1951-52

VICTORIA

COUNTRY ROADS BOARD

THIRTY-EIGHTH ANNUAL REPORT

FOR YEAR ENDED 30TH JUNE, 1951.

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

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COUNTRY ROADS BOARD

THIRTY-EIGHTH ANNUAL REPORT
1951

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COUNTRY ROADS BOARD

THIRTY-EIGHTH ANNUAL REPORT

Exhibition Building,
Carlton, N.3,
18th December, 1951.

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* 1928 (No. 3662), the Board has the honour to submit to you, for presentation to Parliament, a report of its proceedings for the year ended 30th June, 1951.

FINANCE.

There have been some increases in revenue during the year, but far short of what is necessary to meet rising costs and to deal with the heavy arrears of essential road works. An ever-widening gap between needs and the money to meet them is causing the Board very grave concern.

The receipts from motor registration fees and fines, and drivers' licence fees paid to the Country Roads Board Fund during the year amounted to £3,497,996 compared with £2,934,684 during the preceding financial year, an increase of £563,312. Refunds and the cost of collection totalled £338,885, leaving a net revenue of £3,159,111.

Under the terms of section 6 (1) of the *Commonwealth Aid Roads and Works Act* 1947, an amount of £92,505 was received for the construction, reconstruction, maintenance, and repair of roads, with the exception of one-sixth of that amount (£15,418) which was allotted for expenditure on other works connected with transport. This amount represented the receipts in respect of the month of June, 1950, which were not actually received by the State until July, 1950.

The Commonwealth Aid Roads and Works Act 1947 has now been replaced by the *Commonwealth Aid Roads Act* 1950, which came into operation on the 1st July, 1950, and provides for payment to the States of the proceeds of 6d. per gallon of Customs duty on motor spirit imported into Australia, and a total of 3½d. per gallon excise duty on motor spirit refined in Australia, the amount being divided amongst the States on the basis in use since 1926, i.e., in proportions 3 : 5 as to population and 2 : 5 area. Collections in respect of spirit used in civil aircraft or for the purposes of civil aviation are excluded. This Act will operate for a period of five years. Of the amount provided under the new Act, 65 per cent. less the sum of £600,000 per annum over the whole of the Commonwealth is to be expended on the construction, reconstruction, maintenance, and repair of roads, on the purchase of roadmaking plant, or on other works in connection with transport and 35 per cent. on the construction, reconstruction, maintenance, and repair of roads in rural areas.

Of the £600,000 above referred to, £500,000 is to be expended by the Commonwealth on the construction, reconstruction, maintenance, and repair of strategic roads and roads of access to Commonwealth property, and £100,000 on the promotion of road safety practices throughout Australia.

A total sum of £1,911,575 was received by the Board during the financial year under the provisions of the new Act, so that the total amount received by the Board from motor registration fees and fines, drivers' licence fees, municipal repayments, &c., and from Commonwealth sources was £5,338,403 as compared with £4,258,736 in the previous financial year.

From the loan authorization of £500,000 for the construction and reconstruction of metropolitan roads and bridges, passed by Parliament under Acts Nos. 4188, 4414, and 4498, £34,956 was expended during the year, leaving a balance at the 30th June, 1951, of £106,994. An amount of £756,000 was also expended from the loan authorization of £5,000,000 under Act No. 5363 for the carrying out of permanent improvements and permanent works on State highways, tourists' roads, and forest roads.

The total amount allocated for reconditioning, maintenance work, &c., on main roads, State highways, tourists' roads, forest roads, and Murray River bridges during the financial year 1950–51 was the largest in the Board's history, namely, £7,587,329.

At the 30th June, 1951, the amount standing to the credit of the Country Roads Board Fund was £72,937, which is fully covered by commitments in respect of expenditure incurred by municipalities but not claimed by that date, and liabilities entered into on account of works commenced but not completed.

Commonwealth Aid Roads Act 1950.

The following amounts were expended on roads and bridges during the year from balance available under the *Commonwealth Aid Roads and Works Act* 1947, and provision under the *Commonwealth Aid Roads Act* 1950 :—

	£
Maintenance of classified roads to assist municipalities ..	1,878,088
Construction of roads of a developmental character	584,082
Restoration and rebuilding of bridges on unclassified roads ..	14,650
Assistance on construction of Soldier Settlement roads ..	22,256
Construction, reconstruction, and maintenance of school bus routes	25,476
Roads to properties of isolated settlers	14,063
Repair of flood damage	110,471
Provision towards maintenance of roads previously constructed with moneys provided by the State and the Commonwealth ..	166,693
Total	2,815,779

Whereas at the beginning of the financial year credit balances in Commonwealth aid funds totalled £929,439 by the 30th June, 1951, the Board's credit balances shown under *Commonwealth Aid Roads Act* 1950, were reduced to nil under Section 6 (1), and £100,514 under Section 7 (1).

This amount was fully committed by expenditure incurred but not reimbursed or works for which provision had been made. The marked reduction in credit balances is due partly to a generally increased capacity for undertaking works by direct labour and contract, and partly to steeply rising costs.

GENERAL.

The total allocation by the Board for the financial year 1950–51 was the largest in the Board's history, and the total road expenditure of £5,362,023 also surpassed all previous figures.

The balance of £1,312,269 in hand at the 1st July, 1950, comprising £304,451 in the Country Roads Board Fund, £929,439 from Federal funds, and £78,379 from loan moneys, was fully expended, and the financial year ended with a credit balance of only £177,929, representing £72,937 in the Country Roads Board Fund, £101,613 from Federal funds, and £3,379 from loan moneys.

To finance the programme undertaken revenue funds available and the balances were not sufficient, and it was necessary to draw upon loan funds to the extent of £756,000 for vitally necessary reconstruction works on State highways.

MAIN ROADS.

Allocation of Funds.

An amount of £3,888,947 was allocated during the year for the maintenance, improvement, and realignment of 9,800 miles of declared roads, this sum covering such items as patrol and general maintenance, fire protection, bridge maintenance, resheeting, realignment, resealing, initial sealing, bridge construction, and improvements generally. The amount actually expended during the year was £2,024,119, or 52 per cent. of the amount allocated, and commitments amounting to £797,000 were outstanding at the 30th June, 1951. Of the amount allocated, £2,376,720 was provided from the Country Roads Board Fund and £1,512,227 from moneys available under the Commonwealth Aid Roads Act.

One hundred and eighty-six municipalities participated in the allocation, in which provision was made for 29 new bridges and for the reconstruction of 35 existing bridges.

As indicated in the previous report, the maintenance of a number of main roads is carried out under the direct supervision of the Board. The portion of the Board's allocation of funds which applied to these particular works was £298,067.

In addition to general maintenance, a number of extensive improvement works was carried out under the Board's direct supervision, the principal works including the following :—

Nowa Nowa Road—Shire of Tambo.

Resheeting 4·75 miles near Nowa Nowa.

Colac-Ballarat Road—Shire of Buninyong.

Reconstruction of 3·75 miles, including regrading, realignment, and sealing has been completed, and reconstruction of a further section of 3·47 miles is in progress.

Mansfield Road—Shire of Mansfield.

Realignment and reconstruction at Hearne's Lane corner.

Bonegilla Road—Shire of Wodonga.

Realignment, reconstruction, and resheeting, priming and sealing of a length of 0·83 miles.

Upper Goulburn Road—Shire of Alexandra.

Reconstruction, widening, and sealing of 6 miles between Thornton and Eildon Weir. (Plates Nos. 34 and 58.)

Apportionment of Costs.

Under the provisions of the Country Roads Act, municipal councils are called upon to contribute not more than one-third of the amount expended during the preceding financial year on main roads. It is also provided that where on any main road the cost of maintenance is deemed excessive, and such cost is due to motor traffic not of local origin or to timber traffic, the municipal contribution may be reduced below one-third.

In determining the council's contribution, however, the Board is also required by the Act to take into account the revenue, valuation, and rating of the municipality concerned.

During the last financial year, the rates of contribution by municipalities were very carefully revised and in many cases were further reduced, with corresponding benefits to the municipal councils concerned. The general overhead benefit is reflected in the following figures :—

	£	s.	d.
Expenditure from Country Roads Board Fund during 1949–50	880,734	9	9
Expenditure from Commonwealth Aid Funds 1949–50 ..	337,094	15	2
Total Expenditure	1,217,829	4	11
Amount apportioned to Councils based only on C.R.B. Fund Expenditure	187,109	10	9

(The amounts provided from Commonwealth sources are free of contribution by the councils.)

Percentage of apportionment to Country Roads Board Fund expenditure 21·24 per cent.

Percentage of apportionment to total expenditure 15·36 per cent.

The corresponding percentages in the previous financial year were 24·75 per cent. and 17·29 per cent., respectively, indicating that the average contribution by the councils of the total expenditure on main roads has been reduced by 1·92 per cent.

Had the expenditure from the Country Roads Board Fund been apportioned on a one-third basis throughout, the total contributions would have been £293,578 3s. 3d. instead of £187,109 10s. 9d.

Eight hundred and seventy-seven roads participated in the reduction of contribution.

STATE HIGHWAYS.

A very extensive programme of work was carried out during the year on State highways, the bulk of it being under the direct supervision of the Board. The total expenditure was £2,077,175. Apart from general maintenance, which is undertaken by permanent patrols, important improvement works were put in hand, including the following :—

Bairnsdale Division.

Princes Highway East.—Reconstruction of damaged piers in the Avon River bridge at Stratford and strengthening of detour roads, including the provision of a low-level bridge at Weir's crossing.

Construction of a double 8-foot x 9-foot reinforced concrete culvert at Mount Raymond. Initial treatment of 3·03 miles near the Sydenham Inlet turn-off, and 1·46 miles on the McKenzie River deviation. Resheeting of 4 miles of weak pavement near Cann River, and 31·59 miles between Governors Bend and the New South Wales border. Reconstruction of Reedy Creek floodway.

Omeo Highway.—Reconstruction and sealing of 1·84 miles near Bruthen. (Plate No. 1.) Resheeting of 17·1 miles near Omeo. Widening of curves near Tambo crossing.

South Gippsland Highway.—Reconstruction and sealing of 3·75 miles near Monkey Creek.

Bonang Highway.—Resheeting of 8·25 miles near Orbost.

Ballarat Division.

Western Highway.—Widening narrow cutting and embankment west of Werribee River at Ballan.

Midland Highway.—Widening, resheeting, and sealing narrow section of 1·99 miles north of Elaine (in progress). Renewal of superstructure of bridge over Canadian Creek at Ballarat by casting a reinforced concrete slab on the existing masonry abutments.

Pyrenees Highway.—Construction and sealing of 1·43 miles on the deviation west of Newstead necessitated by the construction of the Cairn Curran Reservoir. Widening, resheeting, and sealing 0·92 miles west of Joyce's Creek. Realignment, regrading, resheeting, and sealing 1·46 miles east of Carisbrook.

Realignment at the Wimmera River near Elmhurst (0·8 miles). Construction of a new bridge is approaching completion.

Benalla Division.

Hume Highway.—Work was commenced on the reconstruction, realignment, and widening of a length of 3·78 miles near Avenel. The major portion of the earthworks was completed, but gravelling and sealing have yet to be done.

Over a length of 1 mile north of Violet Town, where trees had reduced the effective formation width to about 24 feet, conditions were improved by the removal of the trees and the widening of the formation to 30 feet.

Work was commenced on the reconstruction through Wodonga township, which also embraces a section of the Murray Valley Highway. This project provides for a sealed pavement width of 60 feet for a distance 3,050 feet between Lawrence and Osborne Streets, and a sealed pavement width of 40 feet over a distance of 1,500 feet from Osborne Street to Wodonga Street (at the approach to the bridge over Wodonga Creek). The Council is contributing to the cost of the work outside the central 40 feet.

Murray Valley Highway.—A length of 2·2 miles east of Cobram was strengthened in preparation for sealing with bitumen, the work involved being the widening of the pavement to 20 feet and an increase in the depth of the pavement to 7 inches (consolidated).

Goulburn Valley Highway.—A length of 4 miles between Numurkah and Katunga was strengthened and sealed with bitumen.

Ovens Highway.—A length of 3·28 miles between Brookfield and Bowman's Forest was regraded, widened, and resheeted in preparation for a bitumen seal. The existing pavement was strengthened to provide for a width of 20 feet by a consolidated depth of 7 inches.

In addition, the reconstruction and sealing of 1 mile of the highway near Ovens was carried out under the supervision of the Bright Shire Council.

Bendigo Division.

Calder Highway.—Realignment, regrading, widening, and strengthening with limestone of two sections totalling 9·2 miles between Mittyack and Nunga, and sealing 4 miles of this work.

Forming and surfacing with limestone of 6 miles on the new deviation past the Hattah Railway Station. Construction is proceeding on the remaining 7·6 miles of the deviation, which when completed, will reduce the total mileage to Mildura by about 6 miles. (Plate No. 2.)

Widening, reconstruction, and sealing of an old narrow rough section 3·87 miles in length between Irymple and Mildura. Widening, reconstruction, and sealing of another section 1·86 miles in length between Mildura and Merbein. The total length of sealing carried out during the year on this part of the highway, including the two sections mentioned above and the sections reconstructed in the previous year, was 9·79 miles. (Plates Nos. 3 and 4.)

An old timber structure near Kurting was replaced by a new concrete two-span bridge. The timber approach to the concrete bridge over the Bullock Creek at Maron was replaced by reinforced concrete slabs.

Northern Highway.—The existing reinforced concrete bridge over Simmering Creek near Strathallan was widened from 14 feet to 22 feet. In the town of Echuca, a small timber bridge was replaced by a large pipe culvert.

Murray Valley Highway.—Very weak sections totalling 8·9 miles between Kerang and Lake Boga were widened and strengthened and 5·78 miles of this length were sealed. A further 2 miles was widened and lightly sheeted in preparation for completion at a later date, and 3 miles of bituminous pavement which had broken up under heavy traffic was lightly resheeted and subsequently maintained as a gravel pavement.

A length of 3·75 miles of narrow bituminous pavement between Swan Hill and Nyah was widened with limestone, and north of Wood Wood a length of 4·27 miles of limestone pavement was widened and strengthened in preparation for extending the sealing. Sections of limestone pavement totalling 18·5 miles between Piangil and Lake Powell were sheeted with limestone.

Plate No. 1.—Reconstruction and Sealing of the Omeo Highway near Bruthen.

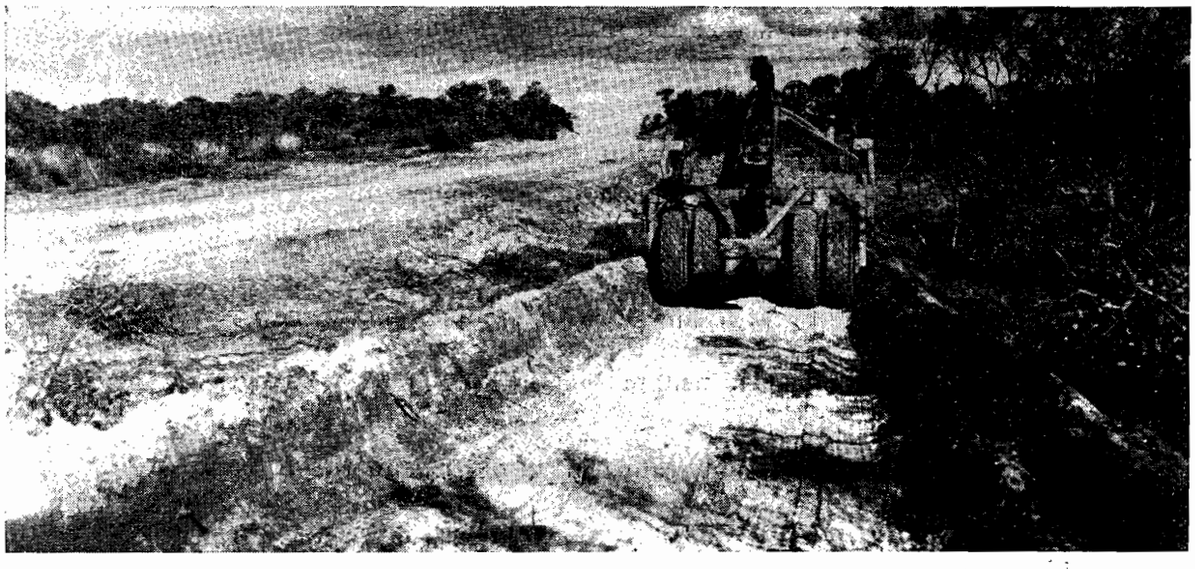


Plate No. 2.—A Heavy Tractor and Scoop working on the Hattah Deviation on the Calder Highway, south of Mildura. This Deviation will replace an old, rough tortuous track, and will shorten the Calder Highway by six miles.

Plate No. 3.—A rough, old section of the Calder Highway between Mildura and Wentworth, now resheeted.

HOLDING OLD ASSETS

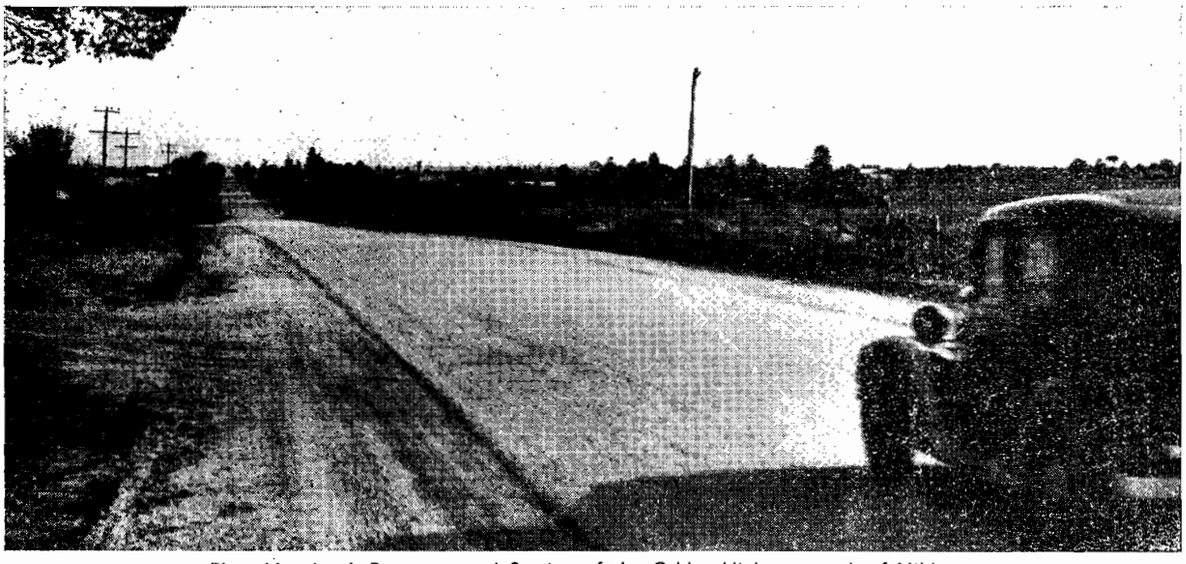


Plate No. 4.—A Reconstructed Section of the Calder Highway south of Mildura.

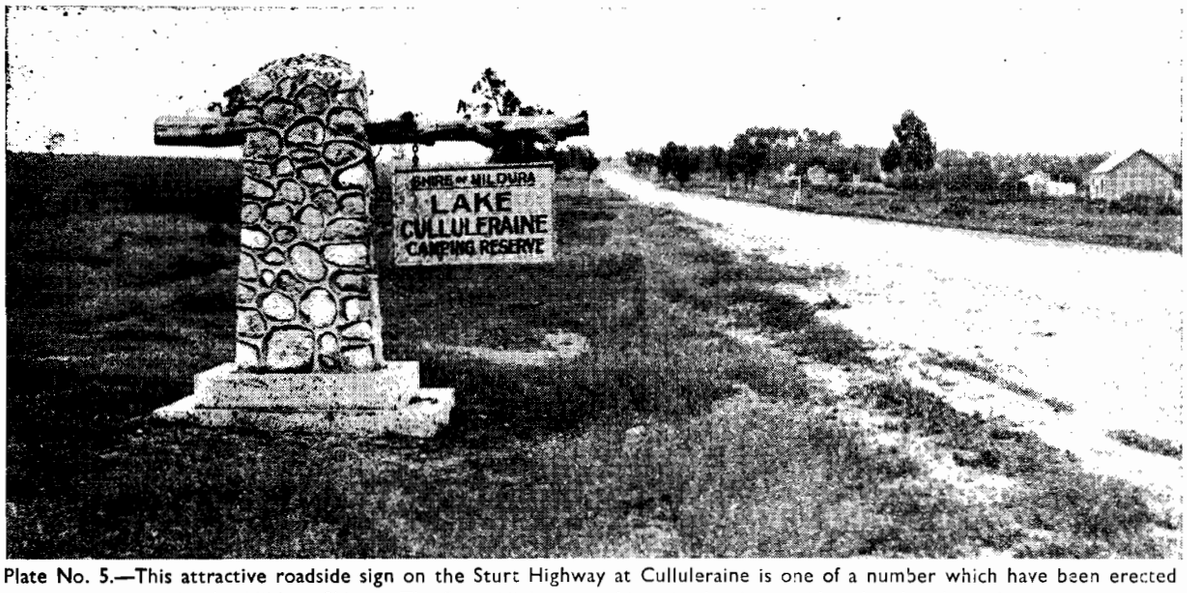


Plate No. 5.—This attractive roadside sign on the Sturt Highway at Culluleraine is one of a number which have been erected in the Mildura Shire. The Sturt Highway at this point has been widened and resheeted.

ENTIRE RECONSTRUCTION

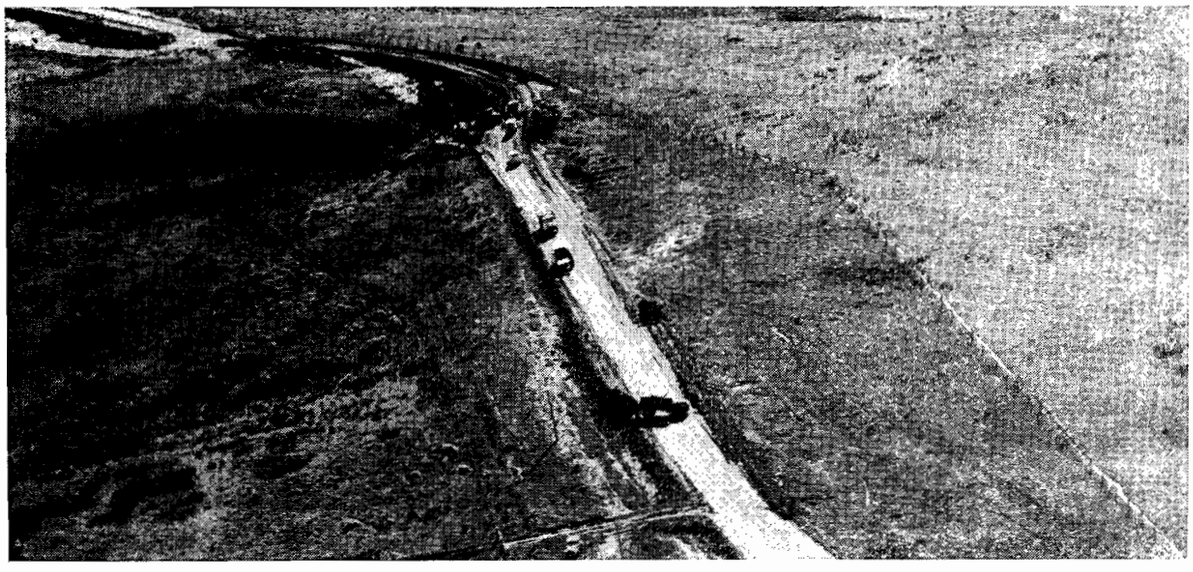


Plate No. 6.—Work in progress on the reconstruction of the Bass Highway near Anderson.

WIDENING VERY NARROW SECTIONS

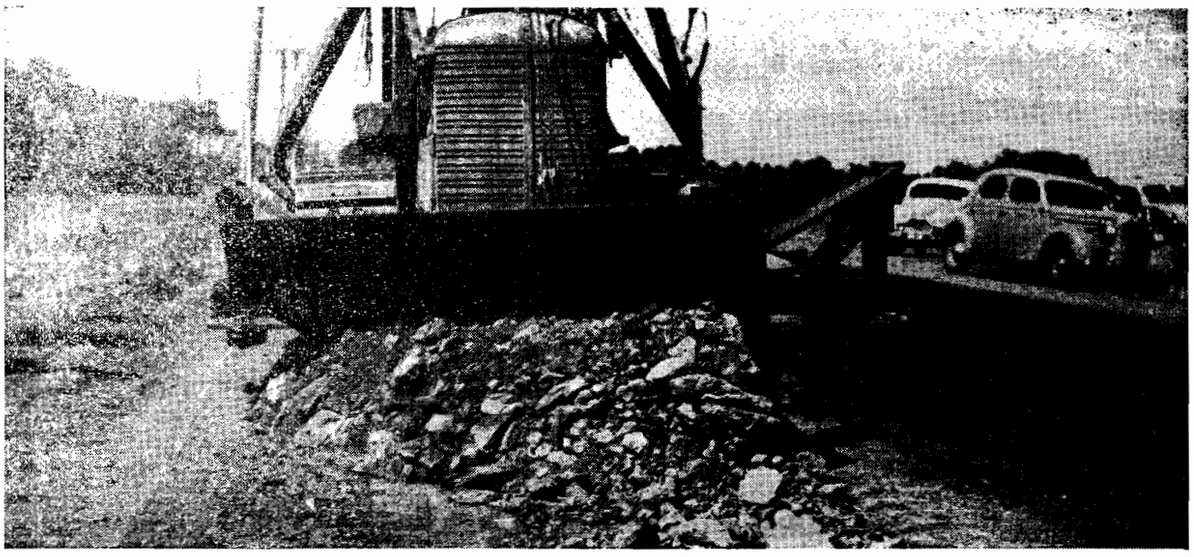


Plate No. 7.—A Trench Digging Attachment on a Bulldozer in use on the widening of the Hume Highway near Campbellfield. In one operation this apparatus excavates a trench of the correct depth and width.

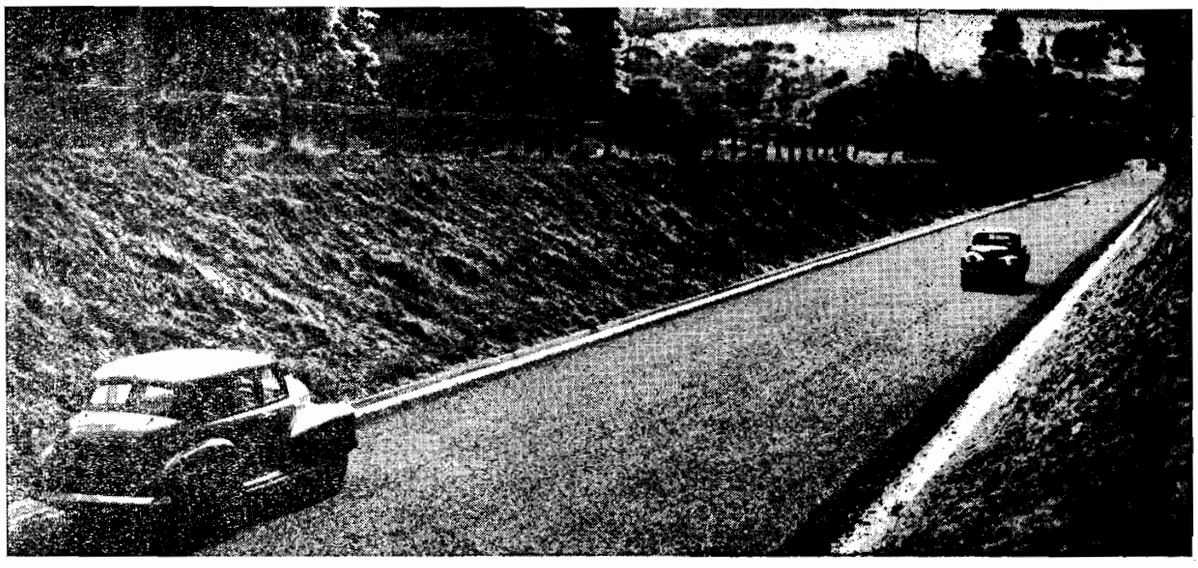


Plate No. 8.—A widened section of the Nepean Highway through a cutting near Balcombe which was formerly very narrow and weak.

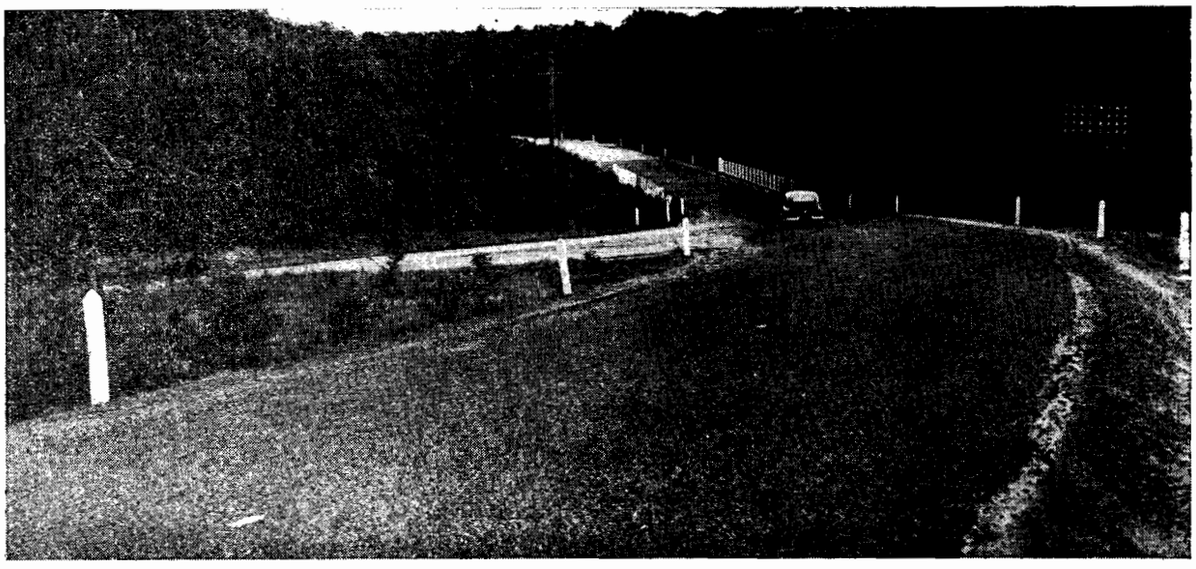


Plate No. 9.—The reconstructed and widened approaches to a bridge over the Balcombe Creek on the Nepean Highway.

REPLACING OLD, OBSOLETE WORN-OUT SECTIONS

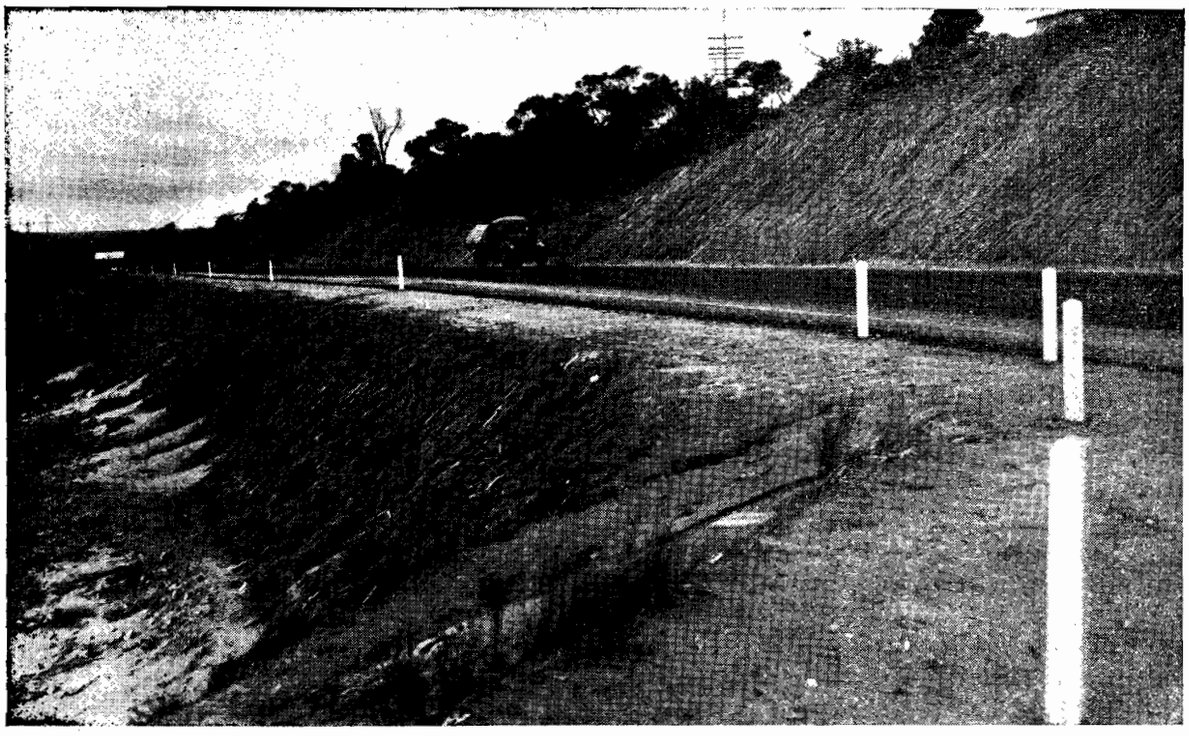


Plate No. 10.—A section of the Nepean Highway near Blairgowrie, where thatching of the batter with ti-tree was carried out to control sand erosion. New work replaces old, narrow, worn-out tortuous section.

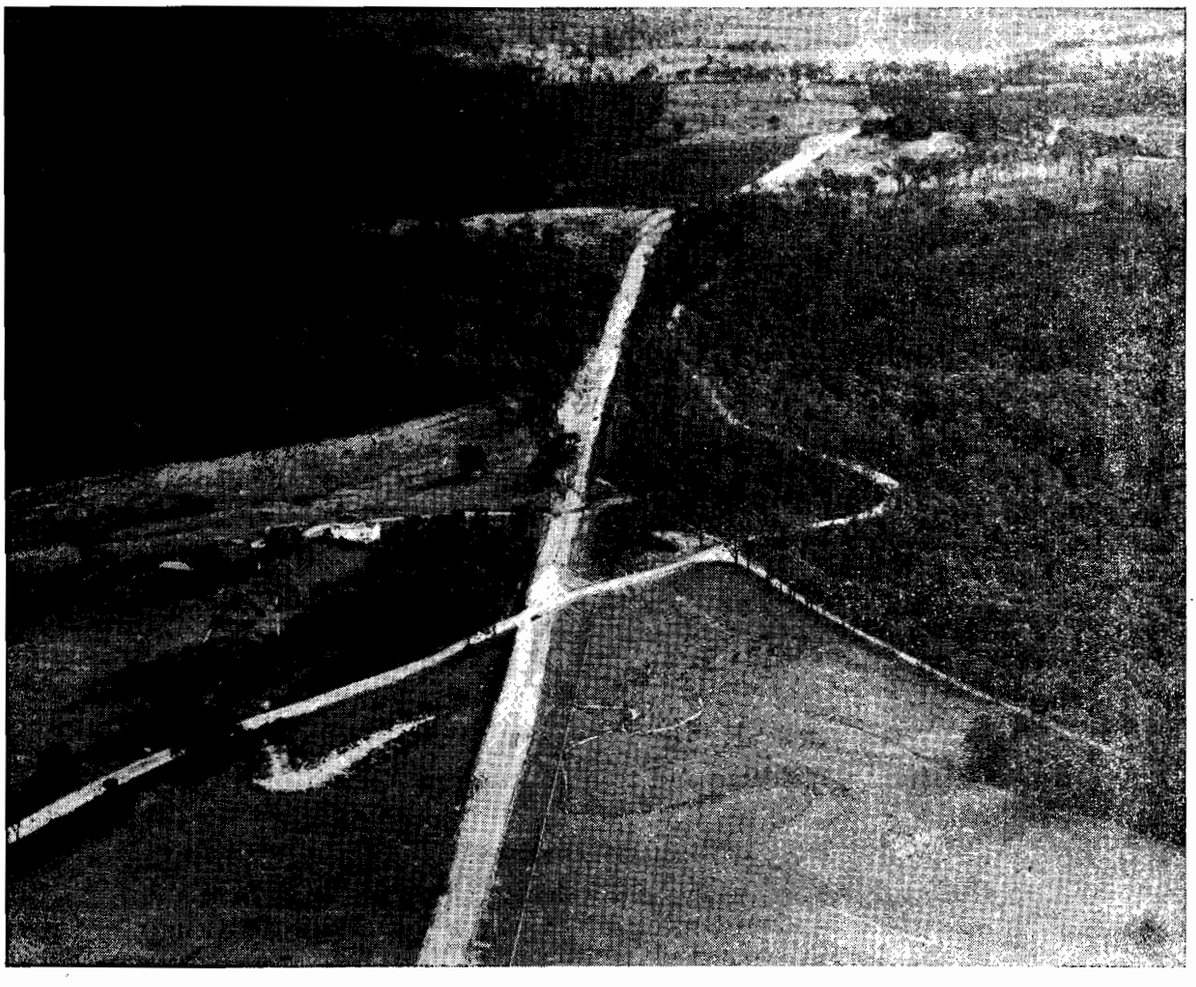


Plate No. 11.—Reconstruction, including re-alignment and regrading of the South Gippsland Highway between Nyora Turnoff and Loch.

Midland Highway.—2·8 miles of gravel pavement west from Byrneside was reconstructed and widened in preparation for extending the sealing towards Stanhope. A length of 1·93 miles westerly from Corop extending over the Mount Carmel Range was constructed on a new alignment.

Sturt Highway.—Reconstruction in preparation for sealing was completed for a further 13 miles, and a length of 6 miles constructed in the previous year was sealed. (Plate No. 5.)

Loddon Valley Highway.—Sections of 1·2 miles south of Durham Ox which had failed, and 3·75 miles north of Pyramid Hill turnoff, were reconstructed.

Dandenong Division.

Bass Highway.—Reconstruction and sealing of 2·3 miles between Bass and Anderson was completed. (Plate No. 6.) Reconstruction between Anderson and Kilcunda is in progress. The old pavements on these sections were narrow and very rough, and totally inadequate for the increased traffic to Wonthaggi and Phillip Island.

Hume Highway.—Widening of 2·06 miles of pavement by 4 feet between Fawkner and Campbellfield, a section subject to heavy and dense traffic. (Plate No. 7.)

Maroondah Highway.—New bridge and realignment at Acheron River. Reconstruction and sealing of 1·4 miles at Kanumbra.

Nepean Highway.—Battering of cliff face at Oliver's Hill, Frankston, thus completing restoration after the large slip in that vicinity. Reconstruction and widening of 0·7 miles at Balcombe cutting, where the old road was dangerously narrow and rough. (Plates Nos. 8 and 9.) Reconstruction of 1 mile which had failed east of Dromana. Reconstruction, including realignment and regrading, 0·6 miles at Blairgowrie, east of Sorrento. (Plate No. 10.)

Princes Highway East.—Reconstruction of 0·75 miles near Pakenham which had failed. Replacement of culvert at Ti Tree Creek.

South Gippsland Highway.—Widening and sheeting 3·5 miles at Koo-wee-rup and Five Ways on failed section. Reconstruction including realignment and regrading of 1·71 miles between Nyora Turn-off and Bass River; earthworks have been completed. (Plate No. 11.)

Geelong Division.

Western Highway.—Reconstruction, widening, and sealing of 1½ miles, and reconstructing and widening of 1¼ miles through the Pentland Hills at Bacchus Marsh. Reconstruction and widening of bridge over Korkuperrimal Creek, with new concrete deck. These works extended the improvement of a worn-out and dangerous section of road on which very little had been done for over 20 years. (Plates Nos. 12 and 13.)

Calder Highway.—Construction of new reinforced-concrete two-cell 8 ft. 6 in. x 10 ft. culvert at Corkscrew Hill. Construction of new road at this point on an improved alignment and grade was commenced. The narrow old bridge approached by steep grades and sharp bends has been the site of an increasing number of accidents, including serious fatalities.

Princes Highway West.—Resheeting three weak sections at Laverton, Werribee, and Buckley has been commenced.

New double cell culvert and embankment were built at Werribee to eliminate flooding and improve visibility.

Bellarine Highway.—Widening and reconstruction in Hesse Street, Queenscliffe.

Horsham Division.

Western Highway.—Strengthening and widening on a very weak section of 8·2 miles south of Horsham, including improvement of the poor alignment in the vicinity of Green Lake. Widening the heavily trafficked pavement at the approaches to the City of Horsham (in progress).

Reconstruction and strengthening of sections of weak pavement totalling 9 miles between Nhill and South Australian Border. This work is still in progress, and a contract for the supply of 25,000 cubic yards of crushed sandstone was let for similar work between Dimboola and Nhill.

A reinforced-concrete precast slab was placed on the masonry abutments of two old culverts near Stawell. An old timber bridge near Great Western (Bass's bridge) was replaced by two large reinforced concrete pipes with concrete end walls.

A length of 10 miles of rough old sealed pavement between Ararat and Great Western was retreated by the plant-mix drag-spread method.

Henty Highway.—Reconstruction commenced on a length of 5 miles in order later to extend the seal southerly towards Cherrypool. Reconstruction of 8·9 miles south from Warracknabeal towards Horsham was completed and the section sealed. (Plate No. 14.) This work included improvements to the alignment at Kellalac and the replacement of an old timber culvert with a battery of five 36-inch diameter Armco pipe culverts. Reconstruction of 11 miles between Kellalac and Dooen was commenced and contracts were let for the supply of 47,000 cubic yards of crushed sandstone.

Borung Highway.—Strengthening and sealing of 5·7 miles in the Donald Shire near Jeffcott was completed. Construction of approximately 12·5 miles in the Shire of Warracknabeal, on part of which a base course had been constructed in the previous year, was completed and the sealing extended for a further length of 7 miles. Construction of a base course for a length of 7 miles between Carron and Litchfield was carried out and the work of completing this section is in progress. (Plate No. 15.)

North-Western Highway.—Reconstruction, strengthening, and widening of 3·4 miles at Swanwater which has failed was almost completed in readiness for sealing. (Plate No. 16.)

Replacement of old timber bridge at Middle Creek, south of St. Arnaud, with a triple-cell reinforced-concrete culvert was completed.

Warrnambool Division.

Princes Highway West.—Reconstruction in scoria, realignment, and sealing of 1·44 miles through Port Fairy on a section where the old bitumen surface was worn out.

Reconstruction in gravel and double coat sealing of 4·5 miles between Drumborg and Lyons. This completed the bitumen surfacing of the highway from Melbourne to the South Australian border.

Henty Highway.—Reconstruction in gravel and realignment of 1·11 miles north of Portland and sealing of 0·7 miles.

Reconstruction in gravel of 1·4 miles between Cavendish and Rocklands Deviation. On the latter deviation 8·03 miles of new highway was constructed in gravel between Cavendish and Cherrypool, and a reinforced concrete flat slab bridge of 182 ft. 8 in. span was completed over Ti Tree Creek.

Glenelg Highway.—Reconstruction in gravel of crushed rock of 5 miles between Coleraine and Casterton.

TOURISTS' ROADS.

The greater portion of the expenditure on this class of road during the year was in respect of general maintenance, but certain improvements were also carried out. Generally, the work was under the direct supervision of the Board and the total expenditure incurred was £212,398.

The total length of proclaimed tourists' roads at the 30th June, 1951, was 432 miles.

RECONSTRUCTION OF WEAK SECTION BUILT IN 1926

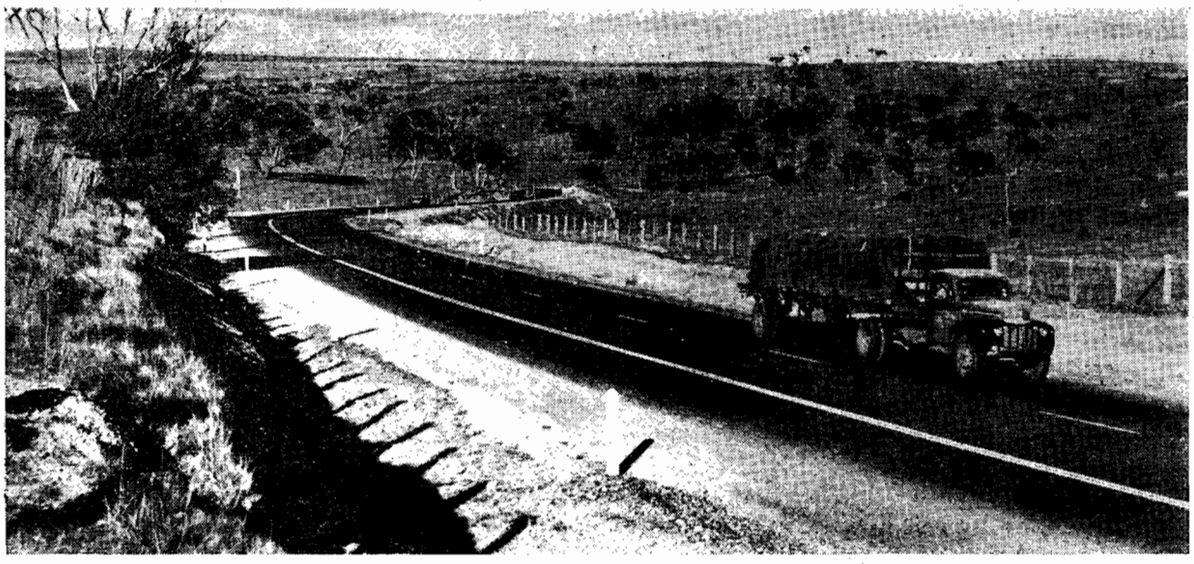


Plate No. 12.—A section of the reconstructed Western Highway in the Pentland Hills area. A lane for slow traffic is provided on the extreme left of the Highway on the climb through the Pentland Hills.

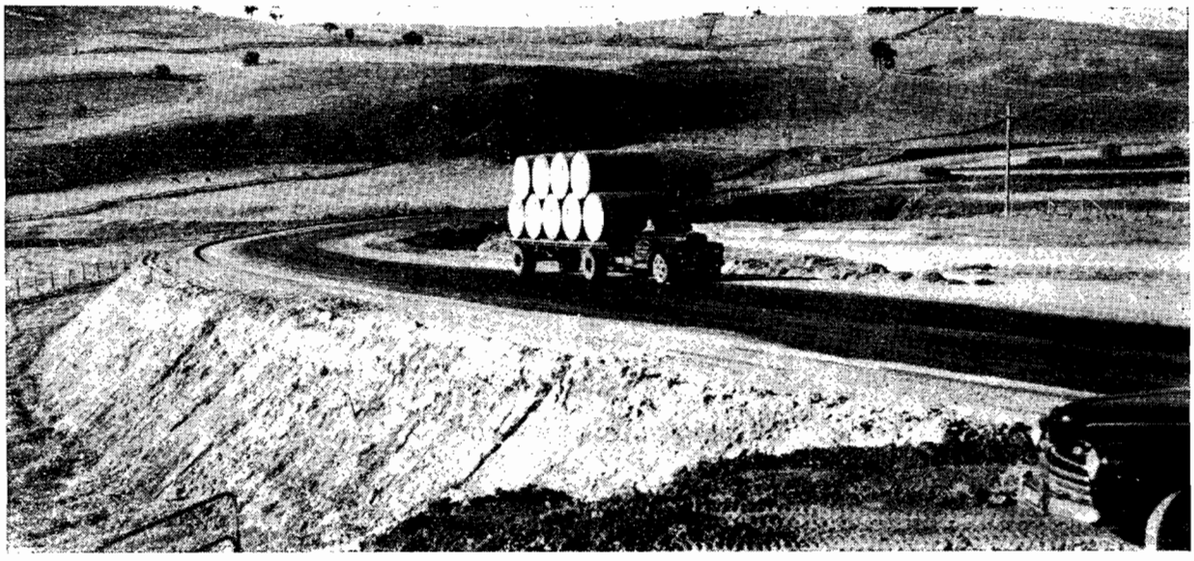


Plate No. 13.—The re-aligned approaches to the bridge over the Korkuperrimul Creek on the Western Highway in the Pentland Hills.

A NEW LINK

Plate No. 14.—Construction and sealing of the Henty Highway, south of Warracknabeal.

ANOTHER NEW LINK

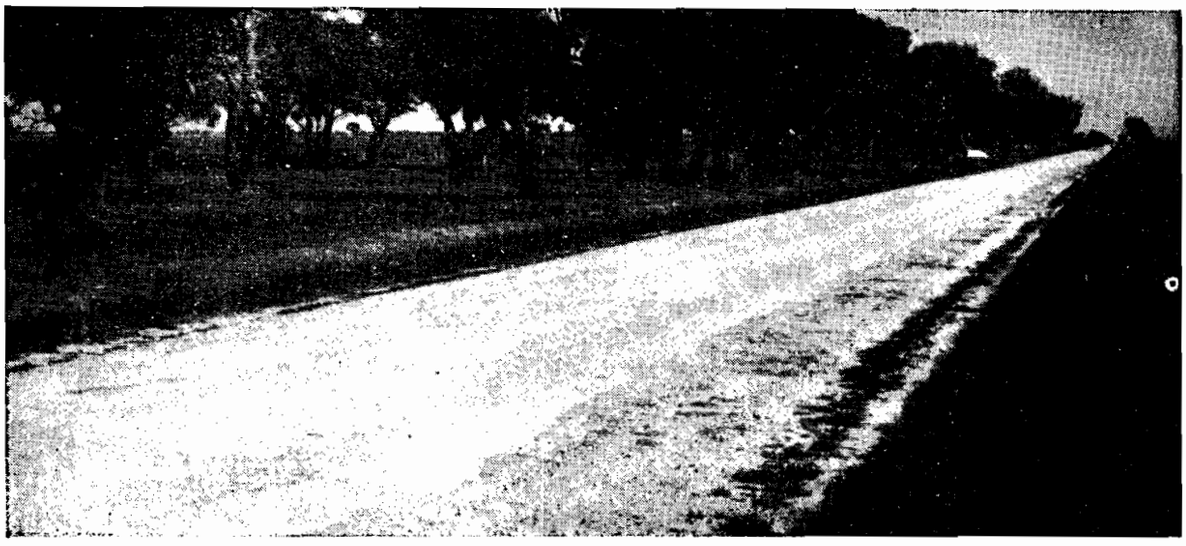


Plate No. 15.—Construction and sealing on Borung Highway between Warracknabeal and Litchfield.

SECTIONS WHICH PATCHING WOULD NO LONGER HOLD

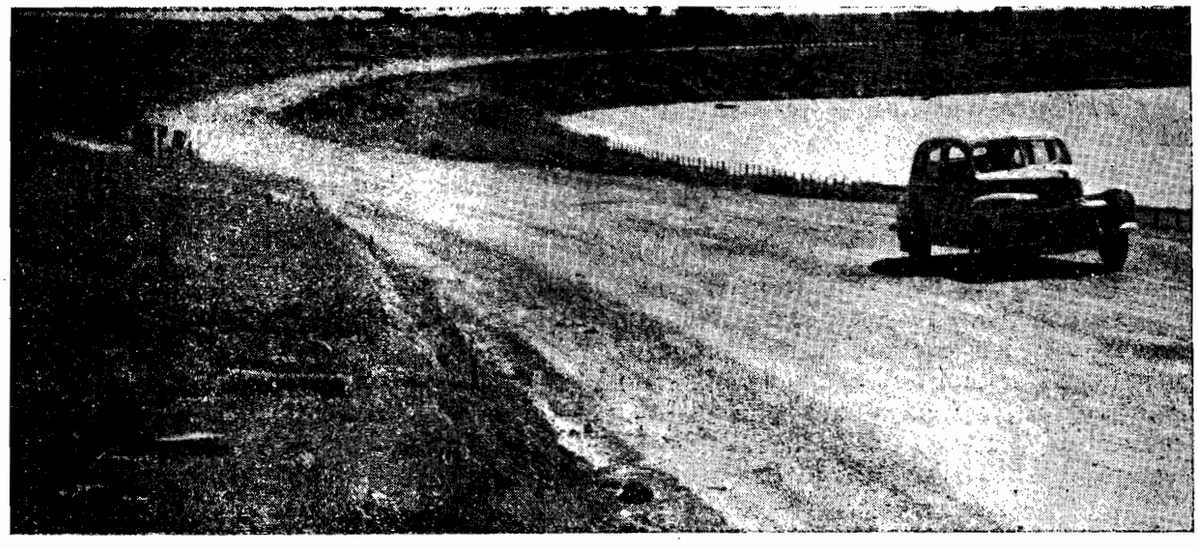


Plate No. 16.—A section of the North-Western Highway at Swanwater which has been entirely reconstructed, strengthened and widened after extensive failures.

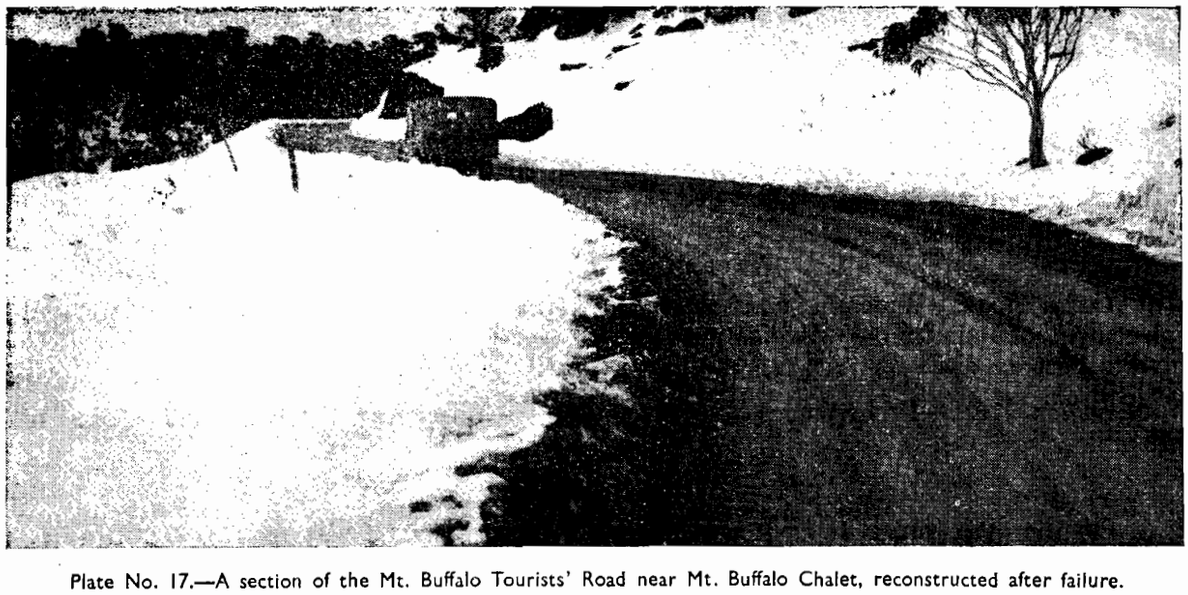


Plate No. 17.—A section of the Mt. Buffalo Tourists' Road near Mt. Buffalo Chalet, reconstructed after failure.

Works undertaken included the following :—

BAIRNSDALE DIVISION.

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

Sydenham Inlet Road.—Resheeting of 3 miles in sections throughout.

BENALLA DIVISION.

Mount Buffalo Road.—Twelve sharp curves were improved, the existing formation was widened to 22 feet, and the pavement strengthened by resheeting with crushed rock in preparation for sealing over a length of 2 miles (4·0–6·0 miles). A further length of 2 miles (16·00–18·00 miles) was resheeted with fine crushed rock to provide a consolidated depth of 3 inches over a width of 17 feet. (Plate No. 17.)

Alpine Road.—A section of 1·35 miles between mileages 17·50 and 18·85 between St. Bernard and Mount Hotham was widened to 17 feet and resheeted with gravel. In addition, 26 very sharp curves, over a length of 13·3 miles between Harrietville and Mount St. Bernard were widened to improve visibility and facilitate the operation of the snow plough.

Mount Buller Road.—Several curves were improved and parking areas constructed between Mirrimbah and the summit, over a length of 5½ miles. The formation was widened from 15 feet to 18 feet over a length of 3 miles near Mirrimbah. Two sections, each one-quarter of a mile in length, through the built-up area near Mirrimbah were strengthened and sealed.

DANDENONG DIVISION.

Phillip Island Road.—Reconstruction and sealing of 1·5 miles between Anderson and San Remo.

Reconstruction of 2·9 miles between San Remo and Cowes.

GEELONG DIVISION.

Ocean Road (Plate No. 18.)—Widening, resheeting, and sealing 2 miles between Anglesea and Airey's Inlet. (Plate No. 19.) Resheeting 7 miles between Anglesea and Torquay. Reconstruction, including widening and realignment of 1 mile between the Jamieson River and Separation Creek. Resheeting a total length of 5½ miles between Cumberland River and Mount Defiance and between Wye River and Carisbrook Creek. Construction of a three-cell 60-inch diameter reinforced concrete culvert (to replace a bridge destroyed by floods) at Milford Creek, near Apollo Bay.

HORSHAM DIVISION.

Grampians Road.—Widening and clearing approximately 3 miles of narrow formation south of Hall's Gap, together with resheeting of various sections.

Mount Victory Road.—Widening 3 miles of narrow, rocky side-cutting between Zumstein's and Wartook.

Resheeting of water worn pavement between Wartook and Hall's Gap (still in progress).

Silverband Road.—Widening of portion of the narrow side-cutting in the vicinity of the Silverband Falls was commenced.

WARRNAMBOOL DIVISION.

Ocean Road.—Widening and raising formation over 0·6 miles of river flats and replacement of four timber culverts near Princetown with multiple-cell reinforced concrete culverts cast in situ.

Dutton Way.—Resheeting with gravel of 3·65 miles near Portland, and sealing of 1·15 miles.

FOREST ROADS.

On the 30th June, 1951, the total length of proclaimed forest roads was 375 miles, and the expenditure during the year on the construction and maintenance of these roads amounted to £63,333. (Plates Nos. 20 and 21.)

UNCLASSIFIED ROADS.

Construction.

Municipal councils throughout the State submitted applications totalling £3,534,000 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 Act* 1950, and a total sum of £2,168,153 was allocated to 2,179 jobs on 2,110 roads in 161 municipalities.

The amount expended during the financial year was £756,936, and this sum was supplemented by an amount of £157,925 expended by the Councils from their own funds.

Isolated Settlers' Roads.

The Board allocated a total sum of £51,726 for the construction of roads to serve the properties of isolated settlers. This sum was distributed over 323 grants on 323 roads in 87 municipalities. These grants were made available on the understanding that the Council expends on the work an additional amount equivalent to at least 10 per cent. of the grant.

The expenditure on isolated settlers' roads during the year amounted to £14,063, supplemented by £1,404 from the Councils' own funds.

Maintenance.

It has been the practice of the Board for some years past to assist municipal councils in the maintenance of certain of the more important unclassified roads upon the construction of which Federal aid or other Government funds had been expended. As indicated in the Board's last Annual Report, the Board realized the value of such assistance to the Councils in their routine maintenance problem and the desirability of extending the scope of this scheme. Councils were accordingly invited for the first time to submit applications for grants of this nature on their road network, and a total sum of £458,000 was applied for, covering 1947 unclassified roads 157 inmunicipalities.

The total sum allocated for this class of work was £276,500, affecting 1,732 roads in 152 municipalities, and £166,693 was expended, supplemented by municipal contributions totalling at least £61,263.

In making these grants, the Board made it clear to the Councils that the grants were not intended to cover the whole cost of maintenance, but were, in effect, contributions towards such cost. It is possible, therefore, that the total amount expended by Councils from municipal funds was much greater than the last-mentioned sum.

Lockhart's Gap Road.

Reference was made in the Board's previous Report to the Board's commencing under its direct supervision the rehabilitation of the Lockhart's Gap Road, an old side-cutting originally constructed over 70 years ago for gold transport.

The work carried out by the Board, which involved reforming, improvement of turns too sharp for motor traffic, gravelling and culvert replacements, was completed late in 1950, and the Board has arranged to undertake the necessary maintenance under its direct supervision until the 30th June, 1952.

The cost of the work to 30th June, 1951, was £24,983.

BRIDGES.

It is a matter of regret that the bridge reconstruction work carried out during the year was again considerably less than is necessary to maintain a steady programme of strengthening or renewal to meet the demands of modern traffic. Apart from the limited funds at the Board's disposal, labour and materials were not forthcoming to the extent desired, and the Board was faced with further difficulties in the shape of a shortage of professional officers to prepare plans and designs and a scarcity of contractors able and willing to undertake this type of work.

WIDENING OLD, NARROW SECTIONS

Plate No. 18.—A corner of the Ocean Road between Eastern View and Lorne, which has been widened for safety.

Plate No. 19.—The widening of the Ocean Road in progress between Anglesea and Airey's Inlet.

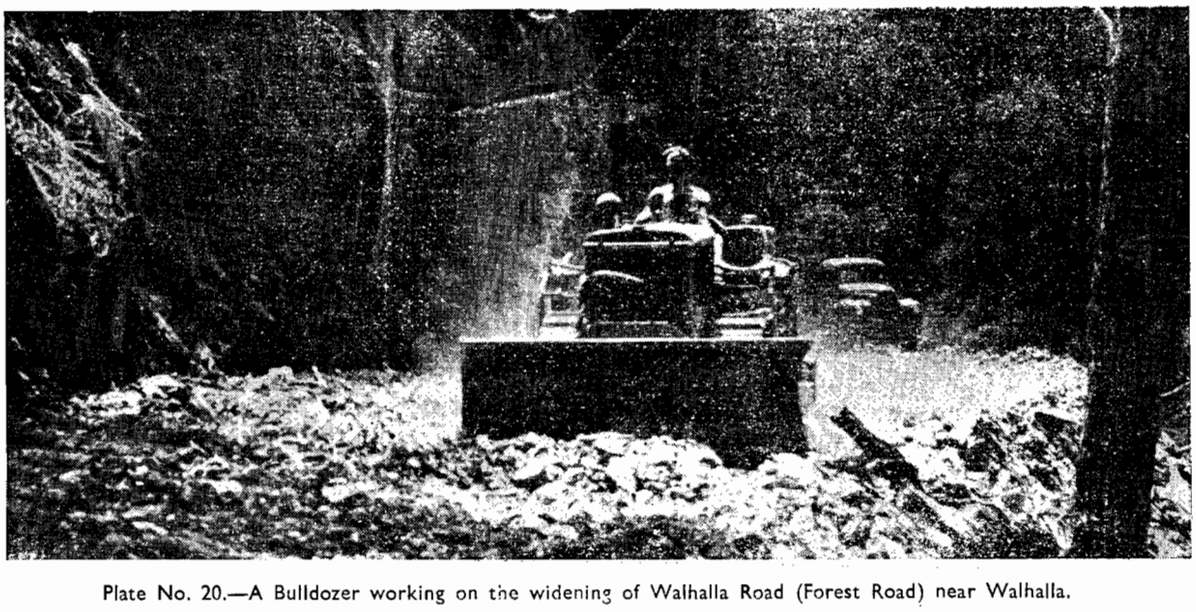


Plate No. 20.—A Bulldozer working on the widening of Walhalla Road (Forest Road) near Walhalla.

BENCHING FOR VISIBILITY

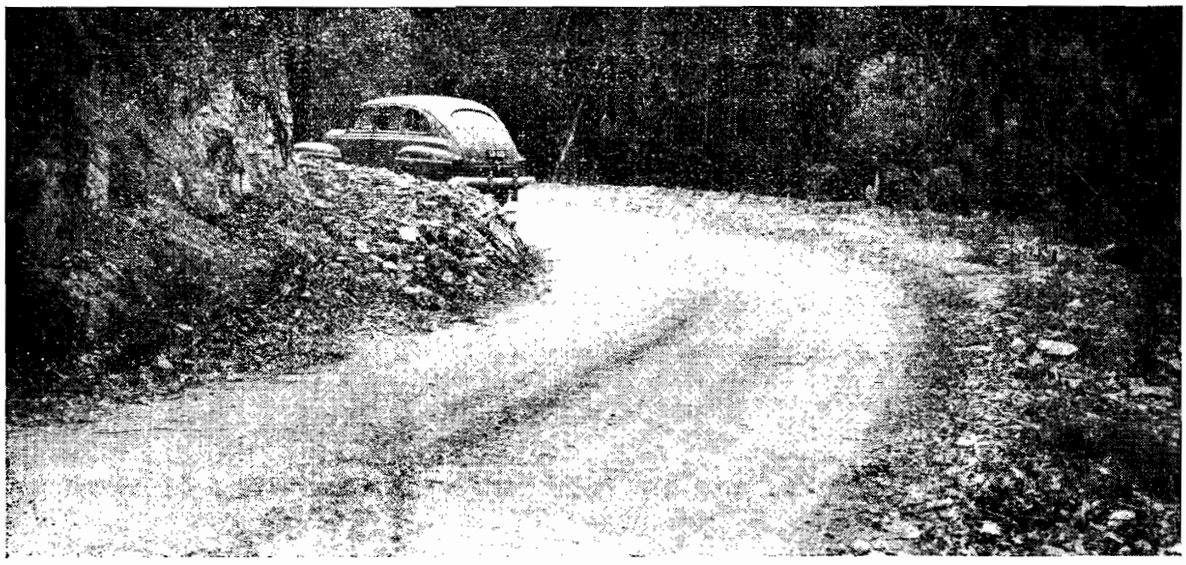


Plate No. 21.—Typical benching and widening on narrow side cutting of Walhalla Road (Forest Road) near Walhalla. Note benching for visibility.

BRIDGES LACKING MAINTENANCE

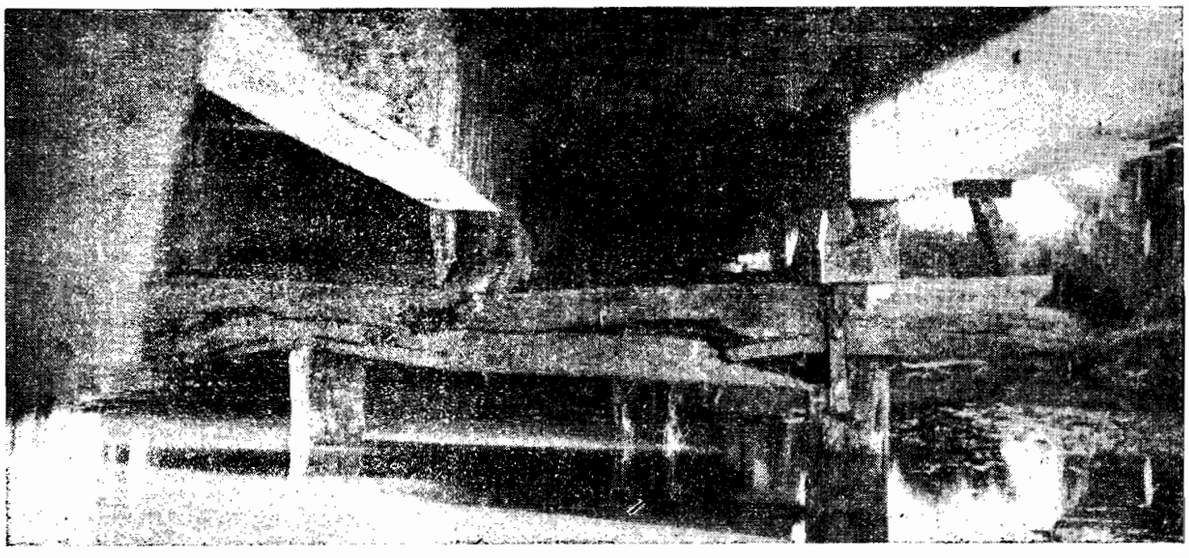


Plate No. 22.—An old timber bridge over Gumbower Creek on the Turrumberry-Lock Road.

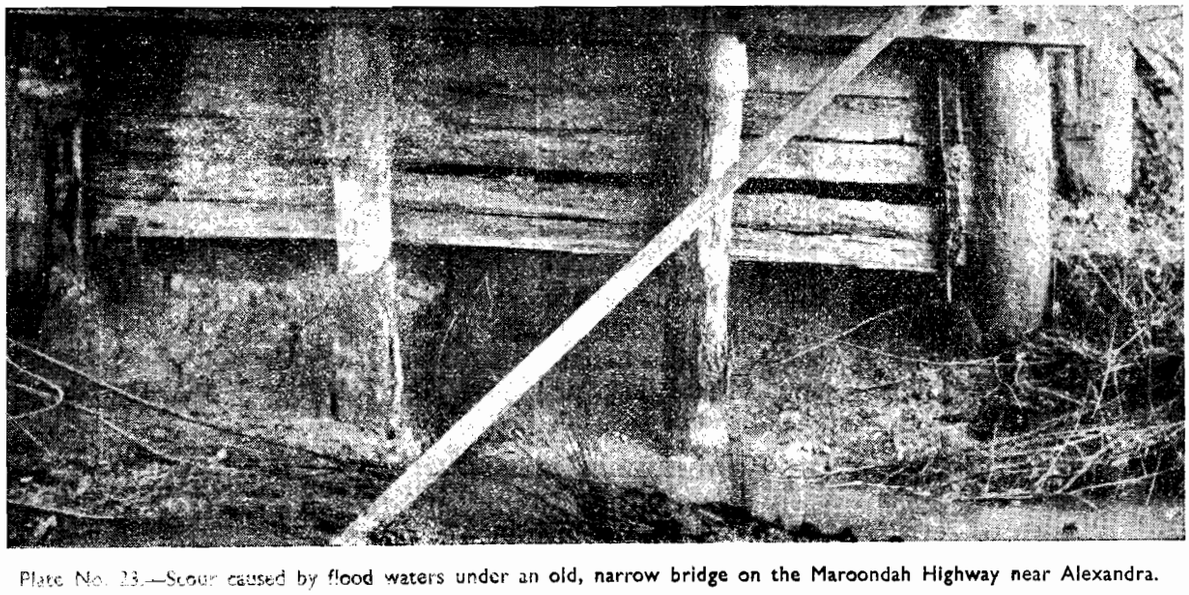


Plate No. 23.—Scour caused by flood waters under an old, narrow bridge on the Maroondah Highway near Alexandra.

During the year, 153 projects of a total value of £388,164 were initiated, bringing the total number of structures erected or in course of erection by the Board and municipal councils to 3,663. Forty of the new projects, of a total value of £232,147, were supervised directly by the Board, and 113 of a total value of £156,017 were supervised by municipal councils.

Metropolitan Bridges.

Swan Street (*Yarra River*).—The progress made with this structure, which was commenced in September, 1946, is still unsatisfactory, inasmuch as, notwithstanding some measure of improvement in the supply of materials, work was held up for four months through an industrial dispute to which the Board was not actually a party.

When work was eventually resumed, one-third of the men who had been employed on the work did not report for duty, and it has not yet been possible to build up the strength of the gang to its original numbers.

However, at 30th June, work had progressed to the stage that the piers and abutments had been completed and the form work for the main span had been half completed.

Bell Street (*Darebin Creek*).—Although the tender of Garrett Constructions for this work was let in February, 1950, the progress made with the work has not come up to expectations.

Bell Street (*Merri Creek*).—Plans and specifications for a new bridge at the above site were completed during the year by the Board's staff, and tenders were invited for the work, so far without success.

The structure is to consist of a single wrought-iron girder bridge with a reinforced-concrete deck and reinforced-concrete approach slabs. The overall length will be 169 ft. 6 in., with a roadway width of 43 feet and two footways each 5 ft. 7 in. wide.

Structures on Melbourne-Footscray Road.

Reference was made in the previous Report to the recommendations of the Parliamentary Public Works Committee regarding bridges over the Maribyrnong River and the Moonee Ponds Creek outlet at the Coal Canal, on the Melbourne–Footscray Road. Plans and specifications were completed by the Board's staff during the year for the first stage in the implementation of the Committee's recommendation, namely, the provision of a temporary bridge over the Maribyrnong River pending completion of the permanent structure. On instructions from the Government, action has been taken to assemble plant and materials, and tenders for the construction work have been invited, so far without result.

Northern Metropolitan Bridges.

Following a deputation to the Minister of Public Works by representatives of the Brunswick, Coburg, Essendon, and Northcote City Councils, which asked for financial assistance towards the cost of replacing certain worn-out bridges over the Moonee Ponds and Merri Creeks, the Board was asked to look into the possibility of assisting the Councils under the provisions of the Country Roads Act, and subsequently a programme was approved whereby five bridges, particulars of which are set out hereunder, will be reconstructed under that Act, utilizing loan moneys, the estimated cost of the structures being of the order of £30,000 each. They are to be dealt with in the following order of priority :—

(1) Bridge over Moonee Ponds Creek at Albion Street (Cities of Brunswick and Essendon). This is a timber and steel structure only 16 feet wide, without footways, and on a poor alignment. The abutments are in a precarious position. A wider bridge is urgently needed.

(2) Bridge over Moonee Ponds Creek in Moreland Road West (Cities of Essendon, Coburg, and Brunswick). This is a timber and steel bridge with brick piles and abutments. The abutment brickwork on the west side is not built down to a solid foundation and has been affected by erosion. The timber supports are also in very bad condition. The road is an important one and carries bus traffic.

(3) Bridge over the Merri Creek, connecting Arthurton Road, Northcote, with Blyth Street, Brunswick (Cities of Northcote and Brunswick). The existing bridge is a wooden pile bridge over 70 years old, with the piles reaching danger point and the deck in a bad state.

(4) Bridge over Moonee Ponds Creek—Brunswick Road, Brunswick, and Ormond Road, Essendon (Cities of Brunswick and Essendon). This bridge which has bottleneck approaches, carries heavy traffic to and from the Moonee Valley Racecourse.

(5) Bridge over Moonee Ponds Creek in Victoria Street, Brunswick, and Wilson Street, Essendon (Cities of Brunswick and Essendon). This bridge, which is a brick and concrete arch, has an approach 66 feet wide at an acute angle, and is itself only 24 feet wide. The cross camber on both the bridge and the approach roads precludes the efficient use of this 24-feet width.

The surveys for the Albion Street and Moreland Road bridges have been completed, and the new structures are being designed. The surveys and designs for the other three bridges will be completed as soon as possible.

BRIDGE MAINTENANCE.

The poor condition of many of the old timber bridges in the State can be at least partly attributed to the lack of attention given to the bridge once it has been built. There is a grave tendency, once a structure has been completed, to forget it until some part of it becomes in such a condition that it is unable to withstand the load it is required to carry. (Plates Nos. 22 and 23.)

With the increase of loads permitted under the *Motor Car Act* 1949, and the decline in the quality of timber available, it is essential that consistent, methodical, and practical maintenance and painting be carried out. The natural enemies of timber are insect attack and alternating wetness and dryness. To control these factors or minimize damage is impossible without systematic maintenance.

The Board has laid special stress on the importance of bridge maintenance by including a separate item in its forms of application for main-road maintenance grants, and during the financial year 1950–51, provided £65,000 for work of this nature on roads under its jurisdiction.

FLOOD DAMAGE.

During the year extensive damage was again caused in various parts of the State by floods, and, as in previous years, the Board provided funds to assist Councils in carrying out the necessary repairs to road pavements and to bridges and culverts.

In the case of main roads, provision was made for the most part from the Country Roads Board Fund, but in certain cases where the cost of restoration was specially heavy, some provision was made from Commonwealth funds. On unclassified roads, provision was made from Commonwealth funds subject to a contribution by the Councils concerned.

The effect of floods on the Board's operations, is not merely reflected in the expenditure incurred on repairs, but in the diversion of manpower and materials from what should be the normal road programme. The total amount allotted by the Board during the year from the Country Roads Board Fund for the repair of flood damage was £29,470, and from Commonwealth Funds £32,105, whilst the Councils were required to contribute to the work on unclassified roads to the extent of £5,065.

The following municipalities participated in the above-mentioned grants:—

The Town of St. Arnaud and the Shires of Alberton, Avon, Bairnsdale, Charlton, Deakin, Donald, Kara Kara, Maffra, Morwell, McIvor, Omeo, Rodney, Romsey, Rosedale, Shepparton, Tambo, Traralgon, Werribee, Winchelsea, and Woorayl.

It will be noted that a great deal of damage was done in the eastern part of the State. Damage was particularly heavy in the vicinity of Traralgon Creek, due to the formation of a wave of low pressure developing on a limited front which was centred over the Gippsland area. This depression resulted in a rainfall of 611 points at Traralgon on the 18th and 19th February, 1951, and an exceptionally heavy fall of 21 inches at Bolook at the head of the catchment area of the Traralgon Creek. This latter record occurred over a four-day period.

Eight bridges were destroyed along this Creek, two of them on the Traralgon Creek Road, one on the Traralgon–Jeeralang Road, which are declared main roads, and the remaining five serving properties along the Creek. The amount of the damage, in terms of the replacement value of types which were in use, was estimated at £13,000 whilst further damage to the extent of £2,000 was represented by washouts on the main roads. Portion of the Board's direct labour organization was made available to the Council to assist in the restoration both of the roads and bridges. (Plates Nos. 24 to 28.)

SOLDIER SETTLEMENT ESTATE ROADS.

Further requests were received by the Board during the year from the Soldier Settlement Commission for the investigation of road requirements in new estates purchased by the Commission, and, in a few instances, for additional road proposals relating to estates which had already been under consideration.

In accordance with the procedure which has been adopted in these cases, the schemes were investigated by the municipal engineers and the Board's Divisional Engineers, after which recommendations were made by the Board to the Commission as to the funds which might be provided and the basis of contribution by the parties concerned, i.e., the Commission, the Councils, and the Board.

A total sum of £137,827 was allotted during the year, of which £79,488 was provided by the Commission, £41,343 by the Board, and £16,996 by the Councils.

Works Undertaken during the Year.

Reports received from municipal engineers indicate the progress made to the 30th June, 1951, with works to serve Soldier Settlement Estates as under :—

Ararat Shire.

Burrumbeep Estate.—42,400 feet of forming and grading has been completed on the Burrumbeep Estate road and the construction of culverts commenced.

Edgarley Estate.—8,448 feet forming, grading, and draining on McCarthy's Road has been completed.

Construction of culverts on the Edgarley Estate Road has been completed.

Ballan Shire.

Beremboke Estate.—Approximately 1 mile of Green's Lane has been reformed and lightly gravelled before weather conditions and the inaccessability of gravel deposits necessitated a cessation of work.

Belfast Shire.

Tarrone Estate.—9,000 feet of forming, grading, and culverts on the Toolong West Road.

Berwick Shire.

Harewood Park Estate.—A length of 7,157 feet of construction and sanding on the Harewood Park Road has been carried out, completing the roading for this Estate. (Plates Nos. 29 and 30.)

Bulla Shire.

Clarkefield Estate.—6¼ miles of forming, grading, and gravelling, and the installation of culverts on the Clarkfield Estate Road and Palmer's Road has been completed, thus completing the roading of the Estate in this Shire.

Colac Shire.

Barunah Plains Estate.—10,136 feet of forming and gravelling has been completed with the exception of the crossing over the railway reserve.

7,300 feet of forming and gravelling on another road has been completed with the exception of two large culverts, which were awaiting the culvert units.

Dundas Shire.

Gerrigerrup Estate.—3,000 feet of construction of the approach road from the Penshurst–Macarthur Road to the Eumeralla Crossing had been completed when work was held up on account of wet weather. Plans and specifications for the bridge over the Eumeralla River have been approved.

FLOOD DAMAGE TO BRIDGES OVER TRARALGON CREEK

Plate No. 24.—Eight bridges across the Trarlagon Creek were destroyed as a result of the 21-inch fall of rain at Balook at the head of the Catchment Area in February, 1951. The photograph above shows the debris just below Caldwell's Bridge.

Plate No. 25.—The road was completely washed out at this section.

Plate No. 26.—The site of Caldwell's Bridge.

Plate No. 27.—An abutment of Thompson's Bridge was washed out and the approaches scoured away.

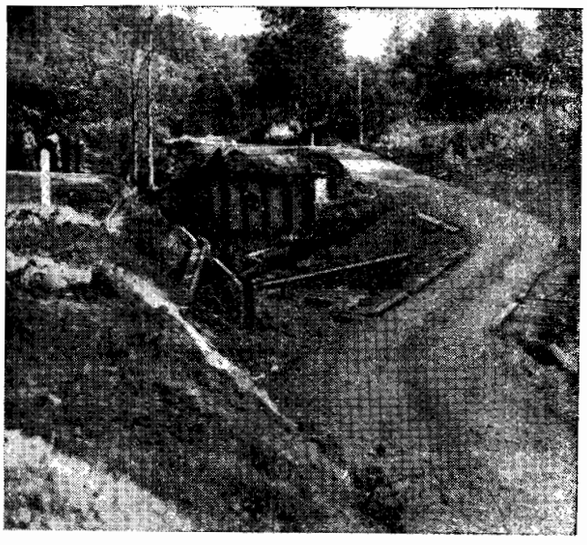
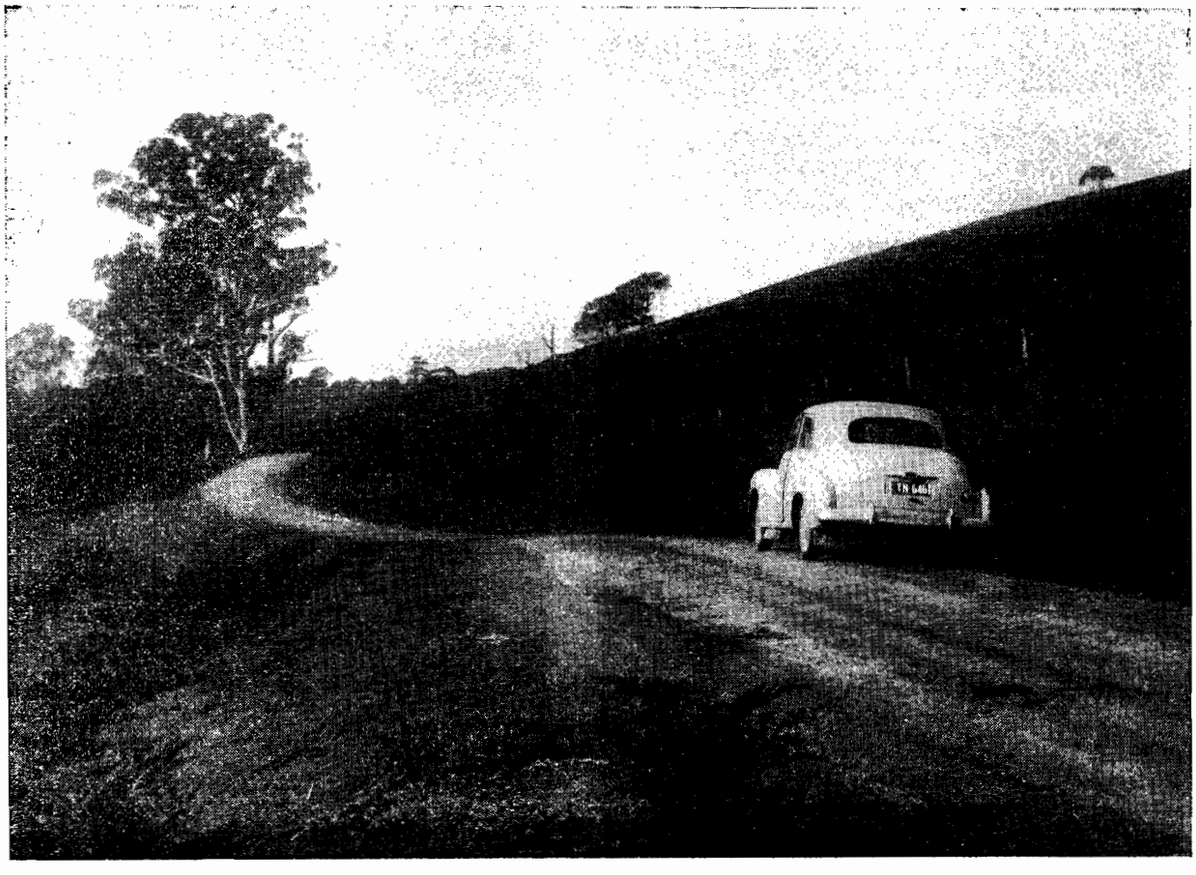


Plate No. 28.—Guntzler's Bridge (on left) was washed out. The temporary bridge can be seen in the foreground.

A SOLDIER SETTLEMENT ESTATE ROAD



Plates Nos. 29 and 30.—Sections of the Harewood Park Road serving the Harewood Park Estate in the Shire of Berwick. This road was completed during the last financial year.

Springwood Estate.—The worst sections of the road, totalling 6,000 feet, had been completed and large culverts put in to provide the settlers with access to their blocks, before work was stopped by wet weather.

Ardachy Estate.—Survey of the roads to serve this Estate has been practically completed.

Morgiana Estate.—Survey of roads has been commenced.

Nigretta Estate.—Preliminary investigations only have so far been made.

Glenelg Shire.

Hindson's Estate.—Construction of 20-ft. span reinforced-concrete bridge over Boggy Creek on Maddock's Road.

The construction of approximately 50 per cent. of the roads within this Estate has been completed and the remainder have been formed and surfaced with a base-course gravel. A top course of fine-crushed rock has yet to be spread.

Talisker Estate.—All settlers on this Estate have now a constructed outlet, but construction of the Ridge Road Extension to the Merino–Struan–Tahara Road has not yet been undertaken.

Hampden Shire.

Larra Estate.—Formation and gravelling has been completed on the Anderson's Road (0·28 miles), Lower Darlington Road (1·61 miles), Byrn's Road (1·21 miles), Murray's Road (1·14 miles), and Kurweeton–Laura Road (1·71 miles), but culvert construction is still incomplete owing to shortage of materials.

Gnarpurt Estate.—Forming and gravelling have been completed on the Lower Darlington Road (1·7 miles) and Hope's Road (0·7 miles), but a large floodway and culvert have yet to be completed.

Marida Yallock Estate No. 1.—Half a mile of Geddes Road has been partly formed and gravelled, but work has been held up pending the receipt of materials for the construction of a culvert.

Marida Yallock Estate No. 2.—Forming, the bottom course of gravel, and laying of minor culverts has been completed over a length of 2·53 miles of Hoses Road, and plans have been approved for the balance of the formation and gravelling (1·27 miles). Gravel for the surfacing of Bateman's Road (0·66 miles) has been delivered, but construction of formation has not yet commenced. 1·1 miles of formation and gravelling on Vagg's Road has been completed and gravel for the surfacing of the balance of the road (1·01 miles) has been delivered.

Marida Yallock Estate No. 3.—0·56 miles of formation on Leverett's Road has been completed and a contract let for the supply of gravel.

Wiridgil Estate.—1·29 miles of forming on the Wiridgil Estate Road has been completed and the first course of gravel spread.

Cloven Hills Estate.—Formation work for the full length of 5·21 miles of the Cloven Hills Road has been commenced.

Ettrick Estate.—A contract has been let for the formation and drainage of 2·51 miles of the Ettrick Road.

Korumburra Shire.

Wolonga Estate.—The forming, grading, draining, and gravelling of 1,800 feet of Gow's and Neilson's Road (western approach) has been completed and gives access to two soldier settlers. 1,775 feet of similar work on McRobert's Road (eastern approach) has been completed and gives access to three soldier settlers. These two roads complete the access required for settlers in the Estate.

Kowree Shire.

Mundarra Estate.—6 miles of grubbing, clearing, forming, and gravelling of the Mundarra Road has been completed as well as 3·6 miles of similar work on the Mundarra West Road. These works complete the roading for this Estate.

Newlands Estate.—4·5 miles of clearing and grubbing on Miller and McKerrow's Road has been completed as well as 3·9 miles of similar work on Oliver and Hole's Road, but construction has not yet commenced.

Kyneton Shire.

Coliban Downs Estate.—Formation has been completed and culverts constructed.

Leigh Shire.

Barunah Plains Estate.—12,910 feet of formation and culverts has been completed and the full length gravelled to a depth of 4½ inches.

Lexton Shire.

Langi Kal Kal Estate.—1½ miles of the Beaufort–Addington Road (from Kavanagh's Corner to the Black Bottom Road) has been constructed. Further progress has been made with the installation of a large triple culvert on the Black Bottom Road, thus practically completing the work on that road. The large pipes required for the Emu Creek Crossing on the Emu Creek Road have been received, but the work of installation was held up by wet weather. Three miles of reconstruction on the Learmonth–Beaufort Road within the Estate was completed during the year.

Mansfield Shire.

Wairere Estate.—13,000 feet of forming and grading and provision of culverts has been completed, and about 6,000 feet has been gravelled.

McCormack's Estate.—7,100 feet of forming and grading has been completed on Soldier's Road and culverts installed. 2,900 feet of forming and grading has been completed on Long Lane Road and culverts installed. 5,000 feet of reforming and grading has been completed on Blue Range Road and culverts installed.

Marong Shire.

Yarraberb Estate.—Most of the road work in connection with this Estate was carried out in the previous financial year, but further funds have been provided for extending the construction.

Melton Shire.

Mount Aitken Estate.—Works on this road were practically completed when the winter rains caused a set-back. Shortage of cement has prevented the end walls of the culverts being completed.

Minhamite Shire.

Tarrone Estate.—The extension of Tarrone Lane between Moyne River and Deep Creek has been constructed by direct labour under the direct supervision of the Board. Work was commenced on the road from the Back Creek bridge to the northern boundary of the Estate, but had to be abandoned owing to wet weather. Contracts have been let for gravelling the Tarrone Road from the Moyne River to the northern boundary of the Estate. The construction of Maher's Road is in hand by contract, and tenders have been invited for forming and gravelling the Tarrone South Boundary Road.

The following work in this Estate was carried out under the Board's direct supervision :—

1·61 miles of forming and reforming from the Moyne River to Back Creek, together with the construction of a new timber and rolled steel joist bridge 70 feet long over Back Creek.

Gerrigerrup Estate.—Contracts have been let for the construction of the Gerrigerrup Road (the principal road through the Estate), and plans have been prepared for the road linking up with the roads in Young's Estate.

Kangertong Estate.—A contract has been let for the construction of the road running west from " Glenwood " (the only new construction required on this Estate).

Young's Estate.—Surveys have been carried out but plans have not yet been finalised.

Glengleeson Estate.—The centre line has been located and standard of alignment determined.

Mortlake Shire.

Narrapumelap South Estate.—7,272 feet of forming and gravelling on the access road to the Estate, together with the construction of a ford over the Hopkins River, have been completed.

Merrang Estate.—7,000 feet of forming and grading has been practically completed, and a contract let for the supplying and spreading of 1,275 cubic yards of gravel over this length. This will complete the roading for this Estate.

Boonerah Estate.—24,827 feet of grubbing, clearing, forming, and grading has been completed, and a contract let for supplying and spreading of 4,590 cubic yards of gravel over this length. This will complete the roading for this Estate also.

Ennerdale and Myuna Estate.—21,272 feet of forming and grading has been commenced. Of the 13 miles of access road required for this Estate, 5 miles have been surveyed.

Mount Rouse Shire.

Boortkoi Estate.—6,800 lineal feet of forming and gravelling has been completed.

Chatsworth House Estate.—5,400 feet of forming and gravelling has been completed, and contracts let for further works covering 29,070 feet.

Woodhouse Estate.—16,059 feet of construction has been completed out of a total length of 68,591 feet, for which contracts were let. The balance of the work was held up by wet weather.

Nareeb Estate.—13,610 feet of construction has been completed.

Narrapumelap Estate.—Two contracts covering a total length of 25,400 feet have been completed and 5,000 feet of construction completed out of a total length of 13,800 feet of construction under a third contract. Two other contracts were let but no work was carried out thereon during the year.

Mount Sturgeon Estate.—Surveys have been completed over a length of 40,113 feet.

Numurkah Shire.

Murray Valley Estate.—1·5 miles of forming and gravelling on Collie's Road have been completed, and forming of a further 1·5 miles has been completed and the gravelling commenced on the same road. Two miles of forming has been completed and gravelling commenced on Boundary Road. One mile of forming has been completed and gravelling commenced on Lorenz's Road. A contract has been let for 7·28 miles of forming and 4·5 miles of reforming on various roads, and the reshaping of a further 6·58 miles has been put in hand with the Council's plant. Contracts have been let for the supply and delivery of the gravel for the 18·36 miles covered by these three sections and a start has been made with the work.

Portland Shire.

Ardgarton Estate.—2½ miles of construction has been completed with the exception of final trimming-up and construction of culvert end-walls.

Condah Estate.—2½ miles of grubbing and clearing and preliminary formation work has been completed.

Ardachy Estate.—Plans and specifications have been completed for 1 mile of construction, but work has not yet commenced.

Rochester Shire.

Kamarooka Estate.—Specifications have been approved for works on Trounson's Road, and the Elmore–Mitiamo Road, and work on the latter road has been commenced by direct labour. Completion of the work, has, however, been delayed by floods.

Rodney Shire.

Kiota Estate.—Forming, grading, and provision of culverts has been commenced.

Romsey Shire.

Clarkfield Estate.—While no work has been carried out in this Estate during the year, considerable time has been spent in investigating a suitable location for the principal road. Plans and specifications have been approved for the construction of a feeder road (Webster's Road).

Swan Hill Shire.

Robinvale Estate.—A contract has been let for 19,943 feet of clearing, forming, and gravelling, and this work is in hand.

Tungamah Shire.

Murray Valley Settlement.—Construction has been completed on Roosevelt Road (1·64 miles), Collins Road (0·17 miles), Dunkirk Road (0·29 miles), Labuan Road (3·01 miles), Kokoda Road (1·83 miles), Singapore Road (4·04 miles), Larissa Road (3 miles), Macarthur Road (3·85 miles), Montgomery Road (1·55 miles), and Churchill Road (4·04 miles).

Work has been commenced on Tobruk Road (1·96 miles), Blamey Road (2·47 miles), Labuan Road (2 miles), Kokoda Road (2·20 miles), Singapore Road (0·40 miles), and Montgomery Road (1 mile).

23·42 miles had been completed at the 30th June, 1951, out of a total length of 35·45 miles of construction required in this settlement.

Warrnambool Shire.

Spring Creek Estate.—9,000 feet of reforming and gravelling has been completed.

Wimmera Shire.

Domaschenz Estate.—No major works were carried out during the year on roads serving this Estate, but plans and specifications were approved for 8,000 feet of reconstruction on roads within the Estate and 1,100 of reconstruction on the approach road.

WORK FOR OTHER AUTHORITIES.

During the year, the Board carried out a number of important works for other authorities within the provisions of the *Country Roads* (*Works and Evidence*) *Act* 1948, the principal works being summarized hereunder.

Forests Commission.

In the Licola area in the Shire of Maffra, where extensive works had been undertaken to facilitate the Commission's logging operations, fencing was erected along the road from the Licola Bridge to Riggall's Gap, and the new Licola–Crescent Creek Road was maintained on behalf of the Commission.

Works were also continued on the Benwerrin–Mount Sabine and Sunnyside Roads in the Shires of Winchelsea and Otway, to assist in the extraction of timber from the area.

The total sum expended during the year on the Commission's works was £8,996.

Melbourne and Metropolitan Board of Works.

Considerable progress was made during the year on the works being carried out on behalf of the Melbourne and Metropolitan Board of Works to provide improved road connections to the site of the proposed new dam at Walsh's Creek. As part of this scheme, a total sum of £86,460 was expended on road and bridge works in the year, the whole cost being borne by the Board of Works. (Plates Nos. 31, 32, and 33.)

CONSTRUCTION OF NEW WARBURTON - WOODS POINT ROAD

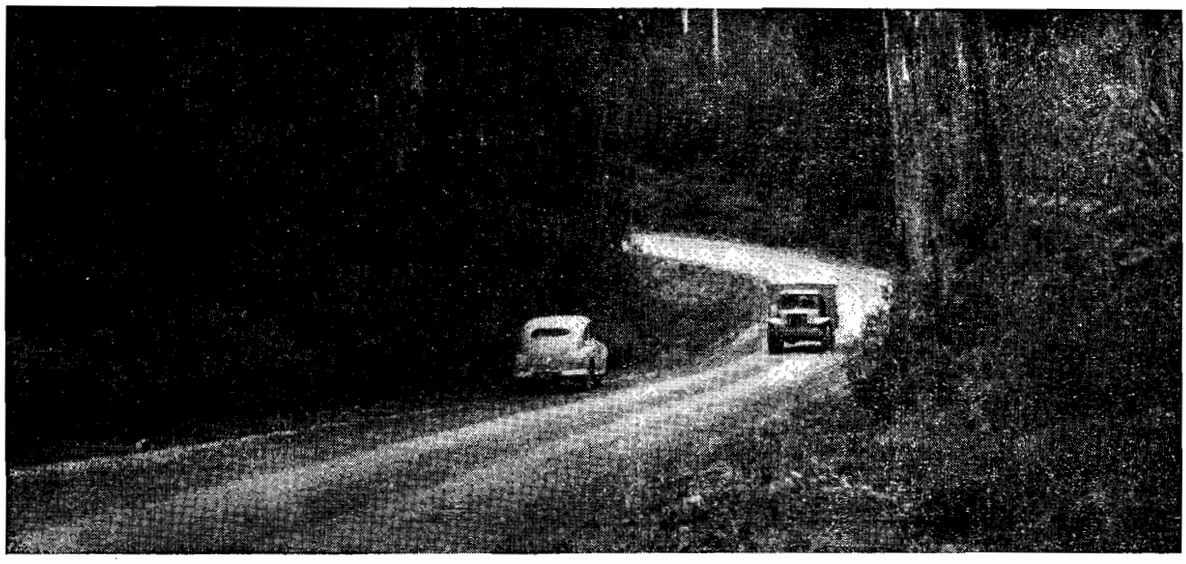


Plate No. 31.—The altered route of the Warburton-Woods Point Road, rendered necessary by the construction of the Upper Yarra Dam, follows the Reefton Spur and then the old Yarra Track to Woods Point. A corner of the new Reefton Spur Road is pictured above.

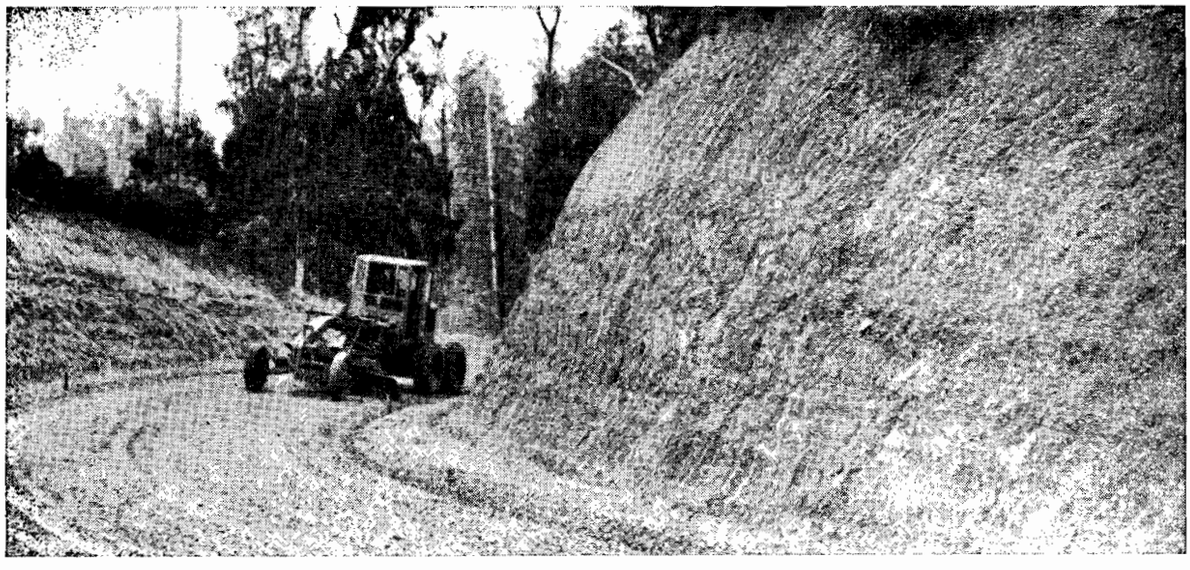


Plate No. 32.—A grader working on the Reefton Spur end of the new Yarra Track.

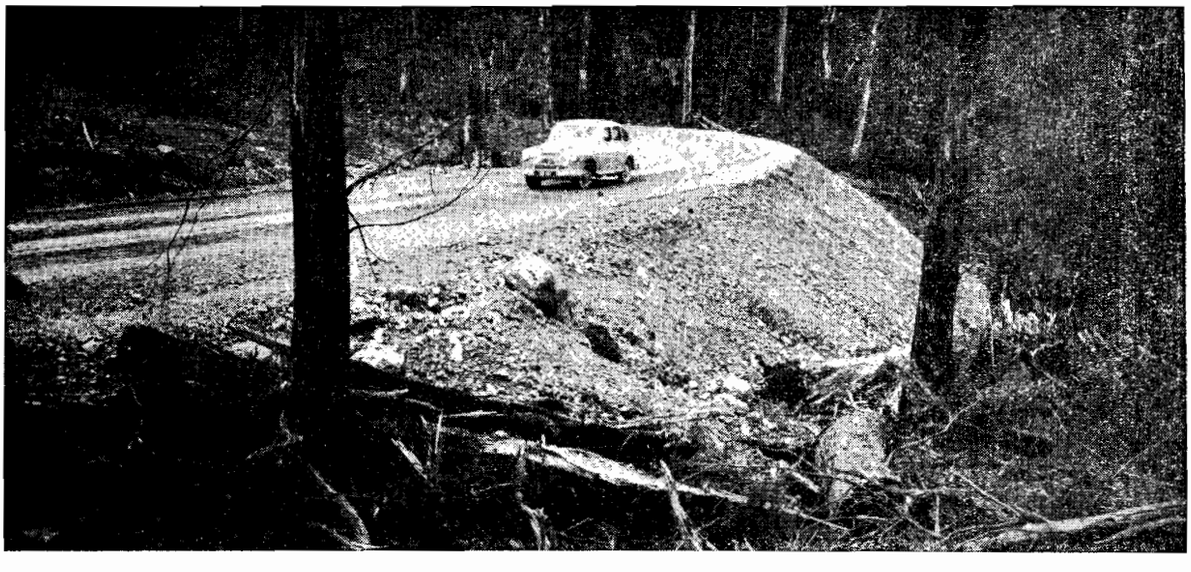


Plate No. 33.—Portion of the new Yarra Track.

EILDON DAM INVOLVES RECONSTRUCTING ROAD TO RAILHEAD

Plate No. 34.—Work on the reconstruction of the Upper Goulburn Road between Thornton and Eildon.

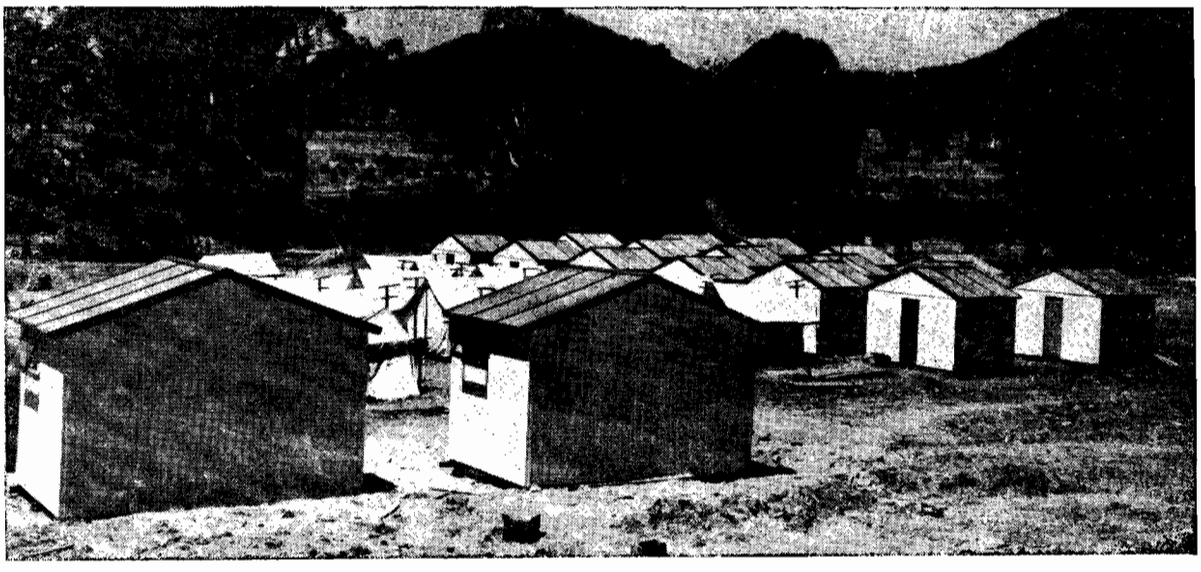


Plate No. 35.—Huts at the Snob's Creek Camp, on the Upper Goulburn Road.

HOUSING FOR DECENTRALIZED ACTIVITIES

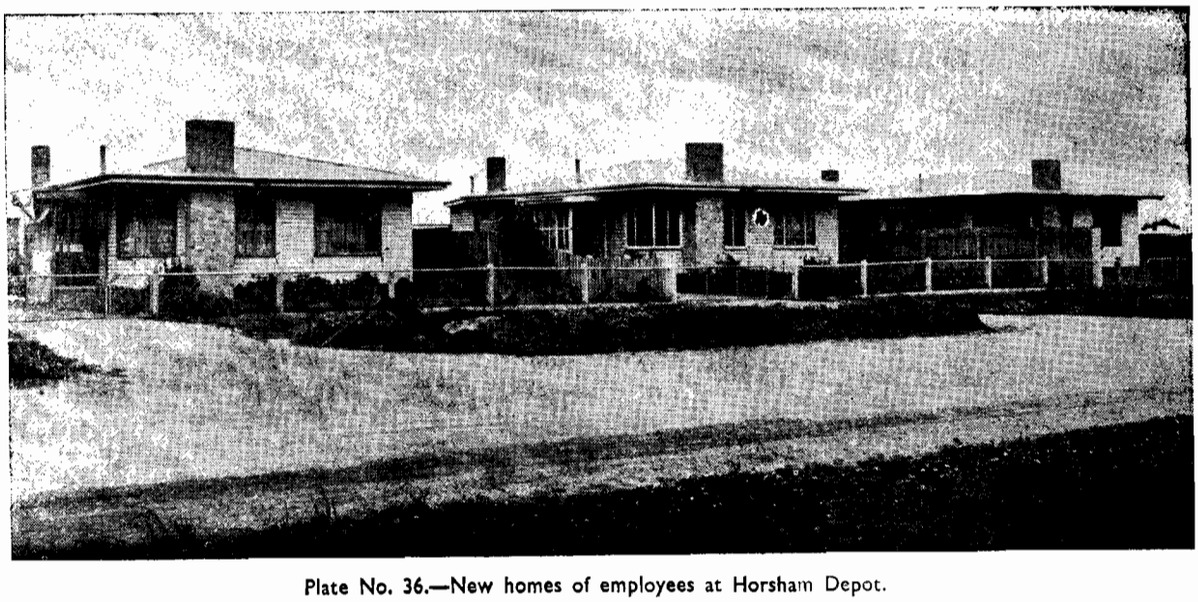


Plate No. 36.—New homes of employees at Horsham Depot.

State Electricity Commission.

Work was continued on the reconstruction of the Kiewa Valley Road from Bandiana to the Commission's works at Mount Beauty, a total length of approximately 53 miles. This road will be required to carry very heavy traffic in connection with the Commission's extensive Kiewa scheme, and a high standard of strengthening, &c., is necessary.

The work was commenced during the financial year 1949–50, and the construction surfacing, and sealing of a length of 20·76 miles has been completed, leaving a balance of 32·24 miles to complete the project.

Works carried out by the Board on this road during the financial year, included the following :—

Construction of precast reinforced concrete bridge of overall length of 92 feet, 22 feet between kerbs, at Middle Creek, and a similar bridge 47 feet long and 22 feet between kerbs at Hell Hole Creek.

Reconstruction, realignment, and sealing of 2·8 miles near Dederang and 4·5 miles south of Kergunyah. Reconstruction, widening, and resheeting with fine crushed rock and sealing of 1·3 miles near Tawonga. Reconstruction and sealing of 1·6 miles between Tawonga and West Kiewa River.

The total expenditure during the financial year 1950–51 was £151,536 19s. 2d.

Public Works Department.

At the request of the Public Works Department, the Board commenced the construction of an access road to the Dookie College land at the top of Mount Major, in the College area, a length of 10,700 feet, and an expenditure of £117 was incurred during the year.

State Rivers and Water Supply Commission.

Works carried out on behalf of the Commission during the year included (*a*) road and bridge strengthening along the Upper Goulburn Road from Alexandra to Eildon Weir, to provide for the heavy cartage to the weir (Plates Nos. 34 and 35), (*b*) the construction of a deviation of the Henty Highway around the Rocklands Reservoir (including a new reinforced concrete bridge over Ti Tree Creek), and (*c*) the construction of a deviation of the Pyrenees Highway rendered necessary by the construction of the Cairn Curran Reservoir.

The total sum expended during the year on these works was £76,087.

Housing Commission.

In the Geelong area, the Board undertook the construction of roads, channels, drains, and footpaths at Norlane Estate, Section 2, it being the intention to complete the road and drainage part of the work prior to the arrival of the prefabricated houses. The construction of all the gravel streets, totalling 19,500 feet in length has been completed, together with the attendant underground drains. Work was also commenced on similar lines on Section 1 of the Estate, on the east of the Princes Highway at Norlane. A length of 3,100 feet of street construction is involved in this portion of the scheme. The total expenditure during the year on these schemes was £35,529.

At Morwell, substantial progress was made during the year on the street-construction work in the area known as Hourigan's Estate, comprising forming, grading, surfacing, and the construction of footbridges, kerbs, channels, and sub-surface pipe drainage. The total sum expended during the year was £85,255.

At Moe, the construction of service roads on the future line of the Prince's Highway, comprising the forming and gravelling of the pavements, together with concrete kerbs, channels, and concrete footpaths, was further advanced during the year, an expenditure of £550 being incurred in that period.

Department of Land and Survey.

Further work was carried out on the construction of the approach road to the Buchan Caves, which had been commenced in the previous year at the request of the Committee of Management of the Caves Reserve. The total expenditure to date on this project is £4,347, of which £540 was expended during the financial year 1950–51.

Grain Elevators Board.

The construction of gravel roadways and turning areas, together with concrete kerbs and channels, at the Grain Elevators Board's terminal silos and loading wharf at North Geelong was well advanced during the year, when an amount of £4,386 was expended.

COMMONWEALTH WORKS.

The following works were carried out during the year for the Commonwealth Government :—

Works in hand in the previous year were continued to completion at East Sale and Mangalore Aerodromes and at the Mulwala Explosives Factory.

DECENTRALIZATION.

Further additions were made to workshops, stores, and staff housing schemes in the various country divisions as follows :—

Bairnsdale.—A timber dwelling for the use of an engineer was completed and occupied during the year, and three prefabricated houses were erected for the roadmen and depot employees, two of which have been occupied. The third is practically completed. Additional stores accommodation was provided at the depot in a separate 42-ft. x 16-ft. shed, and a new 50-ft. x 30-ft. "Armco" carpenters' shop has been erected, thereby permitting the expansion of the machine workshop in the space originally occupied by the carpenters. Another block of land was purchased on which it is proposed to erect an additional prefabricated house for the depot employee.

Benalla.—Three additional prefabricated houses were provided during the year, one for engineering staff and two for workshop personnel, making the housing position at Benalla as follows :—

Engineering Staff—three houses completed, two houses in course of erection.

Workshop Personnel—eight houses completed.

Two prefabricated houses were also supplied for the patrolmen stationed at Walwa and Tallangatta respectively.

At the Benalla Depot area, the greater portion was drained by the construction of open-dished concrete drains, and the construction of the future bridge precasting depot (area 525 feet x 143 feet), was commenced. A commencement was also made with the construction of a private street on the Board's land (Calder Street), to serve the residents and the bridge precasting depot. This street will be 528 feet in length with a 22-ft. pavement sealed 20-ft. wide.

Bendigo.—The total number of houses now provided at the Bendigo Depot comprises three brick veneer houses completed and occupied, one brick veneer still in course of construction, and eight prefabricated houses. On other sites in the City of Bendigo two prefabricated houses were provided. Two brick veneer residences in the Shire of Strathfieldsaye, adjoining Bendigo, were purchased for engineering members of the staff, and prefabricated houses were provided for patrolmen at Stanhope and Serpentine. The Board has now a total of 24 houses in the Division for officers, patrolmen, and workshop personnel, &c.

Dandenong.—Approximately two acres of land were purchased at Pakenham for a patrol storage site and residence, and preparations were made for the erection of a prefabricated house when available.

Additional storage sheds were erected at the patrol storage site at Tooradin, and 1 acre of land was purchased for a patrol storage site and residence at Alexandra where preparations have been made for the erection of a prefabricated house.

A seven-roomed weatherboard house was purchased in Rodd Street, Dandenong, for the use of the Roadmaster, who is now in occupation.

Geelong.—During the year, a blacksmith's shop, car and truck wash area, and an hydraulic hoist for greasing, &c., were installed at the Divisional Depot, and a plant shelter 100 feet x 44 feet erected. A concrete precasting yard was developed to a stage where

piles and beams, &c., for bridges are being precast. The site for the new Mechanical Workshop for plant maintenance was prepared, together with road access and drainage, and concrete columns for the building were precast. In addition, permanent entrance gates and a chain-mesh fence enclosing the depot were erected.

A new weatherboard residence for the workshop foreman which is being built by contract under the supervision of the Public Works Department in High Street, Belmont, was commenced, and a prefabricated weatherboard house was also erected at Werribee for the use of the Board's patrolman in charge of the section of the Princes Highway from Melbourne to Geelong.

Horsham.—Seven prefabricated houses were erected during the year, three being occupied by Assistant Engineers and by the Divisional Accountant's Clerk, and the remaining four being provided in order to augment the strength of the workshop personnel. (Plate No. 36.) One fitter is in occupation, another has been allotted a residence, the third is temporarily occupied by one of the Board's patrolmen, whilst the fourth is not quite complete. The residence for the Divisional Engineer for which a contract was let in October, 1949, has made slow progress, but is nearing completion.

The 100-ft. x 60-ft. " Igloo " workshop building was completed excepting for glass windows, and is now in use as the workshop. The " Sydney Williams " hut, used originally as a temporary workshop, has been converted for use as a machine shop with access thereto from the main workshop. An 80-ft. x 20-ft. "Armco " building was erected and fitted with steel bins, &c., for a store, and is now in use. Development of the carpenters' shop by conversion of the original open-plant shelters progressed to the extent of the casting of a concrete floor.

To provide for extension of workshops, development of a precasting area, &c., additional land totalling approximately $3\frac{1}{4}$ acres, adjacent to the present depot area, was purchased during the year.

Warrnambool.—During the year, two residences in Warrnambool were purchased, one for the use of the Divisional Accountant and the other for the Traffic Officer, whilst a prefabricated house was supplied and erected on land owned by the Board in Warrnambool for the use of one of its assistant engineers.

The Board also purchased approximately $6\frac{1}{2}$ acres of land for development as a Divisional Depot, including plant repair workshops, concrete precasting site, stores building, and foreman's residence. Two acres of land previously owned by the Board on which an old depot was situated, was transferred as part payment for the new site, and all buildings and materials at the old depot were transferred to the new site.

In addition to the above activities in Warrnambool itself, four prefabricated houses were erected, viz., one at Casterton for the use of the patrolman, and three at Dennington for workshop and depot personnel.

SNOW REMOVAL.

With the increasing popularity of the snow-fields for winter sports, considerable investigation has been carried out by the Board into the most satisfactory method of snow clearing, particularly on the Alpine Road between Omeo and Bright. (Plates Nos 37–42.)

The section approaching Mount Hotham (elevation 6,101 feet), has been cleared of snow experimentally between Harrietville and Mount St. Bernard (elevation 5,060 feet), over the last three winters, using a " Matador " diesel truck of approximately 70 h.p. fitted with a " Frink " type " V " blade raised by hydraulic control. Experience gained during the year 1950–51 indicated that the machine could cope with falls up to 18 inches, and could, therefore, except under abnormal conditions, keep the road open between Harrietville and Mount St. Bernard, but it is quite ineffective with falls of greater depth.

The disadvantages of this unit were—

(*a*) Insufficient width of blade.

The blade discharges the snow just outside the normal wheel tracks. Much of this falls back into the cleared track, and as successive falls build up the height of the windrow discharge from the blade is lessened considerably.

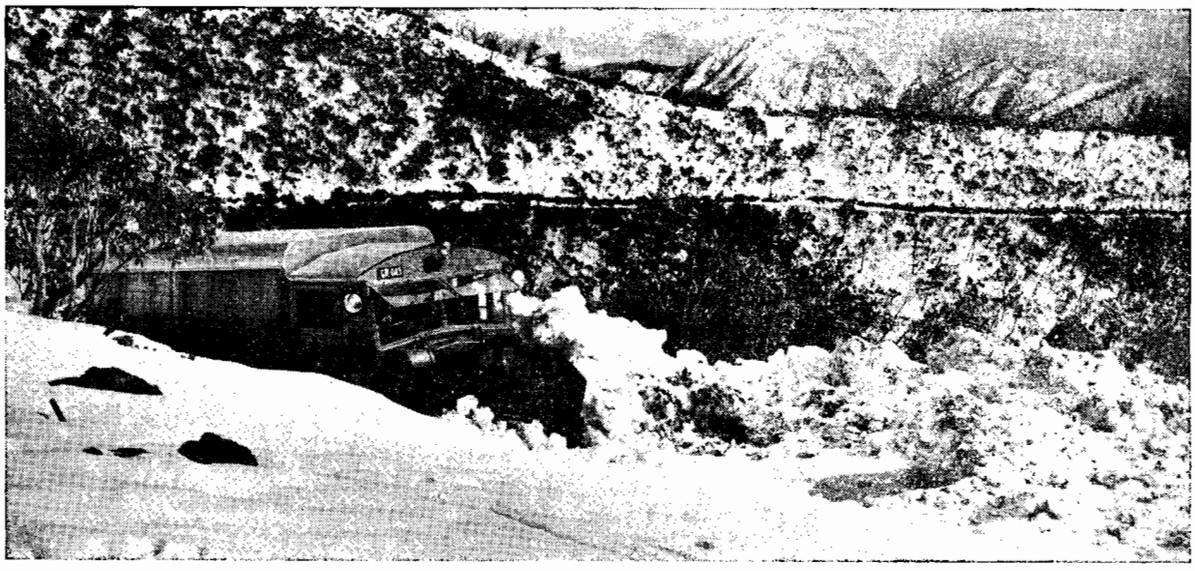


Plate No. 37.—The Matador Snow Plough on the Alpine Road above Harrietville where the operation of angle-dozers had been checked by the eight-feet depth of snow. A lower part of the road can be seen over the top of the snow plough.

Plate No. 38.—A snow drift to a depth of eighteen feet on the Alpine Road, 3½ miles from the Hotham Chalet.

Plate No. 39.—The Matador Snow Plough at Mt. St. Bernard, one of the few turning points on the Alpine Road.

Plate No. 40.—Over fifty skiers preparing for the four-mile hazardous trek from Mt. St. Bernard on the Alpine Road (Tourists' Road) to their various places of accommodation at Mt. Hotham.

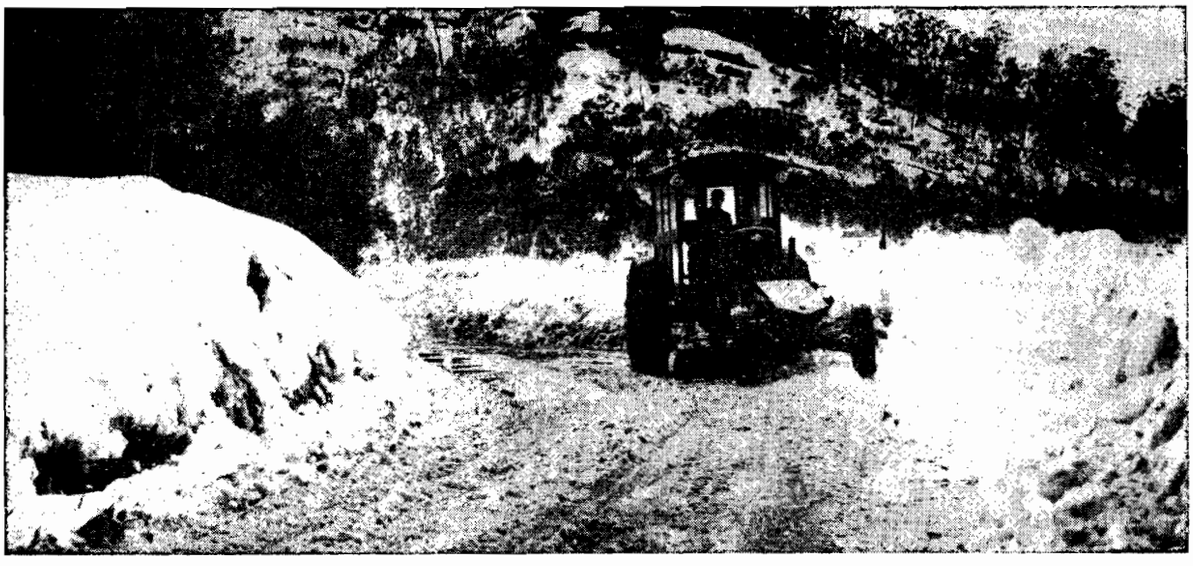


Plate No. 41.—A Country Roads Board Grader working on light snow clearance at Mt. Buffalo (Tourists' Road).

Plate No. 42.—A medium tractor fitted with a wide V-blade being used by the Victorian Railways for snow clearance on roads to the ski runs at Mt. Buffalo (Tourists' Road).

(*b*) *Length of Wheel Base.*

The long wheel-base vehicle cannot negotiate sharp radius curves since the rear wheels track into the high windrow. A greater width of blade would diminish this effect.

(*c*) *Manœuvreability and Traction.*

Bar-tread tyres and heavy wheel chains, combined with the load on the blade, make steering extremely difficult (often a two-man job), whilst in heavy snow these adjuncts are insufficient to counter wheel slip.

(*d*) *Road Width and Grade.*

Since the vehicle cannot be manœuvred around on the comparatively narrow road, the power-driven winch at the back of the vehicle cannot be used for the removal of heavy fallen timber.

Considerable delays have occurred for the reasons stated, whilst the combination of grade and alignment limits the speed of snow clearing to about 1½ miles per hour.

Extreme snow conditions existed when, coincident with a mechanical breakdown of the Matador, abnormal falls occurred, ranging from 3 feet deep at 10 miles, to 6 feet of snow at 13·3 miles (Mount St. Bernard). Angle dozers were transported long distances to cope with this emergency, and with the aid of these Class 3 tractors (approximately 60 h.p.), the road was opened to Mount St. Bernard.

The 60-h.p. angle dozers proved effective in snow up to 3 feet deep, but their rate of progress was slow (approximately ¾ mile per hour). Where snow is deeper, a more highly-powered dozer with a bigger blade is necessary. The manœuvreability of a tractor has very definite advantages over the Matador with a fixed " V " blade, in that turning places can be made in a confined width of road, and the angle dozer can, when necessary, widen the track cleared by its initial passage and dispose of the windrow by pushing snow over the sideling bank. If fitted with a winch, the dozer could dispose of fallen timber met with, even on a narrow section of road.

Owing to the severe conditions on the Alpine Road, it would appear that at least a Class 2 tractor would need to be held in readiness in the vicinity of Harrietville at the foot of the grade to assist the Matador in an emergency if it were desired to keep the road open beyond Mount St. Bernard to the 15-mile post (elevation 5,100 feet). Overnight falls are often heavy and ploughing at night would be an extremely hazardous task.

One of the difficulties is the lack of satisfactory accommodation for the snow-removal gang at the top of the grade, with the result that the men have had to work from points of low elevation upwards through the snow. Beyond Mount St. Bernard, winds attain gale force and side slopes are precipitous.

Despite the difficulties already enumerated, however, progress has been made, and the Federation of Victorian Ski Clubs has expressed gratification at the attention given by the Board to mountain access roads, which, it states, has been of inestimable value to skiers as well as to the general public.

The Board will continue to experiment in the light of the experience already gained.

BITUMINOUS-SURFACE TREATMENT.

Reference was made in the 37th Annual Report to the great benefits derived from the extension of bituminous-surface treatment and to the efforts being made by the Board to extend those benefits.

The total cost of operating a semi-trailer truck over rough, dusty or corrugated gravel roads may be as great as 3s. per mile, whereas over even bituminous surfaces it may be reduced, to say, 2s. 6d. per mile. A similar saving applies to motor cars. For traffic of over 50 to 100 vehicles a day there may also be a saving in road-maintenance costs over a period of years including the cost of resealing as required. Thus extension of bitumen surfacing, apart from the added safety and amenity it provides, is highly desirable in the interests of national economy. Bituminous extension also means that more transportation services can be provided for a given quantity of imported fuel. The work is costly, but the savings and service justify it for a far greater mileage than has so far been treated.

The following table indicates the mileage of roads treated during the last five financial years.

Year.	Mileage of Road.			
	Initial Treatment.		Retreatments.	Total.
	Extension.	Reconstruction.		
1946–47	104·3	55·8	500·1	660·2
1947–48	303·3	68	555·7	927
1948–49	167·5	112·7	504·4	784·6
1949–50	291·2	75·9	518·3	885·4
1950–51	437	98	385	920
Average for five years	260·6	82·1	492·7	835·4

The progress made in recent years in the extension of initial treatment work may be gauged from the fact that in 1934, the total mileage of roads in the State which had been treated with bitumen, with funds provided by the Board, was 2,946, whilst the total mileage so treated as at the 30th June, 1951, was 6,932, an average increase of 235 miles per annum.

Greater progress would, no doubt, have been made with the extension of initial treatment work had it not been for the intervention of the 1939–45 World War, as in that period of six years, only 205 miles of new work was carried out.

The figure 235 miles per annum does not include lengths of road which had to be resealed, and sections previously treated with bitumen which had to be reconstructed and the seal coat again restored. In the same period 1934–51, 7,685 miles of retreatment were carried out, in addition to the restoration of sealing on 450 miles of reconstructed sections. The foregoing figures show that for the period of seventeen years, the average annual mileage of bituminous surface treatment of all types carried out with the Boards plant was 711.

With the acquisition of additional plant, the Board's capacity for this type of work will be further increased, and provided the necessary funds are made available, the benefits of sealed roads will be extended to more and more road users. (Plates Nos. 43 and 44.)

In common with all other phases of the Board's activities, however, rising costs are being severely felt in connection with bituminous surface treatment work, and the great difficulty being experienced in obtaining adequate supplies of covering aggregate for bitumen is a further serious problem, quite apart from the fact that the cost of such material is now three times what it was in the years immediately preceding World War II.

In 1939, the average cost of one cubic yard of covering aggregate was 12s. 10d. In 1951, the cost was £1 4s. 1d. with a prospect of a further substantial increase in the financial year 1951–52.

Substantial progress was made during the year with the purchase and assembling of new plant in order to increase the Board's capacity for bituminous surface treatment work by 50 per cent., the following items of new plant having been obtained :—

Aggregate loaders (Barber Greene)	2
Rotating belt spreaders	4
Rotary road brooms	6
Power rollers	5
Cookhouses (mobile)	10
Water tanks (180 gallons)	36
Broom drags	1
Tractors (pneumatic tyred)	15
Land Rovers (utilities)	15
Mobile offices (for cost clerks)	18
Aggregate gradation unit	1

The sprayers operating during the year 1950–51 comprised seven 400-gallon, five 600-gallon, two 800-gallon, and one plant-mix seal unit. For the year's programme, 14,227 tons of bituminous materials were obtained by contract as set out hereunder :—

		Tons.
Bitumen—		
In drums	8,331	
In bulk	1,287	
	——	9,618
Cutback bitumen		344
Asphaltic oil		962
Primer tar—		
Vertical retort	1,652	
Horizontal retort	617	
	——	2,269
Tar oil—cleaning oil		58
Fuel oil		194
Bituminous emulsion		782
		14,227

A considerable additional quantity of fuel oil and horizontal retort tar was obtained by direct purchase from country sources of supply.

Some appreciation of the plant and equipment necessary in a typical mobile 1,000-gallon spraying unit may be gauged from Plate No. 45 and from the following particulars :—

Units No.	*Details.*
1	Overseer's utility.
2–3	1,000-gallon sprayer towing a cost-clerk's office.
4–5	Aggregate loader towing a rotary road broom.
6, 7, 8	Tender truck loaded with auxiliary equipment, towing a roller carrier loaded with a 6-ton roller.
9–10	Motor truck loaded with auxiliary equipment towing a cookhouse.
11–12	Motor truck loaded with auxiliary equipment towing a 600-gallon heater loaded with warning signs.
13, 14, 15	Motor truck loaded with a front-end loader towing a 600-gallon heater loaded with auxiliary equipment.
16–17	Motor truck loaded with auxiliary equipment towing a 600-gallon heater, also loaded with auxiliary equipment.
18–19	Motor truck loaded with auxiliary equipment towing a 400-gallon heater, also loaded with auxiliary equipment.
20–21	Motor truck loaded with auxiliary equipment towing a 400-gallon heater, also loaded with auxiliary equipment.
22–23	Motor truck loaded with auxiliary equipment towing a rotating belt spreader.
24–25	Motor truck loaded with auxiliary equipment towing a pneumatic-tyred roller.
26–27	Motor truck loaded with auxiliary equipment towing a 400-gallon heater, also loaded with auxiliary equipment.

The total sprayer crew numbered 35. The photograph was taken on the Western Highway at Wail in December, 1950.

Plate No. 43.—Harrietville Main Road east of Bright reconstructed and sealed.

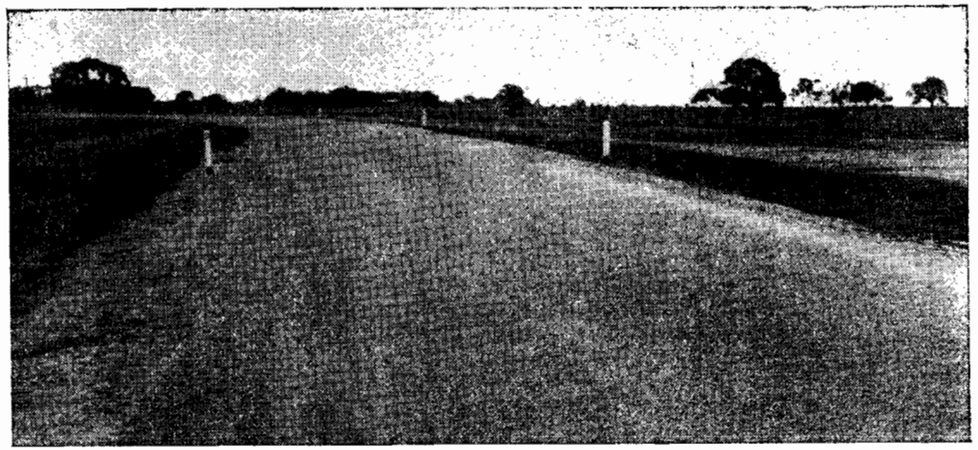


Plate No. 44.—A reconstructed section of the Loddon Valley Highway near Durham Ox.

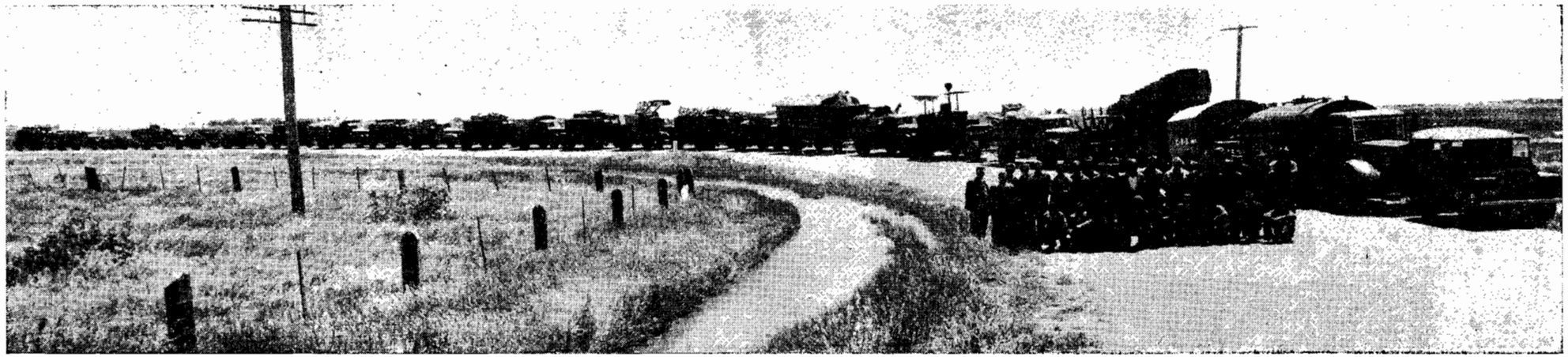
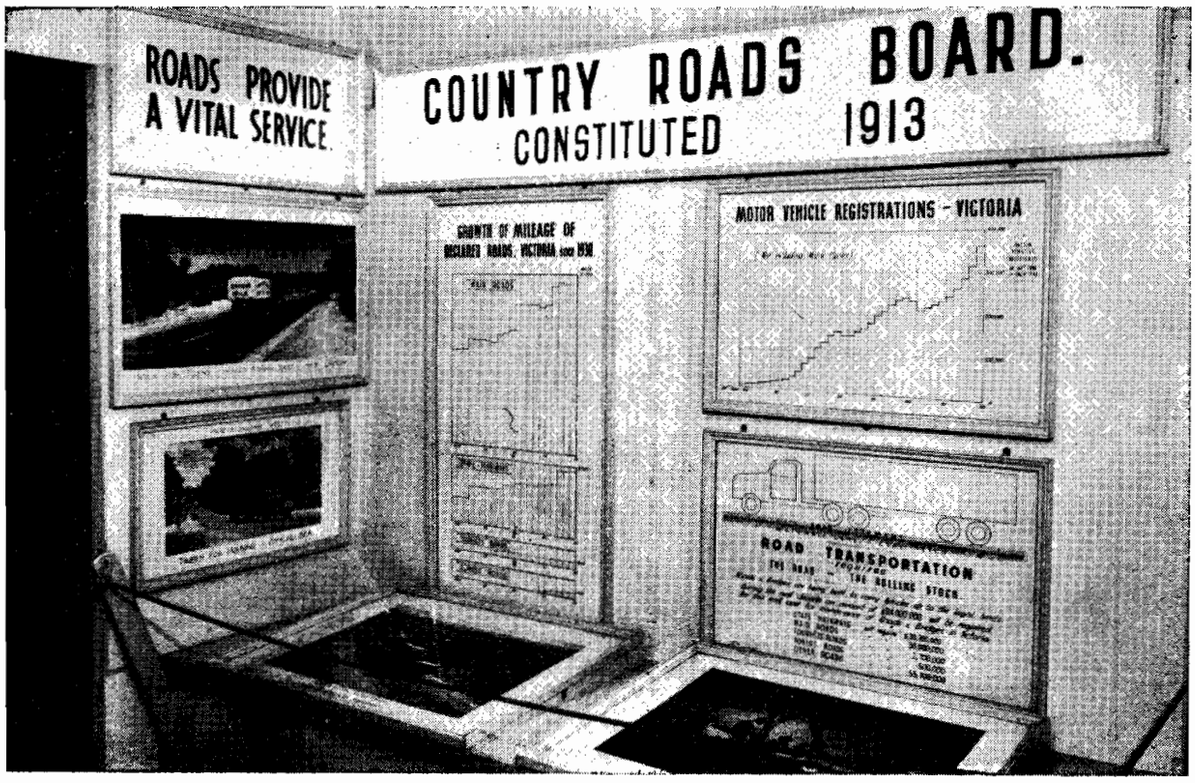
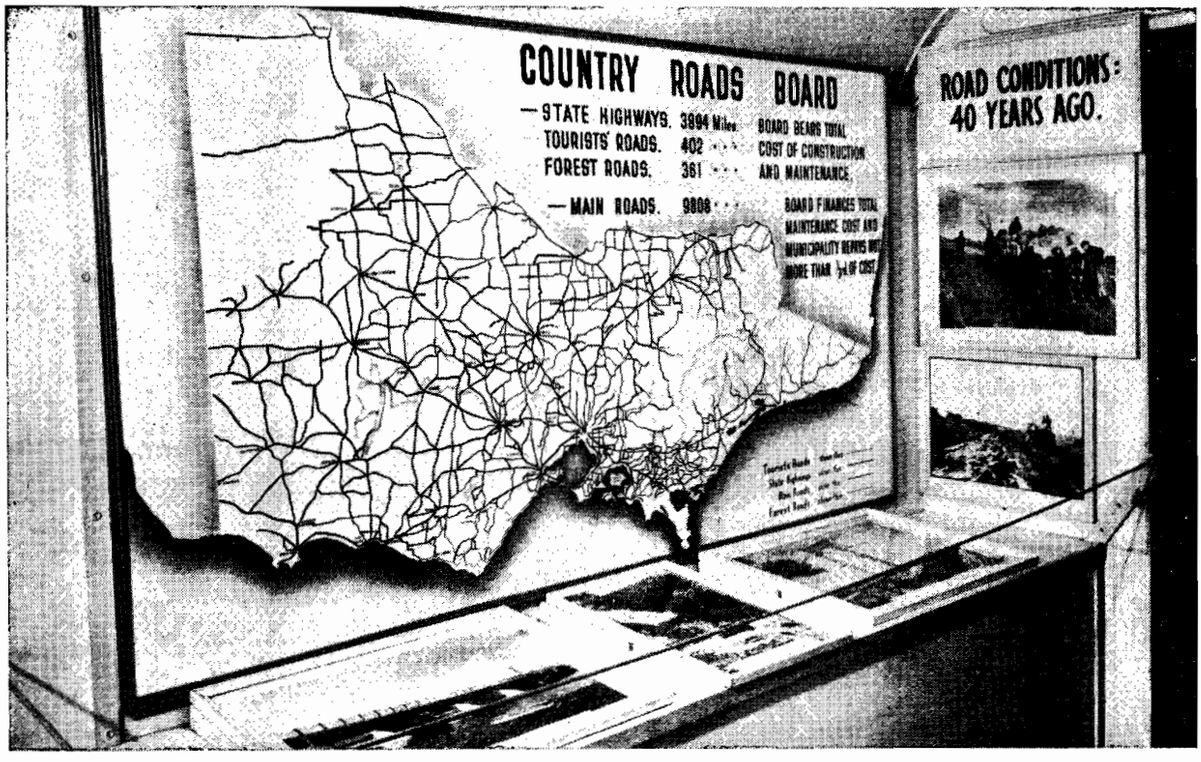


Plate No. 45.—An 800-gallon bitumen spraying unit in the Horsham Division.

CENTENARY TRAIN EXHIBIT





Plates Nos. 46 and 47.—The Board, along with other Government Departments and Instrumentalities, was invited to furnish an exhibit for the Centenary train, which was organized as part of the State's Centenary Celebrations, and opportunity was taken to display a number of photographs illustrating road conditions in this State to-day and 40 years ago, together with graphs and documents relating to motor vehicle registrations, mileage of declared roads, &c.

MUNICIPAL CLAIMS.

With the object of reducing the volume and cost of the municipal administrative work involved in the preparation of claims for reimbursement by the Board, and at the same time facilitating the handling of claims by the Board's staff, Councils have been relieved of the necessity of supplying copies of time sheets, and of lodging receipted wages sheets and other vouchers in support of claims.

Under the amended procedure, the claims duly certified need to be supported only by summaries of expenditure covering wages, materials, plant hire, and other charges, the relative voucher numbers being quoted, and the related documents being retained by the municipalities for purposes of record, inspection, and audit.

This new procedure has already justified itself, and is believed to be generally acceptable to the municipalities throughout the State.

PHOTOGRAPHY.

Four new colour cine-films with sound tracks were completed during the year, comprising—

1. " Gazette No. 6 ", which deals with the abnormal and extremely heavy loads that our road system is called upon to carry, and illustrates, by means of scenes of a grass fire being fought by the Seymour Bush Fire Brigade, the need for caution in lighting picnic fires by the roadside.

2. " The Rebuilding of Rosebrook Bridge ", which shows the actual floods that carried away this important structure on the Princes Highway West in 1946, and also shows the new bridge in course of construction.

3. " 1950 ", which shows the erection of a Bailey bridge at Puckapunyal by members of the 22nd Construction Regiment Supplementary Engineering Reserve, the formation of which, under the command of the Board's Engineer for Bridges, Lieut.-Col. I. J. O'Donnell, O.B.E., B.C.E., A.M.I.E.(Aust.), was referred to at some length in the Board's 37th Annual Report.

4. "Aftermath ", which illustrates the burden thrown upon the road system of this State during the disastrous rail strike in 1950, shows how vital road transport has become, and gives some indication of the strain that would be imposed on the road network in a Commonwealth emergency.

The Board's Mobile Film Unit displayed films on 154 occasions in camps established by the Board which are remote from townships, and in addition, 60 screenings of the Board's films were given to municipalities, clubs, and other organizations throughout the year, including a number specially for New Australians.

The photographic side of the Board's activities was strengthened during the year by the appointment of a " Still " photographer, which will enable up-to-date photographic records to be kept of the works programme, information of new features to be disseminated in assimilable form, and reports of field officers and research engineers to be more adequately illustrated with consequent saving of time by senior executive officers.

ROAD MATERIALS.

Increasing costs of quarrying, carting, &c., have made it imperative, in many parts of the State, to investigate the possibility of using local materials, even though not of the highest quality, in preference to better-class materials which could only be obtained by cartage over long distances at a correspondingly high cost. In some cases these investigations have borne good fruit, and quarries or pits have been successfully developed which promise to solve local road surfacing problems for many years to come.

These investigations have been carried out by various members of the engineering staffs of the Board and Councils, partly in the course of controlling works under construction and partly with special assistance from the Board's geologist, soils engineer, and other members of the materials research division.

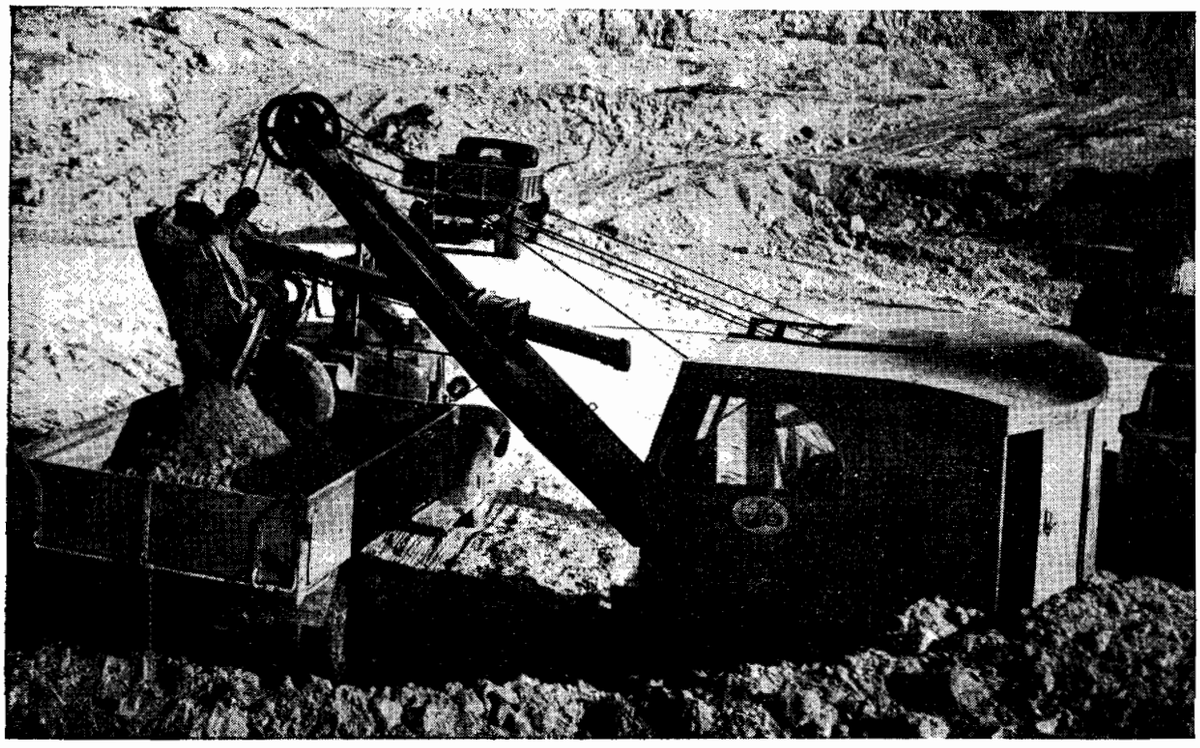


Plate No. 48.—A power shovel working in the soft sandstone quarry off the Kerang-Quambatook Road on Kendall's property. This quarry provides material for use on roads in this area.

Plate No. 49.—A sheep's foot roller at work on the Loddon Valley Highway south of Kerang, compacting soft sandstone.

Plate No. 50.—A heavy grader at work on the same section of the Loddon Valley Highway.

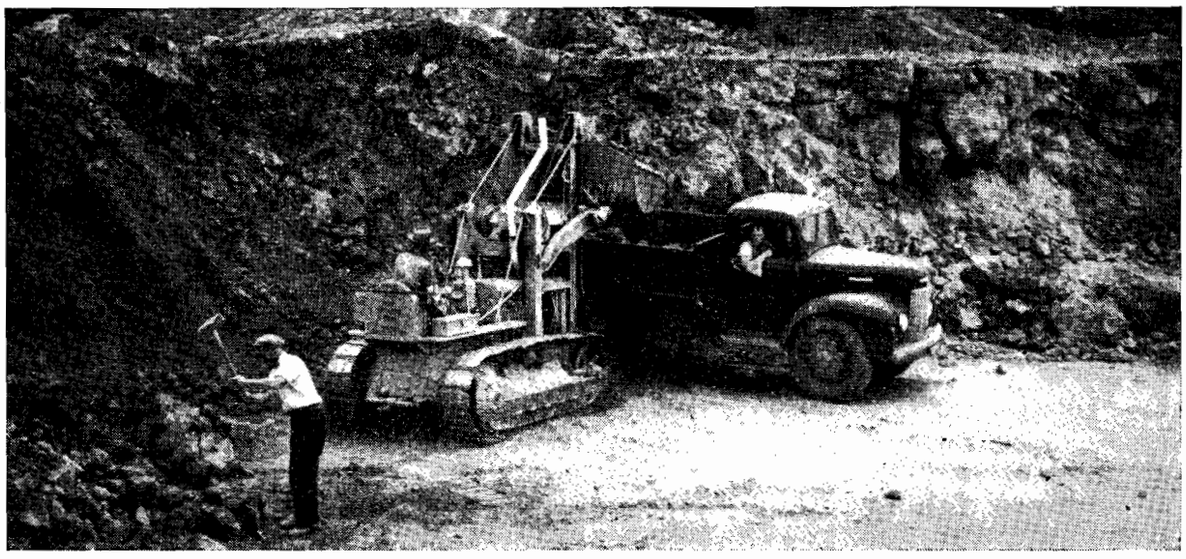


Plate No. 51.—A mechanical loader working in the sandstone quarry off the Western Highway at Salisbury.

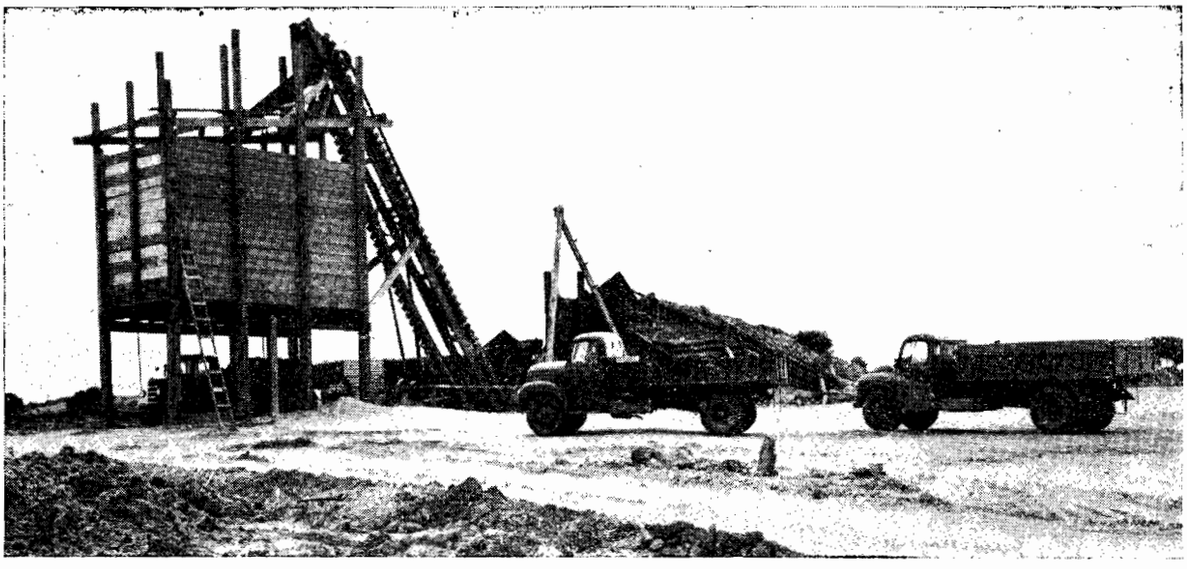


Plate No. 52.—The crushing plant and loading hopper at the Salisbury Quarry.

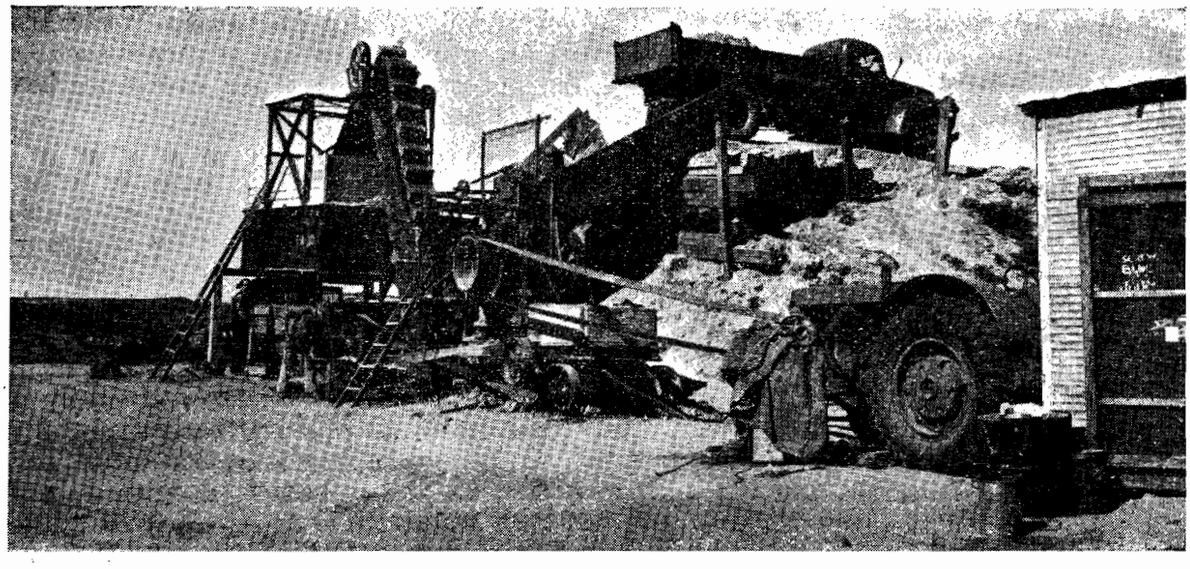


Plate No. 53.—The crushing plant at the sandstone quarry off the Henty Highway near Dooen.

An outstanding example of the successful use of local material in the Bendigo Division during the year was the development of a pit in the soft sandstone in the property of Mr. Kendall in the Parish of Koorangie. For the reconstruction of the Murray Valley Highway near Kerang, and between Kerang and Swan Hill, as well as for the Loddon Valley Highway south of Kerang, large quantities of material were required. Limited quantities of limestone only were available for base-course work, whilst the only suitable material for top course work was crushed granite from the Pyramid Hill area, the use of which, north of Kerang involved heavy cartage costs. Intensive prospecting of the country north and west of Kerang finally resulted in the discovery of a deposit of soft sandstone beneath a shallow layer of limestone and marl, located in Kendall's property approximately 8 miles west of Kerang and 1 mile from the Kerang–Quambatook main road.

After proving the existence of a considerable quantity of material suitable for road pavement construction, a decision was made to work the deposit and utilize the material for base-course construction. It was later found practicable to use the material for the top course and to produce a satisfactory surface by breaking up the material during quarrying and on the road bed without the use of mechanical crushers. During the financial year, approximately 50,000 cubic yards of the sandstone have been used, the pit has been developed to a depth of 30 feet, and during the next financial year it is anticipated that an even greater quantity of material will be obtained. The saving shown on the quarrying and loading of this material as against the purchase of crushed rock from the Pyramid Hill area is approximately 7s. per cubic yard, and the saving on cartage on the work carried out during the year averages approximately 13s. per cubic yard, representing a total saving of about 20s. per cubic yard or £50,000 for the financial year. In addition, the higher rate of supply of the sandstone has enabled much greater progress to be made with the reconstruction work. (Plates Nos. 48, 49, and 50.)

Further prospecting in the Bendigo Division has disclosed the existence of a similar deposit in the Parish of Kunat Kunat, about 5 miles from Lake Boga, and although the depth of overburden in this locality is approximately 5 feet, the material may prove very valuable in later years.

In the Shire of Belfast, the Council has installed a crushing plant at Kirkstall for the production of crushed rock and aggregate. The material available is surface basalt, and it is anticipated that 3,000 cubic yards will be obtained from this particular quarry. It is estimated that there will be a saving of £1 per cubic yard by the use of this material over imported material which has had to be obtained by road cartage on a 45-mile lead.

In the Dandenong Division, selected quarry waste has been successfully used as a base course in widening trenches on the South Gippsland Highway and as a base course on roads on Phillip Island. It is available in considerable quantity from the Berwick, Pakenham, and Phillip Island Quarries (approximately 5,000 to 6,000 cubic yards per annum from each source).

On the Mornington Peninsula, where the quarries in operation are crushing sandstone and mudstone, and obtaining an undesirable plastic fine-crushed rock, the mixing of non-plastic sand with the crushed rock has given a resultant pavement suitable for sealing. The practice of mixing sand with this fine-crushed rock should have a marked effect on the economy of road construction in this area.

In the Heath Hill and Grantville areas, deposits of sand are generally either non-plastic and free or highly plastic, i.e., there is very little pit-run sand of a suitable grading and plasticity for roadmaking in the locality. Use of these normally unsuitable local materials has been possible by stabilizing the non-plastic sand by the addition of selected loams and reduction of the plasticity of the plastic sand by the addition of fine non-plastic sand, and roads surfaced with these materials have been sealed.

The State Coal Mine dumps at Wonthaggi provide an almost unlimited supply of non-plastic burnt clay which has been found suitable for roadmaking, particularly as a base course. It is a relatively light material, similar to brickbats, breaks down fairly easily under heavy traffic, and is readily consolidated. It has been used extensively in the top course on the Bass Highway and has been sealed. Had fine-crushed rock been available, however, a top course of 2-in. consolidated fine-crushed rock would have been used before sealing.

The outstanding case in the Horsham Division in which local materials were successfully used was in the Donald area, where a natural mixture of sand and limestone nodules was found in large quantities on the western bank of Lake Buloke, approximately 5 miles east of Massey. In the past, road construction in the area had been done, firstly, with imported gravel from the Stawell district or gravel carted over long leads from the Kara Kara area and, latterly, with sandstone from quarries developed near Lake Buloke. The rapid depletion of the sandstone, which had to be crushed, led to serious consideration of soil cement as a pavement material, when investigations into the deposits of sandy limestone suggested that it was worth trying. A section of 2 miles was constructed with this material at Watchem two years ago and a seal coat applied which proved to be satisfactory. Since then approximately 48,000 cubic yards of the material have been used on the Borung and North Western Highways at a very cheap cost as compared with crushed sandstone or imported gravel, and it is estimated that there is still a quantity of 50,000 cubic yards of the material available.

Another instance of the use of local materials is the development of the sandstone quarries in the northern and western parts of the Horsham Division, where, in the early years of the Board's operations, gravel had been imported by rail from Langi Logan or Stawell. Quarries to produce crushed sandstone have been developed at Dooen, Lah, Kellalac, Salisbury, Kaniva, Lillimur, and in the Shire of Dunmunkle, and during the year 1950–51 a total quantity of 126,000 cubic yards of this material was used from these sources for highway and main-road pavements. Although the crushed sandstone cannot be said to be a very good pavement material, the alternative of importing gravel by rail is quite impracticable and prohibitive, and the sandstone is much better for sealed pavements than the majority of the local limestones, which are generally highly plastic. (Plates Nos. 51, 52, and 53.)

In order to ascertain whether the rate of degradation of quartz gravel or quartz screenings under traffic can be reduced by the use of well-graded aggregates, or, alternatively, the adoption of two seal coats, 24 experimental sections were laid down on the Western Highway over a length of 2·05 miles near Green Lake, South of Horsham. The work comprised initial treatment using three different types of quartz or quartzite aggregate and coarse sand.

The experimental length was designed to test (*a*) the life of several types of aggregate available in the district, (*b*) the best grading for each of several types of aggregate under test, and (*c*) the relative values of single and multiple applications seals for mineral aggregates and quartz gravel and crushed quartzite.

MATERIALS RESEARCH.

The importance of the subject of materials research need hardly be stressed, in view of the economies which can be effected by the judicious use of local materials. This is especially important in those localities where first-class roadmaking materials are not available in any quantity, and must be carted a considerable distance.

During the year, the Board's Materials Research Division, in conjunction with a Committee of the Institution of Engineers, Australia, has been investigating the pavement thickness required for residential streets in the suburbs of Melbourne. The results of this investigation may well prove to be of great benefit in the Board's own programme.

In many parts of the State supplies of crushed rock of sufficiently good quality for road construction are difficult to obtain. On occasions, it has been necessary to mix sand into the material to reduce the plasticity of the binder. The proportion of sand necessary to obtain the most satisfactory results has been determined by the Division.

Investigation was also commenced in the laboratory into the use of Mallee drift-sand mixed with bitumen as a material for surfacing roads in the north-western part of the State.

Testing of concrete and concrete aggregates has been continued, and has formed the basis of an educational campaign which is showing some effect in improving the quality of the concrete used in the Board's constructional work.

The chemical laboratory is being equipped to carry out the simpler identification tests on paints used for the protection of structures, and will ultimately be in a position to detect unauthorized changes in the composition of this material.

Divisional laboratories have been established, or are in course of being established, at each of the Board's country divisional offices. A limited amount of work can be done for municipal engineers, although it is advisable for these engineers to equip themselves with some testing equipment of their own, such as, for example, a set of sieves and equipment for shrinkage tests.

Some indication of the extent of the ramifications of the Materials Research Division may be gauged from the fact that, whereas in 1939, the Division consisted of five officers, it now comprises sixteen, apart from testing officers stationed at country divisional centres.

THE 1950 RAIL STRIKE.

The 54-day rail strike late in 1950 had a disastrous effect on the Board's road system, particularly on the State highways, and the damage done will take many years to make good.

The strike resulted in goods which would normally be transported by rail being carried by road, with a consequent large increase in traffic density, much more heavy loading, and a considerable amount of overloading. (Plate No. 54.) It was realized, of course, that there was no other alternative form of transport, and that every endeavour should be made to ensure that the people of the State received essential supplies and that secondary industries were able to continue in operation, otherwise the dislocation which existed in the transport sphere could easily have spread to industry. The problem which faced the Board was how to keep loads within reasonable limits to prevent widespread road failures. (Plates Nos. 55 and 56.)

The traffic, involving as it did an abrupt increase in the number of heavy wheel loads per hour imposed upon the pavements, searched out weak areas of the foundations with startling rapidity, resulting in heaving up of the whole road. Passing and overtaking were intensified, so that shoulders, constructed necessarily much more lightly than the main pavement, soon degenerated into quagmires or a succession of ruts and holes. The edges of pavements rapidly broke away. Ravelling of old bitumen seal coats was accentuated and potholes quickly developed in them. Thus maintenance problems, already somewhat acute on the more heavily-trafficked roads, suddenly became overwhelming. Where one truck patrol of, say, three men had been employed, it became necessary to increase the gang and then to put on one, and in some sections two additional truck patrols, in the endeavour to keep apace with the damage. Next, on the worst sections, it was necessary to stop adjacent construction works and divert larger gangs to piecemeal reconstruction of failed lengths.

The Board was already confronted with a big task in the strengthening of highways and main roads to provide for the normal increase in traffic, quite apart from the additional strain imposed as a result of the rail strike, and the additional cost to the Board of repairing the extra damage done was considerable.

The effect of the increased traffic was most marked on the Hume Highway and the Princes Highway East, both of which suffered severely, so much so that heavy transports were actually bogged on the Princes Highway in Yarragon and Trafalgar in the shopping centres. On a 6-mile section of the road, including the townships, 30 trucks were bogged. (Plate No. 57.)

The restoration work on the roads generally, and particularly on these two highways, necessitated a substantial diversion of manpower and plant from other urgent projects, and the economic loss was a very serious one.

In an endeavour to police the speeds and load restrictions on commercial vehicles as laid down in the Motor Car Act, the Board's Traffic Officers worked long and arduously, and many offences were detected. On some highways, the density of traffic was such that it was almost impossible for drivers to travel at excessive speed. The Traffic Officers' reports indicated, however, that the majority of the operators were anxious to comply with the law as regards loads, and that only about 2 per cent. were unreasonable.

One lesson of the episode is that persistent overloading even by a few operators can speedily ruin a road which may behave perfectly satisfactorily under loads up to the legal limits. It is most reprehensible that individual operators either wilfully or through neglect should attempt to secure a brief benefit at the expense of the whole community. Such supposed benefit if resulting in eventual breaking up of the road is something which the community cannot afford, nor should it condone the offence.

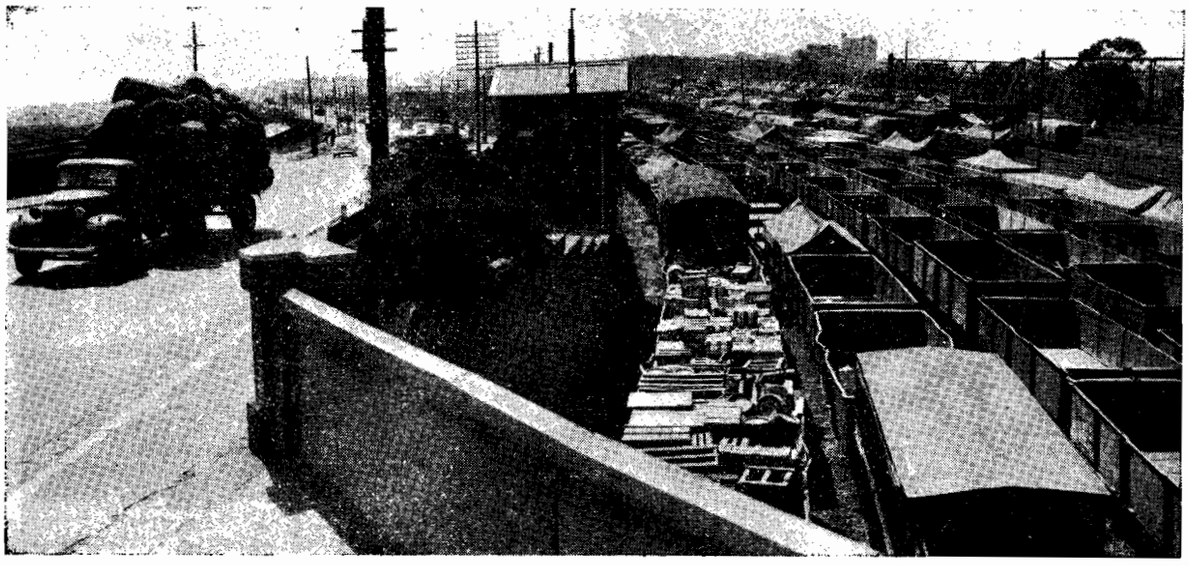


Plate No. 54.—Fifty-four days inactivity of the Railways throughout the State of Victoria tremendously increased the weight of traffic on the roads. Here the inactivity at the North Melbourne Railway Goods Yard is contrasted with the heavy traffic on Dynon Road.

Plate No. 55.—A section of Princes Highway East near Darnum which failed under the weight and volume of traffic.

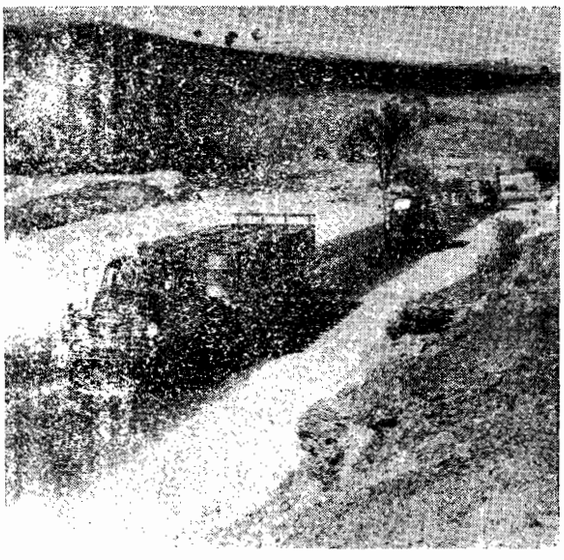


Plate No. 56.—Westbound traffic climbing from Djerriwarrah Creek on the Western Highway west of Bacchus Marsh.

Plate No. 57.—Repairing the failed section of the Princes Highway East at Yarragon where the poor quality sub-grades were removed. Granitic sand was used for back filling to a depth of as much as 5 feet.

A LOGGING TRANSPORT ON THE UPPER GOULBURN ROAD

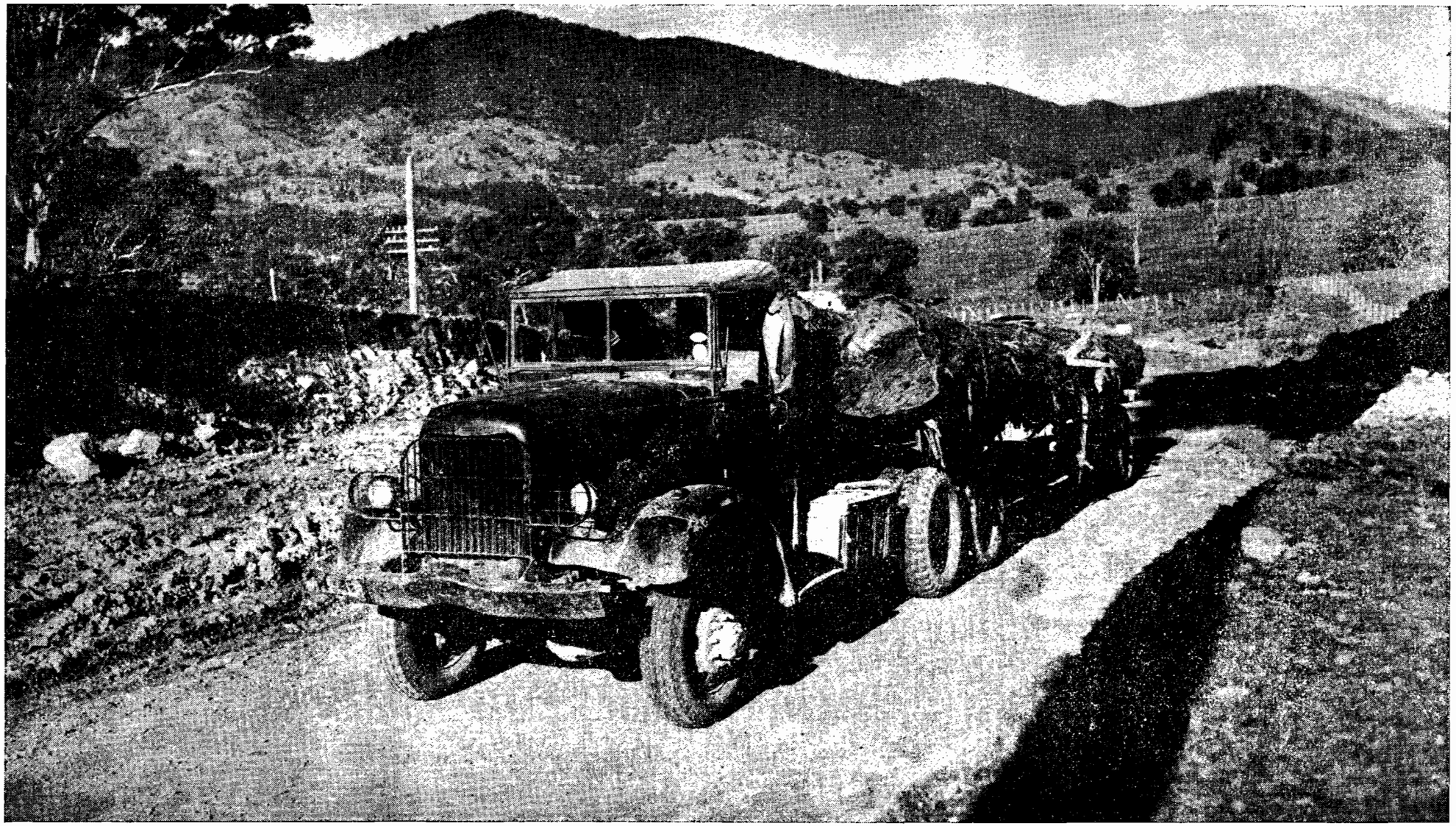


Plate No. 58.—Much use is made of the new road from the railhead at Alexandra to the Eildon Dam by logging transports, in addition to the extreme weight of traffic of the Utah Construction Limited.

CONTROL OF HEAVY TRAFFIC.

Detailed reference was made in the 37th Annual Report to the principal provisions of the amending Motor Car Act, which came into operation on the 1st January, 1950, and it was mentioned that, as a result of the various amendments to the Act, there had already been a reduction in the number of special permits issued by the Board.

The total number of permits issued in 1950–51 was 3,217, as compared with 4,159 in 1949–50, a reduction of 942. The number of single trip permits was reduced by 206 from 2,289 to 2,083, and the number of annual permits by 736 from 1,870 to 1,134.

The following statement indicates the type of permits issued during the year. Some of the individual permits covered more than one concession.

Exceeding 8 feet in width	2,556
Exceeding 12 feet in height	1,449
Exceeding legal length	1,574
Exceeding 6 tons load limit	970
Exceeding weight limitations—under 20 tons	17
Exceeding weight limitations—20–30 tons	346
Exceeding weight limitations—30–40 tons	219
Exceeding 40 tons	35
Miscellaneous	3
	7,169

The comparable number of permits issued in 1949–50 was 7,394.

PREDICTION OF FUTURE TRAFFIC.

On important roads the pavements when built or reconstructed may be expected to serve for some 25 years before further reconstruction becomes necessary, and structures must serve for 40 or more years. To avoid obsolescence during the life of the pavement or structure, it is essential to build the facility to such a standard that traffic demands are satisfied over the larger portion of its life. Future prediction of traffic, therefore, is a matter of great importance when new works or reconstruction of existing facilities are under consideration.

Examination of records kept over a period of some ten years prior to World War II., indicated that the amount of traffic on the roads (i.e., traffic index, measured from counts at a standard series of stations) is proportional to the total motor-vehicle fuel used in Victoria (petrol gallonage). This relation was used early in 1950 in making a prediction of future traffic. The steps taken in preparing the prediction were :—

(1) An estimation of population in future years.
(2) An estimation of the ratio of number of vehicles to population.
(3) From (1) and (2) an estimation of number of vehicles in future years.
(4) An estimation of fuel to be used per vehicle per annum in future.
(5) From (3) and (4) an estimation of the total fuel likely to be used in future years.
(6) From (5) and the observed proportional relation of traffic to fuel a traffic index curve was directly derived showing the anticipated traffic year by year. The curve obtained indicated that the traffic would increase by 50 per cent. over a ten-year period.

Traffic counts taken during 1950 and 1951, have however, shown that traffic is, at present, increasing at a much higher rate than predicted. This is due to present-day conditions causing increasing use to be made of road facilities, particularly by commercial users. The ratio of number of vehicles to population is increasing more rapidly than anticipated. The annual mileage of vehicles and consequently the gallons of fuel used per vehicle are also increasing faster than expected. Use of road transport is forced upon the community by the inability of the railway and shipping systems to supply the service demanded. Road transport is also preferred because of the better standard of service, with saving in time and cheaper packaging. Apart from the phenomenal increase in road freight, the number of passenger cars is also increasing at a high rate, leading to congestion at critical sections.

The traffic intensity which existed at the outbreak of war in 1939 was reproduced by 1948 and that traffic was doubled in the next three years. Should the present transport conditions continue for some years, it is patent that the present road facilities which are already overtaxed will become totally inadequate and like the railways, incapable of fulfilling demands. Increased revenues are already urgently needed merely to arrest deterioration, but progressive improvements must also be financed if the road system is to perform as it should either as an up-to-date community asset or as a vital link during any emergency.

RESTRICTION OF LOADING ON ROADS.

As in previous years, action had been taken to limit to 6 tons the gross weight to be carried on certain roads, not with the object of actually prohibiting the carriage of greater gross weight than 6 tons, but to enable the Board to control the traffic by the issue of permits based on the type and tyre equipment of the vehicles used.

It is the Board's desire to remove the load restrictions as soon as the sections of road concerned can be sufficiently strengthened to permit of their carrying normal loads, and it is gratifying that, during the past year, it was possible to remove the restrictions on (*a*) the section of the Western Highway between Horsham and the Rainbow Road, (*b*) the section of the Rainbow Road between the Western Highway and Jeparit, (*c*) the section of the North Western Highway from Donald to Litchfield, and (*d*) the full length of the Borung Highway.

STANDARDS.

Concrete Slabs.

In the Board's 35th Annual Report (page 43), reference was made to the adoption of a standard type of concrete slab for replacing timber decks on small culverts constructed with masonry walls for piers and abutments.

The use of these slabs has proved to be very popular and their application to different classes of works is rapidly extending. To cope with heavier loading and to make use of the better class of concrete now being manufactured, these slabs have been redesigned to cover a variety of spans ranging from 4 feet to 20 feet. They are designed using a concrete working stress of 1,050 lb. per square inch, and possess the great advantage that they can readily be made by municipal engineers as spare-time jobs in their depots, provided that suitable care is taken with the concrete.

RISING COSTS.

The steady influx of new motor vehicles into the State in the post-war years has been reflected in the corresponding increase in the Board's revenue from motor registration fees and fines, but, regrettably roadmaking costs have increased at a rate out of all proportion to the rate of increase of the Board's revenue.

Wages last year were three times greater than in 1938–39, the average cost per cubic yard of gravel aggregate for bituminous surface treatment work has increased in the same period from 12s. 10d. to £1 4s. 1d., whilst the cost of construction of 1 mile of typical new main road in undulating country to meet the traffic needs of to-day has increased from £3,500 to £17,500.

One mile of construction of a State Highway in 1939 on Wimmera soil to meet the then traffic requirements cost £1,400. Last year similar work cost £6,000.

On a densely trafficked arterial route 1 mile of construction 20 feet wide cost in 1939, £7,600. The estimated cost of construction of 1 mile of the same road 48 feet wide, as is really necessary to accommodate present-day traffic, is now upwards of £67,000 per mile.

LAND SUBDIVISION ALONG HIGHWAYS.

The increasing number of subdivisions of land along main traffic arteries has drawn attention to the necessity for ensuring that adequate provision is made in such subdivisions for the reservation of land for future road improvements.

Where land is being used for agricultural purposes, the acquisition of some portion thereof for road widening, &c., is not as a rule of serious consequence to the owner, but where it is intended to subdivide that land into building blocks or shop sites, with the probability that buildings will be erected at an early date, it behoves the road authority to decide upon its plan as affecting that land before the plan of subdivision is approved.

The Board has accordingly invited the co-operation of municipal councils throughout the State by asking them, before sealing any plan of subdivision of land adjoining any road under the Board's jurisdiction, or adjacent to an important road intersection, to submit such plans for the Board's consideration.

It has already been possible in a number of cases to plan ahead for anticipated traffic requirements by requesting the setting back of the property line a sufficient distance to permit of future road widening or to ensure that provision is made for splays at intersections to provide adequate sight distances, or for extra width of reserve to accommodate extra lines of vehicles in the future at such locations.

At the same time, consideration is given to the advisability of providing, where possible in the subdivisional design for limited access to the highway from the subdivided area, thereby removing a definite danger hazard.

The Board is very gratified at the co-operation it has so far received both from municipal councils and subdividers.

PLANT POOL.

The *Commonwealth Aid Roads Act* 1950 contains a provision whereby certain moneys available under that Act may be used not only for direct road works, but alternatively for the purchase of roadmaking plant. There are, however, no additional or separate Commonwealth funds reserved for plant purchase.

The majority of Victorian municipalities utilize plant on a considerable mileage of main and local roads, and they are generally in a position to make their own arrangements for finance either from revenue or loan. Most councils have in effect, already acquired much plant for themselves and the possession of several power-graders by one Council is by no means exceptional.

Some smaller municipalities are less satisfactorily equipped because they have not considered that the plant if purchased would be fully occupied. Sometimes units have been ordered, but deliveries have been delayed, whilst in other cases the Councils have been slow to appreciate the need for mechanization even on a scale within their modest resources and suited to their work and finance. In a few remaining cases the municipalities are too small to warrant their owning even a light power-grader. In general, however, it may be said that mechanization has been undertaken or is extending where the volume of work justifies ownership by a Council.

For many years, the Federal Aid Funds available to this State have been widely distributed to Councils for road and bridge construction and maintenance, both on declared and unclassified roads, and on all the works involved Councils have been reimbursed plant hire on a basis which would recoup all their costs, including interest and depreciation. This means, in effect, that, over a period of years, the Councils have been able to purchase their own plant by instalments from the road grants. The Board has, moreover, always assessed the contributions of Councils towards those grants with due regard to the circumstances of each municipality and any financial disabilities it may have.

For those Councils where separate ownership of specialized units is not warranted, or for others who have not sufficient plant of their own, the Board has endeavoured over the years, to make some of its plant available on loan from time to time, and has also had in view the establishment of a " Plant pool " consisting of items of plant which would be available, through the Board's Divisional Engineers for municipal use exclusively.

The general post-war shortage of plant, especially new units, the frequency of breakdowns of old units, and the expanding works programmes have, however, combined to make the full implementation of this scheme extremely difficult, but some progress has been made and four power-graders have so far been allotted full-time to this municipal plant pool.

These units are at present allotted to the Dandenong, Bairnsdale, Bendigo, and Warrnambool Divisions respectively, but as the opportunity occurs, it is proposed that a pool of plant comprising a heavy tandem power-grader, a medium power-grader, a Class 3 or a Class 4 tractor and a multi-wheel roller be built up in each Division.

These units will, of course, be a nucleus only of the plant pool in the division, and it is hoped that other items will eventually be added.

TRAFFIC LINE MARKING.

During 1950–51, 1,206 miles of road were maintained in a striped condition, and, as some sections required to be striped twice during the year, this involved the painting of 1,928 miles of road, of which 1,881 miles were roads under the jurisdiction of the Board, the remaining 57 miles being other roads striped at the cost of the Municipal Councils concerned.

In addition to the above work, 6 miles of road which had not been previously painted were striped.

The total expenditure was £11,701 11s. 3d., representing an average of £6 0s. 9d. per mile of line. 7,042 gallons of lacquer were used, the rate of application being 3·63 gallons per mile.

TRAFFIC OFFENCES.

During the year, the number of offences against the Motor Car Acts further increased, as set out in the following comparative statement of the cases in which convictions were obtained in 1949–50 and 1950–51 respectively :—

—	1949–50.	1950–51.
Speeding (freight vehicles)	269	429
Speeding (passenger vehicles)	4	4
Exceeding 13 tons gross weight	322	..
Exceeding 10 tons gross weight	21	..
Exceeding 6 tons load limit	147	192
Exceeding 17,000 lb. on one axle	104	372
Exceeding 7½ tons on one axle	47	191
Exceeding gross weight on axle group	49	..
Exceeding 3 tons on trailer axle	9	..
Exceeding two-thirds of vehicle weight on one axle	1	..
Exceeding loading capacity	24	30
Exceeding conditions of special permit	167	36
Exceeding 8 feet in width	10	21
Exceeding 12 feet in height	..	..
Exceeding 45 feet in length	6	22
Exceeding 35 feet in length for rigid portion of articulated unit	1	..
Refusing to allow vehicle to be weighed	13	9
Other offences	..	5
Total	1,194	1,311

The total fines imposed amounted to £14,355 5s., a record in the Board's history, and an increase of approximately 18 per cent. on the previous highest total last year. The number of cases in which fines were inflicted (1,311) was only 10 per cent. in excess of the number last year, but the average amount of the fines increased from £10 4s. to £10 19s.

It is of interest to note that, with the introduction of amended legislation placing responsibility on owners of vehicles offending against certain provisions of the Motor Car Act, the Courts considerably increased fines for overloading, the average fine imposed on owners of vehicles exceeding the permitted weight on groups of axles being £33, whilst in the case of proceedings against owners of vehicles overloading on one axle the average fine was £15 6s.

This increase, together with a tightening up of controls in New South Wales and a more effective liaison between that State and Victoria since January last, has resulted in a lessening of overloading offences, not only in number, but also in the degree of individual overloading. This last result was, of course, partly due to the increased allowable gross loads as provided for in the amended Act.

OFFENCES AGAINST COUNTRY ROADS ACTS.

The number of cases in which proceedings were successfully instituted for offences against the *Country Roads (Impounding of Cattle) Act* 1935 for allowing cattle to wander on State highways was 373, as compared with 292 in the previous year. The amounts received in fines for the periods were £796 and £473 2s. 6d. respectively, and the average fine per case increased from £1 12s. 5d. to £2 2s. 9d. Despite this increase, the fines imposed are still thought to be too low, and not a sufficient deterrent to those who appear to be making a practice of grazing stock on public highways.

In all, 410 offences were reported, involving stock numbering 3,206, of which 504 were impounded.

PROPOSED LINK ROADWAY.

Station Street to Albert Street, Northcote.

A recommendation made by the Metropolitan Town Planning Commission in its report issued in 1929 that the linking of the above roads was essential to provide direct road communication in the area seems likely to be carried into effect. Apart from its local significance, it is probable that this road may have additional importance as portion of a new link between the Hume Highway and the northern and western sections of the metropolis, and in view of the rapid development of the area, the opportunity to provide the reserve for this roadway cannot be lost, as the cost of providing this link will never be less than at present.

Discussions have taken place between the Housing Commission, which has extensive interests in the area, the Town and Country Planning Board, the Northcote and Preston City Councils, and the Country Roads Board on the question of the apportionment of cost of the work.

Whilst finality has not yet been reached, it is probable that action will be taken in the near future for the purchase of the necessary land for the road, even though the road construction may not be undertaken immediately.

CONFERENCE OF STATE ROAD AUTHORITIES OF AUSTRALIA.

The Thirteenth Conference was held on the 16th and 17th October, 1950, at the offices of the Highways and Local Government Department, Adelaide, and was attended by representatives of the other State Road Authorities throughout the Commonwealth, together with a representative of the Commonwealth Department of Works and Housing.

Many items of importance were discussed, amongst them being the invitation of tenders for bitumen supplies, representation at the short course for highway engineers being conducted in the United States of America by the Bureau of Public Roads in that country, uniform road statistics, exchange of information on main road legislation and practice, financial assistance to the States by the Commonwealth, motor vehicle taxation, road safety and road signs and signals, dimensions of motor vehicles, import licences for roadmaking plant, limited access rights, standard specifications for soil tests and bridges, and route numbering.

Arising out of this annual conference of State Road Authorities, committees consisting of senior officers of the various authorities have been set up which meet annually and submit to the main conference reports and recommendations on matters referred to them by that conference.

Committees now functioning in this way are the Principal Technical Committee which comprises the Chief Engineers of each of the Authorities, the Materials Research Committee, the Plant and Equipment Committee, and the Bridge Designing Committee.

Meetings of these committees were held during the year at Brisbane (Principal Technical Committee), Adelaide (Materials Research Committee), and Sydney (Bridge Designing Committee).

CONFERENCE OF MUNICIPAL ENGINEERS.

The Seventh Conference of Muncipal Engineers arranged by the Board was held in Melbourne on the 30th and 31st May, 1950, and the very encouraging attendance of 140 municipal engineers, in addition to the senior engineers of the Board's own staff, indicated that this conference has " come to stay ", and is serving a very useful purpose. This was evidenced by the wide variety of technical items on the agenda and by the discussions which took place.

The Board itself is very gratified by the interest shown by the municipal engineers generally in these conferences, as they offer an excellent opportuity for engineers to discuss their particular problems and to benefit by the experience of other members of the profession. In all cases, members of the Board's engineering staff had given considerable thought beforehand to the various items submitted for inclusion on the agenda, and following the introduction of the subject by the engineer by whom it was sponsored and comments by others present, the matter prepared by the engineers of the Board was presented to the conference.

As on previous occasions, the material presented by the Board's engineers will be circulated for general information.

ACTS AFFECTING THE COUNTRY ROADS BOARD.

The following Acts affecting the operations of the Board were passed during the year :—

Country Roads Board Act 1950 (No. 5495).

Provision is made for the appointment by the Governor in Council of the Chairman of the Board, the Deputy Chairman, and Acting Members, and for the determination by the Governor in Council of the salaries of the Members of the Board. Following on this amendment Mr. F. M. Corrigan was appointed Deputy Chairman of the Board.

Motor Car (Drivers' Licences) Act 1950 (No. 5496).

Provision is made for the minimum age for a licence to drive a motor tractor the property of any primary producer, to be seventeen years.

The Municipalities and Other Authorities Finance Act 1950 (No. 5512).

This Act provides for the fee for a motor car driver's licence to be increased from 5s. to 10s. per annum, and for half the amount of all motor-car drivers' licence fees less cost of collection to be paid into the Country Roads Board Fund.

The Act also provides that, with the approval of the Governor in Council and on the recommendation of the Country Roads Board after consultation with the Chief Commissioner of Police and the Council of the municipality concerned, there may be applied out of the Country Roads Board Fund sums not exceeding £10,000 in any one financial year and £50,000 in all towards the construction purchase and installation on any route of traffic control lights by the Country Roads Board or any municipality.

MISSIONS ABROAD OF OFFICERS.

Mechanical Engineer.

Reference was made in the 37th Annual Report to the visit of the Board's Mechanical Engineer, Mr. G. M. Langham, B.M.E., A.M.I.E.(Aust.), to Great Britain, America, and Europe to investigate developments in the manufacture of road construction plant and the design and lay-out of workshops.

Mr. Langham, who returned to Melbourne on the 7th November, 1950, was able to obtain information of considerable value on the above-mentioned matters, and recommendations made by him since his return for alterations to the Board's mechanical division are being gradually implemented.

His contacts with manufacturers of many types of plant used by the Board have also borne good fruit.

Whilst in Great Britain, Mr. Langham also investigated the possibility of securing skilled tradesmen who would be prepared to join the Board's service, but it is regretted that his efforts in this direction have been limited to recruitments from single migrants arriving in Victoria under the general Commonwealth scheme.

Deputy Chief Engineer.

The Board's Deputy Chief Engineer (Mr. J. Mathieson, M.C.E., M.I.E.(Aust.), who left for the United States of America in May, 1950, to attend the course arranged by the United States Public Roads Administration for highway officials and engineers, returned to Melbourne on the 23rd December, 1950.

This sixteen weeks course, which dealt with the Theory and Practice of Highway Improvement and Utilization, proved to be a very informative one, and his additional investigations both in the United States and Great Britain, into traffic and safety problems has enabled him to gain information which will be of great value to the Board in dealing with such matters.

Mr. Mathieson is preparing a report on his mission, which will eventually be available for distribution.

DOMINION CIVIL SERVICE FELLOWSHIPS.

The Commonwealth Fund of New York, a philanthropic foundation existing since 1925 and supported by certain endowments, has established for British subjects a number of fellowships tenable in the United States of America. In creating these fellowships, the Directors of the fund have been impelled by a belief in the value of international opportunities for education and travel and by a desire to strengthen the mutual amity and understanding between the British Commonwealth and the United States.

Five of these fellowships were offered for 1951 to persons holding appointments in the Government of Australia, New Zealand, and South Africa, and one was awarded to one of the Board's most promising engineers, Mr. K. G. E. Moody, B.C.E.(Hons.), M.Eng.Sc.(Hons.)

Mr. Moody proposes to undertake research into the behaviour of reinforced concrete and steel structures when subjected to loads approaching the maximum loading capacity of the structures. These studies will be carried out under Professor F. E. Rickart, at the Universities of California and Illinois.

OVERSEAS ENGINEERS.

By arrangement with the Universities Commission, Mr. Utai Voodhigula, a graduate in civil engineering of Thailand, was attached to the Board's staff for a period of four months to enable him to study in Australia, the subject of highway and bridge construction, under a United Nations Technical Development Fellowship.

During that period, Mr. Voodhigula was attached for short terms to the Board's Bridge Division, its laboratory, and to various country Divisions, to enable him to obtain a general picture of the Board's operations.

Mr. Mohammed Hamied-Ud-Din, B.Sc., C.E., of Lahore, West Pakiston, also spent a fortnight with the Board, inspecting road and bridge works in progress, under a similar fellowship.

A third visitor during the year was Mr. B. P. Patel, from New Delhi, India.

ACCIDENTS TO EMPLOYEES.

The number of accidents in which the Board's employees were concerned during the year exceeded the number for the previous year, although, on the other hand, there has been an increase in the number of persons employed by the Board.

For the most part, the accidents were not of a serious nature, but it is a matter of regret that seven of the Board's employees lost their lives during the year.

The general nature of the accidents is summarized in the following statement:—

Fatal	7
Strains and sprains	34
Fractures	11
Eye injuries	59
Bruises, lacerations	34
Burns	18
Injuries to limbs	206
Poison	2
Heart strain	3
Head injuries	24
Infections	9
Miscellaneous	43
	450

STAFF.

Since the 1st July, 1950, the total of the Board's Staff has increased from 395 (comprising of 228 males and 31 females on the permanent staff, and 83 males and 53 females on the temporary staff) to 431, made up as follows:—

Permanent Staff—	
Males	229
Females	29
Temporary Staff—	
Males	112
Females	61

Whilst the net increase in numbers was 36, there were actually 84 new appointments made, as 48 officers resigned or retired during the year.

The Board is still having difficulty in recruiting staff, especially professional officers, and the loss of so many officers, some with considerable experience, during the year has been a very serious one.

STAFF ACTIVITIES.

Charities Fund.

For many years, members of the Staff have contributed to a Charities Fund, their voluntary contributions being deducted fortnightly from their salaries.

During the year, the total sum received by this means was £227 19s. 6d., and this sum together with portion of the balance already in hand, was distributed to 24 charities throughout the State. The total amount distributed during the year was £251 11s., and the charities supported included various metropolitan and country hospitals, the Lord Mayor's Fund, the Institute for the Blind, and similar deserving organizations.

Staff Journal.

It is a matter of regret that the staff journal *Roadlines* ceased publication after the fourth quarterly issue, due to the fact that the Editor, Miss N. Strover, Officer in Charge of the Correspondence Records Section, was compelled owing to pressure of official duties to relinquish the position. As this publication had been greatly appreciated during this brief history, it is hoped that other arrangements will shortly be made for it to be again taken in hand.

Social Committee.

The old adage "All work and no play makes Jack a dull boy" has inspired the energetic Social Committee appointed by the Staff to great heights in endeavouring to cater for the recreational side of its activities.

In addition to the annual staff ball, theatre nights, and week-end outings for the staff, a means was sought to provide some form of recreation for the staff during the lunch period, bearing in mind that the Board's offices are so situated that it is difficult for the members of the staff to use the period for shopping as would probably be the case if the offices were located in the city proper.

Thanks to the co-operation of the Secretary of the Exhibition Trustees, space has been made available in the main Exhibition Building for the playing of table tennis, basketball, badminton, &c., and these facilities are fully availed of and greatly appreciated by the staff generally.

The Social Committee is doing an excellent job and its efforts merit the wholehearted support of all members of the staff.

MOTOR REGISTRATION.

During the year 451,781 vehicles, including traction engines and motor cycles, were registered. This represents a net increase of 39·883 or 9·7 per cent. over the figures for the financial year 1949–50.

Vehicles.	Financial Year 1949–50.		Financial Year 1950–51.		Increase.	Decrease.
Private—						
New	32,192		36,565			
Secondhand—Re-registered ..	11,340		15,806			
Renewals	178,719		206,338			
		222,251		258,709	36,458	
Commercial—						
New	9,416		12,132			
Secondhand—Re-registered ..	4,350		4,932			
Renewals	55,997		56,835			
		69,763		73,902	4,139	
Primary Producers—						
New	7,036		6,528			
Secondhand—Re-registered ..	3,105		3,385			
Renewals	59,239		59,639			
		69,380		69,552	172	
Hire		4,262		4,463	201	
Licences under Motor Omnibus Act ..		864		878	14	
Trailers		11,100		10,699	..	401
Traction Engines, &c.		47		47		
Motor Cycles		34,231		33,531	..	700
Total		411,898		451,781	40,984	1,101

ACCOUNTS.

Statements of accounts for the year ended 30th June, 1951, 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.

—	Under Board's Supervision.			Under Council's Supervision.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.
1. State Highways—									
Maintenance and Reconditioning	1,248,827	10	11	72,347	3	5	1,321,174	14	4
Construction	711,026	14	6	44,973	5	6	756,000	0	0
2. Main Roads—									
Permanent Works	34,955	19	9	..			34,955	19	9
Maintenance and Reconditioning	205,590	15	1	1,818,528	5	11	2,024,119	1	0
3. Unclassified Roads—									
Construction and maintenance	54,155	15	0	702,780	10	10	756,936	5	10
Roads for isolated settlers	..			14,062	11	11	14,062	11	11
Federal maintenance	25,398	19	7	141,293	11	11	166,692	11	6
4. Tourists' Roads—									
Maintenance	209,466	16	3	2,804	17	7	212,271	13	10
Construction	126	6	11	..			126	6	11
5. Forest Roads—									
Maintenance	24,577	15	8	27,217	4	8	51,795	0	4
Construction	11,538	5	3	..			11,538	5	3
6. Murray River Bridges and Punts—									
Maintenance	11,249	6	8	391	19	7	11,641	6	3
7. Roads adjoining Commonwealth properties ..	709	0	5	..			709	0	5
	2,537,623	6	0	2,824,399	11	4	5,362,022	17	4

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. :—

	£
Commonwealth Government	17,390 18 4
State Instrumentalities, &c.	477,199 1 7
	494,589 19 11

OFFICERS AND EMPLOYEES.

The Board desires to express its appreciation of the loyalty and efficient manner in which officers and employees responded to the demands made upon them in a year in which the expenditure was the highest in the Board's history, and shortages of personnel in some sections particularly acute.

ACKNOWLEDGMENTS.

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

It is also desired to record the thanks and appreciation of the Board to officers of Government Departments, State Instrumentalities, and the road authorities in other States for their assistance. The ready co-operation of 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, Deputy Chairman.
R. F. JANSEN, Member.

W. H. NEVILLE, Secretary.

CHIEF ENGINEER'S REPORT.

Country Roads Board Office,
Melbourne,
7th November, 1951.

THE CHAIRMAN,

SIR,

I have the honour to submit the following account of certain matters of engineering interest included in the Board's work during the year 1950–51.

MECHANICAL DIVISION.

Efficiency.—A summary of overall and mechanical efficiency, as defined in the 36th (1949) Report, is given for the more important classes of plant in Table A. For purposes of comparison, figures for the last four years are shown in Table "A".

The figures to the end of May, 1951, do not take into consideration the following units which 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
1950–51	13	2

The efficiency of tractors has improved slightly over the last year, while the efficiency of power graders has fallen off by about the same percentage. The reason for this is probably the greater concentration on the maintenance of tractors.

Plant Strength.—Table B shows the number of major items owned by the Board at 30th June, 1949, 1950, and 1951.

Class I. and II. tractors have been on order for some years, but only eight units have been delivered since 1940. Most of the "new" units have been imported from England after being reconditioned, consequently they will have had about 5,000 hours use before being received by the Board. It is hoped that some units will arrive shortly under the "Dollar Loan" otherwise the present condition of the fleet will persist with 42 per cent. of all units broken down and out of action.

A large number of tractors is still on order and would have been available during the financial year 1951–52. This, it was hoped, would have improved the overall efficiency, but owing to reductions in funds a limited number of units only will be accepted.

Maintenance.—While the general plant maintenance position, number of fitters, and quantity of spare parts available have remained substantially the same as in the previous year, there has been a small increase in the quantity of work done.

Preliminary steps have been taken to improve the quality of maintenance of the Board's plant by :—

(*a*) Re-organizing the Mechanical Division.

(*b*) Making individual engineers responsible for certain classes of plant, e.g., one man specializes in B.S.T. plant, while another is responsible for automotive equipment.

(*c*) Providing and carrying out more testing after overhauls.

TABLE "B."—TRACTORS AND POWER GRADERS.

	Number Owned by the Board.		
	30th June, 1949.	30th June, 1950.	30th June, 1951.
Crawler Tractors—			
Class 1	17	20	28
Class 2	44	47	47
Class 3	18	19	20
Class 4	13	16	22
	92	102	117
Power Graders—			
Heavy—Tandem Diesel	47	52	62
Medium—Dual-wheel Diesel ..	7	7	15
Light—			
Single drive, hand control ..	14	12	6
Single drive, power control ..	15	21	21
Patrol Power Graders	3	6	13
Speed Patrols	4	4	7
	90	102	124

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.	1950–51.	1947–48.	1948–49.	1949–50.	1950–51.
		Years.	%	%	%	%	%	%	%	%
Crawler Tractors—										
Class 1	20	4	42	27	37	39	45	33	51	44
Class 2	43	4·3	39	33	35	41	50	45	44	47
Class 3	19	4	34	21	26	33	37	36	31	38
Class 4	22	3·5	55	33	38	43	64	47	51	48
Power Graders—										
Heavy—Tandem Diesel	62	4·5	72	54	74	67	73	76	77	70
Medium—Dual wheel, Diesel ..	15	6·5	61	64	66	72	62	76	77	79
Light—Single drive, hand control ..	6	7·4	48	28	33	29	52	42	38	34
Light—Single drive, power control ..	19	4	72	49	63	64	73	56	70	68
Patrol power graders	13	1·4	..	86	80	67	..	89	91	73
"Speed Patrols"	7	3·4	..	71	69	66	..	88	78	69

(*d*) Making more frequent and more complete inspections of plant in the field, and improving the follow-up of required repairs, particularly by Divisional workshops.
(*e*) Introducing foremen's conferences.
(*f*) Preventive maintenance.

Well-recognized preventive-maintenance schedules for motor vehicles exist and are in use to prevent vehicle breakdowns, but do not appear to be available for many other items of plant. They are being developed for crawler tractors, have been used with success on two major construction jobs, and are now being tried out on a larger scale in one Division.

Minor building alterations have been made and additional equipment obtained to improve the working efficiency of the central workshops. The diesel injection equipment test-room is now well equipped and is capable of dealing with all but one type of pump in use by the Board. Use is made of this room to test diesel pumps and injectors for two other Government departments.

Divisional workshop buildings at Horsham and Bairnsdale have been enlarged and limited additional personnel and equipment have been acquired at most centres. These workshops are now coping with most of the field plant maintenance work in the Divisions, and by carrying out a small number of overhauls, are reducing the strain on the overloaded Central workshops.

General investigational work carried out in conjunction with engineers from other Divisions includes :—

Further rock-drilling tests.
Metal spraying.
Design of magnetic clutches.
Trench cutting blades for use in pavement widening.
Soil testing machine.
Beading of sign boards.

In conclusion, the increase in numbers of the Board's plant and the ageing of much of its equipment has stressed the need for improved workshop and maintenance facilities which will eventually be provided at the new depot at Syndal.

STONE-CRUSHING PLANT.

One of the serious problems with which the Board has had to contend since the war has been the difficulty in getting fine crushed rock for pavement construction or crushed stone for use as covering material for bituminous surface treatment.

Before the war these materials were crushed by a number of small contractors, from whom tenders could usually be obtained for quantities of 1,000 yards and upwards. Since the war, largely owing to the difficulty in obtaining labour for spalling, few tenders have been received for this kind of work in isolated areas. The bulk of the material which the Board has been able to get has been produced by larger quarries, involving long road hauls owing to the shortage of railway trucks. An example is given by the orders placed with one contractor for 6,350 cubic yards of crushed material in the Warrnambool Division. The original contract provided for rail cartage. No other source of material was available and, owing to shortage of trucks, it was necessary to carry the bulk of the material by road at an additional cost of over £1 per cubic yard.

Under normal conditions, it would have been recommended to the Board that quarries equipped with primary stone breakers should be opened at selected centres for the purpose of supplying large areas by rail. Since railway trucks cannot be obtained, the only solution appeared to be the acquisition of large primary crushers of a mobile type which could, with a quarrying gang, be moved from site to site and set up at each of them for the purpose of crushing, to a size which could be handled by smaller plant, quantities of spalls of the order of 15,000 to 20,000 cubic yards. Enquiries regarding suitable plant available abroad were made by the Deputy Chief Engineer during his visit to the U.S.A. and England, and by the Mechanical Engineer in England. Following these, and consideration of the weights which could be carried on pneumatic tires without exceeding the limits normally adopted when issuing permits, the Board placed an order in the U.S.A. for a 36-in. x 22-in. crusher with a bar-type feeder for removing small stones and dirt before crushing. The machine has been imported, mounted on a chassis fitted with pneumatic tyres. To comply with loading requirements it will be necessary to replace the single front axle with a bogie and, during transport, to remove the feeder. (Fig. 1.)

To operate this unit economically, it will be necessary to provide a considerable quantity of auxiliary equipment, including a ¾-cubic-yard shovel, suitable dump trucks, and quarrying plant. Clumsy as the organization involved in this proposal may appear, it is the only positive action which can be taken until railway trucks and/or labour which will undertake spalling are available.

Orders for crushing plant capable of reducing spalls to the sizes required for fine-crushed rock and aggregate for sealing were placed with local makers five years ago. Only one of the plants ordered has been delivered. Quotations have, therefore, been obtained from overseas firms for a mobile plant made up of three units, equipped with three crushers, the largest being about 24 inches x 13 inches, with feeders, screens, elevators, bins, &c. A single unit with a 30-in. x 15-in. crusher has also been ordered for use in quarries where the stone "shoots" into relatively small spalls, so as to feed existing plants with a minimum of hand spalling.

THE COMPACTION OF FINE-CRUSHED ROCK.

Nature of Tests.—As an extension of work done on the compaction of soils and gravels by the Road Research Laboratory, Department of Scientific and Industrial Research, Great Britain, tests have been carried out to investigate the factors involved in the compaction of fine-crushed rock. The following conclusions were reached and circulated to members of the staff in Engineering Note No. 36 :—

(*a*) The moisture content of the fine-crushed rock is one of the most important factors. With a 7-ton smooth roller, eight passes at 8·2 per cent. moisture content were more effective than 64 passes at 4½ per cent. to 5 per cent. moisture content. The rock must not be drier than the optimum moisture content, but it can be much wetter than the optimum without ill-effect. It is desirable either to slurry the crushed rock at the crushing plant, or to saturate stockpiles with water about 24 hours before the material is picked up from them.
(*b*) Compacting was most effective with a loose layer 6 inches to 8 inches thick for a 10-ton smooth roller and 4 inches to 6 inches thick for a 7-ton roller.
(*c*) A 25-cwt. vibrating roller was about equal to a 7-ton smooth roller. The most effective speed was 2 m.p.h. with 4-in. loose thickness of fine-crushed rock.
(*d*) A pneumatic-tired roller *fully loaded* to 8 tons with eleven tires kept inflated to 50 lb. per sq. in. was as effective as the 7-ton smooth roller. The most effective speed was 3 m.p.h. Twelve passes of the roller at 3 m.p.h. produced the same density as 20 to 60 passes at 6 or 10 m.p.h. The roller was most effective with layers of fine-crushed rock of 4-in. to 6-in. loose thickness.
(*e*) A sheepsfoot roller was not effective under the conditions of the test.

PORTABLE SPALLING CRUSHER

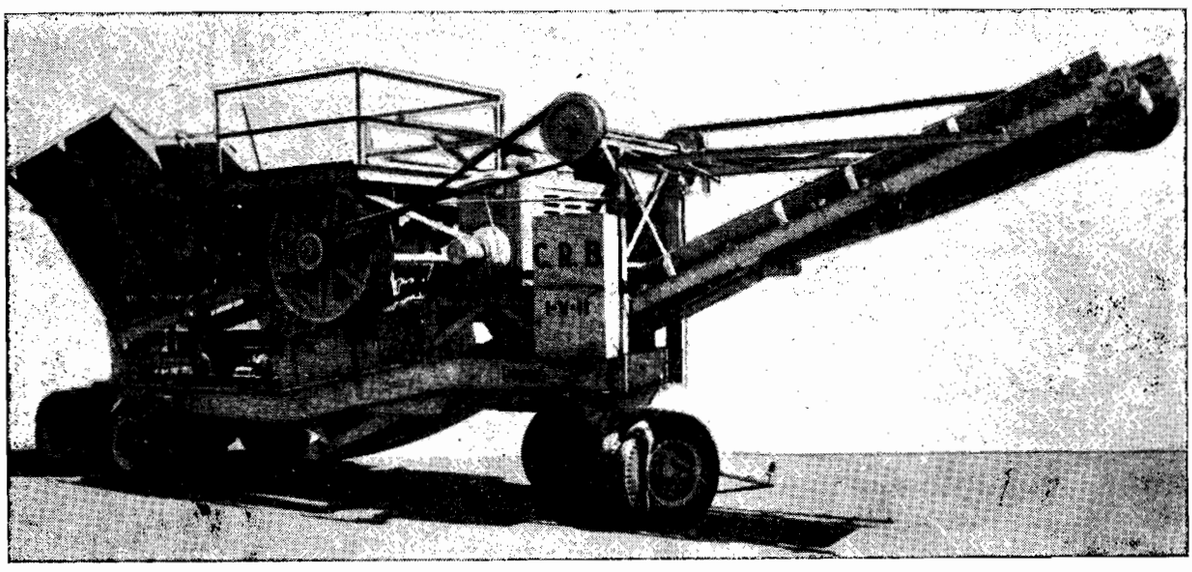


Fig. 1.—Cedarapids Portable Spalling Crusher which has an output of 800 cubic yards of eight-inch spalls per day.

PRECAST BRIDGE CONSTRUCTION

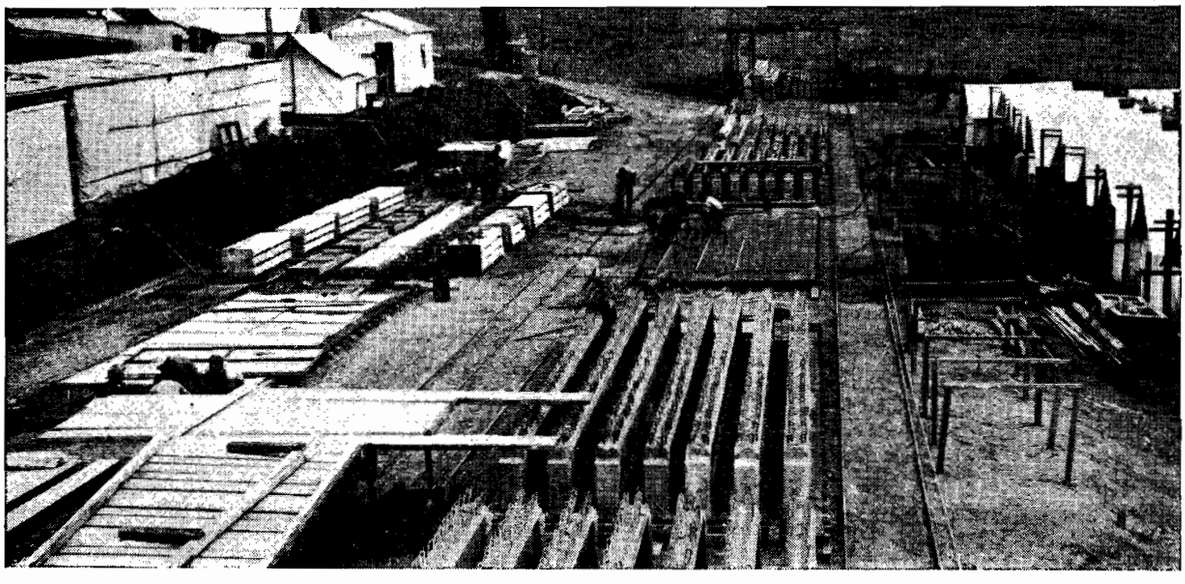


Fig. 2.—Precasting yard near Wodonga.

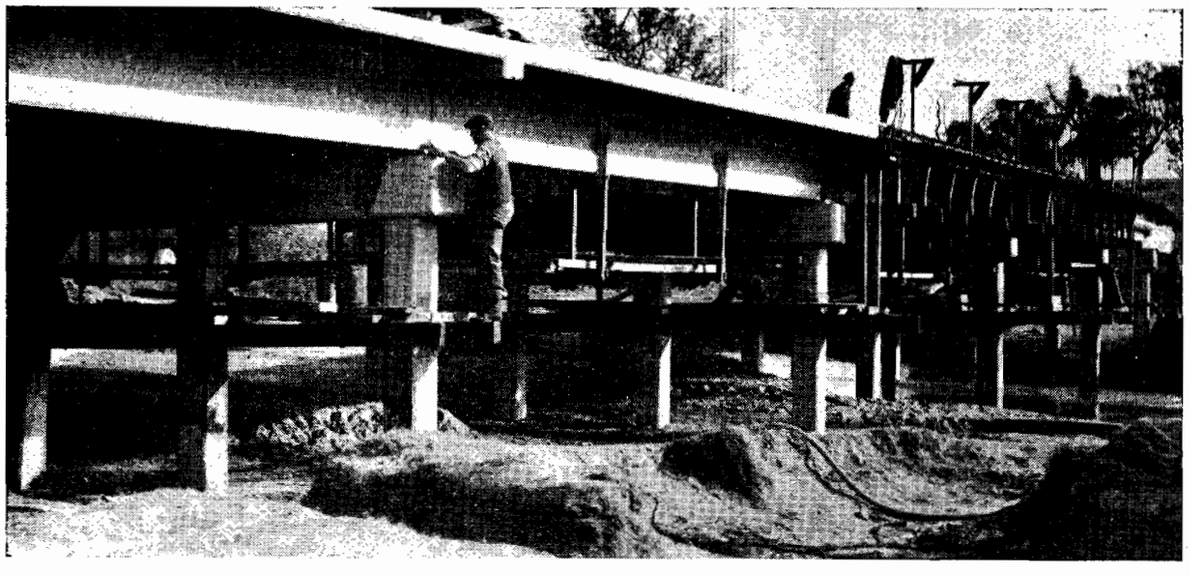


Fig. 3.—Precast concrete bridge over Yackandandah Creek in Shire of Yackandandah, showing details of precast crosshe ds, beams and formwork for deck.

Mr. TUPMAN RETIRES

Fig. 4.—Mr. L. C. Tupman, former Mechanical Engineer, who, since reaching the retiring age, has been acting as Associate Mechanical Engineer has now completed his service with the Country Roads Board.

SOIL PREPARATION

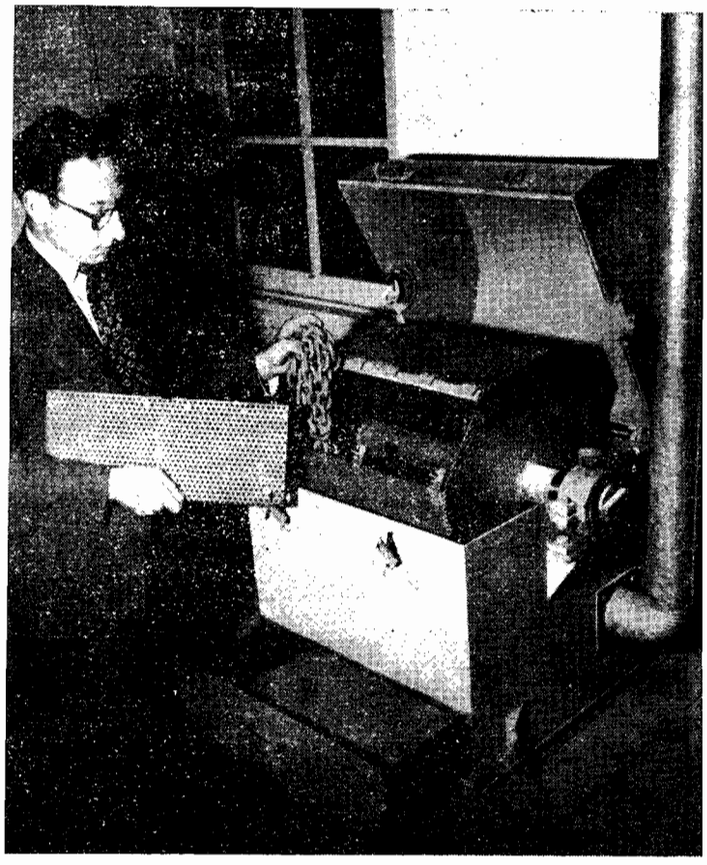


Fig. 5.—This mechanical device has been installed in the laboratory for preparing samples of soil, etc., for testing.

FLOOD DEBRIS

Fig. 6.—A timber bridge on the Traralgon Creek Road provided with a floodway. This was the only structure to survive the flood in this section.

Practical Recommendations Arising from the Tests.

(*a*) Flat rollers should be as heavy as can be transported.

(*b*) Pneumatic-tired rollers should be heavy and tire pressures high.

(*c*) Sheepsfoot rollers should be reserved for use in clay soils, particularly when the soils are at the optimum moisture content or slightly drier.

(*d*) Vibrating rollers are effective on fine-crushed rock, but on account of the need for careful maintenance they would best be employed on sands which cannot be compacted readily by other means.

(*e*) Fine crushed rock should be saturated with water before spreading.

Details of the tests upon which some of the above conclusions are based, are given in Research Memorandum No. 8, "Use of Rollers for Compaction of Fine-crushed Rock".

LABORATORY.

Work Carried Out during the Year.—Owing to shortage of staff, the greater part of the year was devoted to routine tests, particularly those necessary for estimating the bearing capacity of sub-grades and evaluating local pavement materials. Exceptions were the investigation into the consolidation of fine-crushed rock, reported in a previous paragraph, the establishment of a reasonable correlation between the results of the Los Angeles Abrasions Test and the Stewart Aggregate Impact Test, and the extension of work on simple soil tests covered by Research Memoranda Nos. 6 and 7.

Additional Apparatus.—Where large numbers of samples of soils and gravel-sand clay mixtures are tested, the preparation of samples consumes a great deal of time, apart from that required for the actual tests. Following upon observations made by Mr. Gawith, Materials Research Engineer, during his visit abroad in 1948, a mechanical device for use in preparing samples has been installed and is shown in Fig. 5. An octagonal drum made of $\frac{1}{8}$-in. plate perforated with $\frac{3}{16}$-in. holes, is rotated slowly about its axis. The soil or gravel is placed in the drum, together with a length of chain or a heavy block of wood. Hot air is blown through the hollow shaft on which the drum is mounted. The material which will pass through a $\frac{3}{16}$-in. hole, falls into a tray in the bottom of the machine. The clean, surface-dry stone remains in the drum. The hot air is produced by electric heaters of 1,500 watts capacity.

BITUMINOUS-SURFACE TREATMENT.

Mileage of "Black" Road in Board's System.—Table "C" shows the lengths of declared and "black" road included in the Board's road system at 30th June, 1951.

TABLE "C."—TOTAL MILES OF DECLARED AND OF BITUMINOUS SURFACE-TREATED ROAD IN THE BOARD'S SYSTEM AT 30TH JUNE, 1951.

Type of Road.	Miles.		Percentage Treated.
	Declared.	Treated.	
State Highways	3,850	2,887	75
Main Roads	9,800	3,895	39·6
Tourists' Roads	432	113	26·2
Forest Roads	375	37	9·9
Totals	14,457	6,932	48

Extent of Work.—The total length of bituminous-surface treatment carried out on the Board's declared roads, and on undeclared roads with financial assistance from the Board, was 944 miles, an increase of 6 miles over that done in 1949–50. Of this, 829 miles was done by the Board's plant, which also sprayed 65 miles for other Authorities and Municipalities. The Board's own plant thus treated 894 miles of road as compared with 952 miles in 1949–50. The main reason for the decrease is that the ratio of initial treatment to total work increased from 42 per cent. in 1949–50 to 56 per cent. in 1950–51. Of the work carried out on the Board's system 365 miles consisted of retreatment, of which 333 was light resealing (average application of binder 0·15 gals. per sq. yd.). This length of 365 miles is only 5·5 per cent. of the "black" road in the Board's system at the 30th June, 1950. Reconstructed sections which were again treated amounted to 1·5 per cent.

Rate of Retreatment.—Bearing in mind the drastic reduction in funds available for reconstruction and the increase in weight and volume of traffic using roads which were not built to carry it, attention is invited to the low rate of retreatment and reconstruction. This is shown by Table "D" and indicates the need for a higher percentage of this type of work over the next few years if existing assets are not to be lost.

TABLE "D."—RATES OF RECONSTRUCTION AND RETREATMENT, 1942–51.

Year.	Surface Treated Mileage at 30th June of the Last-named Year.	Initial Treatment on Previously Treated Lengths.		Re-treatments.		Total.	
		Miles.	Percentage of Length Treated to Previous June.	Miles.	Percentage of Length Treated to Previous June.	Miles.	Percentage.
1942–43	5,643	..	..	257	4·6	257	4·6
1943–44	5,655	..	..	443	7·8	443	7·8
1944–45	5,658	15·5	0·3	657	11·6	672·5	11·9
1945–46	5,669	11·5	0·2	651	11·5	662·5	11·7
1946–47	5,773	55·8	1·0	500	8·8	555·8	9·8
1947–48	6,055	68	1·2	555·7	9·6	623·7	10·8
1948–49	6,226	125·9	2·1	504·4	8·3	630·3	10·4
1949–50	6,572	75·9	1·2	518·3	8·3	594·2	9·5
1950–51	6,932	97·4	1·5	364·7	5·5	462·1	7

Cost of Work.—Table "E" shows the continued rise in costs since the end of the war and the percentage increase since 1946–47.

TABLE "E."—RISE IN THE COST OF WORK AND SCREENINGS.

Year.	Work. Cost in Pence per Square Yard. Initial Treatment Prime and Seal.	Work. Cost in Pence per Square Yard. Re-sealing, Binder 0·15 gall./s.yd.	Aggregate (Screenings). At per Cubic Yard by the Roadside.
			s. d.
1946–47	16·5	7·9	24 3
1947–48	18·7	9·6	26 0
1948–49	21·2	10·4	30 0
1949–50	23·1	11·6	30 6
1950–51	26·8	12·8	35 9
	%	%	%
Increase in cost of 1950–51 works over 1946–47 ..	62	62	47

Tables "F" and "G" show why the increase in cost of work has been greater than that of materials during the period.

While some of this falling-off in output can be ascribed to shortage of screenings and delays in road preparation, much of it can only be attributed to the type of labour now available and insufficient engineering supervision, both factors being associated with prevailing shortages of manpower.

TABLE "F."—PERCENTAGE INCREASES IN COST OF VARIOUS PARTS OF B.S.T. WORK SINCE 1946–47.

Item.	Increase, 1946–47 to 1950–51. Initial Treatment, Prime and Seal.	Increase, 1946–47 to 1950–51. Re-sealing 0·15 gall./sq.yd.
	%	%
Materials	34	40
Labour	166	136
Stores	92	113
Plant Hire	112	87

TABLE "G."—OUTPUT PER DAY IN THE FIELD OBTAINED FROM 400-GALLON BITUMINOUS SURFACING UNITS.

Period.	Loads Sprayed per Day in the Field.	Gallons Sprayed per Day in the Field.
Average five years, 1935–36 to 1939–40 ..	4·26	1,730
Average five years, 1944–45 to 1948–49 ..	3·20	1,222
Year 1950–51	2·44	920

Record.—The following Tables "H," "J," "K," and "L" are included for purposes of record.

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

Type of Road. Road.	Control.	Length in Miles. Nature of Work. Initial Treatments. P.M.	Primed Only. E.	Primed Only. R.	Prime and Seal. E.	Prime and Seal. R.	Re-treatments. Re-seals—Binder gall./sq.yd. 0·1.	0·15.	0·2.	P.M.S.	R.M.S.	Summary of Work. State Highways.	Main Roads.
State Highways ..	Direct	..	..	..	50·6	52·2	33	56·7	48·4	16·3	..	257·2	..
	Municipal ..	..	..	..	10·8	7·4	..	10·5	1·2	0·6	..	30·5	..
Other Roads ..	Direct	..	..	..	40·6	3·7	..	7·2	17·7	..	..	..	69·2
	Municipal ..	..	1·1	..	258·1	34·1	13·3	75·3	69·2	7·5	7·8	..	466·4
	Totals ..	..	1·1	..	360·1	97·4	46·3	149·7	136·5	24·4	7·8	287·7	535·6
		1·1			457·5		332·5			32·2			
		458·6					364·7					823·3	
		823·3											

This table does not include 79 miles of I.T.P. and S. (Extension) and 42·9 miles of re-treatment on unclassified roads.

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

TABLE "J."—AVERAGE COST OF WORK CARRIED OUT BY C.R.B. PLANT ON C.R.B. DECLARED ROADS DURING 1950-51. COST IN PENCE PER SQUARE YARD.

Item.	Nature of Work.															
	Initial Treatments.						Re-treatments.									
							Re-seals.						Plantmix Seal.		Roadmix Seal.	
	Prime Only, 0·2 gall. per sq. yd.		Seal Only, 0·25 gall. per sq. yd.		Prime 0·2 and Seal at 0·25 gall./sq. yd.		Binder in gall. per sq. yd.									
							0·1.		0·15.		0·2.					
Square yards costed ..	11,467.		105,618.		3,343,513.		331,685.		1,103,080.		1,160,313.		235,567.		37,432.	
	d.	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%
Materials	4·15	46	12·83	59	16·03	59	5·32	51	7·98	62	9·48	64	21·71	51	13·28	52
Labour	3·41	38	4·58	21	6·07	23	2·73	26	2·69	21	2·86	19	10·65	25	6·82	26
Stores	0·14	2	0·65	3	0·77	3	0·37	4	0·34	3	0·35	2	1·62	4	0·68	3
Plant Hire ..	1·30	14	3·58	17	3·97	15	1·97	19	1·76	14	2·17	15	8·49	20	5·02	19
Totals ..	9·00	100	21·64	100	26·84	100	10·39	100	12·77	100	14·86	100	42·47	100	25·80	100

TABLE "K."—LENGTH OF WORK CARRIED OUT IN 1949-50 AND 1950-51.

Type of Road and Plant Used.	Miles Done.	
	1949-50.	1950-51.
(a) Work on C.R.B. Declared Roads.		
(i) Board's plant	838	785
(ii) Municipal or hired plant	47	38
	— 885	— 823
(b) Work on Undeclared Roads to which the Board Contributes.		
(i) Board's plant	34	44
(ii) Municipal or hired plant	19	77
	— 53	— 121
(c) Work for other Authorities carried out by Board's Plant.		
(i) Municipalities	44	39
(ii) State instrumentalities	7	3
(iii) Commonwealth of Australia ..	29	23
	— 80	— 65
Totals	1,018	1,009

TABLE "L."—AVERAGE PRICE OF AGGREGATE FOR BITUMINOUS SURFACING AT PER CUBIC YARD STACKED BY THE ROADSIDE.

Material.	Cubic Yards Costed.	Price per Cubic Yard.
		s. d.
Screenings	74,403	35 9
Gravel	37,336	32 0
Sand	1,839	22 5
Scoria	807	7 8
	114,385	34 3

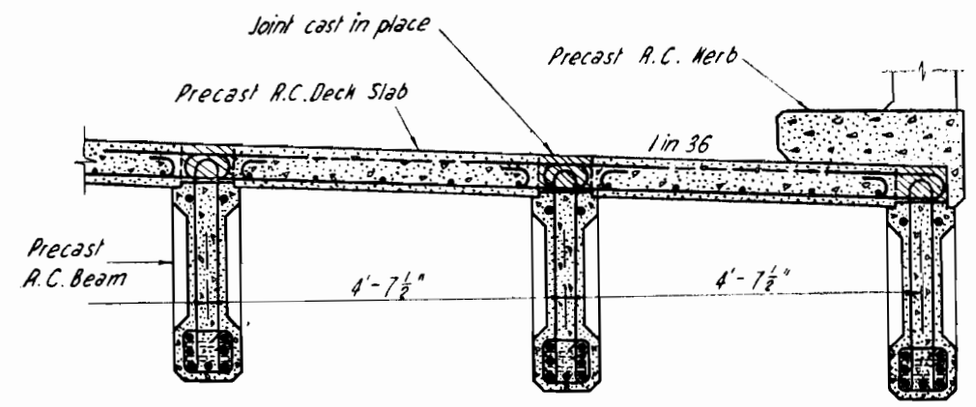
BRIDGES.

Standard Design Specification for Australia.—Reference was made in the Annual Report of 1950 to discussion of a Standard Specification for Bridges by the Committee of Bridge Engineers of all State Road Authorities in the Commonwealth. A further meeting was held in Sydney in March, 1951, when the section of the specification dealing with design was finalized except for some minor matters, the treatment of which is dependent on the quality of materials—particularly timber—available in the various States.

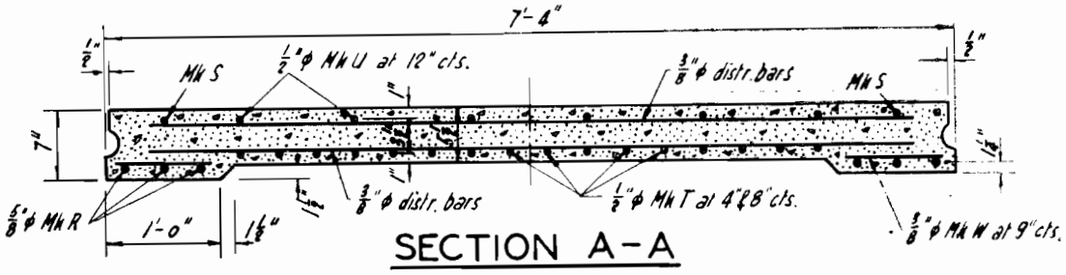
Revision of Standard Designs for Bridges and Culverts.—Unfortunately it has not been possible to proceed as far as was hoped with the revision of standards made necessary by the A.A.S.H.O. H20-S16 (44)—1949 loading adopted by the State Road Authorities. As a result of the Bridge Engineers' Committee's recommendations higher working stresses are being adopted for concrete, and a modified approach to the problem of shear has been adopted. These factors have had a retarding value on the production of standards, but as opportunity permits this work is being put in hand.

Pre-cast Work.—Reference has been made in the 35th, 36th, and 37th Annual Reports (1948, 1949, and 1950) to the development of pre-cast work. Considerable progress has been made in this type of construction, and pre-casting yards are in the initial stages of development at Warrnambool, Geelong, and Ballarat. During the year a yard has been established at Thornton, while the field pre-casting yard near Wodonga has been fully occupied in construction of piles, crossheads, beams, kerbs, and handrail panels for the various bridges on the Kiewa-Wodonga Road. Fig. No. 2 gives a general picture of this yard. The longest pile cast has been 30 feet, while beam spans of 30 feet have been used. Fig. 3 shows the bridge over Yackandandah Creek nearing completion. This structure consists of six 30-ft. spans, is 24 feet between kerbs, and is built on a curve of 933·6-ft. radius with a maximum superelevation of 1 in 30 on the deck.

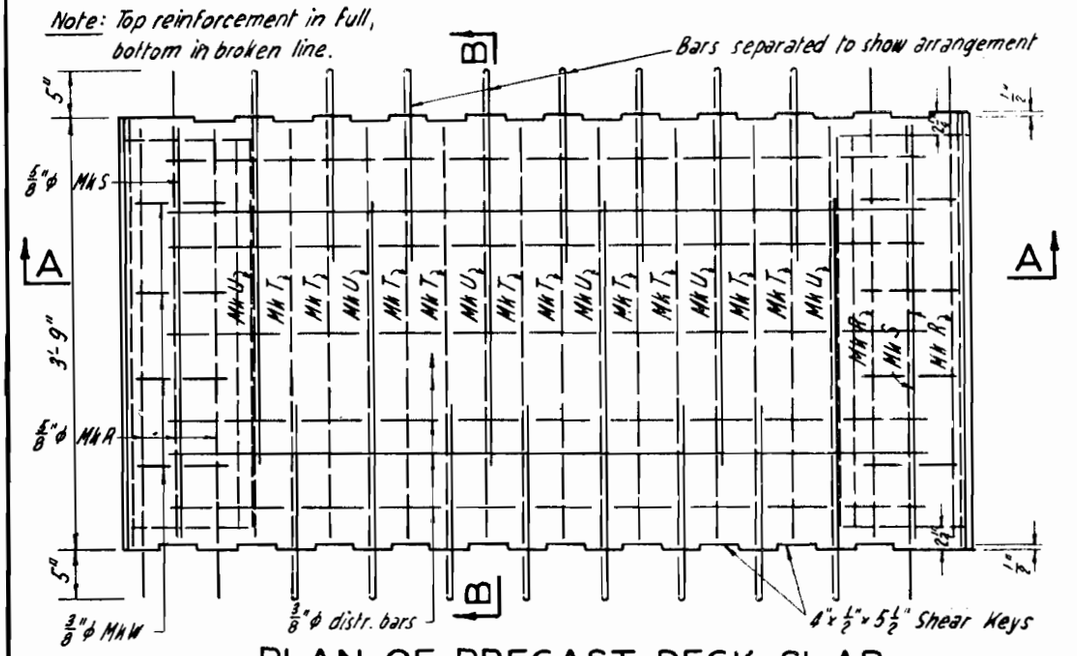
During the year development of the pre-cast U type of slab referred to in the 35th Annual Report (1948), has progressed and a standard has been produced covering spans from 4 feet to 20 feet, at which span it is generally economical to change into Tee Beam construction. These slabs have been designed with working stress of 1,050 p.s.i. in concrete and 18,000 p.s.i. in steel. A simple and economical method of developing lateral distribution of the loading between slabs is under investigation.



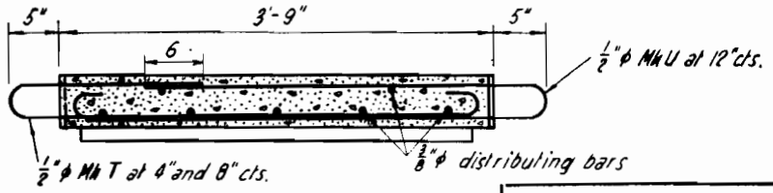
CROSS-SECTION OF BRIDGE DECK



SECTION A-A



PLAN OF PRECAST DECK SLAB



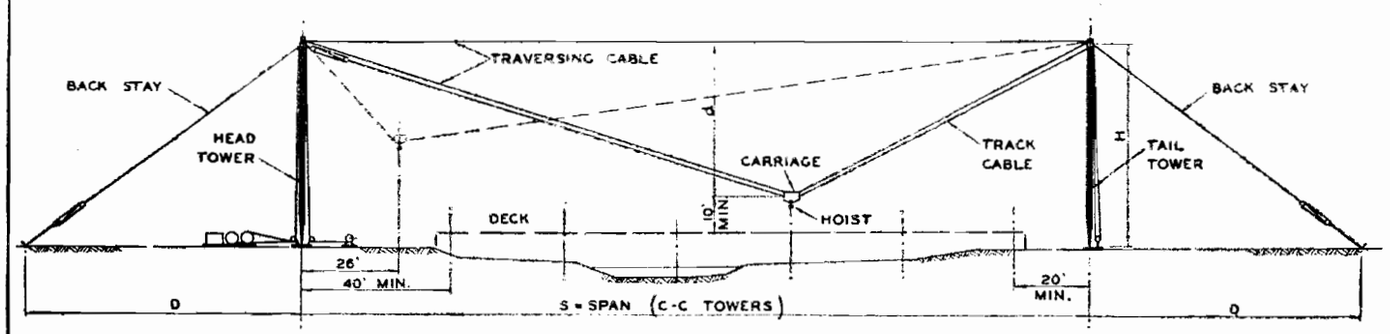
SECTION B-B

COUNTRY ROADS BOARD

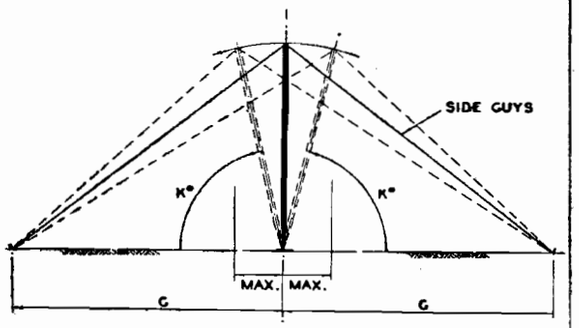
PRECAST R. C. DECK SLABS

DRAWN A.K.	CHECKED	REF.
TRACED W.K.	DATE 20/11/51.	No.

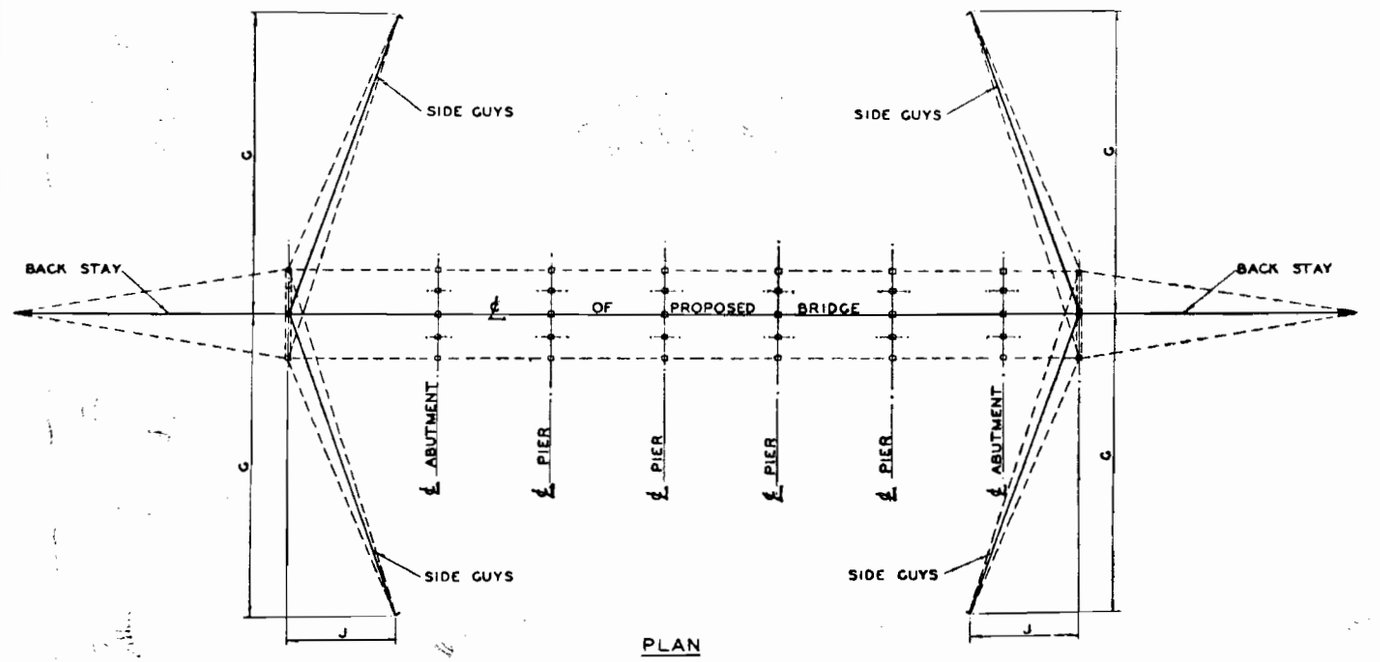
Fig. 7.—Details showing the suggested types of Precast Deck Panel.



SIDE ELEVATION



END ELEVATION



PLAN

DIMENSIONS FOR GENERAL LAYOUT PLAN

D = 65' TO 110'
G = 65' TO 110'
J = $\frac{1}{3}$ G
K° = 75° MINIMUM
S NOT GREATER THAN 250'

COUNTRY ROADS BOARD

CONSTRUCTION CABLEWAY

GENERAL LAYOUT

DRAWN R. J.	CHECKED C.A.M.	REFERENCE Nº
TRACED J.M.E.	DATE 17-12-51	C 1.

Fig. 8.

So far, pre-cast Tee-beam spans have been designed for bridges 24-ft. wide between kerbs as follows :—

Span.	Number of Beams.	Weight of Single Beam.
		Tons.
22 ft. 6 in.	7	2·1
30 feet	6	3·0
37 ft. 6 in. ..	6 if deck cast in place ..	4·0
	7 if deck of pre-cast slabs	

In this type of bridge the deck slab has so far been cast in situ, the formwork being shown in Fig. 3. In order to reduce the field work still further, plans are in hand for using pre-cast deck slabs, general details of which are shown on Plate 1.

Erection of Pre-cast Sections.—The maximum weight of any unit used has been 4·3 tons for a 33-ft. length of abutment crosshead. The weight of beams is given above. Experience of erection with the aid of a " Flying Fox " has been very good and it is considered to be the speediest and most economical system—the main delay being in the construction of anchorages and erection of the towers, &c. In the bridge shown in Fig. 3, the following progress was made by an untrained crew, using the system for the first time, once the lifting gear had been erected.

Crossheads, 3 No. placed in 4 hours.
Beams, 42 No. placed in 28 hours.

These figures include the time taken to load the pre-cast units on to trucks in the casting yard and transport them a distance of about 400 yards to the bridge.

Plate 2 shows details of the flying fox. The towers consist of columns, each of four angles braced with round bars welded on. Each tower is made up of units 15 feet long to facilitate lengthening or shortening to suit the site.

Cost of Pre-cast Units.—A large percentage of the cost of pre-casting work is incurred in establishing the depot with its necessary plant, in camp establishment and maintenance, and in payment of camping allowance. This means that unit costs depend largely on the total production over a long period. Figures to date clearly indicate the saving possible by developing pre-casting yards in central areas where a large proportion of the labour required can live at home.

A subdivision of the *direct* charges in this type of work indicates the following :—

Item.	*Percentage of Total.*
Construction Materials—	
Cement	7·5
Steel	29·1
Aggregate and Sand	4·6
Timber	9·3
Tie Wire	0·9
Productive Labour—	
Tieing Steel, &c.	12·5
Formwork	21·9
Concreting	6·0
Stripping and Curing	5·0
Shifting Units	3·2
	100·0

These figures show the high percentage due to steel with present-design standards, and stress the need for further investigation to determine the most suitable design stresses for overall economy with prevailing prices of materials and labour. The possible value of prestressing is evident.

Floods.—During the year a major flood occurred in the valley of the Traralgon Creek in the mid south-eastern section of the State. Over a period of four days a total of 21.4 inches of rain fell at the head of the catchment area and 6.28 inches in the lower reaches.

In a length of 16 miles of this stream eight bridges were demolished. All these bridges had timber piers with either timber or steel stringers. The amount of debris which was brought down in the stream was the cause of the damage and it was particularly noticeable that provision had been made for a floodway at one end of the only bridge on the section which survived. See Fig. 6. Large quantities of debris, including some very big logs, were apparently carried over this floodway, thus relieving the pressure on the bridge, although the flood level was 3 to 4 feet over the deck.

The value of a floodway in such a stream as this cannot be over-emphasized and bears out the point raised in the Annual Report of 1946 dealing with the floods in the Warrnambool area, where falls of 11 inches for 72 hours were recorded.

ENGINEERING CIRCULARS.

The following Research Memoranda and Engineering Notes were issued during the year. No Technical Bulletins were prepared :—

Research Memoranda.

Memo. No.	Title.	Date of Issue.
6	Estimation of California Bearing Ratio at 100 per cent, modified A.A.S.H.O. compaction from simple soil tests	March, 1951
7	Relation between linear shrinkage and other simple tests for average soils	March, 1951
8	Use of rollers for compaction of fine-crushed rock	April, 1951

Engineering Notes.

Note No.	Title.	Date of Issue.
29	Consolidation of batters in filling by use of sheepsfoot roller	4th August, 1950
30	Geometric design—Pavement and bridge widths (amends Note No. 28)	7th February, 1951
31	Geometric design—Pavement and bridge widths—Fixing bridge and pavement widths for roads in the Board's system	22nd February, 1951
32	Routine maintenance of sealed pavements	7th December, 1950
33	Bituminous cut-backs	11th April, 1951
34	Primer seals	30th April, 1951

STAFF.

General.—It is desired to record the good work done by the Board's engineering staff under the difficulties imposed upon it by the large programme of works necessary to provide facilities for other authorities and yet maintain reasonable service for the public, by the depletion of staff owing to higher salaries offered elsewhere, and by the lack of contractors who will undertake either road or bridge work for the Board. In particular, attention is invited to the last of the three handicaps.

Disadvantages of Direct Labour Works.—The necessity for carrying out the bulk of the Board's work by direct labour means that the engineering staff has not only to undertake the design and supervision of work under its control, but also to assume responsibility for accommodation of personnel, maintenance of plant and administration which in more normal times are the business of the contractor, and make up the service which justifies any profit he may make out of the work. It also increases the difficulty in training young and inexperienced engineers. When supervising contract work these young men had to learn to pay close attention to technical details and to insist upon a high standard of work, often in spite of opposition. They also had the advantage of observing the organization and methods adopted by men well experienced in the type of work being carried out. It is hoped that the present lack of funds will at least give more senior engineers an opportunity of assisting young members of the profession in benefiting from their practical experience.

Mr. L. C. Tupman.—The departure of Mr. L. C. Tupman, who, since he reached the retiring age, has been acting as Associate Mechanical Engineer, was a great loss to his friends and associates of the staff. His tenure of office as Mechanical Engineer and also as associate will long be remembered for its happy combination of humanity and insistence on good service.

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

Papers.	Professional or Scientific Associations.	Authors.
"Mountain Road Survey and Design" ..	I.E.A., Melbourne Division, Junior and Students Section, 11th July, 1950	A. Winnett, Student I.E., Aust. and R. H. Simpson, Junior I.E. Aust. (Joint Paper)
"The Public Control of Highway Access and Roadside Development"	I.E.A., Melbourne Division, Civil Engineering Branch, 28th July, 1950	G. J. Dempster, B.C.E., A.M.I.E. Aust.
"Pre-stressed Concrete"	Australian and New Zealand Society for the Advaneement of Science, Brisbane, April, 1951	I. J. O'Donnell, O.B.E., B.C.E., A.M.I.E. Aust.
"Talk on His Trip to America and to United Kingdom"	I.E.A., Melbourne Division, Civil Branch, 30th May, 1951	J. Mathieson, M.C.E., A.M.I.E. Aust.
"Accident Rate Measurements on Roads"	I.E.A., Melbourne Division, Civil Engineering Branch, 22nd June, 1951	N. G. Roeszler, A.M.I.E. Aust., C.E.

Yours obediently,

C. G. ROBERTS,
Chief Engineer.

APPENDIX.

COUNTRY ROADS BOARD.

STATEMENT OF RECEIPTS AND PAYMENTS FOR YEAR ENDED 30TH JUNE, 1951.

(Adjusted to nearest pound.)

	Country Roads Board Fund.	*Commonwealth Aid Roads and Works Act* 1947.		*Commonwealth Aid Roads Act* 1950.		*Federal Aid Roads and Works Act* 1937.	Loan Funds.	Total.
		Sec. 6 (1).	Sec. 6 (4).	Sec. 6 (1).	Sec. 7 (1).			
RECEIPTS.	£	£	£	£	£	£	£	£
Balances at 1st July, 1950	304,451	451,566	476,065	..	..	1,808	78,379	1,312,269
Motor Car Registration Fees 3,274,435								
Drivers' Licence Fees .. 143,291								
Fines 63,754								
3,481,480								
Less Cost of Collection .. 322,369								
	3,159,111	..	..	..	..	..	..	3,159,111
Municipalities Repayments—Maintenance Main Roads	187,109	..	..	..	..	..	..	187,109
Moneys provided by *Commonwealth Aid Roads and Works Act* 1947	..	77,087	..	..	..	..	..	77,087
Moneys provided by *Commonwealth Aid Roads Act* 1950	..	..	..	1,129,933	781,642	..	..	1,911,575
Receipts from State Loan Funds—Act 3662	..	..	..	..	..	..	34,956	34,956
Act 5363	..	..	..	..	..	..	681,000	681,000
Other Receipts—Fees and Fines	3,521	..	..	..	..	..	..	3,521
	3,654,192	528,653	476,065	1,129,933	781,642	1,808	794,335	7,366,628
PAYMENTS.								
Construction and Maintenance of Roads and Bridges—								
Main Roads	1,370,112	21,184	..	632,823	..	..	34,956	2,059,075
State Highways	372,825	500,000	..	450,000	..	..	756,000	2,078,825
Tourists' Roads	..	..	135,065	..	77,207	..	..	212,272
Forest Roads..	..	..	4,558	..	58,775	..	..	63,333
Unclassified Roads	..	7,161	283,248	38,743	418,697	..	..	747,849
Isolated Settlers' Roads	..	..	5,660	..	8,402	..	..	14,062
Federal Maintenance	..	308	47,534	822	118,029	..	..	166,693
Roads Adjoining Commonwealth Properties	..	..	..	..	..	709	..	709
Murray River Bridges and Punts ..	11,641	..	..	..	..	..	..	11,641
Land Purchases	..	..	..	7,545	18	..	..	7,563
Traffic Line Marking	12,497	..	..	..	..	..	..	12,497
Plant Purchases	578,273	..	..	..	..	..	..	578,273
Interest and Sinking Fund Payments ..	525,845	..	..	..	..	..	..	525,845
Interest and Sinking Fund Payments—Great Ocean Road	1,000	..	..	..	..	..	..	1,000
Payment to Tourists' Resorts Fund ..	37,879	..	..	..	..	..	..	37,879
General Expenditure	360,477	..	..	..	..	..	..	360,477
Administration Expenditure	310,706	..	..	..	..	..	..	310,706
	3,581,255	528,653	476,065	1,129,933	681,128	709	790,956	7,188,699
Balances at 30th June, 1951 ..	72,937	..	..	..	100,514	1,099	3,379	177,929

NOTES.—The Balances at 1st July, 1950, differ from those presented by the Treasurer, as in the previous financial year adjustments had been made in the books of the Board in respect of charges to alternative funds after the Treasurer's books had closed.

Amounts shown under *Commonwealth Aid Roads and Works Act* 1947, Sec. 6 (1) and *Commonwealth Aid Roads Act* 1950, Sec. 6 (1) do not include the proportions reserved for other works connected with transport in terms of those Acts, as such proportions are not disbursed by the Board.

Municipalities were formerly required to contribute annually towards the cost of Permanent Works on Main and Developmental Roads. Acts 4140 and 4415 relieved Municipalities of this annual liability which has the effect in year ended 30th June, 1951, of decreasing the amount available for expenditure by the Board by the sum of £194,356.

AUDITOR-GENERAL'S CERTIFICATE.

The accounts of the Country Roads Board for the year ended 30th June, 1951, have been audited. In my opinion the above Statement of Receipts and Payments fairly presents, in summary form, the transactions during that period.

E. A. PEVERILL,
Auditor-General,
31st January, 1952.

C. G. GRIFFITHS,
Accountant,
16th October, 1951.

APPENDIX—*continued.*

COUNTRY ROADS BOARD.

LOAN LIABILITY AT 30TH JUNE, 1951.

—	£ s. d.	Main Roads. £ s. d.	Developmental Roads. £ s. d.	Total. £ s. d.
Permanent Works—				
Main Roads	5,186,874 13 7			
State Highways	1,371,244 4 1			
Tourists' Roads	55,292 10 3			
Forest Roads	1,083 18 11			
		6,614,495 6 10		
Developmental Roads		..	6,425,757 10 11	13,040,252 17 9
Discount and Expenses		166,494 15 2	238,318 3 4	404,812 18 6
Unexpended Proceeds		3,379 6 9	..	3,379 6 9
Total Amount Borrowed		6,784,369 8 9	6,664,075 14 3	13,448,445 3 0
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		792,455 18 6	..	792,455 18 6
National Debt Sinking Fund		706,271 0 0	1,078,122 17 3	1,784,393 17 3
		1,869,634 7 2	1,779,592 4 9	3,649,226 11 11
Loan Liability at 30th June, 1951		4,914,735 1 7	4,884,483 9 6	9,799,218 11 1

WORKS EXECUTED ON BEHALF OF COMMONWEALTH AND STATE AUTHORITIES FOR YEAR ENDED 30TH JUNE, 1951.

Department or Authority.	Description of Works.	Expenditure. £ s. d.
Department of Lands and Survey ..	Roadworks: Buchan Caves Reserve	540 0 5
Forests Commission	Roadworks: Maffra, Otway, Winchelsea Shires	8,996 3 4
Grain Elevators Board	Roadworks: Approaches to Wheat Terminal, Geelong	4,386 7 7
Housing Commission	Roadworks: Ballarat, Norlane, Morwell Housing Estates Roadworks: Moe Service Roads	85,805 4 4
Melbourne and Metropolitan Board of Works	Bridgeworks, Roadworks: Healesville, Upper Yarra Shires ..	86,460 19 0
Public Works Department	Roadworks: Oliver's Hill, Frankston; Dookie Agricultural College	116 11 11
Soldier Settlement Commission	Roadworks in Soldier Settlement Areas throughout Victoria ..	63,412 6 0
State Coal Mine	Maintenance of roads, Wonthaggi	37 15 0
State Electricity Commission	Bridgeworks, Roadworks: Kiewa Valley, Morwell	151,356 19 2
State Rivers and Water Supply Commission	Bridgeworks, Roadworks: Eildon Weir Project, Rocklands and Cairn Curran Reservoirs	76,086 14 10
		477,199 1 7
Department of Works and Housing ..	Roadworks: Mulwala Explosives Factory; East Sale, Essendon, Mangalore Aerodromes	17,390 18 4
		494,589 19 11

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