1950-51.

VICTORIA.

COUNTRY ROADS BOARD.

THIRTY-SEVENTH ANNUAL REPORT

FOR YEAR ENDED 30TH JUNE, 1950.

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

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COUNTRY ROADS BOARD

THIRTY-SEVENTH ANNUAL REPORT
1950

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COUNTRY ROADS BOARD.

THIRTY-SEVENTH ANNUAL REPORT.

Exhibition Building,
Carlton, N.3,
4th December, 1950.

The Honorable P. T. Byrnes, M.L.C.,
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 (No. 3662), the Board has the honour to submit to you, for presentation to Parliament, the report of its proceedings for the year ended 30th June, 1950.

FINANCE.

REVENUE FUNDS.

During the year the receipts from motor registration fees and fines paid into the Country Roads Board Fund amounted to £2,802,971, compared with £2,322,224 during the preceding year, an increase of £612,460. In addition £131,713 was received from drivers' licence fees. The cost of collection and refunds totalled £247,194, leaving a net revenue of £2,687,490.

Although the Country Roads Act provides for payment into the Country Roads Board Fund of drivers' licence fees, action had been taken by legislation each year since 1st July, 1932, to divert those fees to consolidated revenue. However, such legislation was not introduced in respect of the year 1949–50, with the result that the fees were paid into the Fund. The total amount diverted from the Fund in seventeen years was £1,485,891.

The increased revenue for the year was due in part to the fact that the 25 per cent. reduction in registration fees in respect of certain motor vehicles, which operated during petrol rationing, ceased as from 22nd February, when such rationing was lifted. The extra amount received for the remainder of the year as a result is estimated at £140,000. It is estimated that the reduction of fees since 1942 amounted to £2,500,000. The legislation dealing with the restoration of fees is referred to elsewhere.

An amount of £1,018,233 received under the provisions of Section 6 (1) of the *Commonwealth Aid Roads and Works Act* 1947 was available for construction, reconstruction, maintenance, and repair of roads, with the exception of one-sixth of that amount (£169,705), which was allotted for expenditure on other works connected with transport. In addition the sum of £522,000 was made available in accordance with Section 6 (4) of the same Act for expenditure upon the construction, reconstruction, maintenance and repair of roads through sparsely populated areas, timber country, and rural areas.

The total receipts credited to the Country Roads Board Fund, and the amounts received under the *Commonwealth Aid Roads and Works Act* 1947, amounted to £4,258,736 for the year. During the financial year 1948–49, the total corresponding receipts amounted to £3,397,364.

Loan Moneys.

From the loan authorization of £500,000 for the construction and reconstruction of metropolitan roads and bridges, passed by Parliament under Acts 4188, 4414, and 4498, £41,867 was expended during the year. A balance of £141,950 remained at 30th June, 1950.

From the loan authorization of £5,000,000 for the carrying out of permanent improvements and permanent works on State highways, tourists' roads, and forest roads under the *Country Roads (Financial) Act* 1949, £302,086 was expended during the year. The total to 30th June, 1950, was £671,621.

Commonwealth Aid Roads and Works Act, 1947.

The following amounts were expended on roads and bridges during the year from balances available under the Federal Aid Roads and Works Agreement 1937 and provision from the *Commonwealth Aid Roads and Works Act* 1947 :—

	£
Maintenance of classified roads to assist Municipalities	616,221
Construction of roads of a developmental character	197,034
Restoration and rebuilding of bridges on unclassified roads ..	66,055
Assistance in construction of soldier settlement roads	14,388
Construction, reconstruction and maintenance of school bus routes ..	13,596
Isolated settlers' roads	13,175
Flood damage repair	7,073
Removal of drift sand, bush fire restoration works, &c.	99
Provision towards maintenance of roads previously constructed with moneys provided by the State and the Commonwealth ..	66,759
Total	£94,400

For the maintenance and repair of public roads adjoining or of approach to property of the Commonwealth within the State of Victoria, an amount of £2,543 was available under the terms of the Federal Aid Roads and Works Agreement, which amount had been committed from the previous year. The expenditure was £735.

At the 30th June, 1950, credit balances shown in the Commonwealth Aid Roads and Works Account were £451,566 under Section 6 (1) and £476,065 under Section 6 (4). These amounts were covered by expenditure incurred but not reimbursed or by works for which provision had been made.

In the Board's 34th and 36th Annual Reports special reference was made to the provisions of the *Commonwealth Aid Roads and Works Act* 1947 which operated for a period of three years from the 1st July, 1947, thus terminating on the 30th June, 1950.

For the financial year 1949–50 the portion of the customs and excise duty on motor spirit paid to the States as a whole on the area-population basis was £5,767,058 in addition to £3,000,000 from consolidated revenue. The total amount collected for the year by the Commonwealth was £19,901,441 of which £6,322,672 was collected in Victoria.

The amount received by the State of Victoria on the area-population basis in respect of the financial year was £1,003,468 from the duty on motor spirit plus £522,000 being the State's proportion (17·4 per cent.) of the payment from consolidated revenue. The figures quoted are those paid by the Commonwealth in respect of the financial year; the actual amount as received by the State does not include receipts for June which are included in the accounts for the new financial year.

From the commencement of the first agreement on 1st July, 1926, to the 30th June, 1950 (24 years) the total amount collected by the Commonwealth in respect of duty on motor spirit was £210,648,923 of which £62,842,728 was collected in Victoria. The total amount paid to the States was £72,138,503; the portion of that amount collected in Victoria was £22,028,000, but only £12,730,116 was received by the State. The total extra provision made by the Commonwealth from consolidated revenue in the last three financial years was £6,000,000 of which Victoria received £1,044,000.

The types of works for which provision has been made from Commonwealth-aid funds have previously been detailed.

Generally speaking allocations are made to local government authorities for specific works to be undertaken by them. In the financial year 1949-50 provision was made for bridge and road construction and maintenance jobs in municipalities in all parts of the State. In recent years substantial provision has been made for such works as road construction in soldier settlement areas, construction and maintenance of school bus routes and flood restoration works which are quite apart from works involved in dealing with the general road programme for the State.

MAIN ROADS.

Allocation of Funds.

An amount of £2,462,814 was allocated during the year for such works as patrol and general maintenance, fire protection, bridge maintenance, reconditioning, resheeting, resealing, initial sealing, bridge construction, and general improvement of main roads over a length of 9,710 miles. The amount expended was £1,217,829 and commitments amounting to £585,432 were outstanding at the end of the year. Provision of £1,693,203 was made from the Country Roads Board Fund and £769,611 from moneys available under the Commonwealth Aid Roads and Works Act.

The allocation from the Country Roads Board Fund was made for 3,523 separate jobs on 1,128 roads in 185 municipalities; that from Commonwealth-aid funds for 1,172 jobs on 540 roads in 141 municipalities.

The length of reseals for the twelve months extended over 272·6 miles, whilst new seals on sections previously sealed, but which required reconstruction, comprised 34·6 miles. New seals, being extensions of the bituminous surface treatment system, totalled 213·6 miles. The total of the lengths dealt with was 520·8 miles, being an increase of 52·72 miles on the previous year.

New bridge projects initiated totalled 49 and the reconstruction of 29 existing bridges was completed, the total cost of the projects being £126,001.

Responsibility for Work.

As a general rule municipal councils are responsible for the works on main roads. In certain cases, however, they are carried out under the direct supervision of the Board's own officers; this is generally governed by conditions of expediency, such as convenience of organizing the work in conjunction with other work in an area, or the work being situated on the outskirts of municipal districts or affecting more than one Council. The following are the principal roads which were maintained directly by the Board during the year:—

Shire.	Road.
Alberton	Grand Ridge
Avon	Dargo (portion)
Bellarine	Barwon Heads–Ocean Grove
Bellarine	Wallington–Ocean Grove
Bulla	Melbourne–Lancefield
Eltham	Healesville–Kinglake
Goulburn	Goulburn Valley
Healesville	Buxton-Marysville
Healesville	Healesville–Kinglake
Healesville	Marysville
Huntly	Goornong–Colbinabbin
Huntly	Elmore-Raywood
Keilor	Melbourne–Bendigo
Korumburra	Lang Lang–Nyora
Maffra	Licola
Mansfield	Mansfield
Mansfield	Mansfield–Woods Point
Mansfield	Mansfield–Tolmie
Mansfield	Tolmie–Whitfield
Metcalfe	Elphinstone–Harcourt
Morwell	Grand Ridge
Morwell	Boolarra–Foster

Shire.	Road.
Morwell	Morwell–Mirboo
Oxley	Mansfield–Tolmie
Oxley	Tolmie–Whitfield
Queenscliff (Borough)	Point Lonsdale
South Gippsland	Toora–Gunyah
South Gippsland	Boolarra–Foster
Tambo	Bruthen–Buchan
Tambo	Gelantipy
Tambo	Nowa Nowa
Upper Yarra	Woods Point
Wangaratta	Rutherglen
Whittlesea	Whittlesea–Kinglake
Wodonga	Bonegilla
Woorayl	Boolarra–Foster
Yea	Healesville–Kinglake
Yea	Whittlesea–Kinglake

Apart from general maintenance the following more extensive improvement works were carried out by the Board on main roads :—

Colac–Ballarat Road (*Leigh Shire*).

Strengthening by resheeting and sealing of 5½ miles to Buninyong Shire boundary.

Healesville–Kinglake Road.

Sealing of 2·9 miles between Maroondah channel and Chum Creek.

Mansfield Road.

Re-alignment of 1·07 mile in rocky country near Merrijig.

Mansfield–Wood's Point Road.

Widening rock side cuttings between Knockwood and Gaffney's Creek.

Wallington–Ocean Grove Road.

Reconstruction and sealing of remaining section of ¾ mile, thus completing sealed road to Ocean Grove.

Wood's Point Road.

Resheeting sections between " The Springs " and Matlock.

Apportionment of Costs.

The following statement shows how the expenditure for the year on main roads was divided between the Country Roads Board Fund (State motor registration fees, &c.), Commonwealth aid funds (petrol taxation) and municipalities :—

	£	s.	d.
Main Roads Expenditure C.R.B. Fund 1948–49	759,561	19	10
Main Roads Expenditure Commonwealth Aid 1948–49 ..	327,558	2	0
	1,087,120	1	10
Amount apportioned to Councils based only on above C.R.B. Fund Expenditure	187,989	18	1
Percentage of apportionment to C.R.B. Fund Expenditure ..	24·75 per cent.		
Percentage of apportionment to above total expenditure ..	17·29 per cent.		

Under the provisions of the Country Roads Acts the ordinary proportion of the cost to be contributed by municipal councils would be one-third of the first amount, i.e., £253,187. The second amount of £327,558 does not involve any further municipal contribution whatever. Moreover, on any main road where the cost was deemed excessive, and especially on roads subjected to traffic not of local origin, or timber traffic, the municipal contribution has been reduced below one-third in accordance with the provisions of the Country Roads Act. Thus, instead of contributing £253,187, the councils have been called upon to the extent of £187,990 only, a reduction of £65,198, or an average contribution of one-quarter instead of one-third of the total amount apportioned. Expressed in terms of total expenditure (including that from Commonwealth Funds) the councils' contribution is only 17·29 per cent.

Thus the State, through the Country Roads Board, paid over four-fifths of the cost of main road expenditure. In this way the State recognizes that modern traffic conditions vary considerably from those which operated when motor transport was in its infancy and that there are now few main roads on which there is not some proportion of traffic which comes under the definition of "not of local origin". This movement was anticipated when the legislature provided for the greater portion (two-thirds) of the cost of maintenance being borne by the State from motor vehicles fees. The reduction of contribution by municipalities and consequent increase of payment by the State has gradually advanced and been made applicable to a greater number of roads as traffic on the roads has increased. Out of a total of 1,091 main roads in respect of which maintenance expenditure was apportioned in the financial year 1949–50, a reduction was effected in 600 cases. It is important to record, however, that the Board in recommending a reduction in the contribution to be made by a Council is obliged to take into account the revenue, valuation and rating of the municipality as well as the other factors mentioned.

STATE HIGHWAYS.

Generally the work on State highways is undertaken under the direct supervision of the Board. However, the Act provides that the Board may contract with the Council of a municipality to do the work. During the year the work on the following highways in their municipal districts was carried out by the Councils of the municipalities named :—

Municipality.	Highway.
Alberton Shire	South Gippsland (part)
Braybrook Shire	Western
Bright Shire	Ovens (part)
Brighton City	Nepean
Box Hill City	Maroondah
Camberwell City	Maroondah
Coburg City	Hume
Corio Shire	Midland
Corio Shire	Princes
Geelong City	Princes
Geelong West City	Midland
Korumburra Shire	South Gippsland
Mildura City	Sturt
Mildura Shire	Calder
Mildura Shire	Sturt
Moorabbin City	Nepean
Mordialloc City	Nepean
Nunawading City	Maroondah
Oakleigh City	Princes
Ringwood Borough	Maroondah
South Barwon Shire	Princes
Walpeup Shire	Ouyen
Woorayl Shire	South Gippsland

The total length of State highways at 30th June, 1950, was 3,849 miles. It is the practice to provide for regular maintenance, which is carried out by permanent patrols. In addition improvements and reconstruction works are undertaken within the limits of financial, labour, and material resources. The principal works of this description put in hand or completed consisted of the following :—

Bass Highway.—Reconstruction of 2·2 miles of very weak pavement between Bass and Anderson.

Bellarine Highway.—Plant mix seal at Queenscliff.

Borung Highway.—Construction of 0·7 mile at the junction of the Donald-Swan Hill road.

Construction of base course of 3-in. consolidated sandstone for a length of 8·1 miles in the Warracknabeal Shire.

Strengthening and sealing 5 miles near Warracknabeal.

Calder Highway.—Construction of deviation between mileage 300 and mileage 321 south of Nowingi known as the "Hattah Deviation". The existing road which is only a lightly-surfaced track, follows a circuitous course 21 miles in length whilst the new direct route reduces the length to be reconstructed by approximately 6½ miles. Grubbing and clearing was carried out during the year.

Resheeting of limestone pavement for 9·59 miles between Trinita and Nowingi.

Glenelg Highway.—Completion of widening of 1·81 mile of existing 14-ft. sealed pavement to 22 feet and resheeting including regrading and realignment of curves at Skipton.

Widening of 3·3 miles of existing 14-ft. sealed pavement to 22 feet and resheeting including regrading and realignment of curves on section west of Skipton.

Resealing 3·9 miles between Glenthompson and Dunkeld.

Resealing 8·02 miles between Hamilton and Coleraine.

Goulburn Valley Highway.—Strengthening and sealing of 3·4 miles between Wunghnu and Numurkah.

Henty Highway.—Reconstruction in gravel and sealing of 1·21 mile from Tyers-street to the northern township boundary in the Township of Portland.

Sealing of 11·61 miles between Heywood and Myamyn which was primer sealed in the previous year.

Resheeting with gravel of 2·86 miles north of Cavendish.

Construction of 8·03 miles of a deviation between Cavendish and Cherrypool, necessitated by construction of Rocklands reservoir.

Resheeting of 8·93 miles from Rocklands deviation north to Cherrypool.

Reconstruction with a view to sealing of 8·9 miles between Kellalac and Warracknabeal.

Reconstruction and sealing of weak pavement near Lah.

Widening of pavement for 4·7 miles near Galaquil.

Hume Highway.—Realignment of curve 2 miles north of Broadford involving half a mile of reconstruction. Numerous serious accidents had occurred at this locality.

Loddon Valley Highway.—Strengthening of 12·35 miles with sand clay and granitic sand in several sections between Serpentine and Durham Ox and sealing of 8 miles, 4·2 miles being reinstatement of seal, and the balance extension.

Widening and strengthening with limestone and fine crushed rock of 4·5 miles and sealing of 4 miles between Tragowel turnoff and the Murray Valley Highway at South Kerang. The old sealed road, which was built for light traffic prevailing prior to 1939, had completely failed with post-war traffic.

Maroondah Highway.—Reconstruction and realignment of 0·6 mile at new bridge over Acheron River 2 miles north of Narbethong.

Reconstruction of 1·6 mile near Kanumbra.

Midland Highway.—Realignment of 0·87 mile and reconstruction and strengthening of 1·11 mile approximately 4 miles south of Benalla.

Murray Valley Highway.—Reconstruction and sealing of 7·2 miles between Cobram and Strathmerton, a section where loads had been limited to 6 tons gross.

Sealing of 4·72 miles of sand clay between McCoy's Bridge and Wyuna West.

Sheeting with granitic sand of a weak, worn-out sealed section between Gunbower and Leitchville.

Strengthening and sealing of worn-out sealed sections, totalling 2·52 miles, between the Loddon Valley Highway junction at Kerang and the Wandella Creek.

Nepean Highway.—Reconstruction and widening of 1,600 feet of pavement and repair of major slip at Oliver's Hill, Frankston (Plates Nos. 1, 2, 3 and 4).

Plant mix seal of 1¼ mile between Edithvale and Chelsea and 1¾ mile between Chelsea and Seaford Road.

Northern Highway.—Reconstruction and realignment of 1½ mile of previously unsealed pavement between Pyalong and Tooboorac.

Strengthening, realignment, regrading, widening and sealing of 3·38 miles of rough old gravel pavement north of Heathcote, commencing at the Bendigo turnoff.

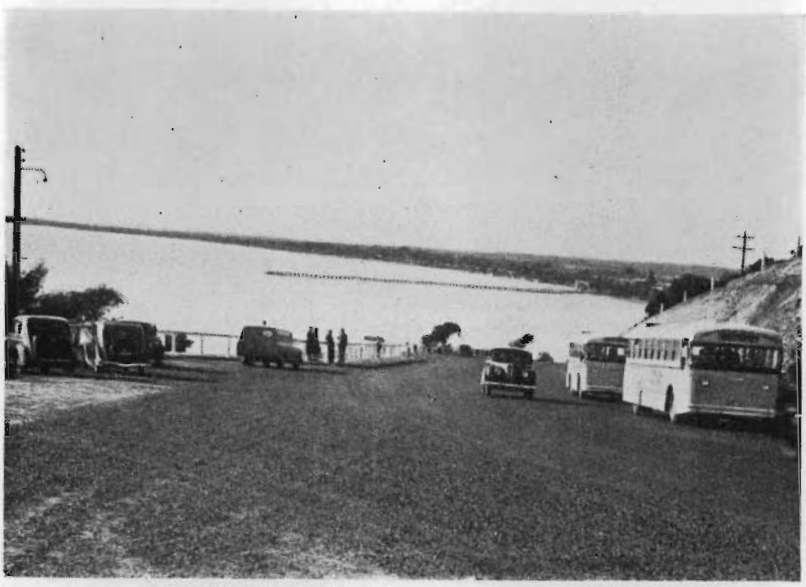
North-Western Highway.—Sealing of 3·75 miles of Section 1.

Reconstruction and sealing of a number of failed sections totalling 2·65 miles between Stuart Mill and St. Arnaud.

1. Nepean Highway. Subsidence at Oliver's Hill, Frankston.

2. Nepean Highway. Restored bank at Oliver's Hill.

3. Nepean Highway. Completed pavement at Oliver's Hill.



4. Nepean Highway. Completed pavement at Oliver's Hill.

5. Western Highway. Reconstruction work in progress between Bacchus Marsh and Myrniong.

Reconstruction and sealing of lengths totalling 1·9 mile between St. Arnaud and Donald. The old narrow sealed pavement had failed under increasing traffic.

Reconstruction and sealing of total length of 6 miles between Buloke and Litchfield, and in the townships of Watchem and Birchip.

Omeo Highway.—Resheeting 11·5 miles near Tambo Crossing.
Widening of curves near Tambo Crossing.
Widening of curves between Razor Back and Lightning Creek.
Construction of new reinforced concrete bridge at Swift's Creek (commenced).

Ouyen Highway.—Resheeting of limestone pavement in sections totalling 8 miles in length between Ouyen and the South Australian border.

Ovens Highway.—Strengthening and sealing of 2·65 miles in two sections.
Resealing of 6·4 miles in five sections.

Princes Highway East.—Sealing of shoulders on the densely-trafficked section from Oakleigh to Dandenong, thus increasing the sealed width from 20 feet to 26 feet for 8 miles.
Reconstruction, including curve improvement of $\frac{3}{4}$ mile, $1\frac{1}{2}$ mile east of Pakenham.
Reconstruction, widening, and reinstatement of sealing on 1 mile west of Drouin.
Construction of embanked deviation near Moe, constituting approaches to new bridge being erected by the Railway Construction Branch over the new Moe-Yallourn railway. The work includes 15,000 cubic yards of filling and a composite granitic sand and fine crushed rock pavement.
Resheeting 16,000 feet of weak pavement between Cabbage Tree and Bell Bird Hill.
Gravelling 9,600 feet at McKenzie River deviation.
Resheeting 13·93 miles of weak pavement between Bell Bird Hill and Tonghi.
Resheeting 8·6 miles of weak pavement between Cann River and Genoa.

Princes Highway West.—Plant mix sealing in Geelong City, in Colac and in Corio Shire.
Regrading and improvement of two vertical curves of sub-standard visibility between Moriac and Winchelsea where the pavement had failed.
Resealing 9·87 miles near Warncoort.
Resealing 7·7 miles between Colac and Pirron Yallock.
Resealing 4·6 miles between Stoneyford and Weerite.
Construction of approaches to Moyne River bridge.
Reconstruction in scoria between Rosebrook and Port Fairy.
Reinstatement of sealing on approaches to Rosebrook bridge and the reconstructed section between Rosebrook and Port Fairy.
Resealing 5·5 miles between Garvoc and Panmure.

South Gippsland Highway.—Reconstruction, widening, and resheeting of 2 miles between Koo-wee-rup turnoff and Yallock Creek, which length had failed under increasing traffic.
Sealing of 4 miles between Lang Lang and Nyora.
Completion of construction and sealing 1·4 mile of realignment at Franklin River, west of Toora.
Reconstruction of 3·91 miles near Monkey Creek (commenced).

Sturt Highway.—Strengthening and widening with limestone of 21 miles to a point approximately 10 miles west of Lake Cullulleraine and sealing 13 miles.

Western Highway.—Widening and strengthening of 7·94 miles near Drung Drung commenced and 2 miles completed.
Reconstruction of weak sections totalling 4·9 miles between Horsham and South Australian border.
Contract let for the supply of 16,000 cubic yards of crushed sandstone for reconstruction between Nhill and Kaniva.
Reconstruction, widening and realignment between Bacchus Marsh and Myrniong; at 30th June, approximately three-quarters of a mile had been completed except for reinstatement of sealing and an additional 1 mile was in progress. (Plate No. 5.)
Resealing of 4·32 miles between Myrniong and Ballarat.
Resealing of 4·85 miles between Ballarat and Ararat.
Reconstruction and sealing of 2·78 miles near Trawalla where the old sealed road had failed.

TOURISTS' ROADS.

The principal works undertaken during the year consisted of general maintenance, the amount expended being £138,637. In addition £11,155 of loan money was expended on construction work. Generally the work was carried out under the direct supervision of the Board.

The total length of proclaimed tourists' roads at the end of the year was 402 miles.

Heavy commercial traffic, including timber trucks and passenger buses, has necessitated strengthening and widening on many sections.

Among the more important major works undertaken were the following :—

Alpine Road.—Reconstruction and resheeting between Cobungra and Mount Hotham Chalet.

Donna Buang Road.—Widening, surfacing, and construction of turn-table between Cement Creek and Donna Buang.

Grampians Road.—Clearing and widening of 2 miles of narrow formation south of Hall's Gap commenced.

Mallacoota Road.—Resheeting 5½ miles near Genoa.

Mount Buffalo Road.—Widening of 0·65 mile and regrading 1·3 mile between 16·5 miles and the Chalet.

On the Horn Road section improvement of rough portion from the Horn Hut to the end of the road ; and grading portion from Mount Buffalo Road to Dingo Dell.

Mount Buller Road.—Widening curves and construction of parking places between 3·9 and 6·75 miles past Mirrimbah.

Mount Victory Road (Grampians).—Widening narrow rocky side cutting between Zumstein's and Wartook commenced and approximately half a mile completed.

Light resheeting of worn pavement between Wartook and Hall's Gap.

Ocean Road.—Widening, strengthening, and reinstatement of sealing between Anglesea and Airey's Inlet. The road has now been widened to accommodate a 22-ft. seal in Anglesea Township, 20 feet in the vicinity of the lookout, and 18 feet at Point Roadknight.

Widening and strengthening at Airey's Inlet township to accommodate a 20-ft. seal.

Widening in preparation for strengthening and sealing for 2 miles between Anglesea and Airey's Inlet.

The programme of general widening of the narrow sections of the road between Lorne and Apollo Bay had to be discontinued to enable the gang and equipment to deal with extensive flood damage repair works, which are referred to elsewhere.

Phillip Island Road.—Completion of reconstruction and sealing of 3 miles between San Remo and Cowes.

Reconstruction of a further 2·5 miles between San Remo and Cowes for sealing in 1950–51.

Reconstruction and widening of 1·5 mile between Anderson and San Remo for sealing in 1951.

It is anticipated that by the autumn of 1951 the total length of 16 miles between Anderson and Cowes will be constructed and sealed except for 2·75 miles.

Wartook Road (Grampians).—Resheeting of worn pavement for 5 miles.

FOREST ROADS.

The total length of proclaimed forest roads at 30th June, 1950, was 342 miles. The total amount expended on maintenance in the year and charged against the Country Roads Board Fund without contribution by Municipal Councils was £42,308. In addition £227 of loan money was expended.

Apart from general maintenance the special improvement work shown was carried out on the following roads :—

Bruthen–Buchan Road.—Resheeting 13·1 miles between Bruthen and Nowa Nowa Road junction.

Walhalla Road.—Resheeting 5 miles between Matlock and Johnson's Mill.

ROADS FOR DEVELOPMENT.

Construction.

Applications totalling £2,283,000 were received from Municipal Councils for the provision of funds for the construction of unclassified roads of a developmental character to be financed from funds available under the *Commonwealth Aid Roads and Works Act* 1947. Provision was made for 1,546 separate jobs on 1,509 roads in 165 municipalities, the total amount involved being £1,229,340.

The amount expended during the year was £298,244 supplemented by £58,349 contributed by the Councils from their own funds.

Isolated Settlers.

The Board also allocated a total of £118,452 for roads to serve the properties of isolated settlers; 280 grants were made affecting 276 roads and 80 municipalities. Generally these grants are made on the condition that an amount equivalent to at least 10 per cent. additional is expended by the Council.

Maintenance.

An amount of £102,449 was allocated to Councils to assist in the maintenance of unclassified roads; £66,759 was expended, in addition to which municipal contributions totalled £17,427.

In the past, provision of this description has been confined to comparatively few of the more important unclassified roads on which Federal Aid or other Government funds provided for construction works have been expended. It is recognized, however, that the assistance granted in this way is of considerable value to Councils, and the Board is hopeful of extending its scope; with this end in view Councils were invited to submit applications for assistance in maintaining during the ensuing year those roads under their control, which whilst of secondary importance compared with main roads, nevertheless warrant such a subsidy.

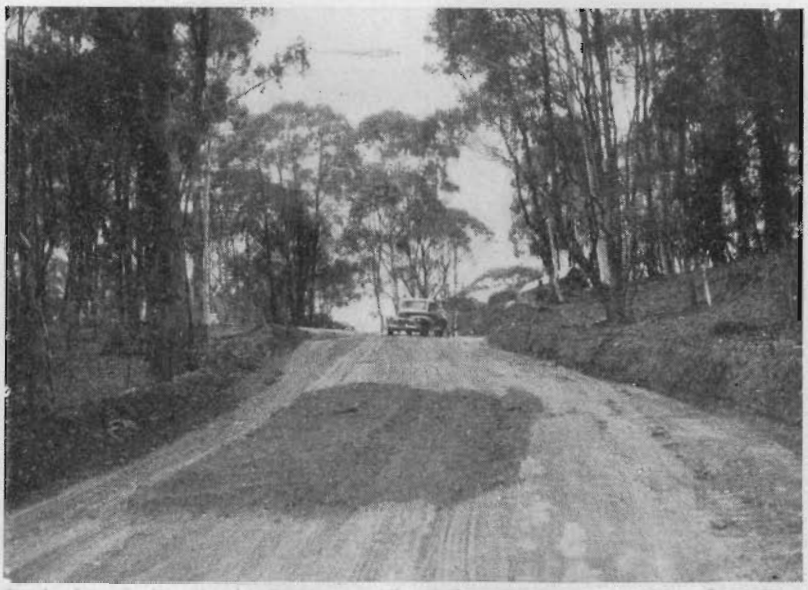
Whilst the maintenance work on these unclassified roads is undertaken by Municipal Councils as a general rule, it has been the Board's practice to carry out the work under its direct control, in a few instances, for reasons similar to those mentioned as applicable to certain main roads. Roads which come under this category include the following:—

Shire.	Road.
Alberton	Traralgon–Balook
Alberton	Dingo Creek
Alexandra	Eildon Weir–Jamieson
Bellarine	Point Lonsdale–Ocean Grove
Braybrook	Truganina Explosives Reserve
Eltham	Kinglake–Glenburn
Eltham	Kinglake–Flowerdale
Keilor	Lancefield
Mansfield	Eildon Weir–Jamieson
Mansfield	Tolmie East
Morwell	Morwell River Valley Roads
Orbost	Bonang–Gelantipy
Orbost	Betka River
Orbost	Mallacoota Foreshore
Portland	Winnap–Drik Drik
Portland	Drik Drik–Nelson
Portland	Dutton Way
Rosedale	Callignee South
Rosedale	Callignee Estate
South Barwon	Barwon Heads–Torquay
South Gippsland	Wilson's Promontory
Tambo	Bonang–Gelantipy
Tambo	Black Mountain
Tambo	Suggan Buggan
Tambo	Lake Tyer's Mission Station
Werribee	Truganina Explosives Reserve

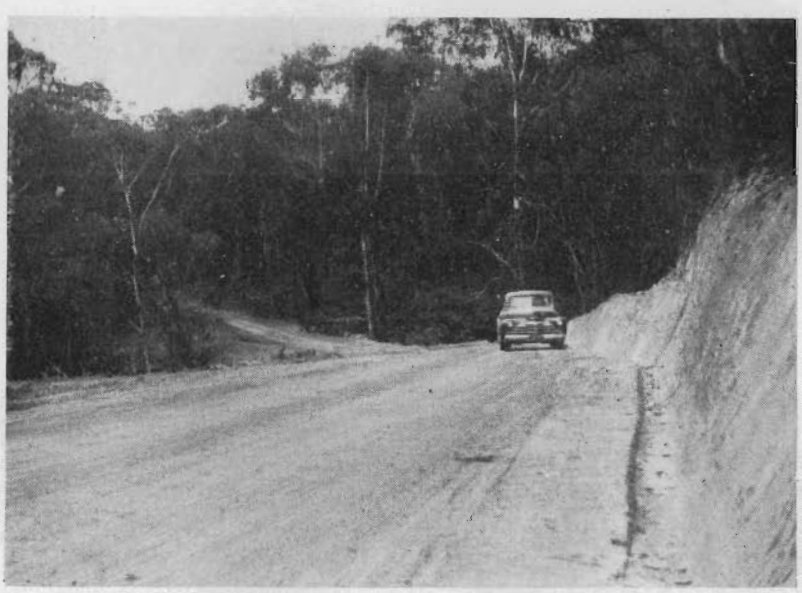
6. Lockhart's Gap Road. Old road on saddle at top of Gap before reconstruction.

7. Lockhart's Gap Road. General view of old road showing burnt out culvert.

8. Lockhart's Gap Road. Cobblestone surface before reconstruction.

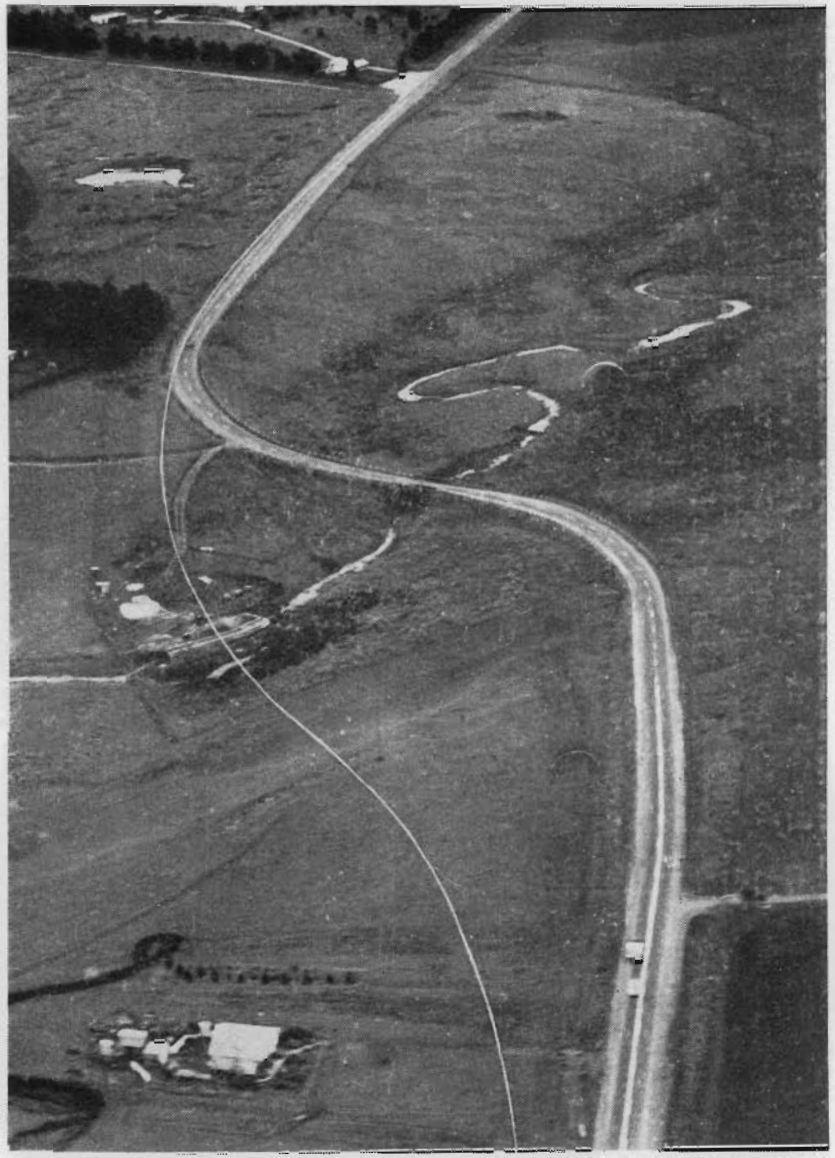


9. Lockhart's Gap Road. Road on saddle of Gap after reconstruction. Spreading granitic sand is in progress.

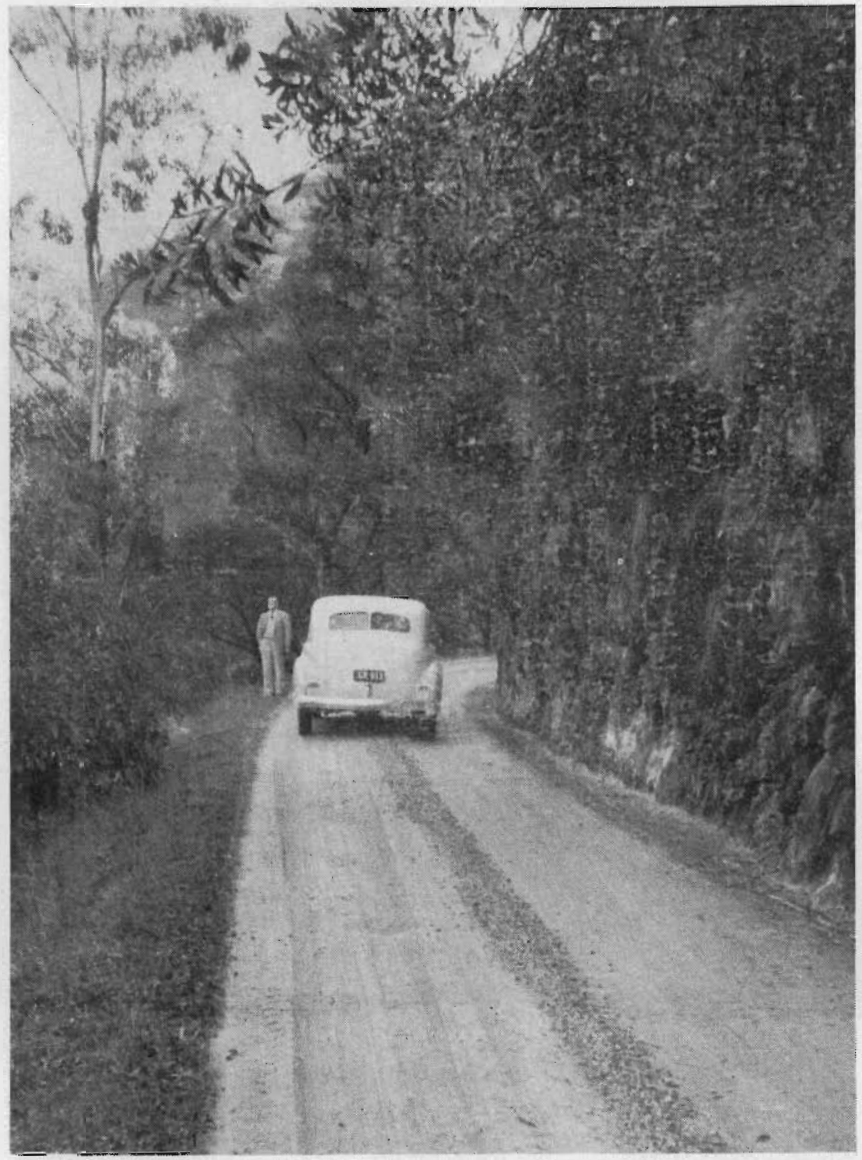


10. Lockhart's Gap Road. Section shown in plate No. 7 after reconstruction.

11. Benalla Shire. Mollyullah-Tatong Road. New bridge over Ryan's Creek.



12. Calder Highway at "Corkscrew Hill"—showing proposed new alignment and bridge in course of construction.



13. Walhalla (Forest) Road. Section half mile south of Walhalla selected for widening.

Shire.	Road.
Winchelsea	Benwerrin-Mount Sabine
Yarrawonga	Yarrawonga Stock Crossing
Yea	Kinglake–Glenburn
Yea	Kinglake–Flowerdale

In addition provision is made for the maintenance of 11·5 miles of road on French Island which is not in a municipal district.

Lockhart's Gap Road.

Whilst the construction works on unclassified roads were undertaken generally by Municipal Councils the Board has commenced the re-establishment of the road in the Shires of Yackandandah and Towong known as Lockhart's Gap Road, utilizing its direct labour organization which is engaged on the Kiewa Valley (Main) Road in the vicinity. This old road is of some historic interest, having been originally constructed about 70 years ago, to provide a short route for the transport of gold from Granite Flat on the Omeo Highway to Wodonga and Albury. It comprised a crossing via the low Lockhart's Gap over the range of hills between the Mitta Mitta and Kiewa River valleys. The width of the formation was about 18 feet, the pavement consisted of cobblestone pitching, and the streams were crossed by timber bridges; in some cases the longer bridges were built on masonry abutments.

With the agricultural development in the Mitta Mitta valley, traffic tended to follow the flat grades along the valley to Tallangatta, and the much shorter coach road fell into disuse, eventually becoming impassable after some of the bridges had been burnt out in bush fires. Water erosion of the cobblestone base had left a very rough surface.

Over a period of years small grants had been made for improvement of short sections to serve settlement near Sandy Creek and Charleroi at the northern end and Tallandoon at the south, but nothing had been done on the steep sections.

The work of reconstruction undertaken by the Board in May, 1950, consisted of—(*a*) the substitution of large concrete pipe culverts and earth filling for the burnt-out bridges, (*b*) ripping and reforming of the old rough base, (*c*) improvement of some of the sharper curves, and (*d*) surfacing with road-building gravel. (Plates Nos. 6 to 10.)

BRIDGES.

General Considerations.

The bridge construction work carried out was again far below that necessary to strengthen or renew the bridges throughout the State within a reasonable period.

During the year 135 bridge projects of a total value of £221,037 were initiated, bringing the total number of structures erected or in course of erection by the Board and Municipal Councils to 3,510. Of the 135 new projects, 42 of a total value of £114,813 were supervised by the Board, and 93 of a total value of £106,224 were supervised by municipalities.

Structures for Other Authorities.

The Board is aware that throughout the State large numbers of bridges now require renewal. On many old structures, loads are severely restricted and the completion of the bridge reconstruction programme within reasonable time is essential, if serious interference with transport is to be avoided. At the present time, however, it is necessary for special attention to be given to works outside that programme, or to delay quite urgent items whilst attending to certain stronger bridges merely to assist in the activities of other authorities. Whilst these works have become of high priority as a result of their association with important national development projects, and will be of permanent value, they would not have been undertaken for some time as part of the Board's operations. The structures referred to comprise ten on the Kiewa Valley Road to provide adequately for transport to State Electricity Commission works at Bogong, twelve on the Upper Goulburn Road to carry heavy traffic from Alexandra to Eildon Weir, strengthening of eight bridges on Princes Highway East for extra heavy loads to Latrobe Valley, strengthening of two bridges on Princes Highway West for Munitions Department cartage, reconstruction and raising of the bridge at Joyce's Creek in connexion with the Cairn Curran reservoir, and a new bridge at Ti Tree Creek on the deviation of the Henty Highway around Rocklands reservoir. In addition, plans are in course of preparation for new bridges over the railway at Belgrave and Leongatha.

Works Undertaken.

Some of the more important bridge works carried out during the year were the following :—

Calder Highway.—Construction of twin-cell reinforced-concrete culvert approximately 20 feet across 97 feet long, and 15 feet high at Kororoit Creek. This culvert is being constructed on a new site to enable the highway at the notorious "Corkscrew Hill" to be realigned. (Plate No. 12.)

Henty Highway.—Replacement of old timber culvert by reinforced concrete cell culvert near Hamilton.

Construction of reinforced-concrete flat-slab bridge 182 ft. 8 in. long, 22 feet wide over Ti Tree Creek on the Rocklands deviation.

Replacement of old timber bridge by triple-cell reinforced-concrete box culvert over Bungalally Creek.

Replacement of timber bridge over Yarriambiac Creek at Kellalac by a five-cell 36-inch diameter Armco pipe culvert on new alignment.

Northern Highway.—Construction of two-cell reinforced-concrete box culvert near the Nagambie Road.

Two-span timber culvert with granite masonry pier and abutments, 3 miles north of Heathcote.

North-Western Highway.—Replacement of old timber bridge over Middle Creek south of St. Arnaud by a triple-cell reinforced-concrete culvert.

Replacement of timber culvert at Sutherland between St. Arnaud and Cope Cope by a five-cell 36-inch diameter Armco pipe culvert.

Ocean Road.—Construction of reinforced-concrete bridge 124 feet long over Spring Creek at Torquay and new approaches on improved alignment.

Princes Highway West.—Completion of reinforced concrete bridge over Moyne River at Rosebrook.

Pyrenees Highway.—Construction of low-level footbridge over Campbell's Creek at Castlemaine.

Metropolitan Bridges.

Swan Street (Yarra River).

Progress with the bridge over the Yarra River at Swan Street, which was commenced in September, 1946, has been slow. In the early stages of the job it was necessary to close down the work for a year on account of shortages of materials and industrial delays. Whilst the material supplies are now satisfactory, the difficulty of obtaining and retaining the services of skilled tradesmen has rendered reasonable progress impossible. Despite an intensive campaign to obtain labour an average of only about fifteen men have been held for formwork erection, whereas at least 100 are essential to ensure satisfactory and economical working. Despite the delay, continuous work was maintained during the year, and at 30th June, one abutment and three river piers had been completed, practically the whole of the temporary piles for supporting the concrete deck had been driven and about one-third of the formwork had been erected.

Bell Street (Darebin Creek).

A tender for the erection of a three-span reinforced-concrete bridge 90 feet long and 55 feet wide between kerbs was let to Garrett Constructions for £19,915 10s. in February, 1950, but little progress had been made at the 30th June.

Structures on Melbourne–Footscray Road.

A report was submitted to the Government by the Parliamentary Public Works Committee following an inquiry into the questions referred to it by the Governor in Council relating to the bridges over the Maribyrnong River and the Moonee Ponds Creek outlet at the Coal Canal on the Melbourne–Footscray Road; that report recommended, *inter alia*, that the Board should be the constructing and maintenance authority for the whole of the road and bridge construction consisting of—

(*a*) New bridge over the Maribyrnong River.
(*b*) Temporary bridge pending completion of the new structure.
(*c*) New bridge over the Moonee Ponds Creek at the Coal Canal.
(*d*) Temporary repairs to the existing structure.

At the end of June, 1950, the Board was requested to make all necessary arrangements for the early construction of the temporary bridge over the Maribyrnong River, the repairs to the bridge over the Moonee Ponds Creek having been undertaken by the Melbourne City Council. The necessary surveys and boring were put in hand immediately and action taken to assemble plant, equipment and materials.

River Murray Crossings.

Provision is made in the Country Roads Act for the Country Roads Board Fund to be applied in the payment of any costs incurred in or about the maintenance of any road over the River Murray. In most cases the actual work on the bridge structures is undertaken by the Department of Main Roads, New South Wales, the cost of this work being borne equally by that Department and the Board.

The maintenance of approaches on either side is the full responsibility of the respective States; no portion of the cost is borne by the municipality. As several of the bridges are used as rail crossings also, some portion of the cost of maintenance of these structures is borne by the Railway Department.

The following list shows the various crossings which are affected by the general arrangement:—

Crossing.	Adjoining Shire.
Biggara Bridge	Upper Murray
Indi Bridge	Upper Murray
Bringenbrong Bridge	Upper Murray
Towong Bridge	Upper Murray
Tintaldra Bridge	Upper Murray
Jingellic Bridge	Towong
Wymah Punt	Towong
Hume Dam Approaches	Wodonga
Bonegilla Bridge	Wodonga
Union Bridge	Wodonga
Howlong Bridge	Rutherglen
Corowa Bridge	Rutherglen
Mulwala Bridge	Yarrawonga
Cobram Bridge	Tungamah
Tocumwal Bridge	Tungamah
Barmah Punt	Numurkah
Echuca Bridge	Echuca (Borough)
Barham Bridge	Kerang
Gonn's Crossing Bridge	Kerang
Swan Hill Bridge	Swan Hill
Speewa Punt	Swan Hill
Nyah Bridge	Swan Hill
Toolebuc Bridge	Swan Hill
Euston Bridge	Swan Hill
Mildura Bridge	Mildura
Abbotsford Bridge	Mildura

The total amount charged to the Country Roads Board Fund in the year 1949–50 for the maintenance of crossings and approaches was £6,021.

Agreement with State Rivers and Water Supply Commission.

The construction of an extensive network of channels by the State Rivers and Water Supply Commission has resulted in a very large number of bridges and culverts where the channels cross public roads. Some years ago it was found desirable that an agreement for sharing the cost of bridge and culvert construction and maintenance should be drawn up, in order that all cases could be considered consistently. Owing to the alterations of conditions of traffic and other factors it became necessary during the year to modify this agreement which applies to roads under the Board's control, viz, State highways, main roads, tourists' roads, and forest roads.

The agreement provides that in the case of structures at natural waterways, the Commission's responsibility for cost shall be related to the extent to which the cost of such structures is increased as a result of the Commission's operations. In the case of supply or drainage channels used by and under the control of the Commission, the Commission shall accept responsibility for the erection, maintenance and renewal of all necessary structures up to a specified width, having regard to the traffic density and speed value of the road.

The schedule to the modified agreement provides varying widths from 18 feet to 24 feet in the case of bridges and from 18 feet to the full formation width in the case of culverts.

Other portions of the agreement relate to the amount to be paid for reinstatement of road surfaces disturbed by the Commission's operations, the costs to be paid in connexion with the remodelling or widening of existing structures, grading of approaches to new and existing structures, Board's responsibility where alterations are made by it, and responsibility for the erection of approach fencing.

The Commission has agreed that the conditions of agreement with the Board may be applied to works on roads controlled by municipalities whose own structures comply with the conditions set out in the agreement. This ensures satisfactory consistency in standards on all types of roads, whether at present under the jurisdiction of the Board or otherwise.

SOLDIER SETTLEMENT ESTATE ROADS.

During the year, the Board received requests from the Soldier Settlement Commission for investigation of road requirements in additional estates acquired by the Commission.

As in previous years inspections were made by the respective municipal engineers and the Board's Divisional Engineers, following which recommendations were made by the Board to the Commission for the provision of funds.

Co-operative grants made during the year totalled £80,176 by the Commission, £26,273 by the Board, and £14,615 by the various municipal Councils for works in the following estates; in some cases earlier grants had been made for the same Estates:—

Shire.	Estate.
Ararat	Narrapumelap No. 3
Ararat	Edgarley
Bannockburn	Tall Tree
Belfast	Tarrone
Berwick	Harewood Park
Broadmeadows	Summer Hill
Dundas	Springwood
Dundas	Gerrigerrup
Glenelg	Hindson's
Hampden	Cloven Hills
Hampden	Marida Yallock No. 1.
Huntly	Kamarooka
Kowree	Mundarra
Kowree	Newlands
Leigh	Tall Tree
Lexton	Langi Kal Kal
Lillydale	Ferndale
Mansfield	Wairere
Mansfield	McCormack's
Melton	Mt. Aitken
Minhamite	Tarrone
Minhamite	Gerrigerrup
Minhamite	Kangertong
Mortlake	Boortkoi
Mortlake	Merrang
Mount Rouse	Nareeb
Mount Rouse	Narrapumelap No. 3
Mount Rouse	Boortkoi
Mount Rouse	Woodhouse
Numurkah	Murray Valley
Swan Hill	Robinvale
Swan Hill	Carroll's
Towong	Buchanan's
Tungamah	Murray Valley
Wannon	Tulse Hill
Warrnambool	Boortkoi
Warrnambool	Spring Hill
Wimmera	Domaschenz

Works Undertaken.

The progress with the more extensive works, which are being carried out under the supervision of Shire Engineers, and some of which had been commenced in the previous year, is indicated hereunder.

Ararat Shire.

Yalla-Y-Poora Estate—

Construction of concrete steel and timber bridge over Wongan Creek on Coburn's Road.

Forming and gravelling of 25,360 feet of Coburn's Road.

Clearing, forming, and grading of 20,000 feet of Yalla-Y-Poora Road.

Gravelling of 10,400 feet of Ritchie's Road.

Edgarley Estate—

Grading and forming of 11,800 feet of Edgarley Road.

Narrapumelap Estate—

Gravelling of 3,600 feet of Grimmer's Road.

Estate No. 3—

Forming and grading of 6,000 feet.

Belfast Shire.

Tarrone Estate.—

Forming and gravelling of 10,900 feet and laying of culverts on Riddell's Road.

Berwick Shire.

Harewood Park Estate.—

Forming and sanding of 7,157 feet.

Bulla Shire.

Clarkefield Estate.—

Plans and specifications prepared for the forming, grading, and gravelling of $6\frac{1}{4}$ miles.

Dundas Shire.

Springwood Estate.—

Forming, provision of culverts, and sheeting with gravel of 0·85 mile.

Glenelg Shire.

Hindson's Estate.—

Forming and surfacing of 1,650 feet of Willoughby's Road.
Forming and surfacing of 6,537 feet of Maddock's Road.
Forming and surfacing of 3,436 feet of Hayward's Road.
Forming and surfacing of 5,061 feet of School Lane.
Forming and surfacing of 3,000 feet of Nolan's Road.

Talisker Estate.—

Forming and surfacing of 5,082 feet of Boggy Creek Road.

Hampden Shire.

Cloven Hills Estate.—

Construction of 3·28 miles.

Gnarpurt Estate.—

Forming and gravelling of 1·7 mile of Lower Darlington Road.
Forming and gravelling of 0·7 mile of Hope's Road.

Larra Estate.—

Gravelling of 0·28 mile of Anderson's Road.
Forming and gravelling of 1·61 mile of Lower Darlington Road.
Forming and gravelling of 1·21 mile of Burns' Road.
Forming and gravelling of 1·14 mile of Hurry's Road.

Marida Yallock Estate No. 2.—
Forming and gravelling of 3·8 miles of Hope's Road.
Provision of temporary track at Bateman's Road.
Forming and gravelling of 0·64 mile of Robertson's Road.
Forming and gravelling of 2·11 miles of Vagg's Road.

Marida Yallock Estate No. 3.—
Forming of 0·58 mile of Leveritt's Road.

Huntly Shire.

Kamarooka Estate.—
Forming and surfacing of 2·47 miles of Elmore–Mitiamo Road.
Forming and surfacing 0·99 mile of Coughlin–Wicker's Road.

Kowree Shire.

Mundarra Estate.—
Grubbing and clearing.

Leigh Shire.

Tall Tree Estate.—
Gravel surfacing of 6,000 feet.
Forming and surfacing of 7,933 feet.
Construction of grouted stone filling on 1,000 feet.
Grubbing basalt boulders and gravelling on two sections of 4,248 and 3,600 feet.

Lexton Shire.

Langi Kal Kal Estate.—
Forming and gravelling of 35,209 feet of Black Bottom Road.
Forming and gravelling of 22,300 feet of Emu Creek Road.

Lillydale Shire.

Ferndale Estate.—
Grubbing, clearing, forming, and gravelling of 1,937 feet.

Mansfield Shire.

Wairere Estate.—
Forming and grading of 13,000 feet and provision of culverts on Delatite Lane.

McCormack's Estate.—
Forming and grading of 7,100 feet and provision of culverts on Soldiers' Road.
Forming and grading of 2,900 feet and provision of culverts on Long Lane.
Reforming and grading of 5,000 feet and provision of culverts on Blue Range Road.

Marong Shire.

Yarraberb Estate.—
Forming and gravelling of 11,200 feet.

Melton Shire.

Mt. Aitken Estate.—
Survey, plans, and specifications completed.

Minhamite Shire.

Tarrone Estate No. 1.—
Forming and grading of 1,500 feet.
Plans and specifications prepared for resheeting and gravelling of 1½ mile of Tarrone Lane.

Tarrone Estate No. 2.—
Stone barrier removed and temporary bridge constructed.

Gerrigerrup Estate.—
Surveys completed and plans and specifications in course of preparation.

Mortlake Shire.

Chamallak Estate.—
Scoria surfacing of 5,000 feet.

Mt. Fyans Estate.—
Gravelling of 7,000 feet.

Narrapumelap South Estate.—
Forming of 3,000 feet.

North Station Estate.—
Sealing of floodway over Blind Creek.

Mount Rouse Shire.

Chatsworth House Estate.—
Forming and gravelling 5·53 miles.

Boortkoi Estate.—
Contract let for forming and gravelling 2·3 miles.

Numurkah Shire.

Murray Valley Estate.—
Contracts let for the construction of 5·5 miles.

Portland Shire.

Ardgarton Estate.—
Forming, grading, and gravelling of 12,356 feet.

Rochester Shire.

Burnewang Estate.—
Gravelling of 6,695 feet of Bonn Road.

Kamarooka Estate.—
Forming and sanding of 16,170 feet of Dingee Road.
Forming and sanding of 5,256 feet of Coughlin–Wicker's Road.

Romsey Shire.

Clarkefield Estate.—
Contract let for the supply of gravel.

Swan Hill Shire.

Robinvale Estate.—
Forming and gravelling of 19,943 feet.

Tungamah Shire.

Murray Valley Settlement.—
Forming and surfacing of 9,650 feet.
Forming and surfacing of 8,655 feet.

Wannon Shire.

Tulse Hill Estate.—
Forming and gravelling of 14,800 feet.

Waranga Shire.

Burnewang Estate.—
Forming and gravelling of 24,160 feet.

Warrnambool Shire.

Boortkoi Estate.—
Forming, grading, and gravelling of 32,370 feet.

Wimmera Shire.

Domaschenz Estate.—
Completion of construction of 21,900 feet of loamed road.

FLOOD DAMAGE.

General.

During the year extensive damage was caused in different parts of the State as a result of heavy rains and subsequent flooding. As in the past the Board has provided funds to assist councils in the necessary repairs to road pavements and bridge and culvert structures. For main roads provision was made from the Country Roads Board Fund under maintenance conditions, but where the cost of restoration works was particularly heavy some assistance from Commonwealth aid funds was granted. For unclassified roads provision has been made from Commonwealth aid funds with some contribution by the councils. In addition to causing great damage to valuable property these national disasters have the effect of diverting manpower and materials from important developmental road works and utilizing funds which would otherwise be available for the normal road programme.

The total amount provided by the Board from the Country Roads Board Fund for main roads during the financial year was £24,119 and from Commonwealth aid funds £159,532. In addition the contribution by councils in respect of unclassified roads totalled £19,066.

The following list of municipalities which obtained grants indicates the widespread effect of floods :—

Cities—

Sale
Shepparton

Shires—

Alberton
Alexandra
Avon
Bairnsdale
Bannockburn
Cohuna
Deakin
Euroa
Goulburn
Heytesbury
Leigh
Lowan
Maffra
Maldon
Mirboo
Numurkah
Omeo
Orbost
Otway
Portland
Rochester
Rodney
Romsey
Rosedale
Shepparton
Strathfieldsaye
Tambo
Towong
Traralgon
Tungamah
Waranga
Werribee
Woorayl
Yea

Whilst only minor damage was caused in some parts of the State, conditions were exceptional in the Bairnsdale Division (Eastern Gippsland), Bendigo Division (Eastern section), and Geelong Division (Otway area).

Bairnsdale Division (Eastern Gippsland).

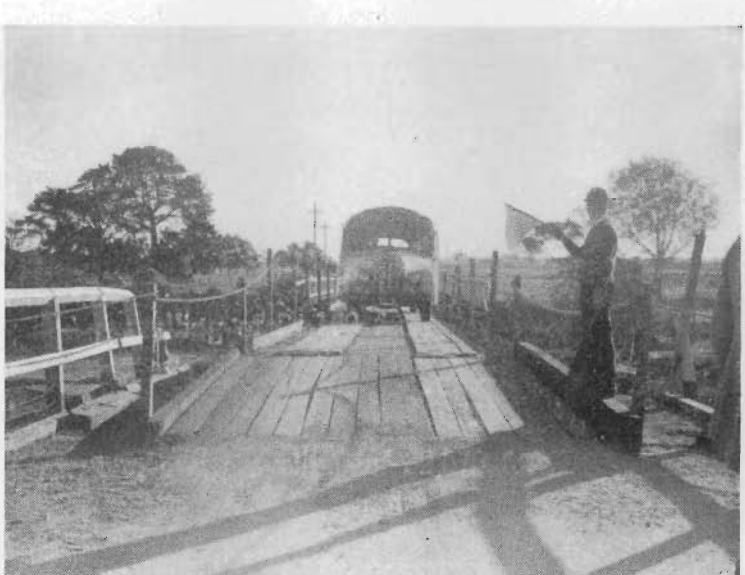
In the 36th Annual Report special reference was made to the damage which occurred in the Bairnsdale Division following heavy rains early in January, 1949. The same area suffered much more extensive damage as a result of exceptional rains in the early months of 1950, following a year in which more than twice the average annual rainfall was recorded, thus causing saturation of the ground and consequent abnormal run-off. From 1st January, 1950, to 7th April, 1950, the rainfall was approximately 20 inches, the most serious flooding occurring on the 9th and 10th February and early in April.

A feature of the flooding on these occasions was the long periods over which the waters remained. Considerable damage was caused to the following State highways and roads, the maintenance of which is under the direct control of the Board. The principal damage was caused by land slips, the carrying away of bridges and culverts, and the washing out of shoulders :—

Princes Highway.
Omeo Highway.
Bonang Highway.
South Gippsland Highway.

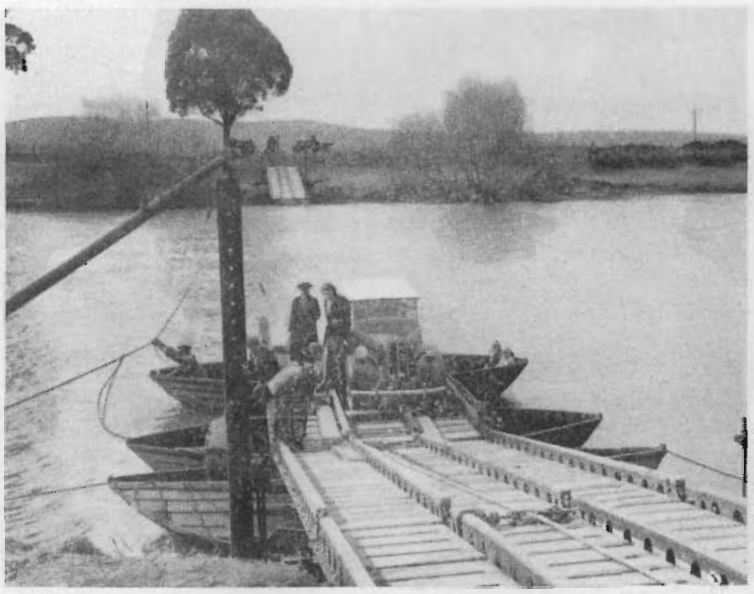
14. Princes Highway East, showing collapsed spans of bridge over Avon River at Stratford.

15. Temporary spans at bridge over Avon River at Stratford.



16. Traffic on temporary spans at bridge over Avon River at Stratford.

17, 18, and 19. Orbost-Marlo Road · Washaway at Gilbert's Gulch.



20 and 21. Orbost-Marlo Road. Emergency army punt used for crossing Snowy River.

22. Suggan Buggan Road (East Gippsland). General view of washaway.

23. Suggan Buggan Road. Major washaway ; view taken from road.

24. Midland Highway. Flooded section at Wallinjoc Swamp, approximately 5 miles west of Stanhope—March, 1950.

25. Goornong - Colbinabbin Road. Debris at Ferguson's Bridge over Campaspe River after flood in October, 1949.

26. Ocean Road. Collapsed bridge due to flood, October, 1949. Rock-filling on deck is retaining an emergency half-width pavement.

27. Ocean Road. Typical land slip following flood—October, 1949.

28. Ocean Road. Washaway at Chapman's Creek—October, 1949.

29. Ocean Road. Typical damage to outside edge of road, and retaining wall in course of construction.

30. Ocean Road. Retaining wall built following landslip near Cape Patten in November, 1949.

Marlo Road.
Sydenham Inlet Road.
Mallacoota Road.
Gipsy Point Road.
Dargo Road.
Bruthen–Buchan Road.
Bonang–Gelantipy Road.
Black Mountain Road.
Suggan Buggan Road.

The most extensive damage was caused at two particular points, viz :—

(*a*) *Stratford.*

The Avon River reached the height of approximately 22 feet on the gauge, which point is about 7 feet below deck level. On the 5th April the first pier of the bridge on the Stratford end collapsed taking two spans and leaving a gap of 78 feet. To give immediate relief a commercially built up girder was placed to enable traffic, restricted to 6 tons gross weight, to use the bridge. (Plates Nos. 14 to 16.) In order that traffic might be diverted whilst permanent repairs are being effected a low level bridge is being built at Weir's Crossing some distance up stream and the bridge over Blackall Creek on the Llowalong road is being strengthened.

(*b*) *Marlo Road–Gilbert's Gulch.*

Since April, 1949, the Snowy River has breached the road at Gilbert's Gulch on four occasions. During the flood in April, 1950, a gap of 400 feet was caused. In order to provide for traffic between Orbost and Marlo as quickly as possible an army ferry was obtained and put into commission. A temporary track was then provided across the clay bar and the construction of a bridge to span the Gulch put in hand. (Plates Nos. 17 to 21.)

As the flooding occurred during the Easter holidays when traffic was heavy, every endeavour was made to reduce the dislocation to the minimum and as many men as possible were engaged for repairs. In addition the Board's regular employees willingly sacrificed their holidays in order to continue at work. The Board wishes to place on record its appreciation of the manner in which they worked and the public spirit shown by them on this occasion.

As a result of the Snowy River overflowing its banks, traffic on the Marlo road has been suspended on a number of occasions in recent years, thus isolating the township of Marlo and marooning residents and visitors. In order to provide an alternative route provision has been made for continuing the construction of a road connecting the Marlo–Cape Conran Road with the Princes Highway near Cabbage Tree. Whilst this route to Orbost will be considerably longer than via the main road it will serve as a relief outlet and at the same time provide a useful connecting road from Marlo towards Eden.

Bendigo Division (Eastern Section).

Rain commenced to fall on the evening of the 17th March, 1950, and continued almost without ceasing for approximately 36 hours. The total fall ranged from about 14 inches in 36 hours in the Murchison and Rushworth districts to about 10 inches in the western areas. The heaviest rainfall was followed by a series of storms on the 19th and 20th March.

The very flat nature of the greater portion of the area resulted in serious local flooding of all creeks and water courses. Traffic was seriously inconvenienced on the Murray Valley and Midland Highways, as well as on numerous main roads and other roads. (Plate No. 24.)

The feature of the floods was the prolonged period of inundation resulting in the weakening of many miles of both sealed and unsealed pavements. Due to the flatness of the country the velocity of the flooded streams was low with the result that comparatively little damage was caused to bridge structures.

Geelong Division.

(Otway Area.)

Owing to the heavy rains between 22nd and 24th October, 1949 (7·30 inches being recorded at Lorne), considerable damage was caused to the Ocean Road with the result that traffic between Lorne and Apollo Bay was blocked ; the section betweer

Anglesea and Lorne was also closed, but for a shorter period. The principal damage consisted of slips from the high side, which were removed by machine; however, more serious slips from the low side occurred, involving the provision of retaining walls. In all, damage occurred at 38 points between Lorne and Apollo Bay. In addition a culvert and filling at Chapman's Creek, and a bridge near Apollo Bay were washed out. Provision was made for their replacement by a 60-inch diameter pipe culvert in the former case, and by a battery of four 60-inch diameter pipes in the latter. (Plates Nos. 26 to 30.)

The total estimated cost of repair works was £15,000.

BITUMINOUS SURFACE TREATMENT.

Importance of Work.

Vigorous extension of bituminous surfacing throughout the State is important in the interests of—

(*a*) Lower maintenance costs where traffic density is high.
(*b*) Lower operating costs of motor vehicles.
(*c*) Safety on account of reduction of the dust nuisance, and protection of crops from dust in certain areas.
(*d*) Conservation of road-making materials where these are becoming scarce.
(*e*) Smoother transport of perishable produce and greater comfort to road users generally.

So as to extend the benefits of sealed roads to the maximum length possible, the widths to be treated are reduced in the first stage of the improvement and, generally, a greater width than 12 feet is not approved if the traffic count shows less than 100 vehicles per day. In this way the limited manpower and plant available are able to carry out a longer length of sealing, the materials such as bitumen and aggregate which are expensive and difficult to obtain are conserved, the funds available are more widely distributed, and more road users thus obtain the benefit of sealed roads, and do so at an earlier date.

One of the first improvements to country roads inaugurated by the Board in 1914 was the commencement of bituminous surfacing by mechanical means, tar being used in the earliest work. To date, over 6,400 miles have been sealed, but this is only 45 per cent. of the Board's system of declared roads. Many heavily trafficked roads are awaiting treatment and great acceleration of the present rate of improvement is required. This involves manufacture of more plant units of a highly specialized type, more crushing and screening and other machinery for production of aggregate, and extensive preparatory strengthening and widening of the road pavements which is necessary before sealing can be undertaken.

Extension of Programme.

Action is therefore being taken to acquire sufficient plant to increase the capacity as a first stage by 50 per cent. as early as possible. Strenuous efforts are also being made to increase the production of aggregate.

During the financial year 1949–50 three 800-gallon bitumen sprayers, one 600-gallon pneumatic-tired oil-fired bitumen heater, one gradation unit for small Barber-Greene plant mix-seal unit, and seventeen aggregate spreaders were purchased, whilst extensive additional plant consisting of bitumen sprayers, bitumen heaters, road brooms, rotating belt spreaders and carriers, road roller carriers, broom drags, mobile cookhouses, tanks, aggregate loaders, multi-wheel rollers, dryers, &c., have been ordered for delivery in the financial year 1950–51.

The total quantity of bitumen purchased during the financial year 1949–50 was 883 tons or 194,000 gallons in bulk and 5,911 tons or 1,298,080 gallons in drums.

EARTH-MOVING PLANT.

Reference has previously been made to the shortage of heavy earth-moving equipment, particularly new crawler tractors. At the present time the Board has 122 such tractors, almost the whole of which had been in use prior to purchase by the Board, and their use can be continued even inadequately only with great difficulty. At the end of the year 55 of the 122 tractors were out of action awaiting repairs, which are slow and costly, due to delay in obtaining spare parts and to shortage of workshop personnel.

For replacements alone a minimum of twelve new tractors should have been provided each year, but for the two and a half years from 1st July, 1948, only eight were actually delivered or promised.

In view of the extremely serious position at a time when the Board is called upon to undertake the large number of construction works necessary to overtake arrears and to assist other authorities with urgent works of a developmental character, special representations were made to the Government with a view to obtaining the necessary dollar exchange for at least fifteen additional new heavy machines (Class I. and/or Class II.) during 1950 and at least twelve during 1951.

From time to time it has come to the knowledge of the Board that plant was being offered for sale in New South Wales and Queensland, when arrangements were made for members of its mechanical engineering staff to inspect this plant. Whilst some items were acquired on these occasions the results will have very little effect on the plant position.

Elsewhere in this Report reference is made to the visit abroad of the Board's Mechanical Engineer who is making enquiries as to the possibility of obtaining plant from non-dollar areas. The Engineer for Bridges during his visit to Great Britain in 1949 also made enquiries as a result of which several items of reconditioned plant have been acquired.

The Board is extending as rapidly as possible the facilities for effecting repairs to plant especially in divisional centres. Progress made in the various divisions is referred to under the heading of " Decentralization ".

PRIORITY OF MAINTENANCE.

The Board is concerned that increasing difficulty is being experienced in continuing the standard of maintenance which is desirable. Various causes are quoted to account for poor maintenance, the principal being the comparatively weak pavements which were provided for lighter pre-war traffic, and the impossibility of carrying out, in a short time, the huge programme of widening and strengthening necessary to cope with modern transport. Notwithstanding these difficulties, the Board still considers that such work as pavement repair and shoulder maintenance can be carried out most expeditiously by small, suitable equipped patrol organizations, each confined to a limited length of road. With the alarmingly rapid deterioration of road surfaces, necessitating extensive patching, it has been necessary to strengthen or, in some cases, to duplicate such patrol gangs pending reconstruction or re-sheeting.

Although the policy of regular and unremitting maintenance by patrolmen has been consistently advocated by the Board since its inception, recent personal inspections of main roads in some parts of the State have still revealed a regrettable absence of any regular system of maintenance of main roads, although funds have been provided for the purpose, with the result that the roads in question are now in a deplorable condition. The Board again urges the more general establishment of systematic maintenance organizations to prevent deterioration. The first consideration in the allocation of funds, particularly for established main roads, is to provide for general maintenance, a principle which is embodied in the Country Roads Acts as a statutory responsibility.

Some Councils do indeed realize the importance of routine maintenance—" a stitch in time saves nine "—and have organized the work on main roads so that detailed responsibility for carrying out corrective measures is given to individual patrolmen, or to patrolmen in charge of small truck patrols, rather than leaving the engineer with the hopeless task of personally directing from the municipal centre each day's patrol work in every detail. In one shire the council's policy is, moreover, to add a quota of maintenance material to every foot of unsealed road in the shire during every year. Faced with manpower shortages many councils are also adopting progressive schemes of equipping their workmen with the less costly mechanical aids, such as motor trucks, truck-mounted loaders, tractor loaders, and pneumatic-tired drawn graders, while the humbler road-drag and planer still find a well-merited place in the equipment of some patrols, supplementing the work of maintenance power graders, which cannot always be everywhere in a district at the most suitable time. In some areas the benefits of mechanization have not been sufficiently appreciated. In one shire it was noted that individual patrolmen, allotted commendably each to a section of main road, were, however, still equipped only with horses and drays.

PROGRAMME OF ROAD IMPROVEMENT.

Under this heading reference was made in the 36th Annual Report to the investigations which were being made by the Board to ascertain the essential requirements for rural road and bridge construction and maintenance over a period of ten years.

Generally, the Board has received excellent co-operation from municipal officers in the assembling of data, but the lack of information from a small number of municipalities has delayed completion of the plan.

However, by accepting the figures supplied and estimating the requirements in other cases, it has been possible to arrive at the approximate amount necessary to provide for—

(*a*) Estimated traffic at the end of ten years which for the purpose is based on 150 per cent. of the 1947–48 count in the case of classified roads, viz, State highways, main roads, tourists' roads, and forest roads, and

(*b*) The complete maintenance of the existing and new assets in all cases and essential improvement required to provide—

(i) for traffic up to full legal load limits on the classified roads, and,

(ii) for a reasonable standard of work to withstand the increasing traffic on unclassified roads.

The preliminary analysis indicates that to carry out the programme envisaged (not including roads in cities or private street construction) and to provide for other expenditure such as interest and sinking fund on loan expenditure, purchase of plant and equipment, administration, &c., at least £100,000,000 will be required spread over the next ten years or an average of £10,000,000 per annum for that period. The estimate is based on 1949 costs.

As the annual amount is considerably more than the combined current revenues now available to the Board and the municipalities affected it will be seen that if reasonable progress is to be made in providing adequate road facilities throughout the State, additional revenue will be necessary from some source.

The required increase in revenue funds and in effort is at least 60 per cent. of the scale obtaining in the year 1949–50, i.e., some £3,500,000 additional per annum should be expended.

The estimate of requirements is by no means extravagant. Roads throughout the State deteriorated during the war years, and the accumulated credit balances of the Board and a few municipal councils totalled less than £2,500,000, a small amount in comparison even with normal road works left undone during the war years. Main roads and State highways, and not a few other roads, suffered seriously from defence and heavy essential traffic; whilst since the war the phenomenal growth in number and weight of heavy vehicles has added much more than 100 per cent. to the effort and cost of road work. As never before, the national effort depends on road transport. Everywhere the benefits of high capacity roads are demanded as a vital necessity, inseparably bound up with efficient conduct of primary and secondary industries and indispensable to the very existence of the rural and provincial communities as organized to-day.

The estimate represents an inescapable cost. If the State and the nation do not provide the road services which the estimate represents, they will pay the amount of the deficiency, and more, in excessive transportation costs and in the wasteful crippling of effort on schemes of dispersal, decentralization, and closer settlement, as well as on great national works served by the road system.

WORK FOR OTHER AUTHORITIES.

The following works were carried out for the Authorities named :—

Forests Commission.

A length of 12½ miles of the road from Licola to Crescent Creek was completed during the year, enabling logging operations to commence.

Reforming and surfacing of the balance of the formed section of the Benwerrin–Mt. Sabine Road between Todd's Corner and Mackie's Mill, a distance of 4¼ miles.

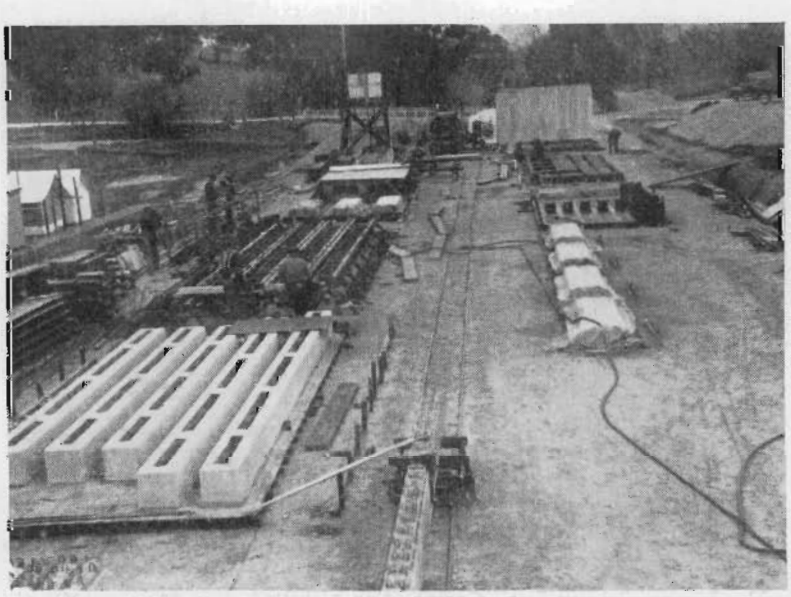
31. Princes Highway East near Morwell. Showing houses in course of erection by Housing Commission and roads being constructed by Board. Subdivisional road has been provided inside Estate and parallel with highway.

32. Princes Highway East. Service road in course of construction along route of proposed new highway south of Moe.

33. Princes Highway East. Consolidation of batter in filling by sheepsfoot roller controlled by logging winch.

34. Kiewa Valley Road. Deviation constructed and base course of consolidated river gravel laid.

35. Kiewa Valley Road. Hilly section completed with crushed rock surfacing prior to sealing.



36. Kiewa Valley Road. General view of reinforced concrete bridge casting depot.

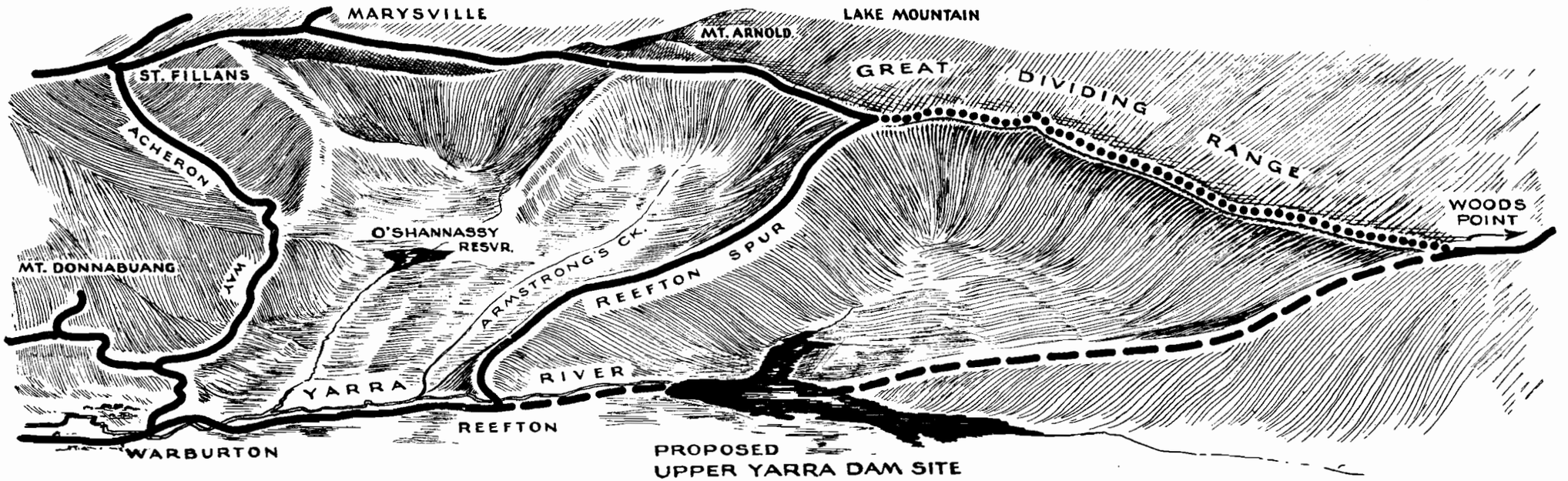


Fig. 1.—Showing altered route of the Warburton–Woods Point Road rendered necessary by the construction of the proposed Upper Yarra Dam. The road shown thus . . . . along the Dividing Range, together with the already constructed Reefton Spur Road, will be substituted for the road shown thus — — —, portion of which will be inundated by the Upper Yarra Dam, when completed.

GRAIN ELEVATORS BOARD.

Commencement of construction of concrete kerb and channels and the forming and surfacing with gravel of the roadway and turning areas at the Grain Elevators Board's Terminal at Langdon Street, North Geelong, a contract having been let for £3,365.

HOUSING COMMISSION.

Morwell.

Following on the work done for the Housing Commission in the previous year a further length of 11,600 feet of street construction was completed, comprising forming, grading, and surfacing, together with the construction of foot bridges, kerbs, channels, and sub-surface pipe drainage, making a total length of 2·82 miles to the 30th June, 1950. Work is continuing on a further 2½ miles of similar work which will complete the street construction required in the area known as Hourigan's Estate. (Plate No. 31.)

Moe.

Work has commenced on the construction of service roads on the new line of the Princes Highway through Moe. This comprises construction of formation and gravel pavements together with concrete kerbs, channels, and concrete footpaths. The length to be constructed is 0·61 mile of which 80 per cent. was complete at 30th June, 1950. (Plate No. 32.)

Ballarat and Geelong.

Proposals for the construction of streets in Housing Commission Estates at Ballarat and at Geelong were investigated at the request of the Commission.

MELBOURNE AND METROPOLITAN BOARD OF WORKS.

Forming and surfacing 1·7 miles between Big Pat's Creek and East Warburton
Forming and surfacing 2·75 miles between Warburton and Walsh's Creek.
This work is portion of that illustrated in Figure 1.

STATE ELECTRICITY COMMISSION.

At the request of the Commission the Board has put in hand the complete reconstruction of the road from Bandiana to the Commission's works at Mt. Beauty, following the valley of the Kiewa River a distance of approximately 53 miles. The work, which is required to permit of heavy cartage of materials from the railhead, consists of construction and surfacing of extensive deviations at places together with re-sheeting of the existing road where that is to be retained, and sealing of the full length. Bridges are to be strengthened or replaced as detailed elsewhere. During the year the construction and surfacing of a total length of 15·52 miles was completed. (Plates Nos. 34 to 36.)

An amount of £24,000 was expended on the removal of overburden at the Yallourn North Brown Coal Mine. This work was taken over by the State Electricity Commission on 11th November, 1949, the Board having thus assisted in an emergency programme since January, 1947, a total of approximately 1,878,000 cubic yards of overburden having been removed, and approximately 560,000 tons of coal won by the Board's organization.

STATE RIVERS AND WATER SUPPLY COMMISSION.

Construction of deviation of the Pyrenees Highway east of Newstead necessitated by the construction of the Cairn Curran Reservoir. A section of 1·51 mile at the Newstead end was completed and sealed; work on the balance of the deviation including the bridge at Joyce's Creek is being proceeded with. The total length of the deviation is 3·69 miles.

Work on the Henty Highway deviation around Rocklands reservoir was continued, including new reinforced concrete bridge over Ti Tree Creek.

Extensive investigations were carried out in connection with the road and bridge strengthening to be undertaken to provide for heavy cartage along the Upper Goulburn Road from Alexandra to Eildon Weir.

LATROBE VALLEY WORKS.

The following works were undertaken during the year:—

Jeeralang West Main Road.—Forming, surfacing, and fencing of 2 miles of road deviation. Completion of road to connect with the Princes Highway east of Morwell awaits construction of bridge to provide for passage under railway, a temporary connection having been provided via the works area.

Midland Highway.—Completion by sealing of deviation Morwell to Eel Hole Creek 8,600 feet in length which became necessary to enable the State Electricity Commission to commence the new "open cut".

Construction of two-cell 10 feet x 10 feet reinforced concrete culvert at south end of Yinnar Township.

Widening formation, strengthening pavement, and sealing 1·4 mile from Whitelaw's Track to Sassafras Creek.

COMMONWEALTH WORKS.

The following works were carried out for the Commonwealth Government.

Bendigo Ordnance Factory.—Re-sealing and maintenance of roads at Ordnance Factory, Bendigo.

East Sale Aerodrome.—Completion of reconstruction of the main 90° runway consisting of gravelling and sealing a length of 7,000 feet, 150 feet wide, with overruns of 400 feet at each end.

Construction of new apron areas in unsealed gravel adjacent to four hangars, together with gravel base course for the subsequent concrete floor in the hangars and incidental drainage work.

Flinders Naval Base.—Sealing of streets at Flinders Naval Base.

Mangalore Aerodrome.—Construction of new apron, taxiway, and terminal building area and sealing of two runways.

The amount expended during the year was £40,450.

Mulwala Explosives Factory.—Sealing roads at Mulwala explosives factory.

ACTS AFFECTING THE COUNTRY ROADS BOARD.

During the year the following Acts were passed :—

Country Roads Board Fund (Amendment) Act 1949 (No. 5398).

Provision is made for the application to the financial year 1949–50 of the *Country Roads Board Fund Act* 1932 (No. 2) which provides for suspension of the annual payment from Consolidated Revenue into that Fund as provided by Section 38 (2) of the principal Act.

Motor Car (Amendment) Act 1949 (No. 5450).

The provisions of this Act which affect the operations of the Board are referred to elsewhere in this report.

Motor Car (Registration) Act 1949 (No. 5423).

Section 6 of the *Motor Car (Amendment) Act* 1942 provided that in the case of the registration or renewal of registration of a motor car the fee payable should be reduced by 25 per cent. except in the case of a motor car to which a gas producer is fitted or in respect of which the normal monthly allowance of liquid fuel pursuant to the Commonwealth National Security (Liquid Fuel) Regulations is more than 25 gallons. Provision was also made that the Section should continue in operation " during the present war and no longer ".

The *Liquid Fuel Act* 1949 provided for the Governor in Council to make regulations for or in respect to all matters necessary to be prescribed for the equitable distribution of liquid fuel available in Victoria, thus superseding the provisions of the Commonwealth National Security Regulations referred to. It was also provided that the Act should remain in force until the 31st December, 1950, or such earlier day as is fixed by the Governor in Council.

The Motor Car (Registration) Act 1949 provided that in the *Motor Car (Amendment) Act* 1942, for the expression " Commonwealth National Security (Liquid Fuel) Regulations " there should be substituted the expression " Regulations under the *Liquid Fuel Act* 1949 " and for the sub-section in the 1942 Act relating to the period during which it should operate to be amended to provide for the restriction to continue in operation " until the *Liquid Fuel Act* 1949, ceases to be in force and no longer ".

By an Order of the Governor in Council, published in the *Government Gazette*, the 22nd February, 1950, was subsequently fixed as the day on which the *Liquid Fuel Act* 1949 should cease to remain in force, and consequently the full motor registration fees as provided by the Motor Car Act operated from that day.

Tourists' Resorts Development (Financial) Act 1949 (No. 5446).

The *Tourists' Resorts Development Act* 1938 provided for the payment into the " Tourists Resorts Fund " out of the Country Roads Board Fund after the 1st July in each year of an amount equivalent to 1 per cent. of the nett annual amount credited to the Country Roads Board Fund under Section 38 of the *Country Roads Act* 1928 in respect of the financial year then past. Act No. 5446 provides for the payment to be increased from 1 per cent. to 2 per cent.

DECENTRALIZATION.

Some progress as detailed hereunder has been made with the organization necessary to give effect to the Board's proposals for further decentralization of its activities, although delay is still being experienced owing to difficulty in obtaining residences for staff and in providing workshop and storeyard buildings.

Bairnsdale.

Approval was given for a new residence for Divisional Engineer to be constructed by direct labour following repeated unsuccessful attempts to let the work by contract.

Two pre-fabricated houses were ordered for Roadmaster and Fitter respectively.

Approval was given for alterations to existing office building to provide accommodation for laboratory, &c.

Additional three acres of land were purchased adjoining existing depot for extension.

As the initial workshop soon became inadequate, approval was given for an "Armco" hut to be provided for the carpenters' shop.

Ballarat.

House for Assistant Engineer was completed and occupied in May, 1950.

Tender was accepted for house for Divisional Accountant.

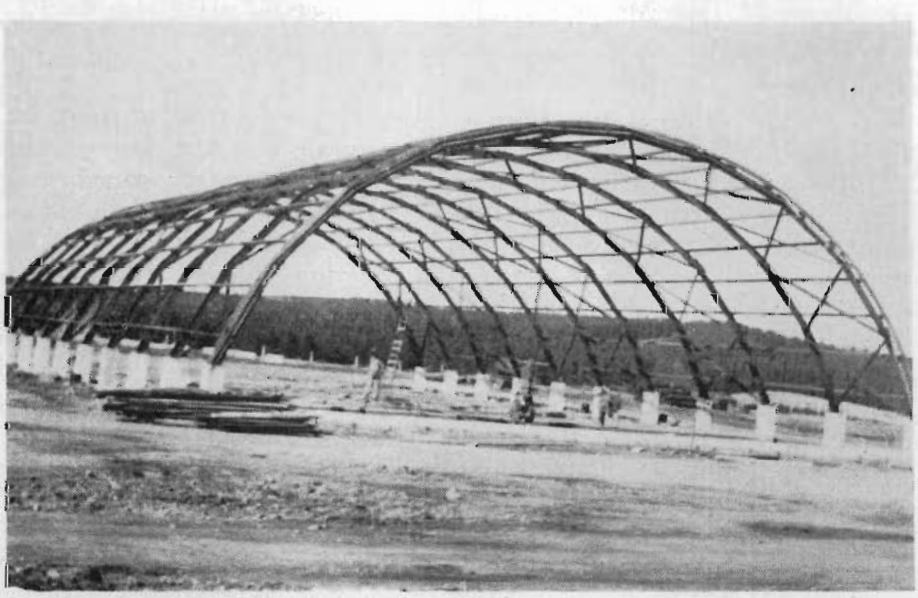
Negotiations are in hand for house site for Traffic Officer.

Pre-fabricated houses were erected on two sites at the depot and occupied by Roadmaster and Depot Foreman respectively. Approval was given for further house to be erected for Fitter on remaining site.

Divisional office in old Court House building was renovated and separate rooms provided for Divisional Engineer, draftsmen, and others.

"Armco-Igloo" hut (100 feet x 60 feet) is in course of erection at depot for use as workshop. (Plate No. 37.)

Contract has been let for supply of gravel for depot roads and hardstandings, also for fencing.



37. Ballarat Depot. "Armco-Igloo" hut in course of construction for use as workshop.

Benalla.

Brick veneer houses are in course of erection for Divisional Engineer and Assistant Divisional Engineer.

Pre-fabricated house was obtained for Stock Inspector, and two such additional houses for staff are being obtained.

Steel saw-tooth building 120 feet by 60 feet for use as new workshop is on order.

Bendigo.

There are seven houses at sites adjoining the depot now completed and occupied; and two additional in course of erection.

Proposals were prepared by Public Works Department for adaptation of old Y.M.C.A. building purchased in 1947 for office purposes.

Tender was let for extension of workshop 58 feet by 36 feet in brick, concrete, timber, and asbestos cement.

GEELONG.

Houses for Divisional Accountant and Assistant Engineer were completed and occupied.

Tender was let for alterations to and renovation of divisional office.

Approval was given for extension of workshop by a bay 30 feet x 20 feet to accommodate carpenters' shop.

Provision was made for fencing and gates.

HORSHAM.

Houses have been provided for and occupied by Divisional Engineer, Assistant Divisional Engineer, Assistant Engineer, Divisional Accountant, Divisional Clerk, and Workshop Foreman.

The divisional office is still located temporarily at the public library building; this is most inadequate for Board's requirements, but no progress has been made with erection of new building on Board's land in Firebrace Street.

"Igloo" hut for workshop and "Armco" hut for store are in course of erection. "Sydney Williams" hut 60 feet by 20 feet is in use as a temporary workshop in meantime.

Residences for Roadmaster and Patrolman respectively were purchased at Donald and Watchem.

TRARALGON.

On the area previously purchased sufficient land for eight housing blocks has been reserved adjoining stores depot and workshop, pre-fabricated houses being erected on four sites; additional houses are on order.

Other building sites in the town have been purchased for office and residences. In the meantime arrangements were made to establish an office temporarily in the proposed stores building.

For use as a workshop a steel-framed building 100 feet by 60 feet was ordered but delivery has been delayed. An "Armco" hut has been erected for use as a temporary measure.

WARRNAMBOOL.

An area of 7 acres near Princes Highway between Warrnambool and Dennington was purchased for workshop and storeyard site.

Approval was given for purchase of a steel-framed building 100 feet by 60 feet for use as a workshop.

GENERAL.

The Board is appreciative of the assistance rendered by the Public Works Department in arranging for the building of houses in various centres and in making the services of its officers available for the inspection and valuation of existing residences offered for sale. Thanks are also due to the Housing Commission for making available pre-fabricated houses for erection at certain Divisional centres.

SUBSIDY ON IMPORTED MATERIALS.

By the *Imported Materials Loan and Application Act* 1949 it is provided that loan money appropriated under the Act may be applied to meet portion of the amount involved in the purchase and delivery from outside Victoria of materials required for specified classes of works. In view of the shortage of certain materials necessary for works carried out by the Board imported materials have been purchased on the understanding that loan money available under the Act would be provided to cover the difference between the cost of purchase from outside Victoria and the local equivalent cost.

During the financial year mild steel and cement for bridge works and sundry materials such as galvanized iron and fencing wire were purchased, the total amount of subsidy involved being £23,962.

BASIS OF ALLOCATION OF FUNDS.

It has always been the Board's practice to deal personally with all applications for the provision of funds and to consider separately the individual works for which application is made by Councils. Although a great deal of consideration of details by the Board itself is thus involved, particularly in connection with the distribution of funds for main roads and their allocation for specific classes and items of works, it is considered that the attention paid to this aspect of the Board's operations has been of great benefit to all concerned. When dealing with the applications the Board has

to keep in view the total funds which are available, and is able to exercise its judgment on the basis of the advice given by its Divisional Engineers supplemented by personal knowledge obtained from inspections and by a broad assessment of the relative importance of works on various roads in all parts of the State. It is also necessary for particular attention to be paid to the financial position of Councils and their probable obligations as a result of the grants made.

For each of the various classes of roads special consideration is given to the relative benefits received by ratepayers directly served, by the local community, and by road users operating over a wider area or even by State-wide interests. Roads classified as State Highways, tourists' roads, and forest roads, are considered to be of national importance and the full cost is borne by the State as abutting ratepayers benefit only in small degree. As main roads are to a greater extent of local value, some contribution is required from the ratepayers through the local authority. Unclassified roads are dealt with according to their own merits having regard to the interests served, the class of work and other aspects.

In determining the extent of the grants to be made it is necessary for the Board to take into consideration a number of factors. In some parts of the State for various reasons there was comparatively little progress made with road development in the earlier years of the Board's operations. More recently, however, there has been a greater road consciousness in those areas and a much needed and accelerated road programme has resulted. Attention is also paid to the capacity of Councils to undertake work both through local contractors and by direct labour. Generally the order of priority of items as submitted by the Councils is adopted by the Board.

In deciding the contributions to be made by Councils the Board pays particular attention to their financial position. This principle has been laid down by the legislature in connection with the reduction of contributions in respect of main road maintenance works as indicated earlier in this Report, and the Board is guided by that principle when dealing with undeclared roads. From records available it is apparent that whilst the majority of Councils are prepared to adopt a policy of self-help by obtaining as much revenue as possible through reasonable valuations and rates, thus obtaining some improvement in services for their ratepayers, others are reluctant to obtain more than a bare minimum. Special consideration for those who are prepared to help themselves is justified. Other factors which must be considered are the area of the municipality, the relative productivity of the land, the extent of non-rateable land, climatic conditions, special classes of traffic to be catered for, total financial obligations, &c.

It must be borne in mind that the Board's assistance to Councils is limited by the amount of money available, and if the municipal contributions are reduced the result must be that the assistance will be restricted to a lesser mileage of roads. Moreover for main roads the amount of contributions made by municipalities is paid into the Country Roads Board Fund and is thus available for further allocation. The contributions required of Councils towards works on unclassified roads similarly enable more work to be undertaken than would otherwise be the case. The lower the contributions the fewer the items that can be satisfactorily included in the year's programme.

It is being realized to a greater extent that good roads, well maintained, constitute a sound investment from which dividends are obtained for ratepayers by way of reduced transport costs, less damage to produce, greater comfort of travel, and saving of time. Municipal Councils should also be able to derive greater revenue on account of the increased value of land served by the whole system of improved roads.

MUNICIPAL ON-COST CHARGES.

At the Conference of Municipal Engineers convened by the Board in 1949 the Board had been asked to amend its longstanding procedure of requiring Councils to bear certain overhead expenses on direct labour works as part of their contribution to the joint programme of road works. Engineers stressed both the desirability of including these items in estimates of day labour works so as to facilitate direct comparison of costs with those by the contract method, and also the necessity that all requests for funds should include all items of cost.

After a review of the question the Board has decided to amend and extend the basis of reimbursement to cover such items as award holidays, annual leave, pay-roll tax, workers' compensation insurance, tools and equipment. As an alternative

to requiring Councils to render separate claims covering the preparation of each of these items applicable to the Board's works it has been decided to reimburse Councils on the basis of a percentage charge of 15 per cent. on wages and allowances as assessed for the purpose of calculating pay-roll tax.

In addition municipalities will be reimbursed expenditure in respect of sick leave for employees, superannuation charges (Council's contribution), long-service leave, wet weather, allowances in respect of grader blades, &c., as it is not considered that these items could be satisfactorily covered by a percentage allowance. Generally the conditions, which have been set out in detail to the Councils, provide for payment to cover periods during which work is carried out with funds provided by the Board.

RESTRICTION OF RIBBON DEVELOPMENT ALONG HIGHWAYS.

The improvement of the highway system and the development of motor transport have frequently led to subdivision of land abutting on highways. Whilst this is most evident in the vicinity of large centres of population it is noted that on account of facility of transport, areas of cheap land at considerable distances from those centres have also been subdivided with the result that new villages are created straggling along the highways. Thus in many parts of the State what was agricultural land held in large areas is now used for residential, business or industrial purposes, with a ribbon of narrow frontages on to the highway. The result has been that, whereas under former conditions access to the highway pavement was required at only a few places for use on odd occasions, the owner of each building allotment now desires to have separate access for constant use. Apart from the inconvenience and delay thus caused to vehicle operators on heavily trafficked roads a considerable danger hazard attends the presence of so many places at which vehicles may enter or leave the road. In addition the traffic capacity of the highways is restricted and efforts made by the road authorities in providing better roads to facilitate traffic are in the end nullified.

The Board recognizes that many of sections of State highways and main roads are becoming obsolete owing to the increasing traffic, and that it is essential to provide additional facilities. This is evidenced by the fact that during the financial year 1938-39 the number of motor vehicles registered in the State was 266,862, and the corresponding figure during 1949–50 was 411,898, representing an increase of 54 per cent.

The following table shows in relation to Victoria the number of head of population per registered vehicle (not including motor cycles) at the dates set out :—

Date.	Population per Vehicle.
December, 1947	7·6
December, 1948	7·0
December, 1949	6·5
December, 1950	6·0 (estimated)

The demand on the road system from the point of view of capacity and safety is increased by the additional numbers of heavier and larger commercial vehicles in use and the higher speed of modern motor vehicles of all types.

Owing to war conditions which affected the capacity to undertake works as well as the revenue available, it has not been possible for road construction works to keep pace with motor vehicle development.

Proposals have been considered for alleviating the position, such as the widening of highway pavements and reserves, the construction of new roads to by-pass congested areas, and the construction of service roads for the benefit of local traffic. These improvements may serve as a means of relieving present or incipient congestion of traffic, but will prove inadequate on a long term basis unless coupled with some action to prevent a repetition of the conditions.

The same problems have been faced in other parts of the world; in Great Britain some years ago the development which occurred along by-pass roads, intended to relieve traffic, constituted such a problem that a "Restriction of Ribbon Development Act" was passed in 1935, and wider powers have been more recently embodied in the Town and Country Planning Acts.

In Victoria, unwarranted land subdivision along important roads may now be checked if the local government authorities concerned will take advantage of the *Town and Country Planning Act*, 1949, to have "zoning schemes" approved in which the land abutting the roads is zoned for restricted usage, e.g., for agricultural purposes. Action on these lines is in progress in a few cases, but many councils appear slow to appreciate the urgency of the problem, and, in any event, experience in England with the similar provisions of the "Restriction of Ribbon Development Acts" suggests that exceptions approved after the initial adoption of such a restrictive scheme may become so numerous as to utterly defeat the objective of the Act.

Legislation adopted in several States of the U.S.A. to deal with the problem enables the State highway authority to purchase full or partial access rights along existing roads and, similarly, to purchase such rights when resuming areas on new alignments required for by-passes or new arterial routes. Similar legislation has been enacted in New Zealand and in New South Wales, and in each case construction of "limited access" roads is proceeding. The fact that the State road authority will be responsible to preserve the new utility intact, is one which should make this new procedure most valuable in achieving the desired end.

The urgency of making provision by appropriate legislation to control "ribbon development" along State highways is fully realized.

It is emphasized that action has not been taken, or is necessary, with the object of providing speedways, but in the general interests of economy and safety of transportation by motor vehicle.

The Board is satisfied that some such action is necessary in this State in the near future. The Bureau of Public Roads, U.S.A., has recommended to the States of U.S.A. a model "limited access" highway law entitled "An Act to provide for the planning, designation, establishment, use, regulation, alteration, improvement, maintenance and vacation of limited access facilities; the acquisition of lands required therefor; the restriction of intersections and control of approaches, the establishment of local service roads; the prohibition of certain acts thereon and provision for penalties therefor; and for other purposes". This action by the Federal Road authority indicates the seriousness with which the problem is viewed in U.S.A. Similar action in Victoria has been recommended by the Board's Chief Engineer in his report on his mission abroad in 1947.

CONFERENCE OF STATE ROAD AUTHORITIES OF AUSTRALIA.

The Twelfth Conference, which was held at the offices of the Commissioner of Main Roads, Brisbane, at the end of August, 1949, was attended by representatives of other State road authorities throughout the Commonwealth.

Matters of considerable importance were discussed, including supply of bitumen, submissions to the Australian Transport Advisory Council dealing with classification of roads, &c., road signs, standard specification for bridges, bridge design loading, supply of spare parts for tractors from dollar areas, a system of road numbering, permissible dimensions and loading of motor vehicles, financial assistance for roads by the Commonwealth.

During the year Mr. D. V. Fleming, O.B.E., M.I.E. (Aust.), upon retirement from the position of Director of Highways and Local Government, South Australia, ended an association with the Conference which he had maintained since its inception.

CONFERENCE OF MUNICIPAL ENGINEERS.

The Sixth Conference of Municipal Engineers convened by the Board, which is now looked upon as an annual event, was held on the 24th, 25th, and 26th May, 1950. This was attended by 127 Municipal Engineers in addition to Senior Engineers of the Board's staff. When convening the conference the Board had requested Councils to suggest matters of a technical nature for inclusion in the agenda. The procedure adopted at the conference was to request the engineer sponsoring the question to

state his case, followed by comments by other engineers, and for a reply to be given by the Engineer of the Board specializing in the particular subject. A large number of subjects associated with the design and construction of roads and bridges was considered, and the personal contact with so many engineers dealing with similar problems was of great value.

Pending the preparation of a complete report on the conference, details of the information furnished by the Board's engineers on the following subjects have been circulated to municipal engineers :—

By Mr. C. G. Roberts, M.C., B.Sc. (Eng.) A.M.I.E. (Aust.), Chief Engineer.

The practicability of designing roads, in areas remote from rail services, with sufficient pavement strength to carry modern transports fully laden.

By Mr. H. P. Wood, C.E., A.M.I.E. (Aust.), Highways Engineer.

Effect of camber (of gravel roads) on corrugations and pot holes.

By Mr. L. T. Butler, B.Sc. (Eng.) A.M.I.E. (Aust.), Divisional Engineer, Dandenong Division.

Suggestion that buffer pitching or kerbing be placed on the edge of bitumen on main roads to reduce edge maintenance.

By Mr. A. H. Gawith, M.C.E., A.M.I.E. (Aust.), Materials Research Engineer.

(*a*) Requirements for aggregates suitable for making concrete.

(*b*) Plasticity limits for gravel in base courses of pavements which are to be sealed.

(*c*) Present status of flexible pavement design.

(*d*) The use of chemical additions, such as calcium chloride, sodium chloride, and lime to improve the binding properties of gravel.

By Mr. N. G. Roeszler, C.E., L.S., A.M.I.E. (Aust.), Divisional Engineer, Metropolitan Division.

The stabilizing of old metal and gravel roads with bituminous emulsion.

By Mr. J. D. Thorpe, C.E., Assistant Highways Engineer.

(*a*) Methods of consolidating fine crushed rock pavements without causing corrugations.

(*b*) Consolidation of fine crushed rock surfacing when depths exceed 8 inches and on fills.

MISSIONS ABROAD OF OFFICERS.

Engineer for Bridges.

In the 36th Annual Report reference was made to the visit abroad of the Board's Engineer for Bridges, Mr. I. J. O'Donnell, O.B.E., B.C.E., A.M.I.E. (Aust.), to investigate economical designs of bridges adopted in Great Britain and Europe following the war. Mr. O'Donnell returned on the 28th November, 1949. During his absence he visited Great Britain, Sweden, Holland, Belgium, Switzerland, France, and a small section of Germany.

The most prominent feature noted was the development of pre-stressed concrete in France and its gradual movement to and adoption in England with particular reference to railway and road bridges. The simplicity of design and economy of materials adopted in order to expedite the restoration works necessitated by war damage were outstanding. The principles of pre-stressed concrete for the Board's requirements will be adopted as conditions are favourable. In the meantime, however, action has been taken to adopt factory type construction for reinforced concrete bridges in order to reduce the field work to the minimum, to standardize the work, and to enable as much work as possible to be carried out without disturbance by bad weather conditions.

Mechanical Engineer.

In view of the importance of plant in the carrying out of the Board's operations, and having regard to the rapid developments which are taking place in the manufacture of road construction plant, approval was given for the Board's Mechanical Engineer, Mr. G. M. Langham, B.M.E., A.M.I.E. (Aust.), to visit Great Britain, America, and Europe. As the Board has in hand considerable development of its workshops throughout the State it was also considered desirable to obtain first-hand knowledge of the latest design and lay-out of workshops and he most

modern workshop practice, particularly in relation to maintenance and reconditioning of heavy earth-moving plant. In addition it was deemed desirable to investigate the possibility of obtaining crawler tractors and heavy graders from the United Kingdom in view of the necessity for conserving dollars, and to have personal contact with those who have been representing the Board and the State in obtaining plant from Great Britain. Opportunity is also being taken to investigate the possibility of obtaining skilled tradesmen in Great Britain who would be prepared to join the Board's service.

Deputy Chief Engineer.

At the end of 1948 advice was received from the Commonwealth Government of a scheme developed by the United States Public Roads Administration to assist highway officials and engineers who contemplate visiting U.S.A. Arrangements have been made to establish a course in American highway practice which would enable information to be conveyed at the same time to all visitors by way of lectures and inspection of works.

Whilst there was no particular restriction placed on the number of persons who may take advantage of the scheme, the principal difficulty so far as Australia was concerned related to dollar exchange. No nomination for the 1949 course was made by this State, but three Australian representatives, one from the Commonwealth Department of Works and Housing and one each from the State Road Authorities of New South Wales and South Australia attended.

Early in 1950 the Board received advice that the gratifying response of foreign countries invited to send delegates to the course had prompted the Bureau of Public Roads to announce that a further course would commence on the 15th May, 1950, and cover a period of approximately sixteen weeks.

In view of the reports received as to the great value derived by the engineers who had attended the course in 1949, the Board decided to recommend that its Deputy Chief Engineer, Mr. J. Mathieson, M.C.E., M.I.E. (Aust.), attend the new course. This recommendation was adopted by the Government. The New South Wales Government also approved of a representative from the Department of Main Roads of that State attending.

It is proposed that advantage be taken of Mr. Mathieson's visit to enable him to return to Australia via Great Britain in order to give him the opportunity of studying at first hand traffic and safety problems, a subject with which he is associated as an officer of the Board and a representative on the National Safety Council.

DEVELOPMENT OF TRAFFIC ARTERIES.

General.

The Board has investigated schemes to facilitate traffic at centres of urban population in many parts of the State, as well as on various heavily trafficked highways in country areas. In most cases the projects are not to be undertaken at present beyond the reservation or purchase of necessary land. The Board has conferred with the Town and Country Planning Board and its officers in planning the facilities which will eventually prove most suitable. Details of several proposals of varying types are given below.

Outer Metropolitan Area.

Generally, declared main roads terminate on the outskirts of the metropolitan area or at tram termini. However, the necessity for constructing connecting links and gaps in the outer metropolitan roads was recognized some years ago in order that the effectiveness of the road system might be increased, and loan funds were provided for such purposes. In the absence of any co-ordinating authority for the metropolitan area and bearing in mind its limited funds, the Board has proceeded slowly with certain of the projects, but the situation has recently become critical particularly in view of the rapid development of building. In some cases it was noted that land abutting on roads which are important traffic arteries was being subdivided and buildings erected; it was therefore considered that some action should be taken by the Board under its existing powers at least to acquire additional land for future road purposes in order to avoid a great deal of eventual inconvenience and heavy expenditure in interference with or removal of houses and business premises. In some cases recent development has already proceeded so far along certain roads that what would otherwise have been very desirable road improvements have become impracticable on account of the expenditure involved.

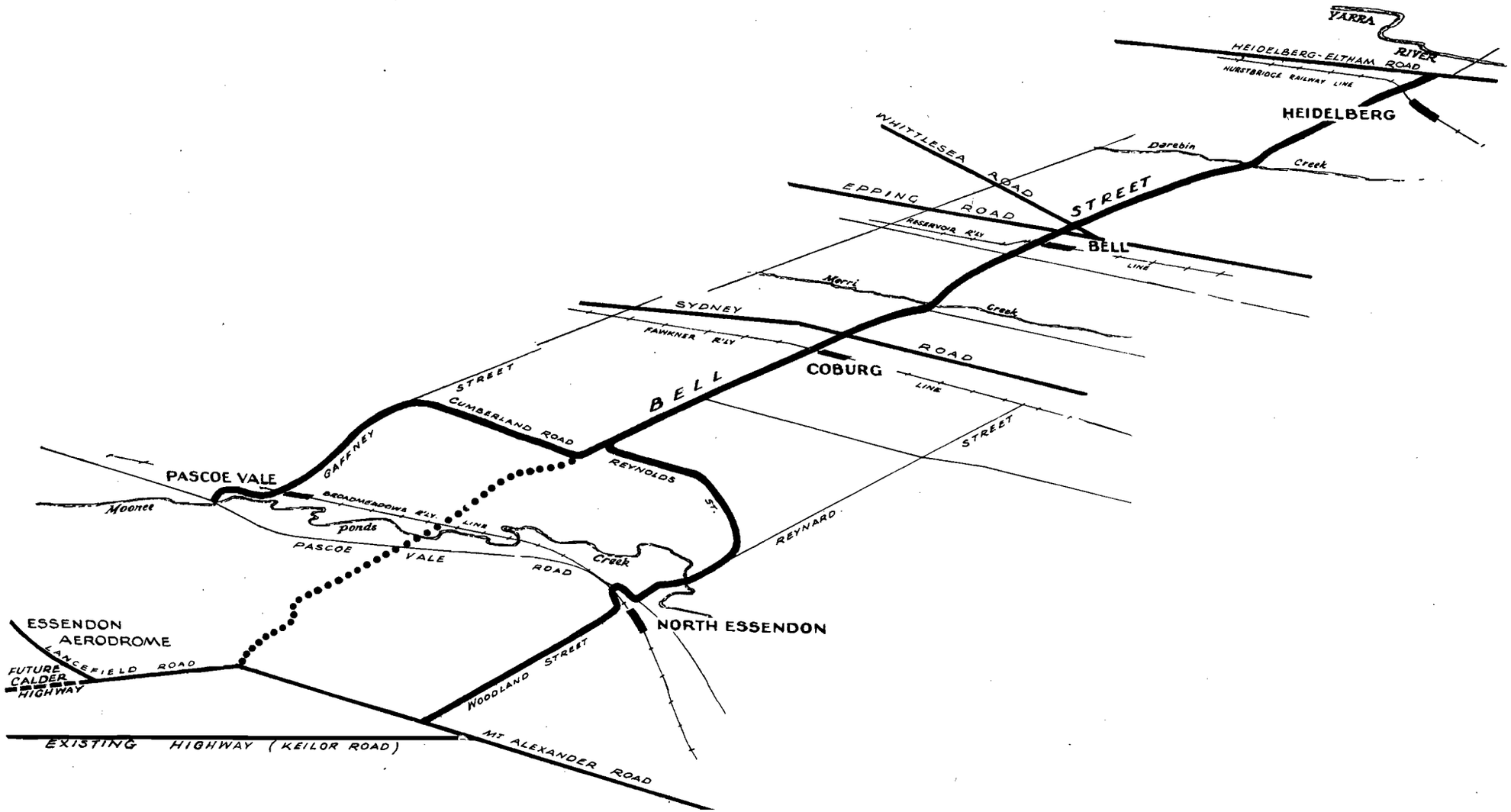


Fig. 2.—Showing proposed connection between Western end of Bell Street and Calder Highway. (Page 35).

Since the recent appointment by the Melbourne and Metropolitan Board of Works of a Chief Planner to enable it to prepare a planning scheme for the extended metropolitan area as required by the *Town and Country Planning* (*Metropolitan*) *Act* 1949 the Board has submitted to him particulars of any proposals affecting that wide area which it has investigated, and will continue to work in co-operation with that Board as required.

The necessity for an east-west connecting road in the northern portion of the metropolitan area having been recognized, Bell Street, which even some years ago was a route of outstanding importance, was declared a main road in August, 1947. This road extends easterly in a direct line from the Main Heidelberg–Eltham Road at Heidelberg to the Moonee Ponds Creek, a distance of 7·34 miles, passing through the outskirts of the cities of Heidelberg and Preston and portion of Coburg. It is intersected by such important arteries as the Whittlesea Road, Epping Road, and Sydney Road which carry large volumes of traffic to and from the areas north of Melbourne.

It also provides an established link by means of old bridges over Darebin Creek and Merri Creek. For part of its length Bell Street is built up, but a section in Preston City between O'Keefe Street and Darebin Creek, a length of approximately 1 mile, was still comparatively free of buildings. Action was therefore taken to acquire sufficient land for widening the existing road reserve of 66 feet by 52 feet. Portion of the area had been acquired by the Housing Commission which made the land under its control available for road purposes. Of the 66 allotments from which land was taken 49 were owned by private individuals, and only five private houses were affected. In some cases the Housing Commission was able to make other blocks of land in the vicinity available to owners who had been deprived of their frontages to Bell Street.

Action had previously been taken by the Heidelberg City Council to widen the road to 132 feet on the section easterly from Darebin Creek to Waterdale Road, by arrangement with the Housing Commission ; in addition the Council had adopted a scheme for widening from Waterdale Road to Upper Heidelberg Road to 80 feet which was the maximum possible without serious interference with properties.

The bridge over Darebin Creek at the boundary of the Heidelberg and Preston Cities having become dilapidated, and its approaches being sharply curved with descending grades, proposals for the erection of a new structure on an improved alignment have been adopted and as detailed elsewhere a contract for the work has been let.

Unsatisfactory conditions also exist at the crossing over Merri Creek on the boundary of the Preston and Coburg Cities owing to the narrowness of the old structure. Some time ago girders from the old railway bridge at South Yarra were acquired to enable the bridge to be reconstructed, but up to the present it has not been possible for any work to be undertaken.

The effectiveness of Bell Street as a connecting link is marred by the fact that at its western end it terminates at the escarpment of Moonee Ponds Creek, necessitating traffic being diverted by indirect routes via other streets in order to reach areas to the west. Following conferences between the Board and the Councils of the Coburg City and Broadmeadows Shire a scheme for continuing the road over Moonee Ponds Creek and forming a link with Pascoe Vale Road, Lancefield Road, and Calder Highway has been devised. Figure 2 indicates the effects of the proposals.

Geelong.

In view of the development which has taken place at Geelong serious traffic problems have arisen, and these have been investigated by the Board, particularly as they affect through traffic. The Board has also acted in close co-operation with the Geelong and District Town Planning Committee, which is representative of the Geelong City Council and surrounding municipalities. An urgent decision was required on account of the progress of building works along the Princes Highway at Norlane, North of Geelong, between North Shore Road and the Bacchus Marsh Road junction where the Housing Commission has acquired a large area. Investigation showed that the highway reserve could be widened on the west side from 99 feet to 198 feet between those points by affecting only fourteen privately owned allotments. Action is being taken for the acquisition of the necessary land.

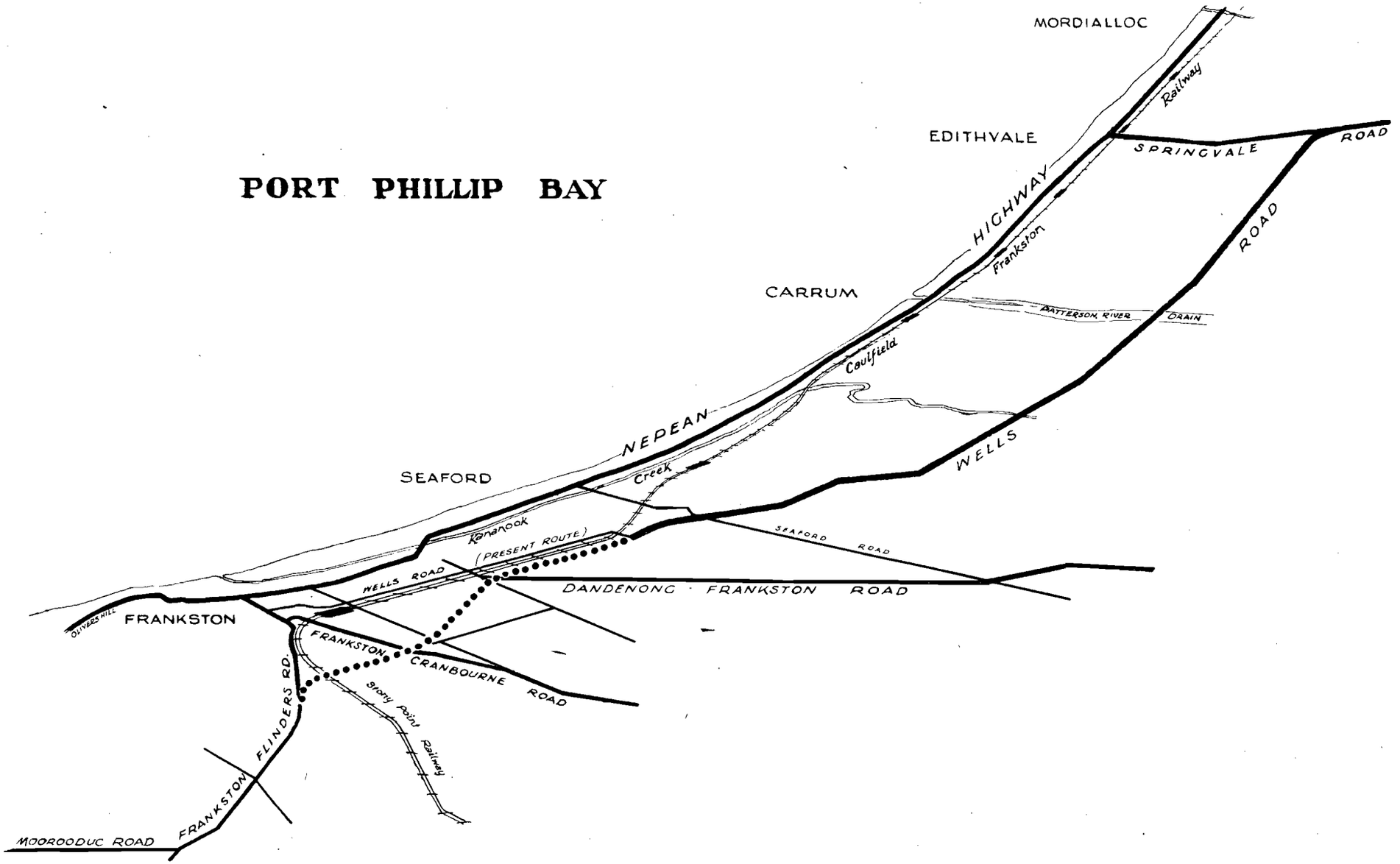


Fig. 3.—Showing proposal for development of Wells Road to provide improved traffic facilities to Mornington Peninsula. Line . . . . shows section of new road to be constructed. (Page 36).

The section of the highway through Belmont on the South of the Barwon River also presents a problem on account of its narrow width, the presence of trams and the narrow frontage blocks which are occupied by residences and shops. In addition the heavily trafficked roads to Barwon Heads and Torquay lead off the highway at this point. As opportunity exists to obtain land for a by-pass via Settlement Road on account of the comparatively open country traversed, the Board, after consulting the Joint Town Planning Committee for the Geelong area, has adopted a scheme along these lines.

Mornington Peninsula.

In an endeavour to provide further facilities for traffic to Mornington Peninsula, investigations have been carried out for some time, and these are still being pursued with a view to completing the scheme. Some years ago Wells Road, which runs parallel with the Nepean Highway, was declared a main road, but owing to its termination in the congested area near the Frankston railway station it could not be utilized to its maximum extent as a through route without considerable improvement. It was, therefore, decided to acquire sufficient land from private property to continue the road along the western side of the railway line and to provide a connection to McMahon's Road crossing the Frankston–Cranbourne Road and joining the Frankston–Flinders Road on the outskirts of Frankston. Action has been taken by the Board for the acquisition of land to carry out the proposals and, in addition, to provide for the widening generally from 66 feet to 132 feet of the section of Wells Road which will remain in the scheme. This was considered necessary in view of the subdivisions which had occurred along the route, with some building activity.

In view of the heavy programme of road construction which is now in hand, it is not contemplated that actual work will be put in hand for some time.

Figure 3 shows the proposal as it has been developed up to the present, from which it will be seen that provision will be made for traffic to the Flinders area to proceed via Frankston–Flinders Road and that to the western area of the Peninsula via Moorooduc Road without entering Nepean Highway for a considerable distance. In addition, the Frankston and Hastings Shire Council has approached the Board regarding a possible extension of the scheme to provide a connection with the Mount Eliza area.

The Board was hopeful of finalizing proposals for the provision of a suitable connecting route at the northerly end, but it was necessary for this to be modified on account of the Commonwealth Government having acquired an extensive area of land for airport purposes. Investigations are still proceeding.

Moe and Morwell.

Some years ago "ribbon development" in Moe along the Princes Highway and an awkward bend in the route in this small township led the Board to investigate a deviation to the south. It was at this time that the enlargement of Moe as a "dormitory" town for the Latrobe Valley brown coal field development was initiated by the Government. With the co-operation of the Housing Commission of Victoria, and in conjunction with Narracan Shire Council, which soon afterwards commenced the preparation of a statutory town planning scheme for the area, provision was made for the deviation through the planned area in a location as far south as was practicable.

At Morwell, similarly, the Board has engaged with the council and other authorities in planning adjustments to the Princes Highway and other roads necessitated by the development of the brown coal field. Where immediate deviations were required, these have been provided as noted elsewhere, and provision has also been made in the town plan of Morwell and in the regional plan of the Latrobe Valley to ensure that the land for future deviations on new roads will be available when certain critical stages arrive in the development of the area, e.g., the severing of the existing route of the Princes Highway by the extension of the Yallourn open cut. In dovetailing the requirements of roads into those of coal winning, briquetting, and other industries, railways, and the various amenities and township extensions, the need for Government action, evident at an early stage, was provided through the Latrobe Valley Development Committee in whose activities the Board constantly co-operated.

CONTROL OF HEAVY TRAFFIC.

Amendment of Motor Car Act.

By an amendment of the Motor Car Act which came into operation on the 1st January, 1950, provision was made for the operation of commercial motor vehicles on a much less restricted basis than hitherto. Whilst maximum weights had previously been provided these did not take into consideration overseas trends in vehicle construction particularly with multi-wheel vehicles. Pending the passing of amending legislation it had been necessary to issue many permits for the operation of commercial vehicles which exceeded old legal limits for gross weight, and this was done according to a schedule applicable to various classes of vehicles.

The general question of what limits should be specified in any amending legislation so as best to fit Australian conditions had been considered on several occasions by the Conference of State Road Authorities of Australia whose recommendations were adopted by the Australian Transport Advisory Council, with the result that amendment of the law on the subject has been at least considered by each of the States on a uniform basis.

The following are the principal provisions of the new legislation in Victoria as affecting road pavements, but provision is made for granting permits under certain circumstances. :—

(*a*) The gross weight on any one tire not to exceed 5,000 lb.

(*b*) Gross weight carried on any one axle not to exceed 17,000 lb.

(*c*) Gross weight on all axles or any consecutive group of axles not to exceed the weight shown in the schedule to the Act varying between 11 tons 16 cwt. and 26 tons 1 cwt. having regard to the distance between the extreme axles of the vehicle or of a group of axles.

(*d*) Tire pressure not to exceed 100 lb. per square inch.

(*e*) Width of vehicle and load not to exceed 8 feet.

(*f*) Height of vehicle and load not to exceed 12 feet.

(*g*) The overall length of vehicles other than articulated vehicles not to exceed—

(i) In the case of a vehicle used for the carrying of passengers for hire—33 feet.

(ii) In any other case—31 feet.

(*h*) Overall length of an articulated vehicle not to exceed 45 feet and length of either of the rigid parts not to exceed 35 feet.

(*i*) Overall length of vehicle and trailer not to exceed 50 feet.

The provisions relating to the limitation of speeds of motor vehicles used for carrying goods for hire or goods in the course of trade or used for carrying passengers for hire have been modified. The speeds now provided range between 12 miles per hour for a vehicle with a gross weight exceeding 3 tons and fitted with one or more tires other than pneumatic tires and 40 miles per hour in the case of a pneumatic-tired passenger carrying vehicle or goods vehicle, the gross weight of which exceeds 50 cwt. but not 3 tons.

Provision is also made for the reduction in allowable length, weight or speed on specified highways by proclamation of the Governor in Council. Under this provision action has been taken to limit the length and speed of passenger vehicles and the speed of commercial vehicles on the Ocean Road between Torquay and Princetown.

Issue of Permits.

As a result of the various amendments to the Act there has already been a reduction in the number of special permits. Whilst the new Act operated for only portion of the financial year there was a reduction of 134, the number of permits issued being 4,159. The number of single trip permits was 2,289, being a reduction of 96 on the previous year.

The statement hereunder indicates the types of permits issued; in some cases individual permits cover more than one consideration.

Exceeding 8 feet wide	2,163
Exceeding 12 feet high	1,078
Exceeding legal length	1,086
Exceeding 6 tons load limit	1,235
Exceeding 13 tons but not 15 tons	558
Exceeding 15 tons but not 20 tons	561
Exceeding 20 tons but not 30 tons	522
Exceeding 30 tons	176
Miscellaneous	15
	7,394

The large number of permits issued for excess width and height is accounted for by the large increase in movement of pre-fabricated houses. Of course special restrictions, e.g., relating to time of journey, roads to be travelled, and provision of pilot vehicle are specified.

Restriction of Loading on Roads.

As formerly, action had been taken to limit to six tons the gross weight to be carried on certain roads, but following the strengthening of the pavements the restrictions which had previously applied to the Murray Valley Highway between Yarrawonga and Strathmerton and the Warburton–Woods Point Road between Warburton and McVeighs have been lifted.

Details of sections of State highways on which the restriction has been placed are set out on page 21 of the 36th Annual Report. At the present time the length affected is 778 miles; the total length originally covered by restrictions was 1,109 miles, thus showing a reduction of 331 miles which has occurred in recent years due to strengthening of pavements.

Long Distance Heavy Cartage.

A feature of post-war traffic is the very great increase of long-distance haulage of heavy goods resulting in rapid deterioration of old surfaces. Pending wholesale strengthening of the roads, which cannot be done all at once, measures such as to control gross weight of vehicles below legal limits, or to close critical sections to specified classes of traffic, are regarded as warranted only to gain time for reconstruction works, and in view of the urgent necessity for the delivery of goods and the apparent difficulty of obtaining them by other means, such controls are applied as sparingly as possible. A case in point is the cartage of timber from the Orbost area. It has come to the knowledge of the Board that timber from this area is being carted by road along the Princes Highway, a distance of 236 miles, which not only has a detrimental effect on the road pavement but involves high transport costs. The information received by the Board indicates that whereas only three saw mills were operating between Bairnsdale and Orbost three years ago, there are now at least 25, and the output is so great that the railway system is unable to cope with it. There is also a persistent stream of interstate traffic along other routes such as the Hume Highway, Sturt Highway and Western Highway, and on all types of roads there are increasing numbers of categories of special goods traffic such as perishable primary products, fragile and valuable merchandise for rural consumption, and manufactured or partly manufactured products. Passenger traffic on cross-country routes, school buses, and tourist and chartered vehicles add an ever increasing burden on roads built to quite light standards. These factors all necessitate extensive strengthening of the road system if load restrictions are to be avoided or the general collapse of the roads prevented. As indicated above it has been necessary to continue a 6-ton limit in places, but strengthening is being pushed on as rapidly as possible, and in spite of the severity of traffic the lengths subject to restricted loading are so far being steadily reduced.

ROAD SAFETY.

Accident Reports.

During the year 1949–50, reports of 437 accidents were received from patrolmen. These indicated that 101 persons were killed in 78 accidents and 317 injured in 185 accidents. The records available to the Board apply only to accidents which occurred on roads controlled directly by it, chiefly State highways. In some cases evidence of the circumstances was directly available to those preparing the reports, whilst in others, data made available by the police were utilized.

The various alleged causes, or possible contributory causes, are classified by the supervising engineers under the following headings, the statistics for the accidents recorded being as shown. In the case of some accidents several possible contributory causes are shown, so that percentage figures for the various causes cannot be given. For purposes of comparison the numbers for the year 1948–49 are also shown.

	1948–49.	1949–50.
Human and Mechanical Defects—		
Carelessness and faulty driving	140	251
Mechanical defects	22	57
High speed	48	63
Intoxication alleged	11	18
Alignment—		
Curve too sharp for average speed on section	20	19
Poor visibility round curve	2	6
Grade—		
Poor visibility over vertical curve	1	6
Steep grade	4	2
Shape of Pavement—		
Excessive crossfall	—	—
Insufficient cant on curve	1	3
Irregularities affecting steering	1	14
Insufficient width	3	7
State of Surface—		
Slippery black surface	2	1
Slippery wet gravel, sand, or limestone	4	1
Slippery formation	5	4
Loose screenings, gravel or sand	6	2
Signs, &c.—		
Insufficient or misleading signs	1	5
Insufficient or misleading barriers or lights	—	—
Poor marking of curve	—	1
Weather Conditions—		
Poor visibility, rain or fog	11	25
Wet road	10	23
Light—		
Darkness	20	54
Dusk	6	19
Headlight glare	12	25
Sun in eyes of driver	8	2
Miscellaneous—		
Railway crossing	4	10
Narrow bridge or culvert	6	12
Narrow bank on cutting	1	5
Wandering stock	6	22
Bad condition of shoulders	1	3
Trees close to pavement	1	2
Road intersection	Not recorded	73
Object on road	,,	3
Multi-axle vehicle	,,	66
Other causes	20	3

When roads are found to be in such a condition of failure that reconstruction is being planned, the opportunity is taken to design other improvements which will build into the road an improved degree of safety at any points where the accident record shows that to be desirable. The increase in traffic and especially in numbers of wide trucks and buses is requiring widening of many sections of pavement both in the interests of safety and because it is becoming quite impracticable to maintain the edges of old narrow roads. At other locations improvements in the various aids to traffic (e.g., warning signs), are made from time to time as a result of study of accident reports.

38. Princes Highway East. Truck parking bay near Drouin.

Traffic Line Marking.

The work of repainting worn lines and marking new ones comprised a total length of 2,045 miles of State highways, main roads, and tourists' roads, and 45 miles on behalf of municipalities. The expenditure involved was £8,918 or an average of £4 5s. 4d. per mile. The total quantity of lacquer used was 5,566 gallons, or an average of 2·67 gallons per mile.

Truck Parking Bays.

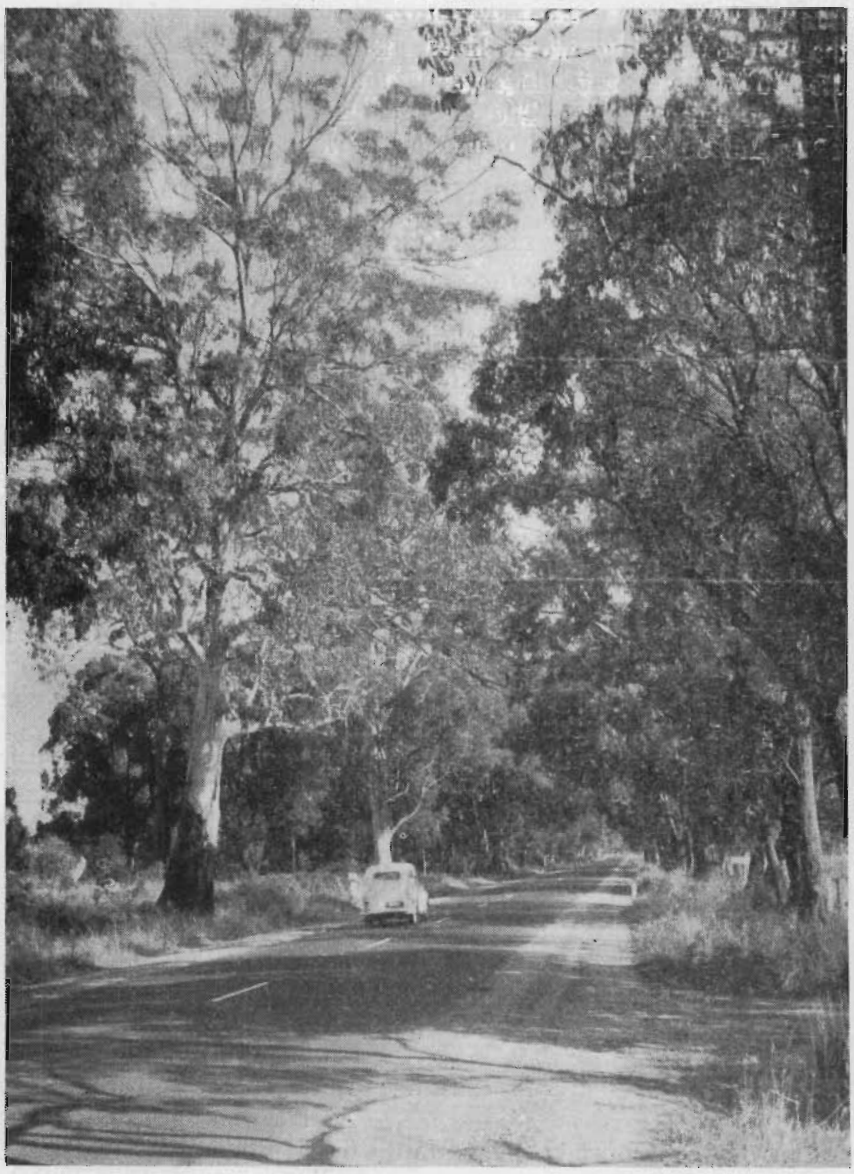
In 1947 provision was made for the forming and surfacing of an area adjoining the Princes Highway at mileage 55 near Drouin to enable large transport vehicles to park clear of the highway pavement in order that drivers may rest. (Plate No. 38.) The practice of such vehicles being parked close to the pavement of busy highways for long periods is undesirable and frequently creates a dangerous hazard. As the experimental bay, which consists of a loop road within the highway reserve, has proved successful the, Board intends to provide similar bays at other places where experience indicates that they are necessary. For the present approval has been given for their construction at the following points, and the work will be put in hand as early as possible.

Highway.	Location.
Calder	At 65·15 and 65·40 miles (one bay for each line of traffic) south of Elphinstone. At Harcourt, 98·7 miles. At Big Hill (one bay for each line of traffic).
Hume	Between Euroa and Avenel. Crest of Pretty Sally Hill (two bays). Crest of Beveridge Hill. South of junction with Northern Highway (one bay for each line of traffic).
Maroondah	Top of Black Spur. Top of Melbourne Hill, Lilydale.
Northern	3 miles north of Tooborac (one bay for each line of traffic).
Princes Highway East	Top of Berwick Hill (one bay for each line of traffic).
Western	Between Stawell and Deep Lead. At 235·5 miles near Nhill.
Elphinstone–Harcourt Road (Main Road)	6 miles from Elphinstone (one bay for each line of traffic).

TRAFFIC OFFENCES.

During the year there was a further increase in the number of offences against the Motor Car Acts as revealed by the following statement, indicating the number of cases for which convictions were obtained in the years 1948–49 and 1949–50 :—

—	1948–49.	1949–50.
Speeding (freight vehicle)	282	269
Speeding (passenger vehicle)	10	4
Exceeding 13 tons gross weight	272	322
Exceeding 10 tons gross weight	11	21
Exceeding 6 tons load limit	120	147
Exceeding 17,000 lb. on one axle	..	104
Exceeding 7½ tons on one axle	18	47
Exceeding gross weight on axle group	..	49
Exceeding 3 tons on trailer axle	9	9
Exceeding two-thirds of vehicle weight on one axle	1	1
Exceeding load capacity	..	24
Exceeding conditions of special permit	176	167
Exceeding 8 feet wide	6	10
Exceeding 12 feet high	2	..
Exceeding 45 feet long	..	6
Exceeding 35 feet long for rigid part of articulated unit	..	1
Refusing to allow vehicle to be weighed	48	13
Other offences	5	..
Total	960	1,194



39. Princes Highway East. Picturesque section near Picnic Point at 47 mile post.

40. Princes Highway East. Fine specimen of River Red Gum (*Euc Rostrata*) near Dandenong.

The total fines imposed amounted to £12,180 and costs £152, as compared with £9,109 and £123 respectively in 1948–49, the increase in fines being 33 per cent.

In the thirty-sixth annual report reference was made to the difficulty experienced in the collection of fines, particularly in the case of interstate operators. Whilst improvement of the Commonwealth laws as referred to would still be of considerable value in this respect, the Board, with co-operation of the Police Department, has been able to take certain action under present conditions to ensure payment of a large amount of outstanding fines.

OFFENCES AGAINST COUNTRY ROADS ACTS.

During the year proceedings were successfully instituted for 292 offences against the *Country Roads (Impounding of Cattle) Act* 1935, for allowing cattle to wander unattended on State highways, the fines amounting to £473. Warnings were issued in 71 cases.

Whilst the Board has noted that recently the practice of allowing stock to wander unattended on State highways has not been so prevalent as in the past, due in some measure to the increased attention which has been given by the appointment of additional officers, it is considered that there is still room for improvement. The importance of control is emphasized by the number of accidents where unattended stock were involved, as indicated in a previous paragraph. Considerable difficulty has been experienced by the officers in carrying out their duties by the absence or inadequacy of pounds in some districts. The co-operation of municipal councils in this respect is urged in order that the menace to road users of wandering stock may be eliminated, particularly as several serious accidents resulted from collisions with animals. It is also considered that greater penalties are warranted as a deterrent.

PRESERVATION OF ROADSIDE BEAUTY.

As in the past, the Board has investigated proposals submitted by the Postmaster-General's Department and the State Electricity Commission for the erection of pole lines on road reserves, particularly to ensure that future road improvement proposals are considered and that growing trees are preserved. The Board is pleased to record that the authorities referred to have co-operated with it and that as a result the roadside beauty has been preserved as far as practicable. This has been achieved in some cases by the erection of pole lines on private land adjoining highways where considerable damage would have been caused if the highway reserve had been used. The value of this co-operation is shown by modifications of proposals of the State Electricity Commission in the case of pole lines on the Calder Highway between Bendigo and Marong and on the road between Emerald and Gembrook.

Plates Nos. 39 and 40 show examples of beautiful roadside trees which the Board is anxious to preserve from destruction.

On several occasions attention has been drawn by the Native Plants Preservation Group of the Field Naturalists' Club of Victoria to the presence of groups of unique and in some cases rare native plants within road reserves, and the desirability of protecting them. Following recent representations in this matter two areas on the Ocean Road in the vicinity of Anglesea have been fenced after careful investigation to ensure that visibility of road users would not be affected and that the areas are not likely to be required in the future for road improvements.

A census of plants identified as supplied by the Group indicates that their preservation has been of very great scientific value. A similar area on the Hume Highway in the vicinity of Euroa was fenced several years ago.

ADVERTISING HOARDINGS.

From time to time reference has been made to the Board's action in connection with the control of advertising hoardings in the vicinity of State highways. Special attention is paid to this matter in the interests of safety and to preserve the natural beauty of the landscape. Recently the Board has extended the State highway system to cover long lengths in open country as well as through townships and populous areas. Reports as to the existence of advertising hoardings in the vicinity of these

highways have been received and considered by the Board, special attention having been given to the Maroondah and Nepean highways on which the traffic is particularly heavy. As a result of the Board's action in requiring the removal of certain hoardings, representations were made by the Outdoor Advertising Association of Australia, that some consideration be allowed especially in the case of hoardings in centres of population which generally are also business areas.

As conditions vary to such a great extent in all parts of the State, considerable difficulty has been experienced in laying down a formula which can apply in all cases. Special consideration must be given to such factors as visibility for road users, the presence of warning and direction signs, traffic signals, and other aspects which render undesirable and dangerous the presence of any object calculated to cause confusion apart from the necessity for studying the aesthetic conditions of any particular location. The Board has, therefore, come to the conclusion that all cases should be dealt with on their merits. As this will involve detailed investigation it has been decided to appoint a committee of senior officers to advise on applications and reports received on existing hoardings. However, in general the Board has not taken any action in the case of advertisements for goods on sale in the premises on which the advertisements are displayed, or of advertising hoardings in business areas.

MILK AND CREAM STANDS.

In view of the number of applications which were being received by the Board from dairy farmers for permission to erect on public roads, stands for milk and cream cans, the Board circularised municipal councils in December, 1940, setting out the conditions under which such stands should be permitted, having regard to the interests and safety of traffic and in order to avoid erection of unsightly structures.

During the year it was found necessary to bring this matter under the notice of Councils again as it would appear that the conditions laid down were not being observed. Generally, the conditions provide that the stands shall be so erected that vehicles shall be clear of the road formation and that visibility shall not be restricted. A sketch showing a low cost type of stand designed for utility and appearance has been supplied.

PHOTOGRAPHY.

During the year five new 16 mm. colour films with sound tracks were completed. These comprise :—

Gazettes 3, 4, and 5 dealing with a wide range of subjects.

" Timber Bridge " illustrating the construction of a timber and steel bridge over the Goulburn River at Jamieson.

" Seaside Holiday " featuring roads to the seaside and the traffic thereon.

A mobile unit for the display of films at the Board's more isolated construction camps has commenced operation, a circuit covering fourteen camps with one display a month having been adopted. The total screenings of films by the Board's officers during the year was 57 including a number especially for New Australians.

EMPLOYEES.

Industrial.

In December, 1949, the Conciliation Commissioner in charge of the road construction industry announced a variation of the Australian Workers Union construction award providing for an increase in travelling allowances and in the weekend earnings of cookhouse personnel.

In May, 1950, the Conciliation Commissioner in charge of the Road Transport Industry announced a new award. After negotiations with the Transport Workers Union, the Board applied during the hearing of the case for a continuance of the exemption from the working conditions of the award, proposing in lieu thereof to observe the conditions of the Australian Workers Union Construction award. The exemption was granted by the Commissioner, and the Board's transport workers, approximately 350 in number, will continue to observe the working conditions prescribed by the Australian Workers' Union Award.

A new Award covering the employees of municipalities operative as from the 2nd January, 1950, was announced by the Conciliation Commissioner on the 6th March, 1950. This Award substantially increased the earnings of municipal employees, the average increase to each employee being approximately 15s. per week. It is estimated that during the second half of the financial year expenditure charged to funds provided by the Board for works carried out by municipalities was increased by approximately £50,000 as a result of the Award.

During the year the maximum number of employees in the Board's service at any one time was 2,084, of whom 263 men were employed on works being carried out by the Board for other authorities.

The total number of individuals employed during the year was 4,445, but 2,225 ceased employment of their own accord or were discharged.

Amenities.

Owing to the shortage of materials after the war difficulty was experienced in providing the standard of camp for workmen which was considered desirable. As conditions improve the Board is endeavouring to raise the standard, and in view of the fact that the majority of the Board's works are not of long duration, arrangements have been made for the standardization of accommodation and equipment, to facilitate erection and removal.

The various items of accommodation and equipment for which provision is being made include the following:—

Sleeping accommodation for men.
Mess huts
Kitchens
Recreation rooms.
Drying rooms.
Ablution showers.
Latrines.
Hot-water systems.

Employment.

In common with other construction authorities the Board is still experiencing considerable difficulty in obtaining sufficient labour to carry out its large programme of works. Whilst this is the case with unskilled labour the position is particularly acute so far as skilled men such as fitters and turners, motor mechanics, plant operators, and carpenters for bridges are concerned. Although conditions of employment are made as attractive as possible within the framework of industrial awards, it has not been possible to obtain sufficient men to enable works to be carried out with the maximum efficiency.

With a view to improving the position to some extent, endeavours have been made to obtain the services of as many New Australians as possible to work under conditions which have been laid down for their employment. At the 30th June, 1950, 131 were employed. Generally, the Board's experience with them has been most favourable both from the point of view of their ability as workmen, and their conduct.

One of the features which has militated against employment is housing, particularly as related to migrants. To assist in overcoming this difficulty the Board has purchased a commodious residence in Holmes-road, Moonee Ponds, which it is proposed to operate as a hostel for unmarried men. Action has been taken through the Commonwealth Ministry of Immigration with a view to the nomination of suitable men from Great Britain especially for employment at the central workshops.

Accidents to Employees.

The Board is concerned at the number of accidents which occur to its employees, although generally they are not of a very serious nature and do not involve long absence from duty. Action is taken by means of literature and posters obtained from the National Safety Council to bring under the notice of employees the necessity for safety precautions. During the year 370 accidents were reported to the State Insurance Office, one of which was fatal.

The following statement indicates the nature of these accidents:—

Fatal	1
Strains and sprains	90
Ruptures	5
Fractures	27
Eye injuries	46
Bruises, lacerations	151
Burns	19
Poison	21
Heart strain	2
Internal haemorrhage	2
Head injuries	4
Bites	2
	370

STAFF.

At the 1st July, 1949, the total of the Board's staff was 363, consisting of 208 permanent (195 male and 13 female), and 155 temporary (75 male and 80 female). The total at the 30th June, 1950, was 395, consisting of 259 permanent (228 male and 31 female), and 136 temporary (83 male and 53 female). Whilst the total increase was 32, of that number 21 were in divisional centres away from Melbourne, and 11 at head office and central workshops or storeyards, which indicates the expansion of the Board's decentralization programme. Although there was a net increase in the number of officers, actually 91 new appointments were made, as 59 officers resigned or retired. The loss of that number of experienced officers (representing 16 per cent. of the staff as at 1st July, 1949) has had a serious effect on the Board's operations.

STAFF ACTIVITIES.

Charities Fund.

During the year an amount of £207 was voluntarily contributed by members of the staff to the Charities Fund, the contributions by individual officers being deducted fortnightly from their salaries. The fund is under control of a committee of officers who allocate amounts from time to time to various charities. An amount of £182 11s. was paid to various metropolitan and country hospitals and a number of other organizations such as Australian Red Cross, Institute for the Blind, Lord Mayor's Fund, &c.

Staff Journal.

At the suggestion of officers, approval has been given for the publication of a Staff Journal, under the name *Roadlines*.

For the present it is proposed that this be issued quarterly, the first of which was published in December, 1949. This journal, which is edited by Miss N. Strover, Officer in Charge, Correspondence Records Section, consists of items of interest relating to the staff personnel and articles of general interest contributed by members of the staff. The keen interest in the publication, which has a circulation of approximately 400, indicates that it is filling a long-felt want. The cost is 1s. per copy.

DEPARTMENT OF THE ARMY.

Supplementary Reserve Regiment.

Following approval of the Commonwealth Government to the raising of supplementary reserve units in the Department of the Army, such units to be sponsored by various government departments, the Board has agreed to participate in the scheme and to raise within its organization the following units :—

(*a*) One regimental headquarters of 7 officers and 26 other ranks.

(*b*) One construction squadron of 7 officers and 153 other ranks.

(*c*) One plant squadron (less one troop) of 5 officers and 126 other ranks.

For the purpose it is hoped that suitable arrangements will be made for municipal councils to be regarded as part of the Board's organization.

The purpose of the scheme is to make available volunteer technicians and tradesmen whose qualifications could be used by the Army in war without further technical training. The proposed training is to be the same as the C.M.F. except that training will be confined to an annual camp of two weeks.

The co-operation of suitable staff and employees of the Board and Municipal Councils has been sought and has been favourably received.

The Department of the Army has confirmed the appointment as Officer Commanding of the Board's Engineer for Bridges, Lieutenant-Colonel I. J. O'Donnell, O.B.E., B.C.E., A.M.I.E. (Aust.), who had been C.R.E., 8th Division, 2nd A.I.F.

OFFICE ACCOMMODATION.

Although additional accommodation has been made available to the Board in recent years, the space occupied is still inadequate, particularly for the drawing office staff, which is now working under extremely unsatisfactory conditions. Some relief is contemplated by the provision of additional huts in the area at the rear of the main office, but it is considered that this can only be looked upon as a temporary expedient until conditions are opportune for a complete rebuilding scheme.

The Board is also concerned that no provision can be made for canteen or dining-room facilities or for staff recreation, especially as the offices are situated at some distance from the city, which makes it necessary for the majority of the staff to have their mid-day meal at the office.

PUBLICATIONS.

During the year, a report by Mr. A. H. Gawith, M.C.E., A.M.I.E. (Aust.), Materials Research Engineer, following his visit to England, Europe, and the United States of America was printed. This report deals with the International Conference on Soil Mechanics and Foundation Engineering, held in Holland in 1948, and various aspects of such subjects as methods and organization of research, pavement design, soils, concrete, bitumen and oil testing, laboratory buildings and equipment, &c.

One "technical bulletin" dealing with the design of concrete mixers by a graphical method was issued by the Chief Engineer and also, as occasion arose, ten "engineering notes" on various subjects with titles as listed in his attached report. The prompt dissemination of such information throughout the Board's organization and its availability to municipal engineers concerned are valuable means of increasing the efficiency with which the road and bridge programme is carried out.

PERSONNEL OF BOARD.

Following the retirement of Mr. W. L. Dale on the 30th June, 1949, Mr. D. V. Darwin, M.M., M.C.E., M.I.C.E., M.I.E. (Aust.), who had been a member of the Board from 2nd January, 1945, was appointed Chairman as from the 1st July, 1949, and Mr. R. F. Jansen, M.S.M., F.C.I.S., who had held the position of Secretary of the Board from the 1st July, 1929, was appointed a Member as from the 1st July, 1949.

MOTOR REGISTRATION.

During the year 411,898 vehicles, including traction engines and motor cycles, were registered in Victoria.

The number of motor vehicles of various classes registered for the past two financial years, as set out in the following statement, shows a net increase of 52,756 or 14·69 per cent. over the figures for the financial year 1949–50 :—

Vehicles.	Financial Year 1948–49.		Financial Year 1949–50.		Increase.	Decrease.
Private—						
New	18,312		32,192			
Secondhand—Re-registered ..	8,693		11,340			
Renewals	158,038		178,719			
		185,043		222,251	37,208	
Commercial—						
New	7,234		9,416			
Secondhand—Re-registered ..	4,320		4,350			
Renewals	52,077		55,997			
		63,631		69,763	6,132	
Primary Producers—						
New	4,232		7,036			
Secondhand—Re-registered ..	2,891		3,105			
Renewals	56,451		59,239			
		63,574		69,380	5,806	
Hire		3,958		4,262	304	
Licences under Motor Omnibus Act ..		949		864	..	85
Trailers		10,272		11,100	828	
Traction Engines, &c.		68		47	..	21
Motor Cycles		31,647		34,231	2,584	
Total		359,142		411,898	52,862	106

ACCOUNTS.

Statements of accounts for the year ended 30th June, 1950, appear 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, including expenditure under special appropriation :—

—	Under Board's Supervision.	Under Councils' Supervision	Total.
	£ s. d.	£ s. d.	£ s. d.
1. State Highways—			
Maintenance and reconditioning	963,098 17 8	86,785 4 2	1,049,884 1 10
Construction	271,100 2 4	19,603 12 3	290,703 14 7
2. Main Roads—			
Permanent Works (Swan-street and Darebin Creek bridges)	41,866 13 1	..	41,866 13 1
Construction and restoration	2,723 4 8	3,078 3 1	5,801 7 9
Maintenance and reconditioning	128,307 4 7	1,089,522 0 4	1,217,829 4 11
3. Developmental Roads—			
Construction and maintenance	55,524 17 5	309,479 0 3	365,003 17 8
Roads for Isolated Settlers	..	13,175 0 2	13,175 0 2
4. Tourists' Roads—			
Maintenance	134,716 15 0	3,969 1 4	138,685 16 4
Construction	11,155 1 1	..	11,155 1 1
5. Forest Roads—			
Construction	226 18 0	..	226 18 0
Maintenance	19,728 4 9	24,218 16 5	43,947 1 2
6. Murray River Bridges and Punts—			
Maintenance	5,344 1 11	677 8 6	6,021 10 5
7. Roads adjoining Commonwealth properties ..	236 3 8	498 17 4	735 1 0
Total	1,634,028 4 2	1,551,007 3 10	3,185,035 8 0

In addition to the amounts shown in the above statement, the following expenditure was incurred during the year in respect of works carried out on behalf of the Commonwealth Government and several State Instrumentalities, &c. :—

	£	s.	d.
Commonwealth Government	94,181	10	4
State Instrumentalities, &c.	349,194	0	8
	443,375	11	0

OFFICERS AND EMPLOYEES.

Again the Board has to express its appreciation of the efficient manner in which all officers and employees loyally carried out the demands made upon them.

ACKNOWLEDGMENTS.

The thanks of the Board are tendered to the Honorable Sir James Kennedy, M.L.C., who was Minister of Public Works throughout the period, for his help and interest in the Board's work.

The Board also desires to record its appreciation and thanks to officers of Government Departments, State Instrumentalities, and the Road Authorities of other States for their assistance. The active co-operation of the Victorian municipal councils and their officers is also gratefully acknowledged.

We have the honour to be,

Sir,

Your obedient servants,

D. V. DARWIN, Chairman.

F. M. CORRIGAN, Member.

R. F. JANSEN, Member.

W. H. NEVILLE, Secretary.

12227/50.—5

CHIEF ENGINEER'S REPORT.

Country Roads Board,
Melbourne,
1st December, 1950.

THE CHAIRMAN,

SIR,

I have the honour to submit the following particulars of certain matters of engineering interest included in the Board's work during the year 1949-50.

GEOMETRIC DESIGN—THIRD LANES FOR SLOW TRAFFIC ON HILLS.

Every motor car driver has had the experience of following a crawling truck up a long steep grade on a two-lane road, and being prevented from passing by opposing traffic, lack of visibility, and similar impediments, which would be overcome if the slow-moving traffic was provided with an additional lane for its own use. The design problem involved is the determination of the conditions justifying an added third lane for slow-moving traffic and, where it is considered necessary, the length over which it should be provided.

To assist in this determination which largely depends on vehicle performance, data has been obtained in conjunction with General Motors-Holdens Limited, by road checks of some twenty heavy vehicles, chosen at random, at previously selected steep grades. Special tests were also made with a G.M.-H. truck, driven at various pre-determined speeds, to widen the range of information obtained by observation of the commercially driven vehicles. A very thorough study of the data was made by G.M.-H. engineers and made available for the Board's use. The report forms a valuable contribution to the knowledge of a problem concerning which there has been very little reliable information available for Victorian conditions. It shows that the average crawl speed of the twenty vehicles on grades averaging 5·7 per cent. was 8·2 miles per hour, crawl speed being the minimum constant speed to which a vehicle is reduced by a long steep grade, and, concurrently, the maximum speed it will maintain in the particular lower gear required by that grade, when normally driven. The study also showed that the speed of the present average heavily loaded truck on Victorian roads is reduced to less than 15 miles per hour in a very short distance by a grade exceeding 3 per cent., and thence rapidly to its average crawl speed of approximately 8 mile per hour as the grade increases.

Light vehicles such as cars, provided with safe overtaking facilities, can maintain high speeds on grades exceeding 6 per cent., so that the warrant for an added lane might be determined by grade alone. This, however, would not be possible economically, and, with the comparatively low traffic densities likely to operate on most Victorian roads for some years, it is considered that, wherever safe overtaking sight distance is available, no third lane for slow moving traffic should be provided at present.

Allowing a combined perception and reaction time of one and a half seconds, the safe overtaking sight distance for a vehicle travelling at 20 mile per hour and overtaking another travelling at 8 mile per hour, is approximately 800 feet. The vehicle operation studies showed that a truck, after passing the top of a grade took 1,000 feet to regain its normal speed, this being determined by driver behaviour rather than by grade or type of vehicle. From these considerations it was decided to adopt the following tentative design basis :—

(*a*) For the time being to provide the additional lane where grades exceed 6 per cent.

(*b*) The additional lane to begin where the visibility falls below 800 feet.

(*c*) To continue the third lane until the 800 feet visibility for safe overtaking is regained.

(*d*) To effect the transition from two to three lanes and vice versa by two reverse curves of 1,000 feet radii, occupying about 200 feet additional length at each end of the third lane.

Additional lanes, designed as set out in the last paragraph, are being constructed west of Bacchus Marsh on the Western Highway where their value, and the accuracy of the assumptions in design, will be watched with interest.

PLANT.

Efficiency.—A summary of overall and mechanical efficiency, as defined in last year's report, is given for the more important classes of equipment in Table A. For purposes of comparison, figures for the last three years are shown.

TABLE "A."—PLANT EFFICIENCY.

Type of Plant.	Number of Units in Group.	Average Age of Units in Group.	Overall Efficiency.			Mechanical Efficiency.		
			1947–48.	1948–49.	1949–50.	1947–48.	1948–49.	1949–50.
		Years.	%	%	%	%	%	%
Crawler Tractors—								
Class 1	17	4	42	27	37	45	33	51
Class 2	45	4·3	39	33	35	50	45	44
Class 3	19	4	34	21	26	37	36	31
Class 4	14	3·5	55	33	38	64	47	51
Power Graders—								
Heavy—Tandem Diesel	50	5	72	54	74	73	76	77
Medium—Dual wheel, Diesel	7	14	61	64	66	62	76	77
Light—Single drive, hand control	12	15	48	28	33	52	42	38
Light—Single drive, power control	21	6	72	49	63	73	56	70
Patrol power graders	6	1·2	..	86	80	..	89	91
"Speed Patrols"	4	4·3	..	71	69	..	88	78

The above figures, to the end of May, 1950, do not take into consideration the following units that did not work at all during the years in question :-

Year.	Tractors.	Power Graders.
1947–48	21	6
1948–49	14	1
1949–50	20	10

The figures indicate little change from last year's performance. In detail they show that a number of the older light graders should be sold as soon as they can be replaced.

Plant Strength.—Table B shows the number of major items owned by the Board at 30th June, 1949, and 30th June, 1950.

TABLE "B."—TRACTORS AND POWER GRADERS.

	Number Owned by the Board,	
	30th June, 1949.	30th June, 1950.
Crawler Tractors—		
Class 1	17	20
Class 2	44	47
Class 3	18	19
Class 4	13	16
Power Graders—		
Heavy—Tandem Diesel	47	52
Medium—Dual wheel Diesel	7	7
Light—		
Single drive, hand control ..	14	12
Single drive, power control ..	15	21
Patrol Power Graders	3	6
Speed Patrols	4	4

The few heavy tractors added to the fleet are second-hand machines imported from England after thorough overhaul and, with our limited repair facilities, cannot be considered as contributing to the Board's work potential to the extent the numbers indicate. The new machines, which it is hoped to get during the next two years, with dollar credit obtained as a result of the 100,000,000 dollar loan, are urgently required to improve the position. The supply of graders has improved since June, 1950.

Maintenance.—The volume of maintenance of the Board's plant has been retarded, as in the previous year, by a shortage of skilled fitters, spare parts and workshop space. Despite these handicaps a slight increase in output has been achieved by working overtime and the development of Divisional workshops. While the spare parts position has improved, it has been found necessary to make some parts which are still in short supply.

The standard of plant maintenance at present is low due principally to the demand for the plant being in excess of the maintenance capacity, which, coupled with the lack of experienced technical staff, prevents the introduction of properly planned preventive maintenance and overhauls.

The extension of workshop facilities in country centres, where suitable personnel can be more easily attracted to the Board's service, should improve the position within the next two years.

PRECISE LEVEL SURVEY OF VICTORIA.

After many years without a good standard datum for levels on the Board's works, it is pleasing to report that the Department of Lands and Survey will shortly begin a precise level survey which will eventually cover the whole State. The Surveyor-General recently convened a conference at which representatives of all interested bodies were present and the technical procedure necessary for a precise survey of this type was discussed. The special equipment imported by the Department for the work, including a Wild Precise Level and invar staff, were on exhibition.

A route connecting Point Lonsdale and Portland has been selected for initial work by the precise levelling party, to enable the personnel to acquire facility with the necessary specialized technique, and it is expected that the work will commence early in 1951. The Board has offered assistance in labour and materials to establish the necessary permanent marks.

AERIAL PHOTOGRAPHY.

Use has recently been made of oblique aerial photographs when studying special projects. This type of photograph in some cases gives a better visual indication of a project than is possible with vertical photographs, and it is hoped to be able to extend the use of this method where applicable. Plate No. 1, showing a section of the Calder Highway re-aligned near Taradale indicates clearly the nature of the country, the old and the new route, and demonstrates how this type of photograph may be of value.

Further projects are also being investigated by standard photogrammetric methods, using the excellent equipment operated by the Lands Department, which is shortly getting a second Wild A5 Plotting Machine for large-scale topographical work of the type required by the Board. This addition should assist greatly in the rapid solution of many of the Board's major location problems.

ROCK DRILLING.

During the year, investigation has been continued with the object of determining the most suitable plant and procedure for the Board's work. The following is a summary of these investigations and the tentative practice based on them.

Percussion Drilling.—(i) Percussion drilling is used in medium and hard rocks. The Board now standardizes on detachable, taper fitted drill bits, either steel or tungsten carbide. This reduces handling costs and damage due to handling, since the steel bits are thrown away when blunt and the tungsten carbide-tipped bits only are handled when sharpening by grinding is necessary. The rods remain on the works.

(ii) Tungsten carbide-tipped bits of the chisel and cross-bit types are used ; chisel bits in medium hard rocks and cross-bits in hard or fissured rocks. For medium and softer rocks, down to a hardness of 2 on Moh's scale, one pass steel-drill bits, costing 1s. 1½d. in store, are used. They cannot be reground.

(iii) The following standards are now followed on the Board's works when the rock is hard enough to warrant the use of tungsten carbide-tipped bits :—

1½ in. diameter bits for 2 ft. 6 in. and 5-foot rods.
1 7/16 in. diameter bits for 7 ft. 6 in. and 10-foot rods.
1⅜ in. diameter bits for rods longer than 10 feet.

In order to save on steels, bits, and changes, 2 ft. 6 in. rod changes with 2 ft. 6 in. starters have been adopted. For difficult holes, 18-inch starters are available.

(iv) The present tendency is to use the heaviest jack-hammer which will not fracture the bit. Whilst this practice may somewhat reduce the life of a tungsten carbide-tipped bit, measured in feet drilled, it improves the rate of penetration to a considerable extent, thereby reducing labour, maintenance, and fuel costs.

Plate 1.—Calder Highway, Section 1. Re-alignment near Taradale, looking towards Castlemaine.

(v) The following table indicates present recommendations :—

Moh's Hardness of Rock.	Weight of Jack-hammer.	Type of Bit.
2–3	32–35	Steel
3–4	40–45	Steel
4–5	45–55	Steel or T.C. chisel
5–6	55–60	T.C. chisel
6–7	45–50	T.C. chisel
6–7	55–60	T.C. cross
Above 7	45–50	T.C. cross

Cross-bits only are used in fissured rock.

(vi) Attention has been given to the question of air supply for best penetration, and 80 p.s.i. at the jack-hammer, with the hammer working, has been accepted as standard. Investigations showed that, unless very costly overhauls are frequently carried out, the output of air compressors falls off considerably after some months of use and that the air requirements of used jack-hammers are considerably in excess of the rated consumption. Compressors may deliver 20 per cent. less air than the rated output, and jack-hammers require 20 per cent. more than when new. It will, therefore, be necessary to review the combinations of compressors and jack-hammers hitherto considered satisfactory.

(vii) The use of heavier hammers has shown the need for special alloy steels for drill rods, as breakages with the material hitherto used have been excessive.

Rotary Drilling.—Rotary drilling is being introduced for sedimentary rocks, gravels, mudstone, dry earth, &c., and promises well for dry materials of a hardness up to 2 on Moh's scale. The auger rods are, however, unable to lift materials that stick to the rod and consequently under-water drilling and the drilling of clays is very difficult, or impossible, with the small rotary air drills used by the Board. Rotary drills used at East Warburton have given excellent service, the drilling rates being up to 3 feet per minute. Consideration is being given now to the use of electric rotary drills driven by 5-h.p. petrol-electric generators, costing less to instal and run than air equipment.

General.—In order to obtain the best drilling results in the future, classes were held for some 75 overseers, instructions being given on all aspects of rock drilling.

The drillability of rocks is being investigated in order to find a method whereby the choice of the best drilling equipment, the life-time of the bits, and the expected penetration can be predicted by simple laboratory test methods, obviating the need for expensive and inconclusive test drillings.

TRAFFIC LINE-MARKING PAINT.

Quantity Used.—During the year, 5,566 gallons of line-marking lacquer were used, at a cost of £4,638. Because of an increased supply of white pigment to the paint trade, no difficulty is now experienced in obtaining white line-marking paint.

Basis of Specification.—The quality of the paint supplied is governed by a performance specification which prescribes test procedures which are employed in the Board's laboratory to estimate the manner in which the material may be expected to behave under actual service conditions. Special attention is paid to its ability to resist the action of weather and traffic abrasion, as these will primarily determine the time which can elapse before repainting of the traffic line becomes necessary.

Testing.—Resistance to weathering is evaluated by means of an accelerated weathering machine which was constructed in the Board's laboratory. The machine employs four infra-red lamps, a mercury-vapour lamp,

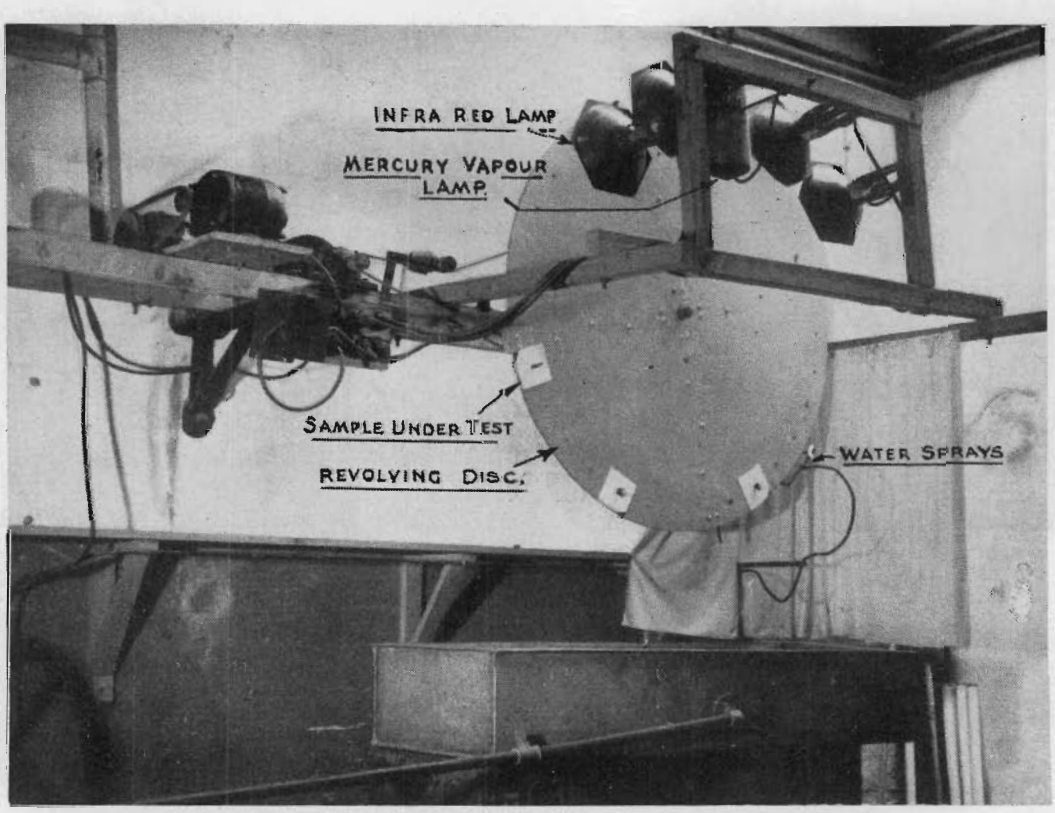


Plate 2.—Accelerated weathering machine for testing traffic line paint.

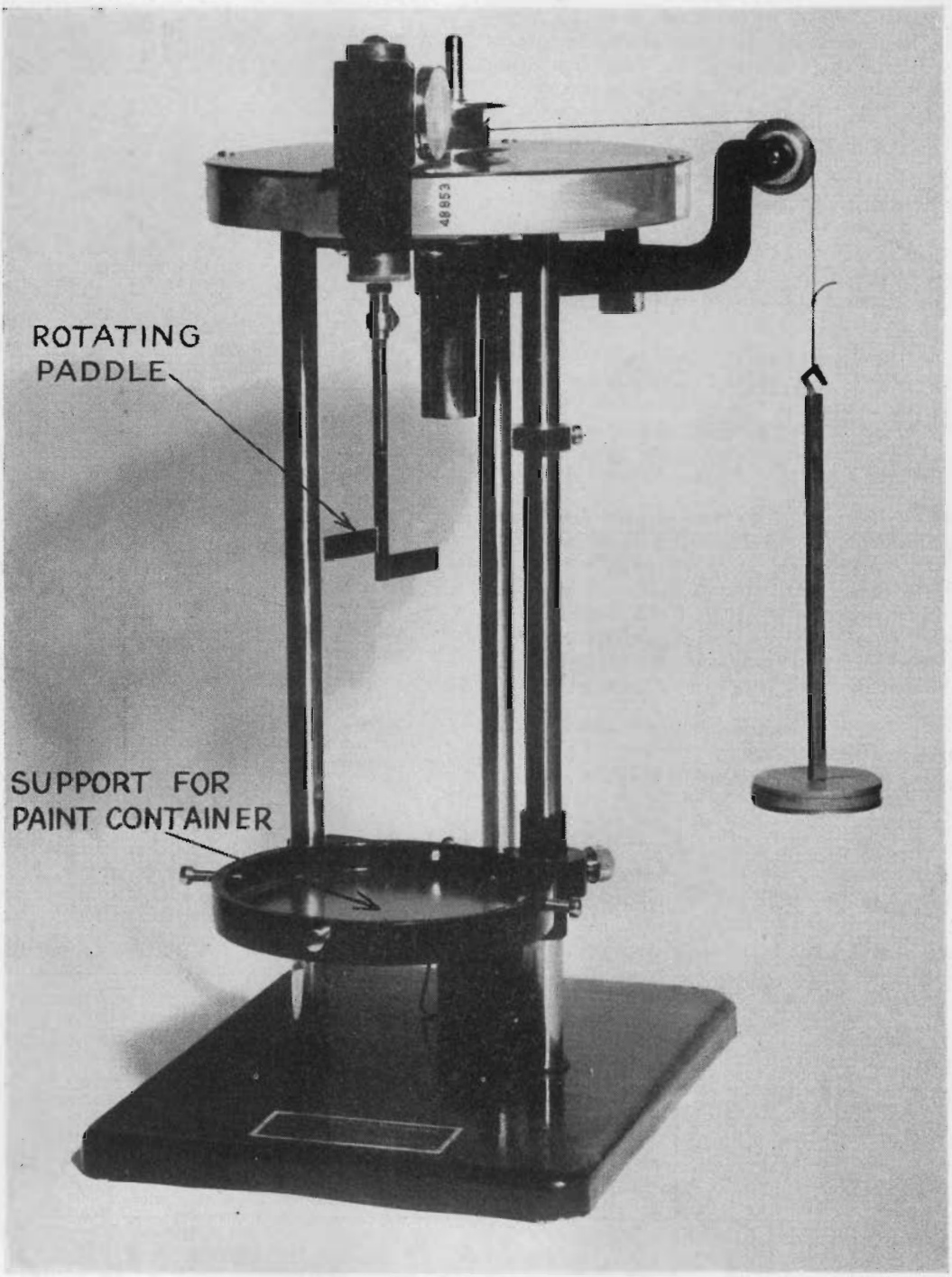


Plate 3.—Stormer-Krebs viscosimeter, for measuring the consistency of paint.

and two water sprays, and is shown in Plate No. 2. Samples, after having undergone the accelerated weathering treatment, are tested for resistance to abrasion on the Taber Abraser, which was described and illustrated in the Board's Annual Report of 1946. The Stormer-Krebs viscosimeter, shown in Plate No. 3, is employed to determine the consistency.

Other important properties of the material examined are :—The possession of a desirably short drying time, the ability of the material to remain in storage in drums without hard settlement occurring, and freedom from bleeding when applied to a bituminous pavement.

BITUMINOUS SURFACE TREATMENT.

Extent of Work.—The total length of work carried out on the Board's declared roads and on undeclared roads with financial assistance from the Board was 938 miles, an increase of 12½ per cent. over the year 1948–49. Of this, 872 miles was done by the Board's own plant, which also sprayed 80 miles for Municipalities and the Commonwealth.

Costs.—Costs continued to rise, the increase over the previous year's cost of priming and sealing being 8·9 per cent., and of re-treatment with 0·15 gallon of binder per square yard of surface (the predominant rate of application) 11·5 per cent. The increase in the cost of priming and sealing since 1938–39 was 172·6 per cent.

Locally Refined Bitumen.—The year saw the first use of locally refined bitumen, delivered in bulk by road tankers to the site of the work. This must be considered as the first step in the change to bulk handling, which will eventually affect the greater part of the Board's work of this type. Consideration is being given to the type of installations which will be necessary to store and handle the material when rail tank cars can be built.

Tabulations.—The following tabulations give in some detail the length of various types of work carried out and unit costs. They show that approximately 8½ per cent. of the "black" roads in existence on the Board's system at the beginning of the year was re-treated. Three features to which attention is invited are that :—

(*a*) Of the re-treatments, 304 miles out of 518 included rates of application of binder of 0·15 gallon per square yard or less, for which a life greater than five or six years cannot be expected.

(*b*) Of the re-treatments, only 28 miles were of the corrective type.

(*c*) Priming and sealing of reconstructed sections covered only 1·2 per cent. of the "black" system at the beginning of the year.

TABLE "C".—TOTAL MILES IN THE DECLARED AND THE BITUMINOUS SURFACE-TREATED SYSTEM AS AT 30TH JUNE, 1950.

Type of Road.	Miles.		Percentage Treated.
	Declared.	Treated.	
State Highways	3,849	2,867	75
Main Roads	9,710	3,501	36
Tourists' Roads	402	100	13·5
Forest Roads	342		
Totals	14,303	6,468	45

TABLE "D".—LENGTH OF WORK CARRIED OUT IN 1948–49 AND 1949–50.

Type of Road and Plant Used.	Miles Done.	
	1948–49.	1949–50.
(*a*) *Work on C.R.B. Declared Roads.*		
(i) Board's plant	734	838
(ii) Municipal or hired plant	50	47
	— 784	— 885
(*b*) *Work on Undeclared Roads to which the Board Contributes.*		
(i) Board's plant	39	34
(ii) Municipal or hired plant	4	19
	— 43	— 53
(*c*) *Work for other Authorities carried out by Board's Plant.*		
(i) Municipalities	55	44
(ii) State instrumentalities	..	7
(iii) Commonwealth of Australia ..	27	29
	— 82	— 80
Totals	909	1,018

The total work carried out on Declared C.R.B. roads increased by about 12½ per cent.

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

Type of Road.		Length in Miles.												Summary of Work.	
		Nature of Work.													
		Initial Treatments.					Re-treatments.								
Road.	Control.	P.M.	P.		P. and S., and Seal on Existing Primer.		Re-seals—Binder in gall./sq. yd.				P.M.S.	R.M.S.		State Highways.	Other Roads.
			E.	R.	E.	R.	0·10.	0·15.	0·20.	0·25.					
State Highways	Direct	..	3·2	..	52·5	35·0	28·4	94·1	64·6	20·5	17·2	4·2		319·7	..
	Municipal ..	..	..	..	21·9	6·3	2·4	10·1	2·4	..	1·8	..		44·9	..
Main, Tourists', and Forest Roads	Direct	..	..	..	15·2	3·7	..	16·9	1·0	1·1	..	..		..	37·9
	Municipal ..	..	5·6	4·6	192·8	26·3	23·1	129·2	93·6	3·3	4·4	..		..	482·9
	Totals ..	..	8·8	4·6	282·4	71·3	53·9	250·3	161·6	24·9	23·4	4·2		364·6	520·8
			13·4		353·7		490·7				27·6			885·4	
			367·1				518·3								
			885·4												

Abbreviations :—
P.M.—Penetration macadam.
P.—Priming only (partly completed initial treatment).
E.—Extensions to the bituminous surfaced system.
R.—Initial treatment on reconstructed lengths of previously sealed pavements.
P.M.S.—Re-treatment by the plantmix seal process.
R.M.S.—Re-treatment by the roadmix seal process.

TABLE "F."—AVERAGE COST OF WORK CARRIED OUT BY C.R.B. PLANT ON C.R.B. DECLARED ROADS DURING 1949–50. COST IN PENCE PER SQUARE YARD.

	Nature of Work.															
	Initial Treatments.						Re-treatments.									
							Re-seals.						P.M.S.		R.M.S.	
	Prime Only, 0·20 gall. per sq. yd.		Seal on Existing Primer, 0·25 gall. per sq. yd.		Prime and Seal: Primer 0·20, Binder 0·25, gall./sq. yd.		Nominal Rate of Application of Binder in gall. per sq. yd.									
							0·10.		0·15.		0·20.					
Square yards costed ..	68,850.		146,419.		3,034,215.		474,325.		2,180,276.		1,350,873.		200,053.		42,778.	
	d.	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%
Materials	6·07	65	11·99	67	15·24	66	5·37	57	7·80	67	9·68	66	17·63	48	28·67	81
Labour	1·54	17	3·14	18	3·90	17	2·19	23	1·86	16	2·54	17	9·10	25	3·44	10
Stores	0·41	4	0·40	2	0·66	3	0·39	4	0·33	3	0·42	3	1·94	5	0·73	2
Plant Hire ..	1·27	14	2·40	13	3·29	14	1·56	16	1·62	14	2·01	14	7·80	22	2·56	7
Totals ..	9·29	100	17·93	100	23·09	100	9·52	100	11 61	100	14·64	100	36·45	100	35·41	100

Table "F" sets out an analysis of the cost of all work carried out by Board plant on declared roads. The costs are given in pence per square yard. In the case of re-treatments by the plantmix (P.M.S.) and the roadmix (R.M.S.) processes, the average rate of application was one cubic yard of pre-mixed bituminous macadam measured loose, to 45 and 50 square yards of pavement respectively.

The roadmix seal costs are of little value, as they are the average costs from a number of small isolated jobs.

The trend in the cost of work is shown in Table "G" and in the cost of aggregate in Table "H".

TABLE "G".—COST PER SQUARE YARD OF INITIAL TREATMENT AND MEDIUM RE-SEALS IN 1947–48, 1948–49, AND 1949–50.

Cost in Pence per Square Yard.

Item.	Initial Treatment, Prime and Seal.			Re-treatment, Binder 0·15 gall./sq. yd.		
	Year.			Year.		
	1947–48.	1948–49.	1949–50.	1947–48.	1948–49.	1949–50.
Materials ..	13·00	14·63	15·24	6·67	7·30	7·80
Labour ..	3·02	3·51	3·90	1·49	1·62	1·86
Stores ..	0·47	0·52	0·66	0·26	0·29	0·33
Plant Hire ..	2·21	2·54	3·29	1·15	1·20	1·62
Total ..	18·70	21·20	23·09	9·57	10·41	11·61

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

Material.	Price per Cubic Yard.			
	1945–46.	1947–48.	1948–49.	1949–50.
	s. d.	*s. d.*	*s. d.*	*s. d.*
Screenings	24 3	26 0	30 0	30 6
Gravel	21 3	27 7	32 11	33 10
Sand	12 5	14 5	12 8	10 4
Scoria	9 3	10 8	12 5	10 5
All Aggregate ..	22 2	24 10	29 1	29 4

BRIDGES.

Standard Design Specification for Australia.—During the year the first conference of Bridge Engineers from the various States was held in Melbourne with the object of recommending to the State Road Authorities a specification covering the design and construction of bridges which would standardize procedure in all the States. A section covering the design procedure was formulated and is now before the State Road Authorities for confirmation. Later conferences will deal with different sections of the problem.

Revision of Standards.—The adoption of a standard loading for bridges viz: A.A.S.H.O. H20 S16 (1944), coupled with the additional bridge widths now required, has resulted in many standards not being satisfactory. Due to shortage of staff and pressure of other work it has unfortunately not been possible to progress as far as desired with the necessary revision.

Pre-cast Concrete Units.—Reference has been made in previous reports to the designs adopted for pre-cast slabs for culverts up to a clear span of 10 feet, and to the designs for pre-cast tee beams for spans up to 22 feet. Many of the slabs have been in successful operation while construction of the tee beam spans up to 30 feet has been undertaken during the year. Proposals for increasing the tee beam spans up to approximately 50 feet are being investigated.

Pre-cast concrete construction has been adopted for a workshop extension at the Board's depot in Bendigo, where a clear span of 35 feet was required, with a clearance to the eaves of 18 feet. Plate No. 4 shows the type of frame adopted and its erection from the floor where it was cast to its position in the structure. Proposals are in hand for the adoption of this principle for a saw-tooth truss of 30 feet clear span with a similar vertical clearance.

Construction.—During the year 25 direct labour bridge gangs were employed on construction of new bridges and on heavy maintenance. Seven gangs were engaged on works required by other authorities for the development of the State. Owing to the rapidly increasing density and weight of traffic the number of bridges in the State which require urgent replacement is very high. Because of this and the shortage of contractors every effort is being made to increase the number of gangs.

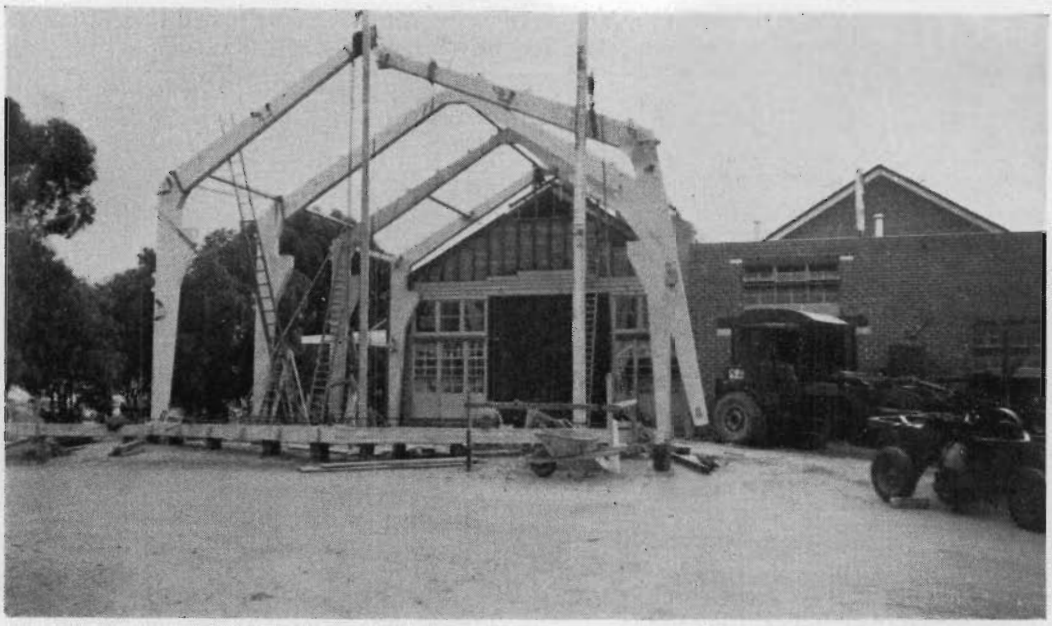


Plate 4.—Precast concrete frames being erected for the Bendigo workshop extension.

Shortages of materials have been a serious problem, and during the year large quantities of cement, steel, and other building materials were imported. A pool of essential construction equipment is being developed on a divisional and reserve basis so that both Municipalities and Contractors may be assisted where necessary.

Due to the decline in the quality and availability of timber, increasing emphasis is placed on the use of permanent structures, particularly where the road and stream conditions are stable. Because of this, particular attention has been paid to the control of concrete in the field. It is obvious that with careful selection of aggregates and correct methods of batching, mixing, placing, and compacting, a regular strength of at least 3,000 lb./sq. in. in compression at 28 days is readily attained. Too much stress cannot be placed on the need for the early selection of aggregates, so that all necessary comparative tests can be made in good time.

Heavy Loadings.—Reference has been made in previous reports to the increase in heavy loadings and in 1948 certain details were given of a special 18-foot wide transporter which was in use under special permits. This vehicle has been in almost constant use during the year and in a recent case tests on both timber and concrete structures were carried out during the passage of the transporter section of the vehicle carrying a nett load of 58 tons bringing the total gross load to 80 tons, with a bogie loading of 40 tons. Time and staff have not permitted a full analysis of the test results to be made but the following facts have emerged.

(*a*) *Timber Piles.*

Vertical movements of 0·025" were measured in some cases, there being no permanent settlement. "Bowing" of the piles due to load being on one span and none on adjacent spans was noticeable.

(*b*) *Concrete Structures.*

(i) Rigid Frame Slabs and Box Culvert types behaved very well, the lateral distribution of the load being very noticeable and typical deflections were as follows:—

Rigid Frame Slab—15-foot span.
Deflection at C.L.—·031 inch.
Deflection 10 foot off C.L.—·024 inch.
Box Culvert Type—8-foot span.
Deflection on C.L.—·014 inch.

(ii) Lateral distribution in the case of Tee Beam bridges was not as good as anticipated. Typical deflections on a four-beam bridge of Rigid Frame type and 32-foot span were:—

Outer beams—·052 inch.
Inner beams—·076 inch.

(iii) Continuity effects in some of the older concrete continuous bridges were not very noticeable due to the tensile steel over the piers not being carried far enough into the spans.

(iv) Preliminary investigations show that it is reasonable to assume that the value of "n" for concrete had decreased to a value varying between 5 and 8.

(*c*) Impact.

Before crossing any structure the vehicle was stopped and then moved across the structure at the slowest possible speed. The deflection instruments indicated that the impact was practically negligible.

TECHNICAL BULLETINS, ETC.

No Research Memorandum was compiled during the year owing to pressure of routine work. The following Technical Bulletins and Engineering Notes were issued:—

Technical Bulletins.

Bulletin No.	*Title.*	*Date of Issue.*
No. 5	Design of Concrete Mixes—Graphical Method	14.9.49

Engineering Notes.

Note No.	*Title.*	*Date of Issue.*
No. 19	Plant—Tungsten Carbide-Tipped Rock-Drill Bits	30.8.49
No. 20	Hints on Sampling for Pavement Design	21.9.49
No. 21	Earthworks—Consolidation and Use of Good Material in Upper Layers of Banks	25.10.49
No. 22	Road Planning—Width of Road Reserves	25.10.49
No. 23	Vibrating Roller 28–J–1	18.1.50
No. 24	Notes on Rock Drilling	18.1.50
No. 25	Plant—Motor Vehicles—Engine Lubrication	25.2.50
No. 26	Removal of Traffic Lines ..	11·5.50
No. 27	Tractor Operation	20.6.50
No. 28	Geometric Design — Pavement Widths	21.6.50

INTERNAL LECTURES.

The demand for copies of the " internal lectures," to which reference was made in the report for 1944–45, became so heavy that the Board decided that they should be printed. They became available, with the title " Road Construction and Maintenance ", towards the end of 1949, and have been issued to the Board's engineers and to all practising Municipal Engineers. Additional copies can be obtained from the Secretary at a cost of 10s. each.

Because of the nature of the original lecture form, the publication cannot be looked upon as a complete text book on road engineering but, if read with the articles by Mr. G. J. Dempster on " Some Aspects of the Geometric Design of Roads," which originally appeared in the *Municipal Journal*, and have been reprinted as a whole, a reasonably comprehensive description of the Board's practice may be obtained.

STAFF.

Deputy Chief Engineer.—Mr. J. Mathieson, M.C.E., M.I.E. (Aust.), left Melbourne for the U.S.A. and the United Kingdom on 3rd May, 1950, to attend a course in Highway Engineering for senior engineers with the Bureau of Public Roads, U.S.A., and to study problems in connection with traffic and the planning of metropolitan roads. He is expected to return to Melbourne at the enp of December.

Mechanical Engineer.—Mr. G. Langham, B.M.E., A.M.I.E. (Aust.), left Australia for the U.S.A., the United Kingdom, and Europe on 13th April, 1950, returning to Victoria on 4th November. The purpose of his visit to these countries was to investigate plant maintenance organization and methods, workshop layout and practice, and the availability of plant suitable for the Board's work. The information he has obtained will be of great value in the development of the Board's plant maintenance facilities, for which he will be responsible.

It is desired to again invite the Board's attention to the good work of the engineering staff under the difficult conditions of to-day.

Yours obediently,

C. G. ROBERTS,

Chief Engineer.

APPENDIX.

COUNTRY ROADS BOARD.

STATEMENT OF RECEIPTS AND PAYMENTS FOR YEAR ENDED 30TH JUNE, 1950.

(Adjusted to nearest pound.)

		Country Roads Board Fund.	*Federal Aid Roads and Works Act* 1937.	*Commonwealth Aid Roads and Works Act* 1947		Loan Funds.	Total.
				Sec. 6 (1).	Sec. 6 (4).		
RECEIPTS.	£	£	£	£	£	£	£
Balances at 1st July, 1949		410,642	2,543	360,404	181,070	30,465	985,124
Motor Car Registration Fees	2,740,293						
Drivers' Licence Fees	131,678						
Fines	46,026						
	2,917,997						
Less Cost of Collection	230,507						
		2,687,490	..	..	..	..	2,687,490
Municipalities' Repayments*							
Permanent Works—Outer Metropolitan Roads	1,899						
Maintenance—Main Roads	187,889						
		189,788	..	..	..	..	189,788
Contribution from State Rivers and Water Supply Commission for Maintenance of Specified Bridges in perpetuity		10,000	..	..	..	..	10,000
Moneys provided by *Commonwealth Aid Roads and Works Act* 1947		..	..	848,528	522,000	..	1,370,528
Receipts from State Loan Funds		..	..	..	..	391,867	391,867
Other Receipts—Fees and Fines		929	..	..	..	..	929
Transfer of Sinking Fund Payments from *Federal Aid Roads and Works Act* 1937 to Country Roads Board Fund		..	10,029	..	..	..	10,029
		3,298,849	12,572	1,208,932	703,070	422,332	5,645,755
PAYMENTS.							
Construction and Maintenance of Roads and Bridges—							
Main Roads		880,734	..	337,095	..	41,867	1,259,696
State Highways		778,247	10,029	250,000	..	290,704	1,328,980
Tourists' Roads		138,637	..	..	..	11,155	149,792
Forest Roads		42,308	..	..	..	227	42,535
Unclassified Roads		..	..	153,157	147,071	..	300,228
Isolated Settlers' Roads		..	..	..	13,175	..	13,175
Federal Maintenance		..	..	..	66,759	..	66,759
Commonwealth Roads		..	735	..	..	..	735
Murray River Bridges and Punts		6,021	..	..	..	..	6,021
Land Purchased		..	..	17,114	..	..	17,114
Traffic Line Marking		8,918	..	..	..	..	8,918
Plant Purchased		211,661	..	..	..	..	211,661
Interest and Sinking Fund Payments		520,184	..	..	..	..	520,184
Interest and Sinking Fund Payments—Great Ocean Road		1,000	..	..	..	..	1,000
Sinking Fund Payment *Federal Aid Roads and Works Act* 1937		10,029	..	..	..	..	10,029
Payment to Tourists' Resorts Fund		27,781	..	..	..	..	27,781
General Expenditure		117,761	..	..	..	..	117,761
Administration Expenditure		251,117	..	..	..	..	251,117
Balances at 30th June, 1950		304,451	1,808	451,566	476,065	78,379	1,312,269
		3,298,849	12,572	1,208,932	703,070	422,332	5,645,755

NOTES.—(A) Amounts shown under *Commonwealth Aid Roads and Works Act* 1947 Sec. 6 (1) do 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.

(B) The above figures differ from those presented by the Treasnrer as adjustments have been made in the books of the Board in respect of charges to alternative funds effected after 30th June, 1950.

* 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, 1950, of decreasing the amount available for expenditure by the Board by the sum of £201,328.

AUDITOR-GENERAL'S CERTIFICATE.

The Accounts of the Country Roads Board have been examined for the year ended 30th June, 1950, and subject to the explanation contained in footnote (B) the foregoing statement of Receipts and Payments is, in my opinion, correct.

E. A. PEVERILL,
Auditor-General,
31st January, 1951.

C. G. GRIFFITHS,
Accountant,
20th October, 1950.

APPENDIX—*continued.*

COUNTRY ROADS BOARD.

LOAN LIABILITY AT 30TH JUNE, 1950.

—	£ s. d.	Main Roads. £ s. d.	Developmental Roads. £ s. d.	Total. £ s. d.
Permanent Works—				
Main Roads	5,151,918 13 10			
State Highways	615,244 4 1			
Tourists' Roads	55,292 10 3			
Forest Roads	1,083 18 11			
		5,823,539 7 1		
Developmental Roads		..	6,425,757 10 11	12,249,296 18 0
Discount and Expenses		166,434 1 9	238,248 1 5	404,682 3 2
Unexpended Proceeds		78,379 6 9	..	78,379 6 9
Total Amount Borrowed		6,068,352 15 7	6,664,005 12 4	12,732,358 7 11
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		753,107 9 0	..	753,107 9 0
National Debt Sinking Fund		659,498 10 4	1,012,518 7 0	1,672,016 17 4
		1,783,513 8 0	1,713,987 14 6	3,497,501 2 6
		4,284,839 7 7	4,950,017 17 10	9,234,857 5 5
Less Outstanding at Treasury		286 10 0	..	286 10 0
Loan Liability at 30th June, 1950		4,284,552 17 7	4,950,017 17 10	9,234,570 15 5

WORKS EXECUTED ON BEHALF OF COMMONWEALTH AND STATE AUTHORITIES FOR YEAR ENDED 30TH JUNE, 1950.

Department or Authority.	Description of Works.	Expenditure. £ s. d.
State Coal Mine	Maintenance of roads, Wonthaggi	166 19 8
State Electricity Commission	Yallourn Coal Mine Developmental Scheme	118,985 19 5
	Roads in Kiewa Valley and Morwell	
Forests Commission	Maffra Shire, Licola Roadworks, Bridgeworks ..	26,398 14 4
	Winchelsea Shire, Benwerrin–Mt. Sabine Road ..	
Melbourne and Metropolitan Board of Works	Upper Yarra Shire, Bridgeworks, Roadworks	59,905 14 11
Public Works Department	Roadworks, Oliver's Hill, Frankston	961 6 10
	Truginina Explosives Reserve Road	
Soldier Settlement Commission	Roads in Soldier Settlement Areas throughout Victoria ..	37,111 16 10
State Rivers and Water Supply Commission	Deviations and bridgeworks, Rocklands and Cairn Curran Reservoirs	52,786 15 0
Housing Commission	Roads in Morwell and Moe Districts	50,282 17 8
Department of Lands and Survey ..	Buchan Caves Roads	2,592 14 0
Grain Elevators Board	Approaches to Wheat Terminal, Geelong	1 2 0
		349,194 0 8
Department of Works and Housing ..	East Sale and Mangalore Aerodromes	94,181 10 4
		443,375 11 0

By Authority: J. J. GOURLEY, Government Printer, Melbourne.