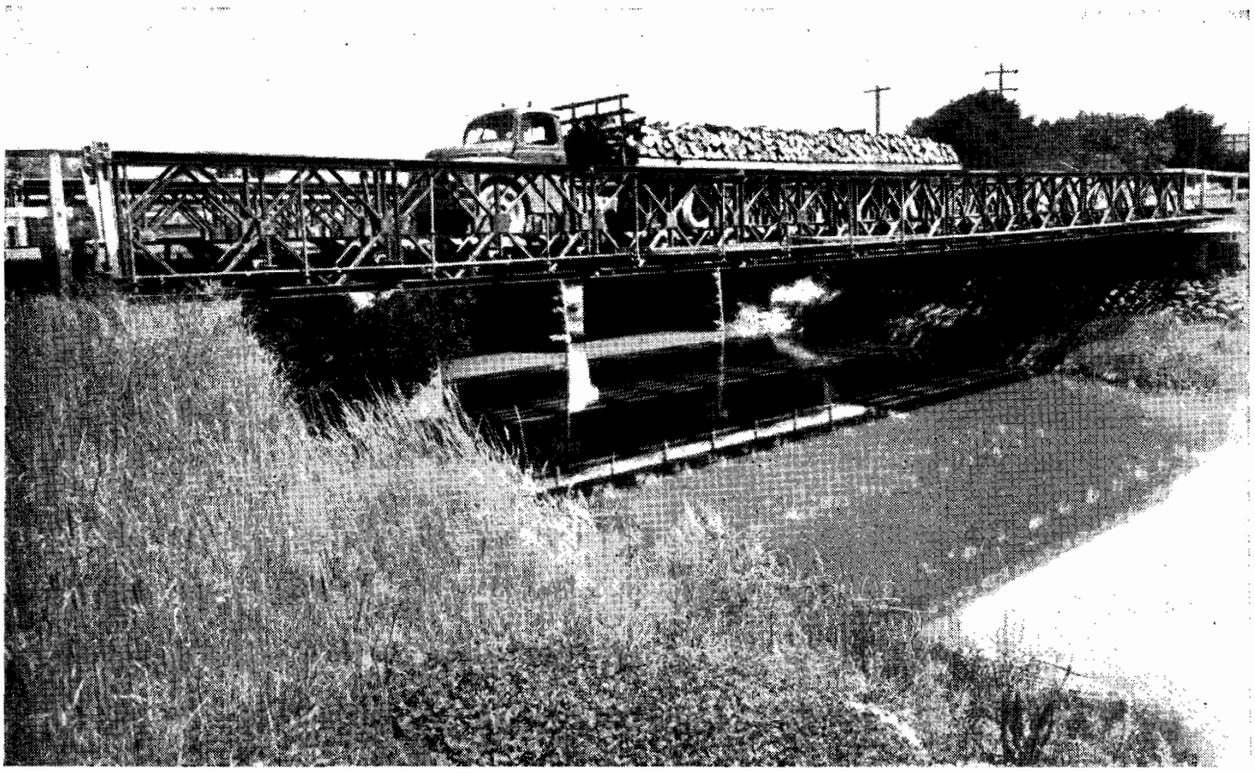
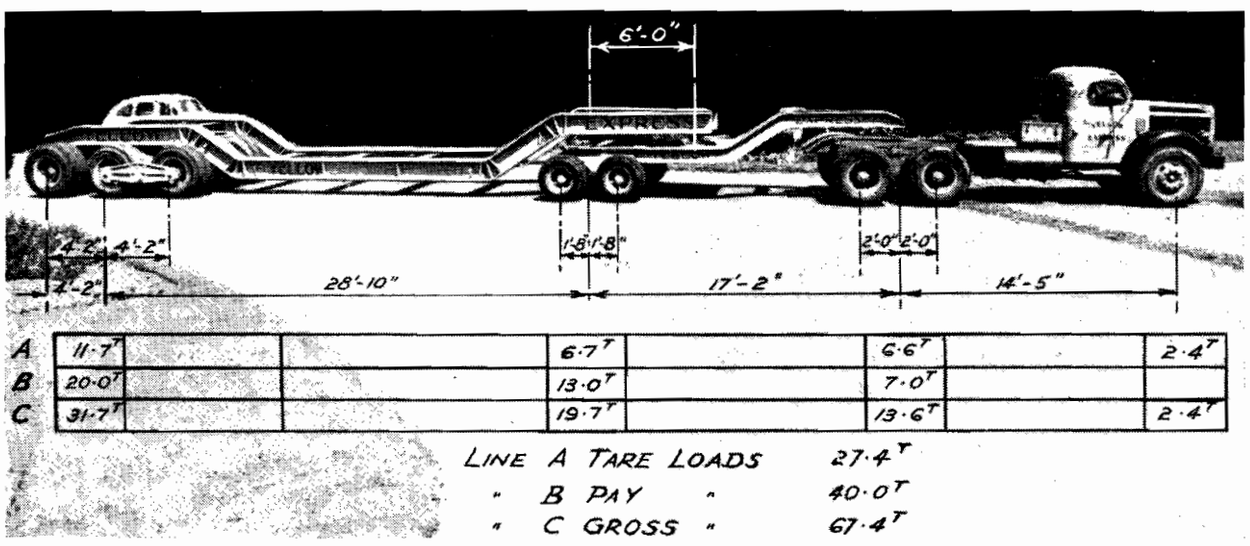


Fig. 5.—Temporary bridge, Jackson's Creek, Gisborne.



A	11·7T			6·7T		6·6T		2·4T
B	20·0T			13·0T		7·0T		
C	31·7T			19·7T		13·6T		2·4T

LINE A TARE LOADS 27·4T
" B PAY " 40·0T
" C GROSS " 67·4T

Fig. 6.—Special float for heavy loads.

Emergency Bridging.—Previous Annual Reports have referred to the value in emergency of the stocks of army pattern commercial built-up girders which the Board keeps. These have a limited load capacity for long spans, and in view of the present condition of many bridges in the State, steps were taken during the year to obtain stocks of Bailey Bridging with which it will be possible to carry normal highway loading over a span of 120 feet. The equipment has already been used in a dual Bailey Bridge of 90 feet span erected over Jackson's Creek at Gisborne on the Calder Highway, when a serious scour developed at one pier of the old bridge. This is shown in Fig. 5.

Provision for Heavy Loads.—Decentralization of industry and the development of the State's power and water resources have required that many heavy pieces of equipment and machinery, which are too big to be handled by the Railways Department, should be taken considerable distances by road. Special vehicles have to be provided, and while in most cases the number of wheels keeps individual wheel loads within legal limits, and so avoids overloading the road pavements, the problem of bridges is more difficult. Although many structures are capable of taking big loads, provided that there is adequate distribution of the load both laterally and longitudinally, a considerable number have had to be strengthened and, in places, completely new bridges have been necessary. One special vehicle to meet these conditions is shown in Fig. 6. The weights shown in the figure are those produced by a 40-ton pay load, satisfactory distribution being obtained by making the overall width of the rear bogie 12 feet.

Floods.—In many areas the rainfall during the winter was considerably above previous averages, resulting in floods nearly equal to the record ones of 1934. The Barwon, Latrobe, Thompson, Avon, and Snowy River Valleys have been the main focal points. Considerable damage to stream banks was done and in some cases courses of rivers were so altered as to endanger structures. Fig. 7 shows the present course of the Avon River. The overprinting

AVON RIVER AT STRATFORD.

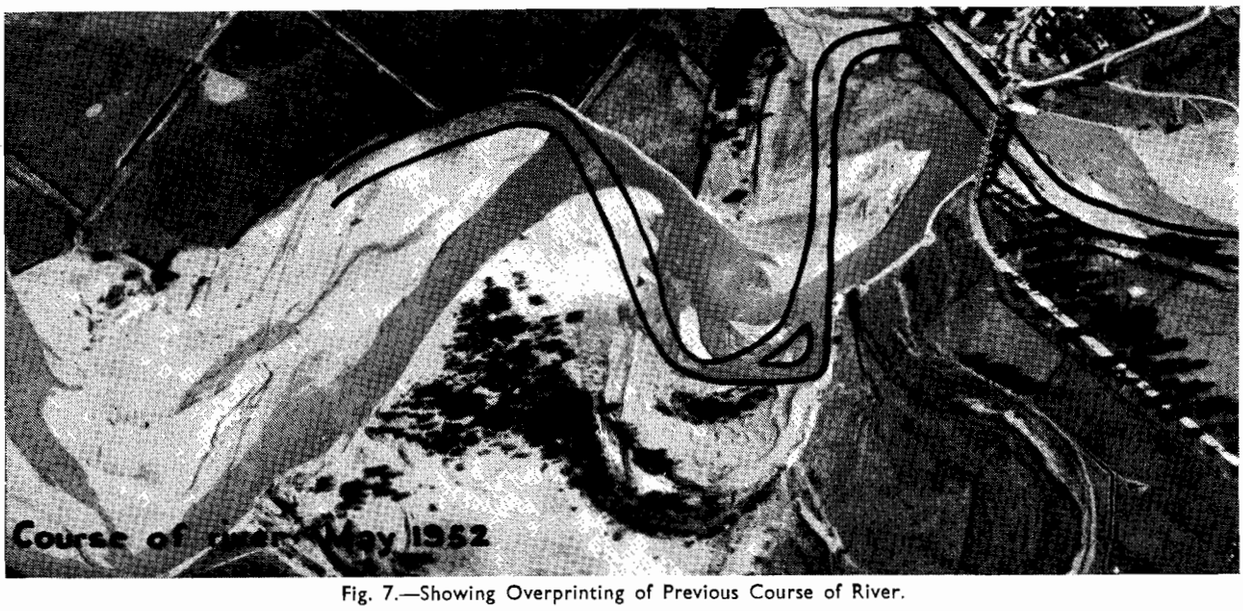


Fig. 7.—Showing Overprinting of Previous Course of River.

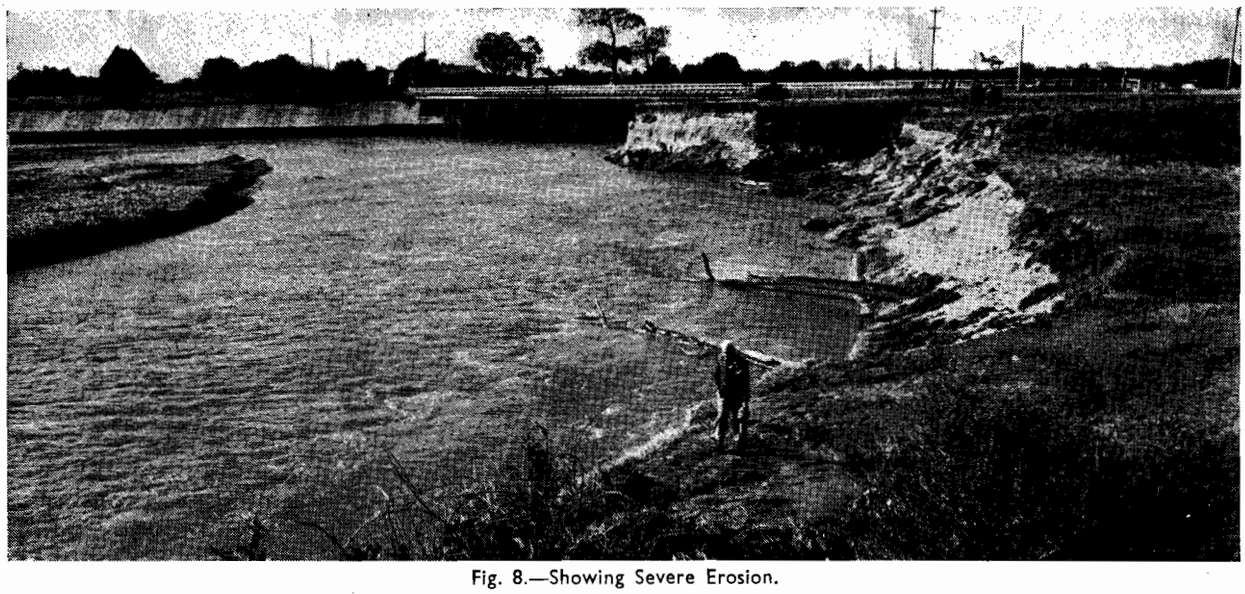


Fig. 8.—Showing Severe Erosion.

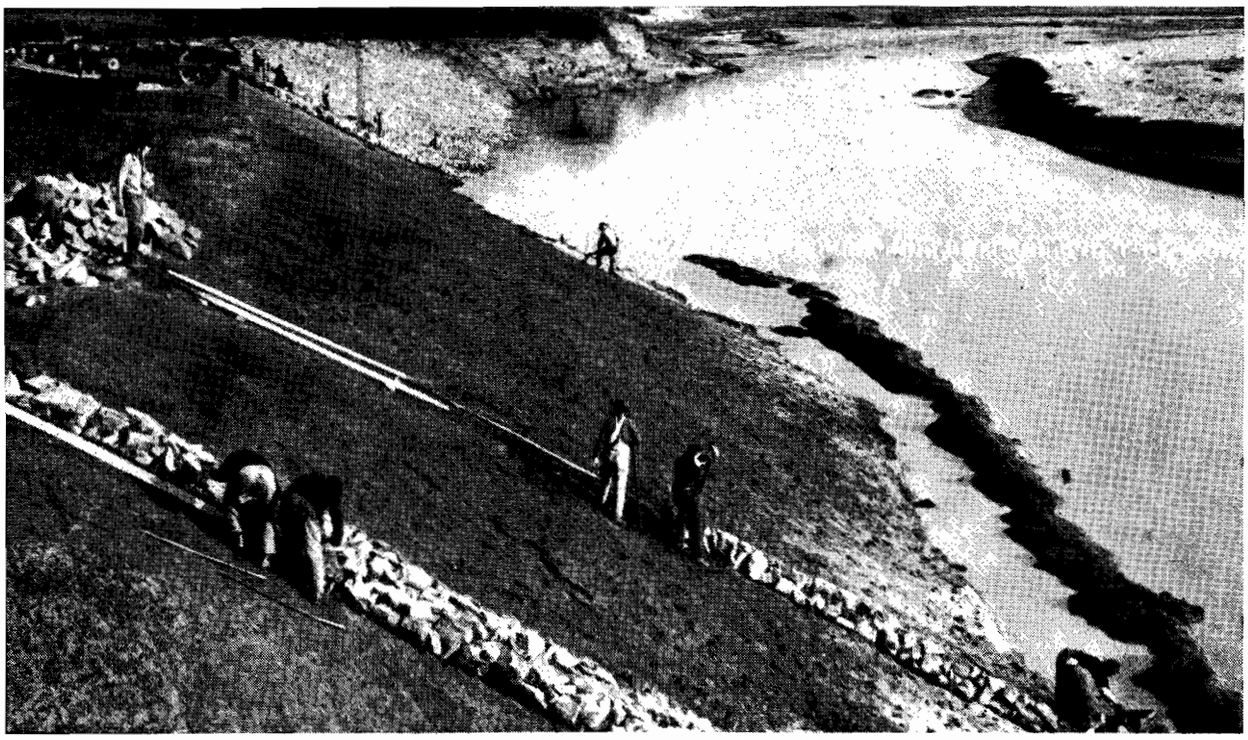


Fig. 9.—Sausages Placed in Position to Control Erosion.

shows the river course previous to flooding. Fig. 8 indicates the severe erosion which occurred in June, 1952—threatening the western abutment of the bridge on the Princes Highway at Stratford. Fig. 9 shows the measures taken to protect the highway and bridge. These consisted of forming a layer over the surface of the bank by means of cylinders of wire mesh filled with rock. The cylinders were 2 feet in diameter and were wired together to make a flexible, protective mat. Willows have also been planted between the stone " sausages."

LABORATORY.

Concrete Testing.—During the year an Amsler compression testing machine of 400,000 pounds capacity was installed in the Board's laboratory. With the aid of this machine it is possible to break up to 8-in. cylinders of the high quality concrete used in reinforced concrete piles. Fig. 10 shows this machine installed. The quality of the concrete used throughout the Board's work during the year was generally good.

Paints.—The Board's chemical laboratory has now been equipped for testing paints in order to ensure proper control of materials supplied under contract.

Aggregate for Bituminous Surface Treatment.—As the result of work carried out during the year, it has been possible to devise a simple method for estimating the average least dimension of aggregate, and hence the rate of application of aggregate and bitumen. The revised method only requires the determination of the " flakiness index " (British Standard Specification No. 63), in addition to the normal grading on square aperture sieves. By plotting a graph of square sieve aperture against " percentage of material passing each sieve " it is possible to find the " median size." This can be regarded as a hypothetical sieve aperture which 50 per cent. of the material will pass. Knowing the " median size " and the " flakiness index " the average least dimension is found from an empirical chart. Further details of the method, with the charts required, are given in Technical Bulletin No. 10.

Sand Asphalt for Thin Carpets.—Owing to the high cost of aggregates for bituminous surface treatment in the northern parts of the State, experiments were continued on the use of " drift " sands in asphalt mixtures for thin carpets. The methods employed were those of the United States Corps of Engineers, using the Marshall stability test. It was found that, in spite of the fineness of the sand, it was possible to produce mixtures which would be expected to give adequate stability for the purpose required.

Pavement Design.—The Institution of Engineers, Australia, Melbourne Division, was requested during the year by Commonwealth and State Housing Authorities to investigate the necessary thickness of pavements in the streets of housing estates. At the request of that Committee an investigation was carried out into failures

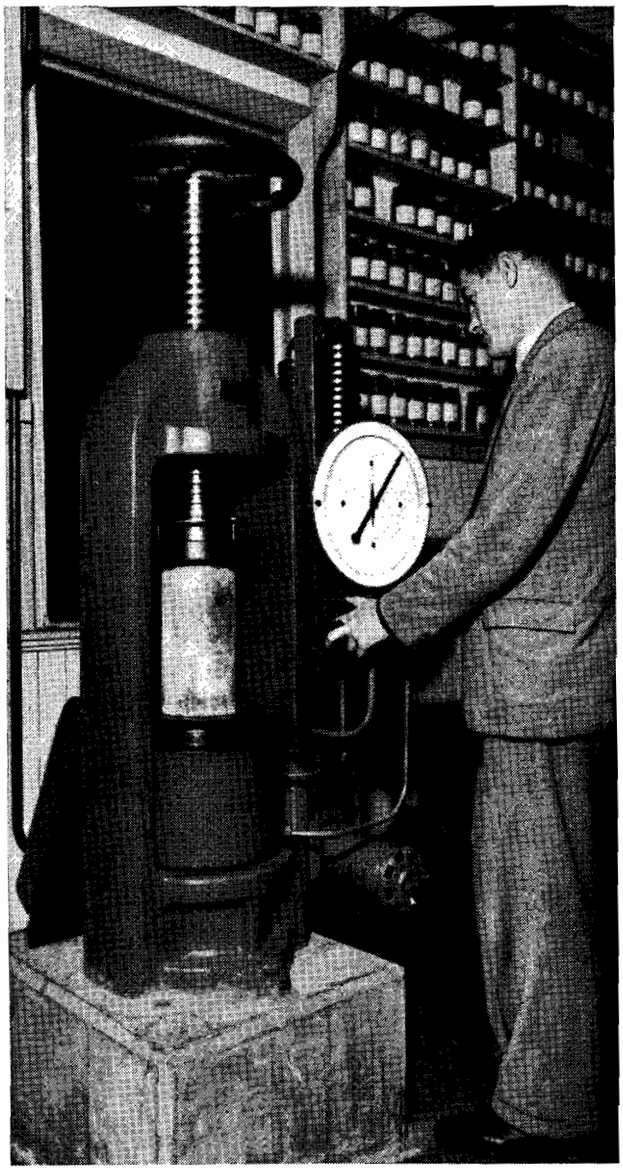


Fig. 10.—Amsler Testing Machine.

of pavements in the suburbs of Melbourne. An estimate was made of the California Bearing Ratio at each location, using methods based on simple soil tests which have been described previously. As a starting point, to establish a suitable design curve, use was made of a table given by Fergus in the Transactions of the American Society of Civil Engineers, Vol. 115 (1950) p. 565. It was found that a curve computed from this table as appropriate for 5,000 repetitions of a 6,000 pound aircraft wheel load made a reasonable separation between pavements which had failed and those which had not failed. The curve is shown in Fig. 11. It is not intended to imply that the actual wheel loads are 6,000 pounds or the number of repetitions 5,000 on residential streets; the curve is only an arbitrary curve of suitable shape. Nor is there any assumption as to the degree of saturation or the time of soaking of the C.B.R. specimens. The estimated California Bearing Ratio is used as an index of soil quality which is compared directly with pavement thickness and performance.

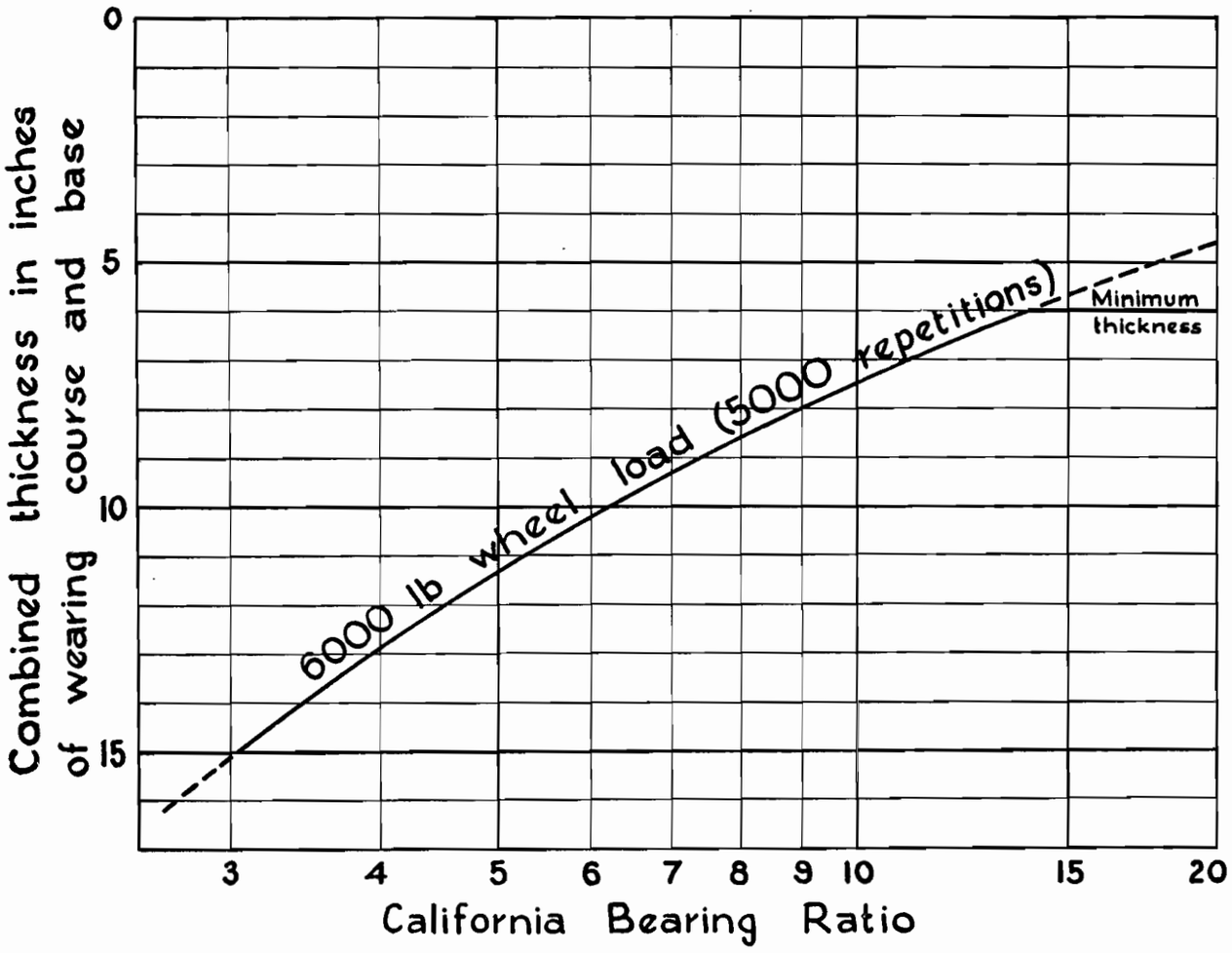


Fig. 11.

ENGINEERING CIRCULARS.

The following Research Memoranda, Engineering Notes and Technical Bulletins were issued during the year. The mailing list for Research Memoranda includes authorities in :—

England	India
New Zealand	U.S.A.
South Africa	Italy.

No.	Title.	Date of Issue.
	RESEARCH MEMORANDA.	
9	The relation between Los Angeles abrasion loss and Stewart aggregate impact test	August, 1951
10	A comparison of Los Angeles abrasion loss per cent. and aggregate crushing test values	January, 1952
11	Adhesion agents for use in bitumen surface treatment with wet aggregates	February, 1952
	TECHNICAL BULLETINS.	
6	Road capacity	April, 1952
7	Bituminous surface treatment— " Primerseals " to protect a pavement until a normal seal coat can be applied	May, 1952
8	Photography as an aid to asphalt research	May, 1952

No.	Title.	Date of Issue.
	ENGINEERING NOTES.	
35	Signs at narrow bridges and traffic lines on bridges	July, 1951
36	The compaction of fine crushed rock	July, 1951
37	Compaction of soil	February, 1952
38	Conversion of horse roller	January, 1952

STAFF.

General.—After the many changes in personnel and their location which took place following the last war, the engineering staff position became more stable during the year and sincere and loyal service was given to the Board.

The present lack of money will provide the opportunity for the younger members to take stock of their experience and technical knowledge, so that they will be able to accept their responsibility for ensuring good and economical work when sufficient funds are available for the extensive work ahead.

Technical Papers.—The following papers were read to professional associations by members of the staff during the year :—

Papers.	Professional Associations, &c.	Authors.
The use of *in situ* shear tests in the design of flexible pavements	Conference on the shear characteristics of soils held at University of Melbourne, 2nd to 6th June, 1952, under the auspices of the University of Melbourne and the Institution of Engineers, Australia	A. H. Gawith, M.C.E., A.M.I.E.Aust.
Maintenance of road construction plant ..	Mechanical Branch, Melbourne Division, Institution of Engineers, Australia, 24th April, 1952	G. M. Langham, B.Mech.E., A.M.I.E.Aust., Dip.Elec.Eng.

Yours obediently,

C. G. ROBERTS,
Chief Engineer

APPENDIX.

COUNTRY ROADS BOARD.

STATEMENT OF RECEIPTS AND PAYMENTS FOR YEAR ENDED 30TH JUNE, 1952.

(Adjusted to nearest pound.)

	£	Country Roads Board Fund.	*Commonwealth Aid Roads Act* 1950. Sec. 6 (1).	*Commonwealth Aid Roads Act* 1950. Sec. 7 (1).	*Federal Aid Roads and Works Act* 1937.	Loan Funds.	Total.
RECEIPTS.	£	£	£	£	£	£	£
Balances at 1st July, 1951		72,937	..	100,514	1,099	3,379	177,929
Motor Car Registration Fees	3,916,992						
Drivers' Licence Fees	159,950						
Fines	83,376						
	4,160,318						
Less Cost of Collection	306,356						
		3,853,962	..	..	..	..	3,853,962
Municipalities Repayments—							
Permanent Works—Outer Metropolitan Roads	29						
Maintenance Main Roads	283,362						
		283,391	..	..	..	..	283,391
Moneys provided by *Commonwealth Aid Roads Act* 1950		..	1,563,303	937,847	..	..	2,501,150
Receipts from State Loan Funds—							
Act 3662		..	..	..	..	100,461	100,461
Act 5363		..	..	..	..	946,160	946,160
Other Receipts—Fees and Fines		4,222	..	..	..	..	4,222
		4,214,512	1,563,303	1,038,361	1,099	1,050,000	7,867,275
PAYMENTS.							
Construction and Maintenance of Roads and Bridges—							
Main Roads		1,644,581	881,633	..	..	100,461	2,626,675
State Highways		554,000	654,666	..	..	949,539	2,158,205
Tourists' Roads		..	..	196,512	..	..	196,512
Forest Roads		..	..	69,150	..	..	69,150
Unclassified Roads		..	20,737	634,941	..	..	655,678
Isolated Settlers' Roads		..	..	16,371	..	..	16,371
Federal Maintenance		..	46	101,289	..	..	101,335
Roads adjoining Commonwealth Properties		..	..	..	1,099	..	1,099
Murray River Bridges and Punts		10,775	..	..	..	..	10,775
Traffic Line Marking		12,729	..	..	..	..	12,729
Plant Purchases		695,539	6,221	..	..	..	701,760
Interest and Sinking Fund Payments		536,870	..	..	..	..	536,870
Interest and Sinking Fund Payments—Great Ocean Road		1,000	..	..	..	..	1,000
Payment to Tourists' Resorts Fund		46,098	..	..	..	..	46,098
General Expenditure		230,644	..	..	..	..	230,644
Administration Expenditure		450,351	..	..	..	..	450,351
		4,182,587	1,563,303	1,018,263	1,099	1,050,000	7,815,252
Balances at 30th June, 1952		31,925	..	20,098	..	..	52,023

NOTES.—The amount shown under *Commonwealth Aid Roads Act* 1950, Sec. 6 (1) does not include the proportion reserved for other works connected with transport in terms of that Act, as that proportion is not disbursed by the Board.

Municipalities were formerly required to contribute annually towards the cost of Permanent Works on Main and Developmental Roads. Acts 4140 and 4415 relieved Municipalities of this annual liability which has the effect in year ended 30th June, 1952, of decreasing the amount available for expenditure by the Board by the sum of £184,312.

AUDITOR-GENERAL'S CERTIFICATE.

The accounts of the Country Roads Board for the year ended 30th June, 1952, have been audited. In my opinion the above statement of Receipts and Payments fairly presents, in summary form, the transactions during that period.

E. A. PEVERILL,
Auditor-General,
30th December, 1952.

C. G. GRIFFITHS,
Accountant,
10th October, 1952.

APPENDIX—*continued.*

COUNTRY ROADS BOARD.

WORKS EXECUTED ON BEHALF OF COMMONWEALTH AND STATE AUTHORITIES FOR YEAR ENDED 30TH JUNE, 1952.

Department or Authority.	Description of Works.	Expenditure Chargeable to Authority. £ s. d.
Department of Lands and Survey	Roadworks: Buchan Caves Reserve	1,893 18 3
Forests Commission	Roadworks: Maffra, Otway Shires	7,705 15 5
Grain Elevators Board	Roadworks: Approaches to Wheat Terminal, Geelong	741 8 0
Gas and Fuel Corporation of Victoria	Roadworks: Morwell	2,863 11 6
Housing Commission	Roadworks: Ballarat, Morwell, Norlane Housing Estates Roadworks: Moe Service Roads	185,106 5 0
Melbourne and Metropolitan Board of Works	Bridgeworks, Roadworks: Healesville, Upper Yarra Shires	85,273 14 1
Public Works Department	Roadworks: Town of Portland, Dookie Agricultural College, Chandler Highway	4,495 6 2
Soldier Settlement Commission	Roadworks in Soldier Settlement Estates throughout Victoria	138,038 17 2
State Coal Mine	Maintenance of Roads, Wonthaggi	196 11 9
State Electricity Commission	Bridgeworks, Roadworks: Kiewa Valley, Princes Highway East, Morwell	225,786 11 8
State Rivers and Water Supply Commission	Bridgeworks, Roadworks: Eildon Weir Project, Cairn Curran Reservoir, Bonnie Doon	83,582 10 4
Victorian Inland Meat Authority	Roadworks: Ballarat	1,616 4 9
		737,300 14 1
Public Works Department	Repairs to Flood and Bush Fire Damage	23,490 11 10
Department of Works	Construction Works: Avalon, East Sale, Mangalore Aerodromes, Bandiana, Bendigo, Graytown, Longlea, Mt. Oberon, Watsonia. Bridge Strengthening, Seymour Area: Sealing Works, Essendon Aerodrome	501,806 17 0
		1,262,598 2 11

LOAN LIABILITY AT 30TH JUNE, 1952.

	£ s. d.	Main Roads. £ s. d.	Developmental Roads. £ s. d.	Total. £ s. d.
Permanent Works—				
Main Roads	5,287,335 4 5			
State Highways	2,320,783 13 3			
Tourists' Roads	55,292 10 3			
Forest Roads	1,083 18 11			
		7,664,495 6 10	..	..
Developmental Roads		..	6,425,757 10 11	14,090,252 17 9
Discount and Expenses		176,425 1 0	238,318 3 4	414,743 4 4
Total Amount Borrowed		7,840,920 7 10	6,664,075 14 3	14,504,996 2 1
Less Redemption of Loans—				
Redemption Funds		85,219 1 1	646,386 7 4	731,605 8 5
Main Roads Sinking Fund		285,688 7 7	..	285,688 7 7
Developmental Roads Sinking Fund		..	55,083 0 2	55,083 0 2
State Loans Repayment Fund		849,793 8 1	..	849,793 8 1
National Debt Sinking Fund		764,452 5 8	1,154,967 10 10	1,919,419 16 6
		1,985,153 2 5	1,856,436 18 4	3,841,590 0 9
Loan Liability at 30th June, 1952		5,855,767 5 5	4,807,638 15 11	10,663,406 1 4

By Authority: W. M. HOUSTON, Government Printer, Melbourne.