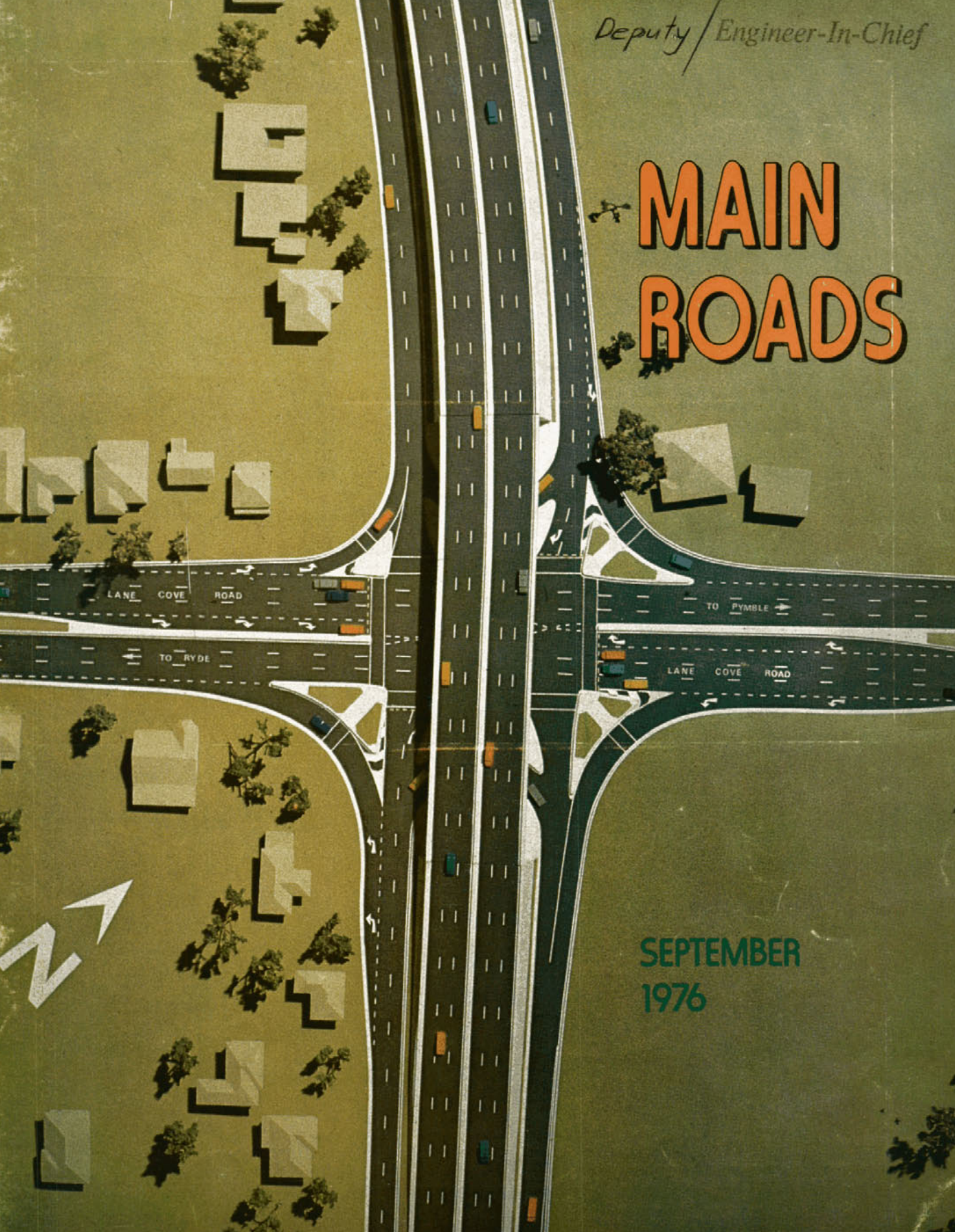
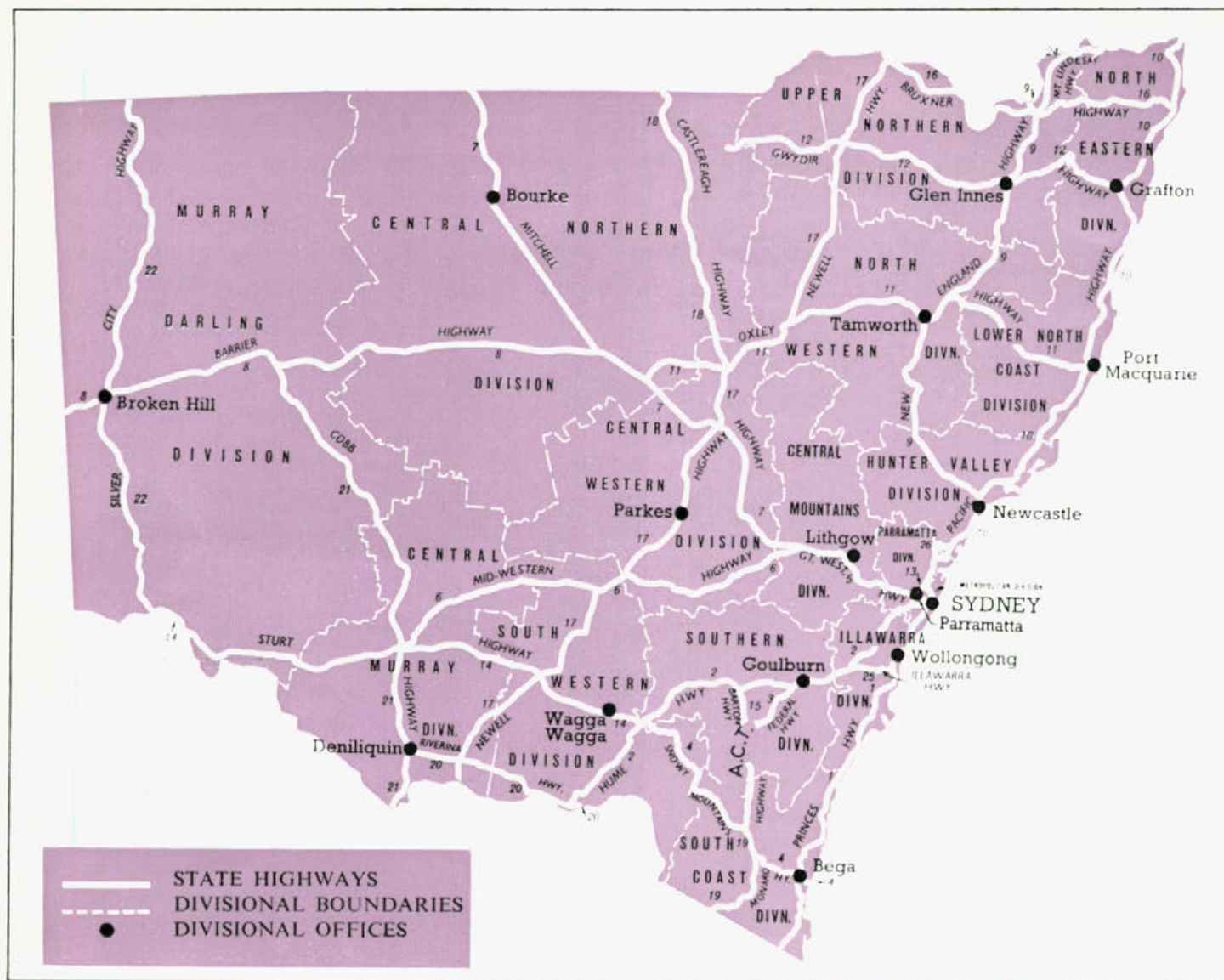


Deputy / Engineer-In-Chief

MAIN ROADS



SEPTEMBER
1976



New South Wales

Area—801 428 km²

Population as at 30th December, 1975—
4 810 900 (estimated)

Length of Public Roads—208 804 km

Number of Motor Vehicles registered as at
30th December, 1975—2 177 200*

* "This figure has been obtained from the Australian Bureau of Statistics. It should be noted that, due to the exclusion of certain categories of vehicles (such as tractors and trailers), etc., this figure is considerably lower than the statistics published prior to December, 1974, which were obtained from the New South Wales Department of Motor Transport."

ROAD CLASSIFICATIONS AND LENGTHS IN NEW SOUTH WALES

Lengths of Main, Tourist and Developmental Roads, as
at 30th June, 1975.

Freeways	..	..	..	..	..	114
State Highways	..	..	..	..	..	10 476
Trunk Roads	..	..	..	..	..	7 080
Ordinary Main Roads	..	..	..	..	..	18 317
Secondary Roads	..	..	..	..	..	285
Tourist Roads	..	..	..	..	..	395
Developmental Roads	..	..	..	..	..	3 608
Unclassified Roads	..	..	..	..	..	2 480
TOTAL	..	..	..	..	..	42 755 km

MAIN ROADS

JOURNAL OF THE DEPARTMENT OF MAIN ROADS, NEW SOUTH WALES

SEPTEMBER, 1976

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Front cover: Scale model of the proposed interchange which will carry Epping Road over Ring Road 3 at North Ryde (see details on page 24).

Back cover: Picturesque views at Narrabri, showing two bridges on the Newell Highway. The bridge over the Namoi River (top) was opened to traffic in November, 1974 and the new bridge over Narrabri Creek, Violet Street (bottom) was opened in May, 1975.

PROPHETS AND PLANNERS

Looking into the future, like looking into a mirror, can bring us face to face with a *puzzling outline*. As we study our reflected image each morning we might well ask "Are things getting better or worse?" Do we see more wrinkles or less, more flab or more muscle, more grey hairs or a distinguished streak of silver?

Likewise if we *crystal ball gaze*, we are faced with conflicting possibilities for the future. Should we be optimistic or pessimistic? In the long view is man, generation by generation, making life happier, more worthwhile and less painful, or is his increasing knowledge only giving him a frightening potential for more fearsome destruction?

In spite of all its frustrations, looking into the future seems to attract all sorts of prophets, at all sorts of levels, and because the unknown has an inherent fascination, we tend to listen expectantly to all sorts of forecasts about all sorts of things, from tomorrow's weather to the "end of the world". What's more, all of us like to try our hand—or rather mind—at it, especially when it comes to sports matches and election results.

"We'll beat the Poms by an innings and 200 runs in the first test, just wait and see."

"Flying Prince is a certainty to win next Saturday."

"Ali will knock him out in the 3rd round."

"Bob'll be Prime Minister, one day!"

The results of sound engineering are, thank heavens, not as unpredictable as football matches but, nevertheless, road and bridge designers (and the public who'll be using the finished products) like to know beforehand just what a certain project will look like when it is completed. For this reason, scale models of some of the Department's major works are built and artist's impressions are commissioned as a preview of coming attractions (see front cover and pages 24-25).

The Department doesn't leave the future to chance; it plans with as skilful calculations and careful predictions as it can. The work of the Advance Planning Section (briefly outlined on page 22) is part of this forward-looking policy—as is also the work of the Advance Planning Committee of NAASRA (mentioned on page 30).

A more recent outcome of our community's desire to look into the future—before things go too far to be altered—are the new government requirements on Environmental Impact Studies (outlined on page 5).

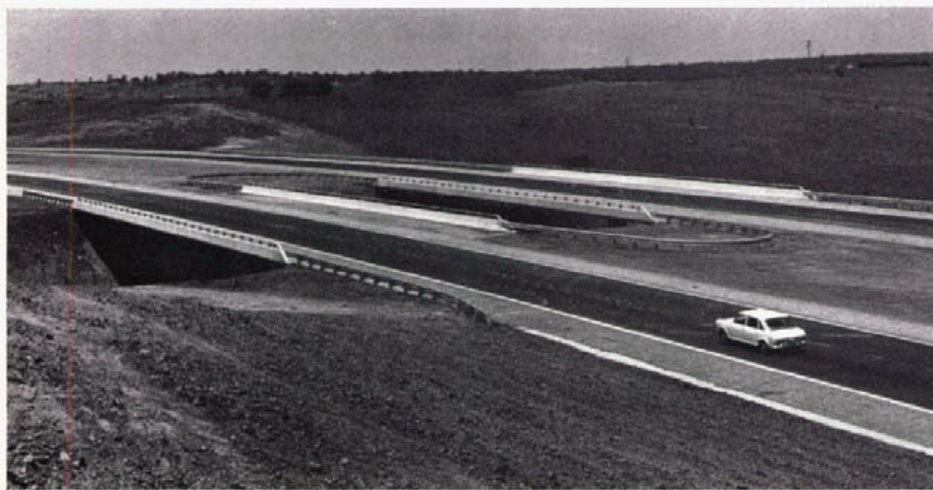
Back in 1789, that dedicated visionary, Governor Arthur Phillip, prefixed a book on his "Voyage to Botany Bay" with a prophetic poem by Erasmus Darwin about Sydney Cove. It included the lines . . .

"There, ray'd from cities o'er the cultur'd land,

Shall bright canals, and solid roads expand."

Amid the grim realities of those first uncertain years of the early colony such a dream was probably hard to hold onto. And even now, in many areas, it is still only coming true—as the solid bituminous surfacing of roads gradually extends throughout the State. It is a continuing and difficult process . . . for whether it's planning roads or building roads, it is hard work turning dreams into realities. And, unlike many visionaries, Departmental officers are involved deeply in both tasks. ●

MORE ABOUT THE F5



SOUTH WESTERN FREEWAY

The planned route of the South Western Freeway extends from the proposed Southern Freeway at Tempe, in a general westerly direction to The Cross Roads near Liverpool and thence through semi-rural and rural conditions in a southerly direction via Campbelltown, Menangle and Douglas Park towards Mittagong.

Construction has been completed from The Cross Roads to Campbelltown and is in hand between Campbelltown and Aylmerton, just north of Mittagong. This section of the Freeway will be approximately 64 km in length and will shorten the existing route via the Hume Highway by 13 km. This decreased distance, together with vastly improved travelling conditions, is expected to cut travelling time between these centres by about one half. The first 7.9 km section from The Cross Roads to Raby Road near Campbelltown was opened on 26th October, 1973. The second 5.8 km section from Raby Road near Campbelltown to Main Road No. 178 (Camden Road) near Kenny Hill was opened on 16th December, 1974.

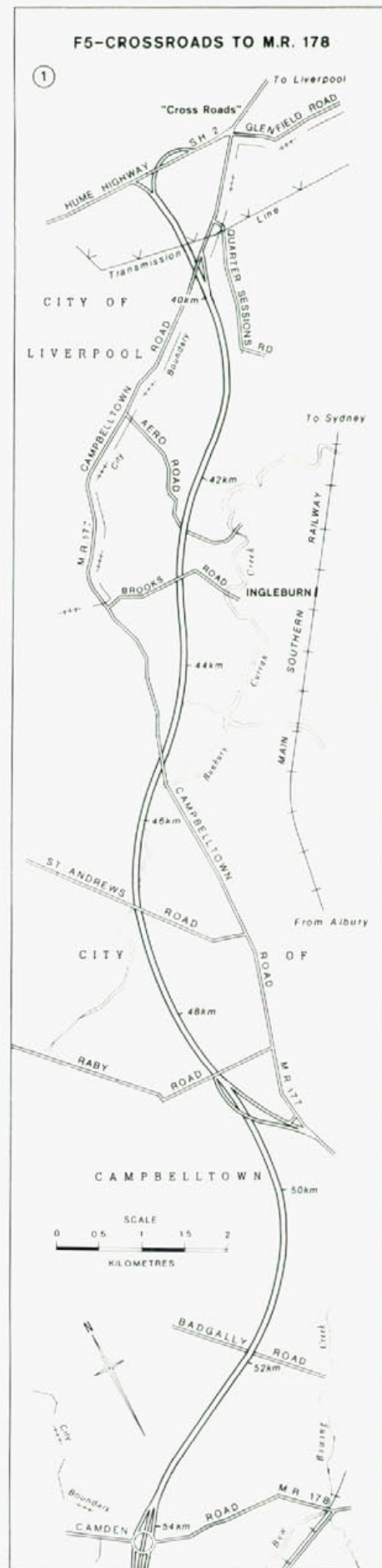
The route of the F5 is through country varying from gently undulating pastures in the north to the more rugged sandstone country on the edge of the Nepean River catchment area in the south. In keeping with the Department's normal practice, special attention has been paid in the design to the blending of the roadworks into the countryside. A substantial landscaping scheme is in progress so as to

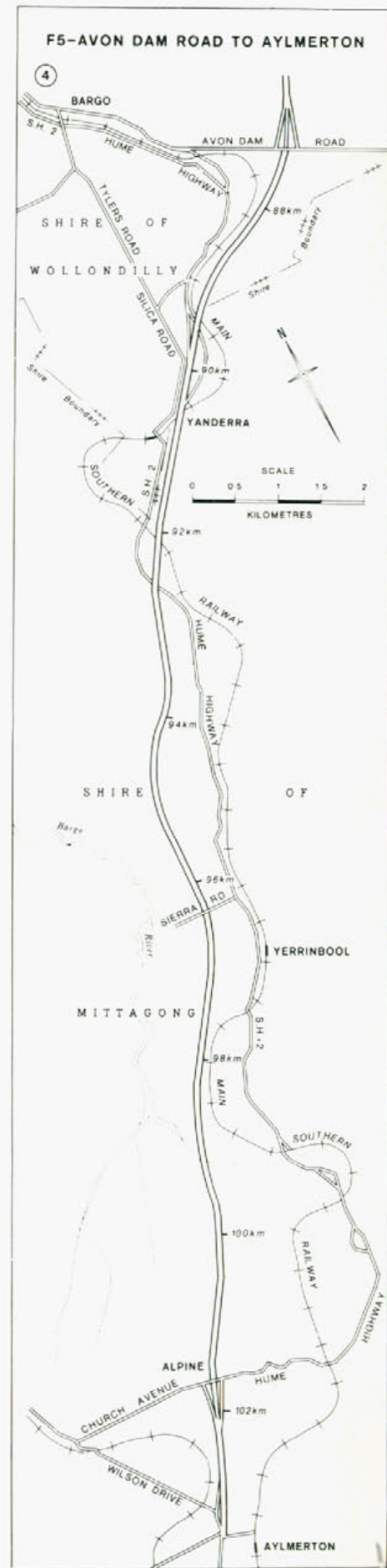
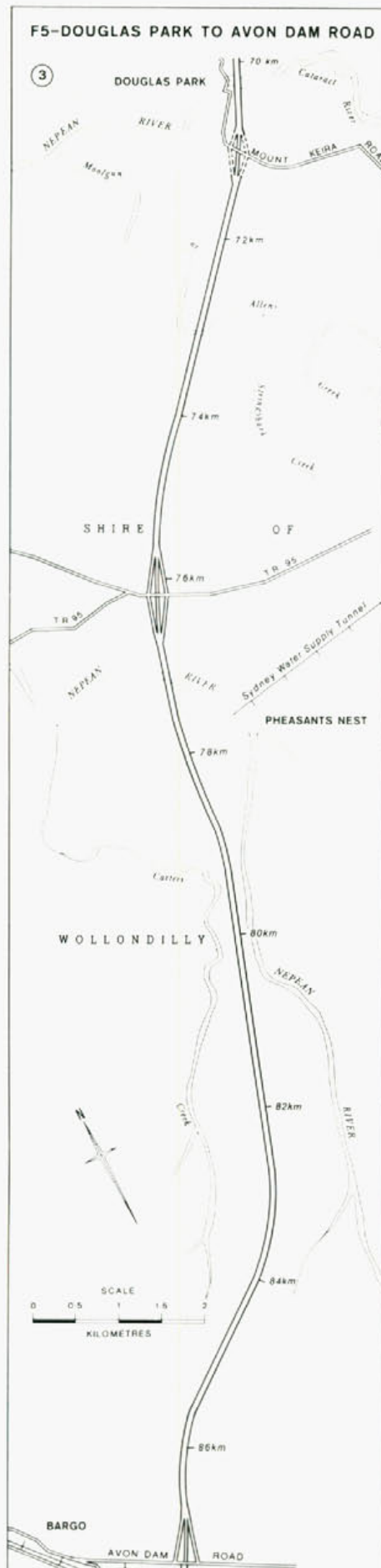
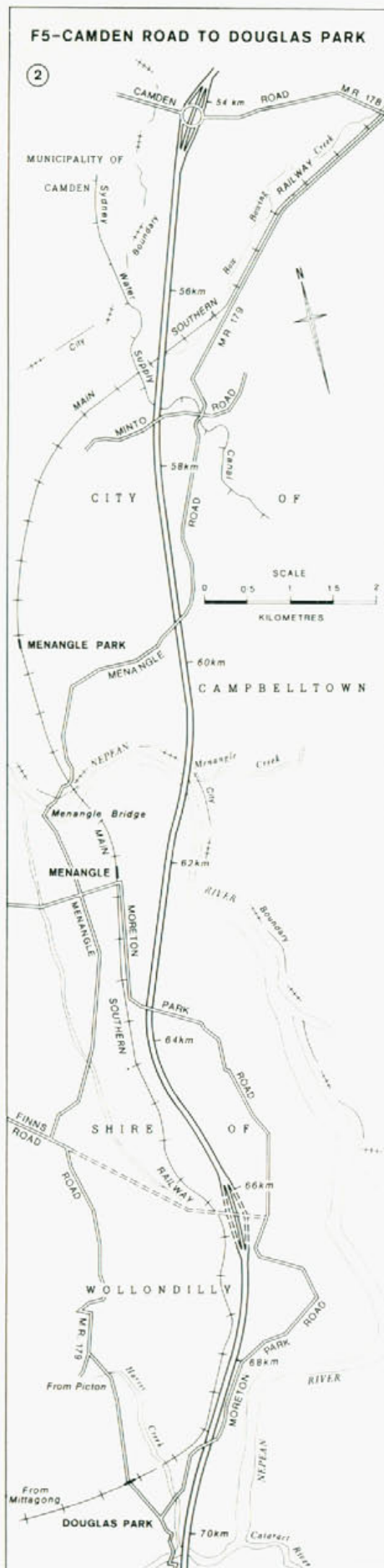
create an overall visual environment of high standard (see also following article).

The initial construction will provide for four lanes of traffic. Each of the two carriageways will be 12.8 metres wide, having two 3.65 metre wide traffic lanes with shoulders on each side. The median is of variable width and the design allows for the carriageways to be widened to three traffic lanes when the need for additional lanes arises in the future.

The construction of the dual carriageways of the full length of the F5 will require the excavation and compaction of 8 600 000 cubic metres of earth and rock as well as the provision of 2 200 000 square metres of road pavement and shoulders. The deepest cut on the section will be 22 metres and the highest fill will be 45 metres.

As freeways provide safe high speed travel by eliminating cross traffic, access is provided for only by specially designed traffic interchanges. Initially, there will be seven interchanges . . . at The Cross Roads, Raby Road, Camden Road, Wilton, Avon Dam Road, Yanderra and Aylmerton. Provision has been made for additional interchanges to cater for future development in the Campbelltown - Camden - Appin growth centres. These interchanges together with three crossings of the Nepean River and the need to separate cross traffic from Freeway traffic require, in all, forty-five bridges. The total length of these bridges would correspond to a two-lane bridge







Aerial view looking southwest over the construction of the F5 at Yanderra, showing where a temporary junction will be made with the Hume Highway (on the right). The Main Southern Railway Line is on the left. These views show the dramatic progress of the work from June, 1975 (above left) to May, 1976 (above right).

over 4.5 km long. The bridges range in size from the twin structures, 334 m long, over the Nepean River at Pheasants Nest to the 12.3 m long bridge over the Sydney Water Supply Channel, 57.3 km south of Sydney.

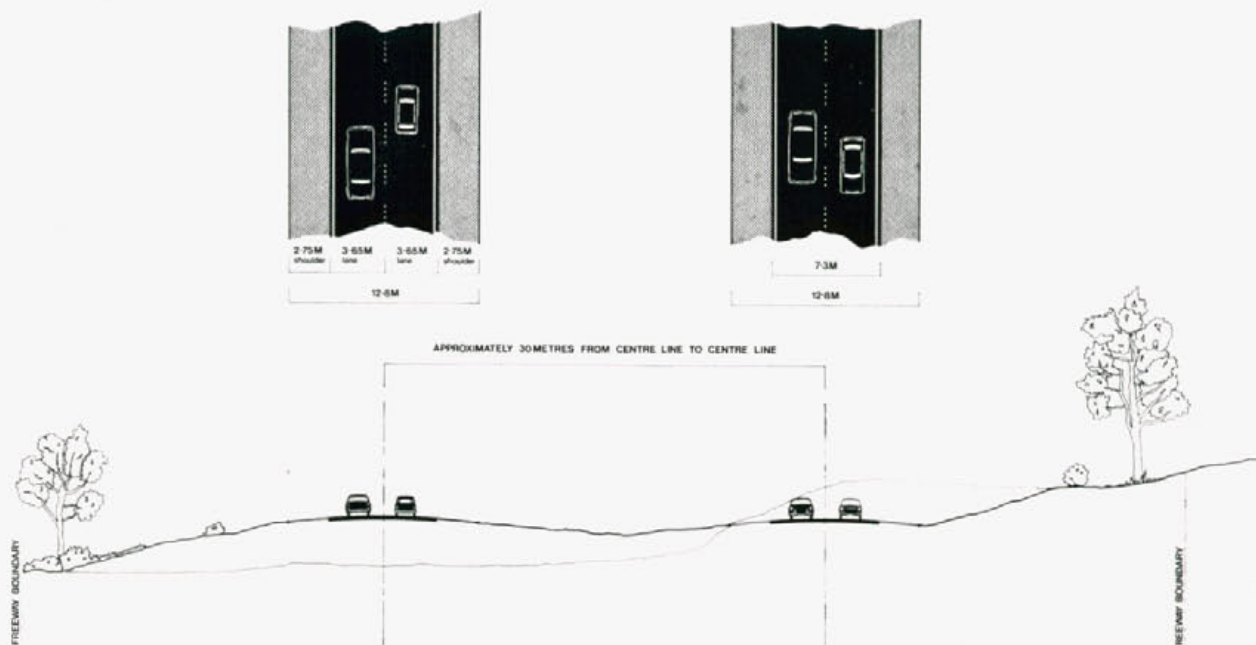
In May, 1976, a tender of \$993,704 was accepted by the Department in connection with construction of a section of the South Western Freeway. The contract was awarded to White Industries Limited for the construction of earthworks, drainage and fencing for the 2.9 km length between Avon Dam Road near Bargo and Yanderra.

Tenders for the construction of the Freeway between Pheasants Nest near Wilton and Avon Dam Road will be called later in the year, as will tenders for a bridge over the Freeway at Avon Dam Road.

The construction of the 13.1 km length of the F5 between Yanderra and Alymerton is proceeding well and it should be opened to traffic by about mid-1977. Construction of the Freeway between Campbelltown and Pheasants Nest (within the City of Campbelltown and the Shire of Wollondilly) is making good headway and is scheduled for completion in 1981. ●

Previous articles on the South Western Freeway have appeared in the following issues of "Main Roads".

- "South Western Expressway—Cross Roads to Campbelltown", March, 1969, Vol. 34, No. 3, pp 99-101.
- "The Shape of Things to Come", March, 1971, Vol. 36, No. 3, pp 76-77.
- "Expressway News", March, 1972, Vol. 37, No. 3, p 92.
- "Focus on Freeways", March, 1973, Vol. 38, No. 3, pp 71-72.
- "Openings", December, 1973, Vol. 39, No. 2, p 51.
- Colour centre spread, March, 1974, Vol. 39, No. 3, pp 80-81.
- "Yerrinbool to Yanderra", June, 1974, Vol. 39, No. 4, p 115.
- "New Section Opened", December, 1974, Vol. 40, No. 2, pp 50-51.



SOME NOTES ON A STUDY OF

THE ENVIRONMENTAL IMPACT OF FREEWAY F5

From near Campbelltown to Yanderra

A growing appreciation of the scope and scale of the environmental changes that can be caused by many of man's activities has led to efforts by various governments throughout the world to control these environmental effects. The measures utilised to achieve this control generally have taken the form of enforcement or inducement through legislation.

In Australia, the most important environmental control legislation at the Federal level is the Environmental Protection (Impact of Proposals) Act 1974, together with supporting statutory rules and administrative procedures. The Act provides far-reaching powers for the Federal Government concerning all developments and other activities involving expenditure of Commonwealth funds. It also gives the Federal Government the right to conduct enquiries on these or any related matters which may be considered to have a significant effect on the environment.

The Roads Grant Act 1974 requires the States to submit a programme of proposed road projects to the Federal Minister for Transport for approval (as outlined in "Main Roads", March, 1975, Vol. 40, No. 3, pp. 66-69). Restrictions upon projects contained in these programmes can be imposed on environmental grounds.

At the State level, the State Pollution Control Commission is the authority primarily responsible for the enforcement of specialist anti-pollution acts in New South Wales. Its responsibilities include administration of the Clean Air Act 1970, the Clean Waters Act 1970 and the Noise Control Act 1975. The State Pollution Control Commission Act 1970 binds the Crown and charges the Commission with the responsibility of ensuring that all practical measures are taken to prevent, control, abate or mitigate pollution of the environment.

ENVIRONMENTAL STUDY GROUP

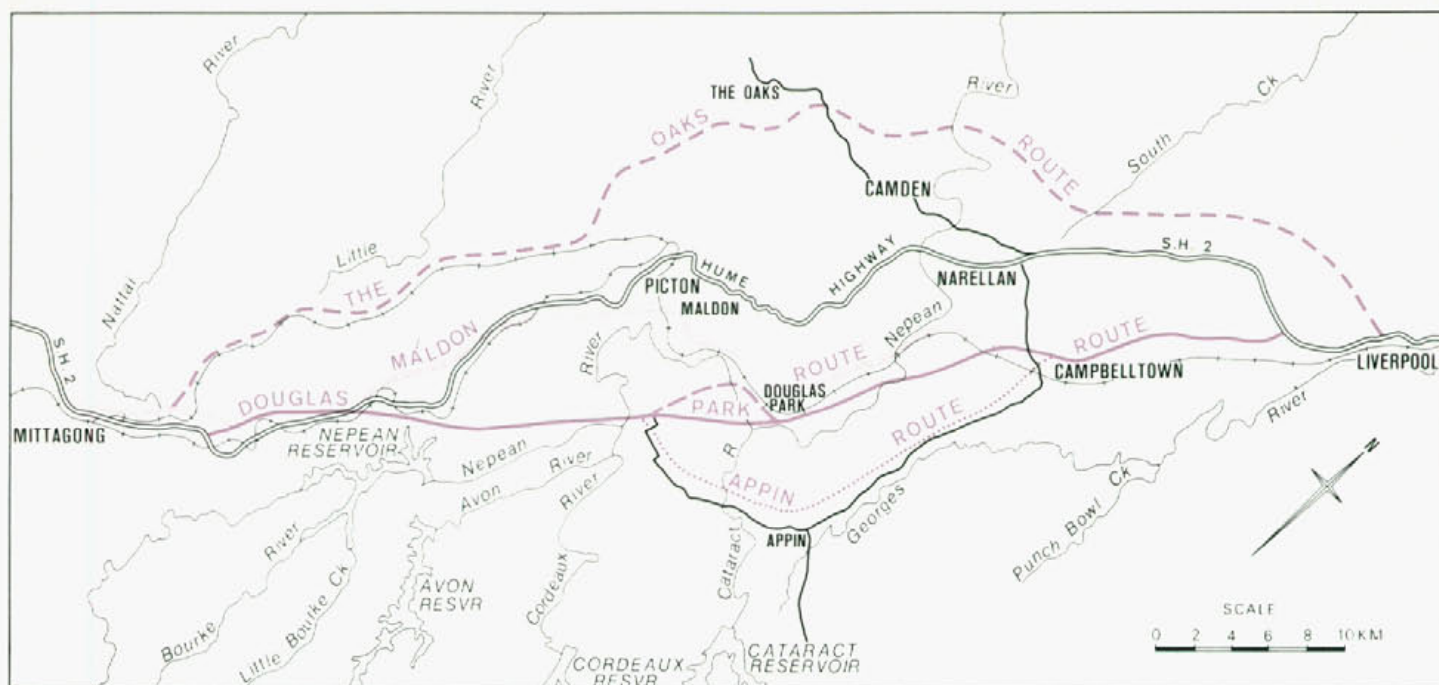
In light of this increasing concern for environmental quality, the Department

appointed an Engineer for Environmental Matters early in 1970, and then a Planning Assistant at the beginning of 1974, as an initial step in the establishment of an Environmental Study Group. The first major environmental impact study undertaken was for the section of the South Western Freeway (F5) from Main Road No. 178 (i.e., Camden Road from Campbelltown to Narellan) at Kennys Hill, near Campbelltown, to Yanderra. Since the project had already reached the design stage, this involved studying 35 kilometres of freeway corridor in a predominantly rural environment with the aim of ascertaining whether alternative alignments had been adequately explored in determining the preferred route, and that this route was designed to minimise any adverse environmental impacts. This Environmental Impact Study was required for submission to the Federal Ministers for Transport and Environment in an application for funding.

CORRIDOR INVESTIGATIONS

The natural physical setting, together with the existing and proposed settlements and facilities, act as planning constraints in the consideration of possible freeway routes. While not all constraints are absolute, together they set the general bounds on freeway location in the south-western sector of metropolitan Sydney.

The main natural constraints in the northern half of the study area are formed by the Nepean River Gorge with its tributaries and flood plain, the central hill lands running north-south from Leppington to Menangle, and the major hill range extending from Orangeville and The Oaks, beyond Picton



to Douglas Park. In the southern half, the natural constraints are the Picton Catchment Area with its Bargo River Gorge and natural vegetation, and the Sydney Metropolitan Catchment Area with its complex of gorges and natural vegetation.

Man-made constraints include the existing and planned settlement areas, the highway and railway networks, dams, reservoirs and water supply canal, sewerage treatment works, and other utility services and facilities.

ALTERNATIVE ROUTES CONSIDERED

Four feasible alternative routes between Liverpool and Mittagong had been considered. As shown on the map above, these were:

- ☆ The Oaks Route,
- ☆ The Campbelltown-Maldon Route,
- ☆ The Campbelltown-Douglas Park Route, and
- ☆ The Campbelltown-Appin Route.

The Oaks Route

The Oaks Route was located to pass west of the Razorback Range but was eliminated from final consideration because:

- ☆ it was circuitous (9 km longer than the Campbelltown-Douglas Park Route);
- ☆ it crossed the Nepean River flood plain;
- ☆ it would not serve the Campbelltown-Camden-Appin new cities complex;

- ☆ it could not be effectively integrated with any scheme for an arterial road between Wollongong and the Campbelltown-Camden-Appin complex; and
- ☆ it would require construction in one stage of its full 90 km length.

The Campbelltown-Maldon Route

All of the investigated routes other than the Oaks Route used a common line for the Liverpool to Campbelltown section. At the time of the Environmental Study, this length had already been constructed from The Cross Roads, near Liverpool, to Main Road No. 178, near Campbelltown.

The Maldon Route was the earliest to be investigated (1957) and south of Main Road No. 178 it was located close to the Hume Highway over most of its length. This factor had the advantage of enabling the Freeway to be constructed in stages and *in lieu of* major highway improvements, if such an alternative was considered necessary.

Subsequently, it was decided that locating two routes (i.e., a freeway and a highway) in adjacent positions for long lengths was undesirable both for planning purposes and on economic grounds, especially if additional functions could be served by separation. Furthermore, the route passed across the Nepean River flood plain and was also vulnerable to damage from slips and earth flows in the Razorback Range area.

The Campbelltown-Douglas Park and Campbelltown-Appin Routes

Both the Douglas Park and the Appin Routes were considered satisfactory, although the latter was initially favoured because of the value attached to the shortening of possible connections to the South Coast region.

At the time of the initial investigation of alternative routes, consideration of the development of Campbelltown, by officers of the former State Planning Authority, had been on the basis of a moderate-sized town. Advice from that Authority in 1965 made it clear that the southwestern sector of Sydney would need to be developed to accommodate a substantially larger population. As the outline of the new urban complex was being prepared, it soon became apparent that the Douglas Park Route would be superior to the Appin Route.

With modifications to fit the planning scheme of the new cities complex, the Douglas Park Route was adopted as the preferred location because:

- ☆ it made the least adverse impact on both the natural and man-made environments;
- ☆ it offered the greatest benefits for local development, as well as for inter-city and interstate traffic; and
- ☆ it could be designed to high standards at reasonable cost.

ENVIRONMENTAL IMPACTS

Any major project will make an impact on the environment which is either beneficial, adverse, or a combination of both. The Department's Environmental Impact Study revealed that the section of F5 under investigation would have both adverse and beneficial impacts. To complete the study, these were then compared with the impacts arising from a "no-construction" alternative.

Adverse Impacts

As with all new roadworks, the construction of this section of the South Western Freeway (F5), from near Campbelltown to Yanderra, has required acquisition of land for the new road reserve and the destruction of some vegetation within this reserve. It has also specifically required the demolition of four houses, the filling in of several small farm dams, and severance of several farm properties. Bridging of the Nepean River and Allens Creek will be required as well as minor incursion along the edge of a water catchment area. During the construction period, there will be increased dust and noise in a rural environment and temporary inconvenience to local traffic using cross roads.

Beneficial Impacts

By removing a heavy volume of through traffic from the built-up areas of Narellan, Camden, Picton, Tahmoor, Bargo and Appin, a reduction in the vibration, noise and air pollution in these centres will undoubtedly follow and a more pleasant and more healthy atmosphere for local activities will be provided. There will also be greatly improved economic and general growth potential for the whole Campbelltown - Camden - Appin region, because the F5 will provide increased accessibility and integration with markets in other urban and rural areas. The inter-city movement of people and goods will also benefit from reduced travelling times and costs, as well as from improved safety and aesthetic driving conditions.

Implications of a "No-Construction" Alternative

Adverse impacts upon the residents of the settlements along adjacent lengths of the Hume Highway, Appin Road (Main Road No. 177) and Menangle Road (Main Road No. 179) can be expected to increase rapidly in intensity and frequency if there is any delay in

the provision of this Freeway or if a decision is made not to proceed with it. These adverse effects will include increased air and noise pollution, more vibration from passing vehicles, more traffic accidents, and continued disruption to shopping, business and other locally-oriented activities.

Without the Freeway, road-users throughout the region can expect increasing inconvenience and delay caused by traffic congestion, as well as an increasing traffic accident and fatality risk. On the 54 km length of the Hume Highway from Camden to Yerrinbool, there were nine fatal and 102 injury accidents reported for the year 1972, and three fatal and 108 injury accidents reported for the year 1973.

If the "no-construction" alternative was accepted, this would, of course, preclude the anticipated joint development of the Freeway with the planned residential, industrial, commercial, educational and recreational facilities in the Campbelltown-Camden-Appin metropolitan growth centre. The stimulus to economic development which the Freeway could provide for this growth centre would then be lost. Continued concentration of economic, social, cultural and other activities into the major metropolitan area of Sydney—with its increasing growth problems—would be encouraged. Integration of the planned Campbelltown - Camden - Appin growth centre with Sydney, Canberra, Albury-Wodonga, and Melbourne would be adversely affected by limiting its accessibility.

Abatement of Adverse Impacts

In acquiring land for this section of the F5, the Department has followed normal property acquisition negotiations and compensation procedures. In addition, the relocation of the small water dams and the restoration of access (including special provision for stock access) were undertaken on affected properties. All buildings and properties of national and regional importance were carefully avoided. Restoration of areas affected by the clearance of vegetation will be carried out and, in addition, many thousands of trees and shrubs will be planted to supplement the natural vegetation. The excellent alignment and minimal grades of the Freeway will help to reduce motor vehicle emissions and noise to the lowest practicable levels obtainable from a road engineering viewpoint.

In areas where residential development is planned, the road reserve has been widened from 91.4 to 152.4 metres to provide an additional environmental buffer zone on either side of the Freeway. A special study of the site of the proposed University and Technical College to be built near the F5 at Campbelltown has been undertaken by the Planning and Environment Commission to check that noise levels from freeway traffic will be within an acceptable range.

To carry the F5 over the major watercourses, bridges have been designed instead of culverts. This action will minimise the environmental impact by ensuring:

- ☆ that the watercourses will be retained in their natural state;
- ☆ that the watertable and alignment of the watercourses will not be altered (this will avoid adversely affecting the established vegetation along the banks); and
- ☆ that the fish habitat will remain unchanged.

Special design provisions have been made for those bridges which will cross the water supply channel and arrangements have been made for continuing consultation with the Metropolitan Water, Sewerage and Drainage Board with regard to the catchment areas. Scour protection has been designed for the outlets of the culverts which have been built over minor waterways.

To monitor the possible development of any unforeseen adverse environmental effects which may arise after construction of this section of the F5, regular periodic field inspections are to be made by officers of the Department's Environmental Study Group. ●

Previous articles on the environment have appeared in the following issues of "Main Roads".

- "Roadmaking and Treeplanting — Department's Dual Duty", September, 1972, Vol. 38, No. 1, pp 2-5.
- "Environmental Considerations on Planning a Modern Freeway", March, 1973, Vol. 38, No. 3, pp 76-86.
- "1975—A Time of Freeways" (Main Roads and Freeways in Relation to Urban Planning), June, 1975, Vol. 40, No. 4, pp 122-126.



This article explains the functions of the recently established Traffic Authority of New South Wales, and the associated transfer of the road activities of the Department of Motor Transport to the Department of Main Roads.

The Traffic Authority Act was proclaimed from 1st June, 1976 in the *Government Gazette* of 23rd April, 1976 and took effect at law from the first-mentioned date.

The Traffic Authority Act provides in general terms for the traffic management and traffic facility responsibilities of the Police Department, the Department of Motor Transport and the Department of Main Roads to be transferred to the Traffic Authority. It also provides for the separate funding of those works for which the Authority is now responsible.

The Authority has four official members, and two appointed members to represent Local Government. The four official members are the Commissioner of Motor Transport (who is Chairman of the Authority), the Commissioner for Main Roads, the Commissioner of Police and a commissioner of the Planning and Environment Commission. One of the two appointed members is from the Council of the City of Sydney and the other is nominated jointly by the Local Government Association of New South Wales and the Shires Association of New South Wales. Action is in hand to amend the Act to provide for an appointed member representing the Transport Workers Union.

RESPONSIBILITIES

The Authority is charged with the following responsibilities.

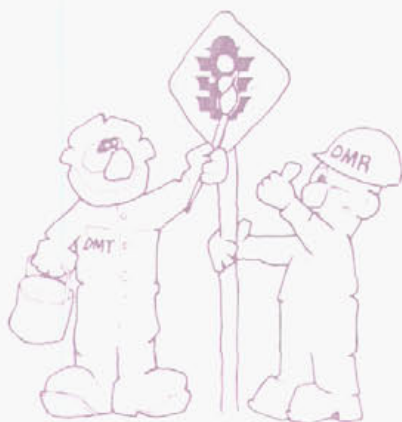
- ☆ Reviewing traffic arrangements in the State concerning the movement,

regulation and control of traffic and the parking of vehicles.

- ☆ Formulating or adopting plans and proposals for the improvement of those arrangements.
- ☆ Establishing general standards for traffic control facilities and setting general principles in connection with their design, construction, erection, affixing, marking, maintenance, repair, alteration, operation or removal.
- ☆ Establishing general standards and principles for the design of intersections and their approaches, as well as the approaches to railway level crossings—for the purposes of road safety, and for the better movement, regulation and control of traffic.
- ☆ Establishing priorities for those works for which it provides funds.
- ☆ Promoting traffic safety.
- ☆ Co-ordinating the activities of various public authorities, as may be necessary to implement its plans and proposals.

The Authority may also become involved in the following activities.

- ☆ Publicising its activities, as well as advising and educating drivers and other persons concerning its activities.
- ☆ Making reports and recommendations to the Minister for Transport and Highways in relation to traffic arrangements, traffic planning, traffic safety, parking of vehicles, traffic control facilities and similar matters.
- ☆ Making reports or recommendations to the Minister for Transport and



Highways for amending the law in relation to its functions.

- ☆ Carrying out or promoting research into the activities with which it is concerned.
- ☆ Making recommendations to public authorities concerning street lighting.

MONEY MATTERS

Funds for the activities of the Traffic Authority will be drawn from a Traffic Facilities Fund, established in the Treasury and into which will be paid the following amounts.

- ☆ The amount from the Road Transport and Traffic Fund previously used by the Department of Motor Transport for its road activities.
- ☆ The amount from the Sydney Harbour Bridge Account used for traffic facilities on the Bridge and its approaches.
- ☆ The amount from the motor vehicles tax levy and the motor vehicles weight tax previously used by the Department of Main Roads for traffic facilities work.



- ☆ The amounts collected by Councils from meter parking and previously paid to the Department of Motor Transport.
- ☆ The amounts provided by the Commonwealth Government for traffic facilities (i.e., all MITERS Funds—for Minor Improvements to Traffic Engineering and Road Safety—and that part of National Highways Funds applied to traffic facilities).
- ☆ Other amounts received by the Authority, the Commissioner for Main Roads or the Commissioner for Motor Transport for works of this nature

and directed by the Authority to be paid into the Fund.

Payments will be made out of the Funds for such items as are listed below.

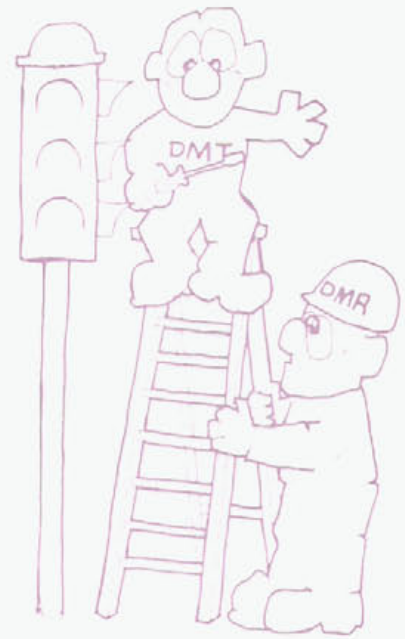
- ☆ Administrative and other expenses in operating the Authority, its secretariat and its committees.
- ☆ The cost of traffic facilities work generally, e.g., signposting, linemarking and installation of traffic signals.
- ☆ The cost of relieving traffic congestion or protecting pedestrians, e.g., signs, markings and pedestrian refuges.
- ☆ The cost of roadworks associated with the provision of traffic facilities, e.g., roadworks at traffic signals.
- ☆ The cost of constructing pedestrian overbridges and subways.
- ☆ The cost of improvements—for traffic safety and/or the movement, regulation or control of traffic—at intersections and their approaches, and at the approaches to railway level crossings.
- ☆ The cost of traffic safety research or traffic safety education.
- ☆ The cost of the acquisition of land needed for any traffic facility improvement.

NEW RESPONSIBILITIES

The Traffic Authority commenced operating on 1st June, 1976. However, to effect a smooth changeover in administrative and financial functions in the last month of the financial year it was agreed that there would be no changes in the operation of the Department of Main Roads or the Department of Motor Transport before 30th June, 1976.

Under the new arrangement, the Department of Main Roads assumed responsibility for all activities concerned with traffic management and traffic facilities as from 1st July, 1976. At that date, officers of the Department of Motor Transport, who had been engaged in those activities, were transferred to the Department of Main Roads. At that date (and in accordance with the long standing policy of decentralisation adopted by the Department of Main Roads) Departmental Divisional Engineers became responsible for all traffic management and traffic facilities work within their divisional areas (both on classified main roads and non-classified roads).

It was arranged for most country divisions to have an "ex-DMT" traffic facilities supervisor transferred to their staff and made responsible to the Divisional Engineer. The duties of these



supervisors include liaison with shire, municipal and county councils, as well as inspections of works on traffic facilities undertaken by the local authorities.

As from 1st July, 1976, the Traffic Service Section of the Department of Main Roads became responsible for the administration of all work associated with traffic facilities and traffic management referred or delegated to the Department by the Traffic Authority or by the Traffic Authority Act.

ORGANISATIONAL ARRANGEMENTS

Approximately 400 personnel of the Department of Motor Transport transferred to the Department of Main Roads on 1st July, 1976. Those affected personnel who were previously working at the Head Office of the Department of Motor Transport moved into the Traffic Service Section on 21st June, 1976 but continued to report to the Commissioner for Motor Transport until the end of the month.

The field personnel attached to the four district offices of the metropolitan region of the Department of Motor Transport became responsible to the Metropolitan Engineer, Metropolitan Division, and the Divisional Engineer, Parramatta Division as appropriate. Certain field supervisors reported to the closest divisional office to which they were previously stationed. Those units of the Department of Motor Transport previously reporting to the Head Office branch of that Department (i.e., the signal construction gangs and contractors,

the Development Section—which also supervises the area traffic signal control system of Sydney—the Signals Workshop and the Sign Workshop) continued for an interim period to report to the transferred Head Office unit of the Department of Motor Transport (which became part of the Traffic Service Section of the Department of Main Roads).

Since then, progressive moves have been introduced to fully integrate the Department of Motor Transport's unit with this Department and to bring its operational boundaries within the Department's divisional boundaries. This may take up to twelve months to complete and in isolated cases possibly longer (see timetable on right).

INTEGRATION OF PERSONNEL

The transferred personnel of the Department of Motor Transport included engineers, draftsmen (called draftsmen and engineering assistants), field supervisors, foremen, technicians, technicians' assistants, painters, signwriters, carpenters, traffic checkers and labourers. Some clerical officers were also seconded for a short period.

As the "ex-DMT" personnel were previously covered by awards and agreements made with the Commissioner for Motor Transport, these have been initially retained. It is intended progressively to bring all personnel under awards or

agreements with the Commissioner for Main Roads covering like personnel or by establishing a new agreement or award with the Commissioner. Negotiations are proceeding with the industrial associations of each group concerned and, where applicable, with the group with which they may be integrated in the Department of Main Roads.

The Department's objective is the complete integration of all Department of Motor Transport personnel into this Department's organisational structure, as only by this means will the full benefits of the transfer be achieved. For example, professional engineers of the Department of Motor Transport (all of whom are working in the traffic engineering field) will be integrated with the Department's general group of engineers. The draftsmen and engineering assistants will generally be integrated with the Department of Main Roads' draftsmen but this may require the creation of a new classification to cover some who are engaged on specialised duties.

ON WITH THE JOB

A programme of Traffic Facilities work for 1976-77 has been prepared on the basis of information already held. The programme will be subject first to a determination by the new Traffic Authority of New South Wales and, following this, programmes of traffic facilities work to be undertaken in each Division will be issued from Head Office.

TIMETABLE OF TRANSFER OPERATION

21st June, 1976

DMT Head Office staff transfer from Rosebery to DMR Traffic Service Section.

1st July, 1976

Official transfer date for traffic engineering functions from DMT to DMR. (This includes manufacture, installation and maintenance of traffic signals, regulatory and warning signs and road markings.) Ex-DMT district engineers and traffic facilities supervisors report to DMR Divisional Engineers.

1st July, 1976 to 9th August, 1976

DMR take over paying ex-DMT personnel, including all timekeeping, storekeeping and costing functions.

1st July, 1976 to 1st September, 1976

Ex-DMT district staff move to appropriate Divisional Offices.

1st September, 1976 to 1st November, 1977

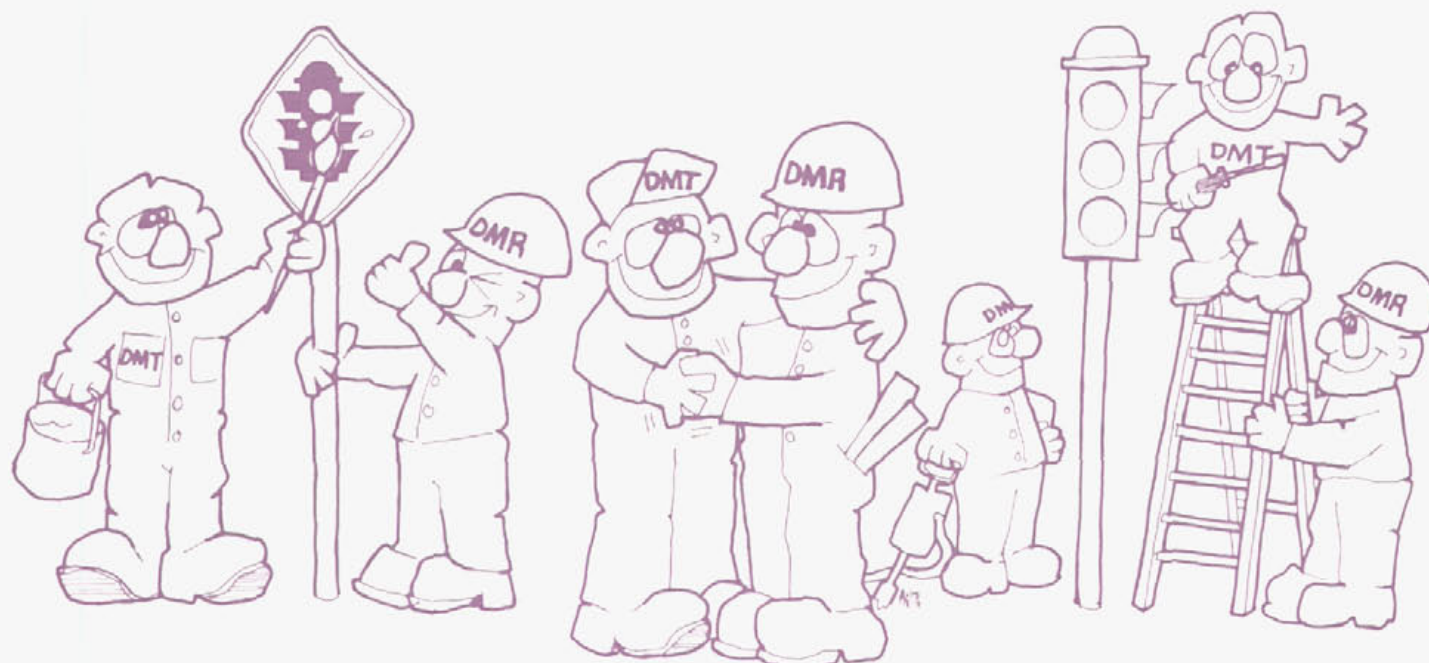
Adjust ex-DMT metropolitan district offices to DMR divisional boundaries.

1st January, 1977 to 1st April, 1977

Transfer routine design functions on traffic signals and intersections to the divisions, e.g., road design and electrical draftsmen to be relocated.

1st January, 1977 to 1st July, 1978

Transfer traffic signal construction works to divisions. ●



New Bridges and Highway Improvements at Goulburn

"Were it an earthly paradise, the purgatory one has to undergo before reaching it would make its visitors few and far between." Unkind words, indeed, but ones which can be readily understood in their context. Published in "The Empire" of 21st May, 1857, they referred to the travelling conditions between Sydney and Goulburn at that time. If the disgruntled correspondent who wrote them had been blessed with more than his fair share of longevity and had been present at the recent opening of the new FitzRoy Bridge over Mulwaree Ponds at Goulburn, his sentiments would probably have been more generous.

The new bridge was officially opened by the Minister for Transport and Highways, Hon. Peter Cox, M.L.A. (see page 28), at a ceremony commencing at 11.30 a.m. on 21st June, 1976. Mr Cox's first ribbon cutting event for the Department was unfortunately accompanied by a shower of rain, and to his personal credit and the gratification of all present he said but a few well chosen words.

At the ceremony, the Commissioner for Main Roads (Mr A. F. Schmidt) introduced the other speakers, who were the Mayor of Goulburn (Alderman E. J. McDermott), the State Member for Goulburn (R. A. Brewer, Esq., M.L.A.) and the Federal Member for Eden-Monaro (M. E. Sainsbury, Esq., M.P.). It was generally expressed that the new bridges and roadworks, which would now greet visitors to Goulburn, would create a much better impression than in the past. Further, it was emphasised that efforts to attract more industry to this thriving city would be greatly assisted by these improvements to its northern approaches.

A COMPLICATED OPERATION

The building of the bridge was not an isolated matter; it was part of a large-scale project involving two other new bridges over the Main Southern Railway Line and over the branch line to Crookwell—and a new 3.5 km length of dual carriageway deviation extending from Lagoon Street to Governors Hill. It was not a simple project but rather one whose construction difficulties were compounded by the need to keep the highway open to traffic as well as to co-ordinate construction with railway requirements.

At the time of the official opening, it was possible to open only two lanes of the new FitzRoy Bridge and that part of the deviation from the bridge to Lagoon Street, including two lanes of the new bridge over the Crookwell Branch Line. It is expected that all four lanes of the three new bridges will be available to traffic by December, 1976 and the remaining roadworks to Governors Hill completed by mid-1977.

The intricate programming involved in keeping traffic moving during construction of the bridges can be gauged from the following schedule.

April, 1976: Southbound carriageway of new Crookwell Branch Line bridge opened for two-way traffic.

June, 1976: Northbound carriageway of new FitzRoy Bridge opened for two-way traffic. Traffic changed from southbound to northbound carriageway on new Crookwell Branch Line bridge. Traffic continues to use existing bridge over Main Southern Line.

October, 1976: Southbound carriageway of new bridge over Main Southern Line to be opened to traffic. Southbound carriageways of FitzRoy Bridge and Crookwell Branch Line Bridge to be opened, bringing both carriageways on both bridges into full use.

December, 1976: Northbound carriageway of new bridge over Main Southern Line to be opened, bringing dual (two-lane) carriageways into operation from Long Street to Union Street.

DETAILS OF STRUCTURES

Designed by engineers in the Department, the 107.3 metre long FitzRoy Bridge over Mulwaree Ponds is a five-span steel and concrete structure equipped with two traffic lanes (each 3.7 m wide) in each direction, a 1.2 m wide raised median and a 1.5 m wide footway on the upstream side. The bridge was built for the Department by Transbridge Pty Ltd at a contract price of \$554,565.

The new bridge over the Main Southern Railway Line is 2.7 km from Goulburn Railway Station and will be a single span, 23.7 m long composite steel girder and reinforced concrete slab bridge. The deck provisions for traffic and pedestrians are the same as on the new FitzRoy Bridge. Allowance has been made for 6 m vertical

clearance above the (future) rail level and for 5.5 m horizontal clearance on the down track (i.e., travelling towards Goulburn) and 3 m on the up track. Transbridge Pty Ltd are also building this bridge for the Department at a contract price of \$336,674. The existing bridge is being retained by Goulburn City Council to provide local access over the railway line, to and from Long Street.

The new bridge over the Crookwell Branch Railway Line is only 6.7 m long and again features the same deck width provisions as the other two new bridges. The new structure eliminates a narrow timber bridge on poor alignment and grading.

The approaches to the new bridges and the roadway between them will eliminate several dangerous curves. The total cost of the three new bridges and the associated 3.5 km long highway deviation is estimated to be \$3.5 million.

HUME HIGHWAY HAPPENINGS

Since July, 1974, the South Western Freeway and the Hume Highway south of The Cross Roads (near Liverpool) have been classified as a "National Highway" (as have the Barton and Federal Highways). Consequently, funds for both maintenance and construction of these "National Highways" have been provided by the Commonwealth Government under the National Roads Act.

The Hume Highway is probably the most talked about highway in New South Wales. Undeniably, there are quite a few sections which are less than adequate for the amount and type of traffic that they have to carry. For a number of years it has been planned to eventually have all the Hume Highway improved to dual carriageway standard, a task which will obviously cost many millions of dollars. As an interim measure there has been a special approach by the State Government to the Australian Government for the provision of additional funds to accelerate reconstruction of the sub-standard sections.

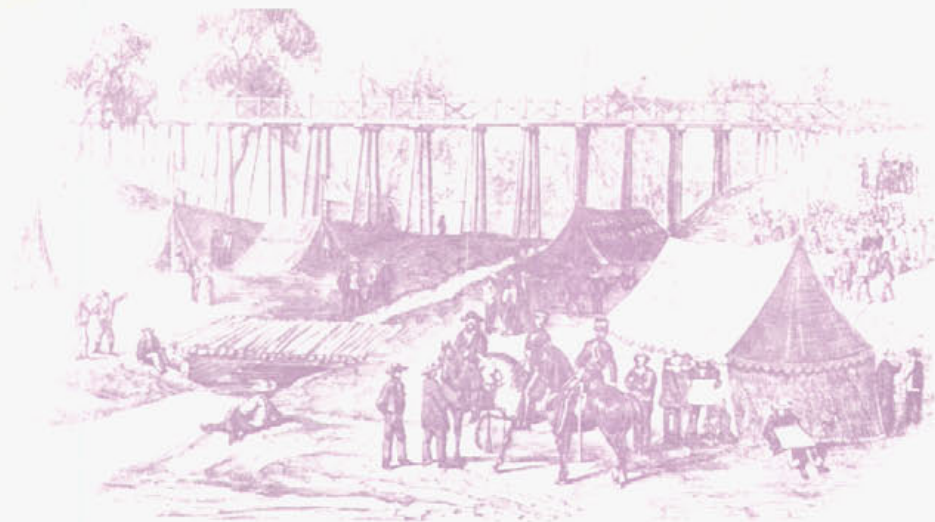
The Hume Highway extends throughout four of the Department's Divisions—the Parramatta, Illawarra, Southern and South Western Divisions. By far the longest length, 248 km, is contained within the Southern Division which has its headquarters at Goulburn.

In the financial year, 1973-74, the Department spent about \$4 million on that part of the Hume Highway within its Southern Division. Two of the works on which that money was spent included:

- ☆ the 7 km of dual carriageway from Narambulla Creek to Towrang Hill, north of Goulburn (including a duplicate bridge at Narambulla Creek); and
- ☆ a dual carriageway deviation extending between 10.5 and 17 km west of Yass (by-passing Bowning, including duplicate



The Hon. Peter Cox, M.L.A., Minister for Transport and Highways unveiling a plaque at the opening of the new FitzRoy Bridge on 21st June, 1976.



The opening of the first FitzRoy Bridge on 20th December, 1854—as depicted in the *Illustrated Sydney News* of 23rd December, 1854. The previous crossing can be seen in the foreground.

bridges over Bowning Creek and replacing a section of highway which was only 6 m wide).

In the following year, 1974-75, the expenditure on the Hume Highway in the Southern Division increased to \$6.1 million. This amount helped to finalise another 5.5 km length of dual carriageway from Marulan to Narambulla Creek and to commence the extension of the Bowning dual carriageway work from between 6.4 and 10.5 km south of Yass.

FAIR GO

In 1959, a traffic volume study showed that an average of 2 420 vehicles travelled over the old FitzRoy Bridge. The Department's traffic service engineers have recently estimated that the new bridge will carry about 13 000 vehicles each day during 1976. However, the problem of the Hume Highway results not only from the volume of traffic, which is considerable enough, but also from the type of traffic.

The Hume Highway has more than its fair share of heavy interstate transport. Surveys have shown that 22% of all traffic just north of Goulburn consists of heavy transports. This is quite an astounding figure—almost one in four! To make matters worse, of approximately 45 000 transports stopped by Departmental Weight of Loads Inspectors throughout the State during 1974-75, 10 561 (i.e., 23.6%) were found to be overloaded. Again, almost one in four! It could then be reasonably assumed that about one in every sixteen or so vehicles on the Hume Highway is overloaded! This may be good for transport operator's costs, but it is certainly not good for the community which has to pay for roads damaged by the stress and strain of loads which they were never designed or built to carry. In terms of fuel usage, rail transport is the most economical way to transport passengers and freight long distances. It is therefore to be hoped that there will be a return to a greater use of rail transport between Sydney and Melbourne in the not-too-distant future.

OTHER MAJOR WORKS IN SOUTHERN DIVISION

On the Barton Highway, travelling conditions will be greatly improved between Murrumbateman and Jeir Creek through the present programme of formation widening and pavement strengthening.

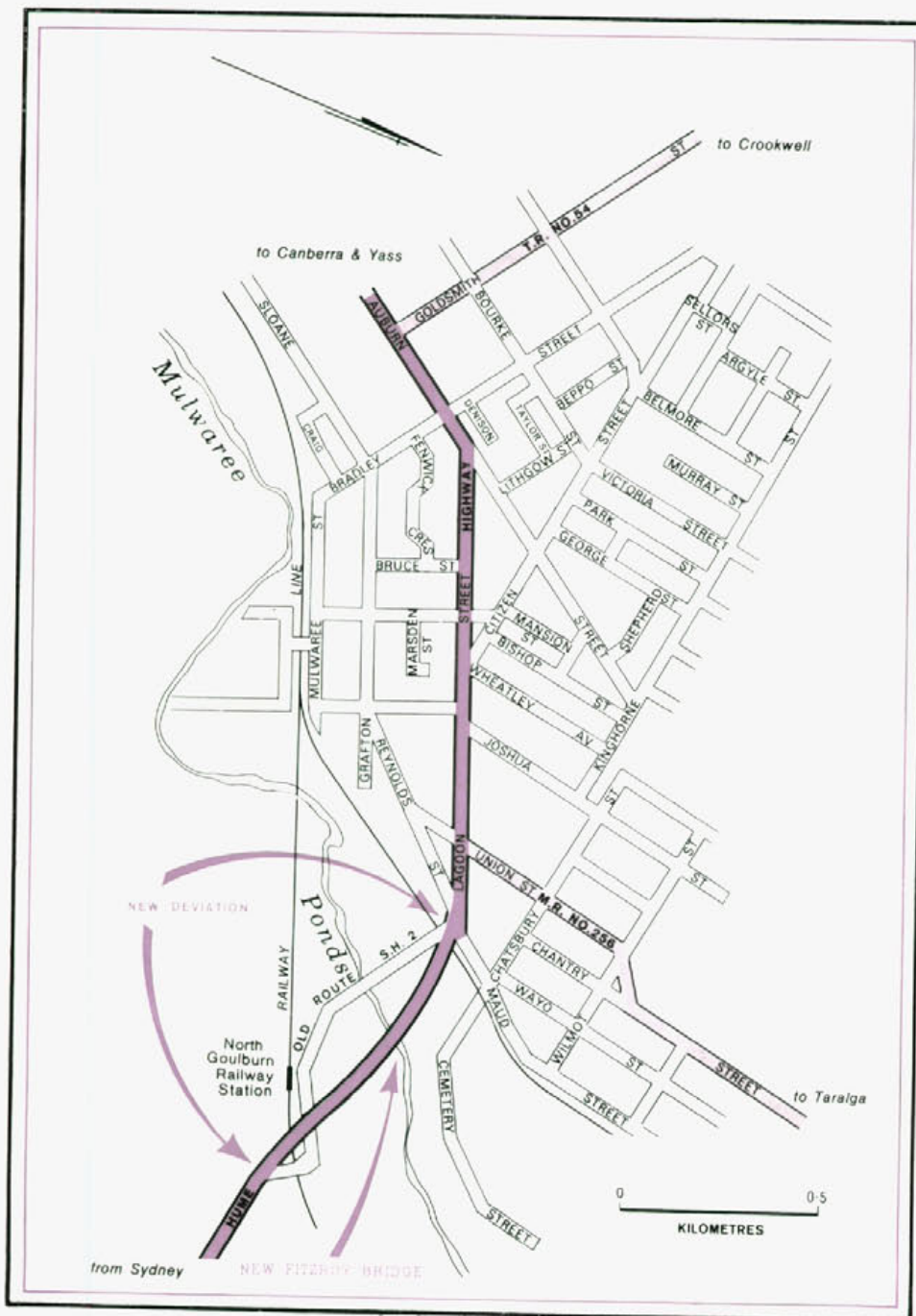
On the Federal Highway, a major work (estimated to cost about \$1.2 million) is the provision of a second carriageway along an 8 km length south of the Hume Highway junction at Yarra.

A new bridge over the Shoalhaven River at Warri, north of Braidwood on the Batemans Bay-Queanbeyan Road (Trunk Road No. 51) is nearing its scheduled completion date of October, 1976. This work, along with its approaches, is also estimated to cost approximately \$1.2 million.

With this sample of the works now going on within the Southern Division, it is not difficult to see how the Department managed to spend \$13.7 million in this Division during 1974-75 nor to understand that the estimated expenditure for 1975-76 amounted to \$16.15 million.

FUTURE WORKS

Here is a brief outline of some of the works which are planned for the Hume Highway in the near future.



- A second carriageway for the 5 km length from Uringalla Creek to Marulan, costing about \$1.3 million.
- The reconstruction and widening of the divided carriageways at Towrang Creek.
- General improvement works between Marulan and Goulburn; the provision of an asphaltic concrete surface on the divided carriageways between Goulburn and Yarra and on the Bowning deviation near Yass.
- The construction of divided carriageways between Two Mile Creek and Conroys Gap, between 16 and 20 km west of Yass (at a cost of about \$750,000).

OTHER WORKS NEARBY

During 1973-74, the Department spent \$21.8 million on the total length of the Hume Highway within New South Wales and this figure increased to \$28.6 million during 1974-75. This total expenditure of \$50.4 million over two years included an amount of \$23.3 million on the South Western Freeway, whose route parallels that of the Hume Highway.

The longest bridge on which the Department is working (or, in fact, has ever worked on) is the bridge over the Murrumbidgee River at Gundagai. Expected to be completed early in 1977, this massive 1 143 m 27-span bridge will cost in the vicinity of \$4 million (see article in March, 1974 issue of "Main Roads", Vol. 39, No. 3, pp. 66-69).

At Yass, the Department is constructing a new bridge over the Yass River to replace a narrow old wrought iron structure now inadequate for traffic. Estimated to cost about \$575,000, the new bridge should be open to traffic in mid-1977. Dual carriageways are also proceeding west of Yass and these require a new bridge over Derringullen Creek to carry northbound traffic. At a cost of approximately \$290,000, this work should be completed by the end of 1976. Another new bridge is being built over the Fish River, 45 km south of Goulburn, and should be operational by November, 1976.

Articles on the Hume Highway which have appeared recently in "Main Roads" include:

- Hume Highway Repairs
December, 1975, Vol. 41, No. 2, pp. 39-43.
- Report on Construction of Dual Carriageways
March, 1974, Vol. 39, No. 2, pp. 88-91.
- Camden Deviation
December, 1974, Vol. 40, No. 2, p. 53.
- Schedule of Restoration Work
December, 1974, Vol. 40, No. 2, pp. 62-63.

* * *

A SHORT HISTORY OF THE BRIDGES AT MULWAREE PONDS

Mulwaree Ponds has seen four bridges at this site. The first, erected in 1837, was a far less imposing structure than its descendants. Located next to "Keeley's Brickyards", this bridge consisted of logs laid across long beams which were, in turn, supported by small stone "walls" on each bank of the main watercourse, about 100 metres upstream (south) of the new bridge. It is most likely that this bridge was built by convicts in the chain gang from Towrang Stockade (north of Goulburn) and supervised by Lieutenant Gorham. Gorham was listed as "assistant engineer and superintendant of ironed gangs" at Towrang and was responsible for the construction of the "Great South Road" from the Stockade to Goulburn.

This primitive structure was to serve for almost twenty years until the first FitzRoy Bridge was completed in 1854 and named in honour of Governor FitzRoy, who had visited Goulburn in 1850.

Below: The slim concrete piers of the new FitzRoy Bridge rise in stark contrast to the older structure in the background.

Bottom: Bridge styles of different eras can be compared in these views of the new and old FitzRoy Bridges.



Apparently, the opening of this £3,000 bridge on 20th December, 1854 was a festive occasion in Goulburn. The local press reported that "The Oddfellows with that true public spirit which characterises them . . . attended, and gave a degree of eclat to the affair that it would not otherwise have possessed". A German band "enlivened the proceedings by playing . . . popular airs". It was also reported that the proprietor of the Commercial Hotel "had a temporary license and booth, and furnished a first-rate lunch".

There seems to have been a last minute change concerning who was to open the bridge. The "Goulburn Herald" of 23rd December, 1854 gives the honour to "Mr. Beazley, the second clerk of Colonial Works". In contrast, "The Illustrated Sydney News" of the same date prematurely reported it was local Police Magistrate, Patrick Plunkett, Esq., who, as it turned out, was unable to attend as planned.

"The opening of the bridge over the Mulwaree Ponds, Goulburn, which has been looked forward to for some time past with great anxiety by the inhabitants of the surrounding district took place on Wednesday, the 20th instant, and went off with great eclat and a good deal of festivity. The Bridge was opened by Patrick Plunkett, Esq., Police Magistrate, who consented to preside, at the request of the Colonial Architect, and by whom it was christened 'The Fitz Roy Bridge'.

The following brief particulars relative to this fine structure will be interesting in connection with our engraving:—The quantity of timber used for the bridge is 147,677 feet; the length of the bridge is 515 feet; its breadth is 25 feet, and its height is 22 feet. On the Goulburn side there has been a cutting of 2650 yards of rock and iron-stone, in order to make a road from the bridge to the level ascending by a gentle rising till it reaches the culminating point, and from thence to Goulburn by a level line of road."

From the illustration accompanying the reference (reproduced below), it can be seen that the bridge was a high trestle structure with open balustrading. An article in "The Australasian Engineer" of 7th November, 1939 (p. 20) claims that it was designed by Mr E. T. B. Blacket and "The Illustrated Sydney News" of 16th December, 1854 reports that it was built by a contractor named Smith. Although only a wooden structure, it served the district well, surviving the "Great Flood" of 1864 (when the floodwaters completely covered the bridge) and another in 1870 (when the deck was flooded by over nine inches of water).

It is stated by Mr W. A. Bayley in his book "Lilac City—The Story of Goulburn" (published by Goulburn City Council in 1954) p. 26, that . . .

"The opening of the new bridge altered the trend of traffic which, although a street led into Grafton Street, tended more and more to follow Lagoon Street which grew to be the Highway leading into Auburn Street. It has remained so to this day, Sloane Street fading from use as the main road which it had been from the establishment of the settlement."

Things got moving on the next FitzRoy Bridge in the early 1880's as the following extract from the "Goulburn Herald" of 6th January, 1882 explains.

"Fitzroy Bridge. The Government originally voted £3000 for the construction of an intended timber bridge, but decided on an iron bridge. This was responsible for all tenders exceeding the estimated cost. The engineer for roads recommended the acceptance of the lowest tenderers, which will be Dunn's & Sigley's tenders, that of James Dunn & Co. for section 1. £3348/5/- and that of Sigley & Co. for



The squat, secure, stone abutments and piers of the old Fitz Roy Bridge seem to support the cast-iron lattice truss spans with ease.

section 2. £4978—the former being the iron superstructure, the latter for the iron and stone piers for the erection of the bridge. The total cost of £8326/5/- was approved by the Secretary of Works."

The "Herald" reflected ". . . the structure when completed will be the most costly of the kind and it is hoped to be the most durable erected in this district".

Construction apparently commenced in 1883 and on 5th June, 1884 the "Goulburn Herald" reported that "operations are again proceeding at the new bridge across the Mulwaree at North Goulburn. Workmen are engaged in erecting the iron superstructure and also fencing the road leading to the bridge".

The "Goulburn Evening Penny Post" of 17th June, 1884 published a complaint from "Ratepayer" of North Goulburn, calling attention to the "bad state of the road at the approaches to the bridge now in course of construction". He said it was very dangerous as "no light was there on Saturday night" and rain had made it more dangerous than before.

Construction was carried on during the rest of 1884 and the "Penny Post" of 25th October, 1884 stated "The new Fitzroy bridge will be opened for traffic after to-day, the work being almost complete. One or two items remain yet to be done, the principal of which are the fencing of the approaches, and the planing of two additional hand rails on the bridge".

The new 303 feet long bridge was constructed with sandstone faced piers and abutments, and had five cast iron lattice truss spans with a buckle plate deck, topped with ballast and bitumen. Footways were provided both on the upstream and downstream sides of the deck.

It did not take long for floodwaters to pit their strength against the new bridge. It suffered considerable damage from floods in January, 1885 with the Goulburn approaches being partially washed away and the approach fence and railings being put severely out of joint.

In 1909, Fitz Roy Bridge was proclaimed a "National Bridge" under the care of the Department of Public Works. The bridge was later maintained by Goulburn Municipal Council, major work being carried out on the wearing surface during 1935. A proposal was submitted during 1940 for the widening of the carriageway from 17 ft 6 in to 21 ft between kerbs by narrowing both footways. This work was carried out during 1941-42.

Following failures in the buckle plates during the mid-1950's, proposals were submitted for an alternative deck system. Reinforced concrete decks and open mesh steel decks were considered. A concrete deck cast over the buckle plates was actually approved but due to the difficulties with provision for traffic, it was decided to replace the complete deck system with an Armeo Bridge Planking deck. The work was carried out under contract to Moy Bros Pty Ltd in 1962 and was completed in 17 weeks. A wearing surface of asphaltic concrete was added by the Department's Yass Works Office organisation. Temporary traffic signals were installed by the Department of Motor Transport for the duration of the redecking operation.

After almost 92 years of service the second Fitz Roy Bridge was closed to traffic and is to be demolished. But part of it, at least, will live on in a far more pleasant setting—for the Council of the Anglican Cathedral Church of St Saviour in Bourke Street, Goulburn has obtained the stone from the piers and abutments (which are of the same type and vintage as that in the Cathedral), to help complete the Cathedral's tower and spire.●

* * *

Much of the historical information in this article has been kindly made available by Mr S. J. Tuzewell, of the Goulburn and District Historical Society.

A brief reference and photograph under the heading "Replacement for Fitz Roy Bridge at Goulburn" appeared in the September, 1975 issue of "Main Roads", Vol. 41, No. 1, p. 29.

The colour illustration of the first Fitz Roy Bridge published opposite was originally reproduced in black and white in the Illustrated Sydney News of 30th December, 1854 (p. 469).



GATEWAY TO GOULBURN



Top left: Early illustration of the first FitzRoy Bridge built at Goulburn in 1854.

Above: Putting the finishing touches on the new bridge over Mulwaree Ponds, which replaces the 1884 structure in the background.

Left: This view looking west over Goulburn shows how the new road and bridgeworks will provide a safer and more pleasant approach to Goulburn. The new bridge to carry the Hume Highway over the Main Southern Railway Line can be seen in the foreground.

Below: The old and new highway bridges over the Crookwell Branch Railway Line.





roads - the everyday



Bombarded with so many calls for our attention, most of us do not give much thought to the part played by roads in the humdrum activities of everyday living. The role of roads in getting us — as individuals and as a community — through each day is surprisingly substantial. A kaleidoscope of colourful activity comes and goes along our roads throughout the day and night. These photographs show only part of the picture.





asset for everybody



Roads allow for the convenient movement of people and the vital interchange of goods — and also provide access for emergency services in times of special need. We all depend on roads far more than we generally realise. They are probably the most used and yet least acknowledged asset in our community. Roads are not a luxury, like champagne, they are as essential to our well-being as the services that use them and as the goods that are delivered daily along them.





Wet in the West

These aerial views (taken in February) show only some of the disruption and damage caused by extensive floods in the northwest of the State earlier this year.

Above: The Warrego River at Gumbalie on Main Road No. 405, west of Bourke.

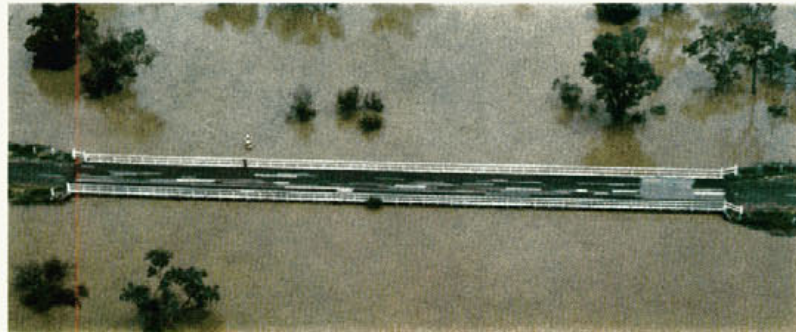
Below: Floodwaters besiege this bridge on the Castlereagh Highway, south of Walgett.

Bottom: Three new bridges being built over the Paroo River and its channels at Wanaaring stand out above the floodwaters.



Above: Repairs to previous flood damage on the Castlereagh Highway at Warranbool, north of Walgett, received another set-back.

Below: With a keen sense of preservation but little knowledge of traffic hazards, these kangaroos took to the Castlereagh Highway near Walgett.



DEPARTMENTAL ORGANISATION

THE ENGINEER-IN-CHIEF'S BRANCH ... AND HOW IT OPERATES

This is the second in a series of articles which outline what goes on *behind the scenes* throughout the Department's organisation. It is hoped that these will give our readers an insight into the administrative structure of the Department as a whole, as well as the functions of various officers and sections. The first article appeared in the June, 1976 issue of "Main Roads", Vol. 41, No. 4, pp. 121-124.

Since the first article, the Department has assumed new responsibilities resulting from the passing by Parliament of the Traffic Authority Act 1976 which established the Traffic Authority of N.S.W. and transferred to the Department of Main Roads certain road activities formerly undertaken by the Department of Motor Transport.

Under the new legislation the Department is now responsible for the planning, installation and maintenance of traffic signals and other traffic facilities on all roads throughout the State. These new responsibilities are administered by the Traffic Service Engineer through the Chief Engineer (Urban).

Bridge Section (Operations)

The Bridge Section (Operations) is responsible for the Head Office supervision and administration of the bridge construction which is undertaken by contract throughout the divisions, as well as the bridge maintenance and construction which is undertaken by the Department's own forces (excluding the Inner and Outer Freeway Construction Divisions). The Bridge Engineer (Operations) supervises the disposition of bridge foremen and superintending officers for bridge construction and maintenance work.

The programming and organisation of bridge inspections and subsequent maintenance are a specific responsibility of this Section, as are matters relating to the attachment of public utilities to bridges on Classified Main Roads.

The Section maintains all bridge records, such as the bridge card index, flood measurements, load and speed limitations, bridge closures, and temporary bridges erected.

Planning for construction programming and design priority is undertaken in co-operation with the Bridge Section (Design).

Bridge Section (Design)

The Bridge Section (Design) is responsible for all bridge design work carried out by the Department and by Consulting Engineers commissioned by the Department (except for bridges which are part of "package" commissions for the design of some inner freeways). The Section is also responsible for the checking of bridge designs prepared by divisions, (in the Department's Divisional Offices, or by Councils, or by Councils' Consultants) on Classified Main Roads and on Rural Local Roads. The examination of the adequacy of structures on routes where heavy load movements will be undertaken is also made by this Section.

The work of the design staff includes the preparation of tender documents and the examination of tenders for bridge works.

Departmental representatives on NAASRA, SAA*, and other technical committees dealing with matters related to structural bridge design, are generally selected from this Section.

Rural Investigations Section

The function of the Rural Investigations Section falls into three main categories. These are:

- (i) Road location planning throughout the State, except for the Counties of Cumberland and Northumberland and the City of Greater Wollongong, and preparation of plans for motorway proclamations. This work includes the review, from a location aspect, of important design proposals originating in Divisional Offices and from Councils.

- (ii) Maintenance of a record system from which enquirers (both private and government organisations), are informed of any likely conflict between their land development schemes and the Department's road planning proposals.

- (iii) Reviewing the rural portion of the Main Roads System, submitting recommendations on proposals for varying road classifications, and examining local government planning schemes.

The Rural Investigations Section also arranges aerial photography and photogrammetry to cover all the Department's requirements and maintains a library of aerial photographs.

Materials and Research Section

The Materials and Research Section undertakes research studies into the properties and behaviour of materials used in road and bridge construction and maintenance. This entails recommending, carrying out and arranging programmes of research, as well as involvement in and appraisal of research carried out by others (such as ARRB†), and the implementation of research findings.

The functions of the Section (listed below) include the establishment of quality control standards and procedures, involving the provision of testing facilities and the operation of centralised testing services.

- ☆ Operation of the Materials and Research Laboratory at Milsons Point.
- ☆ Establishing, equipping and staffing of all laboratories, including those in each division.
- ☆ Overall supervision of divisional laboratories and field control procedures.
- ☆ Training of laboratory staff.

* National Association of Australian State Road Authorities and Standards Association of Australia.

† Australian Road Research Board.

- ☆ Development of testing methods and apparatus.
- ☆ Establishing and updating appropriate specifications and technical instructions.
- ☆ Co-operation with all sections in the solution of operational problems.
- ☆ Advising on testing and the interpretation of test results.

The Section provides representation on various committees dealing with matters pertaining to roadmaking materials (such as NAASRA, SAA, and Inter-departmental Committees).

Apart from providing for testing which is not carried out in divisional laboratories (such as the testing of steel, paints, aggregates, bituminous materials, shrinkage and creep of concrete, etc.) the Materials and Research Section and laboratory provide a number of special services, as listed below.

- ☐ Calibration of equipment.
- ☐ Foundation investigations (slope stability).
- ☐ Geological appraisals.
- ☐ Seismic and resistivity surveys.
- ☐ Blast monitoring.
- ☐ *In situ* California Bearing Ratio (CBR) surveys.
- ☐ Pavement strength surveys (using Benkelman Beam equipment and the deflectograph).
- ☐ Skid resistance surveys.
- ☐ Pavement roughness surveys.

Architectural Section

The function of the Architectural Section is to provide a professional service on all matters relating to the design of buildings, furnishings, landscape work, and the appearance of structures. The section is not generally involved with building work carried out by direct control except in an advisory capacity.

With most matters the Architectural Section is responsible directly to the Chief Engineer (Rural). Otherwise it operates directly with the respective sections responsible for the work. Proposals for works office, sub-depots, roadside rest areas, and landscape designs are prepared for the Highways Engineer and matters relating to property adjustments, relocations, or demolitions are carried out for the Principal Surveyor and Property Officer.

The work in the Section is under the direction of qualified architects and carried out by draftsmen classified as architectural officers and landscape planners. Additionally, a quantity surveyor and a specification writer are attached for specialised work, together

with a building foreman to assist with the supervision of contracts.

For departmental building work in divisions, including housing, toll offices, alterations and additions etc., an architect is available to inspect and advise on layouts for the Divisional Engineer's consideration. Following finalisation of a layout, approvals are then sought to prepare working drawings and specifications and later for the invitation of tenders subject to the availability of funds. Dependent upon the size of the work, tenders are either invited by the Divisional Office or direct from Head Office and dealt with in the prescribed manner.

Urban Investigations Section

It is the function of the Urban Investigations Section to maintain under continual review, the planned Main Roads network for the principal urban areas of New South Wales.

In performing this function, activity groups within the Section concentrate on five major objectives.

- (i) To determine transport needs and identify movement corridors (transportation studies).
- (ii) To prepare preliminary designs in order to establish future road boundaries (outline location design).
- (iii) To publicise the location of proposed routes and co-operate with other planning authorities (outline planning liaison).
- (iv) To exercise control over land that is required for future roadworks so as to prevent plans being prejudiced by undesirable development (development control).
- (v) To maintain records of road proclamations and fill basic charting needs (cartography).

Road Design Section

The Road Design Section is responsible for matters relating to the detailed engineering design of Main Roads and Freeways. Its principal functions are outlined below.

- ☐ To examine and report on all engineering road designs prepared in Divisions and by Councils, which are outside the authorities of the Divisional Engineer to approve. These include designs for State Highways; and the more important designs prepared by the Department or Councils for work on Trunk Roads, Ordinary Main Roads, Secondary Roads, Tourist Roads, and on Developmental Roads.

- ☐ Examination of all designs for major intersection improvements including channelisation schemes and interchanges.
- ☐ Design of freeways.
- ☐ Design of any major roadwork as determined by the Engineer-in-Chief.
- ☐ Preparation of road design standards and instructions.
- ☐ Investigation of new road design techniques, drafting aids, and drafting methods.
- ☐ Recommendation of cross sections for major bridges.
- ☐ Construction of scale models of some major works.

Traffic Service Section

The Traffic Service Section is concerned with all matters which relate to road safety and the efficient operation of traffic on Main Roads. It therefore becomes involved in many aspects of the Department's operations. It is concerned with planning and design to ensure that safety and efficiency is built into the road system; it becomes involved in construction where the works are staged and traffic must be handled during construction, while on the existing road system it is concerned that proper guidance and safety measures are maintained at all times.

Since July 1976, the Section's activities have been enlarged to include the design, construction and maintenance of traffic signals together with the control over all traffic facilities on local roads as well as on Main Roads.

Other activities of the Traffic Service Section are:

- ☐ collection and analysis of traffic and accident data;
- ☐ administration of land development applications to minimise adverse effects of generated traffic;
- ☐ development of road and area traffic control and management schemes;
- ☐ traffic designs including intersections, interchanges, medians, climbing lanes and safety ramps;
- ☐ development of policies for linemarking and signposting and administration of linemarking programmes;
- ☐ control of advertising on and adjacent to Main Roads;
- ☐ development and administration of programmes for all traffic facilities works;
- ☐ examination of traffic schemes and designs prepared in Divisional Offices;
- ☐ providing data and assistance to Divisions and other specialist sections in determining needs for traffic movement and safety.

NAASRA Traffic Engineering Committee and on other interstate committees whose objects are to achieve uniformity of traffic engineering practice in all Australian States.

Survey and Property Section

The Survey and Property Section is responsible for:

- ☐ the supply of search information;
- ☐ surveys in the metropolitan area;
- ☐ the examination of all real property surveys;
- ☐ the preparation of property plans;
- ☐ the valuation and negotiation for the acquisition of real estate; and
- ☐ the clearance of the right-of-way by the demolition, relocation, or adjustment (in accordance with plans and specifications prepared by the Principal Architect).

The Principal Surveyor and Property Officer is assisted in the administration of the Survey and Property Section by a Deputy and three Assistant Principal Surveyor and Property Officers, who are responsible for:

- ☐ actions involving resumptions, residues and acquisitions;
- ☐ property surveys, survey drafting and council acquisitions; and
- ☐ staff matters and engineering surveys.

The Principal Valuer is responsible to the Principal Surveyor and Property Officer for all matters connected with the valuation of land and property to be acquired by the Department.

Library

The Library is a service section that provides facilities for the information of officers in both Head Office and Divisional Offices. The Head Office Library is supplemented by sixteen smaller Divisional Office libraries.

The facilities provided are as follows.

- ☐ Technical books on subjects directly or indirectly related to the Department's activities (e.g., bridge engineering, road engineering, surveying, traffic engineering, town planning).
- ☐ Periodicals on similar subjects, to provide current information to officers.
- ☐ Australian and international standards.
- ☐ Acts of Parliament and statistical bulletins.
- ☐ Indexes and abstracts to engineering information.
- ☐ Photocopies of periodical articles and other relevant information.
- ☐ In addition, the library provides access to the information resources of other government and non-government libraries, through an extensive inter-library loan system.

Advance Planning Section

The Advance Planning Section is concerned with identifying road needs and then establishing programme priorities directed towards satisfying those needs. To this end, the Advance Planning Section records statistics relating to roads, motor vehicles, and road finance, and gathers data on future estimates of road traffic, motor vehicle population, and finance available for roadworks. Studies on the economics of road improvements are also carried out. The particular functions of the Section are set out below.

- ☐ Keeping records of statistics relating to roads, traffic, and finance.
- ☐ Maintaining an inventory of the initial construction standard and the current condition of all State Highways, Trunk Roads, Ordinary Main Roads and Developmental Roads.
- ☐ Preparing long range estimates of the Department's income.
- ☐ Making studies of the life characteristics of roads and bridges.
- ☐ Making long range studies for road classification and system expansion, particularly in relation to National Highways.
- ☐ Making studies of road needs and preparing long range programmes of road and bridge works in accordance with these needs.
- ☐ Carrying out studies into the economics of road construction and road transport generally. Relating the cost of building roads to the economic benefits which result.
- ☐ Studying methods of taxation used to finance road construction and maintenance. Relating taxation with benefits to the taxpayer.
- ☐ Representing the Department on appropriate Committees.
- ☐ Illustrating the statistics, where appropriate, on charts and maps.

Technical Computing Section

The Technical Computing Section provides computing and other data processing services to the Engineer-in-Chief's Branch. These services include systems analysis and design, programming, data preparation, and automatic plotting.

The Technical Computing Engineer represents the Department on the NAASRA Computer Committee and on the University of New South Wales Visiting Committee for the Department of Statistics.

Costs Section

The Costs Section deals with costing procedures, assembly of cost data, reports on estimates, and the review of charges for road openings, traffic line-marking, and supply of hot-mix. The Section assembles data for, and calculates, annual cost variations for works undertaken by the Department's own forces (i.e., direct control). It also reports on the operations and outputs of various types of plant and prepares the final reports on the costs of all direct control works. Monthly expenditure returns of direct control works are also prepared for all divisions. The Cost Accountant also assists the Highways Engineer with the reviews of programmes for *direct control* works of maintenance and construction.

FUNCTION OF DIVISIONS

Divisional Offices

For the purpose of administering the Department's responsibilities, the State is divided on an area basis into sixteen divisions. The headquarters of two divisions are located in the Sydney Metropolitan Area, one in Newcastle, another in Wollongong, and the remainder in country towns.

In addition to these sixteen divisions, the Department has established two special divisions to control the construction of freeways in, and adjacent to, the Sydney Metropolitan Area. The Divisional Engineer, Inner Freeway Construction controls freeway works being undertaken within the area bounded by Ring Road No. 3 in the County of Cumberland. The Divisional Engineer, Outer Freeway Construction is responsible for freeway works in the outlying suburbs of Sydney and adjacent rural areas. Both of these Divisional Engineers are responsible to the Deputy Engineer-in-Chief.

Each division is in the charge of a Divisional Engineer who is responsible to the Engineer-in-Chief. So that he may effectively carry out his responsibilities, the Divisional Engineer is assisted by appropriate staff and is vested with substantial authority which enables him to act over a wide field without prior reference to Head Office. The Department's organisation is in this way decentralised to the utmost; local road conditions and local needs being thus constantly under observation. In addition, close co-operation with Councils is facilitated.

A Divisional Engineer's responsibilities cover both works carried out by the Department and works carried out by Councils with funds partly or entirely provided by the Department. Generally, Departmental works are directly supervised by a Works Engineer in charge of a Works Office which is located near the work being undertaken.

A typical Divisional Office may have a staff of between 20 to 40 persons comprising engineers, clerks, typists, draftsmen, testing staff, and one or more survey parties. The larger divisions have a much greater staff complement. There are at each Divisional Office a design drawing office, a testing laboratory, and a small technical reference library.

The Divisional Engineer is assisted by a Supervising Engineer and other engineers, a Senior Draftsman, Surveyors, Scientific Officer in charge of the laboratory, and a Senior Clerk.

The Supervising Engineer (while having a general knowledge of the Department's activities within the division) may, in the smaller divisions, administer in detail the operations of a Works Office and the work of Councils, on behalf of the Divisional Engineer.

The Divisional Office engineers are concerned with the operations and planning of Works Offices and Councils' road and bridge works carried out with funds administered by the Department. It is their responsibility, on behalf of the Divisional Engineer, to inspect the works undertaken and to advise the Works Engineer or the Council's Engineer as necessary. They also liaise with the Works Engineer to ensure that the works undertaken are in accordance with approvals. Except in certain circumstances, bridge construction is directly supervised by a Divisional Office engineer or a specialist bridge engineer attached to a Divisional Office.

Divisional Office draftsmen prepare road construction plans. Road plans prepared by Councils are examined in the Divisional Office. The estimated cost of a work determines whether the plans prepared by Council or in the Divisional drawing office required the approval of the Engineer-in-Chief. Bridge plans are all prepared in Head Office.

The Senior Clerk is responsible to the Divisional Engineer for all clerical matters, examination of Councils' certificates of expenditure and general supervision of the functions of the clerical staff of Works Offices.

Works Offices

A Works Office (under the control of a Works Engineer who is responsible to the Divisional Engineer) is established for the detailed supervision of works being undertaken by the Department's own employees. The works may comprise road construction and maintenance and, in some cases, bridge construction and maintenance. For the two freeway construction divisions, the Works Offices directly supervise bridge construction as well.

If a Works Office is established for the purpose of construction, it is kept in operation only for the duration of the work. Normally, if a Works Office controls maintenance, it is set up on a permanent basis with a fully established depot having an office, workshop, store, and other associated permanent structures.

Depending on the size and nature of work carried out by the Works Office, the Works Engineer may have the assistance of one or more engineers. Generally, the Works Engineer maintains control over the works through his assistant engineers and foremen.

The Road Foreman (and Bridge Foreman, where he is controlled directly by the Works Engineer) is a vital link in the line of authority. He supervises employees and plant on construction and/or maintenance work.

The Plant Foreman is responsible to the Works Engineer for the maintenance and repair of all plant including motor vehicles.

The Cost Clerk is responsible to the Works Engineer for direct supervision of clerical staff. In addition, he assists the Works Engineer with correspondence. The clerical staff prepares plant and haulage returns, keeps records of employees' time-sheets and information for computerisation of wages payments and cost dissections. Under the direction of the Cost Clerk, the Storekeeper is responsible for the preparation of stores requisitions, the receipt and issue of stores, and cost dissections for all stores used.

There are at present forty-six Departmental works offices located throughout the State. The following list groups them in divisions.

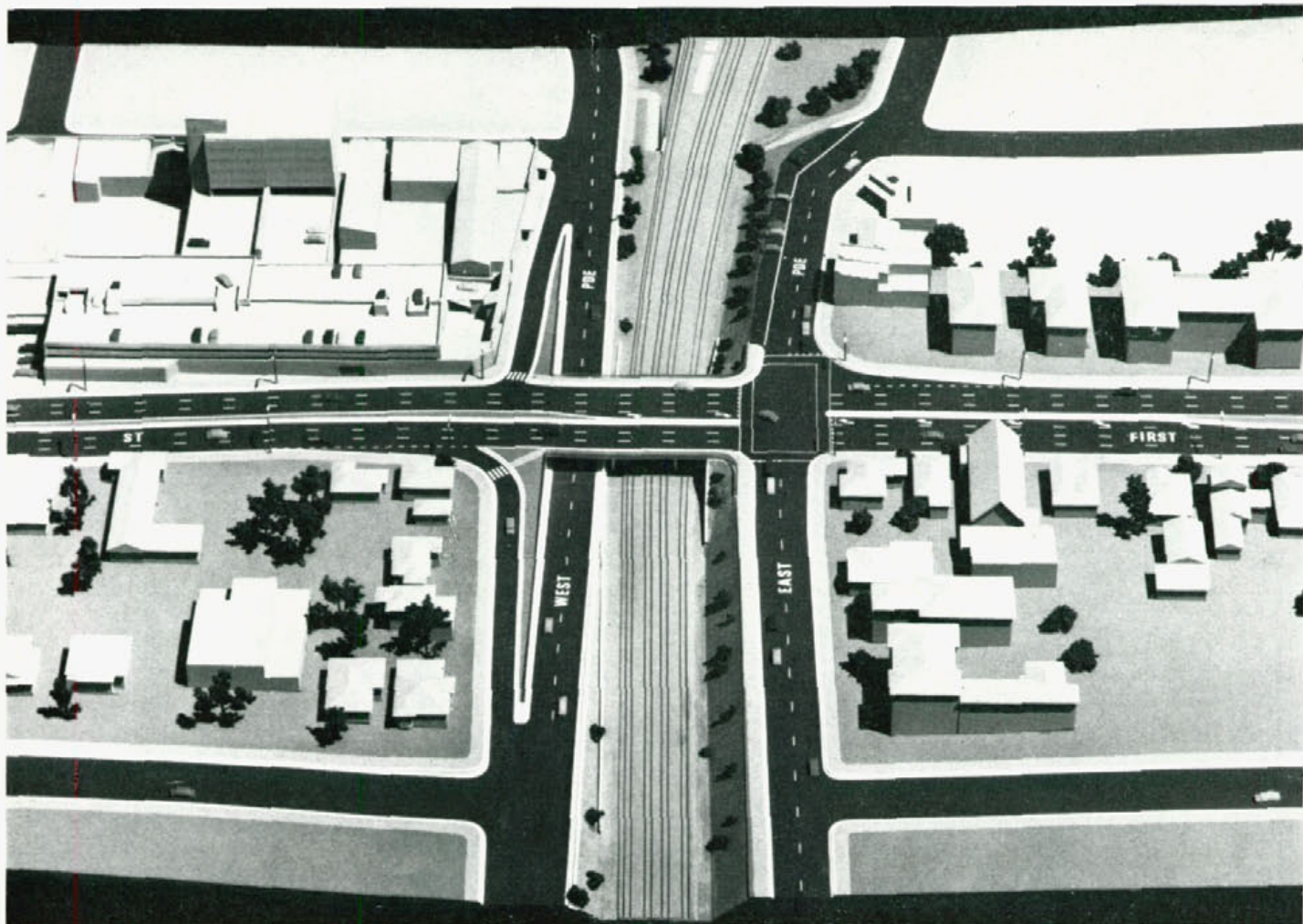
- ☆ Metropolitan Division (Milsons Point),
 - Metropolitan Bridge Maintenance Office (Annandale),
 - North Metropolitan Works Office (Lane Cove),

- South Metropolitan Works Office (Granville), and

- Sydney Harbour Bridge Maintenance Office (Milsons Point).

- ☆ Parramatta Division (Parramatta)
 - Thornleigh, Windsor and Yennora.
- ☆ Central Mountains Division (Lithgow)
 - Bowenfels.
- ☆ Illawarra Division (Wollongong)
 - Bellambi, Bomaderry and Picton.
- ☆ Hunter Valley Division (Newcastle)
 - Singleton and Waratah.
- ☆ Lower North Coast Division (Port Macquarie)
 - Port Macquarie and Walcha.
- ☆ North Eastern Division (Grafton)
 - Ballina and South Grafton.
- ☆ Upper Northern Division (Glen Innes)
 - Bonshaw, Glen Innes, Moree and Tenterfield.
- ☆ North Western Division (Tamworth)
 - Armidale, Coonabarabran and South Tamworth.
- ☆ Central Western Division (Parkes)
 - Dubbo and Orange.
- ☆ Central Northern Division (Bourke)
 - Bourke, Nyngan and Walgett.
- ☆ Murray Darling Division (Broken Hill)
 - Broken Hill, Wentworth and Wilcannia.
- ☆ Central Murray Division (Deniliquin)
 - Finley and Hay.
- ☆ South Western Division (Wagga Wagga)
 - Holbrook, Narrandera and Tumut.
- ☆ South Coast Division (Bega)
 - Bega and Cooma.
- ☆ Southern Division (Goulburn)
 - Goulburn and Yass.
- ☆ Inner Freeway Construction Division
 - Day Street, City (North Western Freeway) and Naremburn (Warringah Freeway).
- ☆ Outer Freeway Construction Division
 - Bargo (South Western Freeway), Campbelltown (South Western Freeway), and Homebush (Western Freeway). ●

Articles on the structure and operations of the Department's Secretarial, Accounts and Legal Branches will be featured in forthcoming issues of "Main Roads".



Scale model showing the location of the proposed bridge on the railway line at Eastwood, looking north. The new shopping complex can be seen at the top left.

LOOKING AHEAD

NEW BRIDGE OVER RAILWAY LINE AT EASTWOOD

On 1st July, 1976, the Minister for Transport and Highways, Mr Peter Cox, announced that a new bridge would be constructed over the Main Northern Railway Line at Eastwood. The announcement advised the acceptance by the Commissioner for Main Roads of a \$836,378 tender by Pearson Bridge (N.S.W.) Pty Ltd. This new bridge, with a greater traffic capacity than the existing one, will greatly relieve the congested traffic conditions at Eastwood which have increased appreciably since

the opening of the Eastwood Shopping Centre.

The work will consist of the construction of a 42.8 metre bridge over both the railway line and West Parade. It will link Rutledge Street (on the west of the railway line) and First Avenue (on the east of the railway line) and will provide six traffic lanes. The three span, prestressed concrete structure was designed within the Department.

In addition to the bridge construction, the existing street system in approach

to the new bridge will undergo extensive improvements. Included in the contract are excavation works to allow West Parade to pass beneath the western span of the bridge. Associated roadworks will involve the reconstruction and widening of Rutledge Street between Shaftesbury and Ryedale Roads and the completion of the underpass in West Parade, with two ramps providing for left turns into and out of Rutledge Street.

Contract time for construction of the bridgeworks is 80 weeks.

LOOKING AHEAD

NEW BRIDGE OVER RING ROAD 3 AT NORTH RYDE

Tenders were invited in June, 1973 for the construction of a bridge to carry Epping Road (Main Road No. 373) over Lane Cove Road (Main Road No. 162) at North Ryde.

Designed by the Department of Main Roads, the prestressed concrete overpass bridge will be 101.8 m long and 21.8 m wide. This width will incorporate six traffic lanes and a median.

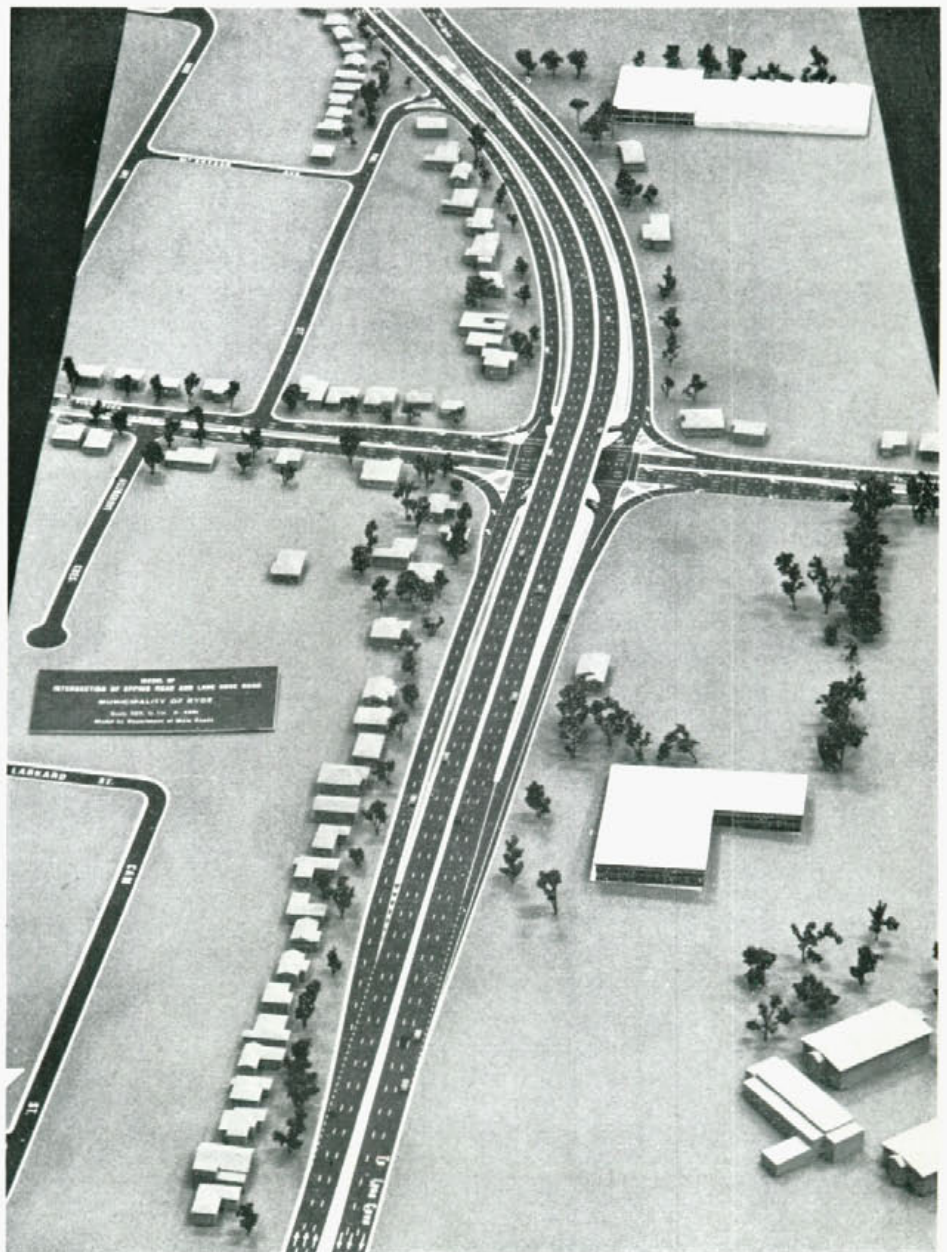
The grade separation of this busy intersection will greatly ease traffic flow at this location where it is estimated that peak-hour traffic will reach approximately 7 000 vehicles an hour by 1980.

In conjunction with the bridgework, Epping Road will be widened to six lanes between Delhi Road and Shrimptons Creek.

Lane Cove Road forms portion of Ring Road 3 and this major project is part of the State Government's plan to improve this important outer circumferential route, which links Mona Vale and Blakehurst.

See colour photograph of a scale model of this interchange on the front cover of this issue. This model is on display on the third floor of the Department's Head Office and can be viewed by arrangement with the Public Relations Section.

A brief article on the design of the interchange appeared in the December, 1974 issue of "Main Roads" (Vol. 40, No. 2, p 52). ●



Scale model of the proposed interchange at the intersection of Epping Road (vertical) and Lane Cove Road (horizontal), at North Ryde, looking northwest.

LET THE RECORDS SPEAK...

More about Early Toll Roads and Toll Collecting

This is the second of a proposed series of articles giving direct quotations from contemporary historical records about tolls imposed on travellers along New South Wales roads in the 1800's.

The first article appeared in the March, 1976 issue of "Main Roads" (Vol. 41, No. 3, pp. 72-73). The last extract then quoted was from a despatch from Governor Lachlan Macquarie to Lord Liverpool in London on 17th November, 1812. It began . . .

"I am very Much Concerned to find that Your Lordship does Not entirely approve of My having Commenced and opened a good Turnpike Road from Sydney to Windsor on the Banks of the Hawkesbury, a Distance of about Forty Miles, and Which is now entirely Completed with the Exception of one Bridge; which being once finished, Toll-Bars will then be Erected between Parramatta and Windsor."

Following other remarks (as quoted in the March, 1976 issue), Macquarie continued . . .

"The Road already Made to the Hawkesbury has been productive of the greatest Benefit, in Affording the Settlers along that Line of Road a greater Facility in transporting their Produce to the Markets at Sydney, and it has also Wonderfully Improved the general Face and Appearance of the Country. The Money advanced from the Police Fund of the Colony for the Construction of these Roads and Bridges Can only be Considered in the Light of a Loan, as the Amount of the Toll-Rates are paid back to the Police Fund, Which Not only pays the Interest of the Sum advanced, but will in a few Years repay the Principal, Originally advanced. Under these Circumstances I confidently hope Your Lordship will approve of my Continuing to Construct public permanent Roads and Bridges through the principal Inhabited parts of

the Colony, two more great Turnpike-Roads being Yet essentially Necessary between the Town of Sydney and Liverpool and between the former and the River Nepean. From the great Advantages already derived to the people from the Construction of the Turnpike Road to Windsor, I can safely Venture to Assure Your Lordship that the Making of the two others, now proposed, to the Town of Liverpool and the River Nepean, will essentially Contribute to the internal Prosperity and General Welfare of this Colony."

(from HRA I, Vol. 7, pp. 604-605)

The collection of tolls on the road to the Hawkesbury River (which had been forecast by Macquarie in the above despatch) was introduced in 1814.

"GOVERNMENT PUBLIC NOTICE"

Secretary's Office, Sydney,
27th November, 1813.

The New Road leading from Parramatta to Windsor, being some Time since completed, and two Toll Gates erected thereon, with suitable Houses for the Accommodation of the Gate-keepers, the Public are informed, that one of those Toll Gates is placed near to the Bridge over the River at Parramatta, and the other at Rouse Hill (sometimes called Vinegar Hill), at a Distance of about eight Miles from Windsor; and Tolls will commence to be levied at those Gates on the 1st Day of January next.

It being intended to Farm the Tolls to be collected at the said Gates, for one Year from the said 1st Day of January, 1814, Notice is hereby given, that sealed Tenders or Proposals for the farming of the Tolls will be received at the Office of D'Arcy Wentworth, Esq. one of the Trustees and Commissioners for the Turnpike Roads, on Wednesday the 15th Day of December next.

A Scale of the Tolls intended to be levied at the foregoing Gates may be seen at the Office of the Superintendent of Police.

By Command of His Excellency,
The Governor,
J. T. CAMPBELL, Secretary."

(from Sydney Gazette, 27th November, 1813, p. 1)

At this point it might be as well to include some comments about turnpikes.

The term *turnpike* originally described a medieval structure used to prevent horses from entering narrow streets. Initially, it consisted of an upright post surmounted by a horizontally revolving wooden cross, the ends of which were sharpened. By the 17th Century it had lost its spiked appearance and had evolved into a pivoted or hinged bar used to close a road until tolls had been collected. Following riots throughout England in the early 18th Century, the destruction of toll gates was made an offence punishable by death.

(Ref. "The Turnpike Road System in England, 1663-1840", by W. Albert, Cambridge, 1972)

Here, as in England, road-users tried both obvious and devious ways to avoid paying the tolls. The following extract from the Sydney Gazette of 13th March, 1813 (p. 1) shows that the authorities were just as persistent in their plans to frustrate any toll evasion tactics.

"GOVERNMENT ORDER AND PUBLIC NOTICE

Secretary's Office, Sydney,
13th March, 1813.

Whereas the Road leading from Sydney to the South Head, lately made by Public Subscription for the Convenience and pleasant Recreation of the Inhabitants of the Colony, has been much cut up and injured by Cars, Carts, and Waggons passing over it for the Purpose of conveying Fire-wood from the adjacent Lands, to make Sale of at Sydney; and it being clearly ascertained, that this Practice has not arisen out of any superior Facility in procuring Fire-wood in this Direction, but from the sole Motive of the Owners avoiding the Toll to which they were subject when they brought said Fire-wood from the usual Grounds through the Turnpike, on the main Road leading hence to Parramatta.

His Excellency the GOVERNOR having given these Circumstances due consideration, has deemed it expedient that all Cars, Carts, or Waggons, loaded with Fire-wood, Lime, or other Goods or Merchandise of whatever Sort, which shall in future proceed along the said South Head Road from Botany Bay, or elsewhere, to the Town of Sydney, shall, on and after the 15th Instant, pay the same Rate of Toll they would be liable to if they were to pass through the Turnpike Gate on the Road to Parramatta.

In Pursuance of this Regulation, HIS EXCELLENCY has lately caused a Toll-Gate to be erected on the said Road, leading from Sydney to the South Head, on the Boundary of Mr. Palmer's Lands, at the South East Extremity of Hyde Park; and this Toll-Gate being now completed at the Expence of Government, the same Toll Dues are in future to be demanded and paid there on all Cars, Carts, and Waggons passing through it, as at the Toll-Gate on the Main Road to Parramatta.

No Tolls are to be paid or demanded at this new Gate for private Carriages, Curricles, Chaises, Gigs, or Riding Horses; neither is any Toll to be paid for Horses, Cows, Sheep, or Cattle of any Kind, on going out to, or returning from Grazing through the said Gate.

The Tolls which shall be thus collected being intended to be laid out on the Repair of the said Road to South Head, as it may be found to require it, the Toll-keeper is hereby directed to keep a clear and regular Account in a Book, of all Cars, Carts, or Waggons which shall in future pass through the new Gate, and of the Tolls respectively paid by them, which Book he is hereby further required to submit, on the 1st Day of each succeeding Month (not being a Holiday) to the Inspection of His Excellency the GOVERNOR.

Evan Davis is appointed Toll-keeper at the new Toll-Gate on the South Head Road.

*By Command of His Excellency the
Governor,*

J. T. CAMPBELL, Secretary."

The next turnpike route to be completed was the embryo Hume Highway, which received favourable coverage in the Sydney Gazette of 26th February, 1814 (p. 2).

"The new Road leading to Liverpool (constructed by Mr. William Roberts) being compleated a few days ago, His Excellency the Governor, accompanied by Lieutenant Governor Molle, was pleased to go thither on Tuesday last, the 22nd instant, and perform the ceremony of opening it, on which occasion the barriers at the bridges which had been suffered to remain until then, were immediately removed to make way for His Excellency's carriage. We understand that His Excellency express much satisfaction with the general line and performance of this important public work, and was particularly struck with the appearance of Moore's Bridge, which is at once bold, strong and workman like, extending across a wide, steep, and beautiful reach of Prospect Creek . . .

It is said to be in contemplation to erect a Toll gate very shortly on this Road, near to Moore's Bridge, where we may venture to assert, that a moderate Toll

will not be more readily demanded than cheerfully and gratefully paid."

Such an amicable response was expected from local settlers because of the "incalculable benefits" which the road would bring . . .

" . . . by enabling them to send their various produce to market by a safe and expeditious line of conveyance instead, of as heretofore, harrassing their cattle, and braking their carts through the rugged and intricate passes of the bush."

Summarising the situation in his despatch to Lord Bathurst on 28th April, 1814, Macquarie either intentionally omitted to report the completion of Liverpool Road or wrote this part of his report more than two months before he sent it.

" . . . a very good Road has been some time since Completed between the Towns of Sydney and Windsor on the Banks of the Hawkesbury, passing thro' the Town of Parramatta, being a Distance of 38 Miles. Another Road between Sydney and Liverpool is now nearly Completed, and one from Liverpool to Parramatta is in progress, which two latter will be a distance of 25 Miles. The Road from Sydney to Windsor has Turnpikes on it in the Neighbourhood of the Towns of Sydney, Parramatta and Windsor, and it is My Intention to Erect Turnpikes on that leading to Liverpool, and thence to Parramatta. When the Liverpool Road shall be finished, I purpose to Commence on a Line of Road from the Town of Parramatta, and to Carry it on in a due Western Direction to the River Nepean, which will be a distance of about 30 Miles; this Road will lead to a Ford on the River, by which Men and Cattle will be enabled to Cross, and by that means to reach the newly discovered Country to the West of the blue Mountains, by the Road which I have already mentioned to Your Lordship my Intention of having Cut across those Mountains from Emu Island.

As these Roads will be of the Utmost Advantage to the Prosperity and welfare of the Colony at large, I trust Your Lordship will approve of their being Undertaken; the Expence will be Considerable, but it will be repaid finally by the Tolls which will be levied on them,

continued on next page

NEW MINISTER FOR TRANSPORT AND HIGHWAYS



Hon. Peter Cox, M.L.A.

Following the State election held on 1st May, 1976, Mr Peter Francis Cox became the Minister for Transport and Highways in the new Labor Government in New South Wales. He is one of several Cabinet Ministers whose careers stretch back to a direct association with the public transport system of this State.

Immediately after completing his secondary education at Marist Brothers College, Lidcombe, Mr Cox began his career in transport as an officer with the Department of Motor Transport. During the 23 years he served with the Department, he gained a clear insight into public transport and the activities of the trade union movement, transport authorities and commuter groups.

Mr Cox began his parliamentary career on 1st May, 1965 when he was elected as the Member for Auburn. He knows this area intimately having lived in Lidcombe and Auburn most of his life.

After three years as a Member of the Legislative Assembly Mr Cox was elected as the Shadow Minister for Transport. His knowledge of transport and his strong links with the trade union movement allowed him to be one of the most energetic and successful shadow ministers for the Labor Party in Opposition. Mr Cox continued to serve as shadow minister for eight years until Labor gained office earlier this year.

During World War II, Mr Cox served in the Armed Forces with the 2/10 Infantry Battalion which took part in the landing at Balikpapan, Borneo.

Mr Cox is married with five children and lives in Auburn.●

and in the Mean time the Interest will be paid by those Tolls, and the Roads kept in good Repair. The Money Necessary for these important Improvements will be drawn from the Colonial Funds, which I entertain the Hope will meet Your Lordship's fullest Approbation."

(HRA I, Vol. 8, pp. 152-153)

In the same year (1814), a double murder was committed in May at the toll-keeper's house near the "Toll South Bar at Parramatta". Two immediate suspects were Michael Hoolaghan and Alexander Suttar who worked nearby (with two other men William Day and Thomas Bond) on the new Parramatta-Liverpool Road.

The transcript of their trial gives us one of the few contemporary insights into the type of men employed on the roads and at the tollgates, their rough existence and crude habits, and the attitudes of others to them. The two men were found guilty and sentenced to be hung but, in a remarkable climax to this unusual episode, one of the real murderers confessed.

In appealing to London for their free pardon, Governor Macquarie explained the dramatic turn of events.

"Notwithstanding this Sentence, the impression was so strong on the Public Mind that they were not the Murderers, that I yielded so far to the earnest Solicitations made to me in their behalf by some Persons of respectability as to defer the execution of the Sentence from time to time, in the hope that some Circumstances would come to light to Settle every doubt on the Subject.

Most Providentially for these Apparently Ill fated Men this Suspension of their Sentence took place, for their innocence has at length been most clearly and satisfactorily established by the Voluntary Confession of One of the Real Murderers, Named John White."

Giving evidence at the trial, Francis Oakes, Chief Constable at Parramatta described what happened. (Edward Main was the keeper of the "Turnpike Gate" at "the South Toll Bar at Parramatta").

"Edward Main came to my House and informed me that two ruffians Had been there, and had shot one man dead, and

the other was dying. I went to the Toll-Gate and asked him had he any knowledge of the persons; he said he had; he was sure it was the men making the new road from Parramatta to Liverpool. He particularly named Woolaghan. I asked him did he know the man's voice; he said yes: He mentioned Suttar, but was not positive as to him. I sent the constables with a party of Soldiers out to bring them in. At this time I was at the Toll-Gate. I had been there but a few minutes when this hat was picked up at the outside of the Toll-gate on the Causeway at the end of the House next the bridge."

The men lived in two bark huts on the road "about two Miles and a quarter from the Turnpike at Parramatta". They were employed by road contractor William Roberts who gave evidence that Hoolaghan had been in his employ for over a year and Suttar for three months. Roberts considered Hoolaghan to be "a peaceable quiet man and very industrious" and "trusted him as an overseer over the other men".

Patrick Cullen also gave evidence, speaking more bluntly.

"Redman and I farm the Tolls on the Parramatta road. I had some conversation with Main before this business happened, relating to the Prisoners at bar. On the fourth or fifth of May last, I overhauled Main's Books. When I overhauled his books and Settled the account, he said he could not pay the Money due at that time: he said he had a parcel of bills that he knew Mr. Redman and I could not approve of, and that he laid them out for a Cask of Beer with Mr. Blaxland; in the course of this Conversation, he said he dared to say his Wife was along with the ragamuffins at Robert's Hut; he did not mention any body's names. I understood him to mean the huts these four men were living at; he spoke in very Angry terms."

(HRA I, Vol. 8, pp. 357-367)

So endeth our report on another unusual episode in the story of early toll collecting. In later issues, we will be looking at the fiery refusal of rebellious Judge Jeffery Bent to pay tolls and at the building of Francis Greenway's grandiose toll house near Railway Square.●

For more than forty years the National Association of Australian State Road Authorities (NAASRA) has been the focus for co-operation between the States in the study of road problems. Inevitably, as traffic volumes have grown and as vehicle models have developed, more and more problems have arisen. The close association of the various State Road Authorities in NAASRA has meant that these problems are faced, and solutions worked out, as a combined effort. Duplication is avoided, and the most experienced road engineers in Australia are available as needed to co-operate in each exercise.

History and Development

The birth of NAASRA is closely related to the passing in 1926 of the Federal Aid Roads Act (Commonwealth) setting up a Federal Aid Roads Board. The Board consisted of the Commonwealth Minister in charge of the Act and the Ministers from each State in charge of roads and was intended to assist in the smooth working of the new legislation. This Board met annually and it was the practice for the technical members of the various State Authorities to meet at the same time to discuss road problems and policies of interstate importance.

When the Federal Aid Roads Act was amended in 1931, supervision by the Commonwealth was relaxed and the Board disbanded. This resulted in the regular and official contact between State Road Authorities being discontinued until, in 1933, at a conference of Ministers for Transport, it was considered that both the rail and road authorities of all States should meet in conference from time to time.

The first Conference of State Road Authorities (COSRA) was held in 1934 at Melbourne and it was evident that the value of the formal agenda was enhanced by the opportunity for informal discussion, road inspections and the interchange of ideas. The conference resolved to hold similar meetings annually at each capital city in rotation.

In 1935 a representative from the appropriate Commonwealth department was invited to attend and representation has continued ever since to give a total of seven authorities in the Association, which now meets twice each year.

NAASRA maintains a permanent secretariat which occupies quarters in the Department of Main Roads in this State.

Road research always played an important part in conference discussions and research work was co-ordinated

The Role of NAASRA In Australia's National Roading Policy

among the States wherever possible. However, with the increasing importance of road research, NAASRA decided in 1959 to set up a separate organisation to be called the Australian Road Research Board (ARRB), which had its first meeting in Sydney in 1960.

In 1966 the Commonwealth Bureau of Roads was constituted to advise the Commonwealth Government regarding the granting of financial assistance to the States in connection with roads or road transport. NAASRA established liaison with the Bureau by inviting the Chairman to attend appropriate sessions of the NAASRA meetings. The Bureau has based its recommendations to the Commonwealth Government on the results of detailed road needs surveys which have been conducted jointly by the Bureau and NAASRA.

Objectives and Aims

NAASRA provides a means for the States to pool technical and administrative experience, to co-ordinate and rationalise road research projects, to harmonise and co-ordinate standards, to ascertain and publish the facts about Australia's principal roads and their financing, and to develop an informal outlook on Australia's road problems as a whole.

Its objectives are:

- ☐ to establish the role of roads in a balanced transportation system and therefrom develop an adequate, economic and safe road system for the nation;
- ☐ to promote a public awareness of the role that roads play in the social structure of the community; and
- ☐ to have NAASRA recognised as a forum for the formulation of national road policies.

NAASRA aims to:

- ☐ consult with other agencies and to undertake studies for the formulation of policies as outlined in the objectives;
- ☐ establish appropriate standards for all classes of roads;

- ☐ disseminate information on the value of roads in the national economy and the role played by roads in transportation;
- ☐ promote road safety by balanced planning, design and road traffic management practices;
- ☐ promote the development of improved methods of administration, planning, design, construction, maintenance and operation of roads;
- ☐ advise meetings of ministers on matters relating to the formulation of roading policies and practices; and
- ☐ inform governments and others on all matters relating to the nation's road system and its development.

In carrying out the work of NAASRA, its members (despite their allegiance to their own States) must and do adopt a national outlook. These members have made it a rule that all decisions must be unanimous or at least agreed to with only minor reservations. In spite of this requirement, few matters remain unresolved.

The following comments highlight the varied activities of the Association.

Traffic Safety and Guidance

The problems of traffic safety and guidance have been given constant attention by the Association. One of the Association's first tasks was to join with the Standards Association of Australia in the production of the SAA Road Signs Code. A system of route markers has been adopted for the principal Australian roads based on the system of route marking established throughout the United States of America by the American Association of State Highway and Transport Officials.

In recognition of the importance of safe and efficient traffic movement, the Association has set up a Traffic Engineering Committee to carry out a survey of the applications of traffic engineering in the road problems in Australia. The Committee also set out to develop a programme for co-ordinated research in

this field by the various State Road Authorities and by the Australian Road Research Board (ARRB). In addition, the Association has liaison with the Conference of State Traffic Control Engineers.

Materials Testing and Research

The continuous study of the properties of road-making materials has always been one of the essential tasks of the Association and a Materials Committee has been established for this purpose. This has led to the adoption of uniform methods of testing materials. There is a constant interchange of the results of experience with materials and their testing, and NAASRA members undertake joint research projects. Standardisation of test methods is, where feasible, arranged by the Association through the Standards Association of Australia.

During recent years, with the development of the science of soil mechanics, there has been a rapidly increasing realisation of the fundamental importance of the quality of soil in road foundations. As a result, the field of materials research has been expanded to include soil, which still presents many incompletely solved problems. The Association has prepared a booklet on the selection and testing of gravels and soils for pavement construction. This booklet is made available to road-building authorities throughout Australia and is also used by students.

The work of this Committee is greatly helped by liaison with the Australian Road Research Board (ARRB) to which it transmits proposals for research.

Advance Planning

For efficient forward planning of roadworks, it is necessary to have up-to-date information concerning the present condition of the roads, and soundly based estimates of cost for works required to meet the needs of traffic for some years ahead. In order to obtain information of this nature, the Association carried out an extensive survey of road conditions and traffic volumes throughout the Commonwealth. The information so obtained was used in preparing estimates of the funds required for a reasonable and practicable programme of roadworks for the ten-year period ended 30th June, 1974.

The work entailed in this survey was co-ordinated by the Advance Planning Committee, which was first appointed by the Association in 1958. This Committee serves also as a means of exchanging information on other phases of planning work, including the economics of road

transport; studies relating to taxation for road finance; uniform methods of recording statistical information relating to roads, traffic and finance; and investigations into the life expectancy of road pavements.

Road authorities are large organisations and their efficient management demands considerable forward planning. So far as this applies to the works which they carry out, the Advance Planning Committee of NAASRA concerns itself with obtaining relevant information where co-operation between authorities is needed.

The most notable work of this Committee was the completion of the two road needs surveys. The first survey was for the period 1960-61 to 1969-70 and it resulted in the publication by NAASRA in 1961 of "Australia's Road Needs, Ten-Year Plan". This was followed by a second survey for the period 1964-74 which was published in 1963 and called "Australia's Road Needs for the Ten-Year Period, 1964-74".

Of more interest is the road needs survey conducted in 1972 jointly with the Commonwealth Bureau of Roads. The detailed work of these surveys falls largely to the Advance Planning Committee. The results have provided the most authoritative estimates of the nation's road needs calculated so far.

Plant and Equipment

Mechanised equipment constantly plays a more and more important part in road building and maintenance, and road authorities are conscious of the need to see that plant is used to the best advantage and is properly maintained. The Association, through its Plant and Equipment Committee, interchanges information on the performance and up-keep of plant being used by the various State Road Authorities.

The Association is also working towards the development and improvement of locally manufactured plant units to suit Australian conditions and towards the standardisation of wearing parts. Recommended minimum requirements for a number of plant items have been prepared. Standards for construction and maintenance equipment have been or are being prepared by the Standards Association of Australia with the aid of members of NAASRA.

Vehicle Standards

Control of weight of loads to protect roadways covers two aspects—the road pavement itself and the bridges along the route. A limit on wheel or axle load provides the means to protect road

pavements and bridge decks and a limit on the laden weight of a vehicle protects bridge girders, trusses and piers. With the object of securing uniformity throughout Australia, the Association has produced recommended standards for the regulation of the weights of loads on roads. These standards cover limits for axle load, single tyre load, load on tandem axles, gross weight and pressure in tyres.

The Association has also considered and made recommendations to the Australian Transport Advisory Council covering Commonwealth-wide standards for the maximum length and width of vehicles and is represented on the Australian Motor Vehicle Standards Committee.

Bridge Design Standards

Originally each State Road Authority had its own design specification for highway bridges which defined, among other things, widths, clearances, loads to be designed for, and working stresses. These design specifications differed from one another in some respects and, with the growth of long distance road traffic, it became evident that a standard design specification on a Commonwealth-wide basis was most desirable. The Association therefore prepared such standards.

More recently a revision has been made of the original "Highway Bridge Design Specification" and this is now being issued progressively. Manuals have also been prepared for "Specifications for Highway Bridge Construction" and "Bridge Construction Practice".

Road Design Standards

The Association considered that a uniform policy for road design throughout the Commonwealth was desirable and therefore formulated a uniform policy suitable for use by each State Road Authority as a basis for design practice for two-lane rural roads.

The adopted standard entitled "Policy for Geometric Design of Rural Roads" (amended in 1973) is now in general use. It has been distributed to local government bodies and is on sale to the public by each of the State Road Authorities.

Publications have also been prepared on the design of major urban roads, freeways, and typical urban intersections.

Uniform Road Statistics

In order to provide road statistics for the Commonwealth as a whole on a uniform basis, the Association drew up standard forms for the compilation of statistics covering the lengths of different classifications of roads and different types of road pavements, motor vehicle

registrations and finance. It collects the statistics from each Authority at the close of each financial year and combined statistics are then compiled. These statistics are published in its brochure "Australian Roads".

Mapping

One of the early tasks of the Association was to arrange for the preparation of a road map of Australia showing in a uniform manner the primary road systems in each State and the types of pavements on these primary roads. A four-standard classification has been adopted for the pavement types; namely, bitumen or concrete, gravel or crushed stone, formed only, and unformed. Use was made of this map by the Ministry of National Development in preparing the roads map for the Atlas of Australian Resources, published in 1953. The commentary which accompanies the map in the atlas was prepared by NAASRA.

Highway Naming

One of the results of co-operation among the State Road Authorities has been the adoption of uniform names for interstate highways, such as:

- ☆ the Princes Highway, from Adelaide through Melbourne and along the coast to Sydney;
- ☆ the Pacific Highway, from Sydney north along the coast to Brisbane;
- ☆ the Hume Highway, from Melbourne via Albury to Sydney;
- ☆ the New England Highway, from the Pacific Highway at Hexham (near Newcastle) over the New England

tableland through Tenterfield and Warwick to Toowoomba;

- ☆ the Sturt Highway, from Adelaide through northern Victoria, Hay and Wagga Wagga to the Hume Highway south of Gundagai; and
- ☆ the Eyre Highway, connecting South Australia and Western Australia.

Co-operation with Standards Association

As can be seen from the text so far, the Association maintains a close liaison with the Standards Association of Australia. The Standards Association, in the preparation of standards, follows an established procedure by drawing on the services of all interested organisations. NAASRA has taken the view that, to the greatest possible extent, standards relating to road signs, road materials and road machinery parts should be dealt with by the Standards Association. As a result, they have taken an active part in the preparation of road standards suggested by NAASRA.

The State Road Authorities in turn give the Standards Association every support by making technical officers available to act on committees set up by them. In some cases, officers have been nominated by NAASRA to represent all the Authorities on standing committees of the Standards Association.

Exchange of Information

The Association has arranged for the regular interchange among member Authorities of information on main roads legislation and administrative practice in the various States. It also

arranges for the exchange of technical data, manuals of instruction on methods of carrying out roadworks and administrative instructions.

The attendance of officers of the State Road Authorities at meetings of NAASRA committees (which are held each year in a different State) gives these officers an excellent opportunity to discuss problems among themselves. By means of inspections of works in progress, laboratories, etc., they are able to see the application of principles and methods under varying conditions. These meetings and inspections have assisted greatly in the rapid sharing of new advances in the science and art of road and bridge construction throughout the Commonwealth. There is a similar sharing of information obtained from overseas visits. An arrangement exists whereby reports made by officers of the member Authorities who have been sent abroad for study purposes are made available to all the other Authorities.●

This article has been adopted from the key-note address given by the Commissioner for Main Roads, Mr A. F. Schmidt, at the International Training Course in Road and Bridge Engineering which was conducted earlier this year by the Department in collaboration with NAASRA.

This course was described in the March, 1976 issue of "Main Roads" (Vol. 41, No. 3, p 69) which also contained a list of the current addresses, etc., of all the State Road Authorities.

A brief historical review of NAASRA was also included in the December 1971 issue, (Vol. 37, No. 2, p 38) together with an article on NAASRA Courses for African and Asian Engineers and the International Seminar held in Sydney during August 1971.

TENDERS ACCEPTED BY COUNCILS

The following tenders (in excess of \$20,000) for road and bridge works were accepted by Councils for the three months ended 30th June, 1976.

Council	Road No.	Works or Service	Name of Successful Tenderer	Amount
Camden	M.R. 154	Supply of Armco guardrail for approaches to new bridge over Narellan Creek, 0.00 km to 3.4 km from M.R. 178 at Narellan.	Armco (Aust.) Pty Ltd	\$ 23,883.32
Camden	M.R. 154	Construction of bridge over Narellan Creek at 1.6 km from M.R. 178 at Narellan.	Ripma Constructions	170,032.00
Cobar	T.R. 61	Bitumen surfacing of section 57.9 km to 64.9 km south of Cobar.	Emoleum (Australia) Ltd	23,786.48
Coffs Harbour	M.R. 151	Construction of new 3 span prestressed concrete bridge over Nana Creek, 57.3 km south of Grafton.	M. O. & P. J. Kautto	77,289.40
Eurobodalla	M.R. 271	Construction of bridge over Moruya River 4 km from Moruya at Kiora.	N. J. McIntosh	267,800.00
Gosford	M.R. 336	Supply and lay asphaltic concrete 2.6 to 3.7 km north of Gosford.	Bitupave Ltd	92,318.00
Goulburn City	S.H. 2	Mudjacking and joint sealing of concrete slabs in Auburn Street, Goulburn.	Concrete Industries (Monier) Ltd	46,398.00
Hastings	M.R. 600	Driving of reinforced concrete piles 8 km north of Port Macquarie.	G. J. George	29,781.00
Murray	Rural Road Mathoura/Tocumwal Road	Construction of new bridge over Edward River.	R. C., P. M. and R. G. Murray	136,727.89
Namoi	M.R. 127	Construction of 18 cell 2.5 m x 1.6 m reinforced concrete box culvert at 7.7 km west of Wee Waa.	Emoh Ruu Const. Pty Ltd	68,183.00

Council	Road No.	Works or Services	Name of Successful Tenderer	Amount \$
Namoi Parry	Rural Road S.H. 11	Construction of bridge over Namoi River at Tarriano. Construction of approaches to new structures at Menedebri Creek.	Balland and Sheeman Dayal Singh Constructions (Tamworth) Pty Ltd	146,686.00 51,310.00
Parry Shellharbour Snowy River	S.H. 11 Various Unclassified	Construction of reinforced concrete box extensions. Supply and laying of asphaltic concrete. Construction of bridge over Little River on Adaminaby- Youak Road.	W. H. Marshall & Son Pioneer Asphalts Pty Ltd Nelmac Pty Ltd	32,080.00 50,000.00 59,048.00
Tweed	S.H. 10	Supply, haul and laying of asphaltic concrete in Tweed Heads.	Construction Materials (Aust.) Pty Ltd.	38,407.50
Warren	M.R. 333 and 347	Bitumen rescal.	Shorncliffe Pty Ltd	31,088.72
Wollondilly	Various	Bitumen resealing of pavement.	Alan Wright Bitumen Sealing Pty Ltd	30,859.22

TENDERS ACCEPTED BY THE DEPARTMENT OF MAIN ROADS

The following tenders (in excess of \$20,000) for road and bridge works were accepted by the Department for the three months ended 30th June, 1976.

Road No.	Works or Service	Name of Successful Tenderer	Amount \$
North Western Freeway	City of Sydney. Construction of road PQ pavement by contract.	Melocco Bros Pty Ltd	28,041.24
South Western Freeway	Shire of Wollondilly. Construction of section from near Avon Dam Road to Yanderra—86.7 km to 89.6 km south of Sydney.	White Industries Ltd	993,704.00
Southern Freeway	City of Wollongong. Construction of twin bridge over Mullet Creek between Berkeley and Dapto, 91.5 km south of Sydney.	White Industries Ltd	1,754,277.00
Southern Freeway	City of Wollongong. Construction of Harvey Street Underpass—section from Berkeley to Yallah.	Hornibrook Group (Southern Division)	239,965.00
State Highway No. 1	Princes Highway. Shire of Eurobodalla. Repainting of bridges over Clyde River, Batemans Bay; Wagonga Inlet, Narooma; Turoos River, Bodalla; and Snowy River, Dalgety.	I. Mondello	130,979.70
State Highway No. 2	Hume Highway. Municipality of Yass. Construction of new bridge over Yass River at Yass.	Pearson Bridge (N.S.W.) Pty Ltd	573,138.00
State Highway No. 5	Great Western Highway. Shire of Blaxland. Con- struction of new bridge and alteration to existing bridge over Marrangaroo Creek, 5.8 km west of Lithgow.	Hornibrook Group (Southern Division)	282,044.00
State Highway No. 9	New England Highway. Shire of Scone. Repainting by contract of bridge over Hunter River (Aberdeen Bridge) at Aberdeen and bridge over Namoi River at Manilla on T.R. No. 93.	Kada Painting Contractors Pty Ltd	88,673.80
State Highway No. 9	New England Highway. City of Maitland. Supply and delivery of up to 5 000 tonnes of crushed slag to reconstruction work at Three Mile Creek between 25.9 km and 28.5 km west of Newcastle.	Blue Metal & Gravel (North)	26,250.00
State Highway No. 9	New England Highway. City of Cessnock. Supply and lay up to 900 tonnes of 10 mm dense graded asphaltic concrete to two sites, 21.5 km and 46.0 km west of Maitland.	Bitupave Ltd	29,786.00
State Highways Nos 9 and 10	New England and Pacific Highways. City of Newcastle. Supply and delivery of up to 4 000 tonnes of 10 mm dense graded asphaltic concrete for strengthening pavement 2.1 km west from junction of highways at Hexham.	Bitupave Ltd	86,480.00
State Highway No. 10	Pacific Highway. Shire of Tweed. Repainting by contract of bridge over Tweed River at Barneys Point.	Kada Painting Contractors Pty Ltd	49,890.00
State Highway No. 10	Pacific Highway. Shire of Lake Macquarie. Supply and delivery of up to 1 450 tonnes of 10 mm dense graded asphaltic concrete into the Department's spreader at Doyalson, 123.6 km to 125.3 km north of Sydney.	Bitupave Ltd	35,162.00
State Highway No. 10	Pacific Highway. Shire of Coffs Harbour. Manufacture, supply, delivery and stacking of prestressed concrete bridge planks for Diamond Head Overbridge, 21.4 km north of Coffs Harbour.	North-West Prestressed Pty Ltd	57,120.00
State Highway No. 17	Newell Highway. Shire of Jerilderie. Construction of 4 cell 3 m x 1.8 m reinforced concrete box culvert at Turn Back Jimmy Creek.	J. Evans	44,099.07
Main Road No. 592	Cahill Expressway. City of Sydney. Installation of new Jersey type median barrier at eastern end of Circular Quay Overhead Roadway.	Squeeze-Crete (Aust.) Pty Ltd	20,410.00
Various	Shire of Maclean. Winning, crushing and stockpiling of 12,000 M3 sandstone rock at Maclean—1975-76 flood and storm damage.	Ray Austin Earthmoving	42,000.00
Speewa Ferry	Shire of Wakool. Caretaking and operation of ferry over Murray River for 3 years.	W. A. Brooks	28,704.00

MAIN ROADS STANDARD SPECIFICATIONS

Note: Imperial drawings are prefixed by letter A, metric drawings by the letters SD, instructions are so described, all other items are specifications.

ROAD SURVEY AND DESIGN	Form No.
Design of two-lane rural roads (Instruction—1964)	355
Data for design of two-lane rural roads (1973)	892 (Metric)
Flat country cross sections—bitumen sealed pavement (Instruction—1972)	A 6132
Plan and longsection—Two lane rural roads	SD 6215
Standard cross sections for bitumen surfaced two-lane rural roads (1973)	SD 6056

URBAN DRAINAGE

Concrete converter	A 1418
Concrete work other than bridges	738 (Metric)
Design of subsoil and subgrade drainage (Instruction—1973)	513 (Metric)
Gully grating (1969)	A 190
Gully pit with grating	A 1042
With kerb inlet only	A 1043
With grating and extended kerb inlet	A 1352
With extended kerb inlet only	A 1353
With grating for mountable kerb	A 4832
Kerb and gutter shapes (1975)	SD 6246
Perrambulator ramp	A 3491
Vehicle gutter crossings (1974)	SD 6247
Waterway calculations for urban drainage (Instruction—1963)	371B

CULVERTS

(a) Cast in place reinforced concrete box culverts—	
Box culverts with wearing surface	SD 6270
Single cell box culvert under fill from 1 m	SD 6271
Single cell box culvert under fill from 0.3 to 1 m	SD 6272
Multiple cell box culvert under fill from 1 m	SD 6273
Multiple cell box culvert under fill from 0.3 to 1 m	SD 6274
(b) Precast reinforced concrete box culverts—	
Erection of precast concrete box culverts	138B (Metric)
Supply of precast concrete box culverts	138A (Metric)
(c) Pipe culverts—	
Construction of concrete pipe culverts (1974)	25 (Metric)
Design of concrete pipe culverts (1974)	25A (Metric)
Headwalls for pipe culverts—	
Single row—	
600, 750, 900 mm dia.	SD 139
375, 450, 525 mm dia.	SD 143
1 050 mm dia.	SD 172
1 200 mm dia.	SD 173
1 350 mm dia.	SD 174
1 500 mm dia.	SD 175
1 800 mm dia.	SD 177
Supply and laying of asbestos cement drainage pipes (1972)	861

BRIDGES

Concrete work for bridges (1976)	350 (Metric)
Data for bridge design (1973)	18 (Metric)
Delivery of precast concrete members to site (1975)	560 (Metric)
Erection of precast, prestressed concrete bridge units and planks (1975)	557 (Metric)
Erection of precast, prestressed concrete piles (1966)	558
Erection of precast, prestressed concrete bridge girders	561 (Metric)
Excavation for bridges (1974)	563 (Metric)
Extermination of termites in bridges (Instruction—1958)	326
Erection of structural steelwork	262 (Metric)
Manufacture of precast or cast-in-situ, prestressed concrete bridge members (1970)	556
Manufacture of elastomeric bearings for bridge units and girders (1967)	562
Preparation and pretreatment of metal surfaces prior to protective coating or painting—Method Selection Guide	1032 (Metric)
Prestressed concrete bridge drawings—	
(a) Prestressed concrete piles—	
14 in octagonal—45 tons	A 4943
16 in octagonal—50 tons	A 4944
Reinforced concrete piles 35 and 45 tons (1963)	A 1207 8
Reinforced concrete piles (precast) for bridge foundations	564
Superstructure for bridges	568
Supply of high strength steel bolts (1976)	261 (Metric)
Supply of ready mixed concrete, for bridgeworks (1975)	895 (Metric)
Timber for bridges (1976)	140 (Metric)
Waterway diagram (0 to 200 acres)	A 26

BITUMINOUS SURFACES

Bituminous emulsions (cationic) (1973)	304 (Metric)
Bituminous emulsion (anionic) (1973)	305 (Metric)
Bituminous surfacing daily record (1974)	400 (Metric)
Bituminous surfacing job summary (1974)	1011 (Metric)
Cutback chart for bitumen seal coats (1973)	466 (Metric)
Performance requirements for mechanical sprayers	272 (Metric)
Sprayer bitumen surfacing (1974)	93 (Metric)
Sprayer loading slip (1974)	401 (Metric)
Supply and delivery of bitumen (1974)	337 (Metric)
Supply and spraying of bitumen (1973)	898 (Metric)
Supply and delivery of aggregate for use in bituminous plant mix (1975)	952 (Metric)
Supply and delivery of asphaltic concrete (1975)	953 (Metric)
Supply and laying of asphaltic concrete (1975)	612 (Metric)
Supply and laying of dense graded tar plant mix (1975)	954 (Metric)
Supply and delivery of dense graded tar plant mix (1975)	955 (Metric)
Supply and laying of open graded bituminous plant mix (1975)	956 (Metric)
Supply and delivery of open graded bituminous plant mix (1975)	957 (Metric)
Supply of prepared cutback bitumen for sealing purposes (1965)	740
Supply and delivery of cover aggregate for sealing and resealing with bitumen (1975)	351 (Metric)
Tar, supply and delivery (1976)	296 (Metric)
Tar for plant mix, supply and delivery (1976)	870 (Metric)

FENCING

Chain wire guard fencing—erection (1974)	144 (Metric)
SD 149	
Chain wire—supply—(1974)	132 (Metric)
Corrugated steel guard rail—supply—(1976)	SD 5595
Corrugated steel guard rail—erection (1976)	680 (Metric)
SD 5829	
Corrugated steel guard rail—anchor plates (1976)	SD 6264
Corrugated steel guard rail—steel posts (1976)	SD 6277
Delineators for attachment to guard rails (1976)	SD 6280
Drawings: Sheep fence (1974)	SD 494
Rabbit-proof fence (1974)	SD 498
Cattle fence (1974)	SD 1705
Floodgate (1974)	SD 316
“Manproof” pipe and chainwire boundary fence (1975)	611 (Metric)
SD 6278	
Post and wire fencing (1974)	141 (Metric)
Removal and re-erection of fencing (1974)	224 (Metric)
Tubular steel and hardwood post and rail fencing (1976)	143 (Metric)
SD 6284	
Warrants for use of guard fences (Instruction—1973)	246 (Metric)

Form No.

Form No.

FORMATION, INCLUDING EARTHWORKS AND RURAL DRAINAGE

Corrugated PVC subsoil drainage pipe (1972)	907 (Metric)
Earthworks and formation including surface drainage (1974)	70 (Metric)
Installation of lateral drains (1974)	1013 (Metric)
Shoulders and table drains (1973)	827 (Metric)
Standard rubble retaining wall (1941)	A 114
Standard mass concrete retaining wall (1959)	A 4934
Subsoil drains (1973)	528 (Metric)
Waterway calculations for bridges and culverts (1976)*	371A (Metric)

PAVEMENTS

Cement concrete pavement, (1960)	A 1147
Construction of natural gravel or crushed rock road pavement (bitumen surfaced) (1975)	743 (Metric)
Construction or resheeting of natural gravel or crushed rock road pavement (not bitumen surfaced) (1975)	800 (Metric)
Preformed expansion joint fillers (1976)	610 (Metric)
Supply of natural gravel or crushed rock for road pavement (bitumen surfaces) (1975)	744 (Metric)
Supply of natural gravel or crushed rock for road pavement (not bitumen surfaced) (1975)	801 (Metric)
Supply of ready mixed concrete (1973)	609 (Metric)

ROADSIDE

Roadside fireplace (1974)	SD 4671
Roadside litter bin (1975)	SD 5841

TRAFFIC PROVISIONS AND PROTECTION

Control of traffic at Roads and Bridge-works (1975)	121 (Metric)
Guide posts—supply (1973)	252 (Metric)
Guide posts—erection (1973)	253 (Metric)
Manufacture of warning signs (1971)	682
Motor grids—24 ft (1964)	A 5770
Plastic guide posts (1972)	880
Plastic traffic cones—supply spec. (1976)	1045 (Metric)
Roadmarking paint (1966)	671

CONTRACTS

Bulk sum tender form, Council contract (1966)	39
Bulk sum contract form, Council contract (1975)	38
Cover sheet for specifications, Council contract	342
Caretaking and operating ferries	498
General conditions of contract, Council contract (1966)	24B
Schedule of quantities (1966)	64

MANUALS *

Manuals, No. 1—Plant; No. 3—Material; No. 4—Roadside Trees; No. 5—Explosives; No. 6—Bridge Maintenance; No. 7—Road Maintenance.	
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D.M.R. BOOKLETS

Guide to Main Roads Administration, Duties of a Superintending Officer.	
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N.A.A.S.R.A. BOOKLETS

Guide to Publications and Policy of N.A.A.S.R.A.	
List of current publications.	

All standards may be purchased from the **Plan Room** at the Department's Head Office, 309 Castlereagh Street, Sydney. Single copies are free to Councils except those marked *. A charge will be made for sets of standards.

