

Historical Roads of New South Wales

BELL'S
LINE OF ROAD



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NEW SOUTH WALES

The Bell's Line Road (Main Road No. 184)

History and Recent Improvement

The reconstruction of Main Road No. 184, known as Bell's Line Road, from Kurrajong Heights to Bell and Mt. Victoria, a distance of slightly over 34 miles, has recently been brought to an advanced stage towards completion. The earthworks are finished, a pavement with bituminous surface has been provided over 16½ miles from Mt. Victoria, and a temporary sandstone pavement, later to serve as a base course, has been built over the remainder of the length. This section will also be provided with a bituminous surface course as soon as materials can be secured. The reconstructed road will provide an alternative route to the Great Western Highway across the Blue Mountains, and give improved access to settlements at Kurrajong Heights, Bilpin, Mt. Tomah, Mt. Wilson, Mt. Irvine, Bell, Mt. Victoria, Lithgow, and points further west. The growing primary producing districts at Bilpin and Mt. Tomah will have better connection to markets, and the effect of dust on orchards and vegetables will be eliminated. In addition, the considerable recreational possibilities of the northern part of the Blue Mountains area will become available for development and use.

The new road has a special significance in relation to defence, as referred to later.

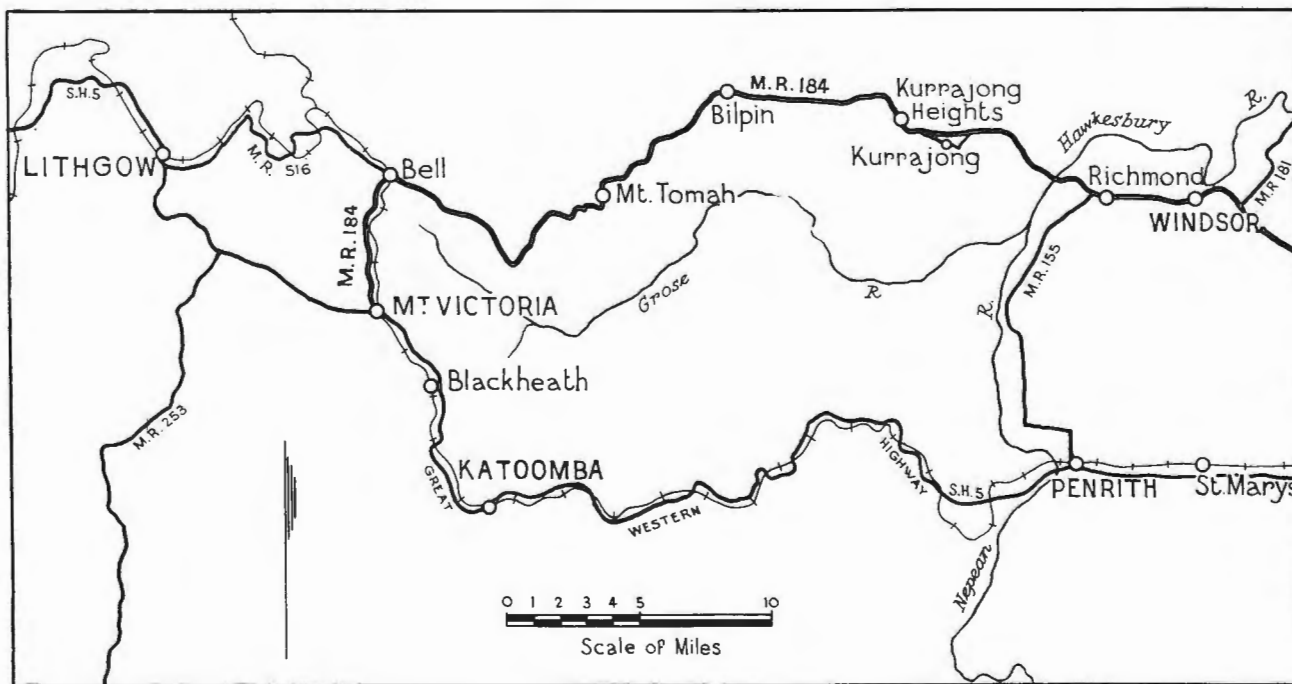
From many points around Sydney the general location of the two great passes over the Blue Mountains may be seen. Three outstanding peaks can be noted on the western horizon named, from south to north, Mts. Hay, King George, and Tomah. This is the

horizon which greeted the view of Governor Phillip who, in 1789, named the ridge the Blue Mountains and the peaks the Carnarthen Hills.

The pass known as the Great Western Highway, State Highway No. 5, crosses the ridge almost due west of Sydney to the left of Mt. Hay and the other pass, Bell's Line, crosses Mt. Tomah slightly to the north of the highest part of that peak. It is not until one actually arrives at the ridges that it is clear why only two passes are possible, and from the summit of Mt. Tomah the two routes are clearly seen to follow the south and north watersheds of the Grose River, the latter meeting on the ridge connecting Mt. Victoria and Bell.

Early History.—The puzzle set the early settlers was how to find even one track through the maze of steep gorges in the mountains, and many unsuccessful attempts were made to penetrate what appeared from the distance to be easy country. Most of the explorers, discouraged by the rugged nature of the terrain around the Grose River, concentrated on the escarpments between Camden and Castlereagh.

The first approach to this barrier to the west was made by Governor Phillip in 1789 without success. The Grose was named by Wm. Patterson in 1794, and it is thought from the somewhat obscure records, that Bass might have reached Mt. Tomah in 1796. The most successful attempt at that time definitely known, however, was in 1804 when Cayley, starting from the



Locality Map.



View of the Grose Valley.

country near where Richmond is to-day, set out west and north-west along the ridge leading to Kurrajong Heights. The account of Cayley's journey is scanty, but it is now considered that after severe hardship, he ventured as far as Mt. King George which had been marked on a map of the infant colony, published 1791—

“This hill appears of much easier ascent than Round Hill after you get to the foot of it.”

Cayley's reports of the type of country traversed were evidently so dismal that his account deterred others from attempting to penetrate the rugged country north of the Grose. Gregory Blaxland, who developed the theory that if one followed the ridge between two valleys in the Blue Mountains most of the huge boulders and cliffs would be avoided resolved, with the encouragement of Governor Macquarie, to try the ridge between the Grose River and Glen Brook Creek, rather than that between the Grose River and the Bowman Creek Valleys. This choice actually determined the ultimate development of the Blue Mountains.

The success of Blaxland's venture has been described in the September, 1949, issue of this Journal. In this article we are concerned with the discovery and development of the country north of the Grose River.

Over eighteen years had elapsed after Cayley's attempt when the following appeared in the *Sydney Gazette*, 9th October, 1823:—

“We are happy to announce that Mr. Archibald Bell, junior, of Richmond Hill, has, after one unsuccessful attempt, effected a passage from that part of the country, to the Cox's River, travelling north-west from Richmond about 14M. to Picture Hill, and then due west to Tomah. On going west, about half-way up, he turned south and after proceeding about 1M. in that direction, found an

excellent passage down it. He then proceeded round the side of the opposite hill” (now Mt. Bell) “about 1½M. in a north-west direction and then bore west for the remainder of the day and north-west the next day till he reached the Cox's River.”

Bell started out from Richmond on 1st September, 1823. Apparently the authorities wasted no time in acting on the discovery of Bell's Pass for Surveyor Hoddle was despatched to set out a trial line for a road along Bell's track and the following extracts are condensed from Hoddle's report dated 4th November, 1823, after he had completed, with the aid of five assistants and two natives, and with equipment including three horses, the location survey of a road which, with slight variation, in general is the present line of Main Road No. 184 between Kurrajong and Bell.

“I have traced and marked a new route from the Ford on the Hawkesbury to the Ford at Cox's River discovered by Mr. Bell, junior. Diamond Ridge is very narrow, no wider than one chain in width. It is steep for 5 chains from Mr. Bell's view and the second descent steep” (now Cut Rock) “for 6 or 7 chains, after which ascents and descents are easy. Bull Comatta, distance 10M., plenty of water, soil varies—generally a clayey loam. Towards Tomah soil is of excellent quality.”

“On the summit of Tomah, distance about 20M., soil is rich. There are several trees 20 to 30 feet in circumference. There was one white gum 70 ft. from the root to the branches, of 20 ft. girth. Tomah bore from Bell's View west 72½ degrees south. Steep and dangerous with loose stones. For a distance of a mile had ravines, which were nearly perpendicular, close to us which made our situation dangerous. The obstacles would soon be

removed by road party. This part would require the most labour as there are many sandstone rocks."

"Stony Hill distant about 23M., rather dangerous for a few chains. Brisbane's Crown Hill is rather steep, at the other side of it—a fine view of the Grose River."

"After leaving Brisbane's Crown the ascents and descents are moderate, but the route is stony. At 33M. it was dangerous for 2 chains—obliged to keep on the side of the ravine for half a mile. There was little impediment to a good road. We then came on to some good cattle runs where there was an abundance of coarse grass—hitherto there was little grass. Soil sandy and barren from Mt. Tomah. The line runs into the road at Collett's Inn."

"The new route is superior in every way to the old Bathurst Road. The worst part, the descent from Tomah, is less dangerous than many places in the old road. In making the road some small alteration may be made in the line marked to render it easier to ascend and descend the hills."

A track was cleared along Surveyor Hoddle's line and the first road had two difficult locations—first, the Kurrajong Ridge which was crossed by ascent

immediately west of the present Kurrajong Heights Post Office, thence northwards to a point approximately 300 yards south of the existing road. Then descent was made westward by a steep track and zigzag down the Cut Rock spur. The second difficult section was the western descent from Mt. Tomah where the road was located on the ridge along the western spur towards Mt. Bell and descent was also made by a steep track and zigzag. West of Mt. Tomah the line followed the ridges, in general on the line of the present-day road.

It should be noted that the western limit of good country on this route is the excellent volcanic soil on Mt. Tomah. There is also volcanic soil on Mt. Irvine on a spur subsidiary to that followed by Bell. Settlers followed the early explorers and as far as Mt. Tomah and north-westwards to Mt. Irvine, the Bell's Line Road served the early pioneers pressing westwards from Kurrajong, but it is clear that for vehicular traffic travel must have been very rough—in fact, it was stated in Raymond's Calendar of 1833 that the road had been largely abandoned as a through road. This road, however, it is reported, was used in moving stock, and, in particular, Mr. Blaxland, brother of the famous explorer, who had a holding in the Hunter Valley, was accustomed to drive his stock along Blaxland Ridge and thence along Bell's Line to the west.



A section of the completed road at top of Mt. Tomah.



Work in progress in sandstone cutting on western side of Mt. Tomah.
(See photo. on page 22.)

In the early thirties of last century, the route of the pass through the Blue Mountains at Mt. Victoria was under consideration. The Governor had laid down the policy that "the existing roads shall be maintained unless a marked improvement is possible in view of the expense incurred in the existing road." The then existing descent at Mt. York to the Cox's River, was in a bad condition, and Major Mitchell was determined to construct the road now known as Victoria Pass on the Great Western Highway. Further development of Bell's Line Road was necessarily shelved by Mitchell because the natural descent from this line on the western escarpment would have been either by further costly construction down ridges near Lithgow, or else into Hartley Vale past Collett's Inn on a route abandoned with the construction of the Victoria Pass.

In 1855 Sir Thomas Mitchell reported on the condition of Bell's Line Road as follows:—

"Bell's Road has been marked from the River Nepean to Collett's Inn along the dividing range which is to the northward of the River Grose. It separates from Darling's Causeway" (the ridge between Mt. Victoria and Bell) "at the angle of that range near the head of the river" (the Grose) "and extends in an easterly direction towards Tomah. It separates from the ridge joining King George's Mount—at a distance of two miles from

its summit. From this point the direction of the ridge is very straight to Tomah but its breadth is in some parts almost too little for a road."

From its eastern end:—

"Bell's Road crosses the most elevated part of a ridge which is nearly parallel to the Nepean at the distance of about three miles from the river. The trees have been cut down from thence to the summit of Mt. Tomah. Just beyond where the wood has been cut the road has been marked round the side of the southern head of the Hill across a declivity of nearly forty degrees. The passage here is extremely difficult at present. From Tomah the road keeps to the ridge already described . . . To seek a road through such country is only to ascertain the direction of the dividing ridges and the road across Mt. Tomah is better in this respect than the road from Emu" (Great Western Highway). "Tomah presents a formidable but not an insurmountable obstruction."

Considerable sums had been spent on the Emu-Blaxland route and settlement had followed on this line. Two roads across the mountains were not required for the young colony, but it is interesting to speculate what would have been the development of the Blue Mountains had Blaxland selected Kurrajong Ridge for his exploration westward.

The first track, west of Kurrajong at Cut Rock with its very steep grade, was later deviated by the construction of an easier but still steep grade in side cutting on the southern slopes of the Cut Rock Ridge. This latter road is still traffickable and was used as a detour during recent construction.

Later in the century further improvements were made—first at Kurrajong Heights where a good location was discovered on the northern side of Cut Rock Spur and at Mt. Tomah where the original road was deviated by following the northern slopes to provide a much better alignment and grade at a lower level. Gradually the middle portion of the length of the road fell into disuse, and it was not until about 1930 that systematic maintenance throughout was re-instituted. However, on account of the narrowness and winding nature of much of the road, it was not in a condition to carry modern long distance traffic, much of it being little better than a bush track.

With the incidence of the financial depression all thoughts of improvements to Main Road No. 184 had to be postponed, but with the return of the State's finances to normal, slightly more than 100 years after the original road had been "abandoned at last as a road to Bathurst," the question of improvement to modern standards was taken up in earnest.

Reconstruction by the Department of Main Roads.—The length of Main Road No. 184 which most required reconstruction was that between Kurrajong Heights and Bell—a distance of slightly over 34 miles, mainly through rough sandstone country. Work on

this length has recently been completed throughout, except for the bituminous surface course, of which 17½ miles remain to be provided. The road has been built to a general design standard based on travel at 40 miles per hour, but on some sections the standard has necessarily been reduced to 30 miles per hour. The steepest grade is 12 per cent. for a length of 800 feet near 17¾ miles from Mt. Victoria and the sharpest curve is 200 feet radius on Mt. Tomah at 18M. 1,200 feet from Mt. Victoria.

Main Road No. 184 is within the area which, for purposes of the Main Roads Act, is regarded as the County of Cumberland.

The reconstruction of Main Road No. 184 falls naturally into four phases as follows:—

1. *The Unemployment Relief Phase.*—The Main Roads Department, prior to the Second World War, investigated the possible development of Main Road No. 184 to serve as an alternative route to the west, and in 1939 Executive Council approval was obtained to undertake construction as an unemployment relief project.

Work was commenced in October, 1939, at the Mt. Victoria end using rationed unemployed relief labour supplemented by full-time key men, plant at this stage being confined to compressors which were necessary to drill before blasting the large quantity of sandstone to be removed for the formation. Work continued on this basis through the



Completed work on cutting. (See photo. page 21.)



Shovel and Bulldozer at work.

early months of the war until, by April, 1941, the earthworks were completed to a point approximately 11 miles from Mt. Victoria.

2. *The War Phase.*—Main Road No. 184 acquired a new importance suddenly in the early part of 1942 when, with the entry of Japan into the war, it was seen that war operations might move to Australia. The Military Authorities desired that the unconstructed sections of this road should be immediately improved, including provision for collecting and passing stations on portions of the road which were only wide enough for one-way traffic, so that the road could be used as an alternative route to the Great Western Highway.

In addition, the State War Effort Co-ordination Committee, supported by representations from the Military Authorities, pressed for the completion of the Department's construction work on this road and on the Windsor-Putty-Singleton Road, so that direct inland access would be available between the Bathurst-Lithgow areas and Newcastle.

To meet the first requirements an inspection was made in February, 1942, with military personnel to determine what immediate work was required to make the route traffickable quickly. There were then two sections which would have been serious bottle-necks

in an emergency—first from Kurrajong Village to Cut Rock, approximately $4\frac{1}{2}$ miles with grades up to 13 per cent. and bad alignment, and secondly on the eastern and western sides of Mt. Tomah. At that date earthworks had been completed to 15 miles from Bell, and work was in progress as far as $23\frac{1}{2}$ miles. Base course of pavement had been laid to 14 miles, and surface course completed between Mt. Victoria and Bell. Equipment and personnel were diverted from the construction organisation to carry out the improvements desired and these were completed by 25th August, 1942.

To meet the second requirement the Department was faced with an almost super-human task. In March, 1942, work was in progress as far as the 25 mile peg from Bell but further depletion of personnel for military service then commenced. It was decided to augment the numbers remaining by transferring men from other works less urgent, and instructions were issued that the road was to be finished between Bell and the 25 mile peg as rapidly as possible, and that final survey and design over outstanding lengths was to be completed as a matter of urgency. Improvements between Kurrajong Heights and the Putty Road turnoff were also listed for further action.

The State War Effort Co-ordination Committee recognised that unfortunately men who might otherwise be available for this work had become absorbed in war industry of higher priority, that construction plant had to be withdrawn for other urgent military work and that it would be difficult to continue the work on a satisfactory basis. Nevertheless it requested the Department, in view of the fact that as a large part of the road had been constructed, to complete the remaining lengths of the road to a satisfactory standard before work was suspended, if that became necessary.

On the 11th September, 1942, construction work ceased. It was evident by then that the theatre of war operations was moving northwards, and that the east coast of New South Wales was no longer in immediate danger. The organisation engaged on the construction was then transferred to urgent works outside the State.

3. *The Post-war Phase: Bilpin-Mt. Tomah Section.*—During the latter period of the war, investigations were made from time to time with a view to carrying on with improvements to Main Road No. 184 when manpower became available again, and the completion of the work was listed for post-war action, so that the work already partly constructed could be completed and made available for general traffic.

In December, 1945, it was decided to recommence the work in a small way and gradually to build up the organisation to full strength as a major construction project. Early in 1946 the work was in hand under the control of a local office established at Bilpin, commencing at 16M. 4,300 feet from Mt. Victoria. The cuts at Mt. Bell were opened up, and in November, 1946, after considerable investigation as to route, the formidable cutting to be made on the western side of Mt. Tomah was started. The determination of route on this section needed courage when one viewed the huge ravine to be filled, and the formidable cliffs which had to be cut down from the mountain to provide access between Mt. Tomah and Mt. Bell. Located under this cliff was the existing road, which had to be kept open to traffic, and which was in the path of most of the debris to be brought down from the excavations above.

To start the cuts on the cliff face, jackhammer operators had to be slung over the edge in bosun's chairs. Material shot down fell on the old road and was bulldozed over the edge, patrolmen at each end of the scene of operations controlling traffic.

In February and March, 1947, exceptionally wet weather was experienced, and it was found advisable to close the road to through traffic and, to make matters worse, portion of the old road subsided. At the end of March weather conditions improved slightly, and some traffic was allowed through, but by April work on the large cutting had reached

a stage when the lower road was being continually blocked by operations on the new road above, and it was impossible to ensure that large boulders did not roll on to the old road; the danger of damage to passing vehicles and of injury to drivers was so serious that the old road was closed until the new formation could be available for traffic at the end of May. "Road Closed" barriers were therefore placed at North Richmond and at Bell, although for light traffic there was an alternative route from Bilpin through Bowen's Creek, Mt. Irvine and Mt. Wilson. By July, 1947, the construction of the base course through the Mt. Tomah cut was completed, and work was pushed ahead east of Mt. Tomah to Bilpin.

During the eighteen months occupied in the construction of the Mt. Tomah-Bilpin section, wet weather caused considerable inconvenience, minor slips occurred on the new work and special precautions had to be taken to assist traffic. Many hundreds of yards of filling were washed away in rainstorms.

The work involved extensive subsoil drainage. The whole length of the route between Mt. Victoria and east of Mt. Tomah passes over sandstone (with the exception of approximately one mile of basalt country on Mt. Tomah), the strata are fissured and absorbent, and the ground water follows ironstone and other hard laminations, developing pressures at low points. Approximately 72,000 linear feet of subsoil drains were inserted over a length of 26 miles east from Mt. Victoria, and



Completed section of road on the Kurrajong side of Bell.

special attention had to be paid to the large embankments at Mt. Tomah and Mt. Bell for the drainage of surface water from springs.

Work on formation and sub-base was completed to 26 miles east of Mt. Victoria by October, 1948.

4. *Post-war Phase: Bilpin-Kurrajong Section.*—During the construction of the Mt. Tomah section, surveys and investigations were continued on the section between Bilpin and Kurrajong and a short deviation at Kurrajong was completed in 1947, involving the construction of a concrete bridge over Little Wheeney Creek and the construction of approximately 1½ miles of new road.

In addition, work was continued east of Bilpin as far as Cut Rock. The sandstone formation at Cut Rock contains a fault in the strata cutting across the road, and in order to make certain that drainage and foundation conditions would be satisfactory, a geological survey of the area was made in August, 1947, from which construction procedure was developed.

The actual construction of the section between Cut Rock and Kurrajong Heights entailed two major problems:—

- (1) that of maintaining traffic on the existing road or over a suitable detour; and
- (2) excavating and blasting so as not to damage retaining walls supporting the existing formation.

The geological report was invaluable in respect of the latter problem, and it was decided that so far as possible the existing road should be kept open to traffic during construction of the new road, and that when traffic had to be blocked, it would be directed on to an old formation over Kurrajong Heights abandoned many years previously. The old road had to be reconditioned for this service, and the arrangement worked with minimum of inconvenience to traffic which was allowed to use the existing road during hours of darkness.

The new road was open to all traffic early in 1949, and the temporary pavement was completed in June of that year.

Materials for Pavement.—It was known even before the war that difficulty would be met in obtaining local pavement materials for this reconstruction. The local sandstone is mainly soft, such isolated hard deposits as existed being small and costly to work.

Isolated deposits of suitable gravels were located between Bell and Mt. Tomah, but in insufficient quantities for the whole length of road. After tests had been conducted it was finally decided to sheet the pavement between Mt. Victoria and a point 12 miles east with chocolate shale from an outcrop on Mt. York, and

from the 12 mile peg to 16½ miles to use the small available quantity of ridge gravel. The work has been completed and a bituminous surface provided.

Between 16½ miles and 36 miles the surrounding country was explored for materials, with little success, and after further tests it was decided to place first a base course of sandstone which, based on tests of subsoils, varies from 8 inches to 15 inches in depth. This pavement material has carried light traffic fairly satisfactorily, but it has not sufficient durability for a permanent pavement, nor is it suitable for sealing. A surface course is, therefore, to be constructed of crushed stone penetrated or otherwise treated with bitumen.

Plant Employed.—In the post-war phases of this construction, the work was fully mechanised. Compressors and jackhammers were used in the rock cuttings. After shooting down, earth and rock were then moved by the following methods: Short leads were dozed by two heavy and two medium bulldozers, on medium leads earth and stone were scooped and drawn by tractors—one 12-cubic yard, one 8-cubic yard, and two 6-cubic yard scoops being employed. For long leads the material was loaded by mechanical shovel into lorries, after it had been dozed to the shovel, or loaded into lorries by dozer from side loaders. Trimming was carried out with heavy auto-patrol grader and by two drawn graders.

The maintenance of the plant and the keeping of the plant moving under such particularly heavy service, at a period when spare parts were frequently unobtainable, was no inconsiderable task, with continued wet weather playing havoc with full efficiency.

Quantities of Work (including Deviation at Kurrajong).—

Earthworks.—Sandy loam, 263,500 cubic yards; sandstone requiring drilling and blasting, 492,200 cubic yards. Total, 755,700 cubic yards (solid measurement).

Trimming and consolidating subgrade and shoulders—195,000 l. ft.

Concrete pipe culverts—sizes 12 in. to 48 in. diameter—10,502 l. ft.

Subsoil drains—98,703 l. ft.

Catch drains—94,965 l. ft.

Pavement—Shale, sandstone and local gravel of variable thickness—433,600 square yards.

Two coat bitumen seal with tar primer—183,800 square yards.

Retaining walls (stone)—360 cubic yards.

Unit Costs for Main Items of Work.—(Direct costs only exclusive of Workers' Compensation Insurance, Pay Roll Tax, Holidays, Camp, Depot, Engineering Supervision and Clerical Costs. Deviation at Kurrajong is included.)

Earthworks—Average cost for Earth and Rock, 6s. 1d. per cubic yard (solid measurement)—includes Unemployment Relief Work carried out with minimum mechanisation.

Trimming and consolidating subgrade and shoulders—£5 19s. 2d. per 100 lineal feet.

Concrete pipe culverts—Average for all sizes, £1 os. 11d. per l. ft.

Pavement—Shale, sandstone and local gravel of variable thickness—3s. 10d. square yard.

Two coats bitumen seal with tar primer including preparation pavement—2s. 5d. square yard.

Supervision.—This work was carried out under the supervision of the Department's Divisional Office at Chatswood.

The general supervision of the construction was carried out from August, 1939, to December, 1941, and

from December, 1943, to August, 1948, by Mr. C. Binns, Divisional Engineer, from December, 1941, to December, 1943, by Mr. E. J. Constable, Acting-Divisional Engineer, and from August, 1948, to the completion of the work by Mr. T. A. Donaldson, Divisional Engineer.

The engineers directly in charge of the work were, in succession: Messrs. L. W. Burgess, H. W. Cover, R. O. Smee, F. A. Relf and J. L. Allan.

