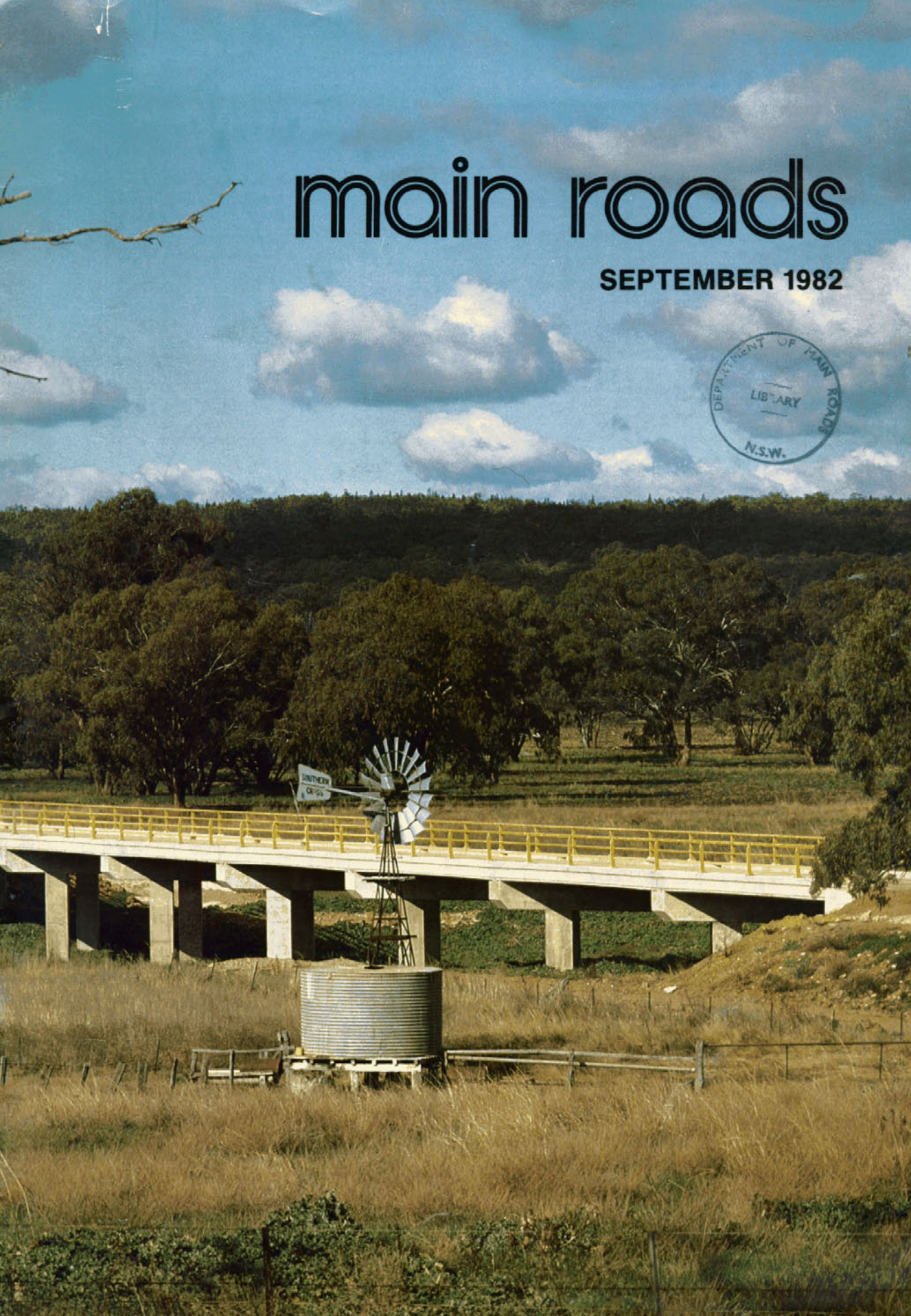
main roads

SEPTEMBER 1982



main roads

JOURNAL OF THE DEPARTMENT OF MAIN ROADS, NEW SOUTH WALES

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CONTENTS

Cover: Roadworks and bridgeworks in progress near Uabry, 17 km west of Cassilis on Trunk Road No. 62.

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KEEPING IN TOUCH

"Keeping in touch" has, in recent years, tended to be the theme of telephone promotions. The appeal is to "Phone home to England" or Greece or wherever our friends or family are. And we are encouraged to imagine the warm and happy excitement of saying hello to someone special, who is *miles away* but still *as close as a telephone.*

With direct dialling push-button convenience and satellite assistance, the telephone is in the forefront of the modern communications revolution. We've certainly come a long way from the pedal radio which kept people in touch throughout the outback in years past.

CB radio has been part of that revolution. Truckies, in particular, have taken CB radios to their hearts—enabling them, in the cabined comfort of their *big rigs* to talk to one another, day or night, while moving across this vast continent. The Department, too, has increased its capacity for two-way radio talking. It has set up new transmitting centres to improve the network of communications between different groups within its widely dispersed workforce—groups which are also almost constantly on the move (see article on pages 71-73).

But keeping in touch orally is not all there is to communications. The spoken word is complemented by the written word. Letter writing may almost be a lost art, but the printed word is still as popular as ever, if the morning and evening rustling of newspapers on commuter trains and buses is any indication.

Our annual report is one of the ways we use the printed word to tell not only parliament and the press, but also the public about what we're doing. An article on pages 87-90 explains this more fully.

Furthermore, the written word, being an almost permanent record, lets us learn not only about contemporary happenings but stores up for us records of what went on in the past. For example, in this issue we keep in touch, in words and pictures, with happenings fifty years ago—in an article on the Golden Jubilee of the unusual double-decker bridge over the Clarence River at Grafton (see article on pages 74-78).

We also like to keep in touch with future possibilities and proposals, as much as reporting present and past activities. Consequently, on pages 79-83, we look ahead to the exciting and momentous PIARC Congress, which will be held in Sydney in October next year. At this meeting, road builders and administrators in Australia will have a unique opportunity to keep in touch with overseas trends and developments. Don't miss the article, but, more importantly, don't miss the Congress.

Roads and bridges, as we've pointed out many times, are themselves a vital form of communications within the community. Two examples come in this issue—a new bridge over the Nunnock River west of Bega (pages 92-94) and a new road link at Queanbeyan (pages 67-70).

So this journal is our special means of letting you know all about the ways we try to keep in touch. ●

NEW ROAD TO THE CAPITAL

In April of this year, a deviation of Trunk Road 51 at Queanbeyan was opened, providing a new, more efficient access route to the Australian Capital Territory.

Early history

Explorers and settlers in the 1820s established the Sydney Road, the first marked route in the area, which proceeded via Bungendore and the Molonglo Plains. It entered Queanbeyan via Old Sydney Road, adjacent to Wright Sports Ground, and crossed the Queanbeyan River at Queens Bridge.

The area was first settled in 1828 and Queanbeyan was gazetted as a town in 1838. Situated on the banks of a river, its name is appropriately derived from an Aboriginal term meaning "clear water". The first holding was recorded under the name of "Quean Bean", so it seems the term suffered a little in translation.

In the 1840s access to Braidwood was established via the Eleven Mile, Captains Flat and Ballalaba, and in 1855 the Clyde Road was marked out to link Braidwood and Batemans Bay.

The first bridge was built across the Queanbeyan River in 1860. At about this time, Samuel Walker opened his "Braidwood Store" in Macquoid Street, East Queanbeyan. He wanted the trade of the district and so, in 1861, chartered the schooner *Titania* to land a consignment of goods at Nelligen. Seven drays lumbered the stock into town for Walker's store. As he had saved 70% on his transport costs, he was able to pass on the savings to his customers. This enterprise established the coast route as a link vital to Queanbeyan.

A rail link finally reached Queanbeyan in 1887. The town gained in importance after 1908, when the site of the Federal capital was decided upon, just 8 km to the west. In 1914, a branch line to Canberra was opened for goods traffic and, in 1923, for passenger traffic.

The road to Canberra was initially via Crawford Street and Uriarra Road. The route was upgraded in the 1920s and the Commonwealth Avenue Bridge over the railway was built at that time. This route passed through what is now the centre of Fyshwick.

Construction details

The deviation of Trunk Road 51 required the construction of 2.5 km of dual carriageway and associated works, which were carried out in five separate stages.

The first stage was the bridge over the railway line near Gilmore Road, completed in May 1977 at a cost of $252,416. This was built under contract to the Department by White Industries Ltd., who also built the western approaches, twin bridges and 5 km of roadworks from the border to Fyshwick in the A.C.T. The final cost of the bridge was shared by the Commonwealth Government (50%), the Department of Main Roads (36%) and the then Public Transport Commission of New South Wales, now the State Rail Authority, (14%). The bridge is 29.1 m long and caters for four lanes eastbound and three lanes westbound, with provision beneath for further railway tracks.

The second stage was the immediate approaches to the railway overbridge, which included a temporary T-junction at Kendall Avenue. This work was carried out by Queanbeyan City Council at a final cost of $85,897, most of which was met by the Department.

The third stage was the section from Kendall Avenue to Stephens Road. This included earthworks, drainage and a pedestrian underpass as far as Stuart Street, with pavement and sealing only to the Stephens Road south exit. The Department contributed $345,532 to this work, which was carried out by Council and opened to traffic on 27 July, 1979.

The fourth stage was the section from Stephens Road to chainage 2000. This was completed in 1981 at a total cost of $975,745, of which the Department's share was $722,114. It was opened to traffic on 16 April, 1982.

The fifth stage was the section from chainage 2000 to Farrer Place. This was recently completed at an estimated final cost of $629,727. The Department's share for this stage was $383,127.

General features

The carriageways are each 10.2 m wide, initially providing two lanes in each direction with 3 m shoulders, which can be converted to an extra lane on each carriageway if the need arises.

The surface finish on the work is a two coat flush seal with 20 mm and 10 mm aggregates, except at side road junctions and intersections and east of Ross Road where 10 mm asphalt surfacing has been adopted.

Based on California Bearing Ratio (C.B.R.) determination of the subgrade, and an estimate of traffic loading during the next 20 years, a total pavement thickness of 300 mm was adopted over most of the work.

A significant construction problem arose during 1980 when Council's road construction gangs encountered difficulty in achieving the specified degree of compaction in the sub-base material. A non-plastic, fine grained but well graded material conforming with the Department's specification requirements for natural gravels was used as sub-base. However, the compaction characteristics of this material were found to be particularly sensitive to moisture content. As well, being cohesionless and devoid of large particles, this material was readily scoured by rainfall.

It was also more permeable than the underlying subgrade, and there was evidence of the weakening effects on the subgrade of a "permeability reversal" at the sub-base/subgrade interface. The most economical solution to these problems proved to be mechanical stabilisation using one part of a more plastic crushed granite (complying with the Department's specification for crushed rock pavement material) to two parts of the fine grained granular material. The resultant mix conformed with the relevant specification for sub-base material, but was less sensitive to moisture content and erosion.

Above: Looking south towards Queanbeyan along the new dual carriageway, showing the wide shoulders and shrubs planted within the median. Right: The New Jersey crash barrier and, below the embankment, some of the 800 plants used in the Council's extensive landscaping program.

In situ density testing of subgrade and pavement materials was supplemented by Benkelman Beam testing, which was mainly carried out by Council's own staff with its own equipment. The use of the Beam enabled large areas to be checked for uniformity and enabled the construction team to detect and correct any weak spots which otherwise may not have been noticed until the work had been opened to traffic. As a general rule, maximum characteristic deflection levels of 0.8 mm at the top of the base, and 1.0 mm on the sub-base were regarded as satisfactory.

A dominant feature of the road is the provision of New Jersey type concrete crash barriers along all embankment sections. This was constructed by Seovic Pty. Ltd. using the slip form method. Apart from providing the best safety performance currently available, it will greatly assist in reducing noise levels and headlight glare in the adjacent residential homes. A total length of 1570 m was laid at a cost of $75,000.

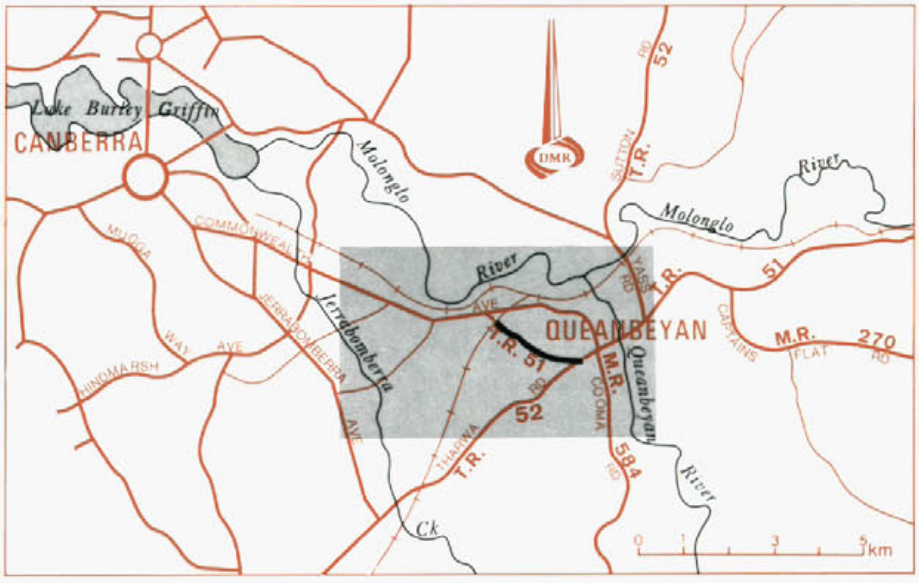
The full section of road was provided with kerbing and median kerbing at a cost of $150,000. The total length laid was 10 300 m, all concrete being supplied by Monaro Mix Specified Concrete Pty. Ltd. of Queanbeyan.

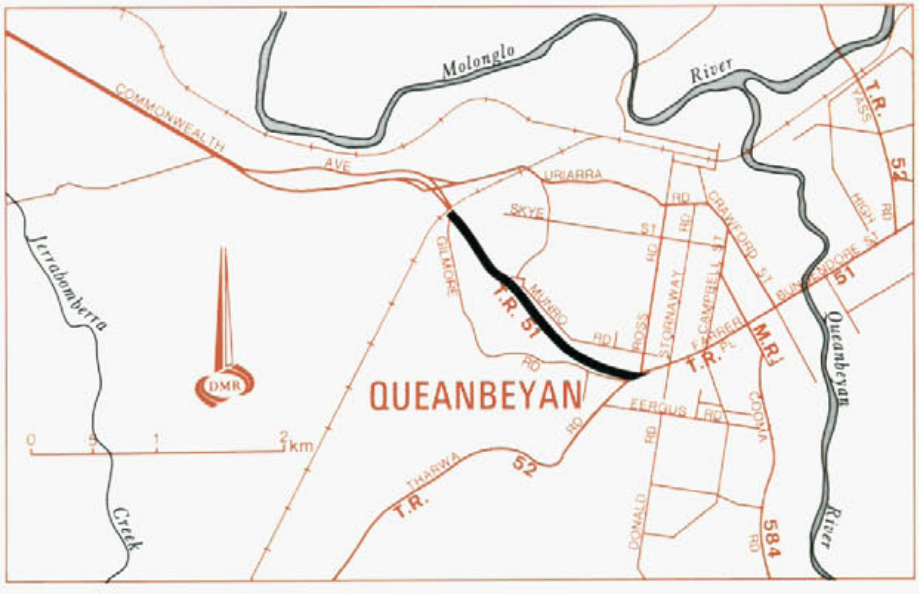
The project included the design and construction of three pedestrian underpasses to ensure total separation of pedestrian and vehicular traffic. These were constructed by placing 2.4 x 2.4 m reinforced concrete box culvert sections (manufactured by Humes Ltd. of Queanbeyan) on a cast-in-situ reinforced concrete base. Lighting was provided both within the underpasses and along the paths leading to them. The total cost of the underpasses was $75,000.

Particular attention was given to stormwater drainage throughout the design and construction of this work. In all, some 2400 linear metres of stormwater pipes were laid and 145 stormwater pits constructed. In order to collect and dispose of subsoil water in the vicinity of the road pavement, subsoil drains 600 mm deep and 300 mm wide, with slotted corrugated plastic pipe in the bottom and backfilled with selected filter material, were constructed along the total length of the project.

Extensive landscaping was carried out by the Council to enhance the overall visual environment, to shield the road from the view of adjacent housing and to reduce noise levels. The design allowed for planting of trees along the road verges and of shrubs within the median. Plantings included Eucalypts, Wattles, Callistemons, Grevilleas and Leptospermums. On areas where heavy planting was not provided, additional top soil was brought in and the area seeded. In places where erosion and scouring of water would occur, the Soil Conservation Service provided seeding and hay-mulching, together with jute meshing in catchdrains.

The total project entailed the excavation and compaction of 50 000 m³ of earth and rock, the provision of 25 000 m³ of pavement gravel, 48 000 m² of two coat seal and 20 000 m² of hot-mixed asphalt surfacing.





The overall construction cost of the project is estimated to be $2,300,000. Further to this was the cost of the necessary land acquisitions, which was met by the Department. During the twenty year period from adoption of the route until construction, it was ensured that adjacent development was compatible with the road proposal.

Up until the late stages of construction, considerable correspondence was entered into concerning the design of some intersections, notably the Gilmore Road/Uriarra Road intersection near the A.C.T. boundary and the Tharwa Road/Ross Road intersection at about chainage 2100. Both intersections have been constructed in accordance with the design as

originally approved. However, traffic volumes and turning patterns will be closely studied as motorists become accustomed to the availability of the new route. It will be an important objective of the traffic monitoring to recognise and treat any traffic problems that might develop.

Most of the construction work was carried out by Yarrowlumla Council, with funding assistance from the Department. The early work in New South Wales was co-ordinated with corresponding work in the A.C.T. by local meetings with staff from the National Capital Development Corporation and the Commonwealth Department of Transport and Construction.

The new route is not a town by-pass as such, as it leads Trunk Road No. 51 through the traditional shopping centre of Queanbeyan along Monaro Street, between Lowe Street and the Queanbeyan River at Queens Bridge. The advantage of the new route is that, between the A.C.T. boundary and Ross Road, controlled access conditions exist for traffic and the alignment and grading are to a modern standard. The former route via Uriarra Road contained curves with advisory speeds as low as 35 and 45 km/h, numerous side roads and cross roads, narrow lanes (12 m between kerbs with 4 lanes) and continuous frontage development.

The completion of this route heralds the complete replacement of the whole of the "Coast" route through Queanbeyan with the exception of Queens Bridge and Monaro Street from the river to Crawford Street.

It is proposed that the new route be proclaimed as a Motorway and as Trunk Road No. 51. When this proclamation occurs, the existing route of Trunk Road No. 51 via Crawford Street and Uriarra Road will revert to unclassified status.

Council has given approval to the name of Canberra Avenue to the new route between the A.C.T. boundary and Ross Road, to correspond with the name of the continuation of the new route within the A.C.T. East of Ross Road, the new route for Trunk Road No. 51 is expected to take the existing street names. (Council may reconsider the name if this proves to be confusing.)

Other works in the area

Works completed in the Southern Division in recent years include the reconstruction of sections of Yass Road (Trunk Road No. 52) to a six-lane divided carriageway, funded jointly by the Department and Council, and the channelisation of the intersection of Atkinson Street and Bungendore Road, completed by the Department at a final cost of $58,000. The recent installation of a right turning storage bay at the junction of Thurralilly Street and Bungendore Road also met with a $25,000 contribution from the Department.

Future priorities in the Queanbeyan area are to extend the work on Yass Road to the A.C.T. boundary and to reconstruct Trunk Road No. 52 from Ross Road towards Delmar Crescent. Several anticipated works relate again to Trunk Road No. 51, which the Yarrowlumla Shire sees as a first priority. These include new bridges over the railway line and over the Molonglo River at Burbong, which are expected to be completed in 1984. There are also plans in progress to provide dual carriageways on State Highway 3, the National Highway, between Canberra and Goulburn, although funding for this may not be available for some time.

Opening ceremony

The new access route to Canberra was officially opened to traffic on 16 April 1982, following a ceremony organised by Queanbeyan City Council.

The opening address was given by the Mayor of Queanbeyan, Alderman David Madew, who said that Queanbeyan now had an entrance of which its citizens could be proud. He continued: *"I don't think anyone can deny the importance of an efficient road link . . . The opening of the road sets Queanbeyan up as a metropolis and is a crucial event in the development of the city."*

Alderman Madew went on to pay tribute to the work of the city engineering staff and the co-operation of the Department. He made special mention of the amount of work put into the extensive planting program, involving more than 800 trees, by Queanbeyan's Parks and Gardens staff.

The Member for Monaro, Mr. John Akister, also commended the road builders and landscapers. He reminded the gathering of the concern that had existed among nearby residents that the new road would degrade the environment, but that the work was now an aesthetic feature of Queanbeyan.

The Federal Member for Eden-Monaro, Mr. Murray Sainsbury, made reference to the former Member for Eden-Monaro, Mr. Bob Whan, who was in attendance at the ceremony. He said Mr. Whan had been a driving force behind the acquisition of funds for the project.

The official address was given by the Commissioner for Main Roads, Mr. Bruce Loder, who described the finished roadwork as equal to the best in the State. Mr. Loder referred to the interdependence of Queanbeyan and Canberra and emphasised that the new link would bring benefits to both centres.

Mr. Loder then unveiled a plaque and cut the ribbon across the Canberra-bound lanes of the road, declaring the new access route open. The official guests then took part in a motorcade which proceeded along the full 2.4 km length of the new work, and returned to the Queanbeyan Leagues Club to join local residents for a luncheon. ●

GETTING THE MESSAGE

THE DEPARTMENT'S TWO-WAY RADIO NETWORK

Early Radio Communications

For many years the Department has used two-way radio installed in plant and vehicles to communicate between mobile field equipment and fixed base stations near Works Offices. This ready means of communication has been invaluable in co-ordinating work, especially where big distances, large projects or potentially hazardous situations are involved.

The South Coast and Western Divisions were among the first two-way radio users in the Department. HF/AM (High Frequency/Amplitude Modulated) radio communication was seen as an essential means of reducing the daily problem of controlling roadworks spread out over hundreds of square kilometres. It also provided a measure of safety for men working in remote locations or exposed to extremes of climate.

As the benefits became better known and as the use of two-way radio became more common among industries and agencies of all types, a number of smaller special two-way radio systems were established in the Department. Weight of Loads Inspectors found that two-way radios operating between vehicles aided co-ordination in their duties. Surveyors used two-way radio where co-ordinating work between team members over large distances was a problem. The Sydney Harbour Bridge Traffic Controllers began to use a special two-way system which gave them instant communication to help co-ordinate lane changing and breakdown vehicles. This particular area, with one of the highest traffic flows in Australia, could easily become chaotic without such a means of anticipating and averting trouble.

In 1972 two VHF/FM (Very High Frequency/Frequency Modulated) channels were established with the operators stationed at Central Workshop, Granville. This aided the control of roadworks in the Metropolitan area and helped co-ordinate the activities of the paving gangs operating from the Department's Central Asphalt Depot and service groups operating from Central Workshop.

The South Coast Division abandoned the earlier use of HF in 1973 and began to operate a spare channel of the Snowy Mountains Council's VHF (low band) system. This aided co-operation between the Department and other authorities in the area, greatly improving the usefulness of the radio service.

Recent developments

From June 1976 the traffic activities of the Department of Motor Transport (DMT) were amalgamated with the Department of Main Roads. The DMT had for some time used VHF radio for rapid deployment of maintenance vehicles to faulty traffic signals. This amalgamation therefore added four more VHF systems to the DMR's services.

Two of these were in the Metropolitan area and the other two were based at Newcastle and Wollongong. The introduction of high quality VHF/FM two-way radio networks in Newcastle and Wollongong was followed by an enormous expansion of services in all Divisions where the terrain suited the VHF frequency band.

The new networks, together with the older established VHF bases, now share eight VHF/FM channels and use 34 base stations to transmit to 1100 mobiles.

The benefits of reliable instant communication with the field workforce are soon realised when such a system is introduced to a Works Office area, as it greatly increases the efficiency of the Works Engineers and their staff who have to travel long distances in order to oversee works in progress.

Setting up a local network

Considerable effort is required in finding and testing potential sites for a new two-way radio base transceiver. During assessment of each site, a temporary base is set up while radio-equipped vehicles traverse all the classified roads of the Works Office area. These vehicles report to the base at regular distances, sometimes at every kilometre, so that the strength of the signals received at the base and at the mobile can be registered.

The resultant signal strength map of the whole area allows the value of the site to be assessed. Ideally, signals should be strength 'five', loud and clear right out to the Works Office boundary and falling off after that. Because of variations in topography this is rarely the case. Consequently, most sites are chosen for their ability to transmit and receive signals of reasonable strength over most of the Works Office area, yet which do not interfere with other networks using the same frequency.

It is sometimes necessary to locate a base transceiver at the second or third highest site. Provided adequate coverage is obtained from the lower site, this choice will often minimise the base signal penetrating into another network.

The search for base transceiver sites has been made easier by the use of the Department's helicopter. In a matter of minutes the helicopter can transfer the temporary test base between hilltops, a task which otherwise might require days of work in gaining access. By use of the helicopter, up to three sites can be checked out in one day.

Radio system research

The older HF (High Frequency) two-way radio systems in the western Divisions have, for a number of reasons, been steadily deteriorating in quality and usefulness. The HF band is just above the normal broadcast band and uses AM (Amplitude Modulation). However, HF/AM systems suffer from electrical interference from industry, vehicles and lightning, so that even at its best the quality of HF communications cannot compare with the clear almost interference-free transmission possible with VHF/FM.

Consequently, in 1980 the Department's Radio Workshop embarked on a programme of research funded under the Department's Transport Planning and Research Programme. The aim was to investigate any recent improvement in equipment and design which might contribute towards raising the quality of HF communication for use by field staff.

An experimental base station was established at Moorkaie Trig near Broken Hill. The site had a number of advantages over existing HF base stations. It was "electrically" quiet due to its remoteness; it was high, being some 150 m above the surrounding countryside; and it was not readily accessible by the general public.

The antenna configuration at the base station involved a special design. As the antennas on mobile vehicles are vertical, it is best to have the base station polarized vertically as well. This requires a good ground plane, which acts like a reflector in strengthening and shaping the transmitted radio wave. In the case of the mobile vehicles, this is formed by the sheet metal roof. The Moorkaie base ground plane comprises 68 sheets of steel mesh welded together to form a mat 25 metres in diameter. The base station antenna at Moorkaie therefore has the same form as the vehicle-mounted antennas of the mobiles.

Solar power

Other details of the experimental HF station are similar to the designs which have become standardised during the phase of new VHF base construction. The transceivers are located in a small concrete block hut with solar panels for battery charging on the roof. Until recently the only alternative to mains power was lead acid batteries which needed to be replaced by freshly charged ones every week or so.

Mains power can be very expensive to connect to remote sites. As well as this cost, mains power often causes electrostatic and electromagnetic interference. It also transmits the unwanted effects of lightning strikes from many kilometres away, which may damage delicate radio equipment.

It is preferable to make use of the recent advances in the technology of solar energy. The cost of a suitably sized solar panel plus the cost of long-life lead acid batteries is often much less than the cost of installing mains power. In addition, once a solar generating system is installed, the energy received thereafter is free.

Another essential connection to any remote two-way radio transceiver is a speech link from the base operator at a Works Office. This link was formerly a telephone-type line hired from Telecom. These lines were often unavailable at the preferred base locations, forcing the base transceivers to be placed at the second or third best locations. Telephone lines also caused unwanted noise and lightning interference.

Elimination of overhead lines and telephone lines also avoids the need to cut a path through timbered country. The environment is thus preserved.

Below left: Solar panel for battery charging in position at a remote base station site. Right: Technicians adjust the antenna at a remote base site. The antenna is mounted on a fold-down mast for easy access. Centre: The completed research base showing the vertical antenna suspended between twin masts. Below: checking a two-way radio base station at a remote site.

These problems have been overcome by using UHF (Ultra High Frequency) links between the Works Office and the remote transceiver on the mountain top. The quality of FM transmission in the UHF band is superb.

These advances combine to free base stations of the frustrating limitations of land line or power connections.

Current work

The Moorkaie test base has been serving as the main communication system for Broken Hill Works Office for almost one year. As well as serving the existing HF/AM equipped mobiles in the Broken Hill Works Office area, the transceiver is also capable of transmitting and receiving in the HF/SSB (High Frequency/Single Side Band) mode. This is a system which is being phased in by the Commonwealth Department of Communications and will eventually replace two-way AM transmission. Two HF/SSB equipped mobiles are being used at Broken Hill to provide a basis for comparing SSB performance against the old AM system. So far the results are even better than was thought possible.

Eventually the HF/AM units will be replaced by HF/SSB mobiles. However, the test base has proved that the Department's existing 250 HF/AM mobile sets throughout the Western Divisions can provide a useful service pending replacement, provided the base station performance is good.

The ability to communicate with the Royal Flying Doctor Base at Broken Hill has also been restored. When the Flying Doctor radio network operated in the AM mode, the Department's vehicles could contact it after the base station at Broken Hill Works Office had shut down for the day. This meant that the Department's field officers were able to call for help at any time in the case of a breakdown, accident or illness.

When the Flying Doctor Base changed to SSB, this safety facility was lost and the situation became a source of concern for the Division. Several schemes for automatically raising the alarm in Broken Hill were tried, but were unsuccessful due to deficiencies in the old base station. With the advent of the Department's use of SSB, the benefit of emergency calls can now be restored.

On the basis of the results of Moorkaie radio test rig, proposed new sites for HF base transceivers have been chosen for every Works Office area which will continue to use HF transmission. Plans are in hand to replace the existing bases by ones patterned on the Broken Hill base. These will be capable of transmitting and receiving both AM and SSB signals in order that the old AM mobile equipment may continue in use while new SSB equipment gradually replaces it.

The future

The installation of radio services must share the available funds with all other works programmes. As a service, the return for investment in two-way radio is at first not always apparent. However, a reliable communication system can revolutionise the methods of Works Office operations and greatly improve efficiency.

There would also be advantages, especially in times of emergencies such as bushfires, floods and major accidents, if the separate two-way radio systems could talk to each other or even directly to the Department's 'Emergency Centre' in Sydney. With the sudden failure of normal communications, such a link up would allow essential Departmental services to continue.

There is a considerable task ahead in improving existing communication services and in remaking the older ones, but it is certain that these improvements will serve well in the Department's role of building and maintaining an efficient roads system. ●

Other Main Roads *articles dealing with radio communication on main roads works include* Radio Telephony Networks on Main Road Works *(March 1970, Vol. 35 No. 3, pp 58-59);* Radio Communication on Main Road Works *(September 1954, Vol. 20 No. 1, pp 1-3);* Radio Telephone Communication between Glen Innes and Gibraltar Range *(December 1949, Vol. 15 No. 2, pp 59-60).*

ANOTHER GOLDEN JUBILEE

50 Years since opening of Clarence River "double-decker" Bridge at Grafton

"The Clarence River Bridge, spanning the finest of the northern rivers, is a unique structure. It is the only bridge of its kind in the world, and therefore its completion may be regarded as an important epoch in the history of bridge construction. It is a double-decker bridge with an opening bascule span, the upper deck carrying the State Highway, known as the Pacific Highway, linking Sydney and Brisbane, and the lower deck carrying the interstate railway and footways for pedestrian traffic on either side."

—The Sydney Mail, 27 July 1932

"Firm and secure, the structure that will be declared open to-day will remain from generation to generation as a monument to the brains that planned it and the skilful workmen who executed the design. Thought, energy, resourcefulness and honest sweat all played their part in constructing that great steel way from bank to bank and so we are reminded of the fact that the presence of such an aid to man's free passage has only been made possible by the manner in which the pioneers in years gone by laid well and truly the foundations of the district's great future."

"It is worthy of note that the whole structure is Australian. The steelwork was made in Australia and the construction was carried out entirely by Australian workmen and the manner in which they performed their task is a credit to the men and to the constructing engineer, himself an Australian and a graduate of Sydney University, under whose supervision they carried out the biggest national work that has been completed in this district."

—The Grafton Daily Examiner, 19 July 1932

"Twenty-five thousand tons of concrete, steelwork of a weight of 4000 tons, the best brains of the civil engineering world and the marshalling and utilisation of incomparable Australian manhood, from technicians and highly-skilled artisans down to the unskilled worker, were the contributing factors in the all-Australian structure that to-day spans the mighty Clarence River—an undertaking that has been an aspiration of residents of the Clarence River for generations."

—The Clarence River Bridge Book

Such was the enthusiastic response to the completion and opening of the unusual double-decker bridge at Grafton on 19 July 1932, exactly four months after the spectacular opening of Sydney Harbour Bridge. It is appropriate therefore to record some of the history of the crossing, the building of the bridge, and its official opening.

In the beginning

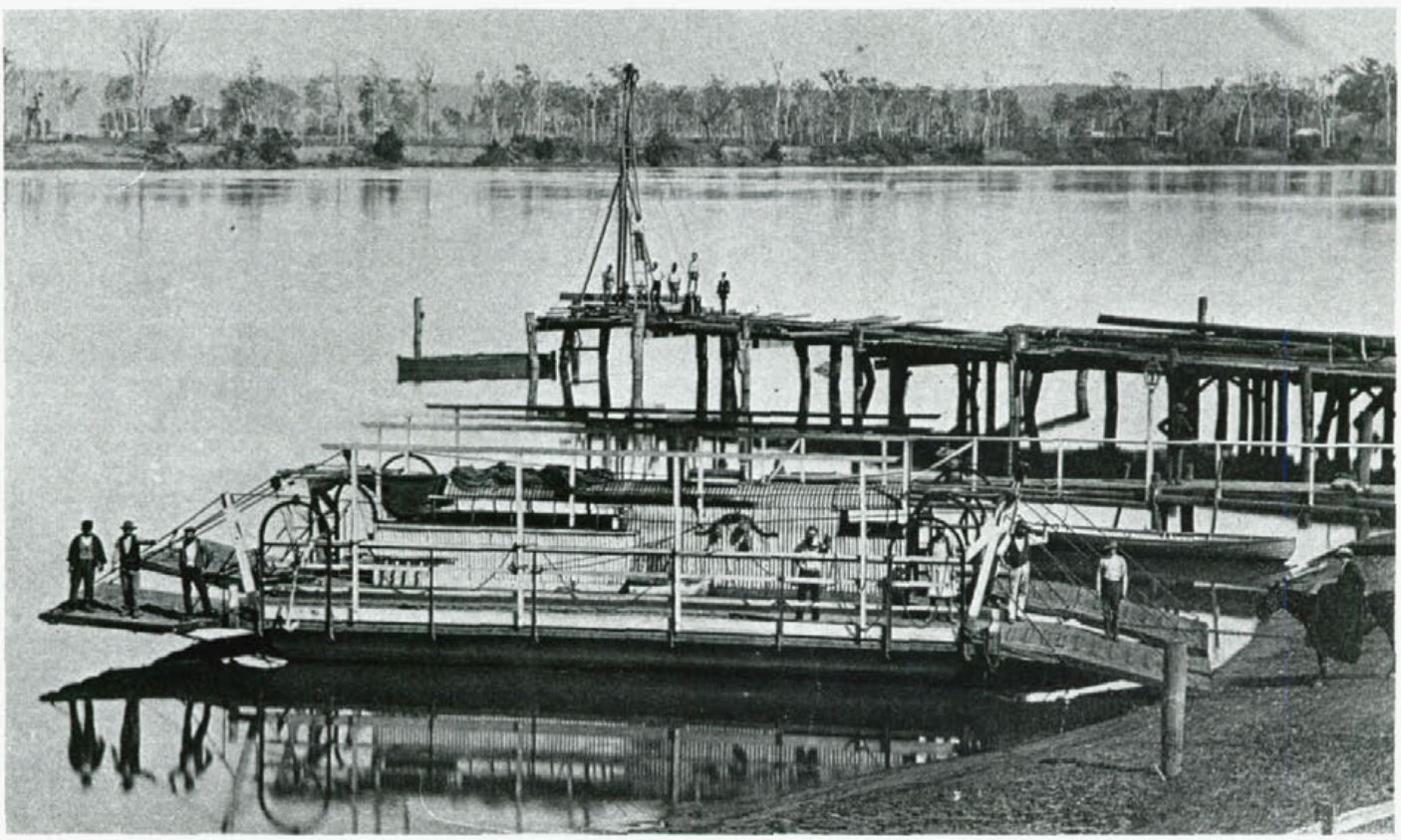
The discovery of the Clarence River cannot be attributed to any one person. Lieutenant Matthew Flinders anchored his ship *Norfolk* at the river entrance in 1799 and named it Shoal Bay, but did not discover the river.

In 1825 four prisoners escaped from Moreton Bay (Brisbane) and made their way to Port Macquarie, crossing the Clarence in their journey. For some years, it was known as the Big River. In 1828 Captain Rous sailed into the Tweed and Richmond Rivers and, believing that he was the discoverer of the former, called it the Clarence, after the Duke of Clarence. Later it was found that Oxley had discovered and named the Tweed River, so in 1839 the name Clarence was applied to the Big River.

Grafton's famous sons

Grafton, which was proclaimed a municipality in 1859, was named after the Duke of Grafton. It is the birthplace of Sir Grafton Elliot Smith (anatomist and anthropologist), Lieut.-General Sir Iven Mackay; Sir Earle (Grafton) Page, and Henry Searle.

Sir Earle Page was Minister for Commerce in the Lyons Government from 9 November 1934 until 7 April 1939 and was also Minister for Health from 29 November 1937 until 7 November 1938. From 7 to 26 April 1939 he briefly led his own Government, both as Prime Minister and Minister for Commerce.



An early ferry operating on the Clarence River at Grafton in 1876.

Henry Searle, champion sculler, was born at Grafton on 14 July 1866 and first learnt rowing through having to row three miles to school. His first race took place at Chatsworth in November 1884, when he won a race for watermen's skiffs, a victory repeated in May 1885 at Harwood Island.

After further victories on the Clarence River in 1886 he went to Sydney, where he soon defeated all his opponents on the Parramatta River course, and won the "championship of the world" and £500 in October 1888.

Searle travelled to England and in September 1889 defeated W. J. O'Connor, champion oarsman of America, on the Thames championship course. On the way back he contracted a fever and when peritonitis set in, he died in Melbourne on 10 December 1889.

Searle was known as the Clarence Comet and his death at 23 years, following his remarkable sculling achievements, shocked Australia. Consequently, when his body reached Sydney the whole city entered into mourning. *"Such a scene,"* one newspaper wrote, *"has never been witnessed in Sydney before, and the streets were never so crowded on any occasion, not even excepting the day of the departure of the Soudan Contingent."*

The body of Searle was then taken by sea to the Clarence River and interred on Esk Island. A column to his memory was erected later in the Parramatta River.

Jacaranda festival

Grafton is renowned for its Jacaranda Festival normally held during a week in November, each year. This celebration, which coincides with the blooming of the city's famous jacaranda trees, was begun on a modest scale in 1935—probably the first of its kind in Australia. By the early 1950s it had grown considerably in scope and importance, and incorporated a wide variety of events and exhibitions.

It set the precedent for many other floral and harvest festivals in country towns throughout Australia, and has still maintained its wide popularity, drawing thousands of visitors to its annual festivities.

Rail links

The Clarence River separates Grafton from South Grafton and for many years it was the main obstacle in completing the rail link between Grafton and Sydney. As far back as 1905 Grafton was connected by rail with Casino in the north, and in 1915 South Grafton was joined with Glenreagh in the south.

Prior to the erection of the bridge, trains were transported across the Clarence River at Grafton by the cumbersome looking, steam driven ferry, *The Swallow*.

Built in Renfrew, Scotland, *The Swallow* came to Australia under its own steam and after several trading voyages, was acquired by the Sydney Harbour Trust.

The need for such a craft to provide the rail link between Grafton and South Grafton was made known to the State Government of the day. The Department of Railways subsequently leased *The Swallow*, remodelled it to carry trains and placed it in service at Grafton on 15 October 1924.

The train ferry—like the later bridge—was a double-decker and needed two trips to convey a fully loaded train of seven carriages across the river. The inevitable delays caused by this service emphasised more and more Grafton's need for a bridge.

"Pulling boats"

The early settlers of the Clarence River faced the problem of crossing and recrossing about 600 metres of water between Grafton and South Grafton. As settlement appears to have commenced simultaneously on both sides of the river, constant communications between the two settlements became imperative.

Rowing or "pulling" boats were the initial solution and in 1932 a Mr. J. T. McKittrick explained to the Grafton Daily Examiner (published on 19 July) that:

". . . the ferry was run in 1854 by Joseph Austin with an open boat carrying 10 or 12. He plied from Fisher's Wharf, at the foot of Duke Street, straight across to Skinner Street. I think his fare was 3d single and 6d after a certain hour. One had a long wait at times as he might be over at south and it might be blowing and one might have to coo-ee for a long time before he heard. Then one had an unpleasant pull across half a mile of river coupled with a high wind and sprays coming on board. With a full boat things would be rather unpleasant and many times people were afraid to tackle it.

"Chas Matthews was the next to have the boat and after him James Cardlish. I am not sure how long these pullin' boats lasted but we eventually got to Nellie, a steam launch. Her capacity might have been 16 to 18. Next we had the Swift, another enlarged carrier, but not much. Both were a big improvement as the trip was done in less time and one had some protection from the weather.

"Later on came the Una and the Helen. These were sister ships of handy size, of good beam and length, also of fair speed and ample seating accommodation, very suitable for the ferry service. They ran for some time under the usual fare and then they together with the punt, were run free."

Another long-time local resident, Mrs. H. B. Waterhouse, recalled that although the steam launch ran till late at night, *"a pulling boat took its place"*, presumably during the *wee* hours until daybreak. She recollected that:

". . . In the winter time, the ferryman had a difficult task, and sometimes, when a dense fog settled on the river and obscured the kerosene lights on shore, he became lost. He would keep on pulling, and on many occasions found himself on the bank, sometimes on Susan Island, and at other times on the main banks at some spot or other a considerable distance from his objective. I have heard that at times he found himself back at the spot from where he started perhaps half an hour previously!

"Later as the result of agitation, the Grafton passengers ferry wharf was removed to Prince Street, and a much better class of passenger boat provided."

Evolution of vehicular ferry

In the pre-punt days, apparently vehicles could not cross the river at Grafton. Horsemen were compelled to place their saddles in a boat and to tow their mounts across the stream.

No date has been sighted for the introduction of the vehicular ferry, but some records indicate that up to the 1860s (or thereabouts) it was worked by hand and was in the charge of Charlie Matthews.

The first steam ferry was put into commission about the year 1862. The first ferry master was John Kilton Andrews, who had been working in the pilot boat at Twofold Bay, on the South Coast. His punt was said to have been sent up from Sydney in pieces (including the machinery). It was assembled at the foot of Villiers Street, and there it was launched when completed.

Mrs. Waterhouse recalled some impressions: *"My earliest recollection of the punt service was about 1867-68. The punt was a peculiar steam contraption, with the boiler and engine in the centre and tracks for vehicles or passengers on either side. A great chain with large links drawn over a revolving cog wheel was the motive power, and by this means the punt crossed and recrossed the river. Everyone in the vicinity knew when the punt was crossing for the big chains as it was being hauled over the cog wheel used to make a great noise that could be heard a mile away on a still night.*

"Sometimes the chain broke and left the punt adrift in the river. I had such an experience. There was a good crowd on board, also a considerable number of horsemen. There were no cars, in fact very few vehicles of any sort in those days. The punt commenced to drift down the river. In course of time, in response to the punt's whistle, several pulling boats put out from the shore and took the foot passengers to the north bank of the river and, after a lapse of some hours, the punt was towed to the approach and the horses got off.

"The fare by the punt was, I think, 9d return. The same fare for a horse and horse-drawn vehicle, and I think the foot passenger fare was 6d. If you came back the next day or later you had to pay again.

"Whenever the engine of the punt was started, thick black soot would belch out of the funnel and smother everyone on the punt, notwithstanding the free use of umbrellas to keep it off. It played havoc with our millinery and light dresses and also the men's white suits."

Mrs. Waterhouse also remembered that: *"What was for many years known as the 'Star' punt—and afterwards Dobie Street—was, I think started by the late John Miller somewhere about the mid sixties. It took the name 'Star' punt from the fact that the Star Hotel stood at the foot of Dobie Street in those days.*

"The original 'Star' punt was a primitive affair pulled to and from across the river by means of a huge coir rope. A man would walk to one end of the punt, grasp this big rope in his hands and walk along a platform to the other

end of the punt, meanwhile putting all his strength forward and pulling the punt along. It was terribly hard work in summer, or when the tide was a bit strong. About 35 years ago (i.e., about 1897) power was installed in the punt and it continued to do useful service until a few months ago (i.e., early 1932 or late 1931)."

Ferry Vessel No. 7

Construction of a new ferry vessel commenced in 1899. It was built by Rogers Brothers at Newcastle under contract to the Public Works Department, who had responsibility for ferries at that time.

The ferry was equipped with compound surface condensing steam engines manufactured by Messrs Simpson and Strickland of Dartmouth, England and capable of developing 30kw. The Public Works Department Annual Report of 1899 commented:
"It is anticipated that the reduction of noise due to the use of condensing engines will be greatly appreciated by the public, as reducing the risk of bringing restive horses on the punt . . ."

The total coast of the ferry was £2,776/7/8. In June 1900 the new ferry was installed on the Clarence River at Grafton where it crossed the 620 m stretch of water in five minutes and thirty-five seconds, and achieved a maximum speed of 11 kilometres per hour in the centre of the trip.

It appears that some years later because of increased patronage, raised decks were built along both sides of the ferry and used to increase the accommodation for pedestrian traffic.

This vessel was subsequently numbered No. 7 in the Department of Main Roads' vehicular ferry fleet and in a remarkable career has provided over 80 years of service on the North Coast of New South Wales.

But, by the 1920s, this vessel was less able to cope with the volume of traffic crossing the river and so a new large steel-hulled ferry was introduced.

The new vessel was built at Newcastle by the State Government Dockyard and was commissioned at Grafton in December 1926, apparently having been brought there in tow of the *MV Orestes*. The new ferry (which was later numbered No. 8) had a capacity of approximately 24 vehicles (double that of No. 7), a gross weight of 261 tonnes and cost £22,486. The hull itself was 39 m (128 feet) in length and, with the flaps added, its total length was 52 m (171 feet). The beam was 11 m (36 feet) and the depth 2 m (6 feet 6 inches).

Consequently, Ferry No. 7 moved downstream to take up duty at Harwood. After the opening of Grafton Bridge in 1932, Ferry No. 8 was moved to Harwood in 1937 and, consequently, No. 7 became the Harwood Relief Vessel.

In 1957, Ferry No. 7 was towed from the Clarence River to the Richmond River, for a major refit at Rileys Hill Dock. Following the provision of a diesel engine and other improvements, No. 7 went into service at Burns Point near Ballina in 1958.

In 1960-61 it was moved westwards along the Richmond River to Woodburn, where it stayed until October last year, when following the opening of the Woodburn Bridge (see article in September 1981 issue of *Main Roads*, Vol. 46, No. 3, pp 67-9, 92) No. 7 made its latest move to Bluff Point, near Lawrence, back on the Clarence River.

Goodbye Ferry No. 8

The Daily Examiner of 19 July 1932 reported this sad aspect of the phasing out of this slow, awkward, yet rather romantic style of river crossing.

"As midnight chimed last night the Grafton punt went out of commission. Her boilers will be blown down, and the craft will stay at Grafton until her future destiny is decided upon by the Department. The steam whistle of the punt blew a farewell dirge as midnight approached, and the last strains that sounded over the placid waters of the Clarence as the midnight hour was reached were "Cock-a-doodle-doo!" *just as much as to say* "Although going out of action, I am still triumphant". *The punt, with her great carrying capacity, had done good service at Grafton. The big vessel has been the means of building and fostering the trade between the two sides of the river, and in this way has done much in facilitating the trade of the two towns and district. VALE!"*

Bridge design and re-design

An Act authorising the construction of the Grafton to South Grafton railway received vice-regal assent on 21 December 1915. It was based on the report of the Public Works Committee, dated 6 June 1913, and provided for a bridge over the Clarence River to carry a double line of railway and footway and to have a movable span with a 70 ft (21.3 m) clear channel for the passage of vessels.

Various sites were examined for a bridge, including via Susan Island, Mountain View, and the present position known as Wilsons Hill. After thorough investigation including trial bores, the latter site was chosen because of the excellent foundation available and the comparatively narrow stretch over such a broad river. It also entailed less railway work to junction with the existing lines. There was some local opposition to the Wilsons Hill site, but the cost of the alternative via Susan Island was nearly double. Consequently, even though being above the navigable limit of the river for all but small vessels, and thus not needing an opening span, the Susan Island proposal was rightly abandoned.

A tentative 6-span design was prepared by the Railway and Tramway Construction Branch of the Public Works Department in 1910. Before working drawings were put in hand, a complete re-investigation was made of the question of most efficient form of pier, method of sinking—etc. A solid pier in one unit from top to base was finally decided on for piers Nos. 2, 3, and 4, to be sunk to rock by means of rectangular steel caissons, using the pneumatic process. For the pier in the southern bank of clay an open excavation, suitably timbered, was considered feasible and economical.

The adoption of more massive piers involving increased cost, led, logically, to the selection of longer spans. By substituting five 240 ft (73 m) main spans for six 200 ft (70 m) spans a saving of one pier was effected and the increased cost was offset.

The bascule span was to have been of the Scherzer rolling type. The horizontal swing type of moving span had been ruled out in 1910, chiefly on account of the size of pier needed to carry an adequate system of rim rollers. Consideration was also given to the direct vertical lift type but the headway required to pass vessels with 85 ft (26 m) masts was a crucial factor which made the adoption of rolling Scherzer justifiable.

The design of the railway bridge, as amended, was approved and a start was made on the working drawings in the early part of 1921. In December 1922, when these drawings were well advanced, the Minister for Works requested the Railway Commissioners to prepare new designs and estimates for a bridge to carry vehicular, in addition to railway and pedestrian, traffic.

Alternative schemes were considered, one with road and railway at a common level (including possible joint usage) and the other with the road at a higher level. The double deck design was not only much the cheaper but enabled all calculations previously made to be used.

Final dimensions

The bridge, as finally designed and built, consists of five steel truss spans of from 212 ft 6 in (74 m) to 245 ft (75 m) in length, a bascule lift span of 76 ft (23.2 m) and two approach spans, one on either side. The approach spans are separated for rail and road traffic, and are 66 ft (20 m) long for the railway and 100 ft (30.5 m) long for the roadway.

The total length of the bridge is 1500 ft (457 m) and it spans 1300 ft (396 m) of water. The spans are carried on seven concrete piers set on solid rock foundations in the bed of the river. The piers contain a total of about 5700 cubic yards (4766 cubic metres) of concrete, weighing over 10 000 tons (10 160 tonnes) and one of them was sunk to a depth of nearly 80 ft (24.4 m) below mean high-water level. Most piers were sunk to between 55 and 65 ft (16.8 and 19.8 m) below water level.

The superstructure is 43 ft (13 m) in height from the top of the concrete piers to the parapets of the roadway and has a width of 43 ft over-all. The railway track, for which provision was made for a double line when traffic warranted it, is 11 ft (3.4 m) above the piers and the two footways on either side are each 5 ft (1.5 m) wide. The lower deck is about 11 ft (3.4 m) above flood level. The upper deck is 27 ft (8.2 m) above the level of the railway tracks and carries a concrete roadway 22 ft 6 in (6.9 m) wide, giving road space for three lanes.

On the northern side, the road approach is borne on 13 concrete archways, and then by an embankment. These concrete archways are set upon ironbark piles, which are driven

30 ft (9.1 m) into the earth. Eight of these piles are under each supporting pier.

Building the bridge

Tenders for the bridge construction were called on 15 June 1927 with a stipulation that Australian steel be used throughout.

Preliminary work was started in August, 1927, and in the same year tenders were accepted from the Clyde Engineering Company Ltd., for the manufacture and supply of steelwork for the caissons (£22,000) and for the superstructure (£144,500).

For a summary of the construction of the bridge, here are some relevant extracts from a report in *The Sydney Mail* of 27 July 1932 (pages 30 to 35):

"The original departmental estimate for the construction of the bridge was £400,000, and it was started by Mr. McGirr ... that, when tenders were called, two were received, one being for £488,000 and the other £497,000. The department decided to undertake the work itself, with the result that the bridge had been constructed for slightly less than the estimate, a saving of nearly £80,000 to the State being effected.

"In June (1928) the first big pontoon for use in the work was launched at Grafton, having been built for the Commissioners by Mr. John Sullivan. Work began in earnest the following month, and on July 11 the ceremony of driving the first rivet was performed by the Minister for Works and Railways and Deputy-Leader of the Government, Mr. E. A. Buttenshaw. The ceremony was performed from a punt moored to the first caisson on the south side of the river, and a large crowd witnessed the historic event.

"Three months later the excavations for the first concrete pier on the edge of the water at the south side of the river were completed and the work of filling with concrete began. From that point the work proceeded steadily, the construction of the piers being the most arduous and difficult part of the undertaking.

"Concurrent with the sinking of the piers the erection of the steel spans proceeded on a grille erected on the south bank of the stream, and from here, on May 25 1930, the first span was floated into position on piers. The process was carried out by means of punts, which were sunk under the big steel superstructure at low tide, took its weight at high tide, were towed to the piers, and there again sunk so that with low tide the span rested on its bearers on top of the piers. The last span was floated into position early this year (1932).

"There are 2,000,000 rivet-holes in the bridge, and it is estimated that these contain 200 tons (205 tonnes) of rivets.

"During the five years of construction in the field, the river rose on several occasions to a height of 8 ft (2.4 m) above normal and, though much delay was caused, there was no great amount of damage or loss. A number of minor accidents also occurred but only one fatality."

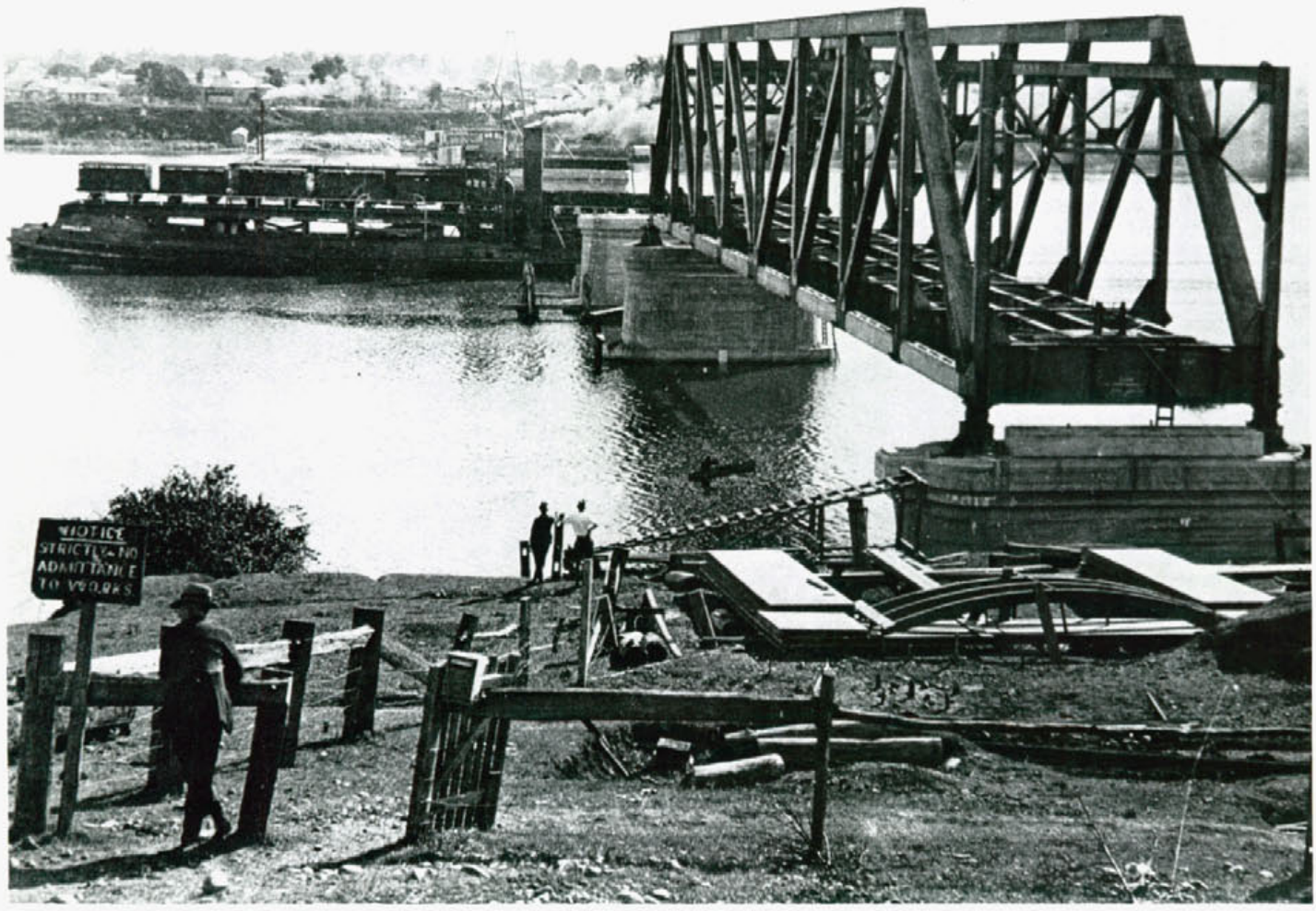
The bascule lift span

The most fascinating feature of the structure is the bascule, or opening span, which was made to lift upward using electric motors operated by current three phase fifty cycle, 415 volt supplied initially from the Nymboida Hydro-electric scheme. When raised, the bascule span left an opening of 70 ft (21.3 m) in width and with a depth of 40 ft (12.2 m) of water in the channel, enabling vessels of up to 2500 tons (2540 tonnes) gross to pass through.

The bascule span is of the Rall (combined rotating and travelling) type. The span weighs 800 tons (813 tonnes) and is carried on two large steel rollers each about 5 ft (1.5 m) in diameter and 2 ft (.6 m) in width, which roll on a steel track. The rollers moved away from the opening simultaneously with the upward rotation of the span, so that with an angular movement of 80 degrees, the maximum allowable, the centre of the rollers was 12 feet 6 inches (3.8 m) from their original position.

The opening procedure consisted of several distinct operations. The first was the sounding of the warning gong which told the traffic (vehicular and foot) that the span was about to be opened.

Then the gates, situated at the north and south of the span, both on roadway and footway, were closed, after which a section of the rails was lifted to give clearance. A section of



The bridge takes shape. The train ferry "Swallow" can be seen passing between piers 3 and 4. (Reproduced courtesy of Mr. G. Weatherhead.)

the roadway deck was dropped also to give clearance. The next operation was the unlocking of the north end of the span after which the main lifting motors came into operation. The lifting motors were two 35 horsepower (26 kW) electric motors, but one was sufficient to do the job.

The whole operation took about two minutes, but the actual lifting was done in one minute.

The opening was controlled from a cabin on the roadway level, placed in a position that gave the operator a clear view up and down stream and along both road and railway. The gates and other moving portions were controlled electrically and interlocked with each other and with the signalling system, so that none of the operations could take place out of its proper sequence.

The whole mechanism was regarded as being accident-proof and even if the operator was suddenly indisposed, all movement of the span would instantly cease.

A local resident, Mr. Ken Jesser, who operated the span for about 20 years, recalls that there were generally 4 or 5 lifts a week in his time. In total, he believes he raised the span over 3400 times.

Giving credit where due

The design and construction of the Clarence River bridge, since its first inception in 1910, was in the hands of the staff of the Railway and Tramway Construction Branch which, until 1 January 1917, was an integral unit of the Public Works Department. On that date it was transferred to the Railway and Tramway Department, preserving its integrity. From early in 1904 until 1 January 1925, Mr. W. Hutchinson directed the activities of the Branch and he was succeeded by Mr. F. E. Wickham, who occupied the position until 3 March 1930, with Mr. W. R. Beaver, Assistant Chief Engineer. On this date the Branch was affiliated with the Existing Lines Branch under the Engineer-in-Chief for the latter, Mr. R. L. Ranken, who took the title Chief Civil Engineer.

The construction work of the Branch, however, still remained under the immediate direction of Mr. Beaver until the passing of the Ministry of Transport Act on 22 March 1932 under which Mr. A. C. Fewtrell was appointed Transport Commissioner for Ways and Works. Mr. Beaver, subsequently, took up duties as Civil Engineer at Bathurst and Mr. V. W. Mahoney, formerly Inspecting Engineer to the Branch, was given control of construction work, including the Clarence River bridge. Mr. J. D. Simpson occupied the position of Inspecting Engineer prior to Mr. Mahoney and supervised the early work on the bridge. Mr. S. D. Webb was in charge of the field work as resident Engineer from August 1927, and had associated with him, as works manager, Mr. W. Rees, doyen of practical bridge builders in the Commonwealth.

Mr. C. A. Edwards was responsible for the location of the bridge and for the original route of the railway extension and Mr. F. E. Wilson for the base lines and triangulation work to establish the pier centres and for the final route as constructed. The inspection and testing of the electrical machinery required to operate the moving span and in the construction plant were carried out by Mr. G. A. Twigg, of the Electrical Branch of Transport Department.

Mr. J. W. Roberts was in charge of the design staff of the Branch from January 1911, until October 1930, when he became associated with Mr. R. J. Boyd, of the Metropolitan Railway Construction Branch, in the supervision of the combined design and drawing staffs of the two construction Branches and of the Existing Lines Branch—but retaining control of work connected with the bridge. The officers most deeply concerned in the design work of the bridge were Mr. E. P. Boaden (bascule span, machinery and electrical equipment), Mr. J. England (fixed spans and reinforced concrete work), Mr. A. Greig (coordination, checking, plant and caisson design) and Mr. L. T. Swift (mechanical and electrical details). ●

A detailed account of the design and construction of this remarkable structure was given in the Transactions of the Institution of Engineers, Australia. *The articles are titled* The Clarence River Bridge *by J. W. Roberts appeared in Vol. XIII. Interesting accounts of the official opening are given, with extensive anecdotes and recollections, in the* Grafton Daily Examiner *editions of Tuesday, 19 July and Wednesday, 20 July 1932. A briefer summary appears in* The Sydney Mail *of Wednesday, 27 July 1932. A booklet entitled* The Clarence River Bridge Book *was published at the time of the opening.*

In our next issue of Main Roads, *we will conclude this anniversary account with descriptions of the popular bridge opening celebrations in Grafton in July 1932, together with some details about the Golden Jubilee celebrations held in July 1982.*

An early article entitled Main Road Adjustments Consequent upon the Opening of the Clarence River Bridge, Grafton *appeared in the September 1932 issue of* Main Roads, *Vol. 4, No. 1, pp. 14-16.*

NEW DEPUTY COMMISSIONER

Mr. John Gordon Crowe was appointed Deputy Commissioner for Main Roads on 16 June, 1982.

A graduate in Civil Engineering from the University of Queensland, Mr. Crowe travelled abroad after graduation to broaden his experience and commenced his highway engineering career with the Ontario Department of Highways working on the Trans-Canada Highway.

On returning to Australia, he joined the Department in February 1959 and was sponsored by the Department to undertake a course in Highway Engineering at the University of New South Wales. After graduating as Master of Engineering Science, Mr. Crowe was appointed Officer-in-Charge of the Department's Brooklyn Works Office. He subsequently served in the Divisional Office at Parkes, in Head Office and at Grafton before being appointed Supervising Engineer, Southern Division at Goulburn in 1970.

He was transferred to Head Office in 1977 as the Assistant to the Engineer for Programmes and Budgets.

When the Policy and Economics Unit was formed in 1979, Mr. Crowe was appointed to the newly created position of Corporate Planner, a position he held until his appointment as Deputy Commissioner.

Mr. Crowe is a Member of the Institution of Engineers, Australia, an Associate of the Australian Institute of Public Administration and an Associate of the Australian Institute of Management. In 1980 he attended the Australian Administrative Staff College at Mt. Eliza, Victoria.

Mr. Crowe brings to the position a wide ranging knowledge of the Department's responsibilities. He also brings a keen desire to maintain and enhance the Main Roads system and to ensure the continued efficiency and effectiveness of the Department.●

1983 World Road Congress for Sydney

Australia has been chosen as host nation for the XVII World Road Congress of the Permanent International Association of Road Congresses (PIARC), to be held in Sydney in October 1983.

PIARC is the principal international roads association and is an adviser to the United Nations on road matters. It encourages the exchange and dissemination of information on roads and road transport.

PIARC holds major road congresses every four years to bring together scientists, engineers, economists and administrators to discuss developments in the planning, design, construction, maintenance and operation of roads.

The XVII World Road Congress will be held in the world renowned Sydney Opera House on the shores of Sydney Harbour from 8 to 15 October. This prestigious gathering will be officially opened on October 9, 1983 by the Governor-General of the Commonwealth of Australia, who has given his patronage to the Congress.

PIARC was founded in 1909 to foster progress in the construction and growth of road systems throughout the world, and to provide a focal point for the exchange of relevant information. Australia first attended a World Road Congress in 1913 and became a National Government Member in 1924.

The date and venue of the congresses are decided by PIARC's governing body, the Permanent International Commission (PIC), which is made up of National Government Members and which has its headquarters in Paris. This will be the first time Australia has hosted a World Road Congress and it is only the second time in 70 years that the Congress has been held in the Southern Hemisphere.

Australian Organising Committee (AOC)

In April 1980, the Australian Organising Committee (AOC) was formed to plan and stage the Congress. The AOC membership includes officers from Commonwealth, State and the private sector and is concerned with technical contribution, the organisation of the Congress, and the maximisation of benefits to Australia.

The principals of the Committee are as follows:

Patron
His Excellency the Right Honourable Sir Ninian Stephen, A.K., G.C.M.G., K.B.E., K.St.J., Governor General of the Commonwealth of Australia.

President
The Honourable Ralph J. Hunt, M.P.
Commonwealth Minister for Transport and Construction

Vice Presidents
The Honourable Paul Whelan, M.P.
Minister for Consumer Affairs &
Minister for Roads, New South Wales
The Honourable S. M. Crabb, M.L.A.
Minister of Transport, Victoria
The Honourable R. J. Hinze, M.L.A.
Minister for Local Government
Main Roads & Police, Queensland
The Honourable M. M. Wilson, M.P.
Minister of Transport, South Australia
The Honourable E. C. Rushton, M.L.A.
Deputy Premier & Minister for Transport, Western Australia
The Honourable I. M. Braid, M.H.A.
Minister for Housing, Construction, Local Government and Lands, Tasmania
The Honourable N. Dondas, M.L.A.
Minister for Transport and Works, Northern Territory
The Honourable Michael Hodgman, M.P.
Minister for the Capital Territory, Australian Capital Territory
Alderman Douglas W. Sutherland, A.M.
The Right Honourable The Lord Mayor of Sydney

Executive Committee
Secretary General
Mr. R. M. Taylor, Secretary
Commonwealth Department of Transport and Construction

Deputy Secretary General
Mr. B. N. Loder
Representative of National Association of Australian State Road Authorities and Commissioner for Main Roads, New South Wales

Members
Mr. T. H. Russell
Chairman, Country Roads Board, Victoria
Mr. E. Finger
Commissioner of Main Roads, Queensland.
Mr. A. K. Johinke
Commissioner of Highways, South Australia
Mr. D. H. Aitken
Commissioner of Main Roads, Western Australia
Mr. G. E. C. McKercher
Director of Main Roads, Tasmania
Mr. C. T. Fuller
Secretary
Department of Transport and Works, Northern Territory

Director
Mr. N. A. Waslin
Senior Adviser, Roads, Commonwealth Department of Transport and Construction

Specialist Advisers
National Association of Australian State Road Authorities
Australian Tourist Commission
Australian Government Advertising Service
New South Wales Department of Tourism
Australian Road Research Board
Institution of Engineers, Australia
Australian Automobile Association
Chartered Institute of Transport
Dean of Faculty of Engineering, University of Sydney
Dean of Faculty of Engineering, University of New South Wales
Cement and Concrete Association of Australia
Australian Asphalt Paving Association Ltd.
Australian Road Federation
The Australian Council of Local Government Engineers Associations
Australian Council of Local Government Associations
The Commercial Vehicle Industry Association of Australia
Construction Equipment Importers & Manufacturers of Australia
Australian Federation of Construction Contractors
Association of Consulting Engineers of Australia

Wide-ranging benefits

The President of the AOC, Mr. Ralph Hunt, said recently that Australia was honoured when its offer to host the XVII Congress in Sydney was accepted. He explained that it would provide an opportunity for all those who share a common interest in roads to meet as professional colleagues.

"Their professional and social interaction should have resultant benefits not only to each other, but to their professions and to PIARC," Mr. Hunt said.

The Congress will provide Australian road engineers with a unique opportunity to discuss the latest overseas developments and for them to "export" their own technological expertise. As one of the most important meetings held anywhere in the world for road engineers, it will greatly enhance Australia's standing in the road engineering field.

The Deputy Secretary General of the AOC, Mr. Bruce Loder, has pointed out that *"the Congress will benefit road engineering in New South Wales by providing a stimulating interchange of ideas with overseas delegates"*. It is expected that 2250 to2500 delegates will attend the Congress, and as many as 1500 of these may come from overseas.

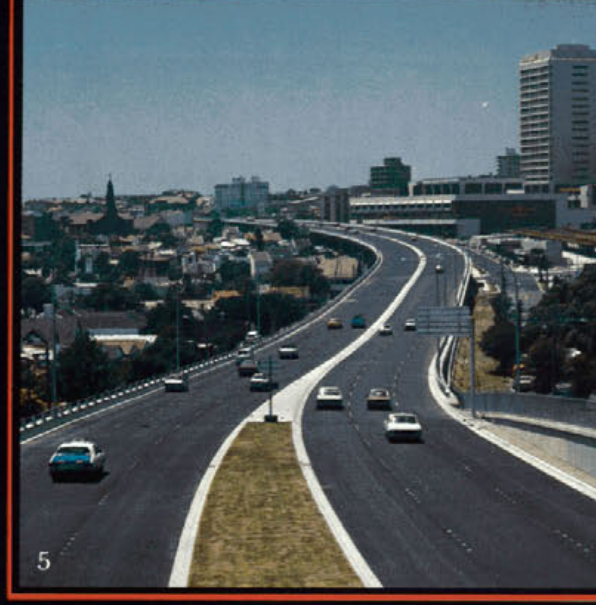
Delegates will include many of the world's foremost road engineers and will represent a broad cross-section of the world's knowledge of the economics, design, construction and maintenance of roads.

Congress program

The technical program will include five *questions* of road concern on which nations will report on progress in their own countries.

1. Sydney will host the 1983 XVII World Road Congress. The Opera House (foreground) will be the congress venue. 2. Ayers Rock, the world's largest monolith, may be seen as part of an optional Study Tour. 3. Rainbow Lorikeets are one of the many examples of Australian wildlife to be seen. 4. The Narrows interchange, Perth, may also be inspected as part of a Study Tour.

SYDNEY:
HOST TO THE 1983
XVII WORLD ROAD CONGRESS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5. Bondi Junction by-pass, an urban motorway in Sydney. 6. Batman Bridge over the Tamar River, Tasmania, may be seen as part of a Study Tour. 7. Long distance road transport in the Australian outback. 8. Hobart, Tasmania. The Wrest Point Casino tower in the foreground may be visited as an option during one of the Study Tours.

The *questions* or themes are . . .

I Earthworks, Drainage and Subgrade
Laboratory and *in-situ* tests, remote sensing, stabilisation and reinforcement, use of industrial wastes, effect of water on bearing capacity, instability risk in slopes, new compaction methods, protection of subgrade, new drainage materials and methods, restoration of damaged subgrade, inspection instruments.

II Construction and Maintenance of Pavements
New techniques, fatigue, surface damage, deflection, skidding resistance, serviceability index, noise levels, artificial aggregates, aerodromes, flexible pavements, new binders and additives, effects of deicing salts, recycling materials, assessment of experimental methods and materials.

III Inter-urban Roads and Motorways
Mathematical methods for forecasting, data handling, environmental problems, public consultation, safety assessment, geometric standards, driver behaviour, service levels, new information techniques.

IV Roads in Urban Areas
New design principles, consequences of energy restrictions, technical and financial measures to influence modal split, developments in noise reduction and other environmental/social considerations.

V Roads in Developing Regions
Evaluation of social and economic impact, chemical stabilisation, dry compaction, optimum levels of labour and equipment, climatic factors.

Australian reporters
National reporters have been appointed to present details of developments in Australia as related to the five questions. These reporters are senior engineers for State Road Authorities.

- *Earthworks, Drainage, Subgrade*
  Mr. H. W. Murphy
  Construction Engineer
  Main Roads Department, Queensland
- *Construction and Maintenance of Pavements*
  Mr. A. Leask
  Materials & Research Engineer
  Department of Main Roads, New South Wales
- *Inter-urban Roads and Motorways*
  Mr. D. P. Ferguson
  Superintending Engineer
  Highways Department, South Australia
- *Roads in Urban Areas*
  Mr. R. T. Underwood
  Chief Engineer (Management Services)
  Country Roads Board, Victoria
- *Roads in Developing Regions*
  Dr. J. I. Gill
  Divisional Engineer
  Main Roads Department, Western Australia

Conference discussions
There will be two special discussion topics at the Congress; namely "*Energy savings in roads and road transport*" and "*The impact of road networks on economic and social life in industrialised countries and in developing countries*".

The energy savings question is particularly topical. The energy crisis is essentially an oil crisis because of the increase in its price, its availability and, for most countries, its payments in foreign currency. Roads and road transport represent an important and partially captive part of oil consumption.

It is, therefore, necessary to seek out all possible savings in this area and discussion will focus on the following six themes.

I General Description (Development of Energy Resources and Needs)
- Analysis of the current situation and recent development.
- Elasticity of road traffic demand according to the price of fuel.
- Government objectives for energy savings in roads and road transport.

II The Vehicle and the Driver
- Recorded and foreseeable decrease in individual vehicle consumption (light vehicles, heavy vehicles, buses); use of non-oil fuels.
- Decrease in consumption to be expected from driver behaviour.
- Forecast of energy consumption through road transport for years 1985-1990.

III Policy and Criteria for the Design of Roads and Road Networks
- Introduction (use of cost-benefit models and considering future).
- Influence of geometric characteristics of roads and general layout of network on consumption.
- Today's criteria (existing geometrical standards).
- Future criteria (future geometrical standards).
- Influence of geometrical standards and types of networks on energetic and financial costs of investments, on vehicle consumption, on cost of accidents and on traffic jamming.

IV Savings to be Expected from Measures of Traffic Operation and Control and from Lighting
- Transport strategies and traffic control.
- Urban conditions (lighting, signalisation, etc.).
- Rural conditions (signalisation, speed control, etc.).
- Energy savings and other effects to be expected from these measures.

V Construction and Maintenance
- Effect of riding qualities on consumption of vehicles.
- Choice of techniques and materials for road construction.
- Choice of techniques and materials for road maintenance.
- Strategies for road construction, maintenance and strengthening.

VI Energy Savings to be Expected from Town Planning Policies and Modal Transfers

VII General Conclusions

The conference discussion on the impact of road networks on economic and social life in industrialised countries and in developing countries will be organised within a panel including, in addition to the chairman of the conference discussion, four reporters from industrialised countries and four reporters from developing countries.

Each reporter will develop one of the following themes; the other reporters will then enter into a discussion with him.

Industrialised countries
- The road in the context of national planning.
- A long term look at the development of transport with particular reference to road transport over the next 10 to 20 years.
- The maintenance, strengthening and improvement of national and regional road networks.
- Road safety.

Developing countries
- National and regional roads: specific criteria to be taken into account for determining the plan.
- Rural roads and their implications for economic, social and cultural development.
- Road safety in developing countries.
- Co-operation between industrialised and developing countries in the field of technology: reciprocal arrangements between the two types of country.

Conference workshop on surface water drainage
This workshop is being organised by the Technical Committee on Roads in Developing Regions with the participation of experts invited by the Committee. There will be four sessions.

1. Calculation of maximum flow for small drainage structures.
2. Design of small water crossings and protection against erosion.
3. Drainage of slopes and protection against erosion.
4. Practical criteria for selection of drainage solutions.

The report of the proceedings of the workshop will be forwarded to all delegates who request it and who pay the appropriate publication and forwarding charges.

Technical committee reports
Apart from staging the Congress, PIARC maintains a number of technical committees which carry out research, and examine and report on individual questions of international significance relating to roads. These questions cover the construction, improvement, maintenance, use and economic development of roads.

Australia is represented on nine of the eleven PIARC Technical Committees. These Committees and their Australian members are as follows.

- *Testing of Road Materials*
  Mr. E. C. Brown, Department of Transport and Construction, Canberra.
- *Roads in Urban Areas*
  Mr. R. T. Underwood, Country Roads Board, Victoria.
- *Roads in Developing Regions*
  Dr. J. B. Metcalf, Australian Road Research Board, Victoria (Committee Chairman).
- *Road Bridges*
  Mr. J. G. Marsh, Main Roads Department, Western Australia.
- *Inter-Urban Roads*
  Mr. V. P. O'Grady, Department of Main Roads, New South Wales.
- *Flexible Roads*
  Dr. R. Gordon, Main Roads Department, Queensland.

The Slip-Form Paver can lay a reinforced concrete roadway at the rate of 140 m³/day. Modern technology in road building will be one of the main discussion points at the XVII World Road Congress, Sydney, October 8 to 15, 1983.

- *Concrete Roads*
  Mr. K. J. Cavanagh, Cement & Concrete Association of Australia, North Sydney (Corresponding Member).
- *Maintenance*
  Mr. E. W. King, Department of Main Roads, New South Wales (Corresponding Member).
- *Road Tunnels*
  Mr. R. D. Henderson, Institution of Engineers Australia, Canberra (Corresponding Member).

The two technical committees on which Australia does not have members are "Surface Characteristics" and "Economic and Finance".

During the Congress, reports from all the technical committees will be given on research carried out since the XVI World Road Congress (which was held at Vienna in 1979).

Official languages

The official Congress languages are English and French. Simultaneous interpretation will be provided during the formal sessions.

Presentation of communications and films

Sessions for the presentation of communications and the showing of films or slides will take place at the same time as the Congress working sessions. The detailed programme of these sessions will be announced at the beginning of the Congress.

Delegates who intend making special presentations are requested to contact the office of the AOC prior to 1st June, 1983.

A short summary of the presentation should be attached, informing on the length of the presentation and whether films or slides will be shown.

The presentation and films must not be of a political, commercial or advertising nature.

Sightseeing

There will be ample opportunities for visitors to enjoy the wide range of attractions which Sydney has to offer.

In addition to the Congress Programme, all Congress delegates and accompanying persons will receive a ticket for a Sydney Harbour Coffee Cruise of 2½ hours duration. There will be a choice of cruises which run daily at 10.00 a.m. and 2.00 p.m.

Special attention will be paid to providing a full range of activities for persons accompanying delegates.

Morning tours will be available to visit the Art Gallery of New South Wales and "The Rocks", an outstanding area of historical and architectural interest adjacent to Sydney Cove (Circular Quay). A tour will also be available, at additional cost, to Taronga Park Zoo on the northern harbour foreshores.

Study tours

After the Congress, there will be four study tours arranged in conjunction with Trans Australia Airlines and AAT Coach Holidays. These will provide the opportunity for delegates to inspect a variety of Australian road and bridge works, in areas of widely different climate and terrain.

The tours will also provide ample opportunity to see Australia's unique flora, fauna and other major tourist attractions.

• STUDY TOUR A (5 days)

Sunday, 16 Oct.
Depart Sydney, travel on South Western Freeway to historic Berrima; on the way see Landsdowne Bridge (built 1836) and modern Freeway bridges. Barbecue lunch and sheep shearing demonstration near Goulburn. Afternoon tour of National Captial, Canberra, including Australian War Memorial and Black Mountain Communications Tower. Overnight Canberra.

Monday, 17 Oct.
Continuing tour of Canberra, Australia's showpiece of architecture and planning, including various types of subdivision development, associated road hierarchy, cycle paths and bus interchange. Tour also includes National Gallery, High Court of Australia, National Library and Australian National University. Travel through highland grazing country to Cooma. Overnight Cooma.

Tuesday, 18 Oct.
Travel into Australia's Alpine Region, pass Lake Eucumbene and other features of the renowned Snowy Mountains Hydro-Electric Scheme. Continue through picturesque countryside. Travel via Murray Valley Highway past Hume Weir, one of Australia's great inland water supplies, to Albury. Overnight Albury.

Wednesday, 19 Oct.
Short tour of major rural centre of Albury/Wodonga and on to Beechworth, one of Australia's early goldmining boom towns. Along Hume Highway to Melbourne. Overnight Melbourne.

Thursday, 20 Oct.
Visit West Gate Freeway and Australian Road Research Centre, Vermont. Tour Dandenong Ranges and return to Melbourne.

• STUDY TOUR B (4 days)

Sunday, 16 Oct.
Fly to Launceston, Tasmania. Inspect significant roads and bridges en route to Hobart. Overnight Hobart. Casino visit optional.

Monday, 17 Oct.
Coach to historic Port Arthur for tour of infamous penal settlement. Cruise on Derwent River to inspect Tasman and Bowen Bridges. Fly to Melbourne, Victoria. Overnight Melbourne.

Tuesday, 18 Oct.
To Ballarat via Western Freeway. Visit pioneer settlement and tour this thriving rural centre. Overnight Melbourne.

Wednesday, 19 Oct.
Visit West Gate Freeway and Australian Road Research Centre, Vermont. Tour Dandenong Ranges and return to Melbourne.

• STUDY TOUR C (7 days)

Sunday, 16 Oct.
Fly to Coolangatta, Queensland. Short tour of the Gold Coast, Australia's most popular holiday resort, en route to accommodation at Surfers Paradise. Afternoon tour of other Gold Coast attractions including exotic tropical bird life. Overnight Surfers Paradise.

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BATTERED, BUCKLED AND BURNT

A Hot Issue at Gundagai

Sheahan Bridge over the Murrumbidgee River at Gundagai was opened to traffic on 25 March 1977. It is a 1143 m long composite steel and concrete structure of 27 spans and the roadway is 9 m wide between kerbs.

The main spans, supported on reinforced concrete piers, are two closed steel box girders of variable depth with a concrete deck. The viaduct spans, supported on prestressed concrete piers, are two steel open trough trapezoidal girders with a concrete deck. In both cases the concrete acts compositely with the steel members to form the girders. The foundations are mainly cast-in-place piles.

Above and right: The accident caused a fire so intense that the aluminium body of the tanker melted. Molten aluminium flowed along the gutters and poured through the scupper holes. Below: This length of misshapen railing shows how intense was the heat generated by the fire. The kerb and parapet are covered with molten aluminium from the tanker body.

On 2 November 1981 an accident occurred on the bridge involving two northbound vehicles, an aluminium tanker carrying 30 000 litres of petrol and a tractor with a backhoe attachment.

The tanker careered out of control after the impact and struck the downstream parapet and railing in Span 12. It simultaneously tipped on its side and skidded for a further fifty metres before coming to rest on the bridge deck in the middle of Span 10.

Petrol leaking from the tanker immediately burst into flames. A large volume of burning petrol poured through the drainage scuppers and set fire below the

bridge deck. The aluminium body of the tanker melted in the heat and molten aluminium flowed along the gutters and poured through the scupper holes, resolidifying when it hit the ground ten metres below.

The damage done

Four panels of railing on the downstream side of Span 12 were destroyed by the impact of the tanker. Buckling and misalignment were caused to another 21 panels on the downstream and upstream sides of Spans 10 and 11. Paint on the railings was also burnt for a considerable distance.

Concrete in the kerb and parapet in Span 10 on both sides of the bridge was severely heat-affected.

Extensive areas of the asphaltic concrete layer were affected by either burning of the bitumen, or dilution of the bitumen by petrol.

Severe damage was done to the 900 mm wide concrete edge strips on either side of the bridge at Span 10. Concrete had spalled to a depth of approximately 25 mm in isolated areas. Around and beneath the spalled sections, the concrete appeared quite sound.

When the deck of the roadway was examined after removal of the asphalt, no defective areas of concrete were found. The asphalt had acted as an effective heat insulating layer.

Concrete cores were taken from the deck at the location of the fire and compressive tests revealed strengths of 32 and 39 MPa. This compared with strengths of 37 and 48 MPa from cores taken from unaffected areas. Although there had been some loss of strength of the concrete due to fire, there was sufficient reserve strength to retain the concrete and simply patch it as required after the spalled areas were removed.

The exterior surface of the paintwork on both girders of Span 10 was damaged by molten aluminium and burning petrol escaping through the deck scuppers. On the interior surfaces of the girders, relatively small areas of the final coat of paint were affected. Heat from the streams of molten aluminium also caused local buckling in two sections of the outside steel web plate of the downstream girder.

Temporary closure

The bridge was closed to all traffic from 2.30 p.m. on 2 November (the time of the accident), till 4.00 p.m. on 3 November. During this period highway traffic used the old route over the Prince Alfred Bridge. Prior to re-opening the bridge, the most severely damaged sections of steel railing were removed and corrugated steel guard-railing erected as a temporary measure.

The most severely damaged sections of asphaltic concrete were replaced or temporarily patched with coldmix. The affected asphaltic concrete on Spans 10 and 11 was removed on 4 November using the Department's Roto-mill and replaced the following day to the original depth and levels.

On with the job

Twelve panels of railing fabricated in the Department's Central Workshop at Granville were erected and another 13 panels were repaired and re-erected in position. All railings were re-painted using a chlorinated rubber paint system.

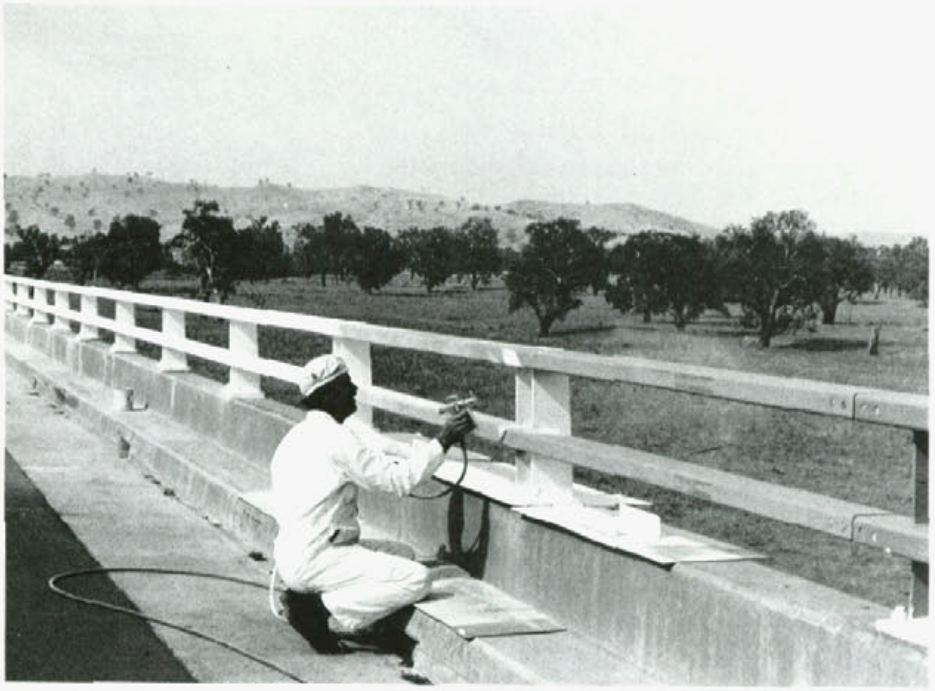
Spalled and unsound concrete was removed and replaced with new concrete. Fire-blackened concrete was sand-blasted to restore the surface appearance. Fire-blackened concrete surfaces under the deck between the girders were also sand-blasted.

The asphaltic concrete wearing surface was replaced and the spalled sections of the concrete edge strips were patched.

Above: The railing in Span 12 was the initial point of impact when the tanker went out of control. Below: Sand-blasting the fire-blackened concrete under the deck.

Scaffolding was erected under Span 10 to enable painting to be carried out and also to facilitate the inspection of the buckled downstream girder.

The exterior surfaces of the two girders over Span 10 were sand-blasted back to bare steel and coated with an organic zinc primer and a chlorinated rubber based paint system similar to the original coating. Internal surfaces of the less affected areas of the steel girders were prepared by air driven wire brushes to remove the top coat of paint. These were repainted with one coat of epoxy paint.



Repaired, replaced or resprayed. The bridge is finally restored.

The structural effects of the buckled sections in the downstream web of the girder were investigated but no attempt was made to remove the buckles from the steel plate as remedial measures could have caused even more problems.

This repair work, carried out by the Department's own forces at an approximate cost of $100,000, was completed in early March, 1982.

Although the cost of repairs may be recoverable, the effort put into restoration work must be regarded as a waste of resources, and the bridge itself is left a little the worse. This is but a small example of the continuing drain on resources and cost to the community of road accidents. We must be vigilant, as always, to reduce the terrible price we pay in death and injury to people and also in the destruction of and damage to our physical environment. With so much else to be done we can ill afford such an unnecessary wastage of our time, manpower, machines and money. ●

Articles on the Sheahan Bridge at Gundagai have appeared in the following issues of Main Roads:

- *State's Longest Road Bridge—Construction Completed: June 1977, Vol. 42, No. 4, pp. 117-120 (available in reprint form)*
- *Design of New Bridge: March 1974, Vol. 39, No. 3, pp. 66-9.*
- *Design investigations using a flood model: June 1964, Vol. 29, No. 4, pp. 118-9.*

A detailed article on its design, which appeared in the Australian Road Research Proceedings, Vol. 8, 1976, pp. 21-31, is available in reprint form from the Department's Public Relations Section.

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Monday, 17 Oct.
Morning at leisure on the beach, shopping, or optional tour to Sea World. After lunch, travel by coach to Mt. Tambourine through the sub-tropical rain forests of the Gold Coast hinterland. Inspect highway en route to Brisbane including major road and bridge works on approach to Brisbane, capital city of Queensland, the Sunshine State. Overnight Brisbane.

Tuesday, 18 Oct.
Morning tour of Brisbane, including inspection of construction progress on the new Gateway Bridge, a major crossing of the Brisbane River. Fly to Rockhampton. Short tour of Rockhampton including inspection of the Fitzroy River Bridge. Overnight Rockhampton.

Wednesday, 19 Oct.
Travel by coach north, via the new Marlborough to Sarina Highway through an area noted for its frequent flooding during the wet season. Then drive through scenic sugar canefields to Mackay, sugar capital of Australia. Overnight at Proserpine/Airlie Beach.

Thursday, 20 Oct.
Coach to Shute Harbour, gateway to the Whitsunday Group of Islands. Cruise by boat to a tropical Whitsunday Island resort. Overnight—Island resort.

Friday, 21 Oct.
Visit the Great Barrier Reef by boat. Relax in the sun, or enjoy a day's fishing in the waters of the Great Barrier Reef. Overnight—Island resort.

Saturday, 22 Oct.
Depart the Island resort and transfer to Townsville, Brisbane or Sydney for connection with flight home.

• STUDY TOUR D (7 days)
Sunday, 16 Oct.
Fly to Adelaide, South Australia. Tour this beautiful and well-planned city, described as a "City of Gardens and Churches". Overnight Adelaide.

Monday, 17 Oct.
Coach to beautiful Barossa Valley, heart of South Australia's famous wine region and founded by German settlers in mid-19th century. In evening view or purchase examples of Australian opals known for their glowing colours. Overnight Adelaide.

Tuesday, 18th Oct.
Fly via Alice Springs to Ayers Rock, the world's largest monolith which is 9 km around and 335 m high. Ayers Rock is noted for its spectacular colour changes at dawn and dusk. Overnight Ayers Rock.

Wednesday, 19 Oct.
Coach through cattle stations of Curtin Springs and Mount Ebenezer and on to Finke River, one of the oldest water courses in the world. See classic example of sealed highway in remote area and observe construction techniques used to extend sealed road through arid country. Tour Alice Springs, featured in the novel "A Town Like Alice", and see the magnificent natural surroundings of this Central Australian town. Fly to Perth via Adelaide. Overnight Perth.

Thursday, 20 Oct.
Tour of Perth with its splendid riverside setting, seeing the freeway system and the impressive Narrows interchange system, beautiful King's Park and its wild flowers, the scenic Swan River and the pioneer village in Armadale. Overnight Perth.

Friday, 21 Oct.
Tour of Perth's beautiful and popular ocean beaches en route to Yanchep National Park. See koala bears and kangaroos in the Wildlife Sanctuary and visit the Marina at Sun City. Overnight Perth.

Saturday, 22 Oct.
Transfer to Perth Airport for flight home. If time permits visit historic Rottnest Island, the home of the unique and friendly Quokka (a member of the kangaroo family), and haven for many species of water birds.

Road '83 Exhibition

During the Congress the International Trade Fair, Road '83 will be held at the Royal Agricultural Society's Showground in Sydney. The scope of exhibits at Road '83 will cover all subject matters at the Congress.

Australian and overseas companies and organisations who supply materials, machinery and skills for the construction of roads, bridges and tunnels are invited to participate in Road '83. This Trade Fair will provide manufacturers, importers and suppliers with a unique marketing opportunity. In a face-to-face situation, they will be able to exhibit and sell products and services to top-level decision makers from all the Australian State Road Authorities and from the world.

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ANNUAL REPORTING

Each year, as required by Section 6 of the Main Roads Act, 1924, the Department produces an annual report which serves primarily as a permanent record of its stewardship, and renders a full account of the Department's policies and operations during the past year. It is tabled in State Parliament by the Minister for Roads usually in late October or early November. The reports are then distributed, in accordance with a mailing list, to State Parliamentarians, Municipal Councils and Public Libraries, and is available to the general public on request, while stocks last.

Recently, the Department's 1980-81 Annual Report underwent close scrutiny in the Australian Institute of Management's Annual Report Awards. We are pleased to record that it won a Silver Award, "for distinguished achievement in annual reporting". The Department previously won a Silver Award in 1980. Prior to that it won Bronze Awards in 1975, 1974 and 1973 and a Merit Award in 1972. These Awards are something of which the whole Department can be justly proud. Not merely for the gratification of winning, but because an award indicates a high measure of success in communicating an organisation's aims and operations to its readers. But now there is a need to look to next year, to the task of upholding the high standard that we have set ourselves.

The significance of our annual report cannot be overstated. It is the means by which the Government and the public see how their $560 million funds have been put to use, and how the working time of over 10,200 direct employees of the Department has been spent. No less important is the information it gives to those employees about the role their own contribution has played in the performance of the Department.

In the 1980-81 Report from the Joint Committee of the Legislative Council and Legislative Assembly upon Public Accounts and Financial Accounts of Statutory Authorities, it is stated: *"Accountability is the essence of our democratic form of government. It is the liability assumed by all those who exercise authority to account for the manner in which they have fulfilled their responsibilities; a liability ultimately to the New South Wales people owed by Parliament, the Government and thus, every government department and agency."*

And later: *"Annual reports of departments and agencies should be another prime source of information on which to base judgements of their respective performances."*

It was then soberly added that: *"In fact, most fall short of the standards of disclosure normally required in the private sector by our corporation laws".*

With this and other concerns in mind, another major reassessment of both the content and the style of presentation of our annual report is currently underway, involving senior Departmental staff and Public Relations Section personnel. In the words of the Commissioner, Mr. Bruce Loder, the aim is to find better ways to: *"demonstrate the Department's effective use of public resources and also to render a full and frank account of our activities".*

Unfortunately, as a service organisation, it can be hard for the Department to illustrate its efficiency (or value for money) in specific terms. Unlike commercial enterprises, who have products to sell and profits to add up, our business of building and maintaining roads and bridges does not lend itself to attractive balance sheets which can clearly demonstrate "a good year".

Nevertheless, there has been for some time a growing awareness in the Department of the need for 'concrete' measurements both of tasks to be tackled and of their performance. For example, increasing use is being made of electronic data equipment to monitor the road system. Over a period of years this data will demonstrate whether or not the road network is becoming more or less adequate to meet the demands placed upon it, and it is hoped that future annual reports will carry some of the findings.

Meanwhile, however, it is hoped that this year's report will present a certain number of objective measurements of the Department's performance.

Such indices as reduced traffic accident statistics at reconstructed intersections, and improved travel times on upgraded highways, would be favourable indicators of our effectiveness.

Wherever possible, statistical information will be more meaningfully presented—making reference to figures from previous years—so that trends will become evident.

As most people are aware, lack of funding for roads, intensified by the present economic climate, has meant that the

At the 1982 Annual Report Award Dinner held at the Wentworth Hotel, Sydney, on 17th May 1982, our Commissioner, Mr. Bruce Loder, was presented with the Silver Award by Prof. Rex Olsson, President of the Australian Institute of Management New South Wales Division. (Photograph reproduced with the kind permission of James Ashburn.)

Department's operations have for some time been curtailed. Consequently some trends might not necessarily show the Department achieving as much as it would wish. The realistic statement of problems is, therefore, a point of special interest.

It is traditional and understandable that organisations tend to be reticent about aspects of their activities that do not present a favourable image. But the new emphasis in annual reporting, reinforced by the comments of the Australian Institute of Management (AIM) and of various government committees, is on candour. It is our duty as a publicly funded organisation to join in this move towards frank disclosure of our problems as well as our achievements.

This is not without purpose. It should be recognised that the annual report provides the Department with a forum in which to present the facts of underfunding to both Parliament and the public. It is the appropriate place to point out the resulting and unavoidable difficulties of having to leave tasks undone and to choose between alternatives. Furthermore, in this context, it is not necessary to confine the report to an account of recent and present operations only, but to give as much reference as possible to future plans and intentions.

Other underlying themes to be developed are the Department's growing

use of new technology to improve efficiency, and the Department's concern, as a community-oriented organisation, for people and places and not just for the technical aspects of road and bridge building.

With the combined efforts of all Departmental staff and especially those responsible for the actual input of information, many of these objectives should be evident in our 1981-82 Annual Report.

Whether or not we finally strike gold in the AIM Awards, there will certainly be the satisfaction of knowing that the Department is attempting to discharge with credit its onus of accountability to the people of New South Wales. ●

The Australian Institute of Management Annual Report Award

Australia was one of the first countries in the world to introduce awards for annual reports, the United States of America having announced its first awards in 1941. The award was introduced into Australia in 1950 by the Finance Panel of the then Sydney Division of the Australian Institute of Management N.S.W. Division.

At first, the stated aim of the award was *"to encourage companies to make the Annual Report speak for industry, and explain the important place which private enterprise occupied in the community"*. As such, the award was confined originally to companies listed on Australian Stock Exchanges.

In 1957, the scope of the award was enlarged to include government and semi-government bodies, charitable institutions and sporting clubs. The reports of these additional organisations were examined separately under the heading of "unlisted organisations". Broadening the awards in this manner made the AIM venture unique in the world.

In 1969, reports for unlisted organisations were divided into several categories and for each category separate criteria were developed against which reports could be evaluated. The Annual Report Award Committee took a major step in 1973 and classified reports in accordance with the industry or type of operation in which the organisation was primarily engaged.

In 1974, general and specific criteria were published for the guidance of those preparing reports. These criteria were expanded and included in the 1975 Adjudicators' Report as the basis for evaluation of future annual reports. Since then revised criteria have been published each year.

The objectives of the Australian Institute of Management's Annual Report Award are:—

- To encourage the presentation of adequate financial and other information vitally needed by shareholders, members, employees and the general public, in a form which can be readily understood.
- To create public awareness of the purposes of enterprises and their achievements.
- To encourage the development of valid and objective measures of performance and to promote a better understanding of the results achieved.
- To establish a better relationship between management, members and employees by disseminating facts and financial results about their own organisation.

Organisations submitting reports are separated into three main divisions, with further subdivisions into classifications. This procedure permits, as far as practicable, the comparison of reports with similar characteristics. The Institute's (1982) current classifications are as follows:—

Division A
Competitive Business Enterprises, including Government Business Enterprises
in competition with Private Enterprise.

1. Manufacturing industry.
2. Building, construction and development.
3. Transportation.
4.1 Mineral and petroleum production.
4.2 Mineral and petroleum exploration and development.
5. Agricultural and rural industries.
6. Retail and wholesale trade.
7. Trading and savings banks.
8. Finance and insurance, and business services.
9. Building societies and credit unions.
10. Accommodation—hotels, entertainment and travel.
11. Communications — newspapers, radio and television.

Division B
Public Administration—Public Authorities and Government Business Enterprises not in competition with Private Enterprise.

1. Government business enterprises.
2. Public administrative units.
3. Government services and education.

Division C
Professional Community Welfare and Health Organisations.

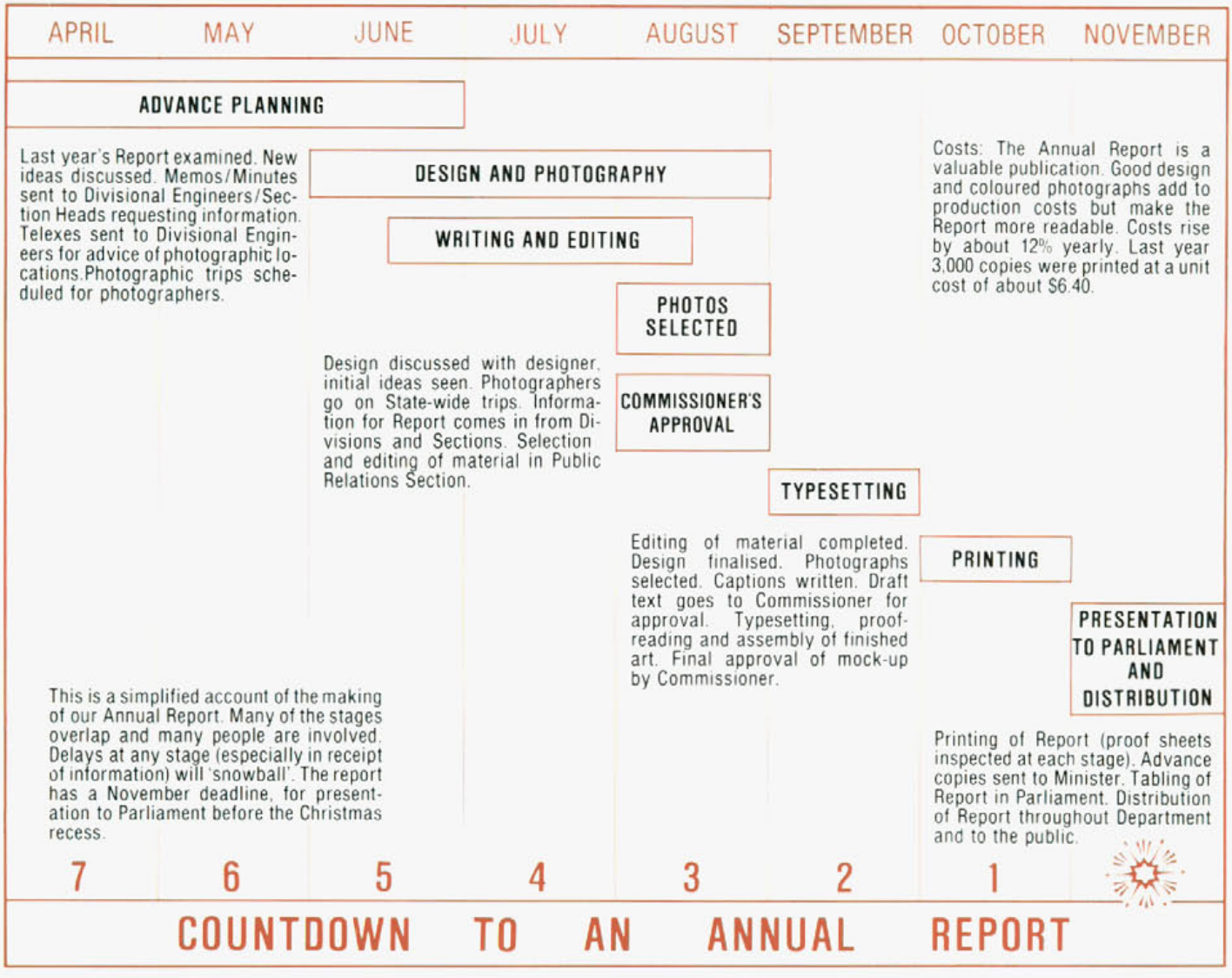
1. Professional and trade associations.
2. Sport and entertainment.
3. Social health and welfare organisations.
4. Hospitals.

All reports received by the Institute are subject to an initial selection process, which requires that to qualify for further examination, reports have to meet the following requirements:—

- Give a clear indication of what the organisation does;
- Include a reasonably comprehensive review of its operations;
- Present financial information in a form, content, and detail appropriate to an organisation of its type;
- Provide statistical and other data for a minimum period of five years in respect of significant items from the profit and loss statement and balance sheet;
- Design and typography to be a reasonable standard.

An annual report is judged on the information presented therein to those concerned. The report is evaluated on its success in meeting AIM's established standards of criteria, and an award is made on this understanding without assessing the profitability, worth or potential of the enterprise.

All organisations whose annual reports fulfil the initial and general requirements of the selection process, and meet substantially the criteria laid down for the separate industry classifications, are considered worthy of Bronze Awards. Silver Awards are made to the better annual re-



ports in each classification, provided they are of sufficient distinction. The best annual reports are then considered for Gold Awards, the achievement of which requires a high standard of excellence in annual reporting.

For the 1980-81 Awards, 402 reports were submitted for adjudication. In Division B, Public Administration (in which our report was judged), 73 entries were received and 14 awards given. The Division is further subdivided into three classifications. In our classification of Government Services and Education, no Gold Award was given, and the Department received the only Silver Award.

In its Adjudicators' Report, the Australian Institute of Management N.S.W. Division not only sets out the purpose of the award but also outlines the criteria it uses in judging reports. It includes the Adjudicators' comments and, for those readers who are unfamiliar with the type of guidance given by the Institute, here are a few selected sample comments from the Division B—Public Administration Section.

"Most reports contained a description (in some cases, far too long) of the organisation's activities, but it was not always possible to discern links with organisational objectives and statutory aims. The reason for existing policies and future options should be clearly stated.

". . . it is desirable that achievement indicators be highlighted where relevant. These should include both qualitative and quantitative data on organisational services and activities to facilitate an assessment of accountabiliy.

"Many of the reports submitted were uninformative in their financial sections. Although, the format and content may have satisfied statutory requirements, disclosure was generally inadequate.

"Many reports appear to be designed for reporting to Parliament and, while their format and content may meet parliamentary requirements, many fall short of disclosing the amount and type of information required by the interested members of the public. In particular the reports assume, too much, that the reader already has significant background knowledge about the activities of the organisations.

"Financial information for some of these bodies spending many millions of dollars annually is in many cases very inadequate.

"Many organisations do not indicate in their statement of significant accounting policies whether or not they adhere to Australian Accounting Standards and, if not, why not.

"Financial information couched in terms of bare parliamentary appropriations is insufficient to convey a meaningful picture of financial performance to the public at large. Again, some reports did not include a certificate from the Auditor-General or otherwise refer to his role in the financial information presented.

"Although cash accounting in accordance with parliamentary accountability requirements was the norm in most of the reports submitted, financial reporting could have been expanded to advantage in some cases so that a more meaningful measurement of financial expenses or costs, as opposed to cash payments, would then be possible.

"Few of the reports examined contained informative comments on policy. The reports were generally devoid of details of the basis of policy decisions. There should be a candid discussion of political, financial and industrial issues facing the

organisation. Although many government organisations are traditionally reluctant to raise some of these issues publicly, the public should be well informed on matters concerning its organisations.

"What is needed to improve annual reports in this division?

- *To clearly set out at the beginning of the report a description of aims and objectives and a summary of activities or services provided without assuming that the reader already knows this. Objectives should be operational or qualified if possible and measures of their achievement or otherwise clearly stated in the report.*
- *Clearer identification of policies and issues and more candid discussion of the reasons for them and possible future options, rather than just a catalogue of the past years' activities and events.*
- *Some discussion of the future outlook for the organisation including future planned capital expenditure.*
- *Improvements in financial reporting.*
- *More specific measures of efficiency or productivity of operations rather than generalised statements.*
- *More candid discussion of industrial relations.*
- *Description of members of the controlling board including qualifications and experience for the position.*
- *Comments on the impact of inflation (where relevant)."*

Any organisations which are interested in obtaining more information concerning the Institute's Award Scheme and its role in promoting better annual reporting are invited to write to The Secretary, Australian Institute of Management N.S.W. Division, 135-145 Walker Street (P.O. Box 328), North Sydney, N.S.W. 2060. ●

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Anzaas/Esso Energy Award

The Australian and New Zealand Association for the Advancement of Science (ANZAAS) jointly with Esso Australia Ltd. selected the Traffic Systems Manager of the Department of Main Roads, Mr. Arthur Sims, as the recipient of their 1982 Energy Award.

This prestigious award was presented to Mr. Sims by His Excellency, Sir Zelman Cowen, Governor-General of Australia, at the 52nd ANZAAS Congress at Macquarie University on 10 May 1982 in recognition of the role he has played in the development of the Sydney Co-ordinated Adaptive Traffic System (SCATS).

This system involves a central supervisory computer, 12 regional computers at key locations in the metropolitan area and over 1,000 micro-computers controlling signalised intersections.

When compared with isolated traffic signal control on arterial roads, SCATS reduced journey time by 23%, stops by 46% and fuel consumption by 12%. The system is both cheaper to install and more effective than any other system in use throughout the world.

In Australia transport consumes about one quarter of all energy and about one half of the nation's petroleum. Urban areas account for 53% of the total transport energy. For the area in Sydney to be controlled by SCATS a 12% reduction in fuel consumption represents a saving of about 60 million litres of petrol each year.

Mr. Sims, representing the Department of Main Roads, was therefore considered a very worthy recipient of the ANZAAS/Esso Energy Award.

In addition to this award, the development of SCATS was previously acknowledged in 1980 by an award from the Institute of Transport Engineers and for Energy Management in 1981 by the Gas and Fuel Corporation of Victoria. ●

An account of the operation of SCATS and the Department's Traffic Control and Emergency Centre will be published in a forthcoming issue of Main Roads.

Mr. Arthur Sims, with his wife Coral, after receiving the 1982 ANZAAS-ESSO Energy Award.

RUNNING THE RED

A most dangerous practice

One of the more recent urban motoring vices to emerge is the foolish and dangerous practice of running the red. These people wrongly see themselves as skilful drivers in beating another set of lights by continuing through both amber and red traffic signals.

As the other flow of traffic at that stage has received its green signal, the red-runner often only narrowly avoids a collision with another vehicle. Quite often a collision does occur, taking its heart-breaking toll in injury and death.

Poor observance of the red traffic signal has unfortunately risen to major problem status. At the request of the Traffic Authority of New South Wales an investigation was carried out and a report entitled "Driver Observance of Traffic Light Signals" issued in May 1980.

An outcome of this report was a trial carried out in the Newcastle area relating to increased amber timing and revised all-red timing. This trial was established by the Traffic Authority at its 35th meeting held in June 1980. The field work was completed in November 1980 and the results are being analysed in relation to before and after accident records. It is intended to reproduce an account of these findings in a future issue of *Main Roads*.

Owing to the seriousness of this offence, the New South Wales Police Department has established an enforcement squad to deal specifically with red-runners. This usually involves at least two police officers being present on site so that satisfactory evidence can be produced in court if prosecutions are defended. These efforts have resulted in many apprehensions but they have also constituted a drain on the limited police resources.

In addition, there are a number of signal installations on heavily trafficked multi-lane roads where it is not practical for this squad to operate. Consequently, the Police Department has been experimenting with photographic techniques which would lead to prosecution for infringers at such intersections.

Photo-recording devices for this purpose have been available overseas for some time. They are connected to the traffic signal system and produce photographic records which show site details, day, date and time data, signal display and vehicle position and identification. Many European countries accept such records in court proceedings.

The Western Australian government is currently using such a system. Earlier this year the Victorian Police Department and the Country Roads Board conducted an extensive field evaluation of a photo-recorder. It is understood that the Victorian Government is currently considering the use of photo-recorders on a regular basis.

Following a recent meeting attended by representatives of the Traffic Authority of New South Wales, the Police Department and the Department of Main Roads, it was agreed that the Police Traffic Branch and the Department of Main Roads should conduct a similar field trial in Sydney.

The site selected for the trial was the intersection of William and Crown Streets, East Sydney. This site is ranked eighth in the state list of black spot intersections. An analysis of the crash distribution revealed that the high number of right-angle accidents involving northbound and westbound vehicles occurred during both day and night conditions.

The trial made use of both black and white and colour film to determine the best film type for the Department's interests, i.e., accident prevention measures, and for the Police Department's enforcement requirements. It is the Police Department's intention to proceed with prosecutions of the identified vehicles' registered owners.

From the Victorian trials, it can be expected that as many as 70% of the drivers of vehicles observed running the red, may either admit liability or have prosecutions effected through the courts.

The use of such equipment not only offers greater safety to both the police and the general public, but would also enable fewer police to maintain a greater level of enforcement. But the greatest benefit of the photo-recording equipment is its role in minimising the dangerous practice of running the red. ●

New Bridge over Nunnock River west of Bega on Snowy Mountains Highway

The Monaro

Late in 1797 Governor John Hunter gave permission for George Bass to explore and chart the southern coastline of the colony. The 1900 km journey was undertaken by Bass, with six seamen and provisions for six weeks, in an 8.7 m long open whale boat, which had been built in Sydney of native banksia. This journey lasted until 25 February 1798 and, on his return, Bass convinced Hunter of the existence of a strait between the mainland and Tasmania and Hunter promptly named it in honour of Bass.

On this journey, Bass entered the mouth of the Bega River on 17 December 1787 and chartered it as far as Jellat Jellat. Later on the same day he entered and named Twofold Bay. The site had the potential to become a thriving port and settlement, as the surrounding countryside was fertile enough to support both crops and livestock. However, the distance from Port Jackson seemed prohibitive.

Settlement soon commenced further west, following the discovery by Captain Mark Currie, Brigade-Major Ovens and Joseph Wild in May 1823 of the Murrumbidgee River and an extensive area of clear country which they named Brisbane Downs. This region was later renamed Monaro (occasionally spelt Maneroo, Manaroo and Menaroo), and presumably based on an aboriginal word meaning breast.

A journal kept by Currie recorded that the most southerly point reached by his party was about 22 km north of the site of the future town of Cooma. Exploration further south must have followed, as it is recorded that in 1827 a cattle station known as *Gegedgerick* had been established at Berridale.

However, the value of the coastal district was not realised until 1829, when W. D. Tarlinton, a settler from Braidwood, penetrated to Cobargo and Bermagui, and later to Bega. He reported of a large, undulating fertile valley, lightly timbered and of an ample rainfall.

Roads soon developed after the Braidwood settlers began to pasture cattle there following Tarlinton's favourable report. At this stage only a rough bridle track ran from Braidwood to Twofold Bay via Belowra, Wandello and Brogo.

The previous three span timber truss structure over the Nunnock River, east of Nimmitabel, was built in 1896 . . . and here photographed in 1960.

The pastures of the plateau soon attracted cattlemen and there was a steady inflow of settlers during the 1830s.

When visiting the coastal district in 1834, Governor Richard Bourke reported: *"Already the flocks and herds of the colonists spread themselves over a large portion of this southern country . . . The excellence of the pastures in the part of the colony I am describing has induced the graziers to resort to it, and much of the fine wool, which is exported to England, is taken from sheep depastured on vacant crown land beyond the limits assigned for the location of settlers."* (Historical Records of Australia, Vol. XVII.)

Following closely upon the exploration of the southern country from the coast were the land journeys of Hume and others which opened up the Monaro district. Penetration of this area was therefore from three sides: from the coast, by way of the Bega Valley and the eastern escarpment of the Great Divide; from the north, and from the west via the Tumut River.

By 1834 the main southern road had reached Goulburn. At Marulan a road leading to Michelago branched and was later extended through Colinton and Bunyan to Cooma to become the first road of access to the Monaro district.

On the Monaro plateau, tracks formed between the various cattle and sheep runs gradually became the roads. Although fairly direct due to the easy terrain, these routes were often difficult to travel after wet weather.

The primitive nature of these roads may be judged from the fact that the Sydney Herald on 24 February 1840 suggested a reward of £500 should be offered for the discovery of a practical road from the Monaro to Twofold Bay.

At this time Ben Boyd, a Scottish entrepreneur and stockbrocker, was making vigorous attempts to attract trade and settlement to Twofold Bay, to ensure that it fulfilled its role as the port of Monaro, eastern Riverina and the adjoining district of Gippsland in Victoria. Boyd built up a thriving port with a large volume of business, exporting cattle brought down from the Monaro and stations nearer the coast.

By 1841 two tracks linked the coast with the Monaro district. The first ran from Eden to Bunyan via Bombala and Coolringdon, and then from Bunyan to Queanbeyan and the north. The other

went from Pambula to Bega, across the mountains to Nimmitabel and then through Coolringdon to Belaira where it connected with another road north to Queanbeyan.

In 1842 the Twofold Bay district received a fresh impetus from Ben Boyd. He had returned from a business trip to London with a heavily financed scheme to establish large-scale whaling. The Governor's recommendation for a town at Twofold Bay was sanctioned by the Home Office and the town of Eden was laid out in 1843. The district of Twofold Bay at this stage extended from Broulee to the present Victorian border.

By 1849 a number of financial misdealings caused Boyd's whaling industry and model town to collapse. In 1851 the district was visited by Governor Sir Charles Fitzroy and in the same year the site for the town of Bega was laid out. Yet Eden remained as a crucial port, particularly during the time of the Kiandra goldrush in the early 1860s.

The mail service from Sydney to Bega was instituted in 1856 and came by horseback via the Monaro Range. Roadbuilding in those times was mainly a private matter. Many settlers supplemented their incomes with roadmaking contracts. A private road was built from Bega to Tathra in 1857 and a bridge over Jellat Creek in 1860.

The most direct route from the coastal plain to the tableland involved the ascent of Brown Mountain, a formidable obstacle which until 1861 had not been climbed. In that year David McDonald located a bridle track down the mountain and thereby opened a direct line from the coast to Nimmitabel.*

In 1864 the Government extended the road from Moruya to Bega via Eurobodalla and Wagonga. This line was extended to Wolumla by Surveyor Heady in 1866 and a horse dray began to ply weekly between Bega and Merimbula.

River crossings were troublesome in the Bega district. Sometimes the Bega River could not be crossed for the whole winter. This was partly remedied in 1867 when a settler named McGregor made a log raft which could carry eight to ten people. This soon proved inadequate and was replaced in 1878 by a bridge built by Daniel Gowing. This was known as the Queen's Truss Bridge and had the largest spans of any bridge in the colony at that time.

A New Bridge over Nunnock River

Forty kilometres west of Bega the Snowy Mountains Highway crosses the Nunnock River, a tributary of the Bemboka River. The old bridge at this site was built in 1896 by the Department of Public Works. It was 38.4 m long and 4.7 m wide and was a three span timber truss structure. During the latter part of its life it sustained repeated damage by overladen vehicles. Major repairs to sheeting and decking were needed in 1977 and further work was required in 1980, when it was obvious that the bridge had come to the end of its economic life.

*See inset *"What's in a name?"*

The replacement structure is 200 metres upstream from the old timber bridge. The 70.7 m long bridge, which is currently nearing completion, consists of steel girders with a compositely acting reinforced concrete deck.

Overall width of the structure is 10 m, including a 9 m carriageway and 500 mm traffic barriers on both sides. The traffic barriers are low concrete parapets surrounded by two-rail steel traffic railings. The wearing surface is to be a 10 mm bituminous flush seal.

What's in a name?

The etymology of a place name often provides interesting details of a locality's fragmentary past. Nimmitabel originally appeared as Nimoitehool, probably of aboriginal derivation, but contested by some as being Persian. Possibly the transcription from the original plans should have read Nimoitebool. In 1848, pastoral grants were held in the district under the corrupted variations Nimitybelle, Nimitybell, Nimity Bell and Nimithybale.

In 1851 Surveyor Townsend referred to Nimmittabil and in 1856 the Surveyor General was petitioned to lay out the town of Nimitty Bell. Yet in 1857 the name was transmitted to the Surveyor General as Nimaty-Bell. On 1 December, 1857, the design for the town was laid before the Executive Council and was finally notified in the Government Gazette of 23 March 1858 as the village of Nimmitabel. It is no wonder that the town name is often misspelt even today!

Sub-structure

As granite rock was present close to the surface at the piers and western abutment, spread footings founded directly on rock were adopted at those locations. The eastern abutment was founded on six cast-in-place concrete piles 0.9 m in diameter, socketed a minimum of 300 mm into granite.

Because of the high stream flow velocity (calculated at 4.4 m/sec), concrete wall type "anchor beam" abutments were adopted. Round single column concrete piers were also chosen to minimise obstruction to the flow, which changes direction with differing heights of flood.

The cantilevered pier headstocks are situated above the design flood level and so do not obstruct the flow.

Superstructure

The superstructure consists of three spans of continuous steel girders acting compositely with a 160 mm thick reinforced concrete deck slab. The central span is 27.5 m long and each end span is 21.6 m long.

The Cooma to Bega run in the 1920's. This route was later named the Snowy Mountains Highway. (New South Wales Government Printer photograph.)

Continuity in each of the seven girders was achieved by field splices, each containing 68 high strength bolts. The girders are 760 mm rolled steel beams, 197 kg/m and 148 kg/m in the central and end spands respectively.

The superstructure is supported on laminated elastomeric bearings at piers and abutments. These permit longitudinal movements arising from thermal expansion and contraction. Neoprene compression seals are provided in deck joints at the abutments.

Materials used

The approximate quantities of materials used in the construction of the bridge were:

Concrete in piles, abutments and piers (25 MPa)	240 m^3
Concrete in deck and kerbs (25 MPa)	140 m^3
Reinforcing steel	70 tonnes
Steel girders	105 tonnes

The bridge was designed by the Department's own design staff and was built under contract by N. J. McIntosh of Cobargo, N.S.W. at an estimated final cost of $425,000. ●

An article in the June 1982 Main Roads *Journal (Vol. 47, No. 2 pp 35-37) dealt with snow clearing on the Snowy Mountains Highway. For a full account of the history of this route see the December 1955 issue of* Main Roads *(Vol. 21 No. 2 pp 43-51) or obtain a copy in reprint form from the Department's Public Relations Section. An article on "The Daylight Roads of the Bega District" appeared in the December 1975 issue of* Main Roads *(Vol. 41, No. 2 pp 54-5), which also included an article on the new bridge at Bega on pp 50-3.*

continued from page 86

The Trade Fair will run from Wednesday, October 12 to Saturday, October 15, 1983 inclusive. It will be open to delegates and trade representatives only on weekdays from 10.00 a.m. to 5.00 p.m., while on Saturday it will be open to the general public as well.

On Friday, October 14, 1983, the AOC of the World Road Congress will host an Australiana Display at the Sydney Showground, where Road '83 is being staged.

The Sydney Royal Agricultural Society's Showground is one of the largest exhibition complexes in the world. It covers 28.8 hectares and has 8 major pavilions with a total floor area in excess of 30 000 square metres. A further 13 000 square metres of outdoor display space is also available.

The Showground also incorporates a number of arenas, grandstands, film theatres and auditorium. It is approximately 5 km from the heart of the city, has ample parking space and a regular bus service to and from the central business district.

Road '83 will be heavily promoted in selected media to ensure a high-level of quality attendance.

All enquiries regarding space bookings should be directed to the organisers, Thomson Exhibitions, 47 Chippen Street, Chippendale N.S.W. 2008, Australia. Phone (02) 699 2411. Telex 22226 Sydney.

As President of the AOC, Mr Ralph Hunt has explained that . . . *"It is proposed that the Fair will mainly provide fine examples of the technical competence of Government authorities and private enterprise in road design, construction and maintenance including products resulting from research and development in Australia. Other exhibitors may wish to show examples of Australian design and manufacture of items which support the roads infrastructure".*

The PIARC Executive Committee Director, Mr. Nelson Waslin has expressed the hope *"that many Australian firms and Government agencies will participate in the Fair so other people for Australia and overseas can appreciate what Australia has to offer in the field of road engineering which is so important to our national economy and to our life style".*

Congress Logo

The emblem chosen for the XVII World Road Congress features four boomerangs, weapons generally associated with Australian Aborigines. The boomerang may be regarded as symbolic of "man-made movement", a term that can also be attributed to roads.

The three types of boomerang used by Australia's Aborigines are the returning, the non-returning or hunting boomerang and a special boomerang used for ritual purposes. The best known of these is the returning boomerang which, because of its design and the skill of the thrower, returns after flight.

The lines between the boomerangs represent roads and converge as cross roads, representing the Congress as a point of nations coming together from the four corners of the world. This is also depicted by the bi-lingual titles forming a circle around the basic emblem.

The colours used in the logo, blue and gold, appear frequently in Australian symbols. They are in Australia's Coat of Arms and in the Order of Australia which is Australia's national award of honour. The Australian Bicentennial Authority is also using blue and gold as the colours for Australia's 1988 celebrations.

Prizes for Best Papers on Roads

Two Belgian associations have offered prizes to the authors of the best two papers dealing with problems related to roads, submitted in conjunction with the Congress. The associations offering the prizes are the Fédération nationale des Entrepreneurs routiers and the Association des Congrès belges de la Route.

A prize worth 50,000 Belgian francs (about $A1,000), will be given to each of two categories: (a) road construction, maintenance and operation, and traffic improvements; and (b) road financing and economics. If papers of sufficiently high standard to win a prize are presented, the winners will be announced at the Congress.

Registrations

To take full advantage of the wealth of knowledge that is available on road matters, the AOC is seeking, by all possible means, to ensure the maximum involvement in the Congress of Australian as well as of overseas scientists, engineers and administrators.

The AOC would welcome the participation of any person (whether a member or non-member of PIARC) interested in road problems. Those individuals interested in attending the Congress should complete a Preliminary Application to Register Form as soon as possible. This application involves no obligation to attend or pay fees if a person decides at a later date not to attend.

Registration fees for Australian delegates are $200 and for accompanying persons $100. Overseas delegates' fees are A$200 for those who have been members since 1980 or earlier and A$300 for members having joined after 1980 and for non-members.

Each Congress participant will receive, in the official language of his choice:

- prior to the opening of the Congress:
  - the general report of the questions to be dealt with
  - the reports of the technical committees
  - the conference discussion papers
- at the opening of the Congress:
  - the set of national reports
- after the Congress:
  - the Report of the Proceedings of the Congress.

Further information and application forms can be obtained from the Secretariat, PIARC Australian Organising Committee, G.P.O. Box 2609, Sydney, N.S.W. 2001; telephone (02) 241 1478 or 27 6940; or telex PIARC AA21825. ●

Tenders Accepted by Councils

The following tenders (in excess of $20,000) for road and bridge works were accepted for the three months ended 30 June 1982.

Council	Road No.	Work or Service	Name of Successful Tenderer	Amount
Bogan	Secondary Road No. 230	Construction of bridge over Duck Creek at Canonba.	A. R. Dickinson Pty. Ltd.	$164,238.00
Gosford	Main Road No. 336	Supply and delivery of lime treated dense graded sub-base between 3.2 & 4.2 km section from Gosford.	Blue Metal & Gravel Ltd.	$47,824.00
Gosford	Main Road No. 336	Supply and lay asphalt on section between 3.2 & 4.2 km from Gosford.	Bitupave Ltd.	$403,604.00
			(Department's share)	$136,040.00
Griffith	Main Road No. 321	Supply and driving of piles for bridge over Mirrool Creek branch canal, 9.7 km south of Griffith.	Nelmac Pty. Ltd.	$23,189.50
Hay	Main Road No. 514	Bitumen spraying at various locations.	Emoleum (Aust) Ltd.	$52,293.30
Moree Plains	State Highways Nos. 12 & 17. Main Road Nos. 232 & 367	Supply and delivery of bitumen sealing aggregate.	Johnstone Gravel Co.	$52,709.20
Moree Plains	State Highways Nos. 12, 16 & 17. Main Road Nos. 232, 367 & 507	Supply, heat, haul and spray C170 bitumen.	Spraypave Pty. Ltd.	$208,477.91
Strathfield	County Road No. 5010	Supply and lay asphaltic concrete.	Allen Bros. Asphalt Ltd.	$78,650.00
Strathfield	County Road No. 5010	Supply and delivery of fine crushed rock.	The Readymix Farley Group (N.S.W.)	$41,944.00
Walcha	Developmental Road No. 1323	Construction of bridge over McDonald River, 42 km south of Walcha.	R. K. Harpley	$58,309.00
Walgett	Shire Road No. 6	Construction of bridge over Pian Creek.	Dyson-Holland Precoat Pty. Ltd.	$21,012.00
Windouran	Main Road No. 296	Bitumen spraying at various locations.	Emoleum (Aust) Pty. Ltd.	$27,121.00
Wingecarribee	Various	Main and Tourist Roads. Maintenance & Improvement Programme, 1981/82; Rural Local Roads Programme, 1981/82.	Emoleum (Aust) Pty. Ltd.	$46,339.32

Tenders Accepted by Department of Main Roads

The following tenders (in excess of $20,000) for road and bridge works were accepted for the three months ended 30 June 1982.

Road No.	Work or Service	Name of Successful Tenderer	Amount
State Highway No. 2	Hume Highway. Shire of Harden. Construction of bridge over Cooneys Creek.	Gervay Construction Pty. Ltd.	$470,000.00
State Highway No. 3	Federal Highway. Shire of Gunning. Granular overlay and bitumen surfacing between 49.2 and 53.7 km south of Goulburn. Win, mix, haul and stabilise natural gravel.	Stabilex Pty. Ltd.	$188,325.00
State Highway No. 7	Mitchell Highway. Shire of Evans. Widening of bridge over Rocks Creek No. 1 at 12.5 km west of Bathurst.	G. & E. M. Tincknell	$82,104.80
State Highway No. 9	New England Highway. City of Maitland. Haulage of up to 20 000 t of slag skulls to construction of dual carriageways between Mitchell Dr and George St East Maitland.	A. Matthews Pty. Ltd.	$59,200.00
State Highway No. 9 and Main Road No. 503	New England Highway and Putty Road. Supply of 1000 t of cold mix for maintenance patching on various sections.	Bitupave Ltd.	$47,750.00
State Highway No. 10	Pacific Highway. Municipality of Lake Macquarie. Supply and delivery of 400 t of fly ash cement to construction work at Cams Wharf turnoff, 132.9 to 135.2 km north of Sydney.	Kooragang Cement Pty. Ltd.	$31,444.00
State Highway No. 10	Pacific Highway. Municipality of Lake Macquarie. Supply and lay 400 t of 20 mm asphaltic concrete to construction work at Cams Wharf turnoff, 132.9 to 135.2 km north of Sydney.	Bitupave Ltd.	$25,580.00
State Highway No. 10	Pacific Highway. City of Newcastle. Foundation investigation test bores at site of new bridge over Hunter River at Hexham.	Herrick and Dal Santo Drilling Pty. Ltd.	$43,925.00
State Highway No. 10	Pacific Highway. Shire of Nambucca. Manufacture and delivery of thirteen 24.6 m long precast, pretensioned concrete broad flanged girders for bridge over railway line at Eungai, 19.9 km south of Macksville.	Humes Ltd.	$86,892.00
State Highway No. 10	Pacific Highway. Municipality of Hastings. Manufacture and delivery of five 17.35 m and ten 12.81 m long pretensioned, precast concrete girders for bridge over north coast railway line at Rossglen, 45.9 km north of Taree.	Humes Ltd.	$39,500.00
State Highway No. 10	Pacific Highway. City of Greater Taree. Manufacture of rectangular hollow section rails for Martin Bridge over Manning River at Taree.	Point Trading Ltd.	$35,980.00
State Highway No. 10	Pacific Highway. Shire of Byron. Win, break down, crush basalt boulders to produce road base and sealing aggregate at "Wreckers Corner".	Ben Hall Industries	$73,650.00
Main Road No. 159	Municipality of Manly. Installation of traffic control signals at intersection of Pittwater Road, Belgrave St and Raglan St and reconstruction of traffic control signals.	Harnett Constructions Pty. Ltd.	$24,822.00
Various	Various shires in North Eastern Division. Supply, heat, haul and spray of C.160 bitumen.	Spraypave Pty. Ltd.	$180,000.00
Various	Supply and delivery of bituminous coldmix for use by Dubbo Works Office.	Bitupave Ltd.	$105,569.00
Various	Supply and delivery of bituminous coldmix for use by Orange Works Office.	Bitupave Ltd.	$54,604.00