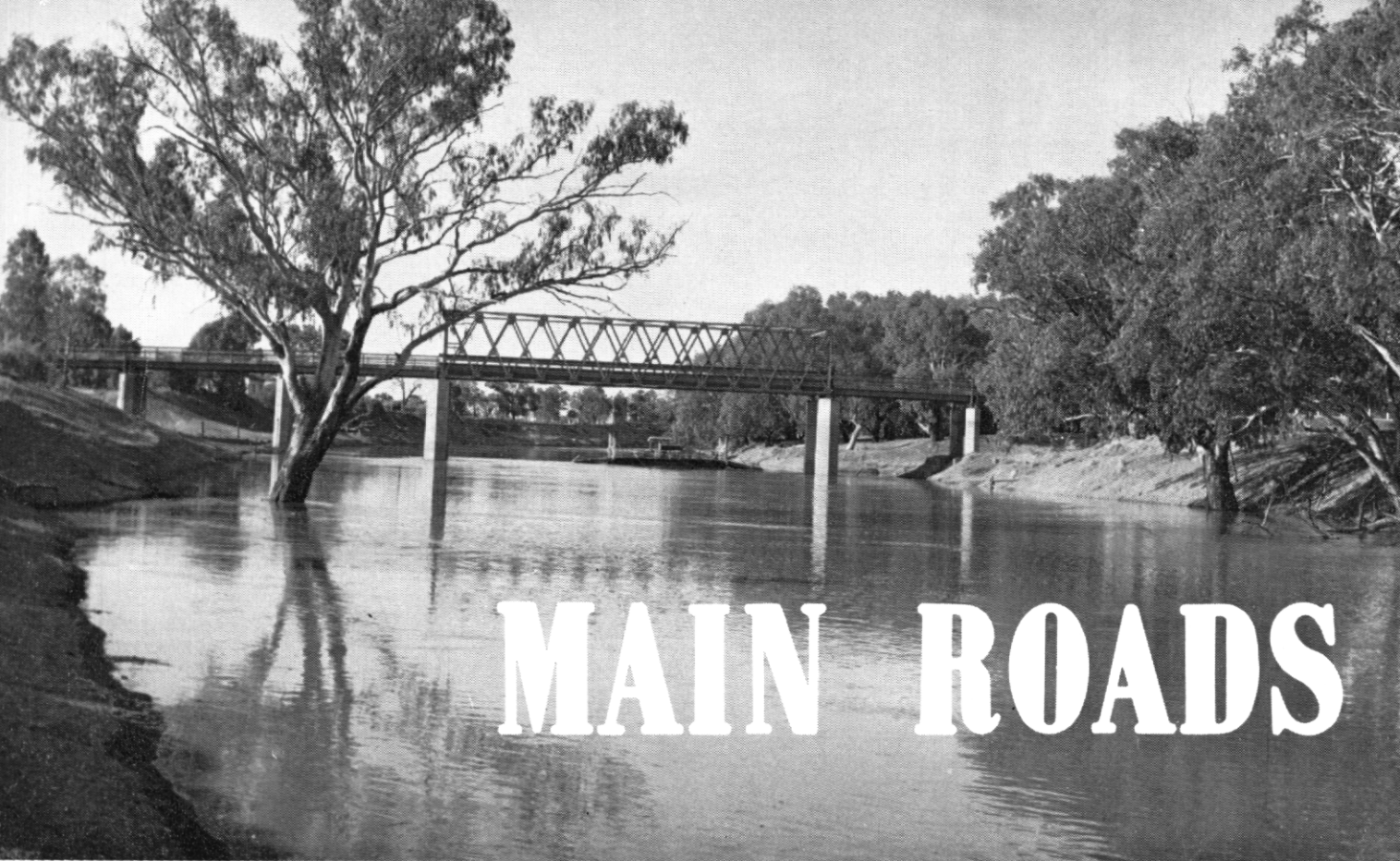


# MAIN ROADS

March, 1965

JOURNAL OF THE DEPARTMENT OF MAIN ROADS • NEW SOUTH WALES





# MAIN ROADS

Bridge over the Darling River at Tilpa

MARCH 1965

Volume 30 Number 3

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Work in progress on the Sydney-Newcastle Expressway

# MAIN ROADS

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DEPARTMENT OF MAIN ROADS  
NEW SOUTH WALES

*Issued quarterly by the  
Commissioner for Main Roads,  
J. A. L. Shaw, D.S.O., B.E.*

Additional copies of this journal may be  
obtained from

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

PRICE  
Three Shillings

ANNUAL SUBSCRIPTION  
Twelve Shillings  
Post Free

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## *New Hunter River Bridge*

The new bridge over the South Channel of the Hunter River at Tourle Street, Mayfield, was opened to traffic on Saturday, 20th February, 1965.

The Hon. J. B. Renshaw, M.L.A., Premier of New South Wales, officiated at a ceremony arranged for the occasion.

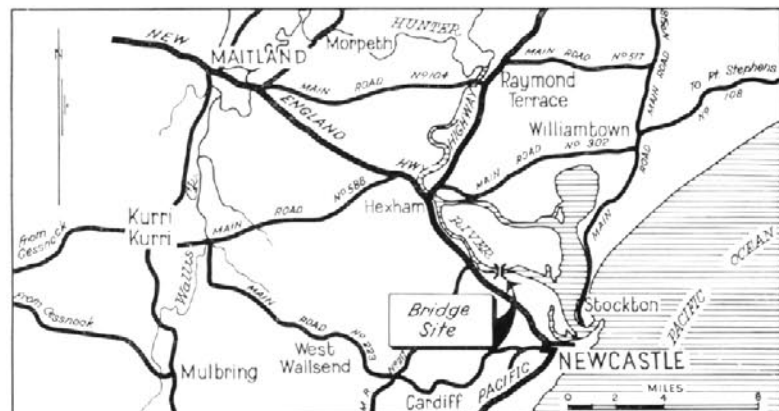
The Department of Main Roads designed the bridge, which is of steel and concrete construction. It is 978 feet long.

The Tourle Street bridge now provides easy access from the Pacific Highway to the Island Reclamation Area between the two channels of the Hunter River.

This bridge, together with another bridge to be built over the North Channel of the Hunter River will eliminate the Newcastle-Stockton ferry from the Main Roads System.

The cost of the bridge and approaches was about £510,000.

Photographs appear on page 93.



## PROGRESS ON SOME DEVELOPMENTAL ROADS AND WORKS

THE opening up of new tracts of country for development and the provision of improved access for settlers in New South Wales have been greatly assisted by the proclamation and construction of selected roads and works (including bridges) as "Developmental Roads" and "Developmental Works".

A road or a road work is proclaimed as "Developmental", following application to the Department of Main Roads by the Shire or Municipal Council or Councils jointly concerned, provided—

- (a) the road or work is not already constructed, and
- (b) its construction will lead to development warranting the expenditure to be incurred.

The cost of construction is met by the Department of Main Roads, the work generally being carried out by Councils.

Developmental Roads and Works have been of the greatest value 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

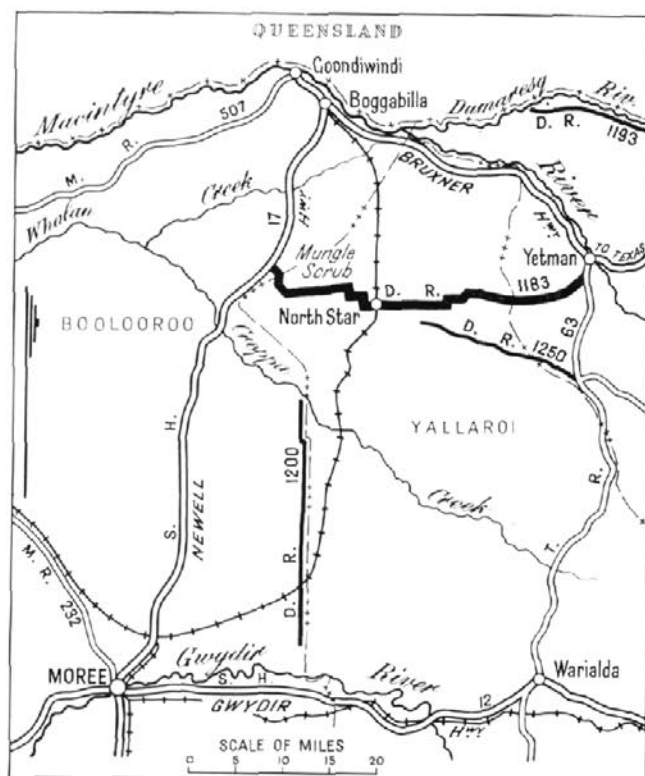
mixed farming areas. Some have been built to aid closer pastoral settlement in inland areas. Special consideration is always given to war service land settlements and other closer settlement areas. In addition to the economic benefits conferred by these roads, settlers also obtain quicker and surer access to business centres, schools, medical care, hospitals and other community services, as well as social and recreational amenities.

Since the inception of the Main Roads Act in 1925, a total of about 4,810 miles of road has been proclaimed as Developmental. In addition, 172 Developmental Works (including bridges) have also been proclaimed.

The funds which the Department has been able to allocate for construction of Developmental Roads and Works have averaged £612,000 per annum in the last three financial years. These funds, however, are not keeping pace with the demand and the need for developmental road construction, and there are many cases where funds are awaited to enable required work to be commenced or continued. It is estimated that the cost to complete construction on roads and works already proclaimed is between three and four million pounds.

Details of some recent works are given below.

### ● DEVELOPMENTAL ROAD NO. 1183. Yetman, via North Star, to Newell Highway, south of Boggabilla. Shires of Ashford, Yallaroi and Boolooroo



Developmental Road No. 1183 commences at Trunk Road No. 63, one mile south of Yetman and extends westerly through North Star to the Newell Highway (State Highway No. 17), 19 miles south of Boggabilla. It is about 39 miles in length and traverses black soil country ranging from undulating areas at its eastern end to flat western plains near the Newell Highway, with an annual average rainfall of about 23 ins. The land is used mainly for the production of wool and wheat.

The Developmental Road functions as an important feeder route for the carriage of wheat to rail at North Star, where there is a bulk wheat depot of 700,000 bushels capacity. It also provides an outlet for the carriage of wool to Texas via Yetman and State Highway No. 16 and to Goondiwindi via State Highway No. 17.

The road had previously been constructed from Trunk Road No. 63 to a point about 5½ miles west of North Star and from Boolooroo Shire boundary to State Highway No. 17. These works were described in the December, 1960, issue of "Main Roads".

Recent work carried out on the intervening length of about 8 miles within Yallaroi Shire completed the construction of the Developmental Road. Before construction of this section, the road consisted of a partly cleared track and was virtually impassable in wet weather. The work comprised grader formation



and boxing, the provision of a 16 ft. wide gravel pavement, the construction of culverts, including a triple 18 ins. diameter pipe culvert, and the replacement of an existing causeway over Back Mungle Creek with an 80 ft. long concrete causeway. Guide and fender posts, complete with delineators, were erected where required.

The work was carried out by Yallaroi Shire Council's day labour forces at a cost of £11,456. The total expenditure was met by the Department of Main Roads.

● **DEVELOPMENTAL ROAD NO. 1265. From Main Road No. 282 near Tumbarumba to approximately 11½ miles easterly. Shire of Tumbarumba**

Developmental Road No. 1265 commences at Main Road No. 282, about 11 miles east of Tumbarumba and runs in an easterly direction for 11.6 miles.

The road traverses mainly the watershed between the Murray and Murrumbidgee catchment areas. The country is of granite, basalt and slate formation well suited to pastoral and agricultural development with an annual average rainfall of 40 inches. Elevation at the highest point on the road is 4,000 feet. To the north of the road is the extensive Bago State Forest. To the south is the Valley of Maragle Creek, the lower portion of which is taken up with Closer Settlement Leases, the upper section including an area of about 10,000 acres of leasehold and freehold land, largely undeveloped until now because of lack of access.

Prior to construction of the road, the track was narrow, winding and generally unformed, rough in dry weather and impassable during periods of rain.

On the section from Main Road No. 282 to 4.7 miles, clearing has been carried out and funds have been provided for construction to commence during the current year. The Department aims to provide funds each year until this section is completed.

Construction of the section from 4.7 miles to 11.6 miles has been completed. The road was constructed

The quantity of wheat received at North Star increased from 378,000 bags in 1959 to 706,000 bags in 1962-63, while the area under wheat cultivation in the north-western portion of Yallaroi Shire increased from 17,500 acres in 1958-59 to 53,000 acres in 1962-63.

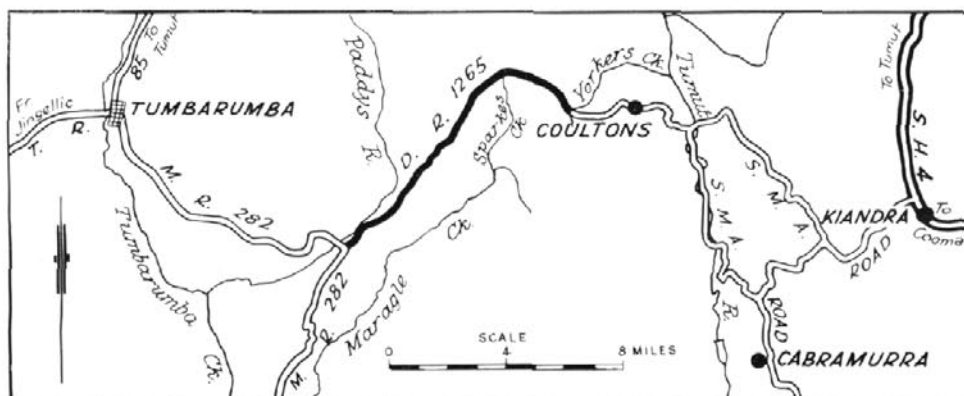
The growth in production may be attributed largely to the availability of a ready means of access for the transport of produce. The figures provide concrete evidence of the benefits to the State which are derived from Developmental Roads expenditure.

to a formation width of 26 ft., with a 20 ft. wide gravel pavement. Works carried out by contract with Tumbarumba Shire Council were the installation at Sparke's Creek of a three-cell 9 ft. x 6 ft. reinforced concrete box culvert with a length of about 33 ft.; formation work on a length of 4.6 miles; and the cartage of gravel. The balance of the work was completed by Tumbarumba Shire Council with day labour forces.

The total cost of the work to date, about £37,000, was met by the Department of Main Roads.

The work already carried out has provided improved access generally. It will assist the development of closer settlement of the surrounding plateau country and will provide a ready means of transport for timber from the Bago State Forest to the mills at Tumbarumba. The road also provides a western access to the Kosciusko State Park and the Snowy Mountains Hydro-Electric Authority works.

Developmental Road No. 1265 about 11 miles from its junction with Main Road No. 282





Developmental Road No. 1283 adjacent to the Colleambally Irrigation Canal

● **DEVELOPMENTAL ROAD NO. 1283.** From Sturt Highway, near Narrandera, to Morundah Road. Shire of Murrumbidgee

That part of Developmental Road No. 1283 on which work has recently been carried out is 9.9 miles in length. It starts at the Sturt Highway 26 miles west of Narrandera and runs in a southerly direction parallel to and on the western side of the Colleambally Irrigation Canal where

it joins an unclassified road leading to Morundah. It serves an area of about 140 square miles.

The road traverses flat grazing and farming country which is contained in the Colleambally Irrigation Area. The majority of the blocks are used for fat lamb raising, wool-growing and, to a lesser extent, cereal crops, mainly rice and wheat. Prior to the development of the irrigation scheme, the country was used entirely for sheep raising and carried about one sheep to four acres. The advent of irrigation is expected to increase the carrying capacity of much of the area to between four and six sheep to the acre. Each block has a rice right of 60 acres from which a crop of about 150 tons is harvested during the autumn months.

The road was constructed generally to a 30 m.p.h. design standard, with a 24 ft. wide formation and a loam pavement 16 ft. wide. It provides all-weather access for the transport of produce and materials.

The work was carried out by Murrumbidgee Shire Council, the total cost, about £7,000, being financed by the Department of Main Roads.

An extension of this Developmental Road, about 9½ miles in length, was proclaimed in 1963. The Department made available to Murrumbidgee Shire Council an amount of £9,100 for expenditure on this section, the construction of which is nearing completion.





### ● DEVELOPMENTAL WORK NO. 3123. Bridge over Bogan River at Charlton. Shire of Brewarrina

Developmental Work No. 3123 consists of a bridge 90 feet long over the Bogan River at Charlton, together with 1,000 feet of approach roadworks. The bridge is situated 24 miles south of Brewarrina on the Brewarrina-Charlton Road.

To the north of the Bogan River the country is generally cleared black soil, whilst to the south it consists generally of red soil which is fairly densely timbered. The average annual rainfall is about 14 inches. The area is used mainly for wool-growing.

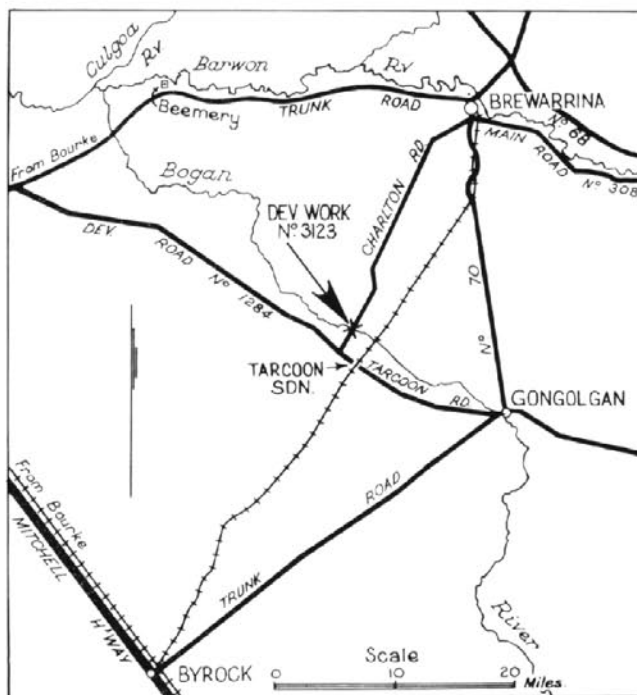
The bridge replaced a causeway which was often untrafficable, depending upon the water level of the river.

The new all-weather crossing provides ready access for adjoining properties to the commercial centre at Brewarrina and to the nearby railhead at Tarcoon.

The bridge consists of three spans and is a steel and concrete structure 90 ft. long, with a width of 12 ft. between kerbs. The concrete deck has been constructed above the highest known flood level. The structure was erected under contract to Brewarrina Shire Council, while the approaches were constructed by Council's day labour forces.

The total cost of the works, about £10,000, was met by the Department of Main Roads.

Development of the area south of the Bogan River will be further assisted by the construction of the road from

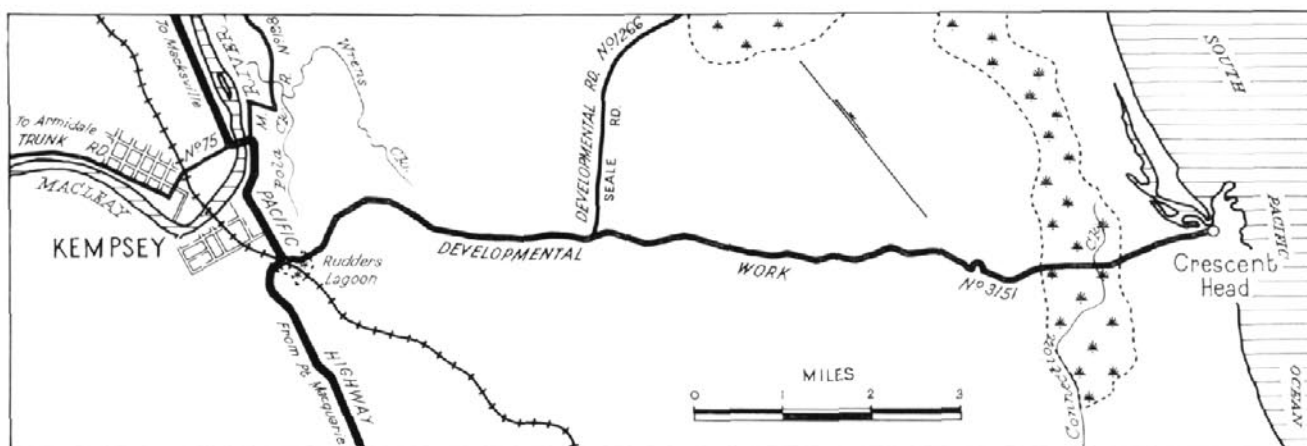


the Bourke-Brewarrina Trunk Road at 16 miles east of Bourke to Tarcoon (Developmental Road No. 1284). Part of this work has been completed by Brewarrina Shire Council, the total expenditure of £7,192 being met by the Department of Main Roads.

The bridge over the Bogan River at Charlton Developmental Work 3123



● **DEVELOPMENTAL WORK NO. 3151. Road from Kempsey to Crescent Head. Municipality of Kempsey and Shire of Macleay**



Developmental Work No. 3151 comprises road and drainage works on the Kempsey-Crescent Head Road, which commences from the Pacific Highway (State Highway No. 10), two miles south of Kempsey, and extends in a south-easterly direction for 11½ miles to the township of Crescent Head. The road traverses mainly timbered country, part being State Forest and the remainder, mixed farms. With the exception of

one substantial hill about 2½ miles from Crescent Head, the area is mainly flat, with some swamp and low hills composed of shale. Branch roads leading off the Kempsey-Crescent Head Road provide access to districts which support rural industries, including dairying, cattle raising, agriculture and timber. Extensive quantities of rutile and zircon are obtained from the beaches immediately south of Crescent Head. The road is used as an outlet for the transport of the refined minerals.

**New construction on Developmental Work No. 3151**



Prior to 1939, the road consisted of a narrow winding bush track but in that year, and during 1940, sections were reconstructed with unemployment relief grants at a cost of £25,000. Since July, 1960, when the Developmental Work was proclaimed, five grants totalling £33,500 have been made available to Macleay Shire Council by the Department of Main Roads. The Department proposes to make a further grant available in the forthcoming financial year to enable the work to be completed.

The road has been bitumen surfaced throughout its length in the Municipality of Kempsey and the Shire of Macleay by the two Councils concerned and the work will now be concentrated mainly on the construction of drainage works on two sections of the road.

One low-lying section known as Rudders Lagoon (near the Kempsey end of the road) is subject to inundation from the Macleay River in time of flood. The pavement of this section is to be raised and an existing small bridge enlarged. Work on the remaining section between Seale Road and Crescent Head entails the construction of a number of pipe and box culverts.

The works are being carried out by the Macleay Shire Council, the full cost being met by the Department of Main Roads.



## *Retirement of Secretary to Department of Main Roads*



Mr. W. W. Weir

Mr. Wallace W. Weir retired from the office of Secretary to the Department of Main Roads, New South Wales, on Friday, 18th December, 1964.

At the time of his retirement, Mr. Weir had completed 49 years of service with the Government, 38 of which were with the Main Roads Board, later the Department of Main Roads. He was appointed Secretary to the Department on 21st November, 1962, prior to which he had occupied the position of Chief Accountant for a number of years.

Mr. Cecil W. Mansfield, previously Deputy Secretary to the Department, succeeded Mr. Weir to the position of Secretary. Mr. Mansfield joined the staff of the Department as a Junior Officer in 1929. He served in a number of field and head office positions prior to his appointment as Assistant Secretary and subsequently Deputy Secretary. He is a qualified accountant and also holds the Diploma of Public Administration from the University of Sydney.

## *Appointment of Successor*



Mr. C. W. Mansfield

## SYDNEY HARBOUR BRIDGE ACCOUNT

Receipts and Payments for the period from 1st July, 1964 to 31st December, 1964

<i>Receipts</i>						<i>Payments</i>					
					£						£
Road Tolls	..	..	..	..	956,277	Cost of collecting road tolls	..	..	..	96,582	
Contributions—						Maintenance and minor improvement	..	..	..	163,894	
Railway passengers	..	..	..	..	73,188	Interest, exchange and management expenses on					
Omnibus passengers	..	..	..	..	8,156	loans	..	..	..	289,910	
Rent from properties	..	..	..	..	29,109	Alterations to structures	..	..	..	7,538	
Miscellaneous	..	..	..	..	337	Administrative expenses and Miscellaneous charges	..	..	..	9,975	
						Transfers to Expressways Fund	..	..	..	425,000	
						Provision of traffic facilities	..	..	..	19,604	
						Toll collection equipment and establishment	..	..	..	190	
					<u>£1,067,067</u>					<u>£1,012,693</u>	

# New Bridge at Nelligen

## CANBERRA- BATEMAN'S BAY TRUNK ROAD



New bridge over the Clyde River at Nelligen

THE ferry service over the Clyde River at Nelligen, which first began in 1871, ceased operating on Saturday, 12th December, 1964, when a new bridge on the Canberra-Bateman's Bay road (Trunk Road No. 51) was officially opened to traffic.

The opening ceremony was performed by the Hon. P. D. Hills, M.L.A., Deputy Premier, Minister for Local Government and Minister for Highways.

The new bridge is of reinforced and prestressed concrete, comprising seven spans, with an overall length of 827 feet. The deck is 24 feet wide between kerbs and there is a 5 feet wide footway on the downstream side. The bridge is built on a skew of 24° across the river and the level of the deck in the centre is approximately 3 feet above the highest recorded flood level.

The bridge design was prepared for the Department by the Sydney firm of Consulting Engineers, Messrs. MacDonald, Wagner and Priddle.

Construction was carried out by E. S. Clementson (N.S.W.) Pty. Ltd., of Sydney.

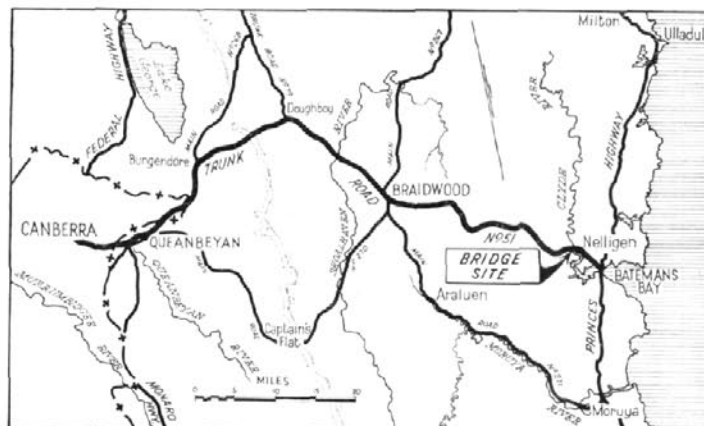
The total cost of constructing the bridge, including the provision of a bituminous pavement on the deck together with the construction of the approaches, was about £340,000.

Another new bridge situated on Trunk Road No. 51, crossing the Mongarlowe River, 10 miles east of Braidwood, was also brought into use prior to the Christmas, 1964 holiday season. It replaced an old timber beam bridge.

Trunk Road No. 51 extends from the Prince's Highway (State Highway No. 1) at Bateman's Bay via Braidwood, Bungendore and Queanbeyan to the Australian Capital Territory boundary. It is the principal link between the coast and Canberra with through holiday traffic accounting for a large proportion of the total traffic.

The annual average daily traffic on Trunk Road No. 51 at the Clyde Mountain is estimated to be about 475 vehicles, but this rises in summer holiday months to about 1,000 vehicles per day.

The construction of the bridges over the Clyde River at Nelligen and the Mongarlowe River marks the completion of the reconstruction of the full length of Trunk Road No. 51.





# TROUBLE SPOT ELIMINATED

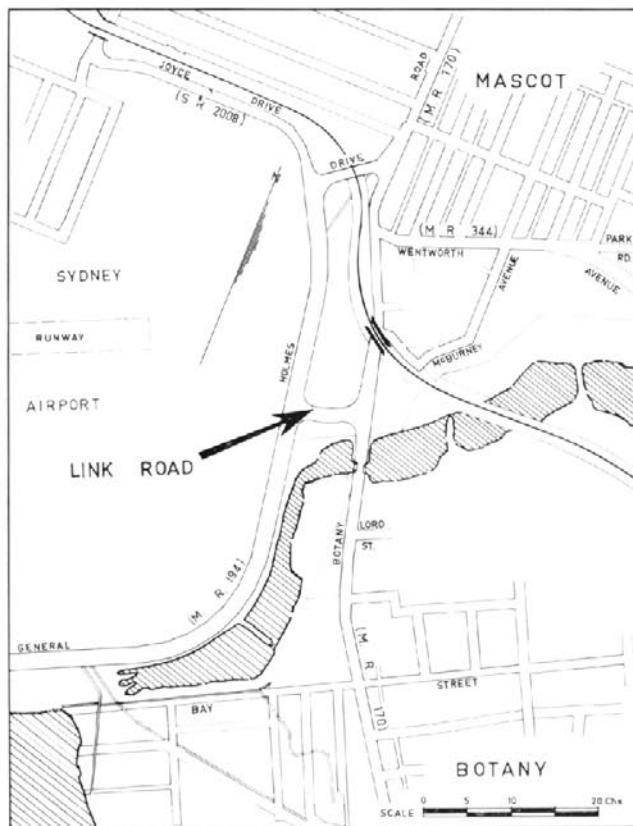
**T**HE General Holmes Drive-Botany Road intersection has for some time been a point of considerable traffic congestion, especially during peak hours, which has had an adverse effect on the smooth flow of traffic on General Holmes Drive.

To eliminate this trouble spot, the Department of Main Roads, in June 1964, commenced the construction of a new road to provide a connection between General Holmes Drive and Botany Road just south of the Botany Goods Railway Line.

The purpose of the new road was to provide a by-pass of the existing intersection which would allow a freer movement of traffic on General Holmes Drive.

The new road was completed and made available to traffic on Monday, 18th January, 1965. It is 500 feet long and includes a bridge 35 feet long and 168 feet wide over a stormwater canal adjacent to General Holmes Drive. The work was carried out at a cost of approximately £110,000.

Since the completion of the link road between Botany Road and General Holmes Drive, it has been found that the traffic moves smoothly on the link road itself, the General Holmes Drive-Botany Road intersection is considerably less congested, with traffic hold-ups virtually eliminated, and traffic moves quite freely along General Holmes Drive.



New link road between Botany Road and General Holmes Drive



## Precoating Aggregate for Bitumen Surfacing

**T**HE increase in speed and power of motor vehicles and the considerable increase in the number of motor vehicles on the road after the 1939-45 War made it difficult to retain cover stones in a bituminous surfaced pavement, the type of surface generally used on rural main roads. Fast moving traffic dislodged individual stones exposing the bitumen which "bled" in hot weather. Flying stones also resulted in the breakage of vehicle windscreens.

Stones were plucked out of the bitumen where there was a lack of bond between the stone and the bitumen. To improve this bond, the Department of Main Roads and other road authorities throughout the world experimented with additives to the bitumen. However, the Department found that the most effective way to improve the bond was at the point where it was most needed, that is, on the surface of each stone. This was done by coating the aggregate with the bonding agent. At first creosote was used as a pre-coating agent, but more recently the Department has done most pre-coating with low viscosity petroleum tar applied at the rate of two gallons per cubic yard of aggregate.

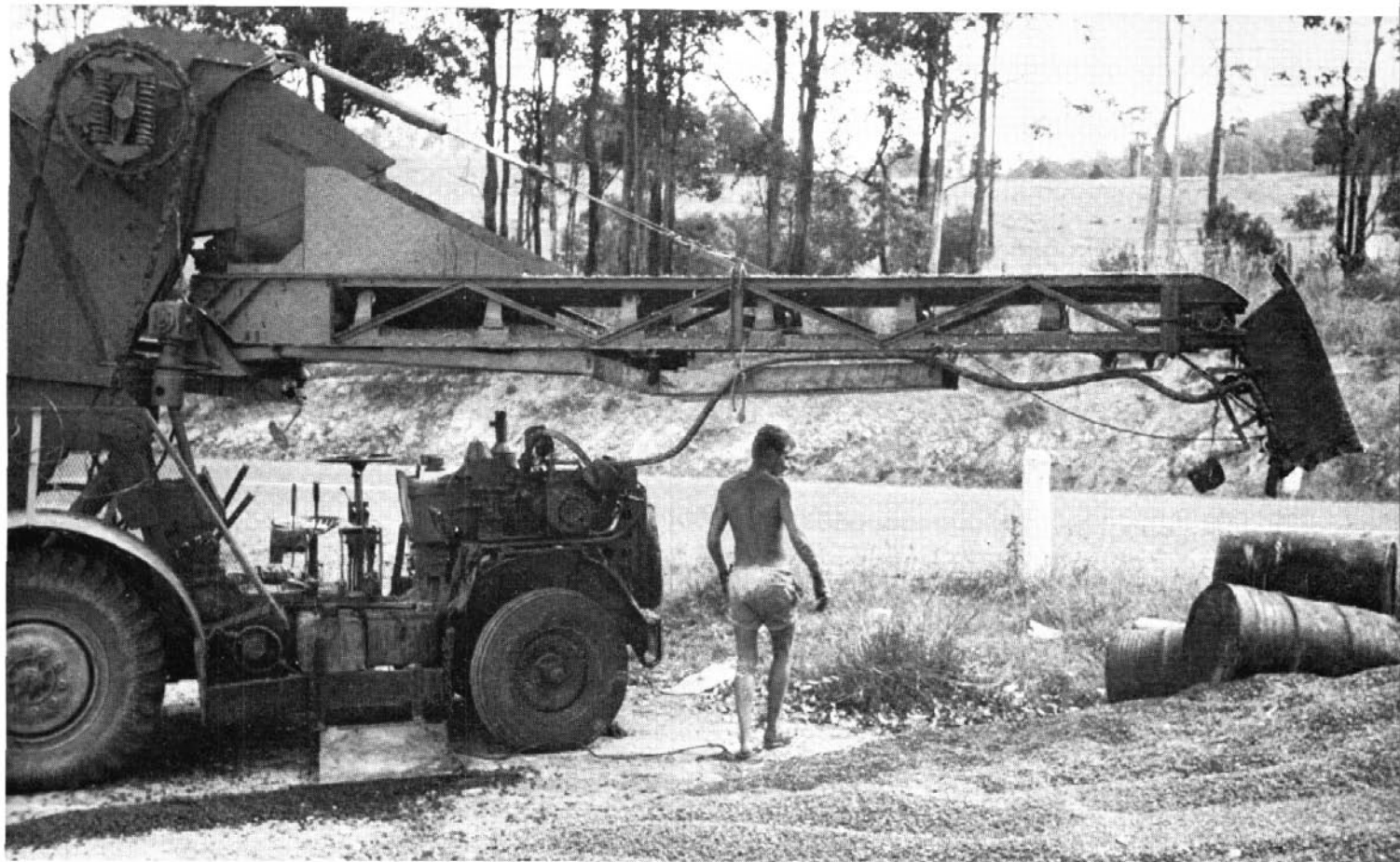
In its early development, precoating was applied by spraying the stockpile as it was turned over by a front-end loader or by spraying the aggregate as the loader deposited it in the lorry. However, this proved to be inefficient and wasteful of materials and manpower.

A contractor to the Department of Main Roads developed a method of spraying the precoating agent on the top of the stockpile and flushing it through with water. However, this gave a very irregular coating,

The aggregate being precoated as it falls through the hood attachment







heavy at the top of the stockpile and very light at the bottom. The water also made working conditions around the stockpile very difficult.

The most successful of these early methods was to spray the face of the stockpile as the aggregate fell down the face to the intake of a continuous bucket-type loader. This gave a good coating but was wasteful of manpower.

Subsequently, one of the Department's officers developed a method of automatic precoating by using a

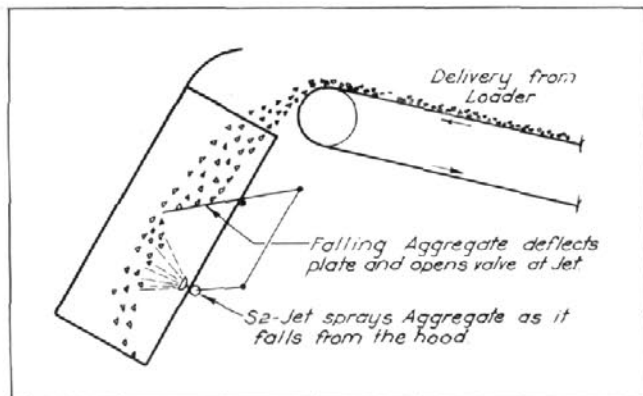
**The bucket type loader showing the hood at the end of the delivery belt**

continuous bucket-type loader. The process provides a good even coat to the aggregate and at the same time eliminates the need for manually applying the agent. The method is illustrated in the accompanying photographs and diagram.

The basic principle is that as aggregate falls from the delivery belt, it strikes a plate in the hood, deflecting it and by a system of levers opens a control valve supplying the precoating agent to a jet. When the aggregate clears the plate it is sprayed by the jet while falling to a new stockpile or into a lorry. As the plate is counterbalanced by a weight, the degree of deflection of the plate and the opening of the control valve is proportional to the amount of aggregate passing through the hood.

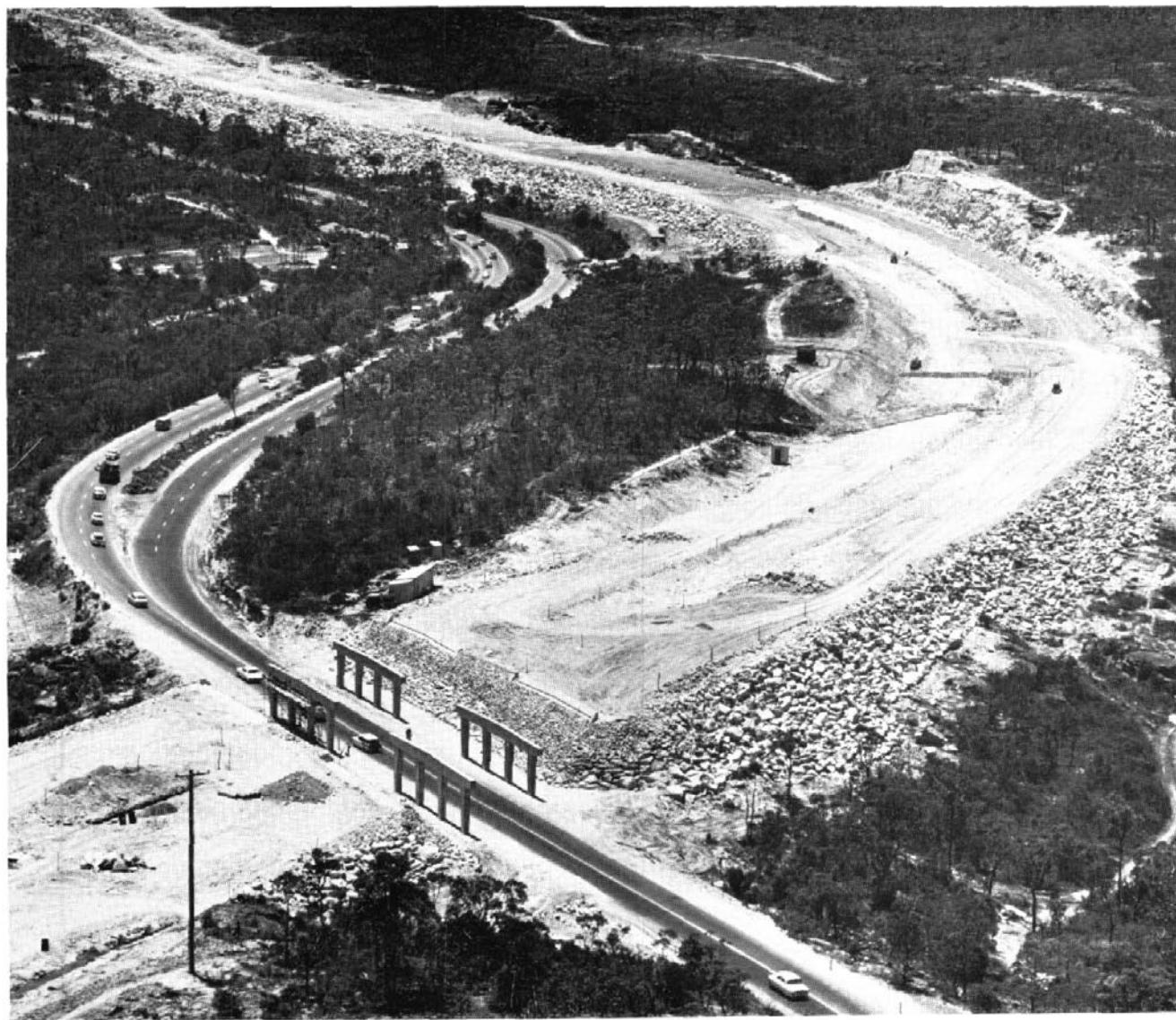
The precoating agent is contained in a drum, fitted on a platform on the loader. It is fed to the jet by a small pump driven off the engine of the loader.

The device requires no labour other than the operator of the loader. It gives a good, even coating of the stone and is economical in its application of the precoating agent.





Construction of the interchange at Mount White



A bridge being constructed to carry the expressway over Pacific Highway near Mount White

route. An interchange is also being provided at the southern end of the first section adjacent to the Hawkesbury River Bridge.

Both contract and day labour jobs are proceeding simultaneously. It is expected that the section being carried out by the Department will be completed about the middle of 1965 and the section being constructed by contract about November, 1965.

At a number of places the route of the expressway cuts across the line of the Pacific Highway and it has been necessary to construct deviations of the highway to provide for its continued use by traffic. These deviations have been constructed on a generally better alignment than the existing highway, although on some lengths, grades are a little steeper. However, on the steeper grades additional lanes for slow moving traffic have been provided.

The length of relocated sections of the Pacific Highway is about  $2\frac{1}{2}$  miles in all and most of this was brought into use late in 1964.

The accompanying photographs illustrate the progress of the work on the first and second sections of the expressway.

The Department is now preparing plans and specifications for the third section of the expressway, that is, from the interchange at Mount White to Calga, a distance of about  $3\frac{1}{2}$  miles, with a view to commencement at an early date.

It is the Department's aim to have the expressway between the Hawkesbury River and Calga, a distance of nearly 10 miles, completed by mid-1967. This will then provide for travel under expressway conditions from the Hawkesbury River to Ourimbah, a distance of about 30 miles.





*Deniliquin*

# Three Western Towns

The Departments's activities are decentralised to the greatest possible extent so that close co-operation with Municipal and Shire Councils is facilitated. The Commissioner for Main Roads is represented by Divisional Engineers with headquarters located at Bourke, Broken Hill and Deniliquin.



*Bourke*

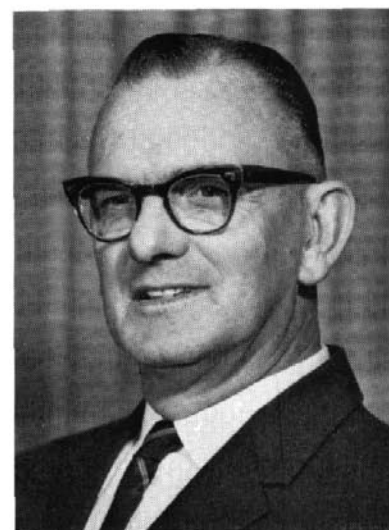




Mr. R. W. Cairns

## Retirement of Department's Chief Accountant

## Appointment of Successor



Mr. R. G. Barton

Mr. Robert W. Cairns, who has been the Department's Chief Accountant since November, 1962, retired from the service of the Department of Main Roads on 29th January, 1965. Mr. Cairns joined the staff of the then Main Roads Board in 1928. He had been associated with the Accounts Branch of the Department throughout his service and prior to his appointment as Chief Accountant, he had occupied the position of Accountant for a number of years.

Following the retirement of Mr. Cairns, Mr. Robert G. Barton, who was formerly the Accountant, was appointed to the position of Chief Accountant to the Department. Mr. Barton is a qualified accountant and cost accountant as well as an incorporated secretary. He also joined the staff of the then Main Roads Board in 1928.

## MAIN ROADS FUND

Receipts and Payments for the period from 1st July, 1964 to 31st December, 1964

	County of Cumberland Main Roads Fund	Country Main Roads Fund
	£	£
<b>RECEIPTS—</b>		
Motor Vehicle Taxation (State) .. .. .	1,532,257	6,129,029
Charges on heavy commercial goods vehicles under Road Maintenance (Contribution) Act, 1958 (State) .. .. .	510,645	2,042,577
Commonwealth Aid Roads Act, 1964 .. .. .	1,076,107	4,164,928
Road Transport and Traffic Fund .. .. .		
From Councils under Section 11 of Main Roads Act and/or for cost of works ..	1,248,795	36,256
Other .. .. .	280,319	136,421
<b>Total Receipts .. .. .</b>	<b>4,648,123</b>	<b>12,509,211</b>
<b>PAYMENTS—</b>		
Maintenance and minor improvement of roads and bridges .. .. .	823,864	3,953,634
Construction and reconstruction of roads and bridges .. .. .	2,218,736	5,639,113
Land Acquisitions .. .. .	712,466	264,660
Administrative Expenses .. .. .	218,296	572,569
Loan charges, payment of interest, exchange, management and flotation expenses ..	50,505	287,205
* Miscellaneous .. .. .	505,911	868,755
	<b>4,529,778</b>	<b>11,585,936</b>

\*Includes transfers to Special Purposes Accounts in respect of finance for Operating Accounts, Suspense Accounts and Reserve Accounts.



# Silver City Highway

## STATE HIGHWAY NO. 22

### Reconstruction and Bitumen Surfacing Between Broken Hill and Wentworth

**T**HE Silver City Highway (State Highway No. 22) is 436 miles long and extends from Buronga near Mildura on the Victorian border via Broken Hill and Tibooburra to the Queensland border at Warri Gate.

From its commencement at its junction with the Sturt Highway (State Highway No. 14) at Buronga, the highway traverses the north bank of the Murray River for 20 miles to Wentworth, at the confluence with the Darling River. The Highway traverses 10 miles of the Darling River flood plain north of Wentworth and then

follows the east bank of the Great Anabranch of the Darling River to a bridge crossing at 52 miles north of Wentworth, after which it follows a generally northerly direction to Broken Hill and thence to the Queensland border.

Between Buronga and Pomona, the highway passes through several irrigation settlements which produce citrus fruits in quantity. Grapes are also grown in this area, either for table use or for the production of wine. Considerable quantities of grapes are dried locally and drying racks are a feature of the landscape.

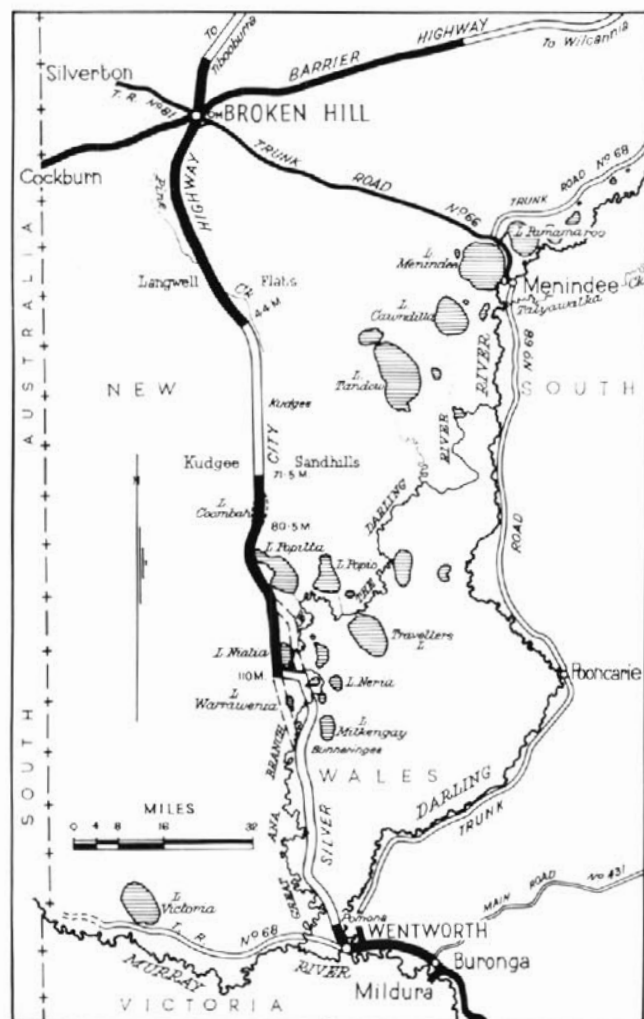
Away from the irrigated areas, the low rainfall, varying from 11 inches per annum at Wentworth to 9 inches per annum at Broken Hill, limits land use to grazing, principally wool growing. Sheep and cattle are now generally transported by road to saleyards at Broken Hill and Yelta (Victoria). Very few stock are moved on foot via the stock routes.

The Silver City Highway within the City of Broken Hill has been provided with a dustless pavement for some time but away from the City the pavement was generally constructed with gravel or the natural material of the country through which it passed.

The highway descends gradually from Broken Hill in the Barrier Ranges, at an elevation of nearly 1,000 feet, through red clayey loams to low red sandy loam country at Kudgee, about 60 miles south of Broken Hill. The southern end of the Kudgee Sandhills, at 72 miles, marks the beginning of shallow lake country which may become inundated by waters spreading from high floods in the Darling River Anabranch.

Reconstruction of the length of the highway between Broken Hill and Wentworth began in the 1954-55 financial year when a sealed pavement four miles long was provided between Wentworth and Pomona, at a cost of £22,370. Graveling was also carried out on selected sections of low lying clayey country between 30 miles and 41 miles south of Broken Hill, known as the Langwell Flats where traffic was blocked in wet weather. Part of the latter work was done by day labour and 6.4 miles were completed by contract, the total cost being £13,343.

Extension of the bitumen surface south of Broken Hill was commenced in October 1955, when a section was





New bridge over Pine Creek about 30 miles south of Broken Hill

completed from 3.0 miles to 8.0 miles south. During the ensuing five years, bitumen surfacing was extended in three sections to 30.6 miles. This included two deviations, 8.5 miles to 16.0 miles and 18.8 miles to 30 miles. The total cost of the work was £238,017. A steel bridge, 400 feet long with a concrete deck 24 feet wide supported on steel plates was constructed at Pine Creek, 29.9 miles south of Broken Hill, at a cost of £28,167. It replaced an open causeway which had frequently blocked traffic.

During the major flooding of the Darling and Murray Rivers systems in 1956, considerable lengths of the Silver City Highway were inundated at critical sections for long periods of time.

These sections, adjacent to Lakes Popilta and Nialia, and the east bank of the Great Anabranh, could not be avoided by local deviations and it became necessary to

plan major deviations of the highway on to high ground to avoid the difficulties caused by flooding and inferior foundations.

Construction of a deviation around the western shores of Lake Popilta, 80.5 miles to 93.6 miles south of Broken Hill was commenced in October, 1961. The deviation, 13.1 miles long, was provided with a bitumen surface by mid-1963. The total cost of this work was £131,370.

Bitumen surfacing extending southerly from Broken Hill was re-commenced in February, 1963 at 30.6 miles south and by August of that year had been extended to 40 miles south of Broken Hill at a cost of £70,045. Reconstruction work was continued to 46.2 miles south of Broken Hill and a bitumen surface was provided to 44 miles. The cost of this work, which was undertaken by the Department by day labour, was £48,829.

#### Reconstructed length about 44 miles south of Broken Hill

At the southern end of the deviation west of Lake Popilta, another deviation, 30 miles in length, has been planned to follow high ground west of the existing road to a new crossing of the Darling River Great Anabranh further downstream at a point, 42 miles by road, north of Wentworth.

The new deviation is being constructed by the Department by day labour in two sections, the northernmost section, 16 miles in length, was completed and made available to traffic on 1st September, 1964. A temporary road, 3.5 miles long, connected the new route to the existing highway south of Lake Nialia. The cost of this work was approximately £157,000.

The southern section of the 30 mile deviation includes two steel bridges, with lengths of 528 feet and 240 feet and a deck width of 24 feet, over the Darling River Great Anabranh at Bunneringee. A contract for construction of the bridges has been let to L. M. Robertson Construction Company of Edwardstown, South Australia, the amount of the accepted tender being £103,887. Bridge construction commenced early in 1965. Road construction, including the provision of a bitumen surface, is proceeding and it is the Department's aim to complete the roadworks at the same time as the bridges.

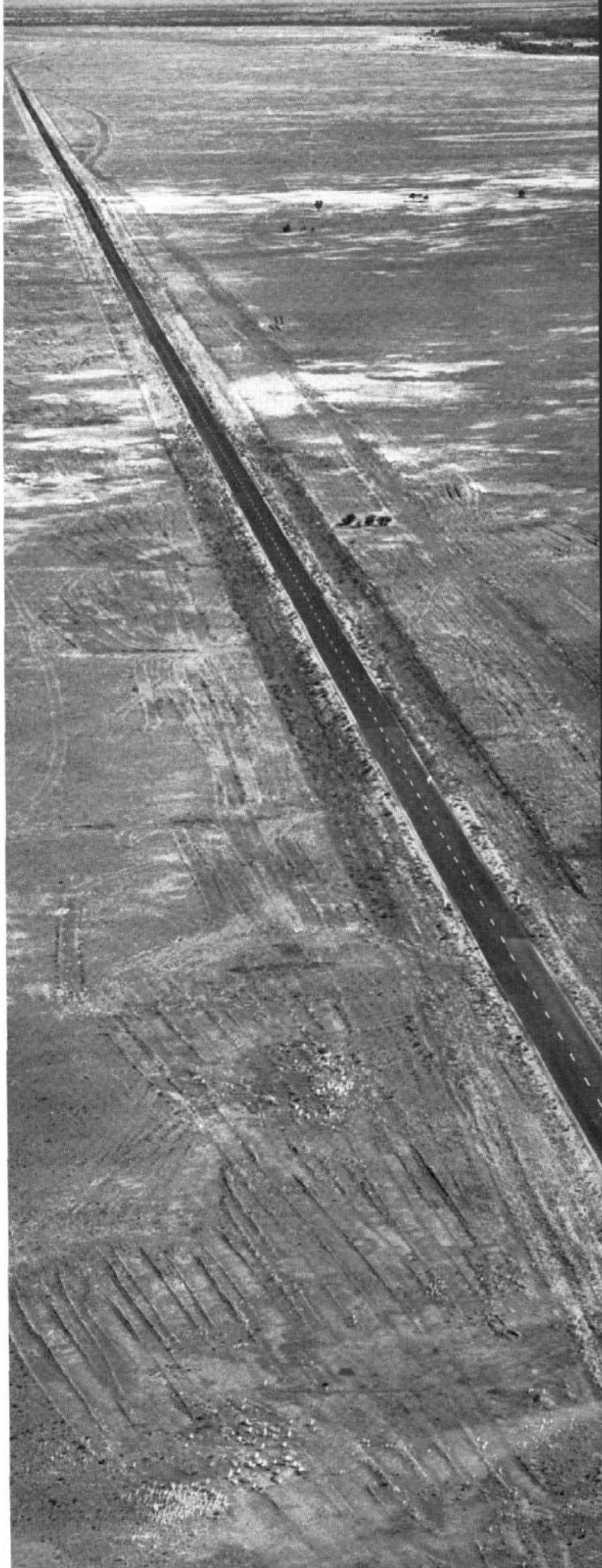
Between 71.5 miles and 80.5 miles south of Broken Hill work was re-commenced on the section across Lake Coombah, which had been partly carried out in 1957. This 9 miles section, immediately north of the Lake Popilta deviation, was completed to a tar primed stage in January 1965. The final bitumen surfacing will be added later. The work was carried out by the Department at a cost of about £54,200.

Travellers on the Silver City Highway, between Broken Hill and Wentworth now have 86 miles of dustless pavement available to them out of the total existing length of 171 miles.

The work remaining to be done, 85 miles in length, comprises two sections, one  $27\frac{1}{2}$  miles north of Lake Coombah and the other,  $57\frac{1}{2}$  miles long, from the southern end of the deviation at present under construction to Pomona.

Future reconstruction works on State Highway No. 22 have been planned on a priority basis which takes into consideration trafficability during adverse weather, the likelihood of flooding, and safety for traffic, much of which, even at this stage, travels at high speed. Some of the proposed works are to be linked by future bridges, in particular the deviation over the Darling River flood plain immediately North of Wentworth.

When the road has been reconstructed throughout, the present distance of 171 miles between Broken Hill and Wentworth will have been reduced to about 166 miles.



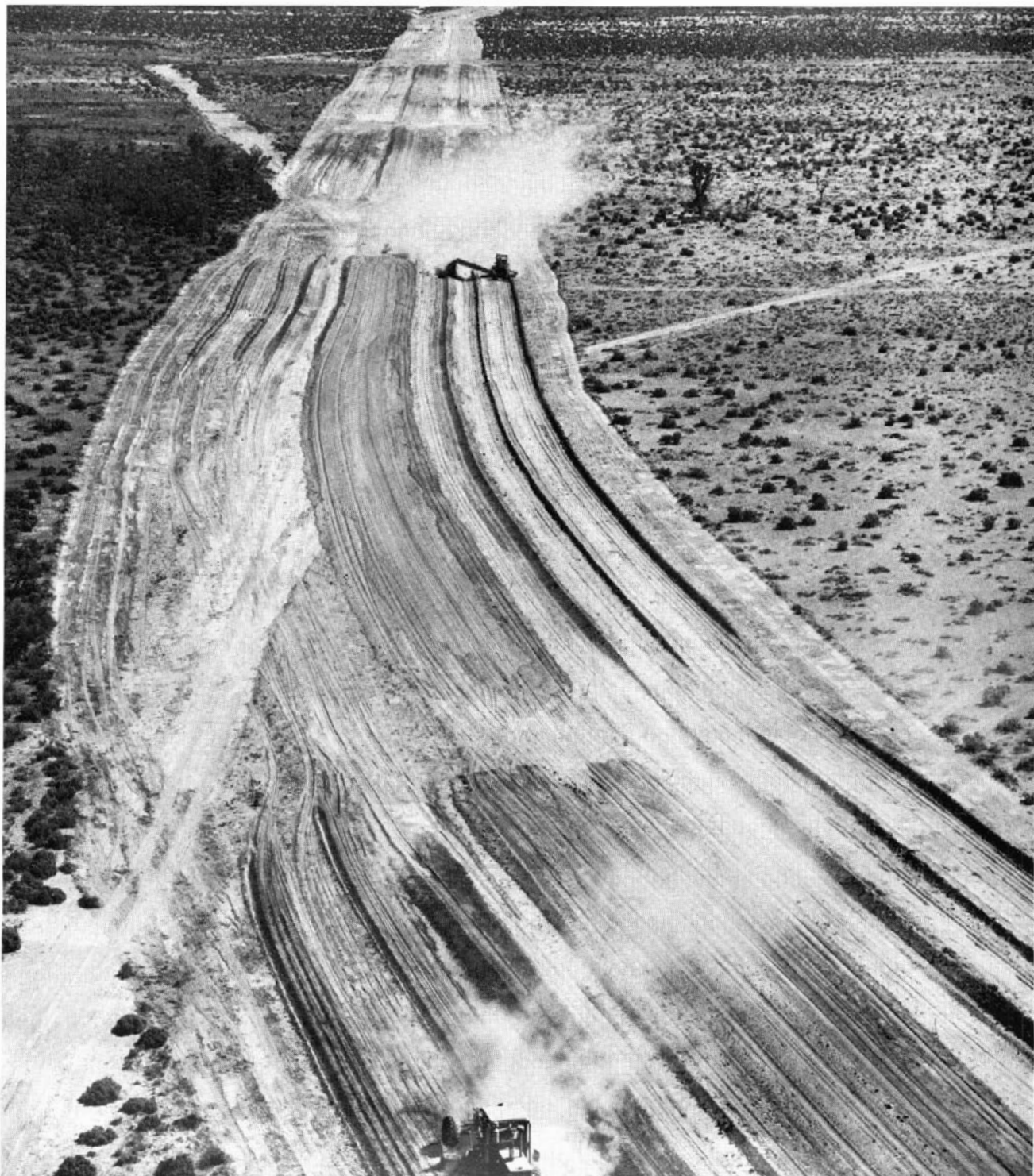


Generally, naturally occurring roadmaking materials suitable for use alone under a bitumen surface have not been located on the route of the highway. However, acceptable mixtures of concretionary limestone gravel, which is fairly widespread at a shallow depth, with about 30 per cent of locally occurring medium coarse sand, have been used with success. In some areas it has been necessary to add small quantities of portland cement to obtain a satisfactory pavement material. Owing to the dry climate, soil moisture can be as low as 3 per cent to 4 per cent and it has been necessary to provide additional water either from dams, wells or creeks, or from bores,

in order to achieve satisfactory compaction of the formation and pavement.

The salinity of water from bores in this area decreases with the depth of the bore. It has been found from experience that salinities above those permitted for drinking purposes are not deleterious to the local road-making materials and in consequence, relatively shallow bores, up to 200 feet in depth have been sunk at suitable locations on the line of the new road. Up to the present, five bores have been sunk by contract and more will be needed as the work progresses.

Reconstruction work in progress on the Bunneringee deviation





Silver City Highway about 100 miles south of Broken Hill

Suitable rock for the production of aggregate does not occur in quantity between Broken Hill and Wentworth and it has been necessary to haul some supplies from Broken Hill, and to accept somewhat softer material crushed from local deposits of secondary limestone. All available aggregate requires precoatng with tar or creosote to assist in adhesion.

Binder has been generally supplied by road from a refinery in Adelaide but supplies from a Melbourne refinery are now becoming available.

The country traversed by the highway is gently undulating with great distances between centres of habitation. Consequently, vehicle speeds are high and the standards of alignment being adopted for the new construction are those appropriate for travel at 60 miles per hour. As far as possible a minimum of 2,000 feet radius curves with sight distances of 1,500 feet are being provided.

Catchment areas are relatively large but due to the low relief there is a reduction in the peak runoff because of local ponding, and the coefficients of runoff rarely

exceed 0.4. However, it has been found desirable to design the roadway for 50-year frequency runoffs, to avoid damage in sudden heavy storms which are not infrequent.

Earthworks are comparatively light and considerable use is made of elevating graders to construct the formation where there are small variations in height of grade line above the natural surface.

In the past the volume of traffic using the Silver City Highway between Broken Hill and Wentworth has been small. With the extension of bitumen surfacing on the main roads system in the east, the rapid growth of tourism and the increasing community interest between Broken Hill and the Sunraysia District centred on Mildura (Victoria), there has been a substantial increase in through traffic on the Silver City Highway. A count made in February, 1964 showed that about 75 vehicles travelled the full length of this road each day compared with 12 vehicles per day in 1955. As the length of sealed pavement on the Silver City Highway increases, greater numbers of vehicles can be expected to travel between Broken Hill and Wentworth.

## NEW SUBURBAN LINK ROAD

**A** NEW road linking Queens Road, Fivedock and Gipps Road, Concord, forming part of Secondary Road No. 2059 was made available to traffic on Saturday, 30th January, 1965.

Constructed across Cintra Park and St. Luke's Park, it provides a connection between Great North Road,

Fivedock and Concord Road, North Strathfield, facilitating direct travel between these suburbs by avoiding the heavily trafficked Parramatta Road.

The new road, which is about 1,000 feet long, was constructed by Concord Municipal Council.

New road across Cintra and St. Luke's Parks, providing connection between Great North Road, Fivedock and Concord Road, North Strathfield





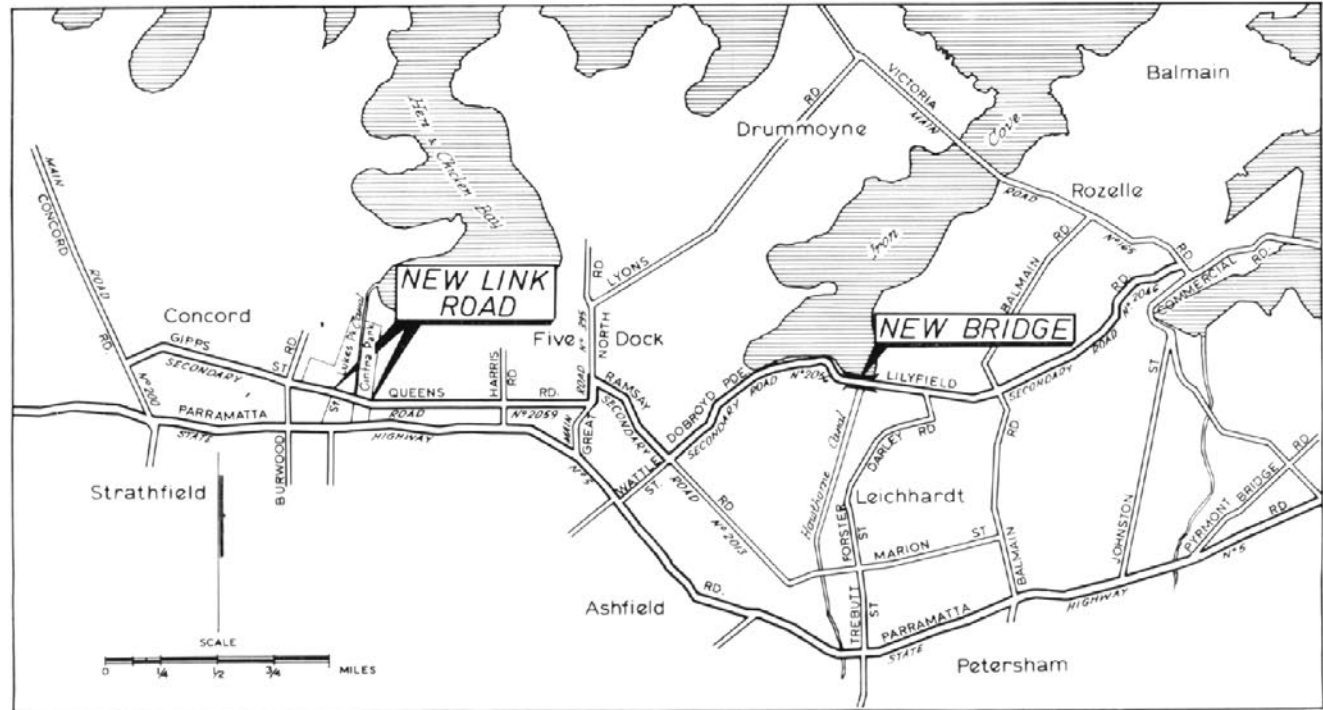


Bridge under construction over Hawthorne Canal

To provide improved traffic conditions leading to the new route, Queens Road, between Great North Road and Cintra Park, was reconstructed and widened by Drummoyne Municipal Council.

The Department of Main Roads shared the cost of the whole of the works with the Concord and Drummoyne Municipal Councils.

Another route which will serve as an alternative to Parramatta Road, will be available later this year when the bridge now being constructed over Hawthorne Canal, Haberfield, is completed. This bridge will provide a connection between Augustus Street, Leichhardt and Dobroyd Parade, Haberfield, giving more direct access between the Balmain-Rozelle area and the western suburbs of Sydney.



# PAVEMENT EDGELINES

Edgelines on Main Road No. 590, Peat's Ridge-Ourimbah Road



THE application of white reflective painted lines to the edges of roadway pavements is a simple and relatively inexpensive way of clearly delineating the pavement edge.

The lines are used on both asphalt and concrete roads and while they are more visible on asphalt in daylight hours, they are quite effective on lighter coloured concrete pavements at night because of the reflective qualities imparted to the paint by the inclusion of millions of tiny glass spheres.

Prior to 1953 edgelines on highways in the United States of America were little used. Experiments had been tried in several States but it was not until 1953 that the Connecticut Highways Department edgelined a busy two-lane highway and conducted studies to determine the effectiveness of the lines. While carrying out these studies the Pennsylvania Turnpike was also edgelined. Later the State of Ohio launched an extensive edgelining programme. From these early experiments a total of almost 135,000 miles of edgelined highways in the United States of America had been developed up to January, 1964. All but two of the fifty American States now use edgelining.

The studies made in the United States of America indicated that edge-lining of road pavements has a highly favourable effect on traffic accident rates; night accidents were generally reduced, and particularly those of the types where a vehicle runs off the road or side-swipes another vehicle. It was also found that, where pedestrians were required to walk on the road shoulders there were fewer accidents involving such people.

United States studies showed that motorists had greater confidence when road pavements were edgelined as they can orient themselves better at night, in fog, and during other adverse weather conditions. Motorists found the lines helped to overcome the problem of headlight glare, by enabling drivers to guide their vehicles by the edge of the road instead of the centre line when approaching other vehicles at night.

American studies also indicated that on edgelined roads the lateral distance between passing vehicles increased. Without edgelines and with only centre line markings, the distance between meeting vehicles tended to decrease. Edgelines discouraged motorists from using road shoulders and consequently there was a reduction in shoulder maintenance.

In the States of Ohio and Kansas, "before" and "after" studies verified the favourable effect on the accident rate. In Ohio there was a reduction of 19

per cent. in the number of accidents and 37 per cent. in the number of fatalities while in Kansas the reduction after edgelining was 21 per cent. and 59 per cent. respectively. The Ohio study also revealed a net decrease of 35 per cent. in the number of night accidents.

There are two basic types of edgelines being used in the United States, namely the skip line pattern and the solid reflectorised line. While initially some States adopted the skip line pattern, the solid reflectorised line is the most popular and all but Alabama are now using this method. North Carolina and Maryland are changing from skip to solid as rapidly as circumstances permit, and Alabama uses solid edgelines on curves, bridge approaches and at intersections.

In Britain, experimental edgelines have been painted 12 inches wide; the inside half, which is reflectorised, is brilliant at night under headlights, and provides a margin of safety before cars strike the pavement edge or the kerb.

Rural roads in Britain have in the past been built with small kerbs and entry pits for drainage. More recently in motorway construction, flush edge beams have been used instead of kerbs. Both methods have proved to be causes of structural weakness in the pavements, allowing entry of water. However, the kerb edged road has been used for so long in Britain that it is difficult to secure any comparison with roads without the equivalent of edgelines.

One major disadvantage of the kerb type of edge as opposed to the painted line, is that after rain the kerb and drainage system can be inadequate. It has been observed that the almost continuous pond of water can produce a serious traffic hazard. Another disadvantage of the kerb type edge is the added cost of constructing a kerb compared with the relatively inexpensive edgeline.

The Department of Main Roads has marked approximately 25 miles of State Highways and major arterial roads with edgelines. Edgelines were first commenced in this State in 1960. They are still regarded as experimental.

The minimum width of road pavement considered suitable for edgelining in New South Wales is 20 feet. Generally, however, only pavements 22 or 24 feet wide are being marked.

One major road which has been edgelined throughout is Main Road No. 590, between Peat's Ridge and Ourimbah. The shoulders on this road are turfed and, consequently, the line of demarcation between the pavement edge and the shoulders is not as clearly defined under headlights at night as it would be with gravel shoulders. It was therefore decided to locate the marked lines 6 inches inside the edge of the pavement. The lines, 3 inches wide, are white, and marked in 50 feet lengths with 10 feet gaps. The edgelining on this road is illustrated in the accompanying photographs.





Edgelines on Main Road No. 590, Peat's Ridge-Ourimbah Road

The Department has carried out vehicle placement studies before and after edgelineing on a pavement 22 feet wide in New South Wales. After analysis of the studies the conclusions reached were:—

1. During hours of darkness vehicles tend to travel further away from the centreline where there is edgelineing and no opposing flow of traffic.

2. When there is an opposing flow of traffic at night, drivers tend to occupy the same lateral position when meeting, as that adopted without edgelines.

3. Edgelineing does not appear to affect lateral placement during daylight.

Up to the present time studies have not been made in this State relating edgelineing to shoulder maintenance and accident occurrence.

# TENDERS ACCEPTED BY COUNCILS

The following tenders (in excess of £3,000) were accepted by the respective Councils for Road and Bridge Works for the three months ended 31st December, 1964.

Council	Road No.	Work or Service	Name of Accepted Tenderer	Amount
				£ s. d.
Alercrombie	S.H. 6 S.H. 7 T.R. 54 M.R. 246	Bitumen surfacing at various locations	Emoleum (Aust.) Ltd.	5,251 3 3
Balranald	T.R. 67	Supply and delivery of 604 cubic yards of $\frac{3}{4}$ in. aggregate between 1.5 m. and 6.4 m. south of Balranald	E. B. Mawson	3,274 4 0
Bogan	S.H. 8	Bitumen surfacing 32 m. to 38.89 m. west of Nyngan	Shorncliffe Pty. Ltd.	8,599 7 8
Bogan	M.R. 204	Construction of precast box culverts between 6.5 m. and 28.5 m. from Nyngan.	J. L. Johnston Pty. Ltd.	5,985 11 0
Bogan	M.R. 204	Construction of earthworks and installation of culverts between 16 m. and 18.25 m. north of Nyngan.	J. L. Johnston Pty. Ltd.	11,963 17 0
Bogan	M.R. 424	Supply and spreading of gravel between 0.4 m. to 26.7 m. from Coolabah.	Stubbs Transport	3,354 10 0
Boorowa	T.R. 56	Bitumen surfacing and resurfacing between 6.55 m. and 8.60 m. north of Boorowa and between 4.70 m. and 7.10 m. south of Boorowa.	Boral Road Services Pty. Ltd.	3,422 16 0
Boree	M.R. 310 M.R. 377	Bitumen surfacing at various locations	Boral Road Services Pty. Ltd.	3,168 3 1
Cobar	T.R. 61 M.R. 421	Bitumen surfacing at various locations	Shorncliffe Pty. Ltd.	5,693 5 8
Conargo	D.W. 3179	Construction of a reinforced concrete bridge 175 feet long over Billabong Creek at Conargo.	Danckert Constructions Pty. Ltd.	22,166 14 4
Coolamon	M.R. 240	Bitumen surfacing 1m.-7 m. north of Coolamon	Boral Road Services Pty. Ltd.	5,757 18 8
Gilgandra	S.H. 11	Bitumen surfacing between 7.95 m. and 15 m. west of Gilgandra.	Shorncliffe Pty. Ltd.	10,534 1 2
Gilgandra	T.R. 77	Construction of 4 cell, 10 ft. x 10 ft. reinforced concrete box culvert at 7.30 m. east of Gilgandra.	A. Cipolla	9,626 10 0
Gilgandra	M.R. 205	Construction of approaches to bridge over Yarragrin Creek 73 m. from Coonamble.	J. A. Burrell	6,144 18 0
Goobang	T.R. 61	Bitumen surfacing between 8.83 m. and 14.19 m. west of Bogan Gate.	Allen Bros. Pty. Ltd.	5,827 16 9
Goobang	T.R. 61	Supply and delivery of 985 cubic yards of aggregate to stockpiles at Yarrabandai.	Orange Blue Metal Pty. Ltd.	3,669 2 6
Goodradigbee	T.R. 56	Reconstruction and bitumen surfacing at Kangiara between 18.97 m. and 20.53 m. from Yass.	Horrex Pty. Ltd.	12,898 0 0
Jemalong	S.H. 17	Supply and delivery of reinforced concrete box culverts at State Highway No. 17 Forbes to Marsden Road (Caragatel).	Monier Pipe Co., Dubbo	4,792 15 0
Jemalong	S.H. 17 T.R. 56 T.R. 61 M.R. 236 M.R. 350 M.R. 377	Bitumen surfacing at various locations	Allen Bros. (Asphalting Contractors) Pty. Ltd.	13,989 0 0
Jerilderie	M.R. 323	Supply and spreading of gravel between 2.5 m. to 8 m. from Jerilderie.	M. Foots	3,882 18 4
Lockhart	M.R. 543	Bitumen surfacing 0.64 m. to 6.91 m. north of the Rock.	Emoleum Pty. Ltd.	5,050 1 8
Lockhart	T.R. 78 T.R. 59 M.R. 370 M.R. 543	Bitumen surfacing at various locations	Emoleum Pty. Ltd.	5,155 12 1
Macintyre	S.H. 12 M.R. 137 M.R. 187	Bitumen surfacing at various locations	Emoleum (Aust.) Ltd.	4,407 4 10
Mulwaree	T.R. 54 M.R. 248 M.R. 256	Supply and delivery of 1,402 cubic yards of aggregate to stockpiles for bitumen surfacing at various locations.	Goulburn City Council	3,133 1 0
Mulwaree	T.R. 54	Construction of 7 span reinforced concrete bridge 210 ft. long with precast pretensioned bridge units over Bumana Creek 4.60 m. from Goulburn.	Albury Constructions Pty.	23,036 0 0
Oberon	M.R. 256	Construction of approaches to bridges over Little River and Running Stream 26 m. south of Oberon.	Williams, Cowell & Harris	7,941 7 0
Talbragar	M.R. 206	Construction of a 4 cell 11 ft. x 6 ft. reinforced concrete box culvert over Troy Gully Creek 3 miles east of Dubbo.	B. Coccancig and T. Cipolla.	5,592 0 0
Tamarang	T.R. 72 M.R. 129	Bitumen surfacing at various locations	Boral Road Services Pty. Ltd.	4,406 14 7
Tamarang	M.R. 126	Reconstruction and bitumen surfacing between 5.80 m. and 7.15 m. from Quirindi.	J. A. & J. D. Holdings Pty. Ltd.	6,886 3 0
Tamworth	S.H. 9	Construction of a 3 cell 10 ft. x 5 ft. reinforced concrete box culvert in the western approach to the Peel River Bridge at Tamworth.	Central Constructions Pty. Ltd.	6,600 0 0
Tumbarumba	T.R. 85	Bitumen surfacing between 6.4 m.-14.5 m. north of Tumbarumba.	Boral Road Services Pty. Ltd.	9,061 8 7

## TENDERS ACCEPTED BY COUNCILS—*continued*

Council	Road No.	Work or Service	Name of Accepted Tenderer	Amount	
Tomki ..	M.R. 544 ..	Supply and delivery of prestressed concrete bridge units for bridge 11·95 m. from Lismore.	Concrete Industries (Qld.) Pty. Ltd.	£ 3,510	s. d. 0 0
Uralla ..	S.H. 9, T.R. 73 and M.R. 124.	Bitumen surfacing at various locations .. ..	Shorncliffe Pty. Ltd. ..	11,340	7 4
Urana ..	M.R. 131 } M.R. 323 }	Bitumen surfacing at various locations .. ..	Boral Road Services Pty. Ltd.	4,514	2 3
Wakool ..	M.R.'s 296 and 386.	Bitumen surfacing at various locations .. ..	Emoleum (Aust.) Ltd. ..	3,464	0 10
Walgett ..	M.R. 127 ..	Construction of 7 span reinforced, prestressed concrete bridge, 140 feet long over Cumberdoon Creek 14 m. east of Walgett.	M. Kallas .. ..	21,736	4 0
Waradgery ..	M.R. 319 ..	Construction of a 4 span reinforced concrete bridge 80 ft. long over Nimmie Creek 2 m. south of Maude.	K. Humphries Pty. Ltd. . .	5,940	4 6
Waugoola ..	S.H. 6, T.R. 56 and Council Roads.	Bitumen surfacing at various locations .. ..	Boral Road Services Pty. Ltd.	11,368	2 9
Wellington ..	M.R. 206 } M.R. 233 }	Bitumen surfacing at various locations .. ..	Boral Road Services Pty. Ltd.	9,838	17 11
Weddin ..	M.R. 398 ..	Bitumen surfacing between 2 m. and 6·26 m. south of Grenfell.	Boral Road Services Pty. Ltd.	3,336	7 2
Windouran ..	S.H. 21 ..	Supply and delivery of aggregate 48·75 m. to 52·18 m. from Deniliquin.	Berrigan Quarries Pty. Ltd.	3,898	11 3
Wollondilly ..	M.R. 179 and D.R. 1302.	Bitumen surfacing at various locations .. ..	Emoleum (Aust.) Pty. Ltd.	4,123	15 11
Wyong ..	T.R. 4014, M.R. 335 and 509.	Bitumen surfacing at various locations .. ..	Boral Road Services Pty. Ltd.	3,030	13 1
Yarrowlumla ..	T.R. 52 ..	Construction of approaches to railway overbridge at Letchworth 3·8 m. from Queanbeyan.	Lundberg Constructions Pty. Ltd.	9,687	0 0

## TENDERS ACCEPTED BY DEPARTMENT OF MAIN ROADS

The following tenders (in excess of £3,000) for Road and Bridge Works were accepted by the Department during the three months ended 31st December, 1964.

Work or Service	Name of Accepted Tenderer	Amount
State Highway No. 6—Mid-Western Highway, Shire of Carrathool. Supply and delivery of aggregate between 41 m. and 48 m. east of Hay.	G. Stevenson, Box 205 P.O., Griffith ..	£ 11,340 s. d. 10 0
State Highway No. 10—Pacific Highway, Shire of Maclean. Supply and delivery of 4,269 concrete fence posts for approaches to Harwood Bridge.	C. M. Wallis and Sons .. ..	3,573 9 7
State Highway No. 10—Pacific Highway, Shire of Port Stephens. Supply and spraying of up to 17,000 gallons of Coke Oven Tar between 28 m. and 29 m. north of Newcastle.	Boral Road Service Pty. Ltd. .. ..	5,264 0 0
State Highway No. 10—Pacific Highway, Shire of Tweed. Supply and spraying of 19,000 gallons of bitumen at Sexton's Hill 14·52 m. to 15·93 m. north of Murwillumbah.	Boral Road Services Pty. Ltd. ..	3,798 2 1
State Highway No. 10—Pacific Highway, Shires of Nambucca and Ullmarra. Bitumen surfacing at various locations.	Shorncliffe Pty. Ltd. .. ..	5,982 5 0
State Highway No. 10—Pacific Highway, Shires of Byron, Tweed, Tintenbar and Woodburn. Bitumen surfacing at various locations.	Boral Road Services Pty. Ltd. ..	3,991 5 1
State Highway No. 11—Oxley Highway, Shire of Hastings. Construction of two steel and reinforced concrete bridges, one 220 ft. long over Hyndman's Creek and one 180 ft. long over Gannon's Creek 9 miles from Wauchope.	Central Constructions Pty. Ltd. ..	37,944 0 0
State Highway No. 14—Sturt Highway and No. 21—Cobb Highway. Main Road No. 514, Shire of Waradgery. Supply and spraying of Petroleum Tar and fluxed bitumen at various locations.	Emoleum Aust. Ltd. .. ..	11,005 2 1
Trunk Road No. 76—Shire of Bellingen. Construction of 5 span steel and reinforced concrete bridge 469 feet long over Bellingen River at Thora.	Reed & Mallik & Stuart Bros. Pty. Ltd.	146,262 18 0
Main Road No. 286—Shire of Snowy River. Supply and delivery of 35,000 cubic yards of base course material to locations between 10 m. and 18·57 m. west of Jindabyne and 9,645 tons of aggregate between 10 m. and 16·40 m. west of Jindabyne.	Utah Construction & Engineering Pty. Ltd. & Brown & Root Sudamericans Ltd.	86,308 15 0
Main Road No. 286—Shire of Snowy River. Construction of two reinforced concrete box culverts, on 2 cell 10 ft. x 9 ft. at Prussian Creek and one 3-cell 8 ft. x 6 ft. at Pipers Creek 17·65 m. and 18·66 m. west of Jindabyne respectively.	Tumbarumba Constructions Pty. Ltd.	13,590 12 9