

1953-54

VICTORIA

COUNTRY ROADS BOARD

FORTIETH ANNUAL REPORT

FOR YEAR ENDED 30TH JUNE, 1953

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

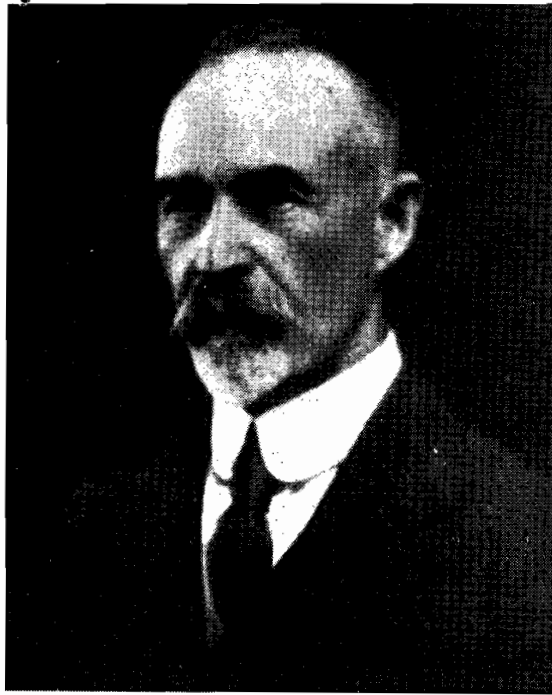
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FORMER BOARD MEMBERS.



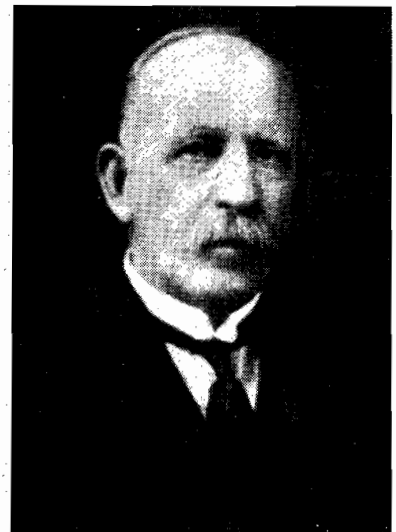
W. CALDER
Chairman, 1913-1928.



W. T. B. McCORMACK,
Member - 1913-1928.
Chairman 1928-1938.



F. W. FRICKE,
Member - 1913-1938.
Chairman 1938-1940.



A. E. CALLAWAY,
Chief Engineer 1913-1928.
Member - - 1928-1929.



W. L. DALE,
Secretary 1913-1929.
Member - 1929-1945.
Chairman 1945-1949.



A. D. MACKENZIE,
Member - - 1938-1940.



L. F. LODER,
Chief Engineer 1928-1940.
Chairman - 1940-1944.

COUNTRY ROADS BOARD

FORTIETH ANNUAL REPORT 1953

CONTENTS

	Page
RETROSPECT—	
The origin and tasks of the Board in 1913	7
Early investigations	9
Growth of Board's responsibilities	9
Co-operation with Municipalities	9
Present-day expenditure	10
FINANCE—	
Inadequacy of funds for present needs	10
Deterioration of road pavements and bridges	10
Allocation of funds 1952-53	10
Receipts from Motor Registration Fees	13
Commonwealth Aid Roads Act	13
Loan Monies expenditure	13
Total Works Allocations	14
MAIN ROADS—	
Allocation of Funds	14
Apportionment of Costs	14
Contributions by Municipal Councils	17
Summary of Works	17
STATE HIGHWAYS—	
Restricted Allocation of Funds	19
Works carried out	19
TOURISTS' ROADS—	
Allocation of Funds	23
Works carried out	23
FOREST ROADS—	
Expenditure and extent of work	23
UNCLASSIFIED ROADS—	
Applications from Councils for Grants	24
Allocations for Maintenance	24
Works carried out	24
BRIDGES—	
Rate of Reconstruction	25
Bridges completed during year	25
Metropolitan Bridges	26
FLOOD DAMAGE—	
Government Assistance	33
Grants to Municipalities	33
Restoration Works carried out	33
WORK FOR OTHER AUTHORITIES—	
Housing Commission	37
State Rivers and Water Supply Commission	37
Melbourne and Metropolitan Board of Works	38
State Electricity Commission	38
Department of Public Works	38
Commonwealth Government Department of Works	38
SOLDIER SETTLEMENT ESTATE ROADS—	
Provision of Funds	40
Progress of Road Construction	40
Expenditure since inception of scheme	40
BIG DESERT ROAD	41
SCHOOL BUS ROUTES—	
Provision of Funds	43
Roads to Consolidated Schools	43
HIGHWAY MAINTENANCE—	
Pavement Failures	43
Work of Patrol Gangs	44
LICOLA ROAD—	
Weight of loads carried	44

COUNTRY ROADS BOARD

FORTIETH ANNUAL REPORT

Exhibition Building,
Carlton, N.3.

30th October, 1953.

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

SIR,

In accordance with the requirements of Section 96 of the *Country Roads Act 1928* (No. 3662), the Board has the honour to submit to you, for presentation to Parliament, a report of its proceedings for the year ended 30th June, 1953.

A RETROSPECT.

As the Board has now been in existence for over 40 years having held its first meeting on the 31st March, 1913, it might not be out of place to look back over that period in appreciation of the wise planning and forethought of the original Board, Messrs. W. Calder (Chairman), W. T. B. McCormack, and F. W. Fricke.

In its first annual report, published in 1914, no reference is made to any shortage of funds, which is the major problem confronting the present Board, but emphasis is laid rather on the physical difficulties with which the Board was faced in its initial survey of the roads of the State. On the contrary, the Board in its first report refers to its inability at the outset to expend the moneys which were available to it.

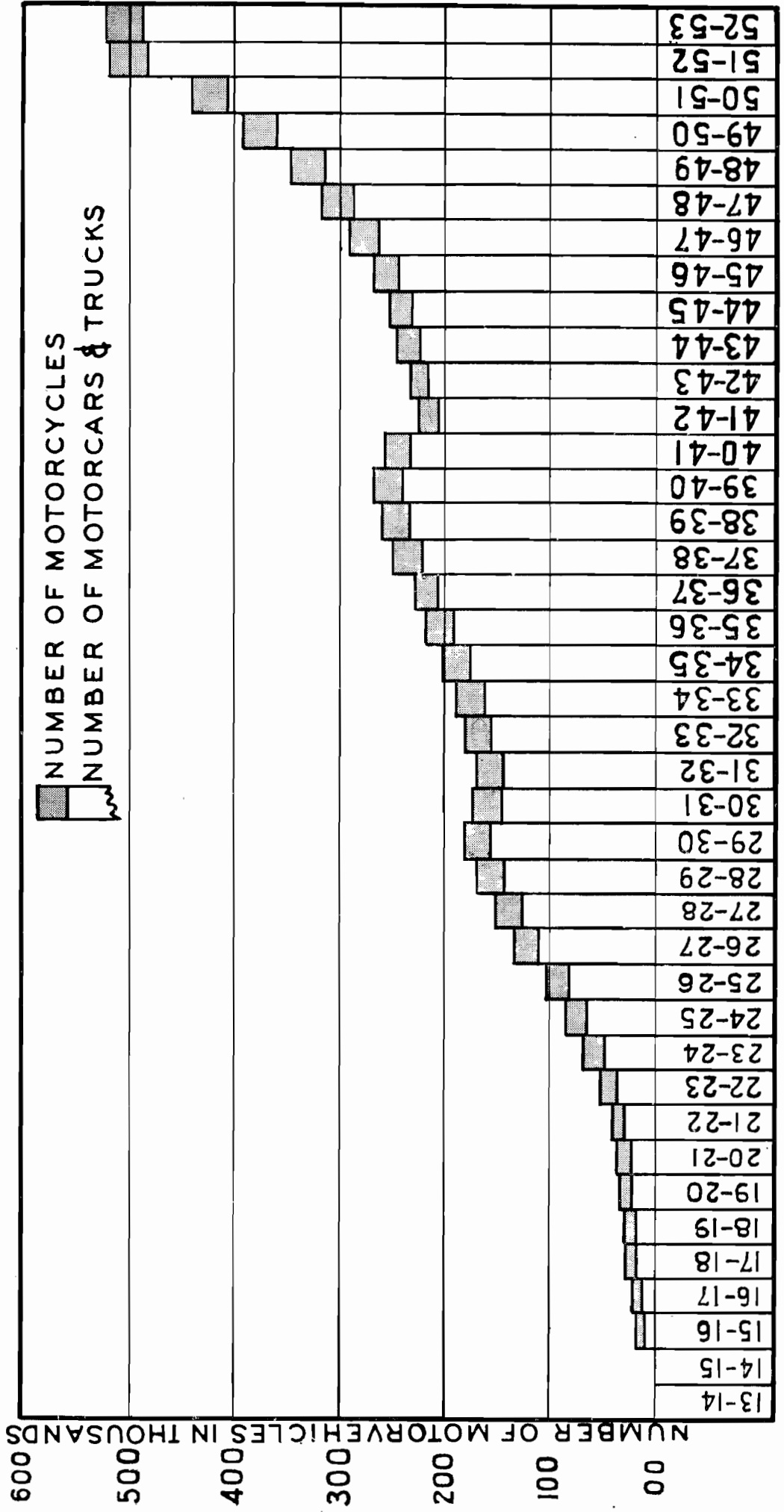
The following extract from the Report refers to this aspect and to the initial tasks encountered :—

“Before any constructional work could be undertaken it was necessary to determine what roads should be brought under the provisions of the Act, or in other words, the roads which should be declared main roads. It was obvious that this could be done only after careful investigation of the existing road conditions throughout the State. That such an investigation was a necessary preliminary, and was recognized as such by the Government, is evident from a statement made by the Hon. H. McKenzie when introducing the Country Roads Bill into the Legislative Assembly, when he said, regarding the duties of the Board which it was proposed to appoint, that, ‘Its first duty will be to make a thorough investigation into existing highways, so that it may have the materials on which to exercise sound judgment.’

At the outset it became apparent to the Board that, in a great many instances, municipal councils had not a clear conception of the provisions of the Country Roads Act, of the manner in which it was to be administered, or of the benefits expected to ensue from its operation; and as the Act requires that Councils are to be consulted before the declaration of any main road, it was decided to visit every municipal district, inspect the roads in each and if possible, to interview the councillors and give a general explanation of the provisions of the Act, and the methods proposed to be adopted in giving effect thereto; and it may be here stated that this procedure has met with the unanimous approval of those councils which the Board has had the privilege of meeting. The visits of the Board to districts such as Gippsland, Cape Otway, and the North-East, where the early construction of better roads is a matter of vital importance to the welfare of the settlers, have also been much appreciated by them, as the improvement of their only means of communication appeared within measurable distance of realization.

NUMBER OF MOTOR VEHICLES REGISTERED

— IN VICTORIA —



FINANCIAL YEAR

Graph No. 1.

Another matter which should be here referred to is the period over which the expenditure of the loan of £2,000,000 should extend. Section 29 of the Act makes provision for the raising of a sum of £400,000 per annum during a period of five years, and some disappointment may have been occasioned because this amount was not expended during the first year. It is therefore necessary to explain that during the first year the Board was, and for a considerable portion of the second year expects to be, fully occupied in making the investigation referred to, which necessitates almost continuous travelling, together with much negotiation with councils. The general organization of the work, the consideration of methods of surveys, the principles of construction and maintenance of roads to be adopted has also occupied much time. This, it may be stated, was also anticipated by the Government, as indicated by a statement by the Hon. the Minister of Lands in Parliament, when he said that "There is no doubt that in the first year the Board will not expend anything like £400,000."

The Board commenced its investigations in the Shire of Lillydale in May, 1913, and continued easterly into Gippsland, proceeding through the Shires along the main Gippsland railway as far east as Traralgon and returning westerly through the coastal and South Gippsland Shires from Alberton on the east to Mornington, Frankston, and Moorabbin on the west. As the inspection of this group was not finished until September, 1913, the thoroughness of the Board's investigations in this part of the State, which occupied four months, will be understood. It will be noted that these inspections were carried out during the winter months, when the roads and tracks were in their worst condition. Many were quite impassable for vehicular traffic, and, in consequence, the greater part of the inspection had to be made on horseback.

It will be remembered that those were the days before the era of the motor vehicle, when the gradient desired was 1 in 20 to meet the needs of horse-drawn vehicles. The report indicates that the greatest handicap to the settlers in hilly country was the hopelessness of ever being able to construct the majority of existing surveyed roads and the unsuitability of the existing gradients.

Since those early days, the phenomenal growth of motor transport, established in recent years, has presented entirely new problems. Graph No. 1 indicates this growth over the years. In like manner, the spread of interests of the Board as the State's Road Authority, has grown enormously from main roads (the only type of its classified roads extant in 1914) to include also developmental roads, State highways, tourists' roads, forest roads, and also to an ever increasing extent assistance in the construction and maintenance of unclassified roads. The growth of townships and cities has transformed many rural sections of its declared roads into busy streets, especially in provincial cities and the outer metropolitan area. The growth of traffic and radical changes in its character have brought a new emphasis on building safety into the roads and designing their layout to provide increased capacity and efficiency of transportation. The value of the assets to be cared for in all classes of Government roads constructed since the establishment of the State 119 years ago is estimated at more than £200,000,000.

The Board's ever increasing functions and responsibilities and the problems which they have brought in their train have been systematically attacked by the setting up of specialized engineering divisions such as for design and construction of bridges, for bituminous surfacing, for research into road and bridge materials, and for the development and upkeep of the ever extending mechanical plant essential for both road and bridge works. The decentralization of activities (there are now ten "regional" divisions, of which eight are located in country centres), has been necessary to secure effective control of the planning and execution of the works. Periodically missions of officers abroad have been arranged with great benefit so as to ensure by personal contacts that Victoria keeps abreast of trends and developments in the older countries. The establishment of the Conference of State Road Authorities of Australia, has provided the machinery for an interchange of ideas and techniques within the Commonwealth and the Board's technical library ensures the collation and dissemination of the latest information available from the technical literature from all over the world.

Whilst these newer developments have added complexity to the Board's organization and activities, the original tasks still recur, e.g., the periodic selection of new sections of road which have advanced to the stage when they should be declared as State highways, main roads, &c., the regular conference with Councils in planning the most suitable programmes of improvements for the State-wide network (including declared main roads) under their immediate control, and the supervision of the councils' maintenance and construction operations, or any lack of effective procedures.

The expenditure to-day for road purposes under the Board's control exceeds £8,000,000 per annum, whilst a further £4,000,000 is expended by local government councils, and there is urgent need for much greater effort than even these figures indicate. In fact, the community as a whole has been far too slow in recognizing how swiftly the importance to the State of its roads and bridges has increased, especially in the post-war period. Demands are being made upon the network (already debilitated during the war years) which we have not matched by an adequate effort to improve, restore, and maintain it.

FINANCE.

In the 39th Annual Report, reference was made to the lamentable shortage of funds at the disposal of the Board during the financial year 1951-52, which made it necessary for the Board to greatly restrict its allocations both for works under municipal supervision and for those under its direct control. During the financial year 1952-53, the position was even more acute, in fact, so far from there being an increase in the funds available to the Board, the receipts from motor registration fees, petrol tax, and loan moneys under the Country Roads Acts were some £330,000 short of the previous year's total.

By way of contrast, costs of road construction and incidental expenditure and the volume and density of traffic using the State's road system further increased, with the result that the Board was able to do less work than in the preceding year. It thus follows that the deterioration of road pavements and structures is still continuing, and the condition of the main road and State highway system is causing the Board grave concern. Under existing circumstances, no relief from this position could be expected unless there is a substantial increase in the funds available to the Board, and the time is approaching when a disruption of road transport by reason of the unsatisfactory road system of the State is a strong possibility. (Plates Nos. 1, 2 and 3.)

Many miles of road constructed before World War II. to a standard which was adequate for the traffic needs of that time will not measure up to present day standards, and the amazing growth of traffic in the last decade has revealed weaknesses in some of the most important roads in the system which through lack of funds have not yet been remedied. Striking examples of this inadequacy may be found in the Murray Valley Highway between Strathmerton and McCoy's bridge and on the Princes Highway East beyond Orbost, the condition of which is far below even the minimum standard that the Board has been endeavouring to achieve throughout the years.

The bridge position has also become serious, and the arrears of work are not being overtaken. Steel and cement are still very costly, and such factors as these limit the amount of work that can be carried out. The general deterioration is particularly marked in the case of old timber bridges, and limitations of weight and width impose further restrictions on transport. It is still necessary to fix load limits on sections of very important routes carrying intensive traffic because of the Board's inability to provide the funds necessary to strengthen them to meet normal requirements. The position is gradually developing that the Board's organization is obliged to confine itself to maintenance on an ever intensified scale when complete reconstruction of the assets is essential and urgent, and would be a far more economical procedure. This is a situation which the Board's lack of funds makes it powerless to prevent. (Plates Nos. 4, 5 and 6.)

During the financial year 1952-53, the total sum applied for by municipal councils and the Board's engineers for works generally of an essential nature on both classified and unclassified roads was £13,007,514, but the Board was able to allocate only £7,554,839. The actual expenditure for the year was £5,596,611 which indicates that, apart from the Board's own organization, the municipalities are on the whole well equipped to undertake the construction and maintenance of roads and spend a very high percentage of the money allocated to them. In some municipalities, there is a well developed system of patrol maintenance, not only on the declared roads, but also on the very important secondary roads, and the Board is aware that its inability to provide the amounts asked for by these councils even for normal patrol maintenance has made it necessary for some of them to curtail this essential item. It is a fact that, for many years, the Board has been endeavouring to encourage councils in the setting up of a reasonable patrol system for the maintenance of their roads, and it is somewhat disconcerting both to those councils and to the Board that it is necessary to restrict the allocation of moneys for such vital work.

HEAVY TRAFFIC—WEAK PAVEMENTS



Plate No. 1.—Week-end Traffic on the Maroondah Highway near Ringwood.

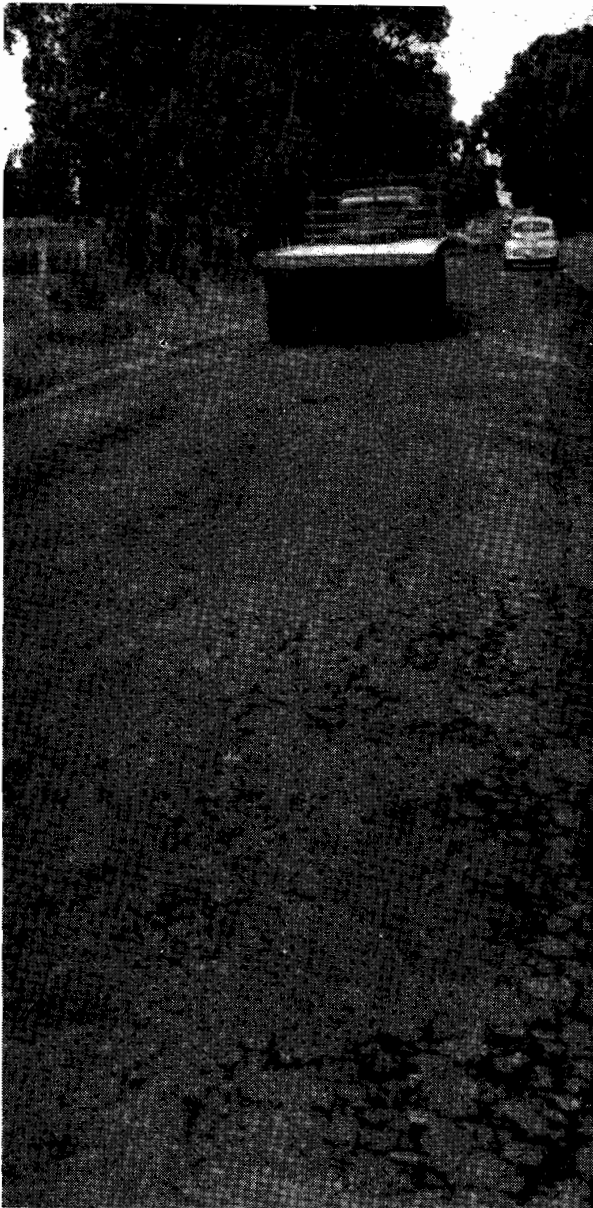


Plate No. 2.—Failed Pavement on Stud Road One Mile North of Ferntree Gully Road.

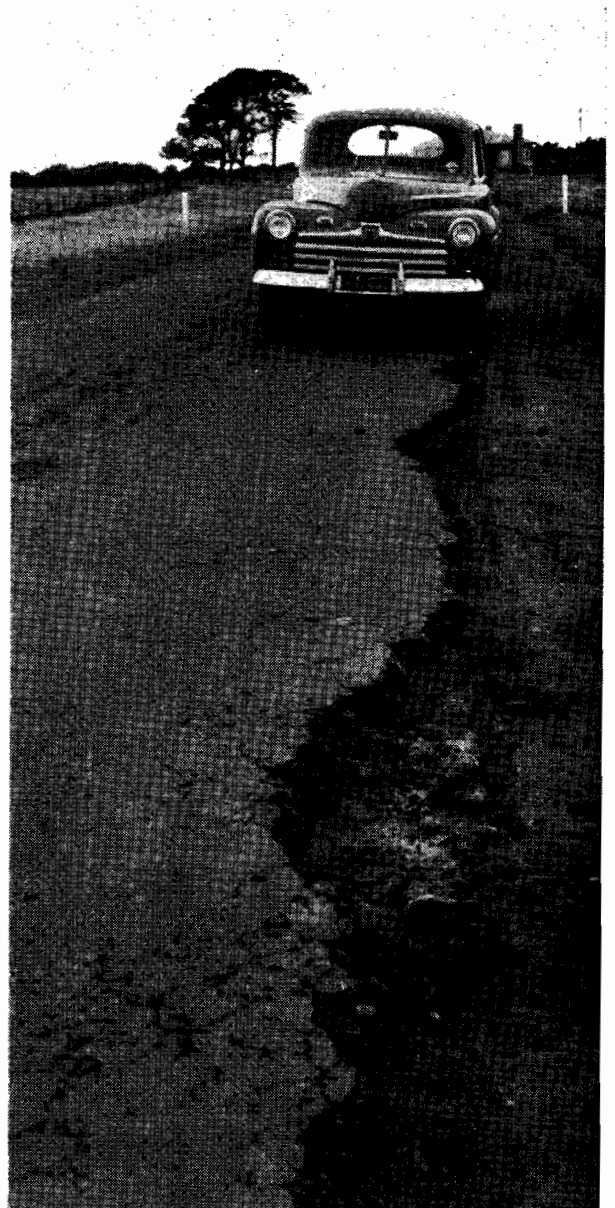


Plate No. 3.—Broken Edges and Potholes on the Narrow Seal of The Princes Highway West near Port Fairy.

SOME BRIDGE DEFICIENCIES



Plate No. 4.—A Narrow, Weak Bridge on the Midland Highway near Shepparton. This bridge carries heavy traffic over the Goulburn River.



Plate No. 5.—Deterioration of Old Reinforced Concrete Bridge over Kilmore Creek on the Northern Highway.

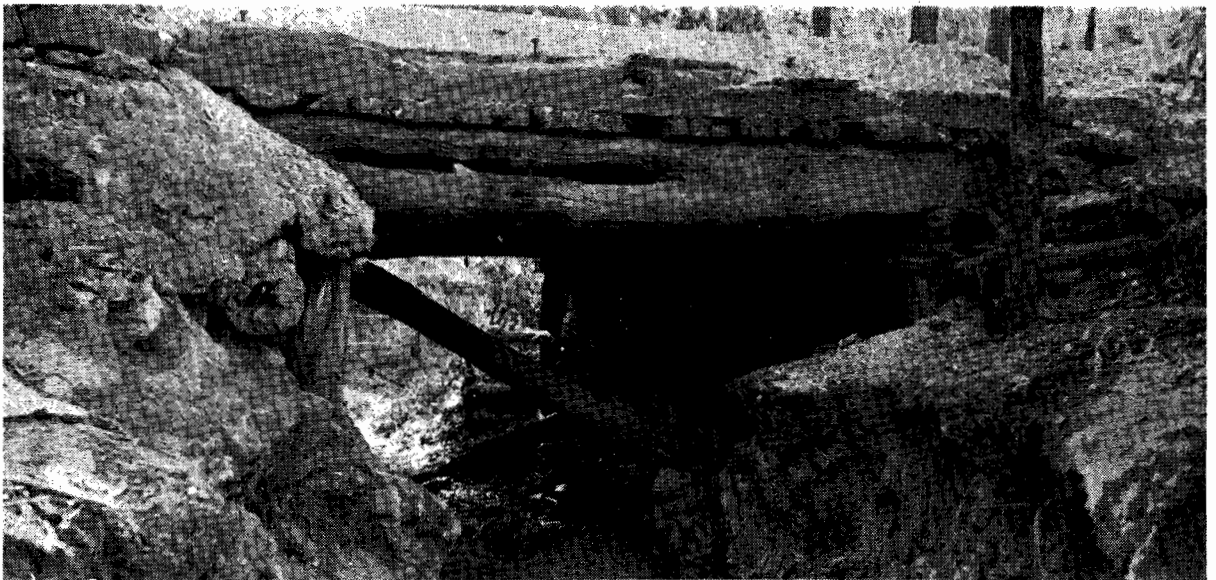


Plate No. 6.—An Old Timber Culvert at White's Mill on the Mandurang Main Road, Strathfieldsaye Shire.

The receipts from motor registration fees and fines, together with half the amount of the drivers' licence fees, totalled £4,171,116, a decrease of £15,790 in the amount received from the same source in the previous financial year. Refunds and the cost of collection absorbed £309,583, leaving a net revenue of £3,861,533.

The *Commonwealth Aid Roads Act* 1950, operative over a period of five years from the 1st July, 1950, provides for distribution amongst the States of the proceeds of 6d. per gallon Customs duty on motor spirit imported into Australia and 3½d. per gallon excise duty on motor spirit refined in Australia, on a basis which has been in operation for many years, namely, in the proportion three-fifths as to population and two-fifths as to area. Collections in respect of spirit used in civil aircraft or for the purposes of civil aviation are excluded. The basis mentioned allows of Victoria receiving only £174,000 of every £1,000,000 distributed.

The Act provides for 65 per cent. of the amount set aside as above, less an amount of £600,000 per annum over the whole of the Commonwealth, to be expended on the construction, reconstruction, maintenance, and repair of roads, on the purchase of roadmaking plant, or on other works connected with transport, either by road or water. The remaining 35 per cent. of the amount provided is to be expended on the construction, reconstruction, maintenance, and repair of roads in rural areas, and is not available for use on declared main roads or State highways.

The sum of £600,000 referred to in the previous paragraph is to be expended by the Commonwealth on (a) the construction, reconstruction, maintenance, and repair of strategic roads and roads of access to Commonwealth property (£500,000) and (b) on the promotion of road safety practice throughout Australia (£100,000).

During the financial year 1952-53, the total sum received by the Board under the provisions of this Act was £2,446,029, making the total sum available to the Board from motor registration fees and fines, drivers' licence fees, municipal repayments, &c., and from Commonwealth sources £6,653,974 as compared with £6,642,725 received from the same sources in the preceding financial year.

In addition, the Board was authorized to expend a total sum of £765,000 from loan moneys during the financial year, a reduction of £285,000 on the amount provided during the previous financial year. The Board originally asked the Government for an allocation of £2,158,000, but was informed that owing to the reduced authorization by the Loan Council only 70 per cent. of the preceding year's grant could be authorized.

The expenditure of loan moneys by the Board is governed by Acts Nos. 4188, 4414, 4498, and 5363, the first three mentioned providing for the construction and reconstruction of metropolitan roads and bridges and the last for the carrying out of permanent improvement and permanent works on State highways, tourists' roads, and forest roads. The full amount made available was expended, the actual expenditure under the respective Acts mentioned being £197,617 and £567,383 respectively.

It may be stated that, whilst the allocation of loan moneys provides further much needed funds for the Board's operations, they are uneconomical in the sense that they add considerably to the Board's interest and sinking fund bill (which already stands at £570,000) and thereby reduces the amount available from the Country Roads Board Fund for distribution to municipalities.

The amount standing to the credit of the Country Roads Board Fund at 30th June, 1953, was £15,097 which, incidentally, was also the total balance from all funds at that date. No balance remained under either of the Commonwealth Aid Road Accounts. This balance was more than covered by commitments in respect of expenditure incurred by municipalities but not claimed by them to date, and liabilities entered into on account of work commenced but not completed. In actual fact, this working balance at the end of the financial year was so small that it was not possible to meet all the claims on hand, many of which had to be held over until after the 1st July, 1953. This small balance out of a total of receipts of £7,418,974 gives some indication of the extreme care necessary in administering the funds during the year, particularly as considerable difficulty is experienced in accurately estimating the amounts which may be credited to the Fund in the last few weeks of the year.

COMMONWEALTH AID ROADS ACT 1950.

The amounts expended on roads and bridges during the year from moneys available under the above Act were as follows :—

	£
Maintenance of classified roads	1,770,539
Construction of roads of a developmental character and restoration and rebuilding of bridges on unclassified roads	354,185
Assistance on construction of soldier settlement roads	29,133
Construction, reconstruction, and maintenance of school bus routes	9,703
Roads to properties of isolated settlers	2,801
Repair of flood damage—unclassified roads	8,739
Provision towards maintenance of roads previously constructed by the State and Commonwealth	291,027
Total	2,466,127

WORKS ALLOCATIONS.

The total road allocation from all funds for the financial year 1952–53 for new works, i.e., not including revotes and commitments, was £6,388,140, as compared with £4,223,319 in 1951–52. The allocation of £6,388,140 was made up of £3,396,013 from the Country Roads Board Fund, £2,392,127 from Commonwealth Aid Roads Funds, and £600,000 from loan moneys.

Including revotes and commitments, the comparable figures for the years 1951–52 and 1952–53 respectively were £7,378,508 and £7,998,667.

MAIN ROADS.

ALLOCATION OF FUNDS.

The total amount applied for in respect of the maintenance and improvement of 9,792 miles of declared main roads was £6,170,577, and the total sum allocated was £2,960,963 or 48 per cent. In making this allocation, the Board endeavoured to provide as far as possible for essential items such as patrol and general maintenance, maintenance of bridges, and resheeting, with a more limited allocation for realignment, resealing, bridge construction and improvements. It very reluctantly eliminated any extensive initial bituminous treatment from its programme in order that it might be in a position to make some provision for maintenance and urgent reconstruction works where sections of road were actually failing. (Plates Nos. 7 to 13.)

The expenditure for the year was £2,174,791, representing 73 per cent. of the amount allocated, as compared with 72 per cent. of the previous year's allocation, and commitments amounting to £539,354 were outstanding at the 30th June, 1953. In the allocation for 1952–53 £888,263 was provided from Commonwealth Aid Roads Funds and £2,072,700 from the Country Roads Board Fund.

The number of municipalities which participated in the allocation was 189 and provision was also made for the maintenance of a number of main roads which are maintained under the direct supervision of the Board. The total amount allocated for the latter group of roads, and included in the total allocation figures mentioned in the previous paragraph was £268,005.

APPORTIONMENT OF COSTS.

The Country Roads Act provides that not more than one-third of the amount expended on the maintenance of main roads from the Country Roads Board Fund during the preceding year shall be apportioned to the municipalities, whose contributions are due and payable on the 1st January in the financial year next following that in which the expenditure was incurred. The Act also provides for the municipal contribution to be reduced below one-third where the cost of maintenance of a road is deemed to be excessive and where such cost is due to motor traffic not of local origin or to timber traffic. At the same time, however, the Board when dealing with the apportionment of the cost must take into account the revenue, valuation and rating of the municipality concerned.

MAIN ROAD DEFICIENCIES



Plate No. 7.—A Badly Deteriorated Section of the Koo-wee-rup-Pakenham Road, three miles north of Koo-wee-rup.

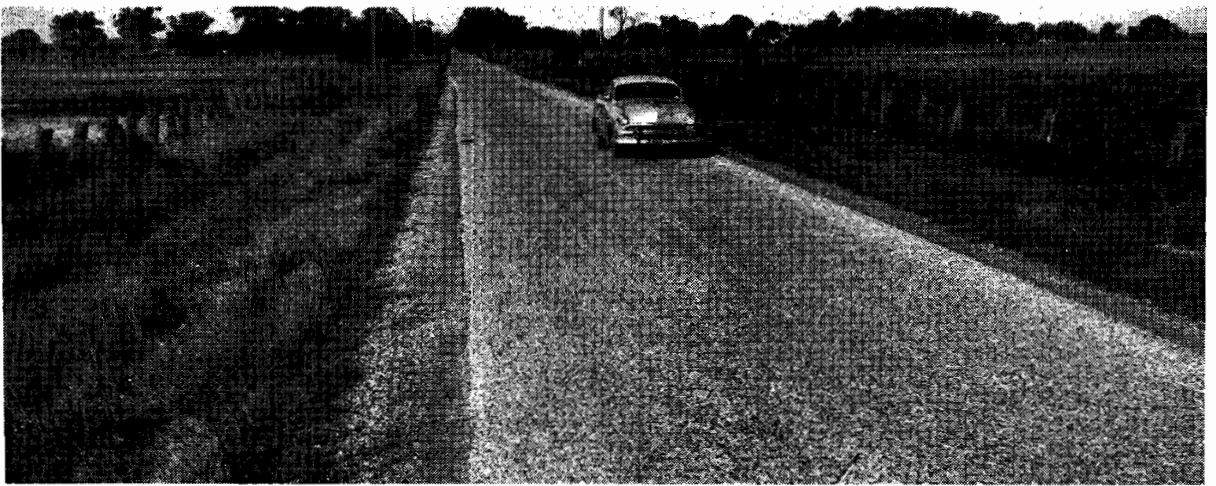
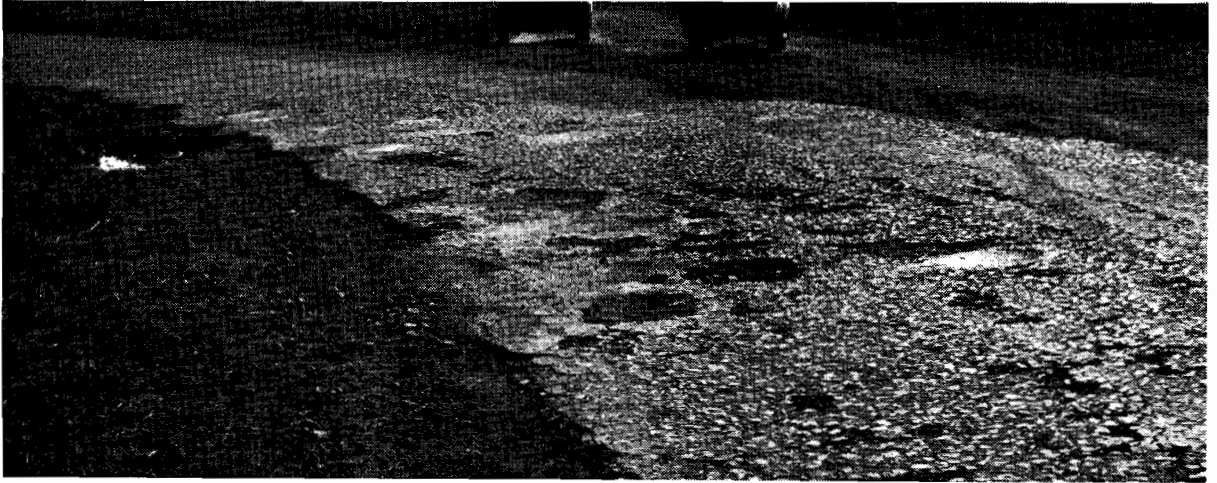


Plate No. 8.—Apsley Road seven miles north of Harrow where the high swamp level has ruined the road surface.

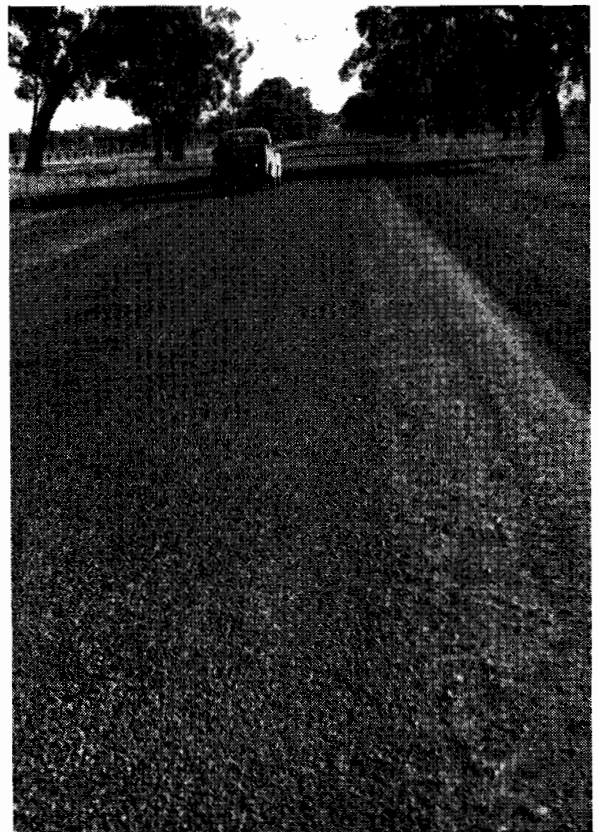
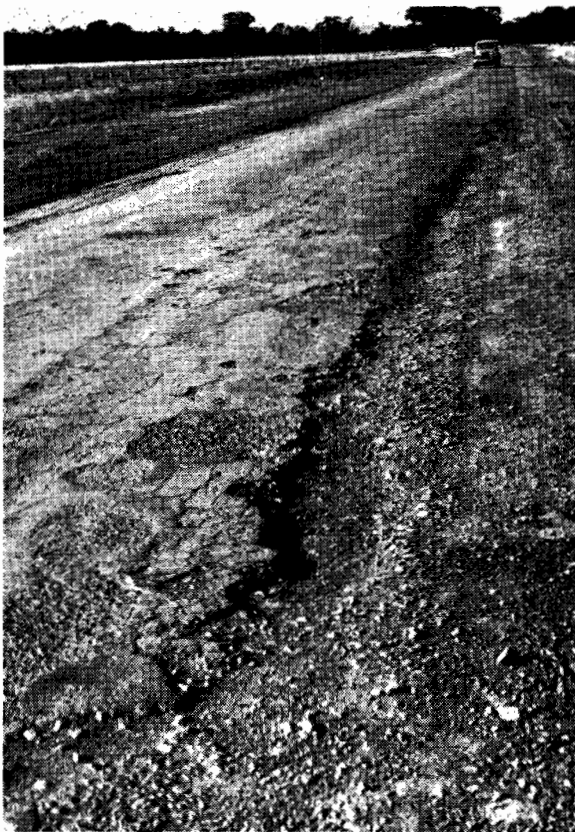


Plate No. 9.—A Tortuous Alignment on the Mt. Napier Road through Stony Rises, Shire of Dundas.

MAIN ROAD CONTRASTS



Plates Nos. 10 and 11.—Sections of the Tatura-Murchison Road. Top picture shows badly failed old sealed section two and a half miles north of Murchison. Lower picture shows a section south of Tatura saved by resealing.



Plates Nos. 12 and 13.—Adjoining Sections of the Mooroopna-Undera Road. The failed bitumen seal on the left is three miles north-west of Mooroopna.

The Board has for some years been endeavouring to assist the Councils in reducing their contributions to the larger projects by supplementing its allocations from the Country Roads Board Fund with grants from Commonwealth Aid Roads Funds, these latter grants being free of contributions by the Council concerned. In general, these supplementary grants are usually made in relation to particular jobs or under special circumstances, and the amounts to be contributed by the recipient Councils are substantially reduced by the application of these grants of "free" money.

When considering in September last, the apportionment of expenditure incurred during the financial year 1951-52 the Board reduced contributions by Councils in a few cases, but the rates of contribution in the great majority of cases were not altered from the previous year. The reduction of a contribution by a Council means, of course, that the Board itself accepts responsibility for a greater share of the cost of maintenance of the particular road, and, with the Board's limited resources, very little further relief in this respect can be given to Councils.

The position as to the apportionment of 1951-52 expenditure is as set out hereunder :—

	£
Expenditure from the Country Roads Board Fund	1,644,581
Expenditure from Commonwealth Aid Roads Fund	881,633
	<hr/>
Total expenditure	2,526,214
	<hr/>
Amount apportioned to Councils based on expenditure from the	
Country Roads Board Fund only	£344,048
Percentage of apportionment to Country Roads Board	
Fund expenditure	21·17 per cent.
Percentage of apportionment to total expenditure ..	13·61 per cent.

In the previous financial year, the corresponding figures were 21·58 per cent. and 13·99 per cent. respectively, which shows that the average contribution by the Councils to the total expenditure on main roads (including Commonwealth Aid Funds) has been reduced 0·38 per cent. Had the expenditure from the fund been apportioned strictly on a one-third basis throughout, the total contributions would have been £548,194 instead of £344,048. Had the whole of the work been financed on a one-third basis from the Country Roads Board Fund without the assistance of the Commonwealth Aid Roads Funds, this figure would have been increased to £842,071.

A number of the more important works carried out during the year on main roads are summarized hereunder :—

Bairnsdale Division.

Tambo Shire.—Tambo Upper Road. (1) 0·85 miles of reconditioning, realignment, and gravelling about 2 miles from Bruthen. (2) Replacement of worn out timbers in the trusses of the bridge over the Tambo River.

Ballaarat Division.

Ballaarat City.—Ballarat-Carngham Road. 0·72 miles of reconstruction with a 9-inch gravel pavement and 3-inch modified macadam top coat (portion of an unconstructed gap within the City boundaries). *Buninyong Shire.*—Old Melbourne Road, 1·1 miles of reconstruction, resurfacing with fine crushed rock, and sealing, to facilitate the cartage of potatoes and hay to the Dunnstown railway station. *Glenlyon Shire.*—Malmsbury-Daylesford Road, 0·76 miles of realignment, regrading, and reconstruction easterly from the Township of Glenlyon (an extension of the work carried out in the preceding year). *Ripon Shire.*—Beaufort-Lexton Road, 1·5 miles of reconstruction on a section of road which carries heavy gravel and timber traffic to Beaufort.

Benalla Division.

Benalla Shire.—Benalla-Yarrowonga Road, 1 mile of bitumen sealing. *Tungamah Shire.*—Benalla-Yarrowonga Road, 1·3 miles of bitumen sealing. *Wangaratta Shire.*—Yarrowonga Road, 3 miles of bitumen sealing.

Dandenong Division.

Alexandra Shire.—Taggerty-Thornton Road, reconstruction of 0·8 miles southerly from Thornton at Rubicon River Flats (work carried out under direct supervision of the Board.) *Bulu Bulu Shire.*—Main Neerim Road, 2½ miles of realignment, reconstruction, and sealing of failed lengths. *Cranbourne Shire.*—Koo-wee-rup-Longwarry Road, 1½ miles of reconstruction, including realignment of sand surfaced road east of Bayles which was of insufficient strength to carry milk lorries. *Mansfield Shire.*—Mansfield-Wood's Point Road, (1) Widening of narrow formation near Kevington, and (2) reconstruction and sealing in Wood's Point township. (Works under direct supervision of the Board).

Warragul Shire.—Warragul Korumburra Road, 1¼ miles of reconstruction and widening.

Resealing.—128 miles of resealing was carried out on main roads in this Division during the year, the highest in the Division for any one year. Had funds permitted, many miles of road so treated would have been strengthened and widened, but, in view of the acute financial position, resealing was adopted in an endeavour to hold the pavements for a little longer. The total length of initial treatment in the Division for the year was 19 miles.

Geelong Division.

Barrabool Shire.—Barrabool Road, 1·2 miles of reconstruction with gravel on Fisher's Hill, west of Highton. *Kyneton Shire.*—Trentham Road, 2·94 miles of resheeting and sealing southerly from Tylden. *Otway Shire.*—Colac-Beech Forest Road, 2·02 miles of reconstruction and widening between Kawarren and Gellibrand. *Romsey Shire.*—Melbourne-Lancefield Road, 1·5 miles of resheeting and sealing at Clarkefield, restoring a section of previously sealed road which had failed under post-war traffic. *Winchelsea Shire.*—Winchelsea-Dean Marsh Road, 1·94 miles of resheeting, widening, and reconstruction of curves northerly from Dean Marsh.

Horsham Division.

Arapiles Shire.—Edenhope-Horsham Road, completion of 6·5 miles of construction and sealing near Miga Lake. (Work carried out under the direct supervision of the Board). *Apsley-Natimuk Road*, completion of 1·2 miles of construction and sealing. *Horsham-Noradjuha Road*, completion of 1·1 miles of construction and sealing. *Karkaroc Shire.*—Patchewollock-Sea Lake and Kinnabulla-Woomelang Roads. Sealing through the townships of Patchewollock and Woomelang respectively. *Kowree Shire.*—Edenhope-Horsham Road, 1·3 miles of extension of construction and sealing towards Horsham. *Warracknabeal Shire.*—Minyip Road, 0·8 miles of reconstruction of failed sealed road between Warracknabeal and Sheep Hills.

Metropolitan Division.

Cities of Heidelberg and Preston.—Bell Street, construction of 1,700 feet of approaches to the new concrete bridge over Darebin Creek including channelization of the intersection of Bell Street and Liberty Parade. Although not yet complete, the construction of the approaches was sufficiently advanced to enable the new bridge to be opened for traffic. *Cities of Malvern and Oakleigh and Shire of Mulgrave.*—Warrigal Road, substantial progress was made with the construction of a new roadway along the eastern side of the widened road reserve between Holmesglen and Allen Street, Oakleigh. A divided road with a medium strip 9 feet wide between the opposing traffic lines is being provided, the total length of the project being 1·1 miles. *City of Moorabbin.*—South Road, construction of 2,600 feet of new pavement between Jasper Road and Tucker Road, as the first stage of a divided roadway from the Moorabbin railway gates to Warrigal Road.

Traralgon Division.

Morwell Shire.—Jeeralang West Road, completion of 3 miles of construction and sealing of deviation at the cost of the State Electricity Commission replacing the road now within the Commission's works area east of Morwell. *Traralgon West Road*, completion of 1½ miles of forming and gravelling of deviation to by-pass the works area of Australian Paper Manufacturers Ltd. (including construction of 3-span flat slab reinforced concrete bridge 90 feet long over the A.P.M. railway line).

STATE HIGHWAYS.

Once again it was possible for the Board to make only a very restricted allocation to meet the needs of the 3,849 miles of declared State highways throughout the State and no provision whatsoever could be made for many much needed improvements. The Board's organization is capable of a far greater effort than the available funds would finance, but no considerable progress can be expected unless substantial additional funds are placed at the Board's disposal.

As practically the whole of the work on the State highways is carried out under the Board's direct supervision, the Board adopted the policy of setting a "target" figure to which its Divisional Engineers were instructed to work. How closely they approached this figure may be gauged from the fact that during the year they expended a total sum of £2,184,574 against a "target" figure of £2,900,000. The total amount originally applied for by the Divisional Engineers at the commencement of the financial year was £3,148,685 but, in the light of its financial position generally, the Board allocated £2,304,074 with a limit on expenditure to a total of £2,152,897 for the year. A very large proportion of the expenditure was applied to urgent maintenance, and many items of works considered really essential had to be held over for lack of funds.

The total expenditure of £2,184,574 included £790,566 from the Country Roads Board Fund and £567,383 from loan moneys, the latter amount being used in reconstruction of old worn out lengths of road, together with a limited number of bridges. This rate of reconstruction is, however, not by any means commensurate with even minimum requirements to meet the needs of traffic.

The more important works carried out during the year included the following:—

Bairnsdale Division.

Princes Highway East.—Reconstruction and sealing of 1·75 miles of weak pavement at Napper's Corner, near Sale, originally constructed in 1930. Gravelling and sealing (part only) of 7·5 miles at Mt. Raymond and Mt. Raymond East. Resheeting 4 miles near Genoa. *Omeo Highway.*—Continuation of widening and improving narrow sections in the vicinity of Tambo Crossing. Widening 4 miles of narrow road between Bogong Saddle and Lightning Creek. *South Gippsland Highway.*—Reconstruction of failed sections totalling 1·55 miles on the floodway section south of Sale.

Ballarat Division.

Western Highway.—Reconstruction, widening, resheeting, and sealing of a failed section of 0·83 miles in length near Llandeilo. Widening the cutting, gravelling the shoulders, and pitching a table drain at Woodman's Hill, east of Ballarat, thus improving the visibility and conditions for passing and overtaking. *North-Western Highway.*—Resealing of a continuous length of 15·26 miles between Avoca and Redbank. *Pyrenees Highway.*—Completion of the construction of 0·79 miles of approaches to the bridge over the Wimmera River at Elmhurst.

Benalla Division.

Hume Highway.—Reconstruction, widening, and sealing a very weak and rough section of 0·8 miles near Longwood, originally constructed in 1928. Reconstruction of failed length of 3·86 miles near Springhurst, in extension of 2·31 miles similarly reconstructed in 1951–52, the old work having been carried out in 1929. *Murray Valley Highway.*—Reconstruction preparatory to sealing of 1 mile of seriously failed section between Towong and Corryong. 5·58 miles of initial sealing of section reconstructed in 1951–52 north and south of Nathalia, on which only a lightly sanded road existed previously. *Midland Highway.*—2 miles of initial sealing of section between Benalla and Swanpool reconstructed during 1951–52.

Bendigo Division.

Calder Highway.—Continuation of work on Hattah deviation, between Ouyen and Nowingi (mileages 300 to 320·85). The length of the new alignment is 13·9 miles, so that there will be a saving in distance of 6·9 miles when the deviation is completed. The work carried out in 1952–53 comprised 5 miles of forming, involving 63,500 cubic yards of cutting, 2 miles of reforming, and 0·5 miles of surfacing (base course only), and the progress to date on the whole project is—forming completed throughout the full length of 13·9 miles, 6·6 miles of surfacing completed to full pavement depth, and 13·1 miles of base course.

WIDENING OF HUME HIGHWAY



Plate No. 14.—Deteriorated Condition of Hume Highway North of Fawkner in 1951.



Plate No. 15.—Same Section after Widening and Resurfacing.

The total number of curves on the old section of highway is 73, of which 49 are sharp or relatively so. The number of curves on the new deviation is only seven, all of large radius.

Included in the formation work carried out last year was the cutting through of the two highest sandhills on the deviation, the depths being 17 feet and 20 feet respectively. The deep cuttings formed in the spring tended to accumulate drift sand during the summer and were reformed in the autumn for surfacing. Similarly, the higher fills having become windswept into a domed formation were cleared to a depth of approximately 1 foot, the sand being removed from the width to be occupied by the pavement. Rye-corn planted on the batters in the autumn has taken root and promises to be effective in controlling further sand movements.

Murray Valley Highway.—Approaches to bridge over Wandella Creek, consisting of 0·5 miles of new formation up to 4 feet in height surfaced with sandstone from Kendall's pit near Kerang. Reconstruction of 2·13 miles between Mystic Park and Lake Tutchewop, including sealing—part of a long length of lightly constructed sealed road built some 20 years ago and destroyed under post-war traffic. Similar reconstruction of 1·15 miles south-east from Lake Boga, including the realignment of a substandard curve.

Dandenong Division.

Nepean Highway.—Completion of realignment at sharp curves, east of Sorrento. *South Gippsland Highway.*—Completion of reconstruction and widening of failed length of 1·44 miles at Sherwood. *Hume Highway.*—Reconstruction and widening of 0·8 miles of failed pavement at "The Springs", south of Wallan. Surfacing of 2·07 miles with hotmix bituminous macadam north of Fawkner. (Plates Nos. 14 and 15.) *Princes Highway East.*—Pavement strengthening of failed sections at Berwick and Officer.

Geelong Division.

Princes Highway West.—Widening, resheeting, and sealing 24 feet wide over failing sections of the Laverton deviation, totalling 1·15 miles. Strengthening and widening pavement west of Winchelsea railway crossing for 0·35 miles. Strengthening by resheeting, together with widening of pavement, west of Winchelsea for 0·7 miles. Strengthening by resheeting and sealing of approaches to Armytage overhead bridge for 0·3 miles. *Calder Highway.*—Strengthening by resheeting and sealing in Black Forest, south of Woodend, for 1·7 miles. *Midland Highway.*—Widening and strengthening by resheeting over three sections north of Bannockburn totalling 1·35 miles.

Horsham Division.

Western Highway.—Sealing of sections totalling 12·65 miles between Gerang Gerung and the South Australian border which had failed and were reconstructed in the previous years. *Henty Highway.*—Completion of construction and sealing of 6·1 miles near Mockinya commenced the previous year, construction of a further length of 6·15 miles, and application of a "primer" seal. The final sealing of a length of 5 miles between Dooen and Kellalac, construction of a further section of 5·9 miles using pavement material stock piled the previous year, a primer seal being applied to this latter section. *Borong Highway.*—Final sealing of a length of 12·8 miles between Carron and Homecroft previously constructed, thus completing the sealing of the highway from Warracknabeal through Donald to Charlton. *North-Western Highway.*—The sealing of 5·3 miles constructed the previous year at Swanwater and Lake Nurrumbeet.

Metropolitan Division.

Nepean Highway.—Intersection with Warrigal Road at Mentone. This intersection is being reconstructed in accordance with plans prepared by the Board's staff. The design provides for islands to divide up the traffic entering the intersection from five approach roads, with a view to facilitating particularly the right hand turning of traffic, which previously had great difficulty in negotiating the intersection at times of heavy peak flow at holiday times and during week ends in the summer season. A feature of the construction is the introduction of a centrally placed indented island to provide storage space and refuge for this turning traffic. The project involved 10,500 square yards of new pavement, 3,100 square yards of divisional islands and 5,900 feet of kerbing and channelling (Plate No. 16).

STATE HIGHWAY IMPROVEMENTS



Plate No. 16.—Channelization at Corner of Nepean Highway and Warrigal Road, Mentone.



Plate No. 17.—Approaches to the New Concrete Bridge on the South Gippsland Highway at the Agnes River.

Traralgon Division.

Princes Highway East.—1·1 miles of deviation west of Morwell over State Electricity Commission's 90 c.m. line. *South Gippsland Highway.*—1·45 miles of deviation at Agnes River, including approaches to new reinforced concrete bridge. (Plate No. 17.)

Warrnambool Division.

Princes Highway West.—Resealing of 26 miles (continuous length) between Weerite and Garvoc. Reconstruction and sealing of 1·32 miles of failing pavement west of Yambuk, a further section of 0·84 miles being also constructed but not sealed.

TOURISTS' ROADS.

The general shortage of funds was reflected in the small allocation for tourists' roads, which covered very largely general maintenance and only a limited number of projects which could be termed "improvements".

The total expenditure on tourists' roads, of which a total length of 432 miles have been proclaimed, was £216,535, of which £208,416 was expended under the direct supervision of the Board.

The more important projects carried out included the following:—

Benalla Division.

Mount Buffalo Road.—Widening of the existing narrow formation between 6 miles and 9 miles to 21 feet. Widening of approximately eight sharp curves between mileages 9 and 13 to increase visibility.

Dandenong Division.

Phillip Island Road.—Completion of reconstruction and sealing of 1·3 miles westerly from the Bass Highway at Anderson.

Geelong Division.

Ocean Road.—Widening, strengthening by resheeting, and sealing on failing sections totalling 1·74 miles towards Anglesea. Extension of widening in steep rock sidecutting at Mt. Defiance. Completion of realignment, widening and paving from Jamieson River towards Separation Creek. Widening and resheeting of failing section of 0·44 miles between Carisbrook Creek and Sugarloaf Creek. Completion of sealing of realigned and widened section of 0·4 miles between Apollo Bay Post Office and the Barham Bridge.

Horsham Division.

Silverband Road.—Widening of 1·5 miles of narrow sidecutting commenced the previous year.

Warrnambool Division.

Ocean Road.—Sheeting 11·76 miles of worn-out gravel surface between Peterborough and Princetown. (See also page 28.)

FOREST ROADS.

A total sum of £113,895 was expended during the year on the 375 miles of proclaimed forest roads throughout the State, the works being again limited to patrol maintenance and maintenance resheeting. It was not possible to finance any substantial improvement works.

The more important works carried out included the following:—

Ballarat Division.

Ballan Shire.—Greendale-Trentham Road, maintenance resheeting of 2 miles south of Blackwood. *Glenlyon and Newstead Shires.*—Drummond-Vaughan Road, maintenance resheeting of weak sections over a length of 7·59 miles. (This work was carried out under the Board's direct supervision.)

Dandenong Division.

Upper Yarra Shire.—Reefton Spur Road, strengthening of approximately 3 miles of failed gravel pavement near Reefton.

UNCLASSIFIED ROADS.

In the past, grants have been made by the Board from Commonwealth Aid Road funds for unclassified roads under three headings, namely, (1) construction of unclassified roads serving settlement, (2) construction of short roads to serve the properties of isolated settlers, and (3) the maintenance of unclassified roads generally.

For the financial year 1952-53, however, the Board combined the first two headings, as it considered that, over the years during which funds had been made available for such work, the needs of isolated settlers had been largely satisfied. The terms of "Isolated Settlers" grants by the Board had remained for many years on the liberal basis of £10 from Commonwealth funds to £1 Council, so that there was a tendency for Councils to include projects under this heading which would in fact serve a wide extent of settlement. Applications for grants for roads within this category will, in future, be included in the general applications for unclassified roads, and will rank for priority with the latter type of road.

As a consequence of this change in procedure, the following applications were received by the Board for the financial year 1952-53:—

Unclassified roads, construction	..	..	..	..	£ 4,085,950
Unclassified roads, maintenance	..	..	..	..	586,540
					4,672,490

It was quite impossible, with the limited funds at its disposal for the Board to make an allocation for construction works even remotely approaching the amount applied for. In an endeavour, however, to preserve existing assets, grants were made for maintenance, generally on the basis of £2 from Commonwealth aid road funds to £1 from the Council. In its advice to the Council, however, the Board laid emphasis on the fact that the amounts allotted were not to be regarded as indicating the limit of expenditure which could or should be incurred on maintenance, but were merely the maximum contribution the Board could make towards the cost.

It is of interest to note that the receipt of these "Federal Maintenance Grants" has been much appreciated by the great majority of Councils, as is evidenced by the high percentage of expenditure recorded by these councils against the grants during the year. On the other hand, the failure of a small minority to avail themselves of the moneys provided is disappointing.

Numerous applications are received by the Board from time to time for the declaration of additional roads as main roads, but the Board has been obliged to advise the applicant Councils that it was not in a position to undertake any additional statutory responsibilities of this nature.

Details of some of the major works carried out during the year on unclassified roads are given hereunder:—

Bairnsdale Division.

Tambo Shire.—Bonang-Gelantipy Road, maintenance resheeting of 4 miles near Yellow Boy Hill.

Ballarat Division.

Buninyong Shire.—Torpeys Road.—1.74 miles of initial treatment, prime and seal, as part of the Council's policy to seal unclassified roads in order to preserve the existing assets. *Glenlyon Shire.*—South Bullarto Road, reconstruction and resurfacing with fine crushed rock of a length of 1.42 miles between the township of North Bullarto and Bullarto. *Ripon Shire.*—Beaufort-Elmhurst Road, 1 mile of resheeting westerly from the township of Raglan. Mt. William Road, 3½ miles of reconstruction, culverts, and sheeting with granitic sand west of Skipton.

Benalla Division.

Benalla Shire.—Upper Lurg-Greta Road, 2 miles of forming and gravelling. *Euroa Shire.*—Cullens Road, 3 miles of forming and gravelling. *Shepparton Shire.*—Fruitgrowers' outlet roads, 3 miles of resheeting and sealing on roads serving as outlets to orchardists.

Dandenong Division.

Healesville and Upper Yarra Shires.—Marysville—Wood's Point Road (Yarra Track), completion of construction from Reefton Spur Road to Monty's Hut.

Horsham Division.

Dimboola Shire.—Katyil—Wail Road, 4,200 feet of forming and rubbling. *Donald Shire.*—Middle Settlement Road, 10,000 feet of reforming and surfacing. *Dunmunkle Shire.*—Banyena—Coromby Road, 4,500 feet of reforming and surfacing. *Kaniva Shire.*—Access Road to the Big Desert, 11,600 feet of forming and rubbling. *Kowree Shire.*—Ullswater—Mortat Road, 13,643 feet of forming and gravelling. *Wimmera Shire.*—Dimboola—Minyip Road, 9,800 feet of surfacing.

Warrnambool Division.

Portland Shire.—Dutton Way, 3 miles of resheeting with gravel and double coat sealing. (This road, which provides a scenic beach road between the Princes Highway and Portland, is now sealed throughout.) Portland—Nelson Road, 2·4 miles of resheeting with soft limestone between Nelson and the South Australian border.

BRIDGES.

The Board is still faced with a big problem in the matter of bridge reconstruction all over the State and on all classes of roads. Many timber bridges built as long as 70 or 80 years ago are still in existence, too often in an advanced state of neglect and decrepitude. That they will even stand up under their own dead load, let alone carry heavy modern vehicles, is a tribute to the quality of the timber available years ago, but that such assets have so often been suffered to deteriorate without even spasmodic maintenance is little tribute to the community's appreciation of its responsibilities. Replacements of these critically weakened links is not proceeding at a pace commensurate with urgent requirements. Projects undertaken were confined to renewal of structures which had practically collapsed. Progress on these was satisfactory, several new contractors having come into the bridge construction field, so that increases in wages and in the prices of materials are to a marked degree offset. More work could now be accomplished at reasonable costs if finances permitted.

Reports are continually reaching the Board as to the weak and dangerous condition of various structures throughout the State and the fixing of gross load limits (some of them very low) is a common occurrence. Applications by Councils for the replacement of worn-out structures, some of them in a parlous condition, cannot for financial reasons be granted, and engineers throughout the State are compelled to adopt makeshift methods of keeping the existing structures in service until some financial assistance from the Board is forthcoming.

Plates Nos. 18, 19 and 20 illustrate the types of old bridges which are only too common in Victoria, and which in their present condition are deficiencies in the road system. Replacement is urgently necessary, but funds are not available, and the general public is compelled to suffer the inconvenience and danger far longer than should be necessary.

During the year, 169 bridges of a total value of £429,876 were initiated, the total number of bridges erected or in course of erection with funds provided by the Board, either under direct or municipal control, being 3,936. Of the new projects, 29 of a total value of £129,285 were supervised by the Board and 140 of a total value of £300,591 were under municipal supervision. The corresponding numbers for the previous financial year were 34 bridges under direct control, of a total value of £242,169, and 70 under municipal control of a total value of £129,183.

Bridges completed during the year included the following:—

Main Roads.

Alexandra Shire.—Upper Goulburn Road.—Precast concrete bridge of three 30 feet spans and 22 feet between kerbs replacing a low narrow timber bridge over U.T. Creek, which was threatened by scour in the creek. (Plate No. 24.) *Benalla Shire.*—Dookie—Devenish Road.—Precast reinforced concrete "U" type slab bridge of 3 spans, width 24 feet between kerbs. *Kara Kara Shire.*—Navarre Road.—Reinforced concrete bridge, 180 feet long, known as Beazley's bridge, over the Avon River, replacing an old dilapidated structure estimated to be about 90 years old which has been kept in service

only by extensive tomming and patching. (Plates Nos. 21 to 23). *Morwell Shire.*—Morwell-Mirboo Road.—Three-span flat-slab reinforced concrete bridge 90 feet long over the Morwell River replacing a weak narrow timber bridge which for some time had been subjected to a 6-ton gross load limit. (Plate No. 25.) *Morwell-Maryvale Road.*—Reinforced concrete bridge constructed to carry the road over the double track railway line to the Australian Paper Manufacturers' Mill at Maryvale. (Plate No. 26.) *Newstead Shire.*—Creswick Road.—Timber bridge over the Green Gully Creek replacing a decrepit narrow timber bridge on a poor alignment. *Otway Shire.*—Beech Forest-Apollo Bay Road. Reconstruction of bridge over the Aire River to facilitate the extraction of timber for the Forests Commission, which is contributing towards the cost of the work. (Plates Nos. 27 and 28.) *Talbot Shire.*—Talbot-Avoca Road.—Reinforced concrete flat-slab two-span bridge over Daisy Hill Creek replacing an old timber bridge. *Upper Yarra Shire.*—Warburton-Wood's Point Road.—Completion of new bridge over the Yarra River at East Warburton consisting of concrete piers carried down to rock with a superstructure of three 60-foot spans of steel girders with concrete deck. (Plate No. 29.) *Wangaratta Shire.*—Yarrowonga Road.—Casting was carried out of all precast reinforced concrete units required for the construction of McDonald's bridge (total length of bridge 100 feet). *Werribee Shire.*—Geelong-Bacchus Marsh Road.—New bridge over the Balliang Creek together with sealed approaches, replacing former flood crossing.

State Highways.

Princes Highway West.—New reinforced concrete bridge 130 feet long over the Shaw River, replacing very weak old structure on a poor alignment. The foundation stone in the abutment of the old bridge shows that, although several timber superstructures have been used on the bridge, the abutments were built in 1858. *Calder Highway.*—New reinforced concrete bridge 180 feet long over the Campaspe River at Carlsruhe, replacing weak old timber structure, works including improved alignment of the highway at this point and straightening a bad bend in the course of the river. *South Gippsland Highway.*—Redecking and strengthening the "swing" bridge over the Latrobe River near Sale. Flat slab concrete bridge over the Bass River between Nyora and Loch, replacing a very narrow weak timber structure. (Plate No. 30.) *Murray Valley Highway.*—Manufacture at Wodonga depot of all precast units for bridges between Nathalia and McCoy's. Flat slab reinforced concrete bridge 108 feet long over Wandella Creek (3 miles west of Kerang) upstream from the old narrow bridge, and on an improved alignment (Plate No. 31). *Loddon Valley Highway.*—Flat slab reinforced concrete bridge near Campbell's Forest replacing an invert which flooded to a depth of more than 2 feet each winter, and held up traffic. The new bridge incorporates railway rails in the deck, which is 11 inches thick, but no kerbs are provided, in order that obstruction to high flood water may be reduced to a minimum. *Midland Highway.*—5-span reinforced concrete flat slab bridge 150 feet long at Middle Creek, North of Yinnar.

Tourists' Roads.

Ocean Road.—Reinforced concrete bridge 76 feet long replacing narrow low level timber bridge over the St. George River, on improved alignment. (Plate No. 32.)

Unclassified Roads.

Bright Shire.—Star Bridge, Porepunkah, new bridge 120 feet long and 20 feet wide of concrete and rolled steel joists. *Ripon Shire.*—Carngham-Lake Goldsmith Road, new bridge 168 feet long (Cameron's) over Mount Emu Creek, with six spans, combined rolled steel joist and concrete deck, existing masonry abutments and two piers, with three new mass concrete piers.

Metropolitan Bridges.

Swan Street (Yarra River).—This bridge, which was commenced in September, 1946, and was delayed from various causes, including industrial disputes, was opened for traffic in August, 1952. Before long, its contribution to city peak traffic problems was evidenced by its carrying over 6,000 vehicles a day.

Bell Street (Darebin Creek).—During the year, this bridge, which is 90 feet long and provides a roadway width of 43 feet with two 6-foot footways, was completed and opened to traffic in February, 1953. Work is still in progress on the approaches. (Plate No. 33.)

OLD BRIDGES

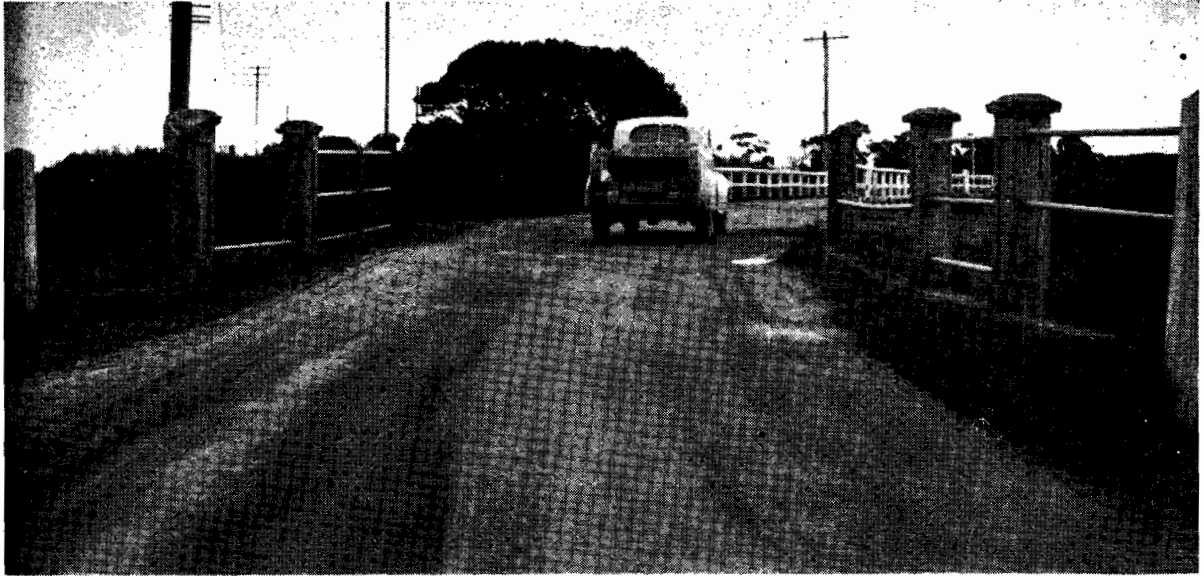


Plate No. 18.—Narrow Bridge on Curve Approaching Main Drain on the Koo-wee-rup-Pakenham Road, showing Damaged Handrail.



Plate No. 19.—Old Bridge and Temporary Bridge over Moyne River on Spencer Road, Shire of Belfast.

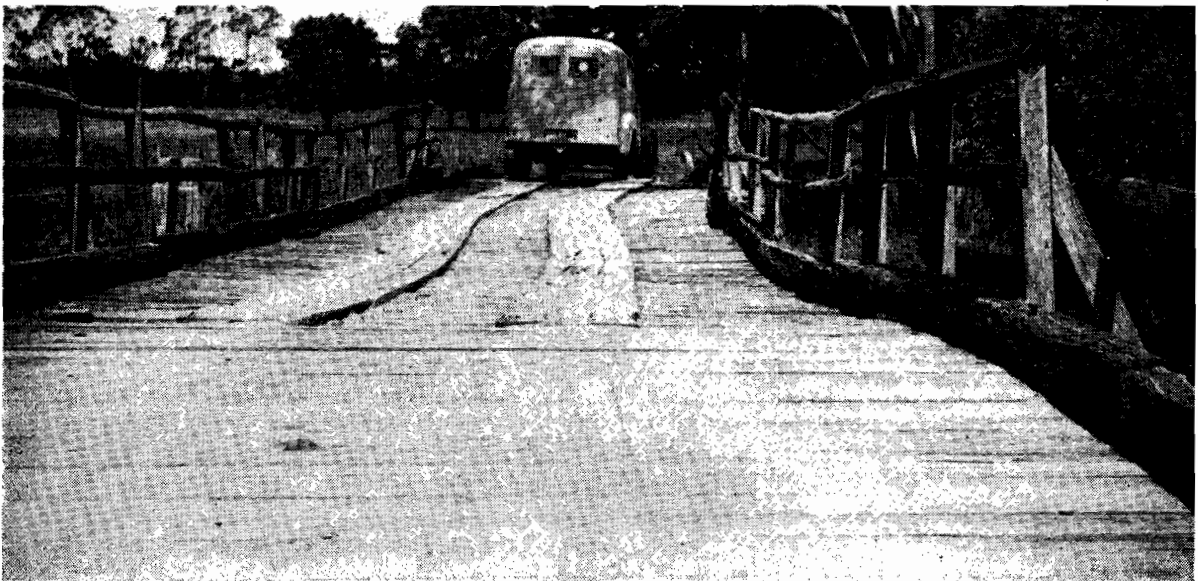


Plate No. 20.—Old Timber Bridge over Tarago River on Morrison's Road, Shire of Buln Buln.

BEAZLEY'S BRIDGE

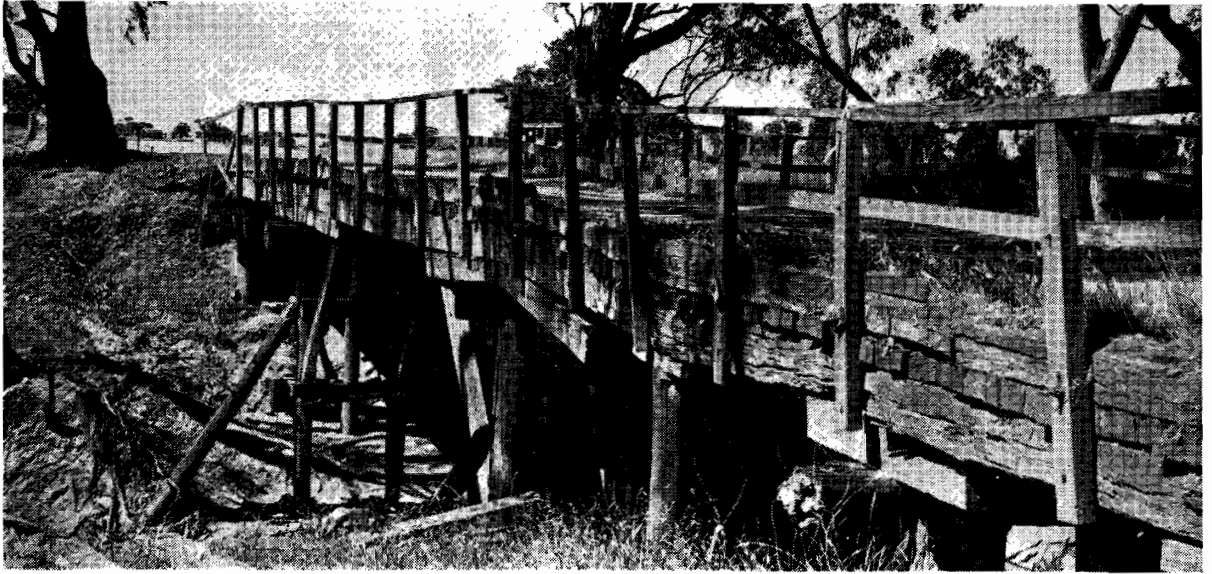


Plate No. 21.—The Old Timber Bridge on Navarre Road over the Avon River, known as Beazley's Bridge.

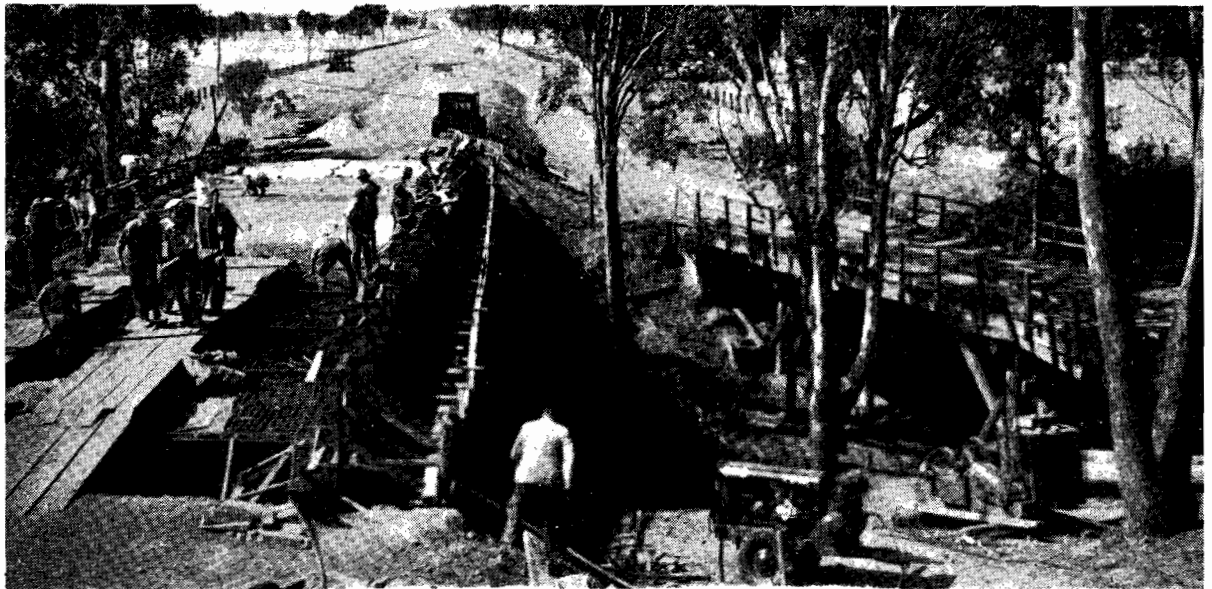


Plate No. 22.—Casting the Deck of the New Bridge.



Plate No. 23.—Newly Completed Reinforced Concrete Bridge.

CONCRETE BRIDGES



Plate No. 24.—Precast Reinforced Concrete Bridge over U.T. Creek on the Upper Goulburn Road.



Plate No. 25.—Sheepsfoot Roller Consolidating Approaches to New Bridge over Morwell River on the Morwell-Mirboo Road.



Plate No. 26.—Bridge on the Morwell-Maryvale Road over Railway Line to the Australian Paper Mills at Maryvale.

OLD AND NEW BRIDGES

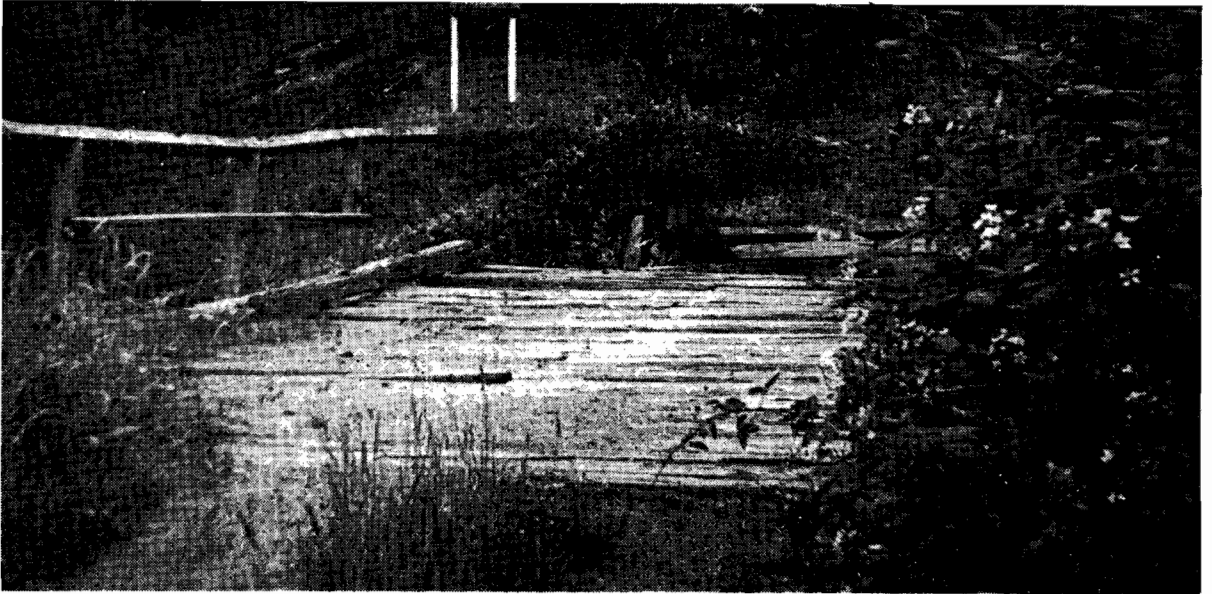


Plate No. 27.—Old Timber Bridge on the Beech Forest-Apollo Bay Road over the Aire River.

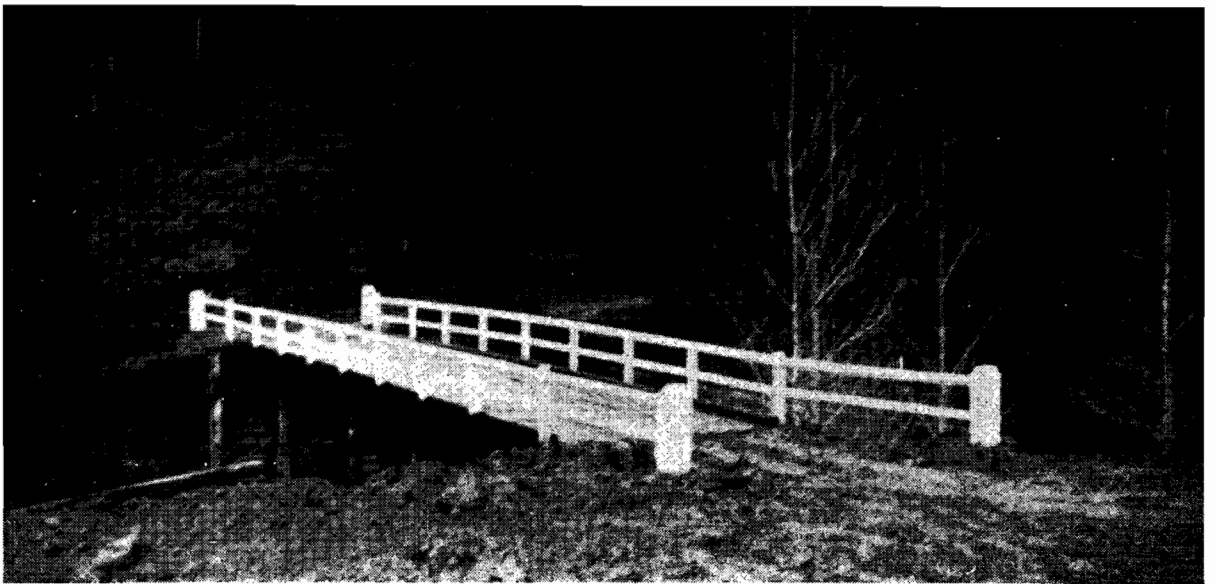


Plate No. 28.—New Bridge on Beech Forest-Apollo Bay Road over the Aire River.



Plate No. 29.—Bridge over Yarra River East of Warburton.

OLD AND NEW BRIDGES

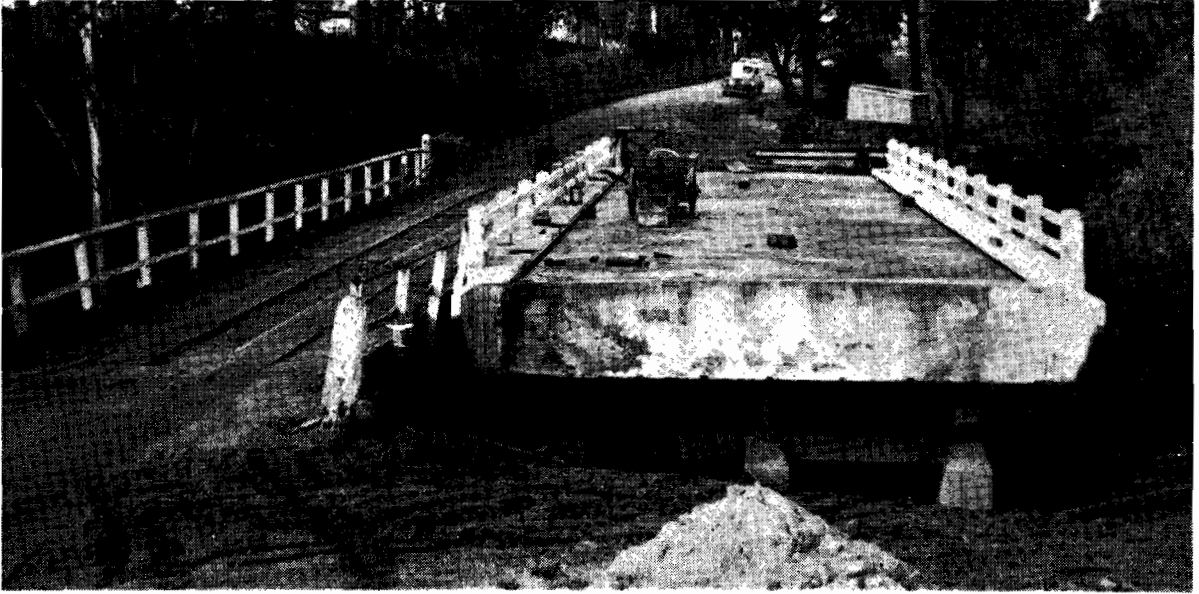


Plate No. 30.—Construction of Concrete Bridge over Bass River on the South Gippsland Highway replacing old, narrow Timber Bridge.



Plate No. 31.—New and Old Bridges over Wandella Creek on the Murray Valley Highway, West of Kerang.

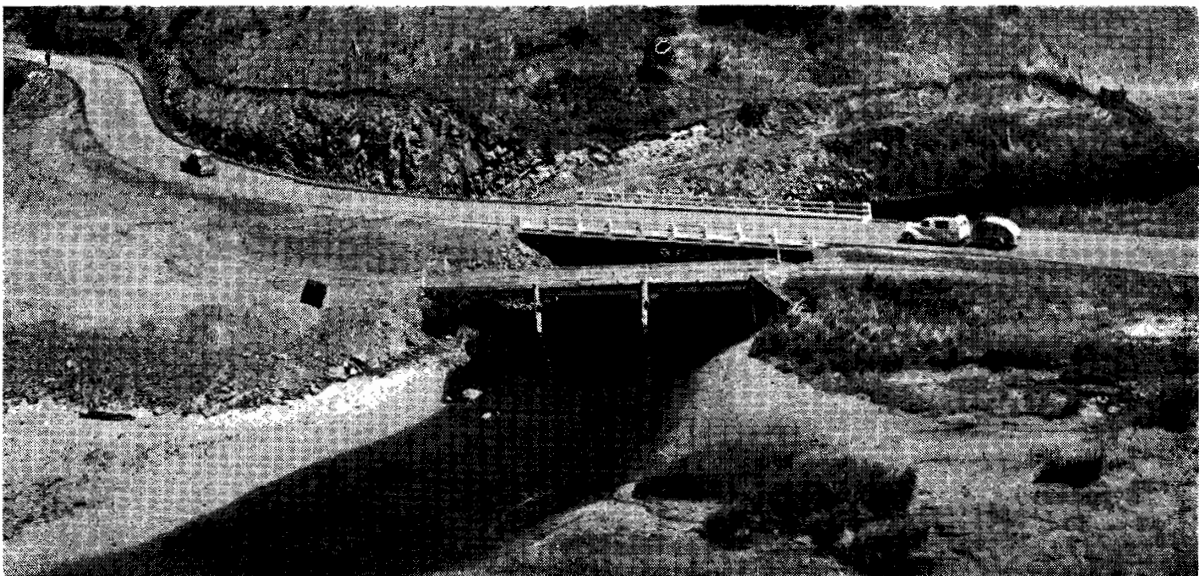


Plate No. 32.—New and Old Bridges on the Ocean Road over St. George River.

METROPOLITAN BRIDGES



Plate No. 33.—Bridge over Darebin Creek in Bell Street, Preston.

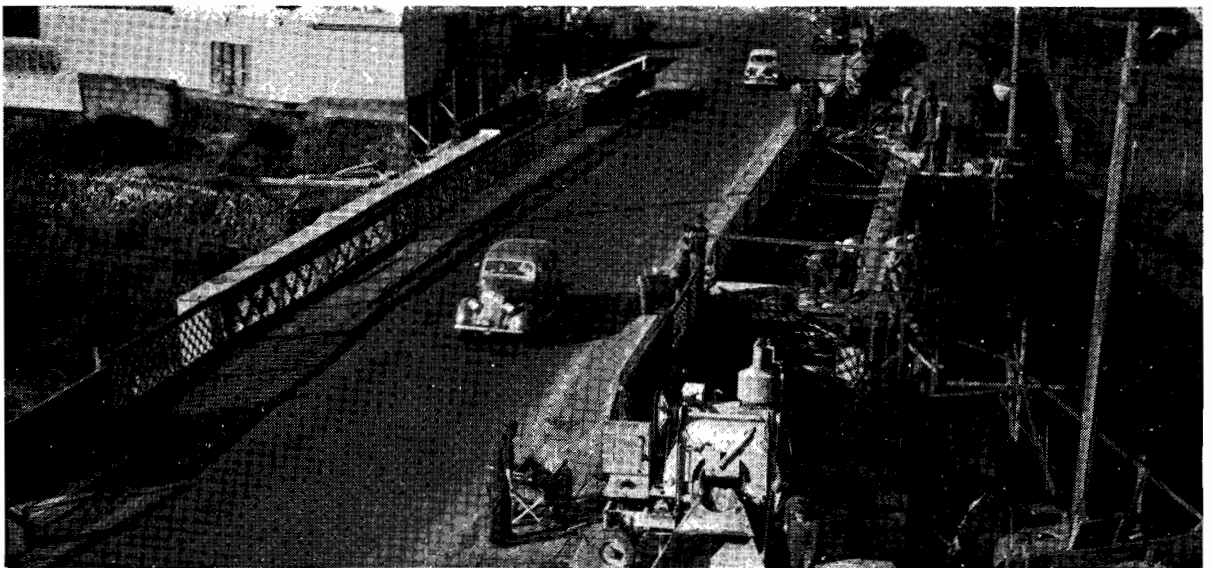


Plate No. 34.—Replacing Old Bridge over Merri Creek in Bell Street, Cities of Coburg and Preston.

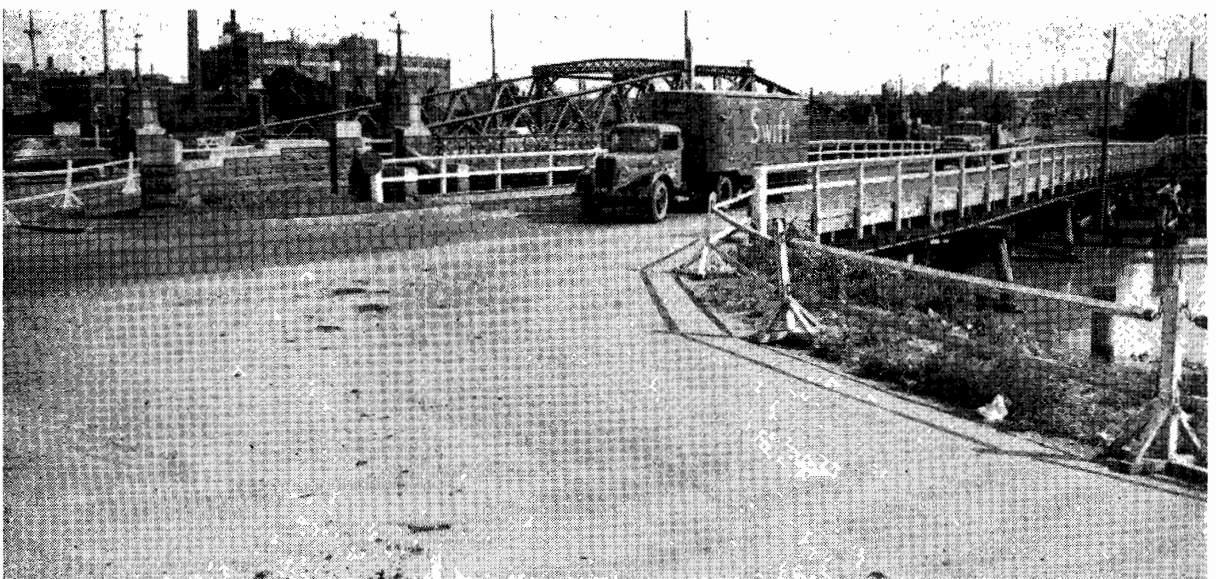


Plate No. 35.—New Temporary Bridge over Maribyrnong River on Melburne-Footscray Road.
Old swing bridge in background.

Bell Street (Merri Creek).—Preliminary work at this site commenced late in May, 1952, with certain excavation work in the stream bed, under the old bridge abutments. In September, 1952, work was started with an augmented gang, and satisfactory progress has since been made. All the difficult foundation work has been completed and a commencement made on the superstructure. (Plate No. 34.)

Melbourne-Footscray Road.—During the year, a temporary bridge over the Maribyrnong River, together with approaches, was completed. The existing old bridge is being restricted to one lane of outbound traffic, thus increasing its effective load capacity, while the temporary bridge is carrying the inward traffic, this arrangement to operate until the construction of a new bridge is completed. (Plate No. 35.)

FLOOD DAMAGE.

The year 1952 was marked by widespread damage to roads and bridges throughout the State by a succession of floods, involving very heavy expenditure in repairs and replacements. Bush fires in the north-eastern part of the State also caused considerable damage to bridges and culverts.

As indicated in the 39th Annual Report, the Government, in February, 1952, made available the sum of £100,000 for assistance to municipalities in connexion with the road and bridge works on unclassified roads necessitated by flood and fire, and this was duly allocated by the Board, although it was not sufficient to cover the whole cost of the works required.

A further sum of £700,000 was subsequently made available by the Government towards the cost of repairs necessitated by later floods on both classified and unclassified roads, both amounts being covered by an item of £800,000 in the *Public Works Loan Application Act* 1952, No. 5657. This amount of £700,000 was duly allocated in October, 1952, and again it was found that it was not sufficient to cover the whole cost of repairs as estimated by the Councils' and the Board's engineers.

As in the case of the original grant of £100,000, this later grant was made available on the basis that 60 per cent. was to be expended on bridges and road blockages, without contribution by the municipalities concerned, and the balance of 40 per cent. on general road repairs, to be on a contributory basis by the municipalities in the case of main roads and unclassified roads and on a non-contributory basis in the case of State highways, tourists' roads, and forest roads.

The severe floods of December, 1952, caused further financial embarrassment to the municipalities and the Board, and it was estimated that an additional £300,000 was needed to meet the bill for the disastrous year 1952. The Government was, however, unable to make any further provision during the financial year.

One stipulation made by the Government in connexion with the grant of £700,000 was that the total expenditure to the 30th June, 1952, including expenditure against allocations made from the first £100,000 should not exceed £450,000. The actual expenditure to the date mentioned was £450,000 and, rather than hold up urgent works, it was necessary for the Board to meet certain expenditure to the amount of £42,190 on classified roads from its own funds; this could only be done at the expense of other necessary works. The extensive deterioration of assets caused by the exceptionally severe floods has set back still further the already lagging programmes of restoration and reconstruction of the various parts of the State's road system.

Some of the more important and extensive projects are set out briefly hereunder:—

Narracan Shire, Walhalla Road in the Township of Walhalla. During the floods of June, 1952, Stringers Creek, which flows through the centre of the town, was severely blocked by debris washed in by tributaries. The resultant erosion of the sides of the creek, which runs alongside the road, caused a great deal of damage, and in order to restore the road it has been necessary to control the creek banks. Plates Nos. 36 and 37 show details of the different methods used. *Orbost Shire, Cann Valley Road.* The timber bridge known as "Double Bridge" was practically washed away (Plate No. 38). The progress being made with the erection of a new structure at a site just downstream of the old bridge is shown in Plate No. 39. *Marlo Road, at Gilbert's Gulch.* Conditions at this point, where over the years access to the township of Marlo has been blocked on many occasions, have caused the Board and the Council considerable concern, and a great deal of money has already been expended in an endeavour to deal with the problem. Following

FLOOD DAMAGE AND REPAIR WORK

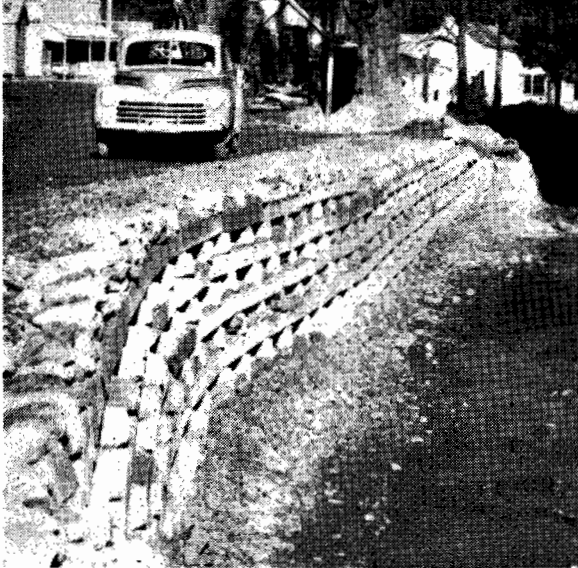


Plate No. 36.—Precast Concrete Log and Chock Type of Retaining Wall at Stringer's Creek, Walhalla.



Plate No. 37.—Stone Filled Mesh Type of Bank Protection at Stringer's Creek, Walhalla.

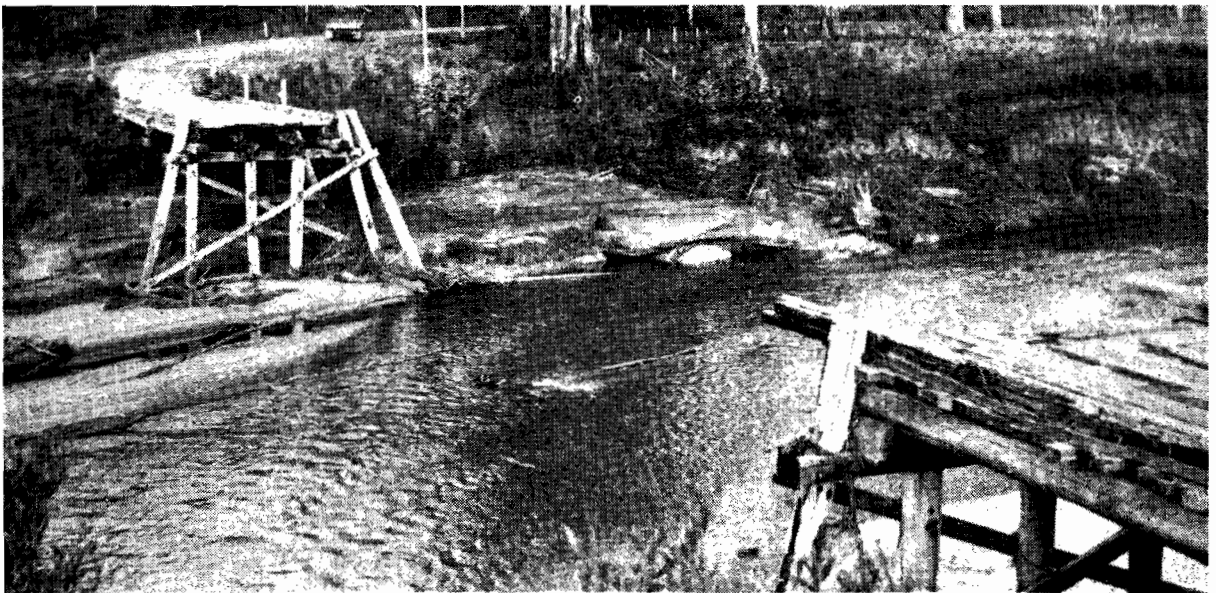


Plate No. 38.—Old Flood Damaged Bridge on Cann Valley Road at Cann River.

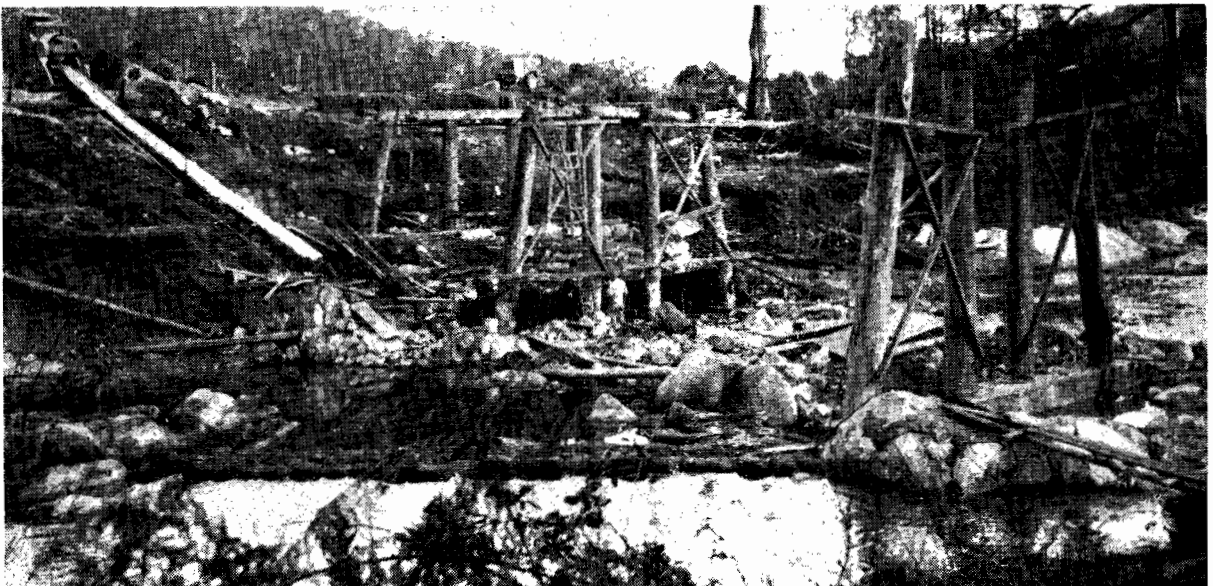


Plate No. 39.—New Bridge Under Construction on Cann Valley Road at Cann River.

the June, 1952, floods, when further damage was done to this section of the road, proposals to make the road to Marlo at this site more independent of the flood in the Snowy River were investigated and remedial work was put in hand. The project is to take the form of a timber and stone stepped construction to prevent the washing away of the road whenever the floods overtop it. The work, which extends for a length of 1,200 feet, is being carried out by the Council, and the attached photographs indicate that substantial progress is being made. (Plates Nos. 40 and 41.)

Avon Shire, Princes Highway, strengthening of the piers of the Avon River Bridge and reinstatement of concrete sheeting and filling on the concrete protection work on the eastern bank of the river. The western bank, which had eroded badly and threatened the highway bridge abutment, was protected by stone "gabions". *Tambo Shire*, Suggan Buggan Road, extensive widening and reconditioning was carried out on this road, which had been blocked to vehicular traffic since the floods of 1950. *Bright Shire*, Harrietville Road, replacement of washed-out approaches to bridge over Ovens River, and repairs to abutment and piers extensively damaged by flood waters. *Euroa Shire*, Shean's Gully and Faithful Creek Road, reforming and resheeting of 1 mile of road washed away. *Mansfield Shire*, Allans Bridge over Goulburn River, replacement of one 50-ft. span and abutment. Home-station Creek Bridge, replacement of one 15-ft. span and abutment. Soldiers Lane, replacement of bridge 50 feet long. *Seymour Shire*, Jessup's Bridge, replacement of washed away culverts by new timber bridge. *Yackandandah Shire*, construction of 20-ft. span bridge at approach to Keegan's Bridge after flood waters had washed away the approach to the bridge. *Upper Yarra Shire*, Wood's Point Road between Warburton and McVeigh's, construction of stone and timber groynes and stone walls for scour prevention, together with replacement of scoured formation, removal of slips, and relaying of culverts. *Winchelsea and Otway Shires*, Ocean Road, one road in the State which invariably suffers when flood conditions exist is the Ocean Road, and reports that some section or other has been blocked as the result of landslip are all too common. A summary of the periods of closure during the first half of the financial year 1952-53 is given hereunder :—

Section.	Length in Miles.	Number of Days Closed.	Period in which Closing was Necessary.
Torquay to Lorne	30.06	26	3½ months
Lorne-Wye River	10	19	2¾ months
Wye River to Apollo Bay	18.45	19	4½ months
Apollo Bay to Calder River	15.75	Nil	Nil
Calder River to Peterborough	60	14	6 months

The longest period of closure was fifteen days, a section of the road near Eastern View having been closed to all traffic from 23rd July to the 6th August, 1952. It was opened to light traffic, up to a gross weight of 6 tons on the latter day, but was not opened to the heavier traffic until 29th August. Works necessitated included removal of landslips and construction of masonry retaining walls to support road formation at several locations between Anglesea and Lorne, particularly at Clarke's Slip, and similar work at several locations between Lorne and Apollo Bay particularly at Sheoak River and Wild Dog Creek; widening 500 feet in heavy side cut at slip 4 miles west of Laver's Hill and restoration of numerous minor slips.

WORK FOR OTHER AUTHORITIES.

The Board's organization was again availed of very largely during the year for the carrying out of special works for a number of Authorities, both Commonwealth and State, which were not suitably equipped for such works, the total expenditure incurred on these works being £1,553,386 14s. 9d., or £314,279 3s. 8d. more than in the previous financial year. Of the first mentioned sum, nearly £1,000,000 was expended on works for the Commonwealth Government arranged through the Commonwealth Department of Works.

FLOOD PROTECTION WORK

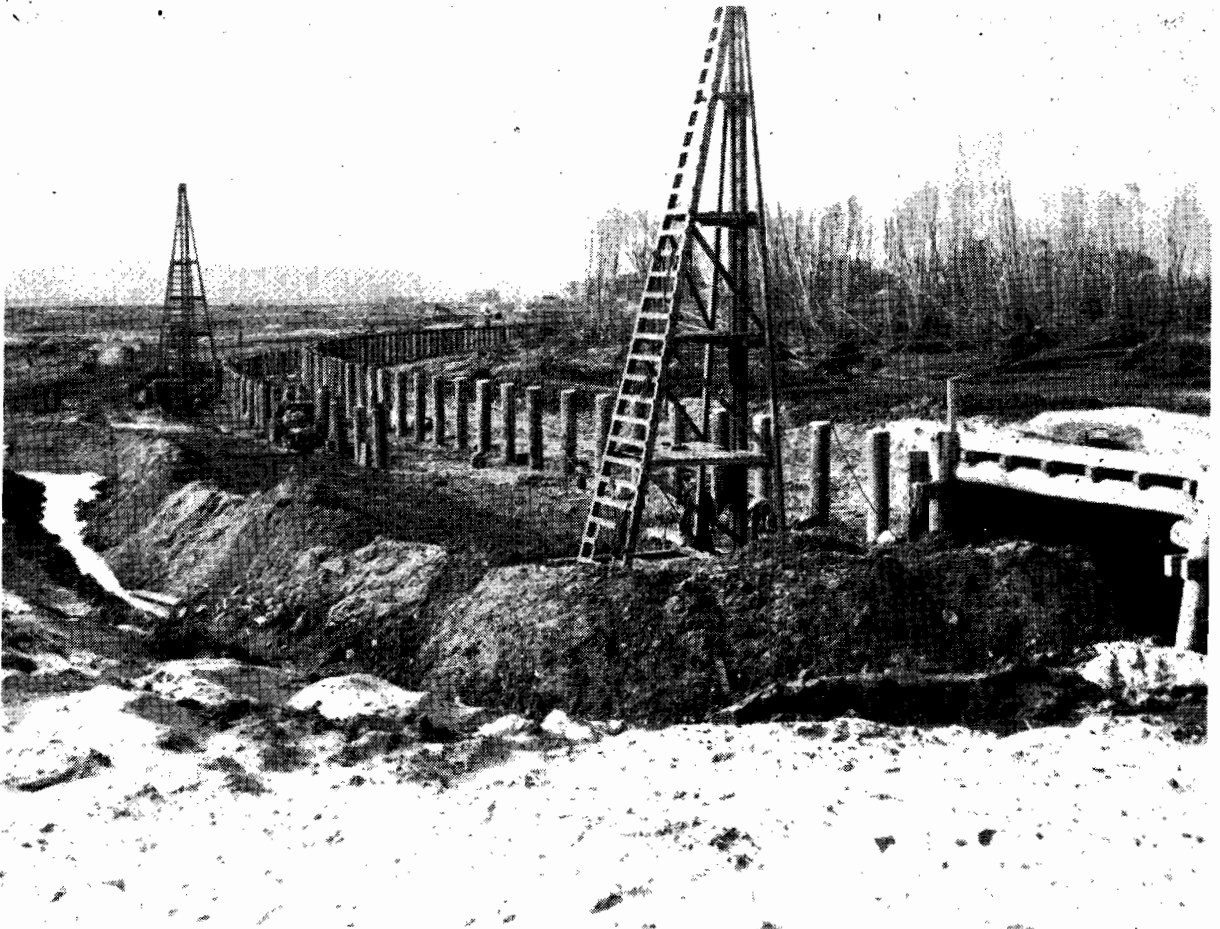


Plate No. 40.—Flood Protection Work in Progress on Marlo Road at Gilbert's Gulch, looking towards Marlo.



Plate No. 41.—Flood Protection Work in Progress on Marlo Road at Gilbert's Gulch, viewed from Marlo end.

Brief particulars of the principal works, both State and Commonwealth, are set out hereunder :—

HOUSING COMMISSION.

Work was continued on the provision of roads, channels, drains, and footpaths on the Ballarat West Estate, on the Norlane Housing Estate near Geelong, and on Hourigan's Estate, Morwell. The total expenditure on all projects was £188,885 19s. 5d.

SOLDIER SETTLEMENT COMMISSION.

The total expenditure during the year on works relating to the provision of road facilities to Soldier Settlement Estates throughout Victoria was £130,899 1s. 9d. Details of the principal works carried out are given in a separate section of this report.

STATE RIVERS AND WATER SUPPLY COMMISSION.

The total amount expended on behalf of the State Rivers and Water Supply Commission during the year was £101,825 5s. 9d., the works involved being those necessitated by the Commission's operations on the Eildon Weir and Hume Weir projects and the Cairn Curran Reservoir. The bulk of the expenditure by the Board on behalf of the Commission for the year has been associated with Big Eildon scheme (approximately 73 per cent.), the expenditure relating to the Hume Weir Extension (£26,898) and Cairn Curran Reservoir Works (£988 18s. 1d.) accounting for the balance.

Big Eildon Project.

The Commission's scheme for raising the Eildon Weir from its present full supply level (R.L. 823) to the future full supply level of R.L. 950 will within two years involve the inundation of numerous roads and bridges in the area.

A major deviation of the Maroondah Highway is required in the vicinity of Bonnie Doon due to the flooding of the valley of Brankeet Creek, which forms a branch of the Delatite arm of the reservoir. Approximately 3 miles of the highway will be deviated, including a major crossing of the Brankeet Creek by means of a high bridge approximately 1,300 feet long and 80 feet above the stream bed, with high earth embanked approaches. Two short deviations near Woodfield, west of Bonnie Doon, are also required. Surveys and plans for these works are in hand.

Nearly the whole of the Eildon-Jamieson Road will be inundated. The present bridge at Big River will be covered by 123 feet of water when the new reservoir is at full supply level. A deviation approximately 25 miles long is involved and investigation surveys to determine the new route have been proceeding.

A new bridge will be required over the Goulburn River near Jamieson to replace the existing Gooley's Bridge, which is about 15 feet too low for the enlarged reservoir.

On the Mansfield-Wood's Point (Main) Road, a length of approximately 3 miles just north of Jamieson will be flooded, involving a deviation. A new structure will be required to replace the old timber truss bridge over the Howqua River, which is 58 feet too low for the enlarged reservoir. A new bridge will be constructed approximately 2¼ miles upstream, and the existing Howqua River Road will be used for some years to connect the new bridge to the present Wood's Point Road along the south bank of the river. North of the new bridge, a deviation 2 miles long is required to connect to the existing road to Mansfield just south of Martin's Gap. Preliminary surveys to determine the various new alignments have been undertaken.

The Upper Goulburn Road from Alexandra to Eildon is below the reservoir and therefore is not subject to inundation, but approximately 16 miles have been reconstructed between Alexandra Railway Station and Eildon township, so as to be able to carry the additional traffic from the railhead.

A considerable mileage of roads serving settlers in Mansfield Shire will need to be relocated either on account of inundation or isolation, and several bridges are involved. The cost of this work will exceed £100,000. A contract is in progress for reconstruction of Royaltown Road serving Tehan's and others.

MELBOURNE AND METROPOLITAN BOARD OF WORKS.

Works undertaken on behalf of the Melbourne and Metropolitan Board of Works during the year were almost entirely associated with the proposed new dam at Walsh's Creek, including the provision of road facilities to the dam site and the replacement of other facilities which will be submerged when the new dam is constructed. The bulk of the total expenditure of £79,592 3s. was incurred on the Marysville-Wood's Point Road (Yarra track) where nearly £60,000 was expended.

STATE ELECTRICITY COMMISSION.

Financial limits prevented the State Electricity Commission from authorizing a programme of work as extensive as that in the previous financial year, when the total expenditure by the Board on the Commission's behalf was £225,786 11s. 8d. The comparable expenditure incurred in 1952-53 was £50,404 11s. 11d., the principal items being the relocation of the Jeeralang West Road south of Morwell (£16,624 3s. 6d.), the Kiewa Valley Road leading to Mount Beauty (£17,872), the strengthening of bridges on the Princes Highway East between Melbourne and Morwell to carry the Commission's specially heavy traffic (£3,416 9s. 9d.), and the deviation west of Morwell (£15,110 5s. 3d.).

DEPARTMENT OF PUBLIC WORKS.

An expenditure of £4,681 18s. 8d. was incurred on certain works undertaken at the request of the Public Works Department, including Ballarat-Carngham Road in the City of Ballarat (£2,322), and road works at Dookie Agricultural College (£1,390 12s. 2d.). Amounts totalling £395 11s. 9d. were also expended on the Chandler Highway, in the Cities of Heidelberg and Kew.

With the development of the brown coal mine at Wensleydale, consideration has been given to the urgent necessity for strengthening a length of about 7 miles of the Winchelsea-Dean Marsh Road between the mine and the Winchelsea Railway Station. The road had been reconstructed in 1946 when the mine was developed, but the output of coal has increased greatly, and is to be still further increased to serve the new electricity power station at Geelong as well as industrial needs in centres along the Princes Highway, so that, with the greatly intensified traffic, extensive failure of the road has occurred and heavy reconstruction is essential to cope with the special traffic.

A report was submitted by the Board's Divisional Engineer which indicated that the estimated cost of strengthening and sealing this section, over a period of four years, was £111,999, of which it was proposed that £30,000 be provided during the financial year 1952-53. The latter amount was authorized from loan moneys, and work was commenced on 15th April, 1953 by direct labour, under the supervision of the Board, the fine crushed rock being supplied by contract. The expenditure to the 30th June, 1953 was £8,302, 12s. 6d.

GAS AND FUEL CORPORATION OF VICTORIA, ETC.

Construction works were carried out on behalf of the Corporation on Tramway and Porter's roads in the Shire of Morwell, the expenditure for the year being £4,562 17s. 1d.

Other works undertaken during the year for various State Authorities were:—

Forests Commission, sundry works in Maffra and Otway Shires, £518 7s. 5d.;
Victorian Inland Meat Authority, road works at Ballarat, £11 2s. 6d.;
and State Coal Mine, maintenance of roads at Wonthaggi, £5 4s.

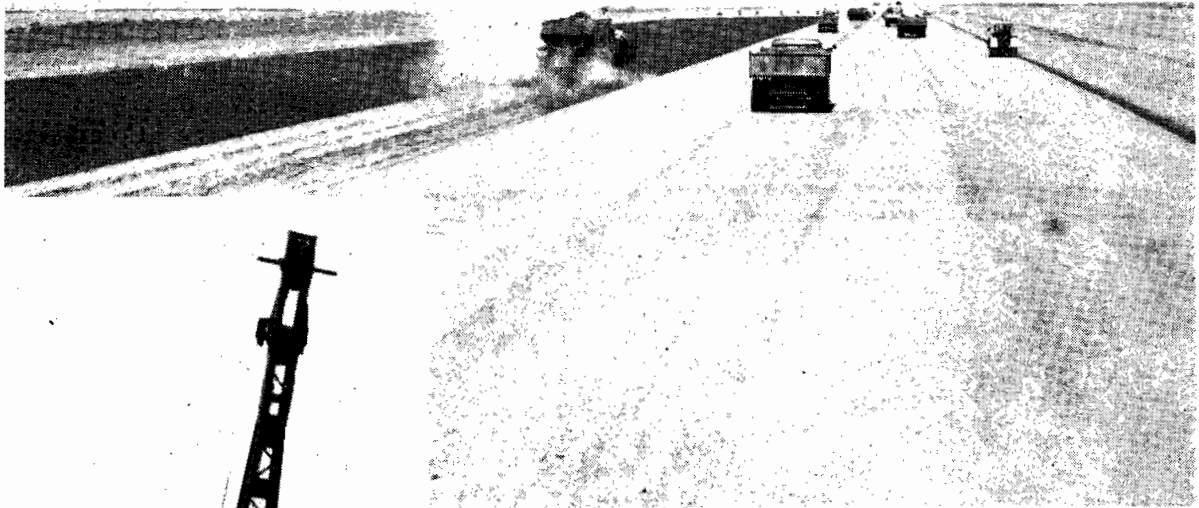
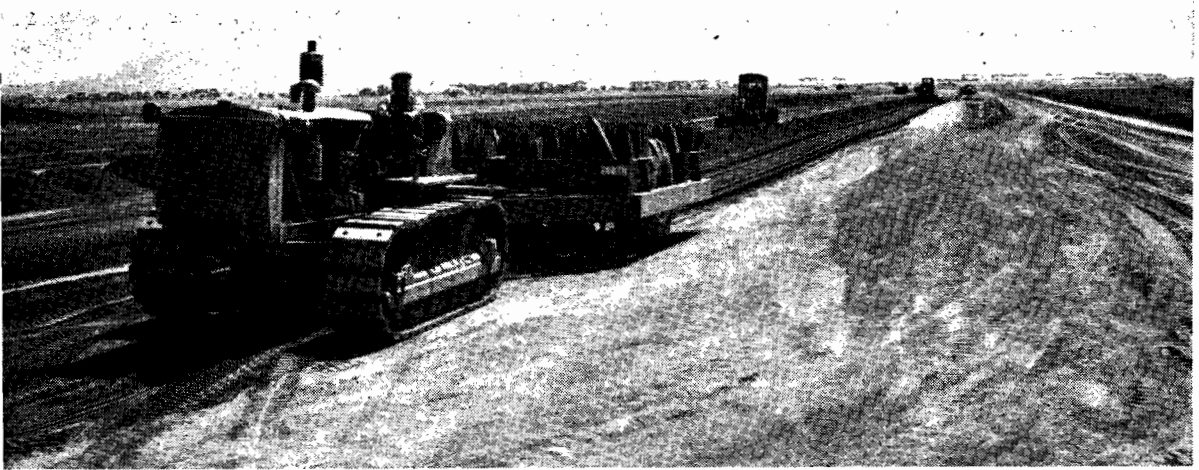
COMMONWEALTH PROJECTS.

DEPARTMENT OF WORKS.

There was again great activity during the year on works being undertaken by the Board on behalf of the Commonwealth Government, through the Department of Works, the net expenditure totalling £992,000 3s. 3d.

The principal works involved include the following:—East Sale aerodrome, construction of runways, extension of hardstanding area, laying of hangar floors, and construction of workshops. (Plates Nos. 44 and 45.) Seymour area, strengthening of bridges to carry especially heavy military traffic. Essendon aerodrome, sealing of taxiway, &c. Avalon aerodrome (Lara), construction of runways, field workshop, &c. (Plates Nos. 42 and 43.) Watsonia military camp area, road works, &c. Graytown project, construction of access road, observation post, and a low-level bridge. Mallacoota aerodrome, clearing, fencing, and road construction. Mangalore aerodrome, construction of aircraft parking base and refuelling taxiway, and extension of runway. Monegetta depot, sundry works in housing and workshop areas. Nhill aerodrome

AERODROME CONSTRUCTION WORK



Plates Nos. 42 and 43.—Construction Work at Avalon Aerodrome.

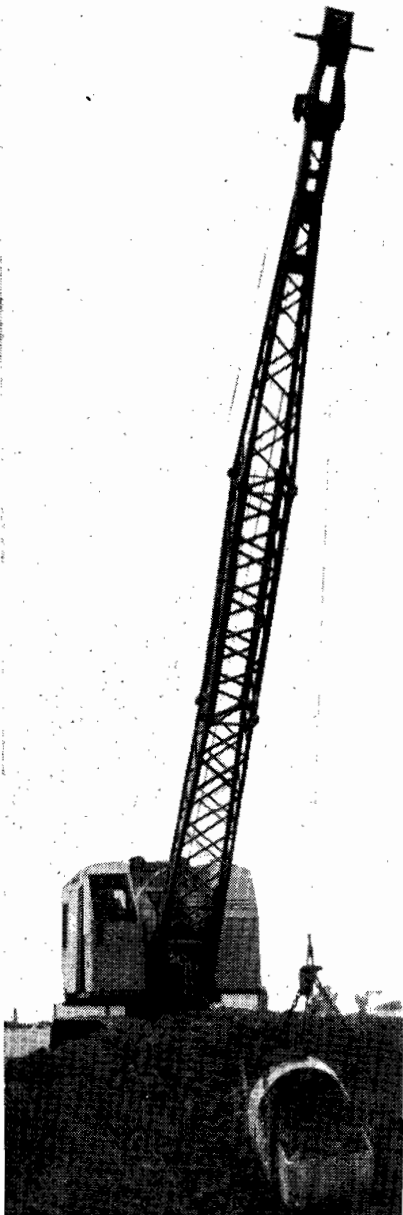


Plate No. 44.—Dragline Excavator at Work on the Main Drain for the East Sale Aerodrome.

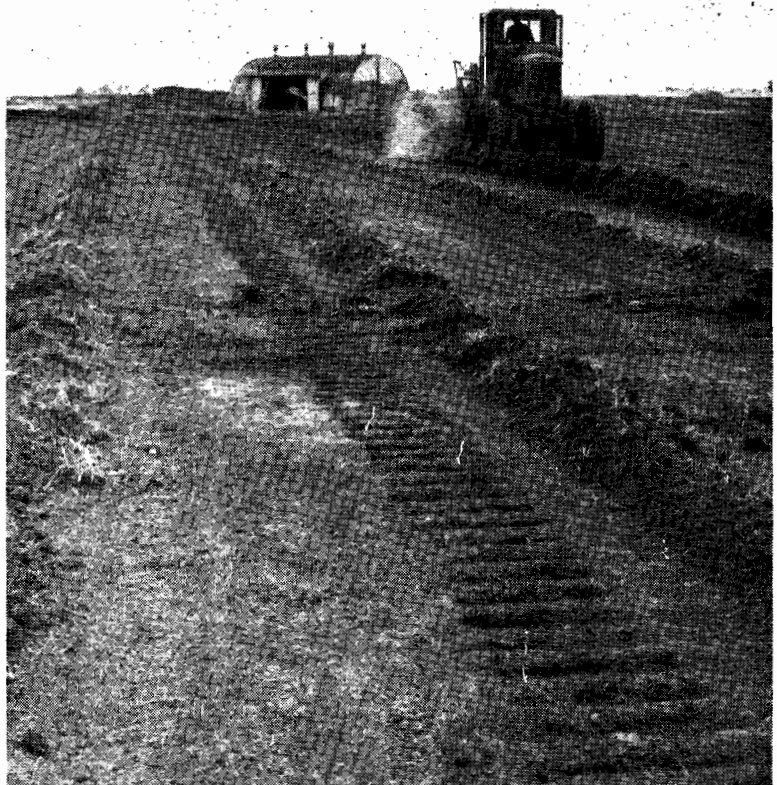


Plate No. 45.—Power Grader Working on New Runway at East Sale Aerodrome

resealing of access road and apron. Puckapunyal army camp, works in housing area. Wilson's Promontory, access road to P.M.G. Radio Station. Longlea explosives depot, construction of mounds, tracks, and drainage required for additional magazine accommodation. Bandiana army ordnance depot, sealing, resealing, sheeting, and drainage of roads. Mulwala explosives factory area, factory area roads. Bendigo migrants hostel, construction of roads, paths, and stormwater drains. Bendigo Ordnance Factory, construction of access road, and drainage works. Albion Project, construction of mounds, roads, cleanways and drainage, stormwater and acid drains.

SOLDIER SETTLEMENT ESTATE ROADS.

Further progress was made during the year with the construction of roads to serve estates purchased by the Soldier Settlement Commission. Following the procedure adopted in previous years, the Board accepted responsibility for the carrying out of the road schemes, i.e., by arranging for the various proposals to be investigated, examining plans and specifications and exercising a general oversight on behalf of the Commission. The actual works themselves were, for the most part, carried out under municipal supervision.

The Board was again unable, owing to its general financial position, to contribute to any great extent towards the cost of these works, although it did in some instances agree to contribute its share of additional costs of road schemes in which it was already financially involved. This meant, of course, that a greater portion of the financial burden had to be accepted by the Soldier Settlement Commission and the municipal councils.

A total amount of £141,093 was allotted during the year for new works on Soldier Settlement Estate Roads, of which £103,809 was provided by the Commission £24,669 by the Councils, and £12,615 by the Board, the corresponding figures for the previous year being £249,926, £206,705, £25,596, and £16,625 respectively.

Works carried out during the year included the following:—*Dundas Shire*, 15 miles of forming, reforming, and gravel sheeting, and construction of bridges and culverts in eight estates. *Hampden Shire*, 6½ miles of formation and 8¼ miles of gravelling in three estates, *Minhamite Shire*, 10½ miles of forming and surfacing and construction of culverts in seven estates. *Mortlake Shire*, 5 miles of forming, gravelling, &c., in five estates. *Mount Rouse Shire*, completion of 30 miles of construction in three estates. *Numurkah Shire*, 27 miles of forming and gravelling and 17 miles of forming in the Murray Valley Estate.

Works completed during the year in many cases marked the completion of the whole of the roading required for the particular estate. The Board desires to again express its appreciation of the co-operation and assistance of the municipal councils generally in this matter, and is particularly gratified by the vigour and enthusiasm with which a number of the municipalities in the western part of the State, in which several Soldier Settlement Estates have been opened up, have entered upon the substantial road programme involved in these estates, especially where they had already a very large programme of normal works to contend with.

The over-all expenditure on roads since the inception of the scheme is £569,490, of which the Commission contributed £382,101, the Board £124,201, and the Councils £63,188. Yearly totals are as follow:—

Year.	Commission.	Board.	Council.	Total.
	£	£	£	£
1946-47 .. .. .	..	349	74	423
1947-48 .. .. .	..	5,479	701	6,180
1948-49	12,639	14,578	3,177	30,394
1949-50	37,112	14,388	8,237	59,737
1950-51	63,412	22,256	11,368	97,036
1951-52	138,039	38,018	20,180	196,237
1952-53	130,899	29,133	19,451	179,483
	382,101	124,201	63,188	569,490

BIG DESERT ROAD.

Following arrangements made between the A.M.P. Society and the Government for the development by the Society of an area of 250,000 acres in the northern part of the Shire of Kaniva (known as the Big Desert) for land settlement, as covered by the *Land (Development Leases) Act* 1951, No. 5585, an application was submitted to the Board by the Council for a grant of £40,700 for the construction of a road into the area.

An investigation by the Board's Divisional Engineer indicated that the total length of road construction involved would be 17 miles, of which 2½ miles from the end of the mile north of Lillimur was through settled country on heavy ground, where the construction of the road was in any case urgently necessary to serve the adjacent settlers. The balance of 14½ miles was through country wholly of the "desert" type. In view of the existing settlement served by the first 2½ mile section, the construction of which was estimated to cost £2,700, the Board decided to provide the sum of £2,250 subject to a contribution of £450 by the Council. The Council accepted this grant and the work was let by contract.

The balance of the £37,700 required for the further length of 14½ miles was provided by the Government under the *Public Works Loan Application Act* 1952 (No. 5657). It was arranged that this portion of the work should be carried out under the direct supervision of the Board, tenders being invited for the supply of limestone and the construction being undertaken by direct labour. The latter work was commenced late in 1952, and excellent progress was made. Owing to the advent of winter, however, it was deemed advisable to close down the works, with a view to their being resumed in the spring. For the same reason, no tender was accepted for the supply of the limestone with a view to inviting fresh tenders when the weather conditions are more favourable.

A substantial part of the work was completed, however, before the job closed down, the grubbing and clearing being completed together with over 80 per cent. of the sand clay base and sand shouldering over the full length of the job.

The country traversed consists of typical mallee sand hills alternating with depressions in which there are clay pans at intervals. There are no limestone gravel deposits in the area, and it was necessary to cart this material from deposits in the vicinity of Yearinga, some miles south-east from the commencement of the work.

In order to reduce the gravel to be carted in, use was made of the sandy clay which occurs in the clay pans, as tests had indicated that this material, though of very fine grading, would form a reasonably suitable base course. The job will involve the use of 40,000 cubic yards of sand clay and 24,000 cubic yards of limestone gravel. (Plates Nos. 46, 47 and 48.)

SCHOOL BUS ROUTES.

For some time past, there has been a movement by the Education Department for consolidating schools and closing isolated schools, but the question of the availability of "all weather" roads to serve the consolidated schools has been considered primarily as one for the municipalities. The Department has realized the necessity for good roads for each particular bus route, and will not establish or extend bus routes until it obtains an assurance from the Council concerned that the roads to be traversed are capable of carrying buses in all weathers.

The amounts involved in providing such roads throughout the State are, however, considerable, and many councils, having insufficient funds for such a special purpose, look to the Government—generally through the Board—for financial assistance, and in many cases where applications have been considered by the Board in the post-war period, they have been thoroughly investigated by the municipal engineers and the Board's Divisional Engineers and the proposals checked with the Education Department.

Where the whole or portion of the school bus route traverses roads under the Board's jurisdiction, e.g., main roads or State highways, provision is already being made by the Board for the requirements of the route from year to year, as the roads are the Board's continued responsibility and carry not only school bus traffic but also fairly heavy general traffic. On the other hand, where the bus routes are over unclassified roads, the Board, when dealing with applications for funds, must be guided by the representations of the councils as to the relative urgency of the works as compared with other works on unclassified roads serving settlements within their municipal districts.

BIG DESERT ROAD, KANIVA



Plate No. 46.—First Stage : Scrub Cleared Away.



Plate No. 47.—Formation and Sandy Clay Base Course.



Plate No. 48.—Loading Sandy Clay for Base Course.

It should be stressed that there are no special Government funds set apart for expenditure on school bus routes on unclassified roads, any provision which the Board may be in a position to make being from Commonwealth aid road funds.

For the financial year 1952-53, applications totalling £374,872 were received by the Board for the construction of school bus routes, but, with the limited funds at its disposal, the Board was able to allocate only £50,930, subject to municipal contributions totalling £15,030. Applications for the maintenance of school bus routes totalled £68,169, and the Board provided £37,110 subject to £17,610 being provided by the Councils.

Some of the road schemes necessitated by the erection of consolidated schools involved considerable expenditure, and three examples may be quoted:—

(a) *Rochester Shire, Lockington Consolidated School.*

In this case, the Council applied for £58,090 for construction of school bus routes, and, as the new school has been completed at a cost of approximately £100,000, it is most desirable that the roads serving the school be constructed at an early date. The Board was, however, unable to make any provision for this work, although a grant of £2,000, subject to a municipal contribution of £500 was made for the Nanneella roads, which serve the Rochester School.

(b) *East Loddon Shire, East Loddon area School.*

This school which is one of the most modern country schools in the State, commenced to operate in 1951, the roads being lightly surfaced with local gravel. Successive wet winters in 1951 and 1952 resulted in rapid deterioration of the roads and led to very unsatisfactory conditions for the school buses, so much so that on 4th June, 1952, a disconcerting accident occurred. (Plate No. 49.) The Council applied in February, 1953, for a grant of £27,000 for the reconstruction of school bus routes to serve this school, but the Board was unable to assist the Council at that stage, as all available funds had already been fully committed.

(c) *Heytesbury Shire, Timboon Consolidated School.*

The Council applied for £18,400 for reconstruction of roads used by buses serving this school, but here again the Board was unable to make any provision. The application of the Council for £8,250 towards maintenance patching was all that could be entertained, £3,940 being provided subject to a contribution of £1,720 by the Council.

The Board is keenly aware of the importance of school bus routes in the interests of the education of children in rural areas, and of the fact the condition of many of these routes leaves much to be desired. It is known that accidents such as mentioned above have occurred from time to time where school buses have been involved, and these have been in a great measure due to the condition of the roads. These facts all point to the urgent necessity for the provision of special funds for the construction and maintenance of school bus routes, especially as, in order to provide all weather roads for the buses, the standard of construction and maintenance must in many instances be higher and consequently more costly than that required for the ordinary settlement road. Under present conditions, any provision made by the Board for such works is at the expense of the developmental works in road and bridge improvements on unclassified roads generally, and in any case, can only be on a very restricted scale.

HIGHWAY MAINTENANCE.

A very important though unspectacular aspect of patrol maintenance is the patching of pot holes and edges, and on the Hume Highway in particular, with its intensive traffic, the patrol gangs have had little time for other necessary measures of maintenance. On the section between Coburg and Seymour, the patrol gang, which formerly comprised one truck and three men has in recent years been enlarged to three trucks and nine men, and even then has at times been unable to cope with the patching. It has been necessary from time to time to provide extra assistance from nearby construction gangs to keep the highway in reasonable condition.

The pavement is in general too weak and the width of 20 feet is inadequate for intensive truck traffic. After each wet period, failures occur in the pavement and edges over a considerable area of road, and the patrol gang has generally only just managed to have repairs effected to pot holes and edges before the next "wet spell". However,

during the past year, the frequency of the wet spells has left less time than usual for catching up on patching before the next wet period. Progressive weakening of the foundation has made the problem of maintenance even more acute.

Resealing of certain lengths of the highway would undoubtedly improve matters, but the restricted funds available to the Board has limited the amount of work of this kind which can be undertaken. This means that the constant patching of pot holes and edges must continue, but, with the steady deterioration of the pavement, it is estimated that, to provide for adequate patching within three days of failure, it would be necessary to treble the strength of the present gang. The expenditure of money and effort involved in the prosaic patching work of the patrol gang is not generally appreciated by the travelling public. On this 50-mile section of the Hume Highway alone, approximately £18,500 per annum is required for this type of work.

This is an example of the uneconomic procedure which the Board is compelled to use in endeavouring to hold together an obsolete road asset. Widening and strengthening are long overdue but the funds for such extensive works have not been forthcoming.

LICOLA ROAD.

During the last few years, extensive works were carried out by the Board in the Licola area to facilitate the Forests Commission's logging operations. As a result of this work, the extraction of timber has been greatly assisted, and some indication of the use to which the new road is put is shown by the following figures furnished by the Commission :—

The average load per vehicle is 3,655 super feet, which, on the basis of 300 super feet to the ton, represents 12 tons per load. The gross load per vehicle is of the order of 17 tons. A maximum of 77 loads per day has been recorded by the Commission, but the average loads on a monthly basis, from July, 1952, to March, 1953, inclusive, are shown in the following table :—

Month.	Week.	Daily Tonnage.		Number of Loads per Day
		Net.	Gross.	
July	15,100 sup. ft.	10 tons	17 tons	1
August	275,800 " "	184 "	289 "	17
September	380,700 " "	254 "	374 "	22
October	517,500 " "	345 "	473 "	29
November	444,700 " "	296 "	425 "	25
December	838,300 " "	559 "	799 "	47
January	1,168,400 " "	777 "	1,105 "	65
February	938,500 " "	656 "	935 "	55
March	1,015,900 " "	677 "	969 "	57
Average month to date	626,300 " "	418 "	595 "	35
Average quota month	698,000 " "	465 "	663 "	39

The average quota figures are based on an annual quota of 33,500,000 super feet, or, say, 111,700 tons, which (at an average load of 12 tons) amounts to 9,309 loads per year with a gross tonnage of 158,250. The average weekly quota figures are based on a "48-week" year, although, for two months of the year (June and July) virtually no timber is likely to be brought down from the forest.

It will be noted that, in the six drier months of the year, from November to April, about 80 per cent. of the total tonnage will be transported, when the average daily loads would be 62 compared with sixteen per day for the wetter six months.

It is of interest to note the railway facilities which would be required to transport this timber if there were a railway from Heyfield to Licola instead of a road. The Railway Department has kindly furnished the following particulars :—

On the broad-gauge line between Heyfield and Melbourne, a class "N" engine could haul a gross load of 390 tons, or a net load of 260 tons. On a narrow-gauge line (as from Erica to Moe), the maximum train load would be—

With a single NA type engine, gross loads, 110 tons, net load 70 tons ;

With a double NA type engine, gross loads, 220 tons, net load 140 tons ;

With a Garrett NA type engine, gross loads, 240 tons, net load 160 tons.

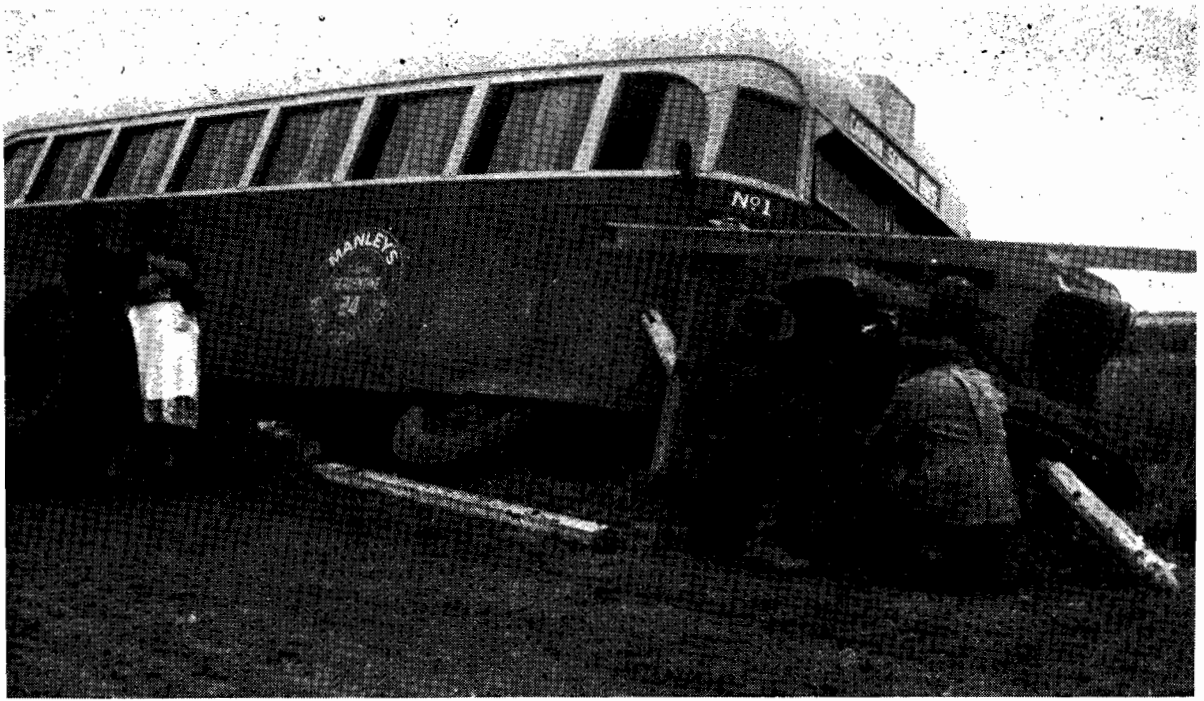


Plate No. 49.—School Bus after an Accident at a Channel Bridge on a Rough Section of Calivil Mail Road, East Loddon Shire.



Plate No. 50.—Plant Shelters at Horsham Divisional Workshops.



Plate No. 51.—General View of Gravel Pit in Youyang Ranges.

An average of 60 loaded vehicles per day over the Licola Road would transport 720 tons per day, which would require three train loads per day over the broad-gauge line or from five to ten trains per day over the narrow-gauge line, according to the type and number of engines operating.

DECENTRALIZATION.

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

Ballarat.—The offices, laboratory, and exterior of the workshop at the depot at Sebastopol were painted, the erection of the timber plant shelter (100' x 44') was completed, and the site gravelled. The road system within the depot was extended to provide access to reinforced-concrete pipe storages and the ultimate site of the precasting bay. A brick oil store was also erected.

Benalla.—Two brick veneer houses, one for the Divisional Engineer and the other for the Assistant Divisional Engineer, which had been partially completed by contract, were completed by direct labour. The workshop buildings at the depot were completed and machine tools installed. Roadways and areas within the depot were gravelled and sealed.

Geelong.—The pre-casting area at the South Geelong depot has been used extensively for the production of pre-cast piles, beams, &c., for various bridge projects both within the Division and for other projects at a reasonable rate. Extensions to the divisional workshops were further advanced, with a view to ultimately undertaking a greater proportion of the overhauling and maintenance of the Board's plant. Progress has, however, been limited owing to the shortage of funds.

Horsham.—A timber residence was built in Baillie Street, Horsham, and occupied by a member of the engineering staff. Further work was carried out in surfacing and draining the extended depot area. Two trussed-roof and one open-faced skillion-roofed plant shelters were erected, and electric light and power were extended to the store and carpenter's shop, where carpenters' machine tools are now operating. Additions were made to the stores building for housing steel sections, and the building of an additional shed for bulk camp equipment is in progress. (Plate No. 50.)

The area for precast concrete manufacture was graded and surfaced, and a start made with the erection of shelter sheds for steel and timber fabrication.

Warrnambool.—The fabricated steel work and other materials necessary for the construction of a 60' x 100' sawtooth building for Divisional workshops were obtained and a contract let for erection.

ROAD MATERIALS.

Rising costs of quarrying and carting and of rail freight, combined with the gradual depletion of old established quarries and pits, have made it more than ever necessary to locate new deposits of roadmaking materials. Municipal officers and officers of the Board are co-operating in this search, and the knowledge and experience of the Board's Materials Research Division, with the laboratory's facilities, are being fully availed of.

In addition to the search for new deposits of good materials for road construction and maintenance, experiments are being conducted in the use of more or less untried materials which it is thought may prove to be of value for this purpose.

One such experiment is being carried out on the Ocean Road near Port Campbell where two sections are being widened, resheeted, and primer-sealed, using a soft ferruginous sandstone (known locally as "rotten rock") and a soft limestone respectively, as pavement materials. Deposits of buckshot gravel, particularly from near Peterborough, which have in the past been used extensively on the Ocean Road, are almost exhausted, and, as complete reconstruction of the road will be necessary in the near future, the location of some suitable alternative material has become an urgent matter.

In the Ballarat division, a new gravel pit, known as the Ballark pit, situated south of Ballan, was opened up by the Board. This pit contains a yellow sandy alluvial quartz deposit from which approximately 10,300 cubic yards has been removed for reconstruction

works on the Western and Midland highways. During operations, many clay seams were encountered and rigid control of the gravel winning operations was necessary. Further investigation of this pit is proposed before operations are continued.

In the Benalla division, a new pit of broken shale was opened on the Glen Creek Road in the Shire of Mansfield, from which it is expected that 50,000 cubic yards will be obtained. This material has proved very suitable as a top-course pavement material, and is at present being used on highway reconstruction work.

A deposit of soft yellow sandstone was opened up in the Lake Boga district on Mr. H. Fox's property, Allotment 21, Parish of Kunut Kunut, in January, 1953. The deposit was located and prospected by one of the Board's Overseers and opened up by a contractor to supply pavement material to the Murray Valley Highway between Mystic Park and Lake Tutchewop. The stone is of a similar nature to that in Kendall's pit near Kerang, but softer. Twenty-eight thousand cubic yards were removed from the pit in 1952-53, and it is now being worked by a contractor supplying pavement material for further reconstruction work in progress on the Murray Valley Highway.

In the Dandenong Division three quarries were opened up, one on the Marysville-Wood's Point Road at the Cumberland, one at Kardella South near Korumburra, and one at East Warburton. During the year large quantities of river gravel from the Goulburn River near Alexandra were won for the construction of the Upper Goulburn and Taggerty-Thornton Roads, and a screening plant was installed for the production of aggregate.

Owing to the inability to obtain sufficient quantities or satisfactory quality of crushed materials for roadmaking purposes in the vicinity of Geelong, it became necessary to prospect and develop areas for the supply of gravel. To this end, an ironstone gravel deposit in the Leopold area is being exploited for projected work on the Bellarine Highway, and it will probably be necessary for the Bellarine Shire Council to exploit other areas in order to obtain satisfactory material to reconstruct and widen the main roads in that Shire, where they are failing under traffic.

The construction of the Avalon Test Flying Field by the Board required the use of approximately 250,000 cubic yards of granite sand from the You Yangs area, which necessitated the development of a new area in which sand of excellent quality was found. This will be of great value for base course when the Princes Highway is developed. (Plate No. 51.)

In the Horsham division, no new deposits of roadmaking material of any major importance were developed during the year, although continued use was made of the sandy limestone material near Lake Buloke, reference to which was made in the 38th Annual Report.

A small deposit of limestone of very good quality was located north of the Western Highway near Lochiel, which was used in the reconstruction of two short sections of failed pavement. A substantial saving in cost was thus achieved, as the alternative material originally proposed to be used was crushed sandstone from Nhill.

In addition to the rotten rock and soft limestone deposits in the Warrnambool division referred to elsewhere, a soft limestone pit has been developed west of Yambuk, where approximately 16,000 cubic yards were obtained from two pits, resulting in a saving of approximately 10s. per cubic yard over any other class of pavement material in the area. Test results indicated that the material is suitable for sealing and a short length has been sealed.

A new pit has also been opened up on the Ocean Road east of Port Campbell, and 4,500 cubic yards of this material used, at an estimated saving of 9s. per cubic yard over gravel. A large quantity of the material is still available in the pit. The material has stood up satisfactorily in an unsealed state under winter conditions, and a short experimental section has been sealed.

In connection with the work on the Portland-Nelson Road, an existing pit used many years ago was found to be very suitable for working with modern earth-moving plant. 2,800 cubic yards were used, and unlimited quantities appear to be available in the Nelson area.

The soft ferruginous sandstone which occurs in the Port Campbell district has been used to a limited extent on forest access roads and on the Ocean Road. The deposits are of variable size, depth, and quality. Because of the desperate shortage of material

in the area, sand pits were opened up east of Port Campbell, and 7,500 cubic yards were used for resheeting, at a saving of approximately 12s. per cubic yard over the cost of gravel. The main difficulty with this material is in obtaining a uniform product without excess fines, using modern earthmoving methods, and for this reason, it may be found expedient to use the soft limestone in preference to the soft sandstone.

PHOTOGRAPHY.

The Board's 16 m.m. documentary sound films are still in great demand, and requests are continually being received from various groups and organizations for screenings by the film section. The topics included such important matters as safe driving, road courtesy, and the meaning of road signs. Others deal with more technical aspects of road and bridge planning, construction, and maintenance, and show the effects of traffic and the services which roads afford to the community. The Board appreciates the increasing public interest in the problems which confront it in its main function of providing a system of roads and bridges adequate to the needs of the State.

During the year 1952-53, programmes of the Board's films were screened on 51 occasions for various outside bodies, 46 of these being in the metropolitan area and 5 in the country. It is estimated that the total audience for these screenings was 9,400. In addition, 21 of the Board's films were lent to 29 borrowers whose standard of projection was known to be satisfactory. Whilst the audience coverage for these screenings is not known precisely, it is thought to be of the order of 9,300. One film in particular ("Aftermath"), which was lent to a leading motor organization for a show which toured through country agents, is reported to have been viewed by a total of 4,000 viewers, all actively associated with road transport.

The Board's mobile film unit gave 110 screenings to workmen in construction camps remote from townships. In all, 32 different locations were visited, the total audience amounting to approximately 3,800. Hired film was used for these screenings, which were greatly appreciated by the Board's employees.

Two new colour films with sound tracks were completed during the year, and these have been favourably received by the audiences to which they have been shown.

The first is "Hume Highway", a film 1,520 feet in length, dealing with early history and the present day activities along this important highway. The second production is "Pre-Cast Bridge", a short film showing the preparation under factory conditions of pre-cast reinforced concrete piles and piers and their later fabrication to form a bridge. In addition, work is proceeding on a film dealing with "Signs and Lines".

Excluding silent black and white films of early activities of the Board, the following 16 mm. films have been produced since 1945:—

- 8 topical gazettes in colour with sound tracks;
- 13 subject films in colour with sound tracks;
- 2 subject films in black and white with sound tracks;
- 1 subject film in colour and black and white.

Copies of the following films produced by the Board have been supplied to Great Britain:—

- (a) To the Agent-General of Victoria—
 - "A Road is Built";
 - "Hume Highway";
- (b) To the Road Research Laboratory, Harmsworth—
 - "Animations for Bituminous Roads, Part I.";
 - "Bituminous Roads, Part I.";
- (c) Purchased by the Shell Company of Australia Limited—
 - "Bituminous Roads, Part I.";
 - "Bituminous Roads, Part II.";
- (d) Purchased by Army Kinema Corporation for British War Office—
 - "Bituminous Roads, Part I.";
 - "Bituminous Road, Part II.".

During the year, the Board's Films Officer (Mr. J. B. Stirling), was granted three months' leave to make a film at the request of the Department of Air of the construction of an air strip at Cocos Island. He also co-operated with personnel of the Department in the production of shots for R.A.A.F. "News-reels".

Mr. Stirling was a member of the R.A.A.F. prior to joining the Board's staff.

CONTROL OF HEAVY TRAFFIC.

The number of special permits issued during the year was 4,314, an increase of 309 (equal to 7·7 per cent.) for the year 1951-52. This number is also the highest up to date, exceeding by 155 the number recorded in the peak year of 1949-50, prior to the introduction of the amending legislation.

Of the 4,314 permits issued, 2,974 were for single trips and 1,340 were tenable for twelve months. These permits cover 7,756 excess dimensions, slightly less than for the previous year.

An examination of the details of these permits reveals a considerable decrease in permits for excess width, height, and length, due almost entirely to a large falling-off in the movement of pre-fabricated houses. On the other hand, movement of overweight loads greatly increased, the relevant number of permits rising from 948 to 1,314, or 39 per cent.

Permits in the 30 to 40 tons gross weight class increased by 59 per cent. from 228 to 386, whilst permits for gross loads exceeding 40 tons increased from 17 to 30, an increase of 57 per cent. The former class comprised mainly carriage of bulldozers, tractors, and mechanical shovels, in respect of which there appears to be a steady trend towards the use of larger and more modern plant, especially by Government Departments.

Loads exceeding 40 tons gross consisted of coal driers and presses for the Morwell briquetting factory, of which fifteen with gross weights from 55 to 66 tons were moved, the balance being mainly electrical equipment. Five loads of 90 tons gross consisted of Centurion 50-ton tanks carried by the Department of the Army.

RESTRICTION OF LOADING ON ROADS.

There are still many sections of important main roads and State highways which are weak owing to the inability of the Board to provide funds to strengthen them sufficiently to meet the needs of the traffic using them, and it is, therefore, still necessary to invoke the provisions of the Motor Car Act and limit the gross load to be carried on these sections of road to 6 tons. This restriction is not imposed with the object of entirely restricting traffic on these roads, but to enable the Board to control such traffic by the issue of permits based on the type of vehicle used and its tire equipment.

In 1952-53, 1,184 permits were issued, as compared with 1,126 issued in 1951-52, but the number of prosecutions for exceeding the conditions of these permits decreased from 221 to 142. The total fines imposed last year for this class of offences amounted to £2,091, an amount very much less than the receipts from this source in 1951-52 (£3,970). The average fine also decreased from £18 to £14 14s. 6d. per case.

Notwithstanding the gratifying falling off in the number of offences, it is regrettable that fines have decreased, as they are not a sufficient deterrent to operators, who will continue to carry excess loads at a profit in spite of the fines imposed.

During the year, 6-ton limits were lifted on the Shepparton-Dookie, Shepparton-Barmah, Katandra, Dookie-Nalinga, and Dookie-Devenish Roads in the Shire of Shepparton, whilst the Otway Lighthouse Road which in 1951 was closed during the winter only was, in 1952, closed for the whole year.

Two unclassified roads were closed under the provisions of the Local Government Act instead of the Motor Car Act, viz., the Marysville-Woods Point Road (Yarra Track section), and the Eildon Weir-Jamieson Road.

The restrictions on the Western Highway, between Dimboola and Salisbury and between Dooen and Warracknabeal, and on the Murray Valley Highway, between Picola Road and the Shepparton-Barmah Road, were removed during the year.

TRAFFIC OFFENCES.

The number of offences against the provisions of the Motor Car Acts during the year was considerably less than the number in 1951-52, as shown in the statement below:—

	1951-52.	1952-53.
Speeding (freight vehicles)	506	320
Speeding (passenger vehicles)	5	2
Exceeding 17,000 lb. on one axle	504	571
Exceeding weight on axle group	158	109
Exceeding 6-ton limit	221	142
Exceeding conditions of special permit	43	66
Exceeding load capacity	30	29
Exceeding 5,000 lb. on one tire	7	3
Exceeding 8 feet in width	62	59
Exceeding 12 feet in height	5	7
Exceeding length limits	42	63
Refusing to allow vehicle to be weighed	6	1
Failing to carry permit .. .. .	..	3
	1,589	1,375

The total fines imposed for the year (£15,056 2s. 6d.) were also less than the previous year's record total of £17,831 10s. by £2,775 7s. 6d., a decrease of 15·5 per cent., but the average amount of the fines (£11 13s. 3d.) showed a slight increase over 1951-52 (£11 4s. 5d.).

There appear to be two main causes of the reversal of the steady upward trend in previous years. In the first place, it would appear that the shortage of certain goods has tapered off to a stage where the higher cost of road transport is not warranted or cannot be recouped. To quote one example, iron piping and steel bore casing were being transported from New South Wales to Victoria, South Australia, and even Western Australia, at the rate of over 1,000 tons per week. This and similar uneconomic cartage has now ceased. Secondly, further restrictive legislation has been passed in the majority of the States, mainly affecting interstate trade by road but also placing some additional limitations on intrastate road traffic.

Of the 1,375 offences reported, 1,293 resulted in court cases, of which only two were dismissed. Thirty-two informations could not be served, five were withdrawn, and in the balance of 45 offences reported, warnings were issued.

Seven drivers of commercial vehicles detected speeding for the second time were fined and, in addition, had their drivers' licences suspended for periods varying from one to three months.

An analysis of the vehicles in the above statement indicates that the total number of offences for 1952-53 for exceeding 17,000 lb. weight on one axle plus those for exceeding weight on a group of axles (680) is approximately the same as for 1951-52 (662), but, from the large increase in the first group of offences (from 504 to 571), it would appear that a great deal of the trouble is caused by the faulty disposition of the load on the vehicle, a matter which could be quite readily rectified when the vehicle is being loaded. The Board's traffic officers have on many occasions when checking loads advised operators as to how loads might be more evenly distributed to comply with the requirements of the Motor Car Acts, but records show that insufficient attention is given by many operators to this important matter.

COLLECTION OF FINES.

Considerable difficulty has been experienced in the past in collecting fines imposed in respect of offences against certain provisions in the Motor Car Act relating to the speed, weight, and dimensions of motor vehicles, this applying particularly to persons resident in other States. An endeavour was made by the Board to obtain some amendment in the legislation governing the process by which such fines are collected, but, up to the present, it has not been possible to achieve this end.

Thanks to the co-operation of the Chief Commissioner of Police, it was possible, approximately three years ago, to obtain on a part-time basis the assistance of a member of the police force to work with the Board's Traffic Officers in collecting outstanding fines from interstate operators, the amount being approximately £1,000. Subsequently the Chief Commissioner approved of one of his officers working full time with the Board, with very gratifying results. The execution of interstate processes was somewhat simplified by the passing in December, 1952, of the *Justices (Service of Process) Act 1951*, which in the case of interstate operators provided for the issue of a commitment warrant of declaration on the distress warrant that the person named therein is resident out of Victoria. In view of the short period during which this Act has been operative, the value of the "short cut" provided is not yet known, but it is anticipated that some speeding up of the collection of fines will result.

The actual cash collected by the Board for outstanding fines for the financial year 1952-53 was £1,368. The improvement over previous years is indicated in the following table:—

PERCENTAGE OF UNPAID FINES.

Year.	At 31st December, 1950.	At 31st December, 1951.	At 31st December, 1952.
1947-48	7.8	6.7	6.4
1948-49	11.4	7.5	6.5
1949-50	11.2	6.9	6.9
1950-51	21.4	7.4	6.7
1951-52 .. .. .	..	16.3	9.3
1952-53 (Six months only)	..	(Six months only) ..	14.4 (Six months only)

The annual record since this work was commenced is shown in the following tables:—

Unpaid Fines.

Year.	Total Fines for Year.	Amount Unpaid.	Percentage Unpaid.
	£ s. d.	£	
1947-48	4,631 1 0	297	6.4
1948-49	9,236 5 0	604	6.5
1949-50	12,812 12 6	899	6.9
1950-51	15,382 5 0	1,035	6.7
1951-52	18,908 5 0	1,749	9.3
1952-53 (half year)	9,660 15 0	1,389	14.4
Total	70,631 3 6	5,973	8.5

Unpaid Fines (States).

Year.	Victoria.	New South Wales.	South Australia.	Queensland.	Total.
	£	£	£	£	£
1947-48	49	230	18	..	297
1948-49	37	440	127	..	604
1949-50	86	676	122	15	899
1950-51	137	772	126	..	1,035
1951-52	391	1,018	320	20	1,749
1952-53 (half year)	247	792	340	10	1,389
Total	947	3,928	1,053	45	5,973
Percentage	15.8	65.8	17.6	0.8	100.0

UNATTENDED STOCK.

Under the provisions of the *Country Roads (Impounding of Cattle) Act 1935*, No. 4332, the Board is empowered to deal with stock found unattended on State highways, and it has three Inspectors employed full time in patrolling the State highways for this purpose. Where stock is released, before being actually impounded, by persons admitting ownership, the offence is reported to the Board, and unless the Board is satisfied that there are extenuating circumstances, proceedings are instituted. Where the stock is impounded, arrangements are made for the Board to be advised by the local council of the names and addresses of the persons releasing the stock, and proceedings are instituted based on the information thus furnished.

The number of offenders detected during the past financial year rose from 375 in the previous year by 164 to a total of 539, an increase of 43·7 per cent. 481 of the offenders were fined (an increase of 148 over the previous year), and warnings were issued in 35 cases. The majority of these warnings were given in cases where property fences had been damaged by floods and bush fires, and it was not reasonable to expect the owners of the properties to have repaired the damage in the time available. The actual number of cattle and sheep found unattended on State highways during the year was 7,276, an increase of 2,434 (or 50 per cent.) over the previous year.

The average fine inflicted for this type of offence is still much too low to provide a sufficient deterrent for offenders, and this is considered to be the only reason for the substantial rise in the number of stock unattended on the highways. Many of the persons detected claim that the reason for the stock being on the highway is the shortage of feed on their own properties, and there seems to be no doubt that the small sums which they are fined are considerably less than the cost of paying for feed to supplement what is on their own property. The average fine for the year was £2 13s. 4d.

A few years ago "shortage of fencing materials" was the excuse given by many offenders whose stock had escaped from their properties on to the highways through the fence being in a bad condition, and the Board was prepared to take a reasonable view of the offence in such circumstances. Fencing materials are, however, much more plentiful at the present time than at any time since 1939, and there is much more labour offering. It seems reasonable, therefore, to expect that conditions will greatly improve in the near future.

TRAFFIC LINE MARKING.

During 1952-53, traffic line marking was carried out on a somewhat larger scale than in the previous year, as 139 miles of road not previously painted were marked. The total mileage of road maintained in a "striped" condition was increased from 1,245 to 1,384 miles, and, as some sections had to be marked more than once during the year, this involved the painting of 2,766 miles of line, 2,660 miles being on roads under the jurisdiction of the Board and the balance of 106 miles relating to other roads marked on behalf of and at the cost of municipal Councils.

The total expenditure on the above work was £21,360, representing an average cost of £7 17s. 0d. per mile of line, whilst 9,176 gallons of lacquer were used, at an average rate of application of 3·32 gallons per mile.

AVAILABILITY OF PLANT.

When dollars for buying machinery in the United States of America were very scarce, the Board decided in an effort to assist municipalities, to establish a pool of plant solely for hire to municipalities for work on roads other than those under the jurisdiction of the Board. As a trial, it was proposed that the pool should be built up to include the following items of plant:—

8 heavy tandem power graders, 3 medium graders, 9 Class III. and Class IV. tractors, and 9 multi wheel rollers.

Shortly after the proposal was adopted, 1 heavy tandem power grader and 2 medium power graders were set aside from new purchases. Experience with this limited fleet indicated, however, that the arrangement by which certain machines were reserved for hire to Councils for work on unclassified roads only was rather inflexible, and was not necessary as more plant became available. At times, the demands would exhaust the supply, whilst at others the graders were not required. For this reason, no more plant has been

specially set aside recently, but requests by municipalities for plant has been met by allocating machines from the Board's general plant. At a recent date, the following units were on hire to various municipalities:—

10 tandem drive power graders, 2 medium power graders, 1 light power grader, 1 Class II. tractor, 3 bitumen heaters, 1 multi wheel roller, 2 drawn graders, and 1 rotary broom.

In addition, a "Jaeger" metal spreader has been imported particularly for work in the outer metropolitan area, and has been hired to various Councils.

The position at the present appears to be satisfactory, but it is possible that, if the demands on the Board's general plant become so heavy that requests from municipalities cannot be complied with, the question of the allocation of machines purchased specially for hire to them must be seriously considered.

TRENCH ROLLER.

For widening pavements, it is essential that consolidation of material in the widening trenches should be effected at the most vital point, namely, the junction between the old pavement and its extension. This cannot be properly done with the normal type of roller.

In view of the necessity for carrying out an extensive programme of such widening on main roads and State highways to cope with increasing traffic, the Board purchased a special "trench" roller for this purpose at a cost of £3,116. The unit manufactured in the United States of America, fitted with pavement cutting attachments, is now in use, with very satisfactory results: it is believed to be the only unit of its kind in this State.

SPEED LIMITS.

Regulations under the Motor Car Act published in the *Government Gazette* of the 23rd August, 1950, revoked all previous speed limit regulations, and provided for the erection by the Board of speed limit and derestriction signs on State highways, main roads, or tourists' roads limiting the speed of vehicles over the particular section of road concerned to 25 miles per hour.

The procedure generally adopted in determining whether or not a speed limit is justified through any town or centre of population is for the Board's Divisional Engineer to discuss the matter on the ground with the Council's officers, and, through the ready co-operation of the Chief Commissioner of Police, with the local police officer. When a speed limit zone is finally agreed upon and the necessary signs erected, the matter is brought to the notice of the Police Department with a request that it be kept under notice with a view to proceedings being instituted against offenders.

One important point to be considered in fixing a speed limit section is that drivers entering that section from side roads may not be aware of the existence of the speed limit. Where these side roads are classified roads, and, therefore, covered by the regulation, the position has been met by the erection of speed limit and derestriction signs on the side road at the approach to the principal road, but this could not be done in the case of side roads not covered by the regulation.

Provision is, however, made in a later regulation for the erection of intermediate signs, smaller than those provided for in the original regulation, at intersections with side roads, so that drivers entering the limited zone are at once aware that the limit is in existence.

Up to the 30th June, 1953, the imposing of speed limits through the following centres of population had been approved by the Board:—

Allansford, Alexandra, Ararat, Bacchus Marsh, Ballan, Bairnsdale, Bayswater, Beaufort, Belgrave (including Tecoma), Benalla, Berwick, Boronia, Broadford, Camperdown, Chelsea, Chiltern, Colac, Colbinabbin, Coleraine, Cranbourne, Dandenong, Daylesford, Dennington, Doncaster, Dromana, Drouin, Dunolly, Eltham, Emerald, Euroa, Fern Tree Gully, Frankston, Geelong, Gembrook, Gisborne, Glenroy, Harcourt, Heathcote, Heywood, Inglewood, Kallista, Kangaroo Flat, Kilmore, Koo-wee-rup, Kyabram, Kyneton, Lakes Entrance, Maryborough, Melton, Minyip, Moe, Mooroopna, Mornington, Morwell, Mount Martha, Murchison, Nagambie, Natimuk, Newborough, Newstead, Nhill, Phillip Island (Bridge), Point Lonsdale, Port Fairy, Portland, Queenscliff,

Rochester, Rosebud, Rupanyup, Rushworth, Rutherglen, Sale, San Remo, Sassafras, Seymour, Shepparton, Skipton, South Tawonga, Speed, St. Arnaud, Stanhope, Stawell West, Stratford, Tallarook, Tatura, Tawonga, Tempy, Terang, Thornton, Trafalgar, Traralgon, Turriff, Upwey, Wangaratta, Warburton, Warracknabeal, Warragul, Warrandyte, Warrnambool, Werribee, Wesburn, Wodonga, Wonthaggi, Woodend, Yarck, Yarragon, Yarram, Yarra Junction, and Yarrawonga.

TRAFFIC CONTROL LIGHTS.

Section 6 (2) of the *Municipalities and Other Authorities Finances Act* 1950, No. 5512, provides that, with the approval of the Governor in Council on the recommendation of the 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 financial year and not exceeding £50,000 in all, towards the construction, purchase, and installation on any road of traffic control lights by the Board or any municipality.

Numerous applications had been received by the Board for assistance in this way up to the 30th June last, and approval had been given for the Board to contribute towards the cost of traffic control lights in thirteen different locations. In each case, the Board is contributing two-thirds of the cost.

DIRECTION BOARDS AND WARNING SIGNS.

For some time past, it has been the Board's practice to reflectorise important direction boards and all warning signs, this being achieved either by setting reflector buttons into the sign legend, or by completely coating the surface of the sign with small glass spheres.

Field testing to determine the relative values of various types of reflecting material is costly and occupies considerable time, whilst there is always a certain amount of difficulty in exactly reproducing test conditions. To overcome these difficulties, an old tunnel under the Exhibition Buildings has been fitted up as a testing room to enable the effectiveness of various reflecting materials to be compared under standard conditions.

Since this tunnel came into use, much progress has been made in improving the night visibility of signs.

TREE PLANTING.

WOODBURN MEMORIAL AVENUE.

Shortly after the Second World War, Mr. J. E. Woodburn of Arcadia approached the Board with a request that an avenue of trees be planted at his expense on the Goulburn Valley Highway in the vicinity of Arcadia as a memorial to his son, who lost his life whilst serving with the R.A.A.F. abroad. The avenue is known as the "Calder Woodburn Memorial Avenue". The Board agreed to co-operate in the proposal, and work was commenced in July, 1945, since when the following numbers of trees have been planted:—

Season 1945	..	..	..	..	..	..	145
„ 1946	..	..	..	..	..	..	263
„ 1947	..	..	..	..	..	..	998
„ 1948	..	..	..	..	..	..	639
„ 1949	..	..	..	..	..	..	392
Total number planted..	..	..	..	..	..	..	2,437

During 1951, name plates in memory of former residents of the district who had fallen in the 1939-45 war were affixed to 82 of the trees.

PRINCES HIGHWAY.

On the section of the Princes Highway between Oakleigh and Dandenong, which it is intended to develop as a four-lane highway, progress has been made with the planting of trees which will fit into the ultimate cross section of the highway.

One hundred and twenty advanced trees have been planted in guards over a distance of 1.5 miles from Box Hill Road to Clayton Road, on a line which will be along the north side of the proposed northern highway lane. The south side will be planted after construction of both highway lanes.

ACTS AFFECTING THE COUNTRY ROADS BOARD.

During the financial year 1952-53, the following legislation affecting the Country Roads Board was enacted :—

Country Roads (Amendment) Act 1952 (No. 5640).

Section 15 of the *Country Roads Act 1928* (No. 3662) provides that the Board shall purchase all land, machinery, tools, implements, and materials that may be needed for the purposes of that Act, provided that no contract involving the expenditure by the Board of an amount exceeding £1,000 shall be entered into by the Board without the written consent of the Minister of Public Works being first obtained.

By the amending Act of 1952, the amount of £1,000 is increased to £2,500.

Section 27 of Act No. 3662 provides that the Board may make payments to any contractor or to the Council of any municipality carrying out any permanent works or maintenance, but shall not make payment of more than 85 per cent. of the contract price of any work in advance of full completion.

The amending Act provides for payment up to 90 per cent. in lieu of 85 per cent.

Section 60 (b) of Act No. 3662 provides that the Board may make by-laws for certain purposes, including the prohibiting or regulating of the use on any road under the jurisdiction of the Board of any vehicle with certain types of projections upon its wheels.

The amending Act provides for the addition to this sub-clause of the words " or of any vehicle which moves wholly or partly on crawler or revolving tracks "

Public Works Loan Application Act 1952 (No. 5657).

This Act provides for the application from loan moneys of various amounts for the respective works and purposes indicated in the schedule of the Act, and includes an item of £800,000 which has been made available to the Board for the repair and replacement of roads and bridges damaged by floods. More detailed reference to this grant is made elsewhere in this report.

CONFERENCE OF STATE ROAD AUTHORITIES OF AUSTRALIA.

The Fifteenth Conference was held at the office of the Department of Main Roads, Perth, from the 8th to the 12th September, 1952, and was attended by representatives of the other State Road Authorities throughout the Commonwealth, with a representative of the Commonwealth Department of Works.

The lengthy agenda paper covered such subjects as the invitation of tenders for the supply of bitumen for the financial year 1953-54, representation at the course for Highway Engineers normally arranged by the Public Road Administration in the United States of America, uniform road statistics, and preparation of an Atlas of Australian resources. Some time was spent in the consideration of several items relating to the numbering and signposting of roads, traffic-line marking, and automatic traffic guidance, whilst recommendations of the Technical Officers' Committees of the Conference relating to certain standard specifications, standard methods of sampling and testing materials, highway bridge design specifications, bridge construction materials and methods, &c., were also dealt with.

Arrangements were made for meetings of the Principal Technical Committee (Sydney, May, 1953), the Bridge Design Committee (Melbourne, February, 1953), and the Materials Research Committee (Sydney, March, 1953). No meeting was arranged of the Plant and Equipment Committee, for 1953, but it was agreed that the holding of a meeting in 1954 be considered at a later date.

CONFERENCE OF MUNICIPAL ENGINEERS.

The Ninth Conference of Municipal Engineers convened by the Board was held in the Auditorium, Police Headquarters Building, Melbourne, on the 27th and 28th May, 1953, and, as with previous conferences, was largely attended, an encouraging fact which appears to indicate that these conferences are fully justified and are meeting a real need. (Plates Nos. 52 and 53.)

CONFERENCES AND OTHER ACTIVITIES

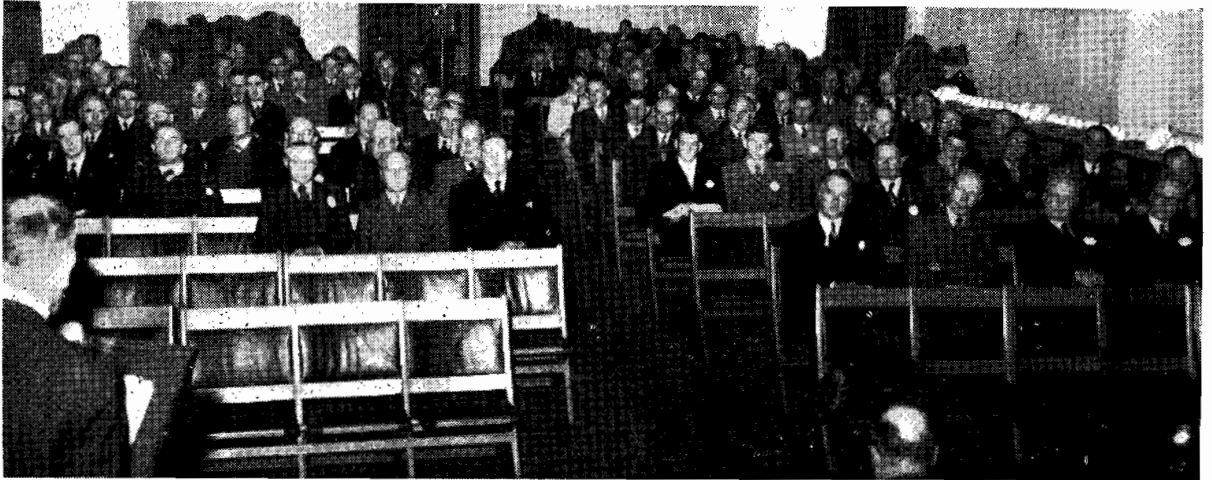


Plate No. 52.—Ninth Municipal Engineers' Conference Arranged by the Board.



Plate No. 53.—From left to right : The Hon. S. Merrifield, M.L.A., Minister of Public Works, Mr. F. M. Corrigan, Deputy Chairman, Mr. D. V. Darwin, Chairman, and Mr. R. F. Jansen, Board Member at the Ninth Municipal Engineers' Conference.



Plate No. 54.—Colombo Plan : Messrs. D. J. Santos (Manila) and F. Mishu (Iraq).

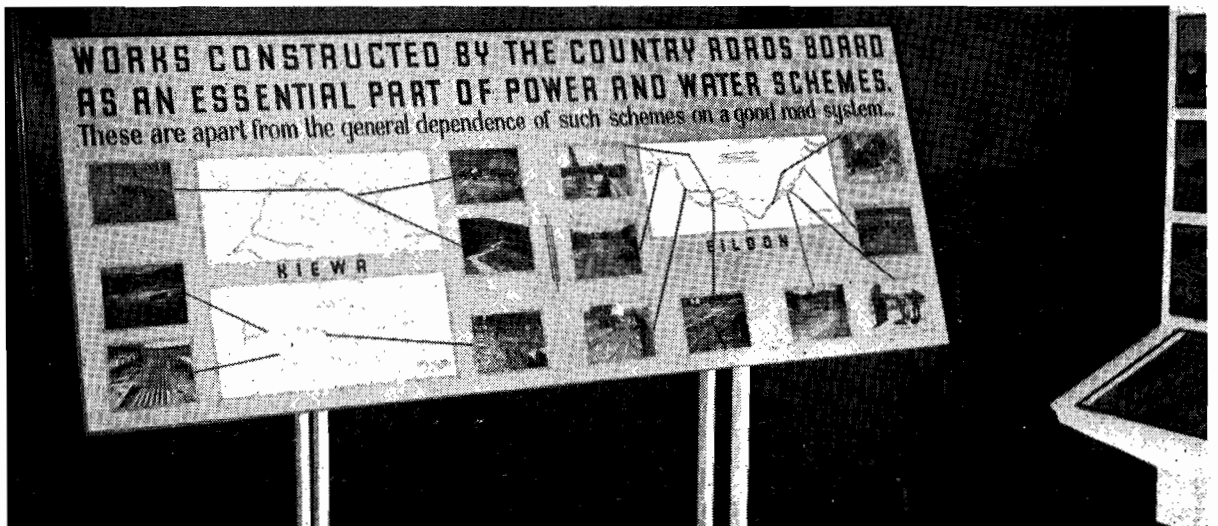


Plate No. 55.—C.R.B. Display at Melbourne Town Hall during Conference of Institution of Engineers, Australia.

The conference was opened by the Minister of Public Works, the Hon. S. Merrifield, M.L.A., whose remarks showed his keen interest in all matters relating to road construction and maintenance and his appreciation of the difficulties which confront the Board in carrying out its functions. An unusual feature of this particular conference, and a very acceptable one, was the presentation, at the invitation of the Board, of papers by two Municipal Engineers, viz., "The system of maintenance and construction adopted in one country Municipality" by Mr. R. J. Chambers, C.E., Engineer to the Shire of Berwick, and "Construction standards for minor roads" by Mr. H. M. Rooney, C.E., L.S., Engineer to the Shire of Hampden.

These and the remaining fourteen items on the agenda covered a wide field, and provoked some very useful discussions. The material prepared by the Board's Officers in replying to the various questions is being circulated for general information as in past years.

MISSIONS ABROAD OF OFFICERS.

In 1948, the Commonwealth Government received advice of a scheme which had been developed by the United States Public Roads Administration to assist the Highway officials and engineers who contemplated visiting that country by arranging a course in American highway practice which would enable information to be disseminated to all visitors at the same time by way of lectures and inspections of works.

The Board's Deputy Chief Engineer, Mr. J. Mathieson, M.C.E., M.I.E. (Aust.), attended this course in 1950 and derived great benefit therefrom. It was intended that, this year, the Divisional Engineer at Bendigo, Mr. F. West, B.C.E., M.I.E. (Aust.), should attend the course, but it was learned that the course, as such, would not be held this year. An assurance was given by the American authorities, however, that they would be glad to extend during 1953 training facilities to individual highway engineers whom the Government might wish to send to the United States for that purpose.

It was thus possible for Mr. West to visit the United States in order to receive training, through the Bureau of Public Roads, in the theory and practice of highway improvement and utilization, and this was approved by the Victorian Government. It also received Commonwealth sponsorship, and Mr. West accordingly left Melbourne by air on the 20th May. It is expected that his visit to the United States will be of four to five months duration.

DOMINION CIVIL SERVICE FELLOWSHIPS.

Reference was made in the 38th Annual Report to the fact that Mr. K. G. E. Moody, B.C.E. (Hons.), M.Eng. Sc. (Hons.), a member of the Board's engineering staff, had been awarded one of the five fellowships offered in 1951 by the Commonwealth Fund Foundation of New York, a philanthropic foundation, to persons holding appointments in the government of Australia, New Zealand, and South Africa. These fellowships are tenable in the United States of America.

Mr. Moody proposed 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 to be carried out under Professor Hognestad at the University of Illinois.

The fellowship was granted in the first instance for a period of twelve months, expiring on the 6th September, 1952, but Mr. Moody's application to the Commonwealth Fund for an extension was approved to the 6th June, 1953, the additional period being spent at the University of Illinois in continuing the study of the same type of work as he had been doing during the first year. He has now obtained the degree of Doctor of Philosophy.

Mr. Moody has written in very appreciative terms of the opportunities provided by the fellowship, both from the scholastic and the financial point of view, and there is no doubt that, as a result, he will be a very much more valuable officer to the Board. He has been granted further leave of absence to enable him to pursue investigations in England also before his return, and it is anticipated that he will reach Melbourne in October, 1953.

VISITS FROM OVERSEAS ENGINEERS.

As mentioned in the 39th Annual Report, the Commonwealth Government is one of the participants in the Commonwealth Technical Co-operation Scheme, under which countries of the British Commonwealth are endeavouring to provide technical assistance to countries in South and South-Eastern Asia, and, by arrangement with the Commonwealth Office of Education, engineers from the latter countries are, from time to time, attached to the Board's staff for short periods to enable them to study road administration and highway and bridge construction practice in this State.

Under this scheme, Messrs. Zamardi and Soeparto of Indonesia, who had been granted Engineering Fellowships, studied the Board's mechanical equipment and plant maintenance facilities from the 14th April to the 7th May, 1953, following a course of training with the Department of Main Roads, New South Wales.

In addition, Mr. J. L. Steevensz, also of Indonesia, who had completed a course of mechanical studies at the Richmond and Melbourne Technical Schools, commenced in February, 1953, a six months' course with the Board.

Under the provisions of the Colombo Plan and the United Nations Technical Assistance Scheme, Mr. A. Ferrer, Supervising Construction Engineer for Roads and Bridges in the Division of Highways, Bureau of Public Works, Manila, Phillippines, who had been granted a United Nations Technical Development Fellowship for study with the Department of Main Roads, New South Wales, visited Victoria from the 2nd to the 11th July, 1952, and investigated works in the Bendigo and Dandenong Divisions, together with the work of other Divisions located at the Board's head office.

Under the same scheme, Mr. D. J. Santos, Civil Engineer of the Programming and Planning Division of the Bureau of Public Works, Manila, and Mr. F. P. Mishu, Superintendent of the Road Section of the Public Works Department, Baghdad, Iraq, visited Victoria from the 5th to the 16th January, 1953, after working with the Department of Main Roads, New South Wales, and investigated the work of the Board. (Plate No. 54.)

EMPLOYMENT.

The total number of men employed by the Board for greater or less periods during the financial year 1952-53, i.e., field personnel as distinct from staff, was 4,502, the peak being reached in March, 1953, when the total number employed was 2,741. Of this total, 565 were employed on works being carried out for other authorities, 423 of them being engaged on Commonwealth works.

The peak of employment in respect of works carried out for other authorities was reached in September, 1952, when the number was 614, including 416 on Commonwealth works.

These figures give some indication of the magnitude of the effort put forward by the Board in carrying out works outside its own normal programme.

No statistics are available of men employed by contractors or by local government councils on the Board's works, but an approximate estimate of the average total employment at any time on road and bridge works financed by the Board and carried out by its own staff and those of the councils is 4,180 men.

ACCIDENTS TO EMPLOYEES.

The number of accidents in which the Board's employees were involved during the financial year was 607, an increase of 91 over the total for the preceding year.

The following statement indicates the general nature of the accidents, which, fortunately, were not all serious. It is a matter of deep regret, however, that three of the Board's employees lost their lives during the year.

Fatal	..	..	3	Poison	..	..	2
Strains and sprains	..	..	79	Heart strain	..	..	2
Fractures	..	..	23	Head injuries	..	..	8
Eye injuries	..	..	106	Infections	..	..	36
Bruises and lacerations	..	..	129	Miscellaneous	..	..	84
Burns	..	..	26				
Injuries to limbs	..	..	109	Total	..	..	607

CANTEEN.

For some months past, there has been considerable agitation on the part of the employees at the Board's Central Workshops, South Melbourne, for the provision of a canteen. After protracted negotiations between the Board and the men's representatives, arrangements were made with the Public Works Department for the erection of a canteen building in No. 2 Storeyard, and the canteen was opened for business on the 22nd April, 1953.

An agreement has been entered into with a contractor specializing in such work for the running of the canteen, and fair support has been given by the personnel at the workshops. It is hoped that this amenity will develop into an attractive adjunct to the Board's workshop and store.

BOARD'S EXHIBITS.

As the Board's obligations relate to the State-wide network of roads, its operations are consequently dispersed over a multitude of relatively small projects. In the aggregate, these wide-spread operations constitute a very large effort, although not as spectacular as the more concentrated efforts say, of building a reservoir or a power house. The community is thus apt to overlook the vital importance of having a safe, sufficient, and well-maintained system of roads designed to fit the traffic at every point.

From time to time the Board, therefore, avails itself of special opportunities of making known the nature and extent of its State-wide obligations and financial liabilities, and of publishing results of investigations into road problems such as in the development of new techniques of construction and maintenance, or by the means of building more safety into the road system.

Two such opportunities presented themselves during the year, the first in connection with the Annual Conference of the Institution of Engineers, Australia, which was held in Melbourne in March, 1953, and the second in connection with the Annual Motor Show held in the Exhibition Building during the same month. For the first of these, the Board was given the opportunity of preparing an exhibit to be placed in the Lower Town Hall, Melbourne, a photograph of the actual exhibit being shown as Plate No. 55. The area available was approximately 40 square feet.

The invitation to exhibit at the Motor Show emanated from the National Safety Council, which had been offered use of a small hall in the Exhibition Building for the purpose of emphasizing the aims of the Council generally. Following a conference convened by the National Safety Council and attended also by representatives of the Railway Department, the Police Department, the Melbourne and Metropolitan Tramways Board, the Royal Automobile Club of Victoria, and the Country Roads Board, this Board prepared a comprehensive exhibit of warning signs, photographs, flashing lights, and a speed measurement device, the general "set up" being as shown in Plate No. 56.

The display material at the Town Hall proved to be of great interest to the engineers from all States attending the conference, whilst the matter presented at the Motor Show attracted considerable public interest.

COMMUNITY EFFORTS.

On many occasions over the years individual settlers have contributed money, material or labour towards road works designed to serve their own properties, this being particularly the case where the road was not a through road. On less frequent occasions, groups of settlers have contributed in like manner to projects more in the nature of a community effort. These projects have, however, for the most part been comparatively small, and of purely local significance.

An offer of assistance on a considerably larger scale has, however, recently been received from certain land-owners whose properties are served by the Longwood-Ruffly Road in the Shires of Euroa and Goulburn, these owners having offered to contribute £2,500 towards the cost of the sealing of the road provided the work is carried out within the next five years.

An inspection of the road was made by the members of the Board during a visit to the district in February, 1953, and the matter was discussed with the members of the Longwood-Ruffly Road Developmental League. A general inspection with the Engineers

BOARD ACTIVITIES



Plate No. 56.—C.R.B. Display on National Safety Council Stand at 1953 Motor Show.

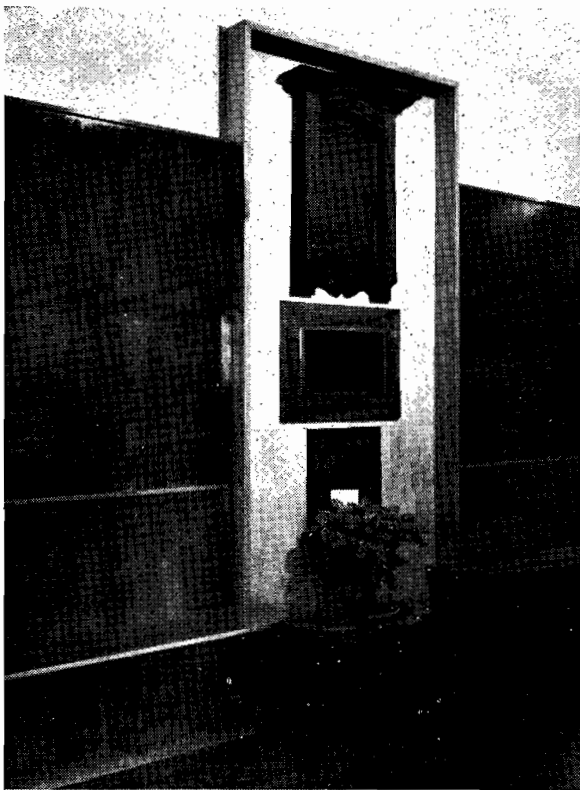


Plate No. 57.—Honour Roll.



Plate No. 58.—Members of Board with Divisional Engineer, Traralgon, on Preliminary Investigation on Wilson's Promontory.

of the two Shires was subsequently made by the Board's Divisional Engineer, when it was estimated that the total cost of strengthening and sealing the total length of 7.4 miles was £16,830.

The question of making some provision for this work is being dealt with by the Board in connection with the allocation of its funds for the financial year 1953-54.

VISITS BY MINISTER.

The Board records with pleasure two visits to its offices during the year by the Minister for Public Works, The Hon. S. Merrifield, M.L.A. His first took place on the 9th January, 1953, shortly after he assumed office, when he made a tour of inspection of the various sections, and afterwards met senior officers.

During the visit the Minister renewed acquaintance with several of the Board's staff with whom he had been associated for a brief period as an officer of its survey staff over twenty years ago.

The second visit was on the 9th June, 1953, when the Minister expressed a desire to discuss with the Board in its own office various aspects of its finances. His interest and co-operation in matters affecting the Board are much appreciated.

MOTOR REGISTRATION.

During the year, registrations effected under the Motor Car Acts total 548,943, this figure including motor cycles and traction engines. This is an increase of $1\frac{1}{4}$ per cent. on the figures for the previous financial year, and suffers by contrast with the large increase of 20 per cent. of the 1951-52 figures over the 1950-51 figures which was reported in the 39th Annual Report.

Cars owned by primary producers which were due for renewal between July and November, 1952, have been transferred to other categories, as the concessional registration for such cars was withdrawn from the 21st November, 1951.

Details of registrations are set out hereunder:—

Vehicles.	Financial Year 1951-52.	Financial Year 1952-53.	Increase.	Decrease.
Private—				
New	42,258	28,556		
Second-hand—Re-registered	19,258	15,966		
Renewals	280,997	326,348		
	342,503	370,870	28,367	
Commercial—				
New	13,378	7,072		
Second-hand—Re-registered	5,624	4,392		
Renewals	67,151	71,149		
	86,153	82,613		3,540
Primary Producers—				
New	8,461	4,343		
Second-hand—Re-registered	3,855	2,598		
Renewals	46,011	37,020		
	58,327	43,961		14,366
Hire	4,861	4,825		36
Licences under Motor Omnibus Act	810	759		51
Trailers	12,246	12,442	196	
Traction Engines, &c.	37	36		1
Motor Cycles	37,196	33,437		3,759
Total	542,133	548,943	28,563	21,753

BOARD'S STAFF AND EMPLOYEES—2ND WORLD WAR.

The Country Roads Board section of the Public Service Branch of the R.S.S.A.I.L.A. is to be warmly thanked for its efforts, firstly, in compiling and checking lists of officers and employees who served in the armed forces during the 1939-45 war, and secondly, in arranging for the provision of a memorial plaque in a suitable setting in the Board's head office.

Investigations indicate that 60 officers and 536 employees actually enlisted, of whom 9 officers and at least 8 employees paid the supreme sacrifice. The last mentioned figure is not, however, by any means conclusive.

The memorial plaque, a photograph of which appears as Plate No. 57, and the cost of which was met by subscription from members of the sub-branch and the Board's staff generally, has been placed in the main east-west corridor of the Board's office, almost immediately opposite the main entrance. The plaque was unveiled by the Chairman of the Board (Mr. D. V. Darwin) on the 5th November, 1952, in the presence of the members of the staff and relatives of the deceased officers whose names appear on the plaque.

STAFF.

Since the 1st July, 1952, the total number of officers on the Board's staff has increased from 460, comprising 240 males and 29 females on the permanent staff and 121 males and 70 females on the temporary staff, to 478, made up as follows:—

Permanent Staff—

Males	291
Females	46
	—337

Temporary Staff—

Males	81
Females	60
	—141

Total 372 males, 106 females 478

During the year 17 male officers and 16 female officers resigned or retired, whilst there were 27 new male and 24 new female appointments, a net increase for the year of 18 officers.

It is pleasing to record that there has been some improvement in the staff position generally, as it is not now quite so difficult to obtain new staff, especially male officers. There is still, however, a shortage of competent female typistes and stenographers and machine operators.

Several officers who retired during the year had had considerable service with the Board, viz., Mr. F. R. Oldfield of the Engineering staff (to whom reference is made elsewhere), (39 years), Mr. E. F. Davies of the Survey staff (28 years), Mr. R. Banks Smith, of the Mechanical drafting staff at Central Workshops (26 years), Mr. J. B. Yuile, of the Accounts Branch (21 years), Mr. R. H. T. Harris, of the Benalla Divisional staff (20 years), and Mr. F. L. Moller, of the Accounts Branch (20 years). These officers had given the Board very loyal and efficient service, of which the Board desires to record its sincere appreciation.

STAFF CHARITIES FUND.

Members of the Board's staff have for many years past been contributing to a charities fund, their contributions being made on a voluntary basis by way of deductions from their salaries at regular fortnightly intervals.

On the 1st July, 1952, there was a balance in hand of £167 6s. 7d., and this was supplemented during the year by contributions to the amount of £304 9s., and sundry donations amounting to £16 11s. The total sum disbursed during the year was £371 0s. 6d. to 27 different charities throughout the State, including a number of Melbourne and country hospitals, the Legacy Club and Junior Legacy, the Returned Servicemen's League and the Institute for the Blind. Donations were also made to several special button day appeals, these donations taking the form of the purchase of a sufficient number of buttons for distribution to contributors to the fund. This system has been found far more satisfactory than the previous system of collecting individually for each separate appeal, and the balance retained in the bank enables speedy support to be given to any worthy appeal which is made at short notice.

RETIREMENT OF MR. F. R. OLDFIELD.

On the 28th March, 1953, Mr. F. R. Oldfield, one of the earliest appointees to the Board's engineering staff, retired from the Board's service after an association with the Board extending over nearly 40 years.

He was appointed to the Board's staff on the 25th May, 1913, as a young engineering draftsman, but his flair for road location led to his being intimately concerned in many of the Board's most intricate location problems, particularly in the Gippsland area, in the early years of its existence. In 1929, his classification was changed to that of Location Engineer, a position which he filled with distinction until he was appointed Divisional Engineer, Traralgon Division, in April, 1944, when that Division was being administered from the Board's head office in Melbourne. In May, 1950 when that Division was actually set up in Traralgon itself, Mr. Oldfield again became Location Engineer, which position he occupied until the date of his retirement.

Mr. Oldfield brought to his task the benefit of a sound training and a wide knowledge of the State as a whole. His value to the Board was such that, although he reached the retiring age in September, 1949, his services were retained, with the approval of the Minister, for three and a half years beyond that date. A few days prior to his retirement, he was the guest of honour at an informal function held in the Board Room, at which members of the Board, senior officers, and old associates were present, and he was subsequently the recipient of a substantial cheque from his colleagues.

Mr. Oldfield has been succeeded by Mr. H. P. George, a former Traffic and Location Engineer to the Board, who in March, 1949, had been appointed Chief Technical Officer to the Town and Country Planning Board. Mr. George, after four years with the latter Board, felt that engineering rather than planning was his proper vocation, and he has returned to the Board's staff with a knowledge of rural and urban planning added to his already wide knowledge of the operations of the Country Roads Board. This additional knowledge should make him of even greater value as a member of the Board's staff.

The reappointment of Mr. George has coincided with the reconstitution of a Traffic and Location Division, in which he will be assisted by both technical and non-technical staff in dealing with the many complex problems that the rapid development of modern transport is bringing with it.

ACCOUNTS.

Statement of accounts for the year ended 30th June, 1953, 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—						
Construction	567,382	15 11	..	..	567,382	15 11
Maintenance and reconditioning	1,524,978	6 9	92,212	5 0	1,617,190	11 9
2. Main Roads—						
Construction	136,380	9 1	61,236	15 0	197,617	4 1
Maintenance and reconditioning	309,310	16 5	1,865,480	4 4	2,174,791	0 9
3. Unclassified Roads—						
Construction and maintenance	19,428	13 6	382,331	8 1	401,760	1 7
Roads for isolated settlers .. .. .	..	..	2,800	18 10	2,800	18 10
Federal maintenance	56,089	10 11	234,937	11 3	291,027	2 2
4. Tourists' Roads—						
Maintenance and reconditioning	208,416	9 11	8,118	1 5	216,534	11 4
5. Forest Roads—						
Maintenance and reconditioning	70,214	3 3	43,681	6 10	113,895	10 1
6. River Murray Bridges and Punts—						
Maintenance and reconditioning	11,402	15 2	2,208	6 8	13,611	1 10
	2,903,604	0 11	2,693,006	17 5	5,596,610	18 4

In addition to the amounts shown in the above statement, the following expenditure was incurred during the year in respect of (a) Works carried out on behalf of the Commonwealth Government and several State Instrumentalities, &c., and (b) Flood and Bush Fire Damage, for which special provision was made by the Government.

	£	s.	d.
Commonwealth Government	992,000	3	3
State Instrumentalities, &c.	561,386	11	6
A.M.P. Project—Kaniva Shire	16,625	16	9
Flood and Bush Fire Damage	426,509	8	2
	<hr/>		
	1,996,521	19	8
	<hr/>		

OFFICERS AND EMPLOYEES.

The Board again desires to record its appreciation of the loyalty and co-operation of its officers and employees during the year and of the very efficient manner in which they carried out their duties. They readily responded to the many demands made upon them and thereby greatly assisted the Board in dealing with the many problems which confronted it.

ACKNOWLEDGMENTS.

The sincere thanks of the Board are tendered to the Hon. P. T. Byrnes, M.L.C., who held office as Minister of Public Works during the first half of the financial year, and to the Hon. S. Merrifield, M.L.A., who succeeded him, for their help and interest in its work.

It is also desired to record the thanks and appreciation of the Board to officers of Government Departments and State Instrumentalities, and to the Road Authorities in the 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.

THE CHAIRMAN,
SIR,

I have the honour to submit the following information on matters of engineering interest included in work done in the year 1952-53.

MECHANICAL PLANT.

Employees.—At the 30th June, 1953, the total number of employees at Central and Divisional workshops, excluding storemen, transport drivers and staff, was 250, compared with 229 at the end of the previous financial year, and 205 at the end of June, 1951.

The labour turnover was considerably less than in the previous year, being of the order of 15 per cent. compared with 25 per cent., which assisted considerably in the operation of the Central workshops.

Volume of Work.—Table A, which shows the number of jobs completed in Central workshops during the past four years, indicates the continued steady rise in volume of work.

TABLE A.—WORKSHOP OUTPUT.

	1949-50.	1950-51.	1951-52.	1952-53.
Manufactured stock ..	358	376	328	372
Equipment repair ..	155	179	140	238
Workshop ..	2,631	2,797	3,020	4,068
Carpenters' shop ..	175	129	139	182
Transport ..	1,109	1,044	1,150	1,353
Total jobs completed	4,428	4,525	4,777	6,213

Divisional workshops dealt with most of the field work, but it was necessary for men from the Central workshops to visit 667 field jobs compared with 457 last year and 445 the previous year.

Overhauls.—Table B shows some of the principal items of plant (other than bituminous plant) given a major overhaul during the year. Figures for 1951-52 are given for purpose of comparison. These may seem inconsistent with the increase in volume of work indicated by Table A. The reasons for this were the larger B.S.T. programme in 1952-53, with the accompanying need for keeping all this type of plant in first class condition, and the reduction in major construction works.

TABLE B.—PLANT OVERHAULS.

	Central Workshops.		Divisions.		Outside.		Total.	
	1951-1952.	1952-1953.	1951-1952.	1952-1953.	1951-1952.	1952-1953.	1951-1952.	1952-1953.
Compressors ..	12	5	2	9	..	..	14	14
Graders—Power	15	11	5	5	5	1	25	17
Loaders—								
F/E Crawler	4	2	..	..	..	1	4	3
F/E Wheel ..	1	..	19	31	..	..	20	31
Mixers—Concrete	4	2	2	1	..	..	6	3
Scoops ..	5	2	..	2	..	..	5	4
Shovels ..	1	3	1	1	..	..	2	4
Tractors—Crawler ..	19	19	3	3	3	3	25	25
Total ..	61	44	32	52	8	5	101	101

Divisional Workshops.—Further progress was made in establishing workshops in Divisions, i.e. :—

- (a) Ballarat—Equipping completed and stores building erected.
- (b) Benalla—Completion of the 60' x 120' sawtooth building and equipment, including overhead travelling crane, installed and wired up.
- (c) Traralgon—Sawtooth building 100' x 60' completed, but has yet to be equipped and wired.
- (d) Warrnambool—Column footings installed and erection of 100' x 60' steel framed building commenced.
- (e) Geelong—Extension of existing workshops partly completed.

B.S.T. Plant.—Further progress was made in providing interchangeability of pumps, pumping engines and other pieces of bitumen sprayers, with a resulting reduction in the time required to overhaul the units. A test set for checking bitumen pumps before they are placed in the sprayers has been made and should be in operation shortly, to reduce the time required for testing and calibration of sprayers after overhaul.

The routine inspection of motor vehicles in the field by plant inspectors has been extended to the B.S.T. plant and, while it has not been possible to do as complete a job as wished, the inspections have proved of great value, particularly when overhaul is necessary.

Field Maintenance and Repairs.—Steps taken to improve field maintenance included the provision of more frequent plant inspections and the introduction of plant service men in the Benalla and Warrnambool Divisions as an experiment. These men visit major items of plant once a fortnight, supervising the servicing and checking for loose or worn parts. Defects are reported to the foreman of the Divisional workshop who arranges for any necessary work on the machine. The arrangement is working well and will be extended. On certain larger works facilities were provided for field repairs, with preventive maintenance as the objective.

Syndal Workshops.—Preliminary layout plans were prepared for new workshops, stores, and general depot on the site purchased at Syndal.

Cost of Plant Replacement.—The estimated cost of replacing the Board's plant on the basis of its working life (in a number of cases greater than the life used for depreciation) is £513,000 per year. This figure includes motor trucks, cars, and utilities, but excludes some special new items such as additional large stone crushing equipment.

Efficiencies of Plant and Plant Use.—In the report for year 1948-49 it was stated that two kinds of efficiency had been adopted in order to assess the mechanical and overall efficiency of the Board's plant. The rating known as "Mechanical Efficiency", as set out, gave some measure of the efficiency of the units concerned, from a mechanical point of view, taking account of liability to breakdown, and the efficiency of the repair facilities and organization. The "Overall Efficiency" indicated the extent to which plant in the Board's possession was used effectively, after taking into account loss of time due to mechanical breakdown, time spent on overhaul, and awaiting overhaul and any other causes. The "Mechanical Efficiency" could only be 100 per cent. if plant never broke down and never needed overhaul, while "Overall Efficiency" could only be 100 per cent. if, in addition, the plant was used continuously.

Both the efficiencies referred to are necessary in order to have some measure of the departure from the ideal use of ideal plant. It has been considered desirable, however, to record and watch another figure which will indicate the deviation from complete freedom from breakdown after the plant has been repaired or overhauled and is made available for work on a job.

It has, therefore, been decided that what has previously been called "Mechanical Efficiency" should now be termed "Overall Mechanical Efficiency" and that the new efficiency introduced should be termed "Mechanical Efficiency of Units in the Field". The definition of the various efficiencies is set out below:—

$$(a) \text{ Overall Efficiency} = \frac{\text{Days worked}}{\text{Working days}} \times 100 \text{ per cent.}$$

(b) Overall Mechanical Efficiency

$$= \frac{\text{Days worked}}{\text{Working days less days lost for reasons other than plant breakdown or overhaul or awaiting overhaul}} \times 100 \text{ per cent.}$$

(c) Mechanical Efficiency of Unit in the Field

$$= \frac{\text{Days worked}}{\text{Days worked + days broken down on job}} \times 100 \text{ per cent.}$$

The three "efficiencies" for certain major items of plant for the years 1951-52 and 1952-53 are set out in Table "C". Units which were in the yard for the full year are excluded.

TABLE C.—PLANT EFFICIENCY.

Type of Plant.	Number of Units in Group.	Average Age of Units in Group. Years.	Overall Efficiency.		Overall Mechanical Efficiency.		Mechanical Efficiency of Units in the Field.	
			1951-52. %	1952-53. %	1951-52. %	1952-53. %	1951-52. %	1952-53. %
Crawler Tractors—								
Class I.	55	2.80	32	34	41	50	79	79
Class II.	45	5.54	26	22	31	27	88	77
Class III.	24	5.14	19	20	27	27	87	72
Class IV.	33	3.96	23	29	29	38	90	82
Power Graders—								
Heavy—Tandem diesel	110	4.41	64	57	67	64	94	91
Medium—Dual wheel diesel	23	5.00	63	52	67	56	95	85
Light—Single drive, power control	20	4.15	43	22	48	24	95	86
Patrol Power Graders	25	2.40	53	56	64	60	94	94
"Speed" Patrols	8	4.50	51	35	54	38	92	93

BITUMINOUS SURFACING.

Extent of the Work.—The total mileage of work carried out in the years 1951-52 and 1952-53 is set out in Table D. The mileage of each type of work carried out on the Board's declared roads is shown in Table E.

Extension of the Treated System.—The total declared system at 30th June, 1953, was 14,448 miles. The "black road" in the Board's declared system at 30th June, 1952, was 7,276 miles. During the year this length was increased by 85 miles, or 1.2 per cent., to a total of 7,361 miles, as set out in Table F. During the year a further length of 17.5 miles was given a temporary primer seal; this work will be completed next season.

The growth of both the declared and treated systems is shown in Figure 1.

Reconstruction and Retreatment of the Bituminous Surfaced System.—Initial treatments on reconstructed lengths of previously sealed pavements totalled 77 miles, or 1.1 per cent. of the treated system at 30th June, 1952, again indicating the slow progress made in reconstructing the many miles of lightly constructed roads first sealed about 20 years ago, when the rate of extension of "black" road averaged approximately 400 miles per annum.

The total length retreated during the year was 887 miles; of this, 879 miles consisted of a sprayed reseal. The policy of retreatment by resealing rather than by a surface corrective type of work was dictated by the funds available and not the riding qualities of the surfaces retreated. The mileage of retreatment was 12.2 per cent. of the "black" roads in the Board's system at 30th June, 1953.

Both the length and weight of the retreatments applied were increased at the expense of the extension of the system and other work. These increases were essential owing to the slow rate of reconstruction and the fact that many of the existing seal coats are too weak.

The mileage and rates of reconstruction and retreatment of the bituminous surfaced system are shown in Figure 2.

Cost of the Work.—The average cost of work carried out by C.R.B. plant on declared roads during 1952-53 is set out in Table G. Figure 3 shows the cost of initial treatments,

and retreatments by sprayed resealing since 1925. The cost of aggregate per cubic yard in stacks by the roadside is set out in Table H. Figure 4 shows the weighted average price of all aggregate over the whole State, in stacks by the roadside.

Supply of Bitumen.—The transport of bitumen in bulk by road from the Altona refinery to the job was further extended; 3,422 tons out of a total of 10,740 tons was handled in this way.

Expenditure.—The expenditure on each type of road and class of work is set out in Table J. The annual expenditure on bituminous surfacing since 1935 and its relation to the total road expenditure is shown in Figure 5. Over the period 1934-35 to 1952-53, the total expenditure on bituminous surfacing was 15.8 per cent. of the total road expenditure.

TABLE D.—LENGTH OF WORK CARRIED OUT IN 1951-52 AND 1952-53.

Type of Road and Plant Used.	Miles Done.	
	1951-52.	1952-53.
(a) Work on C.R.B. Declared Roads—		
(i) Board's plant	887	1,032
(ii) Municipal or hired plant	37	34
	924	1,066
(b) Work on Undeclared Roads to which the Board contributed—		
(i) Board's plant	26	25
(ii) Municipal or hired plant	8	3
	34	28
(c) Work for Other Authorities done by the Board's plant—		
(i) Municipalities	56	83
(ii) State Instrumentalities	7	10
(iii) Commonwealth of Australia*	17	44
	80	137
	1,038	1,231

* The Commonwealth of Australia work is the area treated converted to miles on the basis of a width of 18 ft.

TABLE E.—MILEAGE OF EACH TYPE OF WORK CARRIED OUT ON C.R.B. DECLARED ROADS DURING 1952-53.

Type of Road and Control of Work.		Length in Miles.																					
		Initial Treatments.										Retreatments.										Summary of Work.	
		Nature of the Work.																					
Road.	Control.	Primer Seal.		Seal Only—One Application.		Seal Only—Two Applications.		I.T. Prime and Two Application Seal.		Prime and Seal.		Reseals.					Two Application Reseal.	R.M.S.	P.M.S.	State Highways.	Other Declared Roads.		
		E.	R.	E.	R.	E.	R.	E.	R.	E.	R.	3-in.	4-in.	5-in.	6-in.	7-in.						8-in.	9-in.
State Highways	Direct	14.98	..	..	9.94	..	0.84	6.86	6.37	22.71	21.02	112.76	124.96	135.05	83.87	13.26	10.83	..	2.59	566.04	..
	Municipal	..	..	..	..	..	..	..	..	6.50	0.60	..	4.35	8.84	..	..	..	..	1.13	21.42	..
Main, Tourist, and Forest Roads	Direct	0.75	..	..	2.05	..	..	..	..	3.59	7.91	..	1.65	3.51	3.15	..	..	..	..	22.61	..
	Municipal	1.78	..	4.33	4.25	..	..	..	..	40.80	24.01	10.54	89.54	156.66	99.66	14.79	5.70	3.46	0.50	456.02	..
		17.51	..	4.33	16.24	..	0.84	6.86	6.37	73.60	53.54	123.30	220.50	304.06	186.68	28.05	16.53	3.46	4.22	587.46	478.63		
		17.51	..	20.57	0.84	..	13.23	..	127.14	879.12	7.68	..	..	..	..	..	..	..	..	1,066.09	1,066.09

Abbreviations.—E, Extension to the Bituminous Surfaced System; R, Initial Treatment on a Reconstructed length of previously sealed pavement; R.M.S., Retreatment with Roadmix; P.M.S., Retreatment with Plantmix.

This table does not include 18 miles of Initial Treatment and 10 miles of Retreatment on Undeclared Roads.

TABLE G.—AVERAGE COST OF WORK CARRIED OUT BY C.R.B. PLANT ON C.R.B. DECLARED ROADS DURING 1952-53. COST IN PENCE PER SQUARE YARD.

Item.	Nature of the Work.																							
	Initial Treatments.						Retreatments.																	
	Primer Seal— Two Applications (Temporary).		Seal Only— 0.25 gallon per sq. yd.		Seal Only— Two Applications of Binder and Aggregate.		I.T. Primer and Two Applications Seal.		Prime and Seal Primer 0.20, Seal 0.25, gallon per sq. yd.		Reseals.													
	Nominal Size or Gauge of Aggregate Used.																							
		½-in. "E".		¾-in. "F".		1-in. "G".		1½-in. "H".		2-in. and Sand.		Two Applications Reseal.		Plantmix Seal.										
		d.*	%	d.	%	d.	%	d.	%	d.	%	d.	%	d.	%									
Square yards costed	155,583	245,478	11,814	126,442	1,313,102	1,308,054	2,177,244	2,807,824	1,623,017	270,303	172,209	35,854												
Materials	8.3	60	16.3	66	19.5	60	27.6	74	23.4	66	16.5	73	13.6	69	71	7.6	64	21.2	73	70.8	66			
Labour	3.1	23	4.6	18	6.4	19	5.0	14	6.7	20	3.6	16	3.5	18	2.7	2.4	20	4.2	15	24.1	23			
Stores	0.4	2	0.7	3	0.9	3	0.8	2	0.8	2	0.5	2	0.5	2	0.4	3	0.4	3	0.6	2	1.4	1		
Plant Hire	2.1	15	3.2	13	5.8	18	3.8	10	4.1	12	2.1	9	2.2	11	1.7	1.5	13	3.0	10	10.7	10			
Totals	13.9	100	24.8	100	32.6	100	37.2	100	34.0	100	25.0	100	22.7	100	19.8	100	16.4	100	11.9	100	29.0	100	107.0	100

* Cost in pence per square yard.

THE DECLARED AND BITUMINOUS SURFACED SYSTEM

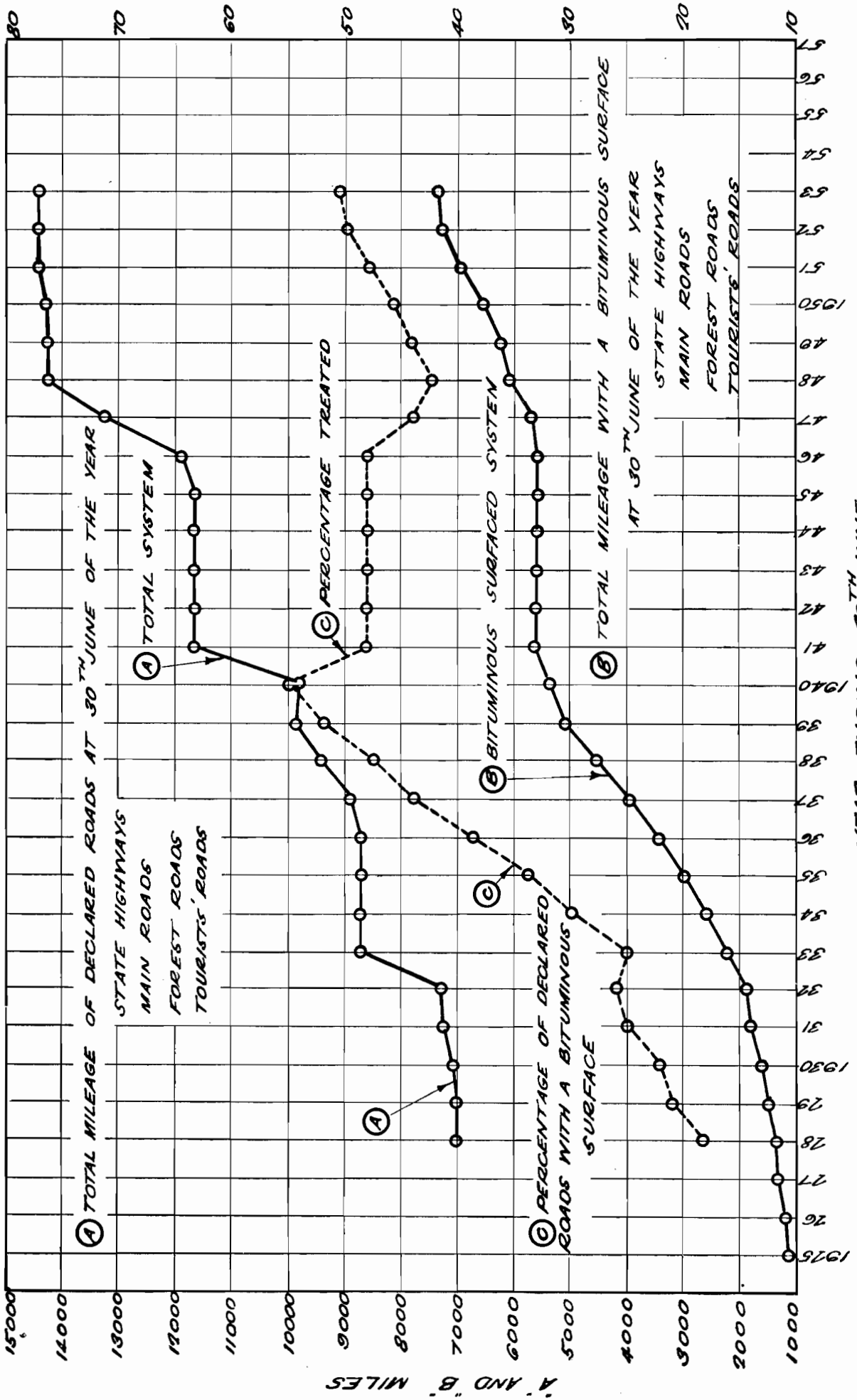
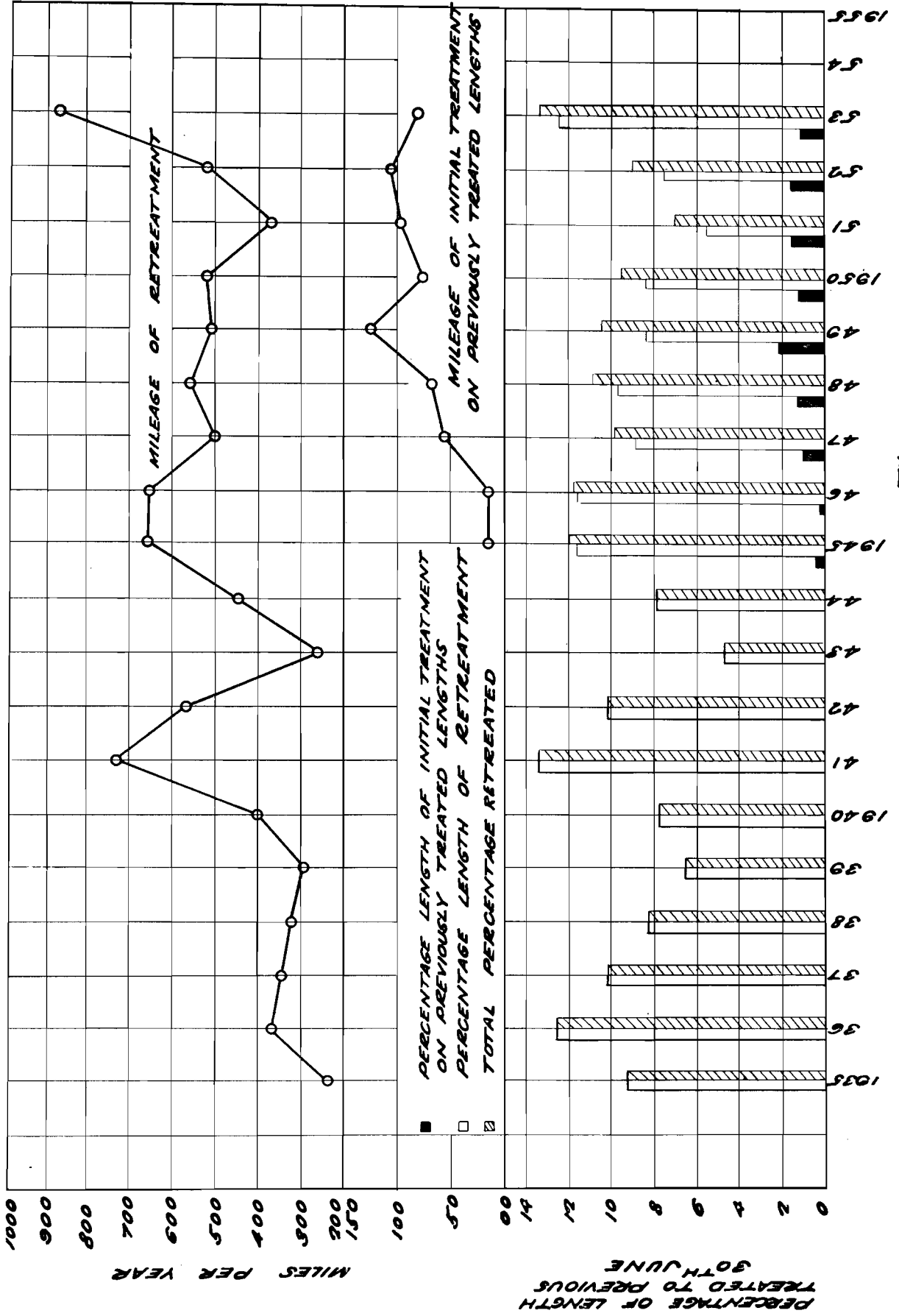


Fig. 1.

MILEAGE AND RATES OF RECONSTRUCTION AND RETREATMENT OF THE BITUMINOUS SURFACED SYSTEM PER YEAR



YEAR ENDING 30TH JUNE

Fig. 2.

COST OF BITUMINOUS SURFACING WORK (ALL WORK WHOLE STATE)

- (A) INITIAL TREATMENT-PRIME AND SEAL-PRIMER 0.25 BINDER 0.25 GALL./S. YD. AGGREGATE 1 C. YD TO 60 S. YDS.
- (B) RETREATMENT-RESEAL. BINDER 0.25 GALL./S. YD. AGGREGATE 1 C. YD TO 60 S. YDS.
- (C) RETREATMENT-RESEAL. BINDER 0.225 GALL./S. YD. AGGREGATE 1 C. YD TO 65 S. YDS.
- (D) RETREATMENT-RESEAL. BINDER 0.20 GALL./S. YD. AGGREGATE 1 C. YD TO 75 S. YDS.
- (E) RETREATMENT-RESEAL. BINDER 0.15 GALL./S. YD. AGGREGATE 1 C. YD TO 100 S. YDS.

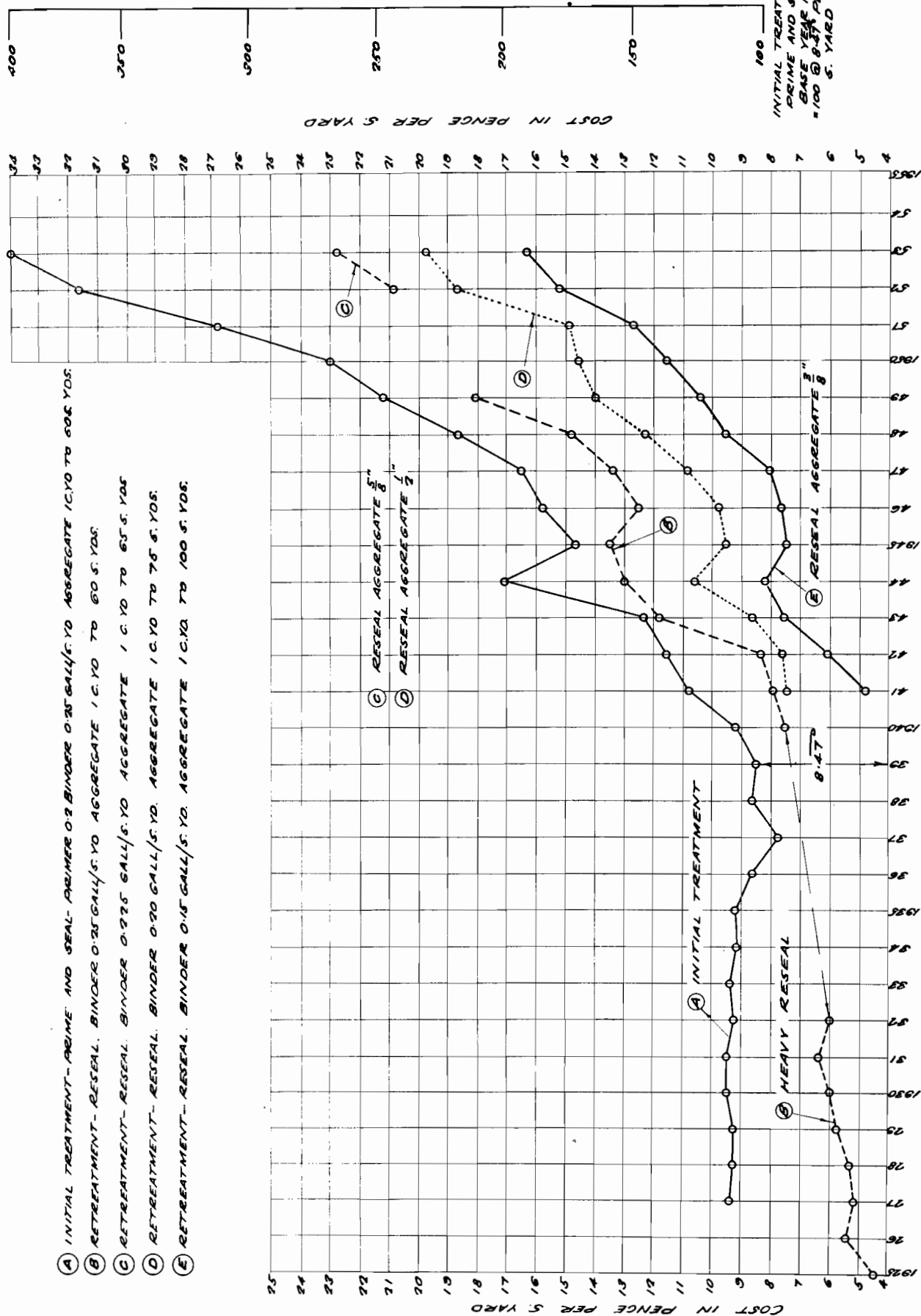


Fig. 3.

PRICE OF BASIC MATERIALS

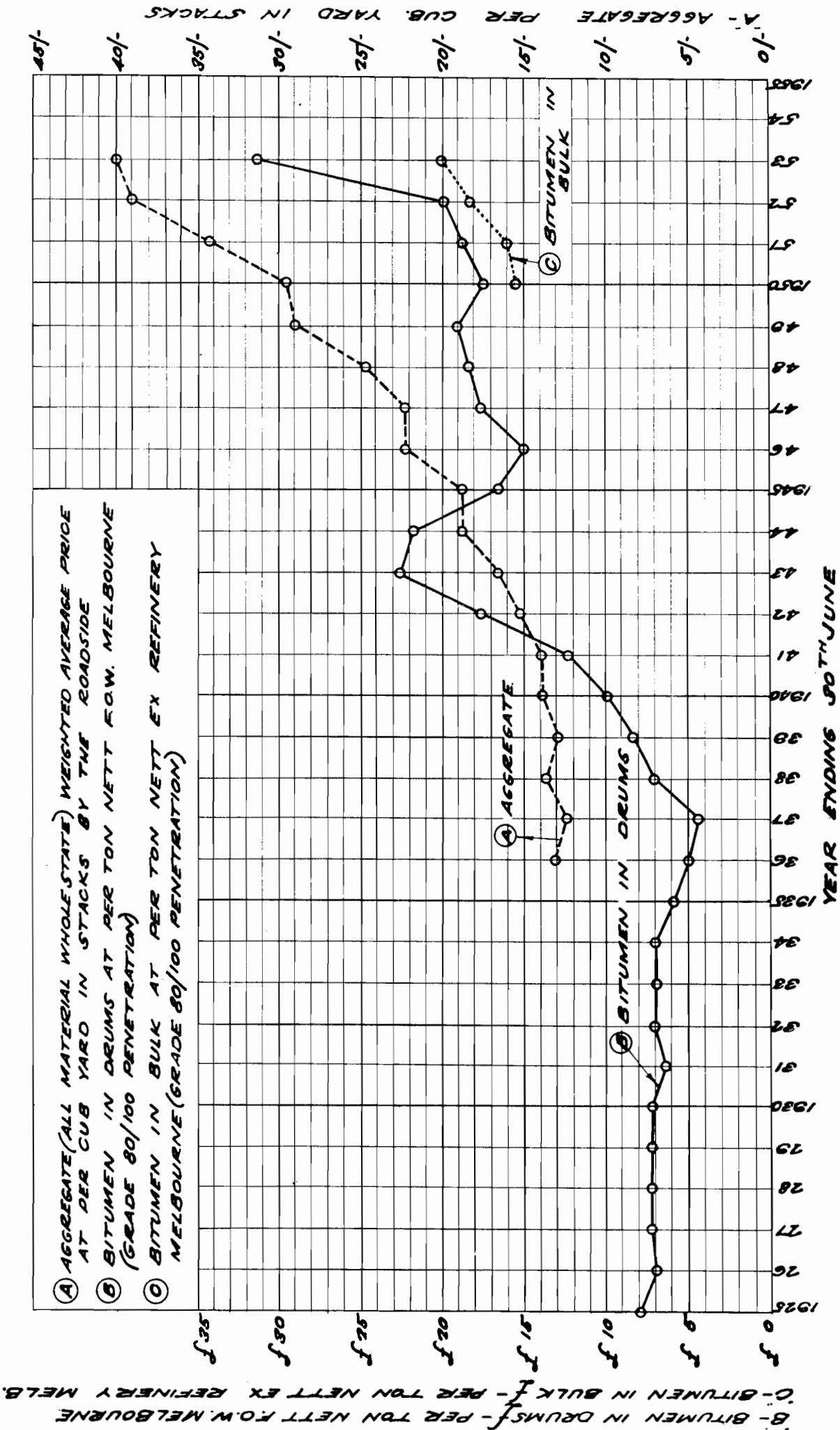


Fig. 4.

EXPENDITURE ON BITUMINOUS SURFACING AND ITS RELATION TO THE TOTAL ROAD EXPENDITURE

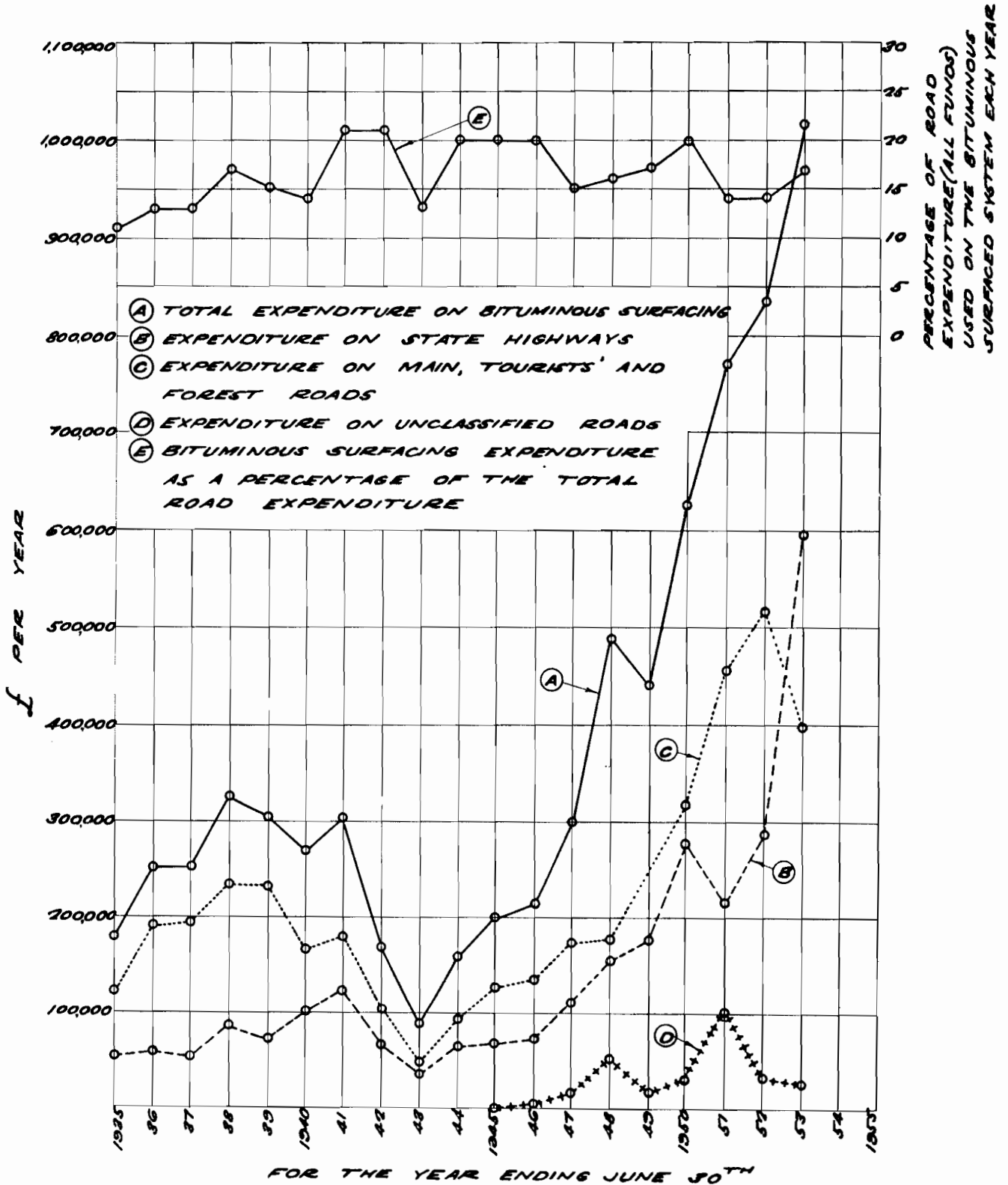


Fig. 5.

TABLE F.—MILEAGE OF EACH CLASS OF ROAD IN THE DECLARED AND BLACK SYSTEMS AND THE PERCENTAGE OF THE DECLARED SYSTEM TREATED AT 30TH JUNE, 1953.

Class of Road.	Miles.		Percentage Treated at 30.6.53.
	Declared 30.6.53.	Treated at 30.6.53.	
State Highways	3,849	2,950	76.6
Main Roads	9,792	4,256	43.5
Tourists' Roads	432	117	27.1
Forest Roads	375	38	10.1
Totals	14,448	7,361	51.0

TABLE H.—AVERAGE PRICE OF AGGREGATE FOR BITUMINOUS SURFACING AT PER CUBIC YARD IN STACKS BY THE ROADSIDE, 1952-53.

Material.	Price per Cubic Yard.
	s. d.
Screenings	40 3
Gravel	42 4
Sand	21 0
Scoria	17 3
Weighted average	39 10

TABLE J.—EXPENDITURE ON BITUMINOUS SURFACING DURING 1952-53.

Class of Road.	Type of Work.			Total Expenditure.
	Initial Treatment.		Retreat-ment.	
	Extensions.	Reconstruc-tion of Previously Treated Work.		
	£	£	£	£
State Highways	53,198	66,915	473,014	593,127
Main, Tourists', and Forest Roads	57,369	53,191	286,687	397,247
Total on the Undeclared System	110,567	120,106	759,701	990,374
Unclassified Roads	20,869	..	6,473	27,342
Grand Totals	131,436	120,106	766,174	1,017,716

BRIDGES.

General.—Steady progress was made with the design and construction of bridges on State Highways and Main Roads. In the Metropolitan Area designs were completed for the bridges over the Merri Creek at Arthurton-road and over the Moonee Ponds Creek at Moreland-road. Contracts for both have since been let. Progress in construction of the bridges over Merri Creek at Bell-street and over Moonee Ponds Creek at Albion-street was satisfactory. A considerable amount of design was done for other instrumentalities in addition to the completion of plans and specifications for the Bonnie Doon Bridge, mentioned in the last Annual Report.

Span lengths of Tee beam bridges with precast beam stems were increased during the year from the range of 22 ft. 6 in., 30 ft., and 35 ft., to 40 ft. and several of this span are now being built.

During the year the design was completed for a precast three-hinged arch span of 75 ft. over the railway line at Belgrave with the intention of calling tenders for the work early in the financial year 1953-54.

State Road Authorities—Design of Highway Bridges.—In previous reports reference has been made to the preparation of a manual for the design of road bridges by the Bridge Design Committee of the Conference of State Road Authorities, Australia. The manual is based on the publication published by the American Association of State Highway Officials, which agreed to the proposed amendment to suit Australian conditions. Due acknowledgment will be included in the Preface.

The manual is being printed and will probably be available for distribution early in 1954. It will, doubtless, be reviewed from time to time and amendments made in the light of experience gained.

The Committee is now engaged in the preparation of Manuals to cover materials and methods of construction.

Height of Handrails.—In previous reports details have been given of the heights of various types of bridge handrails, i.e., 3 ft. 2 in. and 3 ft. 6 in. for the height from deck level to the top of the upper rail or coping for concrete and timber handrails respectively. In the design manual to which reference is made in the previous paragraph provision is as follows:—

- (a) Roadway railings shall have a minimum height of 3 ft. above the roadway adjacent to the kerb.
- (b) Footway railings shall have a minimum height of 3 ft. 3 in. above the adjacent footway level.

In many country districts agricultural machinery cannot be easily carried over narrow bridges with handrails of the standard height. Many of these machines could cross such bridges if the handrail height were reduced, and in several cases, where stock movement is limited, handrails 2 ft. 6 in. above deck level are being constructed as a trial. An example in Kara Kara Shire is shown in Fig. 7.

Bridge Inspections.—This work was continued by the Bridge Inspecting Engineer. Reports have revealed a general lack of maintenance, and the urgent need to "build more maintenance into" the first construction of a bridge. The inspections have provided evidence that with piles driven into the sandy bed of a stream, deterioration is greater five feet below the surface than at ground level. That this weakness is more common in loamy soils than is generally appreciated is indicated by the number of cases in which old timber abutment piles are pushed forward at ground level and piers of the same type settle without apparent cause.

Supply of Materials.—During the year the Board received 2,149 tons of Victorian cement on weekly quotas varying from 10 tons to 64 tons. This, together with approximately 180 tons of cement from other sources, enabled work to proceed, but it was necessary to portion out the weekly quota in small lots, depending on the conditions of the various jobs. This often resulted in an increase in the cost of the cement on the site of the works.

The supply of steel from local sources has been particularly inadequate. Had it not been for the importation of steel in previous years, the position would have been serious. Unless more steel, particularly joists, is made available from local sources, it may be necessary to curtail bridge work in 1953-54, as the withdrawal of subsidies on imported steel makes the cost of imported material so high that its use can only be considered for urgent work.

The supply of bolts, sawn timber, and other items for bridge construction improved.

Costs.—More contractors were tendering for bridge works and competition was keen and, in consequence, there was



Fig. 7. Low handrails to permit passage of agricultural machinery.

a slight decrease in costs of bridges. Although the cost of work will naturally vary with site conditions, the following may be taken as typical for the year :—

- | | |
|------------------------------------|--------------------------------|
| (a) Flat Slab Bridge—cast in place | £5 to £4 10s. per sq. ft. |
| (b) Precast Beam and Slab Type .. | £4 10s. to £3 15s. per sq. ft. |

Particular instances are :—

- | | |
|---|---------------------|
| (a) Flat Slab Bridge 90 ft. long by 22 ft. between kerbs with spread footings | £4 13s. per sq. ft. |
| (b) Precast Beam type on driven pile foundations—180 ft. long by 26 ft. between kerbs | £4 9s. per sq. ft. |

The cost of fabricated plate girders varied from £105 to £110 per ton, delivered to the site.

Composite Action of Steel Girders with Concrete Deck.—Considerable experimental work has been done in various parts of the world on methods of connecting concrete decks to steel girders. The Board has constructed a number of bridges with superstructure of this type, and in the majority of cases has used stirrups or bars welded to the upper flange and embedded in the concrete deck, which has been constructed with a definite haunch springing from the flange. Recent developments indicate that composite action will be fully developed if the movement of the concrete deck relative to the steel flange, both horizontally and vertically, is prevented. This is now being done by means of shear developers consisting of M.S. lugs and loops in combination, as shown in Fig. 8. Several bridges with this type of connection have now been built and tests with electric strain gauges will be carried out at regular intervals in an endeavour to determine the development of creep and the effect of the reduction in the value of n for the concrete as it ages.

Cassidy's Bridge, Shire of Warrnambool, described in the Annual Report for 1948-49, was an example of a

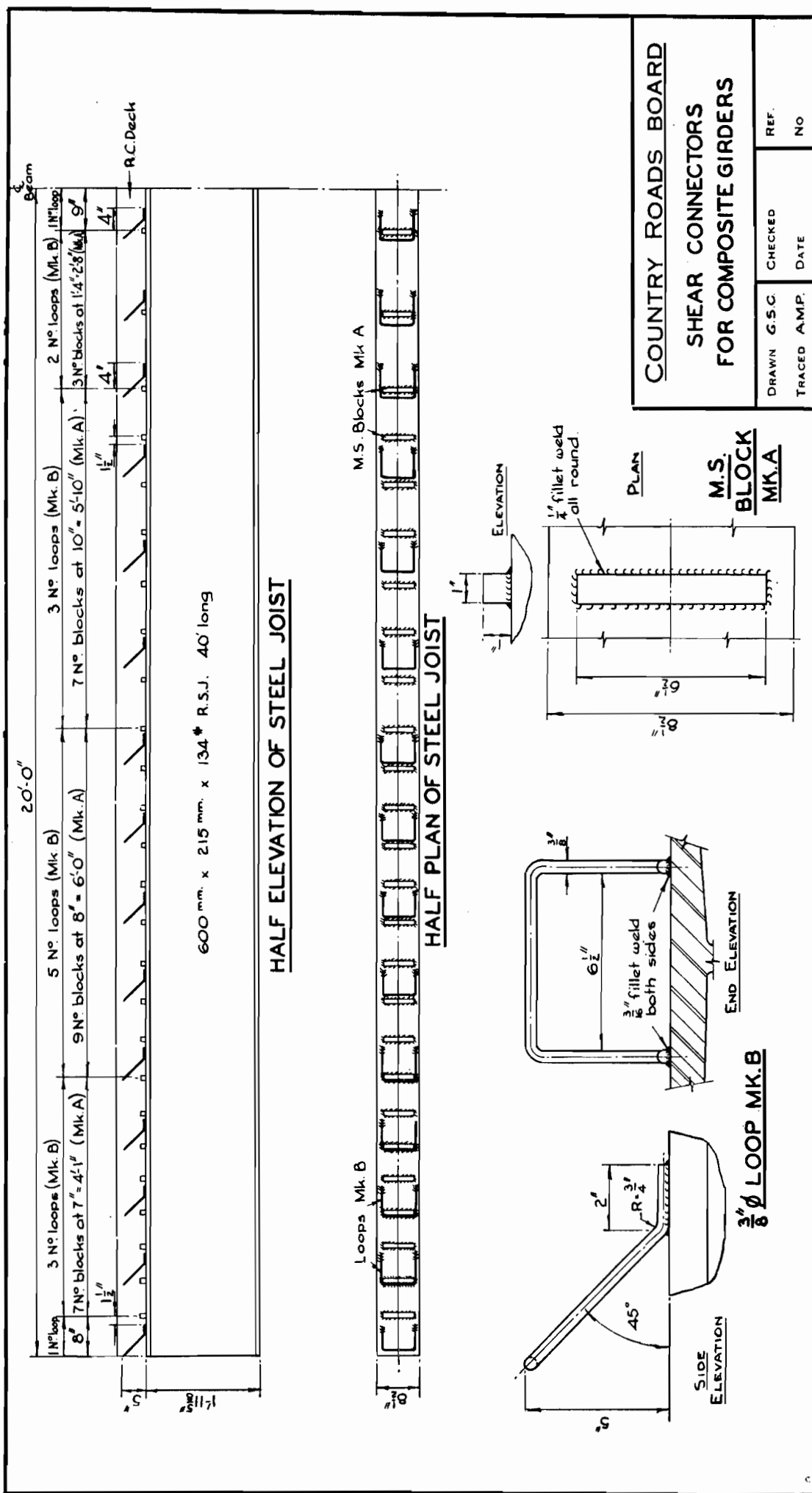
continuous composite bridge in which extra steel was placed in the deck to take the negative binding moment. The bridge over the Yarra River at Warrandyte at present in course of construction is of the same type, but in this case the whole of the tension in the section over the piers is to be taken by the steel girder itself.

Testing.—References have been made in previous reports to the use of Precast U Type Slabs, which were designed for a point load of 9,000 lb. The following conclusions have been drawn from full scale tests carried out during the year :—

- Tensile cracking of the concrete is likely to occur at a mid-span loading of 1.7 to 2.0 times the design load.
- Ultimate failure is probable with a mid-span loading of from 3.3 to 3.9 times the design load.
- In all cases initial failure occurred by yielding of the steel. At this stage the cracks in the concrete were not large and the deflection was of elastic proportions. Further loading of the slab produced more extensive cracking and larger deflection, but the slab was capable of sustaining the load by a readjustment of the stresses. Complete failure finally took place due to the raising of the neutral axis until the concrete crushed.
- The slabs will not fail in shear, and diagonal tension cracks should not be expected until the load is 4 to 5 times the working load.

Further tests are in progress with the object of achieving economy in design.

Protection of Steel Work.—The Annual Report for the year 1947-48 contains certain details of the standard method of treatment then in use. Since then considerable investigation has been carried out by the Materials Research Engineer and discussions have taken place between the



COUNTRY ROADS BOARD		REF.
SHEAR CONNECTORS FOR COMPOSITE GIRDERS		NO
DRAWN	G.S.C.	CHECKED
TRACED	AMP.	DATE

Fig. 8.

Testing Engineers of the various State Road Authorities. The technique of cleaning the steel has not varied but there is a general trend towards a lower pigment content in the paints. The first and second coats now used are of non-setting red lead in linseed oil, complying with S.A.A. Interim Specification 3A. They contain 78 per cent. by weight of red lead and 96 per cent. of non-volatiles per gallon of paint. The product contains approximately 23 lb. of red lead per gallon of finished paint. For the second coat of red lead a little black stainer is added to aid supervision.

The aluminium paint for the third and fourth coats is prepared on the site in quantities for immediate use, by adding 2 lb. of aluminium paste to one gallon of spar varnish. The resultant paint has 1.4 lb. of aluminium per gallon.

Standard Paints.—The Board uses approximately 1,500 gallons of white paint per annum, and during the year a standard specification for white paint and for timber priming paint was formulated. Details of these are as follows, all percentages, when quoted, being by weight:—

- (a) Timber Primer.—This is prepared by adding one pint of raw linseed oil and one pint of mineral turpentine to one gallon of the Red Lead Primer for steel work.
- (b) Exterior Undercoat Paint.—This complies with S.A.A. Interim Specification 11A Type 1, and contains 70 per cent. of a pigment consisting of 60 per cent. white lead, 10 per cent. Titanium Dioxide and 30 per cent. extender. The vehicle contains 65 per cent. raw linseed oil and 35 per cent. volatiles.
- (c) Exterior Oil Gloss White Paint.—This consists of 65 per cent. pigment and 35 per cent. vehicle. The pigment is made up of 60 per cent. white lead, 25 per cent. Zinc Oxide, $7\frac{1}{2}$ per cent. Titanium Dioxide, and 7 per cent. extender; the vehicle containing 85 per cent. raw linseed oil.

Floods.—During the year no floods of major magnitude occurred except in the Cann, Bemm, and Tanjil River catchments, although there were frequent minor floods which damaged many Shire Bridges. The protective work at Stratford on the banks of the Avon, described in last year's report, carried out its function. Some scour under the "sausages" did occur, but the sausages, as expected, settled into the eroded bank. The growth of the willows has been very good.

LABORATORY.

Static Cone Penetrometer.—As a quick means of determining the bearing strength of a soil *in situ* without having to dig a hole, a cone penetrometer has been developed and used in Holland and Switzerland and found to be a useful tool for soil investigation. A machine for using this method of assessing the strength of soils under road pavements has been made and is shown in Fig. 9. It consists essentially of a means of forcing a cone into the soil while continuously measuring the resistance to penetration.

The design provides for a rack type jack with a worm reduction gear for forcing the cone into the soil and uses a proving ring to measure the load. Reaction is supplied by a loaded utility truck. The parts are designed for assembly without the use of bolts and each individual part is light enough to be handled by one or two men. The cone is a 60 degree cone with a base area of 10 sq. cm., i.e., 1.405 inches in diameter. Above the base the diameter decreases gradually over a distance of two inches. The rods on which the cone is mounted are standard diamond drill rods of 1 inch outside diameter so that there will be a diametrical clearance in the hole made by the cone of 0.4 inch. It is

considered that, for the shallow soundings required for investigating road subgrades, this clearance is sufficient to eliminate any friction between the soil and the rod.

With this equipment it is possible, after removing the macadam or crushed stone surfacing, to force the cone slowly into the soil and measure the resistance at every inch of penetration, provided that the C.B.R. *in situ* does not exceed about 20.

From experimental work which has been carried out overseas, one can expect to obtain the shear strength of a soil (a) from the resistance to the cone divided by 10, in the case of soft soils, (b) from the resistance to the cone divided by 14.8 for firm compact soils. Correlation under Victorian conditions is not yet available.

It has been found previously that the resistance to a Proctor needle, divided by 53, gives an approximate value of the C.B.R. of clay soils and from other information it

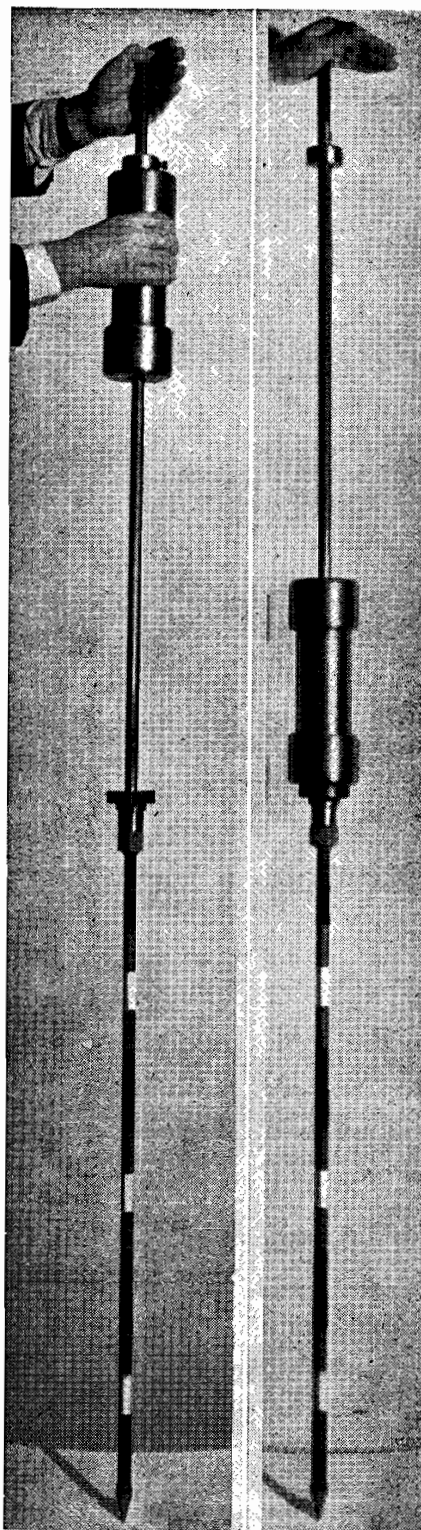


Fig. 10.

seems that the resistance to the cone divided by 50 will give an approximate value of the C.B.R. This has yet to be checked by experience.

Dynamic Cone Penetrometer.—Another type of penetrometer was also constructed and is shown in Fig. 10. This

has the advantage over the static cone penetrometer of much greater portability. It consists of a small cone having a cross-sectional area of $\frac{1}{2}$ sq. inch, which is driven into the soil by the impact on a collar of a 20 lb. weight falling freely through 20 inches. This weight slides on the rod. The depth of penetration for each blow is recorded.



Fig. 9. Static cone penetrometer set up as for use in the field.

WARNING AND OTHER SIGNS.

Specular Reflection from Signs.—It has been noticed that at night some road signs are practically unreadable owing to glare reflected from car headlamps by the painted surface.

Using the Board's dark tunnel, tests were undertaken to determine how this glare could be eliminated. Typical signs were mounted on a frame so that their surfaces were perpendicular to an incident light beam; the frame was then rotated about its vertical axis. These tests showed that the glare was caused by specular reflection from the

surface of the sign and that it can be eliminated if incident light is made to strike the sign surface more than 5° away from the perpendicular.

In future, all signs on the left hand side of the road (except beaded signs) will, in general, be erected with their surfaces turned 6° (1 in 10) in a clockwise direction beyond a perpendicular to the road when considered in plan.

Fig. 6 illustrates the results obtained in the test tunnel.

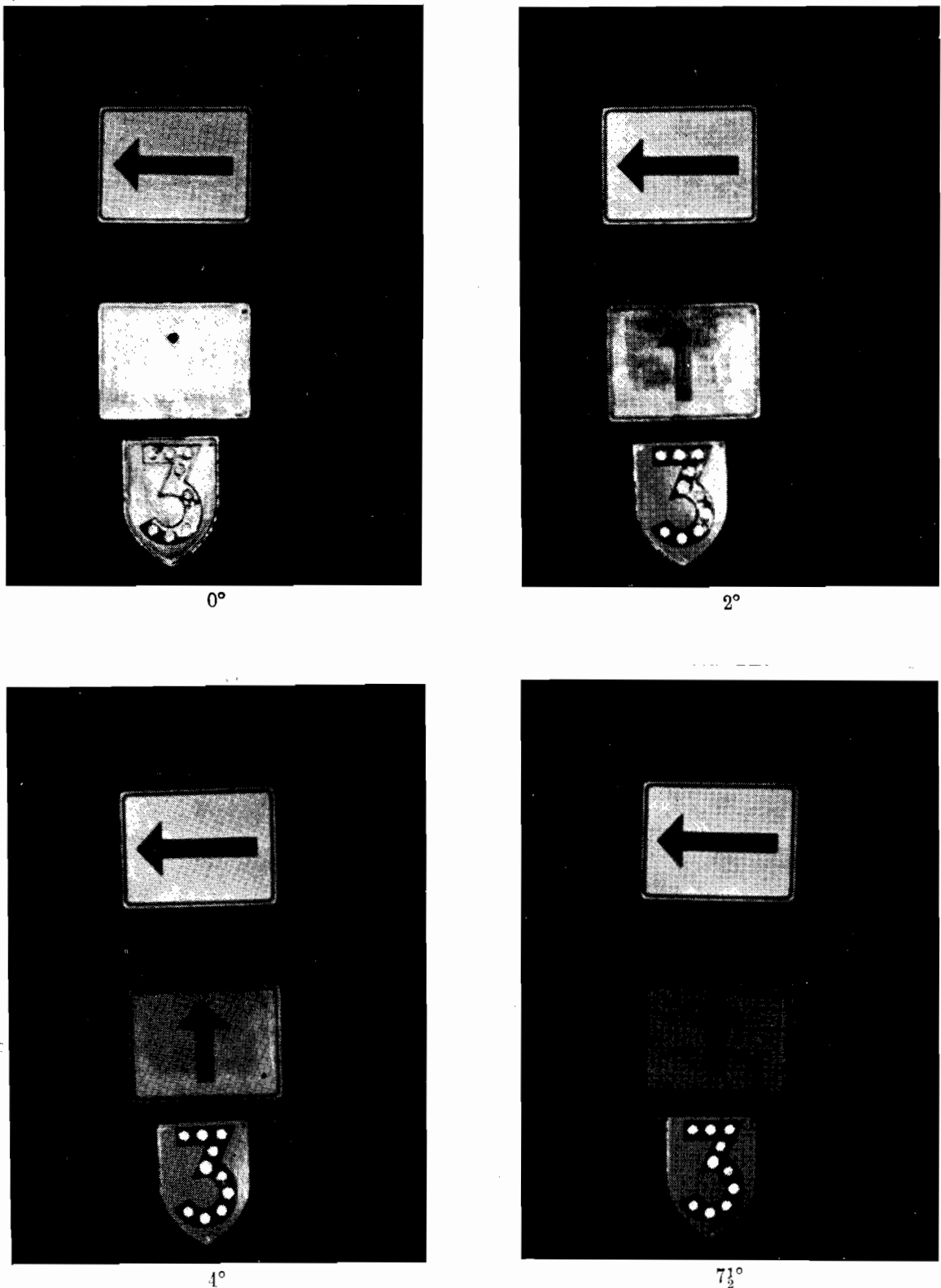


Fig. 6.—Effect of Varying the Angle of Incidence of Light on Sign Surfaces.

Top Sign, Beaded surface; Middle Sign, Gloss paint surface; Bottom Sign, Reflector studs.

The figures beneath each photograph refer to the angle the incident light beam makes with a perpendicular to the sign surface.

STAFF.

The staff of the Engineering Branch continued to give the loyal service to the Board and the community which is one of the privileges of the profession.

During the year the following papers were prepared and presented to professional associations, &c. :—

Papers.	Professional Associations, &c.	Authors.
Forward Road Planning in Victoria ..	Melbourne Division, Institution of Engineers, Australia, 30th September, 1952	C. G. Roberts, M.C., B.Sc. (Eng.), A.M.I.E. Aust., and F. Hosking, E.D., B.C.E., A.M.I.E. Aust.
Road Signs and Lines	Illuminating Engineering Society (Victoria), 26th August, 1952	J. D. Thorpe, M.S.E., A.M.I.E. Aust.
Planning a Highway Facility	Civil Engineering Branch, Melbourne Division of the Institution of Engineers, Australia, 24th October, 1952	J. D. Thorpe, M.S.E., A.M.I.E. Aust.

ENGINEERING CIRCULARS.

The following Technical Bulletins and Engineering Notes were distributed during the year :—

No.	Title.	Date of Issue.
TECHNICAL BULLETINS.		
9	A method for eliminating the slipperiness of a "slick" seal coat	11.8.52
10	Average least dimension of aggregate for bituminous surface treatment	17.9.52
ENGINEERING NOTES.		
39	Procedure for remixing manually, paint which has settled in storage	2.7.52
40	Use of cable operated ripper with an hydraulically controlled tractor	24.7.52
41	The use of paint	21.10.52
42	Direction and warning signs (Angle with road centre line)	29.1.53

Yours obediently,
C. G. ROBERTS,
Chief Engineer.

APPENDIX.

COUNTRY ROADS BOARD.

STATEMENT OF RECEIPTS AND PAYMENTS FOR YEAR ENDED 30TH JUNE, 1953.

(Adjusted to nearest pound.)

	Country Roads Board Fund.	Commonwealth Aid Roads Act 1950.		Loan Funds.		Total.
		Sec. 6 (1).	Sec. 7 (1).	Permanent Works.	Restoration of Flood and Bush Fire Damage.	
RECEIPTS.	£	£	£	£	£	£
Balances at 1st July, 1952	31,925	..	20,098	..	..	52,023
Motor Car Registration Fees	3,890,274	..	..	..	..	..
Drivers' Licence Fees	159,402	..	..	..	..	..
Fines	93,637	..	..	..	..	..
	4,143,313	..	..	..	..	..
Less Cost of Collection	281,780	..	..	..	..	..
	3,861,533	..	..	..	..	3,861,533
Municipalities Repayments—		..	..	..	..	..
Permanent Works—Outer Metropolitan Roads	272	..	..	..	..	..
Maintenance Main Roads	344,048	..	..	..	..	..
	344,320	..	..	..	..	344,320
Moneys provided by Commonwealth Aid Roads Act 1950 .. .. .	..	1,500,879	945,150	..	..	2,446,029
Receipts from State Loan Funds—	..	..	..	..	..	..
Act 3662 .. .. .	..	..	..	197,617	..	197,617
Act 5363 .. .. .	..	..	..	567,383	..	567,383
Act 5657—Flood and Bush Fire Damage .. .. .	..	..	..	..	223,358	223,358
Treasurer's Advance Pending Loan Act 5657—	..	..	..	..	..	..
Flood and Bush Fire Damage .. .. .	..	..	..	..	203,151	203,151
Other Receipts—Fees and Fines	2,092	..	..	..	..	2,092
	4,239,870	1,500,879	965,248	765,000	426,509	7,897,506
PAYMENTS.						
Construction and Maintenance of Roads and Bridges—						
Main Roads	1,503,390	671,401	..	197,617	120,447	2,492,855
State Highways	790,566	826,625	..	567,383	66,229	2,250,803
Tourists' Roads .. .. .	..	..	216,535	..	16,243	232,778
Forest Roads	57,917	..	55,978	..	..	113,895
Unclassified Roads—						
Construction and Maintenance .. .. .	..	2,853	398,907	..	223,358	625,118
Isolated Settlers Roads .. .. .	..	..	2,801	..	..	2,801
Federal Maintenance .. .. .	..	..	291,027	..	..	291,027
Murray River Bridges and Punts	13,611	..	..	..	232	13,843
Traffic Line Marking	23,366	..	..	..	..	23,366
Plant Purchases	840,258	..	..	..	..	840,258
Traffic Lights	1,422	..	..	..	..	1,422
Interest and Sinking Fund Payments	569,001	..	..	..	..	569,001
Interest and Sinking Fund Payments—Great Ocean Road	1,000	..	..	..	..	1,000
Payment to Tourists' Resorts Fund	57,750	..	..	..	..	57,750
General and Administration Expenditure	366,492	..	..	..	..	366,492
	4,224,773	1,500,879	965,248	765,000	426,509	7,882,409
Balances at 30th June, 1953	15,097	..	..	..	..	15,097

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

Municipalities were formerly required to contribute annually towards the cost of Permanent Works on Main and Developmental Roads. Acts 4140 and 4415 relieved Municipalities of this annual liability which has the effect in year ended 30th June, 1953, of decreasing the amount available for expenditure by the Board by the sum of £173,024.

AUDITOR-GENERAL'S CERTIFICATE.

The accounts of the Country Roads Board for the year ended 30th June, 1953, 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,
24th November, 1953.

C. G. GRIFFITHS,
Accountant,
9th October, 1953.

APPENDIX—*continued.*

COUNTRY ROADS BOARD.

WORKS EXECUTED ON BEHALF OF COMMONWEALTH AND STATE AUTHORITIES FOR YEAR ENDED 30TH JUNE, 1953.

Department or Authority.	Description of Works.	Expenditure Chargeable to Authority.		
		£	s.	d.
Department of Public Works	Roadworks: Ballarat City, Dookie Agricultural College, Chandler Highway, Australian Mutual Provident Society Project (Kaniva Shire, Big Desert Road)	21,307	15	5
Forests Commission	Roadworks: Maffra, Otway Shires	518	7	5
Gas and Fuel Corporation of Victoria	Roadworks: Morwell	4,562	17	1
Housing Commission	Roadworks: Ballarat, Morwell, Norlane Housing Estates	188,885	19	5
Melbourne and Metropolitan Board of Works	Bridgeworks, Roadworks: Healesville, Upper Yarra Shires	79,592	3	0
Soldier Settlement Commission	Roadworks in Soldier Settlement Estates throughout Victoria	130,899	1	9
State Coal Mine	Maintenance of roads, Wonthaggi	5	4	0
State Electricity Commission	Bridgeworks, Roadworks: Kiewa Valley, Morwell, Princes Highway East	50,404	11	11
State Rivers and Water Supply Commission	Bridgeworks, Roadworks: Eildon Weir Project, Hume Weir Project, Cairn Curran Reservoir	101,825	5	9
Victorian Inland Meat Authority	Roadworks: Ballarat	11	2	6
		578,012	8	3
Commonwealth Department of Works	Construction works: Avalon, East Sale, Mallacoota, Mangalore Aerodromes, Albion Project, Bandiana Army Ordnance Depot, Bendigo Ordnance Factory, Bendigo Migrants Hostel, Graytown H.A.R. Range, Longlea Explosives Depot, Mt. Oberon Radio Telephone Station, Monegeeta Army Establishment, Mulwala Explosives Factory, Puckapunyal Army Camp, Traralgon Line Depot, Watsonia Military Camp. Sealing works: Essendon, Nhill Aerodromes. Bridge strengthening: Seymour Area	992,000	3	3
		1,570,012	11	6

LOAN LIABILITY AT 30TH JUNE, 1953.

	Main Roads.		Developmental Roads.		Total.	
	£	s. d.	£	s. d.	£	s. d.
Permanent Works—						
Main Roads	5,484,952	8 6				
State Highways	2,888,166	9 2				
Tourists' Roads	55,292	10 3				
Forest Roads.. .. .	1,083	18 11				
			8,429,495	6 10		
Developmental Roads					6,425,757	10 11
Discount and Expenses			178,389	17 7	238,496	1 9
			8,607,885	4 5	6,664,253	12 8
					15,272,138	17 1
Less Redemption of Loans—						
Redemption Funds			85,219	1 1	646,386	7 4
Main Roads Sinking Fund			285,688	7 7		
Developmental Roads Sinking Fund					55,083	0 2
State Loans Repayment Fund			906,184	13 9		
National Debt Sinking Fund			829,353	12 3	1,233,420	16 6
			2,106,445	14 8	1,934,890	4 0
					4,041,335	18 8
Loan Liability at 30th June, 1953			6,501,439	9 9	4,729,363	8 8
					11,230,802	18 5