1960–61

VICTORIA

COUNTRY ROADS BOARD

FORTY-SEVENTH ANNUAL REPORT

FOR YEAR ENDED 30TH JUNE, 1960

PRESENTED TO BOTH HOUSES OF PARLIAMENT PURSUANT TO ACT No. 6229.

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FRONTISPIECE: Overpass in Flinders-street—Portion of Kings Bridge Project.

[**COVER:** Re-aligned and widened section of Hume Highway at Greens Pinch north of Kilmore.]

COUNTRY ROADS BOARD

FORTY-SEVENTH ANNUAL REPORT, 1959-60

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COUNTRY ROADS BOARD

FORTY-SEVENTH ANNUAL REPORT

Exhibition Building,
Carlton, N.3,
21st November, 1960.

The Honorable Sir Thomas Maltby, E.D., M.L.A.,
Minister of Public Works,
State Public Offices,
Melbourne, C.2.

SIR,

In accordance with the requirements of Section 128 of the *Country Roads Act* 1958, No. 6229, the Board has the honour to submit to you for presentation to Parliament a report of its proceedings for the year ended 30th June, 1960.

1. EXTENSION OF CLASSIFIED ROAD SYSTEM.

Throughout the State year by year an ever enlarging programme of work is undertaken, chiefly under the Board's jurisdiction, in maintenance, improvement and development of roads, streets and bridges to serve community requirements of transport and communications. Compared with the Board's detailed surveys of the deficiencies and needs the effort being made is admittedly much too small. However, with some statutory improvement in recent years in the basis of motor registration fees, in the application of certain commercial vehicle taxes to meet road maintenance costs, and in the distribution of Federal Aid Roads funds the shortage has been reducing expressed as a proportion of the yearly effort. After maintenance has been provided for each year a greater proportion of improvements and new work has been possible. Up and down the road system this has indeed been evident, not so much in spectacular works in any one locality as in a widespread betterment of the quality of service both in rural and urban areas, and this notwithstanding such a rate of growth of traffic as might quite fairly be termed " spectacular ".

After reviewing the many factors involved, the Board recommended the transfer of certain main roads to the category of State highways and in a few cases in the classification of tourists' or forest roads, and the declaration of a limited mileage of roads in urban areas as State highways or main roads.

These changes and new declarations provide—

(*a*) 628 miles of additional State highways in rural areas,

(*b*) 20 miles of additional State highways in provincial cities,

(*c*) 16 miles of additional State highways in the Metropolitan Master Plan area,

(*d*) 82·2 miles of additional main roads in the Metropolitan Master Plan area and 3·8 miles in provincial cities,

(*e*) 13·7 miles of additional tourists' road,

(*f*) 34 miles of additional forest road,

(*g*) 674 miles of existing main roads included in the above with amended classification.

The roads concerned appear in Schedules 1 to 3 on pages 7 to 12 of this Report.

It will be noted that it is some of the more important main roads which carry heavy traffic between important centres that are being advanced to the status of State highways. Existing State highways are being extended into and through the centres of the provincial cities of Geelong, Ballarat and Bendigo and further into the metropolitan area. Increased traffic volumes warranted certain of the most important urban roads in the metropolitan area becoming part of the declared main road system. Only a limited mileage of these roads could, however, be included in the present proposals. The Board's finances are insufficient to allow the general declaration of additional main roads in rural areas as yet. However, the most important unclassified rural roads are, in fact, being progressively improved utilizing grants to councils made on a contributory basis from that portion of the Commonwealth Aid (40 per cent.) which must not be spent on main roads and State highways.

Within the limits of the funds available, improvements will be gradually accelerated on the newly declared State highways. Better facilities will be provided on the heavily trafficked urban roads which become the Board's main roads. Unfortunately, existing responsibilities will not allow extensive improvement of the newly declared roads in the form of heavy construction works. Progressive improvement of the roads concerned, together with a somewhat increased construction programme, is intended.

The Licola Road leading from a large timber extraction area to the sawmill and railhead at Heyfield in the Shire of Maffra, previously a main road, has been proclaimed a forest road. The Mount Dandenong Road between Montrose and Olinda in Lillydale Shire and the Olinda Road in Ferntree Gully Shire which were also main roads have been proclaimed the "Mount Dandenong" tourists' road, a classification which its popularity with metropolitan residents and interstate or overseas visitors well merits.

The Board bears the full cost of works necessary to provide for through traffic on State highways, tourists' roads and forest roads, and bears not less than two-thirds of the expenditure from the Country Roads Board Fund in respect of similar works on main roads. The estimated additional financial burden on the Board due to the changes and extensions in the declared road network is £300,000 in 1960–61 and £550,000 in 1961–62. The consequent variations in the mileages of roads in the Board's jurisdiction are shown in Table 1.

TABLE 1.—COUNTRY ROADS BOARD ROADS.

	1959–60.	1960–61.
	miles.	miles.
State highways	3,845	4,509
Main roads	9,751	9,163
Tourists' roads	417	430
Forest roads	378	412
Total	14,391	14,514

On the newly declared roads municipal councils will still retain their responsibility of providing for service roads, excess widths of roadway, parking space, beautification and maintenance of median and dividing strips, lighting, sweeping, underground stormwater drainage, &c., as in the case of existing Country Roads Board roads.

SCHEDULE 1.

DECLARATION OF ADDITIONAL STATE HIGHWAYS IN RURAL AREAS.

Municipality.	Road.	New Declared Title.
Alexandra	Upper Goulburn Road—within the shire	Goulburn Valley Highway
Arapiles	Edenhope–Horsham Road—within the shire	Wimmera Highway
Ballarat Shire	Ballarat Creswick Road—within the shire	Midland Highway
Bannockburn	Geelong Hamilton Road—within the shire	Hamilton Highway
Bass	Inverloch Wonthaggi Road—within the shire	Bass Highway
Birchip	Beulah–Birchip–Wycheproof Road—from Birchip to the Kinnabulla Woomelang Road	North-Western Highway
Birchip	Kinnabulla–Woomelang Road—within the shire	North-Western Highway
Bright	Kiewa Valley Road—within the shire	Kiewa Valley Highway
Broadford	Upper Goulburn Road—within the shire	Goulburn Valley Highway
Bungaree	Ballarat Creswick Road—within the shire	Midland Highway
Castlemaine Town	Castlemaine–Daylesford Road—within the town	Midland Highway
Colac Shire	Geelong–Hamilton Road—within the shire	Hamilton Highway
Corio	Geelong–Hamilton Road—within the shire	Hamilton Highway
Creswick	Castlemaine–Ballarat Road from the southern boundary of shire to the Creswick–Daylesford Road	Midland Highway
Creswick	Creswick–Daylesford Road—within the shire	Midland Highway
Creswick	Daylesford–Ballarat Road—from Creswick–Daylesford Road to the eastern boundary of the shire	Midland Highway
Daylesford Borough	Castlemaine Road—within the borough	Midland Highway
Daylesford Borough	Malmsbury–Daylesford Road—from Ballan Road to Castlemaine Road The newly declared Midland Highway will also include portion of Albert Lane and the portion of the new deviation of the Ballarat Road in the borough	Midland Highway
Dimboola	Dimboola–Warracknabeal Road—within the shire	Borung Highway
Dunmunkle	Marno–Rupanyip Road—within the shire	Wimmera Highway
Dunmunkle	Stawell Warracknabeal Road—from Marnoo–Rupanyup Road to Rupanyup–Murtoa Road	Wimmera Highway
Dunmunkle	Rupanyup–Murtoa Road—within the shire	Wimmera Highway
Dunmunkle	Murtoa–Minyip Road—from Rupanyup–Murtoa Road to Horsham–Murtoa Road	Wimmera Highway
Dunmunkle	Horsham–Murtoa Road—within the shire	Wimmera Highway
Dundas	Geelong–Hamilton Road—within the shire	Hamilton Highway
Fern Tree Gully	Burwood Road—within the shire	Burwood Highway
Fern Tree Gully	Main Ferntree Gully Road—from Burwood Road to Olinda Road	Burwood Highway
Glenelg	Mt. Gambier Road—within the shire	Glenelg Highway
Glenlyon	Ballarat Road Castlemaine–Daylesford Road—within the shire	Midland Highway
Hampden	Geelong–Hamilton Road—within the shire	Hamilton Highway
Kara Kara	Navarre Road—from St. Arnaud borough boundary to Marnoo–St. Arnaud Road	Wimmera Highway
Kara Kara	Marnoo–St. Arnaud Road—within the shire	Wimmera Highway
Karkarooc	Kinnabulla–Woomelang Road—within the shire	North-Western Highway
Karkarooc	Woomelang–Lascelles Road—within the shire	North-Western Highway
Kowree	Edenhope–Horsham Road—within the shire	Wimmera Highway
Kowree	Hamilton–Edenhope Apsley Road—from Edenhope–Horsham Road to the western boundary of the shire	Wimmera Highway
Leigh	Geelong–Hamilton Road—within the shire	Hamilton Highway
Lillydale	Main Warburton Road—within the shire	Warburton Highway
Metcalfe	Elphinstone–Harcourt Road—within the shire	Calder Highway
Mortlake	Geelong–Hamilton Road—within the shire	Hamilton Highway
Mount Rouse	Geelong–Hamilton Road—within the shire	Hamilton Highway
McIvor	Heathcote–Bendigo Road—within the shire	Eppalock Highway
Newstead	Castlemaine–Daylesford Road—within the shire	Midland Highway
Orbost	Cann Valley Road—from Princes Highway East to the New South Wales border	Cann Valley Highway
St. Arnaud Borough	Navarre Road—within the borough	Wimmera Highway
Seymour	Seymour–Yea Road—within the shire	Goulburn Valley Highway
Seymour	Upper Goulburn Road—from Seymour–Yea Road to southern boundary of the shire	Goulburn Valley Highway
Stawell Shire	Marnoo–St. Arnaud Road—within the shire	Wimmera Highway

SCHEDULE 1—*continued.*

DECLARATION OF ADDITIONAL STATE HIGHWAYS IN RURAL AREAS—*continued.*

Municipality.	Road.	New Declared Title.
Stawell Shire	Marnoo Road—from Marnoo–St. Arnaud Road to Marnoo–Rupanyup Road	Wimmera Highway
Stawell Shire	Marnoo–Rupanyup Road—within the shire ..	Wimmera Highway
Strathfieldsaye.. ..	Heathcote–Bendigo Road—within the shire ..	Eppalock Highway
Upper Yarra	Warburton Road—from the western boundary of the shire to the Acheron Way	Warburton Highway
Warracknabeal ..	Dimboola–Warracknabeal Road—within the shire	Borung Highway
Warrnambool Shire ..	Geelong–Hamilton Road—within the shire ..	Hamilton Highway
Wimmera	Dimboola–Warracknabeal Road—within the shire	Borung Highway
Wimmera	Edenhope–Horsham Road within the shire ..	Wimmera Highway
Wimmera	Horsham–Murtoa Road—within the shire ..	Wimmera Highway
Wodonga	Kiewa Valley Road—within the shire	Kiewa Valley Highway
Wonthaggi Borough ..	Wonthaggi Inverloch Road—within the borough..	Bass Highway
Woorayl	Inverloch-Wonthaggi Road—from the western boundary of the shire to the Kongwak-Inverloch Road	Bass Highway
Yackandandah ..	Kiewa Valley Road—within the shire	Kiewa Valley Highway
Yea	Upper Goulburn Road—within the shire ..	Goulburn Valley Highway

SCHEDULE 2.

DECLARATION OF ADDITIONAL STATE HIGHWAYS IN METROPOLITAN AREAS, AND PROVINCIAL CITIES.

Municipality.	Road.	New Declared Title.
Ballaarat City ..	Creswick Road—from Sturt Street, north to the City boundary	Midland Highway
	Main Street—from Barkly Street to Bridge Street excluding the tramway areas maintained by the State Electricity Commission	Midland Highway
	Victoria Street, Bridge Street, Sturt Street—from Stawell Street to Hamilton Avenue excluding the tramway areas maintained by the State Electricity Commission	Western Highway
Bendigo	McCrae Street, Pall Mall—from Nolan Street to Charing Cross excluding the tramway areas maintained by the State Electricity Commission	Midland Highway
	High Street—from Maple Street to View Street excluding the tramway areas maintained by the State Electricity Commission	Calder Highway
	View Street—from High Street to Barnard Street excluding the tramway areas maintained by the State Electricity Commission	Calder Highway
	Barnard Street—from View Street to Mt. Korong Road excluding the tramway areas maintained by the State Electricity Commission	Calder Highway
	Mt. Korong Road—from Barnard Street to existing Calder Highway excluding tramway areas maintained by the State Electricity Commission	Calder Highway
	McIntyre Street, Bond Street, Backhaus Street—from Calder Highway junction to the City boundary excluding the tramway areas maintained by the State Electricity Commission	Loddon Valley Highway
	Heathcote–Bendigo Road—within the City ..	Eppalock Highway
Box Hill	Burwood Road—within the City	Burwood Highway
Broadmeadows ..	Lancefield Road—from Woodland Street to First Avenue	Calder Highway
Caulfield	Dandenong Road—from Waverley Road to Poath Road	Princes Highway

SCHEDULE 2—*continued.*

DECLARATION OF ADDITIONAL STATE HIGHWAYS IN METROPOLITAN AREAS, AND PROVINCIAL CITIES—*continued.*

Municipality.	Road.	New Declared Title.
Eaglehawk Borough ..	Mt. Korong Road—within the borough excluding the tramway areas maintained by the State Electricity Commission	Loddon Valley Highway
Essendon	Sunbury Road—within the city	Calder Highway
	Mt. Alexander Road—from Keilor Road to the northern street alignment of Leake Street, exluding areas maintained by the Melbourne and Metropolitan Tramways Board	Calder Highway
Geelong West	Melbourne Road, Keera Street—from Bell Parade to Latrobe Terrace	Princes Highway
	Aberdeen Street—within the city	Hamilton Highway
Footscray	Ballarat Road—from Droop Street to Geelong Road	Western Highway
	Ballarat Road—from Geelong Road to and including Lynch's bridge over the Maribyrnong River	Princes Highway
	Princes Highway, Main Road—within the city	Princes Highway
Hamilton	Geelong–Hamilton Road—within the city ..	Hamilton Highway
Horsham	Edenhope–Horsham Road—within the city ..	Wimmera Highway
Geelong	Ormond Road, Sydney Parade, Ryrie Street—from Boundary Road to Moorabool Street	Bellarine Highway
	Ryrie Street—from Latrobe Terrace to Moorabool Street	Hamilton Highway
	Mercer Street, Malop Street, Moorabool Street—from Latrobe Terrace to Barwon Terrace	Princes Highway
Keilor	Lancefield Road—from Treadwell Road to the Essendon City boundary	Calder Highway
Malvern	Dandenong Road—from Waverley Road to Warrigal Road	Princes Highway
Newtown and Chilwell ..	Aberdeen Street—within the city	Hamilton Highway
	Hamilton Road—within the city	Hamilton Highway
Nunawading	Burwood Road—within the city	Burwood Highway
Oakleigh	Dandenong Road—from Poath Road to Warrigal Road	Princes Highway
St. Kilda	Brighton Road—central portion of the roadway only, from Glenhuntly Road to Dickens Street, excluding areas maintained by the Melbourne and Metropolitan Tramways Board	Nepean Highway
Sunshine	Ballarat Road—within the city	Western Highway

SCHEDULE 3.

DECLARATION OF ADDITIONAL MAIN ROADS.

Municipality.	Road.	New Declared Title.
Ballaarat City ..	Water Street—from the city boundary to the Western Highway	Daylesford Ballarat Road
Bendigo City	Spring Gully Road, Carpenter Street, Mitchell Street—from the City boundary to Charing Cross excluding the tramway areas maintained by the State Electricity Commission	Mandurang Road
Box Hill City .. (Jt. Nunawading City)	Middleborough Road—from Maroondah Highway to Highbury Road	Doncaster–Mordialloc Road
Brighton City .. .. (Jt. Caulfield City)	North Road—from Thomas Street to the western street alignment of Hawthorn Road	North Road
Brighton City .. .. (Jt. Caulfield City)	North Road—from the eastern street alignment of Hawthorn Road to Nepean Highway	North Road
Brighton City	North Road—from the Nepean Highway to St. Kilda Street	North Road

SCHEDULE 3—*continued.*

DECLARATION OF ADDITIONAL MAIN ROADS.—*continued.*

Municipality.	Road.	New Declared Title.
Brighton City .. .. (Jt. Moorabbin City)	South Road—from the Nepean Highway to Bluff Road	South Road
Brighton City .. .. (Jt. Sandringham City)	South Road—from Bluff Road to New Street ..	South Road
Brighton City	South Road—from New Street to Beach Road ..	South Road
Brighton City	Beach Road and St. Kilda Street—from South Road to Head Street	Beach Road
Broadmeadows City ..	Pascoe Vale Road—from Camp Road to Somerton Road	Pascoe Vale Road
Brunswick City ..	Brunswick Road—from Moonee Ponds Creek to the western street alignment of Grantham Street	Brunswick Road
Brunswick City ..	Brunswick Road—from the eastern street alignment of Grantham Street to the western street alignment of Sydney Road	Brunswick Road
Brunswick City ..	Brunswick Road—from the eastern street alignment of Sydney Road to the western street alignment of Lygon Street	Brunswick Road
Brunswick City ..	Brunswick Road—from the eastern street alignment of Lygon Street to the western street alignment of Nicholson Street excluding the areas maintained by the Melbourne and Metropolitan Tramways Board	Brunswick Road
Camberwell City ..	Canterbury Road—from Burke Road to Warrigal Road	Canterbury Road
Caulfield City .. .. (Jt. Moorabbin City)	North Road—from Poath Road to Thomas Street	North Road
Caulfield City .. .. (Jt. Brighton City)	North Road—from Thomas Street to the western street alignment of Hawthorn Road	North Road
Caulfield City .. .. (Jt. Brighton City)	North Road—from the eastern street alignment of Hawthorn Road to Nepean Highway	North Road
Caulfield City	Grange Road—from Dandenong Road to North Road	Grange Road
Collingwood City .. (Jt. Fitzroy City from Turnbull Street to Smith Street)	Queens Parade—the central portion of the Carriageway from the eastern street alignment of Turnbull Street to the northern street alignment of Alexandra Parade, excluding the areas maintained by the Melbourne and Metropolitan Tramways Board	Heidelberg Road
Collingwood City ..	Hoddle Street—from Queens Parade north of Clifton Hill Overpass to Victoria Parade	Hoddle Main Road
Collingwood City ..	Johnston Street—from the eastern street alignment of Smith Street to the Johnston Street Bridge	Johnston Street
Doncaster and Templestowe Shire	Bulleen Road—from Heidelberg-Warrandyte Road to Manningham Road	Heidelberg-Doncaster Road
Doncaster and Templestowe Shire	Manningham Road—from Bulleen Road to Williamsons Road	Heidelberg-Doncaster Road
Doncaster and Templestowe Shire	Williamsons Road—from Manningham Road to Doncaster Road	Heidelberg-Doncaster Road
Doncaster and Templestowe Shire	Doncaster East Road—from Doncaster Road to Old Warrandyte Road	Doncaster-Mitcham Road
Doncaster and Templestowe Shire	Mitcham Road—from Old Warrandyte Road to southern boundary of the Shire	Doncaster-Mitcham Road
Essendon City .. (Jt. Sunshine City)	Raleigh's Road Bridge—bridge over the Maribyrnong River	Raleigh's Road Bridge
Essendon City ..	Mt. Alexander Road—from Leake Street to Pascoe Vale Road excluding areas maintained by the Melbourne and Metropolitan Tramways Board	Mt. Alexander Road
Essendon City ..	Ormond Road—from Mt. Alexander Road to the Moonee Ponds Creek	Ormond Road
Fern Tree Gully Shire ..	High Street Road—from Dandenong Creek to Stud Road	High Street
Fitzroy City	Alexandra Parade—from the eastern street alignment of Nicholson Street to the western street alignment of Brunswick Street	Heidelberg Road
Fitzroy City	Alexandra Parade—from the eastern street alignment of Brunswick Street, along the prolongation of Queens Parade to the northern street alignment of Alexandra Parade	Heidelberg Road

SCHEDULE 3—*continued.*

DECLARATION OF ADDITIONAL MAIN ROADS—*continued.*

Municipality.	Road.	New Declared Title.
Fitzroy City (Jt. Collingwood City from Turnbull Street to Smith Street)	Queens Parade—the central portion of the carriageway from the eastern street alignment of Turnbull Street to the northern street alignment of Alexandra Parade, excluding the areas maintained by the Melbourne and Metropolitan Tramways Board	Heidelberg Road
Footscray City ..	Hyde Street—from the southern boundary of the city to Napier Street	Hyde Street
Geelong City	Portarlington Road from the city boundary to Sydney Parade	Geelong–Portarlington Road
Hawthorn City (Jt. Kew City)	Barkers Road—from Denmark Street to the western street alignment of Glenferrie Road	Barkers Road
Hawthorn City .. (Jt. Kew City)	Barkers Road—from the eastern street alignment of Glenferrie Road to Burke Road	Barkers Road
Heidelberg City ..	Station Street—from Heidelberg–Eltham Road to the northern boundary of the city	Fairfield–Reservoir Road
Heidelberg City ..	Chandler Highway—from the Heidelberg–Eltham Road to the Yarra River	Chandler Highway Main Road
Kew City	Studley Park Road—from Johnston Street Bridge to Princess Street	Studley Park Road
Kew City	Chandler Highway—from the Yarra River to Princess Street	Chandler Highway Main Road
Kew City	Princess Street—from Earl Street to Studley Park Road	Princess Street
Kew City	Denmark Street—from the southern street alignment of High Street to Barkers Road	Denmark Street
Kew City .. .. (Jt. Hawthorn City)	Barkers Road—from Denmark Street to the western street alignment of Glenferrie Road	Barkers Road
Kew City .. .. (Jt. Hawthorn City)	Barkers Road—from the eastern street alignment of Glenferrie Road to Burke Road	Barkers Road
Melbourne City .. (Jt. Richmond City)	Hoddle Street—from Victoria Parade to the northern street alignment of Bridge Road	Hoddle Main Road
Melbourne City .. (Jt. Richmond City)	Punt Road—from the southern street alignment of Bridge Road to the northern street alignment of Swan Street	Hoddle Main Road
Melbourne City .. (Jt. Richmond City)	Punt Road—from the southern street alignment of Swan Street to Hoddle Bridge	Hoddle Main Road
Melbourne City .. (Jt. Prahran City)	Punt Road—from Hoddle Bridge to the northern street alignment of Toorak Road	Hoddle Main Road
Melbourne City .. (Jt. Prahran City)	Punt Road—from the southern street alignment of Toorak Road to the northern street alignment of Commercial Road	Hoddle Main Road
Melbourne City .. (Jt. Prahran City)	Punt Road—from the southern street alignment of Commercial Road to the northern street alignment of High Street	Hoddle Main Road
Moorabbin City .. (Jt. Oakleigh City)	Clayton Road—from Burke Road to Kingston Road	Doncaster–Mordialloc Road
Moorabbin City .. (Jt. Springvale and Noble Park Shire)	Boundary Road—from Kingston Road to Lower Dandenong Road	Doncaster–Mordialloc Road
Moorabbin City .. (Jt. Oakleigh City)	North Road—from Warrigal Road to Poath Road	North Road
Moorabbin City .. (Jt. Caulfield City)	North Road—from Poath Road to Thomas Street	North Road
Moorabbin City ..	Jasper Road—from North Road to South Road	Jasper Road
Moorabbin City .. (Jt. Brighton City)	South Road—from Nepean Highway to Bluff Road	South Road
Mordialloc City .. (Jt. Springvale and Noble Park Shire)	Boundary Road—from Lower Dandenong Road to Main Drain Road	Doncaster–Mordialloc Road
Mulgrave Shire ..	High Street Road from Warrigal Road to Dandenong Creek	High Street
Mulgrave Shire ..	Stevenson's Road—from Highbury Road to Waverley Road	Doncaster–Mordialloc Road
Northcote City ..	Station Street—from the southern boundary of the City to Mansfield Street	Fairfield–Reservoir Road
Nunawading City ..	Mitcham Road—from the northern boundary of the City to the Maroondah Highway at Mitcham	Doncaster–Mitcham Road

SCHEDULE 3—*continued.*

DECLARATION OF ADDITIONAL MAIN ROADS—*continued.*

Municipality.	Road.	New Declared Title.
Nunawading City .. (Jt. Box Hill City)	Middleborough Road—from Maroondah Highway to Highbury Road	Doncaster–Mordialloc Road
Oakleigh City	Clayton Road—from Fern Tree Gully Road to Burke Road	Doncaster–Mordialloc Road
Oakleigh City .. .. (Jt. Moorabbin City)	Clayton Road—from Burke Road to Kingston Road	Doncaster–Mordialloc Road
Oakleigh City	North Road—from Princes Highway East to Warrigal Road	North Road
Oakleigh City .. .. (Jt. Moorabbin City)	North Road—from Warrigal Road to Poath Road	North Road
Port Melbourne City ..	Beaconsfield Parade, Beach Street—from Pickles Street to Bay Street	Beach Road
Port Melbourne City ..	Williamstown Road—from the Yarra River to Ingles Street	Williamstown Road
Port Melbourne City ..	Normanby Road—from Ingles Street to Boundary Street	Normanby Road
Prahran City .. .. (Jt. Melbourne City)	Punt Road—from Hoddle Bridge to the northern street alignment of Toorak Road	Hoddle Main Road
Prahran City .. .. (Jt. Melbourne City)	Punt Road—from the southern street alignment of Toorak Road to the northern street alignment of Commercial Road	Hoddle Main Road
Prahran City .. .. (Jt. Melbourne City)	Punt Road—from the southern street alignment of Commercial Road to the northern street alignment of High Street	Hoddle Main Road
Prahran City .. .. (Jt. St. Kilda City)	Punt Road—from the southern street alignment of High Street to Nelson Street	Hoddle Main Road
Preston City	Albert Street—from Northcote City boundary to Murray Road	Fairfield Reservoir Road
Preston City	Eileen Street—from Murray Road to Wood Street	Fairfield–Reservoir Road
Richmond City .. (Jt. Melbourne City)	Hoddle Street—from Victoria Parade to the northern street alignment of Bridge Road	Hoddle Main Road
Richmond City .. (Jt. Melbourne City)	Punt Road—from the southern street alignment of Bridge Road to northern street alignment of Swan Street	Hoddle Main Road
Richmond City .. (Jt. Melbourne City)	Punt Road—from the southern street alignment of Swan Street to Hoddle Bridge	Hoddle Main Road
Sandringham City .. (Jt. Brighton City)	South Road—from Bluff Road to New Street ..	South Road
Sandringham City ..	Bluff Road—from Royal Avenue to Beach Road	Bluff Road
South Melbourne City ..	Beaconsfield Parade—from Fraser Street to Pickles Street	Beach Road
South Melbourne City ..	Normanby Road—from Boundary Street to Lorimer Street	Normanby Road
Springvale and Noble Park Shire (Jt. Moorabbin City)	Boundary Road—from Kingston Road to Lower Dandenong Road	Doncaster–Mordialloc Road
Springvale and Noble Park Shire (Jt. Mordialloc City)	Boundary Road—from Lower Dandenong Road to Main Drain Road	Doncaster–Mordialloc Road
Springvale and Noble Park Shire	Main Drain Road—from Boundary Road to Wells Road	Wells Road
Springvale and Noble Park Shire	Wells Road—from Main Drain Road to Springvale Road	Wells Road
Sunshine City .. .. (Jt. Essendon City)	Raleigh's Road Bridge—bridge over the Maribyrnong River	Raleigh's Road Bridge
St. Kilda City.. .. (Jt. Prahran City)	Punt Road—from the southern street alignment of High Street to Nelson Street	Hoddle Main Road
St. Kilda City.. ..	Barkly Street—from Pattison Street to the northern street alignment of Inkerman Street	Hoddle Main Road
St. Kilda City.. ..	Barkly Street—from Blessington Street to Beach Street	Hoddle Main Road
St. Kilda City.. ..	Ormond Esplanade, Marine Parade, Lower Esplanade, Beaconsfield Parade—from Head Street to Fraser Street	Beach Road
Williamstown City ..	Douglas Parade—from Kororoit Creek Road to the northern boundary of the City	Douglas Parade

2. TEN-YEAR TARGET PROGRAMME.

During the year, the ten-year survey of road needs in Victoria was revised and extended to cover the period 1st July, 1960, to 30th June, 1970. This survey together with similar surveys prepared by all other Australian States will be consolidated by the National Association of Australian State Road Authorities so as to provide a comprehensive estimate of national road needs in Australia for the next ten years.

The revised survey for Victoria indicates that the total requirements of programmes of public road and bridge works for the next ten years will be at least £468,000,000 at 1960 price levels, or an average of £46,800,000 per annum. The finance available in the immediate future still falls far behind this estimate. It may be that members of the community, being generally unaware of the deficiency, do not realize what a wasteful resulting expenditure is being incurred through inefficient transportation or how well it would pay to shoulder the burden of road costs and gain the benefits from improved road facilities. Road defects such as poor surfaces, narrow pavements, weak bridges and multitudinous intersections are accompanied by mechanical, material and property losses as well as waste of time, hospitalization losses and even loss of life. It has been abundantly demonstrated by detailed cost analysis of these losses that " good roads cost less than bad roads ".

While State road revenues were increased by raising motor registration fees by 50 per cent. from 1st January, 1957, and by introducing a ton-mile tax on certain vehicles from 1st April, 1956, these taxes being imposed solely for roads, the Commonwealth still continues to use motor vehicle ownership and transportation as convenient subjects of general taxation, very large revenues being so derived as described later. To meet the deficiencies in road finance it appears inevitable that at least at the Commonwealth level, and possibly also at the State level, further efforts must be made for this specific purpose. It is not merely a matter of individual advantage, though that result will follow. It is also an essential step towards elimination of serious national inefficiencies in transportation and hence in productivity.

3. COMMONWEALTH AID ROADS FUNDS.

For more than three decades, Commonwealth assistance for roads was proportionate to the proceeds of taxation of petrol and latterly of diesel fuel used in road vehicles, these " user " taxes being in effect " hypothecated " for road purposes. The new Commonwealth Aid Roads legislation operative as from 1st July, 1959, provides instead for payments of basic grants from general revenue to the States of specific amounts in each of the ensuing five years for expenditure on roads and works connected with transport. These basic grants by the Commonwealth commence at £40,000,000 for financial year 1959–60 and increase by £2,000,000 each year to £48,000,000 for financial year 1963–64.

The basis of distribution between the States has been changed from an " area and population " basis to an " area population and number of motor vehicles registered " basis. Victoria's share has thus increased from 17·573 per cent. under the old formula to 19·920 per cent. under the new formula but still falls far short of the 30 per cent. of taxation on motor vehicles and fuels contributed by Victorian motor vehicle owners.

The legislation also provides for additional " matching " grants to the States amounting to £2,000,000 in financial year 1959–60 rising to £10,000,000 in financial year 1963–64. The distribution of these additional grants to the States is based on the same formula as the distribution of the basic grants but the amount available to each State is also limited to £1 for every £1 allocated by each State Government from its own resources for expenditure on roads in excess of the amounts allocated by it for road expenditure in financial year 1958–59.

Assuming that Victoria is able to participate in the " matching " grants up to the full amounts available to it, receipts by the State from the Commonwealth for road purposes over the five-year period will be £50,000,000 as against £26,510,264 received from the Commonwealth over the last five years of the old legislation. In 1959–60 the Board has received £8,460,574 as against £7,021,000 in 1958–59.

The following tabulation showing actual figures up to 1959–60 and estimates for subsequent years in £ millions contrasts grants to the States with fuel tax collections and vividly shows how, apart from other motor vehicle taxes, the Commonwealth continues to gain additional benefits in fuel tax from year to year despite the increased grants to the States. In addition, should any States fail to take up their matching grants the

Commonwealth share will be correspondingly increased. When other motor vehicle taxes are included the retention of motor taxation by the Commonwealth is seen to be far greater as indicated in Fig. 1.

Year.	1956–57.	1957–58.	1958–59.	1959–60.	1960–61.	1961–62.	1961–63.	1963–64.
Commonwealth Aid Roads distribution gross	31.2	34.6	37.9	42	46	50	54	58
Used by Commonwealth ..	0.95	1.0	1.0	..	..	..	..	..
Available to States	30.25	33.6	36.9	42	46	50	54	58
Fuel tax collections	47.5	50.0	56	60	65	70	75.5	81.5
Retained by Commonwealth ..	17.5	16.4	19.1	18	19	20	21.5	23.5

As in the old legislation, provision is made in the new Act for not less than 40 per cent. of the funds made available being expended on " roads in rural areas other than highways, main roads and trunk roads ", and for expenditure of part of the remaining funds on works connected with transport by road and water other than the construction, reconstruction and maintenance of roads.

The new legislation does not make provision for expenditure on roads serving Commonwealth properties or for road safety practice as charges against Commonwealth Aid Roads funds as was the case in previous Commonwealth Aid Roads legislation. It does, however, permit expenditure on research relating to the construction, maintenance or repair of roads.

It is somewhat unfortunate that, as mentioned above, Federal aid for roads is now unrelated to the taxation derived from motor vehicle ownership and usage. At the State level, as in most countries, it is recognized that direct application of road user taxes for public road purposes is logical and appropriate. It is the operation of motor vehicles which wears out and necessitates improvements of the road network of the community. In operating their vehicles the owners contribute to taxation approximately in direct proportion to their usage so that in the aggregate they can with justice expect that their contribution will be directly devoted to meeting at least a major portion of public road costs. Moreover, the appropriateness of relating usage and taxation is readily realized so that an increase is also generally readily accepted when it is necessary to raise additional road finance. However, as shown in Fig. 1, taxation of motor vehicles, tyres, spare parts and fuel at the Commonwealth level already yields more than three times as much as is being devoted to Federal aid for roads, a quite anomalous situation and one in striking contrast to the principle which the State has so consistently and advantageously adopted.

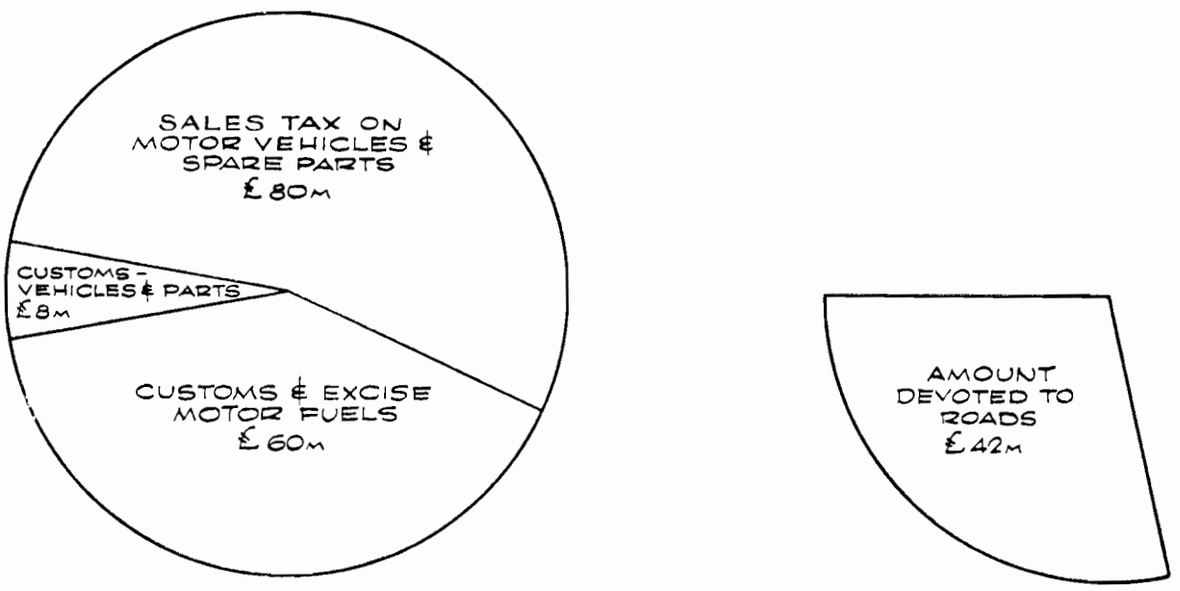

Fig. 1.—Commonwealth Collections from Motor Vehicle Owners and Operators 1959-60.

Total collected .. .. £148 million
Amount devoted to roads .. .. . £42 million

4. RECEIPTS AND PAYMENTS.

The total funds available to the Board for expenditure during the year amounted to £21,592,432 as compared with £18,434,335 during 1958–59, an increase of £3,158,097.

Actual expenditure amounted to £20,948,755 as compared with £17,746,472 for the previous financial year, an increase of £3,202,283. Of the total expenditure of £20,948,755, £13,553,171 was incurred by the Board and £7,395,584 by municipalities.

During the year the net amount received by the Board from motor registration fees and fines, half the drivers' licence fees, and municipalities repayments was £10,117,383, an increase of £806,537 over the amount of £9,310,846 received from these sources during 1958–59.

Proceeds of taxation under the Commercial Goods Vehicles Act amounted to £2,117,494 as compared with £1,873,424 received in the previous financial year.

Under the provisions of the *Commonwealth Aid Roads Act* 1959 which came into operation on 1st July, 1959, an amount of £8,366,445 was paid to the State of Victoria. Of this amount £8,167,244 was received by the Board and the balance of £199,201 allocated

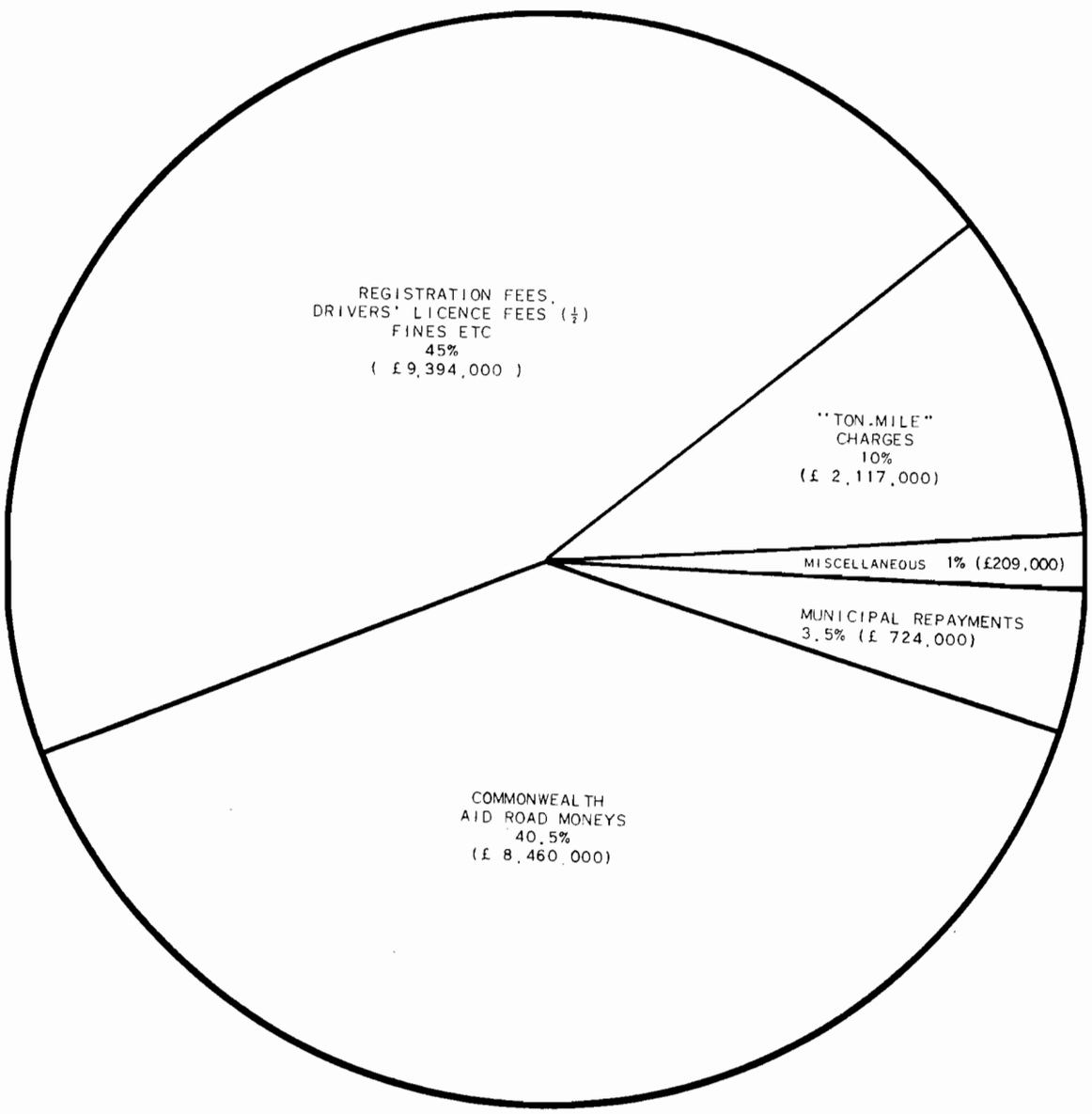

Fig. 2.—Receipts, 1959-60.

for other works connected with transport by road or water. In addition, final payments under the *Commonwealth Aid Roads Act* 1954–56 totalling £293,330 were received by the Board making a total of £8,460,574 received in Commonwealth aid during the year.

The total amount made available to the Board from the Loan Fund during 1959–60 for its normal works was £160,000 and was expended as follows:—

	£
Main Roads	109,995
State Highways	17,005
Tourists' Roads	33,000
	160,000

In addition, £5,124 loan money was made available under the Commonwealth–State Flood Relief Agreement.

Full details of the Board's receipts and payments for year ended 30th June, 1960, are shown on the statement certified by the Auditor-General on page 66 of this Report. In addition. Figs. 2 and 3 illustrate the Board's receipts and payments under various headings.

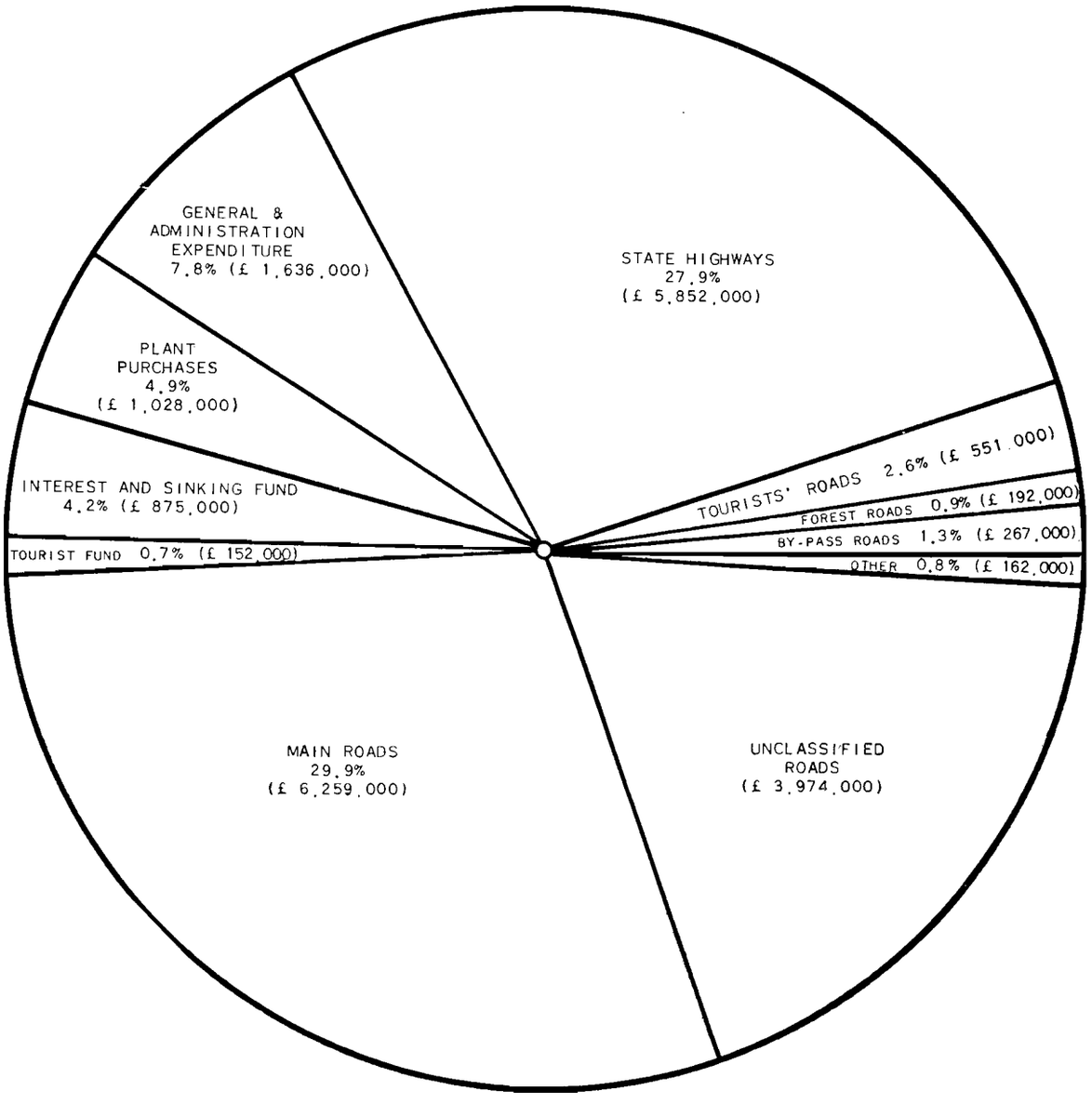

Fig. 3.—Payments, 1959-60.

5. ALLOCATION AND EXPENDITURE OF FUNDS FOR ROAD AND BRIDGE WORKS.

In accordance with its usual practice the Board in March, 1959, called for submission of proposals for works to be continued or undertaken in the following financial year from councils and from its own engineers. After close study of its estimates of income and expenditure for year 1959–60 and after ascertaining the volume of commitments outstanding at 30th June, the Board proceeded in July, 1959, to allocate funds for the forthcoming year's programme. This allocation thus provided for commitments carried forward from 1958–59 and for works proposed to be carried out or commenced prior to the succeeding year's allocation.

In preparing the programme and the corresponding allocations, the Board gives very close consideration to the necessity for each individual item of work, and there are many thousands of these spread over the State-wide network of roads of various categories. The council's applications are studied in detail with the Divisional Engineer concerned whose knowledge of local circumstances and current needs is of the utmost value in this task. Each council's capacity for work and its financial position are also borne in mind as well as local conditions. The Board's direct knowledge of the latter gained year by year in travelling on scheduled inspections with councils and with its own engineers is undoubtedly an essential element in determining on a State-wide basis appropriate allocations of funds for works item by item. The discretion necessarily required to be exercised by the Board in preparing the programmes is rarely called into question by municipal councils either for works under their control or those being directly supervised by the Board.

Subsequent to the main allocation in July, supplementary grants were made to a very limited extent during the year for works of a highly urgent nature or necessitated by unforseen contingencies.

The following table sets out the applications, allocations and expenditure from all sources for financial year 1959–60 as compared with financial year 1958–59 :—

ALL WORKS ON ALL CATEGORIES OF ROADS.

—	1958–59.	1959–60.
	£'000s.	£'000s.
Applications	39,204	39,899
Allocations	20,042	23,823
Expenditure	15,003	17,252

6. MAIN ROADS.

Applications were received from 196 municipal councils and from the Board's Engineers in respect of works under direct supervision of the Board. The following table shows the total allocations made and the actual expenditure for the year. Particulars for the previous year are shown for comparison, together with relevant percentages indicative of the "carry over" inherent in planning and executing works :—

—	1958–59.	1959–60.
	£'000s.	£'000s.
A. Applications	14,207	14,653
B. Allocations	7,732	9,416
C. Expenditure	5,527	6,258
B as percentage of A	54·4%	64·3%
C as percentage of B	75·4%	66·5%

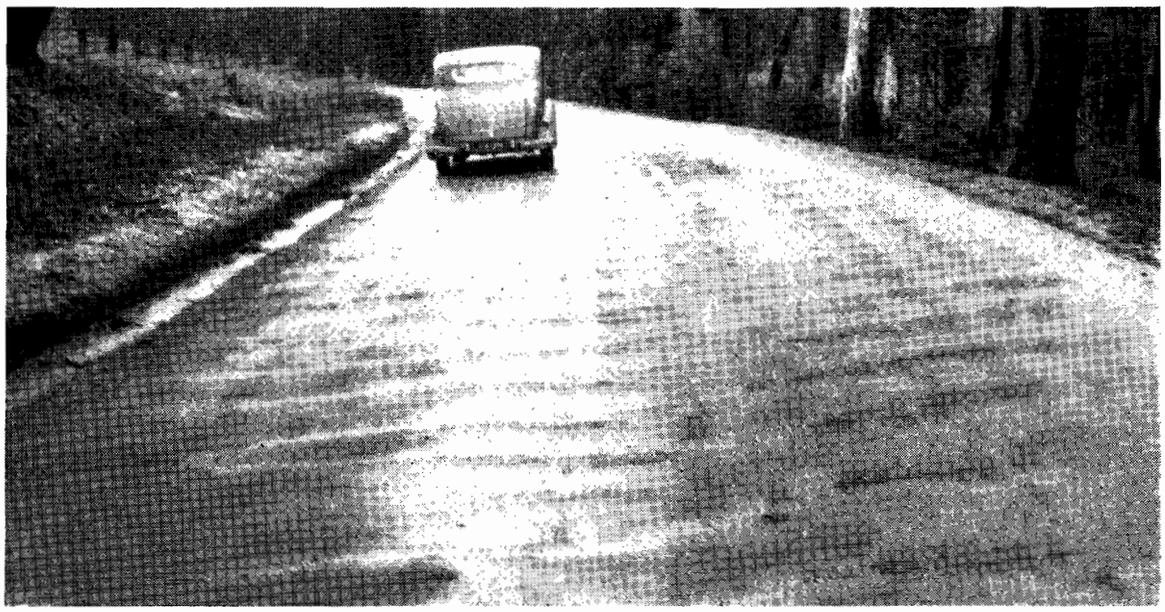

Plate 1.—Before reconstruction (see below) corrugated and pot-holed surface of Tallangatta–Corryong Road, Shire of Upper Murray.

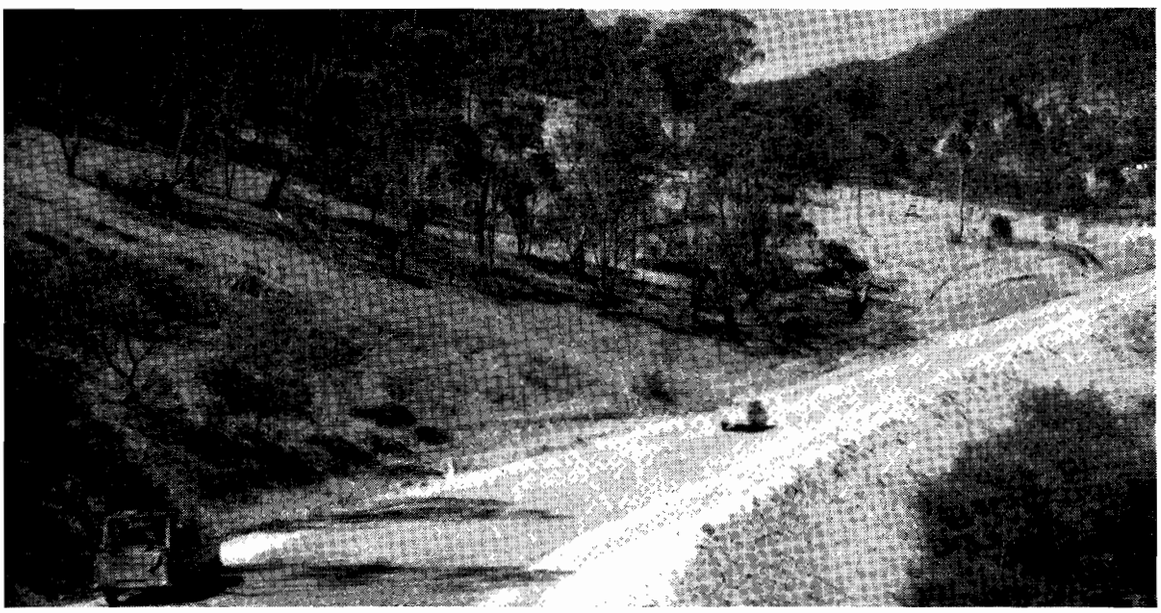

Plate 2.—Shire of Upper Murray. Tallangatta–Corryong Road, reconstructed and sealed section approximately 7 miles west of Cudgewa.

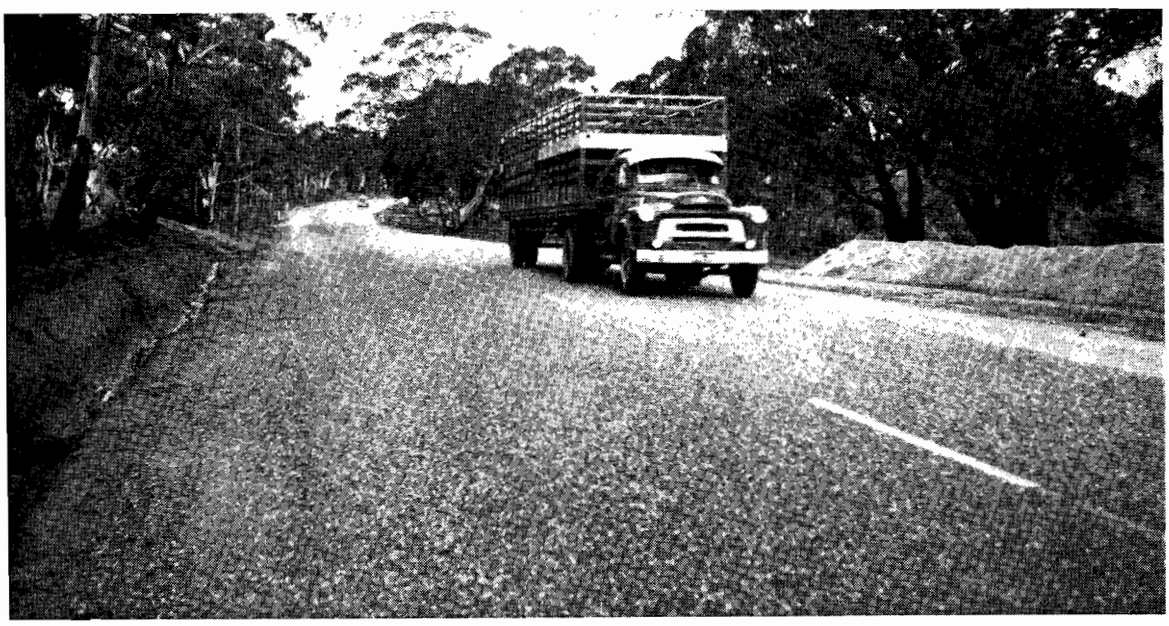

Plate 3.—Shire of Metcalfe. Reconstructed and widened Elphinstone–Harcourt Road at approximately 2·6 miles.

Particulars of major works typical of the many improvements on main roads undertaken during the year are set out hereunder :—

Bairnsdale Division.

Avon Shire.—Bengworden Road—Reconstruction and sealing of 2·5 miles. Dargo Road—Widening and gravelling of 6 miles.

Bairnsdale Shire.—Bullumwaal Road—Construction of 10-ft. diameter Armco pipe culvert. Progress continued with replacement of Wy Yung Bridge over Mitchell River.

Omeo Shire.—Benambra Road—Reconstruction and realignment of a narrow tortuous section 1·5 mile.

Tambo Shire.—Buchan–Orbost Road—Reconstruction and sealing of 2 miles. Tambo Upper Road—Reconstruction and sealing of 2·5 miles. Bruthen–Buchan Road—Reconstruction and sealing of 2 miles.

Ballarat Division.

Ararat Shire.—Ararat–Warrnambool Road—Reconstruction of a hilly section of 3·18 miles immediately south of Ararat, commenced last year, now completed and sealed. Ararat–Halls Gap Road—Further progress was made during the year in constructing a length of 7 miles between Pomonal and the Shire boundary.

Avoca Shire.—Ararat–St. Arnaud Road—Construction of a new composite rolled steel joist and concrete bridge over Wattle Creek at Navarre was commenced.

Ballarat Shire.—Maryborough–Ballarat Road—The three-span concrete bridge over Burrumbete Creek at Miners Rest was completed.

Glenlyon Shire.—Ballarat Road—Construction of 1·35 miles between Sailors Creek and Daylesford was completed by contract, completing the deviation of the steep tortuous section between Peschia's Hill and Daylesford.

Benalla Division.

Mansfield Shire.—Mansfield–Woods Point Road—Continuation of realignment and reconstruction at Martin's Gap between Mansfield and Jamieson, total length of 2·6 miles. Benalla–Maindample Road—Reconstruction and sealing of 1·5 miles.

Oxley Shire.—Wangaratta–Whitfield Road—Realignment at Edi Cutting involving heavy rock work, 0·9 mile. A five-span "U" slab reinforced concrete bridge 100 feet long by 26 feet between kerbs was constructed over Croppers Creek replacing an old timber structure. Bright Road—A four-span "U" slab reinforced concrete bridge 80 feet long by 26 feet between kerbs was similarly constructed.

Towong Shire.—Murray Valley Main Road—Reconstruction of 0·6 mile near Granya. Tallangatta Creek Road—Construction of three-span composite concrete bridge 110 feet long over Tallangatta Creek to replace old timber structure.

Upper Murray Shire.—Tallangatta–Corryong Road—Reconstruction of inadequate sections between Wabba and Berringama (Plates 1 and 2). Corryong Road—Reconstruction of 2·6 miles between Towong Gap and Bringenbrong Bridge, forming part of the route from Cudgewa Railway Station to the new base depot of the Snowy Mountains Authority at Khancoban in New South Wales.

Wodonga, Chiltern, Yackandandah and Beechworth Shires.—Wodonga–Beechworth Road—Commencement of reconstruction of 3 miles including realignment and regrading of two tortuous hilly sections at Leneva Gap and Indigo Gap.

Bendigo Division.

Birchip Shire.—Kinnabulla–Woomelang Road—Between Kinnabulla and Curyo a deviation 5·5 miles in length was constructed and sealed. This work eliminates two railway level crossings of the Mildura line and shortens the through route.

Gordon Shire.—Charlton–Durham Ox Road—Reinforced concrete bridge of five spans, 176 feet in length and 22 feet between kerbs was constructed over Serpentine Creek replacing a very old and dilapidated timber bridge, 14 feet wide between kerbs. Boort–Kerang Road—3 miles of realignment and reconstruction for sealing, extending the seal towards Kerang from Boort.

Metcalfe Shire.—Elphinstone–Harcourt Road—1·2 miles of reconstruction and sealing (Plate 3).

Rochester Shire.—Echuca–Mitiamo Road—3 miles of resheeting for sealing west from Kotto. Echuca–Serpentine Road—Reconstruction and sealing of 1·65 miles, extending the seal westerly from Murray Valley Highway.

Strathfieldsaye Shire.—Bendigo–Heathcote Road—Construction of a reinforced flat slab bridge over Axe Creek to eliminate a bad floodway dip—the bridge consists of four spans and has a total length of 120 feet.

Swan Hill Shire.—Nyah–Ouyen Road—6 miles of reconstruction in limestone pavement and sealing, 12 feet wide, extending sealing on a main through route between Swan Hill and Ouyen. Donald–Swan Hill Road—4 miles of reconstruction and sealing.

Wycheproof Shire.—Berriwillock–Birchip Road—2·75 miles of reconstruction and sealing. Boort–Wycheproof Road—3·1 miles of reconstruction for sealing. Donald–Swan Hill Road—2 miles of reconstruction and sealing.

Dandenong Division.

Doncaster and Templestowe Shire.—Warrandyte–Ringwood Road—Reconstruction of 1·3 miles of narrow side cutting from Hussey's Lane to Hall Road.

Korumburra Shire.—Loch–Wonthaggi Road—Reconstruction of narrow worn out pavement of 1·17 miles south of Loch township—Reconstruction of 1·3 miles south of Korumburra. Korumburra–Warragul Road—Reconstruction of tortuous hill 1·3 miles long north of Korumburra (Plate 4).

Whittlesea Shite.—Whittlesea–Kinglake Road—Further 2·7 miles of the deviation between Whittlesea and Kinglake West constructed; 2·5 miles of the new route has been sealed, and the deviation which is 4·7 miles long is open to traffic, replacing a tortuous side cutting constructed on a 1 in 20 grade 30 years ago.

Geelong Division.

Bannockburn Shire.—Fyansford–Gheringhap Road—2 miles of reconstruction and sealing. This leaves only 0·75 of a mile of this road to be sealed.

Barrabool Shire.—Anglesea Road—Widening and strengthening was commenced to enable the coal traffic to be carried from the new open cut brown coal mine at Anglesea. The work, including widening of the existing bridge over Freshwater Creek was in progress at the close of the year.

Bellarine Shire.—Portarlington–Queenscliff Road—A programme of widening the existing 12-ft. seal to 20 feet over the full length of this road was commenced with a view to completion before the Christmas holiday season in 1960.

Colac Shire.—Colac–Beech Forest Road—1·3 miles of reconstruction and widening and realignment in preparation for sealing and completion of new reinforced concrete bridge over Love's Creek. Colac–Forrest Road—A length of 1·25 miles was realigned and reconstructed in preparation for sealing.

Corio Shire.—Geelong–Bacchus Marsh Road—4 miles of widening, curve improvement, strengthening and sealing.

Kyneton Shire.—Daylesford–Trentham Road—1 mile of reconstruction and sealing. All main roads in this Shire are now sealed although widths are inadequate and a programme of widening must now be commenced.

Otway Shire.—Skenes Creek Road—1·3 miles of reconstruction and realignment in preparation for sealing. Birregurra–Forrest Road—1·75 miles of similar reconstruction.

Horsham Division.

Arapiles Shire.—Natimuk–Hamilton Road—5·8 miles sealed to a width of 12 feet.

Dimboola Shire.—Nhill–Jeparit Road—Reconstruction of 8 miles. Rainbow Beulah–Birchip Road—6 miles of reconstruction.

Donald Shire.—Donald–Swan Hill Road—5 miles were reconstructed and sealed.

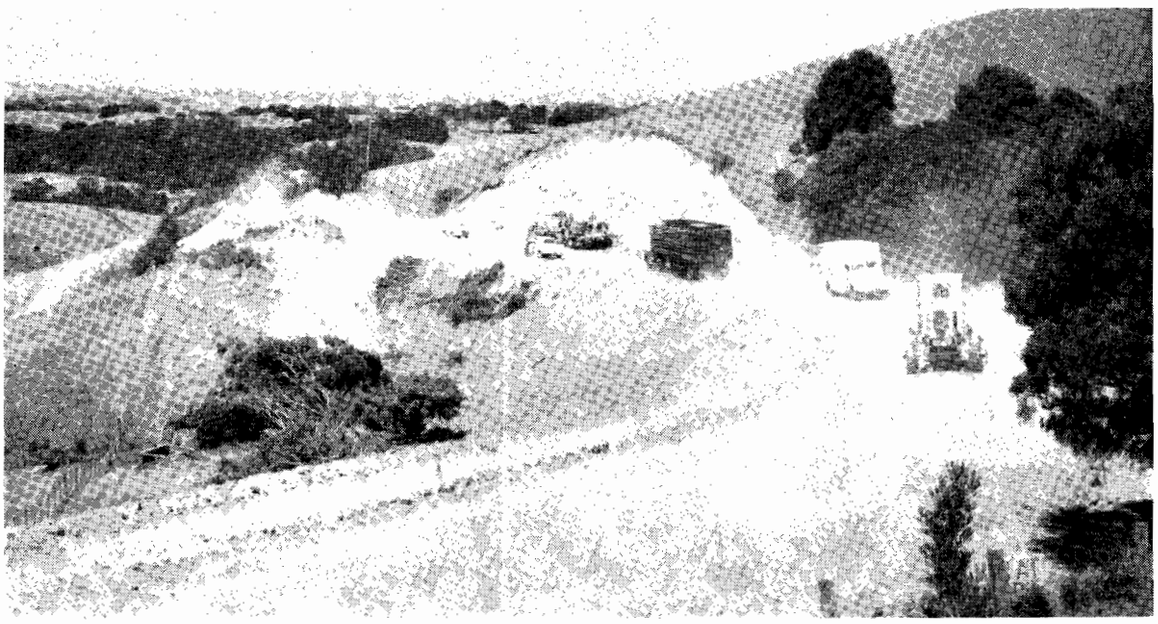

Plate 4.—Shire of Korumburra. Section of Korumburra–Warragul Road during reconstruction.

Plate 5.—Shire of Wimmera. Grampians Road, realigned section between Lah-Arum and Rosebrook; old alignment can be seen on right.

Plate 6.—Ballarat Road near Rosamond Road. Channels reconstructed and asphalt laid. City of Sunshine.

Kara Kara Shire.—St. Arnaud–Wycheproof Road—5 miles sealed. Navarre Road—3·7 miles sealed. St. Arnaud–Dunolly Road—3·8 miles sealed.

Kowree Shire.—Kaniva–Edenhope Road—A length of 7 miles was constructed and sealed. Harrow–Horsham Road—5·7 miles sealed.

Wimmera Shire.—Kalkee Road—7 miles were reconstructed and sealed. Grampians Road—A length of 3 miles was sealed (Plate 5) which, together with reconstruction and sealing on the Mt. Victory tourists' road, provides a sealed road from Horsham to Halls Gap across the Grampians ranges.

Metropolitan Division.

Box Hill City.—Burwood Road—Duplication of roadway from Parer Street to McComas Grove. Canterbury Road—Reconstruction between Station Street and Wavell Street.

Coburg City.—Bell Street Extension—Continuation of construction of embankment westerly from escarpment of Moonee Ponds Creek towards Strathmore.

Essendon City (Joint with Broadmeadows and Keilor).—Sunbury Road—Construction of divided roadway from Keilor Road intersection towards Melbourne Airport.

Footscray City.—Princes Highway West (main road)—Reconstruction with median strip from Barkly Street to railway bridge, and commencement of similar work from Somerville Road to Cemetery Road to provide divided roadway.

Heidelberg City.—Bell Street—Reconstruction of pavement from Studley Road to Cape Street. Heidelberg–Warrandyte Road—Continuation of construction of new bridge over Yarra River at Banksia Street and approaches. Heidelberg–Eltham Road—Reconstruction of intersection with Chandler Highway.

Moorabbin City.—South Road—Continuation of construction of divided roadway between Nepean Highway and Warrigal Road. Warrigal Road—Reconstruction and widening of pavement between Centre Road and Kingston Road.

Sunshine City.—Ballarat Road—Repairing and widening concrete pavement by 6 feet and application of asphalt wearing course from Rosamond Road to Ashley Street, 1 mile (Plate 6). This section was constructed in rolled concrete in 1936 with a view to the asphaltic surfacing being applied soon after, but although increasingly intersected with cracking, has remained stable, still providing a sound pavement now rendered smooth by surfacing.

Traralgon Division.

Alberton Shire.—Yarram–Traralgon Road—Near Gormandale, 1·75 miles of realignment and sealing 18 feet wide.

Morwell Shire.—Tyers Road—Reinforced concrete bridge, 481 feet in length over the Latrobe River, together with 0·50 mile of approaches was completed. This replaces a weak old timber structure which was inadequate to cope with extensive transport of brown coal to Maryvale from a new open cut at Tyers.

Woorayl Shire.—Nerrena Road—East of Coalition Creek, 2·10 miles of reconstruction in preparation for an 18-ft. seal.

Warrnambool Division.

Glenelg Shire.—Casterton–Apsley Road—5·1 miles of reconstruction and sealing. Casterton–Edenhope Road—Construction of reinforced concrete and steel bridge over Wando River. Casterton–Penola Road—Crushing and stockpiling 10,000 cubic yards of limestone for future reconstruction.

Hampden Shire.—Geelong–Hamilton Road—1·60 miles of reconstruction and sealing, 20 feet wide.

Heytesbury Shire.—Timboon–Nullawarre Road—Construction of reinforced concrete bridge over Curdies River.

Minhamite Shire.—Woolsthorpe–Heywood Road—5·2 miles of reforming, widening, and sealing.

Mortlake Shire.—Mortlake–Framlingham Road—2·7 miles of reconstruction and sealing.

Portland Shire.—Dartmoor–Hamilton Road.—Completion of reinforced concrete and timber bridge over Crawford River.

Wannon Shire.—Coleraine–Balmoral Road—2 miles of reconstruction and sealing. Coleraine–Harrow–Apsley Road—3 miles of reconstruction and sealing.

Warrnambool Shire.—Allansford–Nirranda Road—2·2 miles of reconstruction, widening and sealing.

7. TOURISTS' ROADS.

Maintenance and improvement works on tourists' roads proclaimed under the Country Roads Act are under direct supervision of the Board. Municipal councils are not required to contribute towards the cost of work on these roads.

Applications totalled £703,000 for the 417 miles of proclaimed tourists' roads and £525,000 was allocated.

Portion of the Ocean Road between the Anglesea main road and the Anglesea brown coal mine was widened and strengthened to enable it to safely carry the coal traffic in addition to the normal traffic. Loan funds were specially advanced by the Government subject to repayment later, to carry out this work. The work was extended towards Anglesea, this section being financed from the Board's current resources. (Plates 7, 8 and 9.)

The road was widened at various points in continuation of a programme aimed at permitting passenger buses up to 33 feet in length to operate on the road prior to the Christmas season 1960. New bridges were commenced at Sheoak River and Separation Creek, and near the end of the year a contract was let for the construction of a new bridge over the Barham River at Apollo Bay.

In the Grampians area, the Mt. Victory Road was completed as a sealed road, giving an all-sealed connection from Horsham to Halls Gap via Zumsteins and Mt. Victory, while a length of 4 miles of the Grampians Road south from Myrtlebank and Halls Gap was commenced with a view to sealing in 1960–61. A floodway at Illawarra at which traffic was frequently held up in the past years was replaced by a bridge and road embankment.

Improvement by widening and realignment was carried out on the Alpine Road at several locations and on the Mt. Buffalo, Mt. Buller and Donna Buang Roads.

As in previous years, snow was cleared from Mt. Buller, Alpine, and Mt. Buffalo Roads to maintain road accesses to these snowfield resorts during the snow sports season.

Plates 10 to 13 show some of the improvements on tourists' roads.

8. FOREST ROADS.

Applications totalling £310,622 were received for the 378 miles of forest roads proclaimed under the Country Roads Act and £219,127 was allocated.

Much of this work is under council supervision, but no contribution is required from councils.

Major works on forest roads undertaken during the year include further widening and minor realignment of old side cutting on the Dean Marsh–Lorne Road and 3·25 miles of reconstruction of narrow side cuttings south of Tatong on the Tatong–Tolmie Road.

9. UNCLASSIFIED ROADS.

In accordance with its usual practice the Board in year 1959–60 again assisted councils in undertaking works of major improvement and construction and in general maintenance of unclassified roads under municipal jurisdiction.

TOURISTS' ROADS.

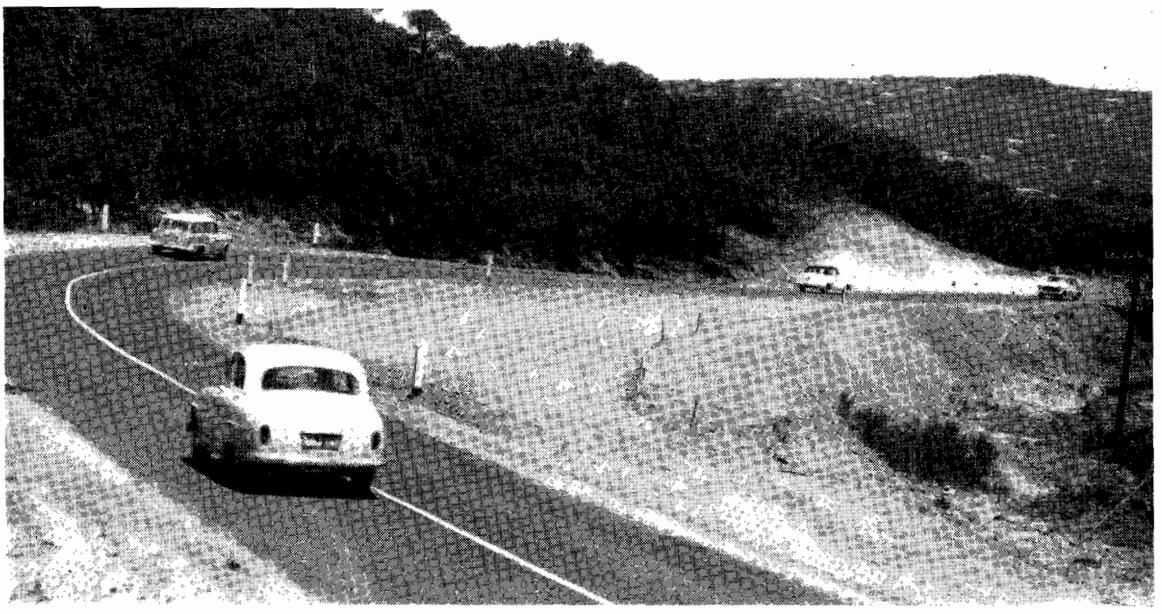

Plate 7.—Ocean Road, Shire of Barrabool. Curves east of Anglesea during reconstruction and realignment.

Plate 8.—Ocean Road, Shire of Barrabool. Approaches to bridge over Anglesea River before realignment (see below).

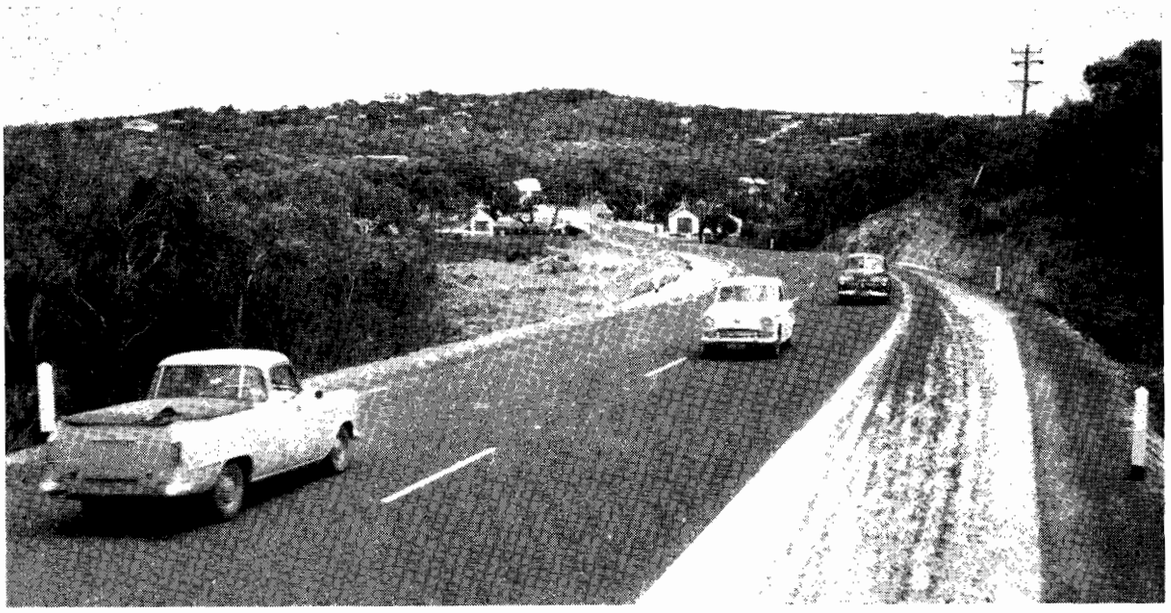

Plate 9.—Ocean Road, Shire of Barrabool. Realignment east of bridge over Anglesea River at 68·3 miles.

TOURISTS' ROADS

Plate 10.—Shire of Otway. Ocean Road. Realignment and reconstruction at Whalebone Creek, 108·3 miles.

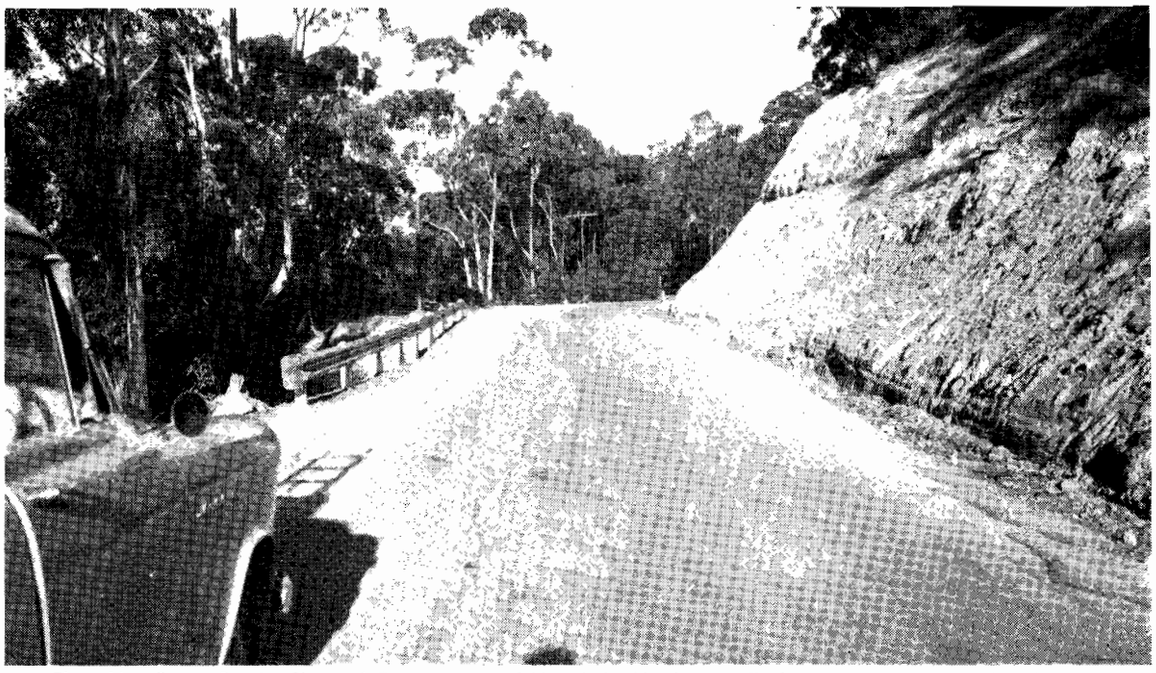

Plate 11.—Ocean Road. Shire of Otway, west of Moonlight Head turn-off after reconstruction and widening.

Plate 12.—Shire of Ararat. Grampians Road near Jimmy's Creek. Side track around a timber culvert burnt out by bush fire.

The following table shows the allocations and expenditure and relates to the financial assistance provided by the Board apart from councils' contributions :—

—	1958–59.	1959–60.
	£'000s.	£'000s.
Construction—		
Applications (totals)	11,221	12,190
Allocations (C.R.B. portion)	4,579	5,501
Expenditure (C.R.B. portion)	2,745	3,364
Maintenance—		
Applications (totals)	1,449	1,428
Allocations (C.R.B. portion)	613	623
Expenditure (C.R.B. portion)	593	606

Major Works.

Particulars of some major works typical of the many improvements on unclassified roads undertaken during the year are set out hereunder :—

Bairnsdale Division.

Avon Shire.—Wonnangatta Road—Extension of formation crossing rocky cliff section known as " Jacob's Ladder " to approximately 9 miles west of where the road crosses the Wonnangatta River via Kingswell Bridge, thus serving additional settlers in Wonnangatta River Valley.

Omeo Shire.—Bindi Road—Reconstruction and sealing of 2·9 miles. Benambra–Corryong Road—General improvement of 2 miles. Little River Road—Reconstruction and sealing of 1·7 miles serving settlement and timber traffic.

Orbost Shire.—Wallagaraugh–Fairhaven Road—Construction of 4 miles, thus providing settlers with road access.

Tambo Shire.—Buchan South Road—Reconstruction and sealing of 1·25 miles. Nungerner Road—Reconstruction and sealing of 1·5 miles. Nicholson–Tambo Upper Road—Reconstruction and sealing of 1 mile. Johnsonville–Bumberrah Road—Reconstruction and sealing of 1 mile.

Ballarat Division.

Ararat Shire.—Ararat–Yalla-Y-Poora Road—A length of 6 miles of this road to and through the Yalla-Y-Poora Soldier Settlement Estate was constructed. Mt. William Road—A length of 2·71 miles reconstructed and sealed.

Ballaarat City.—Water Street—A commencement was made in constructing the final section of this road which links the Ballarat–Daylesford Road with the Western Highway at Caledonian Bridge.

Grenville Shire.—Geelong–Portland Road—A further section of 3 miles of this road south-east of Pitfield was constructed and sealed.

Lexton Shire.—Lexton–Ararat Road—A further section of 4 miles of this road, which forms a link between the North Western and Pyrenees Highways, was constructed and 2 miles of the length were sealed.

Benalla Division.

Benalla Shire.—Wangaratta–Thoona Road—Construction of formation on a new route over the Warby Ranges—total length 1·25 miles.

Nathalia Shire.—Katanga–Picola Road—Reconstruction and sealing of 3 miles.

Numurkah Shire.—Numurkah–Waaia Road—Reconstruction and sealing 3 miles Rockliffe Road—Reconstruction and sealing of 1·9 miles.

Oxley Shire.—Oxley–Milawa Road—2 miles of reconstruction near Oxley.

Wangaratta City.—Swan Street—Construction of three-span reinforced concrete bridge, 60 feet in length and 22 feet between kerbs. White Street—Construction of three-span reinforced concrete bridge, 60 feet in length and 22 feet between kerbs. Grey and Spearing Streets—Reconstruction and sealing of 0·4 mile.

Yackandandah Shire.—Bryant's Gap Road—Construction of 2·5 miles connecting towards Tallangatta in Towong Shire.

Bendigo Division.

Kerang Shire.—Kerang–Koondrook Road—Reconstruction of section of 3·5 miles. The clay subgrade on this project was stabilized with " limil " for a consolidated depth of 6 inches and surfaced with sandstone as described in the Chief Engineer's Report.

McIvor Shire.—Mia Mia–Lancefield Road—1·7 miles of reconstruction and sealing.

Mildura Shire.—Redcliffs–Colignan Road—3·7 miles of reconstruction for sealing—leading to Redcliffs settlement and used by heavy primary produce traffic and as a school bus route. Meringur–Werrimul Consolidated Bus Routes—14 miles of reforming and gravelling to assist in access to schools in a very isolated area. Redcliffs–Morkalla Road—4 miles of reconstruction and sealing to improve conditions in a settled area near Yarrara.

Rochester Shire.—Tennyson South Road—1·4 miles of reconstruction. Nanneella–Store Road—2·2 miles of reconstruction. Gunbower Island Roads—Construction of a three-span reinforced concrete bridge over Gunbower Creek. 120 feet long with 20 feet between kerbs and a 5-ft. footway. This bridge replaces an old timber structure.

Rodney Shire.—Tatura–Dhurringile Road—5 miles of reconstruction and sealing. Trotters Lane—2 miles of reconstruction. Merrigum–Cooma Road—2 miles of reconstruction and sealing. Toolamba–Rushworth Road—1·8 miles of reconstruction and sealing.

Swan Hill Borough.—Curlewis Street—Completion of reconstruction and sealing to provide a by-pass for heavy through traffic from the main street in Swan Hill.

Wycheproof Shire.—Culgoa–Ultima Road—2·7 miles of reconstruction and sealing near Culgoa.

Dandenong Division.

Dandenong City.—Heatherton Road—Construction of reinforced concrete bridge (and approaches) over Dandenong Creek.

Eltham Shire.—Eltham–Diamond Creek Road—Construction of reinforced concrete bridge (and approaches) over Diamond Creek.

Ferntree Gully Shire.—High Street Road—Construction of reinforced concrete bridge (and approaches) over Dandenong Creek ; 0·75 mile of widening and resheeting to provide 20 feet wide sealed pavement.

Flinders Shire.—Merricks Road—Reconstruction and sealing of 0·5 mile (Plate 14).

Yea Shire.—Ghin Ghin Road.—Realignment of 1 mile and construction of two new bridges, providing all-weather access to " Highlands " except for unusual floods in Goulburn River. (Plate 15.)

Geelong Division.

Bannockburn Shire.—Meredith–Shelford Road—2·5 miles of reconstruction in preparation for sealing.

Bellarine Shire.—Ocean Grove–Drysdale Road—0·75 mile of reconstruction and sealing. This length leaves only 0·75 mile of this road to be sealed.

Bulla Shire.—Konagaderra Road—The old Konagaderra Bridge over Deep Creek was replaced by a new concrete and steel structure. Riddell Road—1·25 miles of reconstruction and sealing.

Colac Shire.—Larpent Road—2 miles of reconstruction in preparation for sealing.

Kyneton Shire.—Lauriston Road—3 miles of reconstruction in preparation for sealing. Kyneton–Spring Hill Road—1·5 miles of reconstruction and sealing.

Winchelsea Shire.—Cape Otway Road—2 miles of reconstruction and sealing. Cressy Road—2·75 miles of reconstruction and sealing. This brings the sealing of this road to the vicinity of the Mt. Hesse Soldier Settlement Estate.

TOURISTS' ROAD

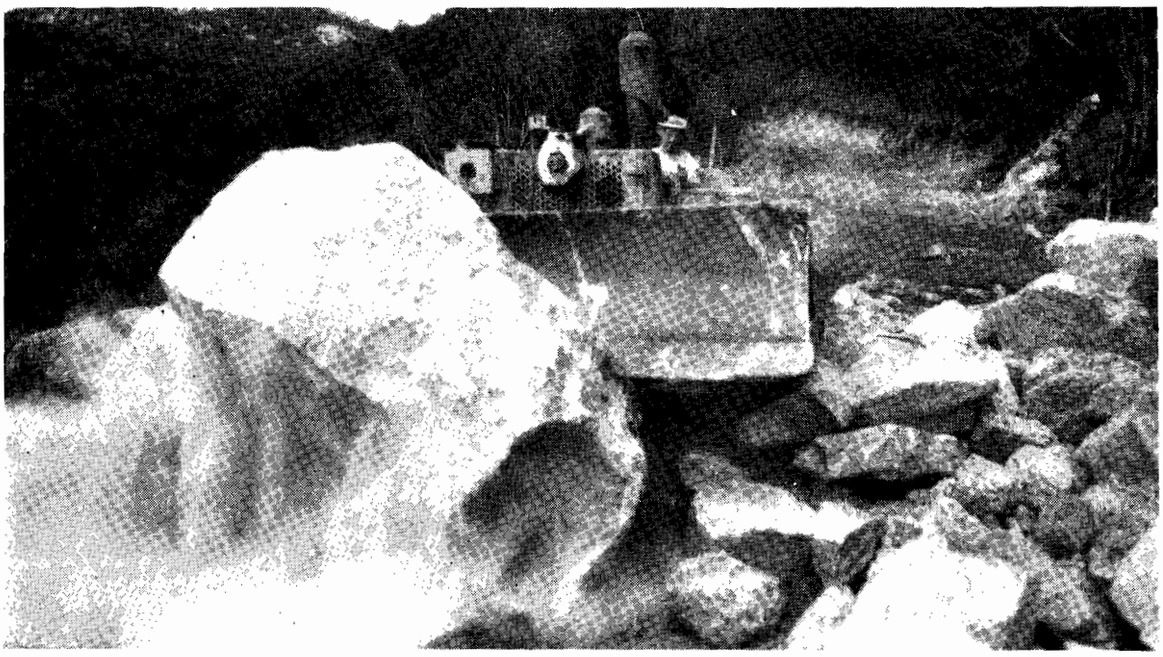

Plate 13.—Shire of Bright. Mt. Buffalo Road (The Horn section). Widening in progress south of the Cathedral.

UNCLASSIFIED ROADS.

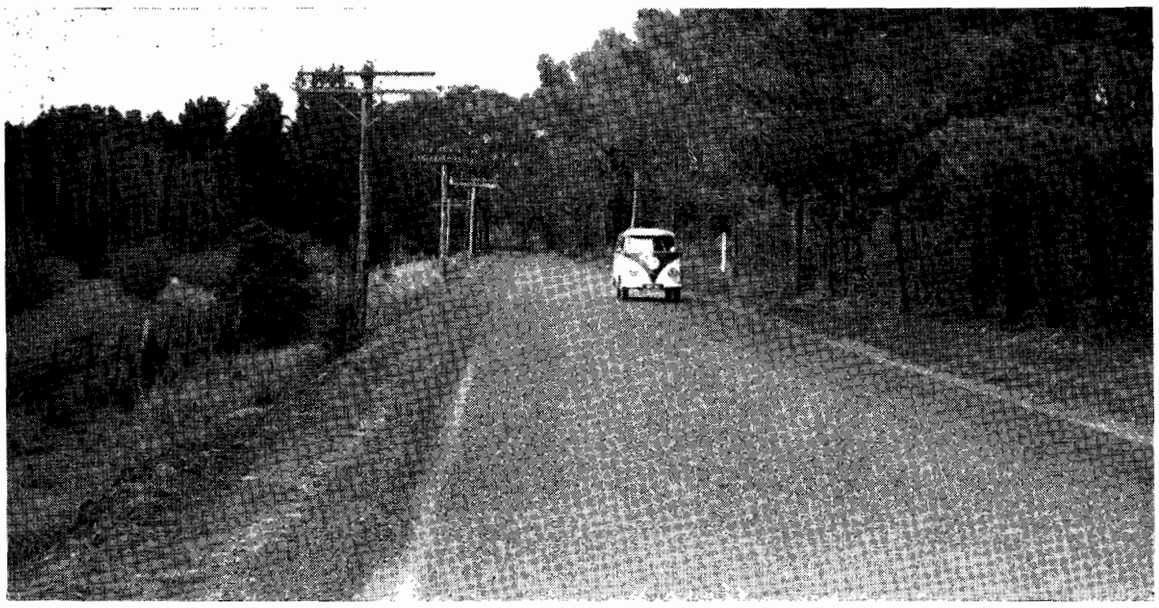

Plate 14.—Shire of Flinders. Completed section of Merricks Road at North Merricks.

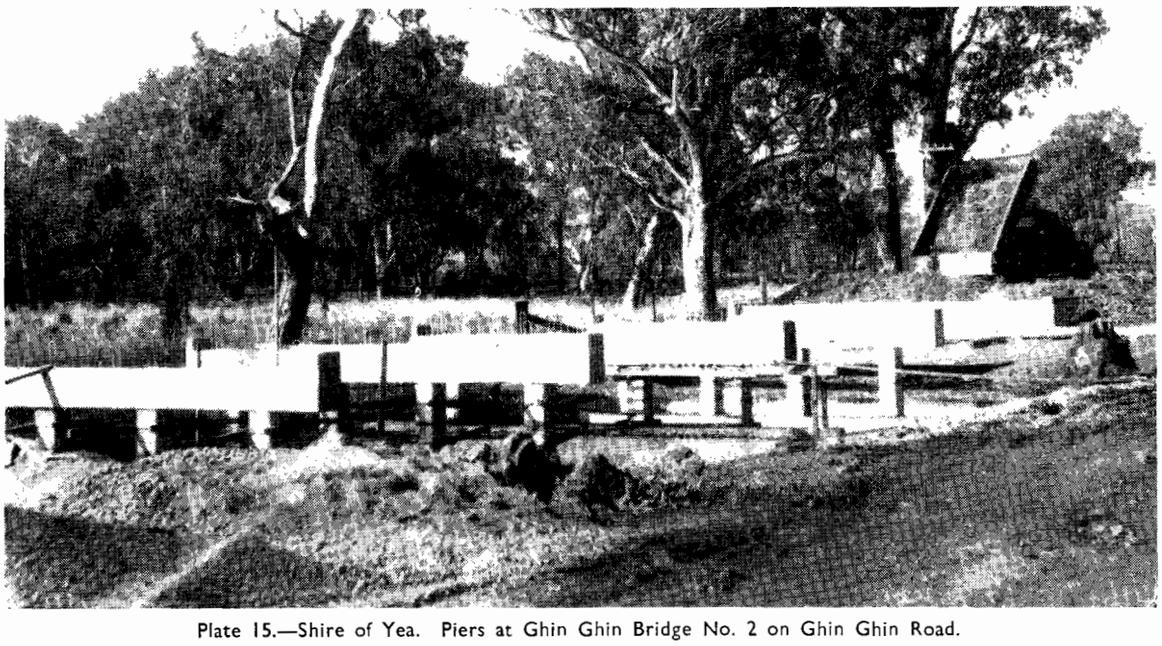

Plate 15.—Shire of Yea. Piers at Ghin Ghin Bridge No. 2 on Ghin Ghin Road.

Horsham Division.

Arapiles Shire.—Jallumba–Clear Lake Road—Construction and sealing of 3·6 miles.

Lowan Shire.—Nhill–Gymbowen Road—3·2 miles constructed, thus improving this route across the "Little Desert".

Warracknabeal Shire.—Warracknabeal–Watchem Road—2·5 miles constructed and sealed.

Metropolitan Division.

Coburg City.—Murray Road—Reconstruction and widening pavement from Sydney Road to Merri Creek. Moreland Road—Reconstruction and widening pavement from Nicholson Street towards Merri Creek.

Footscray City.—Barkly Street—Reconstruction of pavement from Palmerston Street to Argyle Street. Somerville Road—Reconstruction and widening of pavement westerly from Princes Highway West.

Oakleigh City.—North Road—Reconstruction as divided roadway between Best Street and Haughton Road, and reconstruction between Warrigal Road and Best Street.

Preston City.—Eileen Street—Construction of divided roadway from Woods Street to Tyler Street.

Sunshine City.—St. Albans Road—Widening pavement from overhead bridge to St. Albans.

Traralgon Division.

Alberton Shire.—Pound Road—1·5 miles of reconstruction to provide a 12-ft. sealed pavement. Darriman–Seaspray Road—1·5 miles of forming, surfacing and sealing 12 feet wide, to cater for local and tourist traffic.

Mirboo Shire.—Mountain Hut Road—2 miles of realignment, commencing at Mirboo North–Thorpdale Road, to provide an improved through route to Morwell.

Narracan Shire.—Moe–Thorpdale Road—2 miles of reconstruction and sealing 12 feet wide. Waterloo-road—2 miles of reconstruction, and construction of two reinforced concrete bridges.

Rosedale Shire.—Longford–Letts Beach Road—8·5 miles of reconstruction and sealing. This road serves the R.A.A.F. Bombing Range, the Latrobe Valley Water and Sewerage Board's Disposal Farm at Dutson and the developing seaside resorts on the Ninety Mile Beach. Sale–Toongabbie and Denison Roads—4 miles of strengthening and sealing, 12 feet wide, in the Nambrok–Denison Soldier Settlement Irrigation Area.

South Gippsland Shire.—Boys–Buffalo Road and Boys Road—2·25 miles of reconstruction and sealing 18 feet wide on the through route between Meeniyan and Fish Creek to cater for local and tourist traffic. Promontory Road—Reconstruction of 6 miles near Yanakie, serving Yanakie Soldier Settlement Area and increasing traffic to Tidal River camping area, Mount Oberon P.M.G. Station and Wilson's Promontory Lighthouse.

Traralgon Shire.—Town Streets, Traralgon.—2 miles of construction and sealing, 26 feet wide, of various streets in the township of Traralgon.

Woorayl Shire.—Meeniyan–Buffalo Road—2 miles of construction and sealing, 12 feet wide, on the through route between Meeniyan and Fish Creek to cater for local and tourist traffic.

Warrnambool Division.

Dundas Shire.—Glendinning Road—2·4 miles of reconstruction and sealing. Victoria Point Road—·5 miles of reconstruction and sealing.

Hamilton City.—French Street—Reconstruction and sealing, 40 feet wide, between Thompson and Brown Streets in Hamilton. King Street—0·36 mile of reconstruction and sealing, 20 feet wide.

Heytesbury Shire.—Carpendeit–Bungador Road—2 miles of sealing. Timboon–Terang Road—2·2 miles of sealing.

Minhamite Shire.—Codrington Road—3 miles of reforming and resheeting.

PRINCES HIGHWAY

Plate 16.—Princes Highway West, 24 miles, before duplication of pavement (see below).

Plate 17.—Princes Highway West, 24 miles, after completion of the dual highway.

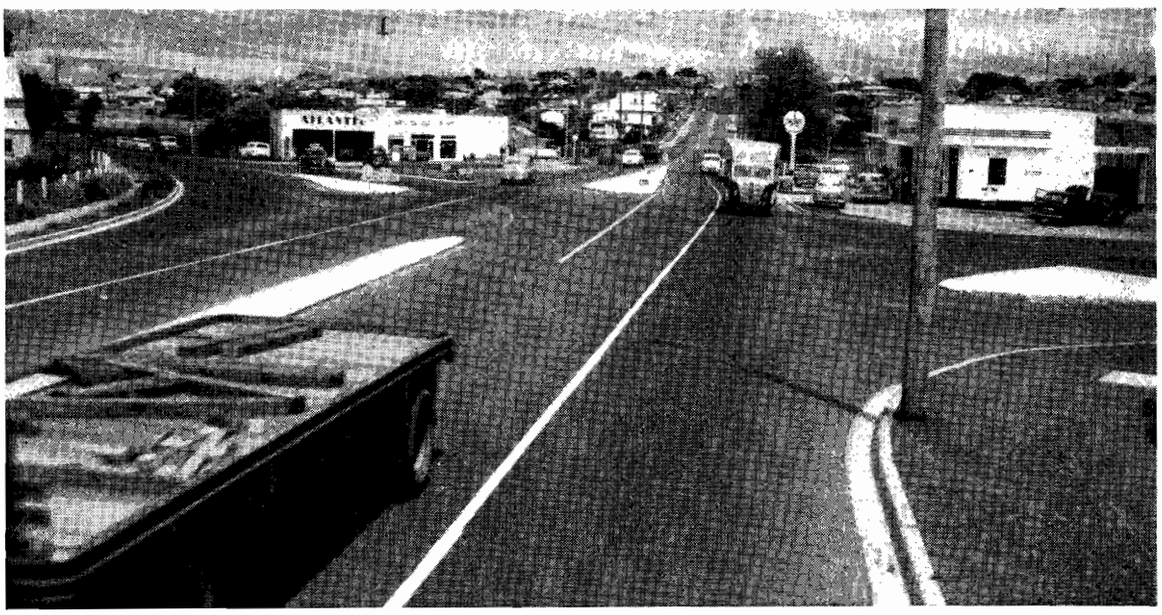

Plate 18.—Shire of South Barwon. Princes Highway West, Section 1. Channelization at junction with Barwon Heads Road.

PRINCES HIGHWAY.

Plate 19.—Shire of Winchelsea. Princes Highway West, Section 2. Bridge demolished by train at Armytage.

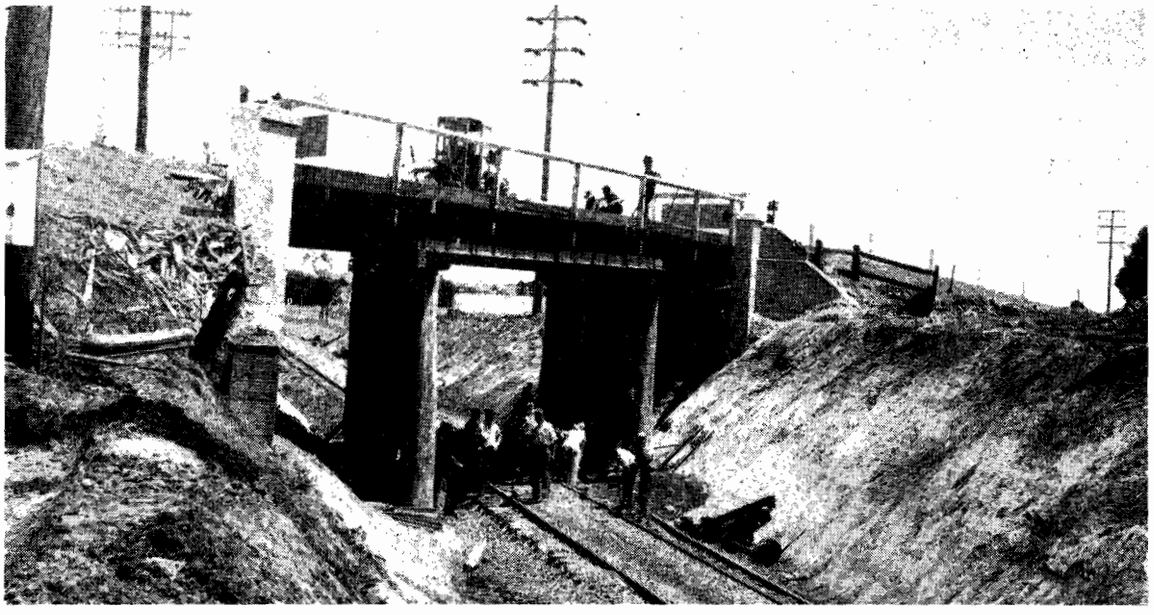

Plate 20.—Shire of Winchelsea. Princes Highway West, Section 2. Temporary replacement of bridge over railway at Armytage.

Plate 21.—Shire of Orbost. Club Terrace Loop. Section constructed by contractor on new alignment near Bemm River, Princes Highway East.

Mount Rouse Shire.—Hamilton–Chatsworth Road—4·6 miles of resheeting and sealing. Back Bushy Creek Road—4·4 miles of loaming and gravelling.

Wannon Shire.—Coleraine–Nareen–Moree Road—5·1 miles of resheeting and sealing. Sandford Road—Construction of four-span reinforced concrete bridge.

10. STATE HIGHWAYS.

Nearly all the maintenance and improvement work on State highways is carried out under the direct superivsion of the Board. Its Divisional Engineers applied for £9.675,000 and were allocated £6,780,000, approximately 70 per cent. of the applications.

The length of the State highway system remained unchanged during the year and comprised 3,845 miles of which 466 miles, or approximately 12 per cent. of the total, still lacks a bituminous or other type of dustless surface. The unsealed sections are, in general, located in areas of the State remote from the metropolis of Melbourne, and in the main they do not carry large traffic volumes. Their condition, however, indicates that the task of constructing the present State highway system is not yet accomplished.

The first call on available funds must of necessity be for the effective maintenance of the system, in order to provide safe and comfortable travelling conditions and to preserve the assets. The time-proven system of maintenance by small gangs of men, mostly under the direct control of the Board's Divisional Engineers, adequately provided with the necessary plant and equipment for the task, has been continued, the total personnel so employed having risen slightly from the previous year to a total of approximately 423 men. These men maintain pavements, shoulders, drains and structures and also attend to plantations and road furniture (signs, guide posts, &c.). Maintenance work, including bituminous retreatment, absorbed approximately 22 per cent. of the funds apportioned for State highways for the year. As the bulk of the road pavements are of the sprayed bitumen type, regular retreatment is required, and during the year a total length of 350 miles of the system was retreated, most of this work being carried out with the Board's own mobile plant under the general management of the Asphalt Engineer. This represented approximately 10 per cent. of the sealed length, a somewhat lower rate than that of the previous year. A feature of the retreatment work was the increased use of hot rolled asphalt in lieu of a sprayed reseal coat, a total length of 35 miles having been carried out as against 24 in 1958–59. This superior type of resurfacing was laid on the more heavily trafficked lengths.

In all parts of the State, worn out or failing sections of State highways were reconstructed and restored. Where considered necessary to meet the present demands of traffic and to provide more adequately for the greater volumes of traffic anticipated during the expected life of the new road sections, improvements consisting of wider and stronger pavements, better alignment and visibility standards and improved gradings were incorporated. A total length of approximately 170 miles of this type of work was completed, spread over many projects.

After having provided for maintenance and restoration the year's programme included also urgent improvements such as the duplication of portions of the most heavily trafficked sections of State highways in the vicinity of Melbourne, the raising of sections subject to recurrent flooding, realignment or deviation of tortuous sections in hilly country, and extension of sealing following after reconstruction. Brief particulars of the principal works of these types are given in the following paragraphs.

Princes Highway West.—Considerable progress was made in duplicating the section between Melbourne and Geelong. (Plates 16 and 17.) Work on the divided highway between Kororoit Creek and Werribee and from near Little River to Norlane which had been practically completed the previous year was continued, taking the form of central median improvement, construction of kerbing and provision for drainage, &c. A further length of 7·25 miles of duplicate pavement between Werribee and Little River was completed by contract and lightly sealed—this section will be completed with a hot rolled asphalt surface early in 1960–61. Vehicular subways at Laverton to carry Railway Avenue through the embankments of the duplicated Princes Highway were completed. Preliminary work of clearing the site of services and some earthworks for extension of the duplicate highway from Norlane towards Geelong was carried out.

Channelization was introduced at the intersection with Barwon Heads main road. (Plate 18.)

STATE HIGHWAYS.

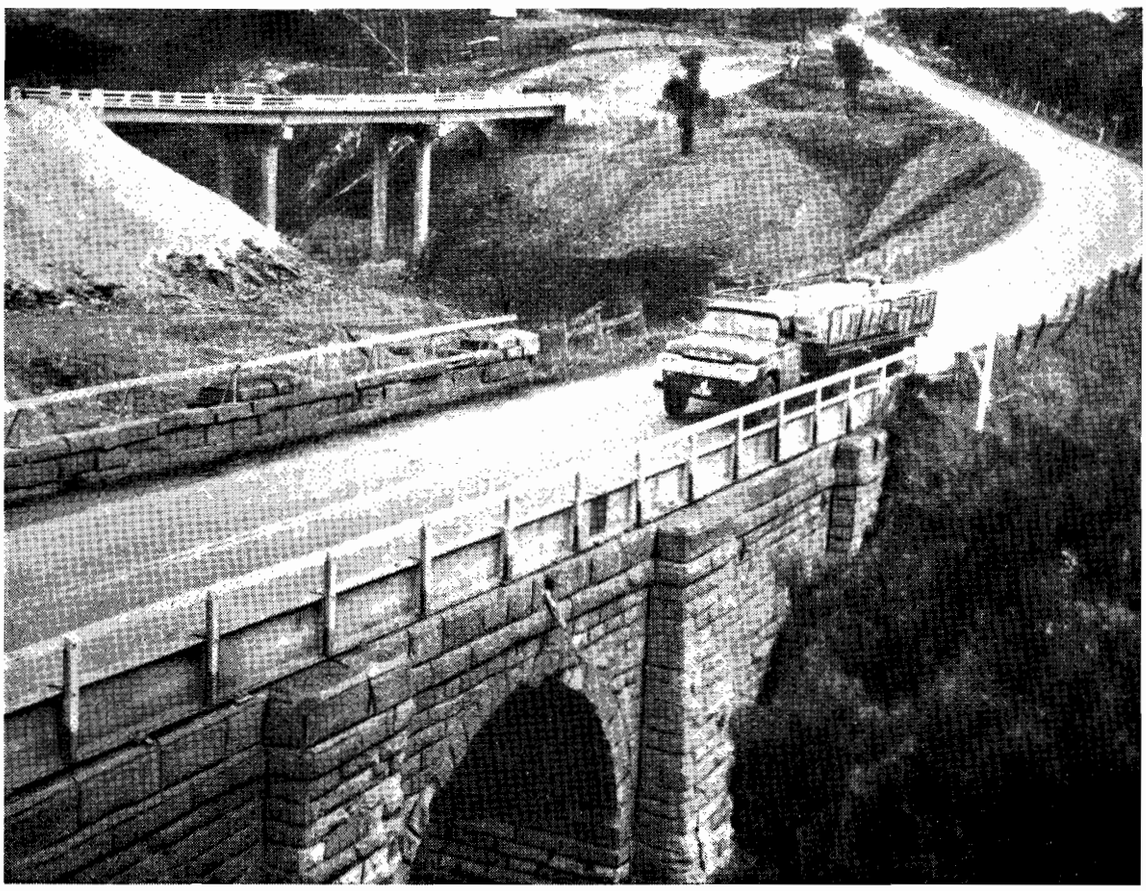

Plate 22.—Shires of Melton and Bacchus Marsh. Western Highway, Section 1. Bridge on new alignment over Djerriwarrh Creek with old narrow bridge in foreground.

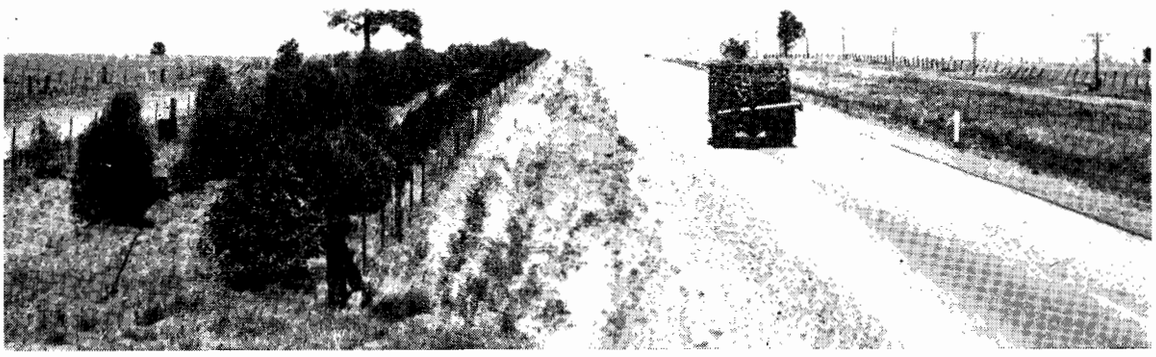

Plate 23.—Shire of Lowan. Western Highway, Section 5. Plantation of trees west of Nhill.

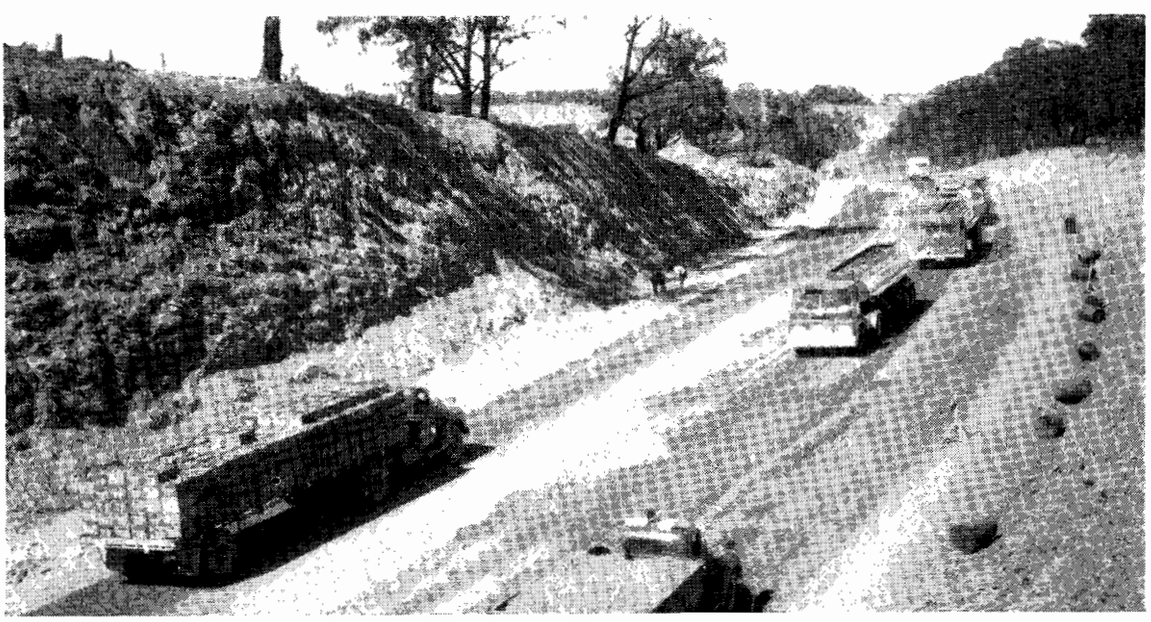

Plate 24.—Hume Highway, Section 1, 39 miles. New alignment and cutting in course of construction at Green's Pinch.

East of Armytage 2·8 miles were widened and reconstructed in preparation for sealing early in 1960–61. A train derailment in December, 1959, resulted in the wrecking of the highway bridge over the railway near Armytage (Plate 19) and intense road traffic over the Christmas–New Year period had to be detoured. A temporary bridge was constructed by the Board (Plate 20) and the highway reopened to traffic within fifteen days of the accident.

At Terang, the southern carriageway of the divided section was reconstructed providing for complete one-way traffic operation through the business section of the town. West of Garvoc a further 2 miles of highway were widened and reconstructed in continuation of work carried out in the previous year, and similar works totalling about 5 miles were completed at Tyrendarra and west of Mumbannar.

Princes Highway East.—Works to further the divided highway project to serve the important commercial and industrial area of Dandenong and provide for the Gippsland traffic were carried out at Huntingdale Road intersection and easterly from Dandenong. Reconstruction works involving widening and greatly improved alignment were completed east of Nar Nar Goon, east of Tynong and at the approaches to the new Bunyip River Bridge, the total length of these projects being 4 miles. Similar works at Trafalgar and Moe resulted in the improvement of a further 3 miles. The major project designed to eliminate flooding of the Princes Highway East at Sale was advanced a further stage by the construction of two reinforced concrete bridges between the Thomson River and Flooding Creek. In continuation of the construction of the road deviation to replace the Club Terrace " Loop " which was commenced in 1958–59 a further 3·5 miles of heavy new construction was nearing completion at the end of the year (Plate 21). Two bridges to take the full flow of the Cann River were completed with banked approaches to raise the highway level. The completion of these works next year will eliminate flooding, the cause of serious delays in past years, from this section. The length of sealed road on the Princes Highway East was extended by approximately 4 miles by the completion of a new section east of the Wingan River.

Western Highway.—A project has been commenced which will greatly improve the alignment, visibility and grade on an old narrow tortuous hilly section at Djerriwarrh Creek west of Melton. A new bridge has been completed and roadworks are well in hand. The bridge abutments and the earthworks provide for a divided highway, but one carriageway only will be constructed in 1960–61 (Plate 22). Improvements to alignment and visibility were carried out west of Ballan and north of Gordon, and at Windermere and Burrumbeet approximately 3 miles of reconstruction, including widening, were completed. Between Ararat and Stawell two sections totalling 5 miles were similarly improved, while at Burnt Creek near Horsham and between Dahlen and Pimpinio weak and narrow sections aggregating 5·5 miles were reconstructed. Tree planting was continued west of Nhill (Plate 23).

Calder Highway.—Between Gisborne and Woodend in the " Black Forest ", an old rough section with a " corduroy " foundation was rebuilt and a deviation was made to eliminate a bad reverse curve, the length of this project being 2 miles. A weak and narrow section 3·5 miles in length between Wycheproof and Culgoa near Warne Railway Station was widened and reconstructed. There are still many sections of this highway with only a 16-ft. wide pavement as constructed 30 years ago. Pending reconstruction and widening of the pavement the shoulders have generally been maintained by repeated sheeting with gravel.

Hume Highway.—A commencement has been made to duplicate the heavily trafficked section of the highway between Fawkner and Somerton, a rapidly developing industrial area. A length of 2 miles has been completed to Camp Road. Through Kilmore township the pavement has been reconstructed between channels, and over Greens Pinch Hill three (and at the crest four) lanes have been provided and the alignment and visibility greatly improved (Plate 24). Towards the objective of providing a 24-ft. minimum width of sealed pavement from Melbourne to the River Murray, further sections of widening and reconstruction totalling 16 miles have been completed or are in progress near Balmattum, Violet Town, Baddaginnie, Winton, Springhurst and Wodonga. Work on raising and relocating the road across the Ovens River flood plain at Wangaratta has continued. Two of the five bridges required were completed and roadworks are in progress. On the Wodonga–River Murray section, now named the " Lincoln Causeway " as a tribute to the Olympic athlete Mr. Mervyn Lincoln, two additional floodway bridges have been widened to accommodate a 24-ft. sealed pavement throughout the length (Plate 25).

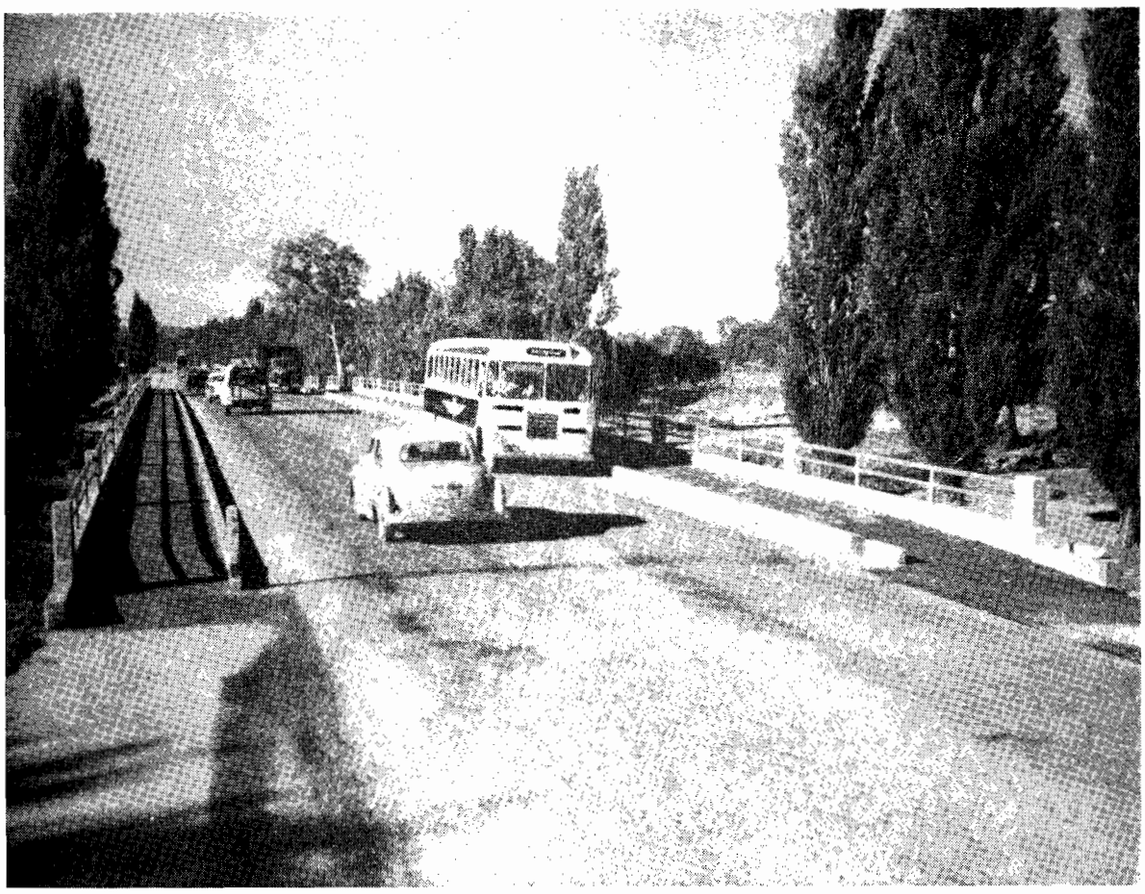

Plate 25.—Hume Highway, Section 3. No. 4 bridge over River Murray flats showing widening from 22 to 28 feet between kerbs, and the provision of two cycle tracks 6 feet wide.

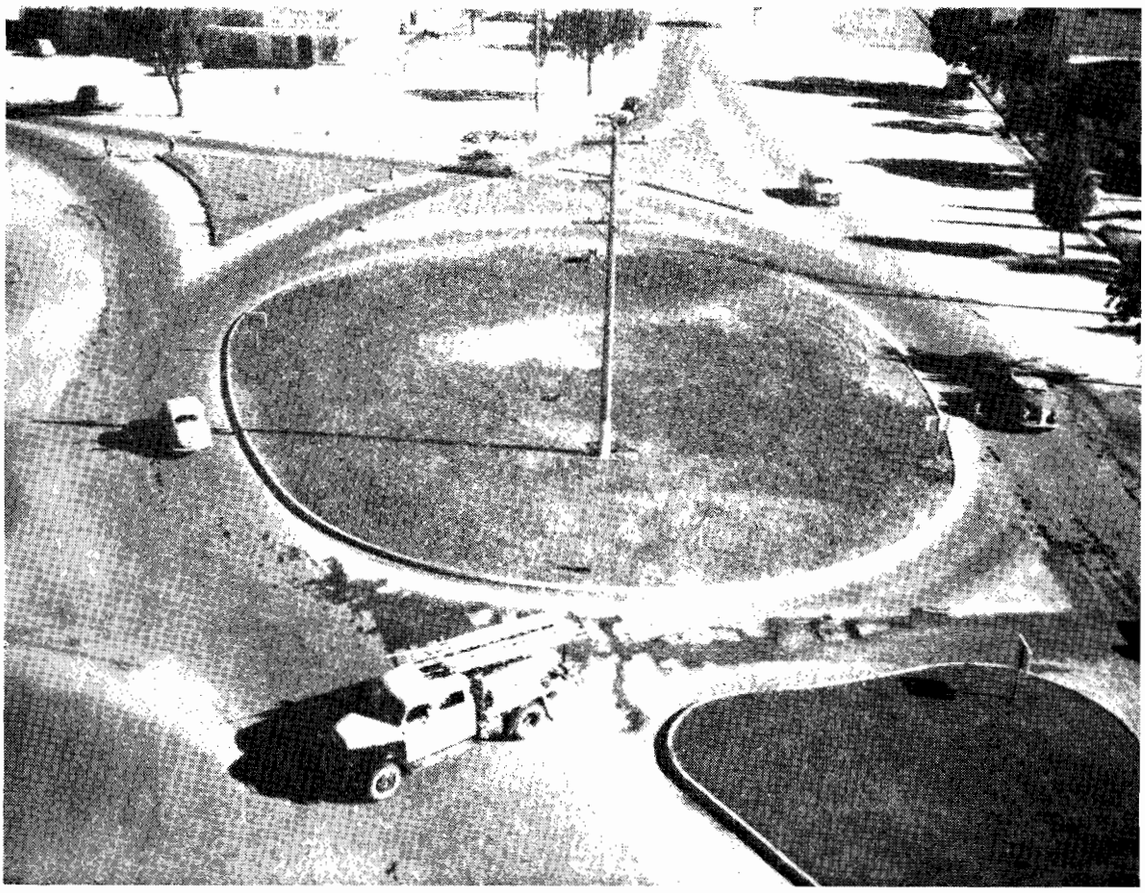

Plate 26.—Murray Valley Highway, Section 2. Channelized intersection at Beechworth-Wodonga Road.

SOIL STABILIZATION, MURRAY VALLEY HIGHWAY.

Plate 27.—Spreading "Limil" on loose soil.

Plate 28.—Mixing "Limil" and soil by disc harrow.

Plate 29.—Murray Valley Highway, Section 2, 132·46 to 138·88 miles. "Seamen" pulverizer being used for final mix.

STATE HIGHWAYS.

Plate 30.—Henty Highway, Section 1. Reconstruction, widening and sealing completed on a section north of Portland.

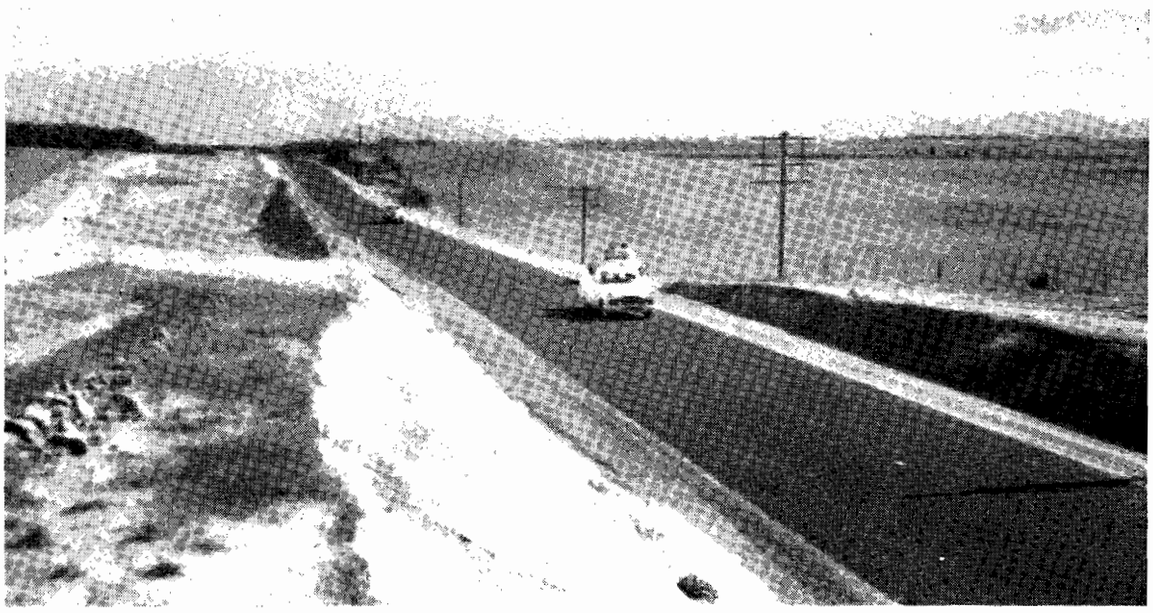

Plate 31.—Glenelg Highway. Approximately 146 miles east of Glenthompson, after realignment, reconstruction and sealing.

WERRIBEE BY-PASS ROAD.

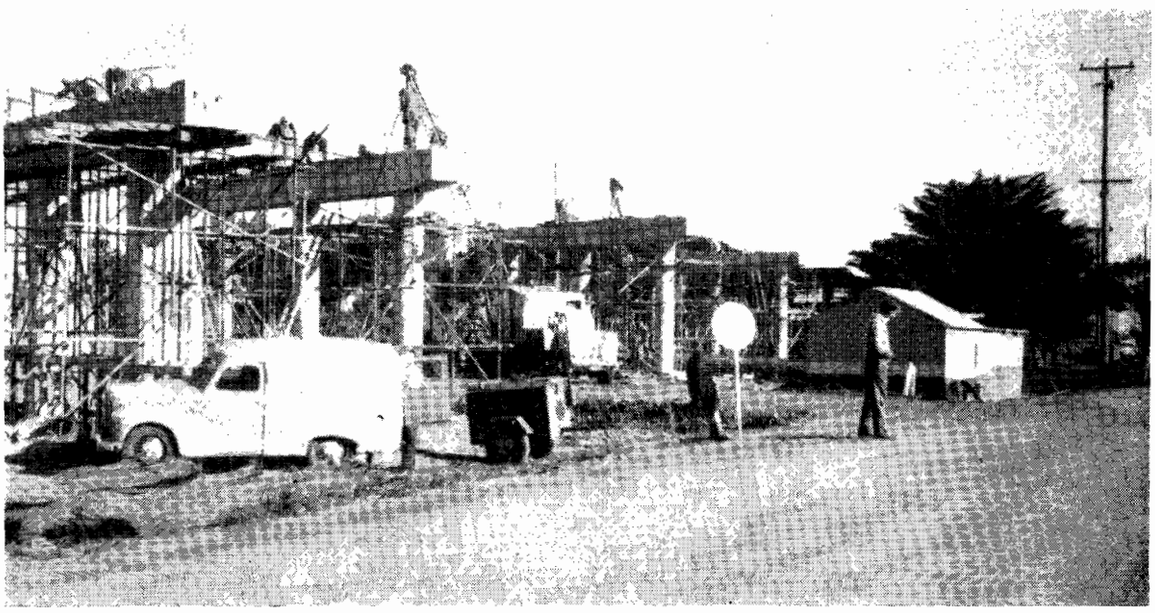

Plate 32.—Duncan's Road Overpass in course of construction.

WHITELAW BY-PASS ROAD, KORUMBURRA.

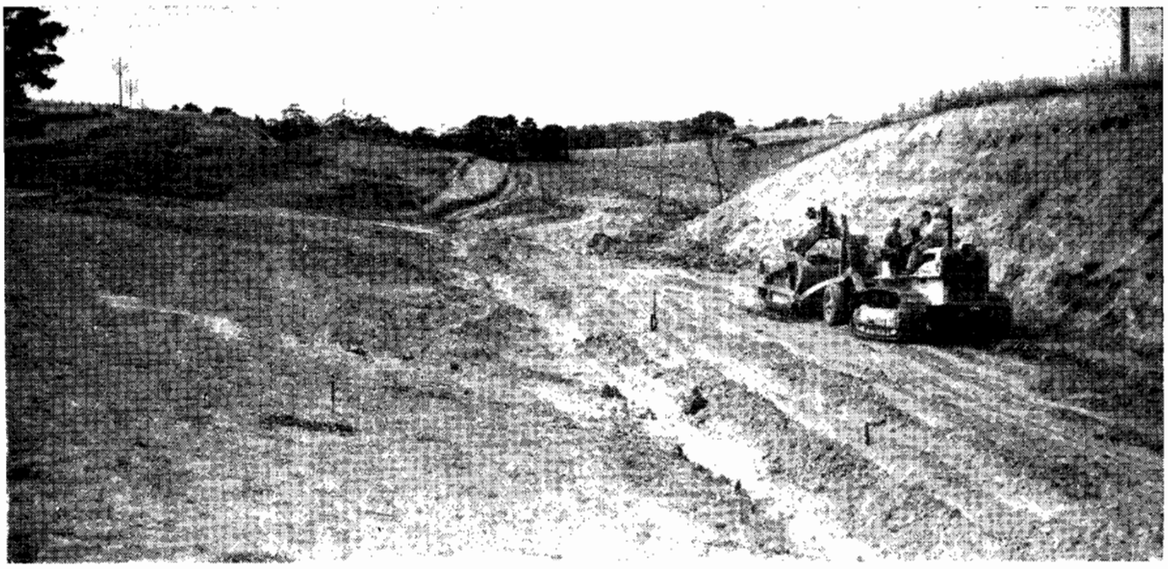

Plate 33.—Construction of Whitelaw By-pass Road. western end.

BRIDGES.

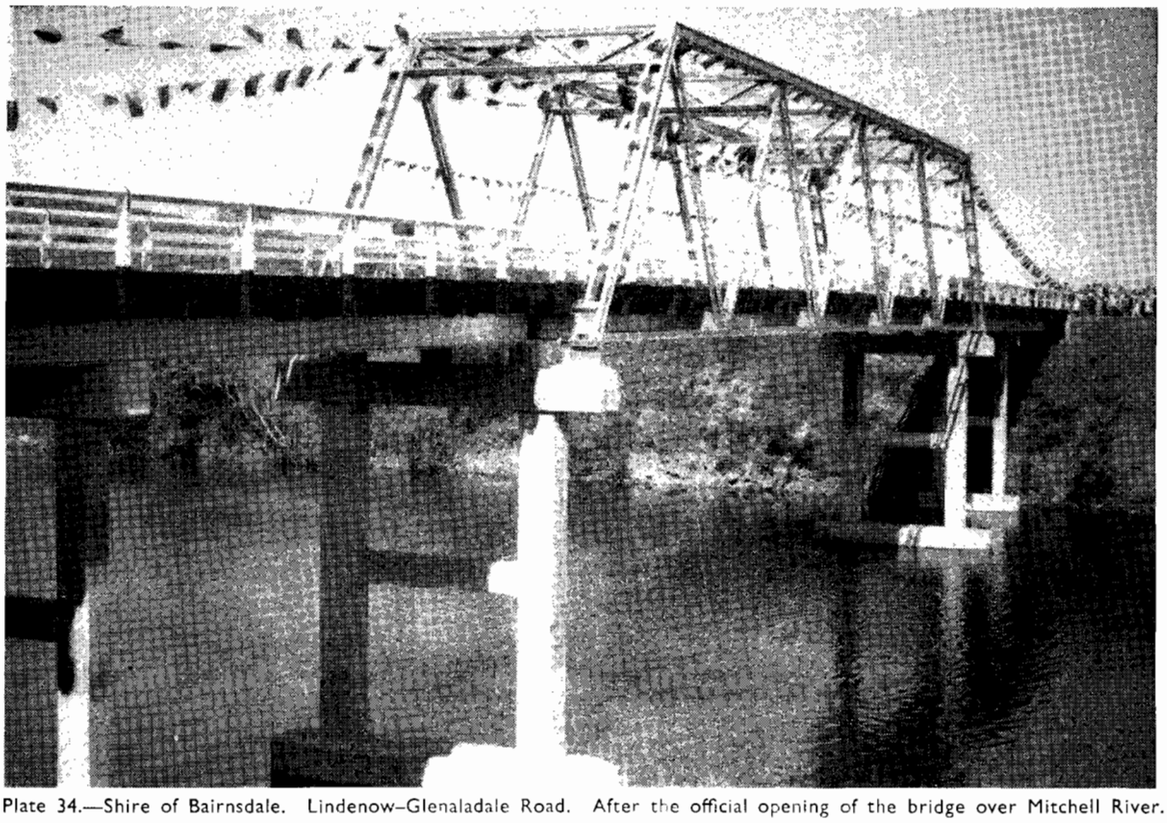

Plate 34.—Shire of Bairnsdale. Lindenow–Glenaladale Road. After the official opening of the bridge over Mitchell River.

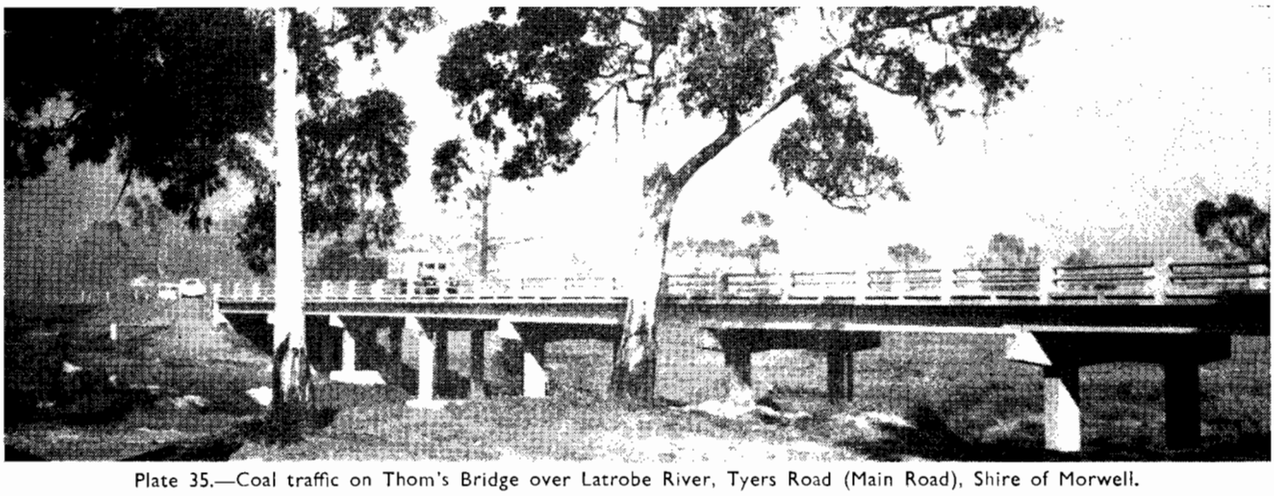

Plate 35.—Coal traffic on Thom's Bridge over Latrobe River, Tyers Road (Main Road), Shire of Morwell.

Murray Valley Highway.—Improvements were carried out to four sections totalling 8 miles between Wodonga and Corryong, and an important intersection at Wodonga was channelized to control traffic flow (Plate 26). East and west of Rutherglen the very narrow old pavement was widened over a length of 7·5 miles, while the last remaining unsealed section between Wodonga and Echuca, situated north of Nathalia, almost 3 miles in length, was constructed and sealed. The " Bay of Biscay " section east of Echuca subject in the past to severe flooding has been raised and a new bridge constructed. This work has been designed and built in conjuction with the State Rivers and Water Supply Commission which has carried out large drainage improvement works in the Deakin irrigation district. A length of 6·5 miles to the east of this section was also reconstructed, the work incorporating the use of hydrated lime as a stabilizing agent (Plates 27 to 29). Reconstruction of weak road between Lake Boga and Swan Hill was continued. East of Nyah seven sections totalling 7·5 miles were completed.

South Gippsland Highway.—Of the existing narrow and poorly aligned section between Korumburra and Leongatha. which needs to be almost entirely replaced, reconstruction was commenced on a length of 4·25 miles between Ruby and Leongatha.

Midland Highway.—West of Stanhope the first two of a series of bridges were commenced which with raised pavement are designed to eliminate serious flooding at the crossing of a tortuous depression. The replacement and widening of bridges on the flood plain of the Goulburn River between Mooroopna and Shepparton was completed during the year, six structures having been so renewed in recent years leaving the main river bridge to be dealt with later. Between Benalla and Mansfield the sealing was extended 2·5 miles, while an additional section 2 miles in length was prepared for this treatment. South of Yinnar the sealing was extended approximately 2·5 miles into the hill section of the highway towards Budgeree.

Henty Highway.—Between Branxholme and Hamilton the pavement was widened and strengthened over approximately 3 miles, a new bridge was erected at Cherrypool over the Glenelg River and 14 miles of narrow seal were widened and 4 miles reconstructed between that point and Horsham. Between Speed and Gypsum two sections of 5·5 miles were reconstructed and sealed leaving a length of only approximately 6·5 miles now unsealed on this highway between Portland and Ouyen. Two miles were reconstructed and sealed between Portland and the junction with the Princes Highway West (Plate 30).

Glenelg Highway.—Improvements were carried out at Cherry Tree Hill east of Linton, at Pittong and also at Streatham totalling 4·5 miles in the Ballarat Division, and on a length of 2 miles east of Glenthompson (Plate 31) in the Warrnambool Division.

The Borung Highway was widened over a length of 19 miles in three localities, west of Charlton, near Jeffcott and near Warracknabeal. effecting great improvement to this route.

Bass Highway.—This year saw the completion of the new Powlett River Bridge and approaches near Wonthaggi which has eliminated a troublesome flooding problem.

Maroondah Highway.—The rapid growth of traffic on the section between Mont Albert and Ringwood has rendered a four-lane facility an urgent need. This year, reconstruction of the section from York Street to Box Hill where the road reserve is only 66 feet wide was completed in the form of a four-lane undivided pavement, the work being supervised by the Box Hill City Council. A section through and west of Ringwood was reconstructed as a divided roadway under the Board's direct supervision, incorporating concrete pavement as surface slab in the business section and buried slab in portion of the remainder. Pavement failures and inequalities have been recurrent in the past on these sections, largely owing to the presence of large diameter trunk water mains entrenched in the clay subgrade, so that a specially robust type of road construction was necessary in the new work. A contract for another divided four-lane section from Middleborough Road, Blackburn, extending a similar form of construction undertaken previously was partly completed at the close of the year.

11. BY-PASS ROADS.

Under the provisions of Part VII. of the Country Roads Act the Board may acquire land for and construct " by-pass roads " which are in other countries variously known as " motorways ", " special roads " or in general as " limited access roads " and may thus include " no access " roads or " freeways ".

Werribee By-pass Road.—The Board accepted the tender of Thiess Bros. (Victoria) Pty. Ltd. for £199,790 for construction of approximately 5 miles of four-lane divided roadway on the new Werribee By-pass Road. Several other contracts have also been signed for the construction in separate parts of two bridges over the Werribee River and of overpasses to carry side road traffic over the by-pass road (Plate 32), whilst some portions of the project in the vicinity of intersections with the existing road are being carried out by the Board's forces. It is expected that this by-pass road will be open to traffic by about May, 1961, when a continuous four-lane divided roadway will be available between Brooklyn and North Geelong for a total distance of 35 miles.

Whitelaw By-pass Road, Korumburra Shire.—Work on the new road which will provide a direct route between Bena and Korumburra is progressing (Plate 33). The new route, which has good alignment and grades, will by-pass 3·5 miles of narrow tortuous hilly sections of the Bena–Korumburra and Warragul–Korumburra Roads including two railway level crossings. Except for temporary access to a severed area at one point, the route will be free from local farm accesses. It will in effect close a gap in the route of the South Gippsland Highway.

Dingley and other By-pass Roads.—In several localities where by-pass roads are being planned for future construction, action has been taken or commenced to acquire the land required as far as possible whilst this is available at prices applicable to rural use. This applied to Dingley By-pass Road, a new route avoiding existing 1-chain roads and designed to extend South Road to the north and east of Dingley. In some cases old subdivisional land is being traversed as for portion of Frankston by-pass which will both divert from Frankston a proportion of traffic proceeding to the Mornington Peninsula and also provide some relief to the Nepean Highway in serving part of Frankston itself. Similar action is proposed where new routes are involved to eliminate railway level crossings on the Hume Highway in connection with the construction of the standard gauge railway from Melbourne to Wodonga, e.g., at Craigieburn and in the vicinity of Barnawartha and Chiltern. In these cases construction of the new routes from the outset as by-pass roads is proposed so that there will be eventually no farm access to or new commercial developments fronting the new facility whilst traffic to and from the townships near the new route will be catered for at suitable interchange points and local traffic on feeder roads will be enabled to reach the townships at suitable crossings. Sufficient land will be acquired to enable such traffic to be carried over or under the by-pass road at a later date even if the necessary structures are not needed at the outset. Other by-pass roads which have been authorized are at Moe, Mt. Eliza and Cranbourne. In some cases where immediate acquisition of the land is less urgent the alternative procedure has been adopted of fixing alignments under the provisions of Section 114 of the Country Roads Act.

12. APPORTIONMENT OF COSTS OF ROAD WORKS.

The entire cost of work done on State highways, tourists' roads and forest roads is borne by the Board. Municipalities are required to contribute towards the cost of works on main roads in accordance with the provisions of the Country Roads Act. Councils are also required to meet a proportion of the expenditure on unclassified roads for which grants have been made from Commonwealth aid moneys.

The Country Roads Act provides that no more than one-third of the amount expended from the Country Roads Board Fund on the maintenance of main roads shall be apportioned to municipalities. The municipal contribution may be reduced below one-third where the cost of maintenance of a road is deemed to be excessive and where such cost is due to motor traffic not of local origin, or to timber traffic.

In September, 1959, the Board proceeded to apportion the £4,170,667 expenditure from the Country Roads Board Fund on main roads. After considering, among other things, the revenue, valuation and rating of each municipality concerned, the Board apportioned a total of £693,764 to councils for the maintenance of main roads.

It must be borne in mind that the Board provided £1,280,910 from Commonwealth Aid Roads moneys free from additional contribution by the councils for reconstruction projects on main roads. It is thus apparent that, whereas the statute provides for one-third of the cost of maintenance of main roads to be apportioned to municipalities, the Board has, in effect, apportioned to councils only 16·63 per cent. of the expenditure from the Country Roads Board Fund which equals 12·72 per cent. of the total expenditure, including Commonwealth Aid Roads grants.

13. CONTRACT AND DIRECT LABOUR WORKS.

The Board is faced with increasing demands for construction and maintenance works on roads and bridges. This increase is due to a number of factors including :—

(*a*) A general increase in all types of registered vehicles which has necessitated provision of additional traffic lanes, wider carriageways, better alignments, separation of carriageways and construction of complex channelization projects to alleviate traffic congestion.

(*b*) The increasing use of road transport and the greater numbers of heavy commercial vehicles now using roads which has rendered essential the strengthening and improvement in standard of alignment and grade of State highways and main roads, together with construction of by-pass roads in certain congested areas.

(*c*) The need for urgent replacement of a large number of old timber bridges which are no longer capable of supporting heavy loads.

(*d*) The demand for large road construction works as a necessary adjunct to major projects undertaken by other government departments such as State Rivers and Water Supply Commission, State Electricity Commission, Soldier Settlement Commission and Housing Commission.

Apart from personnel engaged in regular patrol maintenance the Board has kept intact its established specialist forces to perform work of the following types :—

(*a*) Bituminous surfacing.

(*b*) Complex projects where flexibility of design, construction and supervision is necessary.

(*c*) Works in which there are special difficulties in handling traffic.

(*d*) Urgent works for which, on occasion, no satisfactory tenders or no tenders at all have been received.

The balance of the Board's programme is carried out by contract and it is the Board's practice to employ contractors on road and bridge construction works wherever this course is practicable. There is now a fairly large and satisfactory field of competent and experienced contractors who tender for the Board's contract works of various types and dimensions. Materials used in works performed by the Board's direct labour gangs are also obtained by contract.

In order to simplify contract works, the Board commonly purchases under separate general or local contracts, in some cases on the basis of a year's supply, a large proportion of the materials required, particularly roadmaking materials and bridge components, thereby achieving the following desirable results :

(*a*) Contractors carrying out assembly or construction projects are relieved of responsibilities in connection with the procurement and payment for materials.

(*b*) Tenders are not inflated with excessive charges for materials and overhead expenses.

(*c*) Strict and consistent control in relation to quality and price of materials and components is obtained.

Works under control of municipal councils are similarly undertaken partly by direct labour and partly by contract. Including maintenance operations, the following table gives the relative proportions of the two types of execution of works :—

ROAD EXPENDITURE BY CONTRACT AND DIRECT LABOUR, 1959–60.

	£'000	%	£'000	%
Board's Expenditure—				
Contract Works	3,694	32·5		
Direct Labour	7,675	67·5		
			11,369	60·6
Council's Expenditure—				
Contract Works	1,732	23·4		
Direct Labour .	5,664	76·6		
			7,396	39·4
			18,765	100·0

BRIDGES.

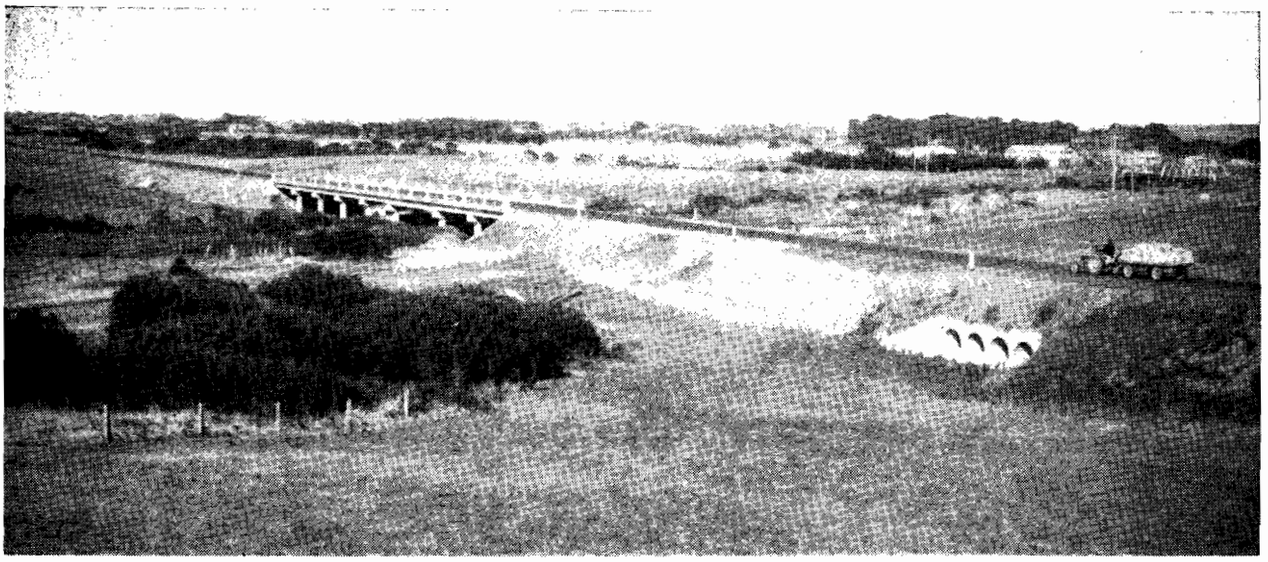

Plate 36.—New bridge and culvert on a new alignment of the Bass Highway, over the Powlett River.

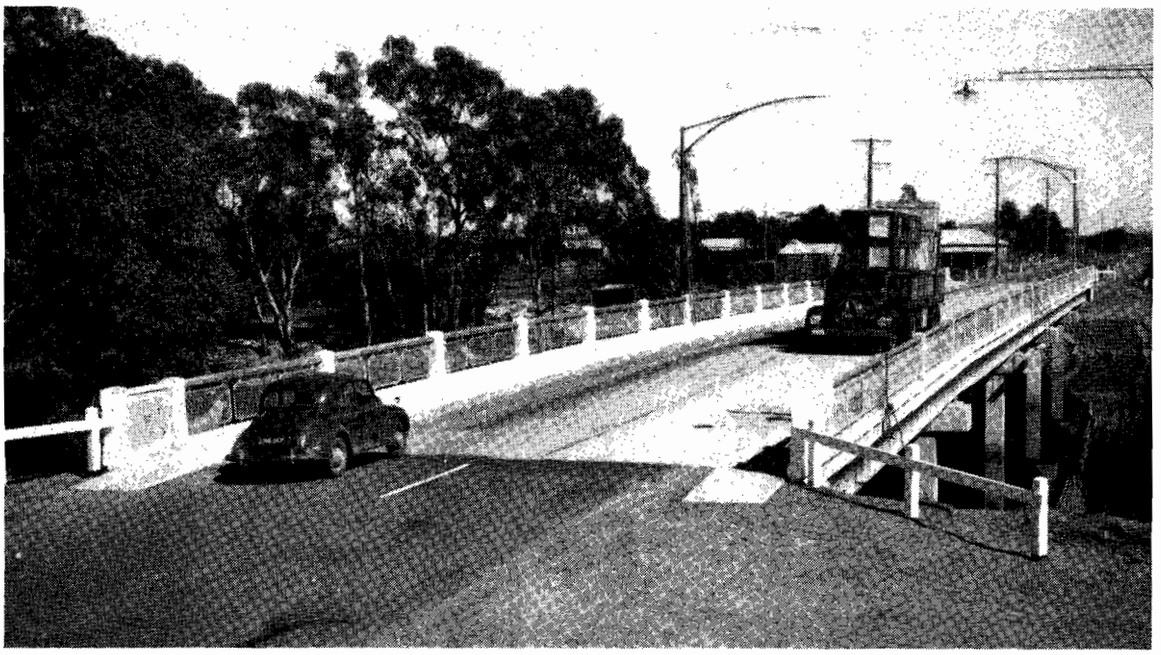

Plate 37.—Calder Highway. New bridge over the Loddon River at Bridgewater.

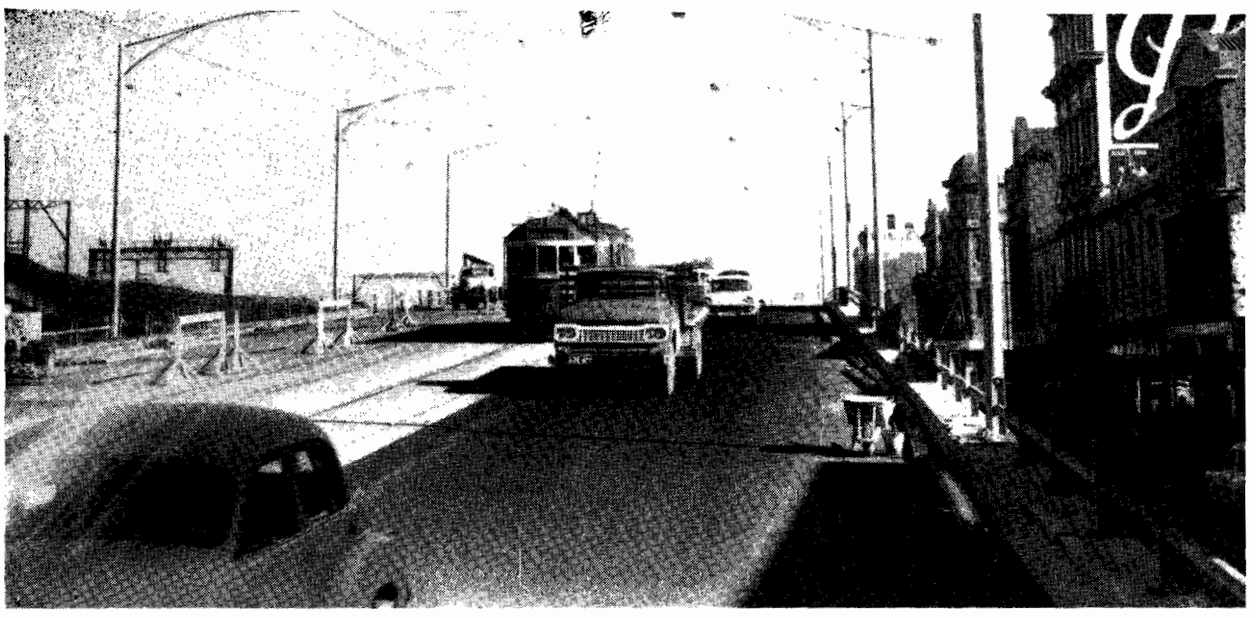

Plate 38.—King Street Bridge. City of Melbourne. Showing traffic using half of overpass in Flinders Street, late July, 1960.

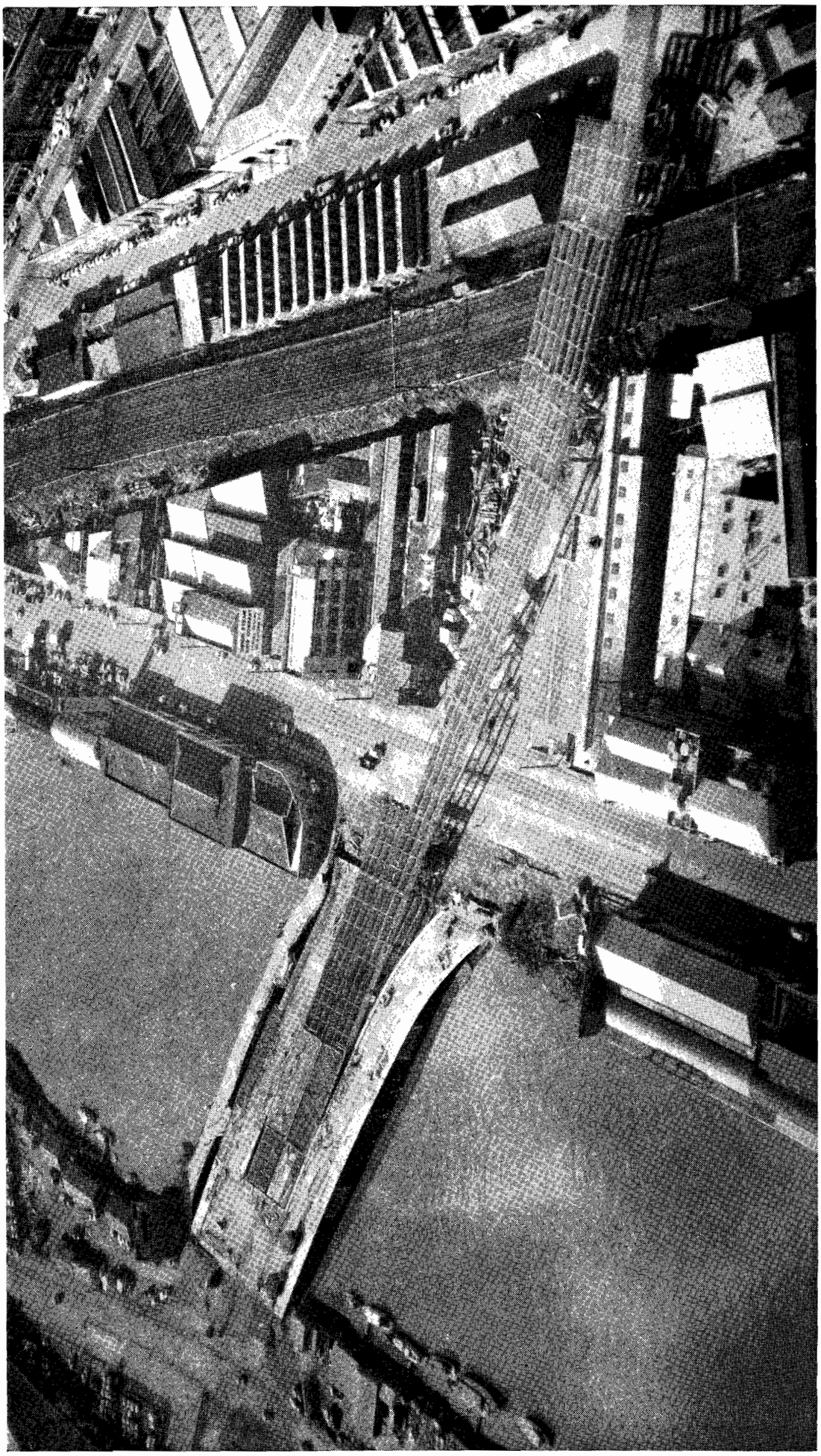

Plate 39.—King Street Bridge, showing almost completed Yarra River span and girders in place over Port Melbourne-St. Kilda railway on right.

BRIDGES.

Plate 40.—City of Melbourne. New temporary bridge over Coal Canal on New Footscray Road.

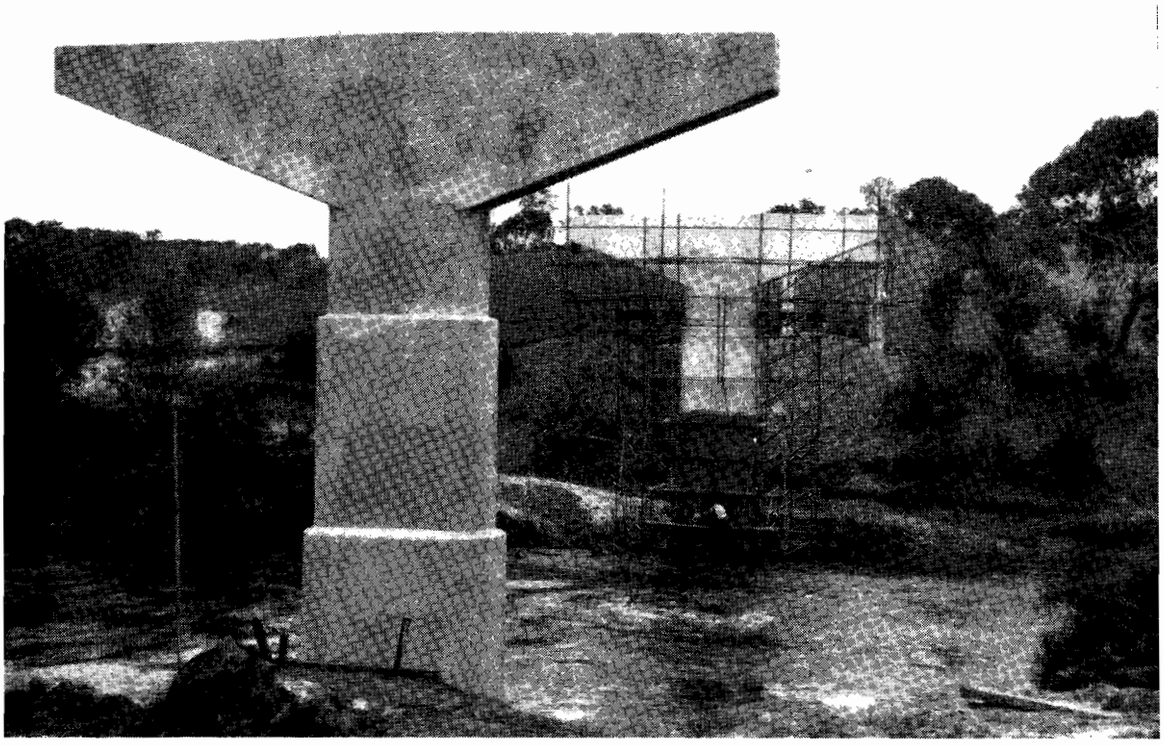

Plate 41.—Shires of Doncaster and Templestowe and Eltham. Bridge over Yarra River, Doncaster–Eltham Road, Templestowe, in course of construction.

BITUMEN DISTRIBUTION DEPOT, HORSHAM.

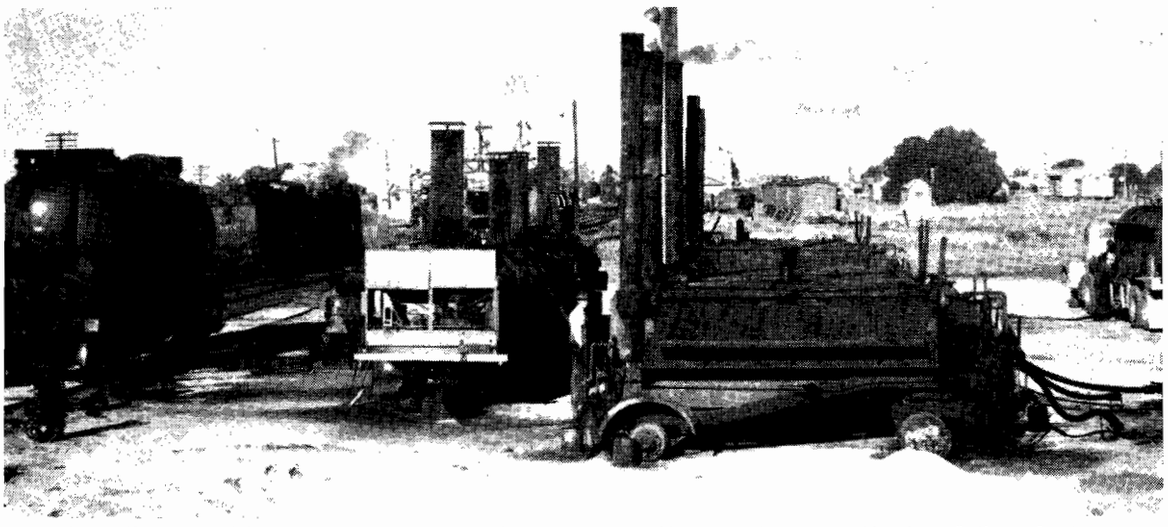

Plate 42.—Central bitumen heating and distributing depot in Horsham Division at Horsham Railway Station.

14. BRIDGES.

The total volume of construction work on new bridges within the Board's programme has again increased. During 1959–60, 208 new bridge projects were started, their total estimated value being £1,630,000 compared with £1,460,000 for 1958–59. One hundred and fifty-four of such bridges (estimated to cost £732,000) were under municipal supervision and 54, estimated to cost £898,000 (excluding King Street Bridge) were under the Board's supervision. Some of the more complex bridges constructed under municipal supervision are designed in collaboration with the Board's Bridge Division.

Keen competition has continued among contractors for the Board's contracts for bridges and components. Due to the loss of experienced engineers from the staff, somewhat increased use has been made of consultants in the preparation of designs and specifications.

Major bridges in various parts of the State completed under the Board's supervision during the financial year included important structures as follows:

(*a*) 280 ft. x 15 ft. over Mitchell River on Glenaladale–Lindenow Road in Bairnsdale Shire. The Deputy Chairman, Mr. C. G. Roberts, performed the opening ceremony on 12th November, 1959 (Plate 34).

(*b*) 481 ft. x 22 ft. over Latrobe River on Tyers main road in the Shire of Morwell (Thom's Bridge) (Plate 35).

(*c*) 342 ft. x 26 ft. over Powlett River on the Bass Highway (Plate 36).

(*d*) 372 ft. x 34 ft. over Loddon River on the Calder Highway at Bridgewater (Plate 37).

(*e*) Two bridges over the Avoca River at Coonooer, the main bridge being 241 ft. x 22 ft. Mr. W. H. Neville, Board Member, performed the opening ceremony of this bridge on 13th August, 1959.

Many bridges were also completed during the year under municipal supervision and these included a new bridge 162 ft. x 22 ft. over the Wando River on the Casterton–Edenhope Road, constructed under the supervision of Glenelg Shire Council.

King Street Bridge.—The substructure of the main bridge was completed in November, 1959, and the east and west lanes of the low level bridge over the Yarra River were completed except for handrailing and lighting.

Fabrication and erection of the welded high tensile steel girders for the elevated carriageway proceeded and approximately 1,500 tons of steelwork were in position by 30th June, 1960. The north side of the Flinders Street Overpass was completed to a stage enabling tram traffic on the permanent tracks to commence running in the second week of June, 1960, and road traffic on the northern half width to be admitted in July. (Plates 38, 39). Further details of work during the year are contained in the report of the Chief Engineer.

Other Metropolitan Bridges.—A temporary timber and steel joist bridge 210 ft. x 42 ft. plus a 5-ft. footway was constructed over the coal canal on New Footscray Road in the first half of 1960 to divert traffic from the existing timber bridge which has been seriously weakened due to rotting of the timbers (Plate 40). The temporary bridge is intended to carry traffic only until the old bridge is permanently replaced. Reinforced concrete piers and abutments for a bridge over the Yarra River on a new road which will connect Eltham with Templestowe were completed and a contract let for the fabrication of the steel girders. The new bridge will be 276 ft. x 24 ft. plus two 6-ft. footways (Plate 41). The reinforced concrete piers and abutments for the new bridge over the Yarra River at Banksia Street, Heidelberg were completed. Progress was made with the fabrication and placing of the welded steel girders for the bridge which will be 278 ft. x 28 ft. between kerbs, plus a 6-ft. footway.

Materials.—During the year, contracts were let for the supply of prestressed concrete slabs and beams to the value of £80,000 and reinforced concrete pipes and box culverts valued at £223,000. £14,000 was spent on the purchase of corrugated galvanized steel pipes during the same period. Owing to insufficient steel being obtained from Australian sources during the year the Board placed orders in the United Kingdom for the supply of approximately 1,600 tons of steel joists and plate. Supplies of reinforcing round steel were sufficient, owing to stocks carried forward from previous years. Approximately 1,800 tons of steel reinforcement for concrete was supplied to Board's projects. Cement supplies were adequate during the year and approximately 7,000 tons were used in Board works.

15. BITUMINOUS SURFACING.

Extent of Work.—During the year, 2,629 miles of bituminous surfacing was undertaken on all classes of roads, a greater length than has been sealed in any previous year in Victoria. This provided 1.190 additional miles of sealed roads, 1.217 miles of restoration of the seal coat on reconstructed sections and of maintenance retreatment. 126 miles of widened sealed pavement and 8 miles of new seal on duplicated carriageways.

The Board's mobile spraying units were assisted to the extent of 4·9 per cent. of the work by municipalities and by contractors in the case of hot mixed. machine spread asphalt. One thousand nine hundred and fifty-nine individual jobs were involved and the average length of each job was 1·34 miles. The Board's sealing organization is thus called upon to meet a wide variety of circumstances and conditions. and such a programme is made possible only by providing in the organization extreme mobility and flexibility.

The extension to the sealed system added 52 miles to the length of sealed roads on State highways, tourists' roads and forest roads. 512 miles on main roads and 626 miles on unclassified roads. The total length of sealed surface on the Board's declared system of 14,392 miles is now 10.415 miles (72·4 per cent.). Retreatment and restoration of the seal coat on reconstructed sections of previously sealed pavement on the declared system amounted to 1,047 miles. or 10·6 per cent. of the treated system. This included retreatment by sealing of 752 miles. or 7·6 per cent. of the sealed system.

A total length of 87 miles of sealing work was undertaken to assist municipalities and State authorities. Full details showing the various types of treatment carried out on the various road categories are included in the Chief Engineer's report. The programme of work, again predominantly of the sprayed type. included the treatment by the use of hot mixed machine spread asphalt. of a length of 52 miles on various road categories. Although this length is a very small percentage of the year's bituminous surfacing, it represents an increase of 73 per cent. on the length of similar work done in the previous year. Consideration is at present being given to the extended use of this type of work on the more heavily trafficked roads in the State system.

Bituminous Plant and Personnel.—Twenty-three complete mobile spraying units and approximately 650 men were employed this year. this being one less unit than engaged on a somewhat smaller programme in the previous year. Factors contributing to the result this year were a long uninterrupted spell of good weather and a general improvement in efficiency. In certain cases. it was possible to provide the mobile units with additional plant, e.g., an extra sprayer or bitumen tanker. &c. This helped to alleviate the problem of delays encountered in doing work long distances from the temporary field depot. In the Horsham Division efficiency and flexibility was improved by setting up a central bitumen and distributing depot. which is described in more detail in the Chief Engineer's section of this Report (Plate 42).

Supply of Material.—A quantity of 24.805 tons of bitumen was supplied from two oil refineries in Victoria for the work. 99 per cent. of this material being handled in bulk. Distribution of the bulk material throughout the State was accomplished to the extent of 73 per cent. in rail tank cars and 27 per cent. by road vehicles.

A total quantity of 269,326 cubic yards of covering aggregate was used in the sprayed work during the year, the output of the Board's own crushing plants again contributing materially to this quantity. Table 5 in the Chief Engineer's section of this Report indicates the trend in the costs of aggregate over the past few years.

16. ELIMINATION OF LEVEL CROSSINGS.

In recent years, aggregate expenditure on the elimination of level crossings has averaged something less than £500.000 per annum of which the Board and Victorian Railways have provided £125,000 each and the Level Crossings Fund £250.000.

During this financial year (1959–60) the Government decided that aggregate expenditure should be increased to £1,000,000 by altering the basis of contribution. It is intended that the funds provided by the Board, Victorian Railways and Level Crossings Fund will now amount to approximately £450,000, £250,000 and £300,000 per annum.

The construction of the standard gauge railway line between Melbourne and Albury has necessitated certain projects on the Hume Highway being carried out before they would normally have been undertaken and has required the Board to divert funds from other works of high priority. However, some assistance in these works on the Hume Highway is being received from the Uniform Railway Gauge Trust Fund. The most important of these projects is the relocation of the highway between Chiltern and Barnawartha which will eliminate three level crossings on the highway itself and permit the closing of four others on minor roads. The total estimated cost of this project will be of the order of £337,000 of which the Board will be required to find approximately £209,000. Plans have been commenced and a start will be made in the next financial year, 1960–61. Investigations are also being carried out for the construction of grade separations at Craigieburn, Tallarook, Euroa, Glenrowan, and Roy and Rowan Streets in Wangaratta. Preliminary estimates of the total cost of works in the north-eastern standard gauge area will amount to £1,185,000 of which the Board's share will be £650,000.

Investigations have been made for the construction of overpasses at Wallace and Bungaree on the Western Highway and the plans for the Wallace overpass have been completed. Investigations have also been made to eliminate four level crossings at Merton and Maindample on the Maroondah Highway by deviating the highway in those areas. Deviations are being considered to eliminate level crossings at Linga on the Ouyen Highway.

In the metropolitan area, work was under progress on the Glenhuntly Road crossing at Elsternwick, the Melbourne Road crossing at Newport and the crossing at Hampshire Road, Sunshine. A proposal for constructing a road-under-rail underpass at Warrigal Road, Oakleigh, has been approved by the Government.

The estimated cost of these works and the Board's contribution are as follows :—

Elsternwick	£370,000	Board's contribution	£86,850
Newport	£246,000	.. ..	£61,500
Sunshine	£300,000	.. ..	£128,250
Oakleigh	£400,000	.. ..	£180,000

17. FLOOD DAMAGE.

The Commonwealth–State Flood Relief Agreement of 15th February, 1957, provided £274,000 for flood protection and associated work as distinct from restoration of roads and bridges. A sum of £40,000 which still remained unspent from this provision was made available towards the restoration of roads and bridges in the Wimmera area which had suffered very severe damage. Restoration of this damage is almost completed.

During the year under review, in spite of a very wet autumn throughout the State, no major flooding was reported involving extensive damages to roads and bridges. In isolated areas, severe storms on certain occasions during the year caused minor damage which was generally repaired from available funds and special provision was found to be necessary in only a few cases. However, many works, chiefly in Gippsland, were delayed due to the extremely wet conditions brought about by the high rainfall recorded in the area over an extended period towards the close of the financial year 1959–60.

WORK FOR OTHER AUTHORITIES.

Plate 43.—Shire of Kaniva. Serviceton North Road. Big Desert Area. Spreading and consolidating sandstone pavement.

Plate 44.—Princes Highway East. Realignment under construction between Herne's Oak and Morwell, looking towards Morwell.

18. WORKS FOR OTHER AUTHORITIES.

The following summary shows works undertaken during the year at the cost of other authorities :—

WORKS EXECUTED ON BEHALF OF COMMONWEALTH AND STATE GOVERNMENT AUTHORITIES FOR YEAR ENDED 30TH JUNE, 1960.

—	Description of Works.	Expenditure.	
Victorian Departments.		£ s. d.	£ s. d.
Department of Public Works	Roadworks, Dam Construction, Exhibition Buildings, Hume Highway, Dookie Agriculture College	7,606 2 6	
Housing Commission ..	Roadworks and Bridgeworks—Morwell Housing Estates, Barry's Road Overpass, Broadmeadows	23,868 6 1	
Lands and Survey Department	Roadworks—Glenelg, Heytesbury, Kaniva, Kowree and Orbost Shires	40,965 9 11	
Latrobe Valley Water and Sewerage Board	Roadworks—Walhalla Road, Gould Deviation	2,833 17 4	
Melbourne and Metropolitan Board of Works	Roadworks—Healesville Shire	748 18 0	
Premier's Department ..	Roadworks—Stawell and Alexandra Shires	5,300 0 0	
Soldier Settlement Commission	Roadworks—Estates throughout Victoria	59,374 19 3	
State Electricity Commission	Roadworks—Morwell Shire, Princes Highway East, Hernes Oak Deviation	78,104 7 8	
State Rivers and Water Supply Commission	Roadworks and Bridgeworks—Eildon and Hume Weir Projects, Bairnsdale, Towong and Yackandandah Shires, Murray Valley Highway	122,227 14 9	
Victoria Police	Roadworks—Police Driving School, Broadmeadows ..	532 9 9	
			341,562 5 3
Commonwealth Departments.			
Department of Works ..	Construction, Maintenance and Sealing Works—Keilor, Metcalfe, Otway and South Gippsland Shires	30,406 5 3	
			30,406 5 3
Special Projects.			
King Street Bridge ..	Construction of bridge over the Yarra River with southern viaduct approach and overpass in Flinders Street, including land acquisition—Cities of Melbourne and South Melbourne	1,014,045 15 7	
Napier Street Bridge ..	Construction of bridge over the Maribyrnong River and rail overpass—Cities of Melbourne and Footscray	54,273 2 2	
Coal Canal Bridge ..	Construction of temporary bridge over the Railway Coal Canal at West Melbourne—City of Melbourne	31,925 16 5	
Railway Level Crossings ..	Elimination of various railway level crossings	28,499 19 10	
Municipalities Forest Road Improvements	Improvement of various roads adjacent to State forests to facilitate the extraction of forest produce	7,158 17 10	
			1,135,903 11 10
	Total	.. ..	1,507,872 2 4

Thirteen and eight-tenth miles of road works were constructed in the Big Desert area north-west of Kaniva at the request of the Lands Department. This will link previous work with the Serviceton North Road and provide access to the Western Highway. (Plate 43.) In the Shire of Kowree 7 miles of roads were cleared, formed and gravelled to give access to new blocks in land settlement schemes at Bringalbert and Meereek.

The reconstruction and realignment of 2·2 miles on the Murray Valley Highway east of Granya was completed at the request of the State Rivers and Water Supply Commission in connection with the Hume Weir enlargement. In respect of the Eildon Weir project 10 miles of the new Eildon–Jamieson Road were completed. For the Public Works Department approximately 1,950 lineal feet of 12 in. x 12 in. reinforced concrete piles were cast in the Benalla Divisional Casting Depot and driven for new building foundations at the Dookie Agricultural College.

Work commenced on the construction of 4·65 miles of the deviation of the Princes Highway East between Hernes Oak and Morwell made necessary by the extension of the State Electricity Commission's Brown Coal Open Cut Mine at Yallourn. (Plate 44.) This work includes the construction of two railway overpasses and three reinforced concrete bridges and a double cell 10-ft. diameter Armco culvert at Morwell River.

19. SOLDIER SETTLEMENT ESTATE ROADS.

Further work has been done in conjuction with the Soldier Settlement Commission and municipal councils in providing subdivisional roads in estates purchased by the Commission or allotted from Crown lands.

ROADMAKING MATERIALS AND RESEARCH.

Plate 45.—Borung Highway, mileage 24. At Donald. Bituminous emulsion stabilizing, showing sprayer and tractor with attached rotary hoe.

NEW ACCOMMODATION FOR HEAD OFFICE STAFF.

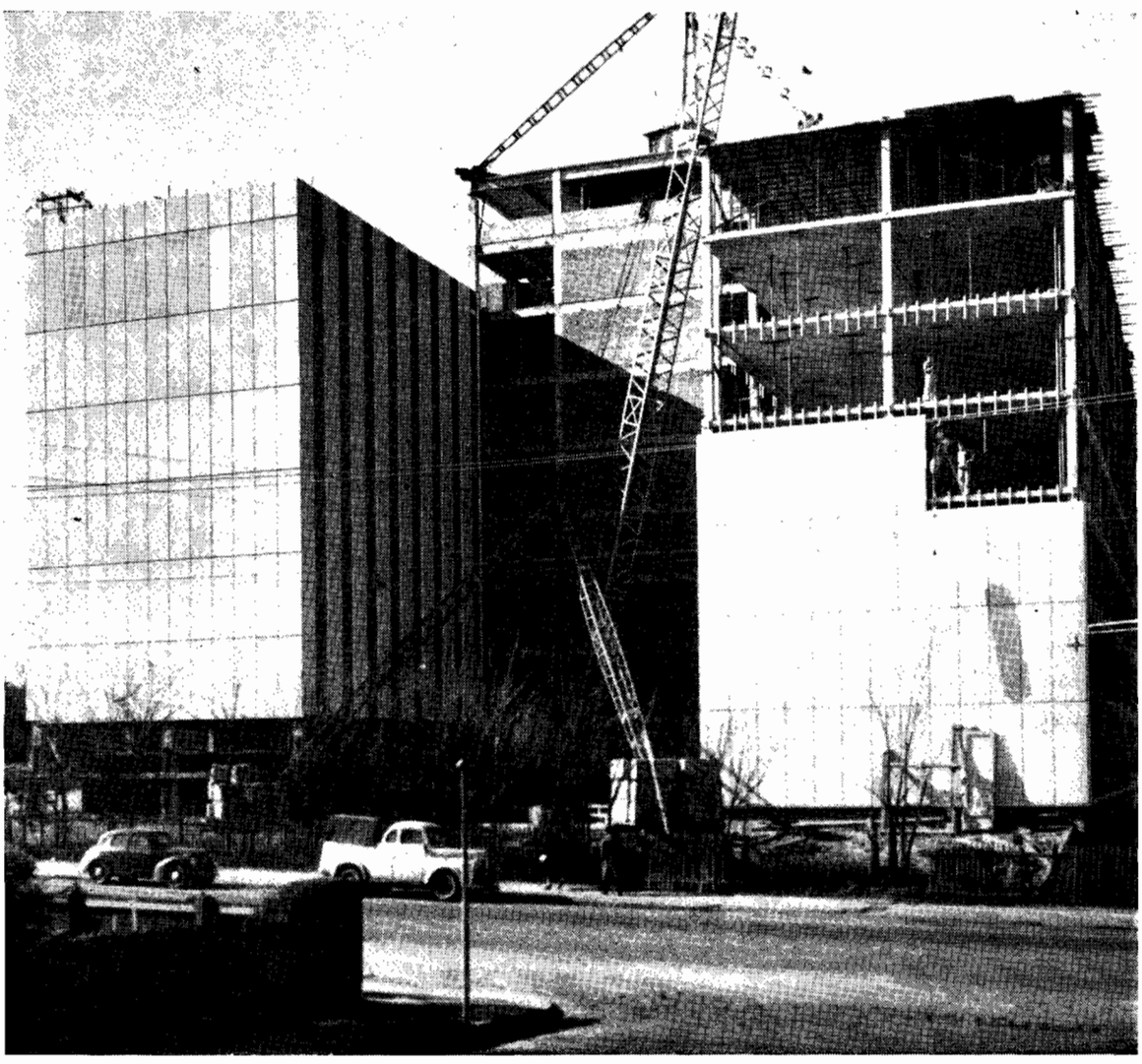

Plate 46.—New Head Office, Denmark Street, Kew, in course of construction, 29th June, 1960.

In the Heytesbury Soldier Settlement Area a further 17 miles of new road formation was constructed under the Board's direct supervision and 2 miles under the supervision of the Shire of Heytesbury. Gravel has been laid on 10 miles of roads most of which were formed during the previous construction season. Further work was carried out for the Commission on Koijak. Kadnook and Stapletons Estates in the Shires of Kowree and Winimera.

The total expenditure during the year 1959-60 on road and bridge works to serve Soldier Settlement Estates was £135.050 of which £59.379 was paid by the Commission, £60,948 by the Board, and £14,723 by the councils. The total expenditure on all roads and bridge works associated with Soldier Settlement Estates since the inception of the scheme is £1.714.083 of which £960.914 was contributed by the Commission, £551.184 by the Board, and £201.985 by the councils.

20. ROADMAKING MATERIALS AND RESEARCH.

The scope and extent of research in field and laboratory into the properties, use and discovery of materials is steadily increasing. Recent demands for more complete investigation of the foundations of bridges and embankments have necessitated the introduction of equipment for obtaining and testing undisturbed samples. A portable seismograph for use in geological investigation of conditions where deep cuttings are involved has been obtained and has been used with advantage. Preliminary tests have been carried out on sandstone deposits in the Horsham Division. Further seismic surveys will be made to assist in locating sandstone deposits in this area, where together with parts of the north-western portion of the State the search for new sources of local roadmaking materials has had to be vigorously pursued in the post-war years.

Supplies of sandy or ferruginous or limestone gravels from surface workings in these regions have become inadequate for the increased requirements of surfacing on all classes of roads and in some places were virtually exhausted. There are few sources of hard rock suitable for crushing, which in any case greatly increases costs and reduces the mileage of work for a given expenditure. In some localities extensive beds of softer rock located generally beneath several feet of "overburden" had been opened up by normal quarrying methods and converted to artificial roadmaking gravel by crushing, usually with an output no more than 100 cubic yards of fine crushed rock per day. With the advent of heavier ripping equipment it has been found possible and, of course, more economical merely to loosen and excavate the material, loading it with front end loaders for cartage direct to the road-bed where it is spread by power graders, the larger lumps being crushed by a drum roller towed by a tractor, quite a usual output being from 500 to 1,000 cubic yards a day. Among the more extensive deposits of sandstone located were those at Lemon Springs in the Shire of Kowree and on the Serviceton North Road in the Shire of Kaniva.

In the Heytesbury Soldier Settlement Area, extensive surveys were carried out in an endeavour to locate supplies of good roadmaking gravel. Although this investigation was unsuccessful, considerable quantities of both fine quality sand and cemented soft sandstone have been found and used in the construction of roads in the area. The sand has proved to be a good base course material, particularly in wet conditions, and it is hoped that the sandstone will be suitable as a top course material.

Investigations have been made into the use of local materials for hot mixed asphalt on the more heavily trafficked roads close to or in the metropolitan area and further work has been undertaken to investigate the effect of using a mixture of fine rounded sand with a coarse sand having more angular and rougher particles.

A short length of pavement was constructed near Donald by using a sandy loam stabilized with bituminous emulsion as a membrane over a "salt pan" before gravel surfacing was applied. (Plate 45.) The object is to prevent accumulation of salt in the gravel and accompanying disruption of bituminous surface sealing.

Experimental work has been done on Princes Highway West near Corio overpass in regard to the stabilization of granitic sand pavements with cement and some experimental trials of lime stabilized materials have been made in Cobram Shire, on the Murray Valley Highway at Cohuna and Nyah and on the Kerang–Koondrook Road in Kerang Shire. Technical aspects of the work are discussed in the Chief Engineer's section of the Report.

The Board's crushing and screening plant at Bald Hills 7 miles north of Ballarat operated throughout the year in providing quartz aggregate for bituminous surfacing treatment work. New quarries operated by contracting companies have been opened up at Euroa, Glenrowan and Barnawartha. These companies have large contracts to supply railway ballast for the north-eastern rail gauge standardization project. The quarries will provide a good source of supply of fine crushed rock and sealing aggregate for the Board's road works in Benalla Division.

How traffic loads are distributed from the surface to lower layers of pavement and subgrade is a subject of vital importance in road design and economics. A research fellowship to study this problem was established by the Board at the University of Melbourne commencing in May, 1956. The first three years' work related chiefly to development of laboratory testing procedures and apparatus enabling a set of experiments to be undertaken with layers representative of an asphaltic carpet on a sand base. Mr. D. T. Currie, B.C.E., who undertook this programme has since joined the Board's staff. A second fellowship is held by Mr. J. Morris, B.C.E. The work is in progress at the Soil Mechanics laboratory of the C.S.I.R.O. recently erected at the Board's depot at Syndal.

21. COMPENSATION FOR ROADMAKING MATERIAL OBTAINED FROM PRIVATE LAND.

Pursuant to Section 50 of the *Country Roads Act* 1958 the Board or any person authorized by it in writing may obtain roadmaking materials from any land not being the site or curtilage of any house, or a garden, lawn, yard, court, park, plantation, planted walk, avenue, or nursery for trees. The Act further provides that the Board shall make compensation to the owners or occupiers for any damage which they may sustain through the exercise of any of the powers conferred upon the Board in this regard. For materials being obtained by municipal councils the similar provisions of the Local Government Act apply. It is of importance that the statutes do not refer to the payment of royalty for the material itself.

Over the years, the Board has approved of payment of compensation to owners or occupiers on a pence per cubic yard basis of material removed. The rate of 3d. per cubic yard was adopted as a minimum offer. In March, 1960, following earlier discussion with the Municipal Association, the Board advised all municipal councils that in future in the ordinary case as a convenient assessment of damages the rate of compensation would range from 3d. per cubic yard to 8d. per cubic yard, according to the depth of the pit and the quality of the land. By this means the landowner knows fairly accurately what compensation he will receive. The new rates do not prejudice the landowner's submitting a claim for higher compensation if he considers that the rate per cubic yard is insufficient. Compensation will then be fixed in accordance with the statutes, i.e., for actual damages sustained.

In recent years there has been a growing awareness in rural areas of erosion problems which might arise if rehabilitation of the areas disturbed is neglected. Tenderers for works affecting the Board are instructed to make all necessary arrangements with the owners and/or occupiers, and in particular to discuss with them the most practicable physical reinstatement of the land disturbed.

22. CONTROL OF HEAVY TRAFFIC.

Total fines and costs resulting from prosecutions under the Motor Car Act amounted to £104,526 16s., a decrease of 3 per cent. as compared with the figure for 1958–59. These fines resulted from 6,450 prosecutions which is 383 or 6 per cent. less than in 1958–59.

The decrease in fines and offences is mainly due to the fact that 105 reports in respect of excess height and 283 in respect of excess length were not proceeded with in view of the challenge under Section 92 of the Commonwealth Constitution in the High Court to the rights of the State to police dimensions of vehicles operating in other States. The Full Court, in June, 1960, handed down its decision in favour of the Board, and policing of interstate vehicles in respect of excess dimensions has been resumed.

There was a large decrease in the number of cases dealt with under the Country Roads Act. Offences totalled 216, a decrease of 115 or 35 per cent. as compared with 1958–59. Fines from 160 court cases amounted to £818, a decrease of £661, compared with last year.

At 30th June, 1959, 603 miles of the Board's roads were limited to 5-ton gross axle load. With improvements on some sections it has been possible to reduce the length so that at 30th June, 1960, the following mileages were similarly limited.

	miles
State Highways	142
Main Roads	192
Tourists' and Forest Roads	216
	550

Eight thousand two hundred and fifteen permit forms were issued during the year, an increase of 1,204 or 17 per cent. Permits relate to various exceptions made in favour of vehicles and loads in excess of statutory limitations where warranted.

The position regarding collection of fines is still most unsatisfactory. Many offenders have no fixed place of abode. The legal procedure requires the production of a commitment warrant at the time the demand is made for payment of the fine and there is of necessity a large amount of " paper work " required from the time of the offence to the collection of the fine or arrest of the offender. For the years 1956–57 to 1958–59, £246,769 was imposed in fines out of which £35,332 or 14·3 per cent. is still unpaid. After discussions with senior officers of the Police Department an improved system has been designed which it is hoped will reduce clerical work of two first constables seconded to the Board thus making a greater proportion of their time effective.

The co-operation of the Chief Commissioner of Police and the keenness and efficiency of the members of the Mobile Traffic Section of the Victoria Police who have been seconded for duty with the Board are greatly appreciated.

23. NEW ACCOMMODATION FOR HEAD OFFICE STAFF.

Since 1928 the Board has occupied offices in the Exhibition Buildings, Carlton, on a rental basis. For many years this accommodation has been inadequate despite erection of temporary huts in the rear of the Western Annexe. Further space within the Exhibition Buildings could not be obtained from the Exhibition Trustees who also desire more space for their own purposes. Increases in the Board's revenue over the last few years with consequently increased construction and maintenance work throughout the State have necessitated provision of additional office space. Several sections of the Head Office administration area are, in fact, housed in other buildings in Carlton. The cramped and obsolete nature of the existing offices and their scattered location have caused many difficulties in administration and have militated against recruitment of adequate staff.

In 1959 the Board was fortunate in obtaining a 98-year lease from the Victorian Railways Commissioners of the site of the former Kew Railway Station. A contract for the erection of a new permanent office building comprising lower ground floor, ground floor and six upper floors on this site was let on 6th November, 1959, to Lewis Construction Co. Pty. Ltd., the date for completion being 1st November, 1960. The architects are Leith and Bartlett Pty. Ltd. The building, which has been designed in the form of the letter " H " and comprises the first stage for development of the site, will have a gross floor area of approximately 141,000 square feet (Plate 46). This figure provides a small margin above the Board's current needs, and those of the Traffic Commission and the Australian Road Research Board. Provision has been made for adequate off-street parking for visitors and staff, and two seventeen-passenger lifts are being installed.

Multi-story construction of the building was favoured because this form provided—

(1) Compact grouping of lifts and other services in the central tower ;

(2) Minimum distance in moving between any departments in the building ;

(3) Minimum area of space in lobbies, passages, &c. ;

(4) Ease of control and direction of visitors.

Orthodox steel column and beam construction, concrete encased, with simple spanning slabs between beams is used. External cladding is generally of precast concrete panels, alternating with windows and glass panels. Care has been taken to ensure that the two office wings have northern and southern light. Continuous louvred sun hoods, 3 feet

wide, are to be fitted to all northern aspects of the building. The eastern and western walls have no windows. In general, individual offices are located on the northern sides of each wing. The general, clerical, and draftmens' offices are situated on the southern sides to obtain the full advantage of more uniform southern light. Provision has been made for a theatrette, staff cafeteria, resident maintenance supervisor's living quarters, observation deck, dark " tunnel " for experimental testing of traffic devices, service station, printing and photography sections.

Timber and stone of Victorian origin have been used extensively throughout. It is expected that the building will be available for occupation during December, 1960.

24. TOURIST DEVELOPMENT.

In 1958 the Government established the Tourist Development Authority whose functions include promotion and development of the tourist industry in Victoria. Mr. D. V. Darwin, Chairman of the Board, is a member of this Authority as of the previous Tourists Resorts Departmental Committee.

The *Tourist Act* 1958 requires the Board to pay annually to the Tourist Fund, 2 per cent. of the total amount credited to the Country Roads Board Fund from motor registration fees, fines and drivers' licence fees, less certain deductions. In addition to this contribution, of course, large amounts of money are expended by the Board each year on general road developments throughout the State to the benefit of tourists.

The Board in accordance with its own statute has proclaimed more than 400 miles of " tourists' roads " on which the cost of improvements and maintenance is borne solely by the Board without council contribution. Typical tourists' roads are the Mount Buffalo Road, the Alpine Road, Donna Buang Road, Grampians Road and the Ocean Road. Large volumes of tourist traffic are also carried on the many miles of State highways and main roads under the Board's control. Tourists, of course, also use many sections of unclassified roads to which the Board gives assistance to councils from Commonwealth Aid Road grants. In fact, most of the Board's work in improving and maintaining roads and bridges, and building safety into roads is of very great value to tourists and must enhance Victoria's attraction to interstate and overseas visitors.

The Board extends the maximum co-operation at all times to the Tourist Development Authority and is able to assist in roading and allied problems which confront that Authority from time to time.

The provision and extension of camping grounds by municipal councils in conjuction with the Authority, the development of roadside "motels" and other accommodation by private enterprise, the establishment of " alpine " villages and special facilities for winter sports at snowfields, the growth of boating sports in summer on lakes and rivers and around the sea-coast and not least the general improvement of the roads all contribute to a marked increase in tourist traffic. This involves not only use of motor cars but also various sizes of omnibus and increasingly also caravans and boat trailers. Such special vehicles mingling in the general traffic occupy extra road-space, and require special care and skill on the part of those driving and special caution on the part of other drivers manœuvring to pass or overtake them, whilst the vehicles themselves need to be constructed with due regard to strength and stability and to safe steering, braking and linkage. In the case of omnibuses this is recognized in the statutes enabling examination of vehicles at the time of registration and control in respect of particular routes. There is a need for similar examination and control of trailers. In Victoria this is at present not provided for in the statutes, which deal only with commercial trailers.

25. DECENTRALIZATION.

The Divisional Office, Bendigo Division, was established early in 1926 in offices situated in the T. & G. Building at View Point. Subsequently, a transfer was made to an area on the ground floor of the State Public Offices in Hargreaves Street. In 1940, a larger area on the top floor of the State Public Offices was obtained and occupied until May, 1960. For some years more office space has been required to accommodate the larger staff necessitated by increasing responsibilities, but sufficient space in the State Public Offices could not be made available to the Board to cover its extending needs.

The Board, therefore, acquired a site at 57 Queen Street on which was a two-story residence, considered suitable for conversion to offices. The building was remodelled and the new offices were opened by the Hon. Sir Thomas Maltby, E.D., M.L.A., Minister of Public Works, on 31st March, 1960. The new accommodation provides adequately for the present staff, comprising the Divisional Engineer and ten engineering officers, the Divisional Accountant and thirteen other officers.

A new patrol residence was purchased at Sale to replace the old dwelling which had passed the state of economic repair.

Rental of Board's Residences—" Points " System.

To provide a more adequate return in the form of rent and to iron out anomalies which previously existed, the Board introduced on 1st January, 1959, a rent assessment system based upon the allotment of " points " for factors deemed to be pertinent to the tenancy of Board's residences throughout the country, viz., salary of occupant, type, size, age and location of premises, and amenities, e.g., hot water service, private garage, &c., provided for the tenant. Previously the occupant's salary was the sole factor used in determining the rental charged.

With the introduction of additional factors under the " points " system, variations in standards of accommodation have been taken into account, and it has been possible for more uniform adjustments to be made to rentals, as and when necessary.

To avoid undue hardship being experienced by some tenants who would have sustained marked rental increases under the " points " system, an introductory period of five years commencing January, 1959, was decided upon as a basis for implementing the plan. This interval has been an important factor in the satisfactory transition from one method to the other. The " points " system is believed to be unique in Australia and, after trial, has proved to be sound in operation. Its simplicity, which enables it to be understood easily and logically, has contributed largely to its successful introduction.

26. WORK STUDY.

After the initial survey of the Secretary's and the Accountant's Branches in 1958 by W. D. Scott and Company Pty. Ltd., Management Consultants, and the intensification of methods improvement under their guidance, the Methods Section has completed a very satisfactory year's work.

Many projects of work simplification have been completed, including investigations into accounting and clerical procedures and organization studies. A complete review of the Board's mechanical accounting procedures and equipment is in progress to determine whether installation of punched card accounting machinery would be warranted.

A detailed survey was made of road construction costing techniques for use on Board's direct labour works. In collaboration with the Construction and Maintenance Engineer and the Costing Officer, a new procedure has been designed to facilitate cost control by supervising engineers and to produce required cost data in the most economical manner.

The work simplification technique used by the Methods Section permits and is, in fact, based on supervisor and employee participation. This method is proving most successful. Supervisors and employees are co-operating well during investigations and many suggestions for improvements are being received.

The Methods Section maintains contact with W. D. Scott and Company Pty. Ltd., the Work Study Section of the Australian Institute of Management, and similar sections in other Government Departments and private enterprises to learn of the latest developments in work simplification techniques.

27. PHOTOGRAPHY.

During the year the Board's mobile projection unit gave 104 screenings at 26 camps in locations remote from townships. Programmes were made up of films hired from commercial distributors and of films produced by the Board. These screenings were viewed by audiences totalling 2,530 persons. In nearer areas ten screenings of films produced by

DISPLAYS.

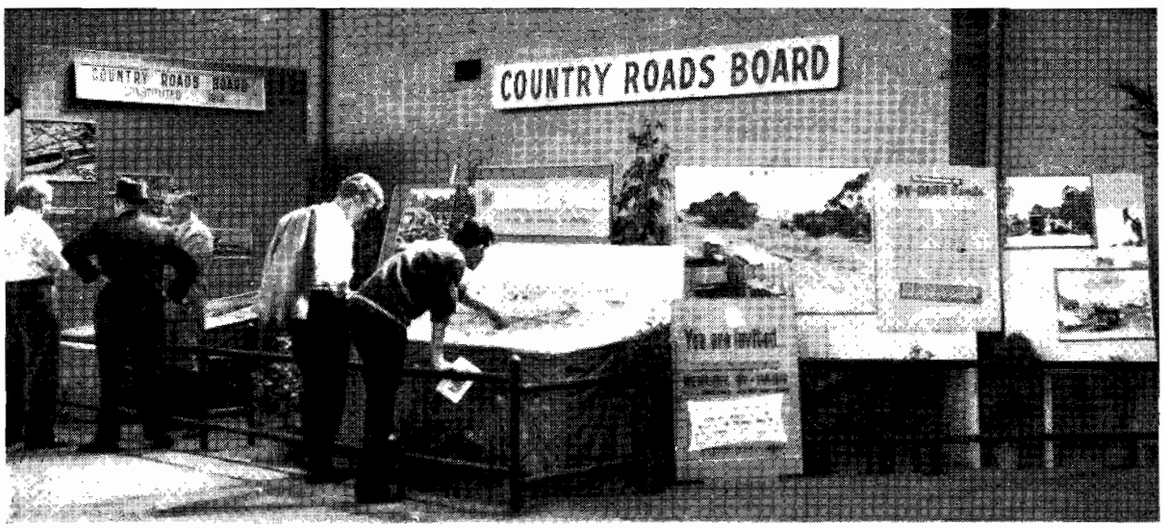

Plate 47.—Exhibition at 1960 Motor Show, Exhibition Buildings, April, 1960.

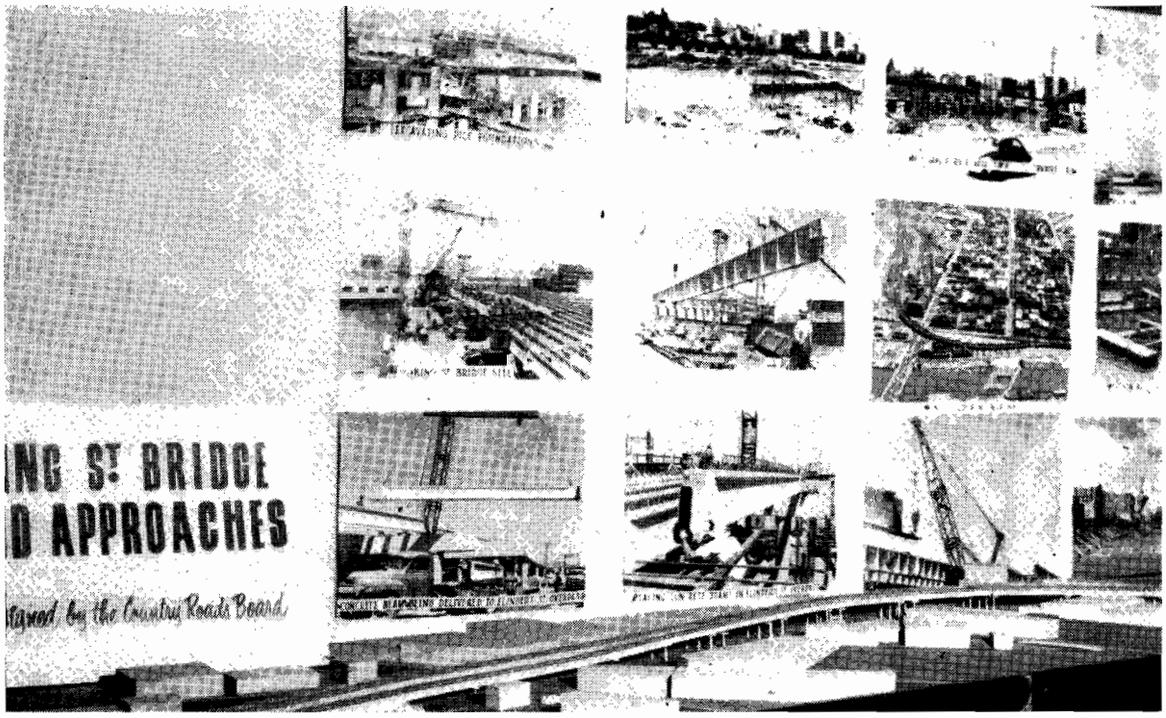

Plate 48.—Display of King Street Bridge in Technological Museum of Victoria during Fifth Congress of Institute of Surveyors of Australia, March, 1960.

Plate 49.—Werribee By-pass model on show at Surveyors' Display and at Motor Show (see above).

the Board were arranged at the request of various clubs and were viewed by 740 persons. In addition, Board's films were also made available on loan on 26 occasions and reports indicate that these were viewed by 2,970 persons.

For record purposes many still photographs were taken throughout the year of Board's and Council's activities on road and bridge works. In some cases where lack of view-points on the ground and the magnitude of the works necessitated aerial photography, one of the Board's photographers made the required exposures from a hired aircraft.

A number of 35 mm. transparencies were prepared for lecture purposes and a series of 5 in. x 4 in. colour transparencies of accident maps were produced for the Traffic Commission.

28. DISPLAYS AND EXHIBITIONS.

The Board exhibited a model of the proposed Werribee By-pass Road at the 1959 Show of the Royal Agricultural Society. A special leaflet for distribution to interested enquirers was prepared in conjunction with this display. In addition, colour transparencies indicating services rendered by roads to the community and films of works in progress by the Board were exhibited.

The model of the Werribee By-pass Road was also exhibited at Geelong and in the R.A.C.V. window at St. Kilda, in each case attracting considerable attention.

At the 1960 Motor Show, models of the King Street Bridge and of the Werribee By-pass Road were exhibited and the Board's officers answered many enquiries regarding details of the projects (Plates 47 and 49).

A model of the King Street Bridge project with relevant photpgraphs, and the Werribee By-pass model were also displayed on 19th to 25th March, 1960, at the Survey Exhibition in the Palmer Hall, Public Library, Melbourne, held in conjunction with the Fifth Survey Congress of The Institution of Surveyors, Australia (Plate 48).

29. MUNICIPAL ASSOCIATION CONFERENCES.

This year conferences were held as follows:—

1. Municipal Association of Victoria ..	At Melbourne on 14th and 15th October, 1959—attended by the Chairman and Members of the Board.
2. Gippsland	At Morwell on 13th April, 1960—Attended by Mr. C. G. Roberts, Deputy Chairman.
3. Northern District	At Heathcote on 28th April, 1960, attended by Mr. W. H. Neville, Member.
4. Western	At Warrnambool on 6th May, 1960, attended by Mr. D. V. Darwin, Chairman.
5. North-Eastern	At Wangaratta on 20th May, 1960—attended by Mr. W. H. Neville, Member.
6. North-Western	At Hopetoun on 25th May, 1960, attended by Mr. C. G. Roberts, Deputy Chairman.

The Board values the opportunity afforded it to attend these conferences which strengthen the close co-operation which exists between it and local government. Information sought by means of or relevant to motions under discussion is often supplied orally at the conferences.

30. CONFERENCE OF MUNICIPAL ENGINEERS.

The Sixteenth Conference of Municipal Engineers, convened by the Board was held in the Royale Ballroom, Exhibition Buildings, Melbourne, on 4th and 5th May, 1960 (Plate 50). Approximately 240 attended, including engineers from most of the 206 municipalities throughout the State, senior engineers of the Country Roads Board and representatives of various Commonwealth and State Government departments which were interested in certain items on the agenda.

The Hon. Sir Thomas Maltby, E.D., M.L.A., Minister of Public Works, welcomed the delegates and officially opened the conference. Sir Thomas suggested that at least two promising municipal engineers should be sent overseas each year to study the latest trends in road and bridge engineering. He mentioned that the shortage of engineers was world-wide and everything possible must be done to provide sufficient and appropriate facilities for teaching and training, and suggested that some of the industries which spend large sums on publicity should use a small percentage of that money to endow students at universities and technical colleges. Sir Thomas also suggested that much could be done at reasonable cost to the State if greater recognition were given to such scholastic institutions as the urban technological institutions in provincial cities. with a closer link with the University and the conferring of degrees.

Papers were presented by the Engineer, Shire of Cohuna, in conjunction with the Engineer, Shire of Kerang, on lime stabilization of subgrades and by the Chairman of the Traffic Commission on tentative warrants for the erection of signs and flashing signals at intersections. Other items on the agenda included the discussion of developments in pre-cast units for bridges, bituminous sealing work and modern trends in the use of compaction equipment. Colour slides were shown by the Engineer, City of Geelong on rubbish disposal and playground equipment and by the Engineer, City of Bendigo on his recent mission abroad; by the Engineer, Shire of Ararat on miscellaneous municipal problems and by the Engineer, Shire of Glenelg on plant for the production of fine crushed rock from dune limestone.

31. BOARD'S INSPECTIONS.

During the year the Members of the Board, accompanied by the Divisional Engineers concerned, inspected roads and bridges in 37 municipalities in all parts of the State. Those visited were the Shires of Mildura, Waranga, Springvale and Noble Park, Portland, Bannockburn, Deakin, Bellarine, Corio, Rosedale, Otway, Korumburra, McIvor, Heytesbury, Kerang, Traralgon, South Gippsland, Cranbourne, Ararat, Stawell, Omeo, Bass, Gordon, Dundas; the Cities of Box Hill, Nunawading, Mildura, Camberwell, Dandenong, Coburg, Preston, Ararat and Hamilton; the Towns of Portland and Stawell; and the Boroughs of Echuca, Queenscliffe and Eaglehawk.

These inspections are of mutual benefit to the Board and the councils. The Board appreciates the co-operation received and the detailed arrangements made for the inspections by the municipalities visited.

32. LEGISLATION AFFECTING THE BOARD.

The following legislation affecting the Board was enacted during the financial year :—

Country Roads (Offices and Buildings) Act 1959 (No. 6546).

This Act gives the Board express powers for the erection, furnishing and fitting of such offices and buildings as the Board thinks proper for the accommodation and housing of its officers, servants and employees and for carrying out the purposes of the Country Roads Acts.

The Act also increased the amount of a contract which may be entered into by the Board without the written consent of the Minister being first obtained, from £2,500 to £10,000.

Coal Canal Bridge Act 1960 (No. 6613).

This Act provides for the construction of a new bridge over the railway Coal Canal at West Melbourne and for the construction of a service road along the northern side of portion of the Melbourne–Footscray Road.

The Board has been appointed the construction authority for the bridge works involved. The service road in Flinders Street is to be constructed by the Melbourne City Council.

Motor Car (Amendment) Act 1960 (No. 6628).

The following amendments included in this Act concern the activities of the Board :—

(*a*) Increased Fines for Unregistered Vehicles.—From 1927 until the operation of this Act the maximum fine for operating an unregistered motor car was £10 for the first offence and £25 for any second or subsequent offence.

The Act now provides for a fine of not more than £20 for a first offence and not more than £50 for a second offence plus an additional amount ranging from £5 to £100 depending on the type of vehicle concerned.

The increased fines should deter the operation of unregistered vehicles on Victorian roads and thus assist the Board's traffic officers in identifying vehicles which do not comply with the provisions of the Act.

(*b*) *Registration Number Plates and Labels for Interstate Vehicles.*—In future, vehicles registered in other States and operating in Victoria will be required to conspicuously display in the appropriate manner and condition all the number plates and labels which they would be required to carry in the State in which they are registered.

This requirement will also assist in the identification of vehicles operating on Victorian roads contrary to the provisions of the Act.

(*c*) *Penalties for Overloading.*—Prior to this amendment the penalty for exceeding a special load limit imposed on a particular road by the Board or for exceeding the load specified in a special permit issued by the Board was a maximum of £50. The Act has now been amended with some minor exceptions to increase the penalty to £100 together with an additional penalty of 10s. for each hundredweight or part of a hundredweight carried in excess of the permissible weight where the excess does not exceed 1 ton and £10 for each ton or part of a ton carried in excess of the permissible weight where the excess is more than 1 ton.

In considering overloading offences generally, the Court may in certain circumstances decline to include the whole or part of the additional penalties provided for in the Act, if it is satisfied that the overload would have been difficult or impossible to avoid.

(*d*) *Weight Limitation.*—The Act now refers to weight limitations in tons and hundredweights instead of pounds. The terminology in this respect now conforms with that used in New South Wales and South Australia.

Under the provisions of the previous Act a rigid or articulated vehicle was permitted to exceed the load capacity shown on the certificate of registration by 10 per cent. provided that axles, axle groups, or tyres were not overloaded. The amending Act has increased this allowance by permitting the gross vehicle weight to be exceeded by 10 per cent. or in the case of a vehicle and a trailer by permitting the gross train weight to be exceeded by 10 per cent.

(*e*) *Trailers.*—The Act previously provided that the width of a trailer could not exceed the width of the towing vehicle. The amending Act now allows a trailer to be 8 feet wide irrespective of the width of the towing vehicle. Except in the case of a trailer having a special braking system a loaded trailer shall not exceed the weight of the towing vehicle by more than 10 per cent.

(*f*) *Gross Vehicle Weight and Gross Train Weight.*—Some legal difficulties have been experienced in the past in obtaining convictions for overloading offences against owners and drivers of vehicles registered in other States and operating in Victoria. Prima facie evidence of the load capacity of a vehicle was that shown on the certificate of registration issued by the Motor Registration Branch.

The Act now defines the terms " Gross Vehicle Weight " and " Gross Train Weight ". The definitions include reference to the weights shown in any certificate of registration issued in any other State. The combined weight of a truck and trailer will be controlled by reference to the maker's gross vehicle weight of gross train weight thus preventing the use of light prime movers with heavy trailers. Prima facie evidence of the tare and load capacity of a vehicle will be that shown on any certificate of registration issued in any other State.

(*g*) *Speed.*—The amending Act has increased the maximum speed limit for a pneumatic-tyred commercial motor vehicle having a gross vehicle weight exceeding 8 tons from 30 miles per hour to 35 miles per hour. The speed limit of 35 miles per hour previously applied only to a commercial vehicle having a gross weight between 3 tons and 8 tons.

If a pneumatic-tyred trailer having a loaded weight exceeding 1 ton is attached to any pneumatic-tyred commercial motor vehicle, the speed limit is now 35 miles per hour. If the trailer has a loaded weight not exceeding 1 ton the speed limit is now 45 miles per hour, provided that the gross vehicle weight of the towing vehicle is less than 3 tons.

(*h*) *Impounding of Vehicles.*—The Act previously provided that the driver of a vehicle who refused to comply with a request by a member of the Police Force or any officer of the Country Roads Board or Traffic Regulation Board to allow the vehicle to be weighed, was liable to a penalty of not more than £100.

The amendment to the Act provides that a vehicle may be impounded if the driver will not comply with a request to weigh the vehicle. In addition to being liable to a penalty of not more than £100 a driver refusing to comply with such a request may be imprisoned for a term of not more than seven days.

Commonwealth Aid Roads Act 1959.

This Act was passed by the Commonwealth Government to operate as from 1st July, 1959. Its provisions are discussed in an earlier section of this Report.

33. NATIONAL ASSOCIATION OF AUSTRALIAN STATE ROAD AUTHORITIES.

At the Twenty-second Conference, which was held at the office of the Department of Main Roads, Sydney, from 28th September to 2nd October, 1959, it was resolved, in view of the growth of the organization and its status in consideration of road and bridge and allied problems at the national level, to change the title " Conference of State Road Authorities of Australia " to " National Association of Australian State Road Authorities ".

Representatives of each State road authority throughout the Commonwealth and the Director-General of the Commonwealth Department of Works attended, whilst officers of the Commonwealth Department of Shipping and Transport were present when items of special interest to that Department were being discussed. Fifty-seven items on the agenda were dealt with, including the definition of accounting classifications for construction and maintenance expenditure; the preparation of a " Guide to Traffic Engineering "; the principles and practice of bituminous surface treatment and the preparation of standard specifications for pre-cast concrete or box culverts and bitumen sprayers.

Arrangements were made for the next conference of N.A.A.S.R.A. to be held in Hobart in November, 1960, and for the various sub-committees to meet during the year, i.e., the Principal Technical Committee, Materials Research Committee, Bridge Design Committee, Traffic Engineering Committee, Plant and Equipment Committee and Advance Planning Committee.

The establishment of an Australian Road Research Board was also discussed and it was decided to hold a special meeting to deal with this subject. Applications were subsequently invited for the position of Director of the proposed Board. The special meeting was duly held at the offices of the Department of Main Roads, Sydney, on 28th and 29th March, 1960, when it was finally resolved to establish the Australian Road Research Board.

34. AUSTRALIAN ROAD RESEARCH BOARD.

The first meeting of the Australian Road Research Board was held at the offices of the Department of Main Roads, Sydney, on 28th and 29th March, 1960. It was resolved that for the period up to the next ordinary meeting in November, 1960, Mr. H. M. Sherrard, the Commissioner for Main Roads, New South Wales, be appointed Chairman, and Mr. D. V. Darwin, Chairman, Country Roads Board, Victoria, be appointed Deputy Chairman.

The meeting discussed details of the constitution, establishment and operation of the Board and arranged for interviews of applicants for the position of Director. Mr. D. F. Glynn, B.C.E., A.M.I.E. Aust., Assoc. M.A.S.C.E., Assoc. M. AMN.Geo. U., of Melbourne was subsequently appointed as Director of the Board (Plate 51). Mr. Glynn is an Honours Graduate in Civil Engineering of the University of Melbourne. He was engaged for a number of years in engineering work with the Melbourne and Metropolitan Board of Works and during the war with the Allied Works Council and more recently with a road contracting firm and has published papers on subjects related to soil mechanics and soil testing for some of which he was awarded the Monash and Edward Noyes prizes by the Institution of Engineers, Australia.

The Australian Road Research Board comprises the Commissioner for Main Roads, New South Wales ; Chairman, Country Roads Board, Victoria ; Commissioner of Main Roads, Roads, Queensland ; Commissioner of Highways, South Australia ; Commissioner of Main Roads, Western Australia ; Director of Public Works, Tasmania ; and the Director-General, Commonwealth Department of Works.

The objects of the Board are :—

(*a*) To provide a national centre for road research information and for the correlation and co-ordination of road research activities.

(*b*) To ascertain the nature and extent of road research required.

(*c*) To encourage and promote the undertaking of road research including research into road planning, location, design, safety, materials, construction, maintenance, structures, equipment, traffic, transport, economics, administration, financing, management, accounting and into any other matters affecting the provision, upkeep, use, protection and development of roads.

(*d*) To provide by means of conferences or symposiums opportunities for the presentation and discussion of the results of road research.

(*e*) To make grants for carrying out road research.

(*f*) To undertake research studies.

(*g*) To publish the results of road research, including those presented at conferences convened by the Board.

(*h*) To appoint specialist committees to assist investigations authorized by the Board and to provide financial and other assistance to such committees.

(*i*) To make available to appropriate bodies or persons information relating to road research matters.

As Director, Mr. Glynn will be responsible for the organization of the Board and for co-ordination and publication of results of the research activities. The provisional headquarters of the Board is in Melbourne at the office of the Country Roads Board.

35. STAFF AND EMPLOYMENT.

Staff.

A shortage of qualified engineers has persisted for some years following the last war, and has caused much overtime to be required of engineers on the Board's staff. Additional qualified engineers, draftsmen and engineering surveyors will be required to cope with the increased works programme in the ensuing year.

One hundred and fourteen male officers and 31 female officers resigned during the year. New appointments totalling 85, comprising 61 males and 24 females were made. The following officers retired during the year 1959–60 :—

Mr. A. Mellor, Clerk, Accountant's Branch, on 11th January, 1960, after 36 years' service with the Board.

Mr. J. S. Grierson, Clerk, Workshops, after fifteen years' service with the Board.

It is greatly regretted that three highly valued officers passed away during the year. These officers were—

Mr. J. W. Boyle, who was employed as a clerk in the Stores Division ;

Mr. J. D. Cantrill, Dip.C.E., C.E., who served as an engineering assistant in the Horsham Division ; and

Mr. A. E. Golding, Ph.B.(C.E.) Yale, M.Sc., M.I.T., late of the Board's Bridge Division.

Cadetships and Scholarships.

Mr. L. M. Jones, B.C.E., C.E., A.M.I.E. Aust., an assistant Divisional Engineer, was awarded an International Road Federation Scholarship in Highway Engineering and Traffic Study at Durham University, England.

The following table shows the number of Board's cadets at the University in the current academic year :—

Year.	Course.	Number of Cadets.
First Year	Commerce	1
First Year	Civil Engineering	4
Second Year	Civil Engineering	8
Second Year	Surveying	1
Third Year	Civil Engineering	5
Fourth Year	Civil Engineering	2

Four probationary cadets, three commerce and one civil engineering, commenced with the Board in January, 1960 : one commerce cadet resigned. On the successful completion of their probationary period the remainder will commence at the University in March, 1961.

Reference to the work being undertaken in conjunction with the Melbourne University under a research fellowship at the cost of the Board is made earlier in the Report.

Training.

It is necessary for the Board in carrying out its functions efficiently and expeditiously to ensure that adequate training is given to its staff. Due attention has been paid to this aspect. All employees are trained directly on the job by their immediate supervisors when they join the staff or when transferred to a new position. This process is carried on continuously. Four pupil surveyors were articled to the Board's Licensed Surveyors during the year 1959–60.

It has been the Board's policy as far as possible to give opportunities to officers at all levels to undertake courses to improve their efficiency. Many officers have been given the opportunity of gaining experience overseas. In addition, internal lectures on a variety of subjects have been given and study groups held, and up-to-date information on technical matters provided by Research Memoranda, Technical Bulletins, and Engineering Notes. Suitable personnel have also been subsidized by the Board at the University and technical schools, as engineering cadets, commerce cadets and technical trainees. Many officers are also taking courses in their own time and at their own expense. Lectures provided by the Australian Institute of Management on various subjects have been attended by engineers and accountants and other officers of the Board.

During the year, two officers attended sessions of the Australian Administrative Staff College. Courses completed at universities by officers of the Board included Highway Traffic Engineering, Yale University, U.S.A.; post-graduate course in Highway Engineering, Durham (U.K.) ; post-graduate course in Highways Engineering, University of New South Wales ; Traffic Engineering, University of New South Wales ; and Electronic Computing, University of Melbourne. Various other technical courses and special courses conducted by outside organizations relative to engineering problems and management and works study were attended by officers of the Board.

At various times over the years, the Board has conducted schools of instruction for its engineers and field overseers in charge of mobile bituminous surfacing units operating throughout the State. These courses were designed to instruct personnel in the processes and procedures of sealing roads, and in the need for constant striving to improve the standard of work. In August, 1959, eighteen supervising engineers and 25 overseers attended such a course over a period of four days. The lectures were liberally illustrated by colour slides. Discussion and interchange of ideas were encouraged as much as possible. It is believed that such refresher courses are very valuable in maintaining the high standard of efficiency to which the Board aspires.

Continued assistance was given to officers of overseas road authorities in training and in providing opportunities to observe road practices in Victoria, e.g., in connection with the Colombo Plan (Plate 52).

PERSONALITIES.

Plate 50.—*Above* : Address by the Hon. Sir Thomas Maltby at Municipal Engineers Conference, 1960, at Royale Ballroom, Exhibition Buildings.

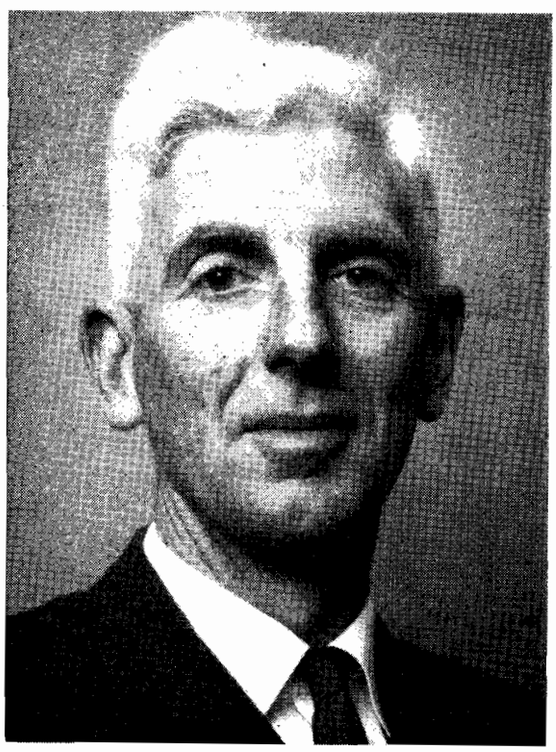

Plate 51.—*Right* : Mr. D. F. Glynn, Director of the Australian Road Research Board.

Plate 52.—*Below—Left to right* : Colombo Plan Students—Mr. Atre, Poona Public Works Department ; Mr. Sivarudrappa, Bangalore Public Works Department ; Mr. Ninan, Kerala State Public Works Department, on inspection of Country Roads Board Head Office.

Employment.

The number of employees for the year averaged 3,072. The peak of employment for the year, which also represented the post-war peak of employment, was reached in March, 1960, when 3,323 were working for the Board and the lowest number was 2,799 in July, 1959.

The total number employed in works being carried out for other authorities reached its peak during July, 1959, when 33 men were working on projects for—

State Rivers and Water Supply Commission .. 12 employees
Housing Commission .. .. 21 ,,

During the year 1959–60, no difficulty has been experienced in recruiting employees.

Staff Charities Fund.

A large number of the Board's staff again gave substantial support to this fund by contributions deducted from each fortnightly pay. The total sum contributed during the year including special donations was £382 1s. 3d., a slight increase over the contributions for the previous year.

A total amount of £359 5s. was contributed to 24 charities throughout the State including various metropolitan and country hospitals, the Junior Legacy Group, the Institute for the Blind, the various appeals by or on behalf of Returned Sailors, Soldiers, and Airmen's Imperial League of Australia. Donations on a " bulk " basis were, as usual, made to several special button day appeals by purchasing buttons or badges for each contributor to the fund. The balance of £169 6s. 9d. on hand at 30th June, 1960, will be used to meet commitments which will arise later in the calendar year.

36. MOTOR REGISTRATION.

Registrations effected during the year under the Motor Car Act totalled 856,142, an increase of 7·3 per cent. on the registrations effected during the previous year, as compared with an increase in 1958–59 of 5½ per cent. over the total for 1957–58.

Vehicles.	Financial Year 1958–59.		Financial Year 1959–60.		Increase.	Decrease.
Private—						
New	55,586		73,225			
Second-hand—						
Re-registered	19,188		20,072			
Renewals	518,697		553,090			
		593,471		646,387	52,916	
Commercial and Hire—						
New	11,187		12,435			
Second-hand—						
Re-registered	4,592		4,455			
Renewals	88,552		91,430			
		104,331		108,320	3,989	
Primary Producer—						
New	3,752		4,043			
Second-hand—						
Re-registered	4,656		3,952			
Renewals	55,121		57,586			
		63,529*		65,581†	2,052	
Licences under Motor Omnibus Act ..		813		766	..	47
Trailers		12,312		13,120	808	..
Motor Cycles		23,435		21,968	..	1,467
		797,891		856,142	59,765	1,514

NOTE.—* Includes 27,157 No Fee Tractors.
† Includes 28,819 No Fee Tractors.

37. ACKNOWLEDGMENTS.

The sincere thanks of the Board are tendered to the Minister of Public Works, the Honorable Sir Thomas Maltby, E.D., M.L.A., for his help and interest in its work.

The Board also thanks sincerely the Honorable L. H. S. Thompson, M.L.C., for his courtesy and assistance during the time when he was Acting Minister of Public Works in the absence abroad of Sir Thomas Maltby.

It is also desired to place on record the Board's thanks and appreciation for the co-operation and assistance of officers of Government Departments, other State instrumentalities and municipal councils, as well as the road authorities in other States.

We have the honour to be,

Sir,

Your obedient servants,

D. V. DARWIN, M.M., M.C.E., M.I.C.E., M.I.E. (Aust.), C.E., F.A.P.I., Chairman.

C. G. ROBERTS, M.C., B.Sc. (Eng.), A.M.I.C.E., M.I.E. (Aust.), C.E., F.A.P.I., Deputy Chairman.

W. H. NEVILLE, J.P., A.A.S.A., Member.

R. E. V. DONALDSON,
J.P., A.A.S.A., A.C.A.A.,
Secretary.

COUNTRY ROADS BOARD.

STATEMENT OF RECEIPTS AND PAYMENTS FOR YEAR ENDED 30TH JUNE, 1960.

(Adjusted to nearest pound.)

		Country Roads Board Fund.		Commonwealth Aid Roads Acts.				
		Act 6229.	Act 6222 Road Maintenance Account.	Sec. 9 (2) 1954-56; Sec. 7 (1) 1959.	Sec. 9 (3) 1954-56; Sec. 7 (2) 1959.	Loan Funds.	Commonwealth-State Flood Restoration.	Total.
RECEIPTS.	£	£	£	£	£	£	£	£
Balances at 1st July, 1959		336,403	..	205,311	146,149	..	..	687,863
Motor Car Registration Fees	8,839,071							
Additional Registration Fees	604,452							
Drivers' Licence Fees	452,324							
Fines	196,246							
	10,092,093							
Less Cost of Collection	698,513							
		9,393,580	..	..	..	..	..	9,393,580
Municipalities' Repayments—								
Permanent Works—Main Roads	30,039							
Maintenance—Main Roads	693,764							
		723,803	..	..	..	..	..	723,803
Moneys provided by *Commonwealth Aid Roads Act* 1954–56		..	..	175,998	117,332	..	..	293,330
Moneys provided by *Commonwealth Aid Roads Act* 1959		..	..	4,820,666	3,346,578	..	..	8,167,244
Proceeds from *Commercial Goods Vehicles Act* 6222		..	2,117,494	..	..	..	..	2,117,494
Receipts from State Loan Funds—Act 6229		..	..	..	..	160,000	..	160,000
Moneys provided under Commonwealth–State Agreement for Flood Restoration		..	..	..	..	..	5,124	5,124
Fees and Fines under Country Roads Act		1,042	..	..	..	..	..	1,042
General Receipts		42,952	..	..	..	..	..	42,952
		10,497,780	2,117,494	5,201,975	3,610,059	160,000	5,124	21,592,432
PAYMENTS.								
Main Roads—								
Construction and Reconstruction		3,435,232	..	1,445,257	..	109,995	1,071	4,991,555
Maintenance		1,225,092	..	42,556	..	..	..	1,267,648
State Highways—								
Construction and Reconstruction		381,807	..	3,335,766	..	17,005	..	3,734,578
Maintenance		..	2,117,464	..	..	..	..	2,117,464
By-pass Roads—Construction		266,880	..	..	..	..	..	266,880
Tourists' Roads—								
Construction and Reconstruction		324,516	..	..	..	33,000	..	357,516
Maintenance		193,572	..	..	..	..	..	193,572
Forest Roads—								
Construction and Reconstruction		..	..	..	98,026	..	..	98,026
Maintenance		51,997	..	..	42,037	..	..	94,034
Unclassified Roads—								
Construction and Reconstruction		..	..	500,000	2,863,563	..	4,053	3,367,616
Maintenance		..	..	..	606,433	..	..	606,433
Murray River Bridges and Punts		124,589	..	..	..	..	..	124,589
Traffic Line Marking		36,362	..	..	..	..	..	36,362
Plant Purchases		1,028,042	..	..	..	..	..	1,028,042
Traffic Lights		1,248	..	..	..	..	..	1,248
Contribution—Australian Road Research Board		..	..	896	..	..	..	896
Interest and Sinking Fund Payments		875,034	..	..	..	..	..	875,034
Payment to Tourist Fund		151,737	..	..	..	..	..	151,737
Transfer of Rent Producing Properties acquired for Road Deviations from Commonwealth Aid Roads to Country Roads Board Fund		122,500	..	*Cr.* 122,500	..	..	..	..
Kew Office		452,275	..	..	..	..	..	452,275
General and Administrative Expenditure		1,183,250	..	..	..	..	..	1,183,250
		9,854,133	2,117,464	5,201,975	3,610,059	160,000	5,124	20,948,755
Balances at 30th June, 1960		643,647	30	..	..	..	..	643,677

NOTE.—Relief to Municipalities granted under Act 6229 Section 32, amounted in 1959–60 to £79,490 3s. 11d.

R. G. COOPER,
Accountant.
8th November, 1960.

AUDITOR-GENERAL'S CERTIFICATE.

The accounts of the Country Roads Board for the year ended 30th June, 1960, have been audited. In my opinion the above statement of Receipts and Payments fairly presents in summary form the transactions during that period.

R. W. GILLARD,
Auditor-General.
14th November, 1960.

COUNTRY ROADS BOARD.

Loan Liability as at 30th June, 1960.

—	£ s. d.	Main Roads, &c. £ s. d.	Developmental Roads. £ s. d.	Total. £ s. d.
Permanent Works—				
Main Roads	6,995,966 8 5			
State Highways	5,607,152 9 3			
Tourists' Roads	88,292 10 3			
Forest Roads	1,083 18 11			
		12,692,495 6 10	..	12,692,495 6 10
Developmental Roads		..	6,425,757 10 11	6,425,757 10 11
Discounts and Expenses		256,322 15 2	265,929 2 1	522,251 17 3
Total Amount Borrowed		12,948,818 2 0	6,691,686 13 0	19,640,504 15 0
Less Redemption of Loans—				
Redemption Funds		85,219 1 1	646,386 7 4	731,605 8 5
Main Roads Sinking Fund		285,688 7 7	..	285,688 7 7
Developmental Roads Sinking Fund		..	55,083 0 2	55,083 0 2
State Loans Repayment Fund		1,138,661 1 3	..	1,138,661 1 3
National Debt Sinking Fund		1,436,777 17 7	1,804,590 2 10	3,241,368 0 5
		2,946,346 7 6	2,506,059 10 4	5,452,405 17 10
Loan Liability at 30th June, 1960		10,002,471 14 6	4,185,627 2 8	14,188,098 17 2

CHIEF ENGINEER'S REPORT

Country Roads Board,
Melbourne,
12th October, 1960.

THE CHAIRMAN,

SIR,

I have the honour to report on matters of tehnical interest included in the work carried out during the financial year 1959/60.

MECHANICAL DIVISION.

The division transferred to the new central workshop and depot at Syndal in December, 1959, leaving only some reduced scale transport and stores activities to be carried out in South Melbourne. Only a small proportion of the personnel preferred not to move to the new location. and their loss has been made up by local labour. In general, the staff position has improved and is now reasonably satisfactory. There is still, however, a need for additional clerical staff and inspecting and instructing personnel. The professional staff has been augmented by the appointment of a Planning Engineer (Mechanical) and an Inspecting Engineer (Mechanical), and these appointments should prove most advantageous to the work of the division.

The following items were added to the Board's plant and equipment during the year :-

(i) Aggregate Loader.—The first of the batch of four C.R.B. designed loaders referred to in the Forty-sixth Annual Report, has been completed in the Board's workshop and has successfully completed its field trials, and is now being used in full scale operations. The other three are nearly completed.

(ii) International Harvester model B275 wheel tractor with attachments for scrub slashing, ploughing, post hole digging, dozing, cultivating, sweeping, and loading.

(iii) Gradall combined excavator, back-actor, ripper, and grader (see Plate 1).

(iv) International Harvester BTD 20 crawler tractor.

(v) Vickers Vikon crawler tractor.

(vi) Michigan model 85A four-wheel drive pneumatic-tyred bucket loader acquired to be the prime mover for a Bros blower type, self-powered snow removing device which is on order.

(vii) Wacker petrol powered rammer.

(viii) Wacker petrol powered vibrating plate.

(ix) Jackson petrol-electric, multiple plate compactor (see Plates 2 and 3).

(x) Hyster grid roller.

(xi) Marshall-Moore 10–12 ton steel wheeled road roller.

(xii) Macro-Tampo eleven-wheeled pneumatic-tyred, self-propelled roller.

(xiii) Foden model FG6/20 three-axle truck powered by Gardner model 6 LX engine.

Plate 1.—" Gradall " combined excavator back-actor ripper, and grader.

Plate 2.—" Jackson " petrol-electric, multiple plate compactor.

Plate 3.—" Jackson " multiple plate compactor showing one plate used separately.

Syndal Depot.—The move to Syndal was accompanied by a small loss of work output which occurred before, during, and for a few weeks after the move, but the better laid out facilities of the well lit modern buildings, together with closer work control, and improved workshop methods and working force morale have already substantially reduced the working hours required to complete specific jobs and bettered the work quality compared with those at South Melbourne.

Of the facilities of the new depot, the following are noted :—

(i) *Floor Heating.*—An automatic, crude-oil fired, circulating hot water type floor heating system serves the floors of the workshop and office building. The system has proved to be most satisfactory.

(ii) *Hot Water Supply.*—A small, crude-oil fired boiler used to supply the steam cleaner produces through a heat exchanger a continuous supply of hot water for the canteen and for hand wash basins and showers.

(iii) *First Aid Station.*—Due to the absence of a hospital or clinic in the immediate neighbourhood, it was necessary to establish a well equipped first aid station. The station is in the full time charge of a qualified nursing sister. The first aid station provides immediate attention in case of minor injuries and by allowing personnel to return to work quickly, improves attendance times. In case of more serious accidents, competent care can be taken of injured personnel until the arrival of a doctor or ambulance.

(iv) *Canteen and Amenities Building.*—In the absence of adequate catering facilities in the Syndal area, the Board erected a canteen for the provision of hot and cold meals and confectionery. The canteen is spacious, well lit and furnished with attractive and modern tubular furniture. The meals are prepared in an all-electric kitchen which also provides tea for the employees and some of the staff. The canteen is well patronized, between 30 per cent. and 40 per cent. purchasing their midday meal. The building housing the canteen also contains the workshop employees' locker and wash room, toilets, and showers.

Among the existing installations the following are of interest :—

(i) *High Cycle Current.*—Fifty-cycle 240-volt electric power supply is converted to 200-cycle 110-volt for operating small hand tools which are smaller, lighter, and have better torque characteristics than those operating on 50-cycle supply.

(ii) *Automatic Welder.*—An automatic welding machine is used for some continuous processes, particularly the reclaiming of worn crawler tractor track rollers and grouser plates.

(iii) *Profile Cutter.*—A modern and precise flame profile cutter is used for the rapid production of grader and ripper tine blanks, bridge spanners, and some other items. The cutter can use a variety of gases and is able to copy profiles from metallic and non-metallic templates and drawings.

(iv) *Cleaning.*—Particular care is being taken with the cleaning of earthmoving and other machinery returned from the field, before inspection dismantling and repair. The machinery is cleaned initially by a high velocity water jet and steam, while, after disassembly, the components are cleaned in chemical baths.

One of the more obvious gains resulting from the more concentrated and better laid out workshop facilities is the reduction in the number of gas hand-welding sets required. This has been reduced from 14 to 6 without loss of output.

Stores.—Rather than build a separate stores building, the Board recently decided to increase the 55,000 sq. ft. area of the new workshop building to 103,000 sq. ft. Of the enlarged building, which will be ready early in 1961, the Central Store will occupy 33,000 sq. ft. and the remaining 70,000 sq. ft. will be needed for additional maintenance and repair requirements. Combining the stores and the workshop in one building will reduce stores and parts handling problems and the associated delays.

ASPHALT DIVISION.

Extent of Work.—Table 1 sets out the mileage of work carried out on declared roads, unclassified roads, and for other authorities during the past two years, the total length for 1959–60 amounting to 2,629 miles or 14·4 per cent. more than that carried out in 1958–59.

Table 2 shows the lengths of different types of work for both initial treatments and retreatments on the declared system, while Table 3 shows the mileages of initial treatments or retreatments carried out on unclassified roads. Table 4 sets out in a summarized form the lengths of different categories of work carried out on all roads to which the Board contributed funds. A total length of 52 miles of road pavements was treated this year with bituminous macadam or bituminous concrete, the work being carried out by contractors, who laid approximately 48,000 tons of material to various widths and thicknesses.

TABLE 1.—LENGTH OF WORK CARRIED OUT IN 1958–59 AND 1959–60.

Type of Road and Plant Used.	Miles.			
	1958–59		1959–60.	
(*a*) Work on C.R.B. declared roads—				
(i) Board's plant ..	1,460		1,617	
(ii) Municipal plant ..	60		76	
(iii) Contractor's plant ..	16		48	
		1,536		1,741
(*b*) Work on undeclared roads to which the Board contributes—				
(i) Board's plant ..	596		745	
(ii) Municipal plant ..	73		52	
(iii) Contractor's plant ..	..		4	
		669		801
(*c*) Work done for other Authorities by Board's plant—				
(i) Municipalities ..	84		78	
(ii) State instrumentalities ..	9		9	
		93		87
		2,298		2,629

TABLE 2.—MILEAGE OF EACH TYPE OF WORK CARRIED OUT ON DECLARED ROADS DURING 1959-60.

Length in Miles.

Type of Road and Control of Work.		Nature of the Work.																				Summary of Work.	
		Initial Treatments.													Retreatments.								
															Reseals.								
															Nominal Size of the Aggregate.					Two Application Reseal.	P.M.S.		
Road.	Control.	Duplication and Widening.		Initial Treatment Primerseal.		One Application Seal Only.		Two Application Seal Only.		I.T. Prime and Two Application Seal.		I.T. Prime and Seal.		Pen. Mac.								State Highways.	Other Declared Roads.
		Widen.	Duplication.	E.	R.	E.	R.	E.	R.	E.	R.	E.	R.	R.	¾-in.	⅝-in.	½-in.	⅜-in.	¼-in.				
State Highways	Direct ..	30·63	8·33	..	2·58	0·10	17·92	..	..	..	1·36	33·12	135·67	..	11·09	20·11	39·54	77·82	136·60	2·26	32·84	549·97	..
	Municipal	0·58	..	..	..	..	..	..	..	..	..	..	11·61	..	..	..	27·70	..	..	..	2·19	42·08	..
Main, Tourists' and Forest Roads	Direct ..	4·49	..	..	..	0·75	6·60	..	..	..	5·22	23·01	11·85	..	1·03	2·29	..	12·34	..	..	2·96	..	70·54
	Municipal	86·20	..	5·61	..	144·63	43·06	6·41	..	12·32	..	338·17	56·71	2·70	11·68	27·29	115·83	112·72	105·92	..	9·34	..	1,078·59
	Totals ..	121·99	8·33	5·61	2·58	145·48	67·58	6·41	..	12·32	6·58	394·30	215·84	2·70	23·80	49·69	183·07	202·88	242·52	2·26	..	592·65	1,147·13
		130·23		8·19		213·06		6·41		18·90		610·14		2·70	704·22						47·33	1,741·2	
		989·63													751·55								
		1,741·2																					

Abbreviations.—E. Extension to the bituminous surfaced system.
R. Initial treatment on a reconstructed length of previously sealed pavement.
P.M.S. Treatment with plantmix
Pen. Mac. Penetration macadam.

NOTE.—The table does not include 801 miles of work on undeclared roads to which the Board contributes funds.

TABLE 3.—MILEAGE OF WORK CARRIED OUT ON UNDECLARED ROADS DURING SEASON 1959–60.

Work.	Miles.	
Initial Treatments—		
Extensions	625·9	
Reconstruction of lengths of previously sealed pavements	34·4	
Widening	4·4	
Retreatments	135·8	
Total		800·5

TABLE 4.—MILEAGE OF DIFFERENT CATEGORIES OF WORK CARRIED OUT ON ROADS TO WHICH THE BOARD CONTRIBUTED FUNDS DURING THE YEAR 1959–60.

Work.	Miles.	
Initial Treatments—		
Extensions to the length of sealed roads	1,190	
Reconstruction of lengths of previously sealed pavements	329·9	
Widening of existing sealed pavements ..	126·3	
Duplication—initial treatment of additional traffic lanes	8·3	
		1,654·5
Retreatments—		
Reseals or plant mixed work		887·2
Total		2,541·7

A total of 269,326 cubic yards of covering aggregate was used in the sprayed work and about 40,000 cubic yards of screenings and sand used in the plant mixed work. The average prices per cubic yard of the different types of aggregate used during the past five years are set out in Table 5. The table indicates that since 1956–57 when the average cost of aggregate rose to a peak of 48s. 8d. per cubic yard there has been a steady, though slight, annual reduction in the average cost, the main factor contributing to this being the increase to the extent of about 8 per cent. in the use of crushed and/or screened gravels which are somewhat cheaper than quarried products.

The average costs of the various types of sprayed work carried out this year, subdivided into the four major categories—material, stores, plant hire, and labour—are set out in Table 6. Despite an increase in wages and plant hire rates during the year, it is pleasing to note that the over-all average cost of resealing work was slightly less than in the year 1958–59, while the cost of standard initial treatment comprising a prime and single application seal coat was less by 12½ per cent. than similar work done in the previous year, although this is partly accounted for by a reduction in the percentage of work carried out with ¾-in. aggregate in favour of ⅝-in. and ½-in. material.

Bituminous Materials.

(*a*) *Bitumen.*—Two refineries in Victoria continue to supply the Board's bitumen requirements, over 99 per cent. being handled throughout the State in bulk. A quantity of 24,805 tons was used in the sprayed work and approximately 2,500 tons in plant mixed work, making the total usage in the bituminous surfacing programme about 27,300 tons.

(*b*) *Priming Materials.*—Dwindling supplies of crude horizontal retort tar, regarded as the most effective material for priming the soft absorptive limestones commonly used for pavement material in the north-west of the State, has led to experimental work with alternative materials, and the best substitute appears to be a lightly distilled vertical retort tar, having the following characteristics (approximately):—

Specific gravity 77° F./77° F.	1·06
Viscosity, Stokes at 122° F. ..	0·6 to 1·5
Insoluble in carbon disulphide —per cent.	5 to 8
Total oils by distillation to 572° F. — percentage by weight	25 to 35

TABLE 5.—AVERAGE PRICE OF AGGREGATE FOR BITUMINOUS SURFACING AT PER CUBIC YARD IN STACKS BY THE ROADSIDE FOR THE YEARS 1955–56, 1956–57, 1957–58, 1958–59, 1959–60.

Material.	Price per Cubic Yard.									
	1955–56.		1956–57.		1957–58.		1958–59.		1959–60.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Screenings	44	10	51	5	49	4	47	9	48	6
Gravel	44	1	39	11	46	1	46	1	42	2
Sand	20	6	29	3	26	3	32	6	27	4
Scoria	18	4	26	2	18	9	8	6	27	1
Average price all aggregates	43	8	48	8	47	11	47	0	46	5

It has been standard practice when sealing these limestone pavements to use ¼ gallon of the crude horizontal tar per square yard, applied in two applications in order to avoid drainage troubles, the object being to effect suitable penetration, plug up the pores in the absorptive pavement material and leave a relatively heavy residue on the surface which will prevent further absorption of the bitumen subsequently applied in the seal coat. From the work carried out this year, it appears that a safe procedure is to use crude horizontal retort tar in the first and the lightly distilled vertical retort tar in the second application of the primer, thus reducing the requirements of the former by about one half, without radically altering normal field procedure.

Light Temporary Bituminous Surfacing.

It has become common practice to use a light type of bituminous surface treatment when the pavement material and conditions are such that there would be some advantage in postponing the application of a normal seal coat for some months. It is necessary to apply a primer-binder which is heavier than the normal primer and this can be either—

(*a*) a "cut-back" primer-seal applied in two applications, the first a very light grade cut-back and the second somewhat heavier, covered with toppings, sand, &c., or,

(*b*) and this is used particularly in winter work, a light application, 0·06–0·75 gallon per square yard of crude vertical retort tar primer reduced in viscosity by heavily cutting back with tar oil which assists the adhesion of the second application, which is applied immediately, and consists of cut-back bitumen covered with ¼-in. or ⅜-in. material.

TABLE 6.—AVERAGE COST OF B.S.T. WORK CARRIED OUT BY C.R.B. PLANT ON ROADS TO WHICH THE BOARD CONTRIBUTED FUNDS DURING 1959–60.

(Cost in Pence per Square Yard.)

Item.	Nature of the Work.																					
	Initial Treatments.										Retreatments.											
											Reseals.											
	I.T. Primerseal.		One Application Seal Only.		Two Application Seal Only.		I.T. Prime and Two Application Seal.		I.T. Prime and Seal.		Nominal Size or Gauge of Aggregate Used.										Two Application Reseal.	
											¾-in. "E".		⅝-in. "F".		½-in. "G".		⅜-in. "H".		¼-in. "I" and Sand.			
Square Yards Costed	207,626		3,528,811		110,454		214,034		8,694,262		326,041		600,290		1,844,326		2,173,773		2,419,554		35,266	
	d.	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%	*d.*	%
Material	10·0	49·3	15·3	62·2	24·2	67·0	23·5	59·6	21·0	60·9	18·5	60·5	17·0	64·2	14·1	60·5	11·5	65·7	10·7	71·8	23·6	70·4
Stores	1·0	4·9	0·7	2·8	1·1	3·0	1·2	3·0	1·2	3·5	1·1	3·6	0·9	3·4	0·6	2·6	0·5	2·9	0·4	2·7	0·7	2·1
Plant Hire	4·3	21·2	3·9	15·9	5·3	14·7	6·7	17·0	5·8	16·8	4·8	15·6	3·8	14·3	4·0	17·2	2·5	14·3	1·8	12·1	4·3	12·8
Labour	5·0	24·6	4·7	19·1	5·5	15·3	8·0	20·4	6·5	18·8	6·2	20·3	4·8	18·1	4·6	19·7	3·0	17·1	2·0	13·4	4·9	14·7
Totals	20·3	100·0	24·6	100·0	36·1	100·0	39·4	100·0	34·5	100·0	30·6	100·0	26·5	100·0	23·3	100·0	17·5	100·0	14·9	100·0	33·5	100·0

Work of this nature is usually satisfactory and is followed by a normal seal coat in 6 to 12 month's time.

An alternative bituminous material for this type of work has been used extensively and very satisfactorily in the Geelong area this year under various conditions of traffic and weather. The material is a treated tar, developed by a tar distiller in Geelong, and comprises a dehydrated distilled vartical retort tar, fluxed with approximately 15 per cent. of dehydrated horizontal retort tar. Typical characteristics of the material are as follows :—

	%
Specific gravity 77° F./77° F.	1.11
Viscosity—Stokes at 122° F.	22.6
Insoluble in carbon disulphide—percentage ..	8·1
Total oils by distillation to 572° F.—percentage by weight	16

The material when sprayed at about 225° F. does not appear to provide much penetration but adheres strongly to a pavement material even when damp, will hold satisfactorily $\frac{5}{16}$-in. aggregate with a single application of 0.175 gallon per square yard and will withstand quite heavy traffic for some months. Because of its high viscosity at normal temperatures, the tar must be handled hot in bulk, a fact which rather restricts its use to areas to which it can be conveniently transported in that condition.

Slurry Sealing.—Reference was made in the Board's Forty-sixth Annual Report to experimental bituminous emulsion slurry seal work carried out on the Murray Valley Highway near Cohuna, with the object of observing the effectiveness or otherwise of the process on an old sealed macadam pavement which was very badly cracked. About nine months after the work was done it was observed that cracking had reappeared through the slurry seal which in places had not adhered well to the old pavement, and the material itself had a lifeless appearance suggesting a deficiency in bitumen content.

Further work was therefore carried out on short sections of a similarly badly cracked pavement on the same highway in February, 1960, and the composition of the slurry mixture was varied from the original work by increasing the quantity of bituminous emulsion in the slurry to about 6 to 8 per cent. by weight, and part of the work was carried out with bituminous emulsion to which rubber latex had been added to the extent of approximately $5\frac{1}{2}$ per cent. by weight of rubber to bitumen content. For further comparison, sections of the cracked pavement were treated with a $\frac{1}{4}$-in. aggregate reseal with hot bitumen, to approximately half of which 2 per cent. by weight of rubber powder was added to the bitumen. This $\frac{1}{4}$-in. resealing was extended for some distance over the original slurry seal work through which pavement cracks had reappeared.

It is too early to draw definite conclusions after four months but impressions gained from recent observations suggest that—

(*a*) the additional binder in the slurry seal has produced a better looking material, although the process has not completely dealt with the cracks in the pavement, which are probably far too extensive for any such light treatment to be wholly effective.

(*b*) there is no obvious difference in the slurry mixture with or without rubber.

(*c*) the $\frac{1}{4}$-in. resealing is almost as effective as the slurry sealing for dealing with the smaller cracks, but it does not obliterate as well as the slurry seal the larger holes which exist where small pieces of the cracked pavement have spalled away.

(*d*) there is no obvious difference in the $\frac{1}{4}$-in. reseals with or without rubber.

(*e*) the best result so far is where the $\frac{1}{4}$-in. reseal was extended over the original slurry seal in which cracking had reappeared. On this section the larger cracks and holes had been filled with slurry and the subsequent reseal now presents a reasonable surface.

Organization of Work.—In order to keep up supplies of heated bituminous material to the sprayer, it is usual for each mobile spraying unit to be provided with its own heating and storage equipment which is set up at the temporary field depots. The depots are kept replenished by drawing supplies by road tankers from either the bitumen refineries, or in areas further afield, from rail tank cars. Each field depot of storage and heating equipment requires its own complement of men, and the mobilizing transport and setting up again when moving from one depot to another consume valuable spraying time. A modification of this system was put into operation in the Horsham division this season, by consolidating all heating, storage, and distribution plant and equipment at a central depot, manned by a minimum number of men, the mobile units operating from temporary depots in the field which were supplied with heated materials from this central depot. Supplies were kept right up to the sprayer on the job thus eliminating delays otherwise normally incurred when the sprayer had to travel a long distance for supply. This also relieved the mobile units of the need for moving and reassembling heating and storage equipment time and time again through the season. The modified system has, in consequence, increased the efficiency of the mobile units, making it possible to carry out more work per unit and to effect some saving in the cost of work. Another advantage of the system is that by having available a priming unit at the central depot, it is possible, at the shortest notice, to apply primer to any new work as soon as it is prepared anywhere in the division.

DIVISION OF ROAD DESIGN.

Engineering Surveys.

During the year 248 miles of engineering surveys of all types were completed by eight Head Office engineering survey parties, each completing on the average $\frac{1}{2}$ to $\frac{2}{3}$ mile per week. the major lengths being for—

	miles.
Reconstruction and widening	53·50
Realignments	38·40
Deviations	26.60
Duplication of pavements in metropolitan area	14·25
Horizontal and vertical control for photogrammetry	48·00

Plans have been completed for 80 jobs totalling 125 miles of roadworks primarily for highway reconstruction or new construction.

By-pass Roads.

During the year, a considerable amount of design work has been completed with the object of reserving the necessary land for roads of this statutory classification, i.e., roads of the freeway type which will provide for fast, safe, and free flowing movement of high volumes of traffic free from local accesses. Before land can be acquired for these routes all future interchanges, some of great complexity, must be designed so as to accurately determine the land required. Investigations of this nature have been concentrated this year on all or part of routes which may be required in the future around Dandenong, to the Mornington Peninsula, to the proposed Tullamarine Jet Airport, to Geelong, and around several

country towns, notably on the Hume Highway. If land for such future projects is acquired before development, very large sums of money for property acquisition will be saved in the future.

Liaison with Melbourne and Metropolitan Board of Works Planners.

Regular liaison meetings have been held between the Chief Engineer and the Traffic Engineer of the Board and the Chief Planner and the Engineer for Metropolitan Highways of the Melbourne and Metropolitan Board of Works to discuss and, as far as possible, co-ordinate the activities of the authorities in the metropolitan area.

Curve Templates.

A series of thin transparent templates has been made to simplify the work involved in road location and interchange design. The curves have been selected from the Board's standard curve design tables. Using a pair of identical templates (one upside down) a curve can be located between control points instead of using the conventional method of using straight edges and railway curves (see Fig. 1).

Traffic Line Marking.

The total mileage of roads maintained in a striped condition during the year 1959–60 was 3,433 miles, an increase of 311 miles over the previous years figure. This total comprised State Highways 2,586 miles, other declared roads 673 miles, and roads not under Board's jurisdiction 174 miles. The total expenditure on this type of work during the financial year was £37,224, and the average cost per mile of standard stripe, i.e., a line consisting of 10-ft. dashes and 30-ft. gaps, £6 5s. The total quantity of lacquer used was 20,030 gallons, with an average rate of application per mile of standard stripe of 3·52 gallons. The following table sets out the mileages treated and retreated by standard stripe during each year since 1952–53, and the square footage per gallon of lacquer used :—

Year.	Sq. ft. per Gallon.	Miles State Highways.	Miles Other Declared Roads.	Miles Undeclared Roads.	Total Mileage.
1952–53	99·47	2,110	550	106	2,766
1953–54	101·57	2,377	645	197	3,220
1954–55	93·57	2,664	651	188	3,503
1955–56	97·26	2,774	828	181	3,783
1956–57	95·76	3,113	831	303	4,247
1957–58	94·16	3,433	968	175	4,576
1958–59	98.03	3,966	1,106	263	5,335
1959–60	94·03	4,283	1,236	302	5,821

Experimental work has been carried out with " beaded " lines, mainly with the " drop on " method, i.e., where the beads have been dropped onto a freshly painted line. The results have been very encouraging, but the Board's existing equipment is not capable of producing beaded lines economically

Title Surveys.

There are now six title survey parties on the Board's staff, who have carried out approximately one-quarter of the 400 surveys completed during the year. The remainder of the surveys has been done by private surveyors. The surveys undertaken by the Board's staff, however, include most of the more complicated projects, and include practically all surveys on State Highways. Owing to the tendency for title surveys to become more involved due to the increasing number

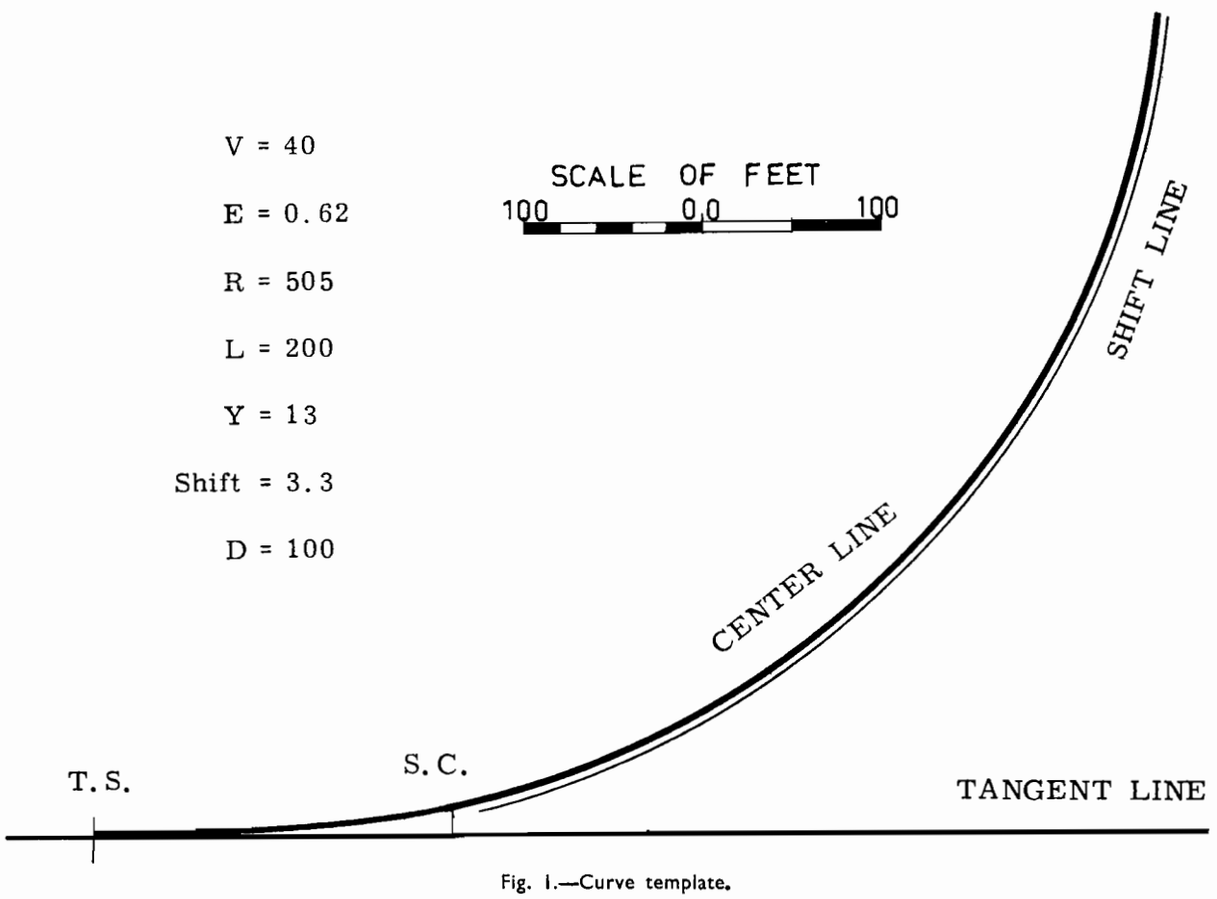

Fig. 1.—Curve template.

of overpasses and by-passes, &c., and the fact that the cost of private surveys is very high, it is becoming very desirable from a practical and an economic point of view that a greater proportion of title surveys be carried out by the Board's staff which, however, would require to be augmented.

MATERIALS RESEARCH DIVISION.

Soil Testing—Foundations for Bridges and Embankments.—It is being realized that there is a need for more complete investigation of the foundations of bridges and embankments, particularly in respect to possible settlement of embankments and the effect of such movement on the abutments of bridges. Consequently, it is proposed to obtain equipment for taking undisturbed samples and for consolidation testing, as well as additional equipment for carrying out vane shear tests. A Raymond sampler for obtaining partially disturbed samples and for the "standard penetration test" is being used in the examination of bridge foundations, while further use has been made of the deep sounding cone penetrometer. Laboratory equipment for triaxial shear testing of soils has been installed and experience is being gained in its use.

Portable Seismograph.—During the year a portable seismograph was obtained and used to assist in geological investigation of roads where deep cuttings were proposed. With this instrument it is possible to gain information about the depth and hardness of the rock and thus to estimate the type of plant required for ripping or whether it would be necessary to use explosives. Experience is being gained in the interpretation of the test results and the method promises to effect substantial savings in the cost of such investigations.

Hot Mixed Asphalt.—The increased use of hot mixed hot laid asphalt on the more heavily trafficked roads close to or in the metropolitan area has made it necessary to carry out laboratory investigations in order to devise paving mixtures of local materials which will show satisfactory stability, flow, and air voids as indicated by the Marshall test procedure. British Standard Specification No. 594 for rolled asphalt was the initial basis of design, but the bitumen available locally is of 80–100 grade (compared with 40–80 provided for in the specification) and the fine sand, under microscopic examination, proved to have very round smooth grains. It was found that satisfactory stability for heavy traffic could be achieved only by a considerable reduction in bitumen content and a substantial increase in filler content as compared with the British Standard Specification. Further work was undertaken to investigate the effect of using a mixture of the fine rounded sand with a coarse sand having more angular and rougher particles. This work has led to the conclusion that with the rougher sands, although the bitumen content is still somewhat lower than required by the British Standard Specification, it is easier to obtain the proper amount of air voids in the compacted material while still maintaining satisfactory stability and flow.

ROAD CONSTRUCTION.

Concrete Pavement Construction.—Unusual conditions obtained on the Maroondah Highway through Ringwood where the old macadam pavement had failed and required complete reconstruction. Trouble was caused, in part, by the presence of three large water mains, two on the north side 36-in. and 46-in. diameter, being about 40 years old, with another 46-in. main on the south side in relatively good condition. Not only had leakage from the mains, over the years, softened the clay subgrade adjacent to them, but their depth below the finished surface of the pavement was such that, had a flexible pavement been constructed, the necessary compacting equipment would have been required to work virtually on top of the mains. It was, therefore, decided to construct a concrete pavement which would distribute traffic loads over a greater area and would not require the use of heavy equipment.

The initial step was taken by the Melbourne and Metropolitan Board of Works which cement-lined the older pipes. Next, the soft clay was excavated from the areas adjacent to the mains by a "Gradall" which was able to work from the adjacent ground and did not impose any load on the mains. This excavation was filled with wet sand so that any leakage could be taken away by agricultural drains. The actual subgrade was then constructed with 8 inches of gravel covered by 2 inches of fine sand. Compaction was by a 54-in. wide vibrating roller towed by a pneumatic-tyred tractor. In order to detect any leaks which might develop in the mains, 2-in. inspection ports were provided in the concrete slab at 25-ft. centres along the longitudinal axis of each main.

A type cross-section is shown in Fig. 2. The cement content of the concrete was six bags per cubic yard and the average 28-day strength was 4,800 p.s.i. The slabs were constructed with three longitudinal joints so as to form two 12-ft. and one 7-ft. strips. Compaction was achieved with vibrating screeds finished off by a longitudinal float. Initially, the longitudinal float was of timber, but subsequently an aluminium box section was used, the lower surface of which was treated with a thick layer of epoxy resin mixed with sharp sand. This stood wear much better than timber. The finished surface treatment was made by dragging a light bass broom across it. When the initial set had taken place, the slab was covered with polythene sheet, and ultimately with wet sand. Transverse contraction joints were cut with a carborundum saw as soon as the concrete was sufficiently hard to avoid spalling (see Plate 4).

Big Desert Roads—Shire of Kaniva.—During the financial year 1959–60, 12·3 miles of road were constructed in the A.M.P. area and 1·5 mile on behalf of the shire of Kaniva, making a total of 13·8 miles. The work was carried out in fifteen working weeks commencing on 20th October, 1959, and being completed on 26th February, 1960. The whole of the work was through sandy scrub country and involved the winning, loading, cartage, and spreading of 39,000 cubic yards of sandstone and 65,000 cubic yards of sand clay, the whole amounting to 104,000 cubic yards of roadmaking material. The maximum daily output was 2,375 cubic yards and the average 1,350 cubic yards per day. One and three-quarter million gallons of water were delivered to the road from an 8-in. bore sunk to a depth of 337 feet. The most important aspect of the work was the discovery of soft sandstone in this area. Although the material breaks down to a soft condition in the pavement and is, therefore, likely to require constant maintenance, its use greatly reduced the cost of the work carried out. The total cost was £37,420, or £2,700 per mile.

Cement Stabilized Granitic Sand Pavement.—An experimental section of cement stabilized sand pavement was put down on the Princes Highway West in 1959. The nominal thickness of the unstabilized granitic sand from the You Yang hills was 15 inches and the experimental section was laid with 6 inches of stabilized sand on 3, 5, and 7 inches nominal thickness of unstabilized material, the object being to ascertain what reduction in total pavement thickness would be possible if the upper 6 inches of the pavement were stabilized with cement, details being as follows:—

(*a*) *Subgrade.*—The subgrade is a sandy clay with about 70 per cent. passing the No. 200 sieve and with a plasticity index of 40, except for an area around chainage 199200 to 199300 where it is a clay loam.

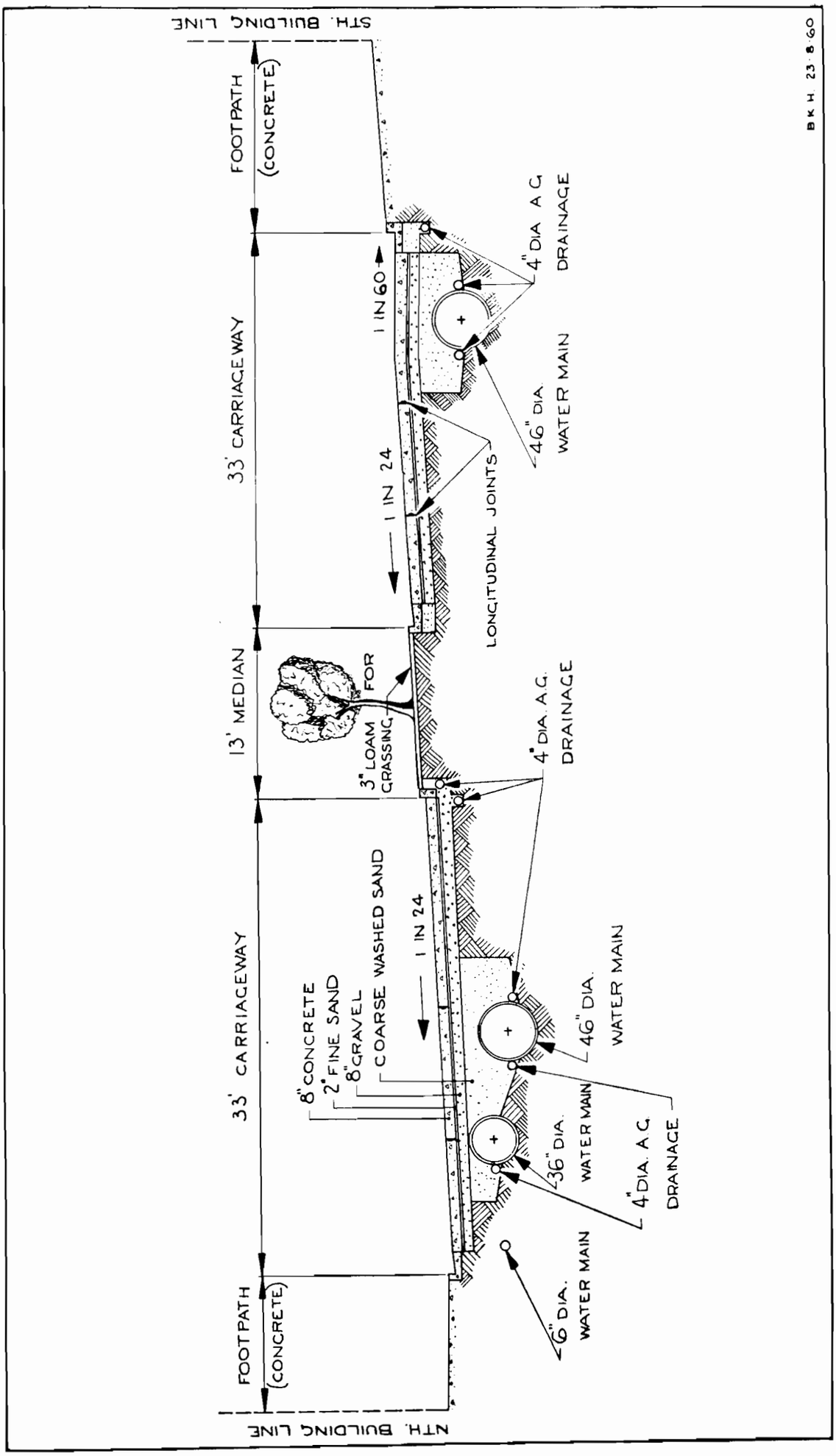

Fig. 2.—Cross-section Maroondah Highway, City of Ringwood.

Plate 4.—Sawn contraction joint showing developed construction crack.

(*b*) *Granitic Sand.*—The plasticity index of the unstabilized sand was below 3, and the sand contained about 36 per cent. passing the No. 36 sieve and 15 per cent. passing the No. 200 sieve.

(*c*) *Cement Content.*—The over-all average content was found by analysis to be 2½ per cent.

(*d*) *Density.*—The compacted densities were relatively low, averaging 95 per cent. of British Standard Compaction.

(*e*) *Thickness.*—The measured thicknesses differ somewhat from the nominal thickness.

Nominal Thickness	*Measured Thickness*
13 inches ..	14·5 inches
11 inches ..	11·8 inches
9 inches ..	10·8 inches

(*f*) *Cracking.*—After priming and prior to sealing, longitudinal cracks at the junction between successive passes of the stabilizing machine and transverse shrinkage cracks were observed but, in addition, cracks were noticed close to the left-hand edge. These consist of longitudinal cracks about 6 inches apart and may be due to lack of support from the subgrade or shoulders. In the weaker sections some of these edge cracks persisted after sealing.

(*g*) *Deflection.*—If a deflection measured by the Benkelmann-beam apparatus, of 0·040 inch under a 9,000-lb. wheel load is taken as being satisfactory for a pavement with a normal bituminous surface treatment, the unstabilized granitic sand and the stabilized section between 198,700 and 199,200, which has a total thickness of 14·5 inches, are not so far showing excessive deflection. Both of the thinner sections, however, are showing some excessive movement under load and will probably require strengthening during 1961.

Lime Stabilization.—Some experimental trials of lime stabilized gravel have been made in the Benalla division, but it is generally found that gravels with a plasticity index below 15 are not much improved in respect to plasticity index by the addition of lime. For these materials cement might produce better results.

In Bendigo division, lime has been used to stabilize more plastic materials with the results listed in Table 7.

TABLE 7.

Road.	Material.	Percentage Limil.	L.L.	P.L.	P.I.	L.S.	C.B.R.
Murray Valley Highway, Section 2 ..	Clay	0	36	12	24	7½	6
		2	34	19	15	6	60
		4	32	22	10	5	70
Channel Street, Cohuna	Clay	0	44	13	31	11½	6
		2	42	19	23	8½	40
Kerang-Koondrook Road	Clay	0	38	12	26	10	6
		2	36	17	19	7	40
		4	35	26	9	4	70
Murray Valley Highway, Section 4 ..	Limestone ..	0	34	13	21	7	30
		1	34	26	8	4	110

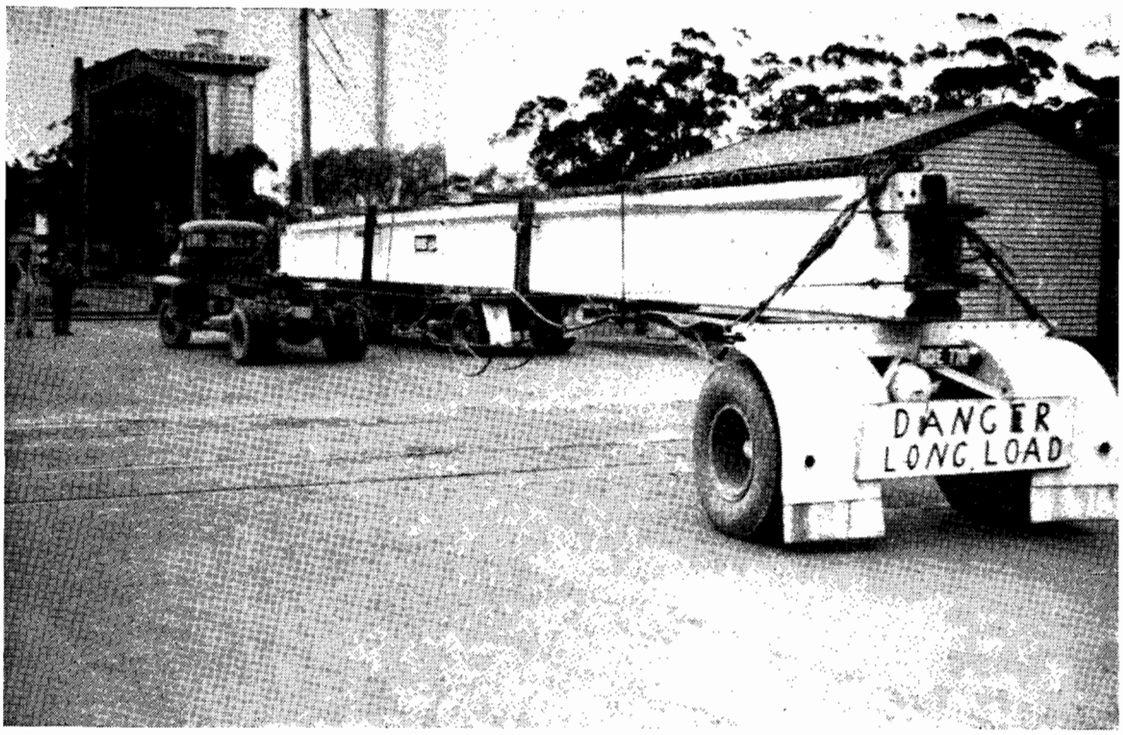

Plate 5.—60-ft. beam on transport.

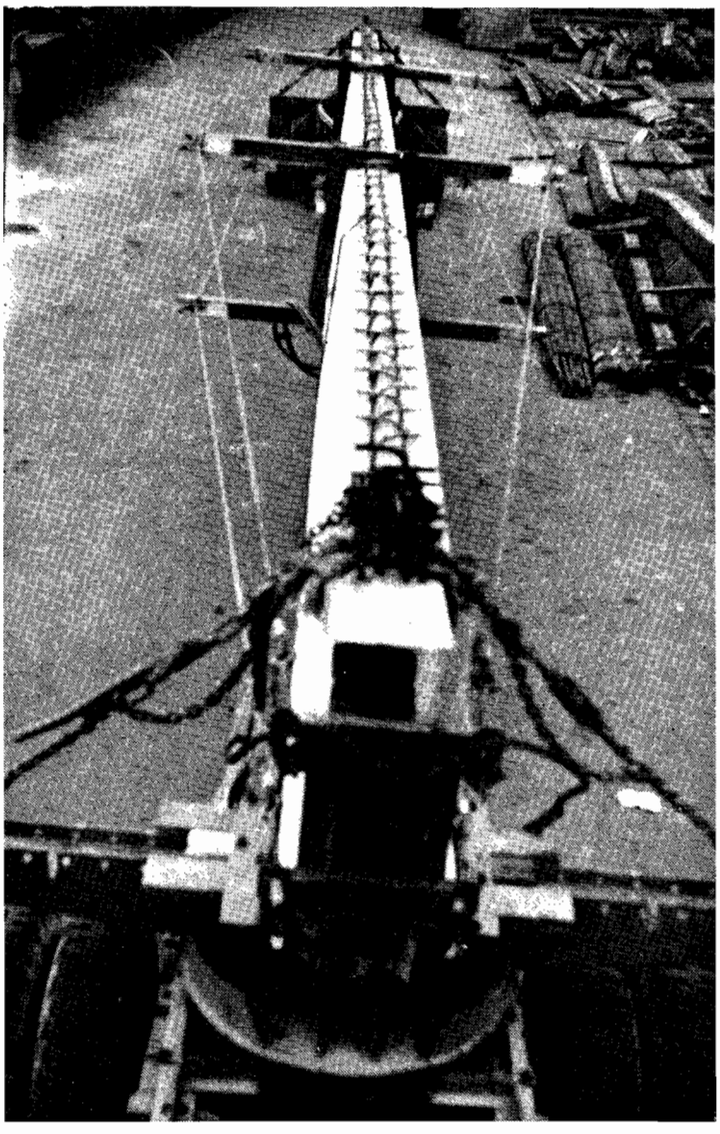

Plate 6.—60-ft. beam showing timber bracing frames and longitudinal trussing cables.

The plastic limestone gravel was improved in its properties by the addition of only 1 per cent. of lime, while admixture of lime to the plastic clay subgrades would be expected to save about 6 inches in the thickness of pavement required above them. However, it became apparent in the field work that more careful control of moisture and more attention to compaction is necessary since the strength of lime stabilized soil is greatly affected by the degree of compaction achieved.

BRIDGE DIVISION.

Prestressed Concrete.—During the year the Board has purchased prestressed concrete slabs to the value of about £80,000. Competition has been keen and individual prices were good, so that it has been possible to carry out construction work in an economical manner and also fairly rapidly. The units comprised form work slabs $1\frac{1}{8}$ inch thick, deck slabs of 15-ft., 20-ft., 25-ft., and 30-ft. spans as well as 40-ft. and 60-ft. beams, the latter weighing approximately 10 tons. Special methods had to be developed for transporting beams of this nature by rail and road and for placing them in position (see Plates 5 and 6). These beams can now be produced at about two-thirds of the cost of a comparable welded steel girder.

Steel Universal Beams.—Erection of a universal beam rolling mill in the United Kingdom has enabled the Board to buy approximately 860 tons of these sections during the year, in sizes up to 36 in. x 12 in. and 194 lb. per foot for use in bridge spans up to 80 feet in length. The beams are more economical than welded plate girders and also save the time and supervision required in the fabrication of the welded girder.

Advanced Construction Techniques.—Construction of the bridge over Djerriwarrh Creek on the Western Highway near Melton, by direct labour, provided an opportunity to use some special techniques because of the height of the deck, 45 feet above the stream bed. The bridge is a three-span composite welded plate girder and reinforced concrete deck construction 182 feet long by 28 feet between kerbs. It was constructed on the northern lane of the future dual highway, and additional abutments and piers were also constructed for the southern lane which will be necessary when a four-lane facility is required. The bridge is on a horizontal curve with a concave vertical curve or sag, having a one way crassfall of 1 in 40. Work was commenced in August, 1959, and completed in May, 1960, three months ahead of the estimated time, at a cost of approximately £46,000.

A 4-ton capacity cableway spanning 269 feet between towers of 70 feet and 30 feet height, and providing 14 feet side tilt either way, was erected. The cableway was used to place the 3·4 ton 60-ft. plate girders as well as concrete in 1 cubic yard bottom dump buckets (see Plate 7). Concrete was batched by a multiple bin weighbatcher dumping directly into the hopper of a $\frac{1}{2}$-cubic yard mixer. On discharge the concrete was transported to the cableway on a light gauge rail track. The weighbatcher bins were charged by front end loader.

Dry conditions in the creek bed permitted open excavation of the pier footings to a maximum depth of 12 feet by back-actor. Pre-assembled formwork with self-supporting tubular scaffolding was used for the pier columns, which were cast in two lifts, each of approximately 15 feet height. The Melbourne abutment columns were cast in one lift of approximately 27 feet height. Crosshead forms were supported on rolled steel joists bearing on corbels bolted to the columns.

Deck formwork was made of plywood panels trimmed with sponge plastic to accommodate girder irregularities and keep bleeding of the deck concrete to a minimum. The deck was screeded longitudinally, using tubular steel screed templates resting on salvageable metal screed chairs, supported on the girders. The deck surface was finished by the use of a hessian drag, and water-cured by the use of hessian covers and perforated soaking hose.

Plate 7.—4-ton capacity cable way used for placing 3.4-ton, 60-ft. plate girders.

King-street Bridge Project.—The Forty-sixth Annual Report described the foundation conditions encountered on the project and the construction methods used. During 1959–60, the piers were completed, the Flinders Street Overpass opened to east-bound traffic and construction continued on the decks of the remainder of the work. The value of the work completed to 30th June, 1960, is £3,013,000.

Foundations.—Reference to the overpass foundations in the previous Report indicated that small settlements might not be unlikely and in order to determine the amount, if any, there and in various sections of the project, it was decided to take a series of precise levels over an extended period. A "Filotecnica" automatic level and a "Holbro All Weather" staff were purchased during the year for this investigation. The level is designed to eliminate many of the uncertainties encountered with the normal type of level fitted with bubbles, such as the effect of wind, sun, and vibration. It is fitted with a micrometer graduated to read to 0·0002 foot, and to date has proved very satisfactory in practice, several closures of ± 0·0006 foot per mile having been obtained. The "Holbro" staff is of light alloy construction and is made in three sections which are easy to assemble and pack. The numerals are engraved on a laminated plastic face, making re-calibrating unnecessary for the life of the staff.

Flinders-street Overpass.—Excavation commenced on the foundations on the southern side of the overpass on 6th January, 1959, and by the 7th September, 1959, the first steel girders were erected (see Plate 8). Upon completion of this first stage, 21st November, 1959, trams were diverted on to temporary tracks laid by the Melbourne and Metropolitan Tramways Board on this part of the structure. On 23rd November, 1959, construction of the foundations on the north side of the overpass commenced, and by 20th February, 1960, the remainder of the steel work on this portion of the project was erected. Following the erection of the precast prestressed beams (see Plate 9) and the concreting of the decks and permanent tram tracks, the trams were diverted from the temporary tracks during the week-end 11th–13th June. With the placing of the handrails and the hot rolled sheet asphalt road surfacing, the northern traffic lanes were opened to the east-bound vehicular traffic on 1st July, 1960.

River Bridges and Elevated Carriageway.—The erection of the steel girders commenced on 6th October, 1959 and by 30th June, 1960, 1,484 tons had been placed out of the total 2,670 tons. The first concrete deck on this section of the project was cast on 25th February, 1960, and by 30th June, 1960, 1,832 cubic yards of concrete were placed with a further 1,600 cubic yards necessary for completion.

Welded Steel Girders.—The number of main girders in the project is 290 weighing approximately 2,670 tons. The girders on the river bridges and elevated carriageway consist of alternate cantilever and suspended spans. Generally the cantilever girders are supported at 30-ft. centres and extend either 9 feet or 17 feet beyond the supports. Suspended spans vary in length from 73 feet to 118 feet between bearings except at the City Road intersection. At this location suspended girders 160 feet long are supported by cantilever girders 110 feet long, having 41-ft. cantilevers, giving a total opening of 242 feet. Web plates are 4 ft. 11 in. deep and 7/16 inch thick, except over the Port Melbourne and St. Kilda railways (3 ft. 11 in. x 7/16 in.), and at the City Road intersection (7 ft. 11 in. x 7/16 in.). Flange plates vary in width from 10 inches to 18 inches and in thickness from $\frac{3}{8}$ inch to 1 inch, with a maximum of three plates in any flange section. Web, flange plates, and bearing stiffeners are high tensile steel to B.S. 968 specification with special clauses added to ensure notch ductility. Intermediate stiffeners and bracing are of mild steel.

The design specification was adapted from the American Welding Society Specification for Welded Highway and Railway Bridges. The allowable tensile stresses were 26,000 p.s.i. for plates up to $\frac{3}{4}$ inch thick and 24,000 p.s.i. for plates over $\frac{3}{4}$ inch thick. Allowable stresses in tension or compression butt welds are the same as for the parent metal. Allowable stress in shear on the effective area of weld metal for fillet welds is 12,500 p.s.i. Where stress fluctuations are large, allowable stresses both in the parent metal and weld metal were reduced in accordance with formulae adapted from the A.W.S. specification. This applied particularly to the points of termination of welded cover plates on the tension flanges of girders. Continuous fillet welds were used between web and flanges and between flange plates, and cover plates were tapered at their ends. Transverse welds on tension flanges were not permitted where the calculated stress exceeded 75 per cent. of the allowable. In such cases crossframe stiffeners were welded to small plates attached to the flanges by longitudinal welds.

Plate thicknesses were limited by specification to a maximum of 1 inch. The minimum web thickness was 1/140 of the clear distance between flanges, with the exception of the girders at the City Road intersection where a web thickness 1/220 of the web depth was used, in combination with longitudinal stiffeners. Long plates would have been preferred, but for convenience 30-ft. lengths were permitted except for the girders for the City Road intersection where 50-ft. plates were used. Longitudinal splices were necessary to provide plates 7 ft. 11 in. wide for the girders for the City Road intersection, as plates of this width are not manufactured in Australia, and rolls for straightening plates wider than 7 feet are not available. To minimize residual stresses, web and flange splices were made before webs were welded to flanges, except in the case of the Flinders Street Overpass, where field welded splices of both webs and flanges were made close to the dead load points of contraflexure in the centre spans.

Crossframes at bearings were designed to transmit lateral loads into the bearings. Those at the junction of suspended and cantilever spans were also designed to transmit torsional forces from suspended span to cantilever span. Intermediate crossframes are of nominal size with the members of minimum size set out in the specification.

Intermediate stiffeners, were used on both sides of all interior girders, but to give a better appearance, intermediate stiffeners were omitted except for crossframe stiffeners on outside girders. In general, it is considered that intermediate stiffeners on both sides of the web are preferable, as they assist in maintaining the cross-sectional shape of girders, as required by theoretical considerations with regard to buckling.

Suspended girders, and those portions of continuous girders with positive moment were designed for composite action with the concrete deck slab. The horizontal shear between girders and deck slab is resisted by shear connectors, which consist of $1\frac{1}{2}$ in. x 1 in. plates, 8 inches or 9 inches long, welded to the top flanges of girders. Separation between girder and deck is prevented by $\frac{3}{8}$-in. diameter M.S. loops welded to the $1\frac{1}{2}$ in. x 1 in. plates. Where the design does not provide for composite action, deck anchors made from 2 in. x $\frac{1}{4}$ in. flats were used.

Live load deflection was limited to 1/800 of span between support bearings, and in the case of cantilevers, to 1/300 of the length of the cantilever. The girders were cambered to provide for dead load deflection plus a small allowance for live load deflections. Rocker bearings were made from cast steel and mild steel.

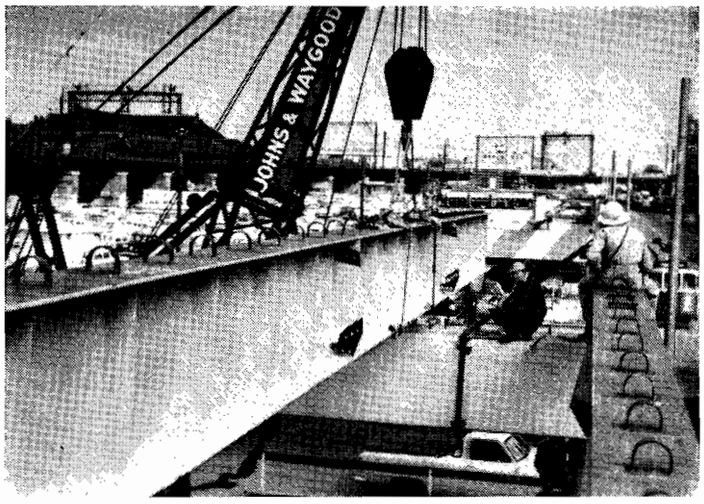

Plate 8.—Seating a steel girder on the Flinders Street Overpass.

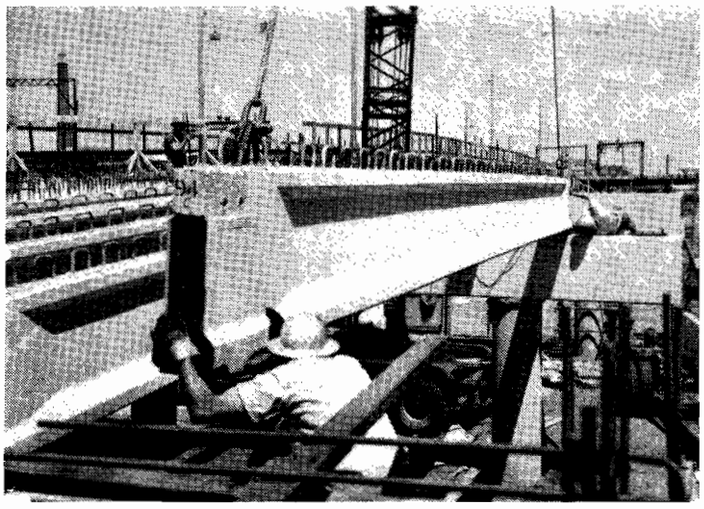

Plate 9.—Seating prestressed concrete beam on the Flinders Street Overpass.

Johns and Waygood Ltd., a subcontractor to Utah Australia limited, carried out the fabrication of the steel girders in their Sandringham factory, and, after delivery to the site by road, carried out the erection. The sequence of the girder fabrication was as follows:—

(*a*) Butt welding the webs, flanges and cover plates to full length;

(*b*) Welding the cover plates to the flanges;

(*c*) Assembly of the flanges and webs in a jig and tacking together;

(*d*) Welding of the flanges to the webs;

(*e*) fitting, tacking, and welding of stiffeners, and bearings.

Fully automatic welding was used for most of the work. A neutral fused flux and mild steel wire was used in fillet welding, but where the butt welds required the properties of the parent metal, a 1·8 per cent. manganese wire was used in place of the mild steel wire. For tacking and where hand welding was necessary, low hydrogen electrodes were used. The natural Vee position (see Plate 10) was adopted as giving the best possible weld quality and contour. Preheating was used for all welding in accordance with the recommendations of the British Welding Research Associations, set out in their publication "Arc Welding Low Alloy Steels" and earlier papers. The girder stiffeners after being placed in position, were welded by a process using a manually-held head with automatic wire feed and travel.

The inspection methods followed those in use in the State of California, and were—

(*a*) approval of the plate and the use of appropriate marks to enable its identification throughout the fabrication processes;

(*b*) approval, prior to production, of welders and procedures that were proposed by the contractor for fabrication;

(*c*) Inspection during production to ensure that the quality of the approved procedures was maintained.

The inspection tools were

(i) visual inspection;

(ii) penetrant dyes;

(iii) magnetic particle inspection;

(iv) radiographic inspection.

The scale of the radiographic inspection was 80 per cent. on the tension side of the girder with 5 per cent. on the compression side of the girder. Random radiography was undertaken on the fillet welding to ensure that the

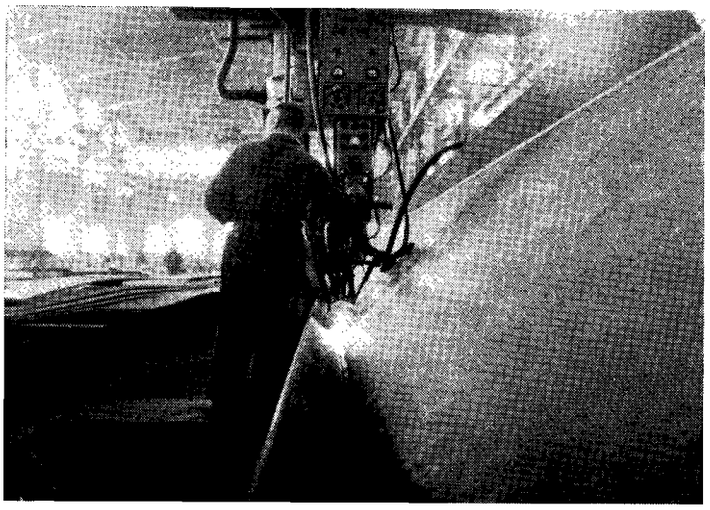

Plate 10.—Welding a girder flange to the web using a single head, fully automatic machine.

fillet welding remained under control. The Commonwealth Defence Standards Laboratories were availed of for consultation on difficult radiographic interpretation. The welding defects disclosed by the above inspection methods were typical of those encountered in steel fabrication and reflected the variations in workmanship that may occur during fabrication. The types of defects encountered were transverse and longitudinal cracks, lack of root fusion and side fusion, heavy slag lines, pipes, porosity, craters, undercut, and incompletely filled grooves. In the early stages of fabrication, the proportion of defects disclosed was approximately 30 per cent. of the shots taken. This high proportion of defects made the development of better welding techniques essential, and this was undertaken by the subcontractor. In consequence the number of defects dropped to an average of 10 per cent., which is comparable with experience in California where 7 per cent. defects are usual.

On the river section the girders were off-loaded using a mobile crane and an overhead gantry, from transports driven on to the temporary bridge across the river and passed to a floating tower. The tower, which was mounted on a pontoon fabricated from naval landing pontoon equipment, floated the girders into position. Over the St. Kilda–Port Melbourne railway tracks, the girders were placed during the week-end 21st–22nd May by Victorian Railways personnel, using a 60-ton railway crane to lift the girders from " Q " type trucks that had been loaded at Montague railway siding.

PUBLICATIONS.

During the year, the following papers were presented by members of the staff :—

Paper.	Author.
The Institution of Engineers, Melbourne Division, Highways and Traffic Engineering Branch, November, 1959 : King Street Bridge Project ; Traffic Engineering Aspects	H. P. George, A.M.I.E. (Aust.), M.S.E., F.A.P.I., A.M.I.T. (Lond), Cert. H.T. (Yale)
Australian Planning Institute, Victorian Division, August, 1959 : Symposium on Drive-in Shopping Centres ; Traffic and Parking	D. J. Delaney, B.C.E., A.M.I.E. (Aust.), M.S.E., Cert. H.T. (Yale), Assoc. I.T.D. (U.S.A.)
The Institution of Surveyors, Australia, March, 1960 : Engineering Survey Work on King Street Bridge Project	J. H. Townley, L.S., M.I.S.(Aust.),M.I.E. (Aust.), and C. F. Robinson, L.S., A.I.S. (Aust.)

PUBLICATIONS—*continued.*

The following Engineering Notes, Technical Bulletins, and Research Memoranda were issued during the year :—

No.	Title.	Date.
	Engineering Notes.	
65	Construction of Pavements on Soft Subgrades	14th June, 1960
	Technical Bulletins.	
16	The Marking of No-overtaking Lines—Warrants and Standards	15th October, 1959
16	Addendum to above	25th May, 1960
17	Estimation of Future Traffic	19th January, 1960
18	The Performance of Rubber Tyred Rollers in Compacting Soil	11th April, 1960
19	Thin Bonded Cement Surfacings Applied to Existing Concrete Road Slabs	25th May, 1960
	Research Memorandum.	
14	Analysis of Bituminous Mixes ..	August, 1959

STAFF.

Additional demands are continually being made on the engineering staff by the increasing volume and complexity of the work undertaken. The untiring efforts of all concerned are much appreciated. The installation of modern equipment for reproducing plans has been of considerable assistance, and investigations are being carried out into the possibility of using digital computers for processing survey data. Other methods of increasing staff effectiveness by improved equipment, revised procedures, codified instructions, and staff discussions are being constantly applied or reviewed.

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C.E., M.A.P.I., Chief Engineer.

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