G. DONALD

SPECIAL ANNIVERSARY ISSUE

JUNE 1975

50 YEARS OF ROADBUILDING

MAIN ROADS

The photograph at right shows the condition of the Sydney-Newcastle road near the crossing of the Hawkesbury River in 1928.

Now, for part of the distance, travellers may choose between the uninterrupted freeway conditions of the Berowra to Calga Tollwork (F3), shown below, and the well constructed route of the Pacific Highway (State Highway No. 10). Such immense road improvement was probably beyond the conception of most Sydney to Newcastle travellers fifty years ago.

FRONT AND BACK COVERS, each row from back cover; left to right.

TOP ROW — Bridge over Tweed River at Murwillumbah on M.R. 142; Construction of bridge over Hawkesbury River on Berowra-Calga Tollwork; Barrier Highway 32 km west of Cobar.

SECOND ROW — Glen Innes Divisional Office; Construction of Kings Cross Road Tunnel; Bridge over Clyde River, Batemans Bay, on Princes Highway; (Behind heading) At Macksville, the bridge over Lower Warrell Creek on the Pacific Highway.

THIRD ROW — Earthworks on the Southern Freeway; Warringah Freeway, North Sydney; A blaze of colour in open country near the Silver City Highway; Oxley Highway, bridge over Mullaley Flood Plains.

BOTTOM ROW — Freeway sign; Laying asphalt in years past; Mid Western Highway 11 km west of Blayney; 64 tonne tractor dozer.

MANY HAPPY RETURNS

In this issue of "Main Roads", we are celebrating our golden anniversary, as it is fifty years since the establishment in 1925 of the Main Roads Board, from which the Department evolved in 1932. Consequently, this issue has a strong nostalgic *flavour* about it.

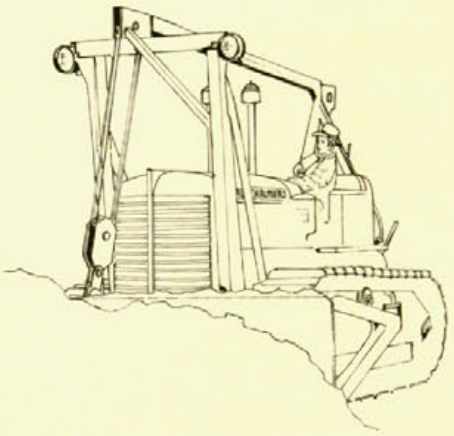
Birthdays usually mean cards, cakes, candles, gifts and the greeting "*Many Happy Returns*". It is a phrase that is particularly appropriate to a road construction authority as roadworks are one thing that bring "*many happy returns*" to the community, and in more ways than one.

Now as never before, roads are the arteries of community life. Since 1925, the majority of families have acquired a private car, often two, and in a growing number of instances, a boat and caravan as well. We are far more mobile than even a generation ago, and life is far more interesting, more varied and happier because we can move easily from one place to another whenever we want to. Shopping jaunts, visits to friends and relatives, trips to mountain look-outs, family picnics by secluded streams, and sunny days at the beach when the surf is up—are all part and parcel of our weekend activities. Our enjoyment of this mobility is in direct relation to the standard of the roads on which we travel. To return home in as happy a frame of mind as we left often depends on whether or not the roads are overcrowded with other cars. Good roads also reduce driving dangers and help to ensure that "*manny happy returns*" means getting home safely.

It has long been claimed that "*Good roads don't cost—they pay*". Certainly the savings to motorists in terms of less vehicle *wear and tear* and faster travelling times are enormous. Furthermore, the *pay off* to countless consumers in terms of lower transportation costs for the movement of goods from one district to another should not be under-rated.

Traditionally written into the greeting "*Many Happy Returns*" is the forward-looking wish for more prosperity and more of the good things of life in the future. Although the Department has come a long way, the task ahead is no easy one. With many grade intersections, railway level crossings, pedestrian crossings, out-of-date bridges and unsealed, narrow and winding roads still remaining, there are certainly enough tasks for another fifty years hard work. Nevertheless, as each Departmental project is completed, it adds to the prosperity of our State and to our store of good things.

Road improvements certainly pay dividends but these *returns* will not come without constant investment. A continuing high contribution to road funds is needed to ensure that we can all celebrate and enjoy "*Many Happy Returns*".●



MAIN ROADS

JOURNAL OF THE DEPARTMENT OF MAIN ROADS—NEW SOUTH WALES

JUNE, 1975

VOLUME 40 NUMBER 4

Issued quarterly by the
Commissioner for Main Roads
A. F. Schmidt

Additional copies of this Journal may be obtained from
Department of Main Roads
309 Castlereagh Street
Sydney, New South Wales, Australia

PRICE

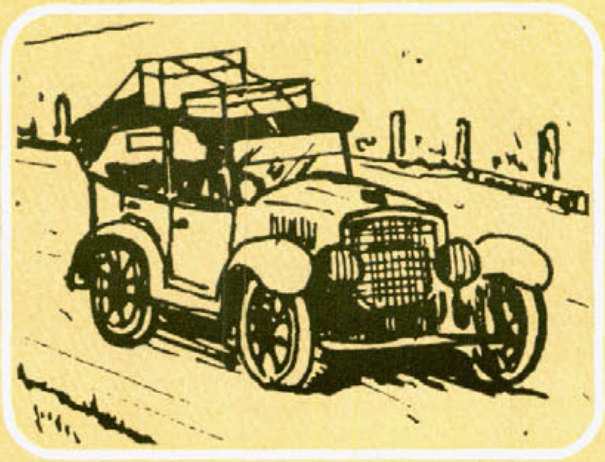
Fifty Cents

ANNUAL SUBSCRIPTION

Two Dollars
Post Free

CONTENTS

MOTORING MANIA



Some people say that to want to drive on today's roads in today's traffic indicates a type of madness. They forget that motoring has always involved an element of risk as well as adventure, and that the possibility of personal injury or even death has never been far away. Road authorities of the 1970's seek not only to build long-lasting roads for pleasurable driving but to combine every element of safety in their design. And yet, the total number of accidents is rising rapidly and the number of motorists killed and injured is increasing nearly every year.

Fifty years ago, the road risks of the 1920's were probably more mechanical than personal, with frequent breakdowns arising from the generally poor state of many roads and the eccentricities of the available motor vehicles. In "*taking to the roads*", the motorists of those years were not only taking a risk but also severely testing their patience and endurance. They required an almost maniacal determination to get *there*, wherever *there* might be.

Today, in contrast, the very ease of motoring and the comfort of our cars may be compounding the risks by insulating us from realising how fast and dangerously we might be travelling. Cushioned in the carpeted cabins of our vehicles, with the radio or taped cassettes of our favourite music capturing our mind's attention, we become less aware and less concerned with conditions outside—on the road—which may well affect our well-being and the safety of others.

Travelling in the Twenties

When the Board came into existence, this road was in an exceptionally bad condition, full of deep potholes and boggy places, and covered with thick mud. Apart from the difficulties it presented to traffic, it was in a most insanitary condition, with accumulated mud, horse manure, and rotted produce; and its construction was urgent on all grounds.

As described in this extract from the Main Roads Board's Annual Report 1925–26, Garden Street, Alexandria, in one of Sydney's inner southern suburbs, might have been an *extreme* example of a poor suburban road, but there were certainly plenty of others in a somewhat similar state at that time.

Motoring in rural areas was apparently just as bad in some instances according to the following extract from "The Roadbuilder in Australia", dated 15th July, 1927.

. . . we are hardly out of the pioneering stage, so far as roads are concerned. To motor from one capital to another is still an enterprise demanding careful thought and anxious preparation. Big stretches of roadway even near the principal cities are trenched with ruts and pitted with potholes that test the springs of the cars and the tempers of the drivers to the breaking point. In the outback regions roads are either non-existent or are in such a condition as to be positively dangerous to the users. If we measure the degree of civilisation in Australia by the roads in any part of the Commonwealth, except in the large centres of population, a low standard must necessarily be assigned.

While the Main Roads Board was establishing an organisation and making improvements to the State's main roads, more and more people were swelling the ranks of motorists. Local councils also found themselves in the situation where horse and buggy tracks had to be converted to *horsepower roads*, and an example of this is described in another issue of "The Roadbuilder in Australia" (16th December, 1929).

The stretch of road . . . was recently and is still . . . a place that is full of holes and not devoid of bumps. It has even been asserted that one of the new small cars—a Baby Peanut—disappeared completely into one of the holes during the recent weekend . . . the particular section of road referred to needs doing up . . . But the local councils of Mittagong and Bowral have tackled the reconditioning of their bit of purgatorial road at last, and soon the wail of the motorist over his damaged axles and busted tyres in that locality will no more be heard in the land.

A New Way of Life

Regardless of road conditions, the newly available mode of travelling was enthusiastically embraced by the general public and a great swing to private motor vehicle ownership really took hold in the late 1930's. During the period 1933 to 1939 motor vehicle growth (48% increase) far outstripped population growth (9%), but of even more importance were indications that each vehicle was being used more than ever before. From official petrol consumption statistics for New South Wales it was calculated that if the average consumption per vehicle was assessed at 12 miles per gallon (4·2 km per litre), the annual mileage travelled per vehicle was approximately 2,800 miles (4 506 km) in 1921; 3,800 miles (6 116 km) in 1933, and 4,800 miles (7 725 km) in 1939.

This increased vehicle usage was confirmed by the Department's records of

traffic at toll bridges and ferries. These showed that between 1933 and 1939 the weekday increase was 70% at Sydney Harbour Bridge, 80% at the Hawkesbury River (Peat's Ferry Bridge), 94% at Stockton, and 97% at Hexham—an average increase of 85%!

Family outings, picnics and holidays became an important part of life for owners of cars. The horrors of certain stretches of road developed into the subjects of humorous stories—*after* the event. Tales abounded of the time the car *didn't make it* to the top of some *steep pinch* without—(a) off-loading grumbling passengers who scrambled up afterwards, (b) boiling just when the nearest water was *two miles* away across a paddock full of rabbit holes, or (c) both.

The mention of certain notorious mountain roads (such as Razorback, Brown Mountain, Macquarie Pass, Clyde Mountain, Gibraltar Range and Talbingo) was enough to bring shudders to the growing band of motorists. Bad weather increased the chances of mishap along the way; floods and bogs were high on the obstacle list. A good supply of *spares* was essential on most long trips through areas where the small towns might not have a replacement part, such as a wheel, a tyre, or a fan belt, and where unlucky motorists might be doomed to a lengthy wait while the essential item was ordered in. An even temper and a strong cranking arm were invaluable assets for the owners of many early motor vehicles.

A Sense of Adventure

The varied and helpful roadside facilities which we enjoy today were scarce a few decades ago and their evolution to present standards was fairly slow. In fact, the comforts of well-appointed service stations with restaurants, snack bars and toilets have only evolved over the past twenty-five years. A *service station* was once represented by a kerbside petrol pump, a bucket of water and an air hose. To maintain a reliable supply of appetizing food for a journey usually meant carrying it along in the boot, in a box strapped to the running board or in the *dicky-seat*—rather than relying on the uncertain standards of some small town cafes.

Travelling at night, outside normal business hours, could be hazardous and inconvenient for the unwise motorist who did not carry sufficient additional petrol to cover the distance. A "Sydney Mail" correspondent of 12th January, 1938, described the problem like this:

It was known that the tank could be filled at Newcastle, about three hours' run from Sydney, but that was only a little over a hundred miles away, and calculation showed that unless fuel could be obtained somewhere farther along during the small hours that tankful would finish about fifty miles from the projected destination. And so it almost happened; Gloucester, Taree, and Port Macquarie were passed without the sign of a petrol station open for business, and the driver was faced with the job of running thirty miles to Kempsey on an unknown quantity of fuel in the bottom of the tank, which might have been two gallons but more probably was nearer one. At Kempsey, petrol supplies were assured, as arrival would have just about coincided with ordinary opening hours. As it happened, however, at a tiny village called Telegraph Point, the obvious owner of a store rejoicing in a petrol pump was observed at his morning ablutions, and he was immediately pounced upon and supplied that by then extremely precious fluid.

Fortunately, the benefits of good motoring facilities were eventually perceived and led to the building of thousands of service stations, offering a wide range of mechanical assistance and touring facilities. Driving comfort has been further increased in recent years by the establishment (by the Department and in conjunction with other government authorities) of over fifty pleasant roadside rest areas, throughout the State.

Publicity and Popularity

The rise in motor vehicle sales in the 1930's was encouraged by, among other things, the intense publicity accompanying reliability trials, hill climbs and speedway races. As new vehicles were promoted, the market expanded and they no longer remained the prerogative of the *rich*. Motoring was now more than a sport or hobby, it was becoming an integral part of community life, for the movement of goods as well as people.

There were many colourful characters associated with early motoring and their exploits gave impetus to the industry. Reliability trials were one of Australia's first motor sports and reached their peak in the 1950's when outstanding drivers received celebrity treatment. Inter-capital city *dashes* were popular in the 1930's but a common fault in all these events was dangerous driving by some competitors and, because they were using public roads, the events eventually drew the displeasure of the authorities. Nevertheless, as late as November, 1937, Norman "Wizard" Smith drove his 100 hp Studebaker from Sydney to Melbourne in 12 hours 23 minutes at an average speed of 71 miles an hour!

(Left): Typical roadside petrol pump of several decades ago, at Hornsby.

Reproduced by courtesy of Mr J. Collingridge.

(Right): Roadside facilities in 1930 at Cobargo on the Princes Highway.

VEHICLES AND ACCIDENTS—STATISTICS

Year ended 30th June	Vehicles registered* (average)	Accidents	Persons killed	Persons injured	Rates per 10 000 vehicles registered		
					Accidents	Persons killed	Persons injured
1925	.. 140 000	..	227	..	..	16·0	..
1935	.. 244 428	8 786	408	6 486	359	16·6	265
1950	.. 475 780	16 189	561	10 405	340	11·8	219
1963	.. 1 112 868	53 931	894	24 580	485	8·0	221
1964	.. 1 177 629	56 917	974	25 662	483	8·3	218
1965	.. 1 257 815	61 969	1 085	27 908	493	8·6	222
1966	.. 1 330 840	65 868	1 134	28 730	495	8·5	216
1967	.. 1 401 674	69 042	1 096	29 558	493	7·8	211
1968	.. 1 472 316	74 026	1 174	30 352	503	7·9	206
1969	.. 1 562 270	78 042	1 206	31 120	500	7·7	199
1970	.. 1 669 778	91 378	1 267	34 755	547	7·6	208
1971	.. 1 767 009	92 858	1 264	34 405	526	7·2	195
1972	.. 1 875 540	107 471	1 137	37 247	573	6·1	199
1973	.. 1 955 456	117 206	1 181	38 301	599	6·0	196
1974	.. 2 053 052	127 353	1 257	40 852	621	6·1	198

*"Vehicles Registered" excludes Tractors, Trailers and Trader Plate registrations.

SOURCE OF STATISTICS

1925 The Official Year Book of New South Wales 1926–27.

1935–1950 Road Accidents in New South Wales Statistical Statement 30th June, 1952.

1963 to 1974 Traffic Accident Research Unit Statistical Statement 30th June, 1974.

Fast and Furious

In the four years from mid-1933 to mid-1937 there were 37,360 accidents, causing 1,795 deaths as well as injury to a further 26,118 persons. In 1936–37 there were over 57% more accidents, 70% more people killed and almost 40% more people injured than in 1933–34. At long last, just prior to Christmas 1937, a speed limit was introduced of 30 miles an hour in built-up areas (i.e., those with street lighting) and 50 miles an hour elsewhere (unless proven not dangerous in the circumstances). Until this time, generally motorists could only be prosecuted for driving at speeds considered to be "*dangerous to the public*".

Following the introduction of specific speed limits, the rate of increase in road accidents began to drop and the year 1938–39 saw the first reduction in the total number of accidents (11,906), and persons killed (545) and injured (8,388).

According to the current statistics (see table above), the rate of persons killed and injured in road accidents in proportion to the number of vehicle registrations has been dropping in recent years. However, we can take little comfort in this as the vast increase in the number of vehicles using the roads means that the death toll is still very high and is a great unnecessary loss in human lives and resources.

Outings with family and friends took on new horizons when privately-owned motor vehicles gave people a wondertul new mobility and sense of independence which the inflexibility of public transport could not provide.

In many respects, *motoring mania* has indeed reached the heights of true madness and the motor car has developed from being a satisfying and useful human tool to also become a deadly weapon of self-destruction that claims more than a thousand lives a year in our State alone.

It appears that many motorists (especially younger drivers) who can no longer enjoy the challenges faced by past generations in getting to a destination in spite of a variety of difficulties, now find a sense of adventure in going further or getting there faster than anyone else. They find their pleasure in simply covering kilometre after kilometre of road—as fast and for as long as possible. Even the more sedate of us have a tendency to "*open up*" on the road in order to make up *precious* time over the long distances we so often drive to get to our favourite holiday spot. Frequently, this means taking risks that just aren't worth it.

Motoring should be, and generally is, an enjoyable pastime as well as a comfortable and convenient way to travel to wherever we want or have to go. But, if the statistics above *prove* anything, they clearly show that, as drivers we must all guard against these moments of recklessness, carelessness, selfishness, tiredness and impatience which so often turn travelling into tragedy. We must be aware that *motoring mania* can be a deadly disease instead of just a harmless infection.●

A new 18-page NAASRA brochure entitled "Roads and Traffic Safety" is now available, free of charge from the Department's Public Relations Section, Third Floor Head Office.

From the Minute Book

The Main Roads Board (forerunner of the Department of Main Roads) held its first meeting on Tuesday, 24th March, 1925 in an office at 301 Castlereagh Street, Sydney. Among the material held in the Department's archives is a copy of the Board's first Minute Book. It records their deliberations on a wide variety of matters and five typical extracts are printed below as an example of what went on *behind the scenes* when the Board considered different types of problems.

The Board consisted of Mr J. Garlick, President, and Mr H. H. Newell and Mr T. H. Upton, Engineering Members. Mr Garlick was previously Under Secretary for Local Government, Mr Newell had been the Department of Public Works District Engineer at Wollongong and Mr Upton was Senior Lecturer in Civil Engineering at the University of Melbourne (see further details of these appointments in the Board's First Annual Report for period ending 30th June, 1926). Mr J. A. Farley was Acting Secretary until the appointment of Mr S. R. Henderson as Secretary and Accountant in November, 1925.

From Minutes of Board's First Meeting on 24th March, 1925

"The President submitted the following Minute:

The first question for the Board to consider is—where is it to begin? The problem before the Board is of a two-fold character geographically—the metropolitan system of main roads, and the country system of main roads. It is two-fold in another sense also, in that the Board must consider maintenance and construction.

I submit for consideration and discussion that our first problem is to **find out** the size of our task, by **taking stock** of the existing main roads—sending out a request for such a report by Councils as will be, in effect a 'stocktaking'.

The second suggestion I submit is that we then proceed to arrange a definite *annual* allowance per mile (or per length) for **maintenance** for each Council's main roads, leaving questions of construction or reconstruction to be dealt with separately on individual special proposals, until we have time to consider construction on a systematic basis.

If this order or work be adopted I would suggest that we proceed on the following lines:

1. *Stocktaking*

(a) Prepare Circular and form to issue to Councils.

(b) Obtain maps of main roads from Public Works Department and from Lands Department.

(c) Organise map filing system.

(d) Get draftsmen ready to plot, note and compile the information received from Councils re the stocktaking, indicating on the maps (by tints) the condition of each section of each main road, and so on.

2. *Maintenance—fixing of allowance*

(a) Compile information from Council's estimates and see what total comes to.

(b) At same time get reports from Public Works Department's District Engineers, by which to apply check to Councils' estimates.

(c) At same time plan a series of personal visits to Councils to explain Act and Board's proposed procedure (endeavouring to cover the Country in six (6) months, if practicable).

I suggest that the above procedure be followed simultaneously in both the Metropolitan and the country districts.

The Board approved of the above minute: and directed that a circular and suitable forms be sent to all Municipal and Shire Councils asking them to carry out the Survey desired by the Board."

28th August, 1925

"*Purchase of Road Rollers:*

The Board took into consideration the quotations received, in reply to an advertisement for road rollers.

Upon examination of the tenders it was found that there were none for rollers of N.S.W. manufacture: but there were two for rollers of Australian manufacture, viz: 'Jelbart' and 'Super-Diesel'. These were both oil driven machines: whereas for the work of macadam or tar-macadam road construction the Board considers a steam roller is superior. The price of the 'Jelbart' small size machine was quoted as £1,380 (with scarifier, etc.) and of the full size machine, 11 to 12 ton, £1,580 (with scarifier, etc.). In the case of the 'Super-Diesel' the price quoted was £1,270, with £585 extra for scarifiers, etc., making a total of £1,855.

The 'Jelbart' machine could not be delivered for 7 weeks: the 'Super-Diesel' for 6 weeks.

The remainder of the tenders were for 16 English machines and one German. As the German machine was not the lowest in price it was not necessary to consider it.

Among the English machines the lowest price quoted was for a 'Garrett' (10 ton) at £1,133, but this was without scarifier, which was quoted at £135 extra, making the total price £1,268.

The actual lowest tender, therefore, was the 'Marshall' (steam) 10 to 12 ton, at £1,150, with scarifier, etc. included: one of which could be delivered from stock within 24 hours.

There was also a tender for 'McLaren' 9½ to 12-ton steam roller at £1,150, with scarifier: but the adding of £110 for necessary equipment brought the price to £1,260.

The next lowest tender was a 'Fowler' 11½ tons (steam) at £1,160: but delivery could not be given for 14 weeks.

Resolved, therefore, to accept the offer of 1 'Marshall' 10 to 12 tons steam roller as quoted, at £1,150 nett, subject to inspection under steam.

As the agents for the 'Marshall' quoted £1,200 each for additional machines, and could not deliver for 12 to 16 weeks, further consideration was given to the remaining tenders.

The next lowest tender was for 3 'Fowler' machines (steam) 12 to 13 tons at £1,190 which could be delivered from stock in Sydney within 7 days. These are fitted with scarifiers, etc.: but not with a water lifter, which would have to be purchased as extra.

Resolved that, as none of the other firms have machines in stock for immediate delivery: and as the price of these machines is also the lowest of those remaining, the Board order the 3 machines offered, subject to inspection under steam.

Lorries:

The Board then took into consideration quotations obtained for lorries.

The Board resolved to adopt a petrol driven vehicle, on account of the lower working loss when standing. The 'A.E.C.' at £1,170 was found unsuitable as it was side discharge only. The 'International' at £1,206/4/- was passed over as the Board had decided to give preference to a British made vehicle. This brought the matter down to the 'Thornycroft' 4-ton waggon with three way tipping at £1,249, of which one could be delivered in 3 weeks and two in 4 weeks.

Resolved to order these."

16th September, 1925

"*Question of Delay in Appointment of Staff*

It was resolved to forward the following minute to the Minister on the above subject:

I have the honor to draw the attention of the Minister to the necessity for an early decision with respect to the appointment of the Secretary of the Main Roads Board, the Designing Engineer, and the remainder of the staff whose appointment has been recommended, and without whom the Board's work must necessarily proceed at a slow pace.

The delay in making these appointments is causing a heavy expense for overtime to the existing staff, which is quite unable to cope with the work: and it is compelling the Members of the Board itself to do necessary work in drafting letters, checking plans and specifications, giving detail directions to clerks, surveyors and draftsmen, when this class of work should be performed by a Secretary, a Designing Engineer or a Staff Surveyor, and the Board should be freed to get into touch with the roads and the Councils throughout the country, and to plan the large schemes of road improvement which it is necessary to carry out, and for which the money is and will be forthcoming during the present financial year.

The Board does not desire to embarrass the Minister or the Government in any way, but it is quite impossible, with the best will in the world, for the Board to carry out the great task entrusted to it if the necessary requirement of an adequate professional and administrative staff is not filled.

The Board desires, with great respect, to point out that roads must be works of engineering: that they cannot be carried out in a proper manner if there be no proper engineering survey first, followed by preparation longitudinal and cross sections of the route, and that in turn followed by careful design to ensure the best location, drainage, and construction: and it is not till these have been carried out that large bodies of men can be employed in the actual work of construction.

The Board has ascertained that the Metropolitan Board of Water Supply and Sewerage, which spends approximately two millions a year in construction and about £700,000 in maintenance, has a staff which numbers all told about 3,500 employees, of whom about 340 are on the clerical staff, and about 360 on the professional staff. Similarly the Harbour Trust, and the Irrigation Commission, are adequately staffed. Each of these bodies has the power to appoint its own staff: and I would suggest for the Minister's consideration that, in any amendment of the Act, the question of giving to the Main Roads Board similar powers might be considered.

In the meantime the Board would be glad if the Minister would kindly take steps to expedite the furnishing of the small number of officers already asked for by the Board, in order to enable it to make more decided progress in its work."

5th October, 1925

"*Reconstruction of Great Trunk Routes:*

The Board resolved to concentrate upon the preparation for the immediate reconstruction of the Great Trunk Routes as follow:

(1) Main South Coast Road, or Prince's Highway, from Bulli southward.

(2) Great Southern Road—from Picton southward.

(3) Great Western Road, from Mt. Victoria towards Bathurst and the west.

(4) Great Northern Road, via Gosford and Newcastle—from Gosford northward.

(4A) Great Northern Road, from Newcastle towards Maitland.

(5) North Coast Road, from Raymond Terrace northward.

The Board resolved to send surveyors to each of the above roads, where not already done, to make the necessary surveys in preparation for the reconstruction of the road.

Materials survey:

The Board also resolved to employ an Assistant Engineer to make a 'Materials' survey along each of these routes, to ascertain what materials for road construction are readily available close to the roads, their situation, and other particulars to facilitate the work of reconstruction when it is put in hand."

23rd October, 1925

"*Maintenance system in the Metropolitan area:*

As various Councils in the County of Cumberland had asked the Board to take over the work of maintaining portions of the main roads, particularly portions of Parramatta Road, the Great Western Road, the Great Southern Road, and the Windsor Road: and as the Governor had duly authorised the Board to undertake this work, a report was called for from Mr Inspecting Engineer Hardie on the subject.

This report, dated 17th October, was considered by the Board. It recommended the establishment of a central depot in the vicinity of Granville: and a system of patrol and maintenance controlled from that depot as a centre. The report was adopted: and instructions given to commence a suitable organisation accordingly."●

A new 16-page brochure entitled "Fifty Years of Main Roads" has been produced by the Department to mark the golden anniversary of the establishment of the Main Roads Board. Although the brochure is mainly pictorial (illustrating changes in techniques in surveying, plant and equipment, road construction and maintenance and bridgeworks), it also contains a brief description of the setting up of the Board, early works undertaken and developments at the time of its abolition.

Copies of the brochure are available from the Public Relations Section, Head Office and from all divisional offices.

THE DIRECTION OF EVENTS 1950–1975

So many events have filled the records of road building in this State during the past fifty years that it is impossible to condense them all into one journal. A previous anniversary issue, published in March, 1950, detailed much of the 25 years of road building from 1925. It is the intention here, then, to look particularly at the years since, 1950 to 1975, and to present a highly abbreviated *direction of events* through these years rather than a list of dates and developments.

The key to all events has been planning, and in the early 1950's planning schemes were implemented which have retained their influence through the whole 25-year period.

Urban Roads

The effectiveness of planning relies on predictions of the future and sometimes planning estimates appear no longer adequate or plausible as the time for positive implementation of projects approaches.

In New South Wales, urban planning for main roads has been influenced by three major planning schemes. In 1951 the Cumberland County Council Planning Scheme was made statutory, followed by the approval in 1952 of the Illawarra Planning Authority Scheme (for the Wollongong area) and the exhibition in the same year of the Northumberland County Council Plan (for the Newcastle area).

The road plans from these comprehensive schemes could not be introduced all at once, nor were they intended to be. The locations and widths of roads were defined in a general way only and before finalisation of their routes a great deal of information on land survey and engineering requirements had to be gathered or calculated progressively.

It soon became obvious to planners of the 1950's that the growth rate estimated for the County of Cumberland would be exceeded and that the Main Roads System incorporated in the Cumberland County Council Planning Scheme would need expansion.

A striking contrast between old and new—the Princes Highway at Timbillica where the old and new bridge crossing the Wallagaraugh River stand side by side, illustrating the type of dramatic progress in bridgebuilding which has occurred during the past 25 years (Photograph taken in 1966).

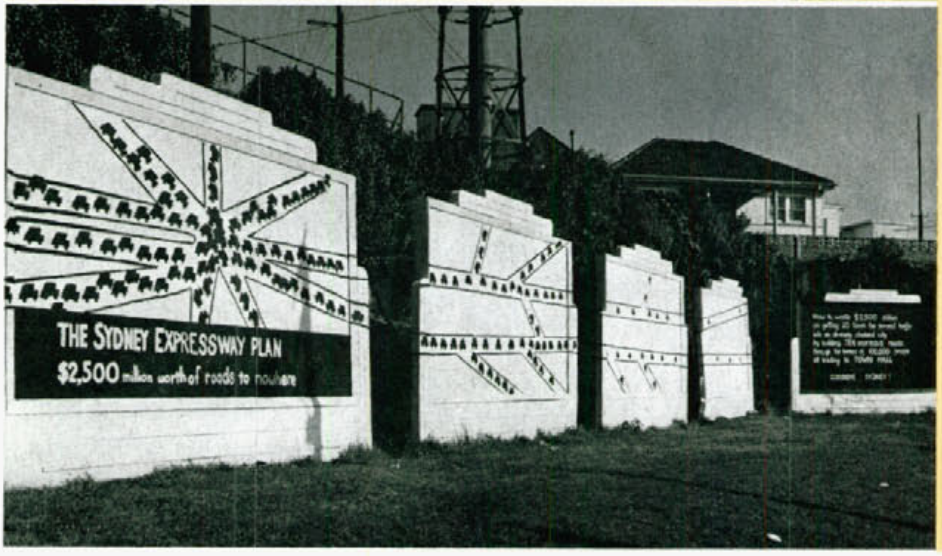
One of the results of these modifications was to increase the capacity of several proposed freeways and to extend the freeway system beyond the boundaries of the County of Cumberland—to Wollongong and the immediate South Coast; to Newcastle; and to the southwest as a traffic relief measure for the Hume Highway. The subsequent expansion of urban population in these directions has proved the expectations of the planners to be correct.

Rural Roads

Two factors have had a major influence on rural road development in this State. They are the large area of land to be served by road communications and the small volume of traffic using most rural roads in comparison with the high urban road use of coastal areas.

In 1950, rural road conditions were poor in a number of areas. The progress of earlier years had been slowed down by World War II and the subsequent shortage of materials and money. However, the actual length and distribution of the basic rural main roads network was fairly adequate for the population served and it then became a question of giving prompt attention to the up-grading of existing roads rather than adding new lengths to their total distance.

The type of improvement to rural main roads had several categories. Many kilometres of new bitumen surfacing on unsealed lengths were needed, while just as essential was the need to strengthen and recondition a good deal of existing bituminous surfacing. Similarly while new bridges were required at open crossings, a number of existing bridges needed replacing. In the Western Division, many track-like routes that were classified as main roads needed urgent construction to earth formation as a minimum standard and to all-weather roads in preference. Improvements to this latter standard were additionally complicated by the lack of suitable local construction material in some parts of the State.



(Right, top): Road widening has been an important feature of urban road improvements, for example this section of the Princes Highway at Arncliffe, near Forest Road (Main Road No. 168) where widening is shown in progress during 1955.

(Below); Anti-freeway protesters sometimes go to great efforts to display their messages. This series of billboard protests appeared beside Victoria Road (Main Road No. 165) at Balmain about May, 1974.

Progressively, however, rural roads were improved. New deviations altered some routes but the face of rural roads has most noticeably been improved by extensive bitumen sealing. Of the highways still not completely sealed at present, the Oxley has only 18 km of gravel remaining, the Gwydir 58 km, the Bruxner 73 km, Monaro 31 km, Mount Lindsay 77 km. On the Castlereagh Highway 46 km is still gravel with 5 km formed only, while the Cobb Highway remains gravel over 57 km and formed only over 226 km and the Silver City Highway remains formed only along 374 km of its length north of Broken Hill. The fully sealed highways are the Princes, Hume, Federal, Snowy Mountains, Great Western, Mid Western, Mitchell, Barrier, New England, Pacific, Sturt, Barton, Newell, Riverina, Illawarra and State Highways Nos 13, 23 and 26.

Bridges

By 1950, bridge building had still not recovered from the poor progress of the War years and the shortage of materials, particularly steel, which occurred immediately afterwards. Maintenance priorities on many deteriorating old bridges used up the finance needed for their replacement and delayed the building of bridges at new crossings.

By 1954, lack of funds was the main restriction holding back bridge building, as described by the Commissioner for Main Roads, Mr H. M. Sherrard (in the March, 1954 issue of "Main Roads", Vol. 14, No. 3, p. 66).

"*Before the war an average of about seventy bridges were built each year. Since the war the number each year has averaged about* 26. *There is a tremendous lag in bridge construction. This was due in the first place to a shortage of materials and skilled labour, but now these are readily available, except for structural steel, and funds are now the limiting factor.*"

These early difficulties were eventually remedied and the following decade saw the erection of some very large and important bridges. They are not as attractive as today's designs but, nevertheless, were valuable major works in their time and included such structures as those over Iron Cove at Drummoyne (1955), the Clyde River at Batemans Bay (1956) and the Karuah River at Karuah (1957).

Ingenuity in making economies in construction and speeding the work were important to bridge builders during this period, so new techniques in construction were developed, and resulted in the more frequent use of prestressed concrete for superstructures. This led to subsequent savings in construction and maintenance costs, as well as slimmer and better looking bridges.

Freeways

In New South Wales, as in all States, freeways are a relatively new phenomenon with their carefully restricted access and faster, safer traffic flow. Since construction began in the late 1950's, a total of 91 km of freeways has been opened to traffic (to 30th June, 1975). Freeways provide some of the most attractive driving conditions of any roads in the State and their detailed planning and construction have placed emphasis on creating a facility which will blend with the environment and highlight its attractions, rather than disturb them. Extensive landscaping of the roadside areas has also been undertaken to give freeways an appealing visual impact.

No summary of road building in these years should fail to mention that of all main roads, freeways have aroused the most controversy. It is not so much that freeways have been criticised (for it is good that people should think about the value of roads and their place in the scheme of things) but it is unfortunate that they have been the focus of so many uninformed and irrational attacks. It has become a trend in recent years to give prominence in the media to any form of protest or complaint and seldom is publicity of equal magnitude given to the *pros* in reply to the *cons*. So much so that it is difficult to tell where the

(Left, top): The bridge over Iron Cove, completed in July, 1955 is an example of the delays to bridgeworks caused by the War and the shortages of Post-War years. It was originally decided to replace the previous bridge in 1939 and survey and design were completed in 1942.

(Below): The important and heavily trafficked Pacific Highway became totally sealed on 2nd April, 1958 when this last section of gravel nerr Taree was surfaced with bitumen.

majority of public opinion lies or what the silent majority thinks about the views of the very vocal *knockers*.

The benefits of freeways (which contribute to, rather than destroy, the quietness of suburban streets) should be obvious to all who use them, as well as to those who still have to travel along congested arteries where freeways are planned but have not yet been constructed. No-one—least of all the Department—seeks the unrestricted intrusion of freeways into urban areas, but it is clear that a basic freeway network is part of the solution to our transportation problems.

The Changing Scene

What are the differences in the look of roads, 1950's style, in comparison with the 1970's? The most obvious change is a higher traffic density on almost every section of road in the State. This higher traffic density has been part of the reason for an increasing number of traffic accidents each year (see table on page 100 in article on "Motoring Mania"). With this in mind, the Department has made traffic safety features an important part of the road scene.

The types of features designed to increase safety have included the provision of climbing lanes (construction of the first being on the Pacific Highway near Gosford in 1954), and the introduction of channelised facilities at busy locations, wherever this has been practicable. The separation of opposing traffic streams by the construction of median strips or dual carriageways is another way to ensure greater safety for motorists. There is now a total of 569 km of roads with median strips or dual carriageways in New South Wales.

The inaugural linemarking programme in New South Wales occurred during 1937–38. However, the familiar broken centre line and continuous centre line combination of today came into use in 1949 and a few years later the yellow colour used for linemarking began to be replaced by the more easily seen white lines. The present situation is that all linemarking is in white, except the "barrier lines" (the unbroken lines to prohibit overtaking) which are marked in yellow.

Roadside furnishings, such as direction sign posts, warning signs, and advisory speed signs, are not only more frequent beside the roads but their design and construction and the materials used are far superior to their 1950 counterparts. Their positioning is chosen with scientific precision and they stand side-by-side with an increasing number of guardrails and reflective road markers (to delineate lane lines), which were scarce by comparison 25 years ago. Over these years, the control of advertising signs erected beside main roads has continued and the general absence of them in many areas confirms a long-standing resolution to retain an open, unobstructed view for motorists, free from the distractions of commercial publicity.

To close this summary of the *direction of events*, it seems appropriate to look at the future. How different will road travel be at the end of the next 25 years in 2000 AD, a date which has connotations of a vastly different, ultra-sophisticated style of life?

At our present rate of progress it seems that the look of roads in New South Wales then will not be so very different from now, with the possible exception of there being a larger percentage of freeway-type roads.

In 25 years, electronically-controlled vehicles and superior automatic traffic guidance equipment may have practical viability in some places. However, generally, we are unlikely to be involved by then in any wholly new concept of "*driving*", although our road vehicles will no doubt be far more sophisticated and efficient, as well as designed with greater emphasis on safety features, and exhaust emission controls. Then as now, the road standards which we get will be only those which we as a community are prepared to pay for.●

ROADMAKERS against the ELEMENTS

"It's raining cats and dogs . . ."

STORMS, according to mythology, are the work of the *cat*, which brings the pouring rain, and the *dog*, which brings the strong gusts of wind.*

It is no myth, however, that the rampages of storms, which periodically sweep parts of New South Wales, do great damage to our main roads network. The cry of "*it's raining cats and dogs*" is enough to send a chill through road-workers who have seen the damage which wind and rain can cause and who know that they will soon be out there working in the aftermath.

This salvage of damaged roads has been a vital part of the work of the Department and the Main Roads Board during the last 50 years. To the road repairers falls the task of restoring undermined pavements and embankments, clearing fallen trees, scooping away slides of rocks and mud, and repairing or replacing bridges.

Usually, the first repairs to water-damaged roads are intended to restore them to their previous standard. But, in areas prone to frequent flooding, the ideal is to eventually rebuild roads and bridges to higher levels so that future flooding will not affect them. Particularly during the last two decades, construction of flood-free bridges and approach roads has been a feature of the Department's planning.

Even as this anniversary issue is being prepared, large areas of coastal New South Wales have again been innundated by abnormally heavy rains. The damage caused to roads and bridges both recently and in years past is shown in the photographs on this page.

* See "Brewers Dictionary of Phrase and Fable", Cassell, London, 1962, p. 751.

Reproduced by courtesy of the *Sydney Morning Herald*

(Above) The longest bridge built on a flood-free route in New South Wales is the Macarthur Bridge over the Nepean River near Camden on a deviation of the Hume Highway. Its value was proved during recent flooding when the old Camden Bridge, which had previously formed the Hume Highway crossing of the Nepean River in this vicinity, was partly washed away by floodwaters on 23rd June, 1975, (see photograph, left). Without the benefits of the flood-free Macarthur Bridge, travellers and residents of the area would have been severely inconvenienced.

(Right) Frequent flooding of a section of the Pacific Highway at Billinudgel, between Mullumbimby and Murwillumbah, led to the reconstruction of a length to raise it above flood level. Photographed in 1938 while work was in progress.

(Above and right) The sight of severely broken roads has a nightmare quality - the earth split ready to swallow up the unwary traveller. The Hume Highway over Razorback Mountain has suffered this fate many times, for example in November, 1969. Last year, in January, the Castlereagh Highway north of Walgett, fell victim to the the ravages of water and was completely severed at one point, in addition to cracking at several locations.

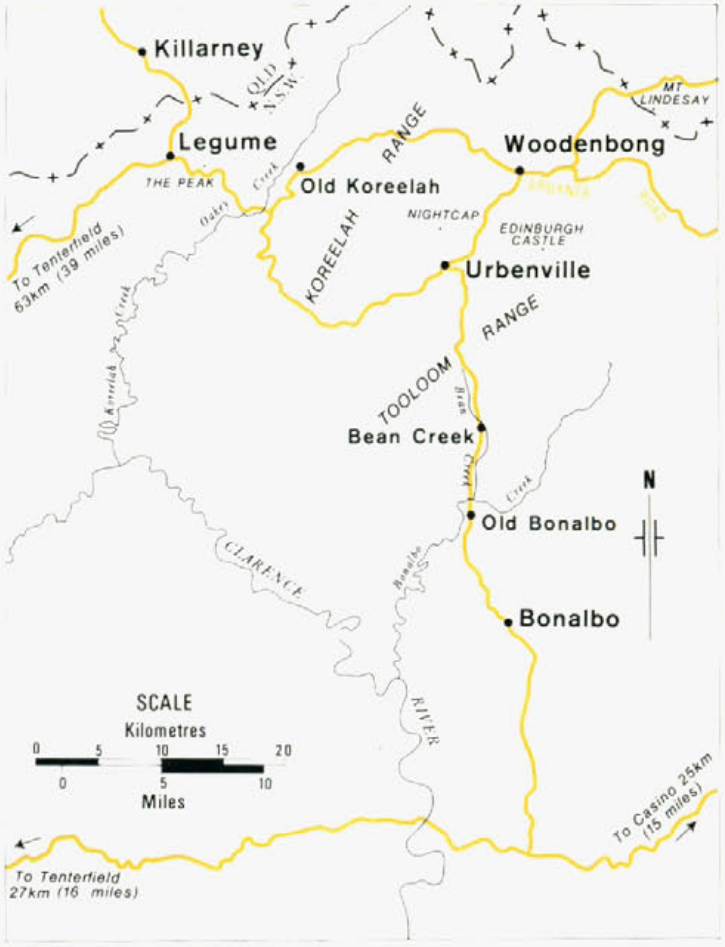
(Left) Flooded roads disrupt commerce and cost private industry and government many thousands of dollars in lost time and damaged goods. Sometimes floodwaters rise so quickly that vehicles have no chance of escape to higher ground, unless they are already being transported piggy-back style, as in this photograph, taken on the Barrier Highway 16 km east of Cobar, in February, 1971.

Reproduced by courtesy of the *Sydney Morning Herald*

(Far left) Three south-bound carriageways of the Hume Highway at Warwick Farm were closed to traffic in June 1975 when this tree collapsed over them during a fierce storm. Workers had to quickly clear it from the Highway to minimise inconvenience to traffic.

Hon. (later Sir Michael) Bruxner

Mr H. H. Newell



Diary of Determined Travellers

Determination is judged to be a good trait for men in public affairs and it must have been possessed in abundance by the two gentlemen who are featured in the following story—the Hon. M. F. (later Sir Michael) Bruxner, M.L.A. and Mr H. H. Newell.

This article, which comprises an extract from *The Tenterfield Star* of 23rd July, 1928, is a description of travelling conditions which were, unfortunately, not confined to the northern rural area of the State at that time. The reporter has certainly written the article with plenty of gusto but few compliments can be paid to sections of his grammar and punctuation. Nevertheless, we have changed none of the story but present it as an unedited reprint of that originally published—with all of the insights it gives.

As Minister for Local Government from October, 1927 to October, 1930, and as Deputy Premier and Minister for Transport from May, 1932 to May, 1941, Mr Bruxner was responsible for the administration of the Main Roads Act. He represented the Tenterfield district in the Legislative Assembly of New South Wales for 42 years and, as a fitting tribute towards the end of his career, State Highway No. 16 was named the Bruxner Highway in November, 1959. Sir Michael died on 28th March, 1970.

Mr Hugh Hamilton Newell was appointed a member of the Main Roads Board in March, 1925 and became President in January, 1932. Following the abolition of the Board in March, 1932, he was appointed Commissioner for Highways and Road Transportation until he became the first Commissioner for Main Roads in December, 1932. Mr Newell died in March, 1941 while still holding office and, in view of his remarkable period of service, State Highway No. 17 was named after him in July, 1941.

This story not only describes some rough road conditions in the late 1920's, but also illustrates the dedication of these two men who insisted on getting out and about to see local situations for themselves.

LOOPED THE LOOP
TOUR OF NORTHERN ROADS IN WET WEATHER
22 MILES IN 11 HOURS

The conditions, the hardships and difficulties under which the man "out back" has to live, were experienced—and experienced in a practical manner—by two of the highest officials in New South Wales so far as road construction work is concerned just recently.

The officials concerned were the Hon. M. F. Bruxner (Minister for Local Government), and Mr H. H. Newell (Chairman of the Main Roads Board).

Mud, black, sticky deep mud, for what seemed to be endless miles on end, was a problem to be overcome.

For years past we have heard the cry from the man on the land who resides in the northern portion of the Tenterfield Shire that the roads are impassable in wet weather. What with the thick muddy surfaces, steep inclines, and no local material with which to cover the road, the man outback has had a trial.

The need for better roads in the outback centres has been an urgent matter, and has occupied the consideration of the greatest brains in the State. The best possible for the time being is being done, but there is no doubt about the

fact that still much more has to be tackled.

With the view of seeing for themselves the progress being made on work which has already been authorised, the Minister for Local Government (Col. M. F. Bruxner, M.L.A.), and Mr H. H. Newell decided to make a visit to the roads in the northern end of the Tenterfield Shire.

On Saturday morning, the 14th inst., the two officials left Bonalbo with the objective of inspecting the Bruxner Road and the Oakey Creek–Woodenbong Road.

The experiences which eventually befell them were not to be envied, and speaks volumes for the sincerity of our member and Mr Newell.

Heavy rain fell the night previous. Enough said! One can easily imagine the state of the Bonalbo roads under such circumstances, but Col. Bruxner was not to be disappointed. He had made up his mind to inspect the roads on which he and Mr Newell had been instrumental in having work commenced. Their determination of mind, and the will to achieve is one which can be commended.

The road on the north side of the Tooloom Range was among the worst encountered by the party, as can be gauged by this photograph taken in 1934 when conditions were essentially the same as six years earlier.

On the Thursday morning previous, Mr Bruxner and Mr Newell left per car for Casino, where they attended the turning of the first sod of the Casino-Bonalbo railway. In the party was his Worship the Mayor of Tenterfield (Ald. S. Armstrong), who also attended the function, Mr W. Mason (secretary to Mr Bruxner), and Mr M. Flint, of *The Tenterfield Star*.

After the Casino function, the party, excepting Ald. Armstrong, travelled to Bonalbo. At Bonalbo on Friday, 13th inst., Col. Bruxner performed the official opening of the new concrete butter factory.

During Friday afternoon and Friday night, rain fell almost continuously over the whole of the district.

Col. Bruxner's programme when he left Tenterfield was to proceed to Urbenville from Bonalbo on the Saturday. From Urbenville, in company with Mr Newell, an inspection would be made of the Bruxner Road. On Sunday the party was to journey to Old Koreelah, thence to Oakey Creek, where an inspection would be made of the work being carried out on the new road being constructed from Koreelah Creek to Woodenbong, and return to Tenterfield the same day.

However, the elements decided otherwise.

In view of the prevailing conditions, the people of Bonalbo were emphatic in their declaration that the party would never reach Urbenville should they attempt to do so. Col. Bruxner had made up his mind to inspect the roads in question, and he was not to be defeated in his objective.

At Bonalbo, Mr Robert Clark, a "man on the land" residing at Beaury Creek, Urbenville, joined the party to assist and guide them along the rough and slippery track which certainly must be ahead. Mr Clark had travelled from Urbenville the previous day to join the Bruxner party on its way to his home town.

A diary of the whole trip was taken, and proves to be very interesting reading. No doubt it will go down in the records of the Main Roads Board, and will be heard of for many years to come. Words will hardly describe to the full just what was experienced from Saturday, July 14th, 1928, to Tuesday night, July 17th, 1928.

The Diary

At 6 a.m. on Saturday, July 14th, 1928, Col. Bruxner, with Mr Newell, came to Room No. 8 at the Hotel Bonalbo, and awakened Mr Fred Dove, driver of the party's conveyance. "Fred", said the Colonel, "we want to get to Urbenville, are you game to tackle it with us?" "Certainly", came the reply. The Colonel assured Mr Dove that the trip would certainly be a hard one, but he would be recompensed for it. The Colonel turned round and remarked, "Milton, you had better get your togs on, as we will be making off as soon as we can." "Got any old strides?" came from the *Star* reporter.

The Colonel returned to his room, and shortly afterwards his genial secretary returned with a very decent pair of gaberdine trousers with the Colonel's compliments. "Thanks," said Flint, and added "do you think he would have a spare pair of shoes." Mason returned shortly afterwards with a pair of slippers, and a remark from the "Boss" that they were all he could spare. With this the reporter had to wear his own shoes.

Breakfast was over shortly after 8 o'clock, and a start was made punctually at 8.30. The main street of Bonalbo was a complete bog, and it was with much difficulty that a start was made. Many of the Bonalbo residents bade a farewell, but pessimistically remarked, "We will see you again shortly." Off we went. The departing party consisted of Col. Bruxner, Mr Newell, Mr Mason (Mr Bruxner's secretary), Mr Clark, Mr Flint, and Mr Dove. Not a bad load together with all the luggage!

The speedometer registered seven miles before any serious difficulty was encountered. We had been on the road just an hour. Seven miles per hour! Some speed! Mud was lying everywhere 8 or 9 inches deep. The car slipped and slid in all directions until the mud became so deep that the car simply sat on the mud and would not proceed. We were all ordered out, and for the first time, at 9.30, had our "shoulder to the wheel" and assisted the car onwards until the wheels were able to get a grip again.

Old Bonalbo, a mile further on, was reached at 9.50, but the car had to be pushed up the hill leading into the little centre.

A few miles further on the tick gate was observed. At 10.15 Mr Hobbin, who is in charge, ran forward with both hands in the air, declaring "Stop! You can't go ahead. It is useless trying to go ahead!"

"Why!" came a voice from the car.

"There are two gullies and a creek ahead which you will never cross," replied Mr Hobbin.

"Good!" but disregarding the alarmist's warning, we pushed forward. The first gully was negotiated without any difficulty; the same for the second gully, but a little further on we observed the creek—yes, Bean Creek. We got out; and inspection was made.

"Pretty high," declared the Colonel, "but we will wait awhile." Two maintenance men came along. They also assured us it was high and one rode his horse through. The water seemed to be about 2 feet deep. However, the engine was protected as well as possible. Time, 10.45. After waiting some time, and the creek receding about 4 to 6 inches, an attempt was made to cross. All were aboard, when, in the middle of the stream, the engine gave out, and the water was running over the running boards. The Colonel gave orders "all out," and everyone jumped out and began to push. The engine started up, and with the assistance of five men, the front wheels reached the opposite bank safely. Just when hope was attained that the car would be landed safe and sound, it was discovered that the two hind wheels were in deep holes, and it was impossible to move the car further. Mr Dove had provided well for such circumstances, and the "pushers" were called from the water where they were standing waist deep, a winding gear was attached to a stump, then on to the car, and in a short time the car was "wound out". At midday a further start was made for Urbenville. Bean Creek is 13 miles from Bonalbo, and Urbenville 9 miles further on. Several very slippery hills were encountered during the next mile or so, and the "block and tackle," which was a further part of the car equipment, was brought into use on almost every occasion. At 2.30 we reached the foot of the dreaded Tooloom Range. Here we had a spell, and in searching the Colonel found a four-leaf clover, which he declared meant luck.

After successfully negotiating many difficulties which seemed almost impossible, the party was confident of getting through.

The Tooloom Range meant a great problem, and it took from 2.30 until 10 minutes to 6 to reach the top. It now seems a remarkable achievement that even the top was reached. A young man named Johnston rode along on horseback and assisted from near the bottom of the range until we reached the top. To describe fully the journey up that range one would have to use a Webster frequently. But we got there. The range is some 3 or 4 miles in length; scarcely 100 yards has a hard surface. It was wet and slippery from bottom to top. At one stage the car slipped off the road, and it was with more good luck than otherwise that it did not topple over the embankment which was a little lower down. A rope was attached to the front axle and to a tree to save it from falling further. As the car proceeded up the hill a few feet at a time, the rope was tightened to the tree, until eventually it was again placed on the road. The grass alongside the road was wet, thick, and slippery.

Going down the range on the opposite side further difficulties were experienced. The road had huge gutters washed out in it. One side had a drop of several hundred feet, and all that could be seen was a black wall, and all were possessed with fear that should the car slip for even 2 feet, over it would go and crash to pieces below. What a great place for some of the "speed cranks" to try their machines out! However, the luck of the clover leaf carried us through, and we landed safely at the bottom of the range. A little further on Mr Clarrie Taylor was waiting. He had waited with horses all day to assist us over a bad crossing. This crossing was nothing to what had been overcome earlier in the day, and without difficulty the car ploughed through it. Five miles out of Urbenville, Mr Stoddard and Mr Graham met us in their Chev. car. They also had come out to assist. The experiences of the day had made us more or less independent, and without further difficulty we reached Urbenville at 7.30—cold, wet, and hungry.

The party inspected new roadworks from Koreelah Creek to Woodenbong (then Developmental Road No. 1055). *By* 1934 *this attractive bridge over Koreelah Creek was almost completed at the location where the travellers had been unable to ford the creek because of high water.*

At Urbenville

The successful trip from Bonalbo to Urbenville was an accomplishment which was originally considered a human impossibility.

Needless to say, after having had a good warm bath, the party appreciated supper.

The following morning an early start was made for Woodenbong, 8 miles away. Some very interesting sights were seen by those of the party who had not been in the locality previously. The most conspicuous of these were the mountains known as the Crown, Beehive, Edinburgh Castle, and the Nightcap.

The blacks' camp also proved a unique sight for those unaccustomed to such people. The road leading from Urbenville to Woodenbong was little better than the road traversed the previous day. About 10 minutes to 11 a very serious bog was experienced a few miles out of Woodenbong. One of the chains were broken, and after the car was hauled from the bog a start was made for Woodenbong where hope was held out of mending the chain. Right on the outskirts of Woodenbong another serious bog was encountered, and here the other chain was broken. The block and tackle was put into operation, and at 11.40 the party arrived at Woodenbong.

While Mr Dove was repairing the broken chains, Col. Bruxner and Mr

Newell walked down the Bruxner Road about a mile to the camp of Mr R. G. Orr, resident engineer in charge.

The Bruxner Road is being constructed by the Public Works Department, and is considered a national work. Col. Bruxner visited it as member for the district.

When the chains were repaired, the car left to pick up Col. Bruxner and Mr Newell. On arriving at Mr Orr's camp, Mr Orr joined the party with his Dodge car, and conveyed Col. Bruxner and Mr Newell with him.

Although the Bruxner Road is far from completed, much good work has already been accomplished. Travelling along this road when it is completed will certainly be a delightful trip. The scenery is delightful, with huge forest trees growing in a stately manner on both sides. In the far distance Mount Lindsay (*sic*) stands as a dominant and outstanding feature. From the "Lookout" Mount Lindsay is about 2½ miles away. This road, about 10 miles in length, will provide some of the finest scenery in the Commonwealth when it is trafficable.

At 2.30, the party in the Hup. car arrived at the "Boarding House" on the Bruxner Road. Here genial Mrs Guiney conducts a boarding house for the men employed on the road. It is a bark structure, but nevertheless Mrs Guiney provided the party with a very appreciative luncheon.

Messrs A. W. Martin and W. J. Graham, both of Woodenbong, gave the party wonderful assistance when bogged on the by-tracks along this route.

At 5.55 p.m. the parties arrived back at Mr Orr's camp, where he kindly provided afternoon tea.

Mr Orr explained that out of 262 working days of the past year only 142 days were worked. This was due to holidays and wet days. Up to June last the lost time owing to wet days worked out at 46%.

The party left Mr Orr's camp at 6 o'clock, travelling back to Urbenville with an unenviable experience. Being dark, one bog followed another until about 2 miles from Urbenville, when the front wheels sunk so deep in water and bog that it was utterly impossible to move the car. The block and tackle was attached to the rear of the car, and with difficulty the "bus" was brought to safety again. Here one of the chains was lost, and the remainder of the journey had to be travelled without the assistance of the chain. It was not until 9 o'clock that the party arrived at Urbenville.

Monday, July 16th

During Sunday night and early Monday morning a heavy storm broke over Urbenville and district. At daylight rain was still falling. However, home had to be tackled, and after the experience of the two previous days, the party was not to be deterred. The car was greased up, and got into readiness with extra chains, &c., for the trip ahead.

Mr Athol Skinner, who runs the mail from Urbenville to Killarney, offered to pilot the party as far as Old Koreelah. At 9.45 everything was ready for a start. Mr Skinner took the lead in his Chevrolet truck and was joined by Mason and Flint. After travelling for about 5 miles a large sea of water was noticed ahead. Across a flat easily 300 feet wide, water was running a banker. Skinner headed into it and successfully crossed; the Hup. followed, and also got through. Woodenbong was reached at 11.5. Black mud and slush was lying everywhere between Urbenville and Woodenbong. Mr Orr joined the party in his Dodge at Woodenbong, and at 15 minutes to 12 another start was made, Skinner again taking the lead. The Hup. came next, and the Dodge with Col. Bruxner and Mr Orr, followed last. About a mile out of Woodenbong another sea of water was observed across the road. This was easily 200 feet wide. The two leading cars got through the water safely, but Mr Orr's car bogged in a deep hole. The Chevrolet backed into the running stream with the intention of pulling the Dodge out. For the first few minutes the Chevrolet seemed to be making great headway, and it looked as though it would pull the Dodge out of the bog, when suddenly the axle broke. It was also discovered that the strain on the Dodge had caused the pinion to break. So within a few hours after leaving Urbenville two of the three cars were disabled, and had to be abandoned.

Mr Skinner, with the mail, joined the Bruxner party, and at 5 minutes past 1 the party set off again. As the road ahead was simply impossible to traverse, the car was diverted through a reserve. The members of the party went ahead and blazed a new track, and it was several hours later that on top of the Koreelah range the road was met again. The car had to be pulled by block and tackle from one tree to another up the Koreelah range. This performance was the only means of getting the car along. It took several hours to travel down the opposite side of the range, and the car met further difficulties. The road was so slippery in one place that the wheels became locked, and all hands endeavouring to steady it, the front mudguard hit "bang" against a tree. All spirits dropped—expecting to see a broken wheel—but fortunately a smashed mudguard was the only damage effected. The travelling from now on was a matter of hours per mile—not miles per hour.

At 7 o'clock the car pulled up in front of the Old Koreelah Post Office. It was the hope of the party to cross the Koreelah Creek, and several of the party were to stay at the home of Mr Hardcastle. The creek was running a banker, and could not be crossed. Mr Mills, the genial host of the Old Koreelah Post Office, and Mr G. Triggs, who had accompanied the party from the post office to the creek, some few hundred yards away, both offered to put the party up for the night. Needless to say, the offers were accepted—with thanks. Col. Bruxner and Mr Mason went with Mr Triggs, while Messrs Newell, Clark, Dove, and Flint accepted the generosity of the Mills' family.

Tuesday

The following morning Messrs Bruxner, Newell, and Clark left on horseback, and rode some 6 miles down the river to the camp on the Oakey Creek Road. After inspection, they returned, and at 1 o'clock the car, with all passengers aboard, crossed the river to Mr Hardcastle's for lunch, and at 2.30 a real start was made for Tenterfield. The Peak, a bad hill on the road to Legume, was negotiated with little difficulty, thanks to Athol Skinner, who took the lead in Mr Triggs' Essex car, and piloted the way across.

At 5 o'clock on Tuesday afternoon Legume was reached, and with a sigh of relief the party welcomed the main Killarney–Tenterfield Road.

The return journey was most pleasant, but at 7 o'clock the battery on the Hup. began to wane. When near Mr W. Bonner's property, "Milford", the lights were very dim. A call was made on Mr Bonner for the loan of another battery, which was generously given. Mrs Bonner generously supplied supper for the party, and precisely at 10 p.m. the car, with all hands safe and sound, arrived at Tenterfield.

An Achievement

To achieve such an experience is certainly a feat. The party really "looped the loop". The various stages included Tenterfield to Casino; Bonalbo, Urbenville, Woodenbong, Old Koreelah, Legume, Tenterfield.●

- **Freeways** (91km): High standard roads, including tollworks, on which cross traffic is carried over or under the roadway at interchanges or grade separation structures. Direct access from abutting properties is prohibited in order to permit the unhindered flow of through traffic.

- **State Highways** (10 492 km): The principal avenues of road communication between the coast and the interior, or throughout the State and connecting with such avenues in other States. State Highways are the direct responsibility of the Commissioner who meets the full cost of road and bridge works on them.

- **Trunk Roads** (7 081 km): The secondary avenues of main road communication which connect the State Highways and, together with the State Highways, can be regarded as linking the main regions of the State. Trunk Roads are the responsibility of the Councils through whose areas they pass but grants are made by the Commissioner to the Councils to meet the full cost of approved works on these roads.

- **Ordinary Main Roads** (18 316 km): The network of main roads which basically connects towns and important centres of population with the State Highway and Trunk Road routes and with each other. In the County of Cumberland, the Commissioner has full responsibility for all works on Ordinary Main Roads. In the country, Ordinary Main Roads are the responsibility of the Councils through whose areas they pass and grants are made by the Commissioner to the Councils to meet the full cost of approved works on them.

- **Developmental Roads** (3 642 km): These are roadworks which serve to develop any district, by providing access to a railway station or shipping wharf or to a road leading to them. There is also provision for individual works (in the nature of missing links which would aid development) to be proclaimed as Developmental Works, e.g. a new bridge, or an isolated unconstructed length of road. The full cost of the construction of Developmental Roads and Works is usually met by the Commissioner. Maintenance after construction is the responsibility of the local Council(s).

- **Tourist Roads** (399 km): These are roads which serve to promote tourism. They are usually under the care and control of local Councils which may be assisted financially by the Commissioner by grants of up to 50% of the cost of construction and maintenance. Where a Tourist Road is within a National Park, the full cost of construction and maintenance is met by the Commissioner.

- **Secondary Roads** (287 km): Roads in the County of Cumberland which carry a substantial volume of through traffic, and thereby give relief to a main road, may be declared by the Commissioner as Secondary Roads for the purposes of the Main Roads Act. Usually half the cost of construction and maintenance of Secondary Roads is met by the Commissioner and the balance contributed by the local Council(s).

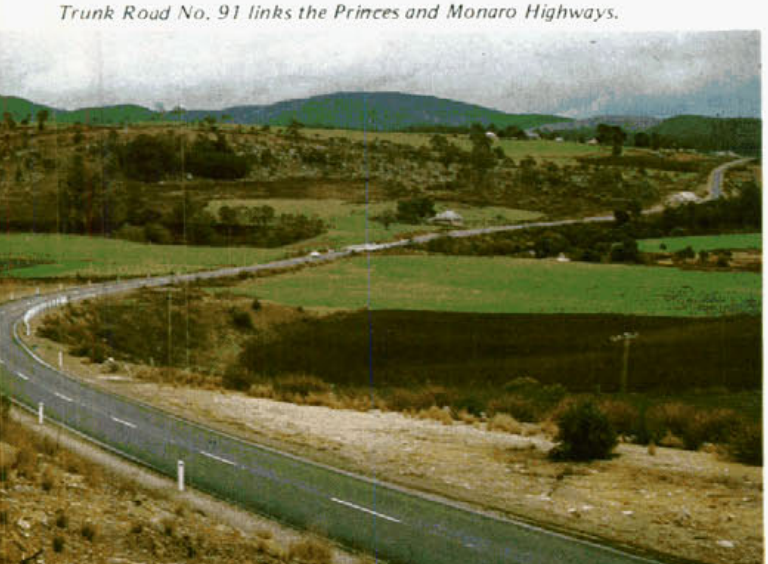
SEVEN ROADS

In New South Wales there are at present seven distinct classes of roads for which the Commissioner for Main Roads holds either full responsibility or a proportion of responsibility. They are described on this page. The total length of each road type, at 30th June, 1975, is given in brackets.

Views along Tourist Road No. 4023 leading to Lake Eucumbene.

The Hume Highway (State Highway No. 2) south of Holbrook.

Trunk Road No. 91 links the Princes and Monaro Highways.



Developmental Road No. 1200, near Moree, gives access to wheat silos.

OUT AND ABOUT...

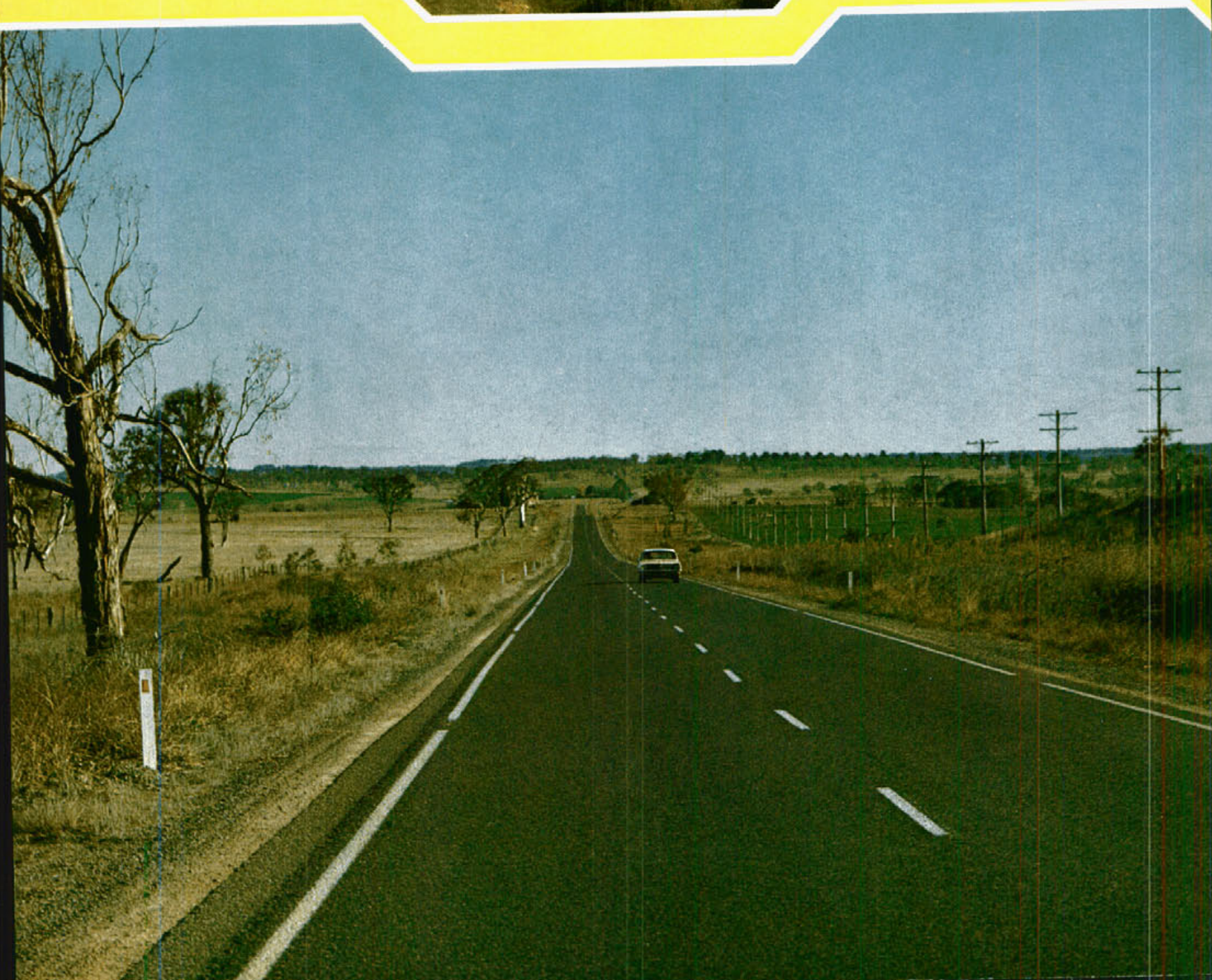
Above: Cows survey passing travellers.

Top right: Rest area 26 km east of Euston, Sturt Highway.

Right: Oxley Highway 14 km south of Coonabarabran.

Below: New England Highway 86 km north of Tamworth.

Any fine weekend, large numbers of people desert the cities and take to the country roads, seeking quiet scenery and pleasant driving along sweeping lengths of well-designed road and stopping occasionally for leisurely refreshment at a roadside rest area.



It's good to leave the pressures of urban life behind, where driving can be a tiresome conflict between pedestrians and heavy traffic, and to move out along broad rural highways enjoying the many attractions this big State can boast.

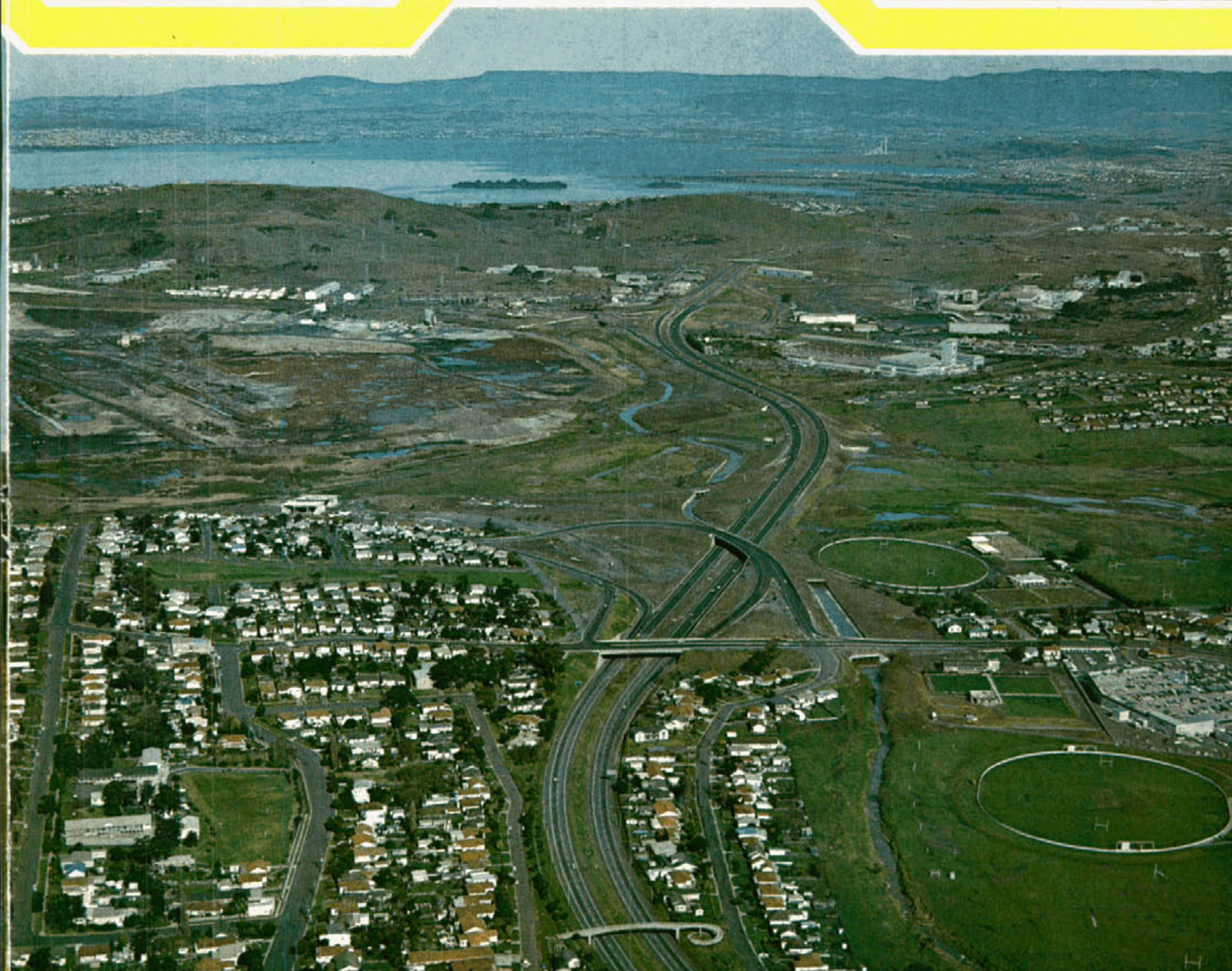
Left: New England Highway 50 km north of Murrurundi.

Below left: Pedestrian footbridge north of Gladesville Bridge.

Below: Monument atop Mt Tomah on Bells Line of Road.

Bottom: Southern Freeway looking south to Five Islands Road in the distance and Gladstone Avenue crossing at centre.

... AND DRIVING ALONG



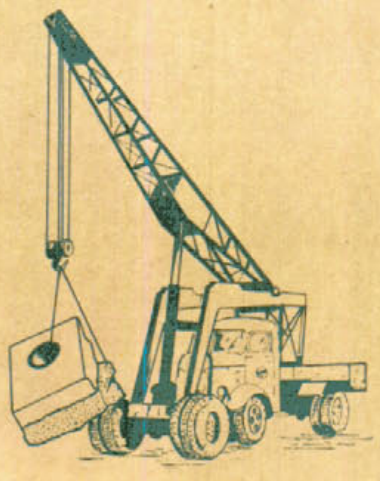
STOP Plant and Equipment

The bright colours of modern plant and equipment at work on new construction, re-construction and general maintenance are a common sight for today's road travellers.

(Top left) The major function of the Department's Central Workshops at Granville is the regular first-class maintenance of plant and equipment. The four-wheel drive loader being steam cleaned here is of a type used by the Department since about 1956 while the type of steam cleaner originated in the early 1940's.

(Below) Soft earth fill on a new road formation is shown being pushed into position by a tractor-dozer of a type common since 1960, although similar types were operating before then.

(Far left) Loosening solid material such as shale was once a laborious task. Shale can now be effectively broken up by a tractor-mounted ripper such as the model seen here which was introduced about 1960.



(Right) One of the most sophisticated roadmaking machines acquired by the Department in recent years is this automatic paver which has the capacity to pave a two-lane width of road in one progressive movement.

A Brief Look at Changes in Roadmaking Plant and Equipment 1925-1975

The large and powerful mechanical monsters now seen on road construction works are the product of years of experimentation and adaption. From earthworks through to completed road, these giant machines make an awesome picture as they push and scrape and heave the rocks and soil, exposing the raw colours beneath the surface and moulding the earth through many processes, into the shape of a modern road.

When the Main Roads Board was first established it did not own roadmaking plant, but obtained equipment on loan from the Department of Public Works. This arrangement was not to continue long before the Board began to purchase a wide array of earthmoving and road-making plant items for its own use and for lease to Councils.

Much of the equipment used in the 1920's or 30's was relatively primitive by comparison with today's efficient machines. Advances in mechanical technology have led to the building of highly specialised machines for road-making and from this have developed vastly improved standards in road design. Some of the advances made because of this technology are outlined here.

Drilling and Blasting

About 20% of the excavation for roadworks is carried out using explosives. A few decades ago this percentage was much higher and when hard materials were encountered the drilling and blasting techniques were slow.

In the years of the Great Depression it was not unusual for holes to be drilled using jumper bars struck by hammers.

Generally however, holes were drilled using hand held jackhammers and carbon drill steels. These drill steels had a chisel point which required frequent reforging.

Diesel engine driven portable compressors with a capacity of about 5 to 6 cubic metres of air per minute were used to operate the jackhammers.

In further developments, drill steels have been fitted with detachable bits with tungsten carbide inserts in various shapes—chisel, button, and cross bits, each designed for specific purposes. These bits are re-sharpened by grinding and give considerably greater drilling time and less variation in the diameter of the hole.

Air operated percussion rock drills are now available in a range of sizes from hand held drills to self propelled track mounted drills and down-the-hole drills. The track mounted drills used on road works are capable of drilling larger diameter holes to considerable depths at a fast rate. They move easily from hole to hole, even over rough terrain, pulling their own compressor when necessary. These machines have a reach to either side and upwards and can drill sloped holes. This means that batters in cuttings through medium to hard rock can be finished neatly by the careful use of explosives.

Pre-splitting or post-splitting of batters in rock cuttings is now the usual practice to give a clean finished face to the cutting, a constant slope throughout its length, and a regularity of shape.

Rear Mounted Rippers

Hydraulically controlled rear mounted rippers on large crawler tractors were developed from the individual unit, which was towed behind a tractor, and have introduced a new era in rock excavation. The increased versatility of rear mounted rippers permits penetration into material where this was not previously possible. Their greater capacity when used with tractors of 300 kW, means that they are capable of ripping rock which previously required drilling and blasting.

Crawler Tractor Dozers

An early type of crawler tractor-dozer of 23 kW required an operator to walk behind and adjust the blade by means of long poles attached to each side of the

Before the development of front end loaders two methods of loading were the chinaman *loading ramp and the side loading ramp.*

A steam shovel of about 0·75 cubic metres capacity operating in 1938.

Breaking up shale with a cleated roller which is being pulled by a 40 *kW tractor. This photograph was taken in* 1948.

tractor. Fortunately crawler tractor-dozers have changed many times since that date, passing through those of 75 to 90 kW in the late 1930's to 112 and 134 kW in the 1950's and on to the very large tractors of the present time. A typical example is 390 kW with an all up weight of 64 tonnes including blade and ripper.

Scoops

Scoops, or scrapers as they are also called, have gone through a similar transformation. In the 1920's and 1930's 1·5 cubic metre scoops of the wheel and/or tumbling variety were extensively used. Through the late 1930's to 1940's they increased in capacity to 3·5, 5·5, 7, and 11 cubic metre capacity, either cable or hydraulically operated. A more recent development has been the motorised scraper with capacities up to 15 and 23 cubic metres, and some of even greater capacity which require assistance in loading either by pushing or pulling.

Graders

Graders are used for spreading, levelling and trimming formations and pavements. In the early part of the period under discussion they were mainly of the drawn variety with the subsequent development of the motor graders common today. Some of todays graders are equipped with electronic devices to ensure accurate finishing to line and level.

In the 1940's and 1950's considerable use was made of elevating graders for movement of earth, particularly in the flat areas of the western part of the State. Here raised formations were constructed to provide improved drainage as the first stage in construction of these roads. The graders, initially of the tractor drawn type, were replaced in the post-war period by power graders fitted with an elevator attachment.

Loading Methods

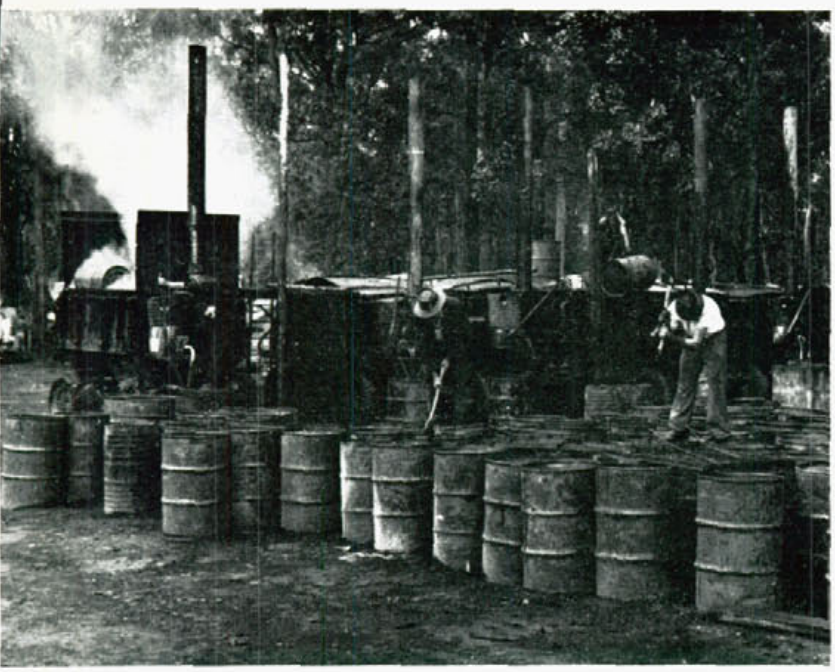
Prior to the development of front end loaders, materials in gravel pits and quarries were loaded by hand or mechanically using a "*chinaman*" or side loading ramp. The former consisted of a trench dug in the centre of the gravel pit, crossed by a timber bridge with a central opening in the deck through which the gravel was fed by scoop or dozer into the truck below. In the latter case, the gravel was transported to the side loader by scoop or dozer and dropped into trucks.

Front End Loaders and Others

The development of mechanical loading devices led to the manufacture of steam operated power shovels. Diesel engine power eventually replaced steam. A typical size used on roadworks was a 0·6 cubic metre bucket shovel, although buckets up to 1·9 cubic metres were used. These shovels have been superseded by the front end loaders which have greater mobility and adaptability.

Front end loaders are an important accessory in all phases of roadmaking operations. The wheeled variety are extremely manoeuverable and were designed to load trucks with loose materials. Because of their versatility and because of necessity they are pressed into performing many tasks for which they were not specifically designed. The major development in this equipment is the articulated wheeled variety with shovel capacities as large as 5 and 7 cubic metres. There have been numerous types of loaders from the cable operated front tipping or overhead loading type to the hydraulically operated front tipping variety which is now almost exclusively used.

Various types of loaders have been developed for attachment to motor lorries such as the side loading Berryman loader and overcab loaders. However, these have very limited application and are mainly used for maintenance work on roads.



In this 1947 photograph, six kettles heat bitumen ready for use on the roads.

A 6-cylinder, 54 kW, diesel-engined elevating scraper drawn by a 70 kW tractor constructing an elevated formation in 1954.

Continuous elevating bucket loaders are also used, their main application being the loading of aggregates for surfacing work. This type of loader was in use prior to the 1920's and has been improved continuously to the present time.

Trimmer-Spreaders

A further advance in the machinery available to the roadbuilder has been the development of finishing machines such as the Dual Lane Automatic Trimmer Spreader which is capable of spreading and trimming large quantities of pavement material to quite fine tolerances. This machine can be used for spreading asphaltic or cement concrete and can readily handle large quantities of up to 400 tonnes per hour. On Freeway work this huge machine, over 11 metres long and 8 metres wide, has comfortably handled 3 810 tonnes of asphaltic concrete in 1 day—virtually the total that could be made available from mixing plants in the Sydney area.

Rollers

Rollers for compaction of earthworks and pavement materials have progressed through the three wheeled steam rollers, of the 1920's and 1930's (and even late 40's) to three wheeled and tandem diesel rollers, drawn sheepsfoot, smooth wheeled vibrating rollers both drawn and self propelled, drawn and self propelled vibrating tamping foot rollers, grid rollers and self propelled pneumatic tyred rollers of varying capacities. Special rollers have been developed for particular purposes, for example cleated and grid rollers to break down shales and narrow wheel rollers for use in trenches.

Road Surfacing

The flush seal surface treatment has been developed and widely used throughout Australia. The development of equipment for heating and spraying bitumen and spreading cover aggregate has undergone startling changes in 50 years.

Up to the late 1940's, bitumen was transported in 200 litre drums and heated on site in wood fired open kettles. Later, pontoon type tanks of about 4 500 litres capacity were used. Hot bitumen was transported in road tankers to a heating site where it was transferred to these tanks and when required heated by oil-fired burners in flues built into the tanks.

Where the work was situated within reasonable haulage distance of a rail siding bitumen was transported in rail tanks and re-heated at the siding for transport to the site in the sprayer.

In the 1930's bitumen sprayers were relatively small both in size and capacity. In the early post-war period sprayers were equipped with geared driven pumps mounted at the rear of the vehicle. The additional weight of this equipment however, limited capacities of sprayers to about 3 900 litres in order to conform with ordinance loading requirements.

In the 1960's the use of hydrostatic drives and pumps, fitted at the front of the tank, enabled sprayers with capacities up to 5 000 litres to be developed.

Spreading Bitumen

The disadvantage of earlier types of aggregate spreaders which were fitted to the rear of lorries was that the lorry containing the aggregate to which the spreader was fitted had to operate in reverse. Such spreaders were the fantail and the several box types.

Improvements have resulted in the self propelled spreader which now tows the lorry containing the aggregate. The lorry tips the aggregate into a receiving hopper from which it is carried forward by a conveyor belt to a forward hopper and then distributed to the road surface by a screw fed over a drum roller.

Asphaltic Concrete Mixing Plants

On the more heavily trafficked roads, particularly in urban areas, asphaltic

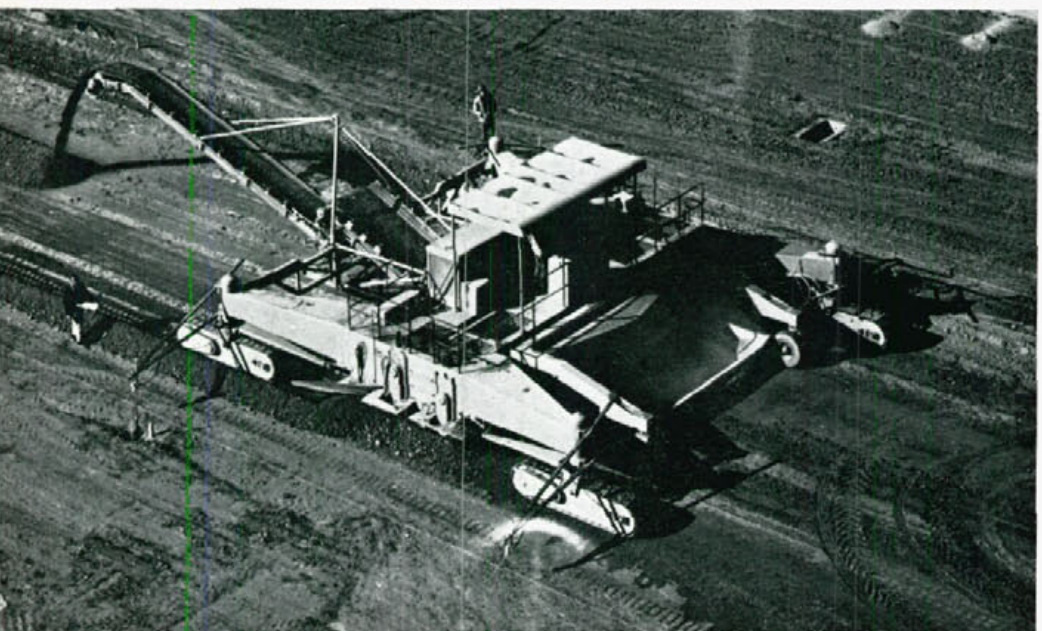
concrete is extensively used on the running surface. Mixing plants for this material have advanced tremendously in the 50 year period. The first mixing plants established by the Department at Granville had a capacity of 275 tonnes per day. These were replaced in 1955 by twin mixing plants each with a batch capacity of 2 300 kg and a rated capacity of 46–70 tonnes per hour. It might be noted that the maximum output from these two units over an extended mixing day was approximately 1700 tonnes.

The Department is now installing at Granville a 6 800 kg batch mixing plant with a rated capacity of 400 tonnes per hour. This equipment is fully automatic and, although typical of other modern asphaltic concrete mixing plants, will have possibly the largest batch capacity in Australia.

Considerable advances have been made in the equipment used for laying asphaltic concrete. In the pre-war and early post-war period, bituminous mixes were often spread by hand-controlled spreader drags drawn by the lorry delivering the material and tipping it ahead of the drag. Asphaltic concrete is now spread by self propelled asphalt pavers to a pre-determined depth, controlled by a string line, with initial compaction imparted by tampers and/or vibrators at the rear of the spreader. Another innovation to the spreading of asphaltic concrete is the Dual Lane Automatic Trimmer Spreader, which like the Dual Lane Asphalt Pavers can handle large quantities of material over the full width of a dual carriageway, thus obviating the need for longitudinal joints in multi-lane carriageways.

Pneumatic tyred rollers and smooth steel wheeled tandem rollers follow the spreader to compact the asphaltic concrete.

A 1927 method of grading using a planer drag compared with the modern dual lane automatic trimmer spreader, seen here involved in a trimming operation.



Concrete Paving

In the pre-war years cement concrete was extensively used in the construction of road pavements but in recent years the use of this material has declined because of its cost and also because of the greater use being made of flexible pavements. There are areas however where concrete is more appropriate than other types of construction and its use is recommended. These areas are not regularly occurring and as a result the purchase of large complex machinery capable of spreading quantities of concrete is not warranted. On the Warringah Freeway, however, a method was used which involved the construction of a concrete pavement 200 mm thick, in two 100 mm layers, and a subsequent overlay with 50 mm of asphaltic concrete. This work was free of traffic permitting long lengths to be laid, and the contractor took advantage of these conditions to use a concrete paving train. The only expansion joints were against structures, the expansion joints later being sawn at close intervals.

Future Developments

It is not likely, in the immediate future, that roadbuilding plant will increase in size to the gigantic proportions of some mining equipment. The normally limited areas of road space available during construction places the emphasis on the development of more *effective* roadbuilding plant rather than increasing its *size* . . . . . a kind of *brains* versus *muscle* situation which may see technical ingenuity produce roadmaking machinery looking very different from that familiar to us today.

☆ ☆ ☆

This has been a brief exploration of the strange world of roadmaking equipment which has grown and improved with the need to build better roads economically and to build them at a faster rate. The never ending review of design standards for roads almost certainly means that we have still to see enormous changes in roadmaking equipment.●

Gates, Grids and Gutters

OBSTACLES OF THE PAST

Among the obvious inhibitors to good driving on main roads in 1925 were the all-too-numerous obstacles in the form of gates, grids and vee-gutters. The newly-established Main Roads Board lost no time in investigating these problems and the minutes of its meeting on 28th May, 1925 record their first thoughts on forming a firm policy for the future.

GATES ON MAIN ROADS

The Board had under consideration a question raised by the Peel Shire Council as to the power of the Board to order the removal of public gates from a Main Road.

The Board decided that there is nothing in the Main Roads Act which empowers the Board to require the removal of gates which are (lawfully) existing upon Main Roads. The administration of the Public Gates Act, 1902, is still vested in either the Minister for Lands or the Local Council (as provided in Section 251 of the Local Government Act, 1919).

The Board, however, took the view that if a road is of sufficient importance to justify its being classified as a Main Road, and being assisted from the fund provided by the Government, by the general body of ratepayers, and by special taxation upon motorists, then it should be free from obstructions such as gates. The Board would probably make it a condition of the proclamation of new Main Roads in future, that they shall be free from such obstructions: and considered that the gates across existing Main Roads should be removed as soon as possible.

Most of today's road travellers hardly ever encounter a gate, even on the most distant roads, but in the 1920's the situation was the reverse, as the following extract from a newspaper in January, 1926 explains.

GATES ON ROADS

One of the many effects of the growth of motor traffic has been to check the granting of permits to erect gates across roads. These gates are erected under two different Acts. A person who has enclosed his holding with a rabbit-proof fence can obtain from the local land board a permit to enclose a road by placing a rabbit-proof gate across it. This saves him the heavy expense of erecting rabbit-proof fencing along one or both sides of the road through his holding. In respect of other fencing, the local Shire Council can give permission to erect a gate. This permit carries with it conditions as to the proper maintenance of this gate to ensure that it can be readily opened. Complaint is continually made by travellers that on some roads gates occur every few miles. At the last meeting of the Lachlan Shire one of the councillors pointed out that permits were granted and gates were put up that were not up to the standard required. He suggested that the public be asked not to close any gate unless it was properly erected and maintained. This is a plan which must be applied with a great deal of caution, because it is an offence for a person to leave such a gate open. A better way of dealing with the matter would be for the council's engineer to report to the council concerning all gates that were not up to the standard, or whose continuance was not justified, in order that the permit might be cancelled and the gates removed.

Later that year (1926), the National Roads and Motorists' Association supported the move to have as many gates as possible removed.

There are some instances where gates are maintained, notwithstanding that the roads have been fenced off since the gates were first constructed. Every gate upon a public road should be challenged and, unless it can be definitely shown to be absolutely necessary, its abolition should be hastened . . .

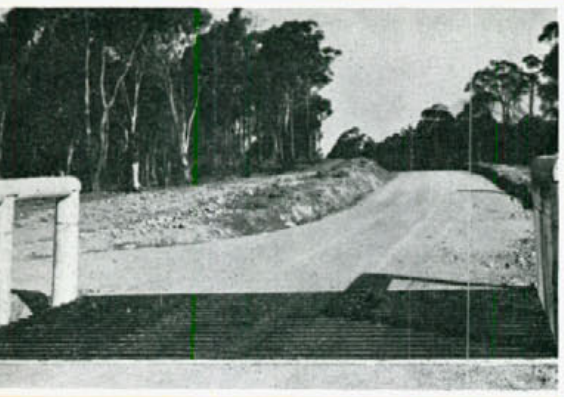
There should be an investigation as to whether all the gates are needed. Some of them have been in existence for 20 or 30 years. It may have been a fair thing to allow the landowner to have gates 30 years ago, when there was far less traffic upon the road and before he had made any money out of the land. But during those 30 years he should have made sufficient to enable him to fence off his land and not have any gates across the roads . . . The traffic on the roads has grown enormously, and it is now unreasonable to expect this large traffic to put up with the inconvenience of gates across busy routes, such gates being for the benefit of a very few. If a road is of sufficient importance to be classed as a main road . . . then it is of sufficient importance to justify the withdrawal of the permits to obstruct the road by gates.

If landowners are allowed to have gates they should comply with the law by (1) keeping them painted white so that they can be seen readily at night; (2) keeping the legend "public gate" painted on the gates so that the public shall know that the gates is a gate across a road, and not simply a gate into a private paddock; and (3) keeping the gate in good order, so that the public which is forced to put up with the inconvenience of the existence of the gate shall not be subject to additional inconvenience due to its being out of repair.

Experiment and Solution

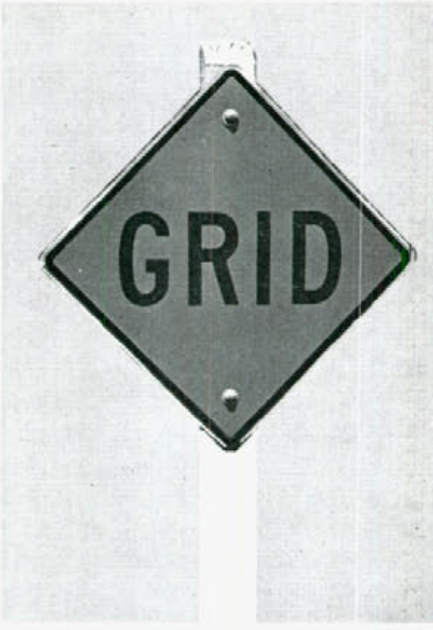
After the determination in the Main Roads Board's minutes (mentioned above), enquiries were made about the alternatives to gates used in Queensland where it was ascertained that fences across roads were sometimes negotiated on inclined ramps, consisting of planks about 250 mm wide, set at a grade of 1 in 6 and with slightly raised kerbs on either side. Another method used with some success in Queensland sheep country was an "S" shaped trench about 3 metres wide, fenced on both sides but having no gate or other obstruction across the road (except the wide trench)!

The Main Roads Board, however, did not adopt these methods, but arranged for the design of a grid (consisting of a pit covered by a grill), to replace the gates and similarly prevent cattle or sheep from moving from one property to another. These all timber and timber and pipe grids were designed to support an axle load of 7 tonnes, but probably few, if any "motor by-passes" (as they were called) were erected to these designs. This was mainly due to the fact that such "by-passes" were erected by private persons and not by Councils, and there was no obligation for them to use the Board's designs and, in fact, the designs probably did not come under the notice of the persons erecting the "by-passes".



(Left) A correctly build grid, in this case part of the dog proof fence on Main Road No. 135, between Guyra and Ebor, in Northern New South Wales. This photograph, taken in 1937, shows the entry to the by-pass at the side of the grid. The 5.5 metre wide grid is situated 1 metre above the natural earth surface, with no excavation, and the entire ramp projects onto the dog-infested side of the fence.

(Below, right) Typical sign erected by the Department to warn motorists travelling along Trunk Road No. 66, between Broken Hill and Menindee.



The Silver City Highway (State Highway No. 22), in the far western area of the State, carries a low traffic volume, yet is a vital communications link. Almost 30 years ago, 190 km north of Broken Hill, this fence (right) literally crossed the road. Its crude type of gate was unfortunately common on some roads. By comparison the photograph (below) shows a reconstructed section of the same highway in 1964, at 167 km south of Broken Hill, where the installation of a well marked grid is a great improvement.

Legislation permitting such grids to be set up on public roads, was assented to on 12th December, 1927 (Amendment No. 51 of 1927, Local Government Act 1919, addition of section 251A) and Section 36 of the Main Roads Act was amended to give the Board the same powers as a Council in respect of requiring "by-passes" on Main and Developmental Roads.

An interesting experiment was carried out at this time to see whether rabbits could cross the proposed grids. One of the new grids was built in a fence between a lucerne field and a barren field, and rabbits were released into the barren field only. Although the rabbits did not cross the grid to get to the lucerne, the Department of Agriculture remained suspicious of the ingenuity of rabbits and considered gates were still necessary to ensure that fences remained rabbit-proof. In this period the huge rabbit population caused incalculable damage to natural vegetation and in turn this led to soil erosion and a severe reduction in the stock-carrying capacity in many districts. It was not until the early 1950's that the number of rabbits was reduced by the introduction of the virus disease myxomatosis.

Where and Why

Another problem for the Main Roads Board was the actual location of the grids—either across the road formation or to the side, as a type of by-pass with the gates remaining on this main route. In 1928, Councils were asked for their opinions about the location of the grids and 156 of the 244 Councils replied. There were 78 Councils in favour of the gates being erected on the road formation, 27 in favour of the grids being erected on the formation, and 51 having no preference. The reports from Councils also indicated that there were then 145 rabbit-proof, 2 dog-proof and 80 miscellaneous gates on main roads throughout the State. As a result of these investigations the Board recommended that the grids be situated on by-passes while the gates remained across the road formation itself. This slight deviation to the side was also thought beneficial in reducing the speed at which vehicles might attempt to cross the grids. Additionally in 1928, a new section was added to the Local Government Act to safeguard Councils against liability for accidents which might occur because of a by-pass.

By late 1934, the original idea about the location of the grid had been reversed and the Department of Main Roads had adopted a standard grid location in the centre of the road formation, with the gate to the side on a by-pass.

By this time, the grids used in the eastern half of the State included light steel tramway rails resting on steel beams, with either timber or concrete abutments. In the west, where the cost of transporting the steel rails would be excessive, all-timber and timber-pipe versions were built.

In March, 1932, after a study of the legal authority covering the erection of existing "by-passes", Divisional Engineers were requested

"to arrange with Councils for the erection by landholders of by-passes at gates not netted or for the entire removal of gates, especially if unauthorised;" and

"to ascertain the authority for the erection of netted gates, and as to their necessity, with a view to recommending appropriate action".

This advice was largely annulled by a circular sent to Councils in October, 1932. This gave Councils general power to approve the erection of additional gates across main roads, without prior approval of the Department, following reports of a large influx of rabbits from western areas.

Width of Grids and Stock Races

For the next 20 years until the mid-50's motor grids (usually only 3 metres wide) were in general use on unsealed roads, at both boundary and internal property fences, in the Western area of New South Wales. The more populated areas of the State saw the removal of many grids from main roads during this period or their widening to 6 metres.

It had been a practise of some landholders in the western areas to replace the grid with a stock race, if the grid had become silted up, or had been removed for any reason.

Stock races were formed by the erection of short lengths of fencing along each side of the road, at the point where the property fences intersected it. They were also usually little more than 3 metres wide, with objects such as tins and bunting hung from them to frighten stock away. Some landholders even erected painted effigies of dogs near the races for the same purpose. Although these stock races seem primitive, they were reasonably effective in discouraging the movement of stock through the openings and were generally satisfactory to graziers, pending the erection of new grids.

By the mid-1950's, however, the Department had commenced a programme of reconstruction and sealing of the main roads system in the Western Division. Wider grids were specified, and grids on sealed roads were limited to fences at property boundaries. This was the first stage in the goal of eliminating grids from all main roads where a bituminous surface had been or was going to be provided. Stock races were permitted at internal fence crossings only, but had to be 1·2 metres wider than the bitumen seal.

As the sealing of roads continued, opposition to the requirements for wide stock races grew, particularly as many graziers did not consider them to be as effective as the earlier gates.

In 1969, the erection of grids was permitted on Western Division roads at locations other than at boundary fences, but they could only replace an existing stock race and their construction had to comply with the Department's current standards. Wide grids were considered no more hazardous than races of the same width.

Cost and Maintenance

Because the erection of grids releases the landowner from the obligation of fencing the road, the cost of the grid has always been borne by him. Where a grid has needed relocation because of new work being undertaken on the road, the Department has allowed the cost of relocation as a charge against the roadwork, with steelwork in some instances, being supplied by the landowner. Until 1972, the construction and maintenance of the approaches to the grid were shared by Department and Council. Approaches are now in most cases principally the Department's expense.

The policy on grids has become strongly defined to ensure that modern 7·3 m wide grids replace the old narrow variety as soon as possible and, with the exception of the Western Division, no additional grids are being constructed on the Main Roads System. Instead, the Department maintains a policy of encouraging landowners to fence roads and thus eliminate entirely the need for gates and grids on public roads, while at the same time alleviating the danger which arises from stock wandering onto roads which are not bordered by fences.

For the record, there are, at present, 116 grids on State Highways, 321 grids on Trunk Roads and 574 grids on Main Roads in New South Wales. No gates (other than at railway level crossings and tick gates) remain on these roads, except 21 on Main Roads in the far western areas of the State.

Vee-Gutters

In its first Annual Report for 1925–26 the Main Roads Board stated that it wished "*to draw special public attention, and especially the attention of councils and their engineers, to the fact that the vee-gutters or open causeway, which it has been customary in the past to construct upon roads, is a very undesirable feature to have upon a road. Before the motor vehicle became the ordinary means of travel, this type of structure, although often very inconvenient to drivers of buggies and sulkies, carts and lorries, was not a serious danger; but with the advent of fast motor traffic, what was a passive inconvenience has now become an active danger*".

The undesirability of the vee-gutters was obvious to all who travelled in motorised vehicles at this time. Travel at anything but the lowest speed over the gutters was dangerous and took a heavy toll on vehicle springs and tyres.

The "*active danger*" of these gutters was commented on as early as 1905 when the Sydney Mail's "motoring" correspondent described conditions on one of the earliest Melbourne–Sydney reliability trials.

With a stretch of apparently excellent road before you, you found yourself suddenly bumped into a young chasm made to obviate the cost of a culvert, and as you rubbed your jarred elbows, took stock of split seats, and listened apprehensively to discover whether engine, tyres, or springs had been crippled, you wished that the road authorities were aboard with you to eat of their own pudding. What might easily be done would be to reduce the sides of the V's from their present grades of sometimes one in three or four to very easy grades, and to paint a fence, post, or a tree-trunk alongside red, by way of indicating the invisible dip.

The Main Roads Board agreed that vee-gutters should be replaced by a substitute form of construction (such as a pipe culvert), urged Councils to eliminate them and offered in every such case to share the expense. As a further incentive, the Board took the "adventurous" step of announcing that it was "*prepared to give a reward of* £1,000 *to the first country shire council which can show that there is not one vee-gutter or open causeway left upon its main roads upon condition that the* £1,000 *is to be spent upon some approved work upon one of the council's main roads. This offer is, of course, limited to country shire councils for obvious reasons.*"

Unfortunately, up to the abolition of the Board in 1932, no Council had claimed this reward.

The Present

Such impediments as gates, grids, and vee-gutters, no longer cause delays or inconvenience to travellers using most rural roads in New South Wales. Those which do remain, particularly in the Western Division of the State, are gradually diminishing in number.

From every point of view, gates, grids, and vee-gutters are an archaic hangover from the past and they are slowly but surely disappearing from our roads.●

Earlier articles on gates, grids and motor by-passes have appeared in the following issues of "Main Roads."

March 1930, Vol. 1, No. 6, pp. 138–39.
May 1935, Vol. 6, No. 3, pp. 66–68.
February 1937, Vol. 8, No. 2, pp. 78–79.
September 1953, Vol. 19, No. 1, pp. 2–3.

1975 A TIME OF FREEWAYS

The following article originated as a paper written for presentation at the 2nd International Environmental Conference, Sydney on 2nd July, 1975 by the Commissioner for Main Roads, Mr A. F. Schmidt, B.E., F.I.E.(Aust.), F.C.I.T. The paper was then entitled "Main Roads and Freeways in Relation to Urban Planning".

THE CONTINUING NEED FOR BETTER ROADS

One of the major changes that have occurred in the twentieth century has been the increase in personal mobility due to the advent of the motor car. Prior to this, the expansion of railways in the nineteenth century enabled the movement of people and goods over longer distances mainly in rural areas and between defined terminals but short journeys in areas where there were no railways were still covered either on foot or by use of the horse. People then accepted that there were physical difficulties facing them in transporting themselves and their goods.

Such difficulties no longer are accepted by most people in developed countries these days who have come to expect or even demand to have the means of easy and ready travel almost wherever the whim takes them and certainly on the shorter trips in the general vicinity of their homes. This expectance, for better or worse, has generally involved ownership of a motor car and the right to use it anywhere and anytime with a maximum of speed and a minimum of inconvenience to themselves. This attitude does not show any tendency to diminish in the community despite an increasing awareness of the adverse effects of indiscriminate use of the motor car such as possible inefficient use of scarce resources, noise, pollution, accidents; in general the effect on the environment, society, and the economy.

There has grown up a strongly pro-public transport lobby with the objects, it appears, of encouraging the use of public transport on the one hand and on the other hand, of reducing or preventing the use of the private motor vehicle. Because of the practical difficulties in improving public transport in the short term to attract sufficient patronage, both of people and goods, the lobby has had to concentrate mainly on the negative aspect in opposing the improvement of road facilities, particularly the construction of freeways and other arterial roads in the inner urban areas. Though loudly vocal they are short on vocabulary and present little evidence of a balanced or logical approach aligned with genuine community interests.

Railways are ideal for the movement of large numbers of people and quantities of goods between predetermined points. These terminal points, however, are not always conveniently located in relation to personal needs and rarely so for the effective movement of goods or provisions of services. There is thus a need for subsidiary transport at one or both ends of the rail journey and with the attendant parking and transfer problems at the terminals, many people and most goods shippers prefer to use a form of transport which does not require intermediate changes. This almost invariably involves a vehicle operated on a public road, be it private motor car, bus, taxi, light truck or large semi-trailer.

It is claimed that improved parking and transfer facilities will reduce this cause of commuter resistance and the experience on the Eastern Suburbs railway in Sydney where such facilities will be provided, will be watched with interest. The need for similar facilities at many points in the Sydney metropolitan areas was, of course, brought out strongly in the recently completed Sydney Area Transportation Study. Rather similarly in respect to goods, there probably could be developed a system for the consolidation of deliveries to central urban areas in an attempt to reduce the considerable amount of commercial traffic that moves about the city.

The public, however, is now so completely accustomed to the independence and convenience of the motor vehicle that a radical change in the proportionate usage of the various modes of transport seems unlikely in the forseeable future. It may be that in due course the internal combustion engine will be replaced by some other means of propulsion but the personally owned and controlled transport vehicle will be with us for a long time and people will expect to be able to use it until a completely satisfactory alternative system has been perfected and then *accepted* as such by the public.

Unless there is a major Government decision to negate by legislation the obviously continuing demand by the community for the private motor vehicle, there seems no doubt that there is warrant on both economic and environmental grounds for the improvement of the network. This judgment is supported by the fact that the volume of traffic on urban roads is increasing at a faster rate than the growth in population. Therefore in order to satisfy the general community and to provide for its wishes, it is essential adequate new roads be constructed to cope with the current and projected future needs. Only the form and nature of the improved network are matters for conjecture and planning.

Obviously the foregoing remarks are an over-simplification of the total situation and are susceptible to argument, debate, expansion, etc. but they are set forth as a brief outline of the dilemma facing Governments and Road Authorities in their efforts to serve the community in the face of constant criticism and opposition by vocal minority groups.

TRANSPORTATION STUDIES AS A BASIS FOR PLANNING ROADS

Planning for roads, and indeed transportation planning in general, cannot be considered as an isolated exercise but must be regarded as an overall planning and decision-making process aimed at the improvement of the way of life. Any alteration in one community activity can have effect in several adjacent areas and there must therefore be co-ordination at the highest level. In particular, land use planning and transportation planning should be conducted as a joint enterprise with adequate feedback and cross fertilization between the two at all stages. It is not difficult to imagine the problems of marrying a new transportation system to a well established and dispersed city like Sydney even without recognizing the topographical constraints.

The need for this interrelationship identifies one of the major problems of transportation planning. While it may be relatively simple to control the provision of (but not necessarily the need for) new transportation facilities in an urban area, there is little effective control of the places where people will choose to live and work. Governments, being democratic institutions representative of the people, bend to pressure over time. This pressure can be from sectional interests, community groups and so on but if sustained long enough and with enough publicity will very often win out. The gradual erosion of the green belt established in the County of Cumberland Planning Scheme of 1951 is a prime example. The release of this land without prior provision of the necessary transport facilities has resulted in many of the problems of workers living in the northern and western suburbs of Sydney today.

Much has been made of the need to reduce the distance between home and job opportunities. The achievement of this desire may take one of two principal forms—moving the factories, heavy industry and major commercial and office developments into or closer to the residential suburbs or moving residents of outer suburbs closer to the factories. Irrespective of which of these methods is adopted there will be opposition and outcry from a large portion of the community. That many people do not want to live near industrial

zones is borne out by the distances and inconvenience commuters are prepared to tolerate daily to live in a 'less urban' area. Thus some form of complusion would almost certainly be required to achieve this aim and it would be a brave government indeed which tried to impose such controls.

Long term predictions of future trends are a necessary adjunct to determining the appropriate means for the mass movement of people and goods in large urban areas and years of planning, design and construction are needed before a major transportation project of any mode can be brought into use. In an endeavour to assist the responsible authorities in this regard a number of governments have commissioned transportation studies at considerable expenditure of funds and skilled manpower, both of which are in short supply. That these studies have deficiencies is beyond question and there are many examples where the decisions, recommendations, proposals, guidelines or what have you, have proved to be arguable to say the least.

The studies have been based on collected data representative of present day conditions from which projections are made of future requirements according to past experience and anticipated changes in technology, living standards, employment patterns, land use patterns and so on. Forecasting community changes of this nature is a very hazardous occupation and wise men refrain from being too positive. Consequently studies must remain constantly under review so that appropriate adjustments can be made with careful attention to short-term as well as long-term needs.

Criticism has been levelled at studies in that the planned projects advocated over the years by the various transport authorities have been seen by the Study Group as desirable. It must be remembered that those projects are not merely the whims of one or two capricious despots but are the considered opinions of professional planners in the authorities. Over the years changes in staff occur and new ideas and thoughts are brought to bear. Fresh data is constantly being accumulated and evaluated, attempts are made to take into account community preferences and the effects on social and environmental aspects are assessed (perhaps somewhat informally in the past). All the expertise available within the authorities then produces a plan which would be compatible with desirable future development. Is it then so surprising that these plans are often endorsed in detailed formal studies?

Generally speaking the land-use plan in the major part of the Sydney Metropolitan Area is fixed and, because of protection over a period of 25 years, so also are the main transportation corridors. By and large we are stuck with these and it is left to us merely to devise the best way of developing them.

Another criticism of the past studies is the lack of community involvement which over the last few years has been seen as an essential ingredient in planning for the future. It is now generally admitted that community representation will be a major component in the preparation of future proposals for land use and transportation planning. Public participation, if properly controlled, may be of value but no doubt will at the same time introduce some problems. Not the least of these will be the delays likely to occur in attempting to reconcile the many conflicting viewpoints which are sure to arise. Will the dis-benefits and high costs of the enforced delays erode the benefits likely to accrue?

It is not the place of a paper of this nature to enter into detailed discussion of this aspect but the following comment appears relevant. Public involvement in overall planning will help the experts escape from much of the criticism which arises if decisions are ultimately proved unsuitable but is it likely that public groups or individuals, however well meaning, are more competent to plan conditions for the next generation than professional planners were a generation ago? In other words are we really going to get anywhere?

Notwithstanding its shortcomings, the transportation study, formal as in the Sydney Area Transportation Study or informal as the ongoing process within the transportation authorities, appears to be the best that is available in a practical form with the present state of the art. The overall development of main roads and freeways in urban areas must therefore be based on and guided by such studies.

OPTIMUM ROAD USAGE

A considerable proportion of an urban area is given over to roads and footways. The percentage varies but can be as high as 25 per cent in inner suburbs, dropping to about 10 per cent in the outer residential areas. It is obvious therefore that in managing such a large area of real estate, careful planning is necessary to ensure that it is used to its greatest benefit. By optimizing and balancing the road network, savings in space taken up by roads can be achieved.

For the purpose of the following discussion it is desirable to define briefly the types of roads making up the urban network.

- ☆ *Arterial.* Those roads whose main function is to serve as the principal arteries for massive through traffic movement. This group would include freeways.
- ☆ *Sub-arterial.* Roads which supplement the arterials in providing for through traffic movements and forming a link between arterial and district systems.
- ☆ *Feeder and Local.* Roads which feed and accept traffic from the arterial and sub-arterial systems in providing access to primarily residential areas.

A major deficiency in the existing urban road structure in Australian cities is the shortfall in roads of arterial and sub-arterial classifications. This leads to the use of local roads and streets by through traffic with the resultant congestion and damage to the environment. Travel on local streets in urban areas should be limited to the distance necessary to reach the nearest road of a higher classification with most of the travel being on such a road. In ideal situations only about 5 per cent of travel distance would be on local roads.

LOCAL ROADS

The benefits of removing all but the small volume of residential traffic from the local street system are obvious. There is reduced traffic noise and pollution, with less likelihood of accidents, especially involving young children and old people. The local road system can quite adequately cater for its only remaining function, that of getting residents to and from their homes or work. In an existing street system this means that many streets can be converted into cul-de-sacs, or altered into pedestrian malls or recreational spaces. In new residential developments the area taken up by streets can be reduced by making them narrower but still capable of serving the purpose of carrying small volumes of low speed traffic. For that reason also, the streets can be blended in with the topography and other natural features, doing minimal damage to the pre-existing environment.

Local roads represent the least efficient use of resources when assessed on distances travelled over them. It has been estimated that the average local street represents a capital investment of 50 cents per vehicle kilometre per day with sub-arterials estimated on the same basis at about one cent and arterials at about three cents. Reduction in the quantity and standard of construction of local roads can obviously be justified on economic grounds but, of course, a service must be maintained even at a cost to the community.

SUB-ARTERIAL ROADS

Sub-arterial roads (usually Main or Secondary Roads in Sydney) have the ability to move large numbers of vehicles, subject to satisfactory traffic management. Such arrangements could include priority being given to traffic on those roads over that on less important side streets, clearway restrictions imposed at certain times of peak traffic flow, and co-ordination of traffic signals to progress platoons of traffic along the road.

The introduction of clearways has a disruptive affect on the adjacent business, commercial and residential activities and is not always popular with local people. However, the parking of vehicles on major surface roads (i.e. other than freeways) prevents the use of a significant portion of the road pavement for its primary intended purpose—that of the passage of vehicles along it. As an example, the common 20 metre wide road reserve is wide enough to contain two footways and four traffic lanes but has its capacity about halved if vehicles are parked at random in the kerbside lanes. As these lanes would be used frequently by fully laden vehicles and buses, the construction technique for the kerbside lanes is of necessity the same as that for the centre lanes and therefore an expensive asset is not being fully utilized.

Planning and traffic authorities are now generally agreed that, other than in the central business district, there is a need to provide sufficient off-street parking facilities in new or re-development schemes to cater for the traffic generated by the scheme. This concept establishes in a developer the responsibility to contribute directly to at least part of the community costs associated with the development. The level of parking provision required by the various local authorities varies according to local conditions having regard to the standards applied to residential, commercial and industrial land uses. The decisions are influenced by local variations in the extent of car ownership, accessibility to public transport, and the scarcity of land for parking.

In the central business district, the desirability of additional off-street parking is not a simple question to decide. It is maintained that off-street parking encourages more people to bring their private vehicles into the area whereas they should be required to leave them elsewhere and use public transport to the central business district. Whether reduced parking facilities would have this result or just add to the problems in the city streets seems to be a matter yet to be resolved in a practical way.

With all these traffic management measures for major surface roads, it still leaves a frustrating stop-go trip at most times and particularly in peak hours. The temptation is there for motorists to avoid these roads and make use of local roads through adjacent suburbs, which is something to be discouraged and which indeed causes considerable heart-burning in many inner suburban areas. There usually are adverse side effects from even such simple changes as erection of traffic lights or a "Stop" sign.

ARTERIAL ROADS

At the other end of the scale, arterial roads (including freeways) are unquestionably the most efficient streets in terms of traffic movement. Operating speeds are higher, resulting in a reduction in the user costs of trucks, buses and other vehicles. Time saved can be used for productive purposes, or for leisure. The safety records of freeways conclusively establish that the higher operating speeds do not lead to accidents as this form of road has a relatively low accident rate per million vehicle kilometres, the usual basis of measurement.

In another respect also, freeways have a clear though little-known advantage over other types of road. The cost of acquisition of land for freeways is often quoted as a disadvantage but in fact is frequently less than if existing main roads were widened to accommodate the same volume of traffic. This is because of the extensive development, often of a commercial nature, to be found along established roads, which renders it extremely expensive to widen the road reserve by even one or two metres whereas the location studies for a freeway strive to avoid the more highly developed (and hence costly) areas.

The routes of new freeways can be planned to cause the least disruption and inconvenience to the community and the environment that is reasonably practical. Road planners are very much aware of the need to preserve buildings and areas of cultural and historical value, together with the retention or expansion of parklands. Unfortunately, the high standards of design required for the safe use of the modern motor vehicle do not always allow the preservation of all that is desirable. The damage caused by roadworks to the natural and architectural heritage is looked upon with dismay by road planners and engineers and every effort is made to leave the completed freeway work in as attractive a condition as possible.

All areas not required for the actual road are grassed and landscaped while small surplus areas outside the freeway boundaries are similarly treated and the public is invited to use them for passive recreational purposes. Even people who most actively disagree with the construction of freeways must see some pleasing aspect in their finished appearance and, of course, we are learning more and more of these techniques as we go.

PLANNING FOR MAIN ROADS AND FREEWAYS

Determination of the standard and spacing of arterial and sub-arterial roads depends on the degree of development and the generation and orientation of traffic movements. In addition it depends on the extent of public transport available and the relative use of each mode. However as a general guide it may be taken that the assignment of traffic to a full freeway system varies between 40 and 60 per cent in large urban areas. Such a system would take up approximately one per cent of the urban area which is small considering the huge volume of traffic which will use it and the benefits which will result.

In an urban environment, the established development of the area is frequently such that planning for major surface roads is necessarily limited to an examination of the existing road network to determine those roads which will require improvement and upgrading to suit the present and projected traffic requirements as determined in a transportation study. Factors to be considered at this stage would include:

- The existing capacity and future requirements.
- The development along the route as it would affect any plans for widening and/or the implementation of traffic management techniques mentioned earlier.
- The effect of any proposed freeway construction. Main roads should supplement and complement a freeway system providing sufficient intersections for interconnection between the two.
- The cost of roadworks associated with the upgrading to the required standard. Such costs would include traffic light installation, intersection channelization, new or wider bridges or overpasses, property acquisition and restoration, as well as the actual road strengthening.
- The streets should have the quality of continuity for maximum traffic convenience and flow.

Within the range of normal operating conditions, the greater the capacity of through roads, the further apart they can be spaced. Thus, six lane roads can be spaced 50% further apart than four lane roads yet

(Left): Solutions to transportation problems in our society require co-operation and integration of planning between all transport authorities. It must be recognised that while improved railway services will hopefully encourage more travel by this means, nevertheless, in order to reach the railway station, many commutors in our sprawling urban society must first travel by road, either in private cars or in buses. Therefore, an efficient and well-designed road system has equal importance to good railways if the up-grading of travel standards is to occur. Similarly, associated facilities (such as extensive car parking areas at railway stations and frequent connecting bus services at covered waiting zones adjacent to stations) are of great importance to the improvement of commuting generally and in attracting more patrons to public transport.

(Right): Freeway construction means giant size roadworks. As a result the completed freeway frequently displays a wide strip of land in the roadside area which by careful landscaping and treeplanting is transformed into an environmental benefit.

only take about a third more actual roadway area. This process cannot be taken too far as an upper limit of efficiency is reached when the volume of traffic entering, leaving or crossing the route causes undue delays to both turning and through traffic. It must also be kept in mind that the purpose of this type of road is to remove traffic from local streets as soon as possible so a compromise between the various aspects is needed when determining the optimum spacing.

When planning freeways, however, the existing road network is not quite as important a consideration. The massive cost and scope of such roads requires that they be located to the maximum effect. This is not to say that existing conditions are ignored but just that the freeway system tends to over-ride many of the constraints involved in developing a major surface road scheme.

Guidelines for determining the economic spacing of freeways can be generalised as follows:

- If the cost of construction per kilometre rises, the freeways should be spaced further apart.
- If the cost of travel increases (e.g. vehicle and fuel costs, or the value of people's time), then it is better to build freeways closer together.
- The higher the speed of travel on surface roads, the further apart should freeways be spaced.
- If trips become longer on the average, freeways should be built closer together.
- Where the densities of vehicular trip-making are high, freeways should be spaced closer together.

It will be found, fortunately, that a well-balanced freeway system will give routes that are conveniently spaced from the land use point of view as well as satisfactory traffic volumes. In more densely populated areas, the segment enclosed by major roads (the spacing being determined by trip generation) will have a high population density so that a community of interest can exist within that segment. As the population density drops in the outer suburbs, so the segments enclosed increase in size still keeping an effective community within that area.

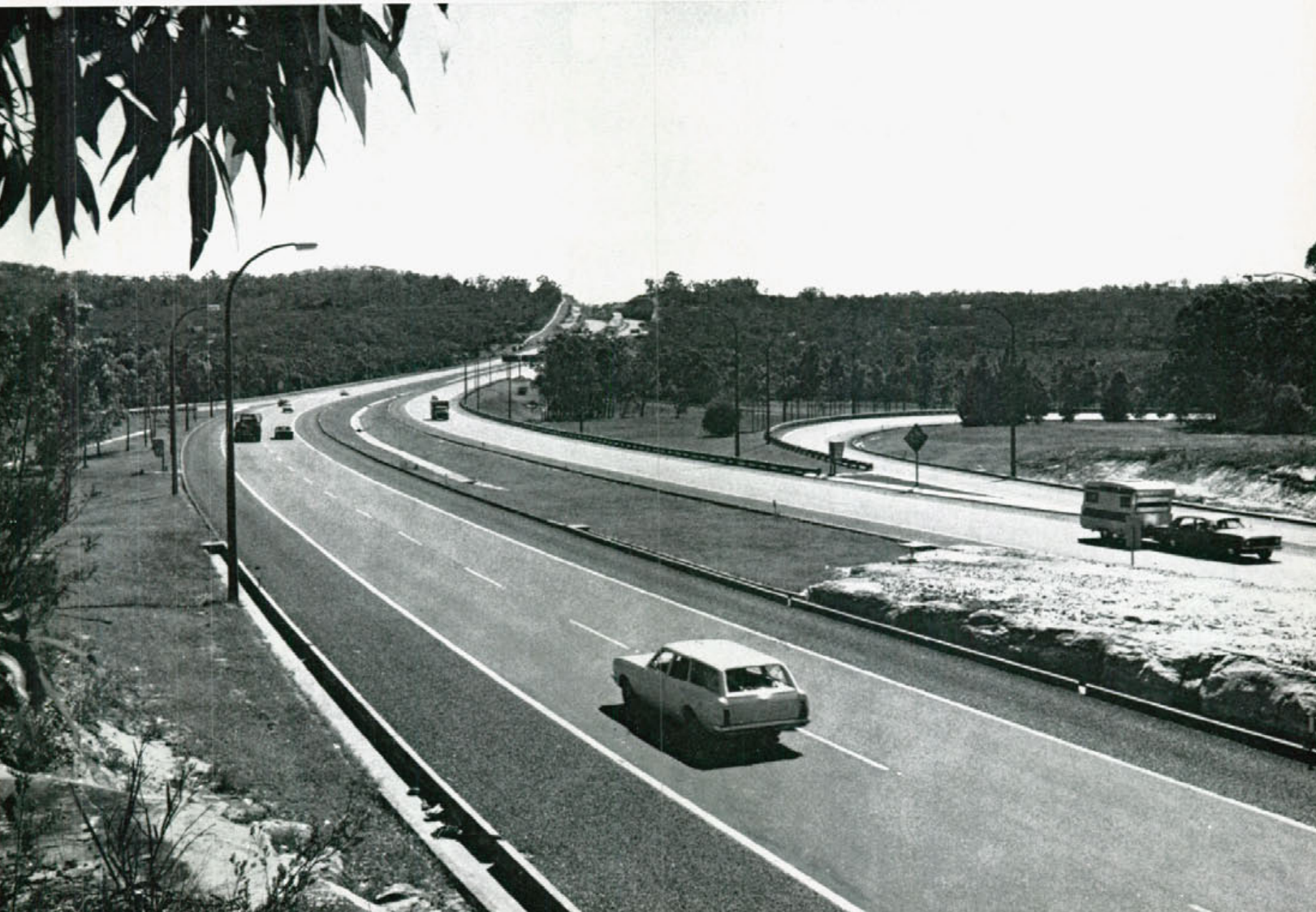
By proper planning of freeways, therefore, it is possible to minimize the effect on the population. Of course, if the freeways can be made to closely parallel other existing natural barriers, such as rivers, or man-made ones such as railways or major roads, the disturbance of the community is further reduced.

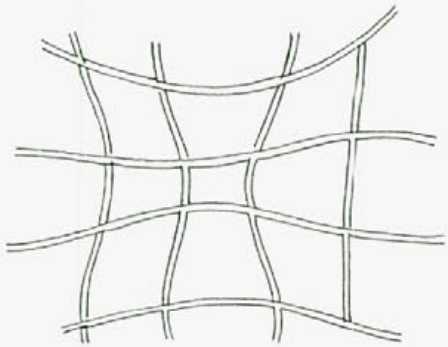
If a city or region were developed to a uniform density throughout, the most efficient freeway network layout would be the grid system. Simple four way interchanges are the most economical to construct, there is continuity on all routes, and the investment in the system is evenly distributed to serve the public. All this is achieved with a minimum length of roadway.

Unfortunately, few cities have such an ideal uniform distribution of development. The usual city has a very dense city centre with gradual diminution as the distance from the centre increases so that the spacing of freeways should gradually increase outwards. This naturally leads to the ring-and-radial system but with the disadvantage that this system tends to concentrate traffic at the core which is very often least able to accept it. A frequent proposal to overcome this defect is to terminate the radials at a ring road on the outskirts of the central business district and feed the traffic into the local road system. A problem which then arises is that the innermost ring road tends to become over-crowded by those who want to go to the centre plus those who wish to cross to the other side of the city.

As a compromise between the two, the "warped" grid has been devised. In this figure (page 126), the roads are pulled closer together in regions of high density giving optimum spacing according to density while preserving continuity and near right angle intersections. The warped grid is not a rigid figure but can be adapted to each local situation.

However, it is rarely the case that these schemes can be adopted without interference from natural barriers, such as rivers, bays, coastlines, or man-made barriers, such as existing railways, major buildings, historical sites. These often grossly distort the situation so that the final layout bears little resemblance to any of the stylised schemes referred to previously. In such cases the design obviously must be the best considering all the circumstances, weighing up the relative economies





Warped grid

of the various engineering solutions against the social and environmental consequences of the alternatives. It is not that many years ago that the importance of the economic factor would have been the major consideration but public involvement and feeling is now such that economics are now no longer dominant. This is not of itself a bad thing provided decisions are reached in the light of a proper understanding of all the community benefits and disadvantages and in an objective fully informed fashion. However, the rapidly changing community attitudes towards environmental considerations pose a most difficult problem in planning projects which take many years to come to fruition. Sometimes the only decision acceptable is not to make a decision at all and to allow chaotic conditions to finally force the issue at considerably greater cost and disturbance. The eventual cost of not doing something can be astronomical both in economic terms and in terms of physical stress and frustration in the community.

DECISIONS NOW

An efficient transport system is essential if urban society *as we know it* is to continue to grow and to improve in quality. Without such a system, the costs, delays and frustrations in moving people and goods will become intolerable and must lead to a deterioration in living standards. It is possible technological advances or resource shortages will force a change in our society which in turn could alter the need for and/or the type of transport system but it must be remembered that people tend to be conservative and will not readily accept change. Thus it is not unreasonable to plan for a future at least somewhat similar to the present. Future generations may enjoy new advanced types of transport but why should the present generation suffer indignity and inconvenience in the meantime?

Roads are an essential part of a balanced transportation network for use by public transport, goods vehicles and the private car. They allow far more flexibility than other types of transport but, between fixed terminals, are less efficient movers of masses of people and large volumes of goods than are railways and similar forms of transport. Road vehicles complement railways in providing feeder services to terminals as well as allowing for those movements for which the railways cannot effectively cater.

Once it is accepted that there is and will continue to be a place for road vehicles in the urban transport sphere then it is necessary to consider the form that the road system should take. A network comprising a balanced proportion of the various road categories can most efficiently provide the required traffic capacity with the suburban streets carrying only local residential traffic and by far the greater percentage using main roads and freeways. The freeway is the most efficient type of road and can carry large volumes of traffic with safety, economy and at comparatively high speeds.

Planning for freeways involves a set of guidelines and concepts for use in laying out the system. However, the terrain and development of the area usually requires the modification of the more idealized schemes so that each overall layout is unique to the urban area to which it applies. Building freeways does change the nature of an urban area, benefiting some but imposing a cost on others and the final choice must take into account the social and environmental consequences as well as engineering and economic considerations. There is no pure economic criterion for determining the advantages and disadvantages and some argument will always ensue. Similarly there is no simple criterion for determining for *all* people whether a change is for better or for worse, subject judgments usually are valueless.

Decisions on construction of major roads have, however, to be made at some stage otherwise the urban framework as we know it will cease to function efficiently. These decisions must be made by the elected representatives of the people or their servants in the light of all the information available and having regard to all the consequences. Once these decisions are made, changing them will prove costly and will seriously affect related planning which rely on these works.●

To inform the public of freeway proposals the Department staged a freeway exhibition at Head Office two years ago and frequently includes models of freeways and information about works-in-progress and completed works in regular displays at country shows and at the Sydney Royal Easter Show.

NEW STUDY OF ROAD TRANSPORT COSTS

A National Look at Vehicle Limits

Over the past 18 months, the National Association of Australian State Road Authorities has been conducting a nation-wide study to enable limits on road vehicle dimensions and loads to be assessed more objectively.

The prime aim of the study is to provide a means of determining the most appropriate legal limits for road vehicles which could be applied nationally or in particular regions. The study has been considering all the consequences of varying such limits, so that an optimum balance can be achieved between the advantages to the community from changes in the limits and the full cost to the community of providing for those changes. As about 20% of the gross domestic product is expended on transport, the study will be of immense value, even if it results in an economy of only a few per cent off the total Australian road transportation bill.

The Study Team, consisting of personnel experienced in transport planning, structures, economics, and systems analysis, has planned and executed the study under the direction of a Steering Committee. On this Committee are representatives from the Association, the Australian Road Research Board, the Australian Road Transport Federation, the Bureau of Transport Economics and the Commonwealth Bureau of Roads.

Collection of Data

Although the bulk of the data for this study has been obtained from the State Road Authorities, members of the Study Team have been responsible for approaching people in the transport industry, seeking their help in supplying information, learning their views on various aspects of road transport and encouraging them to make submissions on matters associated with the study.

The survey is wide ranging and has been looking into the many areas which directly or indirectly, either affect or are affected by any changes in the limitations currently imposed on loads carried along over roads system.

The principal factors considered are:

- vehicle operating costs (which comprise those charges met directly by the haulier, excluding taxes);
- road and bridge construction and maintenance costs;
- the limitation of finances made available for roadworks;
- the enforcement of limits (the effectiveness of vehicle limits being directly related to the intensity with which they are policed and the consequences of detection);
- the uniformity of limits throughout the Commonwealth;
- road safety, (taking into account any evidence of road accident involvement and cost being related to vehicle size and weight);
- special needs of transport users, (such as exemptions for the movement of specific oversize or overweight loads);
- the impact on the environment (such as the effect on people and places of noise, fumes, and vibrations);
- the possible economic effect on other transport modes;
- the community demand for efficient and reasonably priced facilities for the transport of goods, and
- possible future trends.

Preliminary Results

Of the wealth of information already collected by the Study Team, the field surveys in particular have revealed in detail many aspects of the operation of heavy commercial vehicles which were formerly poorly understood. The extent of overloading and general abuse of the weight and dimensional regulations has been found to be considerable and occurs in all States.

The Study Team's enquiries, revealed a strong desire for official consistency, and, where possible, uniformity, in the specification, interpretation and enforcement of the regulations covering vehicle limits throughout Australian States and Territories. It was seen that present variations in limits between States result in:

- increased manufacturing costs for the haulage fleet;
- complexity in basic units and spare parts in what is, by world standards, a relatively small heavy commercial vehicle market;
- loss in productivity of vehicles currently being used in Australia through the inability to utilise available loading capabilities to the full; and
- unnecessary complications introduced by the variable specification and interpretation of State regulations.

The submissions received by the Study Team have also drawn attention to other problems and anomalies in the current specification and application of regulations, with accompanying supporting information and suggestions for improvements.

From preliminary results it is not feasible to predict the overall result of the economic analysis in the study. Already, however, certain features are evident. It is obvious that the present load bearing capacity of roads will be a major factor in establishing an upper limit to gross vehicle weight. There is a possibility that the study could lead to higher structural design standards for future roadworks.

The present standard of some routes and the high volume of traffic which they carry make it reasonable for higher limits to be tolerated on them than elsewhere. Higher weight limits could conceivably be justified in more closely settled areas than in sparsely developed areas. However, the reverse may well apply to dimensional limits.

The results of the study are to be received by NAASRA at the end of this year, after which recommendations based on the outcome will be put to Federal and State Transport Ministers. As far as is known, this is the first time that weights of loads and associated problems have been examined in such depth. Because of this, the study has attracted widespread interest throughout Australia and overseas and its results and recommendations are awaited with great interest.●

Recent articles appearing in "Main Roads" on this subject include:

- "Weight Watching—A Matter for Concern". —September, 1972 issue (Vol. 38 No. 1) p. 8.
- "Vehicle Load Limits on Australian Roads". —December, 1971 issue (Vol. 37, No. 2) pp. 59–62.

A limited number of copies of two leaflets outlining this study, and explaining the concepts and procedures, are still available from the Department's Public Relations Section, Third Floor, Head Office.

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 3 months ended 31st March, 1975.

Road No.	Works or Service	Name of Successful Tenderer	Amount
			$
State Highway No. 2	Hume Highway. City of Goulburn. Construction of new bridge over Main Southern Railway at North Goulburn.	Transbridge Pty Ltd	336,674.40
State Highway No. 2	Hume Highway. City of Goulburn. Construction of new bridge over Crookwell Railway line north of Goulburn.	Transbridge Pty Ltd	143,578.90
State Highway No. 9	New England Highway. City of Maitland. Supply and delivery of up to 2,350 tonnes of 10 mm dense graded asphaltic concrete with R90 binder to construction of dual carriageways from 23·35 km to 25·92 km west of Newcastle.	Bitupave Ltd	38,728.00
State Highway No. 10	Pacific Highway. Shire of Lake Macquarie. Supply and delivery of up to 2,700 tonnes of 10 mm dense graded plant mix with tar binder for construction of dual carriageways between Robert and Naru Streets, South Belmont.	Albion Reid Pty Ltd	48,411.00
State Highway No. 10	Pacific Highway. Shire of Hastings. Demolition of old steel and timber bridge over the Wilson River at Telegraph Point.	M. A. Wenzel	27,600.00
Main Road No. 309	City of Parramatta. Construction of Crib Block Retaining Wall at Ramp "F" in accordance with Specification 0309.354MW.3073.	Knapen Industries Pty Ltd	39,506.00
County Road No. 5037	City of Parramatta. Construction of new bridge over Hunts Creek at North Parramatta.	Leewil Constructions Pty Ltd	182,789.40
Alpine Way Guthega Road Olsen's Lookout Road	Kosciusko National Park. Loading, hauling and tipping of 9 936 cubic metres of road pavement material for work on Kosciusko National Park Roads.	J. H. & N. E. Hillier	20,915.00
Various	Municipality of Hurstville. Asphaltic concrete in connection with Maintenance and Improvement Programme.	Bitupave Ltd and Emoleum (Aust.) Pty Ltd	22,181.30
Various	Pacific and Gwydir Highways. Supply, heat haul and spray of R90 bitumen.	Shorncliffe Pty Ltd	23,539.00
Various	Pacific and Gwydir Highways. Supply, heat haul and spray of R90 bitumen.	Albion Reid Pty Ltd	49,985.00

TENDERS ACCEPTED BY COUNCILS

The following tenders (in excess of $20,000) for road and bridge works were accepted by Councils for the 3 months ended 31st March, 1975

Council	Road No.	Works or Services	Name of Successful Tenderer	Amount
				$
Barraba	T.R. 63	Construction of a 4 x 10·7 metre span concrete bridge over Sheepstation Creek at Cobbadah—18·5 km north of Barraba.	Emoh Ruo Pty Ltd	56,411.30
Bibbenluke	S.H. 19	Reconstruction to subgrade level between 26·7 km and 28·3 km south of Bombala.	Monaro Road Construction Pty Ltd	87,862.26
Macintyre	M.R. 137	Construction of bridge over Swanbrook Creek at 5·6 km north of Inverell.	Emoh Ruo Construction Pty Ltd	105,907.00
Walgett	T.R. 68	Supply and delivery of concrete	Herbert Bros. Pty Ltd	23,000.00
Warren	Various	Bitumen surfacing in connection with the Trunk and Ordinary Main Roads Maintenance and Improvement Programme.	Shorncliffe Pty Ltd	42,530.41
Wingecarribee	M.R. 260	Construction of approaches to bridge over Wingecarribee River at Bong Bong 11·27 km south of S.H. No. 2 at Mittagong.	J. W. Beaumont	142,269.00

D. WEST, GOVERNMENT PRINTER

Soaring against the sky, this bridge pier at Gundagai is one of 26 constructed for the new bridgeworks over the Murrumbidgee River.

It stands as an impressive symbol of the Department's current progress on road and bridge construction projects, which in the near future will constitute valuable additions to the State's road communications network.

Other major works **under construction** at present include: the Waterfall–Bulli Pass Tollwork; several new sections of the South Western Freeway between Kenny Hill and the Nepean River at Menangle, between Aylmerton and Yerrinbool and the continuation to Yanderra; the Western Freeway between Homebush and Clyde; an extension to the Warringah Freeway from Cammeray to Willoughby Road, Naremburn; a new 624 metre long bridge at Bega over the Bega River; three bridges and a deviation of the Hume Highway at Goulburn.

Proposals for **future works** on the State's main roads include a new flood-free bridge at Narrabri on the Newell Highway; the Wollongong Northern Suburbs Distributor; at Abbotsford, a new bridge over the Parramatta River; new bridges over the Shoalhaven River at Nowra, over Swansea Channel at Swansea and over the Clarence River at Grafton; and commencement of work on the the Eastern Suburbs Distributor.

DEPARTMENT OF MAIN ROADS
DMR
NEW SOUTH WALES