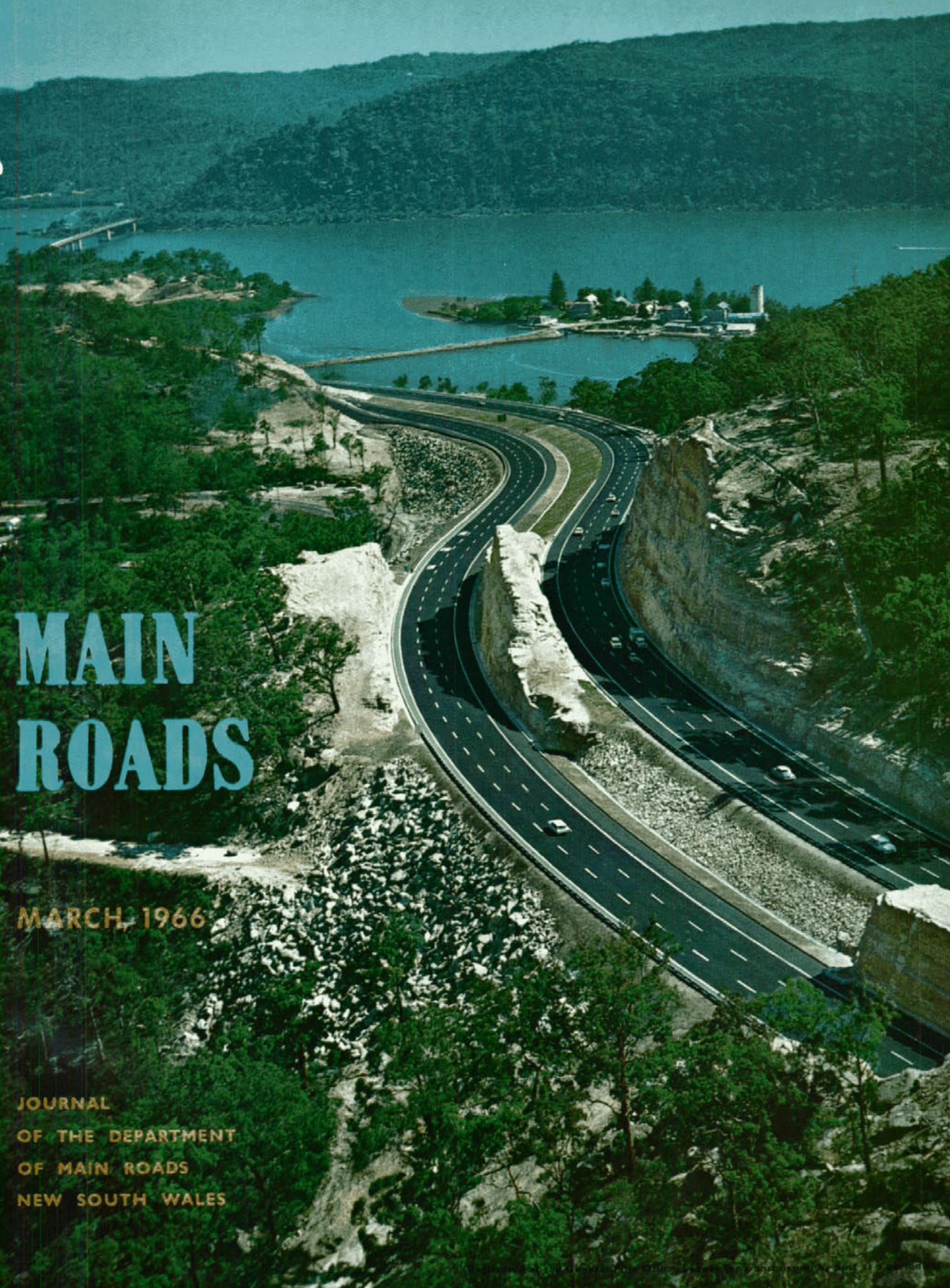
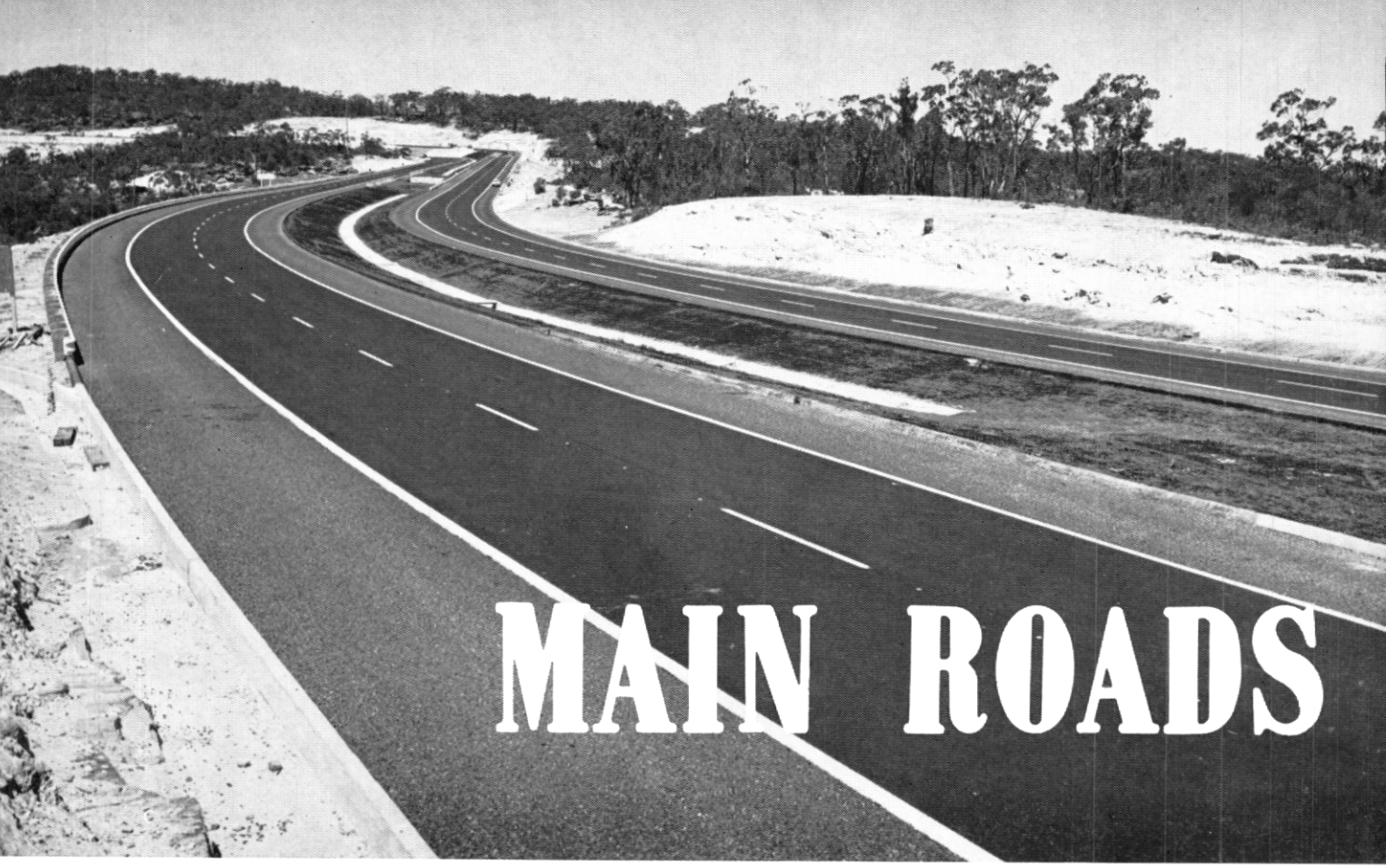


MAIN ROADS

MARCH, 1966

JOURNAL
OF THE DEPARTMENT
OF MAIN ROADS
NEW SOUTH WALES



MAIN ROADS

A section of the Hawkesbury River to Mount White Toll Way MARCH 1966 Volume 31 Number 3

Life is a matter of mind over motor

CONTENTS

COVER SHEET

Part of the recently completed Toll Work on the Sydney-Newcastle Expressway. This view, from the north shows the Hawkesbury River Bridge in the background

MAIN ROADS

MARCH 1966

JOURNAL OF THE
DEPARTMENT OF MAIN ROADS
NEW SOUTH WALES

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Dreams at 20 Cents

To the exasperated driver trapped behind a crawling semi-trailer on the winding Pacific Highway, the Sydney-Newcastle Expressway has so far existed only as a far-off dream.

The rate of growth of the State is to a great extent dependent upon ease of road communication between industrial and commercial centres; and two of the most vital of these are Sydney and Newcastle.

It follows that this project must be brought into being as fast as financial considerations permit, and the levying of a toll on the recently completed section, the Hawkesbury River-Mount White Tollwork, is a means of bringing closer the day when there will be an expressway extending all the way from Sydney to Newcastle.

In the meantime, that same exasperated driver can see that his dream is becoming reality, for, although there will continue to be hold-ups during very busy periods on the Sydney-Newcastle route until the Expressway substantially exists for its full length, the first section is now complete, the second section is well under way, the third section will start soon and the more 20 cents that are collected, the sooner will the State as a whole reap the benefit of this remarkable project.

Opening of the Toll Work

HAWKESBURY RIVER TO MOUNT WHITE

In lighter vein, the Premier, having declared the Toll Work open, cuts the ribbon

THE first section of the Sydney to Newcastle Expressway, the very rugged 5·8 miles from the Hawkesbury River Bridge to Mount White, was officially opened by the Premier, The Hon. R. W. Askin, M.L.A., on the 15th December, 1965.

This 5·8 miles section of tollway is a remarkable engineering achievement. It is one of the most difficult parts of the whole expressway project, traversing extremely rugged country, over deep fills and through high cuttings, and cost $7·5 million, or something like $1,200,000 per mile, including interchanges, bridges and other structures.

In his address the Premier stressed the State Government's awareness of the need for modern highways and expressways

This expenditure, and the considerable effort put into the work, provide the motorist with three valuable advantages:

- ☐ Safe Driving Conditions;
- ☐ Faster Travelling;
- ☐ Tension-free Motoring.

These benefits are brought about by advanced engineering design features which include:

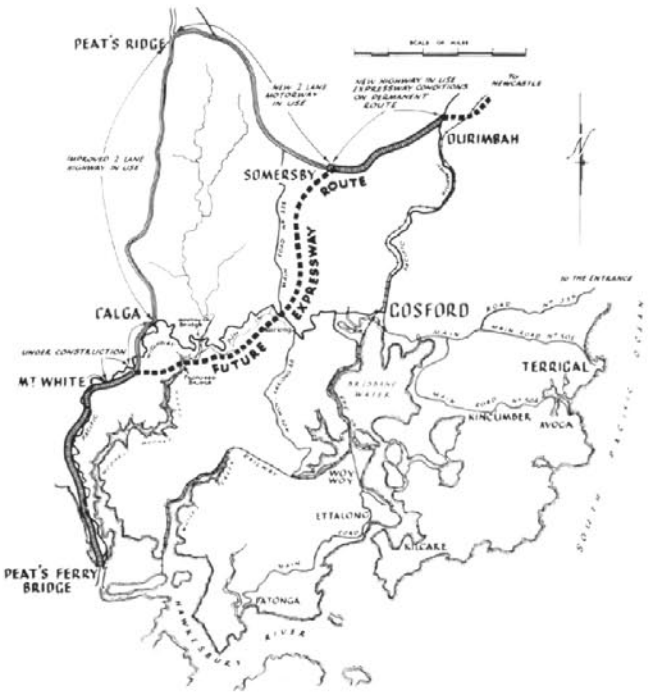
Dual carriageways, each of two traffic lanes, separated by 30 feet wide median strips. Interference between opposing traffic streams is non-existent, as also is headlight glare.

Additional traffic lanes, where necessary, for slow-moving traffic.

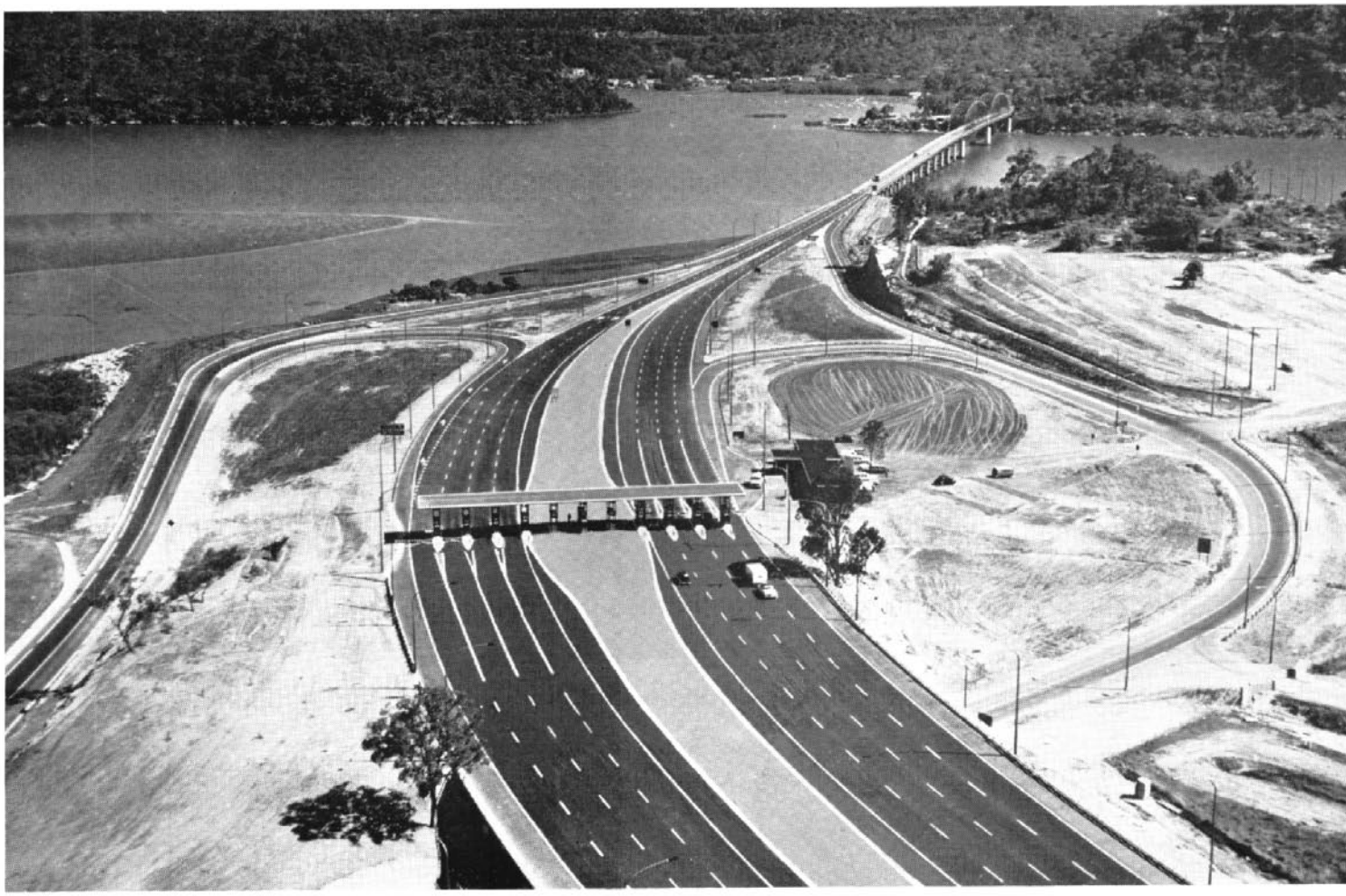
Excellent road alignment facilitating safe driving at speeds of 65 miles per hour, the upper speed limit for this section.

A specially heavy road base to preserve pavement condition and reduce maintenance and the attendant obstruction to traffic.

Access and exit at interchanges only, thus eliminating traffic turning holdups. Interchanges on and off the Toll Work are provided at Mooney Mooney and at Mount White.

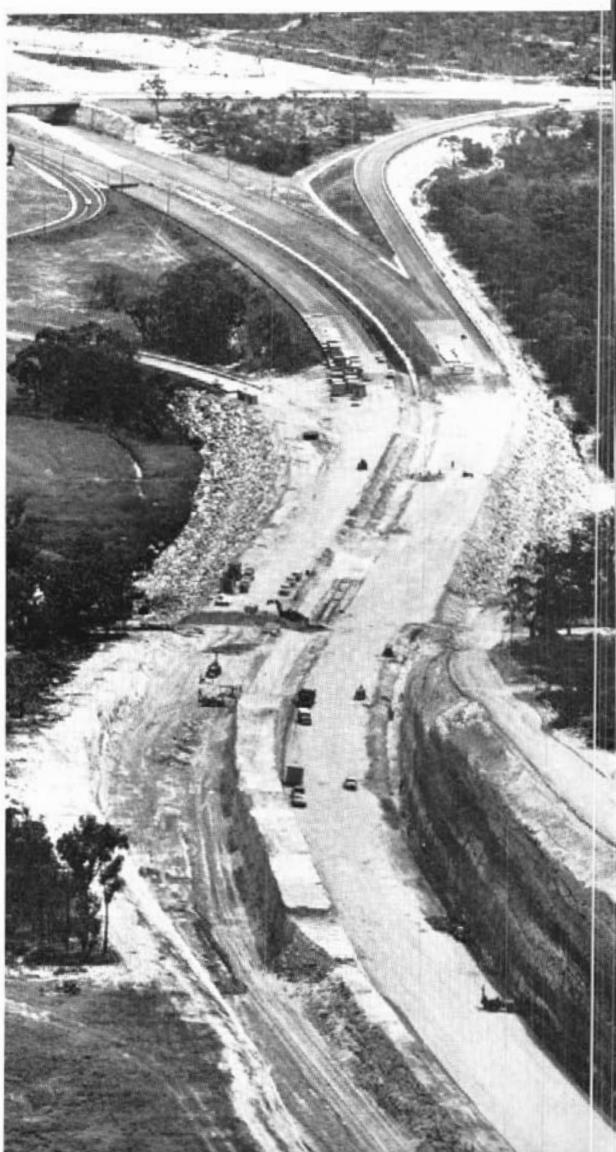


The toll gates of the Hawkesbury River end of the Toll Work. Note the altered route of the Pacific Highway, the alternative toll free route, the south bound lane to the left and the north bound lane to the right and passing under the Toll Work in the foreground

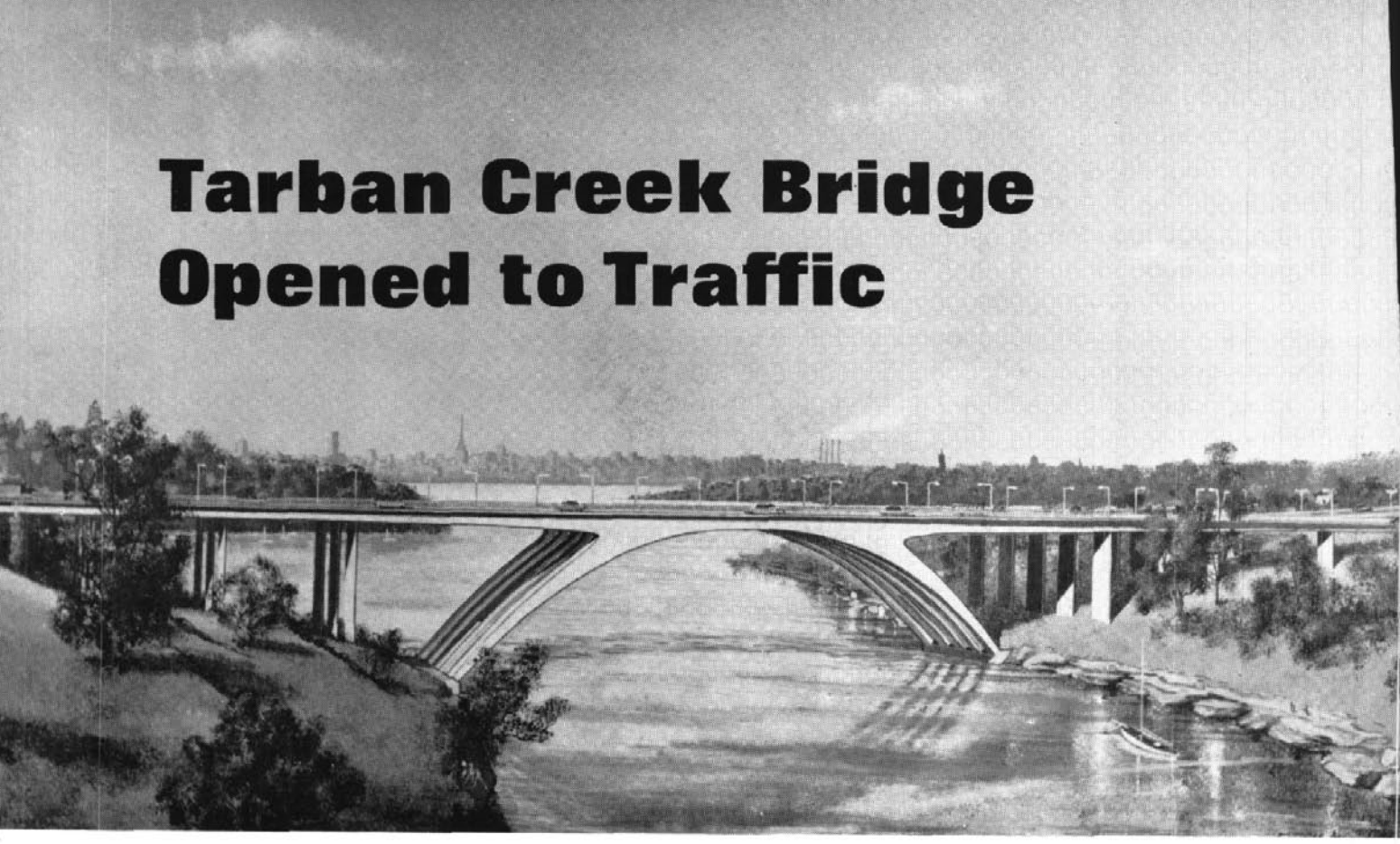


Mount White To Calga

These aerial photographs illustrate the progress of construction on the next section of the Expressway between Mount White and Calga



Tarban Creek Bridge Opened to Traffic



ON THE 16th December, 1965, Tarban Creek Bridge was opened to traffic, thus bringing into full use the first section of the North Western Expressway.

Although there was no opening ceremony, the removal of the barriers and the commencement of the traffic flow was observed by a distinguished group of onlookers, among whom were: The Hon. P. H. Morton, M.L.A., Minister for Highways; the Attorney-General, The Hon. K. M. McCaw, M.L.A., Member for Lane Cove; the Member for the State Electorate of Ryde, The Hon. F. G. Downing, M.L.A.; the Mayor of Hunter's Hill, Alderman J. C. Merrington; the Commissioner of Police, Mr N. T. W. Allan; the Commissioner for Main Roads, Mr J. A. L. Shaw; and the Assistant Commissioner for Main Roads, Mr R. J. S. Thomas.

Tarban Creek Bridge provides a direct connection between the new Gladesville and Fig Tree Bridges, and completes the first section of the North Western Expressway between Drummoyne and Lane Cove. These three bridges, and the road and bridge works associated with them, will greatly assist cross-harbour traffic facilities by providing a favourable route for some traffic which would otherwise use the Sydney Harbour Bridge.

In the first stage of development, two through-lanes will be available for traffic in each direction over Tarban Creek Bridge, pending the planned future widening of Fig Tree Bridge to admit of a further lane in each direction. Ramps off the Expressway permit unrestricted exit to and entry from Gladesville and Hunter's Hill without interference with through-traffic.

Constructed of reinforced and prestressed concrete, the Tarban Creek bridge is 750 feet long with a main arch span of 300 feet and a width between kerbs of 84 feet.

There are twin carriageways each of three lanes, separated by a 12-feet median strip.

A footway 8 feet 3 inches wide has been provided on the eastern side.

Designed by Messrs G. Maunsell & Partners of London and Sydney for the Department of Main Roads,

The Hon. P. H. Morton, M.L.A., Minister for Highways, discusses the new bridge with Mr G. V. Fawkner, Deputy Chief Engineer, and Mr C. W. Mansfield, Secretary, Department of Main Roads

the bridge was built by contract under the supervision of the Department by Reed & Mallik Ltd of England, in partnership with Stuart Bros Pty Ltd of Sydney, who also built the neighbouring Gladesville Bridge.

The Department's own work forces constructed the approaches.

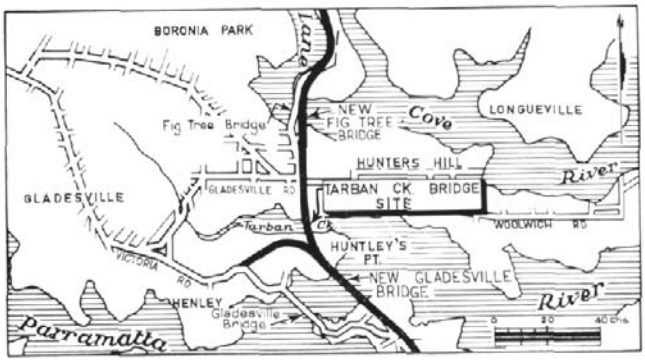
The Tarban Creek Bridge is the sixth and last bridge in this section of the Expressway. It was built at a cost in the vicinity of $1,500,000. The total cost of works (including approaches in Cambridge Street, Drummoyne, Burns Bay Road, Lane Cove, and Victoria Road, Gladesville) brought into full use on completion of the bridge is approximately $12 million, of which $2 million represents the cost of purchasing the land.

The design adopted for the bridge employs a unique conception of a prestressed, post-tensioned concrete girder supported on inclined portal-type legs to form a two-pin arch with a parabolic soffit. Architecturally it blends with the topography and is complementary to the nearby major arch structure of the Gladesville Bridge over the Parramatta River. Each of the five arch ribs is supported on separate abutments set into the sandstone of the creek banks. The five individual abutments are joined above ground by a substantial concrete beam to give the desirable architectural appearance of considerable mass usually associated with arch supports. The clear span of the arch is a little more than 294 feet. There are four approach spans of prestressed concrete beams on each side to give a total deck length of 750 feet. The rise of the arch is 67 feet making the deck level about 75 feet above high tide.

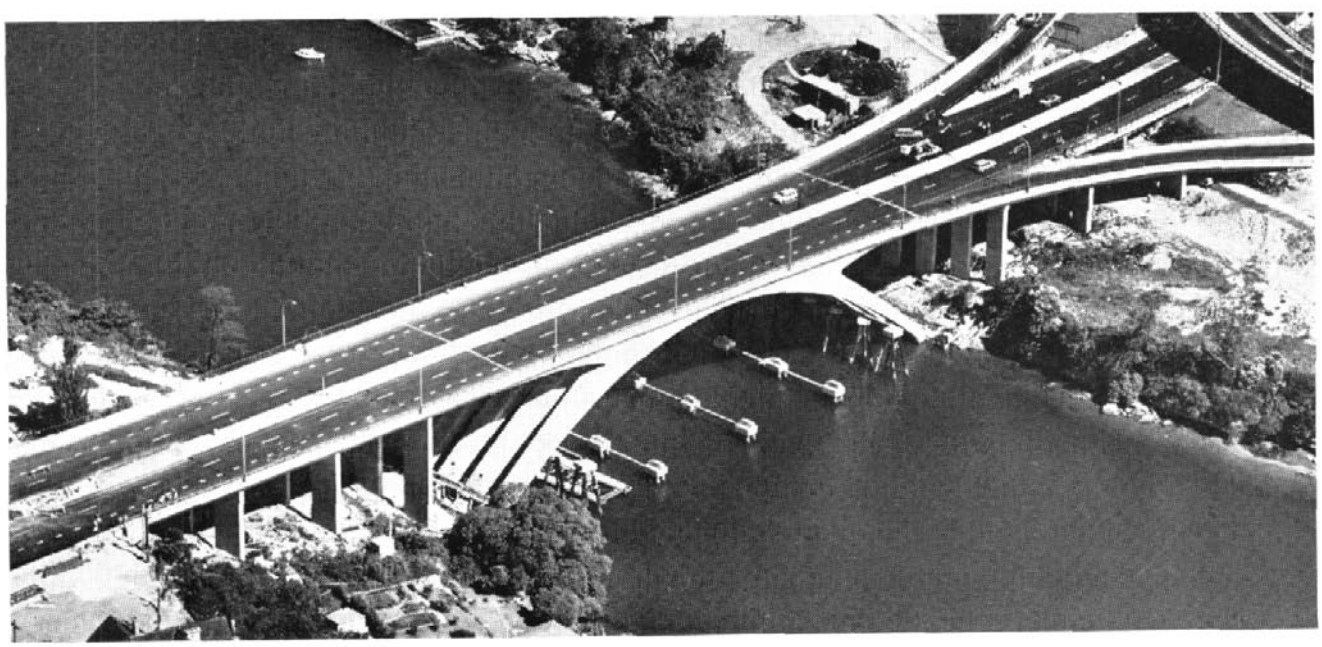
At the southern, or Huntley's Point end, the exit and entrance roads to and from Gladesville are in the form of separate viaducts which merge into the main deck at the second pier, i.e., about 80 feet from the roadway abutments.

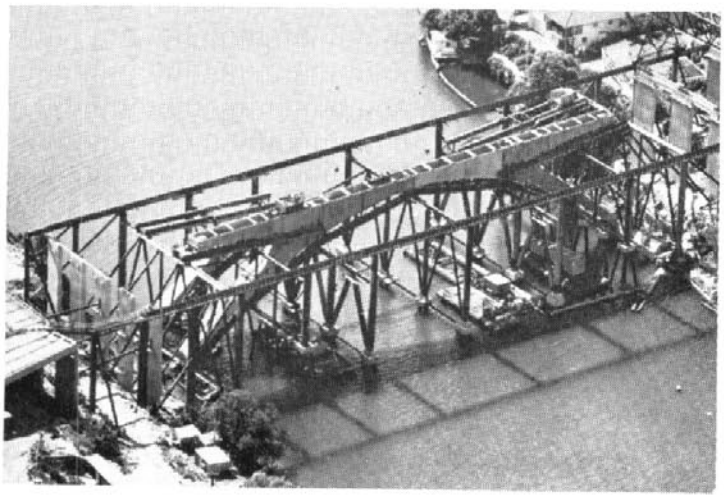
Vertical loads from the arch are taken on cylindrical concrete piles three feet in diameter, founded in sound sandstone some 25 feet below ground level. The piles were formed inside steel tubes and were concreted under water using the intrusion-grouting process. Horizontal thrust is taken on sloping reinforced concrete shafts 7 feet by 4 feet in cross-section let into sound sandstone on the creek banks. The beams and legs forming the arch ribs were erected on falsework fabricated from cylindrical steel piles and rolled steel joists salvaged from the Gladesville Bridge project. The design allowed two ribs (but not adjacent ones) to be erected and supported simultaneously. A travelling gantry crane incorporating a 50-ton hoist was also supported on the falsework and was used for all heavy lifting.

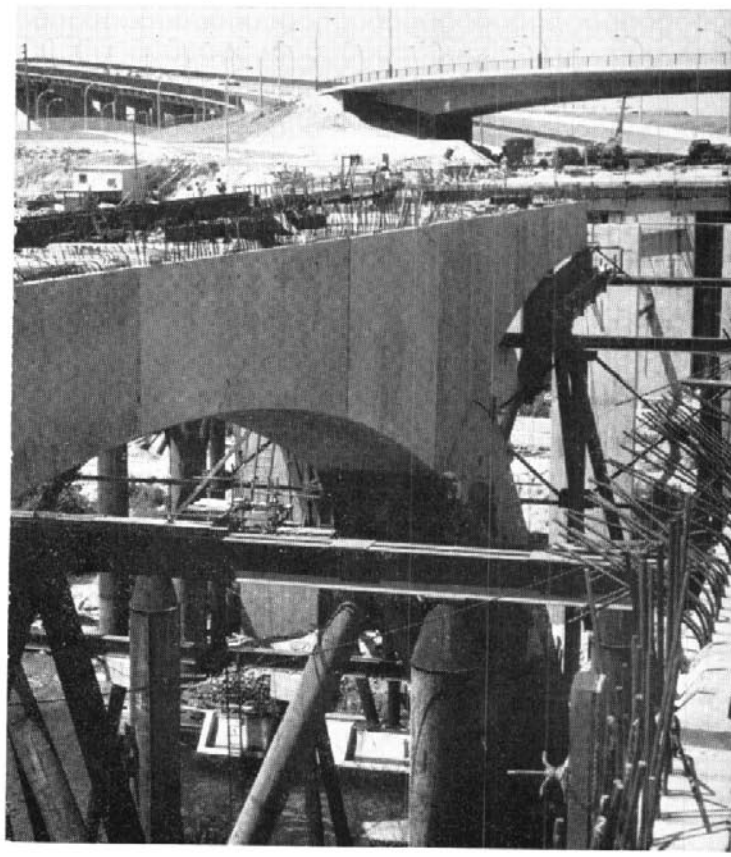
The beams and legs of the arch ribs were segmented into hollow concrete blocks each weighing about 50 tons and manufactured in a casting yard at Woolwich previously used for production of the arch blocks for



The graceful lines of the bridge are apparent in the photograph taken shortly before it was opened to traffic







Tarban Creek Bridge during various stages of construction

Gladesville Bridge. The hollow blocks were brought to the site on barges, lifted onto the falsework with the 50-ton hoist and assembled with 3-inch gaps between them. Assembly commenced with the concrete hinge blocks at the top. Thereafter, the 3-inch spaces were filled with concrete to form continuous structural members.

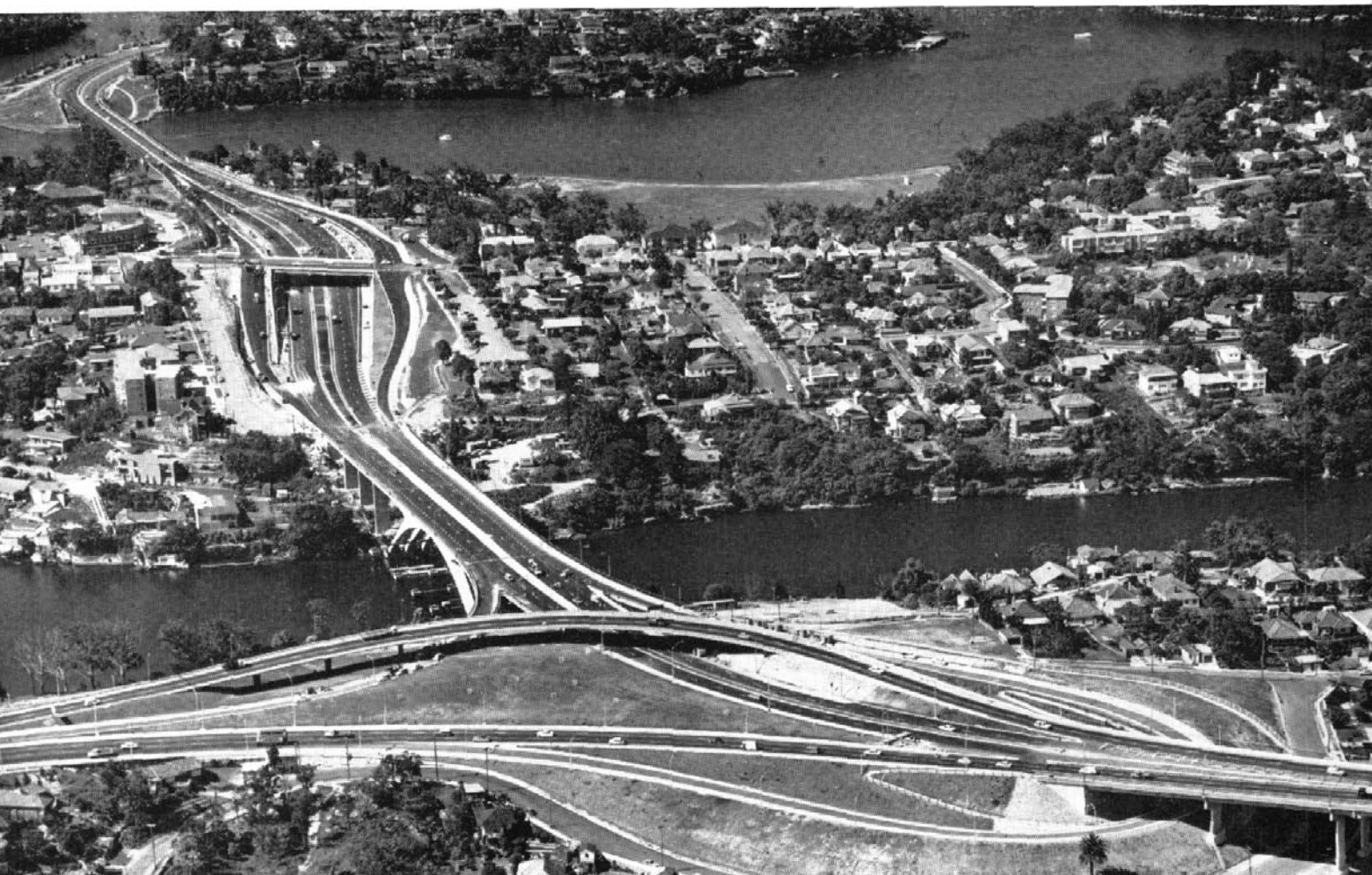
Each horizontal beam, 290 feet in length, was made self-supporting by means of 48 high-tensile steel cables passing from end to end and anchored at a force of 41,000 pounds. At this stage the beam rested on the falsework at two points about 85 feet each side of the centre, with "Freyssinet" flat jacks interposed to permit small vertical adjustments. It was lifted off the falsework by jacking up from the inclined legs using flat jacks set into the concrete of the adjoining blocks. Finally the beam was tied to each leg by means of 48 high-tensile steel cables passing from the base of the leg into anchorages in the bottom of the beam. To provide the necessary strength to support the deck and the adjacent approach span, the cantilevered portion, the tail span, of the main beam was finally fitted with a further 30 high-tensile steel cables while temporary kentledges checked excessive deformation.

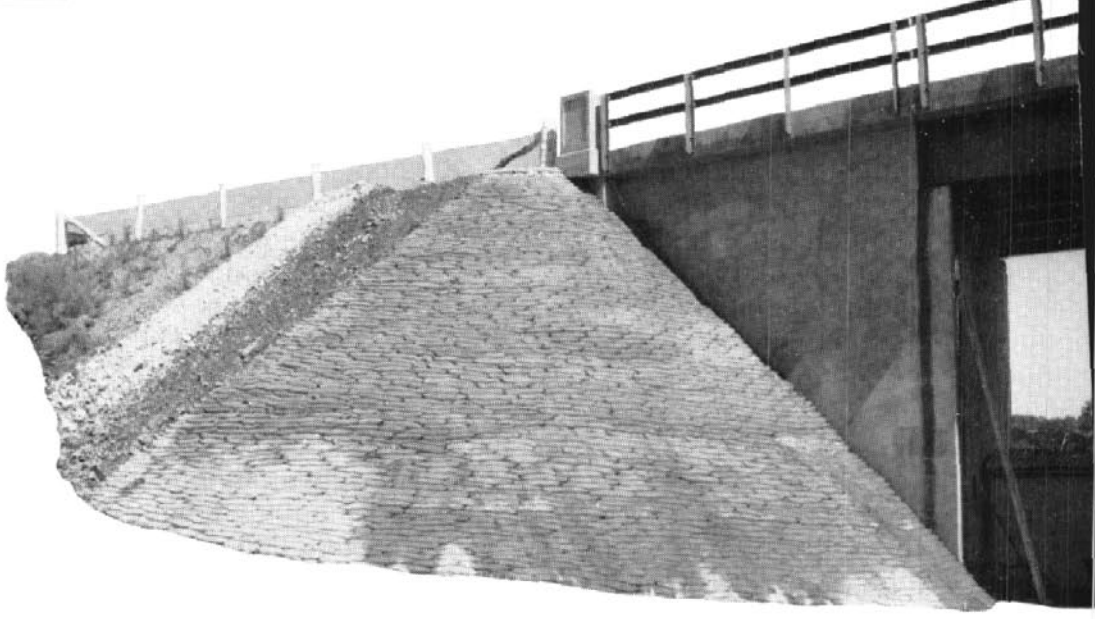
For the full length of the main beams the deck consisted of 8 inches of reinforced concrete poured in place. On the approach beam spans the deck was formed with 3 inches of insitu concrete topping on 5-inch thick precast concrete slabs. The whole deck was surfaced with 2 inches of asphaltic concrete manufactured and placed by the Department's own forces. Finger type expansion joints have been provided in the deck to permit longitudinal movements due to temperature changes and other influences.

The deck has been furnished with pedestrian safety railings and roadway guard-rails on each side, the latter being set on heavy kerbs to retain vehicles out of control. A 12-feet wide median strip has been placed centrally on the deck to facilitate traffic guidance in the first stage development of the Expressway system. Lighting has been installed to the standard required for Traffic Routes by the S.A.A. Street Lighting Code, using colour-corrected flourescent mercury vapour discharge lamps mounted on fabricated steel standards 27 feet 6 inches in height.

A high standard of signposting, together with roadway markings of the most modern design, have been provided for the efficient and safe guidance of traffic, with particular emphasis on the junctions at the southern end of the bridge.

The completed section of the North Western Expressway. Fig Tree Bridge is in the background and the approaches to the Gladesville Bridge lead off to the right





The finished abutment

PROTECTION OF EARTH FILLS AGAINST WATER SCOUR

EARTH fills in bridge approach embankments and at other locations where they are liable to damage by flood or stormwater require some form of protective crust. Methods of providing this protective crust which are used include specially cast concrete blocks and cement grouted stone pitching. Disadvantages of these methods are that the crust tends to crack if the filling subsides and costs for this type of semi-specialised work are high.

During his recent overseas mission Mr N. F. Hatcher, Assistant Chief Engineer, observed in the United States a method of providing a protective coating to earth embankments which does not suffer from these disadvantages. Using this method a weak dry concrete mix is made up of cement and local sand. Hessian or jute bags are filled with the mix and placed in position on the face of the filling. The bags are then moistened to set the sand-cement mixture.

This method was recently used to protect the earth fill at the abutments of a new bridge over the Yass River near Yass on the Hume Highway. At this bridge, which has box type reinforced concrete abutments, the approach fills, over 20 feet high, are submerged to the greater part of this height during periods of high flood. The fill material, being weathered granite, is very susceptible to water scouring.

Hessian bags, 36 inches by 11 inches, were made and filled with a mixture of cement and weathered granite loam in the ratio of one part to four. Mixing was carried out on the site with an ordinary concrete mixer mounted on a small trailer. The mixer emptied the material into a special chute from which the bags were filled.

The bags were filled to 32 inches and tied at 34 inches with wire loop ties. They were then placed in position on the filling, using a guide line to achieve the correct slope. In every 2 square yards of face area a bag was buried in the fill, end on, for keying.

As the bags were laid, filling was placed behind them as necessary and compacted with a mechanical rammer. At the end of each day, the completed work was liberally sprayed with water.

Eleven bags were used to cover one square yard and the cost for the completed work was $9.25 per square yard.

The principal advantages of this method are that skilled labour is not required and that the finished work is sufficiently flexible to take up minor subsidences in the fill without failure of the surface.

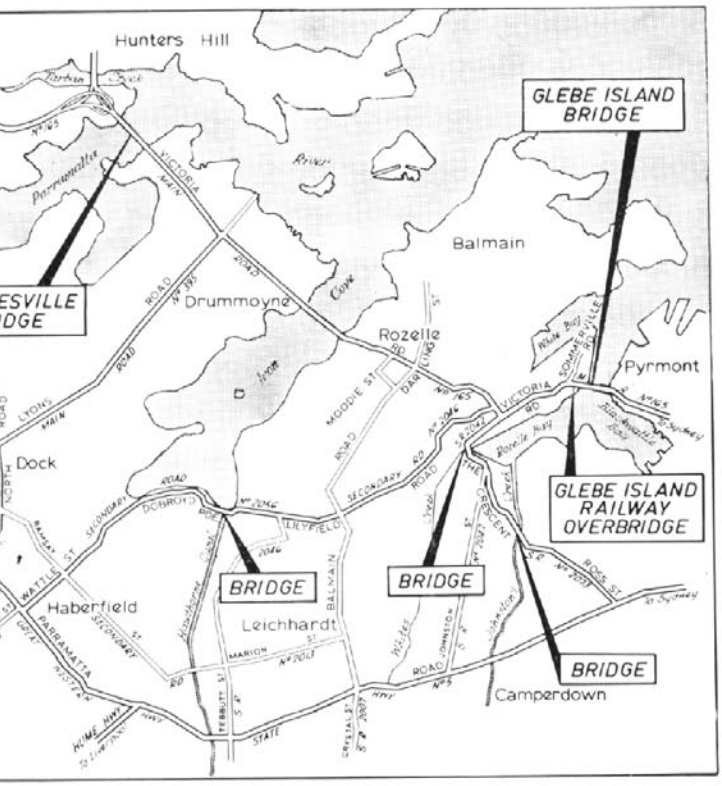
The slope is checked with a guide line and minor irregularities tapped out with the back of a shovel

Improvements in the Main Roads System Between Gladesville Bridge and the City of Sydney

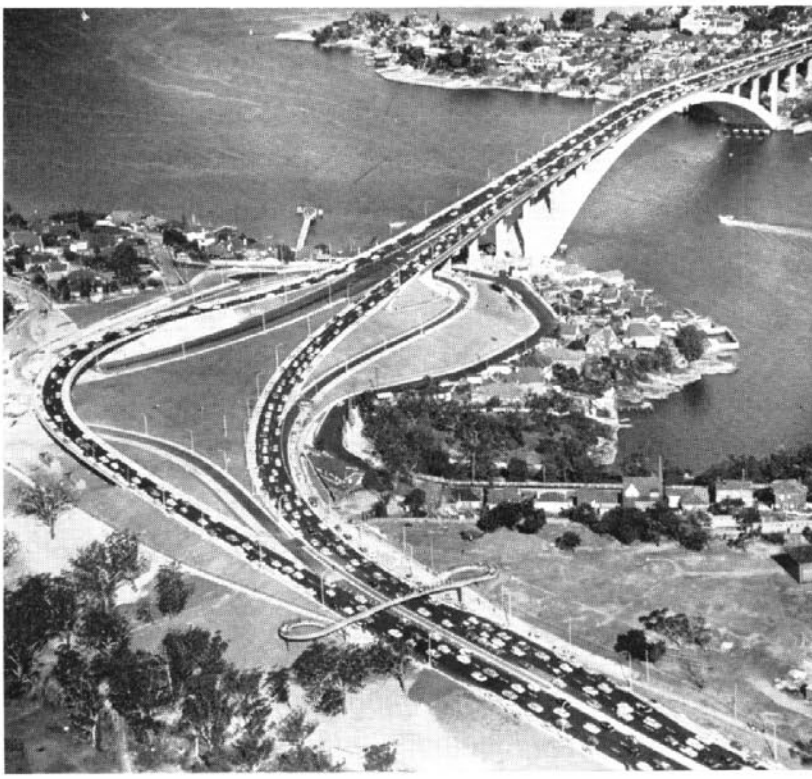
UNTIL October 1964, the crossing of the Parramatta River between Drummoyne and Gladesville was by way of a wrought iron truss bridge built in 1880. The inadequate carriageway width and the existence of an opening span to permit passage of river craft caused extensive delays and serious inconvenience to road users. During peak periods, under police control, the bridge operated as a one-way thoroughfare, with a result that wherever practicable, drivers of road vehicles would select an alternative route which would have its own unsatisfactory features. It was certain, therefore, that the completion of the new Gladesville Bridge and the associated structures at Tarban Creek and Fig Tree would bring about a significant re-arrangement in traffic patterns and behaviour.

These three bridges and associated road works form part of the proposed North Western Expressway and provide vastly improved travelling conditions. Furthermore, the associated principal thoroughfare, Victoria Road, has already been developed to a six-lane standard north of its intersection with Commercial Road at White Bay. These improved conditions, however, have greatly increased traffic load through Drummoyne and Rozelle, with the probability of serious congestion on the City side of Rozelle.

Complete relief will not be possible until the North Western Expressway is constructed between the City and Rozelle, but as an interim measure a number of relatively minor works were planned and undertaken. Consideration was also given to the impact of traffic from a new road crossing provided by a new bridge over Hawthorne Canal between Haberfield and



Late afternoon traffic over the Gladesville Bridge



Intersection of Commercial Road and Victoria Road, White Bay

Leichhardt, and the need to divert this traffic to the greatest extent possible away from the main stream of traffic reaching White Bay from Drummoyne.

Planning was concentrated on the following:

- provision of additional traffic lanes;
- provision of improved alternative routes; and
- provision of special signs to direct road users.

ADDITIONAL TRAFFIC LANES

Additional traffic lanes were provided at certain key intersections to facilitate turning movements. The locations selected for this type of improvement were the intersection of Victoria Road and Commercial Road, White Bay; the intersection of Sommerville Road and Victoria Road, Glebe Island; the bridge over White's Creek at the head of Rozelle Bay, and the intersection of Victoria Road and Moodie Street, Rozelle. Except for the widening of White's Creek, all work was undertaken by the Department of Main Roads using its own labour forces. Inclusive of the widening of the railway overbridge at Sommerville Road, the total cost was about $256,000. The widening of the road and bridge at White's Creek was undertaken by the Leichhardt Municipal Council, partly by contract and partly with its own forces and cost $14,000.

ALTERNATIVE ROUTES

With the concurrence of the Leichhardt Municipal Council, the Council of the City of Sydney and the Ashfield Municipal Council, the Department declared new Secondary Roads from Johnston Street, Annandale, to Parramatta Road, Camperdown, via The Crescent, Crescent Street and Ross Street; and from Victoria Road, White Bay, to Parramatta Road, Haberfield, via Storey Street, New Abattoir Road, Lilyfield Road, Dobroyd Parade and Wattle Street. The former road directly benefits traffic from Gladesville Bridge wishing to proceed to the "uptown" Sydney area, while the latter provided the indirect benefit of an alternative

The new bridge over Hawthorne Canal on Secondary Road No. 2056

route for traffic which would otherwise merge into Victoria Road. Declaration as Secondary Roads of town streets linking these two routes is also being examined.

The construction of the new route via Crescent Street and Ross Street within the City of Sydney (including a new prestressed concrete bridge over Johnston's Creek) was undertaken by the City Council at a cost in the order of $240,000. Within the Municipality of Leichhardt the road was constructed by the Department of Main Roads using its own labour force. This portion cost $40,000. It is of interest to note that the route largely followed the abandoned tram-track area in Forest Lodge.

SIGNPOSTING

Effective signposting is difficult in built-up areas and the incidence of concentrated fast-moving traffic further reduces its effectiveness. To provide satisfactory information for drivers, special signposting, including advance direction signs, was erected at Lyons Road, Drummoyne; at Darling Street, Rozelle, and at Commercial Road, White Bay. This signposting is designed to assist road users in the choice of an alternative route to the more westerly suburbs and facilitates turning movements at the intersections.

While these facilities have had a most beneficial influence on traffic flow between Gladesville Bridge and the City, the Department of Main Roads, in association with the Department of Motor Transport and the Police Department, is constantly examining ways and means of improving road conditions to provide safer and more comfortable travel. While major changes are not feasible until the Expressway system can be advanced appreciably, a number of minor alterations might be possible. Towards this end, investigations are proceeding in respect of intersections of Miller and Saunders Streets, Pyrmont; Bank and Bowman Streets, Pyrmont; Miller and Harris Streets, Pyrmont; Murray and Union Streets, Pyrmont (including entrance to the Railway Goods Yard); Victoria Road and Lyons Road, Drummoyne, and Victoria Road and Westbourne Street, Drummoyne.

Within the limits imposed by the existing town streets system, no avenue is being left unexplored and no effort being spared to minimise bottlenecks and inconveniences for road users between the new Gladesville Bridge and the City of Sydney.

Johnston's Creek Bridge on Secondary Road No. 2073

Artificial Colouring of Rock

THE building of modern highways across hilly or mountainous terrain usually necessitates the excavation of deep cuts and the construction of high embankments in order to ensure an adequate standard of design and alignment. The scars of freshly exposed rock tend to become an ugly and prominent feature of the landscape, particularly where the route passes through a contrasting background of natural bushland.

Many examples of this occurred in the recently constructed length of the Hawkesbury River-Mount White Toll Work. In addition to the deep scarring of large boulders and outcrops of naturally weathered rock, the extensive system of concrete surface drains showed up as startling white ribbons extending up the hillsides.

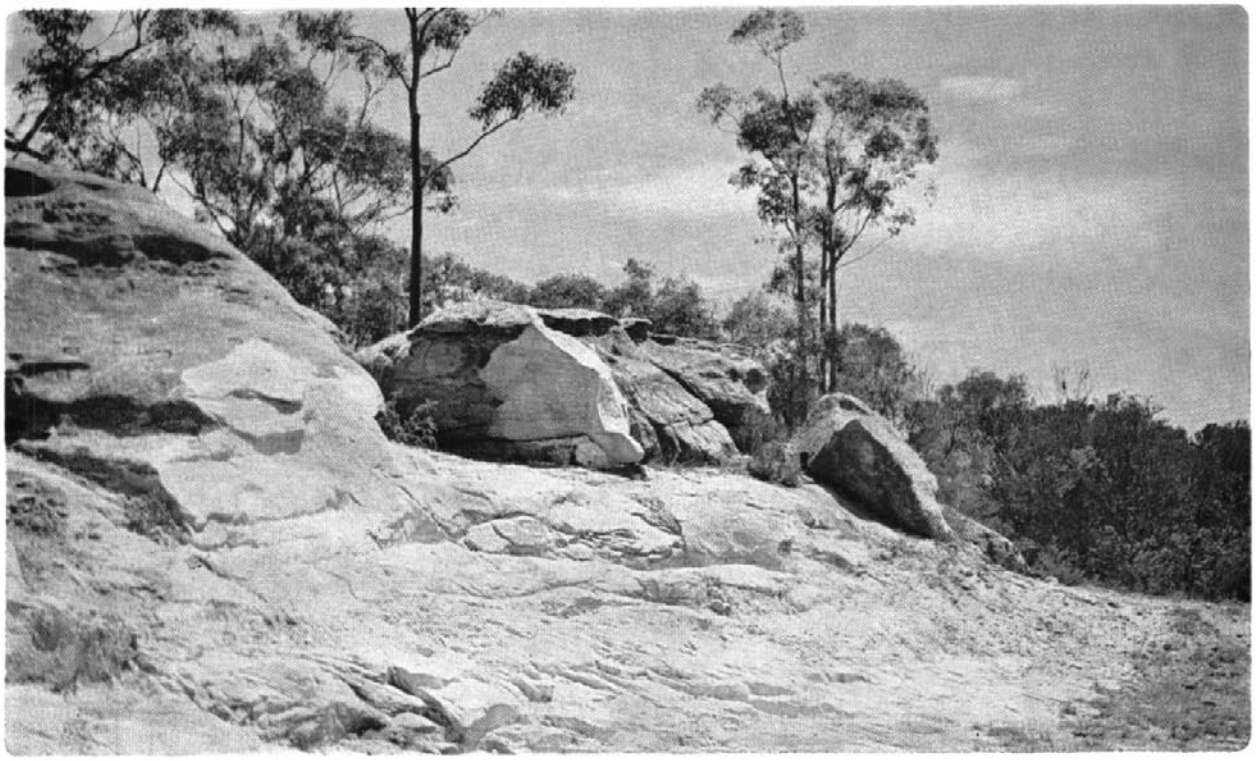
The Department, following a proposal by Professor Peter Spooner, highway landscape consultant, investigated methods of tinting the light-coloured rock and concrete in appropriate locations in an effort to minimise the disfiguring effect of these works on the natural landscape. Experiments were conducted by its Central Testing Laboratory in an endeavour to devise an economical method of colouring stone, keeping in mind desirable tints and the huge areas to be treated, many of which are difficult of access.

The object of the experiments was not to supplant natural weathering or to dispense with natural colouring agencies developed on weathering, but to provide an interim artificial weathering effect. It was assumed that natural weathering, which is a slow but continuous process, would gradually take over and produce the familiar natural tints. Initial experiments were conducted using solutions of a number of iron and manganese salts, to some of which were added pigments of various hues. However, none of these solutions produced the warm grey effect which is the dominant tint of sandstone which has weathered in a natural bush setting.

It was then decided to investigate more closely the natural processes which result in the characteristic tinting of sandstone rock outcrops in the bushland areas surrounding Sydney.

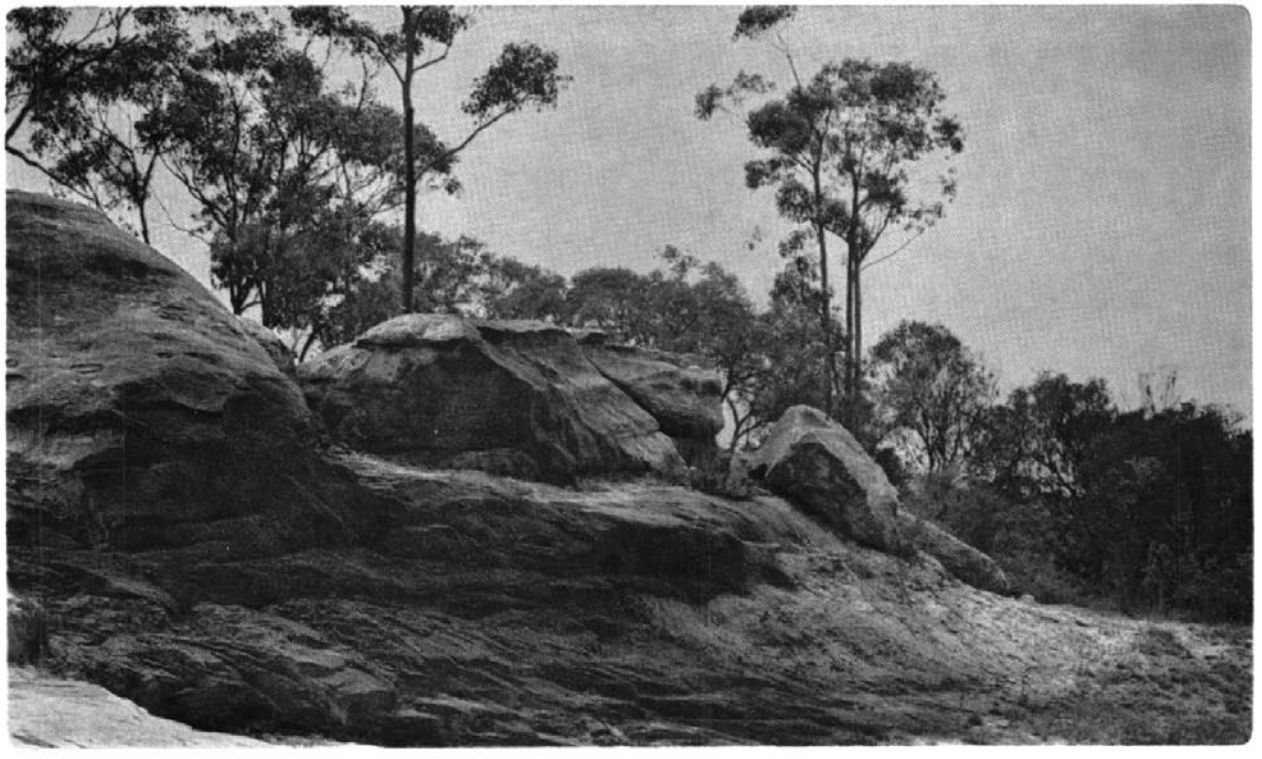
Chemical analysis of scrapings from the weathered rock surfaces revealed the presence of iron and manganese salts, associated with organic matter similar in composition to humic material which is derived from the decay of vegetable debris in soil. Characteristic groups of chemical compounds found in the scrapings included polyuronide, lignin, and tannin material. It was apparent that the natural colouring of sandstone is due to the accumulation of material derived from decaying vegetable matter such as leaves, grass, wood tissue, etc. This material may be deposited directly as forest debris, or may be washed over the rock surface, partly in solution, by seeping ground waters. Other contributing factors are the presence of lichens and mosses on favourably situated rock faces, and charcoal from forest fires.

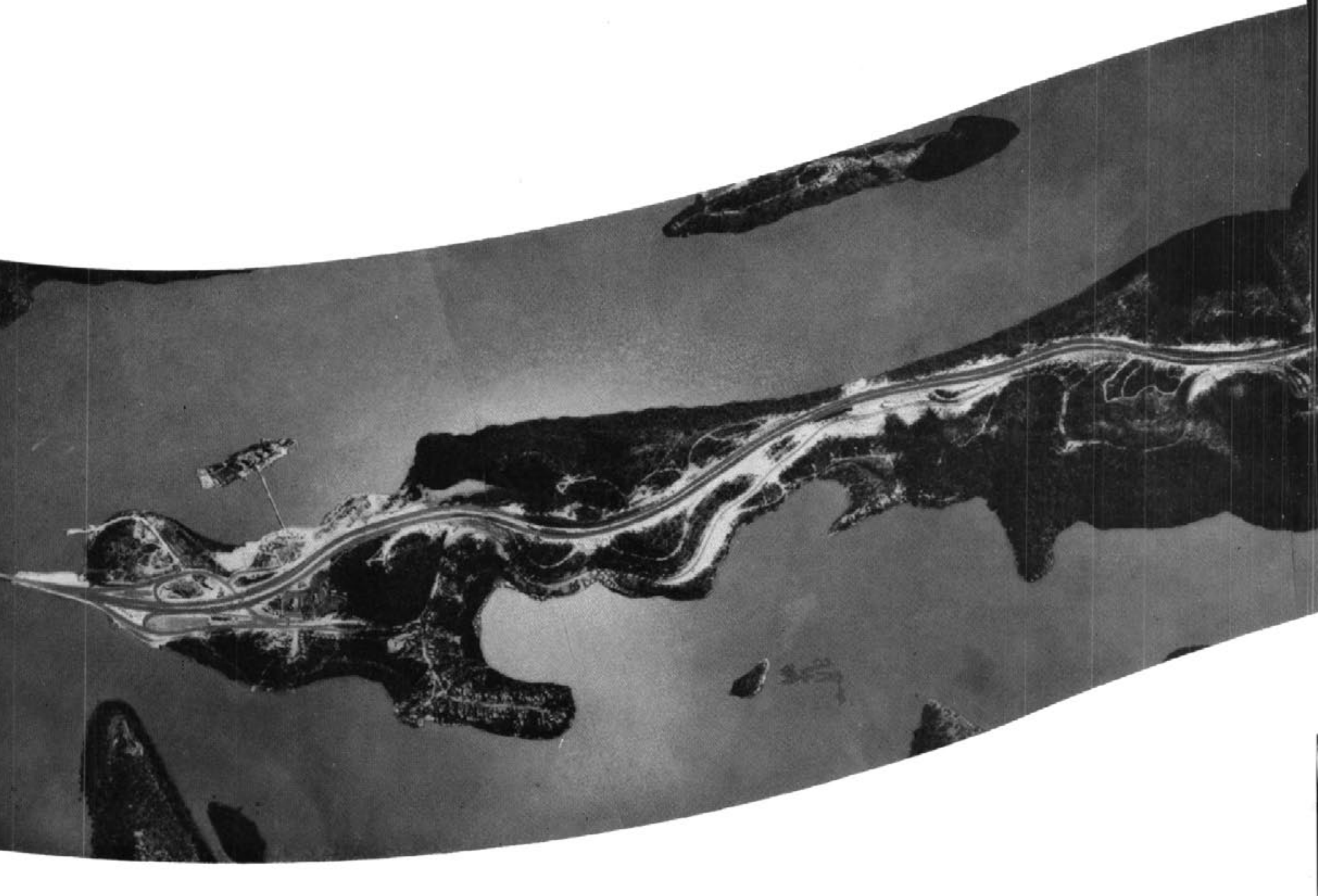
Using this information, formulations employing tannin and iron compounds were prepared and subjected to both laboratory and field testing. Laboratory tests appeared promising, but field trials showed that after a period of three month's exposure to the weather the tinting had faded badly. Further laboratory experiments produced an improved formulation containing carbon black in addition to the organic compounds. The improved formulation was subjected to severe laboratory weathering by ultra-violet ray treatment and prolonged artificial rain. Some fading was still apparent, but the effect was considered sufficiently resistant to serve in the field. Subsequent field trials confirmed this opinion, and the formulation was used in large quantities on the

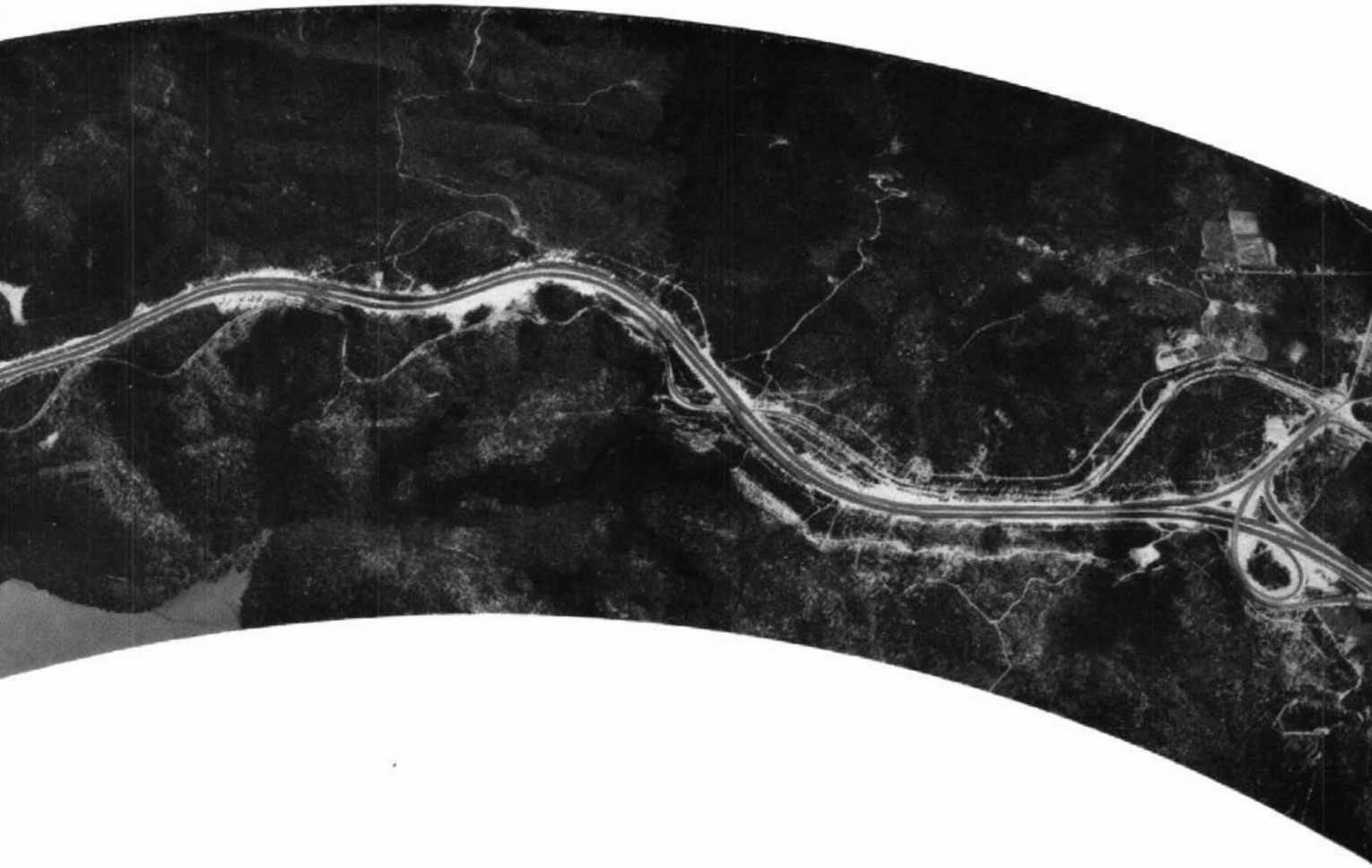


ROCK FACE SCARRED BY CONSTRUCTION WORK

AFTER TREATMENT THE NATURAL APPEARANCE OF THE ROCKS HAS BEEN RESTORED







THE TOLL WORK FROM PEAT'S FERRY BRIDGE TO THE INTERCHANGE AT MOUNT WHITE.
THE WINDING PACIFIC HIGHWAY MAY BE SEEN JUST BELOW THE BOLD LINE OF THE EXPRESSWAY

UNTREATED. THE CONCRETE DRAIN SHOWS UP CLEARLY ON THE HILLSIDE (ABOVE), WHILE (BELOW) THE TREATED DRAIN BLENDS HARMONIOUSLY WITH NATURE

Expressway. The durability of the formulation can be readily improved if certain surface-active agents are employed in conjunction with it, but these are expensive and raise the cost to an uneconomical level. The cost of the improved formulation was $1.15 per 100 sq. ft, not including the cost of the labour of application.

Having proved successful on sandstone, trial lengths of the concrete catch drains were sprayed with the improved tannin-iron compound plus carbon black formulation. Immediately after application the appearance of the drains was quite satisfactory. However, a period of prolonged heavy rain a few days after application removed practically all colouration from the concrete, whilst having little or no effect on sandstone sprayed at the same time.

A further intensive series of experiments was undertaken at the Central Testing Laboratory in an effort to produce a suitably enduring tint for the catch drains. It was found that the addition of a small percentage of phosphoric acid to the improved tannin-iron compound plus carbon black formulation gave a tint to concrete that withstood a rigorous programme of exposure to ultra-violet irradiation, and high-pressure water jets. This preparation was subsequently used on the catch drain system. The formulations for both sandstone and concrete treatment, when applied to their respective locations, appear, immediately after application and for a short period thereafter, to be very dark in hue. This intensity of colour fades on exposure to normal weather conditions to an acceptable level of grey.

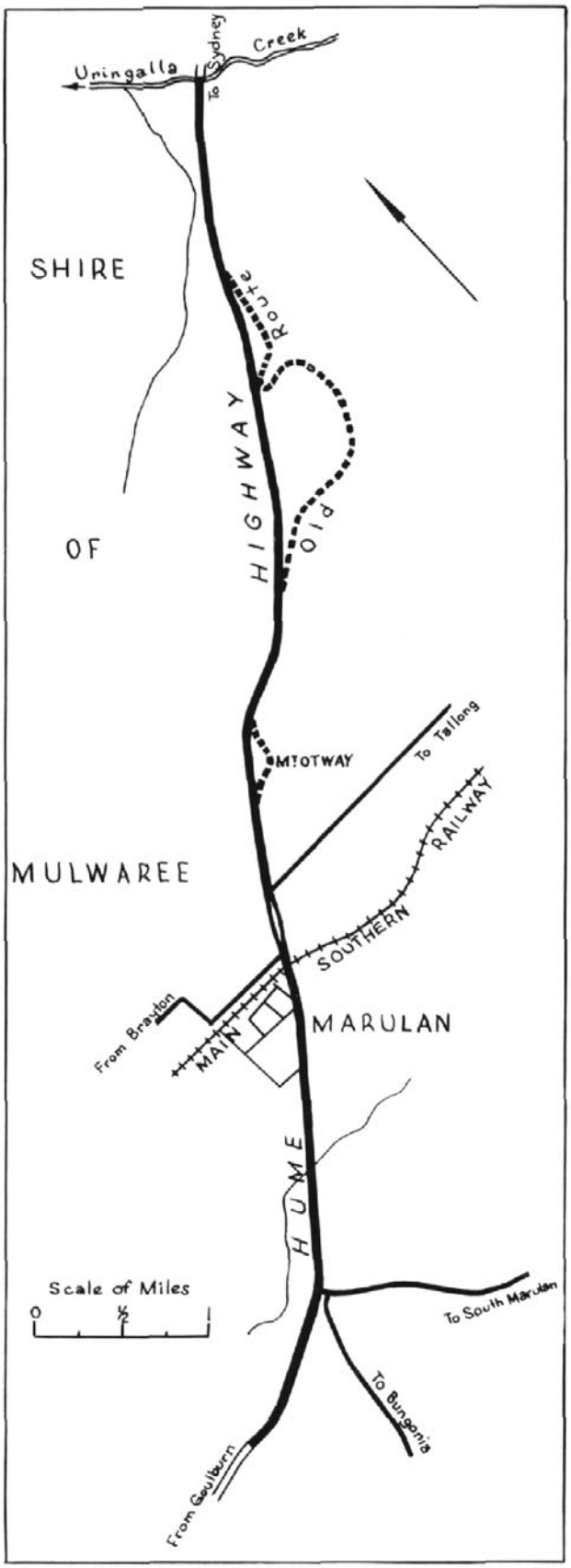
Various techniques for application of the formulations have been tried. For the purpose of all field trials a four-gallon capacity knapsack spray was used, and found to give an even application with the minimum of wastage. This method of application was also used when large-scale spraying was undertaken.

ROADS AND ROAD SAFETY

THE safe use of roads depends on many factors, foremost of which are good drivers, roadworthy vehicles and good roads.

Some of the features provided on modern roads, in order to make them safe, include—

- ☐ Smooth, firm, non-skid surfaces.
- ☐ Sufficient width for vehicles to pass one another safely.
- ☐ Grades which can be descended in safety.
- ☐ Curves with as large a radius as possible.
- ☐ Plant growth and other obstructions cleared away at curves to provide ample visibility.
- ☐ Crests which do not block the view of the road ahead.
- ☐ The road surface sloped, or "super-elevated", on curves to assist the vehicle around the curve.
- ☐ A marked centre-line, where roads are bitumen surfaced, to assist drivers in maintaining correct road position and to warn drivers where overtaking would be unsafe.
- ☐ Edgelines to indicate the edge of road pavements at night.
- ☐ Shoulders, or flanks, of sufficient width for vehicles to stand clear of the pavement.
- ☐ Guide posts to mark the outer edge of the road, especially at night. Safety fencing where required.
- ☐ Warning signs, placed well ahead of the hazard to which they refer.
- ☐ Advisory signs to indicate a speed which should not be exceeded for comfort and safety on curves.
- ☐ Advance direction signs in approach to intersections so that decisions to turn can be made prior to reaching an intersection.
- ☐ Reflectors, black and white stripes, or other markings on obstacles that may exist on or near the road.
- ☐ Absence of advertising signs likely to distract drivers.
- ☐ Intersections so laid out as to reduce the likelihood of collision, and with ample visibility of approaching traffic.
- ☐ Climbing lanes on hills to reduce delays and permit safe overtaking of slow vehicles.
- ☐ Level-crossings fully protected by warning signs and other means, depending on the circumstances.
- ☐ Elimination of level-crossings wherever practicable.



HUME HIGHWAY

RECONSTRUCTION NEAR MARULAN

THE Hume Highway (State Highway No. 2), between seven miles north and three miles south of Marulan on the Southern Tablelands was originally constructed in cement concrete prior to 1930.

By today's standards, parts of this old pavement were on poor alignment and grading. Travellers will recall the hair-pin bend 3·5 miles north of Marulan where the maximum safe speed was only 20 m.p.h. In addition, the pavement was only 20 feet wide and, despite intensive heavy patching and drainage work over recent years, the riding qualities had deteriorated due to subsidence and breaking up of the concrete slabs.

Towards the end of 1963, as part of a general programme for improvement of the Hume Highway between Sydney and Albury, the Department of Main Roads commenced reconstruction of this length. The work has recently been completed.

In planning for the work, a 60 miles per hour design standard was adopted with a minimum curve radius of 3,000 feet. Grades are generally moderate, the maximum being 5·8 per cent at Mount Otway. The new pavement is 24 feet wide with 10 feet wide gravel

shoulders, and, except through the village of Marulan, the location has been planned so that it can eventually form part of a four-lane divided carriageway.

Of the 10 miles of old road, the grading and alignment on sections totalling 3·7 miles were satsisfactory for high speeds. On these sections the road was first widened and where necessary, a new pavement of natural conglomerate gravel was laid upon the old concrete pavement. The thickness of gravel pavement laid varied from 6 inches to 12 inches depending upon the condition of the old concrete, and its longitudinal grades.

On the remaining 6·3 miles, the new road departs from the old alignment and grading. The main departure is a major deviation 1·9 miles long which eliminated a winding section of the old road, including the hair-pin bend mentioned previously.

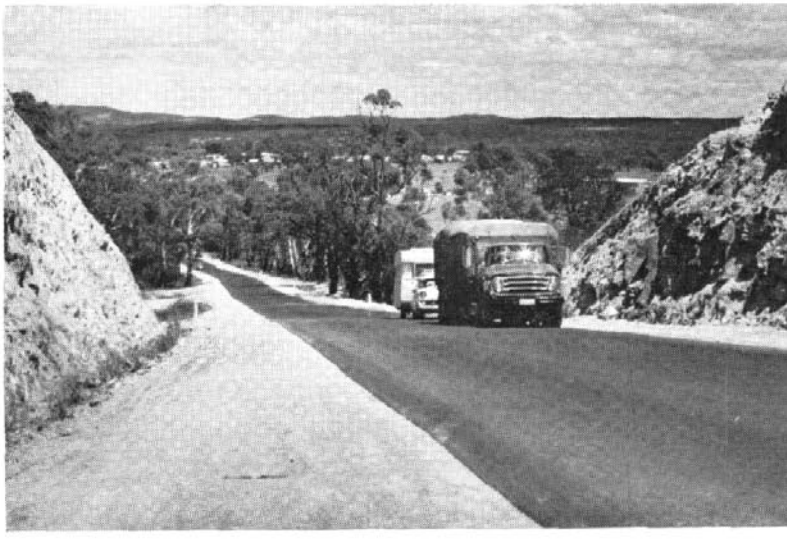
As a result of the realignment there is a saving in distance of 0·7 miles so that the new length of the section is 9·3 miles.

Approximately 160,000 cu. yds of earthworks were carried out to establish the new formation, about half being on the major deviation.

The new gravel pavement was bitumen surfaced progressively as it was completed and is covered with a layer of asphaltic concrete, generally 2-inches thick.

The supply of most of the pavement gravel, and the supply and laying of the asphaltic concrete was carried out by contract. The balance of the work was carried out by the Department with its own forces.

The cost of re-constructing the 9·3 miles was approximately $1,046,000.



Above—Reconstructed section of Hume Highway, 1¾ miles north of Marulan

Centre—Three miles south of Marulan

Below—New work at Mount Otway

NEW BRIDGE NEAR DUBBO

IN THE dry mid-western heat of Wednesday, 2nd February last, The Hon. P. H. Morton, M.L.A., Minister for Highways, officially opened a new bridge over the Talbragar River at Troy Junction on the Newell Highway, four miles north of Dubbo.

The dried out bed of the Talbragar, the sun scorched earth of the countryside, were poignant reminders to those who came to the ceremony from lusher areas, of the seriousness of the prolonged drought.

After the ceremony the Minister inspected the new bridge and the 2·3 miles of deviated highway on which it is situated.

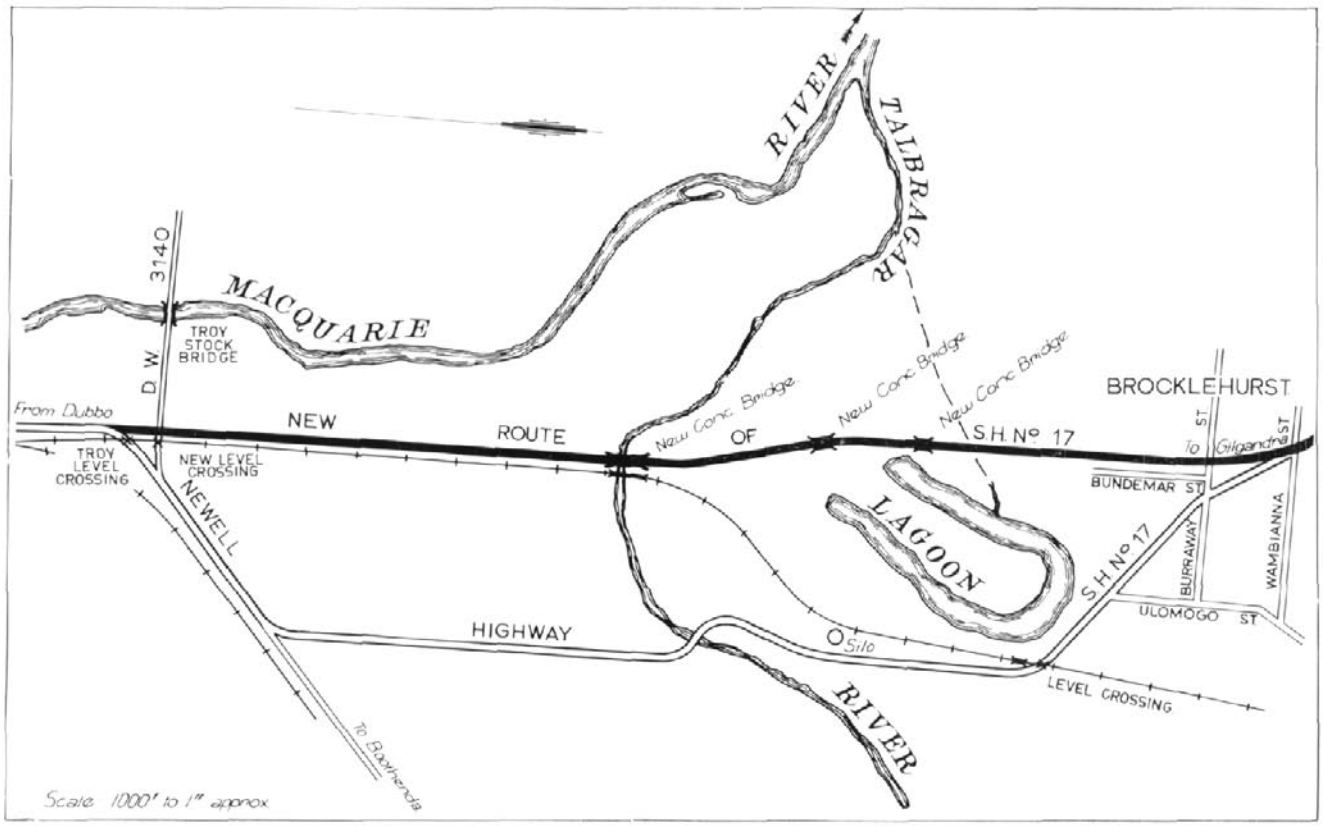
The new bridge, 332 feet long, is constructed of steel and reinforced concrete comprising four composite rolled steel joist spans and one steel truss span. It replaces an old narrow timber bridge and if the Talbragar ever floods again, the water should pass safely under.

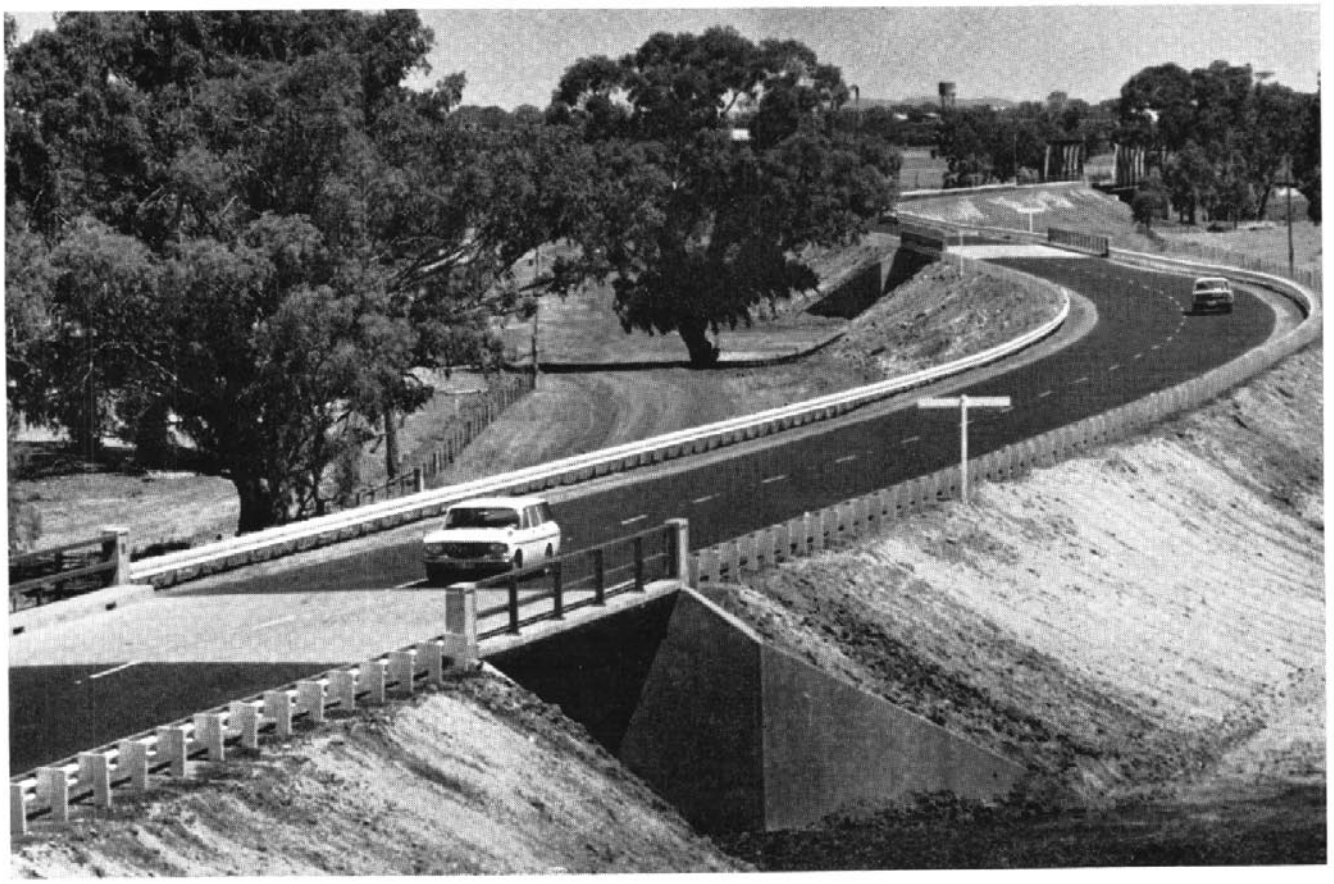
Two smaller bridges have also been built across overflow channels northwards of the main bridge.

The new section of the highway on which the three bridges have been built eliminates two railway level crossings from the route of the Newell Highway and provides better alignment and flood free conditions.

Transfield Pty Ltd built the three bridges, all were designed by the Department, while steelwork for the main bridge was supplied by John Lysaght (Australia) Ltd. The Department's own work force constructed the roadworks.

Full cost of the whole project, approximately $630,000, was borne by the Department.





Above—A section of the deviation showing the two bridges across the overflow channels and the main bridge in the background

Right—The new bridge over the Talbragar River on the Newell Highway

Training Plant Operators

TO TRAIN plant operators and potential operators in the care, maintenance and operation of plant, the Department established a School of Plant Instruction in 1945.

Initially, the school was conducted at the Department's Central Workshop, Granville and operators were brought from country centres for instruction. In 1947, the practice of bringing operators to the Central Workshop for instruction was abandoned in favour of instruction on the job and the School of Plant Instruction has continued to operate in that manner since. Details of the operation of this school in its early years were given in the March, 1954, issue of "Main Roads".

At the present time, there are five instructors, including a senior instructor. They visit all works as frequently as practicable and generally each work twice a year. Experienced operators are given a brief revision of previous instruction, occupying about half a day. Longer periods are spent with less experienced operators, one day or more being devoted to new operators. Men selected as potential operators are also given some training during the visit by the instructors so that they may be available in the event of vacancies occurring in the Department's service.

Apart from the scheduled itinerary, brief visits are made to works in emergencies and when there is a need to instruct a new operator.

The school utilises a film projector and from time to time instructional films (operations, maintenance, safety) are shown to groups of operators.

The instructors co-operate closely with Works Engineers and Foremen prior to and during instruction. Where necessary, adjustments and minor repairs are carried out, so that the plant item is in satisfactory condition while instruction is being given. At the same time this gives the operator an opportunity of servicing the equipment under qualified instruction.

With the expansion of the Department's roadwork activities in recent years, there has been a considerable increase in the quantity of plant utilised and in the replacement of worn-out and obsolete plant. New and improved models of existing types of equipment have become available, while newer types of equipment have been acquired for specific operations.

Before new plant is placed in service, the operator is instructed in operating and servicing the item and new features are explained to him. This instruction is usually given before despatch of the equipment to the job, but on occasions the instructor travels to the work site. This instruction is followed up during the instructor's next visit.

There is still a relatively large labour turnover among operators throughout the State with a continuing loss of trained men. In consequence, there is a constant need for the training of new operators, as well as the training of operators on new and improved machines.

The Department employs approximately 600 plant operators throughout the State in some 40 works centres and each is given instruction during the year.

SYDNEY HARBOUR BRIDGE ACCOUNT

Receipts and Payments for the period from 1st July, 1965 to 31st December, 1965

Receipts	$
Road Tolls	1,954,778
Contributions—	
Railway passengers	140,738
Omnibus passengers	15,702
Rent from Properties	54,818
Miscellaneous	574
Loan Borrowings for the Warringah Expressway Approach	990,000
	$3,156,610

Payments	$
Cost of collecting road tolls	205,008
Maintenance and minor improvement	268,434
Interest, exchange and management expenses on State loans	594,040
Alteration to Archways	12,320
Alteration to other structures	22,290
Administrative expenses	21,100
Provision of traffic facilities	35,276
Interest and provision for repayment—Loan Borrowings under Section 7 of Sydney Harbour Bridge Administration Act	36,048
Transfer to Expressways Fund	1,904,000
Miscellaneous	*23,626
	$3,074,890

* Credit

THE NEWELL HIGHWAY

RECONSTRUCTION — Tocumwal to Ardlethan — Narrabri to Moree

THE Newell Highway, passing through inland New South Wales from the Victorian border to the Queensland border, generally parallels the coast at a distance of about 200 miles inland. It commences at Tocumwal on the Murray River and passes northerly through Narrandera, West Wyalong, Parkes, Dubbo, Gilgandra, Coonabarabran, Narrabri and Moree to Goondiwindi on the Queensland border.

It crosses the Riverina, Sturt, Mid-Western, Mitchell, Oxley and Gwydir Highways, which generally run in an east-west direction, finally joining the Bruxner Highway at Boggabilla. In places, the Newell Highway coincides with short lengths of these other Highways.

When proclaimed, the Newell Highway followed existing main road routes, except from Narrandera to West Wyalong and from Coonabarabran to Narrabri. Over the greater part of these two lengths a road had to be built and progressively improved to carry the highway traffic. An article relating to the construction between Coonabarabran and Narrabri was published in the September 1949, issue of "Main Roads".

This article deals with recent work carried out from Tocumwal to Ardlethan, and from Narrabri to Moree.

GEOGRAPHICAL

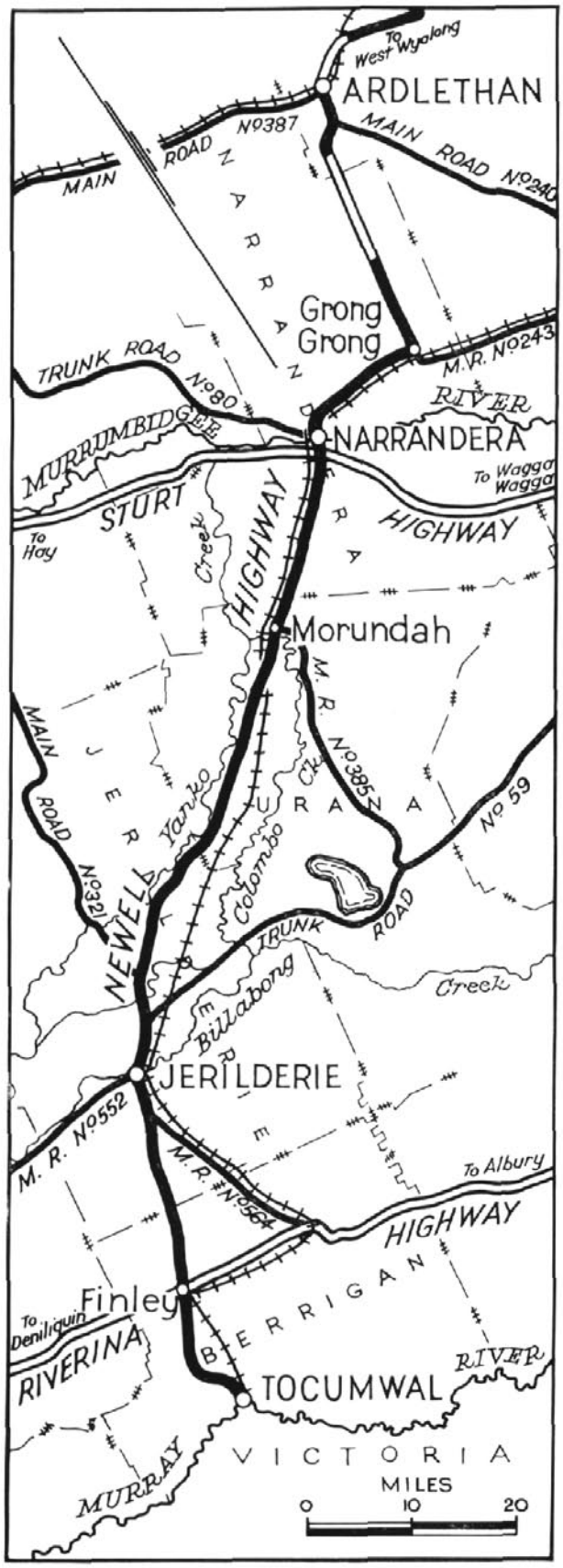
The Newell Highway at its southern end commences in the low sandhill region adjacent to the Murray River at Tocumwal. It traverses partly irrigated flat alluvial country, sands and loams, to Finley, where the predominant agricultural and pastoral activities are wheat growing, cattle and fat lamb raising,

From Finley northerly towards Jerilderie, the country is similar, but the irrigated areas give way to general grazing country. These conditions continue to the Urana/Narrandera Shire Boundary and from there the country rises gradually until the Murrumbidgee flood plain is reached.

After crossing the Murrumbidgee River at Narrandera, the route of the Highway passes across sandhills and some rocky hills of sandstones, conglomerates and shales, to Grong Grong. This land is generally used for grazing, with some wheat growing. Just north of Grong Grong deeply-weathered granite country extends for about five miles from whence undulating to flat grazing country is traversed to Ardlethan. Weathered slates, phyllites, schists and occasional porphyry lie in this region.

Between Narrabri and Moree, the Newell Highway traverses very flat country. From Narrabri to Bellata there are black soil plains where wheat growing is

The "Royal Mail" Hotel at Jerilderie is best known for its association with Ned Kelly in 1879



extensive. Thence, to the Boolooroo Shire boundary, the country is undulating, with ridges of conglomerate gravel.

From the Boolooroo Shire boundary to Moree the country is again mainly flat, so much so that water catchment areas are very difficult to define and culverts have to be sited at known water crossings rather than by topographical analysis.

CONSTRUCTION

Tocumwal to Ardlethan

Prior to 1956, a bitumen pavement extended northwards from Tocumwal to Finley, a length of 13·7 miles, and over lengths of about 4 miles each in the town areas of Jerilderie and Narrandera; that is approximately 22 miles out of a total length of 144 miles. Since then, work has progressed to the stage where there is now a continuous bitumen pavement from the Victorian border to 24 miles north of Narrandera and over the last 5 miles into Ardlethan. The only unsealed length is 11 miles long, located between 24 miles and 35 miles north of Narrandera. Construction is at present proceeding on that length.

Prior to 1961, bitumen pavement construction widths on the Newell Highway were 18 feet and 20 feet. To provide for the needs of increasing traffic, all bitumen pavement work carried out since 1961 has been to a width of 22 feet, with shoulders 6 feet wide (i.e., a formation width of 34 feet).

Reconstruction is at present being undertaken on the old bitumen length between Tocumwal and Finley. Pavement strength is being increased, and the 18 feet pavement is being replaced with one 22 feet wide. The reconstruction length is from 1·6 miles to 12·6 miles north of Tocumwal.

Between Finley and Jerilderie the highway was reconstructed and bitumen surfaced 18 feet wide during 1958 and 1959.

The highway from 3 miles to 43·8 miles north of Jerilderie was reconstructed and bitumen surfaced in the years 1960, 1961 and 1962. With the exception of a width of 18 feet between Jerilderie and 3 miles north of Jerilderie, a 20-feet wide pavement was provided as far as 24·6 miles north; thence a 22-feet wide pavement was provided. The design standards achieved provided unrestricted sight distance and 60 m.p.h. alignment. Gravel used was prior-stream material, stabilised with sand; a pulvi-mixer being used to ensure thorough mixing of these two materials.

The next section of five miles, from 43·8 miles to 48·8 miles north of Jerilderie, is known as the Morundah Deviation. This deviation, completed in 1965, provides improved alignment as well as eliminating a railway level crossing from the route of the highway by the provision of an overbridge. Structures on the deviation include the reinforced concrete overbridge and reinforced

concrete bridges over Colombo Creek and over a section of the adjacent flood plain. The overbridge was constructed by the Department of Railways and the other two bridges by contract to the Department of Main Roads. Part of the road earthworks was constructed by contract, the remaining work being carried out by the Department's own forces. The new pavement is 22 feet wide, with unrestricted sight distance and 60 m.p.h. alignment.

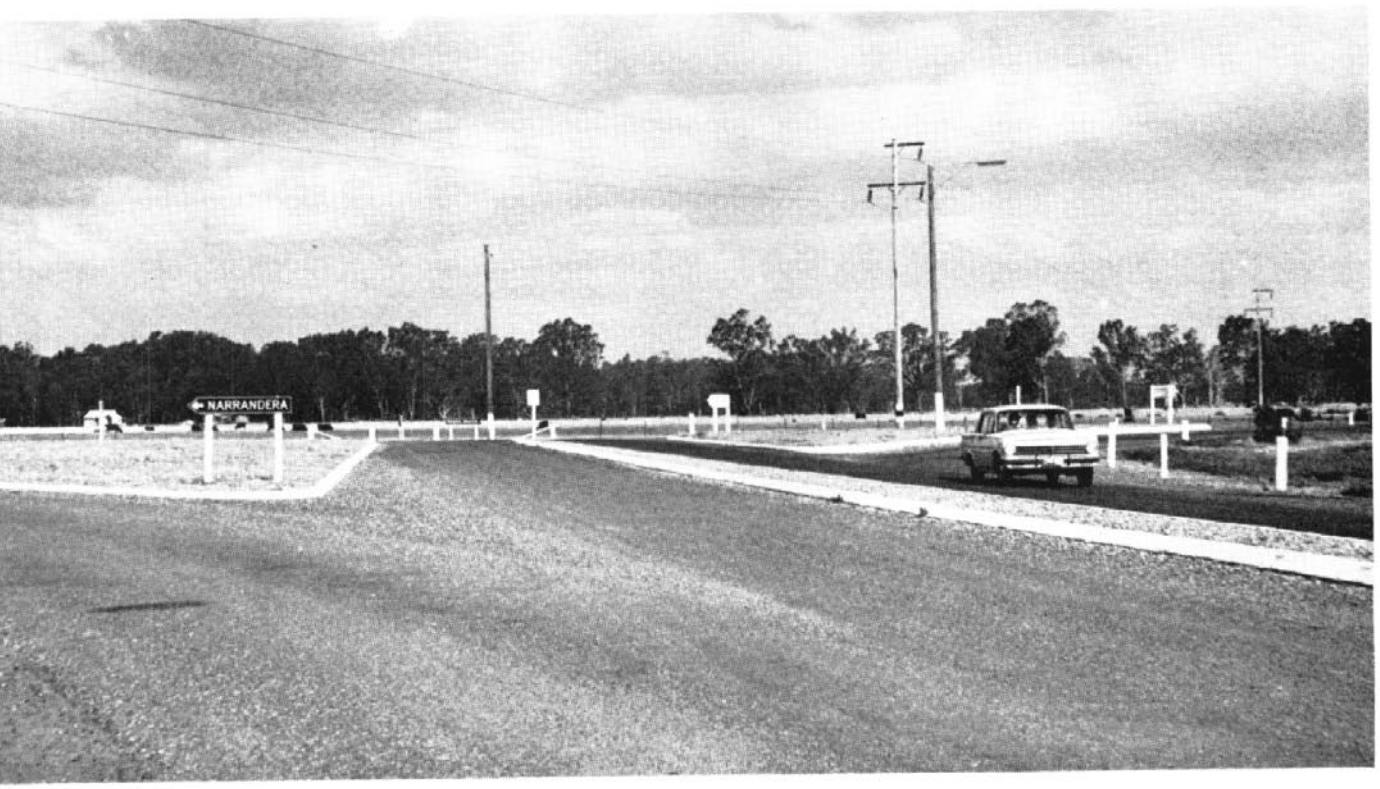
From 48·8 miles to 61·6 miles north of Jerilderie, the highway was reconstructed and bitumen surfaced in 1961-1962. The work is to the same standard as the Morundah Deviation. Gravel used was red conglomerate, stabilised as required with river sand.

Reconstruction and bitumen surfacing from 61·6 miles to 64·6 miles north of Jerilderie were carried out in 1960. Red conglomerate gravel was used on this straight section of road which is bitumen surfaced to a width of 18 feet.

The length 64·6 miles-66·1 miles north of Jerilderie is over the flood plain of Poisoned Waterholes Creek and Gillenbah Creek. The reconstruction and bitumen surfacing were done in 1960-1961. Causeways and

Left—Looking towards Narrandera across Colombo Creek Bridge on the Morundah deviation

Below—Channelised intersection of the Newell and Sturt Highways. Note contrasting colour of the surfaced median strip, and traffic islands



Plant operating in a rocky cutting about 29 miles north of Narrandera

large low-level box culverts built by contract provide the two creek crossings. Pavement width is 22 feet.

The junction of the Newell Highway with the Sturt Highway (State Highway No. 14) is at 66·1 miles. The Newell Highway leaves the Sturt Highway going northwards at 66·6 miles north of Jerilderie. This latter junction was channelised in 1965. The traffic islands and median strips are surfaced in a contrasting colour, and the whole junction is lit with sodium vapour lamps.

From 67·0 miles north of Jerilderie, through Narrandera (Narrandera Terminal is 68·6 miles), to 2·7 miles north of Narrandera, the highway was bitumen surfaced more than 20 years ago.

The length of highway from 2·7 miles to 13·6 miles north of Narrandera (at Grong Grong) was reconstructed and bitumen surfaced 18 feet wide in 1956, 1957 and 1958.

From Grong Grong to 5·1 miles north of Grong Grong reconstruction and bitumen surfacing was carried out by the Department in 1963-64. The new bitumen pavement is 22 feet wide and the road is straight for this length. Some rockwork was involved in the reconstruction work.

The sections from 5·1 miles to 10·4 miles north of Grong Grong has also recently been completed to the same standard, while the length from 10·4 miles to 21·4 miles from Grong Grong is currently under reconstruction.

The next 5·6 miles which leads to the start of a major deviation at Ardlethan, was recently reconstructed and bitumen surfaced. Work on the Ardlethan deviation is expected to commence at an early date.

Narrabri to Moree

Within Namoi Shire from Narrabri to the Boolooroo Shire boundary, a distance of 33·66 miles, the original pavement, with the exception of short lengths of bitumen surfacing in the villages of Edgeroi and Bellata, consisted of a gravel surface. The highway in Narrabri Municipality had been surfaced with bitumen for many years.

The reconstruction follows generally along the line of the old gravel road with the exception of a two-mile deviation, and a railway overbridge, between 29·75 miles and 31·75 miles north of Narrabri. A design speed of 60 m.p.h. was adopted with a sealed pavement width of 22 feet and a formation width of 34 feet. A raised formation averaging 18 inches above natural surface was adopted generally to assist in drainage. The average pavement thickness is 12 inches.

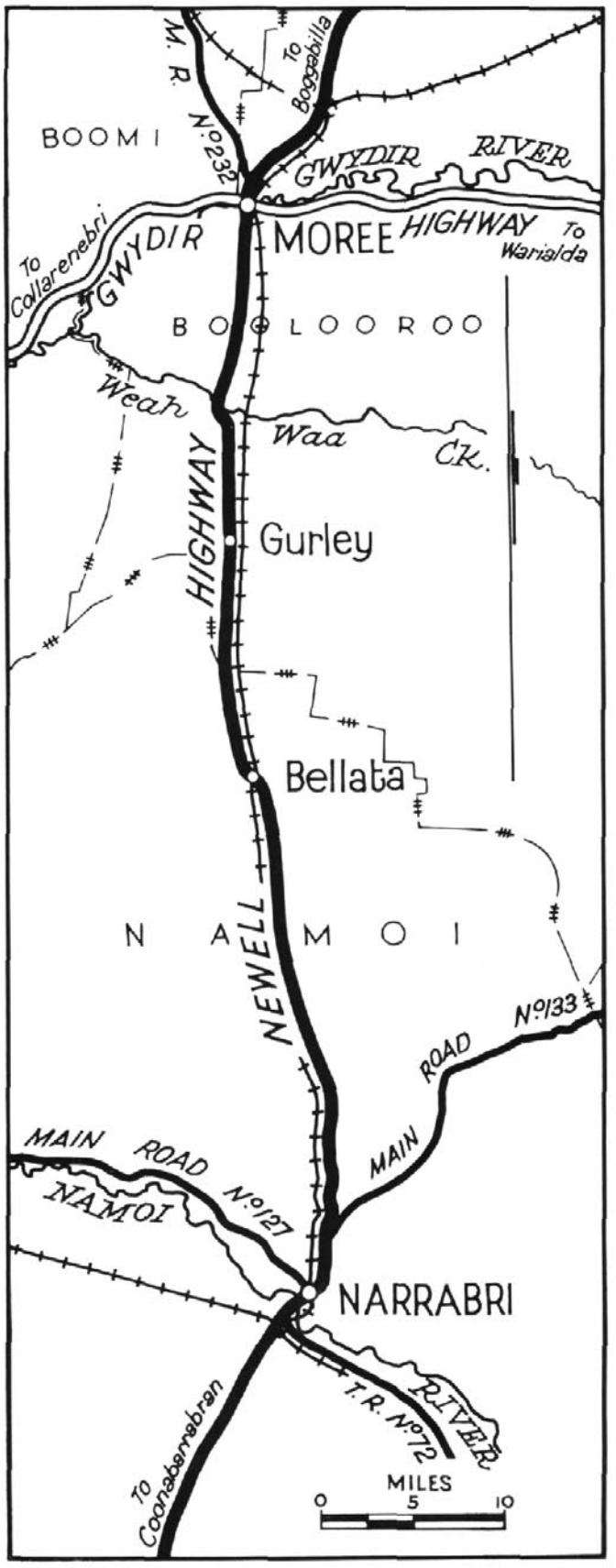
The work proceeded northerly from Narrabri and with the exception of some bridgeworks which were built by contract, was carried out by the Department's own forces.

Due to the very flat nature of the country, drainage was a major problem. The smaller structures were precast box culverts with a small number of concrete pipe culverts. On the larger and more defined waterways, cast-in-situ box culverts were constructed, including eleven bridge size structures. In addition, a 190 feet steel beam and concrete bridge over Ten Mile Creek, was constructed by contract. A 120-feet concrete bridge with precast and prestressed planks was constructed over Pan Creek by the Department's own organisation. An overbridge at approximately one mile north of Bellata was constructed by the Department of Railways, eliminating a railway level crossing from the route of the highway.

Due to the lack of readily available water and the long hauls involved, water for compaction purposes was added by means of a pulvi-mixer on all pavement work and on most of the formation work. Compaction was by smooth steel vibrating rollers followed by pneumatic-tyred rollers. A sheepsfoot roller was also used for compaction of the black soil fills.

The bitumen surfacing was carried out using a cover aggregate of crushed and screened river gravel taken from the Namoi River near Narrabri.

A contract was let in August 1965, for the construction of an eighty-feet concrete bridge with precast prestressed bridge planks over Boggy Creek. This is the last remaining unbridged crossing on this length and it is expected that the bridge and approaches will be completed by June 1966. Other future work proposed on this section of the Newell Highway includes the



Reconstruction completed near Gurley

enlargement of a number of reinforced concrete box culverts which have proved too small to accommodate major floods and the construction of a railway overbridge and deviation approximately two miles north of Narrabri to eliminate a level crossing and to improve drainage under major flooding. The replacement of the existing timber beam bridges over Spring and Bobbiwa Creeks will also be undertaken in the next few years.

Within the Shire of Boolooroo from the Boolooroo-Namoi Shire Boundary to Moree, the old road comprised an earth formation with a stoney gravel pavement, a concrete causeway at the Manamoi Creek crossing, and numerous smaller gravel causeways. Two timber bridges at Weah Waa and Courallie Creeks have been retained in the new alignment.

Prior to 1961, Boolooroo Shire Council had completed bitumen surfacing 18 feet wide on a 28 feet formation width to 5 miles south of Moree. A concrete bridge over Hall's Creek, 4½ miles south of Moree, was constructed during this period by the Department.

A contract has been let to construct a bridge over Little Bumble Creek 1½ miles south of Gurley, and a design has been prepared for a bridge over Manamoi Creek to replace existing causeways. A primed side-track has been provided at both these locations. The existing bitumen surface through Gurley will also be reconstructed to 22 feet.

From 5 miles south of Moree to the Boolooroo Shire boundary the bitumen pavement has been constructed 22 feet wide with 6 feet wide shoulders.

New bitumen pavement ten miles south of Moree

Earthworks throughout have been constructed with black soil, the pavement being established generally 6 inches above the known flood level, with the exception of a long floodway on the northern end of Courallie Creek.

During heavy rain experienced in the course of the work, it was noticed that flooding had occurred south of Weah Waa Creek and additional precast concrete culverts were placed to relieve conditions. Wide shallow drains were constructed on each side of the road which provided the greater part of the filling required.

CONCLUSION

The Department is most anxious to provide the Newell Highway with a bitumen surfaced pavement for its full length and is pressing on with a continuing programme of reconstruction.

Between Tocumwal and Ardlethan and from Narrabri to Moree approximately 140 miles of bitumen surfaced pavement have been provided in the last six years at a total cost of about $4,500,000.

Increasing use of this Highway by commercial vehicles and tourists is noticeable as the bitumen surface is extended. It is expected that there will be further substantial increases in traffic as the work of reconstruction is progressively extended throughout the full length of this very important highway.

At the present rate of progress, the Newell Highway will have a continuous bitumen surface from Tocumwal to north of Moree in some 3 to 4 years.

TENDERS ACCEPTED BY DEPARTMENT OF MAIN ROADS

The following tenders (in excess of $6,000) for Road and Bridge Works were accepted by the Department during the three months ended 31st December, 1965.

Work or Service	Name of Accepted Tenderer	Amount
		$
State Highway No. 2—Hume Highway, Shire of Mittagong. Construction of 4 cell reinforced concrete box culvert over Cutaway Creek 4 m. south of Mittagong.	Pearson Bridge Pty Ltd	35,090.00
State Highway No. 2—Hume Highway, Shire of Mulwaree and City of Goulburn. Supply and laying of 19,540 tons of asphaltic concrete near Marulan.	Jayworth Asphalts Pty Ltd	248,809.20
State Highway No. 2—Hume Highway, Shire of Wollondilly. Construction of 7 span prestressed concrete bridge, 627 feet long over the Bargo River and the Main Southern Railway Line 3 m. north of Bargo.	Transbridge Pty Ltd	390,782.50
State Highway No. 4—Snowy Mountains Highway, Shire of Snowy River. Construction of 4 cell reinforced concrete box culvert at Racecourse Creek 2·29 m. west of Kiandra and 2 cell reinforced concrete box culvert at Three Mile Creek 2·75 m. west of Kiandra.	Tumbarumba Constructions	27,364.00
State Highway No. 5—Great Western Highway. Municipality of Blacktown. Construction of a prestressed reinforced concrete bridge, 135 feet long over the Hume Highway at Church Lane, Blacktown.	F. T. Eastment & Sons Pty Ltd.. ..	84,910.00
State Highway No. 9—New England Highway, Shire of Tenterfield. Supply and delivery of 1,350 cubic yards of aggregate to stockpiles between 40·50 m. and 46·60 m. north of Glen Innes.	N. Dare	10,425.00
State Highway No. 10—Pacific Highway. Municipality of Ballina. Supply and delivery of 1,290 cubic yards of aggregate to various stockpiles.	Lismore City Council	6,171.88
State Highway No. 10—Pacific Highway. Shire of Maclean. Supply heating and spraying 30,000 gallons of bitumen on the approaches to the Harwood Bridge.	Boral Road Services Pty Ltd	13,141.25
State Highway No. 10—Pacific Highway, Shire of Maclean. Supply and delivery of 99 precast, pretensioned bridge units for bridges over New Brooms Head Road and Farlows Lane 4·60 m. and 3·40 m. south of Harwood respectively.	Concrete Industries (Qld.) Pty Ltd ..	20,552.10
State Highway No. 10—Pacific Highway, Shires of Maclean and Ulmarra. Construction of 5 span prestressed, reinforced concrete bridge, 373 feet long over the Coldstream River 16·40 m. north of Grafton.	Pearson Bridge Pty Ltd	235,498.00
State Highway No. 10—Pacific Highway and State Highway No. 16—Bruxner Highway within North Eastern Division. Supply heating and spraying 29,290 gallons of bitumen at various locations.	Boral Road Services Pty Ltd	12,374.97
State Highway No. 11—Oxley Highway, Shires of Gilgandra and Warren. Bitumen surfacing between 16·50 m. to 20 m. and 24 m. to 27·23 m. west of Gilgandra.	Shorncliffe Pty Ltd	16,014.82
State Highway No. 12—Gwydir Highway, Shire of Nymboida. Construction of 2 span prestressed reinforced concrete bridge, 50 feet long over Cowans Creek 3·60 m. from South Grafton.	Dayal Singh Constructions Pty Ltd ..	19,524.50
State Highway No. 16—Bruxner Highway. Shire of Tenterfield. Construction of 2 cell reinforced concrete box culvert at Little Violet Creek.	B. J. Murray	25,622.00
State Highway No. 17—Newell Highway, Shire of Talbragar. Bitumen surfacing between 3 m. and 5·50 m. north of Dubbo.	Shorncliffe Pty Ltd	6,390.55
Main Road No. 286—Shire of Snowy River. Construction of 4 cell reinforced concrete box culvert at Rock Creek in the Perisher Valley.	Tumbarumba Constructions	18,980.63
Main Road No. 286—Shire of Snowy River. Loading and hauling of up to 60,000 cubic yards of free-draining basecourse material from stockpile at the Snowy Adit near Island Bend to Main Road No. 286 between 10 m. and 21 m. west of Jindabyne.	Heavy Haulage	85,650.00
Sydney—Newcastle Expressway—Mount White to Calga, Shire of Gosford. Supply and delivery of precast concrete girder segments, prestressing tendons, precast concrete exposed aggregate side panels, precast concrete cornices, precast concrete girder slabs, precast concrete formwork slabs and the stressing and erection of precast concrete post-tensioned bridge girders for bridge to carry the Pacific Highway over the Sydney-Newcastle Expressway south of Calga.	Gardiner Constructions Pty Ltd ..	65,128.70
Developmental Road No. 1206—Shire of Eurobodalla. Construction of 3 cell reinforced concrete box culvert over Reedy Creek 4.93 m. from Batehaven.	R. Orford	13,715.00

TENDERS ACCEPTED BY COUNCILS

The following tenders (in excess of $6,000) were accepted by the respective Councils for Road and Bridge works for the three months ended 31st December, 1965.

Council	Road No.	Work or Service	Name of Accepted Tenderer	Amount
Abercrombie ..	S.H. 6, T.R. 54, M.R.'s 246 and 252.	Bitumen surfacing of various sections	Emoleum (Aust.) Ltd ..	8,284.57
Balranald ..	T.R. 67 ..	Construction of reinforced concrete box culvert at Box Creek 31 m. north of Balranald.	Reid Bros	2,224.20
Bibbenluke ..	S.H. 19 ..	Reconstruction to subgrade level between 6 m. and 7 m. south of Bombala.	Lundberg Constructions	28,927.72
Bibbenluke ..	M.R. 394 ..	Reconstruction to subgrade level at Shanty Bush Hill between 10 m. and 10.5 m. from the Monaro Highway.	Lundberg Constructions	32,181.32
Blaxland ..	T.R. 55 ..	Construction of 3 cell reinforced concrete box culvert at 19.80 m. north of Lithgow.	D. Burnett	6,440.00
Bogan	S.H. 8 ..	Reconstruction and bitumen surfacing between 45.27 m. and 51.84 m. west of Nyngan.	Shorncliffe Pty Ltd ..	16,028.49
Boolooroo ..	M.R.'s 232 and 507.	Bitumen surfacing between 7.25 m. to 13.60 m. and 16.50 m. to 19.80 m. north of Moree on M.R. 232 and between 6.35 m. to 16.85 m. west of Goondiwindi.	Shorncliffe Pty Ltd ..	25,288.73
Booloroo ..	M.R. 507 ..	Supply and delivery of aggregate between 9 m. to 15 m. west of Goondiwindi.	Ron Johnstone Pty Ltd ..	8,121.20
Boorowa ..	T.R. 56, M.R.'s 241 and 248.	Bitumen surfacing of 118,220 square yards at various locations on T.R. 56 and M.R.'s 241 and 248.	Boral Road Services Pty Ltd.	16,526.19
Campbelltown	M.R. 179 ..	Supply, deliver and laying of asphaltic concrete on approaches to bridge over Water Race 2.30 m. from M.R. 178.	Bituminous Pavements Pty. Ltd.	8,445.00
Carrathool ..	T.R. 80 ..	Bitumen surfacing between 7.50 m. and 12.50 m. south of Hillston.	Allen Bros Pty Ltd ..	12,459.16
Condobolin ..	T.R. 57 and 61.	Bitumen surfacing of various sections	Allen Bros (Asphalting Contractors) Pty Ltd.	23,205.67
Coolah ..	T.R. 77 ..	Bitumen surfacing of various sections	Boral Road Services ..	8,111.15
Darling ..	T.R. 68 and M.R. 421.	Winning, loading and hauling gravel between 0 m. to 9 m. east of Bourke on T.R. 68 and between 0 m. to 4 m. on M.R. 421, south of Bourke.	J. L. Johnstone Pty Ltd ..	18,750.00
Demondrille ..	M.R. 381 ..	Supply and delivery of 26,000 gallons of bitumen for surfacing works at various locations.	Boral Road Services Pty Ltd.	8,361.05
Goobang ..	T.R. 61 ..	Construction of reinforced concrete box culvert and removal of timber bridge at Bumberry Creek 17.59 m. east of Parkes.	A.G. & L. G. Wicks ..	7,915.20
Goodradigbee ..	M.R.'s 249, 275 and 278.	Bitumen surfacing of 46,920 square yards at various locations.	Emoleum (Aust.) Ltd ..	8,111.55
Gunning ..	M.R.'s 241, 249 and 251.	Bitumen surfacing of 54,474 square yards at various locations.	Emoleum (Aust.) Ltd ..	7,536.68
Jemalong ..	S.H. 17, T.R. 56, M.R.'s 236 and 377.	Supply, heating and spraying of 95,172 gallons of bitumen at various locations.	Allen Bros (Asphalting Contractors) Pty Ltd.	49,719.31
Kyogle	D.R. 1129 ..	Construction of 2 span reinforced concrete bridge, 70 feet long over a gully approximately 20 miles from Casino and 3 span reinforced concrete bridge 105 feet long over a gully approximately 23 miles from Casino.	Kennedy Bros	31,322.45
Lachlan ..	T.R. 61 ..	Bitumen surfacing between 4.70 m. and 9.37 m. north west of Condobolin.	Allen Bros (Asphalting Contractors) Pty Ltd.	15,461.30
Lachlan ..	T.R.'s 57 and 61. M.R. 377.	Supply and delivery of aggregate to stockpiles at various locations.	N.C. & A. D. Bennett	16,735.03
Macintyre ..	S.H. 12 ..	Bitumen surfacing between 2.22 m. to 3.60 m. and 21.05 m. to 22 m. west of Inverell.	Emoleum (Aust.) Ltd ..	7,987.33
Murrumburrah	T.R. 84 ..	Construction of 7 span reinforced concrete bridge, 252 feet long over Murrimboola Creek between Murrumburrah and Harden.	Siebels Bros Pty Ltd ..	116,499.80
Muswellbrook	D.W. 3173 ..	Road construction and drainage between 0 m. to 1.42 m. on Jones Reserve Road.	C. T. Marshall	29,940.00
Nundle ..	D.W. 3175 ..	Construction of 3 span reinforced concrete bridge 90 feet long over Sugarloaf Creek near Garoo.	W. H. Marshall	15,296.00

TENDERS ACCEPTED BY COUNCILS—*continued*

Council	Road No.	Work or Service	Name of Accepted Tenderer	Amount
				$
Nymboida ..	T.R. 74 ..	Construction of 3 span prestressed reinforced concrete bridge 95 feet 6 inches long over Goolang Creek 20.40 m. from South Grafton.	Central Constructions Pty Ltd.	37,962.00
Rylstone ..	T.R.'s 54 and 55, M.R. 215.	Supply and delivery of aggregate to stockpiles at various locations.	Rylstone Development Co Pty Ltd.	9,750.00
Scone	T.R. 62 ..	Construction of 2 span reinforced concrete bridge 64 feet long over Sofia Creek 12.35 m. west of Scone.	B. Coceancig & A. Cipolla.	15,559.20
Scone	M.R. 105 ..	Construction of 3 span composite steel and concrete bridge 166 feet long over the Hunter River at Shallow Crossing, 40.54 m. north east of Scone.	Austral Reinforcing ..	39,591.40
Talbragar ..	M.R. 206 ..	Construction of 7 span reinforced concrete bridge 117 feet long over Mitchells Creek 16.50 m. east of Dubbo.	B. Coceancig & A. Cipolla.	31,714.10
Tomki	S.H. 16, T.R. 83, M.R. 149.	Bitumen surfacing of various sections	Boral Road Services Pty Ltd.	7,795.76
Uralla	T.R. 73 and M.R. 124.	Bitumen surfacing of various sections	Shorncliffe Pty Ltd ..	7,629.99
Waugoola ..	S.H. 16, T.R. 56, M.R. 576.	Bitumen surfacing of various sections	Boral Road Services Pty Ltd.	45,699.10
Windouran ..	S.H. 21, M.R. 296.	Supply and delivery of 1,429 cubic yards of aggregate to stockpiles at various locations.	Berrigan Quarries Pty Ltd	6,754.45
Yarrowlumla ..	T.R.'s 51 and 52, M.R.'s 268 and 584.	Supply and delivery of 1,669 tons of aggregate to various locations.	Ready Mixed Concrete (Canberra) Ltd.	7,723.75
Yarrowlumla ..	S.H. 19, T.R.'s 51 and 52, M.R.'s 268 and 584.	Bitumen surfacing of 185,002 square yards at various locations.	Allan Bros (Asphalting Contractors) Pty Ltd.	26,049.83
Young ..	T.R. 78 and M.R. 241.	Bitumen surfacing of 63,474 square yards at various locations.	Boral Road Services Pty Ltd.	8,361.05

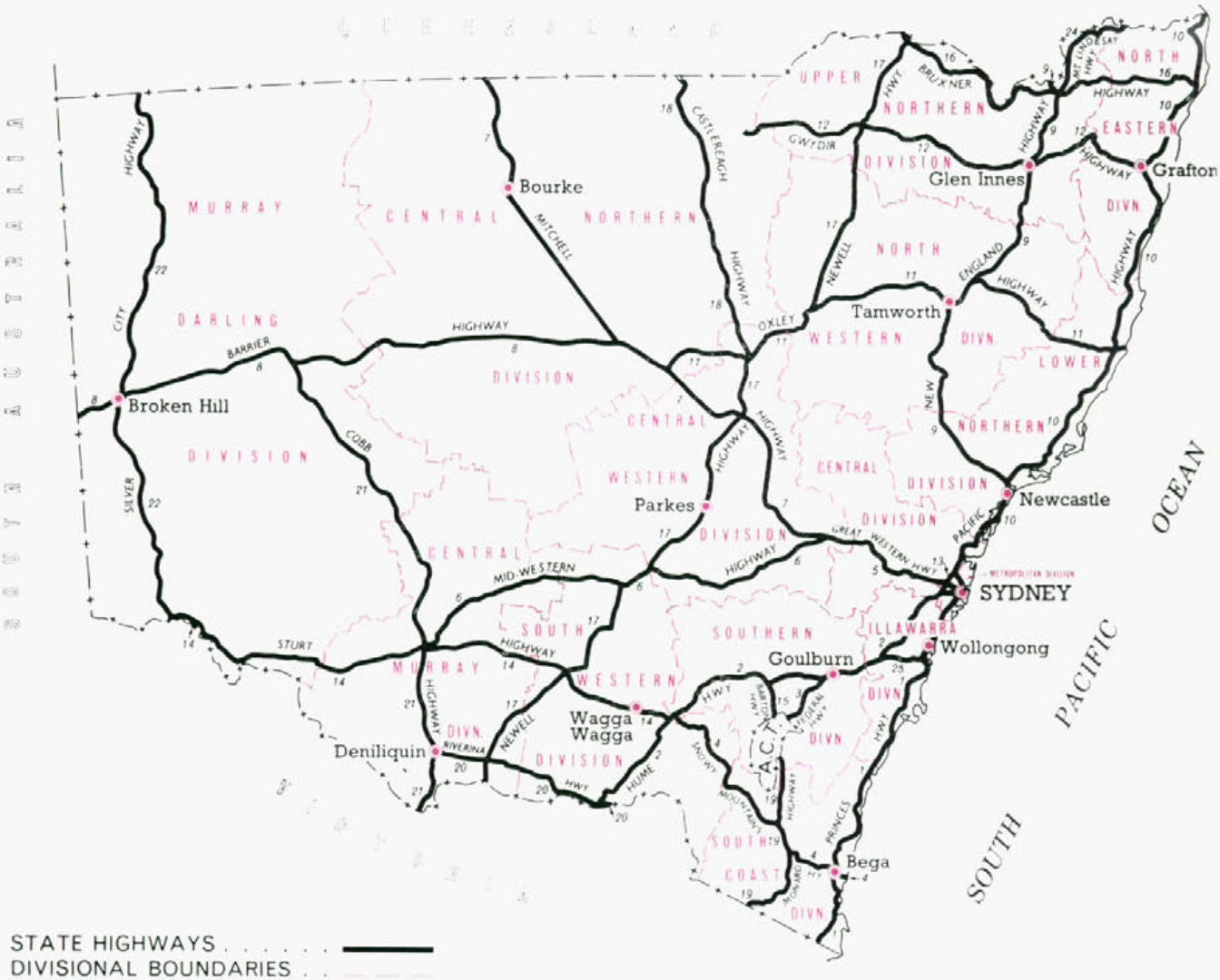
MAIN ROADS FUNDS

Receipts and Payments for the period from 1st July, 1965 to 31st December, 1965

	County of Cumberland Main Roads Fund	Country Main Roads Fund
	$	$
RECEIPTS—		
Motor Vehicle Taxation (State)	3,166,698	12,666,794
Charges on heavy commercial goods vehicles under Road Maintenance (Contribution) Act, 1958 (State)	1,115,196	4,460,804
Commonwealth Aid Roads Act, 1964	2,322,728	9,011,914
From Councils under Section 11 of Main Roads Act and/or for cost of works ..	2,770,458	65,000
Other	568,362	245,242
$	9,943,442	26,449,754
PAYMENTS—		
Maintenance and minor improvements of roads and bridges	1,731,678	7,875,998
Construction and reconstruction of roads and bridges	4,617,554	12,463,238
Land Acquisitions	1,038,628	203,636
Administrative Expenses	241,548	1,553,210
Loan charges, payment of interest, exchange, management and flotation expenses ..	367,850	746,480
* Miscellaneous	1,770,192	1,864,112
$	9,767,450	24,706,674

* Includes transfers to Special Purpose Accounts in respect of finance for operating Accounts, Suspence Accounts and Reserve Accounts.

State Highway System of the State of New South Wales



STATE HIGHWAYS . . . . . ——
DIVISIONAL BOUNDARIES . . . . . ——
DIVISIONAL OFFICES . . . . . •

SCALE OF MILES
50 0 50 100 150 200

Area of New South Wales, 309,433 square miles.
Length of public roads within New South Wales, 131,300 miles.

MILEAGE OF MAIN AND DEVELOPMENTAL ROADS, AS AT 30th JUNE, 1964

State Highways	**6,531**
Trunk Roads	**4,153**
Main Roads	**11,627**
Secondary Roads (County of Cumberland only)	**138**
Tourist Roads	**180**
Developmental Roads	**3,021**
	25,650
UNCLASSIFIED ROADS, in Western part of State, coming within the provisions of the Main Roads Act	**1,102**
TOTAL	**26,752**

Sydney: V. C. N. Blight, Government Printer—1966