MAIN ROADS

DECEMBER 1978

Aerial view looking east over the Naremburn end of the new F1 Warringah Freeway extension, showing the pedestrian overbridge and the Merrenburn Avenue overbridge. In the left background can be seen the historic "suspension" bridge at Northbridge (see article on pages 34-37).

MAIN ROADS

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Front Cover: Aerial view of the recently completed extension to the F1 Warringah Freeway from Miller Street, Cammeray to Willoughby Road, Naremburn (see article on pages 34-37).

Back Cover: A striking view of construction in progress in July 1978 of one of the piers for the new bridge over the Nepean River at Maldon (see article on the design of this bridge on pages 56-61).

THE CHALLENGE OF NECESSITY

Necessity has been called both the *"Mother of invention"* (Jonathan Swift) and *"the spur of genius"* (Honoré de Balzac). Without a doubt it has been responsible for many of mankind's greatest achievements . . . for *"when we are up against a brick wall, we are most likely to invent a ladder"*.

In essence, many of the Department's tasks are a challenge of necessity. An intersection *needs* to be improved; a bridge *needs* to be built. An example of a road construction challenge is contained in the article on the Warringah Freeway extension in this issue. A rock wall needed to be excavated, and a roadway paved through the cutting, without disruption to peak hour traffic in the area. Read how we did it on pages 34 to 37.

Bridge designers also have to think hard and long to find the best solutions for their particular problems. One such case was in regard to the design of the bridge now being built over the Nepean River at Maldon on a deviation of the Picton-Wollongong Road. In this case, the need was to design a structure which could withstand minor earthquakes and possible future subsidence (when mining in the coal seams beneath the bridge site is completed). The article beginning on page 56 gives the details.

Necessity prompts many interesting solutions, but not all of them are unusual, inventive or conceived in a flash of genius. Some are everyday solutions, such as when the necessity to maintain a constant and economical supply of a vast range of materials and equipment gave rise to what is known now as the Department's Supply Section. Its story is on pages 50-54 of this issue.

Most solutions invariably raise another problem — and that's the need for money to carry them out. The Department's experience in raising funds by loan is outlined on pages 38 and 39.

Whether demanding invention, genius, concern or just plain commonsense, necessity has always presented a challenge. In seeking to solve the ever-present road needs of our community, the Department comes face to face with many specific challenges in the fields of road and bridge construction and of traffic management. This journal is a record of the Department's capacity to meet that challenge. ●

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F1 WARRINGAH FREEWAY
Extension to Willoughby

As far as road users are concerned, the Warringah Peninsula to the north of Sydney is almost an island. Three sides are bounded by water and the fourth is enclosed by a National Park and other bush areas. About 207,000 people live in this largely bushland setting.

To the south of the Peninsula is Middle Harbour and its many contributory creeks and waterways. The east is bounded by the Pacific Ocean. To the north is Broken Bay, a vast body of water at the mouth of the usually placid but sometimes flood-stricken Hawkesbury River. On the western side is the Ku-ring-gai Chase National Park, Davidson Park and Roseville Chase.

These parklands include a wide area of bushland and river scenery. They are the habitats of some of the most diverse types of flora and fauna still to be found in their natural state in New South Wales.

Road connections

Major road connections to the Warringah Peninsula are by way of Main Road No. 164, Spit Road, which crosses Middle Harbour over the Spit Bridge and carries some 50,000 vehicles each day, Main Road No. 238, Warringah Road over Roseville Bridge (also about 50,000 vehicles each day), and Main Road No. 162, Mona Vale Road (some parts of which carry over 23,000 vehicles daily).

This huge traffic flow necessarily passes through the suburbs flanking the Warringah Peninsula. A great deal of it tends to divert into convenient alternate routes through otherwise quiet residential streets. Convenient to the passers-through perhaps, but not necessarily so to the people who live along these informal "by-passes".

Earlier plans

To provide another major artery to and from the Warringah Peninsula, the F1 — Warringah Freeway was planned. It was designed to meet the needs of immediate efficiency, while providing for future expansion.

The Freeway, about 14½ km long, would connect Sydney with the Peninsula by way of a new bridge over Middle Harbour. It would also connect with the major distributor roads at Seaforth on the northern side of Middle Harbour.

A connecting Freeway, the F2 — Gore Hill Freeway was proposed to connect the F1 — Warringah Freeway to the Pacific Highway, and so to other roads in the main roads system at Gore Hill. These links would provide convenient routes for traffic to and from the growing industrial areas to the west of Sydney.

Some new connections

The first section of the Warringah Freeway, 2.4 km long, from the Sydney Harbour Bridge to Miller Street in Cammeray, was opened to traffic on 18 June 1968. Interchanges were constructed on this section of the Freeway to allow traffic to flow to and from High Street, Mount Street, Falcon Street and Miller Street. A temporary terminal connection was made at the junction of Brook Street and Chandos Street, Naremburn.

View along the F1 extension from the pedestrian overbridge, looking southeast towards the bridge at Merrenburn Avenue.

Onlookers crowd onto the pedestrian overbridge to watch the direction signs being uncovered on opening day.

Before long, because of the volume of traffic in Chandos Street, delays for northbound traffic were occurring every evening after vehicles left the Freeway. With a daily traffic count of 33,000 vehicles, and morning and evening peaks up to 3,500 vehicles per hour, the signal system controlling traffic at the Chandos Street intersection could not efficiently cope with the total flow. Obviously, some improvement was needed. The Freeway had to be extended at least to Willoughby Road.

Because of reduced funds and the needs for road development in other areas, the commencement of construction of the extension of the Freeway to Willoughby Road, Naremburn was delayed until August 1973.

Problem of funds

As work progressed, it became increasingly obvious that funds on the scale required for the construction of the Freeway to Seaforth would not be available. The importance of this extension of the Freeway became correspondingly more evident. So it was decided to enlarge the work in hand and construct dual carriageways all the way to Willoughby Road.

The wisdom of this decision was confirmed in February 1977, when the State Government announced that it had decided to abandon plans for the extension of the Warringah Freeway beyond Naremburn. The relegation of the F2—Gore Hill Freeway to a greatly modified connection with a comparatively low priority was also announced at this time (see article in March 1977 issue of "Main Roads", Vol. 42, No. 3, p.88).

In June 1978 the Government, at the request of six northside councils, agreed to investigate the retention of the Warringah Freeway reservation as a transport corridor. Mr. David S. Kirby was subsequently appointed as Commissioner of this inquiry.

New traffic flow

Local traffic crosses *over* the Freeway extension on bridges at West Street and Merrenburn Avenue and *under* the Freeway at Brook Street. A connection from Brook Street to Amherst Street also helps free movement of local traffic. Two traffic lanes are available for city-bound traffic joining the Freeway at Willoughby Road, and a further two traffic lanes join the Freeway at Brook Street.

Traffic from the city heading north is carried on four lanes under Miller Street and West Street. At the latter point, two lanes off-load into Brook Street and the remaining two continue on to Willoughby Road. The northbound junction of the Freeway with Willoughby Road is controlled by signals. Provision has been made for a possible future northbound off-loading ramp into Donnelly Street.

Cutting across in a cutting

The Freeway extension crosses diagonally through the local street system in a deep cutting, emerging briefly to pass over Brook Street. Most of its length passes through hard sandstone. Cut batters were predrilled for a neat finish to the excavation. Blasting was not practical because of the proximity of residences and some commercial premises.

At the northern end of the work, beyond Brook Street, the rock strata changed to a softer shale. Although this was easier to cut through, it did cause a major construction problem. To compound this problem, an interface between the rock types under the Merrenburn Avenue bridge was found to have an extensive network of springs. This meant that a major subsoil drainage system had to be designed and built.

Many of the usual difficulties encountered during the construction of this short length of Freeway were made worse by long periods of unusually wet weather during 1974 and 1978.

Heavy traffic using both the local street system and the Freeway also posed problems in planning the work. Traffic flows had to remain as uninterrupted as possible. This was achieved by stage construction.

The first stage of the work involved construction of a new route for northbound traffic along the Freeway to West Street. Traffic flowed along a temporary ramp to rejoin Chandos Street. Work then proceeded on excavating the cutting, now isolated between the northbound and southbound lanes of traffic. This work was continued up to the line of Chandos Street in both directions until a wall of rock, eight metres high and eight metres wide, was left as a final barrier.

No interruptions to peak hour traffic

On one cold and showery weekend, in

The Commissioner for Main Roads, Mr. Brian Sexton, being interviewed for a television news programme, following the opening of the freeway extension on 19 September 1978.

late May 1977, traffic was diverted via local streets and the rock wall was ripped out. Then two lanes of asphalt-paved roadway were built through the cutting. Traffic flowed normally again by 4.30 p.m. on the Sunday night. This spectacular achievement meant that peak hour traffic on Friday, 27 May 1977 and Monday, 30 May 1977 was completely uninterrupted.

Over the following weeks the initial breakthrough was widened to the full width of the Freeway. Then it was possible to divert northbound traffic through the cutting to Brook Street. The temporary ramps to and from Chandos Street were removed and work continued north from Brook Street to Willoughby Road.

The same kind of problem was met in the final junction with Willoughby Road. A new major complex, designed to accommodate 2,000 vehicles per hour in the morning peak, was constructed in stages. One traffic lane at a time was brought into service.

New bridges

Provision of road connections across the Freeway for the nearby residential areas were built at West Street and Merrenburn Avenue. The Freeway itself is carried over Brook Street on twin bridges. Pedestrians have a footbridge which goes directly to the Naremburn Shopping Centre.

West Street is carried over the Freeway by a prestressed concrete structure 57.7 m long with a convex (slightly humped) contour. The central column has been offset to provide two continuous spans of 33.0 m and 27.7 m. This design was chosen so that the longer span could accommodate future ramps to and from Miller Street.

The bridge is a multi-web prestressed concrete box girder structure of variable depth, cast-in-place and post-tensioned. The ends are simply supported at the abutments. The roadway is 12.8 m between kerbs and there are footways, each 3.65 m wide, on each side. An extensive array of public utility pipes, wires and ducts is located beneath each footpath.

The bridge was designed by the Department and built under contract by Central Constructions Pty Ltd. The total cost was $511,000.

The Merrenburn Avenue Bridge also has two spans, one of 49 m and the other 38 m, and crosses the Freeway at an angle of approximately 45 degrees. The superstructure consists of twin cast-in-place post-tensioned concrete box girders with diaphragms at the support points.

End support is provided by sound native rock supplemented by secondary retaining walls on weathered rock. One abutment is fixed and the other has a bearing to allow expansion. The girders are simply supported on twin central columns carried down to ultimate design level, about 8 m below the existing roadway.

The bridge was designed for the Department by Ove Arup and Partners, Consulting Engineers, and constructed under contract by Central Constructions Pty Ltd. The total cost was $638,000.

Keeping future needs in mind

Twin bridges carry the freeway over Brook Street. Their superstructures consist of precast, pretensioned wide-flange beams butted together to form a multi-cell hollow slab. The abutments are anchor-beam stabilised concrete retaining walls supported on cast-in-place concrete piles drilled down to a rock base.

Each bridge has a width of 23.7 m between kerbs, which is the ultimate width of the Freeway. However, urgent interim construction needs called for a pavement width of only 12.8 m between kerbs. Therefore, temporary kerbs have been built. The presently unused portion of the bridge deck has been covered with soil and planted with grass. It blends so well with the approaches that road-users are scarcely aware that they are crossing a bridge.

The Brook Street bridges were designed by the Department and constructed under contract by McConnell, Dowell Constructions Pty Ltd. The total cost of the bridges was $823,000.

Pedestrian provisions

Pedestrians have been catered for by the construction of a footbridge over the Freeway. This runs from the Naremburn Shopping Centre to Rhodes Avenue and Slade Street. A footpath connecting West Street with Chandos Street has also been constructed.

The pedestrian overbridge consists of two steel girders, each 28 m long, simply

The safety provided by the footbridge near Slade Street, Naremburn is exemplified by this little girl carrying her doll above the busy lanes of traffic.

supported at the ends and fixed at a central column.

The girders were designed by the Department and fabricated at the Department's Central Workshop at Granville. Handrails were welded to the girders before delivery. The column and abutment structures were erected by the Department's own forces from the Warringah Freeway Construction Office.

The girders were transported to the site and erected in a single day. This allowed them to be available to pedestrians almost immediately. Construction work on the Freeway was also able to continue unhindered.

Public utilities

The relocation of public utility services which crossed the Freeway route posed some problems which were difficult but not insurmountable.

Few people ever give much thought to the maze of services that link their homes and workplaces. These utilities include pipes for sewage, drainage, gas and water services, conduits for electrical power, and telephone lines. In industrial areas there may be also special connections for computers and pipe-lined chemicals, in both gaseous and liquid form.

West Street had long been a major corridor for these public utility services. They could not be interrupted during roadworks and before the bridge at West Street could be constructed, the utilities had to be temporarily re-routed. To accommodate this re-routing, a temporary bridge was built to carry the utility services and to double as a pedestrian footbridge. Once the new bridge was constructed, the various utility lines were then permanently located under the footways and the temporary structure was removed.

The decision to build the Freeway with a dual carriageway to Willoughby Road was made well after work had commenced in 1973. Because of the urgency involved, some of the utility adjustments could not be completed before the road works were under way. In fact, re-location of one service was completed just six days before the Freeway section was opened to traffic.

Landscaping

A major feature of the construction of the Freeway is the way in which the whole area has been kept as natural-looking as possible, by carefully planned landscaping.

As earthworks were completed, those areas not required for road purposes were covered with topsoil and planted with native plants. Property residues included within the Freeway reserve were turfed. Hills were built and slopes graded and grassed to provide an attractive environment for road users. They were also designed to help screen noise and air-borne pollution from nearby residents. Some 2,000 native trees and shrubs were planted along the verges of the Freeway.

The soft iron oxide colours of the pre-split sandstone batters provide an attractive geological landscaping feature. Eventually the walls of these cuttings will become weatherworn and the colours will mellow.

Smaller batters have been designed to form sections of ornamental stonework to give a neat, tidy and pleasant appearance. A small rest area at the eastern end of the pedestrian overbridge provides a pleasant place to relax.

Completion

Shortly after 11.00 a.m. on Tuesday, 19 September 1978, the final section of the extension of the Warringah Freeway to Willoughby Road was opened to traffic. At that time, local residents saw Mr B. J. Sexton, Commissioner for Main Roads, remove the last barrier board at the northern end of the project. This action climaxed more than five years of work by the Department and an expenditure of $10.7 million.

Once an area dominated by cars, trucks and buses, bustling and crowding into local streets, the region now has wide, open expanses of green grass and trees. Residents can enjoy the peace and quiet of their local streets, now that through traffic by-passes them along the Freeway. ●

An article dealing with the design of the first section of the Warringah Freeway appeared in the December 1967 issue of this journal (Vol. 33, No. 2, pp. 45-50) and the construction was described in detail in the September 1968 issue (Vol. 34, No. 1, pp. 10-16). An article dealing with earlier construction stages of the Freeway extension appeared in the December 1974 issue (Vol. 40, No. 2, pp. 34-37).

LOAN FUNDS

Loan funds have been one of the important sources of income for the Department of Main Roads and its predecessor, the Main Roads Board, which began operations in 1925. In the period 1925 to 1930, loan funds amounting to $11 million ($160 million in 1978/79 prices) represented nearly one-third of funds received and provided finance for about 80% of construction works in that period. The loan funds were provided solely by the State Treasury from the general loan raisings by the Commonwealth Government on the basis that interest and sinking fund payments would be provided from future revenues available for Main Roads.

These loan funds allowed the worst sections of the heavily trafficked Main Roads to be placed in good order or in a usable condition at a much earlier date. One of the important works carried out at this time was the Pacific Highway route from Sydney to Newcastle via Peats Ferry and Gosford. This work provided a far superior route than was available by Wisemans Ferry and reduced the distance between Sydney and Newcastle by 77 km and halved the travelling time.

In view of the heavy reliance on loan funds in the first five years when the backlog of improvement works were being undertaken, the liability for loan charges and repayments was reaching such proportions that difficulty in providing funds for this purpose, as well as money for upkeep of the roads system in future years, was foreshadowed. As a consequence, the amount of loans made available between 1930 and 1962 declined considerably and loan funds represented only 3% of total funds received.

In 1963, in view of the vast amount of work required in the County of Cumberland, legislative action was taken to amend the Main Roads Act to enable the Commissioner for Main Roads to raise loan moneys on the open market.

The new legislation increased the amount of loan money available to the Department and permitted the funding of larger projects which could not be contemplated with normal sources of revenue. Massive undertakings, such as the Berowra to Calga Tollwork and the upgrading of approaches to the Sydney Harbour Bridge (first stage of Warringah Freeway), were possible if the large sums of money needed for their construction could be provided and if additional revenue could be generated from tolls to meet interest and capital repayments.

The use of tolls to meet the debt charges associated with the loans for these projects permitted the Department to borrow further sums for other major works without creating excessive liabilities against future income.

In the decade from 1963, as well as building the Berowra to Calga Tollwork, the Waterfall to Bulli Tollwork and providing the Warringah Freeway approaches to the Sydney Harbour Bridge, the additional loan funds permitted the Department to undertake a number of major bridge projects. New bridges were built at Fig Tree, Gladesville, Tarban Creek, Roseville, Ryde (De Burghs Bridge) and Murwillumbah. Other bridges were built at Louth, Tilpa, Pooncarie, Wardell, Nelligen, Taren Point (Captain Cook Bridge), Harwood, Raymond Terrace and Stockton, where crossings were previously undertaken by vehicular ferry. For road users, completion of these works provided substantial benefits, by eliminating frustrating delays which are unavoidable at ferry crossings. For the Department, the significant costs of running the ferries was saved and this become available to meet the interest charges and capital repayments involved in the loan moneys borrowed.

In recent years, the real value of the Department's income has been seriously reduced by inflationary cost rises in the road industry. Increased loan funds have accordingly been used in an endeavour to maintain the previous level of work effort.

In 1978/79 the loan funds made available to the Department totalled $85 million and represented 18% of the total funds available. This is the highest proportion of loans of total funds since 1929 and is the highest amount ever borrowed by the Department. These loan funds are made up of a special Treasury loan of $7 million for works in the County of Cumberland, a general loan account allocation of $40 million and an amount of $38 million to be raised in the open market by the Commissioner for Main Roads.

None of the recent works undertaken with loan funds have been of the revenue-generating type and the loan servicing costs are becoming an increasing burden on future revenue. At the present time, the Department's loan liability amounts to about $230 million and the interest and sinking fund payments total about $30 million per annum. It will be noted that toll facilities are contributing $5 million and the balance of $25 million has to be provided from the Department's normal revenue. ●

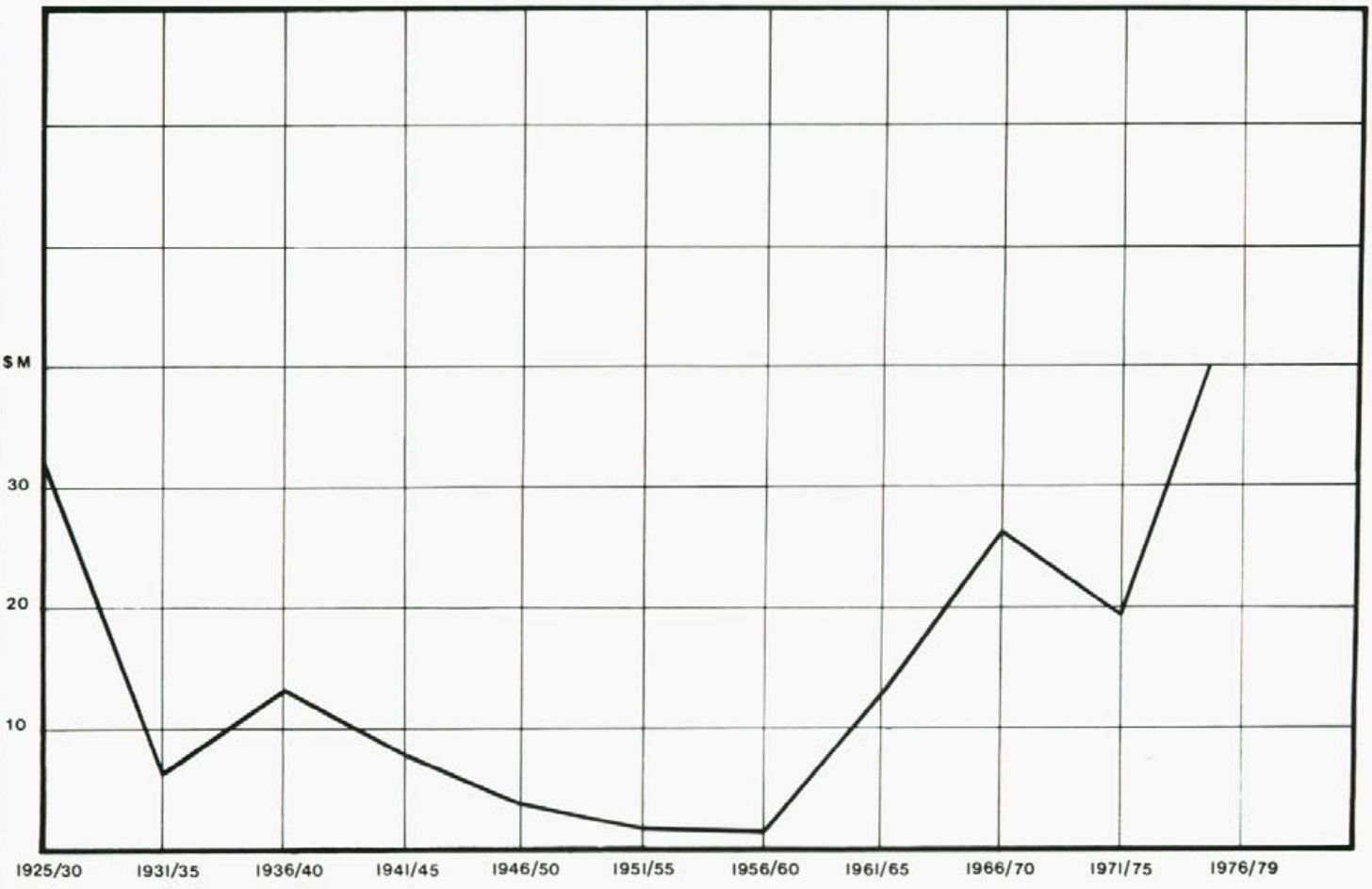
LOAN FUNDS BORROWED BY MAIN ROADS BOARD AND DEPARTMENT OF MAIN ROADS 1926-1979

Year	Amount Borrowed $M	Amount Borrowed At 1978/79 Prices $M
1926	1.998	29.53
1927	1.483	21.66
1928	3.279	47.91
1929	3.374	49.29
1930	0.849	12.78
	10.983	161.17
1931	0.497	7.48
1932	–	–
1933	0.172	3.12
1934	0.444	8.17
1935	0.659	11.95
	1.772	30.72
1936	0.549	9.88
1937	0.912	15.84
1938	0.431	6.78
1939	0.605	7.53
1940	2.032	24.99
	4.529	65.02
1941	2.080	24.59
1942	1.289	14.15
1943	0.100	1.01
1944	–	–
1945	–	–
	3.469	39.75
1946	0.600	5.76
1947	0.800	7.34
1948	0.600	4.79
1949	–	–
1950	–	–
	2.000	17.89
1951	0.430	2.62
1952	0.450	2.44
1953	0.300	1.45
1954	–	–
1955	0.400	1.84
	1.580	8.35
1956	0.300	1.34
1957	0.300	1.28
1958	0.300	1.25
1959	–	–
1960	0.800	3.18
	1.700	7.05
1961	0.850	3.14
1962	1.150	4.15
1963	1.660	5.95
1964	3.200	11.18
1965	7.500	25.37
	14.360	49.79
1966	5.005	16.51
1967	5.700	18.08
1968	8.750	26.87
1969	12.900	38.53
1970	10.600	30.11
	42.955	130.10
1971	11.250	29.34
1972	8.800	21.35
1973	8.500	18.80
1974	6.500	12.63
1975	10.000	15.16
	45.050	97.28
1976	21.250	27.84
1977	19.000	22.18
1978	22.000	23.76
1979	85.000	85.00
	147.250	158.78

COMPARISON OF ALLOCATION OF FUNDS 1928/29 AND 1978/79

Source	1928/29 Amount $M	1928/29 Amount at 1978/79 Prices $M	1928/29 % of Total All Sources %	1928/29 Amount Per Registered Vehicle $	1978/79 Amount $M	1978/79 % of Total All Sources %	1978/79 Amount Per Registered Vehicle $
STATE SOURCE:							
Loss	6.75	98.61	39	413.00	85.00	18	29.00
Motor Vehicle Taxes	6.22	90.86	36	380.00	154.00	33	53.00
Road Maintenance Contribution	–	–	–	–	19.00	4	7.00
Contributions by Councils in County of Cumberland	1.27	18.55	7	78.00	–	–	–
Other	0.81	11.83	5	50.00	41.00	9	14.00
Total State Source	15.05	219.85	87	921.00	299.00	64	103.00
COMMONWEALTH SOURCE:							
Commonwealth Aid Roads Act	2.25	32.87	13	137.00	166.00	36	57.00
TOTAL ALL SOURCES:	$17.30M.	$252.72M.	100%	$1,058.00	$465.00M.	100%	$160.00

LOANS ALLOCATED TO THE DEPARTMENT OF MAIN ROADS 1925 TO 1979 AT 1978/79 VALUES. (BASED ON AVERAGE ANNUAL ALLOCATIONS OVER FIVE YEAR PERIODS.)



NEW MURRUMBIDGEE BRIDGES

Replacing reminders of our paddle-wheel past

On 13 December 1978, two new bridges were made available to traffic over the Murrumbidgee River and its flood channel at Darlington Point.

They replaced two earlier structures, the main of which incorporated a bascule-type lift span. Although inoperative for many years, the lift span and its associated components have remained as reminders of a romantic past. A past when river traffic was an important transport mode for passengers and commercial goods in the Riverina region.

Early settlement

Darlington Point is situated on Main Road No. 321 just north of that road's junction with the Sturt Highway (State Highway No. 14) west of Narrandera.

Charles Sturt and his party passed by this now historic location on 17 December 1829, as they explored downstream along the banks of the Murrumbidgee. The river's name is derived from an aboriginal term meaning *"big (or everflowing) water"*.

It was some years before the country charted by Sturt's exploration was settled, due to the limits imposed by the Government of the time. However, by the end of 1844, all the land on river frontages in the Darlington Point area had been occupied.

Darlington Point's early prominence was mainly as a steamer port. The first paddle steamer to navigate the Murrumbidgee River reached Darlington Point on 17 September 1859.

From then on, the river trade developed quite quickly. Gundagai was too far up the river to be visited regularly, but considerable river trade came as far as Narrandera. In fact, Narrandera was the chief port of the district until the coming of the railway in the 1880s. Narrandera is about 63 road kilometres east of Darlington Point, but, naturally, the distance is considerably greater along the meanders of the Murrumbidgee River.

Darlington Point developments

The settlement at Darlington Point (proclaimed a village on 18 May 1901) grew on both sides of the river. In 1875 the two parts were linked by a punt.

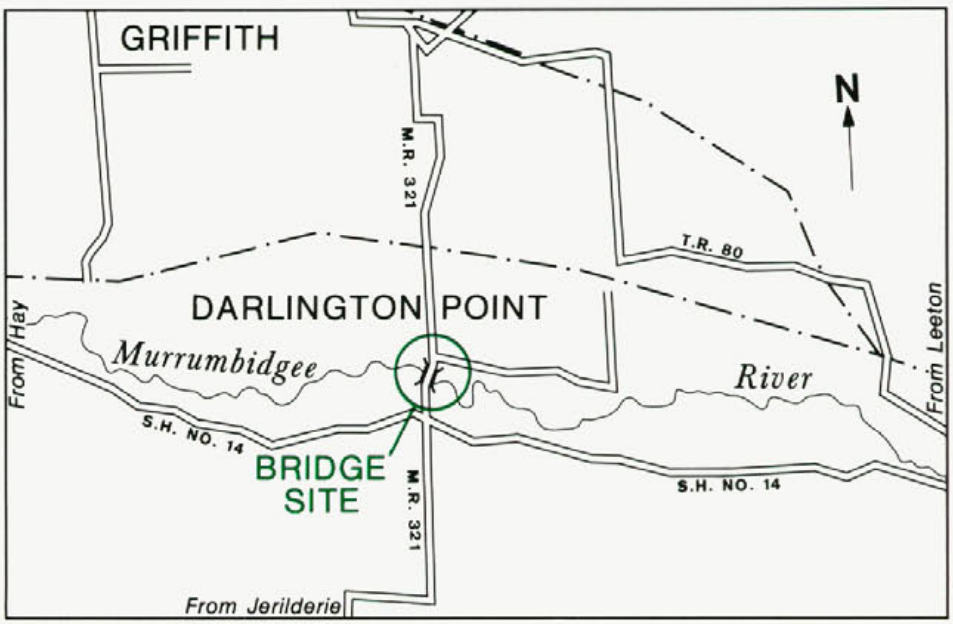
In 1905, the Murrumbidgee River and the flood channel to its north were bridged (see following article on pp.45-46). The main structure (currently still standing) is 206 m long, while the flood channel crossing (also still in existence) measures 93.3 m. The main bridge was equipped with a steel bascule lift span to allow steamers to pass. The 3.7 m width of this span limited the bridge capacity to one traffic lane – with no footway.

The coming of competition

In August 1881 the railway reached the town of Darlington, about 18 km north of Darlington Point. This, along with the gradual improvements in roads in the area, meant the eventual passing of the steamers which were hampered and delayed during times of drought or severe flooding. Some still plied their way on the river as late as the 1930s, carrying mainly wool and timber, but by the end of the decade this river trade had virtually died out.

In passing, it should be mentioned that the name "Darlington" no longer appears on maps of the State, except as the name of a Sydney suburb. Possibly to avoid confusion, the country town's name was changed to Willbriggie in July 1909.

As mentioned earlier, Darlington Point is on Main Road No. 321 which, as the southern outlet for the produce of Griffith and the Murrumbidgee Irrigation Area, is perhaps the most important Ordinary Main Road in the Riverina. It links three State Highways, extending from the Newell Highway, north of



ıt Historic Darlington Point

Jerilderie to the Sturt Highway and then northwards again to the Mid Western Highway, west of Rankins Springs.

With the continuing expansion of the rice, wheat, wine and fruit-growing industries in the area, and the development of the Coleambally Irrigation Area nearby, the old bridge at Darlington Point and its narrow carriageway, was being placed under considerable pressure.

Needs and problems

New bridges over the Murrumbidgee River at this location had been sought for many years, as the rapid development of the Murrumbidgee Valley for irrigation agriculture continued.

Design investigations for the new bridges commenced in the late 1960s. Both of the new bridges were designed for the Department by Messrs. Taylor and Herbert, Consulting Engineers, and in June 1974, tenders were called for a main structure 170 metres long and a flood channel bridge 96 metres long.

A contract for the work was let in September 1974. Unfortunately, continuing high river levels over the next four months prevented any work taking place, and the contract was finally cancelled by mutual agreement in March 1975.

A new contract for the bridges was let in February 1977, to the Wagga Wagga firm of Siebels Concrete Constructions Pty Ltd with a contract price of $1,077,459.

Work under way

Work started early in 1977 and soon after coffer-dams were set up in the river for the sinking of the central cast-in-place piles. A concrete batching plant was installed at the bridge site. Prestressed girders and deck units were fabricated at Narromine and work on a new river bridge (just 20 metres upstream of the old one) was well under way when, in July 1977, some doubts were expressed as to the adequacy of the waterway area being provided. Fears were expressed that the slightly decreased waterway might increase the chances of flood damage to the nearby areas.

In August 1977, a decision was made to extend the river bridge by two spans, increasing its length to approximately 206 metres. The change in design caused an inevitable delay to the completion of the bridges and an equally inevitable rise in the final price. The approximate costs were $930,000 for the main river bridge and $400,000 for the flood channel bridge.

The amended design of the bridge over the main channel provided for eight spans of 19.05 m and three spans of 17.78 m giving an overall bridge length of 205.74 m. The bridge over the flood channel consists of 7 spans of 13.72 m, giving an overall bridge length of 96.04 m.

Identical in section

The widths of the two new bridges are identical at 11.28 m. Each provides a

Construction of the new bridge beside the old structure as at July 1978.

New and old bridges over the flood channel to the north of the main Murrumbidgee River crossing. July 1978.

carriageway of 8.45 m, a footpath 2.20 m wide on the downstream side, and a kerb 0.54 m wide on the upstream side. Provision for carrying public utility services over the river has been made in a duct under the precast concrete slabs of the footway of each structure.

In the initial site investigation, foundation studies revealed thick layers of clay and sand. The foundations of the bridges consist of bored cast-in-situ concrete piles. These rely on both end-bearing and skin friction of the piles against the surrounding strata to support loads of up to 100 tonnes per pile over the main channel section, and up to 60 tonnes per pile over the flood channel section.

Abutments for both bridges are of the simple spill-through type and piers consist of solid walls 5.5 m wide supporting cantilevered headstocks which in turn provide the support for the deck.

Five pretensioned concrete bridge girders, 1.12 m deep, have been used in each span of the bridge over the main channel. These are spaced at 2.44 m centres. The deck is cast-in-situ concrete 180 mm thick. Cross girders have been provided at the ends and at the one-third points of each span.

Eighteen pretensioned bridge units, 0.45 m deep, in which deflected strands have been used, provide the support for a 150 mm thick cast-in-situ concrete deck for the bridge over the flood channel.

Expansion joints have been provided at the abutments of both bridges and adjacent spans have been tied together to provide a carriageway free of joints on the bridges themselves. Flexible rubber bearings have been used to support the deck beams for both bridges.

Safety, efficiency, economy

The completion of these new bridges across the Murrumbidgee River provides an improved link between the two parts of Darlington Point. They give easy and uninterrupted flow for both local and through traffic and ensure safe pedestrian access for the 660 residents of the town. In addition, a major restriction on Main Road No. 321 between Griffith and its southern markets has been removed, allowing heavy traffic to move freely across the Murrumbidgee River with greater safety than possible with the 1905 structures. Another important benefit is that, in the future, maintenance costs for the bridges at this crossing will be considerably reduced. ●

Official Opening of New Bridge at Darlington Point

The ceremony to mark the official opening of the new bridge over the Murrumbidgee River at Darlington Point was held on Friday, 27 April 1979.

Official guests, together with interested local residents and pupils from the nearby school, gathered at the bridge site and witnessed the proceedings. Those in attendance included the Hon. Harry Jensen, Minister for Local Government and Minister for Roads; the Hon. Lin Gordon, Minister for Conservation and Minister for Water Resources, and Member for Murrumbidgee; Mr. J. FitzPatrick, M.P., Federal Member for Riverina; and Councillor J. E. McInnes, President of the Shire of Murrumbidgee.

Other guests included Mr. J. B. Cunneen, Chief Commissioner for Water Resources and the Shire Presidents from the Shires of Wade (Councillor R.W.V. Irvin), Leeton (Councillor W. Barnhill), and Jerilderie (Councillor T. Hogan).

The ceremony commenced at 11.00 a.m. with the playing of the National Tune "Advance Australia Fare", following which Mr. Bruce Loder, Deputy Commissioner for Main Roads addressed the gathering. Mr. Loder apologised for the absence of the Commissioner for Main Roads, Mr. B. J. Sexton who had, at short notice, been required to attend urgent discussions of considerable significance to road finance.

After speaking briefly about the need for the new bridge and about its structural details, Mr. Loder introduced Councillor J. E. McInnes, who welcomed the visitors to the Shire of Murrumbidgee. During his talk, he emphasised the importance of the new bridge in providing an important link between the Murrumbidgee and Colleambally Irrigation Areas. Mr. McInnes also underlined the particular significance of the new bridge as a better link to the regional towns of Leeton and Griffith.

The Hon. Lin Gordon, reinforced many of the welcoming remarks of Mr. McInnes, making special reference to his parliamentary colleague Mr. Jensen.

Mr J. FitzPatrick, M.P., congratulated the Government and the groups of people

Seventy-four years after her father opened the original Darlington Point bridge, Miss Agnes Scobie cuts the ribbon for the new bridge. On the right is the Hon. Harry Jensen, Minister for Local Government and Minister for Roads, and on the left is Mrs. B. N. Loder, wife of the Deputy Commissioner for Main Roads.

who were responsible for bringing the bridge into existence. He said it would allow traffic to flow more freely and would provide a connection between the great agricultural areas, pastoral areas and mining districts of the State.

The Hon. Harry Jensen, M.P., Minister for Local Government and Minister for Roads was then invited to officially open the bridge.

Mr. Jensen commenced by remarking on the delightful weather, noting that, prior to the day it had been raining heavily. He made special mention of the privileges which all Australians share, pointing out that we have undisputed occupation of an entire continent, we are one people speaking one language, and we have access to enormous resources.

Mr. Jensen made reference to the early history of the area and to the fact that Darlington Point's early prominence was mainly as a steamer port. At this point Mr. Jensen mentioned the first bridge which was opened to traffic on 28 June 1905 by the then Member for Murray, Mr. Robert Scobie, M.L.A. (see detailed report on page 45). One of those present on that occasion was Mr. Scobie's 19 year old daughter Agnes.

Seventy four years later, a spritely 93 years young Miss Scobie was an official guest at the opening ceremony of the new bridge. Miss Scobie is now a resident of the Sydney suburb of Collaroy and had flown from Sydney that morning to attend the ceremony. For Miss Scobie it was a momentous and historic occasion, not only because of the opening ceremony but also because it was her first flight.

Mr. Jensen introduced Miss Scobie to the gathering and said that in 1905 her father had invited Mrs. A. J. Cummings, the oldest lady resident in the district, to cut the ribbon. Mr. Jensen said that he would follow the pattern set by Mr. Scobie and invite Miss Scobie to cut the ribbon.

Mr. Jensen continued . . .

"Ladies and gentlemen I'm delighted, honoured, elated at having the privilege of sharing with you this significant occasion. I thank each one of you for the compliment of your presence and now declare the bridge to be officially open and ask Miss Scobie to come with me in order that we can do the 'scissors job'. If anyone should see anybody with a sword in hand galloping up the road on a horse, I'd ask you to make certain that nothing happens to prevent Miss Scobie from the delight I know she's going to feel at being the official cutter of the ribbon."

Miss Scobie was escorted to the centre of the bridge by Mr. Jensen and before cutting the ribbon, she remarked on how lovely it was to see, in this the International Year of the Child, so many children present.

Miss Scobie recalled that her father always tried hard to prise as much money as possible out of the Government for his area. According to Parliamentary records, Mr. Scobie was Member for the Hunter from 9 February 1889 to 25 June 1894, Member for Wentworth from 3 July 1901 to 16 July 1904 and Member for the Murray from 6 August 1904 until 15 August 1917.

Miss Scobie concluded . . .

"He was a wonderful Member of Parliament and to think the people of Darlington Point and district remember him!

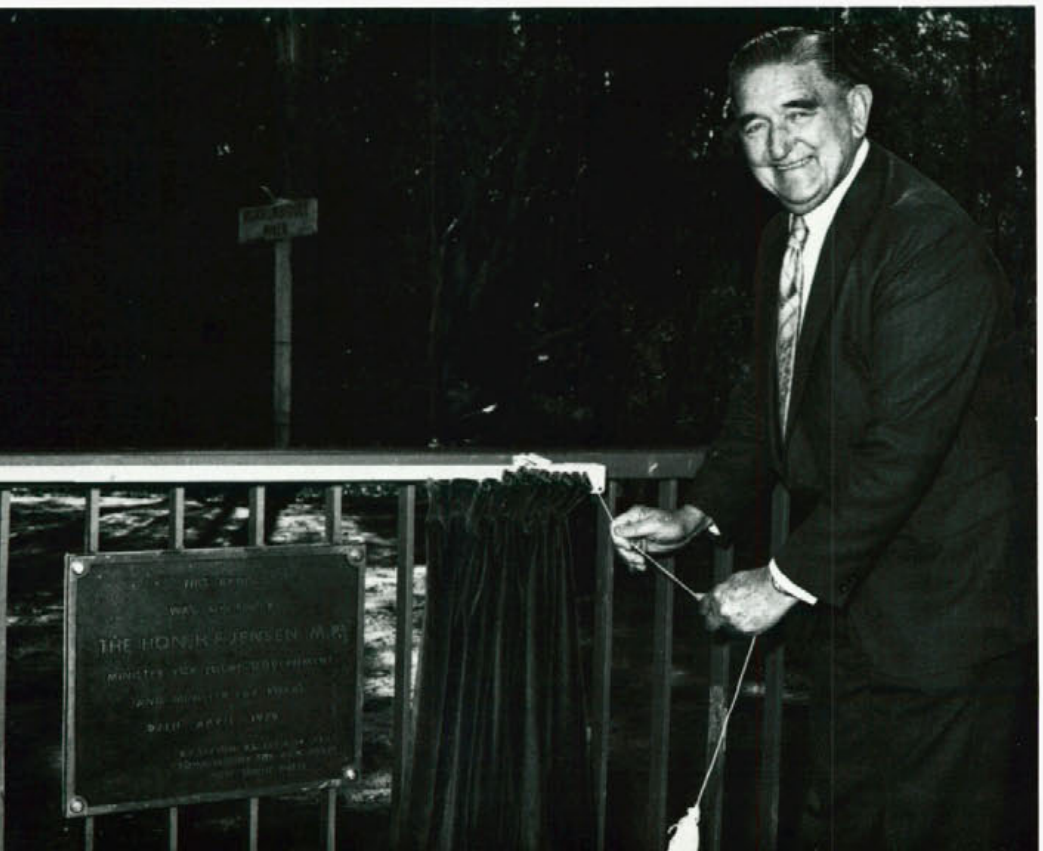
I was a good public servant for 35 years and today I stand in front of you at 93 years of age having played my part in all that I could do and having tried to do my bit for my country.

This is a beautiful country, everything you see around Griffith reminds me so much of the wonderful people in our country and the wonderful men in the Public Service in those wonderful Departments who do such a wonderful lot of good.

I have very, very much pleasure in saying that this ribbon is cut by the daughter of the late Robert Scobie who was your Member for so long."

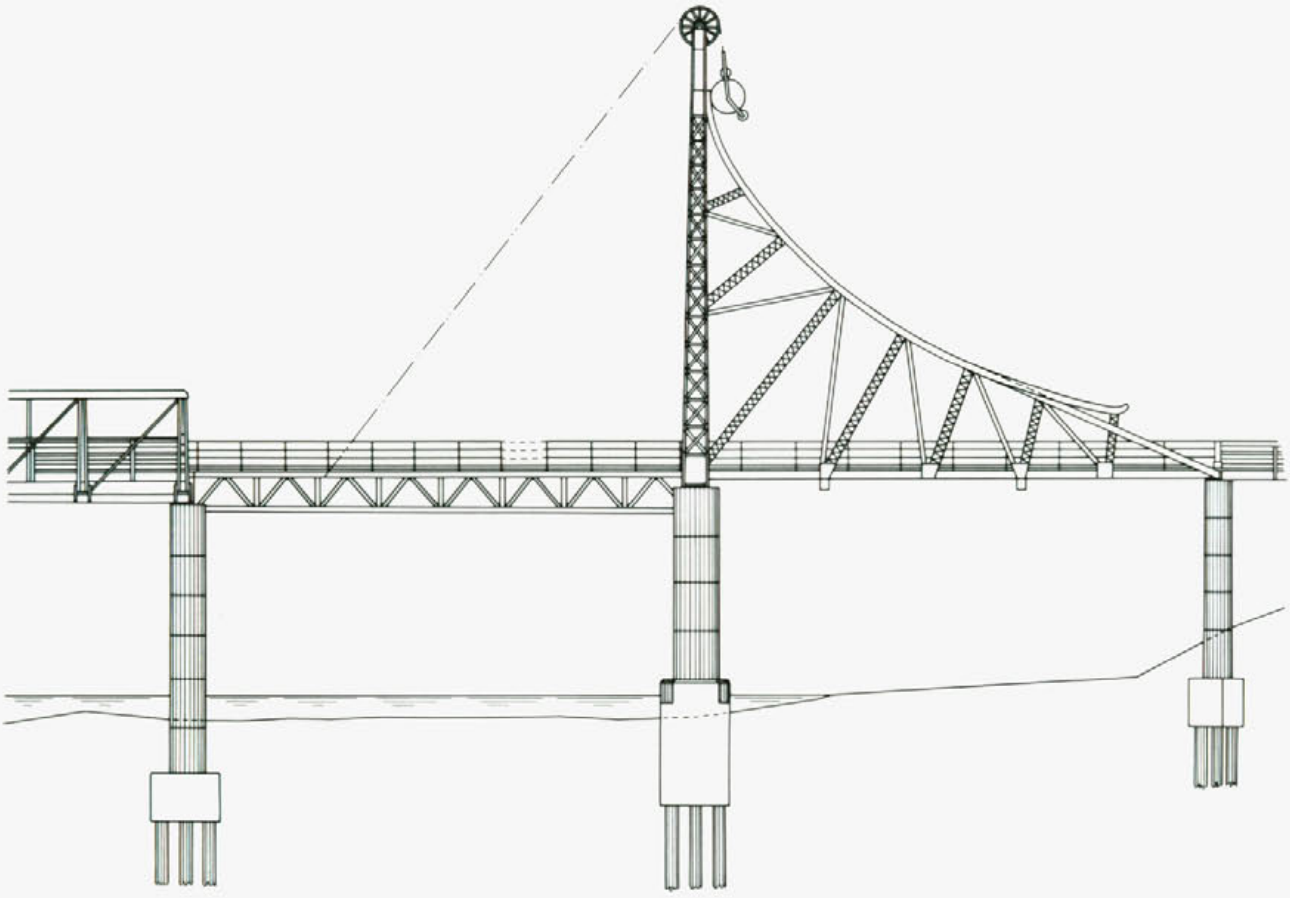
After cutting the ribbon, Miss Scobie was presented with the scissors used for the ceremony. The unveiling of the memorial plaque by Mr. Jensen completed the official ceremony. ●

Due to the present late production of the Journal this article has been included in this issue of "Main Roads" rather than in the June 1979 issue.



Mr. Jensen unveils the memorial plaque to complete the opening ceremony.

The Old Bridge at Darlington Point



Some dimensions and details about the old bridge over the Murrumbidgee River and Darlington Point were published in the Annual Reports of the Department of Public Works. In the 1902-03 Report under "Works in Progress" (p. 59), there is the following entry.

"In order to provide for navigation, a bascule span has been provided in this bridge. This span is of the rolling weight type, similar in principle to that recently completed at Telegraph Point, Wilson's River, but affording a wider opening than was provided in the latter bridge. The opening span, towers and track for the rolling balance weights are of steel and the bridge also includes a composite truss span of 91 feet and 15 beam spans of 30 feet each. The main piers consist of cylinders on pile foundations."

The next Report for the year ended 30 June 1904 mentioned that the bascule span provided *"a clear opening of 60 feet for the river traffic, which consists of river steamers and barges"*. It added that the contract cost of the work was £13,000.

The 1904-05 Report noted that the bascule span was *"similar to that on Coraki Bridge"*. It also stated that *"the river piers consist each of a pair of iron cylinders, supported upon concrete bases carried on timber piles"*.

The official opening of the bridge was held on Wednesday, 28 June 1905 and was reported as follows in the Narandera (sic) Argus of 30 June 1905.

"DARLINGTON POINT BRIDGE

THE OPENING CEREMONY
(By Wire from our Special Reporter),
DARLINGTON POINT, THURSDAY

The opening of the magnificent steel bascule bridge over the Murrumbidgee at Darlington Point was celebrated on Wednesday in cloudy but fine weather.

There was an attendance of over 500 people at the ceremony and at the monster children's picnic and sports earlier in the day.

A four-horse drag met distinguished guests at Darlington Railway Station, and conveyed them to the town. Here a procession met them, headed by the Narandera Town Band, children of the district schools, members of the Celebration Committee, and prominent

residents. The procession moved from the main street to the bridge.

Mr. R. Scobie, M.L.A., delivered the opening oration; after which Mrs. A. J. Cummings, as the oldest lady resident in the district, cut the ribbon, and the bridge was declared open.

Mrs. Cummings was then presented with a silver knife and an enlarged photograph of the bridge, amid roars of cheers.

The banquet was held soon afterwards and was largely attended. The following toasts were proposed:— "The King and Queen" by the Chairman. "Our Visitors", coupled with the names of Mr. R. Scobie, M.L.A. and Mr. F. A. Byrne, late member for the district. Messrs. Scobie and Byrne responded with able speeches; and the toast was also responded to by Messrs. John Jacob, F. Harrison and others. Mr. Herman Kook proposed "The Parliament"; and in reply Mr. Scobie outlined the present Parliamentary programme. The toast of the evening was the "Bridge Opening", coupled with the name of Mr. W. Farquaharson, the contractor, Mr. Farquaheon (sic) being absent in Sydney, Mr. Rorison responded on his behalf. "Pastoral and Agricultural Interests" was proposed by Mr. H. Kook and responded to by Messrs. Harrison and McKinney. "Commerce and Trade" was responded to by Mr W. Legge, Mr. J. J. Gallagher and Mr. A. J. McAlister. Mr. Batty (sic) proposed "The Press", and Mr. A. J. McAlister responded, apologising for the unavoidable absence of absent pressmen. Mr. J. L. Bennett proposed "The Ladies", responded to by Mr. J. J. Gallagher. Mr. Scobie proposed "The Celebration Committee", and Mr. MacDonald responded. Mr. Kook proposed "The Chairman", and Mr. Scobie responded. Mr. Beatty then proposed the toast of "The Bridge Employees".

Mr. Scobie, in the course of his speech, commended the committee for the completeness of their arrangements, which, he said reflected the highest credit on all connected with the celebrations. The large gathering was only fitting the importance of the occasion.

Over 100 people attended the banquet, and seventy couples were present at the ball, which started at nine o'clock in the hall. The floor and music were all that could be wished; and the costumes of the ladies were charming. Among those ladies whose dresses attracted attention were Misses Keeble (2), A. Jones, M. Barnes, Gallagher, Alford, Kook, McGrath, (2), Wilson, Curphy, Connelly and many others.

Mr. Keed, of Junee supplied the marquee for the banquet, which was handsomely decorated. Excellent refreshments were also provided at the ball. Dancing continued until late this morning." ●

This photograph illustrates the tall towers of the old bridge and the curved tracks down which counter-weights travelled when the bascule span was opened.

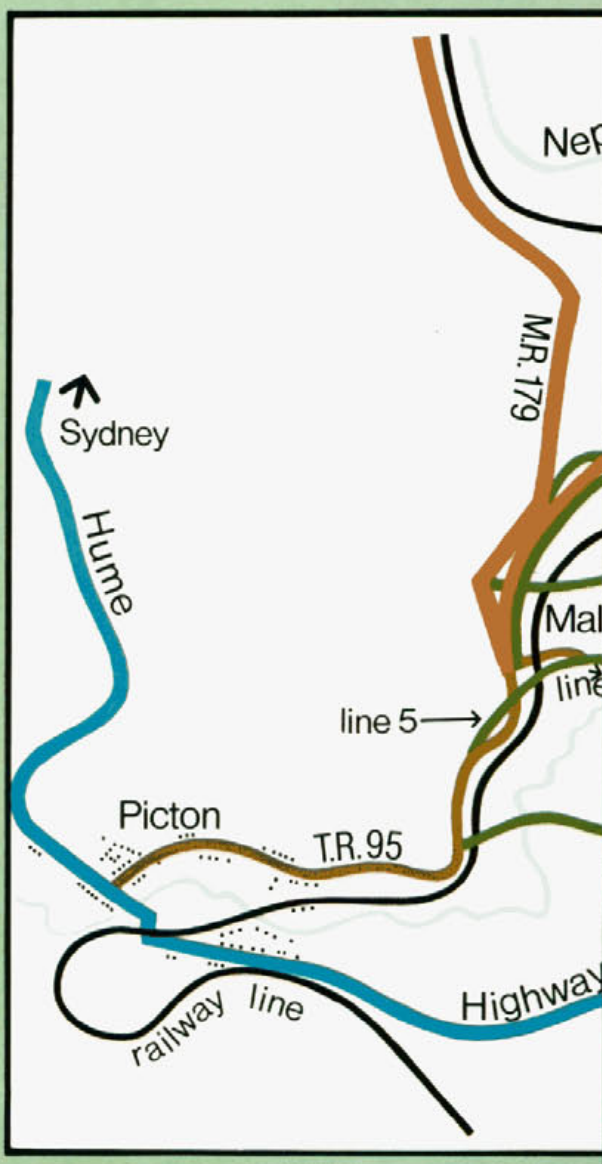
The new Darlington Point Bridge spanning the Murrumbidgee River Channel.

CHANGIN

AT

75

Built in 1903, the bridge over the
building techniques of that era.
the few suspension bridges in th
Seventy-five years later, work by
the construction of a new bridg
outlined in the article on pages 5
and construction features which
of bridge building in New South



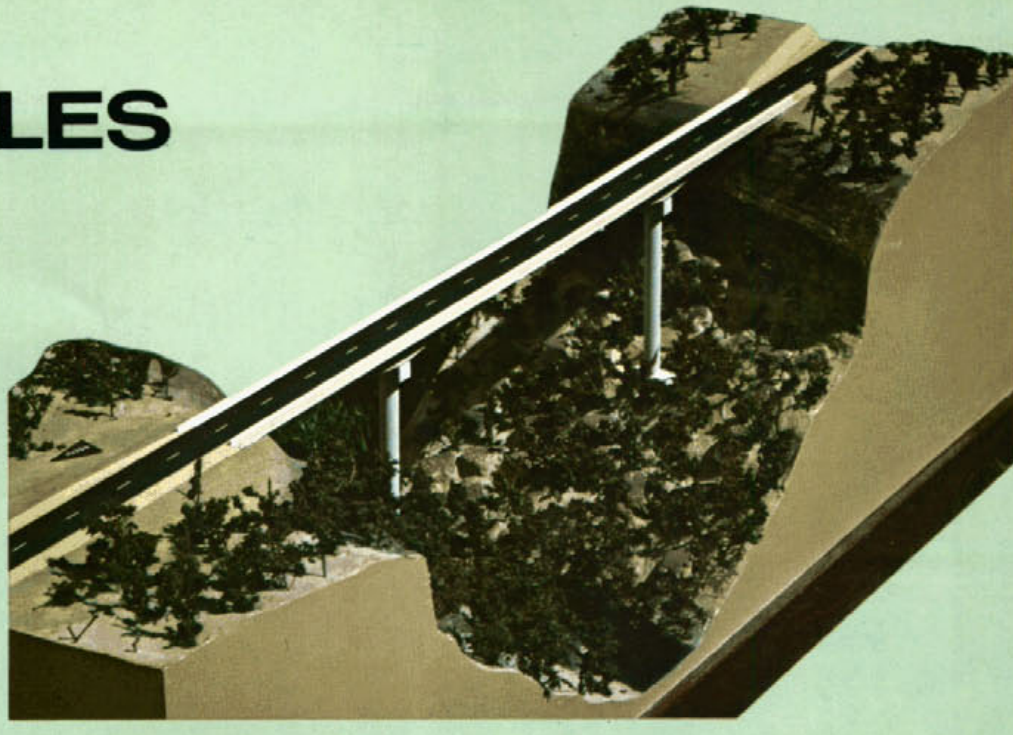
BRIDGE STYLES

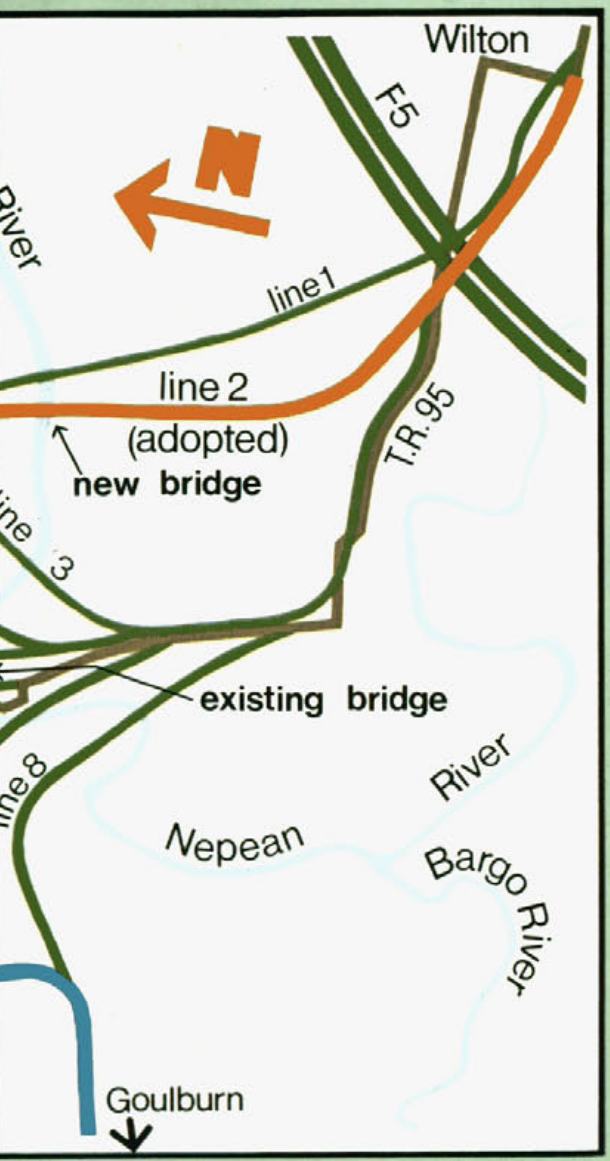
LDON

APART

at Maldon is a fine example of the bridge al at the time and has remained one of

ent and contractors is well advanced on tion of this increasingly busy route. As w bridge has a number of unusual design oteworthy structure in the development



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KEEPING UP SUPPLIES

Have you ever thought how long the Department could contine to undertake its wide ranging variety of tasks without a constant supply of such items as roadmaking materials, replacement parts for plant items, fuels and lubricants, traffic management equipment, etc? Have you considered how long it would take to design a roadway or bridge without engineering scales, calculators and modern survey equipment?

Although many of these items are commonplace, little thought is usually given to the organisation needed in order to have a constant supply of frequently used materials and a speedy replacement of the more specialist items.

How it all began

As early as 1927, in the days of the Main Roads Board, there was a position entitled "Plant and Purchasing Officer". In 1942 this position was separated into two — a Plant Engineer (now known as the Mechanical Engineer) and a Purchasing Officer (now known as the Supply Officer).

Prior to 1960, the buying operations of the Department were conducted from a Purchasing Section situated at Head Office. The central store at Granville operated in the dual capacity of a *local* store serving the Department's Central Workshop complex, and as a true *central* store for the remainder of the Department's offices.

Following an investigation by consultants into the Department's methods of purchasing and handling stores, the Supply Section was formed in March 1960. It was to fulfil the role of both purchaser and supplier of stores and materials, to meet the needs of the Department throughout the State.

Dual responsibilities

Supply is essentially a service to the Department's 18 Divisions. It is directly connected with the actual operations of the Department, and is often involved with respect to technical engineering matters. The Supply Officer, therefore, as head of the Supply Section, is directly responsible to the Deputy Engineer-in-Chief, for the purchase and issue of stores, materials and small plant items. He is not directly responsible for the purchase and/or issue of office stores and stationery (arranged by the Stores Officer), tars and bitumen products (arranged by the Asphalt Engineer), or major plant items (arranged by the Mechanical Engineer).

The Supply Section performs two separate but closely related functions. It is organised into two groups under the titles of: (i) Purchasing, and (ii) Stock Control.

These two groups or sub-sections are controlled by the Purchasing Officer and the Stock Control Officer respectively, who are in turn responsible to the Supply Officer.

The aims of supply

The broad aims of supply are considered to be threefold, namely:

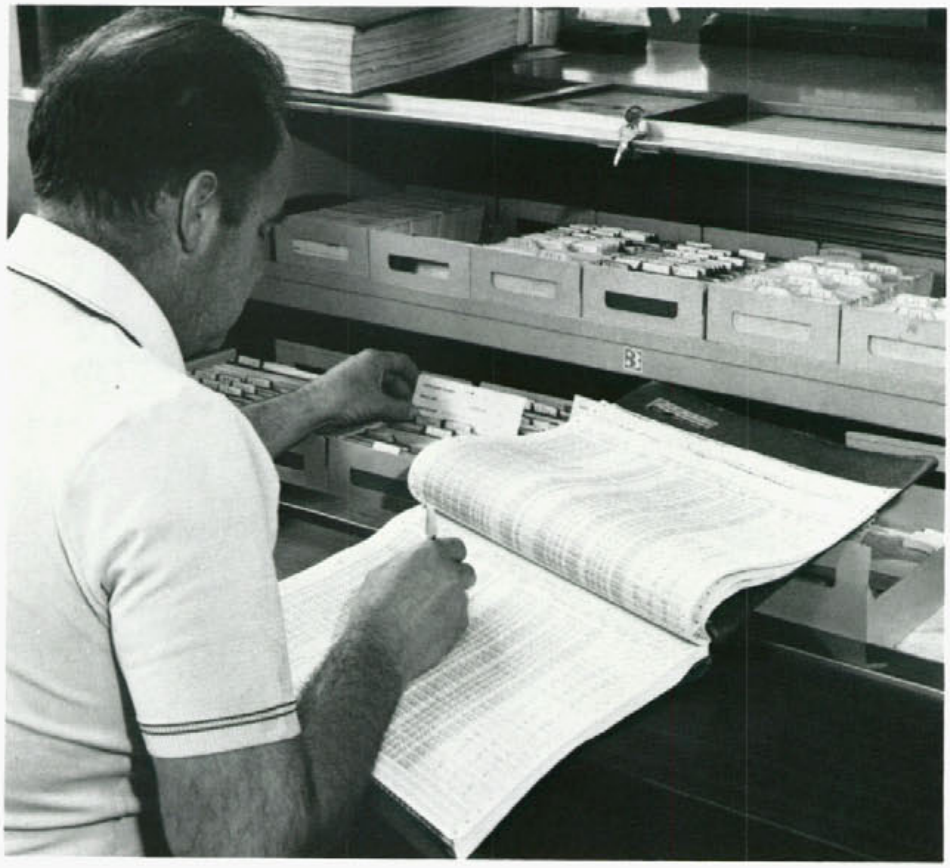
(i) to provide a service to the whole of the Department, by procuring and supplying goods and services when the where they are needed;

(ii) to obtain such goods and services at the lowest possible cost (directly and administratively), subject to availability, and the quantity required;

(iii) to make the best use of available money by holding quantities of stock to the lowest practicable level.

To effectively and economically meet these requirements is a demanding task. Rapidly changing technology, fluctuating prices and shortages of goods are just a few of the problems that need to be dealt with daily, if the Department's state-wide operations are to continue without interruption.

The Purchasing Sub-section is responsible for the procuring of stores and materials. This is achieved by one of three methods: by use of State Government contracts; by the invitation of quotations directly from suppliers or



Central Store stock balances are here being checked against a rotary card-indexing system.

manufacturers; or by manufacture by the Department's Central Workshop.

Where quotations have been invited, the origin of manufacture of the items must be considered, in order to determine the successful quotation. A scheme has been introduced recently by the Government whereby a preference of up to 10% is to be allowed on the quoted price of items manufactured in New South Wales, as against those of interstate origin.

A similar preference is enjoyed by Australian manufacturers, as against overseas manufacturers.

During the 12 months ended 30 June 1962, the following statistics were obtained to gauge the progress of the Section:

Requisitions	23,094
Orders	21,275
Quotations	376

For the 12 months ended 30 June 1978, the following statistics give a comparison.

Requisitions	45,658
Orders	33,142
Quotations	1,136

Checking the stock of paints, primers and sealers on the extensive shelves in the store area.

A length of timber is removed from stock in the storage racks. Each item is labelled clearly and concisely for easy identification.

The Stock Control Sub-section is responsible for the establishment and implementation of a state-wide stock holding policy. It is also responsible for the storage and issue procedures, relating to all stores and materials handled by the Department.

Some comparative figures for this sub-section's operation are:

For year ended 30 June 1962	
Stock issues	$843,516
Stock holdings	$1,012,280
Cost of operations	$78,982
No. of storemen employed	13
For year ended 30 June 1978	
Stock issues	$7,714,142
Stock holdings	$3,051,680
Cost of operations	$883,141.76
No. of storemen employed	21 plus 1 Forklift operator

A view to more room

The present central store complex located at Granville occupies an area of approximately 12,500 m^2, of which 4,200 m^2 is undercover storage. With the ever increasing demand on the Supply Section to meet Field Office requirements of daily requisitions, and with the recent takeover of the Department of Motor Transport Traffic Facilities equipment, the available storage space is inadequate.

The Department is at present evaluating the situation with a view to selecting a new store complex site, with an increase in area to some 22,000 m^2, and to provide undercover storage of approximately 7,200 m^2.

A Stores Operations Officer, responsible to the Stock Control Officer, ensures that office staff and store personnel perform allocated tasks promptly and in the prescribed manner.

The main activities of the Central Store could briefly be determined as:

(a) Physical control of stores, by ensuring adequate security at all times for all stock lines; stocktaking. With approximately 10,500 stock lines at Central Store, of which 50% could be classified as fast moving stock lines, progressive stocktaking is a major exercise to ensure that actual quantities on hand are in agreement with balances appearing on the stock balances printout.

The *annual* stocktake is performed between 1 March and 30 June of each year. This check is made by actual count, weight or measurement as the case may be.

(b) Receiving, storing, issuing and

A selection of road signs, prepared at Central Workshop, being inspected prior to despatch. The shelves store hundreds of signs awaiting distribution.

despatch of all goods. Details of stores received from suppliers, together with direct issues and issues from stock to all Field Offices, are transmitted daily by telex to the Department's Central Computer located at Head Office.

All goods are despatched by the most suitable means available depending on size, weight, destination and urgency. In addition to the use of rail and private road transport, the Department uses its own road transport in some cases.

(c) To maintain RE-ORDER levels of stock lines held in the Store. To ascertain re-order levels, the following points are considered:
   (a) Usage in previous 12 months
   (b) Re-order *quantity* to be most economical order quantity, or equivalent to six months usage
   (c) Re-order *level* to be approximately three months usage, or the lead time involved from order placement date to receipt of stores date.

An efficient system

A "follow-up" system is maintained on all orders where stores and/or materials have not been delivered by the expiry of the delivery period quoted on the order.

As an indication of the work involved in maintaining stocks, approximately 6,500 requisitions for the replacement of stock items are prepared each financial year by the store . . . which averages out at between 20 and 30 each working day.

To ease part of the burden, the Department has recently purchased a Series 43 Honeywell Level 6 mini-computer, for use at the Supply Section. It is envisaged that it will be put to use producing official Departmental orders, and associated statistics. It will also provide an efficient Statewide stock control system, with associated stock holding statistics. •

An earlier article on the organisation and operation of the Department's Central Store appeared in the December 1952 issue of "Main Roads", Vol. 18, No. 2, pp. 49-52.

NEW MINISTER FOR ROADS

Hon. H. F. Jensen, M.P.

Following the recent State Government election, there has been a re-organisation of ministerial responsibilities, whereby the day-to-day management responsibilities for roads have been transferred from the Minister for Transport, Mr. Peter Cox, to the Minister for Local Government, Mr. Harry Jensen.

Henry Frederick Jensen, was born at Newtown (in Sydney) in 1913, and attended various public and private schools, including a three-year period at St. Joseph's College, Hunters Hill. His father was killed at Lone Pine, Gallipoli in 1915 and Legacy helped the Jensen family in many ways during the 1920s.

He started work as a shop assistant in 1927, and became an apprentice electrician two years later. He spent most of the war years as an electrician at Cockatoo Island Dockyard (Sydney) and other shipbuilding and repairing establishments.

After periods as a union delegate, Mr. Jensen became an organiser of the Electrical Trades Union in 1943/44. He spent various terms as Secretary and President of branches and councils of the Australian Labor Party, which he had joined in 1929. He has been Chairman of the A.L.P.'s Local Government Policy Committee since 1968. His industrial experience includes having been a delegate to the New South Wales Trades and Labour Council and an advocate before the Industrial Courts. His trade union career was followed by a period of self-employment as an electrical contractor, and as a distributor of footwear.

Mr. Jensen entered local government as the Australian Labor Party candidate for the East Ward of Randwick Municipal Council in December 1950. In January 1951, he became a councillor of the Sydney County Council. He became Mayor of Randwick in 1954, and Chairman of the Sydney County Council in 1955. In 1956 he was elected Lord Mayor of Sydney and was re-elected in 1959 and again in 1962, serving, in all, a record-breaking 9 years.

Mr. Jensen married in 1935, and in 1958, as a father of six, was named "Father of the Year".

The Jewish Theological Seminary of America honoured Mr. Jensen in 1961, awarding him the Tenth Anniversary Universal Brotherhood Award. He was also an official guest of the Government of Israel at the Tenth Anniversary of the State of Israel.

He became the Member for Wyong in 1965, and remained so until the seat was abolished in 1973, when he became the member for the Legislative Assembly for Munmorah. Mr. Jensen was Shadow Minister for Local Government prior to the 1976 elections. On 14 May 1976, he was sworn in as Minister for Local Government. For a short period, he was also Minister for Planning.

In October 1978, the responsibility for roads was added to Mr. Jensen's portfolio. His office address is Level 34, C.A.G.A. Centre, 8-18 Bent Street, Sydney. Telephone 240 4755.

MINISTERIAL CHANGES

The new areas of responsibility in relation to roads between the Minister for Roads and the Minister for Transport are as follows:

Minister for Roads

- Administration of Department of Main Roads;
- Approval of road and bridge construction programmes for Urban Local Roads and Rural Local Roads;
- Construction of National Highway, National Commerce Roads, Urban Arterial Roads, Rural Arterial Roads and MITERS (Minor Traffic Engineering and Road Safety Improvements) within programmes approved by the Minister for Transport;
- Technical research on road and bridge design, construction and maintenance;
- Representations on road matters generally, road grants to councils and activities of Department of Main Roads (after consultation if and when necessary with Minister for Transport on policy matters requiring his overview);
- Maintenance programmes.

In addition, the Minister for Roads is responsible for administering Ordinance No. 30C of the Local Government Act.

Minister for Transport

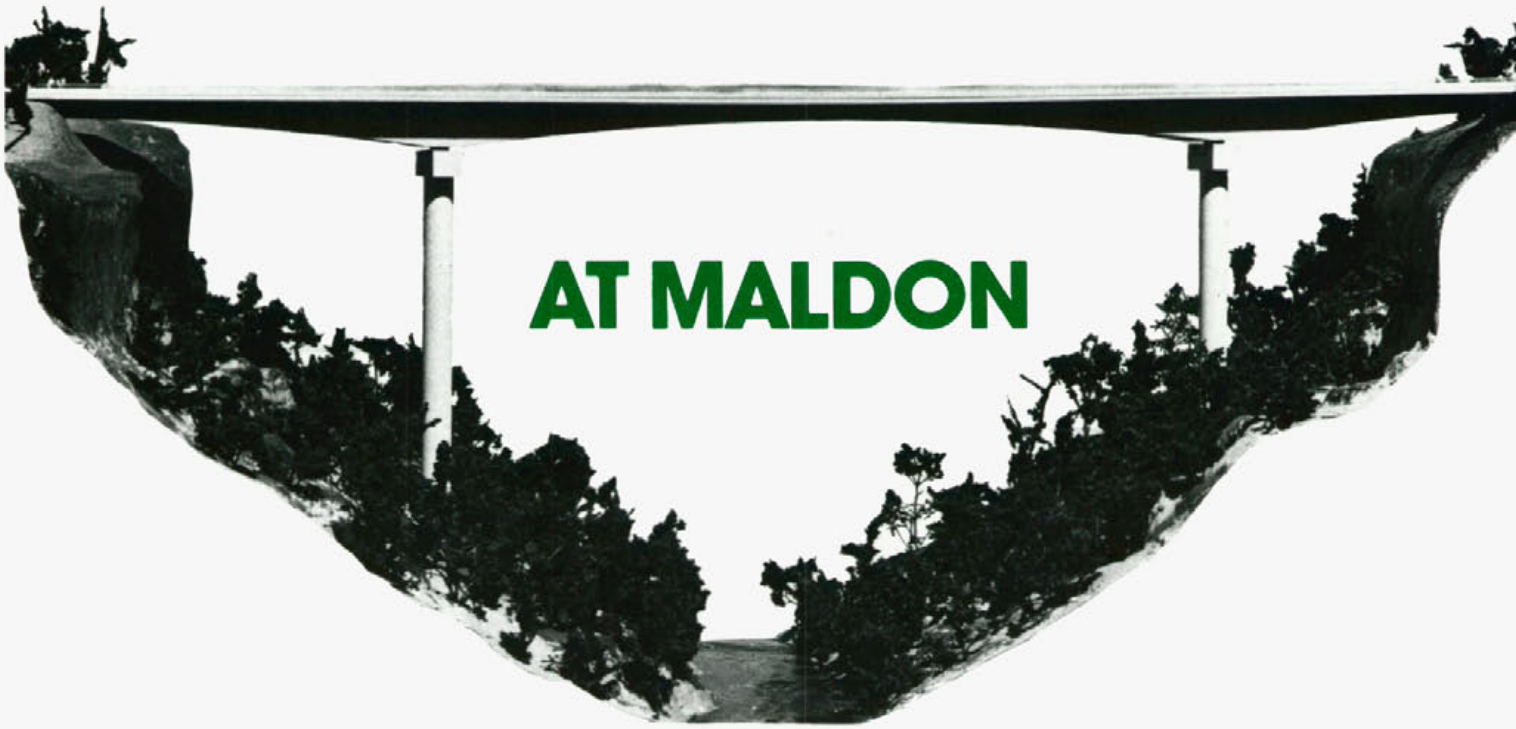
- Co-ordination of State-wide transport policies including responsibility for —
  (a) Financial arrangements including the overall allocation of funds (both State and Commonwealth) between the various road categories — in consultation with Minister for Roads.

  (b) Road planning and approval of the various road and bridge construction and reconstruction programmes, including acquisitions, for —
  National Highways (both construction and maintenance)
  National Commerce Roads
  Urban Arterial Roads
  Rural Arterial Roads
  MITERS (Minor Traffic Engineering and Road Safety Improvements).
  (N.B. Following approval of the above programmes, subsequent administrative action (such as the despatch of grant letters to the Local Members) remains the responsibility of the Minister for Roads, with any representations on these matters being handled by him.)

  (c) Research — to determine priorities for research projects and approve the allocation of funds.
- Relations between the State and Commonwealth on road planning, research, finance and programme matters, including Australian Transport Advisory Council matters.
- Appointment or nomination of representatives on Inter-Departmental and other committees having a bearing on transport planning.
- Urban Transport Advisory Committee, which is to be reconstituted as a statutory advisory body with state-wide responsibility.

The Minister for Transport has a particular responsibility for ensuring the balanced development and co-ordination of public transport and road programmes. ●

BRIDGING THE NEPEAN RIVER AT MALDON



Old Suspension bridge

Although not situated on a highway, the existing Maldon suspension bridge is very well known to many motorists in New South Wales. One of the three remaining suspension bridges on classified roads in the State, it spans a deep ravine of the Nepean River just east of Maldon, which in turn is southeast of Picton. (The other suspension bridges are at Kangaroo Valley and at Kindee Crossing near Ellenborough.)

Built originally by the Department of Public Works in 1903, it has a suspended span of 68.9 m between towers, seven approach spans, and a 4.6 m wide carriageway. The bridge is clearly inadequate for the heavy load of today, and a replacement is being built some 2 km north-east of it on a major deviation of Trunk Road No. 95 — the Picton-Wollongong road. The deviation extends almost 10 km from Maldon to Wilton. On completion of the new concrete structure and the associated deviation, the former route will be deproclaimed.

The suspension bridge built in 1903 was noticeably different from the one now standing. The original structure had a much greater timber content, particularly the bulky timber towers supporting the cables.

Damage by 1939 fire

On 14 January 1939, a fire, driven along the ravine by strong winds, extensively damaged the original bridge. The downstream tower at the Maldon end was completely destroyed. The cable it had supported dropped by 5 m, twisting the end of the bridge and thrusting it almost 2 m downstream. The fire also caused extensive damage to the other timber towers, the all-timber deck and the short timber beam approach spans.

Investigations showed that the cables were not damaged in any way by the heat, nor was the downstream cable stretched as a result of the collapse of the tower and the fall of the span at the Maldon end. However, the steel trusses were twisted during the partial collapse, and local distortions to the lower chords of the trusses had occurred due to the heat from the burning deck timbers.

Access to the bridge was blocked by the fire, and no successful attempt could be made by the local residents to douse the flames until the deck was thoroughly alight. It was claimed at the time that the steelwork was ironically saved by this barrier of fire, as the trusses might have been embrittled by rapid cooling had they been sprayed with water while hot.

To safeguard against damage by future fires, steel towers were used in the reconstructed bridge, supported on the old concrete abutments.

Because of the state of the bridge, and the position of the remaining towers, all of the new towers were built slightly out of position, and were later moved into their permanent positions. A temporary frame was used at the Maldon end to raise the fallen cable.

Further details of this fire damage and subsequent repairs are given in an article entitled "Reconstruction of Maldon Suspension Bridge", which appeared in the February 1940 issue of "Main Roads" (Vol. 11, No. 2, pp. 63-68).

Load limits revised

The original 1903 structure was designed to support a 16 t traction engine with a maximum axle load of 9.5 t. The limit of 16 t, together with a speed restriction equivalent to 25 km/h, existed until 1969.

The Picton-Wollongong road had, by then, become one of a number of coal haul roads serving the Port Kembla coal loader. Considerable pressure was

therefore applied in order to have the load limit on the bridge lifted to a more suitable level. To facilitate this, the kerbs were moved inwards, reducing the carriageway width to 3.6 m and effectively restricting the traffic to the centre of the bridge and limiting flow to a single lane at a time. In 1971 a load limit of 26.5 t was imposed and only one truck was allowed on the bridge at any one time, in order to safeguard the structure.

At the same time as these new limits were being imposed, a number of alternatives for strengthening the bridge were considered. The high cost of the extensive strengthening required and the expected life of the bridge led to the decision to carry out only necessary maintenance and to prepare a design for the bridge's replacement. In 1976 the cable support towers (which had become noticeably twisted and deflected) were straightened.

A new bridge site

With a new bridge design being considered, the bridge approaches also came under scrutiny. The approaches to the existing bridge, built more than 75 years ago, are steep and winding. The line, grade and width would have suited the horse and bullock traffic and the new "horseless carriage" of that time, but they are unsuitable for modern vehicles.

An article on the widening and strengthening of the road from Maldon to Broughton Pass near Wilton – known at that time as Main Road No. 179 – appeared in the December 1952 issue of "Main Roads" (Vol. 18, No. 2, pp. 59-61). It emphasised the need then for an all-weather alternative route for Hume Highway traffic to bypass the low-level bridge at Camden during times of flood.

With the opportunity to improve the length of Trunk Road No. 95 between Picton and Wilton, the Department set out to locate the most suitable route, including the provision of a bridge over the Main Southern Railway Line and an interchange with the F5 – South Western Freeway, as well as the provision of a replacement bridge over the Nepean River.

The Nepean River in this region runs in a gorge about 60 m deep. In times of flood it often rises up to 20 m but this would pose little threat to a high level crossing. However, choosing the most economical site to cross the gorge between Stonequarry Creek and the Razorback Range did provide a challenge. Other constraints on the site location included the large cement works at Maldon, and the grading of the country at the top of the Nepean Groge.

New route considered

The surrounding area was examined by ground inspection and from the Department's helicopter. Accurate contour plans were then prepared photogrammetrically, based on survey work made available by Clutha Development Pty. Ltd. and supplemented by the Department.

Eight possible lines were identified and their grading, approximate earthworks, and likely bridge lengths, widths and angles of skew were determined. The eight lines were then closely examined in the field by senior Departmental bridge and road personnel. A map showing these lines appears on the centre pages of this issue. Lines 7 and 8 upstream of the existing Maldon Bridge were rejected, as the necessary grades would require climbing lanes to extend over the bridge, doubling the necessary bridge width. In addition, coal traffic from the west would have to pass through Picton Shopping Centre, negotiate the narrow subway beneath the railway line, continue south along a steep grade and past the Picton High School.

Lines 5 and 6 near the existing bridge would have required longer bridges than the other lines, and provision for traffic during construction would have been difficult. Of the four possible lines downstream of the existing bridge, line 4 was rejected because of the difficulty in getting an acceptable curve close to the bridge and because of its effect on the nearby cement works. Lines 1 and 3 were rejected for reasons of poor alignment and length.

The accepted route – line 2 – was then developed to connect the new road via an interchange with the F5 – South Western Freeway. Wollondilly Shire Council formally accepted the route on 24 January 1974, and agreed that its design and construction would be the responsibility of the Department.

The road design was completed in June 1976. The new route will be 9.8 km long, with a pavement width of 7.4 m, plus wide shoulders. The steepest grade will be 6% and the sharpest curve will have an 800 m radius. A climbing lane will extend to the east from the new bridge over the Nepean River.

A view of the suspension bridge from the Maldon end immediately after the fire in January 1939, showing portions of the structure still smouldering.

Another view of the damaged bridge showing the suspended span and the damaged upstream tower at the Maldon end. The downstream tower was completely destroyed, as was the timber deck and three approach spans.

An *absorbing* design

In July 1974, Bridge Design Consultants Pty. Ltd. were commissioned by the Department to prepare a design for the new bridge. After considerable preliminary work into feasible structural systems, and an extensive study into mining subsidence and earthquake effects, a twin steel box girder scheme was chosen. The girders were to be continuous over the three spans with the concrete deck acting compositely with the steel boxes. The consultants proposed to erect the girders without any substantial temporary works, by launching one girder at a time.

The site is within 5 km of Picton, which is regarded as an epicentre for recent earthquake activity. The area is classified as being Zone 1 on the Seismic Zone Classification. Provision for earthquake was therefore included in the design. Two coal seams exist at approximately 400 m below the river bed; the upper being the Bulli seam (about 2 m thick), and the Balgownie seam (1 m thick) some 6 m lower. The Department of Mines undertook to regulate mining so that the structure will be protected from settlement due to coal extraction. However, the design allows for a small extent of accidental subsidence.

In the case of the earthquake provisions, tests were carried out by the University of Wollongong on a prototype mechanism comprising hydraulic dampers and frictional energy absorbers to be installed at the abutments.

The lowest tenderer for the construction of the bridge was John Holland (Constructions) Pty. Ltd., who also submitted an alternative tender for a prestressed concrete bridge. The alternative tender was accepted because of its lower initial cost, together with the expected lower maintenance costs. The contract for the amount of $1,884,550 commenced on 5 December 1977.

Balanced cantilever design

The accepted design prepared by John Holland (Constructions) Pty. Ltd. comprises a single cell prestressed concrete box girder of variable depth, erected by balanced cantilever construction, working symmetrically outwards from each pier. The bridge will consist of three spans, 43.5 m, 91.0 m and 43.5 m long, with approach slabs at each abutment, giving an overall length of 186 m. The superstructure will be supported on single reinforced concrete piers, 3.2 m in diameter, approximately 40 m high and reinforced concrete abutments, all founded on sandstone.

Being constructed wholly by the balanced cantilever method, this bridge will be the first of its type to be built in New South Wales, and the first in Australia to be constructed in-situ. The spans, deck width, barriers and provisions for mining subsidence and earthquake were adapted from the original design prepared by Bridge Design Consultants Pty. Ltd.

Piers and abutments

The 3.2 m diameter solid cylindrical pier columns were adopted to allow the use of slip forming for construction, and to provide the necessary flexibility under mining subsidence and earthquake conditions.

The piers have also been designed to allow for rotation of the footing base in case of mining subsidence. There will be provision in the pier bearings for the superstructure to be returned to its normal position after subsidence, and any flexure in the pier to be released.

Foundations for the piers consist of spread footings 9 x 6 m. The abutments will be of reinforced concrete on spread footings, anchored into rock by four rock anchors at each abutment. Approach slabs of 3.9 m will be provided at each abutment. The abutments will also house the mechanisms to resist seismic action and will include substantial thrust blocks.

Expansion joints and bearings

Expansion joints will be provided at each abutment only. The expansion joint consists of cantilevered steel finger plates which also allow for rotation between the deck and the abutment.

A single fixed pot-type bearing of 2500 t capacity will be provided at each pier. Allowance has been made for the possible replacement at a later date of these bearings, by including provision to jack up the superstructure off the pier crosshead.

A tongue-thrust bearing of 100 t capacity will be provided at each abutment to resist transverse horizontal forces, caused by earthquakes. The expansion bearings at the abutments are in the form of pin-ended struts 2 m in length, attached to the underside of the girder webs. These strut/tie connections are able to resist uplift forces during service conditions and to resist the superstructure torsion, while simultaneously permitting longitudinal movement of the superstructure.

Details of superstructure

The 11.83 m width of superstructure will provide a carriageway 9.2 m wide and a 1.2 m footway on the upstream side of the bridge. The carriageway will have a two-way 3% crossfall and will be paved with 50 mm thick asphaltic concrete. A single rail steel traffic barrier will be mounted on the parapets and a steel grill type pedestrian railing provided on the outside of the footway.

The superstructure will consist of a single cell concrete box girder with side cantilevers, and will vary in depth from 5 m at the piers to 2 m at the abutments and at midspan. The bottom flange of the box section will also vary in depth from 390 mm near the pier to 180 mm at midspan and the abutments. The webs will have a constant thickness of 375 mm.

The box section will be longitudinally prestressed by steel tendons located in the top and bottom flanges. The tendons in the top flange will be anchored either at the top of the webs or in tapered blocks projecting down from the top flange. Tapered blocks above the lower slab will provide anchorage for the bottom tendons.

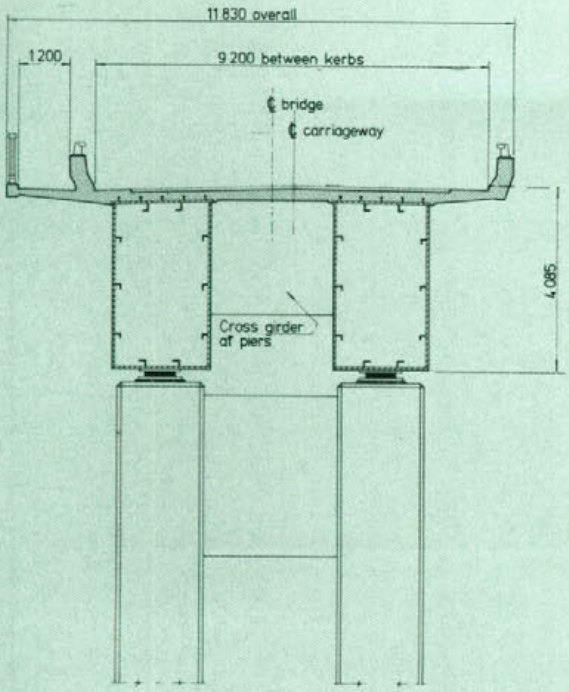
The design requires 68 top flange tendons and 56 bottom flange tendons of varying length.

Each top flange tendon comprises 19 nominal 12.5 mm diameter 7-wire supergrade low relaxation strands. The jacking force for each tendon is 2970 kN (85% of minimum breaking load). The six shortest tendons in the top flange are jacked from one end only and the remaining tendons are stressed from both ends simultaneously.

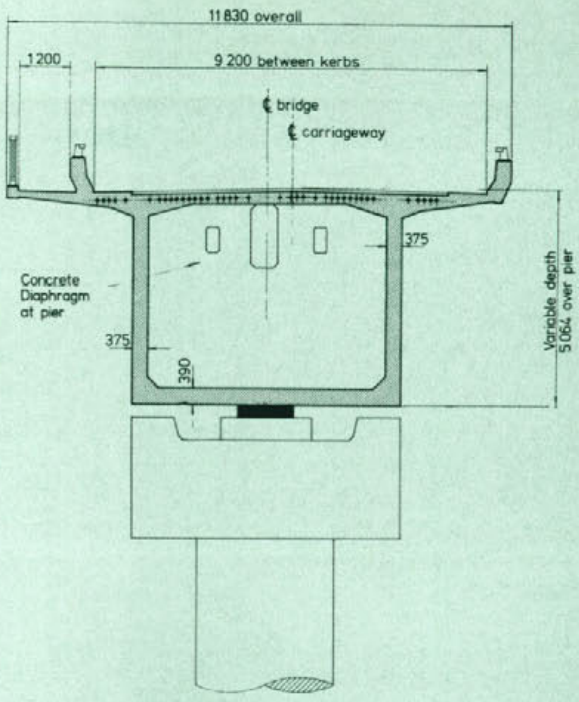
The bottom flange tendons are 12 nominal 12.5 mm diameter 7-wire supergrade, low relaxation strands jacked to between 1725 kN and 1880 kN (78% and 85% respectively for minimum breaking load).

The girder will be erected by working symmetrically outwards from each pier. Two 3.5 m long blocks will be added simultaneously, one each side of the pier, at each stage.

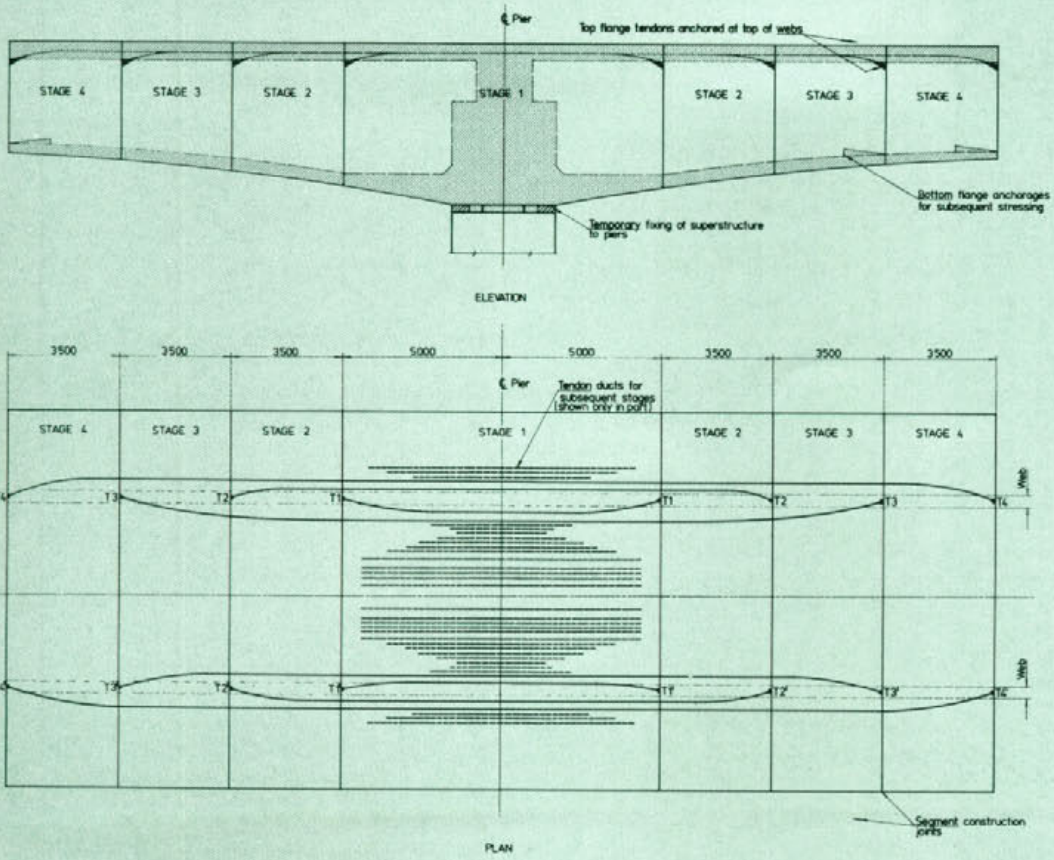
A construction prop will be required between the pier crosshead and the abutment to provide a longitudinal restraint to the pier during construction, thus reducing the bending moments at the pier base.

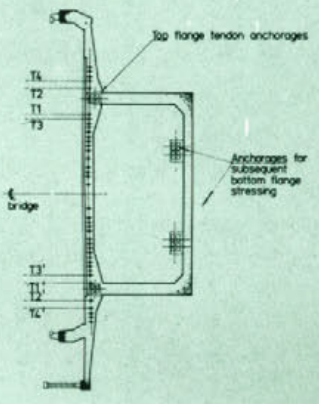


CONFORMING TENDER: TWIN STEEL BOX GIRDERS



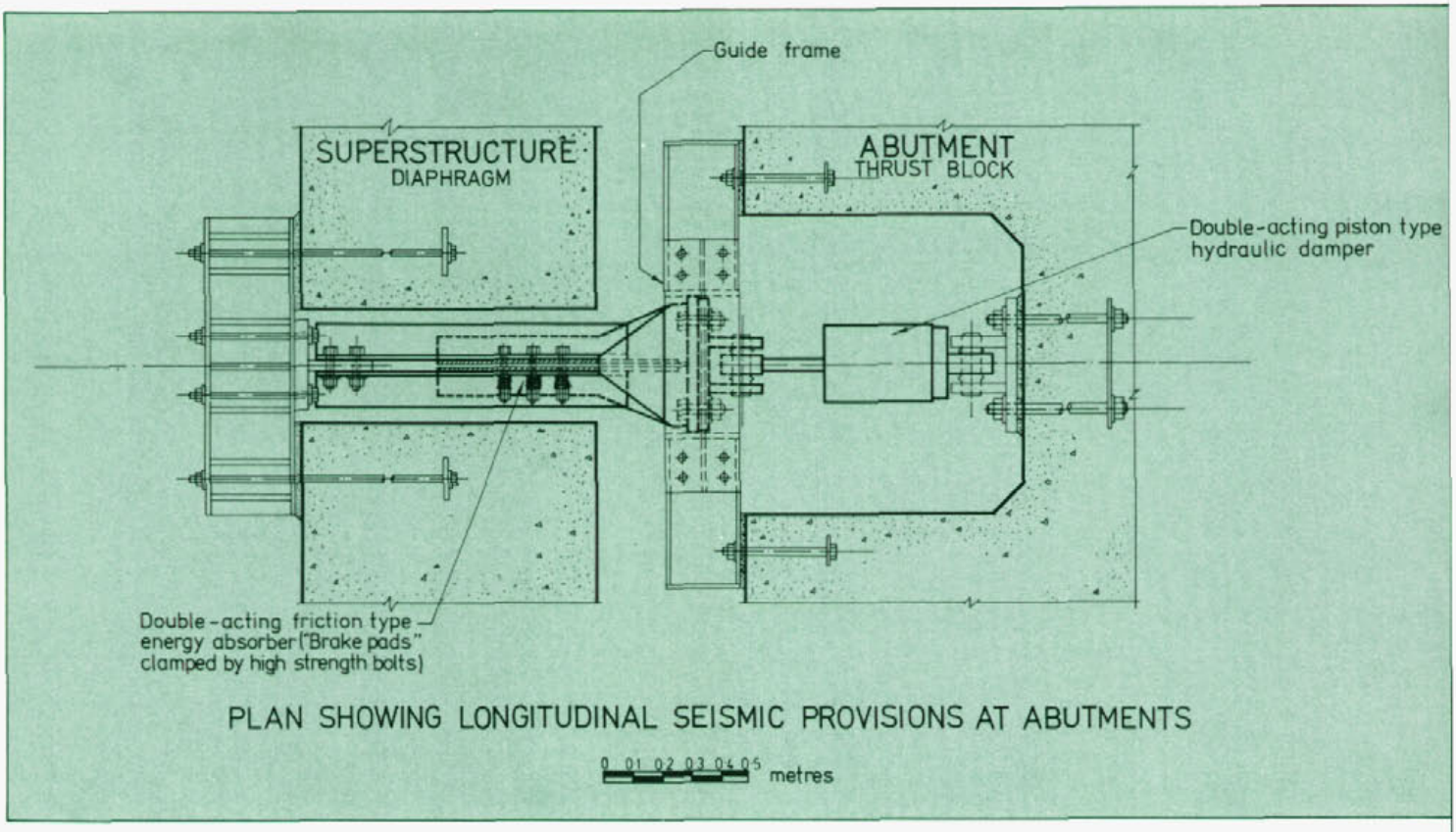
ALTERNATIVE TENDER
SINGLE CELL PRESTRESSED CONCRETE BOX GIRDER





TYPICAL LAYOUT OF TOP FLANGE TENDONS

0 2 4 6 8 10 m



PLAN SHOWING LONGITUDINAL SEISMIC PROVISIONS AT ABUTMENTS

The superstructure will be pinned to the piers and allowed to move longitudinally at each abutment. Expansion and contraction of the main span due to temperature will cause bending in the piers. Longitudinal forces from traffic and wind gusts will be shared between the pier bearings and double-acting hydraulic dampers provided at each abutment. Transverse loads are also to be distributed between piers and abutments through the pinned pier bearings and the tongue thrust bearing at each abutment.

Seismic force provisions

Horizontal seismic force components will be resisted laterally by the bridge superstructure in the same manner as transverse wind loads. The tongue-thrust bearings on the centreline of the structure will transfer the horizontal load to each abutment, tied down by rock anchors.

The longitudinal component of the horizontal seismic force is resisted by two hydraulic dampers at each end of the superstructure. The hydraulic dampers have a slow response to sudden loads, and, as the stiffness of the deck system is much greater than the flexural stiffness of the piers, the abutments will resist the total applied load. However, to avoid damage to the dampers, bolted joints are placed between the dampers and the abutments. Each bolted joint is designed to slip at a load of 16 t, the maximum design capacity of the hydraulic dampers, and to provide this constant damping force in each direction of movement.

Under traffic loading the hydraulic dampers still have a slow response, but as the design force does not exceed 16 t at each damper, the forces are transferred to the abutment. However, under slowly applied loads, such as from temperature, the damper response is such that no resistance is offered and no forces are developed.

Subsidence provisions

Preliminary ground strains and rotations were derived by Bridge Design Consultants Pty. Ltd. from subsidence profiles drawn up by the Coalfields Branch of the New South Wales Department of Mines. A later decision by the Department of Mines to allow only first workings of the underlying coal seams reduced the risk of mining subsidence. Movements would then not take place until the coal pillars had deteriorated sufficiently to collapse under load. The timing, extent and nature of any such subsidence, however, cannot be predicted. Means of relocating the pier bearings relative to the superstructure in the event of any subsidence, therefore, was felt desirable.

The effect of ground rotations on the piers was also significant and in view of the remote possibility of any subsidence, and the likelihood of an intermediate adjustment, a lesser value than that derived from the profiles was adopted. The piers were thus designed to accommodate rotation that would displace their tops by 50 mm, if unrestrained by the superstructure.

The superstructure was also designed to resist such movement, and to allow for relative vertical displacement of piers and/or abutments of 50 mm.

Construction

Construction of the bridge and deviation is progressing well. It is programmed to be completed in 1981, making available the Maldon to Wilton Link at the same time as the opening of the F5 – South Western Freeway between Kenny Hill and Yanderra.

A subsequent article dealing with the construction details of the bridge, and information on the slip-forming process for the pier construction, will appear in a forthcoming issue of "Main Roads". ●

Opening of Maldon Suspension Bridge — 75 Years Ago

Construction of the first bridge over the Nepean River at Maldon commenced early in 1901 and the new structure was opened to traffic of Tuesday, 3 February 1903. An official opening by the Minister for Works, Mr. E. W. O'Sullivan, M.L.A., was held on Thursday, 12 March 1903.

The following extracts from the Picton Post and Advocate give us a vivid word picture of events in an age when life was different from ours in so many ways and yet so similar in others.

A somewhat cynical reference to the commencement of work in Maldon (at the site known then as "Harvey's Crossing") appeared on 19 June 1901 (p.2).

"There is every prospect of the bridge over the Nepean River at Harvey's Crossing soon becoming an accomplished fact. A good deal of uncertainty existed as to whether the present Government intended going on with the work, some persons being inclined to believe that it was only an election dodge, and that as soon as this was over the matter would be hung up again for years. No doubt this idea became instilled into the minds of many by the vagaries of past Governments over the work in question, but the latest to hand is that a large quantity of timber necessary in the construction has been landed on the spot, while the workmen employed are putting on the finishing touches to the trenches, which are to receive the concrete where the cables are to be fastened. Land-owners have also been approached relative to the land through which the proposed deviations connecting with the road will go. This information should raise the spirits of all parties concerned, and the sooner the structure is built the better, for if ever a bridge was needed in the country for the convenience of the public this one is."

The bridge was built by the Department of Public Works using *"day labour"*, as explained in the Picton Post issue of 25 February 1903, (p.3).

"Mr. James McCall, Bridge Inspector, has courteously supplied us with the following particulars in regard to the bridge:— The Nepean River, which runs parallel to the Great Southern Railway from Menangle to Picton, is crossed by road at two places only in the whole of the distance, one near Maldon, and the other near Douglas Park railway station.

Before finally determining upon the position at which this bridge was to be built due consideration was given to the claims of both these sites, but it was decided that that near Maldon presented advantages both from a traffic point of view, and also in regard to economy of construction. The bridge has accordingly been erected at Harvey's Crossing on the road connecting Wilton with the Great Southern Railway at Maldon Station. Prior to the erection of the bridge the road used to cross the Nepean River at a stone causeway some 80 feet below the level of the deck of the new structure, but the approaches were steep and difficult, and the crossing was constantly being damaged by floods, causing delays to traffic and heavy expenditure in maintenance.

The main bridge is a stiffened suspension structure of an uncommon type, inasmuch as the main cables after leaving the towers are carried upwards to an anchorage in the sandstone cliff above the bridge instead of downwards as is usually the case. The main span is 226 feet centres, carried by suspension rods from the cables, of which there are fourteen on either side of the bridge. The cables have socketed end connections secured to steel girders in anchorages, cut out of the solid rock and accessible for inspection. The stiffening trusses are of steel hinged at the towers and also at the centre, to allow for rise and fall of the cables due to temperature changes. The roadway is of timber planking 15 feet wide between kerbs, carried on stringers and cross girders.

In addition to the main span there are seven timber approach spans, built on a curve to meet the roadway on either side of the river. The approaches include a considerable retaining wall on the Maldon side. The materials required have been supplied under various contracts. The cables were imported, the steel and ironwork in stiffening trusses etc. being manufactured by the Clyde Engineering Co., and the timber supplied by various firms. The erection of the structure has been carried out by day labour. The bridge was designed by the Engineer for Bridges, Mr. E. M. deBurgh, and the erection carried out by Mr. James McCall, Bridge Inspector."

Some idea of the local planning for the official ceremony, the picnic and the dance on 12 March and the social significance of the entertainment of the guests — can be gauged from the quite lengthy reports which appeared in the Picton Post on 25 February and 11 March 1903. Space will only allow us to include a few typical extracts.

Meeting, Friday 20 February 1903

"The Secretary reported having written to the Minister for Works and the Member for the district, as to when it would be convenient for them to attend the function . . ."

"Mr. H. S. Clifton said . . . It was strange that no reply had been received from either of the Ministers . . . The Ministers did not appear to take much interest in the matter, and did not seem to desire to be present."

"Mr. R. H. Antill . . . said the time of the Ministers was fully occupied, and as the function was only to take the form of a picnic, it would be better to fix a date, and if the Ministers chose to come well and good."

"Mr. Clifton said . . . If the Ministers did not come it would take the heart out of the affair, and would be a great disappointment to the public."

"Mr. McQuiggin said there was one matter which had not been settled, and that was the naming of the bridge. He moved that it be called Maldon Bridge. It was already called by that name, and they could not do better than adhere to it. Besides, it would get away from local prejudices.

Mr. H. Potter seconded the motion which was carried unanimously."

"It was decided to hold the picnic close to the bridge in Mr. Nicolson's paddock, and that the ceremony of declaring the bridge open take place at noon, the picnic to be held at 1 p.m. After discussion it was resolved to cater for 750 persons."

Meeting Thursday, 5 March 1903

"Included in the correspondence was a letter from the Railway Commissoners agreeing to stop the 5.15 p.m. train from Sydney at Maldon so as to enable visitors to the picnic to return at a convenient hour."

"The Catering Committee submitted their report in which it was stated that the tender of Mrs. Sayle for supplying sandwiches had been accepted, that of T. Ruddiman for cake, D. Sell for fruit, and H. S. Clifton for lollies, the expenditure in this direction amounting to £38-19s."

"They submitted an estimate of the liquor they considered would be required, which included two casks of ale, and two dozen bottles of whisky, which, with the soft drinks brought the expenses up to £53 19s 6d."

"Mr. H. S. Clifton considered that the quantity of liquor, both of spirits and beer was excessive, and moved that it be reduced by one-half."

"The motion was, however, negatived, the feeling of the meeting being that the liquor bill was small considering the number of people it was expected would be present."

"The Mayor considered that there should be some kind of reception for the guests, as it would not be right and fitting to ask the Ministers to take their places in the paddock with the general body of picnicers. If they did that the Ministers would never come again."

"Mr. D. White (said) . . . Everybody should be placed on the same footing, and no distinctions made. It was not right that 20 or 30 gentlemen should enjoy the best of the spoil, and the others have to remain outside. The Ministers of the Crown should fare the same as other people."

"Mr. H. Potter reported that he had made inquiries in regard to a band for the occasion, and had received replies from A. E. Hughes, Sydney, stating that he could supply a band of five or more performers at 15s per man: from the Liverpool Band offering to send ten men for £7 15s: and from the Ashfield Band quoting £10 10s for ten men."

"The Games Committee were voted £1 to provide toys for the children."

Meeting Monday 9 March 1903

"The Reception Committee submitted their report in which they recommended that a cold luncheon consisting of poultry, etc. be provided for the guests and the general committee to the number of about 30; also a blue ribbon to stretch across the bridge, and a suitable knife for presentation to the Minister for Works to cut the ribbon."

"Mr. Pritchard said it would be an insult to the Ministers to entertain them with a bun."

"The report of the Reception Committee was then adopted . . .

Mr. Potter then moved that a charge of 5s be made to the luncheon; in the event of there being any vacant chairs the public being entitled to attend the luncheon on payment of a crown.

Mr. McQuiggin seconded the motion.

A considerable amount of discussion took place as to whether the public should be admitted to the luncheon, and Messrs. Larkin and Antill left the room, stating that they would have nothing further to do with the matter.

The motion was carried".

Shortly afterwards

"The meeting, which had dwindled down considerably, then terminated."

On Wednesday, 18 March 1903, the Picton Post published this "eyewitness" account of events at the opening ceremony.

"OPENING OF MALDON BRIDGE
THE OFFICIAL CEREMONY"

"The Maldon Bridge was officially opened by the Minister for Works on Thursday, with considerable eclat. Nearly a thousand people attended the public picnic which constituted the principal feature in connection with the function, and the little hitches which threatened to mar the success of the affair happily came to nought, and the demonstration was fully up to expectations. The committee who had the matter in hand worked hard to make it go, and the absence of grumbling showed how faithfully they had discharged their thankless duties. There was plenty to eat and drink — rather too much liquor for some — and the presence of an efficient band livened the proceedings up considerably. The weather though warm was fine. The opening ceremony was set down for noon, and long before that hour hundreds of people congregated at the bridge to await the arrival of the Minister for Works and the Member for the district, who were driving from Cataract. It was a long, weary wait. The other metropolitan visitors came by train, and were met by members of the Reception Committee, while Mr. J. J. Hill took charge of the band. They crossed the bridge and went along the road to meet the Ministers of the Crown, and on arrival at "Clemont" they were treated to light refreshments by Mrs. Sheil. As the distinguished guests did not put in an appearance at the bridge till well on towards 2 o'clock the crowd returned to the picnic ground and proceeded to enjoy lunch.

The late arrival of the Ministers had one beneficial effect — it reduced the flow of oratory to a minimum. There was time for one toast only, but nobody seemed disappointed, unless, perhaps, it was Mr. Fuller, our Federal Member. It was rather hard on him to come all the way from Sydney and then not get a chance to orate. Some 40 gentlemen sat down to luncheon, the Mayor presiding. After the usual loyal toasts had been honoured, the Mayor proposed "The Ministry of New South Wales" coupled with the names of the Hons. O'Sullivan and Kidd. In doing so he said that had it not been for the good work done by the present Government the drought would have been more severely felt than had been the case. Referring to the bridge he said it was a work that was urgently needed by the travelling

This photograph from the 1930's shows the original timber towers before they were damaged during bushfires in 1939 and subsequently replaced by steel-work.

public between Picton and Wollongong. He hoped before before long to see the approaches to the bridge completed and stated that the names of O'Sullivan and Kidd would be long remembered amongst us.

The toasts was drunk with musical honours.

Hon. E. W. O'Sullivan, who was cordially received, said he had great pleasure in responding to the toast. The Ministry, he said, was endeavouring to do its duty under very adverse circumstances. No Government in this State ever took office under more distressing circumstances than that to which he and Mr. Kidd had the honour to belong. He referred to the expenditure under the heading of the plaque, the resumptions, and Commonwealth celebrations, and stated that had it not been for the vigorous public works policy pursued by the Government the drought which had paralysed the agricultural, pastoral and mining industries, would have been more acutely felt. He did not say that these works had been started with the sole object of giving work as some of their critics in the Press alleged. They were started with the object of opening up the country and promote settlement, but it so happened by a curious combination of circumstances that they came at the right time thereby saving the country from financial panic . . .

He had been charged with being partial to day labour, but if the Department could carry out work more cheaply than under the contract system he contended that in the interests of the people it was his duty to do so. The Maldon Bridge was a triumph of the day labour system and it was only one of the many works which had been carried out cheaper than by contract. On the other hand if a contractor could do work cheaper than the Departmental estimate he would get the job . . .

In conclusion he said that Maldon Bridge cost £8000 to build, and congratulated Mr. De Burgh, the Engineer, on the erection of such a structure. It was a new idea, but had worked out wonderfully well. It was owing to the indefatigable efforts of Mr. Kidd that the bridge was an accomplished fact, as the Member for this district had, in season and out of season urged the necessity for its construction (Cheers).

Hon. J. Kidd also responded to the toast. He said it was a good thing that the proposed bridge of ten years ago was not built as it would have been a make-shift structure only. The present bridge was a credit to all concerned, and would serve all the requirements of the district. The Minister for Works had been blamed for not keeping his promises, but the people of Picton could not complain on that score. In regard to the cutting down of Picton Hill he would ask them to have a little patience. The Government had to get money the same as private individuals before they could carry out work, but he believed Mr. O'Sullivan would soon be in funds, and the work would be done . . .

Owing to want of time the other toasts on the list were abandoned, and the Minister for Works proceeded to formally declare the bridge open.

The Minister for Works then proceeded to perform the ceremony of opening the bridge. He congratulated them on the erection of such a handsome structure, which was a credit to the Engineer for Bridges, Mr. de Burgh. On behalf of the Government he had much pleasure in handing the bridge over to the people. Mr. O'Sullivan, amid cheers, then cut the ribbon which had been stretched across the bridge, a scramble being made for a piece of the ribbon to keep as a memento of the occasion.

Mr. G. W. Fuller, M.H.R. for Illawarra, spoke a few words in which he congratulated the residents of Picton and Wilton on the erection of such a bridge, which would prove a great boon to the district.

The Ministers and other guests were then driven to Maldon where they boarded the train and returned to Sydney.

A word of praise is due to the Ashfield Borough Band for the excellent services they rendered in connection with the function. Every man in it was a musician and the selections they played were much appreciated. It was the best band that has visited Picton for many a year, and when we want a band we will know where to go. The music at the dance in the evening was something to be remembered." •

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 September 1978.

Council	Road No.	Works or Service	Name of Successful Tenderer	Amount
Dungog	Various	Supply and spray up to 70,080 litres of R90 bitumen on 58,400 m^2 of pavement and spread aggregate on various main roads.	Boral Road Services	$21,000.00
Richmond River	Trunk Road No. 83	Construction of bridge over Branch Creek, 15.5 km south of Casino.	Hastings Pre-stressed Concrete Pty Ltd	$40,932.00
Singleton	State Highway No. 9	Supply and lay up to 1,450 t of asphaltic concrete for reconstruction at Singleton.	Boral Road Services Pty Ltd.	$54,309.00
Wollondilly	Main Road No. 177	Hotmix strengthening and surfacing, approx. 8 km east of Appin.	Boral Asphalt Ltd.	$79,258.00

Tenders Accepted by the 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 September 1978.

Road No.	Work or Service	Name of Successful Tenderer	Amount
F3 – Sydney-Newcastle Freeway	Shire of Wyong. Earthworks, drainage and stabilisation from Ourimbah Creek to Cobbs Rd, 84.5-87.4 km north of Sydney	Dostal and Company Civil Engineering Pty Ltd	Rates as scheduled in tender
F5 – South Western Freeway	City of Campbelltown. Construction of bridge to carry west-bound carriageway of Camden Rd over F5.	White Industries Ltd in joint venture with Enpro Constructions Pty Ltd.	$416,986.90
F5 – South Western Freeway	Shire of Wollondilly. Supply, fabrication, shop protective treatment and delivery of steel bridge girders for bridge over F5 at Trunk Road No. 95.	A.N.I. Engineering Pty Ltd.	$159,800.00

Tenders Accepted by the 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 September 1978.

Road No.	Work or Service	Name of Successful Tenderer	Amount
State Highway No. 2	Hume Highway. Shire of Gundagai. Construction of bridge to carry O'Hagan St. Gundagai over Highway.	Civcon Pty Ltd.	$225,058.00
State Highway No. 2	Hume Highway. Shire of Mittagong. Widening of bridge over Nattai River, 0.9 km north of Mittagong.	Pearson Bridge (N.S.W.) Pty Ltd.	$84,029.00
State Highway No. 2	Hume Highway. Shire of Mulwaree. Supply and delivery of quicklime for National Highway maintenance, improvement and construction programmes.	Blue Circle Southern Cement Ltd.	$21,186.00
State Highway No. 5 and Trunk Road No. 54	Great Western Highway and other roads. City of Bathurst. Kerbing, guttering and associated works for reconstruction and channelisation of Durham and Bentinck Sts, Bathurst.	R. Walsh	$33,151.00
State Highway No. 5, Trunk Road No. 55 an Main Roads Nos. 184 and 516	Great Western Highway and other roads. Cities of Blue Mountains, Greater Lithgow and Bathurst and Shire of Evans. Supply and delivery of 4,000 t of course sand to various locations within Dept's Central Mountains Division.	Kobles Transport	$35,000.00
State Highway No. 8	Barrier Highway. Shire of Central Darling. Sinking of foundation test bores for construction of bridges over Talyawalka flood plain at 9.2, 10.6, 11.6, 12.0 and 13.2 km east of Wilcannia.	Stewart Bros. Pty Ltd.	$30,000.00
State Highway No. 9	New England Highway. Shire of Denman. Supply up to 106,000 litres of class 160 bitumen and spray bitumen and Dept's cutter oil at construction site Near Sandy Creek, 3.2-10.3 km north of Muswellbrook.	Boral Road Services	$25,333.00
State Highway No. 9	New England Highway. City of Maitland. Supply and lay up to 1,000 t of 10 mm asphaltic concrete for reconstruction between Verge St and Anambah Rd, Rutherford, 2.7-4.7 km west of Maitland.	Bitupave Ltd.	$35,290.00
State Highway No. 9	New England Highway. City of Maitland. Supply and lay up to 1,400 t of 20 mm asphaltic concrete for reconstruction between Verge St and Anambah Rd, Rutherford, 2.7-4.7 km west of Maitland.	Bitupave Ltd.	$48,818.00
State Highway No. 10	Pacific Highway. Shire of Manning. Supply, heat and spray class 160 bitumen between 25 km south and 20 km north of Taree.	Shorncliffe Pty Ltd.	$46,270.00
State Highway No. 10	Pacific Highway. Shires of Manning and Hastings. Supply, heat and spray class 160 bitumen, 20-66 km north of Taree.	Shorncliffe Pty Ltd.	$46,770.00
State Highway No. 10	Pacific Highway. Shire of Wyong. Supply and delivery of up to 20,000 m^3 of selected sub-grade material for construction between Saliena Ave and Elizabeth Bay Rd, Lake Munmorah.	D. & J. Constructions Pty Ltd.	$46,000.00
State Highway No. 10	Pacific Highway. Shire of Wyong. Loading and removal of up to 30,000 m^3 of spoil material for construction between Saliena Ave and Elizabeth Bay Rd, Lake Munmorah.	A. Matthews Pty Ltd.	$28,500.00
State Highway No. 10	Pacific Highway. Shire of Wyong. Supply and delivery of up to 10,000 m^3 of selected sub-grade material for construction between Saliena Ave and Elizabeth Bay Rd, Lake Munmorah.	D. & J. Constructions Pty Ltd.	$23,000.00
State Highway No. 10	Pacific Highway. Shire of Coffs Harbour. Win, crush and stockpile up to 15,000 m^3 of crushed rock at Taylors Pit.	Prodger Bros. Construction	$48,000.00
State Highway No. 10	Pacific Highway. Municipality of Ku-ring-gai. Construction of pedestrian subway under Highway near Pymble Railway Station.	Pipeline Boring Pty Ltd.	$103,287.42
State Highway No. 18	Castlereagh Highway. Shire of Walgett. Construction of bridge over Namoi River at Walgett.	A. R. Dickinson Construction Co. Pty Ltd.	$792,045.90
Main Road No. 170	Botany Road, Municipality of Botany. Construction of pile wall foundation at new bridge over Bunnerong main drain, Beauchamp Rd, Matraville.	Vibropile (N.S.W.) Pty Ltd.	$65,685.00
Various	Supply and load up to 1,000 t of 10 mm asphaltic concrete into Dept's trucks for National and State Highways Maintenance and Improvement Programme — in Dept's Hunter Valley Division, centred at Newcastle.	Bitupave Ltd.	$23,900.00
Various	Supply up to 106,000 litres of class 160 bitumen and spray bitumen and Dept's cutter oil, as well as load, haul and spread aggregate; and roll and sweep pavement for State Highways Maintenance and Improvement Programme — in Dept's Hunter Valley Division, centred at Newcastle.	Boral Road Services	$35,140.00
Various	Supply and delivery of up to 1,700 t of 5, 10 and 20 mm nominal size hot mixed cold laid bituminous plant mix to various stockpile sites in Dept's South Grafton Works Office area.	Bitupave Ltd.	$56,046.75
Various	Supply of asphaltic concrete to various sites within Dept's Central Western Division, centred at Parkes.	Bitupave Ltd.	$39,940.00