# MAIN ROADS


JOURNAL OF THE DEPARTMENT OF MAIN ROADS

NEW SOUTH WALES

# MAIN ROADS

Issued Quarterly by and with the Authority of the Commissioner for Main Roads.

*Vol. XXV, No. 2.* *December, 1959* *Price: Two Shillings.*

CONTENTS



**Additional copies of this journal obtainable from the—**

Department of Main Roads,
309 Castlereagh Street, Sydney, New South Wales, Australia.

Box 3903 G.P.O. Telephone: B 0933. Telegrams "Mainroads" Sydney.

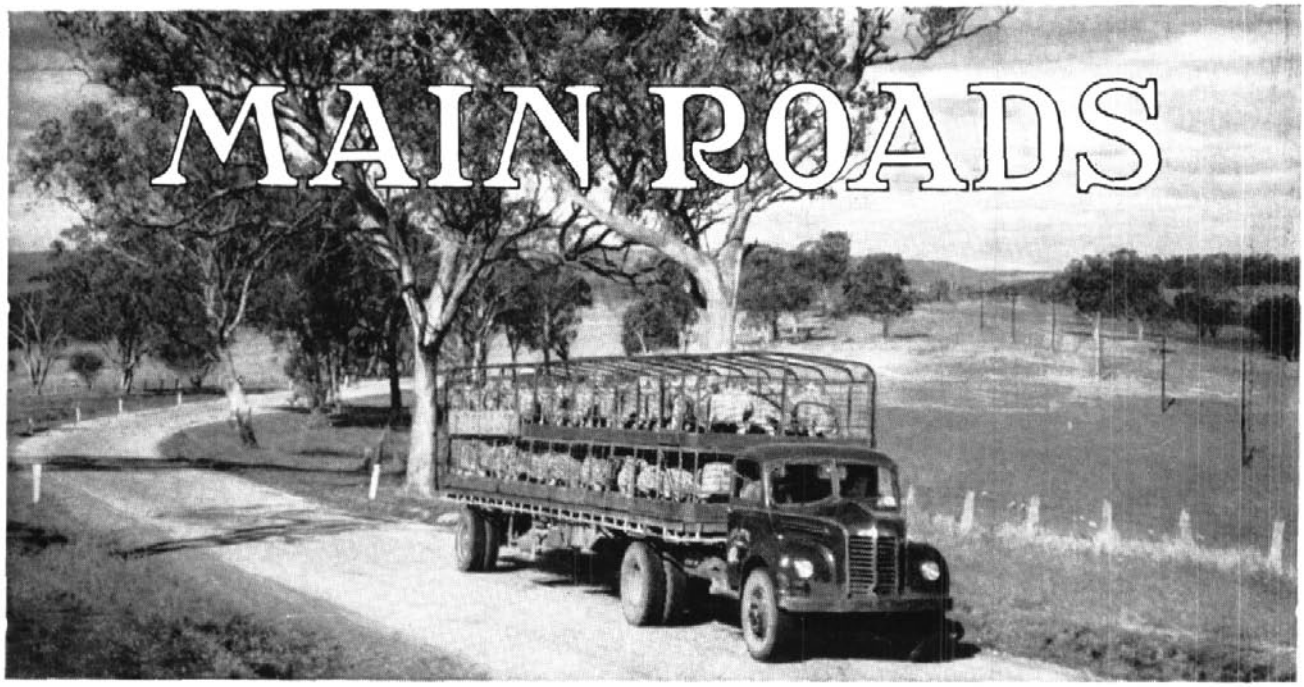
Annual Subscription, 8/-; Post Free.



***Cover Page***

*Police control at a typical school crossing on a metropolitan Main Road.*

*Next Issue: March, 1960.*




34 *DECEMBER*, 1959 Vol. XXV, No. 2

# Review of Year's Work

**An extract from the 34th Annual Report of the Commissioner for Main Roads on the work of the Department of Main Roads for the year ended 30th June, 1959.**

## Works Progress

During the year Councils and the Department of Main Roads provided new dustless bituminous surfacing on 442 miles of Main Road not previously treated. Extension of bitumen surfacing on State Highways was carried out principally in the western part of the State. A total of 44 bridges was completed by Councils and the Department of Main Roads on classified roads. About 100 miles of old deteriorated bitumen surfaced pavement was rebuilt, mainly on the Hume Highway, Pacific Highway and New England Highway. The work usually incorporated other improvements.

Considerable effort, both by contract and day labour, was put into the task of converting to roadway use the area of the Sydney Harbour Bridge previously used for tramway. This work provided two extra road lanes. It cost approximately £1,000,000, and was paid for from Sydney Harbour Bridge revenues.

Notable along the bridge works completed during the year were a large steel bridge over the Wallamba River at Nabiac, a bridge over Middle Harbour at The Spit, a long concrete bridge over the Wallamba River connecting Forster and Tuncurry, and a concrete bridge over the Richmond River at Casino, the two latter being opened just after the end of the financial year.

The principal country works undertaken by the Department by day labour and involving heavy earthworks were on the new route of the Gwydir Highway being established between Grafton and Glen Innes, on the Pacific Highway north of Karuah, on the Prince's Highway, and on the Clyde Mountain section of Trunk Road No. 51 (Canberra to Bateman's Bay).

## Revenue Changes

Two revenue matters of special significance occurred during the year, namely—(1) the re-enactment, for a further five years and in somewhat changed form, of the Commonwealth Aid Roads Act by the Federal Parliament, and (2) a complete year's revenue was received for the first time under the Road Maintenance (Contribution) Act passed by the State Parliament in 1957-58.

So far as Main Roads in New South Wales are concerned, little financial benefit will result from the new Commonwealth Aid Roads Act in comparison with what would have occurred had the old Act been continued without change. The efforts which have been made during past years to secure greater interest by the Commonwealth Government in road needs do not appear to have been effective.

The Road Maintenance (Contribution) Act imposes a charge of one-third of a penny per ton mile on commercial vehicles with a load capacity of more than four tons. The Act produced in the first complete year of operation about £2,400,000 which, less cost of collection, was paid into the Main Roads Funds. The net effect was not only to make possible a higher standard of maintenance where this was needed, but other funds were released as a consequence to enable Councils and the Department to carry out larger programmes of road construction. As a result, grants to Councils for works on Trunk Roads and ordinary Main Roads were generally at a higher level than previously, and it was possible also for the Department to accelerate bridge construction and to undertake some additional improvement work on State Highways.

A later undertaking by the State Government to halve motor vehicle taxation in the case of those vehicles affected by the Road Maintenance (Contribution) Act, will result in a loss of annual revenue of some £800,000, and in future this will be an offset against the increase in revenue from this Act.

**Gladesville Bridge**

In June, 1959, a contract was let in an amount of £2,365,289 for the construction of a six-lane concrete arch bridge over the Parramatta River at Gladesville. The joint contractors are Reed and Mallik Ltd. of Salisbury, England and Stuart Bros. Pty. Ltd. of Sydney. The concrete arch scheme for the crossing was tendered as an alternative to the steel cantilever bridge designed by the Department of Main Roads. After the tenders were received, the preliminary design for the arch bridge was carefully reviewed both by the Department's technical staff and also by staff of the Civil Engineering Department of the University of Sydney. Protracted negotiations followed in relation to the contractor financing the construction of the bridge, as had been offered, but these finally proved abortive, and the Department is providing the finance required, with some Treasury assistance. A dispute between two British firms who had joined with the Australian firm in submitting the original tender caused further delay. Finally, the contract was signed with one British firm and the Australian firm, as stated above. The contract time of completion is three years.

The bridge is required primarily to take the place of a two-lane opening span bridge now approaching the end of its useful life, and because greater traffic capacity is needed. The new bridge is planned both to serve local needs and also to form part of a future freeway to serve a large part of the northern area of the metropolis. It has been designed to cross the Parramatta River at a high level, in order to allow the passage of ocean going ships, as required by the Maritime Services Board of New South Wales.

**New George's River Bridge Proposal**

The existing three-lane bridge over George's River between Tom Ugly's Point and Sylvania on the Prince's Highway is now inadequate to provide for free flow of traffic at all times. The Department has therefore initiated action to construct another bridge across George's River. This will be downstream from the existing bridge, between Rocky Point and Taren Point in the Municipality of Kogarah and the Shire of Sutherland, respectively, where there is at present a vehicular ferry service. The length of the bridge will be about 1,900 feet, and its width will be sufficient to provide for at least four traffic lanes. Ultimately it will form part of a planned freeway (Sydney to Wollongong) but, in the first place, traffic to and from the bridge will use the existing Main Roads.

It is anticipated that it will be possible to invite tenders for the proposed bridge between Rocky Point and Taren Point in approximately two years.

**Sydney Harbour Bridge Traffic.**

In peak periods six of the eight lanes now available are used for traffic in one direction. The two easternmost lanes recently built over the abandoned tramway area are always used for Sydney-bound traffic.

The average daily flow across the Sydney Harbour Bridge immediately prior to the addition of the extra two lanes was 70,000, of which 7,000 travelled in the morning peak periods—5,600 towards the city and 1,400 away from the city. In one of the 24-hour traffic counts taken since the extra lanes were available, a total flow of 80,000 vehicles was recorded. On present indications it would appear that the average daily flow is now of the order of 75,000. This concentration of traffic, varying in amount from hour to hour, which passes through the approaching street system and then crosses the bridge, including passage through a toll barrier, gives rise to many traffic problems. Traffic control is primarily the function of the Police, and there is close co-operation between the Police and the Department of Main Roads in relation to the Sydney Harbour Bridge, on which traffic aids are supplied by the Department of Main Roads, including a tow truck service at certain periods to remove broken-down vehicles. Traffic guiding devices have to be changed during each day to meet changing lane use.

In order to secure better co-ordination, the Department of Main Roads is arranging to provide a bridge traffic facilities supervisor, and to equip Police motor cycle patrols and the tow truck service with radio for communication with the supervisor. By this means it is hoped that the congesting effect of traffic mishaps will be reduced.

**Extension of Cahill Expressway.**

During the year, the Government authorised the construction of an extension of the Cahill Expressway (the overhead Roadway at Circular Quay) from the Conservatorium of Music to Sir John Young Crescent, Woolloomooloo, to be undertaken by the Sydney City Council under the general supervision of the Department of Main Roads. Work commenced in January, 1959.

This portion of the Cahill Expressway was planned by the Department of Main Roads as an "Eastern Distributor", to serve the eastern side of the central

business area, and it is intended that it should continue eastward, as a Freeway, to beyond Bondi Junction, thereby providing an unobstructed route to the eastern suburbs as an alternative to the existing congested routes passing through King's Cross and Taylor Square.

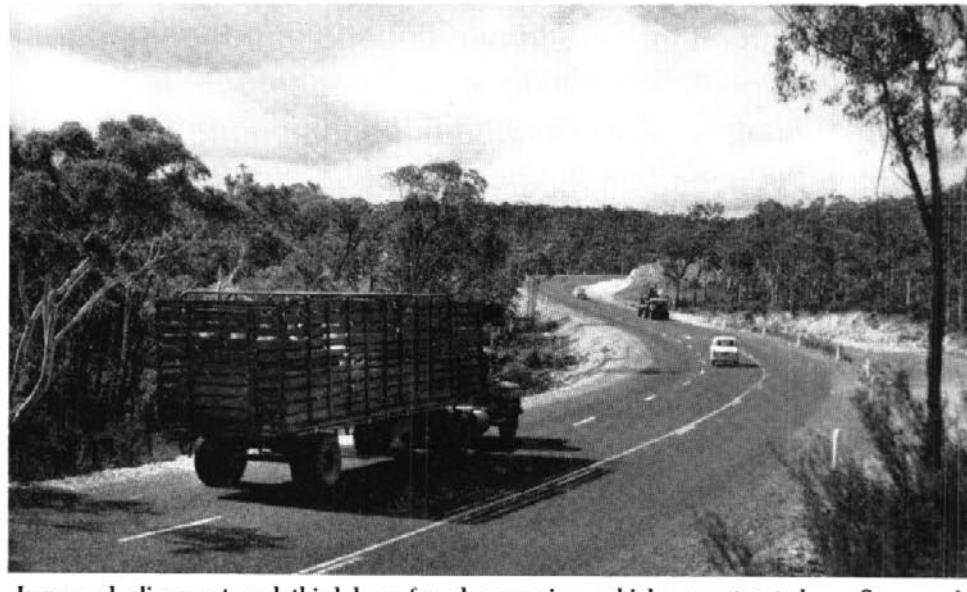
The cost of the extension of the Cahill Expressway now under construction will be met to the extent of 50 per cent. by Sydney Harbour Bridge funds, because to a large degree this part of the Expressway serves as an improved approach to the bridge. The Sydney City Council will provide 25 per cent. of the cost and the remainder will come from State Government sources.

**The Problem of Timber Bridge Replacement.**

On the 22,423 miles of Main Roads in New South Wales there are over 4,000 bridges having spans of 20 feet or more. There are many thousands of smaller waterway structures, concerning which statistics are not kept and which are regarded as being culverts rather than bridges.*

Of the bridges, over 2,500 are of timber. Experience shows that the older constructed timber bridges have a practical life of about sixty years. (Newly constructed timber bridges may have a lesser life because of depletion of supplies of superior quality round timber in the required large sizes.) If an average life of sixty years is adopted, and assuming that the building of the existing timber bridges was carried out at a more or less uniform rate, it is apparent that about 100 old timber bridges require to be replaced each year in order to keep up with deterioration and so save uneconomic maintenance.

Included among the timber bridges there are approximately 150 consisting of one or more timber truss spans. The majority of these were built prior to the coming into effect of the Main Roads Act in 1925, and many are sixty or more years old. In order to keep up with deterioration, not less than six of these should, on the average, be replaced each year. Many of the timber truss spans are narrow and some of the bridges have badly aligned approaches. Such conditions are sometimes intolerable on the more heavily trafficked long-distance highways, when replacement may become necessary solely on account of obsolescence in respect of traffic requirements.



**Improved alignment and third lane for slow-moving vehicles constructed on Governor's Hill on the Hume Highway north of Goulburn.**

In addition to timber bridges, there are a large number of old wrought iron and steel bridges, and some old concrete bridges which also require to be replaced, over a period, either for structural or traffic reasons.

Finally, new bridges are required at many stream crossings at present unbridged, including a number of larger crossings where ferries are in use. There were still, at 30th June, 1959, 28 ferries either on Main Roads or financed from Main Roads funds. The progressive provision of bridges at sites not previously bridged requires about ten new bridges each year.

The conclusion then is that 100 or more new bridges are required each year, of which at least six should be replacements of old timber truss bridges. This conclusion is supported by the fact that normally the Department has before it a standing list of about 400 to 500 bridges each of which has individually come under special notice as requiring early replacement.

* A Main Road bridge in this State is defined as any structure, or proposed structure (excluding a box culvert), where the width of waterway between the inside faces of abutments at the underside of the superstructure is 20 feet or over, or, where the abutments consist of driven piles, the centre to centre distance between the abutments is 20 feet or over. In the case of box culverts, those which will have a total length of at least 20 feet measured along the road are counted as bridges for the purpose of determining the Department's contribution to construction.

As the most urgent are dealt with and removed from the top of the list, others requiring early replacement come under notice and are added to the bottom of the list.

The actual rate of building bridges and large box culverts attained during the last three years, the best since before the last war, is about 85 per annum on Main Roads. Thus, although the Department is expending on bridge maintenance and construction about a quarter of the total revenue available for all works, it is apparent that the degree of progress which is needed to keep abreast of bridge deterioration is not yet being achieved, and that it cannot be achieved at the current revenue level without delaying other needed road works.

### Works by Councils on Country State Highways

In the last Annual Report, reference was made to the large mileage of Country State Highways on which the Department has arranged for Councils to carry out works, about half the total mileage of State Highways being controlled by Councils acting on behalf of the Department of Main Roads. The Department is appreciative of the assistance which it has received in this way from Councils, often at some inconvenience to works for which the Councils are themselves directly responsible. During recent years the Department has, more than in past years, asked a number of Councils, especially in inland areas, to undertake long lengths of road reconstruction and bitumen surfacing. The results obtained have been variable, some Councils being reasonably successful in accomplishing the task set within the required time, and others progressing only at a lesser rate. Where there has been success, it has usually meant that the Council's engineer has spent a large part of his time organising and supervising the work, or to special aid having been extended to the Council by the Department.

It has become apparent that the Department cannot reasonably expect Councils to be able to undertake extensive construction works and to carry them through to completion within a relatively short period while at the same time carrying out their normal activities, which often include other reconstruction and bitumen surfacing on Trunk Roads or ordinary Main Roads, or on local side roads.

### Widening of Rural Road Reserves

During recent years the Department has undertaken the widening of road reserves of country State Highways, and of some other important country Main Roads, and of rural Main Roads in the County of Cumberland.

The general objective is to secure for the future a width of not less than two chains, but where a long section of road is one and a half chains wide usually no further widening is being undertaken. This latter width is also adopted where land has high agricultural value. Where however there appear to be good grounds for expecting that a divided carriageway will be necessary in the future, a width of three chains is aimed at. In undeveloped country, as through natural forest, a width of three chains is usually sought, in order that an adequate roadside belt of native vegetation may be preserved. In the western two-thirds of the State, road widths are normally already in excess of the widths referred to, and widening will seldom be required.

**Reconstructed section of the Pacific Highway south of Brunswick Heads.**

In arranging for road widening the Department has been influenced by the inadequacy of the usual one chain width to meet needs as they develop. In the first place, a two-lane pavement for heavy traffic requires a formation width of about 40 feet. To this must be added space for side slopes and drainage, depending on local conditions. There must also be space for some roadside trees, and for utility services, the interests of which are often in conflict. It is very desirable, also, that a road reserve be of sufficient width to minimise the effect of

ribbon development, which is constantly extending on some of the State's principal rural roads. Other users of roadsides are travelling stock, and last, but perhaps not least, the traveller who needs space to move off the roadway.

The widening of rural Main Roads is generally effected by the re-alignment process, which has the effect of preventing further building on the land to be later incorporated in the road reserve, but leaves it meanwhile in rural usage.

### Selection of Gravel for Bitumen Surfacing

In post-war years rapid deterioration of road surfaces occurred on many Main Roads on which a bitumen surface had been placed over a gravel surface before the war. Investigations into the causes showed that deterioration resulted either from insufficient thickness of pavement, or from lack of stability, under repeated heavy loads, of the gravel of which the pavements were composed. As a result special research was undertaken into methods of design of pavements, and into properties required for stability in gravels.

The qualities which should be sought for materials to be used under a bitumen surface were determined, and various types of tests applied to secure material of appropriate quality. Similar investigations were undertaken in other States and overseas, and the practice now adopted in New South Wales from the local investigations is consistent with the results of studies elsewhere.

When the Department commenced to apply the new test requirements some ten years ago, it established laboratories at Divisional Offices, and appointed additional testing staff, including geologists, who could not only supervise the testing work but also carry out exploration for supplies of natural materials in the field.

With the growth in the volume of bitumen surfacing being undertaken by Councils on Main Roads, Councils have been increasingly drawing on the Department's gravel testing facilities, with the result in some areas that the volume of work has been greater than the Department's staff has been able to accomplish. The Department has been encouraging Councils to undertake at least the simpler types of testing, as by this means many samples of gravel may be rejected without being forwarded to the Department's Divisional laboratory. It is most desirable also that Councils should have sufficient testing equipment to enable them to check-test gravel destined to support a bitumen surface at the time the gravel is being placed on the road.

### Trial Use of Electronic Computer

The Department has had under investigation the use of electronic computers, particularly in respect of road and bridge design, and in survey computations. In the first place, officers of the Department co-operated with representatives of a company manufacturing electronic digital computers in preparing a computing "programme" for rural road design.

Some nine miles of grade line have been computed as a trial, and investigations are proceeding to determine the relative costs between using a computer and proceeding by conventional methods.

**New length of Epping Road constructed between Centennial Avenue and Longueville Road, Lane Cove.**

### Developmental Roads

A steady demand continues from Councils for the provisions of funds for Developmental Roads and also for Developmental Works, i.e., an isolated bridge or short length of road.

Roads or Works are recommended for proclamation as "Developmental" only if their construction is considered, by the Department of Main Roads, as being likely to lead to increased rural production at least

proportionate to the expenditure involved. It is also a general requirement that the road or crossing should not have been "constructed" at some previous time. Generally, the Department meets the full cost of the construction of Developmental Roads and Works and Councils enter into an undertaking to maintain subsequently. In some instances, where the expenditure involved in construction may not appear to the Department of Main Roads to be fully justified on developmental grounds, the Department may contribute something less than the full cost of construction.

The total road mileage which had been proclaimed up to 30th June, 1959, was 4,213. Of this, some had been reclassified as Main Roads and some deproclaimed, leaving a mileage of 2,786 at present proclaimed as Developmental as at 30th June, 1959. In addition, there were 142 proclaimed Developmental Works as at 30th June, 1959

Since the Main Roads Act was passed, Developmental Road construction has averaged over 120 miles per annum.

The cost of completing the construction of Developmental Roads and Developmental Works as at present proclaimed is estimated at approximately £3,000,000.

Developmental Roads constructed in past years have proved their value many times over in stimulating rural development and in serving settlers who would otherwise be isolated at times for lengthy periods. They have been built in the dairying districts of the coast, in the inland wheat-growing areas, and latterly to an increasing extent in mixed farming areas. Some have been built to aid closer pastoral settlement in inland areas. Special consideration has always been given to soldier settlements and other closer settlement areas.

The growth of settlement and traffic, and the improved financial position of Councils as a result of the distribution (through the Minister for Public Works) of Commonwealth Aid funds for expenditure on roads other than Main Roads, have resulted in many Councils desiring further to improve constructed Developmental Roads and Developmental Works, for example, by widening pavements, or providing a bitumen surface. As it is apparent that under such conditions future maintenance attention is assured, it is the practice of the Department of Main Roads to recommend deproclamation, if so desired by a Council, to enable the Council to receive Commonwealth Aid Road grants.

### Traffic Aids

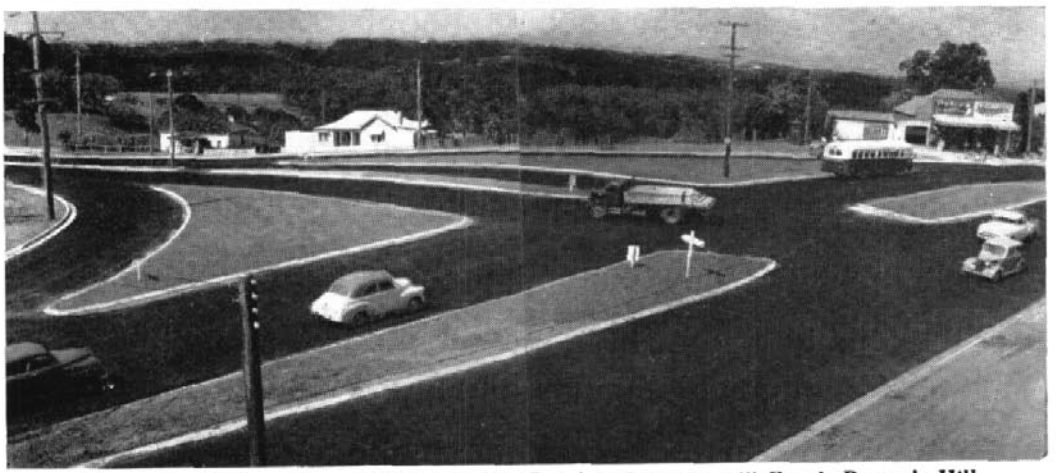
During the year a number of innovations in the nature of improved signs and markings were made on Main Roads to improve traffic safety.

The older types of painted warning signs are being steadily replaced by signs with reflecting surfaces, and a considerable number are now in place on the more important State Highways.

A new type of sign showing the safe speed on curves was introduced, on trial, on a length of the Hume Highway between Camden and Mittagong.

Traffic centre-lines have been changed from yellow to white, but yellow has been retained for the "no crossing" line at point of low visibility. This practice follows that now generally favoured in the United States of America. The adoption of a white centre line brings New South Wales more into line in this respect with most other Australian States.

Tests with glass beaded centre-lines having proved successful, some hundreds of miles of this type of line, giving superior night visibility, were marked during the year.



**Channelised intersection of Old Northern Road and Castle Hill Road, Rogan's Hill.**

### Enquiries Regarding Future Road Boundaries

The Department has responsibility for the preparation of outline designs of planned future metropolitan arterial roads, some of which are to be expressways, and of existing roads to be widened, so that the boundaries of land ultimately required may be determined now. Many property owners or their solicitors enquire of the Department or of the Cumberland County Council as to the effect, if any, of Main Road proposals on their properties. Such enquiries are being currently received by the Department at the rate of 50,000 per annum and the answering of these has become a large operation. A number of enquiries of

the same type are received also at the Department's Newcastle office in relation to Newcastle Main Road proposals.

### Advertising on Main Roads in Towns

From its inception, the Department has followed the practice of not agreeing to the erection of advertising matter on Main Roads, except on business premises and associated with the business therein. This policy appears always to have widespread public support.

From time to time offers are made to Councils by private interests to provide some form of public facility, without cost to the Council, for installation on a Main Road, usually in or near a town, subject to the Council agreeing to the display of advertising matter on the facility. Street nameboards, illuminated street nameboards, mile posts, rubbish containers, seats, clocks, and signs drawing attention to the beauty spots or historic features of the district, are some of the facilities to which such offers have related.

The Department of Main Roads takes the view that such advertising on Main Roads should not be allowed on the grounds of amenity. Further, the roads are public property over which all are free to come and go, and it seems unreasonable that this public property should be used for a purpose which, in effect, is to raise revenue for local purposes. All applications by Councils to the Department for approval to erect advertising matter on Main Roads are uniformly rejected.

### Chair of Highway Engineering—University of New South Wales

Main Roads funds are being used to support the Chair of Highway Engineering at the University of New South Wales. The Chair, which was established as a result of action by the Department of Main Roads, has been most successful, and should further prove its worth in raising the standard of Highway Engineering in New South Wales and in Australia generally, and in attracting more young engineers to highway work. The number of students in 1959 comprised 14 in the post-graduate Degree course, and 12 in the Degree and Diploma courses. The students are drawn both from within and from outside of Australia.

The Professor of Highway Engineering is Professor D. F. Orchard.

### Australian Road Research Board

During the past year, the Conference of Australian State Road Authorities, after much consideration, decided to establish an Australian Road Research Board. The objects of the Board will be essentially to determine the road research needed in Australia, to arrange for it to be carried out using, in the main, existing institutions and to arrange for the presentation, discussion and publication of the results of road research. The field of research will cover not only materials, methods and design, but also the traffic and safety aspects.

The establishment of this central road research agency is likely to prove to be an historic and decisive step in the field of highway engineering in Australia.

The work of the Australian Road Research Board will not greatly affect the amount of day to day research needed to be carried out by the State Road Authorities themselves. It will ensure, rather, that all road research in Australia is co-ordinated, and that more basic research which needs doing is actually carried out.

### Advance Planning

Expenditure of resources on improvement of roads should be related to needs—to do less is wasteful, and to do more is extravagant. For this reason, the Department has established a special "Advance Planning" section at its Head Office whose prime function will be the determination of road needs.

Mainly, needs are of three kinds—pavement of sufficient strength to carry traffic of the required weight; capacity sufficient to pass the volume or expected volume of traffic; and design that will give maximum safety to traffic. Each of these aspects must be examined in needs surveys.

One of the first activities undertaken by the Advance Planning section is organising a State-wide needs survey, which is being done in conjunction with other Australian State Road Authorities in order to present a picture of Australian road needs. Apart from this interstate aspect, however, it is increasingly necessary for the Department to have a logical procedure for the selection of works to be undertaken, so that proper priorities will be allotted. In earlier years little difficulty occurred for experienced officers in making a choice because the lengths of greatest need were easily recognised. In more recent years, however, a factual approach has become necessary, because as road improvement has advanced, a greater number of aspects need to be assessed. A number of Councils whose areas are regarded as typical are co-operating with the Department in the needs survey.

In carrying out needs surveys, special care has to be taken to ensure that all desires are not interpreted as needs, and that targets set are realistic. For this reason it is essential to know among other things the volume and nature of traffic now using the roads, and this information is coming to hand as a result of the traffic surveys which the Department has been carrying out during recent years.

Two other important factors which influence the determination of needs are assessment of economic benefits, and causes of traffic accidents in so far as they are due or partly due to road conditions. The Department has set aside an officer to work under the Professor of Traffic Engineering in the University of New South Wales to undertake research into economics of road conditions and their improvement. Special studies are also being made of recorded accidents where road conditions may be a contributing factor.

The field to be covered by the Advance Planning section will broadly cover the following:—

(i) Road statistics.
(ii) Road inventory, including road condition studies.
(iii) Long range estimates of traffic.
(iv) Needs studies.
(v) Road life studies.
(vi) Long range studies for system expansion and reclassification.
(vii) Long range estimates of income.
(viii) Taxation studies.
(ix) Long range programmes.
(x) Road transport research, including—
  (*a*) cost-benefit analysis;
  (*b*) economic studies of roads and road transport; including relation to transport generally.

**Roads and the Standard of Living**

The standard of living of a people depends mainly on the extent of its natural resources and on the skill of the people in putting the resources to use. Resources cannot be put to use unless they are accessible. This means that good roads or other means of transport must be provided to give access. The United States is an outstanding example of the construction of good roads being followed by rapid development of natural resources, and by a corresponding increase in the standard of living of the people. Thos. H. MacDonald, late Chief of the U.S. Bureau of Public Roads, expressed this as follows:—

> "We were not a wealthy nation when we began improving our highways . . . But the roads themselves helped us create a new wealth, in business and industry and land values . . . So it was not our wealth that made our highways possible. Rather, it was our highways that made our wealth possible."

# Expenditure on Roads in New South Wales

## SOME BRIEF FACTS AND FIGURES

IN New South Wales expenditure on roads is now approaching a figure of £40,000,000 per annum and it is of interest to see from whence this money comes, the authorities which spend the money and how and where it is expended. This information is shown in the tables hereunder for the three years ending 30th June, 1958. It is possible to present the information only up to the financial year 1957-58, data for a later period not yet being available from several sources. It should be noted also that some information included in the tables is not final, but nevertheless the general position is sufficiently complete to provide a fair view of the State's road expenditure.

**(A) Total roads expenditure in recent years distributed between various classes of roads.**

| Classes of road | From *Government* Funds drawn from road users (including fuel tax receipts) together with some special funds provided by *Government* (e.g., Council endowment, repair of flood damage, unemployed relief works). Also includes money borrowed by *Department of Main Roads* | From *Local Government* funds drawn from land rating and loan money borrowed by Councils | Total |
|---|---|---|---|
| | £'000's | £'000's | £'000's |
| 1955–56— | | | |
| Main Roads including State Highways ... ... ... | 12,618 | 2,118 | 14,736 |
| All other Roads ... ... ... ... ... ... | 5,118 | 10,919 | 16,037 |
| Total 1955–56 ... ... ... ... | 17,736 | 13,037 | 30,773 |
| 1956–57— | | | |
| Main Roads including State Highways ... ... ... | 13,179 | 2,108 | 15,287 |
| All other Roads ... ... ... ... ... ... | 6,138 | 12,729 | 18,867 |
| Total 1956–57 ... ... ... ... | 19,317 | 14,837 | 34,154 |
| 1957–58— | | | |
| Main Roads including State Highways ... ... ... | 14,832 | 3,083 | 17,915 |
| All other roads ... ... ... ... ... ... | 6,559 | 12,312 | 18,871 |
| Total 1957–58 ... ... ... ... | 21,391 | 15,395 | 36,786 |

*81636—2

**(B) Total roads expenditure in recent years on all classes of roads distributed between construction (including reconstruction) and maintenance.**

| Heading | From *Government* Funds drawn from road users (including fuel tax receipts) together with some special funds provided by Government (e.g., Council endowment, repair of flood damage, unemployed relief works). Also includes money borrowed by Department of Main Roads | From *Local Government* funds drawn from land rating and loan money borrowed by Councils | Total |
|---|---|---|---|
| | £'000's | £'000's | £'000's |
| 1955–56— | | | |
| Construction and Reconstruction ... ... ... | 10,573 | 5,789 | 16,362 |
| Maintenance and Minor Improvement ... ... ... | 7,163 | 7,248 | 14,411 |
| Total 1955–56 ... ... ... ... | 17,736 | 13,037 | 30,773 |
| 1956–57— | | | |
| Construction and Reconstruction ... ... ... | 11,781 | 6,577 | 18,358 |
| Maintenance and Minor Improvement ... ... ... | 7,536 | 8,260 | 15,796 |
| Total 1956–57 ... ... ... ... | 19,317 | 14,837 | 34,154 |
| 1957–58— | | | |
| Construction and Reconstruction ... ... ... | 14,118 | 6,902 | 21,020 |
| Maintenance and Minor Improvement ... ... ... | 7,273 | 8,493 | 15,766 |
| Total 1957—58 ... ... ... ... | 21,391 | 15,395 | 36,786 |

**(C) Total roads expenditure in recent years on all classes of roads distributed between metropolitan and rural areas.**

| Area | From *Government* Funds drawn from road users (including fuel tax receipts) together with some special funds provided by Government (e.g., Council endowment, repair of flood damage, unemployed relief works). Also includes money borrowed by Department of Main Roads | From *Local Government* funds drawn from land rating and loan money borrowed by Councils | Total |
|---|---|---|---|
| | £'000's | £'000's | £'000's |
| 1955–56— | | | |
| County of Cumberland (Metropolitan) ... ... ... | 3,009 | 4,554 | 7,563 |
| Country (Rural) ... ... ... ... ... ... | 14,727 | 8,483 | 23,210 |
| Total 1955–56 ... ... ... ... | 17,736 | *13,037 | 30,773 |
| 1956–57— | | | |
| County of Cumberland (Metropolitan) ... ... ... | 3,444 | 4,980 | 8,424 |
| Country (Rural) ... ... ... ... ... ... | 15,873 | 9,857 | 25,730 |
| Total 1956–57 ... ... ... ... | 19,317 | *14,837 | 34,154 |
| 1957–58— | | | |
| County of Cumberland (Metropolitan) ... ... ... | 3,691 | 5,245 | 8,936 |
| Country (Rural) ... ... ... ... ... ... | 17,700 | 10,150 | 27,850 |
| Total 1957–58 ... ... ... ... | 21,391 | *15,395 | 36,786 |

* Includes expenditure from rates levied on land and incurred on Main Roads including State Highways in County of Cumberland.

**(D) The percentage of total funds provided by the principal contributors, namely, road users and landowners.**

| Year | *Government funds* drawn principally from road users | *Local Government funds* drawn from landowners |
|---|---|---|
| | % | % |
| 1955–56 ... ... ... | 58 | 42 |
| 1956–57 ... ... ... | 57 | 43 |
| 1957–58 ... ... ... | 58 | 42 |

The information shown in these tables may be summarised as follows, taking 1957-58 as a typical year:—

(1) The total annual road expenditure of the State was about £37,000,000 and it was provided principally by road users £21,500,000 (58 per cent) and land owners £15,500,000 (42 per cent).

(2) The sum of £21,500,000 provided principally by road users was derived from Commonwealth sources (fuel taxation) £10,000,000, from State sources (motor vehicle taxation) £9,000,000, and from Commonwealth and State Government Departments (revenue and loan money) £2,500,000.

(3) The sum of £15,500,000 provided by Local Government came from land rating £13,000,000 and from loan money £2,500,000.

(4) The sum of £37,000,000 was expended as to £18,000,000 on Main Roads (including Highways) and as to £19,000,000 on all other roads.

(5) The sum of £37,000,000 was expended £21,000,000 on the construction and reconstruction of roads and £16,000,000 on the maintenance of roads.

(6) The sum of £37,000,000 was expended as to £9,000,000 in the County of Cumberland (Metropolitan) area and as to £28,000,000 in the Country (rural) area.

(7) The authorities which expended the total sum of £37,00,000 in 1957-58 were:

| Authority | Amount | Remarks |
|---|---|---|
| | £ | |
| Department of Main Roads... ... ... ... | 9,000,000 | On Main Roads. |
| Local Government ... ... ... ... ... | 9,000,000 | On Main Roads. |
| Local Government ... ... ... ... ... | 16,500,000 | On Side Roads. |
| Other Government Departments ... ... ... | 2,500,000 | On Side Roads. |
| Total ... ... ... ... ... | 37,000,000 | |

# SYDNEY HARBOUR BRIDGE ACCOUNT

**Receipts and Payments for the period from 1st July, 1959 to 30th September, 1959.**

| *Receipts* | £ | *Payments* | £ |
|---|---|---|---|
| Road tolls ..... | 234,364 | Cost of collecting road tolls ..... | 24,969 |
| Contributions— | | | |
| Railway passengers ..... | 37,439 | Maintenance and minor improvement ..... | 45,498 |
| Omnibus passengers ..... | 6,288 | Payment of loan charges ..... | 107,465 |
| Rents from properties..... | 6,218 | Installation of new toll office and toll-gates and alterations to existing structures ..... | 25,288 |
| Other ..... | 57 | Provision for traffic facilities ..... | 2,818 |
| | | Administrative expenses and miscellaneous charges ... | 1,727 |
| | | *Conversion of tramway area to roadway ..... | 41,547 |
| | £284,366 | | £249,312 |

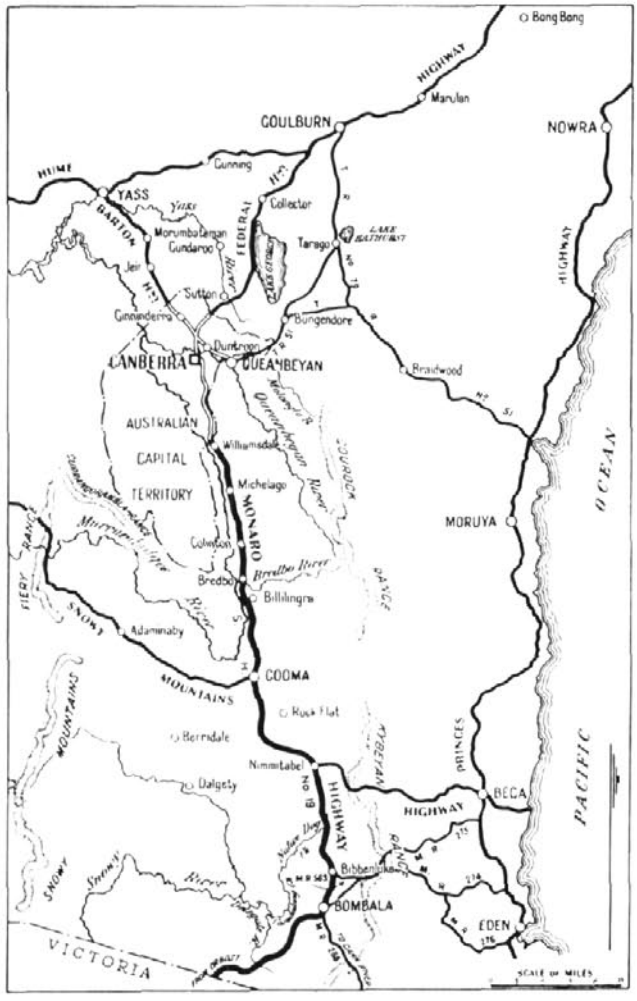
• Capital expenditure financed principally from revenue available; the remainder from accumulated surplus revenue.

# Historical Roads of New South Wales

## THE MONARO HIGHWAY

THE name "Monaro" is used to describe the plateau country of south-eastern New South Wales, extending from south of Canberra to the Victorian border, and bounded on the east by the coastal ranges, and on the west by the Snowy Mountains.

The name "Monaro" is recorded first in the "Journal of An Excursion to The Southward of Lake George in New South Wales" by Captain Mark John Currie, R.N. The journal entry for 4th June, 1823, reads, ". . . From these Natives we learned that the clear country before us was called 'Maneroo', which they described as very extensive; this country we called Brisbane Downs after (and subsequently by permission of) His Excellency the Governor". Captain Currie wrote these words from the most southerly point of land exploration reached on land from Sydney to that date; the party had penetrated to within about 14 miles of the site of the present town of Cooma.




**Route of the Monaro Highway.**

Over the years the boundaries of the area known as Monaro have been subject to fluctuations. Following settlement in the area, Monaro was understood to include the whole of the southern tableland from Michelago to Gippsland and across to Kiandra.

As described by the Rev. Backhouse in 1836, the Monaro Plains from beyond Mount Limestone, (near Canberra), "succeed each other for upwards of 200 miles".

Judge A. McFarland of the Southern District Courts described the district of Monaro in 1872 as being bounded on the east by the coastal range, on the south by the New South Wales-Victorian border, on the west by the Snowy Mountains and on the north by a line extending from the vicinity of Kiandra to the coastal range.

The Monaro plateau is drained in the south by tributaries of the Snowy River, and in the north by the Upper Murrumbidgee. Short coastal streams drain it to the east.

The larger part of the Monaro plateau is undulating to hilly, with a complex system of ridges standing out from the plateau surface between the rivers. Grazing, both of sheep and cattle, is the predominant industry, but in the early days of settlement, mining activity was fairly widespread. The production of silica and limestone is still carried on in parts of the area.

The Monaro Highway commences at Canberra and extends to the Victorian border, serving as the north-south backbone to the road system of the region. After passing through the Australian Capital Territory south from Canberra, the Monaro Highway continues through Michelago, Bredbo, Cooma, Nimmitabel, Bombala and Delegate. Including the length of the Highway which lies within the Australian Capital Territory (22 miles), the total length of the Monaro Highway, from its commencement at Canberra to the Victorian border, is 156 miles.

### Exploration and Discovery

One of the earliest explorers of the southern districts of New South Wales was Hamilton Hume who, in 1841, discovered a tract of country situated a little north of the site of Goulburn, which he named Argyle.

With the object of extending Hume's explorations, an expedition led by the Deputy Surveyor-General, James Meehan, and Dr. Charles Throsby, and including Hume, set out from Liverpool in March, 1818, in

an attempt to find an overland route to Jervis Bay. When near Marulan the expedition divided, one party led by Throsby attempting to effect a passage by a predetermined route and the other under Meehan, accompanied by Hume, endeavouring to head the Shoalhaven River and to reach the coast from the south-west. Throsby succeeded in reaching Jervis Bay but Meehan failed in his objective owing to the impenetrable character of the gorges of the Shoalhaven. In the course of his journey, however, he discovered Lake Bathurst and the Goulburn Plains a little to the south-west.

To encourage settlement in the lands opened up by these discoveries, Throsby in 1820 was commissioned by Governor Macquarie to construct a road to the settlement about to be established at the Goulburn Plains. The road commenced at about where Mittagong now is, passed through Bong Bong and crossed the Wollondilly River which it again reached near the present site of Marulan, from whence it continued in a southerly direction.

While engaged in this work Throsby was told by some aborigines of the existence of a large lake near Lake Bathurst which they called Weereewaa. They also told him of a large river called Murrumbidgee which they said connected with the sea.

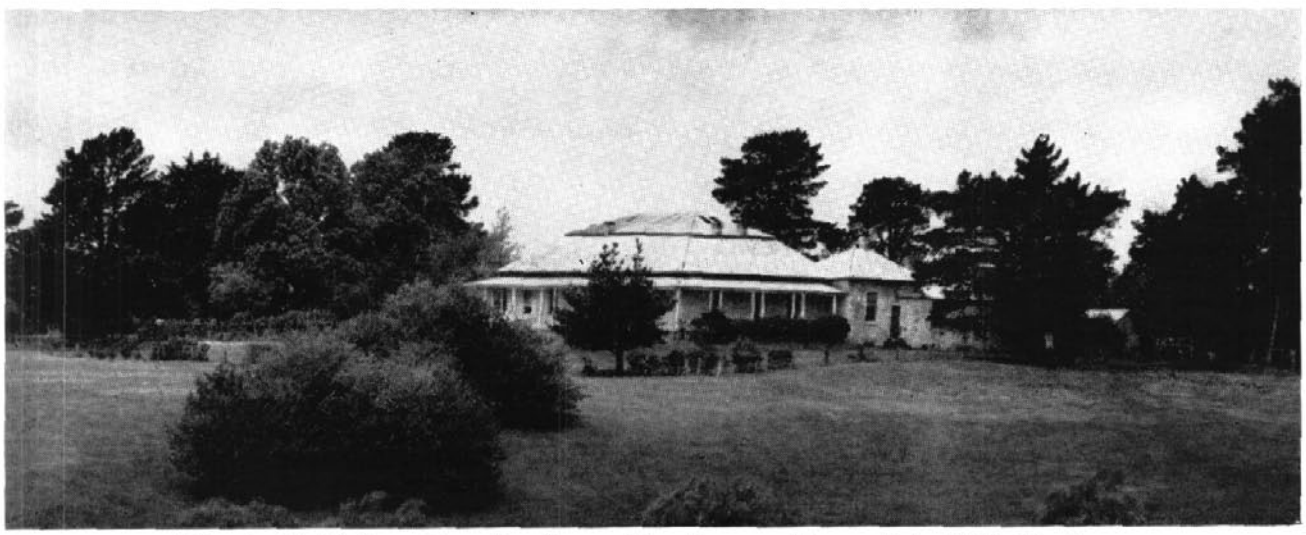
To investigate the story, Throsby despatched Joseph Wild, a constable attached to the road-making party, with two men and on 19th August, 1820, Wild found the lake of which the natives had spoken. In October of that year the Governor, Lachlan Macquarie, visited the lake which he named Lake George.

So impressed was the Governor by the lake, which in his journal he described as "this grand and magnificent sheet of water", and by the surrounding country, that he ordered Wild to endeavour to locate the river of which the natives had spoken. Starting from Lake George Wild, with a constable named James Vaughan and Throsby's nephew, Charles T. Smith, passed through Geary's Gap on the western side of the lake and on 5th December, 1820, reached a river called by the natives "Boongaroon" but which is now known as the Yass River. A day or so later they crossed the watersheds of the Yass and Molonglo Rivers and "came to a very extensive plain, fine rich soil and plenty of grass". This area later became known as the "Limestone Plains". Pressing on, Wild and his companions came to a "beautiful river that was running through the plains in a south-westerly direction" and by the side of which they made camp. The river was that now named the Queanbeyan and the site of the camp was near to Mount Pleasant near Canberra.

Wild did not succeed in finding the Murrumbidgee, but in March, 1821, Throsby with two companions journeyed south from Lake George to the Molonglo watershed and after passing the sites on which Queanbeyan and Canberra were later established, discovered the Murrumbidgee near to its junction with the Molonglo River.

Throsby's explorations were carried a stage further when on 22nd May, 1823, Captain M. J. Currie, R.N., and Brigade Major John Ovens, set out from Throsby's farm at Bong Bong near Bowral for the purpose of exploring the unknown country to the south of Lake George. They were accompanied by Joseph Wild and by the 26th May, the party had passed the limit of southerly settlement. On the 3rd June, they came to an extensive plain which proved to be the commencement of a long chain of downs. This they crossed and encamped on the bank of a gully near what is now Michelago.

On 6th June, 1823, the party crossed a river which they thought was the Murrumbidgee, but which was probably that now known as the Bredbo, and reached the neighbourhood of Billilingra Hill. Owing to a shortage of supplies they were obliged to halt and to return over practically the same route they had followed on their outward travels.



**"Throsby Park" (near Bong Bong) named by Governor Macquarie in 1820. The house was built by Charles Throsby, nephew of Dr. Charles Throsby.**

**Lake Bathurst.**

The journey undertaken by Currie and Ovens was the last expedition of a solely exploratory character to penetrate the Monaro region. Their report attracted the attention of the sheep-men and by 1827 the area of occupied country had extended to Berridale. The further exploration of the Monaro resulted chiefly from the penetration of the unoccupied lands by the pastoralists of the period.

### Early Settlement

Settlement along what was to be the route of the Monaro Highway followed closely in the steps of the explorers. One of the first to occupy land in the area was Lieut. J. J. Moore who, after service in the Napoleonic wars and at the battle of Waterloo, arrived in Sydney in 1816. In 1823, he acquired a block of land in the Queanbeyan district to use as "a sort of cattle station" and he obtained permission to purchase from the Crown an area of 1,000 acres "anywhere in New South Wales". In 1826, Moore submitted a formal application for 1,000 acres in which he said "the land which I wish to purchase is situate at Canberry on the east bank of the river which waters Limestone Plains above its junction with the 'Murrumbeeja' adjoining the grant of Mr. Robert Campbell". Moore called his estate "Canberry" a name destined to be used to designate the Capital City of the Commonwealth of Australia. When, at a later date, the name was changed to Canberra, the estate became known as "Acton", now a part of the capital city area. Lieut. Moore's application for land is preserved in the Mitchell Library, Sydney.

The Robert Campbell to whom Moore referred in his application was a merchant who arrived in Sydney in 1798. In 1806 his ship "Sydney" was chartered by the Government to bring grain from India, in order

**Grave of Joseph Wild at Bong Bong. The tablet reads—In memory of Joseph Wild, Accredited Explorer, Discoverer of Lake George and First Finder of Wildes Meadow, who died 25/5/1847, aged 88 years. This tablet, confirming and supplementing inscription on tombstone, was erected by friends 25/5/1949.**

**Lake George and Federal Highway.**

to relieve a state of near starvation of the Colony, following a devastating flood in the Hawkesbury River. Whilst engaged in this service the ship was lost and in 1825 Campbell was granted £2,000 in cash, and land and sheep, each to the value of £1,000, as compensation for the loss of the vessel. Campbell sent one of his employees, James Ainslie, to obtain sheep from the Government flock at Bathurst and to select land. Ainslie purchased 700 sheep, overlanded them via the Yass Plains, and selected 1,000 acres about Mount Pleasant on which to pasture them. This selection formed the nucleus of the Duntroon estate on which the Royal Australian Military College was later established.

By 1833 considerable settlement had taken place in the country surrounding Canberra. On a map published in that year, thirty-six holdings are shown to have been taken up within an area extending from Lake George to the Molonglo River and there were, in addition, several located on the Murrumbidgee.

According to a "Statistical Return" published by John Lhotsky in his "Journey from Sydney to the Australian Alps" there were, at the beginning of the year 1834, eighteen stations having between them 18,000 cattle and 38,000 sheep, established "in Monaro".

The earliest survey of the Monaro region was undertaken in 1839 by Stewart Ryrie, a resident of the area who previously was Commissary General of the Colony. At the request of the Surveyor-General, Ryrie carried out a general survey of the country between Michelago and the eastern coast and of the area now known as Gippsland. He had no official status and carried out the work in a private capacity and at his own cost. From his notes and sketches the first map of the region was prepared and published in 1841.

Settlement progressed more rapidly than did survey of the areas opened up and by the end of 1843 the pastoral industry had become fairly well established as seems evident from an advertisement which appeared in the "Sydney Morning Herald" of 22nd December, 1843. In this the Boyd Town Store informed "The Settlers of Monaro" that they could "be supplied with stores of every description at Sydney prices; wool, sheepskins and hides taken in exchange".

The discovery of gold at the Snowy River in 1859 and the resultant rush to the Kiandra gold field, assisted in the establishment of the towns and villages now scattered throughout the Monaro but the actual development of the region came about through a process of expansion prompted by the need for pastures for the ever-increasing flocks and herds of the Colony.

### Road Communications

In 1834 a map of the nineteen counties within which legal settlement was permitted was published by the Surveyor-General Major T. L. (later Sir Thomas) Mitchell. On this map a road was shown to leave the main southern route near Mittagong, pass through Bong Bong and then rejoin the main road at the "Village of Marulan". (This was probably the road under

construction by Throsby when he was told by natives of the existence of Lake George and the Murrumbidgee River). At this point a road turned south to Inverary and the southernmost point of Lake Bathurst from where a track passed through "Bungandow" (Bungendore) and Queanbeyan and terminated at the "Miccaligo Plains", the then limit of southerly settlement. At this point the map was marked "from Monaro" which seems to indicate that the track continued to some point further south.

A post office was established at Queanbeyan in 1836 and arrangements were made for the distribution of mail over a wide area. All sorts of conveyances were used for the purpose but the mail carriers were limited to the one principal track shown on Mitchell's map except for those they themselves made to the outlying stations.

In that year, James Backhouse, who travelled extensively through the area, wrote in his "Narrative of a Visit to the Australian Alps" that "in the Colony generally, most of the acknowledged roads were merely cart tracks with the bad places cut through or filled up". Later, in 1839, the Rev. Edward Smith in a letter describing conditions in the Queanbeyan-Canberra district said—"the roads on which I travel in the performance of my duties, being for the most part over plains, are generally good. Some of those, however, which lead through the bush are rather rough".

On a "Map showing each Post Town, Village and Station in the Colony of New South Wales" published in 1844, a "post road" is shown extending from Sydney via Camden, Marulan, Bungonia, Bungendore, Queanbeyan, "Micaligo" and Cooma, to the coast of Victoria near Wilson's Promontory. The road followed the route of the track shown on Mitchell's map as far as "Micaligo" and went on to Cooma by almost the same route as that now taken by the Monaro Highway. On a later map "Prepared for the use of the Post Office Department" in 1852, this road is shown to have terminated at Bungonia but another road, running south from Goulburn, and passing to the west of Lake Bathurst, is shown to have reached a point, unnamed on the map but which can now be identified as Tarago, where it branched, one branch leading through Braidwood to the coast at Broulee and the other running in a south-westerly direction to Bungendore and Queanbeyan, where it joined the road running south to Cooma and Bombala. On this map also, a road is shown to leave the main southern road a few miles south of Goulburn, pass through Collector and Gunderoo to Bungendore where it also joined the road to Queanbeyan, Cooma and beyond. Thus, by 1852, can be traced the emergence of the road system which now serves the Monaro region.

Further information regarding road communications in the more southerly portion of the area was given in a report on the Monaro district by Judge A. McFarland of the Southern District Courts, in 1872. He wrote—"There is one road in general use from Michelago to Cooma—that is by Colinton, Billilingera and Cullen's Flat and that is for the most part a good bush road except in places where it is 'rather rutty'. Another, but less used road is by Colinton, Bredbo, and Brook and Rose Valley Stations. But from Cooma to Bombala there are two roads in general use—a direct one by the Rock Flat and Nimitabel, the 'Native Dog' (Native Dog Creek) and Bibbenluke, and an indirect one by Bobundra or Woolway, Duke's Springs and Bibbenluke or Gunningdrah. 'Tracks' can be made on each for many a mile and with a light buggy and a pair of good horses, nine or ten miles an hour can be readily accomplished in parts of either. The former is the shorter by about ten miles but is the rougher and could spare many of the loose stones that now lie upon it and might be deposited, with great advantage, in the beds of the boggy creeks which it passes . . ."

Although on the maps of the period "roads" are shown as such, it is probable that they were merely routes which had been defined but not formed. In the report above quoted, Judge McFarland says "There has been very little public money expended upon the roads of Monaro . . . and a few bridges . . . are greatly needed".

**The Monaro Highway and countryside near Billilingra Creek.**

**The town of Nimmitabel.**

The road communications of the area had changed considerably by 1882. In that year a map "Prepared for the use of the Post Office Department" was published which showed a net-work of mail lines serving the Monaro region. On this map the original route to Monaro via Bungonia was superseded by a line from Goulburn via Tarago, Bungendore and Queanbeyan. The route through Collector terminated at that point but another route starting from the main southern road at Gunning and passing through Gundaroo and Sutton, joined the original route at Queanbeyan. A net-work of mail lines radiating from Yass included a route through Murrumbateman, Jeir, Ginninderra and Canberra to Queanbeyan where it also joined the original route. On this map, the line extended from Cooma through "Nimitybelle" (Nimmitabel) and Bombala to the Victorian border which it crossed at a point near Delegate. By 1882, therefore, the route of the future Monaro Highway had been established.

In 1928 a re-classification of the Main Roads system was undertaken and the sections of road between Queanbeyan and Cooma and from Nimmitabel to the Victorian border were classified as Trunk Roads, Nos. 52 and 53. Trunk roads were defined as "The secondary avenues of road communication, forming with the State Highways, the framework of a general system of inter-communication through the State, especially where no railways exist".

Over the next few years it was found necessary to expand and intensify the main roads network and a general review of the main roads system was made. Arising out of this review it was decided to re-classify the road from the Australian Capital Territory border at Royalla as a State Highway and by proclamation in the Government Gazette of the 25th March, 1938, the road from Canberra to the Victorian border, excluding the portion within the Australian Capital Territory and excluding the length between Cooma and Nimmitabel, then a part of State Highway No. 4, was designated State Highway, No. 19.

The name "Monaro Highway" was originally applied to the road from the coast at Tathra to the Hume Highway at Tarcutta but in 1955 it was decided to rename this highway from Tathra to Nimmitabel and from Cooma to Tarcutta the "Snowy Mountains Highway" and to apply the name "Monaro Highway" to the highway south from Canberra to the Victorian border near Delegate.

This action was considered appropriate since the Canberra-Delegate road passes through the Monaro District for its full length and forms the backbone of the district's road system.

The Commonwealth Authorities also agreed to apply the name "Monaro" to the portion of the road (22 miles) which is within the Australian Capital Territory and as a result the name "Monaro Highway" now applies over the full length of 156 miles of the road from Canberra to the Victorian border.

## ACKNOWLEDGMENTS

Material used in the preparation of this article has been obtained from:—

The Mitchell Library, Sydney.

Journal and Proceedings of the Royal Australian *Historical Society*;

B.A.A.S. Handbook for New South Wales;

*Study of the Ecosystem of the Monaro Region* of New South Wales—A. B. Costin.

—S.G.P.

# Bitumen Surfacing Across Black Soil Plains

## CONSTRUCTION NEAR COONAMBLE

THE Castlereagh Highway in the Shire of Coonamble in north-western New South Wales is being reconstructed and bitumen surfaced by the Department of Main Roads. The town of Coonamble, which is situated on the Castlereagh Highway thirty-two miles from the southern boundary of the Shire, 361 miles by road from Sydney, is the centre of a high class pastoral area.

The Castlereagh Highway is generally parallel and close to the Castlereagh River. The old road comprised mainly an earth formation with a light surfacing of local sandy loam in parts, although some 4.6 miles on the southern approach to Coonamble had been bitumen surfaced by the Council in earlier years.

Road construction on the Castlereagh Highway in the Shire of Coonamble presents three somewhat unusual features as follows:—

(1) From time to time widespread flooding of the countryside occurs as a result of the Castlereagh River having a channel too small to carry flood flow. In recent years floods seriously interrupted traffic on the Highway in 1950, 1951, 1952, 1955 and 1956.

(2) The soil over most of the length is black clay, the only exception being a length of eight miles at the southern end where the soil is red or grey with some light loams.

(3) Ordinary road gravel is non-existent.

The flow of water which occurs across the Highway in time of flood is too widespread to be dealt with by bridging. Accordingly floodways up to 1,000 feet in length are being provided, graded level for their full length and without crossfall. They are designed to be submerged to a depth not exceeding twelve inches. By this means it is hoped that most vehicles will be able to use the road during flood periods. At the ends of floodways, culverts are being provided to take the run-off from local storms.

In the southern part of the Shire, sandy loam or sand-clay suitable to serve as a pavement is available in limited quantities; in addition sand is available from the bed of the Castlereagh River. Supplies of both reduce towards the north. The black soil subgrade in the southern part of the Shire was found to require an average pavement thickness of ten inches. It was found that if sand and black soil were intimately mixed to form a sub-base, the pavement thickness could, on the average, be reduced to six inches. This form of construction was adopted because it provides a more economical arrangement than using ten inches of sandy loam, the sandy loam deposits being scattered, and often at a distance.

The pavement being provided on floodways comprises a sandy loam base course, and a two inches thick penetration macadam surface course. Shoulders and

**The Castlereagh Highway 15 miles south of Coonamble after reconstruction and bitumen surfacing.**


**An elevating grader at work on the Castlereagh Highway north of Coonamble.**

slopes on the downstream side of floodways are being sprayed with bitumen emulsion to provide some initial protection and to promote the growth of grass.

In view of the few known deposits of sandy loam in the northern part of the Shire, special action is being taken to search for further deposits, and to consider alternative materials. The search is being aided by air photographs which often disclose the course taken by the river or other streams in long past periods. Searching in the field is then carried out at bends and curves in the prior streams where deposition is likely to have occurred, although now usually covered by black soil. Search is by auger, and has already resulted in some success.

**Road formation approaching completion on the Castlereagh Highway north of Coonamble.**

Experiments are also being carried out with mixtures of sand, black soil, and cement, as a possible alternative pavement material.

**Construction**

South of the town of Coonamble the country is very flat, and for the most part the formation has been constructed with motor graders, being mounted a little above the natural surface by excavating from shallow side ditches. Where greater height is required, as at approaches to bridges or large culverts, tractors and scrapers are used.

Immediately north of Coonamble, for some miles the country is liable to submergence over long lengths in time of flood, up to a depth of 12 or 18 inches. On this length a higher formation is being built using an elevating grader. The soil is shaped by motor graders and compacted by sheepsfoot roller.

Sand stabilisation of the surface of the black soil formation is carried out using a soil pulverising mixer. The first pass is made over the dry black soil to break up clods. Then sand is spread and mixed in dry. A final pass is made while adding water through the mixer. Testing is carried out to check both mixture and compaction. Any irregularities are corrected, and the surface course of loam is then added and compacted.

The work is being carried out under the direction of the Department of Main Roads Divisional Engineer, Parkes, now Mr. R. E. Playford, earlier Mr. L. W. Burgess.

# Investigation of Sub-Surface Conditions by Electrical Earth Resistivity Methods

ON behalf of the Department of Main Roads, New South Wales, the School of Mining Engineering and Applied Geology of the University of N.S.W. is carrying out experimental surveys at a number of typical bridge sites to ascertain the suitability of electrical resistivity equipment to determine the nature and depth of foundation materials at bridge sites.

Detailed information relating to deep foundation conditions at bridge sites is generally obtained from borings and the examination of material taken from sludge samples from percussion and rotary drills, or in special cases undisturbed cores obtained with a core drill. Such methods are usually costly and time-consuming.

Where ground conditions are favourable, geophysical methods can often be used to obtain quickly over large areas information concerning the position and depth of changes in strata, but correlation borings are essential in order to interpret correctly the geophysical data. Thus these methods can be used to reduce the number of bores required and to determine locations at which bores should be taken, with resultant savings in cost and time.

The methods employed are either electrical or seismic, electric methods including (*a*) earth resistivity, (*b*) parallel wire and (*c*) self-potential methods. One of the advantages of electrical methods is speed of operation. The most convenient general method is the earth resistivity method.

In the earth resistivity method, four electrodes, usually mild-steel rods approximately two feet long and half inch diameter, are driven into the soil at equal distances along a straight line, the point for which the depth profile is being obtained being located at the midpoint of the line. A current of electricity is passed between the outer pair of electrodes and the difference of potential between the two inner electrodes is measured. From these measurements of potential difference, the resistance of the soil to a depth equal to the distance between the inner (potential) electrodes can be calculated.

This procedure is repeated at increased electrode spacings about the central point so that the specific resistance of strata at different depths is obtained. With some knowledge of the geology of the area, it is possible to make use of the fact that many strata have different resistances and these again vary with water content and salinity. For instance, clay has a lower resistance than gravel or sandstone, while some sedimentaries have lower resistances than igneous rocks. It is thus necessary to establish a correlation for each new locality, based on local geological knowledge and/or test bores.

Methods of interpretation vary, but are generally based on assessing the disconformities in the graphical representation of the relationship between the resistance and the electrode spacing.

From the results to date, it appears that a reasonable degree of accuracy may be attained and that, provided the most suitable interpretation is applied, it may be possible to develop the method as a quick means of obtaining foundation information and reducing the amount of boring usually required. Further tests are being conducted.

# State Highway No. 16 Named After Lieut.-Col. Bruxner

THE Minister for Highways, the Hon. P. D. Hills, M.L.A., announced on the 2nd November, 1959 that it had been decided to name one of the State Highways after Lieut.-Col. the Hon. M. F. Bruxner, D.S.O., M.L.A.

The Highway to be named "Bruxner Highway" extends in a westerly direction from the coast at Ballina and passes through Lismore, Casino, Mallanganee, Tabulam, Drake, Tenterfield, Bonshaw and Yetman to Boggabilla on the Queensland border near Goondiwindi, a length of 272 miles.

Lieut.-Col. Bruxner has represented the Tenterfield area in the Legislative Assembly for about 39 years. He was in charge of the administration of the Main Roads Act as Minister for Local Government from 1927 to 1930 and as Minister for Transport from 1932 to 1941, and during the former period was responsible for the classification of the principal roads of the State as State Highways, for which the State would accept full financial responsibility. This classification had not been provided for in the original Main Roads Act, This far sighted action has been of the greatest benefit to New South Wales, in that it has resulted in the planned improvement of the principal Main Roads of the State, which is still in progress.

Throughout his parliamentary career Lieut.-Col. Bruxner has been always prominent in urging and encouraging the improvement of the Main Roads of the State.

Lieut.-Col. Bruxner rendered distinguished service in the first world war.

**Lieut.-Col. the Hon. M. F. Bruxner, D.S.O., M.L.A.**

# New Gwydir River Bridge on Trunk Road at Yarrowyck

A NEW bridge over the Gwydir River at Yarrowyck on the Trunk Road connecting Bundarra and Uralla was officially opened to traffic by the Commissioner for Main Roads, Mr. H. M. Sherrard, at a ceremony arranged by the Uralla Shire Council on 28th November, 1959.

The new bridge replaces a six-span timber beam bridge which was destroyed by flood in August, 1949. It had a total length of 203 ft. and a carriageway width of 15 ft. As destruction of the bridge temporarily cut direct communication between Bundarra and Uralla, a temporary low level timber bridge of two 20 ft. spans was provided as a stop gap pending the construction of the new permanent bridge.

The new bridge is located at a more favourable site for crossing the river than was the case with the old bridge and, to give access to it, a deviation of the Trunk Road 2½ miles in length was constructed. In addition to being on high ground not subject to flooding, this deviation also obviated the necessity for the construction of a bridge over a tributary creek on the approaches to the old bridge site.

The new bridge consists of six 40 ft. long steel girder spans, and has a total length of 268 ft., including abutments. It has a concrete deck with a carriageway width of 24 ft.

**New steel and concrete bridge over the Gwydir River at Yarrowyck on the Walcha—Bundarra—Uralla—Inverell Trunk Road.**

The bridge was designed by the Department of Main Roads and, together with two box culverts in the approaches, was built by the Department under contract by Central Constructions Coy. Ltd., of Dubbo. The road deviation was built by the Uralla Shire Council by day labour. The total cost of the bridge and the deviation will be about £60,000.

Construction of the bridge was under the supervision of the Department of Main Roads Divisional Engineer, Tamworth, Mr. G. H. Linton.

# Progress in Bitumen Surfacing of Main Roads

IN the last four years over 1,700 miles of new bitumen surface have been provided on Main Roads by the Councils and the Department of Main Roads. Of this mileage 442 miles were carried out during the year ended 30th June, 1959. At that date there were 7,590 miles of bitumen or other dust-free surfaces on the Main Roads of New South Wales.

In addition to the new bitumen surfacing completed during the year, 406 miles of bitumen-surfaced pavements on Main Roads were re-surfaced and a bitumen surface was restored on 97 miles of pavement which had been reconstructed following deterioration of an earlier similar surface.

The distribution over the various classes of Main Roads of the bitumen surfacing work carried out during t'e year was as follows:—

| Nature of Work | State Highways | Trunk Roads | Ordinary Main Roads | Secondary Roads | Total |
|---|---|---|---|---|---|
| 1. New bitumen surfacing ... ... ... ... ... ... ... | 123 | 97 | 139 | 1 | 360 |
| 2. Bitumen resurfacing— | | | | | |
| (*a*) Flush resurfacing ... ... ... ... ... ... ... | 200 | 54 | 65 | ... | 319 |
| (*b*) Road mix resurfacing ... ... ... ... ... ... | 5 | ... | ... | ... | 5 |
| (*c*) Plant mix resurfacing ... ... ... ... ... ... | 54 | 2 | 23 | 3 | 82 |
| 3. Restoration of bitumen surface on pavements after reconstruction ... | 73 | 6 | 15 | 3 | 97 |
| 4. Tar priming or light sealing ... ... ... ... ... ... | 45 | 17 | 20 | ... | 82 |
| Totals... ... ... ... ... ... ... | 500 | 176 | 262 | 7 | 945 |

*From the Annual Report of the Department of Main Roads for the year ended 30th June, 1959.*

# Australian Road Statistics

**The following road statistics have been compiled for the National Association of Australian State Road Authorities from data supplied by the individual States and Territories.**

## 1. Mileages of roads in Australia at 30th June, 1958

| Area | Mileage | | | | Percentage of Total Mileage | | |
|---|---|---|---|---|---|---|---|
| | A Classified State Highways Trunk and Main Roads | B Other roads controlled and/or subsidised by State Road Authorities | C All other roads | Total | A | B | C |
| | miles | miles | miles | miles | per cent. | per cent. | per cent. |
| New South Wales ... ... | 22,444 | 4,653 | 100,194 | 127,291 | 17 | 4 | 79 |
| Victoria ... ... ... | 13,599 | 25,793 | 65,238 | 104,630 | 13 | 25 | 62 |
| Queensland ... ... ... | 18,807 | 2,092 | 102,330 | 123,229 | 15 | 2 | 83 |
| South Australia ... ... ... | 8,188 | 15,000 | 39,012 | 62,200 | 13 | 24 | 63 |
| Western Australia ... ... | *10,606 | 14,390 | 64,567 | 89,563 | 12 | 16 | 72 |
| Tasmania... ... ... ... | 1,814 | 373 | 9,701 | 11,888 | 15 | 3 | 82 |
| Sub-totals States ... ... | 75,458 | 62,301 | 381,042 | 518,801 | 15 | 12 | 73 |
| Australian Capital Territory ... | 79 | 550 | ..... | 629 | 13 | 87 | ... |
| Northern Territory ... ... | 1,232 | 11,219 | ..... | 12,451 | 10 | 90 | ... |
| TOTALS ... ... | 76,769 | 74,070 | 381,042 | 531,881 | 14 | 14 | 72 |

* Includes 7,149 miles of Important Secondary Roads.

## 2. Ratio of mileage of roads to area at 30th June, 1958

| State or Territory | Mileage of roads per 100 square miles | | | |
|---|---|---|---|---|
| | Area | Classified State Highways, Trunk and Main Roads | Roads other than Classified State Highways, Trunk and Main Roads | Total |
| | square miles | miles | miles | miles |
| New South Wales ... ... ... ... ... ... | 309,433 | 7 | 34 | 41 |
| Victoria ... ... ... ... ... ... ... | 87,884 | 15 | 104 | 119 |
| Queensland ... ... ... ... ... ... ... | 670,500 | 3 | 15 | 18 |
| South Australia ... ... ... ... ... ... ... | 380,070 | 2 | 14 | 16 |
| Western Australia ... ... ... ... ... ... | 975,920 | *1 | 8 | 9 |
| Tasmania ... ... ... ... ... ... ... | 26,215 | 7 | 38 | 45 |
| Sub-totals—States ... ... ... ... ... ... | 2,450,022 | 3 | 18 | 21 |
| Australian Capital Territory ... ... ... ... ... | 939 | 8 | 59 | 67 |
| Northern Territory ... ... ... ... ... ... | 523,620 | ... | 2 | 2 |
| TOTALS ... ... ... ... ... ... | 2,974,581 | 3 | 15 | 18 |

* Basis includes 7,149 miles of Important Secondary Roads.

### 3. Number of persons per mile of road at 30th June, 1958

| Area | Population (Estimated as at 30/6/58) | Lengths of road | | | Persons per mile of road | | |
|---|---|---|---|---|---|---|---|
| | | Classified State Highways Trunk and Main Roads | Roads other than classified State Highways, Trunk and Main Roads | Total | Classified State Highways, Trunk and Main Roads | Roads other than classified State Highways, Trunk and Main Roads | Total |
| | | miles | miles | miles | | | |
| New South Wales ... ... | 3,689,175 | 22,444 | 104,847 | 127,291 | 164 | 35 | 29 |
| Victoria ... ... ... ... | 2,741,397 | 13,599 | 91,031 | 104,630 | 202 | 30 | 26 |
| Queensland ... ... ... | 1,417,404 | 18,807 | 104,422 | 123,229 | 75 | 14 | 12 |
| South Australia ... ... ... | 896,750 | 8,188 | 54,012 | 62,200 | 110 | 17 | 14 |
| Western Australia ... ... | 705,250 | *10,606 | 78,957 | 89,563 | 66 | 9 | 8 |
| Tasmania... ... ... ... | 335,418 | 1,814 | 10,074 | 11,888 | 185 | 33 | 28 |
| Sub-totals—States ... | 9,785,394 | 75,458 | 443,343 | 518,801 | 130 | 22 | 19 |
| Australian Capital Territory ... | 41,167 | 79 | 550 | 629 | 521 | 75 | 65 |
| Northern Territory ... ... | 19,579 | 1,232 | 11,219 | 12,451 | 16 | 2 | 2 |
| TOTALS ... ... | 9,846,140 | 76,769 | 455,112 | 531,881 | 128 | 22 | 19 |

* Includes 7,149 miles of Important Secondary Roads.

### 4. Proclaimed State Highways, Trunk and Main Roads—Mileage of concrete and sealed pavements at 30th June, 1958

| Area | Total length of Classified State Highways, Trunk and Main Roads | Classified State Highways, Trunk and Main Roads constructed in cement concrete, bituminous concrete or other bituminous material | |
|---|---|---|---|
| | miles | miles | per cent. |
| New South Wales ... ... ... ... ... ... | 22,444 | 7,110 | 32 |
| Victoria ... ... ... ... ... ... ... | 13,599 | 9,079 | 67 |
| Queensland ... ... ... ... ... ... ... | 18,807 | 4,869 | 26 |
| South Australia ... ... ... ... ... ... ... | 8,188 | 2,804 | 34 |
| Western Australia ... ... ... ... ... ... | *10,606 | †3,662 | 35 |
| Tasmania ... ... ... ... ... ... ... | 1,814 | 874 | 48 |
| Sub-totals—States ... ... ... ... ... ... | 75,458 | 28,398 | 38 |
| Australian Capital Territory ... ... ... ... ... | 79 | 70 | 89 |
| Northern Territory ... ... ... ... ... ... | 1,232 | 1,232 | 100 |
| TOTALS ... ... ... ... ... ... | 76,769 | 29,700 | 39 |

* Includes 7,149 miles of Important Secondary Roads.

† Includes 935 miles of Important Secondary Roads.

## 5. Registration of motor vehicles in Australia at 30th June, 1958

| | Number of Vehicles | | | | | Percentage of total vehicles | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cars | Other vehicles (including lorries, utilities, trailers, tractors and omnibuses) | Sub-total | Motor Cycles | Total | Cars | Other vehicles (including lorries, utilities, trailers, tractors and omnibuses) | Sub-total | Motor Cycles |
| | | | | | | per cent. | per cent. | per cent. | per cent. |
| New South Wales ... | 558,145 | 348,856 | 907,001 | 34,692 | 941,693 | 59 | 37 | 96 | 4 |
| *Victoria ... ... | *556,550 | *175,300 | 731,850 | 24,308 | 756,158 | *74 | *23 | 97 | 3 |
| Queensland ... ... | 206,034 | 162,357 | 368,391 | 20,156 | 388,547 | 53 | 42 | 95 | 5 |
| South Australia ... | 172,934 | 115,628 | 288,562 | 18,723 | 307,285 | 56 | 38 | 94 | 6 |
| Western Australia ... | 110,573 | 66,305 | 176,878 | 12,827 | 189,705 | 58 | 35 | 93 | 7 |
| Tasmania ... ... | 56,224 | 33,183 | 89,407 | 4,008 | 93,415 | 60 | 36 | 96 | 4 |
| Sub-totals—States | 1,660,460 | 901,629 | 2,562,089 | 114,714 | 2,676,803 | 62 | 34 | 96 | 4 |
| Australian Capital Territory. | 8,733 | 4,035 | 12,768 | 451 | 13,219 | 66 | 31 | 97 | 3 |
| Northern Territory ... | 3,121 | 4,542 | 7,663 | 718 | 8,381 | 37 | 54 | 91 | 9 |
| TOTALS ... ... | 1,672,314 | 910,206 | 2,582,520 | 115,883 | 2,698,403 | 62 | 34 | 96 | 4 |

* Registration is according to purpose of use, consequently the figure for cars includes commercial vehicles registered for private use.

## 6. Ratio of registered motor vehicles to population at 30th June, 1958

| Area | Number of registered motor vehicles (including trailers and motor cycles) | Population (Estimated as at 30/6/58) | Number of motor vehicles per 100 persons | Number of persons per motor vehicle |
|---|---|---|---|---|
| New South Wales ... ... ... ... ... ... | 941,693 | 3,689,175 | 26 | 3·9 |
| Victoria ... ... ... ... ... ... ... | 756,158 | 2,741,397 | 28 | 3·6 |
| Queensland ... ... ... ... ... ... ... | 388,547 | 1,417,404 | 27 | 3·6 |
| South Australia ... ... ... ... ... ... | 307,285 | 896,750 | 34 | 2·9 |
| Western Australia ... ... ... ... ... ... | 189,705 | 705,250 | 27 | 3·7 |
| Tasmania ... ... ... ... ... ... ... | 93,415 | 335,418 | 28 | 3·6 |
| Sub-totals—States ... ... ... ... ... | 2,676,803 | 9,785,394 | 27 | 3·7 |
| Australian Capital Territory ... ... ... ... | 13,219 | 41,167 | 32 | 3·1 |
| Northern Territory ... ... ... ... ... ... | 8,381 | 19,579 | 43 | 2·3 |
| TOTALS ... ... ... ... ... ... | 2,698,403 | 9,846,140 | 27 | 3·6 |

## 7. Ratio of registered motor vehicles to mileage of roads at 30th June, 1958

| Area | Number of registered motor vehicles (including trailers and motor cycles) | Mileage of roads | | Number of motor vehicles per mile of road | |
|---|---|---|---|---|---|
| | | Classified State Highways, Trunk and Main Roads | All roads | Classified State Highways, Trunk and Main Roads | All roads |
| New South Wales | 941,693 | 22,444 | 127,291 | 42 | 7·4 |
| Victoria | 756,158 | 13,599 | 104,630 | 56 | 7·2 |
| Queensland | 388,547 | 18,807 | 123,229 | 21 | 3·2 |
| South Australia | 307,285 | 8,188 | 62,200 | 38 | 4·9 |
| Western Australia | 189,705 | *10,606 | 89,563 | *18 | 2·1 |
| Tasmania | 93,415 | 1,814 | 11,888 | 51 | 7·9 |
| Sub-totals—States | 2,676,803 | 75,458 | 518,801 | 35 | 5·2 |
| Australian Capital Territory | 13,219 | 79 | 629 | 167 | 21·0 |
| Northern Territory | 8,381 | 1,232 | 12,451 | 7 | 0·7 |
| TOTALS | 2,698,403 | 76,769 | 531,881 | 35 | 5·1 |

* Includes 7,149 miles of Important Secondary Roads.

## 8. Receipts of State Road Authorities from State Motor Vehicle Taxes and Commonwealth Fuel Taxes during 1957/58

| Area | Amount | | | Percentage of Total Motor Vehicle and Fuel Taxes | |
|---|---|---|---|---|---|
| | State Motor Vehicle Taxes | Commonwealth Fuel Taxes | Total | Motor Vehicle Taxes | Fuel Taxes |
| | £'000 | £'000 | £'000 | per cent. | per cent. |
| New South Wales | 8,445 | *9,501 | 17,946 | 47 | 53 |
| Victoria | 9,762 | †6,309 | 16,071 | 61 | 39 |
| Queensland | 4,585 | ‡6,634 | 11,219 | 41 | 59 |
| South Australia | 3,471 | 3,907 | 7,378 | 47 | 53 |
| Western Australia | §1,988 | 6,707 | 8,695 | 23 | 77 |
| Tasmania | 1,023 | 1,746 | 2,769 | 37 | 63 |
| TOTALS | 29,274 | 34,804 | 64,078 | 46 | 54 |

* Includes £3,602,000 for expenditure on rural roads paid directly to the Department of Public Works and £63,583 to the Department of Motor Transport for expenditure on Unclassified Roads.

† Includes £150,000 for expenditure on other works connected with transport by road or water paid directly to the Department of Public Works.

‡ Includes £1,250,000 paid into the Commonwealth Aid Local Authority Roads Fund for expenditure on Unclassified Roads.

§ Includes £1,045,884 collected and retained by Country Local Authorities.

Receipts of the State Road Authority from motor vehicle taxes in New South Wales, Victoria and Queensland include receipts from charges imposed on heavy commercial goods vehicles. In New South Wales and Queensland the charges were imposed only for part of the year 1957-58, but in Victoria the charges were in operation for the whole year.

The exisiting authorities under which motor vehicle fuel taxes are distributed by the Commonwealth are the Commonwealth Aid Roads Act, 1954-56 and the Commonwealth Aid Roads (Special Assistance) Act, 1957. These Acts remain in force until 30th June, 1959. The new Commonwealth Aid Roads Act will provide grants for roadworks which will not be related to fuel taxes.

## 9. Ratio of receipts of State Road Authorities from State Motor Vehicle Taxes and Commonwealth Fuel Taxes during 1957/58 to number of registered motor vehicles

| Area | Number of motor vehicles (See Table No. 5) | Receipts (See Table No. 8) | | | Per Motor Vehicle | | |
|---|---|---|---|---|---|---|---|
| | | *State Motor Vehicle Taxes | Commonwealth Fuel Taxes | Total | Motor Vehicle Taxes | Fuel Taxes | Total |
| | | £'000 | £'000 | £'000 | £ | £ | £ |
| New South Wales ... ... | 941,693 | 8,445 | †9,501 | 17,946 | 9 | 10 | 19 |
| Victoria ... ... ... | 756,158 | 9,762 | †6,309 | 16,071 | 13 | 8 | 21 |
| Queensland ... ... ... | 388,547 | 4,585 | †6,634 | 11,219 | 12 | 17 | 29 |
| South Australia ... ... | 307,285 | 3,471 | 3,907 | 7,378 | 11 | 13 | 24 |
| Western Australia ... ... | 189,705 | †1,988 | 6,707 | 8,695 | 11 | 35 | 46 |
| Tasmania ... ... ... | 93,415 | 1,023 | 1,746 | 2,769 | 11 | 19 | 30 |
| TOTALS ... ... | 2,676,803 | 29,274 | 34,804 | 64,078 | 11 | 13 | 24 |

* The figures shown in this column for New South Wales, Victoria and Queensland include recently imposed charges on heavy commercial goods vehicles. Receipts in New South Wales and Queensland represent collections for part only of a year whereas those in Victoria represent a full year.

† See notations under Table No. 8 regarding these amounts.

## 10. *Total payments by State Road Authorities during 1957/58 on classified State Highways, Trunk and Main Roads

| Area | Total payments | Mileage of classified State Highways, Trunk and Main Roads | Payments per mile of classified State Highways, Trunk and Main Roads |
|---|---|---|---|
| | £'000 | Miles | £ |
| New South Wales ... ... ... ... ... ... | 15,663 | 22,444 | 698 |
| Victoria ... ... ... ... ... ... ... ... | 11,355 | 13,599 | 835 |
| Queensland ... ... ... ... ... ... ... | 8,952 | 18,807 | 476 |
| South Australia ... ... ... ... ... ... ... | 4,953 | 8,188 | 605 |
| Western Australia ... ... ... ... ... ... | 5,276 | †10,606 | 498 |
| Tasmania ... ... ... ... ... ... ... ... | 2,095 | 1,814 | 1,155 |
| Sub-totals—States ... ... ... ... ... ... | 48,294 | 75,458 | 640 |
| Australian Capital Territory ... ... ... ... ... | 211 | 79 | 2,671 |
| Northern Territory ... ... ... ... ... ... | ‡1,032 | 1,232 | 838 |
| TOTALS ... ... ... ... ... ... | 49,537 | 76,769 | 645 |

* Includes a proportion of administrative charges but excludes other indirect charges such as loan repayments, advances, purchase of plant and plant maintenance, etc.

† Includes 7,149 miles of Important Secondary Roads.

‡ Includes payments in respect of roads other than classified State Highways, Trunk and Main Roads.

## 11. *Payments on all roads during 1957/58

| Area | Payments by— | | | | Percentage of Total Payments from all Sources | | |
|---|---|---|---|---|---|---|---|
| | State Road Authority | †Local Authorities | †Other Authorities | Total | State Road Authority | Local Authorities | Other Authorities |
| | £'000 | £'000 | £'000 | £'000 | per cent. | per cent. | per cent. |
| New South Wales ... ... | 16,414 | 14,275 | §5,938 | 36,627 | 45 | 39 | 16 |
| Victoria ... ... ... | 17,356 | 12,648 | 1,511 | 31,515 | 55 | 40 | 5 |
| Queensland ... ... ... | 10,127 | 5,663 | 312 | 16,102 | 63 | 35 | 2 |
| South Australia ... ... ... | 6,615 | 3,900 | 90 | 10,605 | 62 | 37 | 1 |
| Western Australia ... ... | 7,273 | 2,397 | 151 | 9,821 | 74 | 24 | 2 |
| Tasmania... ... ... ... | 3,048 | 1,204 | ‡ | 4,252 | 72 | 28 | ... |
| Sub-totals—States ... | 60,833 | 40,087 | 8,002 | 108,922 | 56 | 37 | 7 |
| Australian Capital Territory ... | ... | ... | 752 | 752 | ... | ... | 100 |
| Northern Territory ... ... | ... | 32 | 1,032 | 1,064 | ... | 3 | 97 |
| TOTALS ... ... | 60,833 | 40,119 | 9,786 | 110,738 | 55 | 36 | 9 |

* Includes administrative charges but excludes other indirect charges such as loan repayments, advances, purchase of plant and plant maintenance, etc.

† Some of the amounts in these columns represent payments in respect of previous years which is the latest information available.

§ Includes payments in respect of roads other than main roads from Petrol Tax received from the Commonwealth Government. In other States Petrol Tax for this purpose is included in the payments by the State Road Authority.

‡ Not available.

## 12. Payment on all roads during 1957/58 per head of population, per motor vehicle and per mile of road

| Area | Payments per head of population by— | | | | Payments per motor vehicle | Payments per mile of road |
|---|---|---|---|---|---|---|
| | State Road Authority | Local Authorities | Other Authorities | Total | Total | Total |
| | £ | £ | £ | £ | £ | £ |
| New South Wales ... ... | 4·4 | 3·9 | 1·6 | 9·9 | 39 | 288 |
| Victoria ... ... ... ... | 6·3 | 4·6 | 0·6 | 11·5 | 42 | 301 |
| Queensland ... ... ... | 7·2 | 4·0 | 0·2 | 11·4 | 41 | 131 |
| South Australia ... ... ... | 7·3 | 4·4 | 0·1 | 11·8 | 35 | 170 |
| Western Australia ... ... | 10·3 | 3·3 | 0·3 | 13·9 | 52 | 110 |
| Tasmania ... ... ... | 9·1 | 3·6 | ... | 12·7 | 46 | 358 |
| Sub-totals—States ... ... | 6·2 | 4·1 | 0·8 | 11·1 | 41 | 210 |
| Australian Capital Territory ... | ... | ... | 18·3 | 18·3 | 57 | 1,196 |
| Northern Territory ... ... | ... | 1·6 | 52·7 | 54·3 | 127 | 85 |
| AVERAGES ... ... | 6·2 | 4·0 | 1·0 | 11·2 | 41 | 208 |

New Bridge over the Macleay River at Kempsey.



# New Bridge over the Macleay River at Kempsey

A NEW bridge built by the Department of Main Roads over the Macleay River at Kempsey on the Pacific Highway was officially opened to traffic by the Deputy Premier and Treasurer, the Hon. J. B. Renshaw, M.L.A., on the 21st November, 1959.

### The New Bridge

Construction of the new bridge was carried out by contract for the Department of Main Roads by Hornibrook, McKenzie Clark Pty. Ltd. The supply and fabrication of the steelwork was carried out by Bernard-Smith Pty. Ltd. The approaches to the new bridge were built by the Department of Main Roads by day labour. The total cost of the new bridge and its approaches, including the supply of the steelwork, was about £490,000.

The new bridge comprises four 153 ft. long steel truss spans and six 40 ft. long and two 32 ft. long concrete girder approach spans. The total length of the bridge is 917 ft. The carriageway width is 23 ft. There is a 5 ft. wide footway on the northern side of the new bridge.

The main piers of the bridge are supported on concrete cylinders 8 ft. 6 in. in diameter which were sunk, using compressed air, to rock at depths up to 87 ft. below high water level. The piers of the approach spans are supported on concrete piles which were driven to depths of up to 70 ft. below ground. The main piers of the new bridge were placed in line with the main piers of the old bridge, in order to avoid causing any greater obstruction to flood flow than already existing.

The new bridge used 415 tons of structural steelwork in the trusses, 2,860 cubic yards of concrete and 260 tons of reinforcing steel bars, together with 25 tons of steel in the cylinder cutting edges.

The construction of the bridge was supervised by the Department's Divisional Engineer at Newcastle, Mr. R. J. Butler.

### The Old Bridge

The old bridge over the Macleay River at Kempsey was opened to traffic in April, 1900. It cost £22,350. It consisted of four timber truss spans each 153 ft. long and seven 35 ft. long and two 30 ft. long timber girder approach spans, the total length of the bridge being 920 ft.

The river piers of the old bridge comprise 6 ft. diameter cast-iron cylinders filled with concrete which were sunk to rock at a maximum depth of 84 ft. below high-water level. The land piers are of timber.

A notable feature of the old bridge is that the 153 ft. span timber trusses are the longest timber spans ever built in Australia.

**Historical**

In January, 1817, the brig "Trial" was wrecked on the North Coast of New South Wales and the brig "Lady Nelson", under the command of Captain White, was sent to investigate. The "Trial" was found wrecked in an inlet which, as a consequence, was named "Trial Bay". It is believed that the Captain of the "Lady Nelson" brought under notice the discovery during his voyage of two inlets, one of which opened into Trial Bay and which presumably was the Macleay River.

In 1820 Oxley entered the mouth of the Macleay and appears to have gone up that river for about 20 miles. He reported the existence of marshes and swamps, and considered the discovery of no interest.

The first definite information concerning the existence of the Macleay as a river is reported to have been received from four escaped prisoners in 1825. At that time a penal settlement existed at Port Macquarie and the four prisoners, who claimed to be escapees from Moreton Bay, reached Port Macquarie with a story of having crossed not less than 60 rivers or streams and that about 30 miles northward of Trial Bay they had fallen in with a river as large as the Hastings.

In 1826 an expedition was despatched from Port Macquarie under the leadership of Captain Samuel Wright who could be said to be the first explorer of the Macleay.

The Macleay River was first known as Wright's River, then Trial River, then New or McLeay River, and later on was given its present name, Macleay.

Following discovery of the Macleay, settlement was slow. Port Macquarie had been established as a convict settlement in 1821 and this precluded any expansion in the district. However, on the 1st July, 1830, Governor Darling issued a proclamation "declaring Port Macquarie no longer a penal settlement on and after the 15th August, 1830, and all settlers and other free people" could avail themselves of the opportunity of extending settlement to the north.

On the 6th June, 1836, an area of 812 acres on the Macleay River was granted to Samuel Onions and was later conveyed to Enoch William Rudder, a merchant, of Sydney.

In that same year Mr. Rudder had the grant subdivided as a township site and thirty-five allotments were auctioned in Sydney on the 26th November, 1836, as "being portion of the village of Kempsey at the head of navigation on the Macleay River". He erected his own residence on one of the allotments on a site which he called "The Hill". Mr. Rudder could thus be regarded as the founder of Kempsey.

The first ferry crossed the river on 12th February, 1842.

The name "Kempsey" was chosen by Mr. Rudder in commemoration of the valley of Kempsey, Worcestershire, England, which, he stated, it greatly resembled in point of situation.

The present town of Kempsey is on subdivisions of parts of grants made to William Smith and John Verge. The original settlement has now become East Kempsey. Government Surveyors laid out a township which is now called West Kempsey.

# Tenders Accepted by Councils

**The following tenders (in excess of £3,000) were accepted by the respective Councils during the three months ended 30th September, 1959.**

| Council | Road No. | Work | Name of Accepted Tenderer | Amount |
|---|---|---|---|---|
| | | | | £ s. d. |
| Abercrombie ... | 1218 | Construction of concrete bridge 90 ft. long over Oakey Creek. | Central Constructions Pty. Ltd. | 8,931 0 0 |
| Ashford ... ... | 63<br>1 7 | Bitumen surfacing of (1) Trunk Road No. 63 between 4·0 m. and 6·5 m. south of Yetman; (2) Main Road No. 187 between 27·3 m. and 29·3 m. north of Inverell. | Emoleum (Aust.) Ltd. ... | 5,518 16 0 |
| Boomi ... ... | 12 | Bitumen surfacing between 12·2 m. and 17·0 m. west of Moree. | Shorncliffe Pty. Ltd. ... | 3,949 5 9 |
| Boorowa ... | 56 | Reconstruction and bitumen surfacing between 7·04 m. and 9·77 m. south of Boorowa. | Allen Bros. Pty. Ltd. ... | 6,913 2 5 |
| Carrathool ... | 6 | Supply and delivery of 4,540 cu. yds. of screened aggregate between 11·6 m. and 14·45 m. west of Goolgowi. | F. J. Patten ... ... | 3,499 11 8 |

# Tenders Accepted by Councils—*continued*

| Council | Road No. | Work | Name of Accepted Tenderer | Amount |
|---|---|---|---|---|
| Carrathool ... | 6<br>321<br>539 | Tar surfacing of 72,520 sq. yds. of—<br>1. State Highway No. 6—4·56 m. to 12·26 m. west of Rankin's Springs.<br>2. Main Road No. 321—0·35 m. to 7·35 m. north of Darlington Point.<br>3. Main Road No. 539—From Leeton–Griffith Trunk Road to Whitton (1·67 m.). | B.H.P. By-Products Pty. Ltd. | 5,282 0 0 |
| Carrathool ... | 321 | Sand and aggregate stabilisation of 73,920 sq. yds. of pavement 0·35 m. to 7·35 m. north of Darlington Point. | Stabilisers Ltd. ... ... | 4,312 0 0 |
| Cockburn ... | 105 | Bitumen resurfacing between 4·85 m. and 11·12 m. and 14·5 m. and 15·30 m. south of Tamworth. | Shorncliffe Pty. Ltd. ... | 3,556 6 9 |
| Coolah ... ... | 55 | Construction of 4-cell R.C. culvert at 11·5 m. south of Coolah. | J. I. Miller ... ... ... | 3,400 0 0 |
| Coolah ... ... | 77 | Construction of R.C. box culverts at 2·8 m. and 3·42 m. east of Dunedoo. | Australian Concrete Products Pty. Ltd. | 5,137 14 0 |
| Culcairn ... ... | 125 | Bitumen surfacing between 10·15 m. and 16·9 m. from Hume Shire boundary. | B.H.P. By-Products Pty. Ltd. | 4,631 9 9 |
| Gundagai ... | 87 | Construction of R.C. bridge over Mooney Mooney Creek | W. A. Winnett and Sons ... | 6,279 16 0 |
| Illabo ... ... | 57<br>243 | Supply and spraying of bitumen—<br>1. Trunk Road No. 57—33·05 m. to 40·25 m. north of Wagga Wagga.<br>2. Main Road No. 243—5·35 m. to 6·75 m. east of Junee. | B.H.P. By-Products Pty. Ltd. | 5,499 17 2 |
| Jemalong ... | 17 | Construction of four R.C. culverts between 19·6 m. and 20·7 m. south of Forbes. | A. G. and L. Wicks ... | 3,682 4 6 |
| Kempsey ... | 198 | Reconstruction and bitumen surfacing between 4·35 m. and 4·85 m. and 15·00 m. and 19·35 m. north of Kempsey. | B.H.P. By-Products Pty. Ltd. | 4,056 10 10 |
| Liverpool ... | 154 | Resheeting with premix macadam and asphaltic concrete between 11·3 m. and 13·6 m. from Hume Highway. | Bituminous Pavements Pty. Ltd. | 11,028 5 0 |
| Lockhart ... | 370<br>57 | Bitumen surfacing (1) Main Road No. 370 between 13·95 m. and 20·95 m. from Shire boundary towards Albury; (2) Trunk Road No. 57—deviation between The Rock and Bon Accord. | B.H.P. By-Products Pty. Ltd. | 8,615 0 3 |
| Murrumbidgee ... | 321 | Supply and delivery of 275 cu. yds. ¾-in. and 790 cu. yds. ¾-in. aggregate to roadside stockpiles 1·5 m. south of Darlington Point. | Griffith Metal Sand and Gravel Co. Pty. Ltd. | 3,416 17 6 |
| Nymboida ... | 74 | Reconstruction and bitumen surfacing between 24·37 m. and 25·03 m. south of Grafton. | Stoney Ridge Construction and Development Pty. Ltd. | 7,196 0 0 |
| Peel ... ... | 9<br>11<br>130 | Bitumen surfacing of various lengths ... ... ... | Shorncliffe Pty. Ltd. ... | 4,744 12 2 |
| Scone ... ... | 1109 | Construction from 11·4 m. to 12·67 m. east of the Scone–Nundle Main Road. | C. T. Marshall ... ... | 11,637 18 0 |
| Timbrebongie ... | 354 | Construction of R.C. box culvert across Backwater Cowal. | W. E. Troth ... ... | 8,993 10 0 |
| Uralla ... ... | 124 | Construction of bridge over Booralong Creek ... ... | Central Constructions Pty. Ltd. | 33,130 0 0 |
| Waradgery ... | 14<br>319<br>514 | Supply and delivery to stockpiles of 2,898 cu. yds. of ¾-in. and ¾-in. aggregate. | Junee Sand and Gravel Co. Junee. | 15,114 14 0 |
| Wellington ... | 353 | Construction of approaches to bridge over Spicer's Creek at Saxa. | A. C. Stephens and Sons ... | 3,489 18 0 |
| Weddin ... ... | 6 | Elimination of causeways, supply and delivery of aggregate and construction of culverts at various locations between 15 m. and 17 m. | A. H. Bowie ... ... | 24,019 12 0 |
| Windouran ... | 21<br>296 | Supply and delivery of 2,080 cu. yds. cover aggregate to various locations. | T. Hardman ... ... | 8,352 0 0 |
| Yarrowlumla ... | 51 | Reconstruction between 17·7 m. and 23·9 m. east of Queanbeyan. | Stanley Constructions ... | 24,549 0 0 |
| Yarrowlumla ... | 51<br>249<br>268<br>270 | Resurfacing of various lengths ... ... ... ... | Allen Bros. ... ... ... | 3,042 17 3 |

# Tenders Accepted by Department of Main Roads

**The following tenders (in excess of £3,000) were accepted by the Department of Main Roads during the three months ended the 30th September, 1959.**

| Work or Service | Name of Accepted Tenderer | Amount |
|---|---|---|
| | | £ s. d. |
| State Highway No. 9—New England Highway. Shire of Cockburn. Construction of R.C. box culvert over Middle Creek. | S. J. Frost ... ... ... ... | 4,992 5 0 |
| State Highway No. 9—New England Highway. Shire of Patrick Plains. Construction of bridge over Black Creek. | Central Constructions Pty. Ltd. ... | 30,325 0 0 |
| State Highway No. 10—Pacific Highway. Shire of Hastings. Bridge over Hastings River near Blackman's Point. Supply, manufacture and delivery of steelwork. | Transfield Pty. Ltd. ... ... ... | 128,094 3 4 |
| State Highway No. 10—Pacific Highway. Shire of Hastings. Bridge over Hastings River near Blackman's Point. Construction of piers and abutments, erection of steelwork and final completion of structure. | Electric Power Transmission Pty. Ltd.... | 322,811 12 5 |
| State Highway No. 17—Newell Highway. Shire of Jerilderie. Supply and delivery of 2,772 cu. yds. of ¾-in. and 416 cu. yds. ⅜-in. aggregate 20 m. to 35 m. north of Jerilderie. | Junee Sand and Gravel Co. ... ... | 10,361 0 0 |
| Shire of Goobang and Municipality of Parkes—Trunk Road No. 61. Construction of bridge over Billabong Creek at Parkes. | Central Constructions Pty. Ltd. ... | 22,187 0 0 |
| Central Darling Shire—Trunk Road No. 68. Construction of earth formation and pipe culverts for deviation between section 0 m. and 5 m. north of Menindee. | J. H. Furney and Co. ... ... ... | 5,916 10 3 |
| Shire of Nymboida—Main Road No. 511. Construction of bridge over Mann River at Jackadgery. | Theiss Bros. Pty. Ltd. ... ... ... | 226,114 4 9 |
| Shire of Nymboida—Developmental Road No. 1256. Construction between Cattle Creek and Purgatory Creek—section 18·0 m. to 23·4 m. West of South Grafton. | Theiss Bros. Pty. Ltd. ... ... ... | 60,841 8 0 (plus haulage estimated at £2,610) |
| Supply and delivery of bitumen emulsion during the period 1st July, 1959, to 30th June, 1960. | The Shell Co. (Aust.) Ltd. ... ... | 51,792 0 0 |
| Supply of coal to Newcastle-Stockton Ferry Service during the period 1st August, 1959 to 31st July, 1960. | R. W. Miller and Co. ... ... ... | 18,998 19 2 |

## MAIN ROADS FUNDS

**Receipts & Payments for the period from 1st July, 1959 to 30th September, 1959.**

| Heading | County of Cumberland Main Roads Fund | Country Main Roads Fund |
|---|---|---|
| *Receipts* | £ | £ |
| Motor vehicle taxation (State) ... ... ... ... ... ... ... ... | 428,574 | 1,714,294 |
| Charge on heavy commercial goods vehicles under Road Maintenance (Contribution) Act, 1958 (State) ... ... ... ... ... ... ... ... ... ... | 154,084 | 616,337 |
| Commonwealth Aid Roads Act ,1959 ... ... ... ... ... ... ... | 351,429 | 1,355,715 |
| From Councils under Section 11 of Main Roads Act and for cost of works ... ... | 429,733 | 3,920 |
| Other ... ... ... ... ... ... ... ... ... ... ... ... | 52,246 | 39,230 |
| Total Receipts ... ... ... ... ... ... ... ... | 1,416,066 | 3,729,496 |
| *Payments* | | |
| Maintenance and minor improvement of roads and bridges ... ... ... ... | 431,808 | 1,491,212 |
| Construction and reconstruction of roads and bridges ... ... ... ... ... | 453,400 | 1,361,937 |
| Land acquisition ... ... ... ... ... ... ... ... ... ... | 111,266 | 17,956 |
| Administrative expenses ... ... ... ... ... ... ... ... | 79,437 | 134,696 |
| Loan charges— | | |
| Payment of interest, exchange, management and flotation expenses ... ... | ..... | 60,385 |
| *Miscellaneous... ... ... ... ... ... ... ... ... ... ... | 57,082 | 210,947 |
| Total Payments ... ... ... ... ... ... ... ... | 1,132,993 | 3,277,133 |

* Includes transfers to Special Purposes Accounts for purchase of road plant, motor vehicles and other assets, and for special works.

# MAIN ROADS STANDARD SPECIFICATIONS DRAWINGS AND INSTRUCTIONS

***NOTE: Drawings are prefixed by letter "A", instructions are so described; all other items are specifications or forms. Year of revision, if within last 10 years, is shown in brackets.***

Form No.

## ROAD SURVEY AND DESIGN.

A 478, A 478A } Specimen drawings, country road design.
A 478C Specimen drawing, flat country road design.
A 478B Specimen drawings, urban road design.
A 1645 Stadia reduction diagram.
355 Design of two-lane rural highways. (Instruction.)
369 Design of urban roads. (Instruction.)
288 Design of intersections. (Instruction.) (1952.)
402 Design of acceleration and deceleration lanes. (Instruction.)
499 Design of kerb-lines and splays at corners. (Instruction.) (1952.)
A 1614 Widening at points of "A" sight distance.
A 83 Earthwork quantity diagram.
A 1640 Mould for permanent mark block.
Manual No. 2—Survey and design for main road works*
Policy for geometric design of rural roads—State Road Authorities*.

## STREET DRAINAGE.

243 Integral concrete kerb and gutter and vehicle and dish crossing, and drawing. (A 1344.)
245 Gully pit and drawings: with grating (A 1042); kerb inlet only (A 1043); with grating and extended kerb inlet (A 1352) extended kerb inlet (A 1353). (1956).
A 190 Gully grating.
A 1418 Concrete converter.
A 3491 Perambulator ramp.
A 3536 Mountable type kerb with reflectors.

## CULVERTS.

138 Pre-cast concrete box culvert (1957) and drawing: 12 in., 18 in., 24 in., and 30 in. high (A 3847).
206 Reinforced concrete culvert (1948) and instruction sheets. (A 304, A 305, A 306, A 359.)
A 1012–28 Single cell reinforced concrete box culvert: 6 in. to 1 ft. 3 in. (A 1012); 1 ft. 4 in. to 3 ft. (A 1013); 4ft. (A 1014); 5 ft. (A 1015); 6 ft. (A 1016); 7 ft. (A 1027); 8 ft. (A 1018); 9 ft. (A 1019); 10 ft. (A 1020); 11ft. (A 1020A); 12ft. (A 1020B).
A 1021–29 Two cell, reinforced concrete box culvert: 6 in. to 1 ft. 3 in. (A 1021); 1 ft. 4 in. to 3 ft. (A 1022); 4 ft. (A 1023); 5 ft. (A 1024); 6ft. (A 1025); 7 ft. (A 1026); 8 ft. (A 1027); 9 ft. (A 1028); 10 ft. (A 1029);
A 1031–36 Three cell, reinforced concrete box culvert: 6 in. to 1 ft .3 in. (A-1031); 1 ft. 4 in. to 3 ft. (A 1032); 4 ft. (A 1033); 5 ft. (A 1034); A 1040 6 ft. (A 1035); 7 ft. (A 1036); 8 ft. (A 1038); 9 ft. (A 1040).
25 Pipe culverts and headwalls, and drawings: single rows of pipes: 15. in. to 21 in. dia. (A 143); 2 ft. to 3 ft. dia. (A 139); 3 ft. 6 in. dia. (A 172); 4 ft. dia. (A 173); 4 ft. 6 in. dia. (A 174); 5ft. dia. (A-175); 6 ft. dia. (A 177); Double rows of pipes :15 in. to 21 in. dia. (A 211); 2 ft. to 3 ft. dia. (A 203); 3 ft. 6 in. dia. (A 215); 4 ft. dia. (A 208); 4 ft. 6 in. dia. (A 207); 5 ft. dia. (A 206); 6 ft. dia. (A 213). Treble rows of pipes: 15 in. to 21 in. dia. (A-210); 2 ft. to 3 ft. dia. (A 216). Straight headwalls for pipe culverts: 15 in. to 24 in. dia. (A 1153) (1957).
A 1 Joint for concrete pipes.
A 142 Inlet sump for pipe culvert 3 ft. dia. or less. (1947).
139 Timber culvert (1950) and drawings, 1 ft. 6 in. high (A 427); 2 ft. (A 428); 3 ft. (A 429); 4 ft. (A 430); 5 ft. to 8 ft. high (A 431).
A 1223 Timber culvert 20 ft. roadway. (1949.)
A 3472 Timber culvert 22 ft. roadway. (1949.)
303 Supply and delivery of pre-cast reinforced concrete pipes.

## BRIDGES AND FERRIES.

18 Data for bridge design. (1948.)
371 Waterway calculations. (Instruction.)
300 Pile driving frame, specification for 25 ft. and drawings for 30 ft. (A 209); 40 ft. (A 253); and 25 ft. portable (A 1148).
A 3693 Pontoon and pile driving equipment.
164 Timber beam bridge (1947) and instruction sheets, 12 ft. (A 3469); 20 ft. (A 70) (1949); and 22 ft. (A 1761) (1949).
326 Extermination of termites in timber bridges. (Instruction.)
350 Reinforced concrete bridge. (1949.)
495 Design of forms and falsework for concrete bridge construction. (Instruction.)
314 Regulations for running of ferries. (1955.)
A 4 Standard bridge loading. (Instruction.) (1957.)
A 26 Waterway diagram. (1943.)
A 1886 Arrangement of bolting planks. (1948.)
A 45 Timber bridge, standard details. (1949.)
A 1791 Timber beam skew bridge details. (1949.)
A 3470, A 3471 } Low level timber bridge, for 12 ft. and 20 ft. between kerb. (Instruction.) (1949.)
A 1216 Running planks.
A 1207 Reinforced concrete pile—25 tons. (1945.)
A 1208 Reinforced concrete pile—35 tons. (1957.)
A 1621 Reflector strip for bridges.
Highway Bridge Design Specification of State Road Authorities.*

## FORMATION.

70 Formation. (1955.)
528 Subsoil drains. (1957.)
A 1532 Standard typical cross-section.
A 4618 Flat country cross-section, Type A. 1955.
A 4619 Flat country cross-section, Type B. 1955.
A 4620 Flat country cross-section, Type C. 1955.
A 4621 Flat country cross-section, Type D. 1955.

Form No.

A 1101 Cross section one-way feeder road.
A 1102 Cross-section two-way feeder road.
A 114 Rubble retaining wall.

## PAVEMENTS.

71 Gravel pavement. (1949.)
228 Reconstruction with gravel of existing pavement.
254A Supply and delivery of gravel.
72 Broken stone base course. (1956.)
216 *Telford base course.*
68 Reconstruction with broken stone of existing pavement to form a base course.
257 Haulage of materials.
65 Waterbound macadam surface course.
230 Tar or bitumen penetration macadam surface course, 2 in. thick.
66 Tar or bitumen penetration macadam surface course, 3 in. thick.
125 Cement concrete pavement, and plan and cross-section. (A 1147.)
A 380 Galvanised iron strip for deformed joint.
A 381 Bituminous filler strip for transverse expansion joint.
493 Supply of ready mixed concrete.
266 Asphaltic concrete pavement.

## SURFACE TREATMENT.

93 Surfacing and resurfacing with bitumen, tar-bitumen mixture, or tar. (1957.)
466 Fluxing of binders for bituminous flush seals and reseals. (Instruction.)
351 Supply and delivery of cover aggregate for bituminous surfacing work (1957.)
354 Road-mix resealing. (1949.)
397 Fluxing for tar road-mix reseal. (Instruction and chart.)
A 1635 *Fluxing chart for bitumen road-mix reseal.*
167 Resheeting with plant-mixed bituminous macadam by drag spreader. (1951.)

## FENCING AND GRIDS.

141 Post and wire fencing (1947) and drawings: plain (A 494: rabbit-proof (A 498); flood gate (A 316).
143 Ordnance fencing and drawing. (A 7.)
144 Chain wire protection fencing and drawing. (A 149.)
246 Location of protection fencing. (Instruction.)
224 Removal and re-erection of fencing.
A 1705 Plain wire fence for use in cattle country.
A 3598 Wire cable guard fence.

## ROADSIDE.

A 1337 Concrete mile post, Type A.
A 1338 Concrete mile post, Type D.
A 1366 Standard lettering for mile posts.
A 1367 Timber mile post, Type B1.
A 1368 Timber mile post, Type B2.
A 3497 Timber mile post, Type B3.
A 2815 Concrete kerb mile block.
A 1420 Steel mould for concrete mile posts.
A 1381–3, A 1452–5 } Tree guards, Types A, B, C, D, E, F, and G.
Manual No. 4 -Preservation of roadside trees.

## MATERIALS.

296 Tar. (1949.)
337 Residual bitumen and fluxed native asphalt.
305 Bitumen emulsion. (1953.)
349 Light and medium oils for fluxing bitumen. (1948.)
A 27 Slump cone for concrete.
A 178 Mould for concrete test cylinder.
76 Design of non-rigid pavements. (Instruction.)
Manual No. 3 -Materials.*

## TRAFFIC PROVISION AND PROTECTION.

121 Provision for traffic (1954) with general arrangement (A 1323), and details (A 1325) of temporary signs. (1947.)
252 Supply and delivery of guide posts.
253 Erection of guide posts. (Instruction.)
A 1342 Temporary warning sign, details of construction.
A 1346 Iron trestle for road barrier.
A 1341 Timber trestle and barrier.

## PLANT.

A 1414 Gate attachment for lorries with fantail spreader.
A 1450 Half-ton roller with pneumatic tyres for transport.
A 2814 Two-berth pneumatic tyred caravan.
A 2828 Multi-wheeled pneumatic tyred roller.
A 2976 Fantail aggregate spreader.
A 3530 Benders for steel reinforcement.
A 3547 Steel bar cutter.

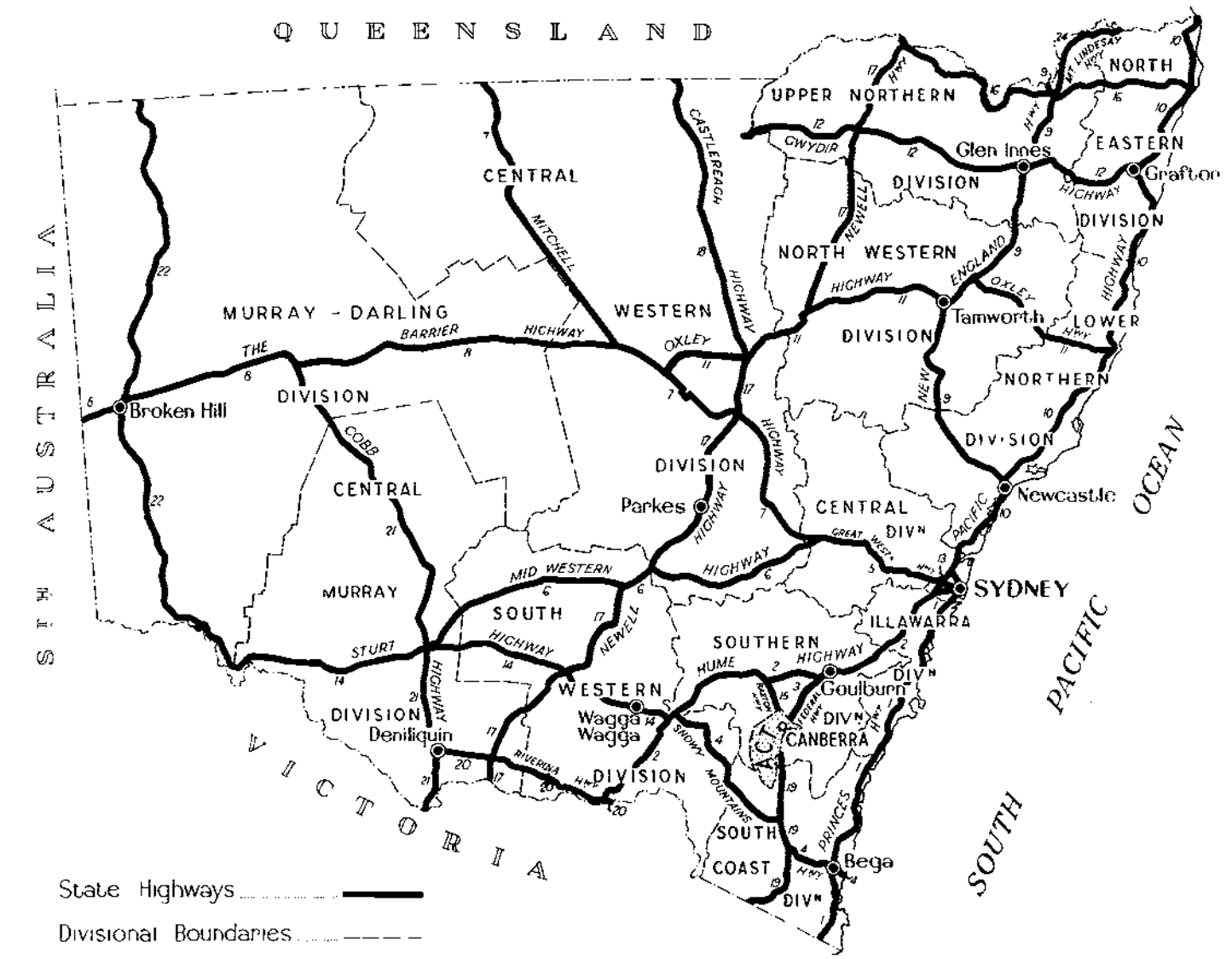
## CONTRACTS.

24B General conditions of contract, Council contract. (1956.)
342 Cover sheet for specifications, Council contract. (1950.)
64 Schedule of quantities form.
39 Bulk sum tender form, Council contract. (1946.)
38 Bulk sum contract form, Council contract.
193 Duties of superintending officer. (Instruction.)
498 Caretaking and operating ferry.

All Standards may be purchased from the Head Office of the Department of Main Roads, 309 Castlereagh Street, Sydney. Single copies are free to Council except those marked *.

Sydney: V. C. N. Blight, Government Printer—1959

# State Highway System of the State of New South Wales




State Highways .....

Divisional Boundaries .....

Divisional Offices .....

SCALE OF MILES

0 20 0 40 80 120 160 200


Area of New South Wales, 309,433 square miles.
Length of public roads within New South Wales, 127,095 miles.

MILEAGE OF MAIN AND DEVELOPMENTAL ROADS, AS AT 30th JUNE, 1959.

| | |
|---|---|
| State Highways | 6,504 |
| Trunk Roads | 4,180 |
| Main Roads | 11,739 |
| Secondary Roads (County of Cumberland only) | 86 |
| Developmental Roads | 2,787 |
| | 25,296 |
| UNCLASSIFIED ROADS, in Western part of State, coming within the provisions of the Main Roads Act | 1,200 |
| TOTAL | 26,496 |