

1925.

NEW ZEALAND.

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# PUBLIC WORKS STATEMENT

BY THE HON. J. G. COATES, MINISTER OF PUBLIC WORKS.

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MR. SPEAKER,—

This is the sixth occasion upon which it has been my privilege to present to you the annual Statement of the Public Works Department.

In last year's Statement the tendency of some workers to look upon loan-moneys as a means of providing them with an opportunity of earning their living was stressed and condemned. The number of works of pressing need during the year has been so great that, instead of a reduction, there has been an increase—of nearly a thousand—in the number of men employed on public works. This position need create no anxiety, as the works undertaken are of public utility and directly or indirectly remunerative. With the exception of the year 1922, when costs were higher, last year's expenditure proved a record. It is gratifying to be able to add that the amount of work done was relatively greater. This last is due to the excellent work of the Department's Engineers and other officers, and to the industry and loyal co-operation of all other employees, and I take this opportunity of expressing to all concerned my sincere thanks and appreciation.

While it is inevitable that public works of a varied and extensive nature should be carried on in developing a young country, if these are not to prove wasteful and unremunerative it is essential that the sources of wealth-production should be expanded concurrently. One of the most difficult tasks of the Minister of Public Works is to balance and utilize money and labour available so that progress may not be hindered, while production is increased sufficiently to allay all anxiety as to the source from which the interest on moneys expended will accrue.

The pronouncements made in London recently concerning the necessity of rationing loan-moneys compel us to consider very carefully our programme of proposed public works, so that any curtailment of our activities contingent upon the difficulty of borrowing may be effected without serious dislocation of the labour-market and with the minimum of inconvenience to the workers.

At intervals throughout the year exceptionally bad weather caused widespread damage. In some cases streams rose to heights never before recorded, destroying protective structures which had proved adequate for half a century. This will necessitate bridges, new protective works, &c., of more generous proportions and of a greater cost than those which have been destroyed. Similar catastrophes have occurred in countries settled for hundreds and thousands of years, therefore, however unfortunate, it is not surprising that such things should happen in New Zealand, where we have the records of but a few years to guide us. At the present stage of the development of our country it may prove more economical to put up structures suitable enough for all ordinary conditions, even at the risk of a similar occurrence, than to pay interest on the larger sum necessary to build above recorded flood risks.

The increasing amount of money which is being expended annually by the Government and by local bodies is a matter which arrests attention and demands the consideration of all concerned. To my mind this is a subject of paramount importance, and should command the most earnest attention not only of members of this House, but of all local bodies and of the public generally. I may best open discussion on this question by observing that in 1920, when I became Minister of Public Works, I undertook a critical investigation of all works then in progress. The further I investigated the firmer I became convinced that the capital costs of works was being piled up by following a policy of diffusion—finance available being spread over too many undertakings, instead of being concentrated upon the most urgent and pushing the same forward with all possible speed, commensurate with efficiency, to a point which would ensure a return upon capital costs. The result is obvious. Capital expended not only failed to earn revenue at the earliest possible moment or provide equivalent benefits, but, by added interest and other charges on unproductive expenditure, the cost of such undertakings was considerably increased. With these facts before me it became my duty to select such works as were most urgent in the public interest, and promised the best and speediest return, and to push them to completion with all possible expedition.

What sum would be considered a reasonable amount for us to spend annually on public works ?

Ours is a young land and but partially developed. Our prosperity, both in town and country, depends on the successful marketing of our primary products. We are far from the world's markets, and it consequently behoves us, in the best way we can, to cheapen the cost of internal transport from the farm to the consuming, manufacturing, and shipping centres. The quality of our products will avail little unless we can place them on the world's markets at prices equivalent to their use-value. True, we cannot afford to spend too much ; but it is equally true that we cannot afford to spend too little. Indeed, the latter is likely to be the more costly in the end. It seems to me that the best mode of procedure is to see that every proposed expenditure is thoroughly analysed and considered from the point of view of its net economic result to the country. If the conclusion is favourable, then do the job, and do it as efficiently and as speedily as possible. Thus costs will be kept at a minimum, and those to be served by the undertaking benefited without undue delay.

The providing of public utilities and increased population are complementary of each other. Better communication by road and rail means closer settlement and greater productivity of our lands. Increased population necessitates the extension of the telegraph, the telephone, the electric light and electric power for domestic use, and the economic working of our farming and subsidiary industries. And the facilities have an aesthetic as well as an economic value to the community, which enhances and renders more attractive living and working in the country, and thus helps to stem the drift of population to the towns.

In this matter a Government is in much the same position as the directorate of a producing and manufacturing company whose undertaking as it grows and



progresses requires more capital to develop and extend its operations. Without such additional capital the undertaking stagnates, and other companies with greater enterprise eventually secure its market. So must it be with us. In these days of competition in the world's markets, if we do not develop our natural resources to their full extent, and in the most enlightened and scientific manner, we will find ourselves losing our place and such present advantages as have been won for us at much cost in labour and sacrifice by those who have gone before. Safety lies only in going forward. To stand still is to go back. But we must go forward with a definite purpose, even as we must see it to be our clear duty to assure ourselves as far as possible that every work of development we undertake is necessary and will justify its cost by the revenue, or other benefits, resultant therefrom.

### LOCAL BODIES' BORROWING.

I have previously urged the need of co-ordinating Government and local bodies' expenditure on public works, and something has already been done in this connection. The present system, in my opinion, is still likely to permit of ill-considered and uneconomic expenditure upon schemes which might well be deferred, if not definitely rejected. I am certainly convinced that before loans are approved by the Governor-General in Council much closer and more expert examination is required by a body of men qualified to determine whether the proposals for which the power to raise money is being asked are in the best interest of the requisitioning locality or of the country. To go a little further with this subject: any man who has given the question of raising civic loans serious consideration must agree that what we need is what might be called a Civic Exchequer to deal with all questions of civic finance. Such a body might introduce several reforms, such as the paying of rates quarterly, a system that would be welcomed by rate-payers with small means, and would have the additional advantage of providing local bodies with the use of considerable sums of money free of interest. However, I am convinced of the need of a special organization to deal comprehensively with this subject. To that end I propose to bring down legislation next session providing for the constitution of a Board to which all applications for loans by local bodies will be referred. It will be the function of such Board to thoroughly investigate all such applications, and make recommendations to the Government thereanent, before the same are finally disposed of.

### WORKS COMPLETED DURING YEAR.

The outstanding work completed during the year was the major stage of the Mangahao hydro-electric station, which was officially opened by the late Right Hon. W. F. Massey, this being indeed one of his last public acts. Prior to the official opening the station had been supplying power to a limited extent. It is now supplying the greater part of the southern end of the North Island, the transmission-lines reaching and being in operation from Wellington in the south to Bunnythorpe in the north, and to Masterton and Dannevirke in the east. In addition, the lines have been extended nearly to Wanganui, and are reaching out to Napier.

From a railway point of view the most important milestone was the final handing-over to the Working Railways Department of the Arthur's Pass Section of the Midland Railway complete with its electrification system. A number of other short sections, totalling with this over 26 miles, were completed and handed over, while rails were laid on an additional 39 miles. I had hoped that it would have been possible to hand over to the Working Railways the connection between the Whangarei and Auckland systems, but owing to the treacherous nature of the part of the country through which this line runs, together with the adverse climatic conditions referred to earlier, it was not thought advisable to do this until the works had been proved for a long period and had been further consolidated. As all classes of traffic are being carried over this section by the Public Works Department, as in the case of some 160 miles of other railways, the population are receiving all facilities which the Railways can provide.

From a roading point of view probably the largest achievement was the practical completion of the bridge over the Northern Wairoa River at Dargaville, which is now carrying traffic, and which I hope to have the pleasure of officially opening immediately after the House rises.

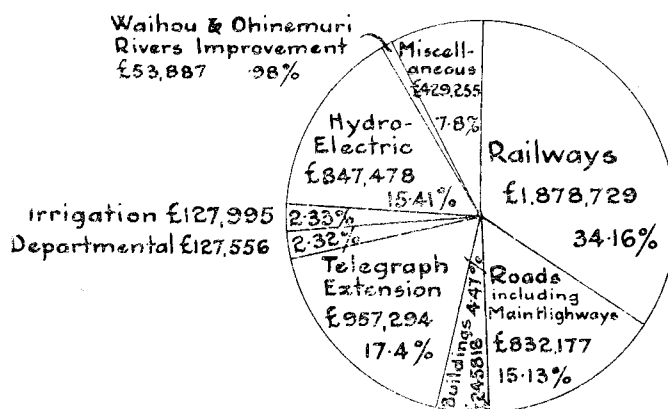
The excellent relations existing between myself and those engaged in the actual carrying-out of the work, which was referred to in my last Statement, are satisfactorily maintained. Evidently the men feel that the Government and the staff are determined to give them a "fair deal," and they reciprocate accordingly.

### PROGRAMME FOR THE FUTURE.

I referred in the Public Works Statement of 1924 to the programme for the future, and, subject to some variations dictated by the financial situation, referred to in my opening remarks, this programme is being adhered to.

### RATIO OF EXPENDITURE.

The ratios which the various types of activities of the Department bear to the whole are indicated graphically in the diagram below. A diagram showing the ratio which the cost of supervision and engineering bears to the total is unnecessary, as there is no measurable difference between this year and last.



### RAILWAY-CONSTRUCTION.

During the last financial year a total length of 26 miles 54 chains of railway was handed over to the Railway Department for incorporation with the general railway system of the country. Details are as follows :—

|                                                          | M. ch. |
|----------------------------------------------------------|--------|
| Huntly-Awaroa Branch Railway .. .. .                     | 1 55   |
| Gisborne-Wairoa Railway (Makaraka-Ngatapa Section) ..    | 11 51  |
| Stratford Main Trunk Railway (Kohuratahi-Tahora Section) | 5 14   |
| Midland Railway (Otira to Arthur's Pass Section) ..      | 8 14   |
|                                                          | <hr/>  |
|                                                          | 26 54  |

In addition to the lines handed over, rails have been laid on 39 miles 8 chains, and goods traffic has been carried on over a length of 58 miles 4 chains, while traffic of all descriptions has been run by the Public Works Department over 132 miles 52 chains, the two principal sections being between Huarau and Portland, and between Tauranga, The Mount, and Taneatua.

The schedule attached gives a complete statement of the work on railways now in progress, and the extent to which it is anticipated it can be completed during the next two years, assuming that sufficient financial provision will be available.

## NORTH ISLAND LINES.

It is expected that the section of railway between Huarau and Portland, over which traffic has been run for a considerable time, will be handed over to the Railway Department before the end of the year. The cause for the delay in actually handing this section over has been already remarked upon by me.

On the Kirikopuni Section it is hoped to have the line fully laid and ballasted to Pukehuia Station, on the Wairoa River, and also to complete the balance of formation work from the Wairoa River to the terminal station at Kirikopuni.

The heaviest work north of Pukehuia is the completion of the Wairoa Bridge. The material for this work is to hand, and an early start of cylinder-sinking will be made. This work, and platelaying onward to the terminus, will be vigorously pushed on. It is expected that the completion of the railway to Kirikopuni will be effected before the end of next year.

A trial line has been run for the railway to be constructed from Kirikopuni to Dargaville, and at the Dargaville end about 3 miles have been pegged out. At the Kirikopuni end the trial line has been run as far as Tangowahine, but the investigations in this connection are not complete. The trial surveys should be completed shortly, when the final location will be decided upon.

In connection with the extension of the railway beyond Rangiahua, trial lines between Rangiahua and Mangamuka have been run and a number of routes investigated, but further investigation is necessary before a final decision is arrived at.

**Auckland-Westfield Deviation :** This important work was commenced just prior to the 31st March last, and has been vigorously proceeded with. This deviation is nearly 10 miles in length, and a double track will be provided for the whole distance. The maximum grade will be 1 in 132, and the sharpest curve of 30 chains radius. Formation from 1m. onwards is being carried out by the Public Works Department. Reconstruction of the Auckland station-yard, 0m. to 1m., is in the hands of the Railway Department. It is hoped to complete this work within three years. A full description of this deviation will be found in the Engineer-in-Chief's report.

On the East Coast Main Trunk Railway from Waihi to Taneatua, the Athenree Section was available for traffic in December, 1924, and a further length, to 11m. 50ch., was available in March last. Under present conditions it will take some time to complete the Athenree Section, but in the meantime the line is safe for passenger traffic to 11m. 50ch.

When the Tuapiro Bridge is completed goods traffic can be carried to Tahawai Station—probably by April next.

From Tahawai to Te Puna (14m. to 35m.) the contractors, Messrs. Armstrong, Whitworth, & Co. (Limited), are making fair progress, but it is not likely that any portion will be available for traffic during the coming year. From 35m. to Tauranga the main work has been on the Waikareao Bridge, which is now nearing completion. Formation from Wairoa to Tauranga will be finished in a few weeks, and the line should be available for goods traffic from Wairoa Bridge to Tauranga at an early date.

From Tauranga to Taneatua the line is open for traffic to Pekatahi. The Whakatane Bridge is finished, and the permanent way laid thereon. This line would have been practically ready for traffic to Taneatua now had not floods to some extent delayed the works. It is expected that traffic will be running to Taneatua in September next. The whole section of railway constructed directly by the Public Works Department should be completed in about two years' time.

On the Napier-Gisborne line the concentration of work on the Tutira Section continued, the work being of an extremely heavy nature. By the end of the current

year it is expected that the work on this section will be completed. Work on the Putorino Section was commenced, and apart from viaduct construction, three being required, is of an easier nature than the Tutira Section, a good deal of the work being possible with plough and scoop. Formation work should be completed early next year.

On the Mohaka Section heavy country will be met with, and three tunnels, aggregating approximately 70 chains, will be required, besides two large viaducts. Preliminary works have been put in hand, and the necessary camps for the accommodation of the workmen erected.

On the Waihua Section considerable earthworks will be necessary, as well as the Maungaturanga Viaduct, and one tunnel of 33  $\frac{1}{2}$  chains, which if sufficient tunnellers are available it is proposed to start before the end of the year.

The final section to Wairoa is mostly in easy country, the outstanding features being the Waihua and Wairoa River Bridges and the Waihua Tunnel. A start was made on the tunnel early in the current year.

On the Stratford Main Trunk Railway, east end, the construction of the Matiere Section is complete with the exception of permanent track on the bridges, the final lift of ballast, and the renovations of the Okahukura Station buildings.

On Ohura Section some very heavy earthwork has to be completed between 15m. and 17m. including Ryan Road station-yard. Station-buildings are also required at Nihoniho, Ryan Road, and Ohura.

Goods and passenger traffic, as intimated in my Statement last year, has been carried by temporary service-line to Toitoti (16m.), but the section will not be completed until next year.

Considerable damage has been caused by floods, and construction works have been retarded thereby.

On the Stratford Main Trunk Railway, west end, active preparations are being made to proceed vigorously with the work of construction. The heavy section of this work lies between the Tangarakau and Heao Rivers. In 5 miles there are four large tunnels and one small tunnel, aggregating not less than 2m. 30ch. of tunnelling. As these are the key to the whole work, it is proposed to concentrate on them, and defer the other formation work on the Raekohua Section, a length of 4 miles, until such time as the tunnelling-work is nearing completion. By doing so large savings of interest payable will be made.

The service tramway mentioned in my previous report as being well in hand was held up owing to the delay in delivery of rails which had to be imported. The work on this tramway comprised the construction of  $4\frac{1}{2}$  miles steam tramway, a bridge over the Tangarakau River, and a haulage incline over the first tunnel. Materials are now coming to hand, and the work will be pushed forward expeditiously, as no actual construction work can be started until adequate access is provided.

The site for a permanent camp at the Tangarakau River has been selected, and arrangements made for the transfer of construction plant from the Otira Tunnel, where it was formerly in use. Preliminary works and the opening of tunnel approaches should be completed by March next year, and so permit of the construction of the first two tunnels and formation between being carried out expeditiously.

On the Opunake Branch Railway the section from Te Roti to Kapuni (7m.) is ready to hand over to the Railway Department. Substantial progress has been made on the remaining section to Opunake, which has enabled a goods service to be run to that town, a distance of  $22\frac{3}{4}$  miles. It is expected that the whole of the work in connection with this branch railway will be out of hand within twelve months from now.

Construction of the Hutt Valley railway duplication was authorized last session, and surveys have been carried out and the centre-line proclaimed. Preparatory works in anticipation of rapid prosecution of this very necessary work were put in hand, and the first sod for the new railway was turned by me in April last. Owing to representations by the local authorities, who were opposed to the construction of a ramp and bridges above the level of the main road, a number of consultations took place between officers representing the Public Works and Railways Departments and the local authorities, this delaying the work somewhat. The matter has now been satisfactorily settled. This will permit of works being vigorously proceeded with.

The Wellington—Tawa Flat deviation of the Main Trunk Railway, which will eliminate the heavy grades between Wellington and Johnsonville, was authorized by the Railways Authorization Act, 1924, and a permanent survey for its location is practically complete. Actual construction works have not yet been commenced, but matters are now in train to permit of their speedy prosecution.

#### SOUTH ISLAND LINES.

On the Glenhope—Murchison Section platelaying is in progress on the Kawatiri Section, and this should be ready for handing over by the end of November.

On the Murchison Section formation and clearing are in hand. The permanent location of the line has been completed to 73m., and trial survey is in hand to 81m.

On the Westport—Inangahua Section work is in progress from Te Kuha to Cascade Creek with the object of providing means for transport of coal from the mines in that vicinity now being opened up. Platelaying has been done up to 8m.

A telephone has been provided between Westport and Te Kuha, and the necessary buildings provided on the section for the accommodation of officers and workmen. The centre-line of railway beyond Cascade Creek has been relocated to 16m.

Otago Central Railway: A reconnaissance survey of another route for the railway from Cromwell northwards has been made, and the estimates for constructing the line (based on the original survey and that recently made) are being considered. Reports on the whole subject by the District Engineer, Inspecting Engineer, and Engineer-in-Chief respectively are attached as an appendix hereto.

On the Lawrence—Roxburgh Railway, Miller's Flat Section, goods traffic between Beaumont and Miller's Flat has been run since the 15th December last. It is expected that this section will be handed over to the Railway Department before the end of the year.

Orepuki—Waiau Railway (Orawia Section): All works on this section are practically completed, and a goods service has been run since September last. It is expected that this section will be handed over to the Railways Department in a few weeks' time.

#### EXPENDITURE.

The total net expenditure under all votes and accounts appearing on the public-works estimates for the financial year ended 31st March, 1925, was £6,258,952. Of this sum £4,373,370 was expended out of General Purposes Account, and the balance, £1,885,582, out of special accounts.

A brief summary of this expenditure, as well as the total expenditure since the inception of the Public Works policy to the 31st March last, follows in tabular form:—

| Class of Work.                                                                     | Expenditure<br>for Year<br>ended<br>31st March,<br>1925. | Total<br>Expenditure to<br>31st March,<br>1925. |
|------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------|
| Railways—                                                                          | £                                                        | £                                               |
| New construction .. .. .                                                           | 1,135,807                                                | 32,056,167                                      |
| Additions to open lines .. .. .                                                    | 742,922                                                  | 14,403,213                                      |
| Payment to Midland Railway bondholders .. .. .                                     | ..                                                       | 150,000                                         |
| Roads .. .. .                                                                      | 606,723                                                  | 15,120,263*                                     |
| Public buildings .. .. .                                                           | 245,818                                                  | 9,324,208                                       |
| Immigration .. .. .                                                                | 136,353                                                  | 2,825,412                                       |
| Purchase of Native lands .. .. .                                                   | ..                                                       | 2,061,739                                       |
| Lighthouses, harbour-works, and harbour defences .. .. .                           | 3,275                                                    | 1,198,166                                       |
| Tourist and health resorts .. .. .                                                 | 12,343                                                   | 349,142                                         |
| Telegraph extension .. .. .                                                        | 957,294                                                  | 7,176,705                                       |
| Development of mining .. .. .                                                      | ..                                                       | 882,975                                         |
| Defence works (general) .. .. .                                                    | 27,133                                                   | 1,118,495                                       |
| Departmental .. .. .                                                               | 127,556                                                  | 2,166,556                                       |
| Irrigation and water-supply .. .. .                                                | 127,995                                                  | 621,212                                         |
| Lands Improvement .. .. .                                                          | 34,172                                                   | 229,677                                         |
| Minor works and services .. .. .                                                   | ..                                                       | 312,607                                         |
| Plant, material, and stores .. .. .                                                | Cr. 12,229                                               | 350,912                                         |
| Quarries (acquisition and operating) .. .. .                                       | 1,815                                                    | 1,815                                           |
| Timber-supply and sawmills for Public Works Department .. .. .                     | Cr. 20,537                                               | 14,170                                          |
| Motor transport services .. .. .                                                   | 5,000                                                    | 28,641                                          |
| Cost and discount, raising loans, &c. .. .. .                                      | 241,930                                                  | 2,043,772                                       |
| Total General Purposes Account .. .. .                                             | 4,373,370†                                               | 92,435,847                                      |
| Aid to Water-power Works and Electric Supply Account .. .. .                       | 847,478‡                                                 | 3,771,334                                       |
| Waihou and Ohinemuri Rivers Improvement Account.. .. .                             | 53,887‡                                                  | 434,582                                         |
| Total Public Works Fund .. .. .                                                    | 5,274,735                                                | 96,641,763                                      |
| Wellington-Hutt Railways, &c.—                                                     |                                                          |                                                 |
| Railway .. .. .                                                                    | ..                                                       | 228,374                                         |
| Road .. .. .                                                                       | ..                                                       | 101,658                                         |
| Railways Improvement Account                                                       | ..                                                       | 641,275                                         |
| Railways Improvement Authorization Act 1914 Account .. .. .                        | 273,407§                                                 | 1,206,069                                       |
| Loans to Local Bodies Account—Roads to open up Crown lands .. .. .                 | ..                                                       | 697,408                                         |
| Opening up Crown Lands for Settlement Account—Roads to open up Crown lands .. .. . | ..                                                       | 206,626                                         |
| Lands for Settlement Account—Roads to open up Crown lands .. .. .                  | 23,144                                                   | 553,793                                         |
| National Endowment Account .. .. .                                                 | ..                                                       | 53,401                                          |
| Education Loan Account .. .. .                                                     | 462,212§                                                 | 1,887,043                                       |
| Main Highways Account Construction Fund .. .. .                                    | 6,033,498                                                | 102,217,410                                     |
|                                                                                    | 225,454                                                  | 225,454                                         |
|                                                                                    | 6,258,952                                                | 102,442,864                                     |

\* Includes £4,500 expended under section 16, subsection (1), Native Land Amendment and Native Claims Adjustment Act, 1923. † Does not include expenditure under the Ellesmere Land Drainage Act, 1905.

‡ Excludes interest during construction.

§ Includes proportionate cost of loan raised under these accounts.

### WAYS AND MEANS.

|                                                                                                     |           |            |
|-----------------------------------------------------------------------------------------------------|-----------|------------|
| On the 1st April, 1924, the available ways and means for general public-works purposes were .. .. . | £         | 888,023    |
| Additional funds were received as follows:—                                                         |           |            |
| (a.) Transferred from Consolidated Fund in terms of section 17 of the Appropriation Act .. .. .     | 1,000,000 |            |
| (b.) Under Aid to Public Works and Land Settlement Act, 1921 .. .. .                                | 1,310     |            |
| (c.) Under Aid to Public Works and Land Settlement Act, 1922 .. .. .                                | 324,851   |            |
| (d.) Finance Act, 1923, section 2 (public works).. .. .                                             | 3,222,612 |            |
| (e.) Recoveries on account of expenditure of previous years .. .. .                                 | 40,795    |            |
| (f.) Ellesmere and Forsyth Reclamation and Akaroa Railway Trust Account receipts .. .. .            | 1,657     |            |
| Less—                                                                                               | £         | 5,479,248  |
| Treasury bills redeemed .. .. .                                                                     | 500,000   |            |
| Transfer to Main Highways Account, Construction Fund .. .. .                                        | 226,000   |            |
|                                                                                                     |           | 726,000    |
|                                                                                                     |           | £4,753,248 |

The net expenditure on works and services chargeable against the General Purposes Account for the year was—

|                                                             | £                 |
|-------------------------------------------------------------|-------------------|
| (a.) Under appropriations .. .. .                           | 4,131,440         |
| (b.) Under Ellesmere Land Drainage Act, 1905 .. .. .        | 439               |
| (c.) Under New Zealand Loans Act, 1908 (stamp duty) .. .. . | 9,832             |
| (d.) Charges and expenses of raising loans .. .. .          | 232,098           |
| Making a total of .. .. .                                   | <u>£4,373,809</u> |

|                                                                                                                |                   |
|----------------------------------------------------------------------------------------------------------------|-------------------|
| This left a credit balance in the account for general purposes at 31st March, 1925, of .. .. .                 | £ 379,439         |
| Legislative authority exists for raising a further .. .. .                                                     | 4,000,920         |
| It is proposed to transfer from accumulated surplus to capital purposes (if required) to the extent of .. .. . | 1,000,000         |
| and to ask for further legislative authority to borrow, when required .. .. .                                  | 4,000,000         |
| Thus making available for public works, general purposes, a total of .. .. .                                   | <u>£9,380,359</u> |

The estimated expenditure under the account for the current financial year, including the transfer of £200,000 to Main Highways Construction Fund, is .. .. . £4,918,500

In addition to the requirements for general purposes, there are a number of special accounts for public works with separate ways and means. The most important of these are :—

| Name of Account.                                            | Balance available at 31st March, 1925. | Unexhausted Borrowing Authority at 31st March, 1925. | Additional Borrowing Authority to be sought during Current Year. | Total available Ways and Means. |
|-------------------------------------------------------------|----------------------------------------|------------------------------------------------------|------------------------------------------------------------------|---------------------------------|
|                                                             | £                                      | £                                                    | £                                                                | £                               |
| Electric-supply Account .. .. .                             | 229,248                                | 6,506,990                                            | ..                                                               | 6,736,238                       |
| Waihou and Ohinemuri Rivers Improvement Account .. .. .     | 273                                    | 164,000                                              | ..                                                               | 164,273                         |
| Railways Improvement Authorization Act 1914 Account .. .. . | 577,601                                | 1,458,310                                            | ..                                                               | 2,035,911                       |
| Main Highways Construction Fund .. .. .                     | 546                                    | 3,000,000                                            | ..                                                               | 3,000,546                       |
| Totals for these special accounts .. .. .                   | 807,668                                | 11,129,300                                           | ..                                                               | 11,936,968                      |

From these figures it will be observed that at the end of the last financial year the unexpended balance of the Public Works Fund for general purposes, plus existing and proposed authorities for raising further moneys, amounted to .. .. . £ 9,380,359

While the balance at the same date in respect to some of the more important public works under special accounts, plus legislative authority to raise additional loans, amounted to .. .. . 11,936,968

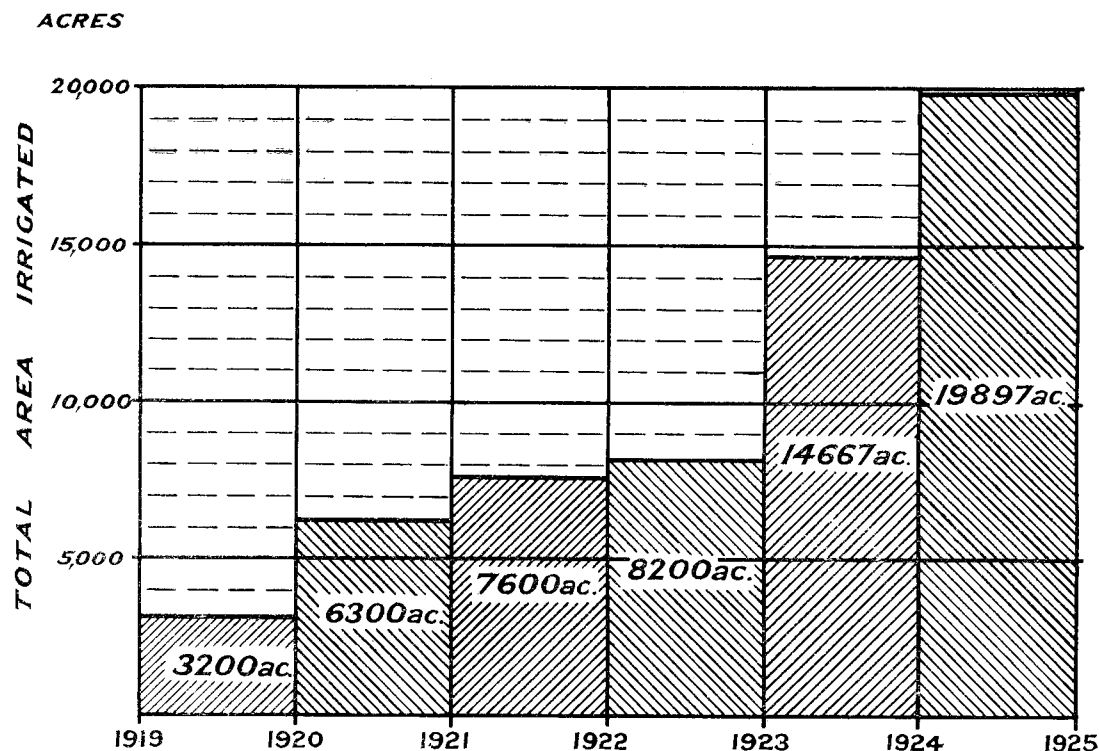
Or a total of .. .. . £21,317,327

## IRRIGATION AND WATER-SUPPLY.

Continued steady progress of irrigation development is to be recorded so far as the operations of last year are concerned. No new works were commenced, the completion of schemes under construction, and surveys and investigation of new schemes proposed, occupying the attention of the Department. The Ida Valley and Galloway schemes are in operation ; and, though the revenue from these schemes is

derived from only about half the available area, while working-expenses as for the whole were incurred, the results are satisfactory. The revenue received amounted to £4,620, while the working - expenses amounted to £2,130, leaving a balance over working-expenses amounting to £2,490, which shows a considerable increase over the receipts of the preceding year. All the other schemes in hand are practically completed, or will be by the commencement of the next irrigation season : with the exception of one scheme, all irrigators requiring water were supplied during last season. The actual area irrigated under all the Government schemes was 19,897 acres, divided among 239 settlers, as against 14,667 acres in the previous year, with 200 settlers.

The graph below shows the growth of irrigation under the Government schemes for the past six years :—



The Ida Valley scheme has been further extended, and three miles of race between Moa Creek and Poolburn Weir has been enlarged; the Syndicate race extended half a mile, and distributary races constructed. Improvements to the Upper Bonanza Race have been carried out, and the Bonanza Flume replacement is in hand. The distribution races in connection with the Galloway scheme were completed.

The Manuhierikia scheme was practically completed, and will serve all parts of the area connected next season.

The erection of the pipe-line authorized in connection with the extension of the Earnsclough scheme was put in hand, while considerable work on the main race and distributary races was carried out.

The Last Chance scheme will be finished next season with the exception of distributary races to some Crown land not yet open for settlement.

The Tarras scheme was nearly completed during last year.

The Teviot River scheme is practically completed, and will be finished before next irrigation season.

In connection with the Hawkdun scheme, repairs to Eweburn Reservoir are in hand, and further investigations in connection with the distribution are being made.

A survey has been made of the Upper Manuhierikia dam area, and plans are now in course of preparation. Plans of the Roaring Meg survey are being prepared, and a survey is in hand for the Luggateburn scheme to serve Crown land in the Clutha Valley. A scheme for the Miller's Flat district to be served from the Minzionburn has been surveyed and the details are now being worked out. Survey



of the Arrow scheme is in hand, and is so far advanced as to permit of work being taken in hand at an early date, after the usual formalities have been complied with.

The following schemes have been in whole or partial operation during the last irrigation season: Ida Valley, Galloway, Manuherikia, Earnscliffe, Ardgour, Last Chance, Tarras, Teviot River, and Bengerburn.

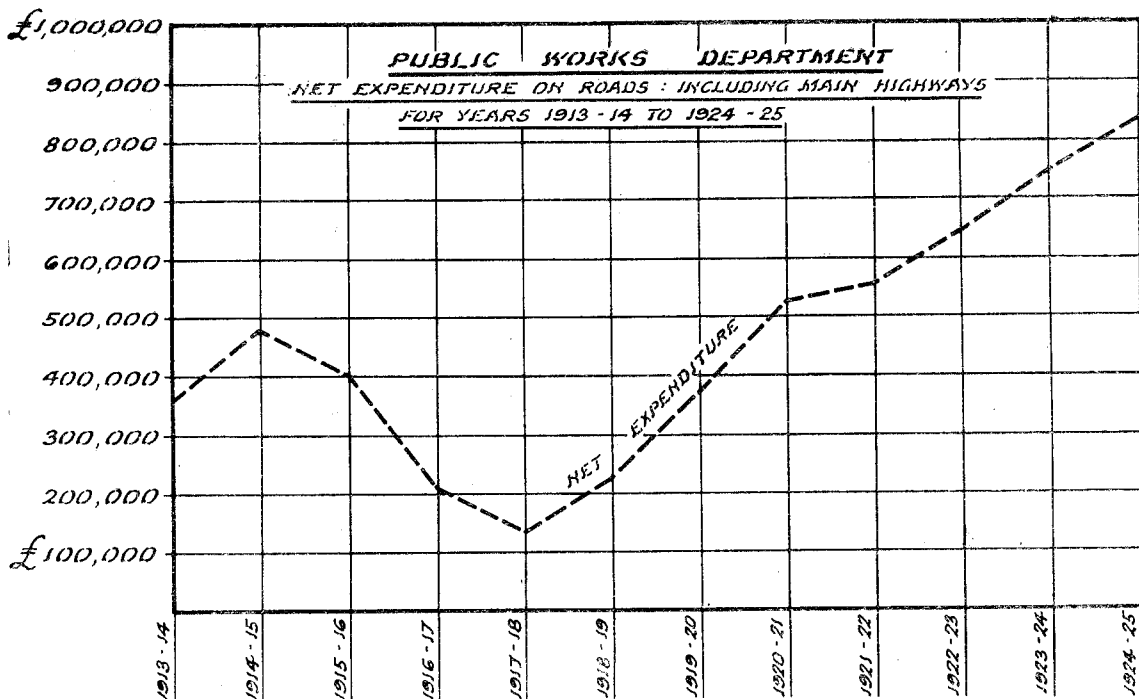
#### OFFICERS SENT ABROAD.

Arrangements were made for Mr. C. J. McKenzie, Assistant Engineer-in-Chief, to visit America, England, and the Continent of Europe, for the purpose of investigating modern methods and practices in engineering as carried out in those countries, and their application to New Zealand conditions. He will investigate particularly the question of tunnelling-machinery, highway construction, and finance.

Mr. J. R. Marks, District Engineer, Dunedin, who has been very intimately connected with the irrigation problems in Central Otago, also accompanied Mr. McKenzie to America, in order to particularly investigate irrigation problems in America generally and California particularly. At the same time he will also be able to gather much useful information on all the different phases of engineering, particularly highway engineering, especially as many of the American conditions and problems are similar to those which, on a smaller scale, exist in this country.

#### ROAD-CONSTRUCTION.

The expenditure for the financial year ended 31st March, 1925, exceeded that of the previous year, which, as honourable members will no doubt recollect from my previous Statement for 1924, represented a record for this Branch of the Department's activities. The diagram below shows the trend of the Department's roading programme for the past eleven years.



It is interesting to note that of the 56,680 odd miles of legalized roads and tracks in the Dominion, 23,097 miles have been fully metalled to dray-road width, and an additional 16,114 miles formed to dray-road width. It is estimated that an expenditure approximating £50,000,000 will yet be required to fully complete all roads as metalled dray-roads.

Considerable attention has also been paid during the past year to the question of road-surfacing. The realization of the capabilities of improved surface to withstand the ever-increasing motor traffic, and thus considerably reduce the cost of

upkeep, has led the Department to adopt the principle of subsidizing the cost of bitumen or tar-sealing or other improved surface. At the same time, in view of the fact that such improved surfacing is particularly in the interests of local bodies, who are primarily responsible for maintenance, it is considered that the scale of subsidy on such work should be lower than that for ordinary macadam road-surfacing. On main highways the Main Highways Act lays down the rate of subsidy. The factors involved in arriving at the subsidy basis are the cost of laying down a gravelled or metalled road as compared with the cost of providing a sealed or more permanent type of surface, the annual cost of upkeep of the several classes of surface, the amount of traffic using or likely to use the road in question, and the ability of the district concerned to pay the capital and maintenance costs involved.

The general question of maintenance has assumed considerable importance since the advent of fast motor traffic. This has rightly received careful consideration by the Department, and I cannot too strongly stress the importance of constant and sufficient maintenance. The initial cost of construction is now not the only factor to be considered in connection with a metalling scheme, but the ability of the district to adequately maintain the road once it is metalled is by no means the least important consideration. The principle has therefore been adopted of investigating a local body's capabilities in this direction before any comprehensive metalling scheme receives the approval of the Department, and in future no authorization of approved grants or subsidies will be made for metalling purposes until the local body satisfies the Department, by a resolution of the Council, that it has arranged to provide and set aside annually sufficient funds to efficiently and effectively maintain the work. Although maintenance of roads is, strictly speaking, the function of local authorities, it is my Department's duty to watch the interests of the State, and by directing attention to necessary maintenance safeguard the value of the State's investment in such roading scheme. Usually the State has as much invested in the road surface as the local authority. It is pleasing to note that local bodies are themselves, to a greater extent than has been the case in the past, moving in the right direction so far as maintenance of roads is concerned.

The system of preparing the public-works roads estimates in accordance with each district's claims for consideration under such factors as area, population, rating, loans for roading purposes, values of undeveloped lands, and estimated amount to fully complete all legal roads has again been adopted. This system, which is the most fair and equitable yet devised, and under which no one district receives at the expense of other localities a greater amount of Government financial assistance than that to which it is justly entitled, is proving entirely satisfactory. Its operation takes the various local bodies very much into the confidence of the Department, and by being made aware before the estimates are actually prepared what amount of assistance may be obtained for that financial year a local body is able to map out a comprehensive programme for the year's operations, and have all arrangements made in time for an early commencement with work as soon as weather conditions permit. A most important feature of the application of this scheme of allocation in connection with the annual roads estimates is the arrangement whereby officers of the Department and the local body confer as to the general requirements of the district concerned. By this means more cordial relations are established between the Department and the local bodies generally, and the advantages to the Dominion from the resultant linking-up of local-body operations are obvious.

#### MAIN HIGHWAYS.

The Main Highways Board, which was launched last year, has now completed a year of operation. Although it has not had time to make any very decided alteration in the transport systems of the Dominion, it is apparent in travelling throughout the country that the additional finances which this organization provides, and the assistance to maintenance of the main avenues of traffic have already had their effect. The Board is functioning well. Its relations with local bodies are of the most harmonious character, and all the officers of the local bodies,

as well as those of my own Department, are making a genuine effort to enable the system to fulfil the anticipations of those who were instrumental in bringing it into being.

Since the first declaration of highways, on the 9th June, 1924, some modifications have been made so that the total length of main highway now equals 6,008 miles, of which 1,362 miles have been declared Government roads. The fact that these roads are Government roads does not necessarily mean that the Government controls and maintains them, though this is the case on 703 miles. In other cases the local authorities are still finding a considerable proportion of the cost of construction and maintenance, but the Government, through the Highways Board, is finding more than the ordinary £1 for £1 or £1 for £2.

Owing to the difficulty which local authorities have found in borrowing the necessary sums for highway work, as much work as was expected has not been done. Furthermore, as in many cases the work which is being undertaken is of a special nature, introducing the use of better systems of surfacing than has been the case in the past, a considerable amount of investigation and consultation has been necessary before finality was arrived at. Therefore, the amount of work actually done on the roads in the way of new construction has not been as great as might have been expected, and is considerably less than that for which money was provided. However, apart from new construction, the additional money which the maintenance payments of the Highways Board provided towards the assistance of local-body maintenance has resulted in quite a marked improvement in the standard of maintenance of many districts. In addition to finding money, the Board has carried on propaganda having for its object the pressing on those controlling the roads the necessity for better maintenance, it being pointed out that, in accordance with the old adage, "A stitch in time saves nine," money judiciously spent on maintenance will enable a road quite adequate for the business traversing it, and comfortable to those using it, to be maintained without the necessity for the expenditure of large sums of borrowed money on reconstruction. Some local authorities, feeling the difficulty of obtaining borrowed money at the allowable rate of interest, have negotiated a bold policy of doubling, or at any rate greatly increasing, their rates, so as to provide their subsidy with which to take up the Board's pound for pound assistance towards new works. This is a sound policy, and will result in much improvement of the highways without passing on to posterity a load of debt which might last far longer than the road to build which it was incurred. Although roads have not been declared main highways through boroughs, except in two or three very special cases, the Board has found it possible with the funds at its disposal to give assistance to boroughs of not more than six thousand inhabitants to an extent equal to that given to the adjoining rural bodies where routes of through traffic pass along borough streets.

### FLOOD DAMAGE.

I regret that it is again necessary to state that on account of exceptional floods damage to roads and bridges has been very considerable. The Department's expenditure under this heading for the past year again, unfortunately, constitutes a record. In very many cases the cost of restoration was quite beyond the resources of the local bodies, and the Government was appealed to for liberal assistance. I desire to point out in this connection that the granting of Government assistance for restoration of flood damage is very closely controlled. The Department's ever-increasing expenditure under flood damage might indicate the development of a policy whereby all damage due to floods, even of a more or less trivial nature, is subsidized. This is by no means the position. Every application for Government aid is very carefully investigated by the Department, and before any subsidy is approved the local body's ability to meet the cost of restoration from its own financial resources, and the question whether or not any or all of the damage can rightly be attributed to neglected maintenance, ill-considered design, faulty constructional work, or to causes beyond the reasonable provision of the local authority, are carefully gone into.

The cost of restoring this damage by flood being very considerable, both to the local authorities and to the Crown, seems to indicate that some better method of finance is called for. The expenditure may be a serious drain on the Government's financial resources, but it is crippling on the local authorities. I am of the opinion that the time has now arrived when local authorities should be empowered, and required by legislation, to set up reserve funds to provide for such exceptional occurrences. This proposal is now being investigated by departmental officers, and it is hoped that a means may be evolved whereby the revenue of any one year should be relieved of the heavy drain due to those spasmodic occurrences.

## HYDRO-ELECTRIC DEVELOPMENTS.

### OPERATION.

The Department's operating hydro-electric plants have had a successful year, have given satisfactory service to consumers, and have been able to make a profit after paying all operating and capital charges.

### LAKE COLERIDGE ELECTRIC SUPPLY.

The capital has been increased during the year from £892,801 to £1,008,491, of which about £100,000 is for duplication works that have not yet gone into operation. The financial results for the year can be summarized as follows:—

|                              |    |    |    |        |                |
|------------------------------|----|----|----|--------|----------------|
| Capital investment           | .. | .. | .. | ..     | £<br>1,008,491 |
| Revenue                      | .. | .. | .. | ..     | 92,163         |
| Expenditure—Working-expenses | .. | .. | .. | 23,270 | £              |
| Interest                     | .. | .. | .. | 47,780 |                |
| Depreciation                 | .. | .. | .. | 15,679 |                |
|                              |    |    |    |        | 86,729         |
| Profit                       | .. | .. | .. | ..     | £5,434         |

This has been utilized in reducing the deficiency which had accumulated on the Profit and Loss in the early years, from £23,172 to £17,738.

The water-supply to the lake has been well maintained. It has not been necessary to draw at all on the storage available, as the lake has been maintained at overflow level practically for the whole year.

The power-station plant has operated very satisfactorily throughout the year, although it has had to carry heavy overloads on several occasions. The maximum load for the year ended 31st March, 1925, was 13,180 kilowatts, occurring in June, 1924, but since the end of the financial year the peak load has exceeded 14,000 kilowatts.

Two 30 in.-diameter siphons were installed during the year to bring in additional water over the intake gates and screens, and to reduce the heavy frictional losses which were occurring on heavy loads. These gates and the tunnel were originally designed for only 9,000 kilowatts, and the siphons at a very limited cost have been successful in enabling heavy overloads to be carried until the second tunnel now under construction can be put into operation.

During the year a new contract for supply of power for a period of twelve years was entered into with the Christchurch City Council, the Department's largest consumer on the Coleridge system. This contract provides that the Council shall guarantee to the Department substantial minimum payments each year, and in return will receive power at rates equivalent to those at which it estimated it could have obtained power from a local development at Waimakariri. It is considered that this contract will have very satisfactory results for both parties: the Department has secured a guaranteed revenue over a long period, and the Council has secured a power-supply at cheap rates, without having to raise a large amount

of capital themselves, and without the risk of having the capital expenditure on which the charges were based exceeded during construction.

#### HORAHORA ELECTRIC SUPPLY.

The financial results on this plant have again been very satisfactory during the year. The position may be summarized as follows :—

|                              |    |    |    |             |                |
|------------------------------|----|----|----|-------------|----------------|
| Capital investment           | .. | .. | .. | ..          | £<br>522,973   |
| Revenue                      | .. | .. | .. | ..          | 65,184         |
| Expenditure—Working-expenses | .. | .. | .. | £<br>14,106 |                |
| Interest                     | .. | .. | .. | 20,129      |                |
| Depreciation                 | .. | .. | .. | 9,757       |                |
|                              |    |    |    |             | <u>43,992</u>  |
| Profit                       | .. | .. | .. | ..          | <u>£21,192</u> |

As this plant has now paid off all deficiencies and is operating at a profit, this amount has been utilized in paying sinking-fund contributions, £4,138, and the balance carried forward into reserve.

The additional units which have been installed during the year came into operation since the end of the financial year, and will enable a considerably greater load to be carried during the coming year. Since the end of the year also power has been supplied over the new transmission-line from Horahora to Auckland.

An arrangement has been come to with the Tauranga Borough Council by which the Department's Horahora system will be interconnected at Waikino with a line from the borough plant at McLaren's Falls, and the borough has contracted to supply up to 1,800 kilowatts to the Department's system. Besides providing this extra amount of power, this connection will be very useful as affording some standby on the end of the single transmission-line between Horahora and Waikino.

#### WAIKAREMOANA PLANT.

The small development at Waikaremoana, installed partly to provide power for the construction works of the proposed major development there, has been in operation supplying power to the Wairoa Power Board. Though the financial results as an operating power-supply station have not been so good as in the two larger schemes, the development has given excellent service to the Wairoa district, and has resulted in considerable development in that locality. The plant has been leased to and is being operated by Wairoa Power Board until such time as it is required for the major development. The capital outlay is £77,314, capital charges (interest and depreciation) amount to £5,735, and the revenue to £2,440, giving a loss of £3,295 for the year.

#### MANGAHAO ELECTRIC SUPPLY.

This station went into operation partially towards the end of the year, supply being given to the Horowhenua Power Board in November, to the Manawatu-Oroua Power Board in December, partial supply to the Hutt Valley Power Board in December, and continuous supply to the same Board in March. The limited revenue obtained from supply before the end of the financial year has been credited to capital, and the scheme considered as an operating development as from the beginning of this financial year—1st April, 1925. The operating capital at that date was £1,493,456, which amount will be added to as additional sections of transmission-line and substations come into operation.

Up to the end of the financial year the peak load on the power-station had reached 7,160 kilowatts, and the revenue obtained £3,237.

Since the end of the financial year supply has been given to the Wellington City Council, to the Tararua Power Board, the Dannevirke Power Board, and

Wairarapa Power Board. The peak load on the plant by the end of June had reached 9,080 kilowatts.

The operation of the plant has been very successful, and no serious interruptions have occurred. It is gratifying to know that of the slight mishaps that have occurred none have been due to the transmission.

#### CONSTRUCTION WORK.

During the year the total expenditure on new works has been £1,043,176, increasing the total expenditure on hydro-electric development from £3,035,172 to £4,078,348. The main items of expenditure have been—

|                                               | £       |
|-----------------------------------------------|---------|
| Lake Coleridge (15,000 k.w. extension, &c.).. | 115,690 |
| Horahora (4,000 k.w. extension, &c.) ..       | 48,156  |
| Mangahao (24,000 k.v.a.) ..                   | 624,944 |
| Arapuni 1A development 45,000 k.w.!           | 253,520 |
| Waikaremoana (construction plant and surveys) | 691     |
| Surveys, other schemes ..                     | 175     |

#### LAKE COLERIDGE DUPLICATION, ETC.

Substantial progress has been made with the work of installing a new tunnel, pipe-lines, and additions to power-station and plant to make available a further 20,000 horse-power at this development. Some difficulty was experienced on the tunnel contract with an inflow of water at the centre shaft, and the alignment was amended to take the new tunnel farther away from the present operating-tunnel. Work is now proceeding without any great difficulty at all four faces, and it is anticipated that the tunnel will be completed in ample time to give additional supply next winter.

Good progress has been made by the Department's own staff with the intake for the new works on the lake-shore. The steel cylinder has been floated into position, sunk, and the shell filled with concrete. The material is now being excavated from the inside, and the cylinder lowered into its final position on the rock. The under-water drive connecting the gate-chamber and tunnel with the cylinder intake has been driven out to within a few feet of the cylinder, and will be broken through as soon as the cylinder is finally embedded in position.

Substantial progress has been made with the extension to power-house, which is now nearing completion; the erection of new pipe-lines is under way, and a drag-line excavator is engaged on the excavation of new tail-race.

Contracts have been let for the supply of new generating plant and switch-gear both for the power-house and the Addington Substation, to provide for the additional loading that will be possible with the extended development. Fair progress is being made on all sections, and it is anticipated that the Department will be able to meet all demands for power on this system by the end of July, 1926.

Materials have been obtained and contracts let for the erection of a second transmission-line between Hororata, on the Coleridge-Christchurch line, and Timaru, and arrangements are being made for the Department to extend this line from Timaru to Oamaru. An endeavour is being made to have these extra lines completed and ready for operation by the time the duplication works at Lake Coleridge are completed. The new line has been designed so that it may ultimately be operated at 110,000 volts, and form part of a main trunk system connecting the different power-stations that may be developed in Canterbury and Otago.

#### MANGAHAO SCHEME.

The major portion of the expenditure on hydro-electric development during the last year has been in connection with this scheme. Altogether a sum of £624,944 was expended during the past financial year. The construction of the dams at Mangahao and Tokomaru, and the interconnecting tunnels, have been completed. The power-house building has been completed, and the whole of the plant and machinery installed and gone into operation. The construction of the main transmission-lines and substations has been expedited. The lines have been

completed to Wellington, and to Bunnythorpe on the north-west, and are under construction towards Wanganui. A line has been erected across the Ruahines from Bunnythorpe to Woodville, and from there north to Waipukurau and south to Masterton. Substations have been erected and the necessary plant installed at Khandallah, Bunnythorpe, Mangamaire, Dannevirke, and Masterton, and a switching-station at Woodville. Extensions to the main lines are being made to Napier and Wanganui, and tenders have been invited for substations at these points. A substation is being built at Ongaonga (for southern Hawke's Bay), and the plant and material is on order for substations at Napier and Wanganui.

#### HORAHORA POWER SCHEME.

An expenditure of £48,156 has been made on extensions to this scheme during the year. The additions to the power-house and headrace have been completed, and the two new 2,000-kilowatt units put into operation. A considerable amount of work has been done on building a new weir across the river above the head-gates, and on the installation of gates to control the flow of water into the power-station. There has been some delay in the delivery of these gates, and further delays have been caused by heavy floods which occurred in the river during May and June.

A start has been made with the erection of a 50,000-volt line between Waikino and Katikati, to connect the Horahora system with the Tauranga Borough plant at McLaren's Falls.

#### ARAPUNI POWER SCHEME.

The contractors for the headworks and plant, Sir W. G. Armstrong, Whitworth, and Co. (Limited), have made an active start on the work under their contract. They have erected complete camps for their staff and workmen adjacent to the dam and power-house, and at the quarry-site some miles farther up the river. Considerable progress has been made with the excavation of the tunnel required to divert the river during construction of the dam, with the excavation at the power-house site, in the headrace, at the intake gate wall and weir, and on the above water excavation at the main dam. The construction of an aerial ropeway to bring in stone from the quarry is under way. The high river levels and floods which occurred in May and June have delayed work in the diversion tunnel to some extent. The Department's own staff has completed the formation and preliminary metalling of the access roads, and has built bridges over the Waikato River and the headrace channel, and commenced formation work on the Waotu-Arapuni Road deviation.

As it is most important that as much load as possible shall be available for the Arapuni Station as soon as it is completed, a considerable amount of survey and construction work has been done on transmission-lines.<sup>1</sup>

The construction of one main 110,000-volt line has been completed from Hamilton to Auckland, and this will be operated meanwhile from Horahora to give a supply of 2,000 k.v.a. to the Auckland Power Board. The survey has been completed, and construction is in hand of a 50,000-volt line from Arapuni to Rotorua. When completed this will be operated from Horahora until Arapuni is available. An extension of the Te Awamutu 50,000-volt line is under construction to Hangatiki, to give supply to the Waitomo Power Board. Surveys are in hand for a 50,000-volt line connecting Waikino and Bombay, across the Hauraki Plains, and also for the additional main 110,000-volt lines between Arapuni and Auckland.

A portion of the main substation at Penrose to give supply to the Auckland Power Board has been built, and the plant necessary to give temporary supply from Horahora has been installed. Plant is also on order to give supply to the Franklin Power Board.

#### FUTURE DEVELOPMENTS.

For the current year the main works under construction will comprise—

*Lake Coleridge.*—Further work on duplication, tunnel, intake, power-house, plant, &c., to bring capacity up to 27,000 kilowatts. Installation of new switch-gear at power-house and Addington Substation. Duplication of main transmission-line to Timaru; erection of main line from Timaru to Oamaru, and erection of substation at Oamaru.

*Horahora*.—Completion of new weir at intake ; erection of transmission-lines to Rotorua, to Hangatiki, and from Waikino to Katikati.

*Mangahao*.—Erection of second dam on Mangahao to give storage necessary to run station to full capacity. Extension of main transmission-lines to Napier and to Wanganui. Erection of substations at these points, and completion of substation at Ongaonga.

*Arapuni*.—Continuation of the contract work by Sir W. G. Armstrong, Whitworth, and Co. (Limited). It is anticipated that the river will be deviated from the base of the dam through the diversion tunnel towards the end of the year, and the placing of the bulk concrete commenced. A start will be made with the erection of main transmission-line to Auckland, and with extension to give supply to the Waitemata Power Board, and with substations to supply that Power Board and the Franklin Power Board.

*Waikaremoana*.—Plans and specifications for the first stage, 20,000 kilowatts, of the main development will be completed, and if satisfactory contracts for the sale of power are entered into a commencement will be made with the construction.

*Other Schemes*.—Survey and investigation work will be continued on other schemes, so that definite plans can be made available for further developments to fit into the general scheme whenever load requirements become such as to warrant additional stations being built.

The works now under construction and about to be started at an early date will require a capital expenditure of about £1,000,000 per annum for the next few years, but are such that we may reasonably expect to pay interest and operating-costs within a short period after completion. Meanwhile the investigation of additional sources of power, particularly in the South Island, will be continued, so that as soon as there is any indication that the present stations are likely to become fully loaded, or that any considerable power load is likely to develop in new districts, a scheme of development will be ready for construction.

In addition to carrying on investigation work on power schemes to meet the ordinary industrial and domestic development, it is proposed to put in hand more detailed surveys of some of the large power sources that exist on the western sounds of Otago and Southland. It is thought that if the potential value of these sources of power is made known in concise and accurate form, it may be the means of attracting special industries to the locality to take advantage of the very cheap power that can undoubtedly be developed in these localities.

#### POWER BOARDS, ETC.

Apart from the work done directly by the Department, the Power Boards throughout the country have carried out a considerable amount of work in distributing the power purchased in bulk from the Department. At the end of the financial year 39 Boards had been formed, covering an area of 62,520 square miles, or 61 per cent. of the total area of the Dominion. The total population in the area controlled by these Boards is 776,510, or 59 per cent. of the population of the Dominion ; the unimproved capital land value of the Power Board areas amounts to £231,485,074, or 70·3 per cent. of the total unimproved capital value of the Dominion.

#### GENERAL.

Apart from the business of generating and supplying power in bulk, the Department has a most important function in controlling and regulating the various electrical works carried out by Power Boards and other local authorities throughout New Zealand. As an indication of the growth of this side of the electrical development it may be mentioned that since 1921 the number of miles of electric lines has increased from 1,909 to 6,011, or an increase of 215 per cent. in four years. With such rapid growth we must be very careful to see that the construction and operation is uniformly safe and economical, and that the general consumer, in most cases unskilled in the intricate technical details of electrical supply, is protected in all ways. This section of the work is fast outgrowing the capacity of the present organization in the Department, and it is hoped during the year to reorganize it so as to enable this work to be carried out in a more comprehensive way.



As this section affects the interests not only of the Department and the ordinary consumer but also the interests of other State Departments, of the power-supply authorities, the insurance companies, and the electrical traders, we have under consideration the setting-up of an advisory Board containing representatives of these bodies to act with the Department in framing regulations and taking other steps to see that work is carried out in the most satisfactory way.

## RAILWAYS.

### RAILWAYS IMPROVEMENT AUTHORIZATION ACT, 1914.

The expenditure under the Railways Improvement Authorization Act, 1914, amounted to £253,874, for new stations and station-yards, goods-sheds, and terminal facilities at Auckland, Wellington, Christchurch, Addington, Lyttelton, Paeroa, and New Plymouth; duplication, Newmarket, New Lynn; grade easements, Penrose-Mercer; new line, Auckland-Westfield; new line in Hutt Valley; deviation, Pelichet Bay; signalling, interlocking, and safety appliances; electric lighting. The proportionate cost of raising the loan was £19,533.

### ADDITIONS TO OPEN LINES.

The expenditure out of the Public Works Fund amounted to £742,922, for the provision of additional rolling-stock, tarpaulins, Westinghouse brakes, steam-heating, workshop machinery, improvements and additions to station-buildings, extension of sidings, bridge-works, subways, cranes, weighbridges, additions to workshops: tablet, telegraph, and telephone facilities; additional dwellings; signals and interlocking; and purchase of land.

## WAIHOU AND OHINEMURI RIVERS IMPROVEMENTS.

Work on the upper and lower branches of the Waihou River was continued, while the destruction of willows on the Ohinemuri River and Hikutaia Creek was completed. No. 1 dredge was in operation on the Upper Waihou River, and No. 2 electric dredge is almost ready for service. A towing-barge has also been provided, and pontoons erected for the discharge pipe-lines. A considerable amount of survey work has been carried out, the principal being river traverse from Mangaiti to Te Aroha; survey of transmission-line from Ngahina to Netherton; and a contour survey of the lower Waihou area between Ngahina and Wharepoa.

## PUBLIC BUILDINGS.

At Auckland new workshops for Public Works Department were completed and occupied. A site was acquired for the erection of a fumigating-shed for the use of the Public Health and Agriculture Departments, and a suitable building has been erected thereon. A new printing-room was erected in the Departmental Buildings for use of the Draughting Branch of the Public Works Department. At the Law Court Buildings in High Street an automatic fire-alarm system was installed, and provision was made for electrically heating offices in the building. At Penrose a new store building was practically completed, as well as a residence for the storekeeper.

At Taumarunui additions to residences of the District Engineer and the Chief Clerk were completed.

At Napier additions to the Public Works Office were completed.

At Wellington additions were made to an existing building to provide further accommodation for the Land and Income Tax Department. A small building at the back of the main departmental buildings was removed, and a commencement made with a substantial addition to accommodate Government Departments, rendered necessary owing to the expansion of public business. A fire-alarm system was installed in the Government Printing Office. At the State Fire Insurance Building radiators were installed. An addition to the Public Works Department's garage was made.

At Nelson electric light was installed in the Provincial Buildings and the departmental building (formerly the Post-office.).

At Dunedin alterations at the old police-station were completed to accommodate Government Departments, and alterations and renovations were carried out at the old Post-office building for a similar purpose. At Alexandra a store building was erected. At Wingatui additional land was acquired and a new explosives-magazine was erected.

A large number of fittings and furnishings required for various departmental offices were made in the Wellington Workshops, while the ordinary maintenance and upkeep of Government buildings generally engaged the attention of a considerable staff throughout the year.

#### COURTHOUSES.

A new Courthouse was erected at Matamata, while extensive additions were completed at Wanganui and Palmerston North. Electric light was installed at Wanganui and Nelson, and renovations and repairs undertaken at Cambridge, Coromandel, Mercer, Otorohanga, Paeroa, Taupo, Ōpotiki, New Plymouth, Waitara, Stratford, Eltham, Hawera, Opunake, Manaia, Waverley, Ohakune, Marton, Patea, Hunterville, Raetihi, Dannevirke, Woodville, Takaka, Greymouth, Westport, Timaru, Fairlie, Temuka, Kaiapoi, Cromwell, Naseby, and Oamaru.

#### PRISON WORKS.

The varied programme of constructional and other works is being continued with satisfactory results by the use of the available prison labour.

The metal-crushing plant at the Auckland Prison has been kept working at its full capacity to satisfy the requirements of the Public Works Department and local bodies. An additional cottage has been erected by prison labour on the Prison Reserve near Mount Eden, and is now in occupation. There are altogether fifteen cottages at Mount Eden which have been erected by prison labour, and it is proposed to erect two additional cottages during the current year. All the available land for departmental cottages will then be occupied.

Inmates of the Waikeria Reformatory have been fully occupied in improving the farm and roads in addition to the developing of an area of virgin land on the Tokanui Estate for the Mental Hospitals Department. At the Hautu Prison Camp, near Tokaanu, prisoners have been employed exclusively in breaking up and bringing into cultivation large tracts of Crown lands. It is proposed to push forward this work more vigorously in the future, and with that view a new camp is being established at Rangipo, close to the junction of the Waiouru and Waimarino-Tokaanu Roads. Sawn timber is being produced in large quantities at the Waikune Prison sawmill, near Erua. It is proposed to install, as early as possible, a planing-machine, which will enable the Department to supply dressed timber required by Government Departments. Prisoners from the Waikune Camp are employed in re-forming and metalling the main arterial road between Raurimu and Ohakune. The Waimarino-Tokaanu Road is also being maintained by prison labour from the Waikune Camp. The construction of the new prison near Mount Crawford, Wellington, is proceeding, and it is proposed to erect during the current year two suitable cottages for married officers who are to be employed there. The brickmaking plant at the Wi Tako Prison, Trentham, has been further improved, and two portable brick-presses manufactured. The erection of an administration block at the Paparua Prison is proceeding satisfactorily. General improvements to the Borstal Institution farm, Invercargill, have been carried out. The low-lying portions of the farm area are being raised by depositing mud and silt taken from the Waihopai River by means of a suction-dredge. The new rifle range on the reclaimed area at Otatara has been completed.

#### POLICE-STATIONS.

There was considerable activity in the erection of police buildings during the last financial year, new buildings being erected at the following places: Rawene, Mercer, Rahotu, Foxton, Port Nelson, Leeston, and St. Albans; new lock-ups were erected at Kerepechi and Henderson.

The general maintenance of police-stations had been suspended in some degree during the war period and for some time thereafter, so that a considerable leeway faced the Department so far as ordinary maintenance of police-stations was concerned. A substantial effort was made during last year to have these arrears of work attended to, and a considerable programme was carried out, including the following places: Russell, Cambridge, Eilerslie, Frankton, Hamilton, Huntly, Kihikihi, Morrinsville, Ngaruawahia, Otorohanga, Paeroa, Te Aroha, Te Awamutu, Waihi, Warkworth, Whitianga, Taneatua, Tauranga, Opotiki, Katikati, Ruatorea, Tolaga Bay, Motu, Rangaroa, Stratford, Normanby, New Plymouth, Waitara, Fitzroy, Eltham, Hawera, Kaponga, Aramoho, Hunterville, Marton, Taihape, Ohakune, Raetihi, Patea, Moawhango, Wanganui, Napier (Carlyle Street), Woodville, Porangahau, Palmerston North, Nelson, Motueka, Richmond, Takaka, Oxford, St. Andrews, Coalgate, Geraldine, Ashburton, Rakaia, Fairlie, Methven, Belfast, Christchurch, Lyttelton, Caversham, Cromwell, Duntroon, Kurow, Lawrence, Milton, Mosgiel, Palmerston, Pembroke, Portobello, Ranfurly, Roxburgh, South Dunedin, and Waitahuna.

#### POST AND TELEGRAPH BUILDINGS.

The rapid expansion of the Department's business continually demands the provision of increased or improved accommodation for the conduct of such business. The maintenance of a progressive building policy is therefore necessary. The requirements are many and varied, but each case is dealt with strictly in its order of urgency.

As an indication of the rapid growth of the Department's business I quote the case of Ngatea, situated on the Hauraki Plains, most of which was a swamp some years ago. In 1912, when a post-office was first established at Ngatea, the business was conducted in a small building situated on the property of one of the settlers, who acted as Postmaster. In 1919 a permanent Postmaster was appointed, and in 1922 a small departmental building, costing £325, was erected. The increase in the volume of business was so marked that within a comparatively short period the accommodation provided was found to be inadequate, and during the latter part of 1924 the erection was commenced of an up-to-date country post-office building, with accommodation for a telephone exchange and residential quarters for the Postmaster, together with storage and garage accommodation, at a cost of £2,750.

During the year arrangements were made for the erection of post-office buildings at each of the following places: Flat Creek, Hyde, Middlemarch, Motueka, Mokauti, Motu, Ngatea, Ohingaiti, Orari, Pokeno, Pongaroa, Puke-miro, St. Andrews, St. Heliers, Silverdale, Springburn, Tarras, Te Uku, Waikino, Wellington (automatic-telephone exchange).

A building which is destined to become the central telephone exchange has been erected in Wellington. In addition to accommodating the switching-apparatus required for the ultimate conversion to automatic working of the whole of the public telephone service in Wellington, offices are provided in the new building for the District Telegraph Engineer and his staff, who are responsible for the city's telephone service.

Additions were made to the post-office buildings at Christchurch, Horopito, Kaikohe, and Te Aroha. At Whakatane additional accommodation for the post-office was obtained by taking that portion of the post-office building previously in occupation by the Postmaster as residential quarters.

Additions were made to the railway-station buildings at Kohuratahi and Tahora to provide accommodation for the post-office.

At Greymouth and Napier combined workshop and garage buildings were erected during the year. Garages were provided at Cambridge and Gore. At Sheffield arrangements were made to lease a building and to adapt it for use as a post-office.

The Department's business at Albury, which had previously been conducted at the railway-station, was during the year transferred to a building the property of the Department, and which had been secured some years previously in anticipation of requirements.

At Ashburton the Department secured the freehold of a property previously leased for the purposes of a garage and store.

The hope expressed in last year's report regarding an addition to the chief post-office building at Gisborne is being consummated. The work is in progress.

Plans are now in course of preparation for buildings at the following places: Marton, Napier, and Taumarunui, and for additions to existing buildings at Palmerston North, Hastings, and Wanganui.

In connection with street-improvement work in the City of Auckland, the Government recently entered into an arrangement with the Auckland City Council for the exchange of certain real estate. The transaction will result in the transfer of the Auckland East Post-office building and site in Shortland Street to the Auckland City Council. The building which is to be demolished is a very old structure, and until 1912 it housed the Chief Post-office at Auckland. If the post and telephone office at present conducted in the building is to be continued, new accommodation will require to be found for the office. The manual-telephone exchange previously in use at Auckland has been replaced by an automatic-telephone exchange, which is housed in a building erected in Wellesley Street.

Portion of the Shortland Street building has been used as a store for telegraph and telephone material and for a workshop. It was necessary, therefore, to secure other accommodation for these purposes. This is being provided by means of an addition to the workshop and garage building in Stanley Street.

In places at which the Post and Telegraph Department has in commission petrol-driven vehicles, and where the circumstances warrant it, suitable arrangements require to be made for the storage and delivery of motor-spirit. The former is provided by means of steel tanks suitably placed underground, and the latter is made by means of a pump. The capacity of the tanks varies from 200 to 1,000 gallons; the pumps are of two types, the measuring type and the non-measuring type.

In addition to the foregoing, renovations and repairs were carried out at nearly one hundred post-offices.

#### CUSTOMHOUSES.

The cellar-floor of the Customhouse at Nelson was relaid in Neufchatel asphalt with concrete top, to prevent water percolating through.

#### MENTAL HOSPITALS DEPARTMENT.

At Auckland electric light has been installed in the institution, and also in the Medical Superintendent's and clerk's residences. The hot-water system in the main building has been remodelled. Extensive repairs and renovations have been carried out, fire appliances inspected, and defective hose renewed. Alterations and renovations have been carried out at the Wolfe Home, and additional ventilation provided.

At Tokanui the administration and store block was completed, and the female admission block is nearing completion. A workshop building was converted into a dormitory, and electric lighting installed in all staff cottages and farm buildings. The necessary machinery was installed in the laundry. A water-supply has been provided from the Te Awamutu Council's main.

At Porirua new day-rooms were provided, and a three-story concrete building with verandas and sun-rooms for the use of the patients. Two villas for female patients are nearly ready for occupation, and steady progress is being made relative to three similar buildings for men patients. Suitable quarters for workmen, including a reading-room and bathrooms and lavatories, have been provided, and a new kitchen and dining-room constructed.

At Hokitika the No. 1 unit, being part of a new scheme proposed, was completed. A residence for the Medical Superintendent, and also cottage for night nurses, were erected. The attendants' quarters were renovated, and the construction of a villa to accommodate a considerable number of patients was put in hand. All buildings have been connected with the new drainage system, and electric lighting installed.

At Nelson Mental Hospital a new store was erected, and a veranda provided at the male portion of the main section. Toitoti Ward was renovated, and alterations and improved lavatory accommodation works put in hand at El Nido Ward.

At Stoke a contract for erection of new closed villa was entered into, and the work is in hand. A survey has been made relative to the general water and drainage scheme proposed.

At Sunnyside Mental Hospital a new building in brick for single male attendants was provided.

At Seacliff the erection of a new bathroom and boiler-house was completed. The erection of single rooms and dining-rooms, with additional sanitary conveniences, is in hand. The erection of new fencing in the female park is in hand. A new workshop for upholsterer and bootmaker was provided.

#### BUILDINGS FOR DEPARTMENT OF AGRICULTURE.

Offices were erected at Owaka and Otautau. Additional buildings were provided at the Ruakura Experimental Station, while necessary farm buildings were provided at Waimaunga Experimental Station. Farm buildings and necessary fencing were provided at the Galloway Experimental Station.

#### HOSPITALS AND OTHER INSTITUTIONS.

At Auckland St. Helens Hospital the old isolation block was renovated, and at Motuihi Quarantine Station necessary maintenance works were carried out. At Hanmer a residence for the Medical Superintendent was provided, and commencement made with the erection of a Women's Hospital. At St. Helens Hospital, Christchurch, an isolation block was provided and new runways erected.

#### EDUCATIONAL.

Considerable progress both in the way of the erection of new primary schools and in additions to existing primary schools was made during the year in overcoming the shortage in accommodation caused by restricted operations before and during the war. A very substantial amount of remodelling has also been done in connection with existing schools where the class-room accommodation is unsuitable in character either from the educational or the hygienic point of view, and the alterations have met with the greatest satisfaction. This has been effected at a small percentage of the cost of entirely new buildings. The policy of rebuilding one per annum of the oldest and least satisfactory schools in the larger centres is being continued. Accordingly, new buildings are being erected at Napier Street, Auckland; Mount Cook, Wellington; Richmond Road and Christchurch West, in Christchurch; Caversham, in Dunedin; and Invercargill South, in Invercargill. In other centres also similar works of less magnitude are being undertaken. New training-colleges are in course of erection in Auckland and Christchurch.

The Government has adopted a policy of erecting secondary-school buildings by the Public Works Department. Under this policy new secondary and technical high-school buildings are in hand in Whangarei, Hastings, and Lower Hutt, while that at Invercargill is nearing completion. Under the same system additions to high schools are in hand or have been completed during the year at Thames, Gisborne, Palmerston North, and Timaru; while in other centres substantial maintenance works have been carried out. Other secondary-school buildings in course of construction or being added to are the Napier Boys' High School, Feilding Technical High School Hostel, Masterton High School Hostel, Wellington East Girls' College, Wellington Boys' College Hostel, Christchurch Boys' High School, Waitaki Boys' High School, and Waitaki Girls' High School.

Extensive building operations in connection with Universities are being undertaken at Auckland (new Arts Building) and at Dunedin (new Medical and Dental Buildings).

#### LIGHTHOUSES.

The policy of converting a number of watched lights to automatic operation has been steadily pursued during the year, Tiritiri and Anglem Point having been completed, and the apparatus for the new automatic incandescent installation, which is to be erected at Cape Foulwind, having been received. The direction-finding experiments in connection with the proposed fog-signal at the Three Kings have been brought to finality, and have served to definitely establish the superiority

of the direction-finder for this locality, arrangements being now in hand to procure the necessary equipment for the establishment of a station at Cape Maria Van Diemen. New lenses have been fitted to the lighthouse at East Cape, and the material for the new automatic light at Matakaoa Point is all ready for erection.

At the Chatham Islands a small electrically lit beacon has been established for the aid of the comparatively limited shipping visiting Waitangi.

A new departure has been made in facilitating communication between some of the isolated lighthouses, and civilization, by means of wireless installations, the first of these at Puysegur Point being now in process of erection. It is anticipated that this policy will increase the amenities of life for lightkeepers on some of the out-of-the-way stations, and in some cases eliminate the difficulties and expense involved in the upkeep of telephone lines or cables in difficult situations.

A number of minor works and improvements have been carried out at the various lights, including a new crane at Cape Brett, water-supply at Cape Palliser, &c.

#### HARBOUR-WORKS.

Various important proposals were put before the Department by various Harbour Boards during the course of the year, and in several cases, Napier and Gisborne in particular, extensive investigations and reports were made.

Maintenance works were carried out at the Westport Harbour, and quite a number of minor works carried out at the smaller ports controlled by the Government.

A wharf and shed were erected on the Wairoa River, whilst snagging operations were carried out at the same place. The sandbar was removed, and the Waikato Stream was improved between the Awaroa Landing and the Waikato River. In the Mokau River the snagging operations which have been in hand for some time were continued.

#### TOURIST AND HEALTH RESORTS.

The principal works carried out during the year were the replacement at Rotorua of wooden with cast-iron water-mains: this work has now been completed. Electric light was installed at the Mount Cook Hermitage, and at the Lake House, Waikaremoana. Work was carried out at the ladies' swimming-bath at Helensville, tracks at Mount Egmont were widened, a new tennis-pavilion was erected at Rotorua, and additions to buildings at Waitomo and Te Anau were made.

Provision is being made this year for the continuation of the work in connection with the additions to the Waitomo Hostel, Lake House, Te Anau Hotel, the huts on Milford Track, and improvements to the tourist resorts generally.

#### TELEGRAPH EXTENSION.

Since the period of depression following the Great War the expansion of the telephone and telegraph systems in New Zealand has been unprecedented, and year by year a greater amount of capital has been required to finance the development of these services. For the year ended 31st March, 1925, the capital expended in extending the telephone and telegraph systems amounted to £957,294. Although there is already one telephone for every thirteen persons in New Zealand, the potential demand for telephone service is still very great, and every expansion of the service gives rise to still further extensions. Twenty-one new exchanges were opened during the year, and to these and other exchanges throughout the Dominion over twelve thousand new connections were made; this being the greatest number of new stations connected during any year since the inception of the telephone-exchange system in New Zealand. In addition to this, the past year's operations included—

The conversion of 7,894 lines of the Auckland exchange system (comprising Wellesley Street, Ponsonby, Mount Eden, Remuera, and Onehunga exchanges) permanently to automatic working:

The prosecution of new automatic installations at Wellington Central, Dunedin, Devonport, and Takapuna; and the extension of the automatic equipment at several other exchanges:

- The extension of the manual switchboard accommodation and the reconstruction of the outside aerial plant at a number of exchanges :
- The installation of underground and aerial cables at many of the smaller exchanges, and the extension of existing cable systems at other places :
- The replacement of the primary telegraph batteries at Wellington by the installation of the more economical universal-battery system :
- The conversion to metallic circuit of many earthworking lines necessitated by the extension of the high-tension circuits of power-lines :
- The reconstruction of many trunk and branch lines throughout the Dominion, and the erection of additional telephone toll circuits between the following places :—

|                            |                        |
|----------------------------|------------------------|
| Ashburton—Ashburton Forks. | Napier—Wairoa.         |
| Ashburton—Springburn.      | Nelson—Richmond.       |
| Auckland—Howick.           | Nightcaps—Birchwood.   |
| Auckland—Waimauku.         | Oamaru—Waitaki.        |
| Auckland—Warkworth.        | Otautau—Riverton.      |
| Dunback—Islay Downs.       | Rangiwahia—Mangaweka.  |
| Glen Murray—Rangiriri.     | Rewhiti—Kumeu.         |
| Havelock—Canvastown.       | Thames—Hauraki Plains. |
| Invercargill—Thornbury.    | Whakatane—Opotiki.     |
| Lawrence—Roxburgh.         |                        |

An important extension of the telephone toll system shortly to be undertaken is the laying of a submarine telephone cable across Cook Strait for the purpose of providing greater facilities for telephone communication between the North and South Islands. The cable, which will be 50 nautical miles in length, is being obtained from the United Kingdom, and should reach New Zealand towards the end of 1925. Arrangements have been made for the N.Z.G.S. "Tutanekai" to be fitted temporarily as a cable-ship, and, if no unforeseen circumstances arise, the new cable should be available for traffic before the 31st March, 1926.

Tenders have recently been accepted for new automatic-telephone installations at Hawera, Stratford, and Dannevirke, and installation work will commence at these places as soon as sufficient supplies of equipment are delivered.

### WORKS FOR DEFENCE DEPARTMENT.

During the past year a commencement was made with the construction of the necessary buildings at the recently acquired Waikato camp, Ngaruawahia. This camp will provide a mobilization base and training-camp for the Northern Command, and on completion of the Ordnance Stores will enable the Ordnance Depot at Auckland and the whole of Featherston Camp to be closed down. A railway-loop siding has been constructed, with a private siding within the camp giving access to the most important stores and other buildings. Several magazines have been constructed or are under construction. Married quarters and single-men's quarters are in course of erection, and a water-supply for camp purposes has been practically completed. A cookhouse for the training-camp has been erected.

At Trentham and Burnham Camps important improvements have been effected, and small-arms ammunition magazines are under construction in both camps.

Elsewhere, various additions and improvements have been made to existing drill-halls, and new halls are being erected.

In the current year's estimates provision is made for continuing the works in progress at Waikato Camp, Ngaruawahia, and for the construction of several urgently necessary drill-halls at various centres throughout the Dominion.

In the existing camps, attention is being paid to improvements to the men's messing accommodation, married quarters, and other necessary structures.

### MECHANICAL APPARATUS.

Numerous requisitions have been received during the year for constructional plant, but from information obtained by keeping a close check upon the actual

service of separate units of plant in each district, the requirements in many cases have been met by transfer.

However, in maintaining a standard of efficiency on construction works it is necessary to occasionally make replacements, while with the growth of departmental activities it is also desirable that new and up-to-date equipment and labour-aiding machines be purchased to advance with and to keep abreast of the times.

Constructional plant purchased during the year was of a varied nature, and included the following items: Eighteen motor-trucks, seven light locomotives, fourteen pumps, eight engines, three crushers, seven electric motors, two excavators, three oil-winches, three concrete-mixers, two welding-plants, two ballast-ploughs, two motor-velocipedes, thirteen machine tools, fifteen special items of plant for main highways, together with seven special testing-machines. It was also necessary to obtain forty-two railway-wagons to cope with the additional traffic on the lines run by the Department.

Mention was made last year of the need for a numerical increase in the mechanical staff, and the necessary appointments have since been made.

### SUMMARY.

To summarize shortly the operations of the Department since I assumed control, I would point out that in the past six years £6,357,301 has been expended on railway-construction, and during that period 291 miles of railway have been brought under traffic, of which 100 miles have been handed over to the Railway Department for working, while 191 miles are being operated by the Public Works Department for the carriage of goods and passengers. The cost of sections handed over to the Railway Department was £4,836,420, a large part of which was expended prior to my assuming control of the Department.

On 4,750 miles of road, including main highways, £3,724,500 have been expended, and during the period covered by such expenditure considerable improvements in road-construction have been introduced. Bitumen penetration and sealing have been experimented with and adopted in places where such protection to road-surfaces was considered desirable and proved to be economical.

Under the heading of "Hydro-electricity" 51,000 horse-power has been developed and transmitted to centres where demands exist, at a cost of £2,195,656, an average cost of £45 per horse-power.

An area of 19,897 acres of ground has been irrigated, which involved the spending of £460,492, a considerable portion of which will provide for further areas on which water is available, but which have not yet been brought into productivity.

The expenditure out of the Public Works Fund in connection with telegraph extension for the past six years has been £3,353,106, distributed annually as follows: 1919-20, £249,379; 1920-21, £336,468; 1921-22, £590,981; 1922-23, £501,575; 1923-24, £717,409; 1924-25, £957,294.

A great deal of mechanical plant for the aiding of labour and the carrying-out of heavy construction has been brought into use, the principal items of which are: Thirty steam-shovels; five drag-line excavators; forty-seven locomotives—steam, petrol, and electric; eighty motor-lorries; sixteen tractors; twenty concrete-mixers; twenty-two power-driven winches; thirteen air-compressors; nineteen stone-crushers; thirteen road-rollers; bitumen boilers and sprayers, and a large array of machine tools, steam boilers, motors, cranes, and the other minor machines necessary for the successful operations of the larger units.

The care of the workers on the line has had the special attention of the officers of the Department, and wherever practicable, and where works were likely to last any considerable time, huts have been provided, at a total cost of £107,131, with which sum 2,287 single men's huts were built, and in addition 343 cottages for married men.

These are the leading features of the operations of the Department, but the other activities have been carried on with equal efficiency, and at such a rate as appeared to be required by the individual necessities of the case.

The object towards which the policy of the Department is directed, is the providing of transport means adequate to the demand, whereby the primary producer,



and, to a lesser extent, the secondary industries, may be brought into convenient and economical communication with other markets, whether the same be overseas or local. Where the produce to be carried is heavy, or the distances are long, the railway still remains the cheapest method, and with the funds available, under a reasonable development scheme, steady progress will be made, and all the disconnected links of the national system will be eventually connected, as well as in some cases pushing existing lines out into country at present unprovided with adequate transport.

With roads my sympathies have always primarily been with the settlers in the backblocks, and while it is necessary in the march of modern progress to provide money whereby modern mechanical transport can be encouraged to operate over gradually increasing lengths, the primary object of ordinary public-works road expenditure must be directed to the providing for opening up access into new country, or providing better access to those settlers who in the past have bravely advanced into the wilderness and proceeded to carve out a home for themselves in advance of the roading facilities which were available in the older settled districts.

The institution of the Main Highways Board, and the declaration of some six thousand miles of main highways, together with their own finance, largely provided directly by the owners of mechanical transport, should make adequate provision for the communications which are required, as it were, between the pioneer backblocks road and the railway or the port.

The highways scheme is more or less in its infancy, but it has, even during the portion of the year in which it has been actively operating, done a very considerable amount of work, and as its finances improve as the result of the steady increase in the numbers of vehicles and the extent of their travel, so the facilities which can be derived will increase at an even greater rate.

With regard to the hydro-electric development, my policy is well known. It is to make such arrangements as will result in an adequate supply of reasonably priced electricity being available for every person in the Dominion to whom it can be provided with an expectation of a satisfactory financial return.

I hope as time goes on to have every public Department housed in buildings which will permit of departmental officers carrying out their duties with efficiency and comfort, and which will be a credit to the General Government and to the country. At the same time the question of permanency and reasonable future expansion will not be lost sight of.

With regard to irrigation operations, so far these have been confined to the Province of Otago almost entirely, and I hope to expand the area under irrigation, and concurrently under intensive culture, as fast as the demand for land by new settlers requires, so that eventually every area of land which possesses the necessary elements of fertility, and to which water can be provided, may be brought into the maximum possible state of development. When the areas of Otago are fully developed, and quite likely before that, I am of opinion that the wonderful results thereby obtained will cause the farmers of many of the dry parts of Canterbury, and even Marlborough, to move for the provision of irrigation systems in their districts, and when that time comes it will be the policy of the Government to meet the demand.

Generally speaking, while avoiding anything in the nature of a boom by means of borrowed money, I hope to continue to spend capital on works which have a reasonable prospect of financial soundness, and which will improve the general productiveness of the country and the comfort and contentment of its people.

As appendices to this Statement, honourable members will find full details of the principal works carried out by the Department in the reports of the Engineer-in-Chief, Government Architect, Chief Electrical Engineer, and Main Highways Board, respectively.

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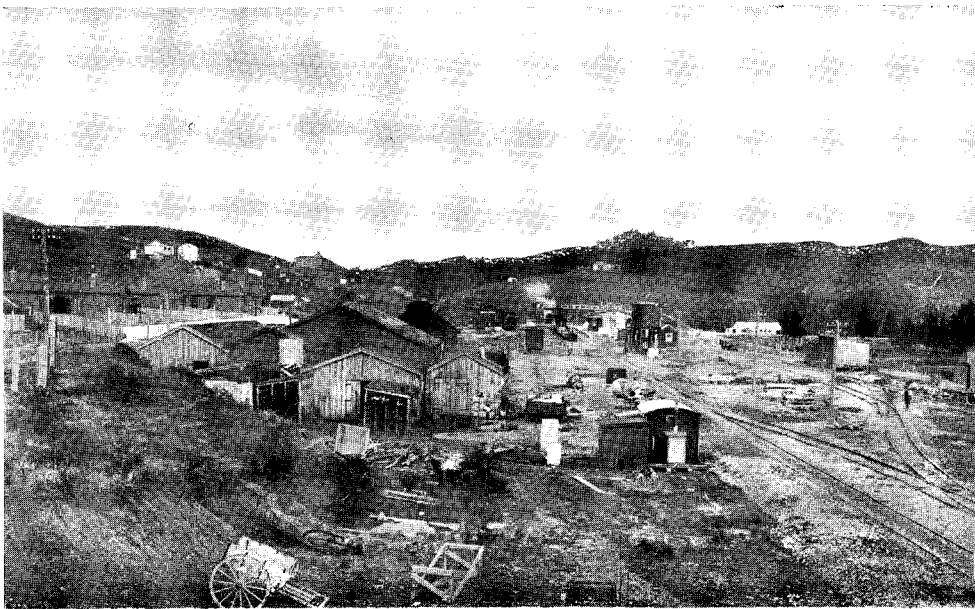
SCHEDULE SHOWING PARTICULARS OF RAILWAY-LINES UNDER CONSTRUCTION AT 1ST APRIL, 1925.

| Railway.                                           | Length of Section. |     | Length under Construction. |     | Handed over to Railway Department during Year ended 31st March, 1925. |     | Rails laid during Year. |     | Length over which Traffic is being run. |     | Length ready for handing over to Railway Department. |     | Ready for handing over to Railway Department within One Year. |     | Ready for handing over to Railway Department within Two Years. |     | Amount spent to Date. |            | Estimated Amount to Complete. |            |
|----------------------------------------------------|--------------------|-----|----------------------------|-----|-----------------------------------------------------------------------|-----|-------------------------|-----|-----------------------------------------|-----|------------------------------------------------------|-----|---------------------------------------------------------------|-----|----------------------------------------------------------------|-----|-----------------------|------------|-------------------------------|------------|
|                                                    | M.                 | CH. | M.                         | CH. | M.                                                                    | CH. | M.                      | CH. | M.                                      | CH. | M.                                                   | CH. | M.                                                            | CH. | M.                                                             | CH. | £                     | £          | £                             | £          |
| North Auckland Main Trunk and Branches—            |                    |     |                            |     |                                                                       |     |                         |     |                                         |     |                                                      |     |                                                               |     |                                                                |     |                       |            |                               |            |
| Whangarei Branch .. .. .                           | 14                 | 52  | 14                         | 52  | ..                                                                    | ..  | ..                      | ..  | 14                                      | 52  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 345,264               | 15,700     | 472,500                       | 15,700     |
| Okaihau—Te Tio .. .. .                             | 21                 | 0   | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 26,106                | 49,000     | 49,000                        | 49,000     |
| Huarau-Waiotira .. .. .                            | 15                 | 70  | 15                         | 70  | ..                                                                    | ..  | ..                      | ..  | 15                                      | 70  | ..                                                   | ..  | 15                                                            | 70  | ..                                                             | ..  | 856,734               | 221,000    | 221,000                       | 221,000    |
| Waiotira-Kirikopuni .. .. .                        | 14                 | 0   | 14                         | 0   | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | 14                                                             | 0   | 572,759               | 250,000    | 250,000                       | 250,000    |
| Kirikopuni-Dargaville .. .. .                      | 13                 | 40  | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Huntly-Awaroa .. .. .                              | 1                  | 60  | ..                         | ..  | 1                                                                     | 55  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Huntly—Westfield Deviation .. .. .                 | 9                  | 67  | 6                          | 0   | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 376                   | 450,000    | 450,000                       | 450,000    |
| Auckland—Westfield Deviation .. .. .               | ..                 | ..  | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| East Coast Main Trunk and Branches—                |                    |     |                            |     |                                                                       |     |                         |     |                                         |     |                                                      |     |                                                               |     |                                                                |     |                       |            |                               |            |
| Waikato—Tauranga .. .. .                           | 38                 | 25  | 38                         | 25  | ..                                                                    | ..  | 9                       | 60  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | 14                                                             | 0   | 331,397               | 505,000    | 505,000                       | 505,000    |
| Tauranga—Taneatua (including Mount Branch) .. .. . | 63                 | 12  | 63                         | 12  | ..                                                                    | ..  | 0                       | 40  | 61                                      | 32  | ..                                                   | ..  | ..                                                            | ..  | 63                                                             | 12  | 1,242,335             | 199,745    | 199,745                       | 199,745    |
| Taneatua—Opotiki .. .. .                           | 25                 | 0   | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Gisborne—Waioa .. .. .                             | 70                 | 0   | ..                         | ..  | 11                                                                    | 51  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 133,754               | 1,500,000  | 1,500,000                     | 1,500,000  |
| Waioa—Eskdale .. .. .                              | 58                 | 10  | 18                         | 0   | ..                                                                    | ..  | 3                       | 50  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 344,820               | 1,200,000  | 1,200,000                     | 1,200,000  |
| Waikopu Branch .. .. .                             | 24                 | 58  | 24                         | 58  | ..                                                                    | ..  | 0                       | 24  | 24                                      | 58  | ..                                                   | ..  | 24                                                            | 58  | ..                                                             | ..  | 484,638               | 61,000     | 61,000                        | 61,000     |
| Stratford—Main Trunk—                              |                    |     |                            |     |                                                                       |     |                         |     |                                         |     |                                                      |     |                                                               |     |                                                                |     |                       |            |                               |            |
| Kohuratahi—Tahora .. .. .                          | 5                  | 14  | 5                          | 14  | 5                                                                     | 14  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Tahora—Ohura .. .. .                               | 24                 | 0   | 3                          | 20  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 31,367                | 750,000    | 750,000                       | 750,000    |
| Ohura—Okahukura .. .. .                            | 19                 | 0   | 19                         | 0   | ..                                                                    | ..  | ..                      | ..  | 16                                      | 0   | ..                                                   | ..  | ..                                                            | ..  | 19                                                             | 0   | 511,373               | 198,756    | 198,756                       | 198,756    |
| Opunake Branch and Manaia Branch .. .. .           | 28                 | 49  | 28                         | 49  | ..                                                                    | ..  | 11                      | 40  | ..                                      | ..  | 7                                                    | 0   | 16                                                            | 0   | ..                                                             | ..  | 365,146               | 65,000     | 65,000                        | 65,000     |
| Rimutaka Deviation .. .. .                         | 13                 | 24  | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Wellington—Tawa Flat Deviation .. .. .             | 8                  | 0   | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Hutt Valley Railway .. .. .                        | ..                 | ..  | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 18,689                | 1,100,000  | 1,100,000                     | 1,100,000  |
| Midland—                                           |                    |     |                            |     |                                                                       |     |                         |     |                                         |     |                                                      |     |                                                               |     |                                                                |     |                       |            |                               |            |
| Glenhope—Inangahua .. .. .                         | 55                 | 0   | 5                          | 71  | ..                                                                    | ..  | 2                       | 40  | ..                                      | ..  | ..                                                   | ..  | 3                                                             | 71  | ..                                                             | ..  | 111,653               | 1,300,000  | 1,300,000                     | 1,300,000  |
| Otira—Arthur's Pass .. .. .                        | 8                  | 40  | ..                         | ..  | 8                                                                     | 14  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Westport—Inangahua .. .. .                         | 22                 | 0   | 4                          | 0   | ..                                                                    | ..  | 2                       | 0   | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 113,684               | 550,000    | 550,000                       | 550,000    |
| South Island Main Trunk—                           |                    |     |                            |     |                                                                       |     |                         |     |                                         |     |                                                      |     |                                                               |     |                                                                |     |                       |            |                               |            |
| Whararui—Parnassus .. .. .                         | 83                 | 0   | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | 17,492                | 2,000,000  | 2,000,000                     | 2,000,000  |
| Lawrence—Roxburgh .. .. .                          | 24                 | 0   | 15                         | 0   | ..                                                                    | ..  | 7                       | 22  | ..                                      | ..  | ..                                                   | ..  | 15                                                            | 0   | ..                                                             | ..  | 237,595               | 150,000    | 150,000                       | 150,000    |
| Beaumont—Roxburgh .. .. .                          | 8                  | 24  | 8                          | 24  | ..                                                                    | ..  | 1                       | 52  | ..                                      | ..  | 8                                                    | 24  | ..                                                            | ..  | ..                                                             | ..  | 100,749               | 8,025      | 8,025                         | 8,025      |
| Orepuki—Waiau .. .. .                              | ..                 | ..  | ..                         | ..  | ..                                                                    | ..  | ..                      | ..  | ..                                      | ..  | ..                                                   | ..  | ..                                                            | ..  | ..                                                             | ..  | ..                    | ..         | ..                            | ..         |
| Totals .. .. .                                     | ..                 | ..  | 283                        | 75  | 26                                                                    | 54  | 39                      | 8   | 132                                     | 52  | 58                                                   | 4   | 29                                                            | 76  | 75                                                             | 39  | 5,845,911             | 12,515,726 | 12,515,726                    | 12,515,726 |

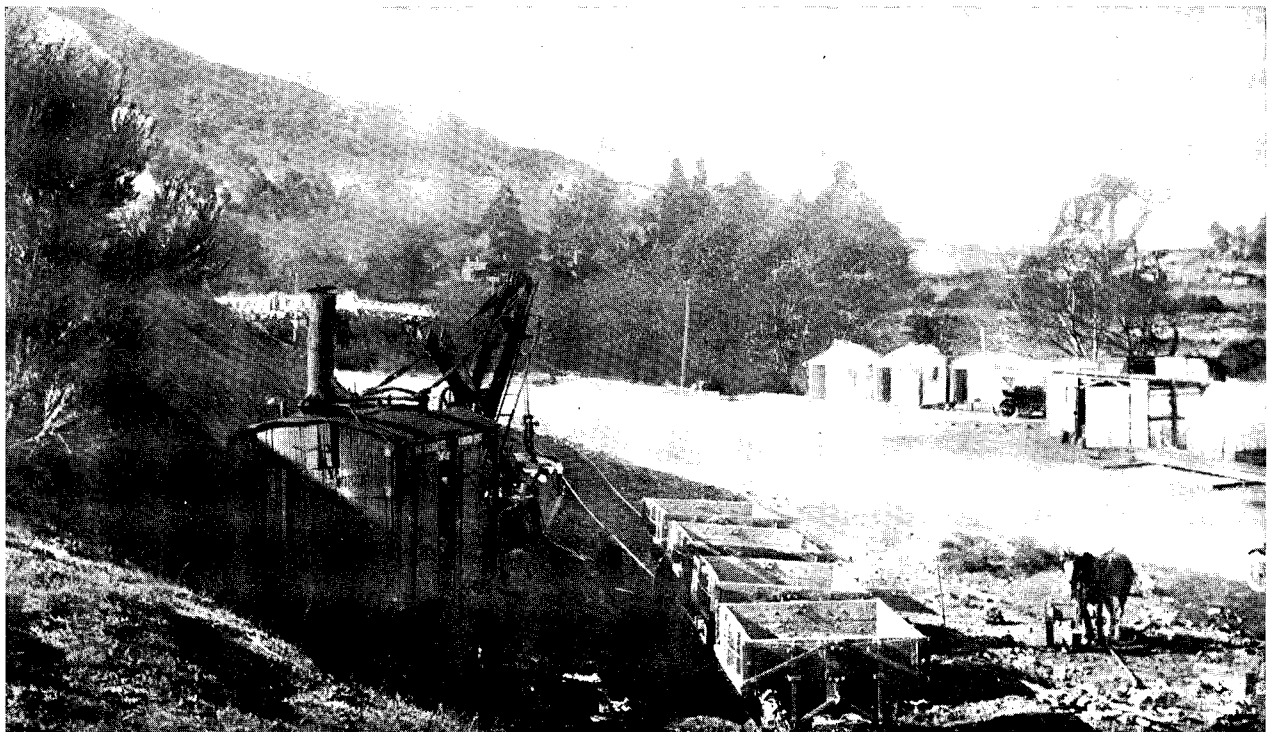
NOTE.—Estimates to complete include amounts required for maintenance and running traffic where traffic is being run.



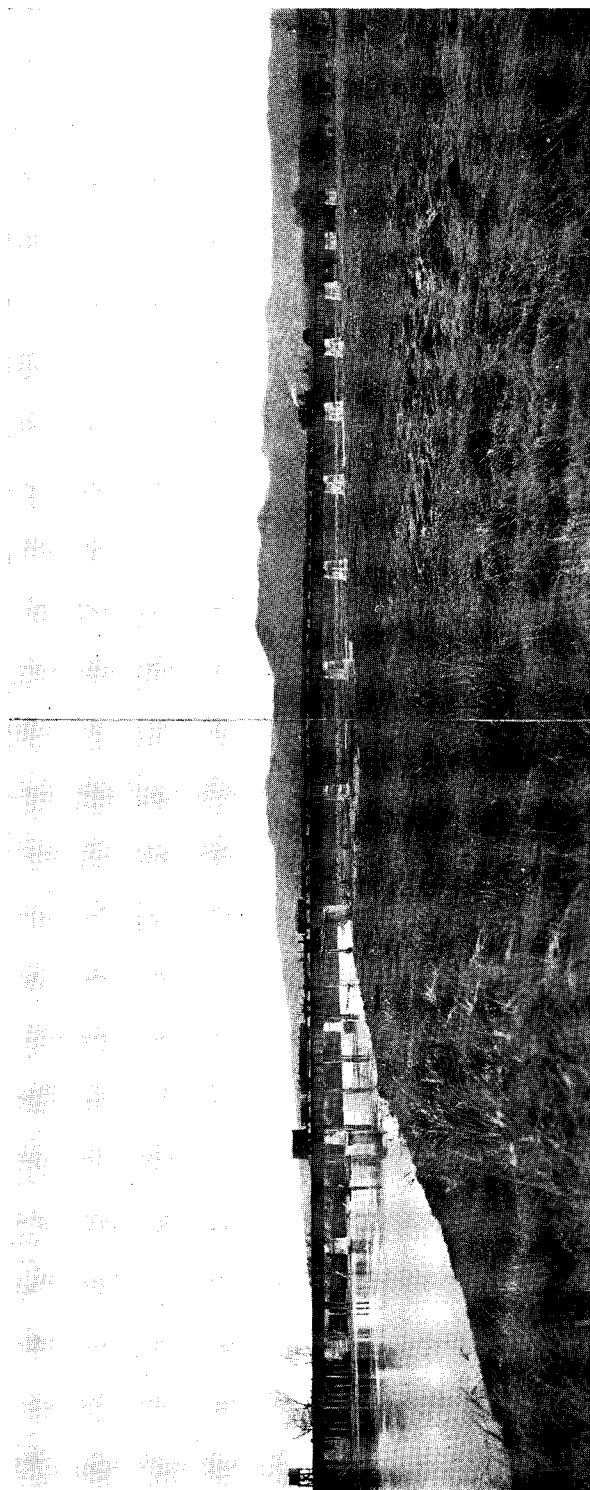
NORTH AUCKLAND MAIN TRUNK RAILWAY, KIRIKOPUNI SECTION.  
Steam-navvy at work.



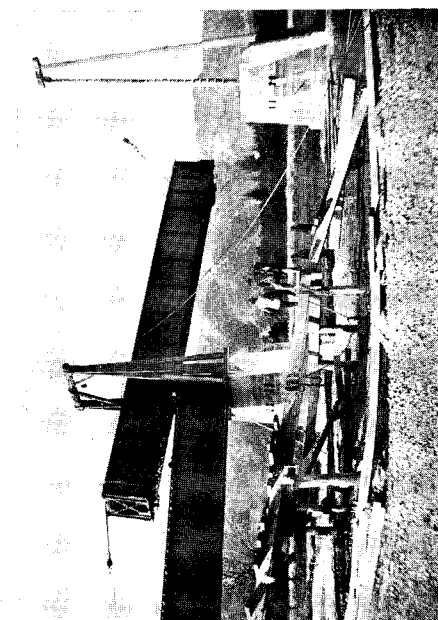
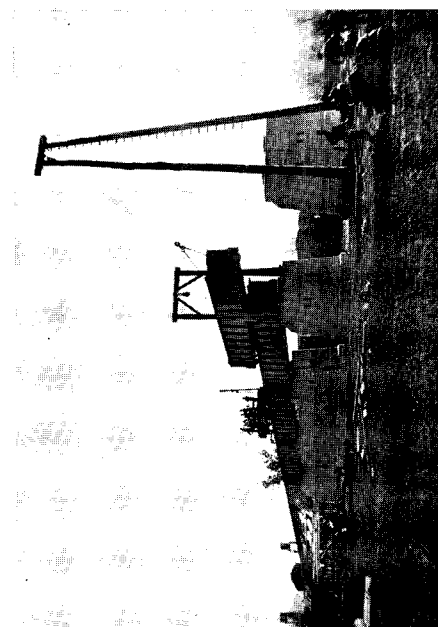
NORTH AUCKLAND MAIN TRUNK RAILWAY, WAIOTIRA SECTION.  
Waiotira Station-yard.



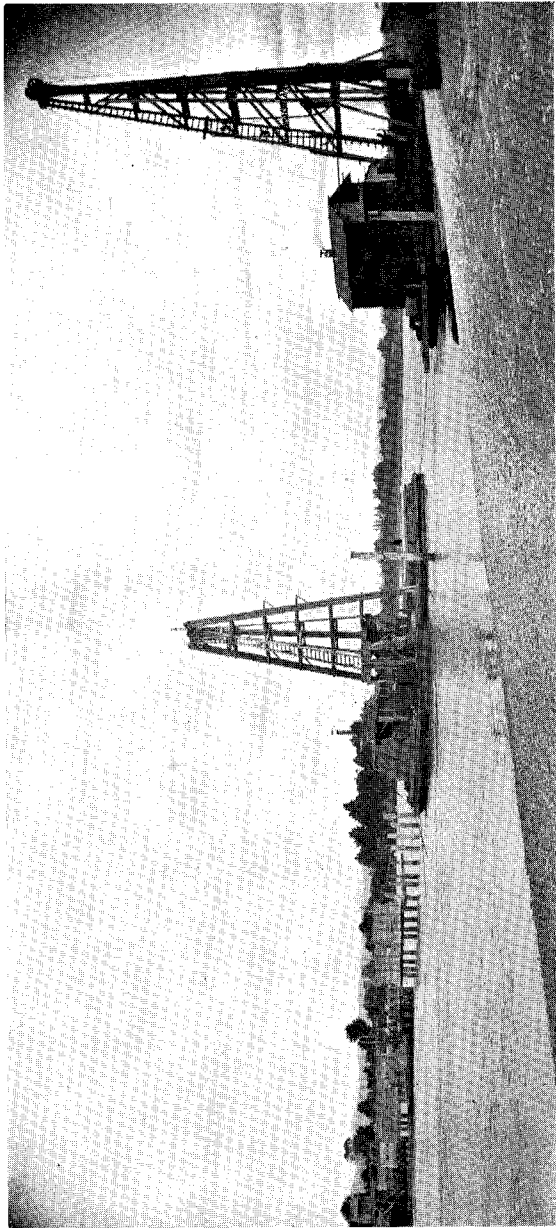
TAIERI RIVER PROTECTION WORKS.  
Steam-navvy in operation at Outram.



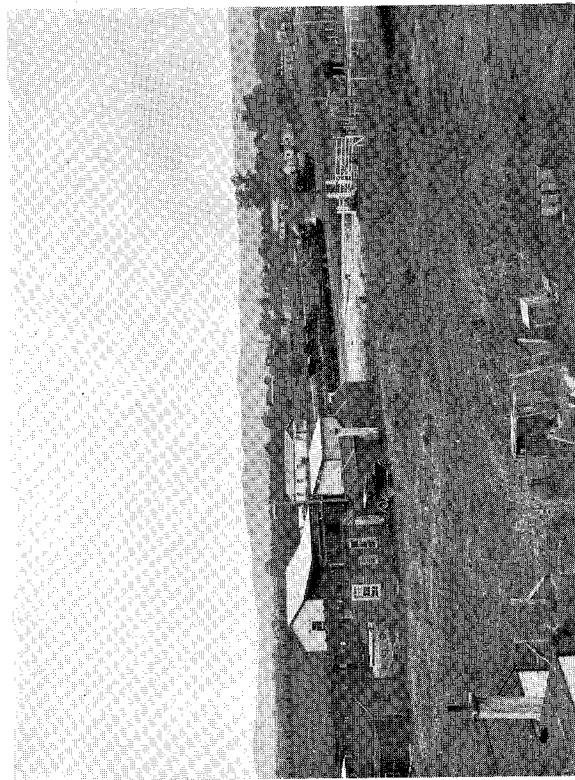
EAST COAST MAIN TRUNK RAILWAY, TANEATUA SECTION : WHAKATANE BRIDGE, AT 98 M. 40 CH.  
General Elevation of Bridge. (Bridge is 1,200 ft. long.)



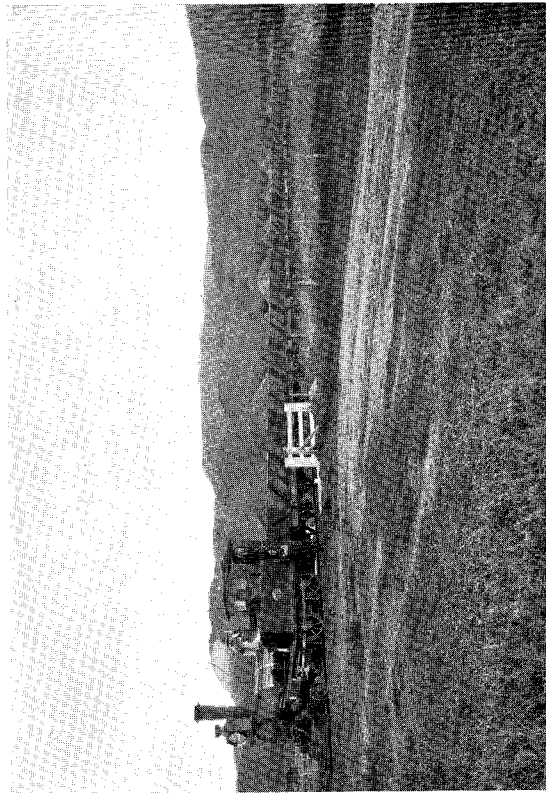
EAST COAST MAIN TRUNK RAILWAY, TANEATUA SECTION : WHAKATANE BRIDGE, AT 98 M. 40 CH.  
Views showing method of erecting Plate-girder Spans.



EAST COAST MAIN TRUNK RAILWAY, TAURANGA SECTION.  
Waikareao Bridge, at 39 m. 60 ch., under construction.



EAST COAST MAIN TRUNK RAILWAY, AWAKERI SECTION.  
Awakeri Station-yard, at 91 m. 11 ch.

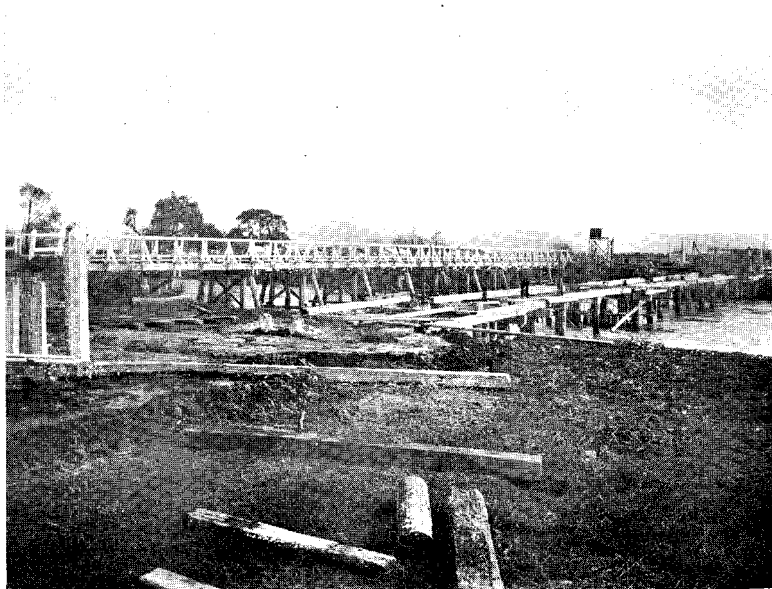


EAST COAST MAIN TRUNK RAILWAY, TAURANGA EASTWARDS.  
Typical Ballast-train.





EAST COAST MAIN TRUNK RAILWAY, AWAKERI SECTION.  
Matata Quarry, at 79 m. 30 ch.: Steam-navvies at work stripping and loading.

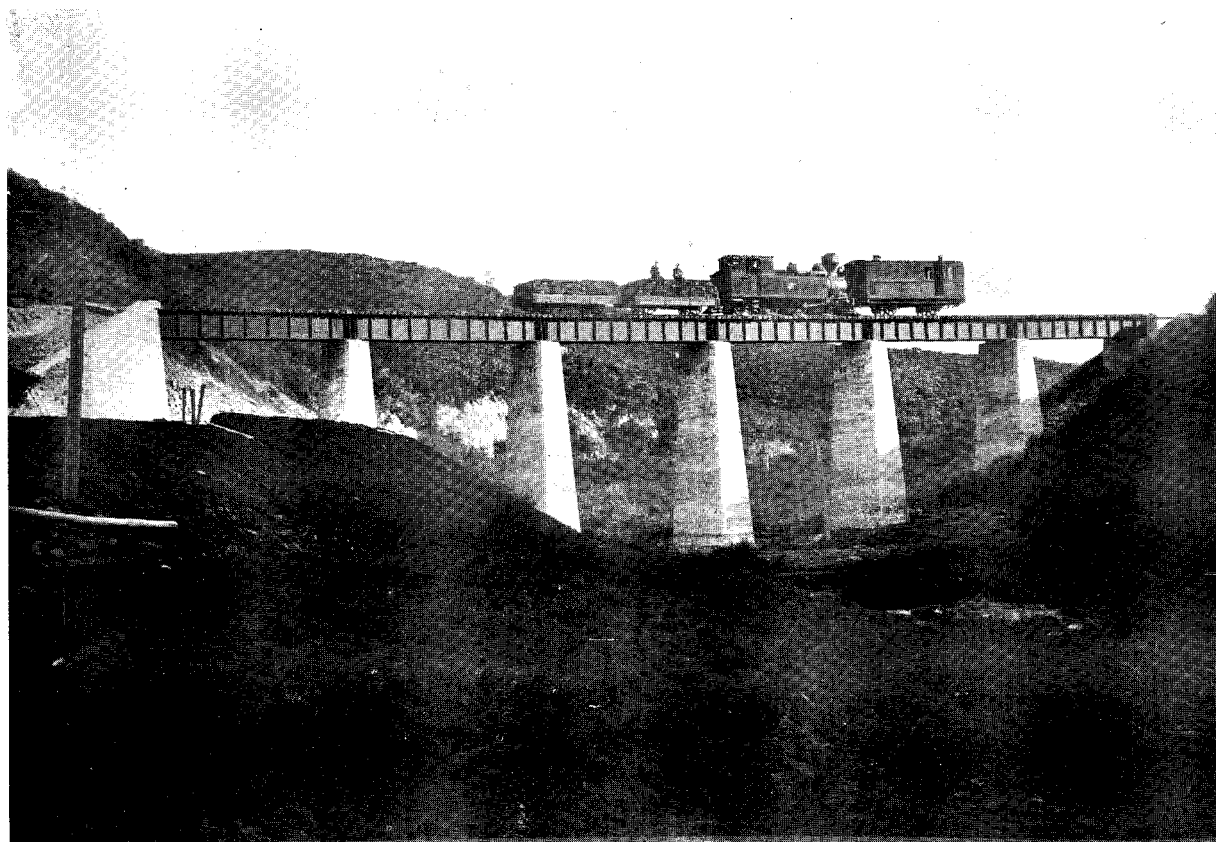


EAST COAST MAIN TRUNK RAILWAY, AWAKERI SECTION.  
Rangitaiki Bridge, at 87 m. 78 ch., under construction (temporary Road and Railway Bridge in background).



EAST COAST MAIN TRUNK RAILWAY, ATHENREE SECTION.

Bridge at 0 m. 3 ch., showing crossing of Waihi Company's Private Line (Waihi Station-yard in background).



EAST COAST MAIN TRUNK RAILWAY, ATHENREE SECTION.

Bridge at 6 m. 60 ch.

D.—1.



EAST COAST MAIN TRUNK RAILWAY, ATHENREE SECTION.  
Bridge at 7 m. 69 ch.



EAST COAST MAIN TRUNK RAILWAY, ATHENREE SECTION.  
Bridge at 70 m. 23 ch. (Quarry in background.)





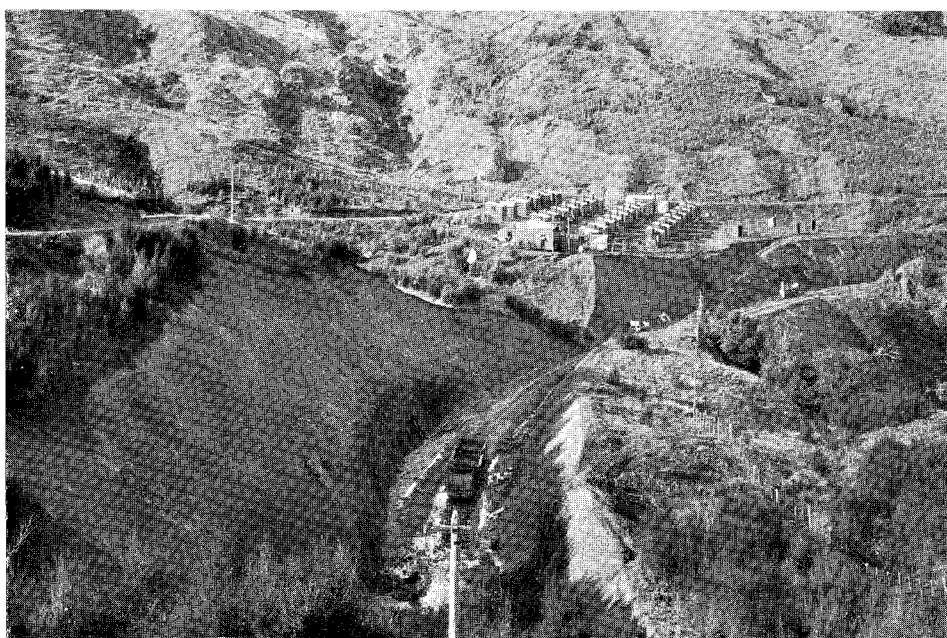
WAIKOKOPU BRANCH RAILWAY.

Waikokopu Wharf (s.s. "Port Albany" in Roadstead, loading frozen meat. &c.).



NAPIER - WAIROA RAILWAY, TUTIRA SECTION.

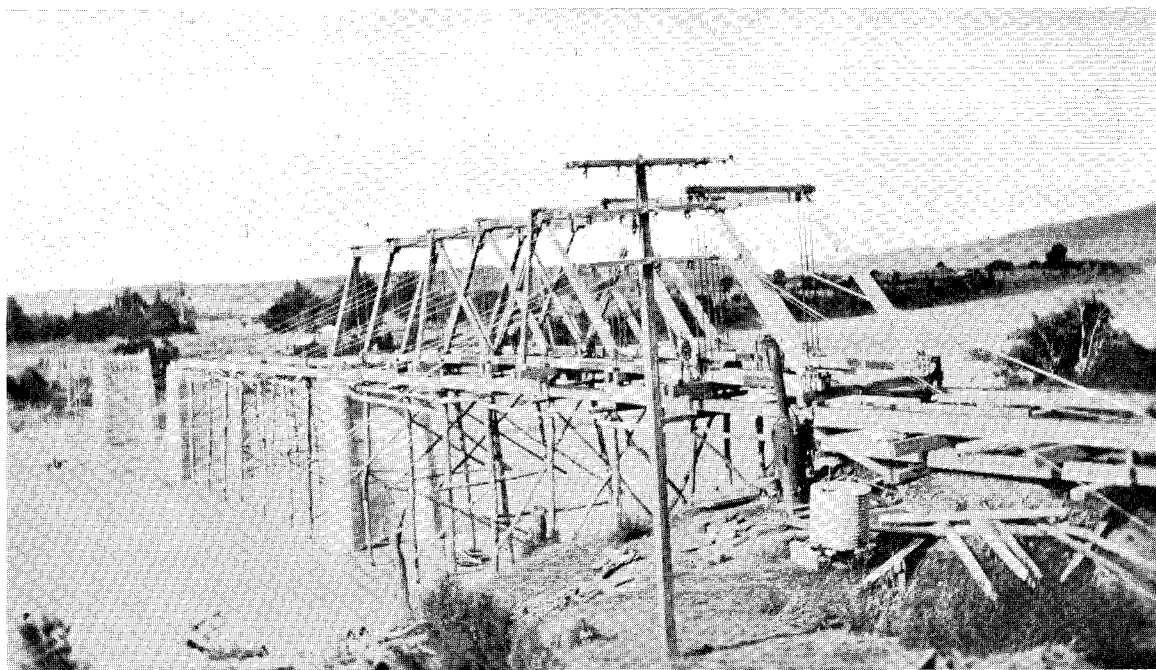
View looking south, showing No. 2 Tunnel.



NAPIER - WAIROA RAILWAY, TUTIRA SECTION.

View looking south from top of No. 2 Tunnel.

D.—1.



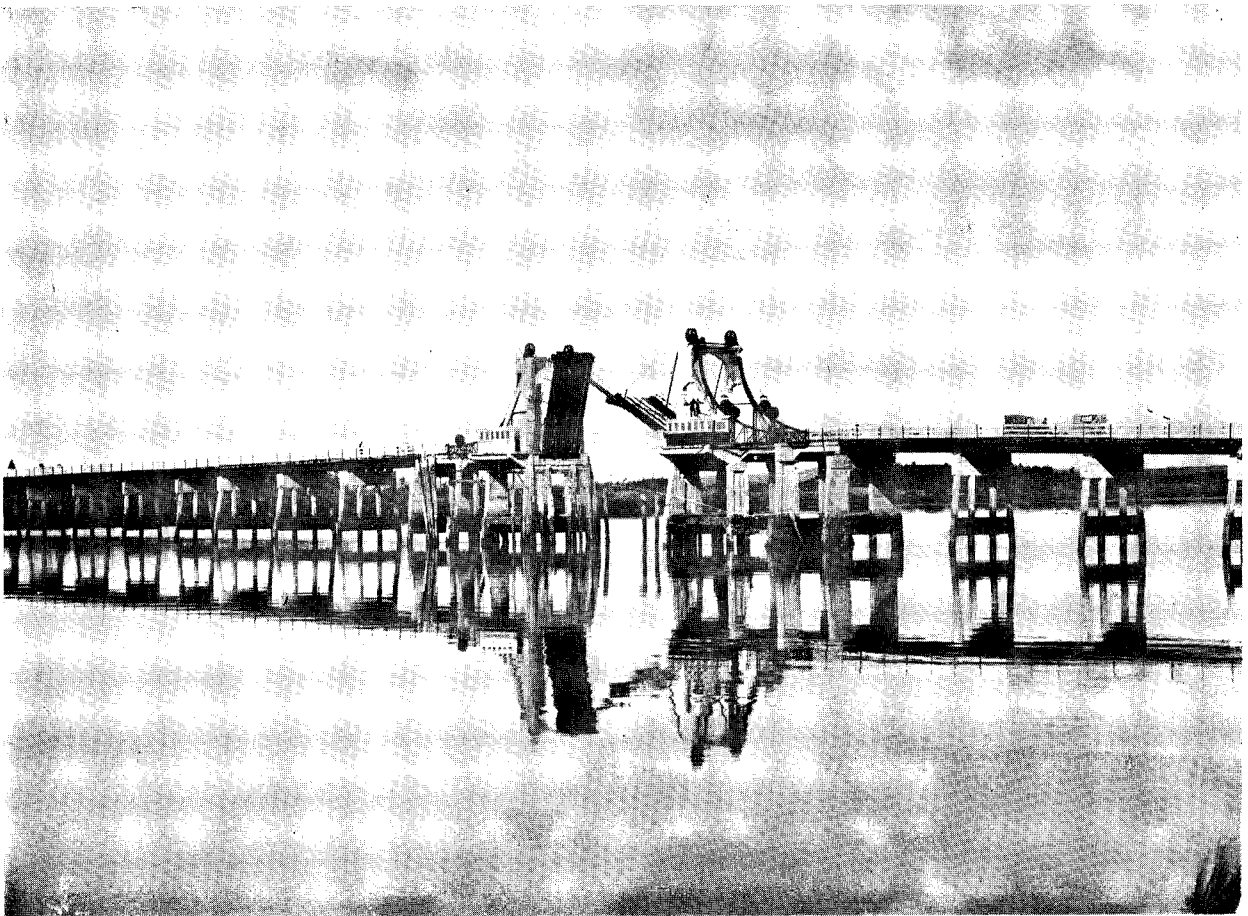
ROTOKAUTUKU BRIDGE UNDER CONSTRUCTION.  
(Span erected on shore and launched out on skidways.)



ROTOKAUTUKU BRIDGE UNDER CONSTRUCTION.



WAIROA RIVER ROAD-BRIDGE AT DARGAVILLE.  
Lift Span.

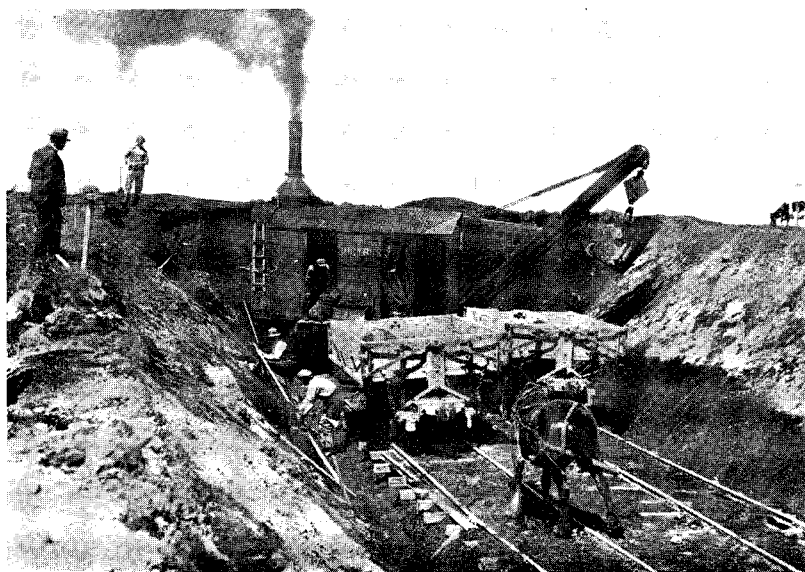


WAIROA RIVER ROAD-BRIDGE AT DARGAVILLE.  
Part General Elevation, showing Lift Span.



OPUNAKE BRANCH RAILWAY.

Kaupokonui River Bridge, at 7 m. 8 ch. : View showing permanent Concrete Piers and temporary Timber Piers and Spans.



OPUNAKE BRANCH RAILWAY.

Steam-navvy in Cutting near Opunake.



OPUNAKE BRANCH RAILWAY.

Waiaua River Bridge, at 22 m. 8 ch.





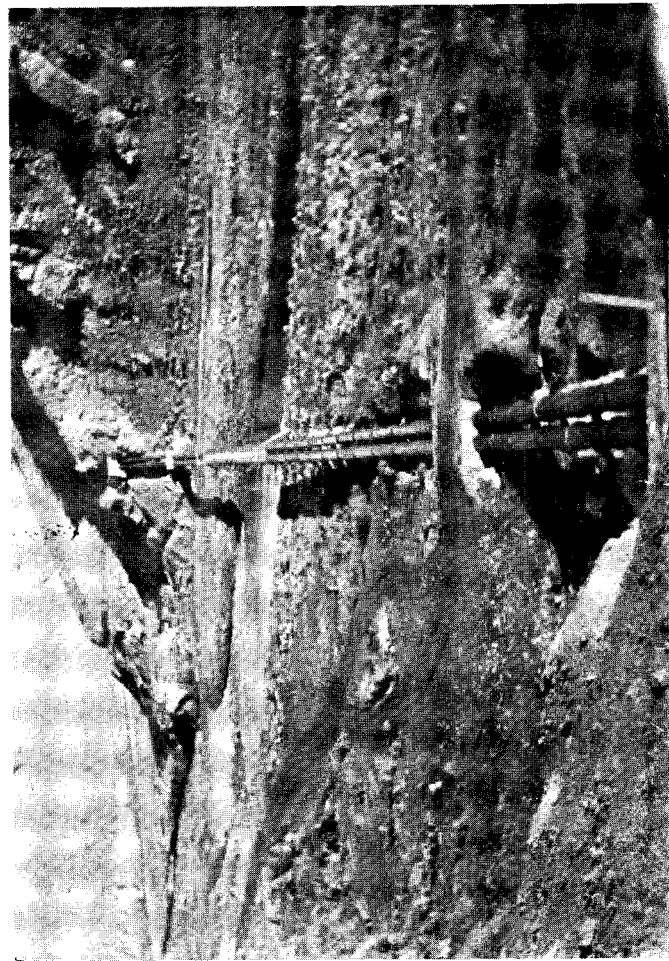
MIDLAND RAILWAY, MURCHISON SECTION.  
Cutting just beyond Kawatiri.



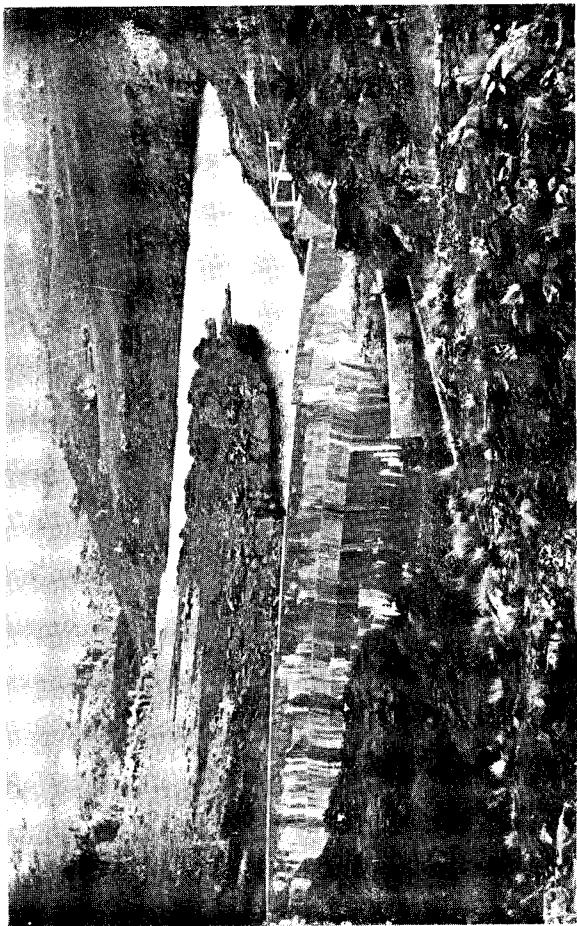
LAWRENCE-ROXBURGH RAILWAY.  
Minzion Burn Bridge.



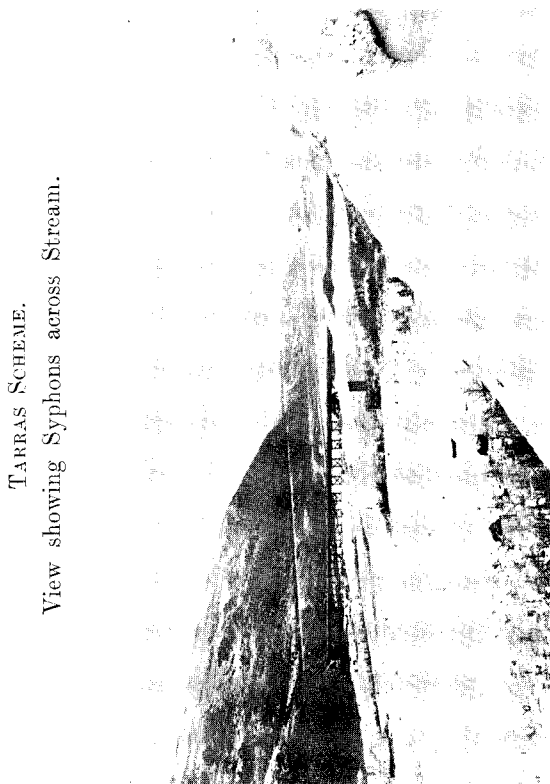
LAWRENCE-ROXBURGH RAILWAY.  
Beaumont River Bridge and Workmen's Camp.



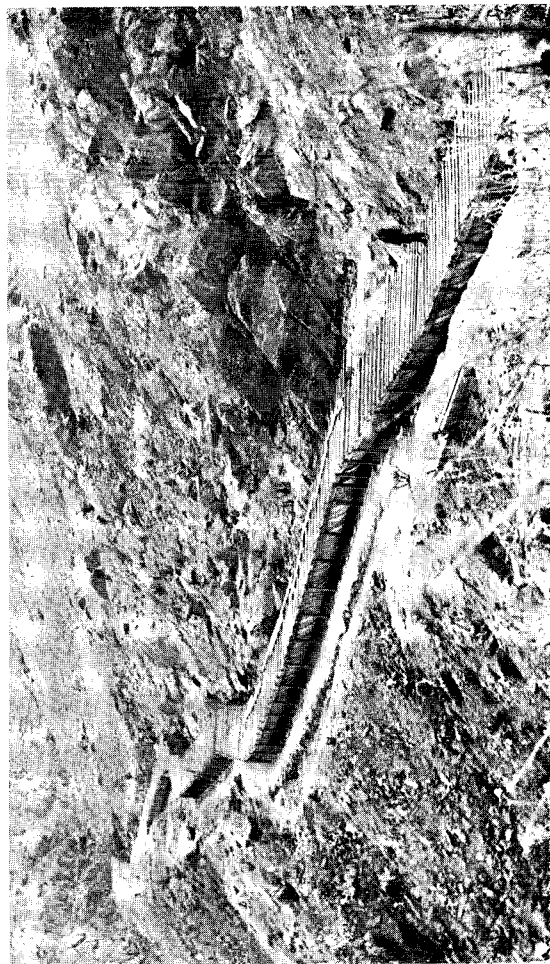
TARRAS SCHEME.  
View showing Syphons across Stream.



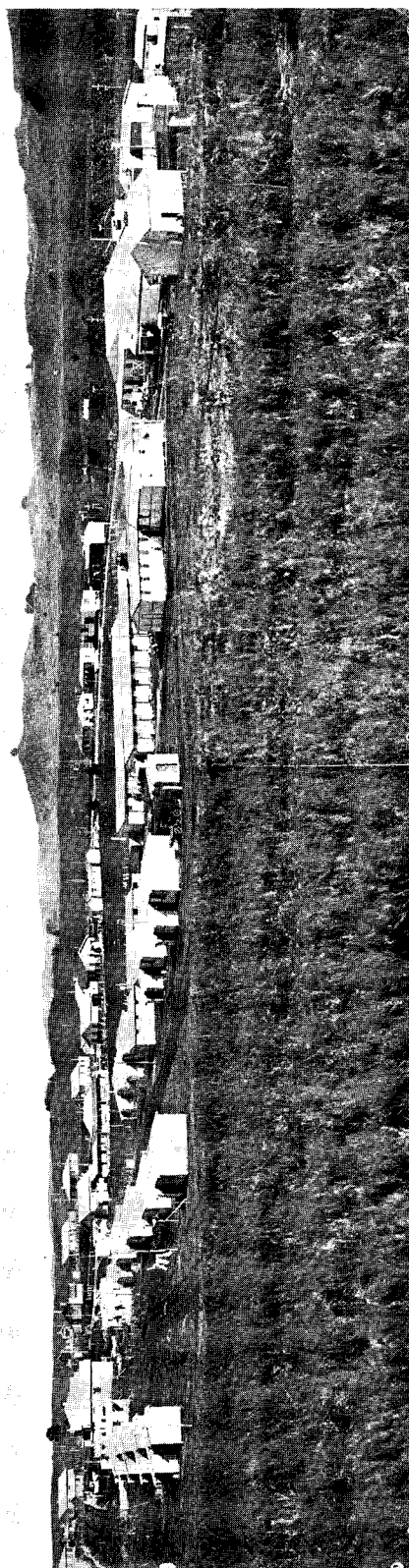
IDA VALLEY SCHEME.  
Moa Creek Weir.



TARRAS SCHEME.  
Another view of Syphons.



MANUHERIKIA SCHEME.  
Manuherikia Gorge: New Corrugated-metal Flume.

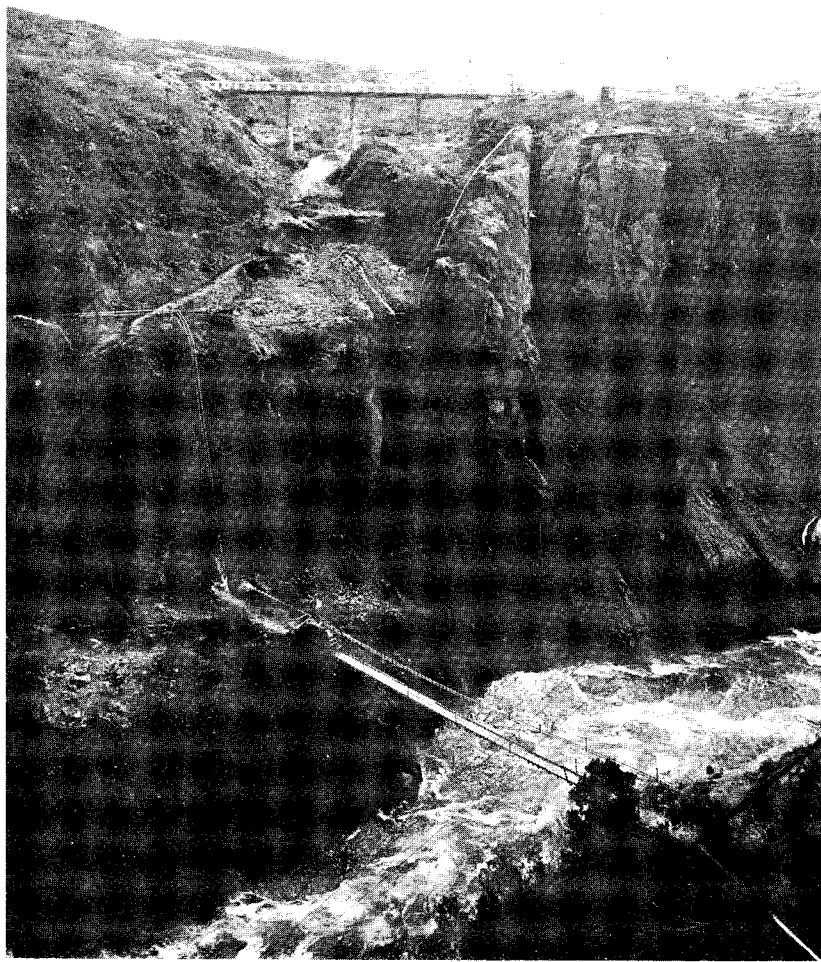


ARAPUNI HYDRO-ELECTRIC POWER SCHEME.  
View of Arapuni Village, showing Workmen's Cottages, Offices, &c.

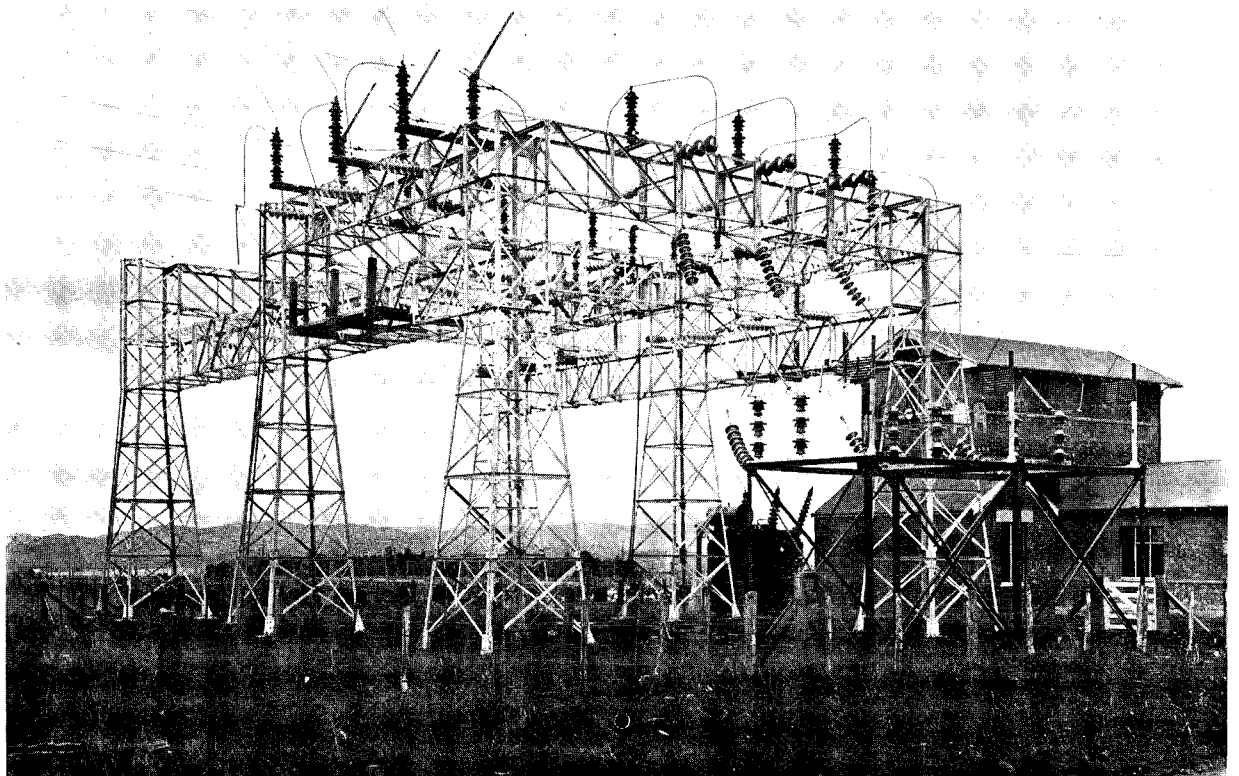


ARAPUNI HYDRO-ELECTRIC POWER SCHEME.  
Arapuni Gorge, showing work in progress at Power-house Site.

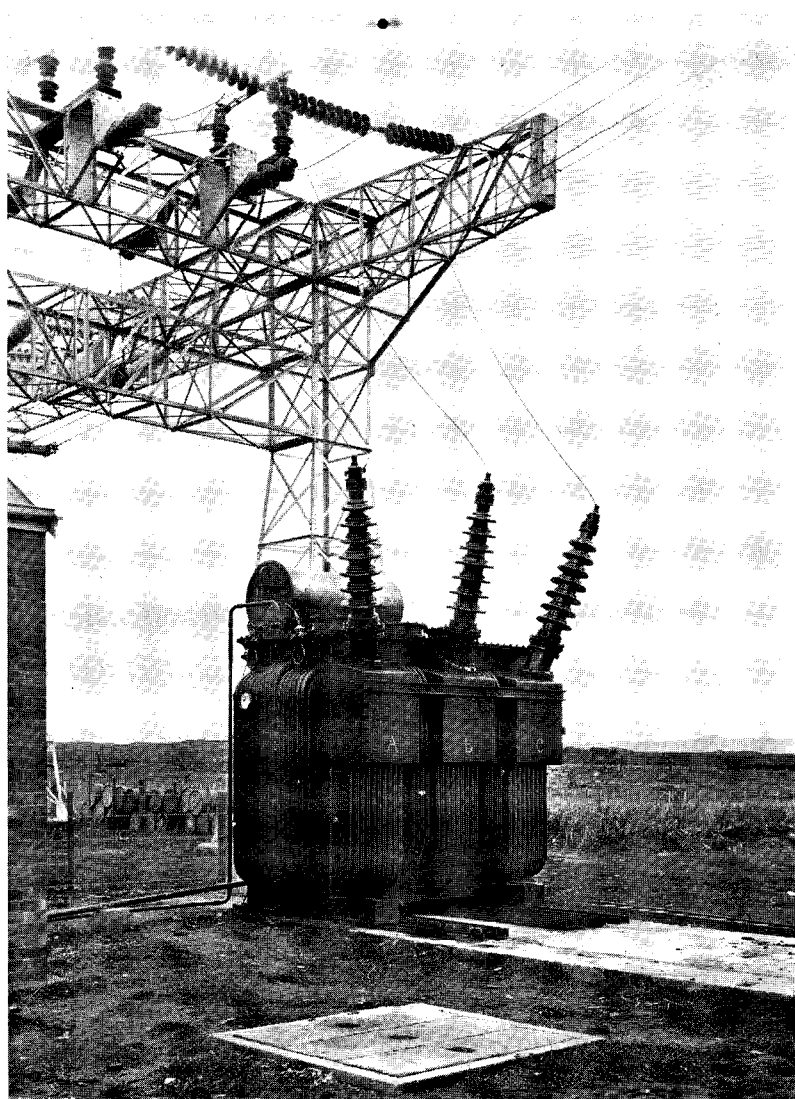




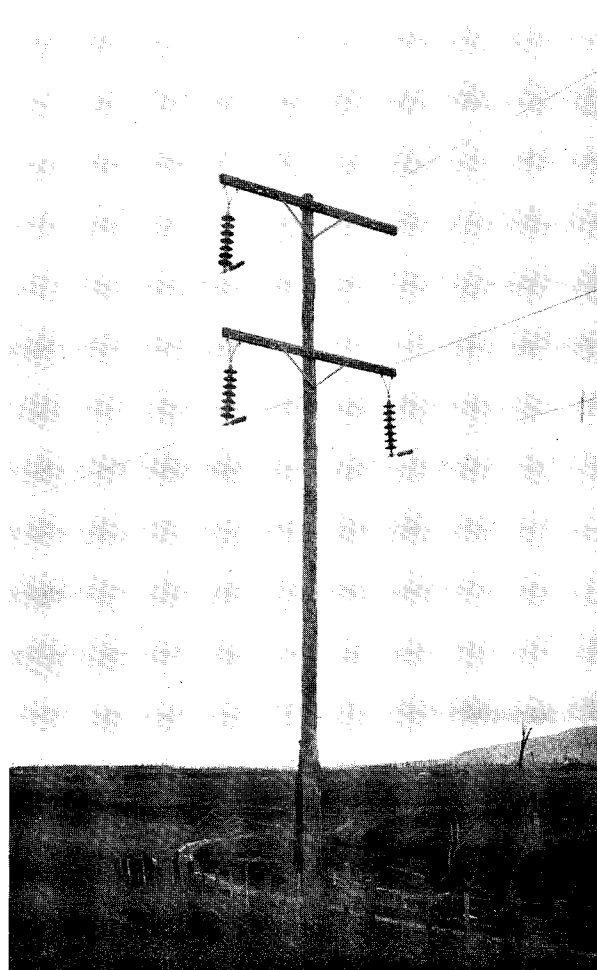
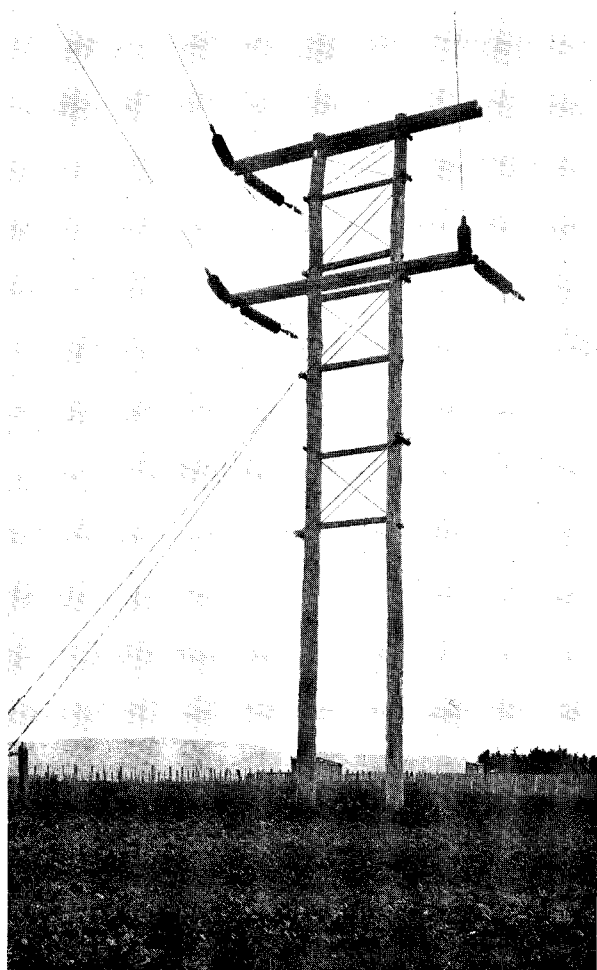
ARAPUNI HYDRO-ELECTRIC POWER SCHEME.  
Excavation at entrance of Headrace.



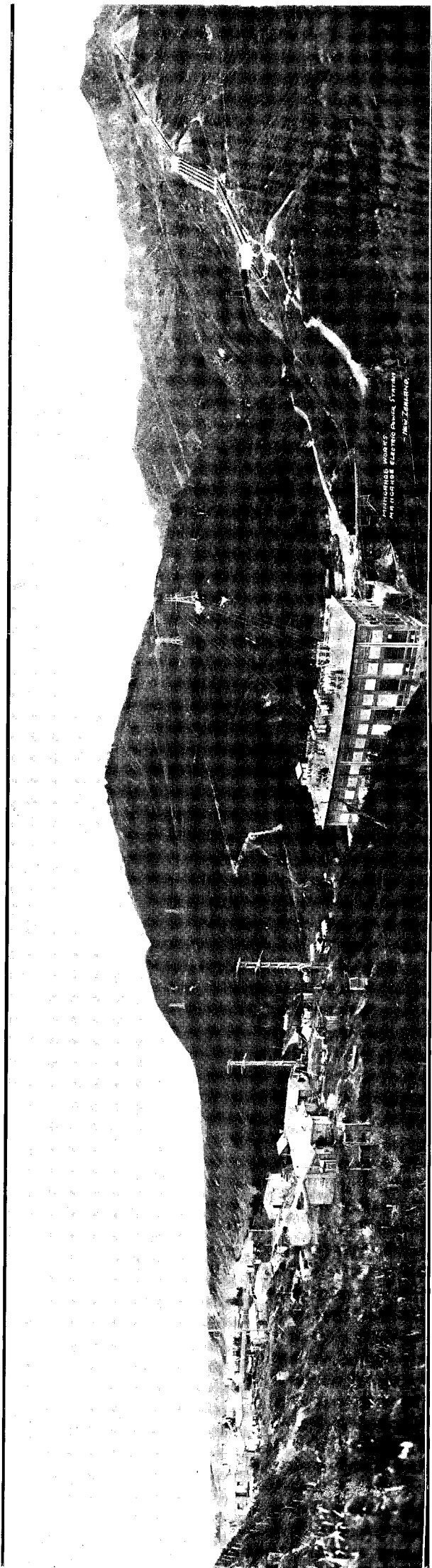
MANGAHAO HYDRO-ELECTRIC POWER PLANT.  
Outdoor Structure at Dannevirke Substation.



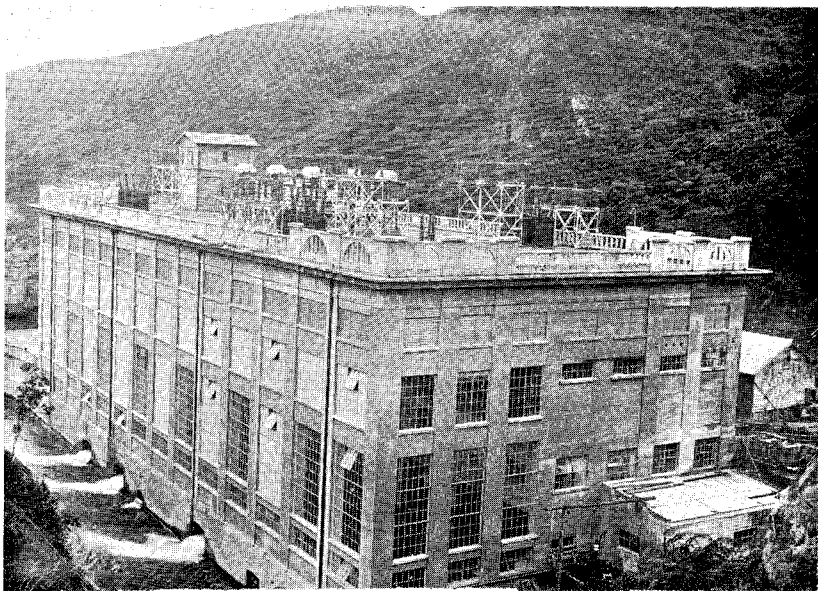
MANGAHAO HYDRO-ELECTRIC POWER PLANT.  
Main Transformer, Dannevirke Substation.



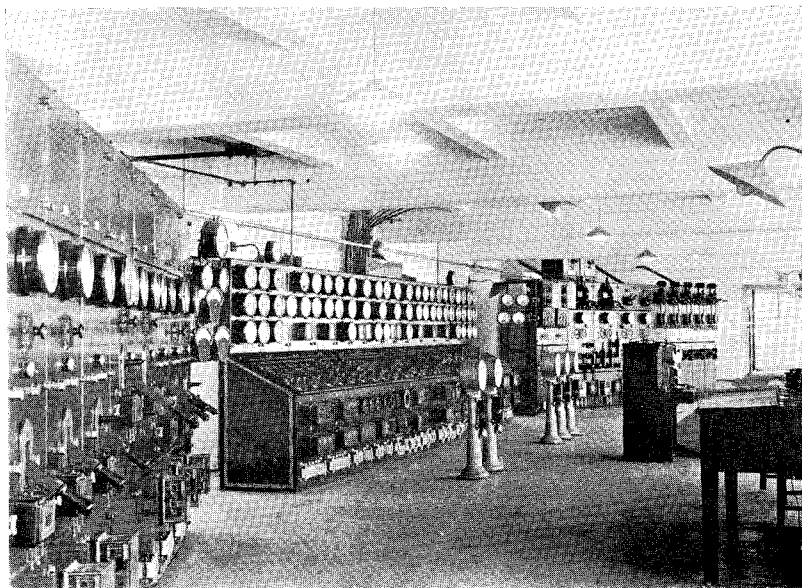
MANGAHAO HYDRO-ELECTRIC POWER PLANT.  
Types of Hardwood Transmission Poles.



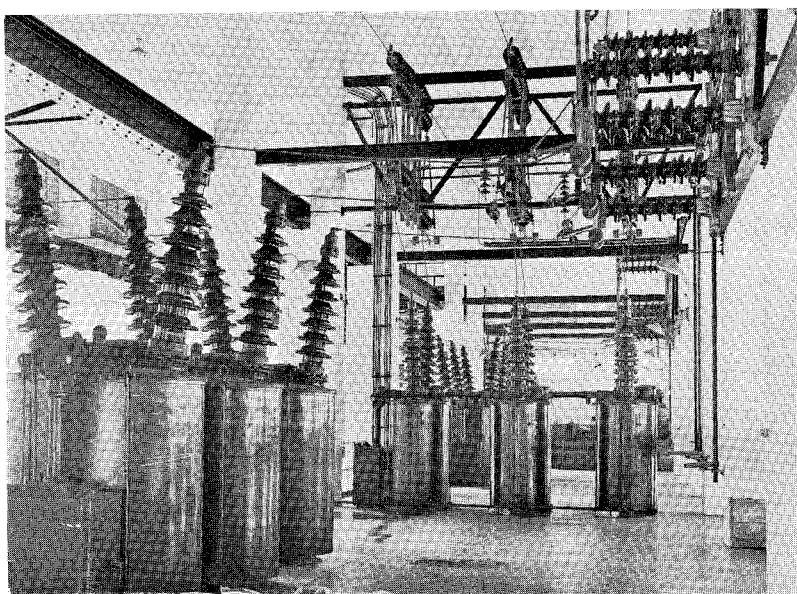
MANGAHAO HYDRO-ELECTRIC POWER SCHEME.  
View showing Power-house, Pipe-line, and Village.



MANGAHAO HYDRO-ELECTRIC POWER PLANT.  
Power-house.

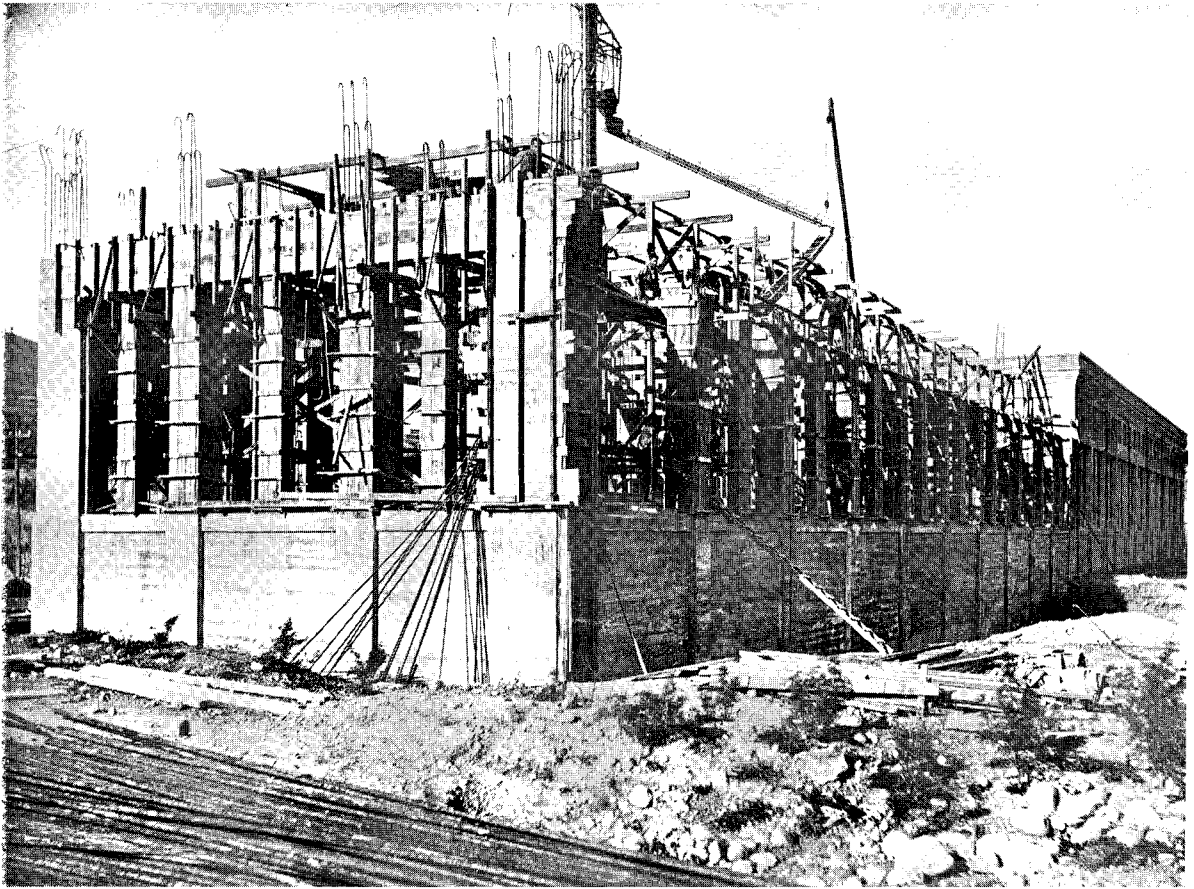


MANGAHAO HYDRO-ELECTRIC POWER PLANT.  
Power-house Switchboard and Control Apparatus.

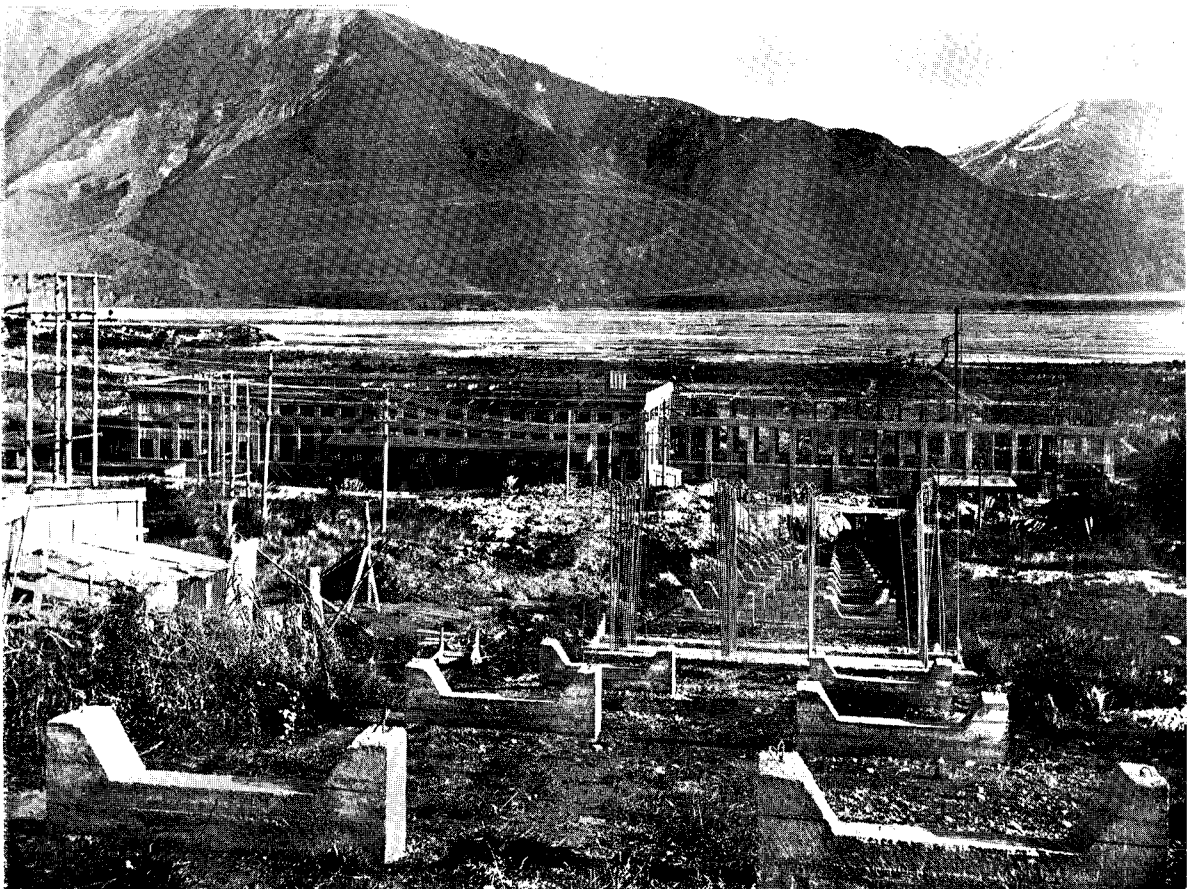


MANGAHAO HYDRO-ELECTRIC POWER PLANT.  
Power-house Extra High Tension Switchgear.

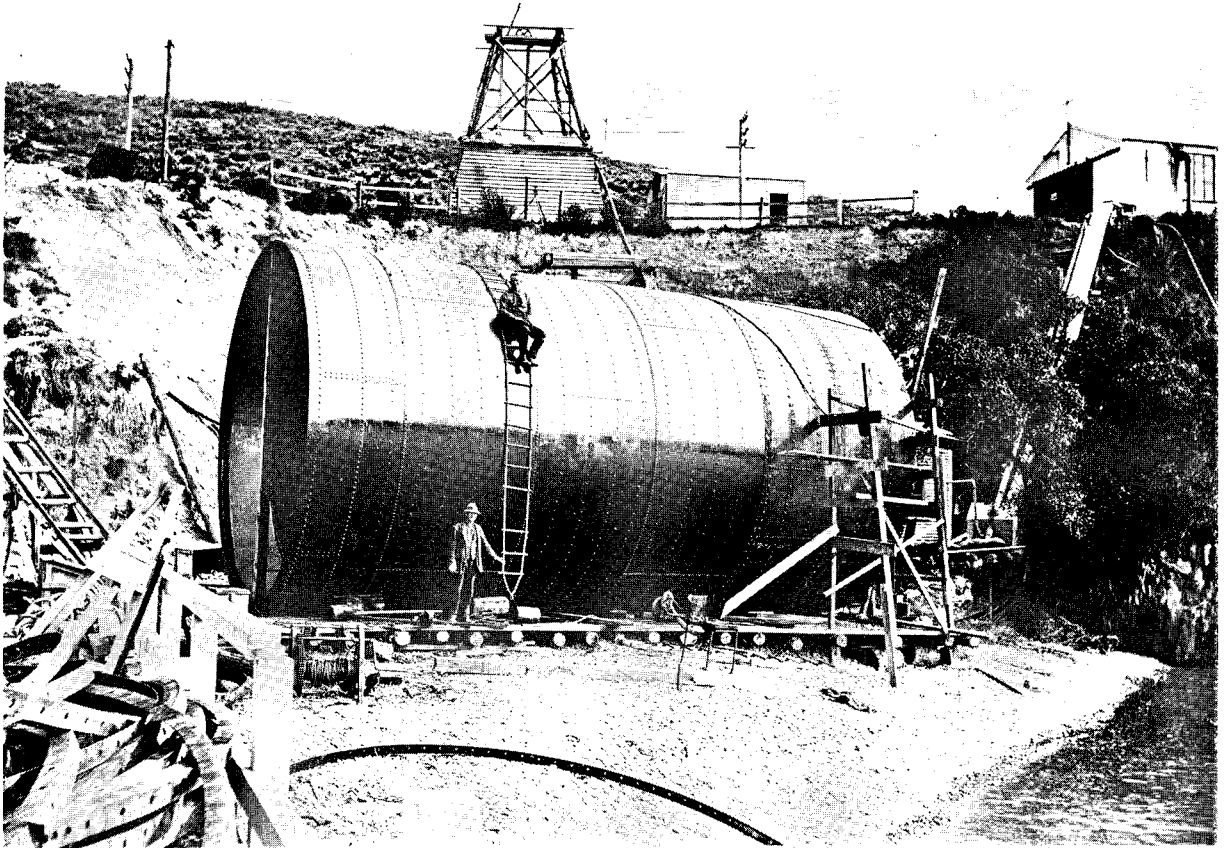




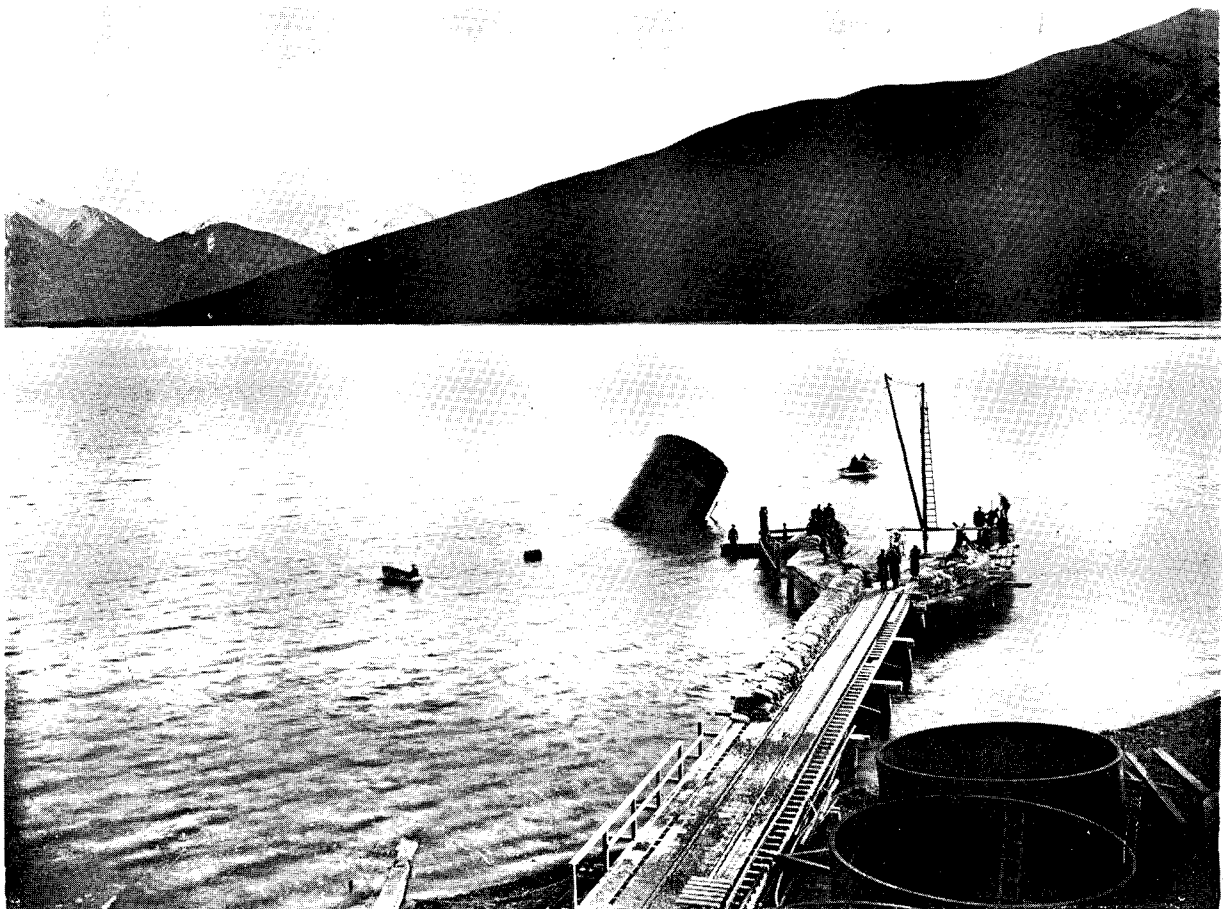
LAKE COLERIDGE HYDRO-ELECTRIC POWER PLANT.  
Power-house Extension (existing Power-house at far end).



LAKE COLERIDGE HYDRO-ELECTRIC POWER PLANT.  
View from new Pipe-line, showing Power-house Extension.

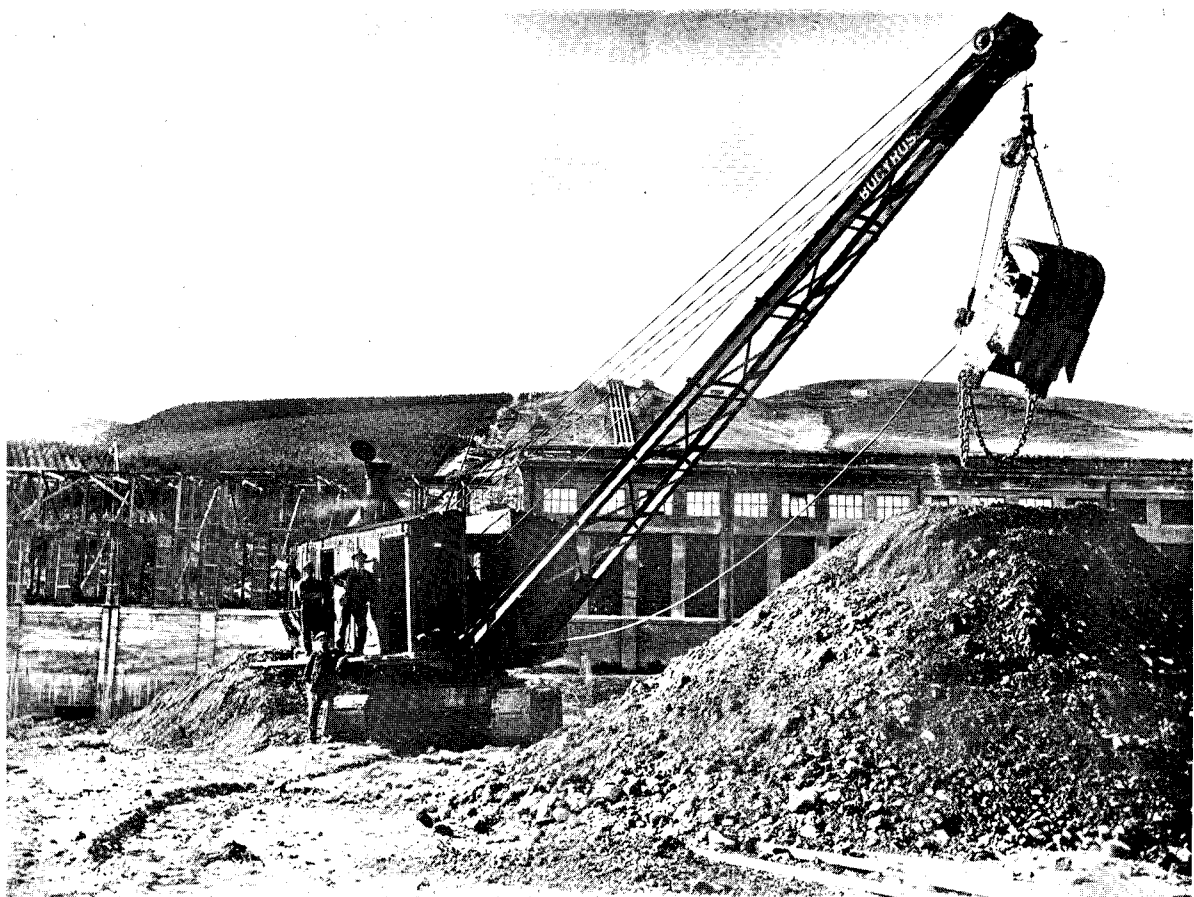


LAKE COLERIDGE HYDRO-ELECTRIC POWER PLANT.  
Intake Cylinder ready for launching.



LAKE COLERIDGE HYDRO-ELECTRIC POWER PLANT.  
Intake Cylinder being floated into position.





LAKE COLERIDGE HYDRO-ELECTRIC POWER PLANT.  
Drag-line excavating Tailrace.



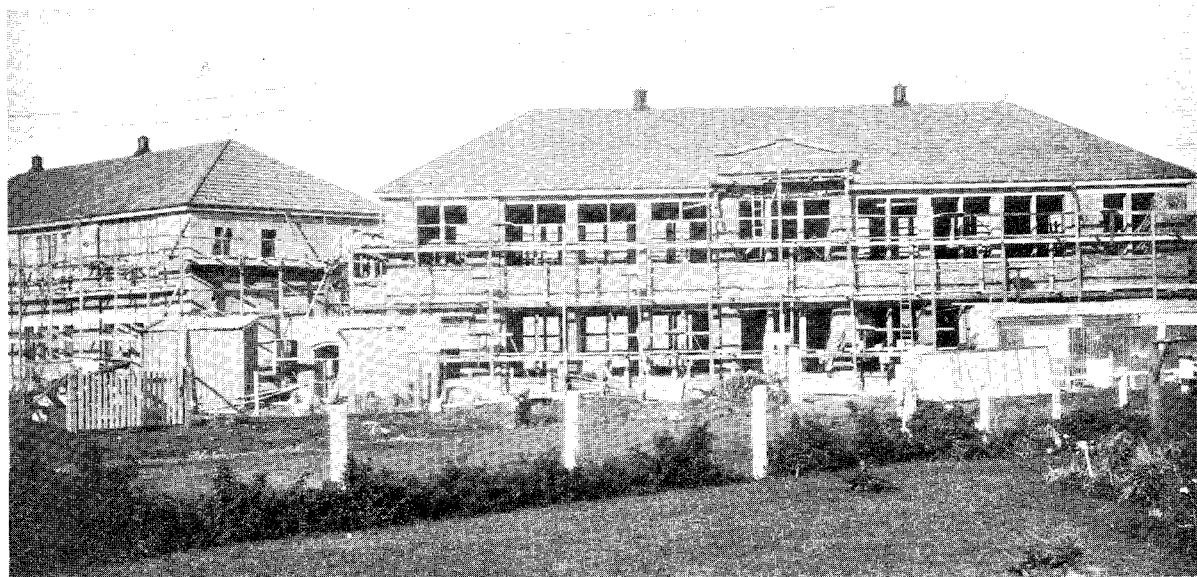
LAKE COLERIDGE HYDRO-ELECTRIC POWER PLANT.  
General view at Intake end of No. 2 Tunnel.



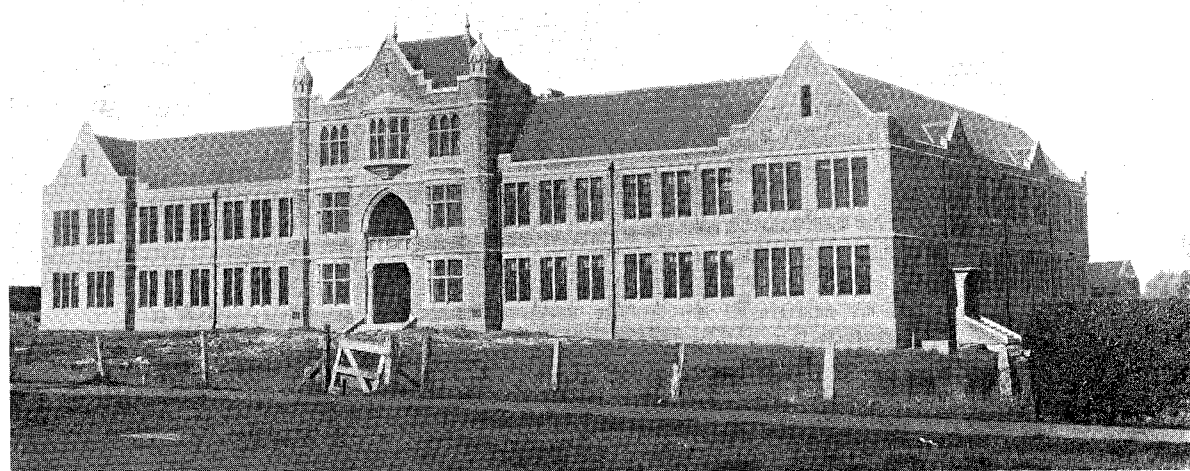
DOG ISLAND LIGHTHOUSE.



TAJAROA HEAD LIGHTHOUSE.



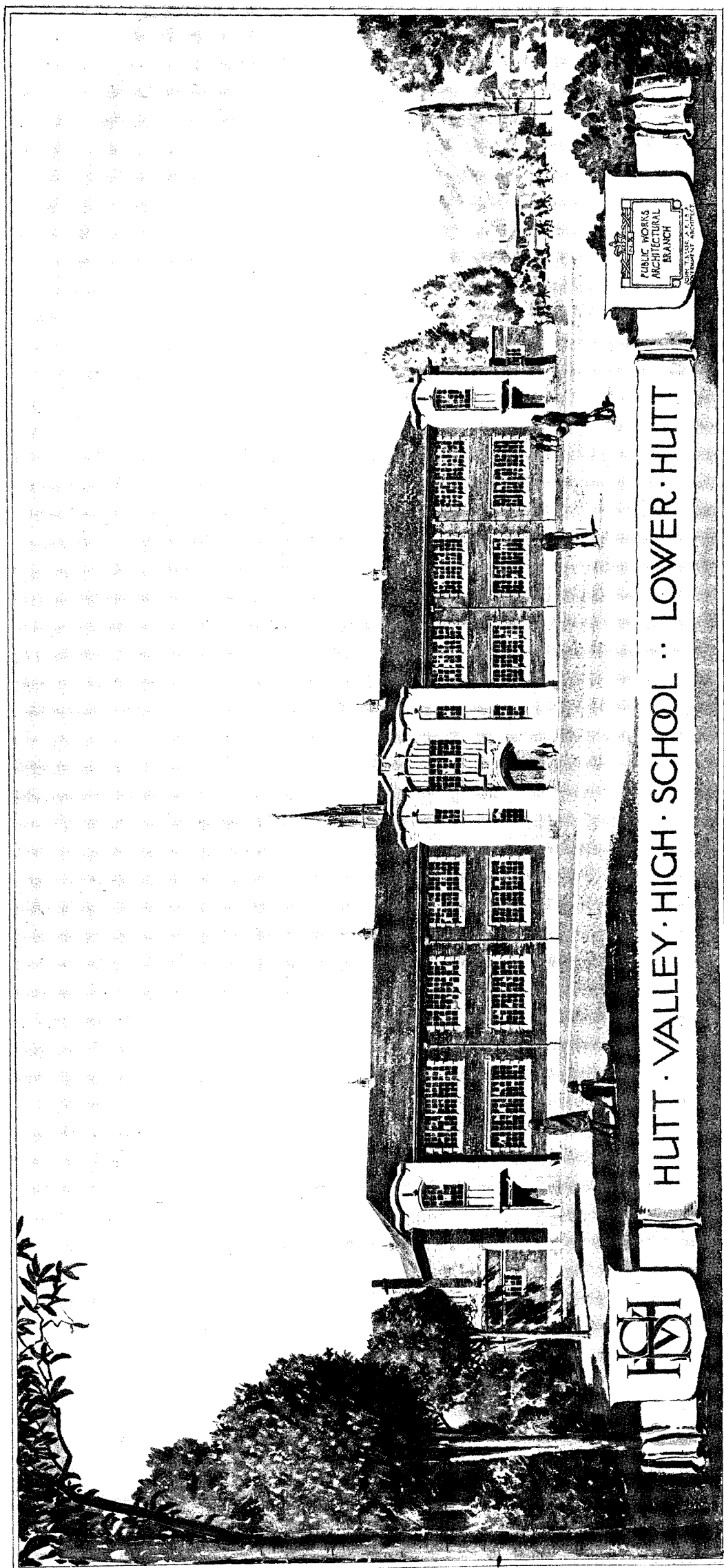
WHANGAREI HIGH SCHOOL.  
Under construction.



SOUTHLAND BOYS' HIGH SCHOOL, INVERCARGILL.  
Front elevation.



SOUTHLAND BOYS' HIGH SCHOOL, INVERCARGILL.  
Side elevation (showing Hall, &c.).



HUTT VALLEY HIGH SCHOOL, LOWER HUTT.  
(Perspective drawing.)





# PUBLIC WORKS STATEMENT, 1925

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### APPENDICES.

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TABLE NO. 1.

SUMMARY SHOWING THE TOTAL EXPENDITURE ON PUBLIC WORKS AND OTHER SERVICES OUT OF PUBLIC WORKS FUND TO 31ST MARCH, 1925, AND THE LIABILITIES ON THAT DATE.

| Number of Table containing Details. | Works.                                                    | Total Expenditure to 31st March, 1924. | Expenditure during Twelve Months ended 31st March, 1925. | Recoveries on Account of Services of Previous Years. | Total Net Expenditure to 31st March, 1925. | Liabilities on 31st March, 1925. | Total Net Expenditure and Liabilities. | Works.                                                  |
|-------------------------------------|-----------------------------------------------------------|----------------------------------------|----------------------------------------------------------|------------------------------------------------------|--------------------------------------------|----------------------------------|----------------------------------------|---------------------------------------------------------|
| 3                                   | Railways* ..                                              | £ 44,618,575                           | £ 1,878,729                                              | £ 37,924                                             | £ 46,459,380                               | £ 67,291                         | £ 46,526,671                           | Railways.*                                              |
| ..                                  | Roads† ..                                                 | 14,513,771                             | 606,723                                                  | 231                                                  | 15,120,263                                 | 48,734                           | 15,168,997                             | Roads.†                                                 |
| ..                                  | Development of mining ..                                  | 832,975                                | ..                                                       | ..                                                   | 832,975                                    | ..                               | 832,975                                | Development of mining.                                  |
| ..                                  | Telegraphs ..                                             | 6,219,411                              | 957,294                                                  | ..                                                   | 7,176,705                                  | ..                               | 7,176,705                              | Telegraphs.                                             |
| ..                                  | Public buildings ..                                       | 9,080,331                              | 245,818                                                  | 1,941                                                | 9,324,208                                  | 19,570                           | 9,343,778                              | Public buildings.                                       |
| ..                                  | Lighthouses, harbour-works, and harbour-defences ..       | 1,194,893                              | 3,275                                                    | 2                                                    | 1,198,166                                  | 74                               | 1,198,240                              | Lighthouses, harbour-works, and harbour-defences.       |
| ..                                  | Departmental ..                                           | 2,039,019                              | 127,556                                                  | 19                                                   | 2,166,556                                  | 1,033                            | 2,167,589                              | Departmental.                                           |
| 18 of 1878                          | Coal-exploration and mine-development ..                  | 10,835                                 | ..                                                       | ..                                                   | 10,835                                     | ..                               | 10,835                                 | Coal-exploration and mine-development.                  |
| 11 of 1877                          | Aiding works on Thames goldfields ..                      | 50,000                                 | ..                                                       | ..                                                   | 50,000                                     | ..                               | 50,000                                 | Aiding works on Thames goldfields.                      |
| ..                                  | Immigration ..                                            | 2,689,075                              | 136,353                                                  | 16                                                   | 2,825,412                                  | ..                               | 2,825,412                              | Immigration.                                            |
| ..                                  | Purchase of Native lands ..                               | 2,061,739                              | ..                                                       | ..                                                   | 2,061,739                                  | ..                               | 2,061,739                              | Purchase of Native lands.                               |
| ..                                  | Defence ..                                                | 1,091,942                              | 27,133                                                   | 580                                                  | 1,118,495                                  | ..                               | 1,118,495                              | Defence.                                                |
| ..                                  | Charges and expenses of raising loans ..                  | 1,801,842                              | 241,930                                                  | ..                                                   | 2,043,772                                  | ..                               | 2,043,772                              | Charges and expenses of raising loans.                  |
| ..                                  | Interest and sinking fund ..                              | 218,500                                | ..                                                       | ..                                                   | 218,500                                    | ..                               | 218,500                                | Interest and sinking fund.                              |
| ..                                  | Rates on Native lands ..                                  | 68,672                                 | ..                                                       | ..                                                   | 68,672                                     | ..                               | 68,672                                 | Rates on Native lands.                                  |
| ..                                  | Thermal springs ..                                        | 14,800                                 | ..                                                       | ..                                                   | 14,800                                     | ..                               | 14,800                                 | Thermal springs.                                        |
| ..                                  | Tourist and health resorts ..                             | 336,880                                | 12,343                                                   | 81                                                   | 349,142                                    | 1,138                            | 350,280                                | Tourist and health resorts.                             |
| ..                                  | Lands improvement‡ ..                                     | 195,505                                | 34,172                                                   | ..                                                   | 229,677                                    | 1,819                            | 231,496                                | Lands improvement.‡                                     |
| ..                                  | Payment to Midland Railway bond-holders ..                | 150,000                                | ..                                                       | ..                                                   | 150,000                                    | ..                               | 150,000                                | Payment to Midland Railway bond-holders.                |
| ..                                  | Irrigation and water-supply§ ..                           | 493,217                                | 127,995                                                  | ..                                                   | 621,212                                    | 6,257                            | 627,469                                | Irrigation and water-supply.§                           |
| ..                                  | Plant, material, and stores ..                            | 363,142                                | Cr. 12,229                                               | 1                                                    | 350,912                                    | 2,947                            | 353,859                                | Plant, material, and stores.                            |
| ..                                  | Quarries (acquisition and operation) ..                   | ..                                     | 1,815                                                    | ..                                                   | 1,815                                      | 3,228                            | 5,043                                  | Quarries (acquisition and operation).                   |
| ..                                  | Timber-supply and sawmills for Public Works Department .. | 34,707                                 | Cr. 20,537                                               | ..                                                   | 14,170                                     | 557                              | 14,727                                 | Timber-supply and sawmills for Public Works Department. |
| ..                                  | Motor Transport Services ..                               | 23,641                                 | 5,000                                                    | ..                                                   | 28,641                                     | ..                               | 28,641                                 | Motor Transport Services.                               |
| ..                                  | Transfer to Main Highways Account, Construction Fund ..   | ..                                     | 226,000                                                  | ..                                                   | 226,000                                    | ..                               | 226,000                                | Transfer to Main Highways Account, Construction Fund.   |
| ..                                  | Totals ..                                                 | 88,103,272                             | 4,599,370                                                | 40,795                                               | 92,661,847                                 | 152,648                          | 92,814,495                             | Totals.                                                 |

\* Exclusive of expenditure on Hutt Railway and Road Improvement and Railways Improvement Accounts. † Includes £4,500 expended under section 16 (1) Native Land Amendment and Native Land Claims Adjustment Act, 1923. ‡ Includes £115,000 previously expended under Irrigation and Water-supply. § Includes £115,000 previously expended under Irrigation and Water-supply. || Includes £115,000 previously expended under Irrigation and Water-supply. ¶ Includes £115,000 previously expended under Irrigation and Water-supply.

TABLE NO. 2.

## GENERAL SUMMARY.

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1903-1904 to 1924-25.

N.B.—The figures in italics, prefixed by "Cr.," are either recoveries on account of services of previous years or receipts-in-aid applied in reduction of expenditure.

| Description of Services.                              | Total Net<br>Expenditure<br>to 31st<br>March, 1903. | Expenditure. |            |            |             |            |             |             |            |             |             |             |
|-------------------------------------------------------|-----------------------------------------------------|--------------|------------|------------|-------------|------------|-------------|-------------|------------|-------------|-------------|-------------|
|                                                       |                                                     | 1903-4.      | 1904-5.    | 1905-6.    | 1906-7.     | 1907-8.    | 1908-9.     | 1909-10.    | 1910-11.   | 1911-12.    | 1912-13.    | 1913-14.    |
| Immigration ..                                        | £<br>1,248,000                                      | £<br>7       | £<br>6,481 | £<br>8,753 | £<br>14,353 | £<br>9,132 | £<br>15,075 | £<br>17,003 | £<br>9,441 | £<br>11,681 | £<br>14,694 | £<br>33,914 |
| Public Works, Departmental ..                         | 491,306                                             | 16,088       | 12,814     | 13,517     | 16,710      | 18,219     | 24,512      | 41,176      | 42,733     | 49,864      | 57,426      | 66,650      |
| Irrigation and Water-supply ..                        | ..                                                  | ..           | ..         | ..         | ..          | ..         | ..          | ..          | 1,562      | 2,794       | 14,689      | 40,329      |
| Railways ..                                           | 19,261,718                                          | 828,704      | 779,891    | 1,021,265  | 1,227,880   | 1,093,535  | 1,116,183   | 1,128,400   | 1,104,071  | 1,125,905   | 1,148,832   | 1,104,897   |
| Payment to Midland Railway Bondholders                | ..                                                  | 150,000      | ..         | ..         | ..          | ..         | ..          | ..          | Cr. 652    | Cr. 6,987   | Cr. 29,528  | Cr. 5,485   |
| Roads:—                                               |                                                     |              |            |            |             |            |             |             |            |             |             |             |
| Miscellaneous Roads and Bridges ..                    | 5,344,153                                           | 316,248      | 202,850    | 306,065    | 308,500     | 285,248    | 422,174     | 297,932     | 229,537    | 383,511     | 337,584     | 353,836     |
| Roads on Goldfields..                                 | 587,142                                             | 45,594       | 26,112     | 45,139     | 38,970      | 38,494     | 47,375      | 40,830      | 25,626     | 41,067      | 36,761      | Cr. 575     |
| Development of Thermal Springs and Natural Scenery .. | 16,023                                              | ..           | ..         | ..         | ..          | ..         | ..          | ..          | ..         | ..          | ..          | 24,143      |
| Lands Improvement Account*                            | 300,930                                             | ..           | ..         | ..         | ..          | ..         | ..          | ..          | ..         | ..          | ..          | ..          |
| Total, Roads ..                                       | 6,248,248                                           | 361,842      | 228,962    | 351,204    | 347,470     | 323,742    | 469,549     | 338,762     | 255,163    | 424,578     | 374,345     | 377,464     |
| Development of Mining ..                              | 725,892                                             | 16,278       | 6,258      | 18,533     | 11,064      | 8,633      | 32,859      | 18,597      | 10,845     | 21,244      | 10,644      | 4,889       |
|                                                       |                                                     |              |            |            |             |            |             | Cr. 1,000   | Cr. 1,000  | Cr. 30      | Cr. 1,015   |             |
| Purchase of Native Lands ..                           | 1,507,033                                           | 5,352        | 6,281      | 13,777     | 9,135       | 2,190      | 2,099       | 30,567      | 2,976      | Cr. 2,466   | Cr. 917     | Cr. 857     |
| Native Lands Purchase Account ..                      | 491,980                                             | ..           | ..         | ..         | ..          | ..         | ..          | ..          | Cr. 2,286  | ..          | ..          | ..          |
| Total, Land Purchases ..                              | 1,999,013                                           | 5,352        | 6,281      | 13,777     | 9,135       | 2,190      | 2,099       | 30,567      | 690        | Cr. 2,466   | Cr. 917     | Cr. 857     |
| Telegraph Extension ..                                | 1,006,465                                           | 47,228       | 79,298     | 77,186     | 114,068     | 155,491    | 163,032     | 123,423     | 111,867    | 147,692     | 251,375     | 302,648     |

\* Subsequent expenditure under separate class "Lands Improvement," see next page.

[Continued on page 4.]

TABLE NO 2—continued.

## GENERAL SUMMARY—continued.

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1903-1904 to 1924-25—continued.

| Description of Services.                                  | Total Net<br>Expenditure<br>to 31st<br>March, 1903. | Expenditure.     |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
|-----------------------------------------------------------|-----------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                                                           |                                                     | 1903-4.          | 1904-5.          | 1905-6.          | 1906-7.          | 1907-8.          | 1908-9.          | 1909-10.         | 1910-11.         | 1911-12.         | 1912-13.         | 1913-14.         |
| <b>Public Buildings:—</b>                                 |                                                     |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| General (including Miscellaneous)                         | £ 265,467                                           | 10,964           | 9,921            | 2,231            | 14,216           | 16,280           | 39,635           | 41,964           | 44,044           | 34,721           | 44,719           | £ 43,199         |
| Parliamentary                                             | 60,953                                              | 602              | 697              | 71               | 1,047            | 4,119            | 5,172            | 3,157            | 237              | 2,004            | 18,806           | 23,612           |
| Judicial { Courthouses                                    | 472,079                                             | 8,799            | 2,174            | 6,509            | 9,580            | 5,788            | 14,473           | 11,119           | 5,759            | 14,556           | 20,097           | 9,423            |
| Prisons                                                   |                                                     | 6,876            | 4,127            | 1,537            | 3,146            | 4,164            | 5,008            | 4,231            | 7,506            | 9,760            | 6,911            | 4,928            |
| Police-stations                                           |                                                     | 10,303           | 6,782            | 7,853            | 22,466           | 18,986           | 17,730           | 16,256           | 9,030            | 19,817           | 18,423           | 14,094           |
| Post and Telegraph                                        | 332,372                                             | 53,918           | 16,008           | 38,419           | 43,918           | 43,724           | 62,262           | 68,574           | 117,815          | 130,815          | 122,999          | 78,815           |
| Customs                                                   | 16,598                                              | 8,719            | 13,018           | 7,903            | 414              | 47               | 2,507            | 233              | ..               | ..               | ..               | ..               |
| Quarantine Stations                                       | 6,865                                               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               |
| Mental Hospitals                                          | 485,762                                             | 15,812           | 15,949           | 16,235           | 8,049            | 7,987            | 15,296           | 19,839           | 12,707           | 8,809            | 46,181           | 26,001           |
| Public Health                                             | 6,315                                               | 6,315            | 4,265            | 7,926            | 1,765            | 7,497            | 4,402            | 319              | ..               | ..               | 376              | ..               |
| Health and Hospital Institutions                          | 59,224                                              | 4,291            | 1,204            | 4,786            | 10,259           | 15,576           | 11,153           | 7,259            | 1,484            | 12,745           | 8,750            | 1,435            |
| School Buildings                                          | 1,145,757                                           | 87,089           | 42,721           | 69,223           | 109,459          | 100,197          | 102,340          | 98,193           | 124,926          | 90,535           | 105,000          | 121,854          |
| Agricultural                                              | 7,627                                               | 2,504            | 1,362            | 2,618            | 2,707            | 1,690            | 5,543            | 6,103            | 1,160            | 3,684            | 6,475            | 4,398            |
| Workers' Dwellings                                        | ..                                                  | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | 22,644           | 46,455           | 41,741           |
| <b>Total, Public Buildings</b>                            | <b>2,852,704</b>                                    | <b>216,192</b>   | <b>117,328</b>   | <b>165,311</b>   | <b>227,026</b>   | <b>226,035</b>   | <b>285,521</b>   | <b>277,157</b>   | <b>324,668</b>   | <b>350,090</b>   | <b>445,192</b>   | <b>369,600</b>   |
| <b>Lighthouses, Harbour-works, and Harbour-defences:—</b> |                                                     |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| Lighthouses..                                             | 153,520                                             | 6,206            | 2,167            | 962              | ..               | 1,417            | 7,481            | 6,762            | 1,470            | 5,428            | 9,031            | 5,174            |
| Harbour-works                                             | 324,528                                             | 1,773            | 1,308            | 2,684            | 2,963            | 2,867            | 4,439            | 4,548            | 4,092            | 6,001            | 7,415            | 3,346            |
| Harbour-defences                                          | 513,305                                             | 2,885            | 2,515            | 1,300            | 1,541            | 2,579            | 7,297            | 5,372            | 2,865            | 1,144            | 339              | Cr. 1,462        |
| <b>Total, Lighthouses, &amp;c.</b>                        | <b>991,353</b>                                      | <b>10,864</b>    | <b>5,990</b>     | <b>4,946</b>     | <b>4,504</b>     | <b>6,863</b>     | <b>19,217</b>    | <b>16,682</b>    | <b>8,427</b>     | <b>12,576</b>    | <b>16,785</b>    | <b>7,297</b>     |
| <b>Rates on Native Lands</b>                              | <b>65,268</b>                                       | <b>666</b>       | <b>631</b>       | <b>548</b>       | <b>695</b>       | <b>837</b>       | <b>27</b>        | <b>..</b>        | <b>..</b>        | <b>..</b>        | <b>..</b>        | <b>..</b>        |
| Contingent Defence                                        | 733,840                                             | 38,723           | 46,588           | 35,369           | 14,874           | 18,574           | 10,766           | 4,977            | 6,071            | 10,437           | 23,790           | 30,186           |
| Tourist and Health Resorts                                | 22,209                                              | 15,643           | 17,508           | 15,888           | 42,271           | 45,048           | 24,286           | 14,507           | 5,912            | 13,361           | 12,905           | 14,989           |
| Lands Improvement*                                        | 4,090                                               | 2,019            | 2,248            | 1,052            | 5,605            | 9,561            | 19,542           | 6,910            | 11,125           | 20,394           | 22,550           | 10,269           |
| Charges and Expenses of raising Loans                     | 1,151,055                                           | 87,249           | 10,764           | 236              | Cr. 5,175        | Cr. 8,487        | 575              | 17,715           | 66,367           | Cr. 66,954       | 72,950           | 105,449          |
| Interest and Sinking Funds                                | 218,500                                             | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               |
| Coal-exploration and Mine-development                     | 10,835                                              | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               |
| Thermal Springs                                           | 14,600                                              | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               | ..               |
| <b>Total Ways and Means Credits</b>                       | <b>37,944,826</b>                                   | <b>7</b>         | <b>1,321,510</b> | <b>1,730,686</b> | <b>5,175</b>     | <b>8,487</b>     | <b>2,183,245</b> | <b>2,022,876</b> | <b>1,891,918</b> | <b>10,530</b>    | <b>103,524</b>   | <b>105,792</b>   |
| <b>Grand Total—Net Expenditure</b>                        | <b>..</b>                                           | <b>1,796,841</b> | <b>1,321,510</b> | <b>1,730,686</b> | <b>2,035,144</b> | <b>1,909,683</b> | <b>2,183,245</b> | <b>2,022,876</b> | <b>1,891,918</b> | <b>2,190,731</b> | <b>3,362,654</b> | <b>2,455,066</b> |

\* For previous expenditure see Roads Class.

[Continued on page 5.]

TABLE NO. 2—continued.

## GENERAL SUMMARY—continued.

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1903-1904 to 1924-25—continued.

| Description of Services.                                   | Expenditure.                   |                               |                             |                             |                             |                               |                             |                             |                                   |                               | Total Net Expenditure to 31st March, 1925. |              |
|------------------------------------------------------------|--------------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------------|-------------------------------|--------------------------------------------|--------------|
|                                                            | 1914-15.                       | 1915-16.                      | 1916-17.                    | 1917-18.                    | 1918-19.                    | 1919-20.                      | 1920-21.                    | 1921-22.                    | 1922-23.                          | 1923-24.                      |                                            | 1924-25.     |
| Immigration .. .. .                                        | £ 33,219                       | £ 10,010<br><i>Cr. 10</i>     | £ 6,533                     | £ 3,856                     | £ <i>Cr. 12,018</i>         | £ <i>Cr. 62,561</i>           | £ <i>Cr. 7,806</i>          | £ 247,528                   | £ 90,611<br><i>Cr. 140</i>        | £ 92,600<br><i>Cr. 1,267</i>  | £ 136,353<br><i>Cr. 16</i>                 | £ 2,825,412  |
| Public Works, Departmental .. .. .                         | 100,719                        | 111,489                       | 131,701                     | 127,962<br><i>Cr. 2,662</i> | 115,419<br><i>Cr. 4,119</i> | 121,677                       | 143,280<br><i>Cr. 6,281</i> | 128,002<br><i>Cr. 525</i>   | 111,367<br><i>Cr. 131</i>         | 110,445<br><i>Cr. 69</i>      | 127,556<br><i>Cr. 19</i>                   | 2,166,556 .. |
| Irrigation and Water-supply* .. .. .                       | 32,090                         | 29,874                        | 20,794                      | 11,650                      | 13,665                      | 34,115                        | 55,344                      | 82,713                      | 58,131                            | 95,467                        | 127,995                                    | 621,212      |
| Railways .. .. .                                           | 2,146,753†<br><i>Cr. 6,022</i> | 1,065,171<br><i>Cr. 4,633</i> | 620,947<br><i>Cr. 4,845</i> | 495,771<br><i>Cr. 110</i>   | 387,923<br><i>Cr. 4,924</i> | 748,649<br><i>Cr. 105,196</i> | 1,365,466<br><i>Cr. 388</i> | 3,133,200<br><i>Cr. 751</i> | 2,110,859<br><i>Cr. 3,771</i>     | 1,776,413<br><i>Cr. 1,167</i> | 1,878,729<br><i>Cr. 37,924</i>             | 46,459,380   |
| Payment to Midland Railway Bondholders .. .. .             | ..                             | ..                            | ..                          | ..                          | ..                          | ..                            | ..                          | ..                          | ..                                | ..                            | ..                                         | 150,000      |
| Roads :—                                                   |                                |                               |                             |                             |                             |                               |                             |                             |                                   |                               |                                            |              |
| Miscellaneous Roads and Bridges .. .. .                    | 484,365                        | 400,062                       | 203,746                     | 128,730<br><i>Cr. 600</i>   | 221,887<br><i>Cr. 997</i>   | 376,097<br><i>Cr. 603</i>     | 527,854<br><i>Cr. 81</i>    | 552,895<br><i>Cr. 197</i>   | 643,156<br><i>Cr. 244</i>         | 751,370<br><i>Cr. 138</i>     | 603,968<br><i>Cr. 231</i>                  | ..           |
| Roads on Goldfields .. .. .                                | 30,065                         | 24,432                        | 17,099                      | 6,912                       | 4,186                       | 12,465                        | 11,050                      | 11,264                      | 4,850                             | 2,867                         | 2,755                                      | ..           |
| Development of Thermal Springs and Natural Scenery .. .. . | ..                             | ..                            | ..                          | ..                          | ..                          | ..                            | ..                          | ..                          | ..                                | ..                            | ..                                         | ..           |
| Lands Improvement Account .. .. .                          | ..                             | ..                            | ..                          | ..                          | ..                          | ..                            | ..                          | ..                          | ..                                | ..                            | ..                                         | ..           |
| Total, Roads .. .. .                                       | 514,430                        | 424,494                       | 220,845                     | 135,042                     | 225,076                     | 387,959                       | 538,823                     | 563,962                     | 647,762                           | 754,049                       | 606,492                                    | 15,120,263   |
| Development of Mining .. .. .                              | 2,384<br><i>Cr. 255</i>        | 6,602                         | 4,592                       | 27<br><i>Cr. 6,545</i>      | 518<br><i>Cr. 1,000</i>     | 1,173<br><i>Cr. 7,008</i>     | 2,153<br><i>Cr. 1,606</i>   | 2,130<br><i>Cr. 51</i>      | <i>Cr. 98</i><br><i>Cr. 1,785</i> | 1,363<br><i>Cr. 2,310</i>     | ..                                         | 882,975 ..   |
| Purchase of Native Lands .. .. .                           | <i>Cr. 1,060</i>               | <i>Cr. 972</i>                | <i>Cr. 868</i>              | <i>Cr. 57</i>               | ..                          | <i>Cr. 57</i>                 | <i>Cr. 57</i>               | <i>Cr. 52</i>               | ..                                | ..                            | ..                                         | ..           |
| Native Lands Purchase Account .. .. .                      | ..                             | ..                            | ..                          | ..                          | ..                          | ..                            | ..                          | ..                          | ..                                | ..                            | ..                                         | ..           |
| Total, Land Purchases .. .. .                              | <i>Cr. 1,060</i>               | <i>Cr. 972</i>                | <i>Cr. 868</i>              | <i>Cr. 57</i>               | ..                          | <i>Cr. 57</i>                 | <i>Cr. 57</i>               | <i>Cr. 52</i>               | ..                                | ..                            | ..                                         | 2,061,739    |
| Telegraph Extension .. .. .                                | 288,395                        | 249,554                       | 203,311                     | 213,955                     | 198,611                     | 249,379                       | 336,468                     | 590,981                     | 512,657<br><i>Cr. 11,082</i>      | 717,409                       | 957,294                                    | 7,176,705    |

\* £5,727 previously included under Lands Improvement, now transferred to Irrigation and Water-supply.

† Includes £1,000,000 expended 1908-9 and 1909-10 under Wellington-Manawatu Railway Purchase Account.

[Continued on page 6.]





TABLE NO 3.

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1925.

| Lines of Railway.                                                     | Total Expenditure by General Government to 31st March, 1924. | Recoveries on Account of Expenditure of Previous Years. | Expenditure out of Public Works Fund during Year 1924-25. |             |               |            |             |       | Expenditure under Special Acts during Year 1924-25.* | Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines. |                | Total Expenditure by General Government to 31st March, 1925. | Valuation of Works constructed by Provincial and Midland Railway Company. |    |    |
|-----------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|-------------|---------------|------------|-------------|-------|------------------------------------------------------|---------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------|---------------------------------------------------------------------------|----|----|
|                                                                       |                                                              |                                                         | Construction and Surveys.                                 |             |               | New Works. |             |       |                                                      | Works on Open Lines.                                                                  | £              |                                                              |                                                                           | s. | d. |
|                                                                       |                                                              |                                                         | £                                                         | s.          | d.            | £          | s.          | d.    |                                                      |                                                                                       |                |                                                              |                                                                           |    |    |
| Kaihu Valley .. .. .                                                  | 178,859 8 1                                                  | .. ..                                                   | 137 14 5                                                  | .. ..       | 137 14 5      | .. ..      | 123 19 6    | .. .. | 3,671 8 11                                           | .. ..                                                                                 | 179,121 2 0    | .. ..                                                        |                                                                           |    |    |
| Opua Wharf to Whangarei and Onerahi .. .. .                           | 560,738 15 8                                                 | 2,000 0 0                                               | .. ..                                                     | .. ..       | .. ..         | .. ..      | 53,131 13 0 | .. .. | .. ..                                                | .. ..                                                                                 | 615,541 17 7   | .. ..                                                        |                                                                           |    |    |
| Otiria to Ngapuhi .. .. .                                             | 125,987 0 0                                                  | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 125,987 0 0    | .. ..                                                        |                                                                           |    |    |
| Whangarei (Kioreoa) to Waitotira .. .. .                              | 388,506 4 0                                                  | .. ..                                                   | 31,862 0 6                                                | 1,895 15 10 | 33,757 16 4   | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 422,264 0 4    | .. ..                                                        |                                                                           |    |    |
| Waipou Branch .. .. .                                                 | 28,014 18 2                                                  | 28,014 18 2                                             | Cr. 35 8 0                                                | .. ..       | Cr. 35 8 0    | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | Cr. 35 8 0     | .. ..                                                        |                                                                           |    |    |
| North Auckland Main Trunk—                                            |                                                              |                                                         |                                                           |             |               |            |             |       |                                                      |                                                                                       |                |                                                              |                                                                           |    |    |
| Ngapuhi Northwards .. .. .                                            | 248,640 16 11                                                | .. ..                                                   | 1,884 8 11                                                | .. ..       | 1,884 8 11    | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 250 5 5        | .. ..                                                        |                                                                           |    |    |
| Helensville Northwards .. .. .                                        | 1,937,949 7 11                                               | .. ..                                                   | 314,737 6 5                                               | 21,331 13 6 | 336,068 19 11 | .. ..      | 40,360 9 5  | .. .. | .. ..                                                | .. ..                                                                                 | 2,314,378 17 3 | .. ..                                                        |                                                                           |    |    |
| North Auckland Main Trunk to Dargaville .. .. .                       | 474 0 0                                                      | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 474 0 0        | .. ..                                                        |                                                                           |    |    |
| Helensville to Te Awamutu .. .. .                                     | 2,829,764 17 8                                               | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | 184,135 2 5 | .. .. | 90,606 13 2                                          | .. ..                                                                                 | 3,104,506 13 3 | .. ..                                                        |                                                                           |    |    |
| Waikuku Branch (Paerata to Waikuku) .. .. .                           | 207,673 18 10                                                | .. ..                                                   | 61 11 0                                                   | .. ..       | 61 11 0       | .. ..      | 780 3 10    | .. .. | .. ..                                                | .. ..                                                                                 | 207,75 9 10    | .. ..                                                        |                                                                           |    |    |
| Huntly to Awaroa .. .. .                                              | 180,755 2 1                                                  | .. ..                                                   | Cr. 1,417 5 1                                             | .. ..       | Cr. 1,417 5 1 | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 180 118 0 10   | .. ..                                                        |                                                                           |    |    |
| Waikokowai Branch .. .. .                                             | 3,442 0 0                                                    | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 3,442 0 0      | .. ..                                                        |                                                                           |    |    |
| Waipa Gravel Access Branch .. .. .                                    | 114 0 0                                                      | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 114 0 0        | .. ..                                                        |                                                                           |    |    |
| Frankton to Thames .. .. .                                            | 377,299 8 4                                                  | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | 28,008 8 8  | .. .. | 26,776 11 5                                          | .. ..                                                                                 | 432,084 8 5    | .. ..                                                        |                                                                           |    |    |
| Cambridge Branch (Ruakura Junction to Cambridge) .. .. .              | 54,977 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | 417 0 3     | .. .. | .. ..                                                | .. ..                                                                                 | 55,394 0 3     | .. ..                                                        |                                                                           |    |    |
| Morrinsville to Rotorua .. .. .                                       | 385,281 2 3                                                  | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 407,889 3 1    | .. ..                                                        |                                                                           |    |    |
| Marton to Te Awamutu .. .. .                                          | 2,876,667 1 10                                               | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | 20,570 0 11 | .. .. | 2,037 19 11                                          | .. ..                                                                                 | 2,931,316 11 6 | .. ..                                                        |                                                                           |    |    |
| Raetihi Branch .. .. .                                                | 88,619 17 1                                                  | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | 53,084 3 6  | .. .. | 1,645 6 2                                            | .. ..                                                                                 | 88,619 17 1    | .. ..                                                        |                                                                           |    |    |
| Paeroa to Pokeno .. .. .                                              | 877 1 7                                                      | .. ..                                                   | 2,097 7 10                                                | .. ..       | 2,097 7 10    | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 2,974 9 5      | .. ..                                                        |                                                                           |    |    |
| Paeroa to Waikuku and Tauranga .. .. .                                | 393,754 19 2                                                 | .. ..                                                   | 112,763 17 2                                              | 28,316 12 1 | 141,080 9 3   | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 534,835 8 5    | .. ..                                                        |                                                                           |    |    |
| Tauranga to Taneatua, including Te Maunga to Maunganui Branch .. .. . | 1,107,578 18 3                                               | .. ..                                                   | 122,397 0 8                                               | 12,369 4 9  | 134,756 5 5   | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 1,242,335 3 8  | .. ..                                                        |                                                                           |    |    |
| Gisborne to Motu .. .. .                                              | 624,554 14 7                                                 | 1,983 0 0                                               | .. ..                                                     | .. ..       | .. ..         | .. ..      | 687 6 0     | .. .. | .. ..                                                | .. ..                                                                                 | 623,259 0 7    | .. ..                                                        |                                                                           |    |    |
| Gisborne to Ormond Tramway .. .. .                                    | 4,975 1 7                                                    | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 4,975 1 7      | .. ..                                                        |                                                                           |    |    |
| Napier to Gisborne—                                                   |                                                              |                                                         |                                                           |             |               |            |             |       |                                                      |                                                                                       |                |                                                              |                                                                           |    |    |
| Gisborne Southwards .. .. .                                           | 268,411 11 6                                                 | .. ..                                                   | 10,906 8 2                                                | 922 14 0    | 11,829 2 2    | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 280,240 13 8   | .. ..                                                        |                                                                           |    |    |
| Waioara Northwards .. .. .                                            | 20,762 16 6                                                  | .. ..                                                   | 180 0 0                                                   | .. ..       | 180 0 0       | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 20,942 16 6    | .. ..                                                        |                                                                           |    |    |
| Napier Northwards .. .. .                                             | 378,431 3 3                                                  | 5,000 0 0                                               | 141,272 13 2                                              | 4,778 13 4  | 146,051 6 6   | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 519,482 9 9    | .. ..                                                        |                                                                           |    |    |
| Waikokopu Branch .. .. .                                              | 424,939 16 0                                                 | .. ..                                                   | 57,917 12 7                                               | 1,780 10 9  | 59,698 3 4    | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 484,637 19 4   | .. ..                                                        |                                                                           |    |    |
| Wellington to Napier—                                                 |                                                              |                                                         |                                                           |             |               |            |             |       |                                                      |                                                                                       |                |                                                              |                                                                           |    |    |
| Napier to Woodville and Palmerston North .. .. .                      | 955,136 1 6                                                  | 142 12 6                                                | .. ..                                                     | .. ..       | .. ..         | .. ..      | 4,815 17 5  | .. .. | 57 17 5                                              | .. ..                                                                                 | 959,867 3 10   | .. ..                                                        |                                                                           |    |    |
| Wellington to Woodville, including Te Aro Extension .. .. .           | 1,798,539 5 1                                                | 100 0 0                                                 | .. ..                                                     | .. ..       | .. ..         | .. ..      | 7,098 6 1   | .. .. | 21,471 11 7                                          | .. ..                                                                                 | 1,827,009 2 9  | .. ..                                                        |                                                                           |    |    |
| Featherston to Martinborough .. .. .                                  | 399 0 0                                                      | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 399 0 0        | .. ..                                                        |                                                                           |    |    |
| Wellington to Waitara—                                                |                                                              |                                                         |                                                           |             |               |            |             |       |                                                      |                                                                                       |                |                                                              |                                                                           |    |    |
| Wellington to Longburn .. .. .                                        | 1,060,066 8 9                                                | .. ..                                                   | 296 13 2                                                  | .. ..       | 296 13 2      | .. ..      | 3,726 10 9  | .. .. | 65,209 16 5                                          | .. ..                                                                                 | 1,129,299 9 1  | .. ..                                                        |                                                                           |    |    |
| Foxton to Waitara and Moturoa .. .. .                                 | 1,598,193 16 6                                               | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | 32,003 12 4 | .. .. | 2,519 18 0                                           | .. ..                                                                                 | 1,632,717 6 10 | .. ..                                                        |                                                                           |    |    |
| Mount Egmont Branch .. .. .                                           | 71,699 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 71,699 0 0     | .. ..                                                        |                                                                           |    |    |
| Moturoa to Opunake .. .. .                                            | 759 0 0                                                      | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 759 0 0        | .. ..                                                        |                                                                           |    |    |
| Opunake Branch (Te Roti to Opunake) .. .. .                           | 246,211 19 11                                                | .. ..                                                   | 72,388 1 8                                                | 26,139 15 7 | 98,527 17 3   | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 344,79 17 2    | .. ..                                                        |                                                                           |    |    |
| Mania Branch (Kapuni to Mania) .. .. .                                | 19,643 19 4                                                  | .. ..                                                   | 4 6 8                                                     | .. ..       | 4 6 8         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 19,648 6 0     | .. ..                                                        |                                                                           |    |    |
| Rangitikei River Quarry Line .. .. .                                  | 206 0 0                                                      | .. ..                                                   | .. ..                                                     | .. ..       | .. ..         | .. ..      | .. ..       | .. .. | .. ..                                                | .. ..                                                                                 | 206 0 0        | .. ..                                                        |                                                                           |    |    |

\* Railways Improvement Authorization Act 1914 Account.

TABLE No. 3—continued.  
EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1925—continued.

| Lines of Railway.                             | Total Expenditure by General Government to 31st March, 1924. | Recoveries on Account of Expenditure of Previous Years. | Expenditure out of Public Works Fund during Year 1924-25. |                    |                            |             |              |         | Expenditure under Special Acts during Year 1924-25.* | Amounts previously charged to "Surveys of New Lines," now charged to Individual Lines. | Total Expenditure by General Government to 31st March, 1925. | Valuation of Works constructed by Provinces and Midland Railway Company. |
|-----------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|--------------------|----------------------------|-------------|--------------|---------|------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------|
|                                               |                                                              |                                                         | New Works.                                                |                    | Works on Open Lines.       |             |              |         |                                                      |                                                                                        |                                                              |                                                                          |
|                                               |                                                              |                                                         | Construction and Surveys.                                 | Permanent-way.     | £                          | s.          | d.           | £       |                                                      |                                                                                        |                                                              |                                                                          |
| Stratford to Okahukura (East End)             | 442,477 16 6                                                 | £ s. d.                                                 | £ s. d.                                                   | £ s. d.            | £ s. d.                    | £ s. d.     | £ s. d.      | £ s. d. | £ s. d.                                              | £ s. d.                                                                                | £ s. d.                                                      |                                                                          |
| Stratford to Okahukura (West End)             | 797,222 3 4                                                  | .. ..                                                   | 61,978 18 4<br>10,409 18 0                                | 6,921 2 7<br>.. .. | 68,900 0 11<br>10,409 18 0 | .. ..       | .. ..        | .. ..   | .. ..                                                | 511,377 17 5<br>807,632 1 4                                                            | .. ..                                                        |                                                                          |
| Nelson to Greymouth—                          |                                                              | .. ..                                                   | 24,635 17 11                                              | 988 4 6            | 25,624 2 5                 | 1,440 0 11  | 429 12 11    |         |                                                      |                                                                                        |                                                              |                                                                          |
| Nelson to Inangahua ..                        | 423,360 10 9                                                 | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 449,414 6 1                                                                            | 78,307 0 0                                                   |                                                                          |
| Stillwater to Inangahua ..                    | 213,803 9 5                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 215,243 10 4                                                                           | 279,685 0 0                                                  |                                                                          |
| Ngahere to Blackball ..                       | 147,532 0 0                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 147,532 0 0                                                                            | .. ..                                                        |                                                                          |
| Westport to Ngakawau ..                       | 189,521 0 0                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | 3,222 19 6  | .. ..        |         |                                                      | 192,743 19 6                                                                           | .. ..                                                        |                                                                          |
| Westport to Inangahua ..                      | 154,374 3 3                                                  | .. ..                                                   | 14,836 18 0                                               | 1,219 13 9         | 16,056 11 9                | .. ..       | .. ..        |         |                                                      | 170,430 15 0                                                                           | .. ..                                                        |                                                                          |
| Greymouth to Rewanui ..                       | 255,646 0 0                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 255,646 0 0                                                                            | .. ..                                                        |                                                                          |
| Point Elizabeth Branch ..                     | 74,145 10 9                                                  | .. ..                                                   | 96 0 2                                                    | .. ..              | 96 0 2                     | .. ..       | .. ..        |         |                                                      | 74,241 10 11                                                                           | .. ..                                                        |                                                                          |
| Greymouth to Ross and Mikonui ..              | 351,689 11 11                                                | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | 3,656 11 6  | 389 2 8      |         |                                                      | 355,735 6 1                                                                            | .. ..                                                        |                                                                          |
| Pictou to Waipara—                            |                                                              | 52 7 9                                                  | 72 16 11                                                  | .. ..              | Cr.                        | .. ..       | .. ..        |         |                                                      | 656,002 1 10                                                                           | .. ..                                                        |                                                                          |
| Pictou Southwards ..                          | 656,127 6 6                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 377,533 0 5                                                                            | .. ..                                                        |                                                                          |
| Waipara Northwards ..                         | 377,533 0 5                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | .. ..                                                                                  | .. ..                                                        |                                                                          |
| Christchurch to Greymouth—                    |                                                              | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | 1,045 0 0   | 10,528 15 5  |         |                                                      | 996,956 11 7                                                                           | 61,579 0 0                                                   |                                                                          |
| Rolleston to Bealey ..                        | 985,382 16 2                                                 | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 25,021 0 0                                                                             | .. ..                                                        |                                                                          |
| Whitecliffs Branch ..                         | 25,021 0 0                                                   | 241 0 0                                                 | 31,406 13 5                                               | 220 14 7           | 31,627 8 0                 | 10,659 2 7  | 10,232 2 3   |         |                                                      | 2,042,436 16 11                                                                        | 263,889 0 0                                                  |                                                                          |
| Greymouth to Bealey ..                        | 1,990,159 4 1                                                | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | .. ..                                                                                  | .. ..                                                        |                                                                          |
| Hurunui to Waitaki—                           |                                                              | 390 0 0                                                 | 46 14 4                                                   | .. ..              | 46 14 4                    | 19,105 0 11 | 25,851 12 4  |         |                                                      | 2,144,711 17 5                                                                         | 316,135 0 0                                                  |                                                                          |
| Main Line (Waiau to Waitaki) ..               | 2,100,098 9 10                                               | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 52,952 0 0                                                                             | .. ..                                                        |                                                                          |
| Oxford Branch (Rangiora to Oxford West)       | 52,952 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 44,277 0 0                                                                             | .. ..                                                        |                                                                          |
| Eyreston Branch (Kaipoi to Bennett's)         | 44,277 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 80,908 0 0                                                                             | 340,500 0 0                                                  |                                                                          |
| Lyttelton Branch ..                           | 80,908 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 91,441 0 0                                                                             | .. ..                                                        |                                                                          |
| Southbridge Branch (Hornby to Southbridge)    | 91,441 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | 1,052 8 5   | .. ..        |         |                                                      | 110,713 14 3                                                                           | .. ..                                                        |                                                                          |
| Little River Branch (Lincoln to Little River) | 109,661 5 10                                                 | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | 2,461 2 4   | .. ..        |         |                                                      | 77,142 15 4                                                                            | .. ..                                                        |                                                                          |
| Rakaia to Methven ..                          | 74,681 13 0                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | 1,006 15 3  | .. ..        |         |                                                      | 64,025 11 3                                                                            | .. ..                                                        |                                                                          |
| Ashburton to Springfield ..                   | 63,018 16 0                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 321 0 0                                                                                | .. ..                                                        |                                                                          |
| Orari to Geraldine ..                         | 321 0 0                                                      | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 68,166 0 1                                                                             | 75,124 0 0                                                   |                                                                          |
| Fairlie Branch (Washdyke Junction to Fairlie) | 68,166 0 1                                                   | .. ..                                                   | 15 16 10                                                  | .. ..              | 15 16 10                   | .. ..       | .. ..        |         |                                                      | 80,686 10 7                                                                            | .. ..                                                        |                                                                          |
| Waimate Branch ..                             | 80,670 13 9                                                  | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | .. ..                                                                                  | .. ..                                                        |                                                                          |
| Canterbury Interior Main Line—                |                                                              | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 54,248 0 0                                                                             | .. ..                                                        |                                                                          |
| Oxford to Malvern ..                          | 54,248 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 542 0 0                                                                                | .. ..                                                        |                                                                          |
| Whitecliffs to Rakaia ..                      | 542 0 0                                                      | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 5,152 0 0                                                                              | .. ..                                                        |                                                                          |
| Temuka to Rangitata ..                        | 5,152 0 0                                                    | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | .. ..                                                                                  | .. ..                                                        |                                                                          |
| Waitaki to Bluff—                             |                                                              | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | 9,463 17 1  | 10,331 17 10 |         |                                                      | 3,374,500 1 10                                                                         | 82,259 0 0                                                   |                                                                          |
| Main Line, including Port Chalmers Branch     | 3,354,704 6 11                                               | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 97,465 0 0                                                                             | 37,500 0 0                                                   |                                                                          |
| Duntroon Branch (Pukeuri to Kurow) ..         | 97,465 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | 26,090 0 0                                                                             | 58,009 0 0                                                   |                                                                          |
| Ngapara Branch (Waiakeka Junction to Ngapara) | 26,090 0 0                                                   | .. ..                                                   | .. ..                                                     | .. ..              | .. ..                      | .. ..       | .. ..        |         |                                                      | .. ..                                                                                  | .. ..                                                        |                                                                          |

\* Railways Improvement Authorization Act 1914 Account.

TABLE NO. 3—continued.

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1925—continued.

| Lines of Railway.                                                                                                                               | Total Expenditure by General Government to 31st March, 1924. | Recoveries on Account of Expenditure of Previous Years. | Expenditure out of Public Works Fund during Year 1924-25. |                |                  |                      |               |                | Expenditure under Special Acts during Year 1924-25.* | Amounts previously charged to "Surveys of New Lines," now charged to Individual Lines. | Total Expenditure by General Government to 31st March, 1925. | Valuation of Works constructed by Provinces and Midland Railway Company. |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------|----------------|------------------|----------------------|---------------|----------------|------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------|
|                                                                                                                                                 |                                                              |                                                         | New Works.                                                |                |                  | Works on Open Lines. |               |                |                                                      |                                                                                        |                                                              |                                                                          |
|                                                                                                                                                 |                                                              |                                                         | Construction and Surveys.                                 | Permanent-way. | Total New Works. |                      |               |                |                                                      |                                                                                        |                                                              |                                                                          |
|                                                                                                                                                 | £ s. d.                                                      | £ s. d.                                                 | £ s. d.                                                   | £ s. d.        | £ s. d.          | £ s. d.              | £ s. d.       | £ s. d.        | £ s. d.                                              | £ s. d.                                                                                | £ s. d.                                                      |                                                                          |
| Waitaki to Bluff—continued.                                                                                                                     |                                                              |                                                         |                                                           |                |                  |                      |               |                |                                                      |                                                                                        |                                                              |                                                                          |
| Livingstone Branch (Windsor to Tokarahi)                                                                                                        | 82,785 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 82,785 0 0                                                                             | ..                                                           |                                                                          |
| Waikato Branch (Palmerston to Dunback)                                                                                                          | 33,191 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 33,191 0 0                                                                             | ..                                                           |                                                                          |
| Fernhill Railway ..                                                                                                                             | 1,415 0 0                                                    | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 1,415 0 0                                                                              | ..                                                           |                                                                          |
| Brighton Road Branch ..                                                                                                                         | 6,474 0 0                                                    | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 6,474 0 0                                                                              | ..                                                           |                                                                          |
| Outram Branch (Mosgiel to Outram) ..                                                                                                            | 11,951 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 11,951 0 0                                                                             | 12,829 0 0                                                   |                                                                          |
| Lawrence Branch ..                                                                                                                              | 478,099 11 3                                                 | ..                                                      | ..                                                        | ..             | ..               | 64,829 13 3          | ..            | ..             | ..                                                   | 542,929 ± 6                                                                            | 29,691 0 0                                                   |                                                                          |
| Balclutha to Tuapeka Mouth ..                                                                                                                   | 2,489 0 0                                                    | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 2,489 0 0                                                                              | ..                                                           |                                                                          |
| Catlin's River Branch (Balclutha to Tahakopa)                                                                                                   | 462,722 0 0                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 462,722 0 0                                                                            | ..                                                           |                                                                          |
| Heriotburn Branch (Waipahi to Edievale)                                                                                                         | 124,808 4 5                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 124,808 4 5                                                                            | ..                                                           |                                                                          |
| Waikaka Branch (McNab to Waikaka) ..                                                                                                            | 68,423 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 68,423 0 0                                                                             | ..                                                           |                                                                          |
| Gore to Lumsden ..                                                                                                                              | 112,143 0 0                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 112,143 0 0                                                                            | ..                                                           |                                                                          |
| Edendale to Glenham ..                                                                                                                          | 53,328 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 53,328 0 0                                                                             | ..                                                           |                                                                          |
| Riversdale to Switzers ..                                                                                                                       | 82,304 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 82,304 0 0                                                                             | ..                                                           |                                                                          |
| Seaward Bush to Catlin's (Appleby to Tokanui)                                                                                                   | 185,360 0 0                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 185,360 0 0                                                                            | ..                                                           |                                                                          |
| Otago Central (Wingatui to Cromwell) ..                                                                                                         | 1,435,918 12 6                                               | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 1,435,918 12 6                                                                         | ..                                                           |                                                                          |
| Invercargill to Kingston—                                                                                                                       |                                                              |                                                         |                                                           |                |                  |                      |               |                |                                                      |                                                                                        |                                                              |                                                                          |
| Main Line ..                                                                                                                                    | 361,796 7 3                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | 1,795 10 ±    | ..             | ..                                                   | 363,591 17 7                                                                           | 91,937 0 0                                                   |                                                                          |
| Mararoa Branch (Lumsden to Mossburn)                                                                                                            | 27,362 12 4                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | 145 12 0      | ..             | ..                                                   | 27,508 4 4                                                                             | ..                                                           |                                                                          |
| Winton to Heddon Bush ..                                                                                                                        | 140 0 0                                                      | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 140 0 0                                                                                | ..                                                           |                                                                          |
| Makarawa to Orepuki and Waiau... ..                                                                                                             | 321,435 1 3                                                  | ..                                                      | ..                                                        | ..             | ..               | 24,943 3 7           | ..            | ..             | ..                                                   | 346,378 4 10                                                                           | 37,097 0 0                                                   |                                                                          |
| Thornbury to Wairoa ..                                                                                                                          | 86,275 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | 758 15 11     | ..             | ..                                                   | 87,033 15 11                                                                           | 23,200 0 0                                                   |                                                                          |
| Forest Hill (Winton to Hedgehope) ..                                                                                                            | 23,337 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 23,337 0 0                                                                             | ..                                                           |                                                                          |
| Expenses of Railway Commissions and other Expenditure not chargeable to Individual Lines                                                        | 10,337 0 0                                                   | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 10,337 0 0                                                                             | ..                                                           |                                                                          |
| Surveys of New Lines—                                                                                                                           |                                                              |                                                         |                                                           |                |                  |                      |               |                |                                                      |                                                                                        |                                                              |                                                                          |
| North Island ..                                                                                                                                 | 35,103 8 11                                                  | ..                                                      | ..                                                        | ..             | ..               | 2,979 8 1            | ..            | ..             | ..                                                   | 38,082 17 6                                                                            | ..                                                           |                                                                          |
| Middle Island ..                                                                                                                                | 5,763 0 0                                                    | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 5,763 0 0                                                                              | ..                                                           |                                                                          |
| Rolling-stock ..                                                                                                                                | 9,370,045 17 5                                               | ..                                                      | ..                                                        | ..             | ..               | ..                   | 258,166 15 11 | ..             | ..                                                   | 9,629,859 4 3                                                                          | ..                                                           |                                                                          |
| Suspense Account, being proportion of cost of raising loan of £1,000,000 at 6 per cent. for Railways Authorization Improvement Act 1914 Account | ..                                                           | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | 42,193 3 10                                                                            | ..                                                           |                                                                          |
| Stock of Permanent-way Materials, 31st March, 1924 ..                                                                                           | 200,580 2 2                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | ..                                                                                     | ..                                                           |                                                                          |
| .. .. £200,580 2 2                                                                                                                              |                                                              | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | ..                                                                                     | ..                                                           |                                                                          |
| .. ..                                                                                                                                           | 46,420,885 8 ±                                               | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | ..                                                                                     | ..                                                           |                                                                          |
| Stock of Permanent-way decreased by ..                                                                                                          | 74,628 19 ±                                                  | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | ..                                                                                     | ..                                                           |                                                                          |
| Stock of Permanent-way Materials, 31st March, 1925 ..                                                                                           | £125,951 2 10                                                | ..                                                      | ..                                                        | ..             | ..               | ..                   | ..            | ..             | ..                                                   | ..                                                                                     | ..                                                           |                                                                          |
| Total ..                                                                                                                                        | 46,346,256 9 0                                               | 37,923 18 5                                             | 1,083,200 4 0                                             | 127,235 5 6    | 1,210,435 9 6    | 742,922 6 9          | 315,600 1 2   | 48,577,290 8 0 | 1,787,741 0 0                                        | ..                                                                                     | ..                                                           |                                                                          |

\* Railways Improvement Authorization Act 1914 Account.

† Includes value for £150,000 paid to debenture-holders under the Midland Railway Petitions Settlement Act Amendment Act, 1903.

**TABLE NO. 4.**  
EXPENDITURE OUT OF SEPARATE ACCOUNTS ON WORKS UNDER THE CONTROL OF THE PUBLIC  
WORKS DEPARTMENT.

| Year.             | Loans to Local Bodies Account. Roads to open up Crown Lands. | Opening up Crown Lands for Settlement Account. Roads to open up Crown Lands. | Land for Settlements Account. Opening up Crown Lands for Settlement Account. Roads to open up Crown Lands. | National Endowment Account. Roads to open up National-endowment Lands. | Land for Settlements Account. Roads to open up Land for Settlements. | Waikou and Ohinemuri Rivers Improvement Account. Waikou and Ohinemuri Rivers Improvement. |
|-------------------|--------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
|                   | £                                                            | £                                                                            | £                                                                                                          | £                                                                      | £                                                                    | £                                                                                         |
| 1890-91 .. .. .   | 25,000                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1891-92 .. .. .   | 64,000                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1892-93 .. .. .   | 800                                                          |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
|                   | 89,800*                                                      |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1891-92 .. .. .   | 8,000†                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1892-93 .. .. .   | 29,833†                                                      |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1893-94 .. .. .   | 30,000†                                                      |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1894-95 .. .. .   | 6,114†                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1894-95 .. .. .   | 42,971†                                                      |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1895-96 .. .. .   | 30,057†                                                      |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1896-97 .. .. .   | 31,017                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1897-98 .. .. .   | 18,770                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1898-99 .. .. .   | 16,972                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1899-1900 .. .. . | 31,363                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1900-1 .. .. .    | 37,390                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1901-2 .. .. .    | 31,979                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1902-3 .. .. .    | 18,578                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1903-4 .. .. .    | 25,753                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1904-5 .. .. .    | 28,895                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1905-6 .. .. .    | 38,801                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1906-7 .. .. .    | 47,371                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1907-8 .. .. .    | 38,524                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1908-9 .. .. .    | 54,713                                                       |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1909-10 .. .. .   | 40,507                                                       |                                                                              |                                                                                                            | 4,975                                                                  |                                                                      |                                                                                           |
|                   | 607,608§                                                     |                                                                              |                                                                                                            |                                                                        |                                                                      |                                                                                           |
| 1910-11 .. .. .   |                                                              | 45,691                                                                       |                                                                                                            | 5,619                                                                  |                                                                      |                                                                                           |
| 1911-12 .. .. .   |                                                              | 49,739                                                                       |                                                                                                            | 6,554                                                                  |                                                                      | 3,769                                                                                     |
| 1912-13 .. .. .   |                                                              | 47,951                                                                       |                                                                                                            | 2,689                                                                  |                                                                      | 9,555                                                                                     |
| 1913-14 .. .. .   |                                                              | 63,245                                                                       |                                                                                                            | 4,282                                                                  |                                                                      | 9,633                                                                                     |
| 1914-15 .. .. .   |                                                              |                                                                              | 92,975                                                                                                     | 9,151                                                                  |                                                                      | 10,004                                                                                    |
| 1915-16 .. .. .   |                                                              |                                                                              | 47,974                                                                                                     | 13,344                                                                 |                                                                      | 9,225                                                                                     |
| 1916-17 .. .. .   |                                                              |                                                                              | 24,730                                                                                                     | 6,787                                                                  |                                                                      | 10,407                                                                                    |
| 1917-18 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 43,996                                                               | 12,025                                                                                    |
| 1918-19 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 51,355                                                               | 27,402                                                                                    |
| 1919-20 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 61,692                                                               | 34,806                                                                                    |
| 1920-21 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 28,920                                                               | 62,249                                                                                    |
| 1921-22 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 51,471                                                               | 54,379                                                                                    |
| 1922-23 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 78,350                                                               | 66,708                                                                                    |
| 1923-24 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 49,186                                                               | 70,533                                                                                    |
| 1924-25 .. .. .   |                                                              |                                                                              |                                                                                                            |                                                                        | 23,144                                                               | 53,887                                                                                    |
|                   | 697,408                                                      | 206,626                                                                      | 165,679                                                                                                    | 53,401                                                                 | 388,114                                                              | 434,582                                                                                   |

\* Payment to the Public Works Fund under section 31 of the Government Loans to Local Bodies Act, 1886, in reduction of expenditure under Class "Roads."

† Paid into the Public Works Fund, reducing the expenditure under Class "Roads."

‡ Paid into the Lands Improvement Account (now included in Public Works Fund under Class "Roads"), reducing the expenditure on roads.

§ Expenditure under the Government Loans to Local Bodies Act Amendment Act, 1891.

**TABLE NO. 5.**  
EXPENDITURE ON PUBLIC BUILDINGS OUT OF PUBLIC WORKS FUND TO THE 31ST MARCH, 1925,  
AND THE LIABILITIES ON THAT DATE.

|                                                                                                  | Total Expenditure to 31st March, 1924. | Expenditure for Year ended 31st March, 1925. | Total Expenditure to 31st March, 1925. | Liabilities on Authorities, Contracts, &c., 31st March, 1925. | Total Expenditure and Liabilities. |
|--------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------|----------------------------------------|---------------------------------------------------------------|------------------------------------|
|                                                                                                  | £                                      | £                                            | £                                      | £                                                             | £                                  |
| Judicial* .. .. .                                                                                | 1,232,421                              | 49,090                                       | 1,281,511                              | 3,883                                                         | 1,285,394                          |
| Postal and telegraph .. .. .                                                                     | 1,760,189                              | 65,707                                       | 1,825,896                              | 5,889                                                         | 1,831,785                          |
| Customs .. .. .                                                                                  | 49,441                                 |                                              | 49,441                                 |                                                               | 49,441                             |
| Offices for public Departments .. .. .                                                           | 593,898                                | 20,702                                       | 614,600                                | 1,859                                                         | 616,459                            |
| Mental hospitals .. .. .                                                                         | 1,001,124                              | 68,438                                       | 1,069,562                              | 5,817                                                         | 1,075,379                          |
| Alexandra Depot, Wellington† .. .. .                                                             | 8,084                                  |                                              | 8,084                                  |                                                               | 8,084                              |
| School buildings .. .. .                                                                         | 3,099,302                              | Cr. 905                                      | 3,098,397                              |                                                               | 3,098,397                          |
| Hospitals‡ .. .. .                                                                               | 253,477                                | 28,235                                       | 281,712                                | 794                                                           | 282,506                            |
| Quarantine-stations .. .. .                                                                      | 62,464                                 |                                              | 62,464                                 |                                                               | 62,464                             |
| Parliament Buildings (old buildings) .. .. .                                                     | 76,553                                 |                                              | 76,553                                 |                                                               | 76,553                             |
| Parliament Buildings (new buildings) .. .. .                                                     | 392,342                                | 1,047                                        | 393,389                                |                                                               | 393,389                            |
| Parliament Buildings (alterations to streets, surrounding grounds, and purchase of land) .. .. . | 14,187                                 |                                              | 14,187                                 |                                                               | 14,187                             |
| Government House, Wellington (land and new building) .. .. .                                     | 72,645                                 |                                              | 72,645                                 |                                                               | 72,645                             |
| Agricultural .. .. .                                                                             | 82,482                                 | 2,556                                        | 85,038                                 | 1,323                                                         | 86,361                             |
| Workers' dwellings .. .. .                                                                       | 319,916                                |                                              | 319,916                                |                                                               | 319,916                            |
| Miscellaneous .. .. .                                                                            | 61,806                                 | 9,007                                        | 70,813                                 | 5                                                             | 70,818                             |
| Totals .. .. .                                                                                   | 9,080,331                              | 243,877                                      | 9,324,208                              | 19,570                                                        | 9,343,778                          |

\* Includes Courthouses, prisons, and police-stations.  
included in "Judicial" class.

† Expenditure re Defence requirements only. Other expenditure  
‡ Includes £32,754 previously shown under "Public Health."









TABLE NO. 6—continued.

GENERAL BALANCE-SHEET AT 31ST MARCH, 1925, COMPARED WITH POSITION AT 31ST MARCH, 1924—continued.

| 1923-24.           |    | 1924-25.       |                    | 1923-24.            |             | Assets.                                                             |    | 1924-25.           |             |
|--------------------|----|----------------|--------------------|---------------------|-------------|---------------------------------------------------------------------|----|--------------------|-------------|
| Liabilities.       |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | £<br>3,034,566 17 9 | s. d.<br>.. | Brought forward                                                     | .. | £<br>4,006,226 6 4 | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 4,427 16 10         | s. d.<br>.. | General expenditure not chargeable to any individual scheme         | .. | 4,439 17 8         | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 23,413 2 11         | s. d.<br>.. | Balance in Electric Supply Account at the end of the year—          | .. | 30,479 13 10       | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | ..                  | s. d.<br>.. | Cash in Public Account                                              | .. | 3,598 15 1         | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 29,752 10 10        | s. d.<br>.. | In hands of Government officers in New Zealand                      | .. | 76,447 15 10       | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 53,165 13 9         | s. d.<br>.. | Investment Account (funds invested until actually required for use) | .. | 152,800 0 0        | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 1,053,242 5 6       | s. d.<br>.. | Stamp Duty Deposit Account                                          | .. | 4,239,913 19 10    | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 4,145,402 13 10     | s. d.<br>.. | Interest accrued on investments to 31st March, 1925                 | .. | 4,490 2 1          | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 16,653 14 7         | s. d.<br>.. | Sundry debtors for interest due but unpaid                          | .. | 269 5 3            | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £<br>4,162,065 8 5 | .. | ..             | £<br>4,244,673 7 2 | 9 0 0               | s. d.<br>.. | Total                                                               | .. | 4,759 7 4          | s. d.<br>.. |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
|                    |    |                |                    |                     |             |                                                                     |    |                    |             |
| £4,162,065 8 5     |    | £4,244,673 7 2 |                    | £4,162,065 8 5      |             | Total                                                               |    | £4,244,673 7 2     |             |

J. J. GIBSON,  
Accountant, Public Works Department.

I hereby certify that the balance-sheet has been duly examined and compared with the relative books and documents submitted for audit, and correctly states the position as disclosed thereby, subject to the reservations included in the certificates of the balance-sheets of the separate schemes required in terms of section 6, State Supply of Electrical Energy Act, 1917.—J. H. FOWLER, Deputy Controller and Auditor-General.

TABLE NO. 6—continued.  
WAIKAREMOANA ELECTRIC-POWER SUPPLY.  
PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1925.

| 1923-24.                                                                                                                                                                                                                                                           | 1924-25.                                                                                                                                | 1923-24.                                                                     | 1924-25.                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| £ s. d.<br>4,165 8 0<br>1,408 11 0<br>5,573 19 0<br>3,473 19 0<br>390 5 0<br>£3,864 4 0                                                                                                                                                                            | £ s. d.<br>4,261 1 0<br>1,418 10 0<br>56 7 0<br>£5,735 18 0<br>3,295 12 4<br>3,864 4 0<br>£7,159 16 4                                   | £ s. d.<br>2,100 0 0<br>3,473 19 0<br>£5,573 19 0<br>3,864 4 0<br>£3,864 4 0 | £ s. d.<br>2,440 5 8<br>3,295 12 4<br>£5,735 18 0<br>7,159 16 4<br>£7,159 16 4 |
| To Interest on capital .. ..<br>Depreciation on plant (2 per cent. on value of assets in operation) .. ..<br>Interest on Depreciation Reserve (4 per cent. on £1,408 11s.) .. ..<br>Loss for year, as above .. ..<br>Loss carried forward at 1st April, 1924 .. .. | By Rental of plant leased to Wairoa Power Board .. ..<br>Loss for year .. ..<br>Accumulated loss to date carried to balance-sheet .. .. |                                                                              |                                                                                |

DEPRECIATION RESERVE.

| £ s. d.                                | £ s. d.                                                                                        | £ s. d.                   | £ s. d.                                          |
|----------------------------------------|------------------------------------------------------------------------------------------------|---------------------------|--------------------------------------------------|
| 1,408 11 0<br>£1,408 11 0              | 2,883 8 0<br>£2,883 8 0                                                                        | 1,408 11 0<br>£1,408 11 0 | 1,408 11 0<br>56 7 0<br>1,418 10 0<br>£2,883 8 0 |
| Balance carried to balance-sheet .. .. | By Balance at close of previous year .. ..<br>Interest .. ..<br>Amount reserved for year .. .. |                           |                                                  |

BALANCE-SHEET AT 31ST MARCH, 1925.

| 1923-24.                                                                                               | 1924-25.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1923-24.                                                                                                                                                                                                            | 1924-25.                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| £ s. d.<br>79,583 6 9<br>20 5 3<br>1,408 11 0<br>£81,012 3 0                                           | £ s. d.<br>82,455 5 9<br>2,883 8 0<br>£85,338 13 9                                                                                                                                                                                                                                                                                                                                                                                                                | £ s. d.<br>11,431 10 10<br>18,478 8 0<br>25,443 0 0<br>6,625 1 11<br>278 17 3<br>2,950 15 9<br>1,260 1 5<br>407 18 5<br>1,000 0 0<br>3,053 11 0<br>5,697 14 5<br>76,622 19 0<br>525 0 0<br>3,864 4 0<br>£81,012 3 0 | £ s. d.<br>11,431 10 10<br>18,478 6 2<br>25,905 18 5<br>6,625 1 11<br>278 17 3<br>3,053 0 9<br>1,260 1 5<br>436 17 11<br>1,000 0 0<br>3,146 2 8<br>5,697 14 5<br>77,313 11 9<br>865 5 8<br>7,159 16 4<br>£85,338 13 9 |
| Balance carried to general balance-sheet .. ..<br>Sundry creditors .. ..<br>Depreciation reserve .. .. | Access roads and bridges .. ..<br>Pipe-lines .. ..<br>Power-house building and machinery .. ..<br>Compensation for land .. ..<br>Headworks .. ..<br>Staff cottages .. ..<br>Workmen's huts .. ..<br>Workshop .. ..<br>Loose plant .. ..<br>Telephone-line to Wairoa .. ..<br>Survey, engineering, and office expenses .. ..<br>Interest during construction .. ..<br>Sundry debtors .. ..<br>Balance from Profit and Loss Account: Accumulated loss to date .. .. |                                                                                                                                                                                                                     |                                                                                                                                                                                                                       |

The balance-sheet has been compared with the various supporting books, vouchers, and documents, and found to correspond therewith, but in the opinion of the Audit Office the Depreciation Reserve Account cannot be accepted as complying with the provisions of section 10 of the State Supply of Electrical Energy Act, 1917, which requires the establishment of a depreciation fund; and there is also no authority of law for the charging against Net Revenue Account of interest in respect of Depreciation Reserve moneys.—J. H. FOWLER, Deputy Controller and Auditor-General.





TABLE No. 6—continued.  
LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY—continued.  
PROFIT AND LOSS APPROPRIATION ACCOUNT.

| 1923-24.                | —                                            | 1924-25.              | 1923-24.                         | 1924-25.                                                                               |
|-------------------------|----------------------------------------------|-----------------------|----------------------------------|----------------------------------------------------------------------------------------|
| £ s. d.<br>23,875 16 11 | To Balance from previous year's statement .. | £ s. d.<br>23,172 9 7 | £ s. d.<br>703 7 4<br>23,172 9 7 | By Balance from Net Revenue Account ..<br>Balance to balance-sheet—Accumulated loss .. |
| £23,875 16 11           |                                              | £23,172 9 7           | £23,875 16 11                    | £ s. d.<br>5,433 10 9<br>17,738 18 10                                                  |
|                         |                                              |                       |                                  | £23,172 9 7                                                                            |

DEPRECIATION RESERVE ACCOUNT.

| £ s. d.     | To                                | £ s. d.      | £ s. d.     | £ s. d.                                            |
|-------------|-----------------------------------|--------------|-------------|----------------------------------------------------|
| 2,409 8 11  | Amounts written off—              | ..           | 61,275 8 7  | By Balance from previous year's statement ..       |
| 307 0 0     | Motor-vehicles and tools ..       | ..           | 2,451 0 0   | Interest at 4 per cent. per annum ..               |
| 1,000 0 0   | Powerhouse turbines (renewals) .. | ..           | 12,584 0 0  | Amount set aside as per Net Revenue Account ..     |
| ..          | Feeder mains (renewals) ..        | ..           |             |                                                    |
| 72,593 19 8 | Paparaia Retiulation ..           | 1,470 10 9   |             |                                                    |
|             | Balance to balance-sheet ..       | 88,631 3 0   |             |                                                    |
| £76,310 8 7 |                                   | £91,176 14 8 | £76,310 8 7 | £ s. d.<br>72,593 19 8<br>2,903 15 0<br>15,679 0 0 |



LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY--continued.

BALANCE-SHEET AT 31ST MARCH, 1925.

| 1923-24.     | Liabilities.                               | 1924-25.      |               | 1923-24.     |                                                     | Assets.                                 | 1924-25.     |             |
|--------------|--------------------------------------------|---------------|---------------|--------------|-----------------------------------------------------|-----------------------------------------|--------------|-------------|
| £ s. d.      |                                            | £ s. d.       | £ s. d.       | £ s. d.      |                                                     | Works at Lake Coleridge--               | £ s. d.      | £ s. d.     |
| 72,593 19 8  | Depreciation Reserve Account .. ..         | ..            | 88,631 3 0    | 4,343 8 7    | Land, including fencing and planting ..             | Land, including fencing and planting .. | 4,507 7 5    | 20,703 13 3 |
| 1,659 14 0   | Sundry creditors--                         | 5,656 1 0     |               | 5,317 4 6    | Coalgate Gorge Road ..                              | Service roads ..                        | 8,319 13 9   |             |
| 3,424 11 5   | On open accounts .. ..                     | 9,891 14 0    |               | 7,566 3 8    | Service roads ..                                    | Service telephones ..                   | 7,566 3 8    |             |
| 308 6 8      | On contracts .. ..                         | 512 15 5      |               | 310 8 5      | Service telephones ..                               |                                         | 310 8 5      |             |
| 5,392 12 1   | Payment for current in advance ..          |               | 16,060 10 5   | 17,537 5 2   |                                                     |                                         |              |             |
|              | Balance carried to general balance-sheet-- |               |               |              | Headworks--                                         |                                         |              |             |
| 977,701 18 5 | Total assets as <i>per contra</i> .. ..    | 1,096,261 0 0 |               | 80,148 6 6   | First tunnel, including inlet and outlet works ..   |                                         | 80,520 8 11  |             |
| 77,986 11 9  | Less total liabilities as above .. ..      | 104,691 13 5  |               | 10,333 5 8   | Second tunnel ..                                    |                                         | 71,111 12 1  |             |
| 899,715 6 8  |                                            |               |               | 68,871 1 1   | Pipe-lines ..                                       |                                         | 83,436 14 5  |             |
|              |                                            |               |               | 1,996 16 2   | Tram-lines ..                                       |                                         | 4,453 7 9    |             |
|              |                                            |               |               | 3,469 15 5   | Weir at lake-outlet, gauges, and fencing ..         |                                         | 3,473 19 5   |             |
|              |                                            |               |               | 21,431 18 11 | Harper River diversion works ..                     |                                         | 22,995 13 11 |             |
|              |                                            |               |               | 186,251 3 9  |                                                     |                                         | 265,991 16 6 |             |
|              |                                            |               |               | 25,446 16 2  | Power-house--                                       |                                         |              |             |
|              |                                            |               |               | 95,297 4 4   | Buildings, &c. ..                                   |                                         | 32,444 11 0  |             |
|              |                                            |               |               | 231 2 1      | Machinery, &c. ..                                   |                                         | 96,019 2 0   |             |
|              |                                            |               |               |              | Office furniture, fittings, &c. ..                  |                                         | 231 2 1      |             |
|              |                                            |               |               | 120,975 2 7  |                                                     |                                         | 128,694 15 1 |             |
|              |                                            |               |               | 14,708 15 1  | Accommodation for staff and workmen--               |                                         |              |             |
|              |                                            |               |               |              | Buildings, fencing, &c. ..                          |                                         | 23,463 6 1   |             |
|              |                                            |               |               |              |                                                     |                                         |              |             |
|              |                                            |               |               |              | Transmission-lines--                                |                                         |              |             |
|              |                                            |               |               | 4,599 8 2    | Land ..                                             |                                         | 4,983 14 4   |             |
|              |                                            |               |               | 177,552 5 11 | Power-lines to Christchurch ..                      |                                         | 178,120 19 6 |             |
|              |                                            |               |               | 56,280 19 3  | Power-lines to South Canterbury ..                  |                                         | 57,460 5 8   |             |
|              |                                            |               |               | 2,408 19 8   | Telephone-system ..                                 |                                         | 2,468 13 3   |             |
|              |                                            |               |               |              | Linemen's cottages, depots, tools, and equipment .. |                                         | 3,244 17 3   |             |
|              |                                            |               |               | 3,244 17 3   | Alterations to public telegraph-lines ..            |                                         | 6,588 12 4   |             |
|              |                                            |               |               | 6,588 12 4   | Point Switching Station ..                          |                                         | 9,154 9 6    |             |
|              |                                            |               |               | 9,018 7 3    |                                                     |                                         | 262,021 12 0 |             |
|              |                                            |               |               | 259,693 9 10 |                                                     |                                         |              |             |
|              |                                            |               |               |              | Addington Substation--                              |                                         |              |             |
|              |                                            |               |               |              | Land, including cottages ..                         |                                         | 3,483 0 5    |             |
|              |                                            |               |               |              | Substation buildings ..                             |                                         | 8,481 6 6    |             |
|              |                                            |               |               |              | Machinery, &c. ..                                   |                                         | 32,089 9 5   |             |
|              |                                            |               |               |              | Store buildings and workshops ..                    |                                         | 5,865 14 3   |             |
|              |                                            |               |               |              |                                                     |                                         | 49,919 10 7  |             |
|              |                                            |               |               |              |                                                     |                                         |              |             |
| 977,801 18 5 | Carried forward .. ..                      | ..            | 1,096,261 0 0 | 643,806 6 0  | Carried forward ..                                  |                                         | 750,794 13 6 |             |

TABLE NO. 6—*continued*.  
LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY—*continued*.  
BALANCE-SHEET AT 31ST MARCH, 1925—*continued*.

| 1923-24. |       | 1924-25.   |       | 1923-24. |       | 1924-25.   |       | Assets.                                         |       | 1924-25.   |       |
|----------|-------|------------|-------|----------|-------|------------|-------|-------------------------------------------------|-------|------------|-------|
| £        | s. d. | £          | s. d. | £        | s. d. | £          | s. d. | £                                               | s. d. | £          | s. d. |
| 977,701  | 18 5  | 1,096,261  | 0 0   | 643,806  | 6 0   | 750,794    | 13 6  | Brought forward ..                              | ..    | 7,021      | 16 1  |
|          |       |            |       |          |       |            |       | Primary distribution—                           | ..    | 4,889      | 19 10 |
|          |       |            |       |          |       |            |       | Supply cables—Christchurch City                 | ..    | 7,097      | 13 1  |
|          |       |            |       |          |       |            |       | Christchurch Tramways..                         | ..    | 19,168     | 19 6  |
|          |       |            |       |          |       |            |       | Lytelton ..                                     | ..    | 11,281     | 7 4   |
|          |       |            |       |          |       |            |       | Northern ..                                     | ..    | 4,046      | 14 1  |
|          |       |            |       |          |       |            |       | Southern ..                                     | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Motukarara ..                                   | ..    | 4,961      | 11 3  |
|          |       |            |       |          |       |            |       | Hororata—Darfield                               | ..    | 8,863      | 1 8   |
|          |       |            |       |          |       |            |       | Hororata ..                                     | ..    | 12,378     | 10 10 |
|          |       |            |       |          |       |            |       | Ashburton ..                                    | ..    | 622        | 9 9   |
|          |       |            |       |          |       |            |       | Timaru ..                                       | ..    | 300        | 4 5   |
|          |       |            |       |          |       |            |       | Lightning-arresters ..                          | ..    | 1,516      | 12 8  |
|          |       |            |       |          |       |            |       | Tools and equipment ..                          | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Alterations to public telegraph-lines           | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | ..                                              | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Secondary distribution—                         | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Supply cables and reticulation ..               | ..    | 15,432     | 8 3   |
|          |       |            |       |          |       |            |       | Local substations ..                            | ..    | 26,141     | 16 1  |
|          |       |            |       |          |       |            |       | ..                                              | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Service transformers and meters                 | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Motor-cars, lorries, and cycles, &c. ..         | ..    | 8,910      | 7 3   |
|          |       |            |       |          |       |            |       | Test-room equipment ..                          | ..    | 7,171      | 4 8   |
|          |       |            |       |          |       |            |       | Loose tools, plant, and equipment ..            | ..    | 107        | 9 4   |
|          |       |            |       |          |       |            |       | Public telephones to the lake                   | ..    | 14,870     | 18 10 |
|          |       |            |       |          |       |            |       | Telephones to Christchurch City Council and     | ..    | 1,729      | 3 9   |
|          |       |            |       |          |       |            |       | Tramway Board and local offices..               | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Christchurch office—Furniture and fittings      | ..    | 173        | 19 1  |
|          |       |            |       |          |       |            |       | Engineering, office, and general expenses on    | ..    | 252        | 16 9  |
|          |       |            |       |          |       |            |       | preliminary surveys and during construction     | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Salaries of Engineers and others on preliminary | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | surveys and during construction ..              | ..    | 32,444     | 17 1  |
|          |       |            |       |          |       |            |       | Interest during construction ..                 | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | ..                                              | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Stocks of material, &c., on hand at date        | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Telephone subscriptions, fire insurance, &c.,   | ..    | 1,008,490  | 18 1  |
|          |       |            |       |          |       |            |       | paid in advance ..                              | ..    | 46,695     | 5 11  |
|          |       |            |       |          |       |            |       | Sundry debtors—                                 | ..    | 136        | 8 4   |
|          |       |            |       |          |       |            |       | For current, rent, work carried out, &c. ..     | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Amount misappropriated by clerk in Christ-      | ..    | 22,537     | 3 0   |
|          |       |            |       |          |       |            |       | church office ..                                | ..    | 362        | 5 10  |
|          |       |            |       |          |       |            |       | ..                                              | ..    | ..         | ..    |
|          |       |            |       |          |       |            |       | Balance from Profit and Loss Appropriation      | ..    | 1,078,522  | 1 2   |
|          |       |            |       |          |       |            |       | Account ..                                      | ..    | 17,738     | 18 10 |
|          |       |            |       |          |       |            |       | ..                                              | ..    | ..         | ..    |
| £977,701 | 18 5  | £1,096,261 | 0 0   | £977,701 | 18 5  | £1,096,261 | 0 0   | ..                                              | ..    | £1,096,261 | 0 0   |

The balance-sheet has been compared with the various supporting books, vouchers, and documents, and found to correspond therewith, but in the opinion of the Audit Office the Depreciation Reserve Account cannot be accepted as complying with the provisions of section 10, State Supply of Electrical Energy Act, 1917, which requires the establishment of a depreciation fund, and there is also no authority of law for the charging against Net Revenue Account of interest in respect of Depreciation Reserves moneys.—J. H. FOWLER, Deputy Controller and Auditor-General.

## WAIKATO ELECTRIC-POWER SUPPLY--HORAHOA SCHEME.

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1925, COMPARED WITH YEAR ENDED 31ST MARCH, 1924.

## Gross Revenue Account.

| 1923-24.                                             |       |       | 1924-25. |    |    | 1923-24. |      |    | 1924-25.                                                        |        |       |
|------------------------------------------------------|-------|-------|----------|----|----|----------|------|----|-----------------------------------------------------------------|--------|-------|
| £                                                    | s.    | d.    | £        | s. | d. | £        | s.   | d. | £                                                               | s.     | d.    |
| To Generating expenses, headworks, and power-house—  |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Salaries ..                                          | 2,711 | 19 2  | ..       | .. | .. | 2,706    | 10 0 | .. | By Sales of electrical energy to wholesale consumers ..         | 63,229 | 17 11 |
| Wages ..                                             | 102   | 0 7   | ..       | .. | .. | 121      | 8 5  | .. | Less discounts and rebates ..                                   | 116    | 11 3  |
| Supplies ..                                          | 132   | 10 10 | ..       | .. | .. | 87       | 6 2  | .. |                                                                 |        |       |
| Transport ..                                         | 72    | 18 1  | ..       | .. | .. | 119      | 1 5  | .. |                                                                 |        |       |
| Maintenance and repairs—                             |       |       | ..       | .. | .. |          |      | .. |                                                                 |        |       |
| Headworks and buildings ..                           | 810   | 19 8  | ..       | .. | .. | 662      | 13 2 | .. | Hire of plant ..                                                | 39     | 6 6   |
| Power-house machinery ..                             | 671   | 10 6  | ..       | .. | .. | 435      | 13 2 | .. | Rent of lines ..                                                | 789    | 4 4   |
| Staff village ..                                     | 143   | 19 3  | ..       | .. | .. | 125      | 8 7  | .. | Miscellaneous rents ..                                          | 671    | 2 6   |
| Erection of temporary weir ..                        | 937   | 6 7   | ..       | .. | .. | 981      | 1 7  | .. |                                                                 |        |       |
|                                                      | 5,583 | 4 8   |          |    |    |          |      |    |                                                                 |        |       |
|                                                      | 88    | 6 8   |          |    |    |          |      |    |                                                                 |        |       |
| Power purchased in bulk ..                           |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Main transmission-lines (50,000-volt)—               |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Horoehora to Waikino—                                |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Wages ..                                             | 531   | 1 5   | ..       | .. | .. | 577      | 2 0  | .. | Testing, oil-drying, and repairs for consumers ..               | 553    | 8 9   |
| Repairs and supplies ..                              | 1,013 | 4 11  | ..       | .. | .. | 351      | 15 8 | .. | Fees for inspection of lines and testing of instruments, &c. .. | 17     | 17 0  |
| Transport ..                                         | 181   | 9 9   | ..       | .. | .. | 238      | 1 3  | .. |                                                                 |        |       |
|                                                      | 1,725 | 16 1  |          |    |    |          |      |    |                                                                 |        |       |
|                                                      | 133   | 5 7   |          |    |    |          |      |    |                                                                 |        |       |
| Horoehora to Hamilton—                               |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Wages ..                                             | 25    | 11 3  | ..       | .. | .. | 162      | 2 4  | .. |                                                                 |        |       |
| Repairs and supplies ..                              | 58    | 6 0   | ..       | .. | .. | 34       | 5 7  | .. |                                                                 |        |       |
| Transport ..                                         |       |       | ..       | .. | .. | 64       | 11 6 | .. |                                                                 |        |       |
|                                                      | 217   | 2 10  |          |    |    |          |      |    |                                                                 |        |       |
| Mystery Creek to Te Awamutu—                         |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Wages ..                                             | 86    | 9 10  | ..       | .. | .. | 84       | 7 10 | .. |                                                                 |        |       |
| Repairs and supplies ..                              | 15    | 10 9  | ..       | .. | .. | 26       | 9 1  | .. |                                                                 |        |       |
| Transport ..                                         | 19    | 7 3   | ..       | .. | .. | 23       | 18 4 | .. |                                                                 |        |       |
|                                                      | 121   | 7 10  |          |    |    |          |      |    |                                                                 |        |       |
| Wairongomai to Waihou—                               |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Wages ..                                             | 18    | 16 9  | ..       | .. | .. | 36       | 2 8  | .. |                                                                 |        |       |
| Repairs and supplies ..                              | 8     | 17 2  | ..       | .. | .. | 27       | 5 7  | .. |                                                                 |        |       |
| Transport ..                                         | ..    |       | ..       | .. | .. | 3        | 1 3  | .. |                                                                 |        |       |
|                                                      | 27    | 13 11 |          |    |    |          |      |    |                                                                 |        |       |
| Main substations (50,000-volt)—                      |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Waikino—                                             |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Operating wages (half) ..                            | 590   | 3 10  | ..       | .. | .. | 585      | 10 2 | .. |                                                                 |        |       |
| Repairs to buildings, machinery, &c. ..              | 92    | 10 11 | ..       | .. | .. | 280      | 4 11 | .. |                                                                 |        |       |
|                                                      | 682   | 14 9  |          |    |    |          |      |    |                                                                 |        |       |
| Hamilton—                                            |       |       |          |    |    |          |      |    |                                                                 |        |       |
| Operating wages ..                                   | 178   | 19 5  | ..       | .. | .. | 246      | 3 3  | .. |                                                                 |        |       |
| Repairs and supplies to buildings, machinery, &c. .. | 27    | 4 6   | ..       | .. | .. | 31       | 15 5 | .. |                                                                 |        |       |
| Maintenance yards, workshops, &c. ..                 | 35    | 1 7   | ..       | .. | .. | 76       | 10 7 | .. |                                                                 |        |       |
| Repairs, tools, and instruments ..                   | 19    | 13 2  | ..       | .. | .. | 28       | 12 2 | .. |                                                                 |        |       |
|                                                      | 260   | 18 8  |          |    |    |          |      |    |                                                                 |        |       |
|                                                      | 8,707 | 5 5   |          |    |    |          |      |    |                                                                 |        |       |
| Carried forward ..                                   |       |       |          |    |    |          |      |    |                                                                 |        |       |
|                                                      |       |       |          |    |    |          |      |    | Carried forward ..                                              |        |       |
|                                                      |       |       |          |    |    |          |      |    |                                                                 | 65,184 | 5 9   |

TABLE NO. 6—continued.

## WAIKATO ELECTRIC-POWER SUPPLY—HORAHORA SCHEME—continued.

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1925, COMPARED WITH YEAR ENDED 31ST MARCH, 1924—continued.

## Gross Revenue Account—continued.

| 1923-24.   | —                                                       | 1924-25.   | 1923-24.    | —                       | 1924-25.   |
|------------|---------------------------------------------------------|------------|-------------|-------------------------|------------|
| £ s. d.    |                                                         | £ s. d.    | £ s. d.     |                         | £ s. d.    |
| 8,707 5 5  | Brought forward .. .. .                                 | 9,372 14 9 | 59,923 16 4 | Brought forward .. .. . | 65,184 5 9 |
| 258 17 6   | Main substations (50,000 volt)—continued.               |            |             |                         |            |
| 15 5 5     | Te Awamutu—                                             | 310 16 10  |             |                         |            |
|            | Operating wages .. .. .                                 |            |             |                         |            |
| 274 2 11   | Repairs and supplies to building and machinery .. .. .  |            |             |                         |            |
| 148 18 0   | Waihou—                                                 |            |             |                         |            |
| 35 19 4    | Operating wages .. .. .                                 |            |             |                         |            |
| 184 17 4   | Repairs and supplies to buildings and machinery .. .. . |            |             |                         |            |
| 37 18 11   | Distribution substations (11,000 volt)—                 | 341 11 4   |             |                         |            |
|            | Wages, repairs, and supplies .. .. .                    |            |             |                         |            |
|            | Distribution lines (11,000 volt)—                       | 35 17 1    |             |                         |            |
| 132 16 10  | Horahora—Hamilton—Frankton—                             |            |             |                         |            |
| 31 1 8     | Wages .. .. .                                           |            |             |                         |            |
| 60 12 3    | Repairs and supplies .. .. .                            |            |             |                         |            |
| 2 0 0      | Transport .. .. .                                       |            |             |                         |            |
|            | Waikino—Waihi .. .. .                                   |            |             |                         |            |
| 226 10 9   | Transmission and distribution general in                | 310 5 2    |             |                         |            |
|            | Horahora—Hamilton area—                                 |            |             |                         |            |
| 687 10 6   | Salaries .. .. .                                        |            |             |                         |            |
| 2 0 0      | Expenses .. .. .                                        |            |             |                         |            |
| 115 6 10   | Transport .. .. .                                       |            |             |                         |            |
| 804 17 4   |                                                         | 876 11 0   |             |                         |            |
|            | Management and general—                                 |            |             |                         |            |
| 960 2 1    | Salaries, wages, and audit fees .. .. .                 |            |             |                         |            |
| 220 15 8   | Accident insurance, sick and holiday pay .. .. .        |            |             |                         |            |
| 305 12 9   | Travelling-expenses and motor-cars .. .. .              |            |             |                         |            |
| 149 1 0    | Postages, telegrams, and telephones .. .. .             |            |             |                         |            |
| 28 7 6     | Fire insurance .. .. .                                  |            |             |                         |            |
| 10 10 0    | Legal expenses .. .. .                                  |            |             |                         |            |
| 112 3 10   | Printing, stationery, and advertising .. .. .           |            |             |                         |            |
| 233 14 0   | Office rent, cleaning, and lighting .. .. .             |            |             |                         |            |
| 53 16 11   | Experimental testing .. .. .                            |            |             |                         |            |
| 23 14 5    | Miscellaneous expenses .. .. .                          |            |             |                         |            |
| 29 10 3    | Fire damage, Hamilton office .. .. .                    |            |             |                         |            |
| 2,127 8 5  |                                                         | 2,343 8 4  |             |                         |            |
| 12,363 1 1 | Carried forward .. .. .                                 |            |             |                         |            |
|            |                                                         | 13,591 4 6 | 59,923 16 4 |                         | 65,184 5 9 |



TABLE NO. 6—continued.  
WAIKATO ELECTRIC-POWER SUPPLY.—HORAHORA SCHEME.—continued.  
DEPRECIATION RESERVE ACCOUNT.

| 1923-24.                                         | —                                                                                                                      | 1924-25.                                                           | 1923-24.                                                        | —                                                                                                                    | 1924-25.                                                        |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| £ s. d.<br>.. 6 2<br>24,831 14 8<br>£27,663 0 10 | To Amount written off for temporary works<br>Amount written off for depreciation of stocks<br>Balance to balance-sheet | £ s. d.<br>1,869 10 6<br>2,031 6 11<br>31,680 16 7<br>£35,581 14 0 | £ s. d.<br>16,605 7 10<br>664 4 0<br>10,393 9 0<br>£27,663 0 10 | By Balance at close of previous year<br>Interest for year .. ..<br>Amount set aside as per Net Revenue Account .. .. | £ s. d.<br>24,831 14 8<br>993 5 0<br>9,756 14 4<br>£35,581 14 0 |

SINKING FUND ACCOUNT.

|                                      |                             |                                      |                                                        |                                                                                                                                                                          |                                                                |
|--------------------------------------|-----------------------------|--------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| £ s. d.<br>12,718 0 0<br>£12,718 0 0 | To Balance to balance-sheet | £ s. d.<br>16,983 5 1<br>£16,983 5 1 | £ s. d.<br>.. ..<br>12,718 0 0<br>.. ..<br>£12,718 0 0 | By Balance at close of previous year<br>Amount set aside as per Profit and Loss Appropriation Account .. ..<br>Accrued interest on investments at 31st March, 1925 .. .. | £ s. d.<br>12,718 0 0<br>4,138 13 7<br>126 11 6<br>£16,983 5 1 |
|--------------------------------------|-----------------------------|--------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|

RESERVE FUND ACCOUNT.

|                           |                             |                                        |                           |                                                                        |                                        |
|---------------------------|-----------------------------|----------------------------------------|---------------------------|------------------------------------------------------------------------|----------------------------------------|
| £ s. d.<br>.. ..<br>.. .. | To Balance to balance-sheet | £ s. d.<br>20,547 12 1<br>£20,547 12 1 | £ s. d.<br>.. ..<br>.. .. | By Amount set aside as per Profit and Loss Appropriation Account .. .. | £ s. d.<br>20,547 12 1<br>£20,547 12 1 |
|---------------------------|-----------------------------|----------------------------------------|---------------------------|------------------------------------------------------------------------|----------------------------------------|



TABLE No. 6—continued.  
 WAIKATO ELECTRIC-POWER SUPPLY.—HORAHORA SCHEME—continued.  
 BALANCE-SHEET AT 31ST MARCH, 1925.

| 1923-24.                                                                                                                                                                                                                                 |              | 1924-25.     |              | 1923-24.        |                                                                                                                                                                                                                               | 1924-25.     |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------|
| Liabilities.                                                                                                                                                                                                                             |              | Assets.      |              |                 |                                                                                                                                                                                                                               |              |       |
| Electric-supply Account—<br>Balance carried to general balance-sheet<br>Sundry creditors ..<br>Depreciation reserve ..<br>Sinking Fund ..<br>Reserve Fund ..<br><br>Balance from Profit and Loss Appropriation Account—<br>Net profit .. | £            | s. d.        | £            | s. d.           | Works, &c., at Horahora—<br>Roads and bridges ..<br>Land and fencing ..<br>Accommodation for staff and workmen ..<br>Headworks ..<br>Generating-station ..<br>Transformer building and machinery ..<br>Tools and equipment .. | £            | s. d. |
|                                                                                                                                                                                                                                          | 462,484 14 4 | 488,098 18 9 | 2,168 5 9    | 2,168 5 9       | ..                                                                                                                                                                                                                            | 2,168 5 9    | ..    |
|                                                                                                                                                                                                                                          | 8,673 10 9   | 7,957 2 3    | 1,039 15 3   | 1,039 15 3      | ..                                                                                                                                                                                                                            | 1,039 15 3   | ..    |
|                                                                                                                                                                                                                                          | 24,831 14 8  | 31,680 16 7  | 11,053 17 2  | 11,353 17 2     | ..                                                                                                                                                                                                                            | 11,353 17 2  | ..    |
|                                                                                                                                                                                                                                          | 12,718 0 0   | 16,983 5 1   | 134,797 0 1  | 158,112 15 4    | ..                                                                                                                                                                                                                            | 158,112 15 4 | ..    |
|                                                                                                                                                                                                                                          | ..           | 20,547 12 1  | 64,483 10 3  | 72,640 18 0     | ..                                                                                                                                                                                                                            | 72,640 18 0  | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 32,244 6 6   | 39,487 17 6     | ..                                                                                                                                                                                                                            | 39,487 17 6  | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 905 15 3     | 1,430 8 3       | ..                                                                                                                                                                                                                            | 1,430 8 3    | ..    |
|                                                                                                                                                                                                                                          | 3,493 19 3   | ..           | 246,692 10 3 | 286,233 17 3    | ..                                                                                                                                                                                                                            | 286,233 17 3 | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | ..           | ..              | ..                                                                                                                                                                                                                            | ..           | ..    |
| Carried forward ..                                                                                                                                                                                                                       | £            | s. d.        | £            | s. d.           | Transmission-lines (50,000 volt)—<br>Horahora-Waihi ..<br>Horahora-Hamilton ..<br>Mystery Creek - Te Awamutu ..<br>Te Awamutu-Hangatiki ..<br>Wairongomai-Waihou ..<br>Waihou-Hamilton ..<br>Linemen's cottages ..            | £            | s. d. |
|                                                                                                                                                                                                                                          | 512,201 19 0 | 565,267 14 9 | 38,460 1 3   | 38,460 1 3      | ..                                                                                                                                                                                                                            | 38,460 1 3   | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 22,190 10 10 | 22,221 10 5     | ..                                                                                                                                                                                                                            | 22,221 10 5  | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 7,556 9 9    | 7,559 9 9       | ..                                                                                                                                                                                                                            | 7,559 9 9    | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | ..           | 1,241 3 8       | ..                                                                                                                                                                                                                            | 1,241 3 8    | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 4,561 6 6    | 4,561 6 6       | ..                                                                                                                                                                                                                            | 4,561 6 6    | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 138 19 2     | 138 19 2        | ..                                                                                                                                                                                                                            | 138 19 2     | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 1,003 17 6   | 1,479 3 1       | ..                                                                                                                                                                                                                            | 1,479 3 1    | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 73,911 5 0   | 75,661 13 10    | ..                                                                                                                                                                                                                            | 75,661 13 10 | ..    |
|                                                                                                                                                                                                                                          | ..           | ..           | 320,603 15 3 | 361,895 11 1    | ..                                                                                                                                                                                                                            | 361,895 11 1 | ..    |
| Carried forward ..                                                                                                                                                                                                                       | ..           | ..           | ..           | Carried forward | ..                                                                                                                                                                                                                            | ..           |       |

TABLE NO. 6—continued.  
 WAIKATO ELECTRIC-POWER SUPPLY.—HORAHORA SCHEME—continued.  
 BALANCE-SHEET AT 31ST MARCH, 1925—continued.

| 1923-24.      | Liabilities.       | 1924-25.      |       | Assets.                                                                     | 1924-25.     |               |
|---------------|--------------------|---------------|-------|-----------------------------------------------------------------------------|--------------|---------------|
|               |                    | £             | s. d. |                                                                             | £            | s. d.         |
| 512,201 19 0  | Brought forward .. | ..            | ..    | Brought forward ..                                                          | ..           | ..            |
|               |                    |               |       | Main substations (50,000-volt)—                                             |              |               |
|               |                    |               |       | Waikato ..                                                                  | 20,719 18 6  |               |
|               |                    |               |       | Hamilton ..                                                                 | 7,836 15 6   |               |
|               |                    |               |       | Te Awamutu ..                                                               | 5,478 14 1   |               |
|               |                    |               |       | Waihou ..                                                                   | 7,230 16 3   |               |
|               |                    |               |       |                                                                             |              | 41,266 4 4    |
|               |                    |               |       | Distribution-lines (11,000-volt)—                                           |              |               |
|               |                    |               |       | Horahora-Frankton ..                                                        | 33,155 11 3  |               |
|               |                    |               |       | Waihi Grand Junction Company line ..                                        | 704 11 11    |               |
|               |                    |               |       | Waikato-Waihi ..                                                            | 6,000 0 0    |               |
|               |                    |               |       |                                                                             |              | 39,860 3 2    |
|               |                    |               |       | Distribution substations (11,000-volt)                                      |              |               |
|               |                    |               |       | Land at Ruakura ..                                                          | 7,406 1 11   |               |
|               |                    |               |       | Stores buildings and fittings and railway-siding, Ruakura ..                | 3,975 11 9   |               |
|               |                    |               |       | Staff residences, Ruakura ..                                                | 7,365 7 2    |               |
|               |                    |               |       | Loose tools and equipment ..                                                | 3,511 19 9   |               |
|               |                    |               |       | Motor lorries, cars, and cycles ..                                          | 3,256 13 11  |               |
|               |                    |               |       | Office furniture, Hamilton ..                                               | 4,035 6 10   |               |
|               |                    |               |       | Office accommodation ..                                                     | 648 2 2      |               |
|               |                    |               |       | Engineering, office, and general expenses on surveys and on construction .. | 218 19 9     |               |
|               |                    |               |       | Salaries of officers on surveys and on construction ..                      | 7,266 6 2    |               |
|               |                    |               |       | Interest during construction ..                                             | 12,400 8 2   |               |
|               |                    |               |       |                                                                             | 29,865 16 11 |               |
|               |                    |               |       |                                                                             |              | 79,950 14 6   |
|               |                    |               |       | General stocks of material on hand ..                                       | ..           |               |
|               |                    |               |       | Debtors—                                                                    |              |               |
|               |                    |               |       | For electricity and sales of material ..                                    | 14,077 1 11  |               |
|               |                    |               |       | For payments in advance ..                                                  | 18 5 11      |               |
|               |                    |               |       |                                                                             |              | 14,095 7 10   |
|               |                    |               |       | Sinking Fund Investment ..                                                  | 12,000 0 0   |               |
|               |                    |               |       | Interest accrued on Sinking Fund ..                                         | 126 11 6     |               |
|               |                    |               |       | In hands of Treasury ..                                                     | 108 10 2     |               |
|               |                    |               |       |                                                                             |              | 12,235 1 8    |
| £512,201 19 0 |                    | £512,201 19 0 |       |                                                                             |              | £565,267 14 9 |

The balance-sheet has been compared with the various supporting books, vouchers, and documents, and found to correspond therewith, but in the opinion of the Audit Office the Depreciation Reserve Account cannot be accepted as complying with the provisions of section 10, State Supply of Electrical Energy Act, 1917, which requires the establishment of a depreciation fund, and there is also no authority of law for the charging against Net Revenue Account of interest in respect of Depreciation Reserve moneys.—J. H. FOWLER, Deputy Controller and Auditor-General.

TABLE NO. 7.  
IRRIGATION AND WATER-SUPPLY.  
SCHEDULE OF SCHEMES COMPLETED OR UNDER CONSTRUCTION.

| Scheme.                             | Source of Supply.                                           | River Discharge <sup>(1)</sup> (Minimum). | Main Canal Discharge (Maximum). |                 | Average Rainfall from Records available. | Rainfall, 1924. | Area commanded (Gross). | Area irrigated at Present. | Works authorized. |                 | Works completed. |                 | Expenditure to 31st March, 1925. | Estimate to complete. | Remarks.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------|-------------------------------------------------------------|-------------------------------------------|---------------------------------|-----------------|------------------------------------------|-----------------|-------------------------|----------------------------|-------------------|-----------------|------------------|-----------------|----------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |                                                             |                                           | As per Design.                  | During 1924-25. |                                          |                 |                         |                            | Main Canals.      | Distributaries. | Main Canals.     | Distributaries. |                                  |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Steward Settlement                  | Waitaki River ..                                            | Cusecs. ..                                | Cusecs. 110                     | Cusecs. ..      | Inches. 20-31 (Steward Settlement)       | Inches. 14-16   | Acres. 18,000           | Acres. ..                  | M. ch. 14 60      | M. ch. 50 31    | M. ch. 14 60     | M. ch. 50 31    | £ 12,115                         | £ ..                  | Completed.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Otekaike                            | Otekaike River ..                                           | 9                                         | 15                              | ..              | 21-48 (Duntroon)                         | 22-62           | 1,500                   | 800                        | 14 37             | 3 47            | 14 37            | 3 47            | 3,631                            | ..                    | Completed. Used only on west side of river.                                                                                                                                                                                                                                                                                                                                                                                                             |
| Ida Valley                          | Manorburn, Poolburn, and Moa Creek. (Storage Manorburn Dam) | ..                                        | 110                             | 101             | 15-64 (Moa Ck.)                          | 15-72           | 28,918                  | 7,929                      | 73 0              | 54 0            | 73 0             | 29 20           | 164,153                          | 5,938                 | About 20,000 acres can now receive partial irrigation equal to one-third complete irrigation, the balance being land that either does not require irrigation or benefits indirectly through irrigation of the balance. To provide further water for its complete irrigation further conservation-works would be necessary. These have been investigated, and as they appear to be excessive in cost, nothing further is now proposed in that direction. |
| Galloway                            | Manorburn Dam ..                                            | ..                                        | 15                              | 11              | 13-77 (Galloway)                         | 14-32           | 2,250                   | 1,949                      | 10 50             | 4 0             | 10 50            | 6 47            | 21,660                           | 245                   | Completed. Orig. Terrace scheme now reduced in area and amalgamated with Galloway.                                                                                                                                                                                                                                                                                                                                                                      |
| Manuherikia - Alexandra-Clyde No. 1 | Manuherikia River                                           | 77                                        | 100                             | 40              | 15-62 (Alexandra, Ophir, and Clyde)      | 16-68           | 11,000                  | 2,462                      | 23 0              | 41 0            | 23 0             | 43 58           | 211,597                          | 5,085                 | Enlargement of main race will be completed in time to give full supply over whole area by 1st September, 1925.                                                                                                                                                                                                                                                                                                                                          |
| Ardgour ..                          | Lindis River ..                                             | 40                                        | 20                              | 20              | 18-91 (Tarras)                           | 20-92           | 2,000                   | 1,416                      | 13 0              | 2 40            | 13 0             | 2 40            | 32,847                           | 412                   | Completed.                                                                                                                                                                                                                                                                                                                                                                                                                                              |

TABLE NO. 7—continued.  
IRRIGATION AND WATER-SUPPLY—continued.  
SCHEDULE OF SCHEMES COMPLETED OR UNDER CONSTRUCTION—continued.

| Scheme.                                       | Source of Supply.                         | River Discharge (Minimum). | Main Canal Discharge (Maximum). |         | Average Rainfall from Records available. | Rainfall 1924. | Area commanded (Gross). | Area irrigated at Present. | Works authorized. |                 | Works completed. |                 | Expenditure to 31st March, 1925. | Estimate to complete. | Remarks.                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------|-------------------------------------------|----------------------------|---------------------------------|---------|------------------------------------------|----------------|-------------------------|----------------------------|-------------------|-----------------|------------------|-----------------|----------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                               |                                           |                            | As per Design.                  | Cusecs. | Inches.                                  |                |                         |                            | M. ch.            | Distributaries. | M. ch.           | Distributaries. |                                  |                       |                                                                                                                                                                                                                                                                                                      |
| Earnsclough (Fraser River)                    | Fraser River                              | Cusecs. 10                 | 20                              | 20      | Inches. 14.10 (Earnsclough)              | 16.15          | 2,743                   | 1,194                      | M. ch. 4 30       | M. ch. 12 10    | M. ch. 4 30      | M. ch. 17 30    | £ 8,855                          | £ 4,320               | Half of scheme completed and working. Being extended to command 2,400 acres with 1 cusec to 300 acres at driest times. Two cusecs of water is allocated free to original settlement of 343 acres. If better irrigation required a storage dam or hydro-electric pumping will have to be resorted to. |
| Last Chance (Fruitlands and Earnsclough Tops) | Shingle, Gorge, and Coal Creeks           | 14                         | 20                              | 10      | 13.88 (Earnsclough and Roxburgh East)    | 15.20          | 4,300                   | 1,217                      | 22 0              | 1 0             | 20 78            | 4 70            | 22,584                           | 2,689                 | All of Fruitlands district now supplied with water, and extension towards Earnsclough Tops proceeding. Water available will irrigate 1,100 acres south of Butcher's Creek, and partially irrigate 2,400 acres of land available for settlement north of Butcher's Creek.                             |
| Tarras ..                                     | Landis River ..                           | 40                         | 70                              | 10      | 18.91 (Tarras)                           | 20.92 (Tarras) | 7,000                   | 320                        | 13 16             | 15 60           | 16 70            | 5 15            | 104,184                          | 13,513                | Under construction. Practically all settlers will be supplied next season.                                                                                                                                                                                                                           |
| Bengerburn ..                                 | Bengerburn ..                             | 1                          | 4                               | 4       | ..                                       | ..             | 1,000                   | 104                        | 2 06              | ..              | 2 06             | ..              | 722                              | 130                   | Completed. Supplying domestic and irrigation requirements.                                                                                                                                                                                                                                           |
| Teviot River ..                               | Teviot River and Lake Onslow dam (estim.) | 40                         | 80                              | 20      | 13.66 (Roxburgh East)                    | 14.25          | 3,300                   | 2,506                      | 16 51             | 10 00           | 16 51            | 10 55           | 34,892                           | 2,915                 | Practically completed, and will supply all settlers next season from 1st September, 1925. Has been slightly extended to include some lands south of Teviot River.                                                                                                                                    |

TABLE N O.7—continued.  
IRRIGATION AND WATER-SUPPLY—continued.  
SCHEDULE OF SCHEMES UNDER INVESTIGATION.

| Scheme.                                 | Source of Supply.                                                            | River Discharge (Minimum). | Main Canals Discharge (Maximum), as per Design. | Average Rainfall from Records available.  | Rainfall, 1924. | Area commanded (gross). | Length of Main Canal. | Length of Distributaries. | Expenditure to 31st March, 1925. | Estimate to complete. | Remarks.                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------|------------------------------------------------------------------------------|----------------------------|-------------------------------------------------|-------------------------------------------|-----------------|-------------------------|-----------------------|---------------------------|----------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maniototo (Upper Taieri)                | Taieri River and storage dam                                                 | Cusecs. 25                 | Cusecs. 500                                     | Inches. 17.50 (Waipiatea)                 | Inches. 18.61   | Acres. 100,000          | Miles. 60             | Miles. ..                 | £ 179                            | £ ..                  | Modified scheme for complete irrigation of 5,000 acres is possible without storage, or for reasonable partial irrigation of 15,000 acres.                                                                                                                                                                                                                                                                   |
| Cronwell Flat and Lowburn (Roaring Meg) | Roaring Meg Stream (gravity), Kawarau River (pumping)                        | 29<br>3,000                | 40                                              | 21.10 (Luggate)                           | 20.97           | 15,000                  | 10                    | 30                        | 1,814                            | 39,700                | Roaring Meg Scheme: This will irrigate 3,750 acres, and may be reduced in cost by charging £11,350 to possible hydro-electric-power development. Kawarau River: A private company is developing this portion of scheme. A survey party is engaged investigating alternative proposals for taking part of Roaring Meg water to Mount Pisa Settlement lands. This may alter estimate. Survey about completed. |
| Upper Manuherikia                       | Manuherikia and Dunstan Rivers and storage dam in Manuherikia River at Falls | 77                         | 355                                             | 18.76 (Clyde, Ophir, and Blackstone Hill) | 21.02           | 96,000                  | 130                   | ..                        | 3,889                            | 866,360               | Survey has been proceeding for several years, and general report just completed. Of the gross area of 96,000 acres, 64,000 acres are estimated to be actually suitable for irrigation. The full development of this scheme involves the construction of a storage dam, estimated to cost £250,000, but some of this cost would be borne by the Hawkdun and Scandinavian schemes.                            |
| Hawkdun (formerly Mount Ida)            | Tributaries of Manuherikia River and Eweburn Reservoir                       | ..                         | 50                                              | 23.91 (Eweburn, Naseby)                   | 27.14           | 10,000                  | ..                    | ..                        | 720                              | 50,000                | For lands in Upper Idaburn to Naseby. Includes £19,000 towards cost of Falls dam, Upper Manuherikia scheme, and £11,000 for value of present works.                                                                                                                                                                                                                                                         |
| Arrow River                             | Arrow River ..                                                               | 55                         | 48                                              | 25.70 (Frankton)                          | 26.26           | 6,536                   | 17                    | 24                        | 406                              | 93,598                | To irrigate Arrow Flats, Miller's Flat, Speargrass Flat, and Frankton. Formation of an irrigation district under the Public Works Act is under close consideration by settlers and Department. Survey in hand.                                                                                                                                                                                              |
| Hawea Flats (first alternative)         | Timaru Creek (gravity)                                                       | 20                         | 30                                              | 24.89 (Hawea Flat)                        | 30.73           | 4,000                   | 11                    | 20                        | 21                               | 41,470                | To irrigate lower flat only.                                                                                                                                                                                                                                                                                                                                                                                |

TABLE NO. 7—*continued*.  
IRRIGATION AND WATER-SUPPLY—*continued*.  
SCHEDULE OF SCHEMES UNDER INVESTIGATION—*continued*.

| Scheme.                         | Source of Supply.                                      | River Discharge (Minimum). | Main Canals Discharge (Maximum), as per Design. | Average Rainfall from Records available. | Rainfall, 1924. | Area commanded (Gross). | Length of Main Canal. | Length of Distributaries. | Expenditure to 31st March, 1925. | Estimate to complete. | Remarks.                                                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------|----------------------------|-------------------------------------------------|------------------------------------------|-----------------|-------------------------|-----------------------|---------------------------|----------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hawea Flats (later alternative) | Hawea River (pumping)                                  | Cusecs. ..                 | Cusecs. ..                                      | Inches. 24.89 (Hawea Flat)               | Inches. 30.73   | Acres. 17,600           | Miles. ..             | Miles. ..                 | £ ..                             | £ 71,720              | Latest tentative proposal. Electric power not necessary, but water to be pumped by direct application of power generated by low-pressure turbines at outlet of Lake Hawea. This appears preferable to alternative No. 1, and appears to be a promising scheme. Further closer survey and estimates are necessary. |
| Chapman's Gully ..              | Butcher's Creek, Conroy's Creek, and storage dam       | ..                         | ..                                              | 15.01 (Alexandra)                        | 16.65           | 100                     | ..                    | ..                        | 16                               | 1,165                 | May yet be amalgamated with Last Chance scheme or possible scheme from Conroy's Gully. ..                                                                                                                                                                                                                         |
| Bendigo Flat ..                 | Lindis River and storage dam                           | 40                         | 30                                              | 18.91 (Tarras)                           | 20.92           | 3,000                   | 7                     | ..                        | ..                               | ..                    | To irrigate Teviot and Ettrick. Involves enlargement of Lake Onslow dam. Some further investigations made, and survey expected to be commenced next spring.                                                                                                                                                       |
| * Teviot River Extension        | Teviot River and Lake Onslow dam                       | 40                         | 80                                              | 13.66 (Roxburgh East)                    | 14.25           | 13,400                  | ..                    | ..                        | ..                               | ..                    | Proposed to utilize abandoned race of Island Block Extended Gold-mining Company. A new and promising proposal. Survey completed.                                                                                                                                                                                  |
| Miller's Flat ..                | Minzionburn ..                                         | 6                          | ..                                              | ..                                       | ..              | 2,000                   | ..                    | ..                        | 79                               | ..                    | To supply water to part of Mount Pisa Settlement lands. Survey about completed.                                                                                                                                                                                                                                   |
| Luggate Bura ..                 | Luggate Burn ..                                        | 6 (after existing rights)  | 12                                              | 21.10 (Luggate)                          | 20.97           | 1,200                   | ..                    | ..                        | ..                               | ..                    | For lands about St. Bathans. Includes £12,000 towards cost of Falls dam, Upper Manuhierika scheme.                                                                                                                                                                                                                |
| Scandinavian ..                 | Tributaries of Manuhierika River and Eweburn Reservoir | ..                         | 20                                              | 28.30 (St. Bathans)                      | 31.57           | 4,000                   | ..                    | ..                        | ..                               | 50,000                |                                                                                                                                                                                                                                                                                                                   |

\* Put under Teviot River scheme above with which it will be ultimately amalgamated.

TABLE NO. 8.  
IRRIGATION AND WATER-SUPPLY : SCHEMES IN OPERATION.  
IDA VALLEY AND GALLOWAY SCHEMES.  
PROFIT AND LOSS ACCOUNT.  
*Gross Revenue Account.*

| 1923-24.                                                                            | —                                                                                                                                                                                                                                                                                                    | 1924-25.                                                                                         | 1923-24.                                               | 1924-25.                                            |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------|
| £ s. d.<br>89 0 0<br>1,789 5 6<br><br>268 16 8<br>10 0 0<br>973 16 7<br>£3,130 18 9 | To Management and operation—<br>Ida Valley section—<br>Salaries .. ..<br>Wages, horse allowances, and other costs of maintenance .. ..<br>Galloway section—<br>Salaries .. ..<br>Wages, horse allowances, and other costs of maintenance .. ..<br>Office rent .. ..<br>Gross profit on working .. .. | £ s. d.<br>213 0 4<br>1,631 7 8<br><br>47 12 0<br>373 15 4<br>10 0 0<br>2,329 2 3<br>£4,604 17 7 | £ s. d.<br>3,130 18 9<br>.. ..<br>.. ..<br>£3,130 18 9 | £ s. d.<br>4,048 7 9<br>566 9 10<br><br>£4,604 17 7 |

*Net Revenue Account.*

| 1923-24.                                                | —                                                                                                                                                                                                                                                                           | 1924-25.                                               | 1923-24.                                         | 1924-25.                                            |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------|
| £ s. d.<br>3,871 1 6<br>6 0 3<br>73 13 4<br>£3,860 15 1 | To Interest on capital outlay ( $4\frac{1}{2}$ per cent. per annum on £178,545 7s. 10d.; one-half charged against revenue and one-half against capital) .. ..<br>Interest on depreciation reserve .. ..<br>Depreciation Reserve Account (1·05235 per cent. on £7,000) .. .. | £ s. d.<br>4,017 5 5<br>9 4 0<br>73 13 4<br>£4,100 2 9 | £ s. d.<br>973 16 7<br>2,886 18 6<br>£3,860 15 1 | £ s. d.<br>2,329 2 3<br>1,771 0 6<br><br>£4,100 2 9 |



TABLE NO. 8—continued.  
DEPRECIATION RESERVE ACCOUNT.

| 1923-24.            | —       | 1924-25.            | 1923-24.           | —                                                   | 1924-25.            |
|---------------------|---------|---------------------|--------------------|-----------------------------------------------------|---------------------|
| £ s. d.<br>229 19 2 | .. .. . | £ s. d.<br>312 16 6 | £ s. d.<br>150 5 7 | By Balance at 31st March, 1924 .. .. .              | £ s. d.<br>229 19 2 |
|                     |         |                     | 6 0 3              | Interest at 4 per cent. per annum .. .. .           | 9 4 0               |
|                     |         |                     | 73 13 4            | Amount set aside as per Net Revenue Account .. .. . | 73 13 4             |
| £229 19 2           |         | £312 16 6           | £229 19 2          |                                                     | £312 16 6           |

GENERAL BALANCE-SHEET AS AT 31ST MARCH, 1925.

| 1923-24.                                                               | Liabilities.                                                                                                                                                                                                                                              | 1924-25.                                                                  | 1923-24.                                                                                                                                                                                | Assets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1924-25.                                                                                                                                                                                                                    |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| £ s. d.<br>178,545 7 10<br>20,967 13 8<br>229 19 2<br>368 7 1<br>2 0 0 | Public Works Fund—Capital expenditure to 31st March, 1925 ..<br>Consolidated Fund—Excess of maintenance and interest charges over receipts .. .. .<br>Depreciation Reserve Account .. .. .<br>Sundry creditors—<br>Ida Valley .. .. .<br>Galloway .. .. . | £ s. d.<br>185,813 2 2<br>27,984 2 2<br>312 16 6<br>602 9 11<br>138 17 11 | £ s. d.<br>49,070 0 0<br>96,615 11 0<br>12,246 11 4<br>10,408 0 0<br>1,090 4 7<br>7,295 8 0<br>176,725 14 11<br>1,140 0 0<br>800 0 0<br>250 0 0<br>10,216 4 2<br>3,227 8 7<br>7,754 0 1 | Dams, weirs, water-races, &c.—<br>Ida Valley section—<br>Proportion Manorburn dam and headraces .. .. .<br>Main water-races .. .. .<br>Distribution water-races .. .. .<br>Galloway section—<br>Proportion Manorburn dam and headraces .. .. .<br>Dip Creek diverting-weir .. .. .<br>Main water-races .. .. .<br>Staff accommodation .. .. .<br>Telephone system .. .. .<br>Stocks of material on hand .. .. .<br>Interest during construction .. .. .<br>Sundry debtors (sale of water) .. .. .<br>Profit and loss—Accumulated loss to date.. .. . | £ s. d.<br>50,507 5 3<br>99,452 5 5<br>12,608 15 3<br>10,721 4 6<br>1,117 19 8<br>7,561 15 8<br>162,568 5 11<br>19,400 19 10<br>1,217 11 7<br>800 0 0<br>2,421 16 2<br>14,233 9 7<br>4,684 5 0<br>9,525 0 7<br>£214,851 8 8 |
| £200,113 7 9                                                           |                                                                                                                                                                                                                                                           | £214,851 8 8                                                              | £200,113 7 9                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                             |

J. J. GIBSON,  
Accountant, Public Works Department.

APPENDICES TO THE PUBLIC WORKS STATEMENT, 1925.

APPENDIX A.

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS  
OUT OF THE PUBLIC WORKS FUND FOR THE YEAR 1924-25.

Prepared in compliance with Section 8 of the Public Works Act, 1908.

SIR,— Public Works Department, Wellington, 25th June, 1925.

In compliance with the 8th section of the Public Works Act, 1908, I enclose a statement of the expenditure during the preceding financial year on all works and services chargeable to the Public Works Fund.

I have, &c.,  
J. G. COATES,  
The Controller and Auditor-General, Wellington. Minister of Public Works.

STATEMENT OF NET EXPENDITURE ON ALL WORKS AND SERVICES CHARGEABLE TO THE PUBLIC  
WORKS FUND FOR THE YEAR 1924-25.

| Vote.  | Summary.                                               | Appropriation. | Gross Expenditure. | Credits-in-Aid. | Net Expenditure. |
|--------|--------------------------------------------------------|----------------|--------------------|-----------------|------------------|
|        |                                                        | £              | £ s. d.            | £ s. d.         | £ s. d.          |
| 43     | General Purposes Account—                              |                |                    |                 |                  |
|        | Public Works, Departmental .. ..                       | 134,766        | 186,990 16 11      | 59,498 0 8      | 127,492 16 3     |
| 44, 45 | Railways .. ..                                         | 2,000,000      | 1,992,176 12 11    | 113,447 16 0    | 1,878,728 16 11  |
| 46-53  | Public Buildings .. ..                                 | 321,000        | 251,391 16 5       | 5,574 3 3       | 245,817 13 2     |
| 54     | Timber-supply and Sawmills for Public Works Department | 2,500          | 21,491 5 5         | 42,028 13 10    | Cr. 20,537 8 5   |
| 55     | Acquisition and operation of Quarries ..               | 11,000         | 11,480 0 7         | 9,664 18 1      | 1,815 2 6        |
| 56-57  | Lighthouses and Harbour-works ..                       | 14,400         | 3,275 9 4          | 0 17 6          | 3,274 11 10      |
| 58     | Development of Tourist Resorts ..                      | 32,500         | 15,512 11 4        | 3,169 9 8       | 12,343 1 8       |
| 59     | Department of Immigration ..                           | 180,000        | 313,919 12         | 6177,566 11 8   | 136,353 0 10     |
| 60-61  | Roads, Bridges, and other Public Works ..              | 854,853        | 625,211 14 9       | 18,488 7 7      | 606,723 7 2      |
| 62     | Telegraph Extension ..                                 | 900,000        | 1,072,989 13       | 2115,695 10 7   | 957,294 2 7      |
| 63     | Motor Transport Services ..                            | 5,000          | 5,000 0 0          | ..              | 5,000 0 0        |
| 64     | Contingent Defence ..                                  | 40,000         | 27,288 4 0         | 155 12 3        | 27,132 11 9      |
| 65     | Lands, Miscellaneous ..                                | 33,250         | 34,404 1 4         | 231 14 7        | 34,172 6 9       |
| 66     | Irrigation, Water-supply, and Drainage ..              | 100,000        | 128,998 0 8        | 1,002 11 2      | 127,995 9 6      |
| 67     | Plant, Material, and Stores ..                         | 30,000         | 89,258 10          | 2101,487 19 0   | Cr. 12,229 8 10  |
| ..     | Unauthorized—Services not provided for ..              | ..             | 959 17 5           | 896 10 8        | 63 6 9           |
| ..     | Transfer to Main Highways Account, Construction Fund   | ..             | 226,000 0 0        | ..              | 226,000 0 0      |
|        | Totals, General Purposes Account ..                    | 4,659,269      | 5,006,348 6 11     | 648,908 16 6    | 4,357,439 10 5   |
| 68     | Electric Supply Account ..                             | 1,133,146      | 879,189 6 7        | 31,711 5 0      | 847,478 1 7      |
| ..     | Waihou and Ohinemuri Rivers Improvement Account        | ..             | 67,932 15 8        | 14,046 1 11     | 53,886 13 9      |
|        | Totals, Public Works Fund ..                           | 5,792,415      | 5,953,470 9        | 2694,666 3      | 5,258,804 5 9    |

This statement includes only the expenditure on works, and does not include expenditure such as interest, sinking funds, and charges and expenses of loans.

J. J. GIBSON,  
Accountant.

F. W. FURKERT,  
Engineer-in-Chief and Under-Secretary.

Examined and found correct.  
G. F. C. CAMPBELL,  
Controller and Auditor-General.

## APPENDIX A—continued.

|    | Name of Vote.                                                           | Appropriation.   | Gross Expenditure.    | Credits-in-Aid.     | Net Expenditure.      |
|----|-------------------------------------------------------------------------|------------------|-----------------------|---------------------|-----------------------|
|    |                                                                         | £                | £ s. d.               | £ s. d.             | £ s. d.               |
|    | <b>PUBLIC WORKS FUND.</b>                                               |                  |                       |                     |                       |
|    | <i>General Purposes Account—</i>                                        |                  |                       |                     |                       |
| 43 | Public Works, Departmental .. ..                                        | 134,766          | 186,990 16 11         | 59,498 0 8          | 127,492 16 3          |
|    | Railways—                                                               |                  |                       |                     |                       |
| 44 | Railway-construction .. ..                                              | 1,200,000        | 1,246,076 18 4        | 110,270 8 2         | 1,135,806 10 2        |
| 45 | Additions to Open Lines .. ..                                           | 800,000          | 746,099 14 7          | 3,177 7 10          | 742,922 6 9           |
|    | Public Buildings—                                                       |                  |                       |                     |                       |
| 46 | General .. ..                                                           | 33,000           | 30,898 18 3           | 108 3 9             | 30,790 14 6           |
| 47 | Courthouses .. ..                                                       | 9,600            | 5,368 10 2            | 5 14 3              | 5,362 15 11           |
| 48 | Prison Buildings and Works .. ..                                        | 32,500           | 25,406 8 9            | 127 0 9             | 25,279 8 0            |
| 49 | Police-stations .. ..                                                   | 19,900           | 18,743 19 11          | 191 5 0             | 18,552 14 11          |
| 50 | Postal and Telegraph .. ..                                              | 83,000           | 66,915 12 11          | 998 4 9             | 65,917 8 2            |
| 51 | Agricultural .. ..                                                      | 7,500            | 7,246 15 6            | 4,005 0 0           | 3,241 15 6            |
| 52 | Mental Hospital Buildings .. ..                                         | 87,500           | 68,567 0 11           | 128 14 9            | 68,438 6 2            |
| 53 | Health and Hospital Institutions .. ..                                  | 48,000           | 28,244 10 0           | 10 0 0              | 28,234 10 0           |
| 54 | Timber-supply and Sawmills for Public Works Department                  | 2,500            | 21,491 5 5            | 42,028 13 10        | Cr.20,537 8 5         |
| 55 | Acquisition and Operation of Quarries .. ..                             | 11,000           | 11,480 0 7            | 9,664 18 1          | 1,815 2 6             |
|    | Lighthouses and Harbour-works—                                          |                  |                       |                     |                       |
| 56 | Lighthouses .. ..                                                       | 6,500            | 2,852 8 9             | 0 17 6              | 2,851 11 3            |
| 57 | Harbour-works .. ..                                                     | 7,900            | 423 0 7               | ..                  | 423 0 7               |
| 58 | Development of Tourist Resorts .. ..                                    | 32,500           | 15,512 11 4           | 3,169 9 8           | 12,343 1 8            |
| 59 | Department of Immigration .. ..                                         | 180,000          | 313,919 12 6          | 177,566 11 8        | 136,353 0 10          |
|    | Construction and Maintenance of Roads, Bridges, and other Public Works— |                  |                       |                     |                       |
| 60 | Roads, &c. .. ..                                                        | 850,603          | 622,223 11 11         | 18,255 7 7          | 603,968 4 4           |
| 61 | Roads on Goldfields .. ..                                               | 4,250            | 2,988 2 10            | 233 0 0             | 2,755 2 10            |
| 62 | Telegraph Extension .. ..                                               | 900,000          | 1,072,989 13 2        | 115,695 10 7        | 957,294 2 7           |
| 63 | Motor Transport Services .. ..                                          | 5,000            | 5,000 0 0             | ..                  | 5,000 0 0             |
| 64 | Contingent Defence .. ..                                                | 40,000           | 27,288 4 0            | 155 12 3            | 27,132 11 9           |
| 65 | Lands, Miscellaneous .. ..                                              | 33,250           | 34,404 1 4            | 231 14 7            | 34,172 6 9            |
| 66 | Irrigation, Water-supply, and Drainage .. ..                            | 100,000          | 128,998 0 8           | 1,002 11 2          | 127,995 9 6           |
| 67 | Plant, Material, and Stores .. ..                                       | 30,000           | 89,258 10 2           | 101,487 19 0        | Cr.12,229 8 10        |
| .. | Unauthorized—Services not provided for .. ..                            | ..               | 959 17 5              | 896 10 8            | 63 6 9                |
| .. | Transfer to Main Highways Account, Construction Fund                    | ..               | 226,000 0 0           | ..                  | 226,000 0 0           |
|    | <b>Totals, General Purposes Account .. ..</b>                           | <b>4,659,269</b> | <b>5,006,348 6 11</b> | <b>648,908 16 6</b> | <b>4,357,439 10 5</b> |
| 68 | <i>Electric Supply Account .. ..</i>                                    | <i>1,133,146</i> | <i>879,189 6 7</i>    | <i>31,711 5 0</i>   | <i>847,478 1 7</i>    |
| .. | <i>Waihou and Ohinemuri Rivers Improvement Account..</i>                | <i>..</i>        | <i>67,932 15 8</i>    | <i>14,046 1 11</i>  | <i>53,886 13 9</i>    |
|    | <b>Totals, Public Works Fund .. ..</b>                                  | <b>5,792,415</b> | <b>5,953,470 9 2</b>  | <b>694,666 3 5</b>  | <b>5,258,804 5 9</b>  |

## APPENDIX B.

## ANNUAL REPORT ON PUBLIC WORKS BY THE ENGINEER-IN-CHIEF.

The ENGINEER-IN-CHIEF to the Hon. MINISTER OF PUBLIC WORKS.

SIR,—

I have the honour to submit the following report upon the various works under my control completed and in progress throughout the Dominion during the period from the 1st July, 1924, to the 30th June, 1925.

## RAILWAYS.

## ABSTRACT.

The following table shows the expenditure on Government railways in New Zealand up to the 31st March, 1925:—

| Name of Railway.                                                                                                                                        | Total Length of Railway or Section. | Open for Traffic. | Expenditure to 31st March, 1925. |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------|----------------------------------|
|                                                                                                                                                         | M. ch.                              | M. ch.            | £                                |
| Kaihu Valley .. .. .                                                                                                                                    | 24 32                               | 24 32             | 179,121                          |
| Otiria-Ngapuhi .. .. .                                                                                                                                  | 13 45                               | 13 45             | 125,987                          |
| Opua Wharf—Onerahi .. .. .                                                                                                                              | 58 6                                | 58 6              | 615,542                          |
| Kioreroa-Waiotira .. .. .                                                                                                                               | 19 79                               | 5 23              | 422,229                          |
| North Auckland Main Trunk Railway (from Helensville)                                                                                                    | 153 75                              | 65 27             | 2,565,378                        |
| Helensville—Te Awamutu, with Branches (including Auckland-Westfield Deviation) .. .. .                                                                  | 173 35                              | 160 63            | 3,498,809                        |
| Frankton Junction—Thames, with Branches .. .. .                                                                                                         | 127 35                              | 87 20             | 1,022,199                        |
| Thames Valley—Rotorua .. .. .                                                                                                                           | 69 33                               | 69 33             | 407,889                          |
| Tauranga-Opotiki, with Branches .. .. .                                                                                                                 | 145 32                              | ..                | 1,242,418                        |
| Gisborne-Opotiki .. .. .                                                                                                                                | 93 44                               | 49 32             | 623,259                          |
| Napier-Gisborne (including Waikokopu Branch) .. .. .                                                                                                    | 231 44                              | 23 44             | 1 305,304                        |
| Wellington—Napier and Palmerston North (including Te Aro Extension, Greytown and Martinborough Branches, and Hutt Valley Railway) .. .. .               | 258 62                              | 233 12            | 2,787,275                        |
| Wellington—Waitara, with Branches .. .. .                                                                                                               | 350 11                              | 285 59            | 3,199,069                        |
| Stratford-Okahukura .. .. .                                                                                                                             | 112 47                              | 47 40             | 1,319,010                        |
| North Island Main Trunk (Marton—Te Awamutu), including Raetihi Branch and Waipa Gravel-access Branch .. .. .                                            | 225 79                              | 218 39            | 3,020,130                        |
| Picton—Waipara (South Island Main Trunk Railway)—                                                                                                       |                                     |                   |                                  |
| Picton southwards .. .. .                                                                                                                               | 92 38                               | 56 6              | 656,002                          |
| Waipara northwards .. .. .                                                                                                                              | 90 45                               | 44 14             | 377,533                          |
| Nelson-Greymouth .. .. .                                                                                                                                | 177 51                              | 125 57            | 664,658                          |
| Stillwater—Arthur's Pass .. .. .                                                                                                                        | 51 41                               | 50 41             | 2,042,437                        |
| Rolleston—Arthur's Pass (including Whitecliffs Branch) .. .. .                                                                                          | 92 59                               | 84 45             | 1,021,978                        |
| Westport—Ngakawau .. .. .                                                                                                                               | 19 56                               | 19 56             | 192,744                          |
| Westport—Ngakawau Extension to Mokihinui*                                                                                                               | 7 12                                | 7 12              | ..                               |
| Mokihinui Colliery Line† .. .. .                                                                                                                        | 3 69                                | 3 69              | ..                               |
| Westport—Inangahua .. .. .                                                                                                                              | 26 0                                | 5 74              | 170,431                          |
| Ngahere—Blackball .. .. .                                                                                                                               | 3 40                                | 3 40              | 147,532                          |
| Greymouth—Rewanui and Branches .. .. .                                                                                                                  | 11 34                               | 11 34             | 329,888                          |
| Greymouth—Waitaha .. .. .                                                                                                                               | 50 32                               | 38 68             | 355,735                          |
| Waipara—Waitaki, with Branches .. .. .                                                                                                                  | 459 34                              | 413 70            | 2,815,345                        |
| Canterbury Interior Main Line—Oxford—Temuka .. .. .                                                                                                     | 83 0                                | 11 44             | 59,942                           |
| Waitaki—Bluff, with Branches .. .. .                                                                                                                    | 600 21                              | 546 12            | 5,268,377                        |
| Otago Central .. .. .                                                                                                                                   | 182 51                              | 147 27            | 1,435,919                        |
| Invercargill—Kingston, with Mararoa Branch .. .. .                                                                                                      | 117 4                               | 97 44             | 391,240                          |
| Forest Hill Railway—Winton—Hedgehope‡ .. .. .                                                                                                           | 12 40                               | 12 40             | 23,337                           |
| Western Railways .. .. .                                                                                                                                | 94 8                                | 70 31             | 433,412                          |
| Preliminary surveys .. .. .                                                                                                                             | ..                                  | ..                | 43,846                           |
| Miscellaneous .. .. .                                                                                                                                   | ..                                  | ..                | 10,337                           |
| Stock of permanent-way on hand .. .. .                                                                                                                  | ..                                  | ..                | 125,951                          |
| Rolling-stock .. .. .                                                                                                                                   | ..                                  | ..                | 9,629,859                        |
| Suspense Account, being proportion of cost of raising loan of £1,000,000 at 6 per cent. for Railways Improvement Authorization Act 1914 Account .. .. . | ..                                  | ..                | 42,193                           |
| <b>Total .. .. .</b>                                                                                                                                    | <b>4,215 9</b>                      | <b>3,092 59</b>   | <b>£48,572,315</b>               |
| <b>PROVINCIAL GOVERNMENT LINES, ETC.</b>                                                                                                                |                                     |                   |                                  |
| Canterbury (lengths included above) .. .. .                                                                                                             | ..                                  | ..                | 731,759                          |
| Otago and Southland .. .. .                                                                                                                             | ..                                  | ..                | 372,522                          |
| Gisborne to Ormond Tramway .. .. .                                                                                                                      | ..                                  | ..                | 4,975                            |
| Midland Railway, valuation of works constructed by company .. .. .                                                                                      | ..                                  | ..                | 683,460                          |
| <b>Grand total .. .. .</b>                                                                                                                              | <b>4,215 9</b>                      | <b>3,092 59</b>   | <b>50,365,031</b>                |

\* The funds for this extension—namely, £235,501 2s. 11d.—were provided by the Westport Harbour Board.

† The funds for purchase of this line, £15,745, were provided by the Westport Harbour Board.

‡ The expenditure on this line as a tramway was made by the Lands Department.

§ Includes expenditure on railways under Hutt Road and Railway Improvement, Railway Improvement Authorization Act, and Railway Improvement Authorization Act 1914 Accounts.

|| Includes value for £150,000 paid to debenture-holders under the Midland Railway Petitions Settlement Act Amendment Act, 1903.

## NORTH AUCKLAND MAIN TRUNK RAILWAY.

*Huarau Northwards.*

*Okoro Section* (24 m. 45 ch. to 38 m. 35 ch. ; length, 13 m. 35 ch.).—In anticipation of a start being made with the construction of this section north of Okaihau, a certain amount of preparatory work is being undertaken to enable workmen on the length between Huarau and Portland to be transferred on the completion of that section. This work consists of the laying-out of a temporary township, erection of huts, formation and metalling of streets, water-supply and drainage. The track is being laid from Okaihau station-yard over the already formed length to the main road, and it is proposed to complete the already partially completed formation over the next 2 miles. Surveys are being made to alter the line in several places to avoid slip country, and also to determine what measure of drainage will be necessary for bad gulleys and moving country.

*Paparewa Section* (90 m. 30 ch. to 92 m. 6 ch. ; length, 1 m. 56 ch.).—The formation work on this section consisted principally of clearing a large slip at the north end of Huarau Tunnel, and ordinary maintenance of the track, but the access road to Paparoa station-yard was formed and metalled and the station-yard fully ballasted. The station-building, platform, loading-bank, latrines, two 6,000-gallon water-vats, and one platelayer's cottage have also been finished. Metal was supplied to the Otamatea County Council for metalling the Paparoa-Paparoa Railway Station Road, and that work is now complete.

*Mareretu Section* (92 m. 6 ch. to 96 m. 20 ch. ; length, 4 m. 14 ch.).—During this winter the continuous rain water-logged the country, with the result that a heavy slip occurred in cutting at 94 m. 73 ch. and necessitated the employment of a steam-shovel to remove it. In addition, a steam-shovel was employed during the year to clear slips at 92 m. 5 ch., 92 m. 30 ch., 93 m. 39 ch., and 94 m. 79 ch. A good running "top" has been obtained on the track throughout this section. At the same time a bank at 94 m. 63 ch. was slipping every night, and great difficulty was experienced in keeping the track open for traffic. Several drainage drives are being put in to tap the seat of the trouble. The metalling of the Mareretu station-yard and approach roads has been completed, and a goods-shed, station-building, latrines, and buffer-stop erected.

*Waikiekie Section* (96 m. 20 ch. to 107 m. 28 ch. ; length, 9 m. 66 ch.).—A steam-shovel was employed in clearing a slip at the north end of the Mareretu Tunnel, and two work-trains have been engaged in clearing up the formation along the whole length of the section. Stone walls and drains aggregating approximately 40 chains in length have been constructed in various cuttings.

Unfortunately, during the year under review, parts of the Waikiekie Tunnel began to show serious displacement in the lining. In the portions which when excavated appeared to be sound an invert was not provided, as was done in the obviously unsound country; this necessitated a considerable portion being relined and provided with an invert. The worst portion has been completed, 201 lineal feet of lining having been renewed with heavy section concrete lining and 260 ft. with new invert.

The metalling of the Taipuha station-yard and the 2 miles of access road has been completed, and latrines have been erected and five platelayers' cottages completed during the year. The formation of the Waikiekie station-yard has been widened, trimmed, and metalled, and the approach road metalled. Latrines have been built, and shelter-shed, goods-shed, and passenger-platform completed. The Waiotira station-yard has been thoroughly stone-drained and metalled; 1½ miles of approach road metalled, and one 6,000-gallon water-vat, turntable, and latrines constructed. Slip materials from the Kirikopuni Section were utilized to enlarge the station-yard to provide for further extensions.

*Kirikopuni Section* (107 m. 28 ch. to 121 m. ; length, 13 m. 52 ch.).—Although progress was much impeded during the exceptionally wet weather last winter, the unusually long summer enabled an active programme of work to be carried out, the aim being to connect the two ends of the line at Waiotira and Northern Wairoa River with the permanent or temporary tracks. The work has comprised general formation, culverts, fencing, platelaying, ballasting, accommodation for staff and workmen, permanent telephone-line, erection of bridges, and completion of the Tokatoka and Omana Tunnels. Considerable trouble was experienced with slips, and ten steam-shovels were occupied in extending the formation and removing slips. Deviations had to be made over a considerable length of the line to avoid heavy slip country, and these have proved effective. At the Pukehuia end it was found advisable to continue the policy of constructing extensive stone drains and stone walls in cuttings, and of draining cuttings and slips to prevent as far as possible any further slips. Stone for this purpose was obtained at various points on the Northern Wairoa River and barged to Pukehuia, where it was railed to the works. At the Waiotira end stone was obtained from Tauraroa Quarry. Much remains to be done in the way of drainage and the removal of slips before the formation is finally stabilized. With the exception of this the formation is practically complete to the terminus at 121 m. The rubble stone walls in the cuttings, &c., have demonstrated their value, as there has been a complete cessation of trouble where they have been erected.

The station-yards at Pikiwahine, Omana, and Pukehuia have been finished, and a large amount of formation work has been completed at the terminal station at Kirikopuni.

Considerable trouble has been experienced with the seat of various banks, particularly in the neighbourhood of the Wairoa River, where the ground is inclined to be soft and swampy. The banks have subsided into the flats, and parts of the flats alongside edges of the banks have been pushed upwards. Owing to the unstable nature of the country and its inability to withstand the superimposed weight of banks it has been found necessary to run banquettes to distribute the weight.

Without the assistance of steam-shovels little progress could have been made in completing the cuttings and deep fillings, and in the removal of the extensive slips which occurred during the year, as when the material becomes saturated and slips it assumes a consistency which renders it very difficult to deal with by hand labour.

Numerous concrete culverts, earthenware and concrete pipes, and also reinforced-concrete pipes, have been placed along this section.

Permanent bridges have been erected at 112 m. 25 ch., 113 m. 66 ch., 115 m. 35 ch., and 118 m. 38 ch., and bridges at 113 m. 0.6 ch., and 120 m. are in course of construction.

All the materials have been procured for the Northern Wairoa River Bridge (118 m. 77 ch.) which will consist of two 105 ft., two 45 ft., and fifteen 30 ft. spans, with the larger ones on cylinders and the smaller on piles. It is hoped to make an early start with the sinking of the cylinders and the driving of the pile piers, and arrangements are being made to carry out these two operations simultaneously.

Both the Omana and the Tokatoka Tunnels, which are 31 chains 72 links and 17 chains 25 links in length respectively, were completed in the early spring, and this has enabled better progress to be made with the work ahead, as all materials can now be railed through the tunnels instead of having to be hauled over two ridges by means of a jig tramway. Both tunnels were driven through very unstable country, involving great care in construction and the use of very heavy concrete lining. No signs of movement have been apparent in the Omana Tunnel, but the Tokatoka Tunnel has developed some cracks for a few chains at the south end, involving a certain amount of reconditioning.

Two miles of line have been fenced on both sides, and the remainder of fencing is nearing completion.

Permanent rails have been laid from Waitotira station-yard to 110 m. 70 ch., and a temporary track from here to 112 m. 23 ch. The permanent track has also been laid from 112 m. 23 ch. to 118 m. 41 ch. with the exception of a few small lengths of temporary track over temporary bridges and wet country, while a certain amount of platelaying has also been undertaken in Pikiwahine, Omana, and Pukehuia station-yards.

The first lift of ballast has been completed from Waitotira to the end of the permanent line at 110 m. 70 ch., and two lifts have been laid from the Omana Tunnel in short lengths aggregating half a mile in the worst places and soft banks onwards to the Wairoa River. Rough scoria ballast has been laid on the remainder of the track between 110 m. 23 ch. and the Wairoa River, as a suitable foundation for the permanent ballasting, and to enable the track to be kept safe.

Two miles and a quarter of approach road, 24 ft. wide, has been formed at the Kirikopuni terminus.

One permanent platelayer's cottage has been completed at Omana station-yard, and a second one (as well as a goods-shed) is now in course of erection. A goods-shed and station-buildings are completed at Pukehuia. Numerous extra huts for married quarters have been provided along the length, and most of them have been lined.

#### WHANGAREI BRANCH RAILWAY.

*Oakleigh Section* (5 m. 27 ch. to 7 m. 60 ch.; length, 2 m. 33 ch.).—The track has been maintained with a good running top, and walls and drains of a total length of 60 chains have been constructed in cuttings which required protection. The approaches to the bridge at 7 m. 32 ch. have been stone-pitched, and concrete wing walls and aprons were added to twenty culverts. All the above are additional to what is usually found necessary in railway-construction, and are necessitated by the particularly treacherous nature of the country.

The formation of the Oakleigh station-yard has been widened, trimmed, and metalled, and the station-building, latrines, platform, loading-bank, cattle-yards, and buffer-stop erected.

*Tauraroa Section* (7 m. 60 ch. to 14 m. 67 ch.; length, 7 m. 7 ch.).—The track has been maintained, cuttings cleaned out, and a total length of 37 chains of stone wall and drain constructed where necessary. The metalling of the Mangapai station-yard has been completed, as well as the erection of goods-shed, latrines, and cattle-yards. The Tauraroa station-yard is metalled, and the erection of station-building, extra platelayer's cottage, latrines, loading-bank, buffer-stop, and two 6,000-gallon vats with water-supply have been completed.

*Tauraroa Quarry and Crushing Plant.*—The output for the year was 5,182 cubic yards of spawls and 76,955 cubic yards of crushed metal. The greater part of the metal was used by the Department on the railway, chiefly for metalling station-yards and access and approach roads; the balance was supplied to local bodies for metalling approach roads. Another complete crushing unit, consisting of a 24 in. by 12 in. crusher, steam-engine, and metal-bin was added to the plant in December last, and a crusher in one of the other units which was found to be too small for the work was replaced by a larger one. A screen was erected for the purpose of producing fine metal suitable for blinding. The tracks in the No. 2 quarry were completely rearranged, and improved facilities provided in both quarries for loading spawls.

*Waitotira Section* (14 m. 67 ch. to 19 m. 75 ch.; length, 5 m. 18 ch.).—The track has been maintained, banks made up to correct width, and cuttings cleaned out. A total length of 31 chains of stone wall and drain has been constructed in various cuttings, and concrete wing walls and aprons added to ten culverts. A large slip at 16 m. 35 ch. has been cleared with a steam-shovel. The large filling at 15 m. 10 ch. has been subsiding since the commencement of wet weather, and a deep stone drain is being constructed with the object of further draining the seat of the bank.

An overbridge was previously erected at 16 m. 33 ch., but owing to a large slip carrying away the abutment pier it was considered best to re-erect it with an additional span at 16 m. 28 ch. rather than attempt to stabilize the approach. The approaches of the new bridge are practically complete, and a repetition of the trouble now seems improbable.

Through passenger and goods traffic has been run between Huarau and Portland, which comprises part of the North Auckland Main Trunk and of the Whangarei Branch, and during the twelve

months under review 46,753 passengers were carried, in addition to 71,681 tons of goods carried northwards and 63,690 southwards. The latter included 1,333 wagons of live-stock from this particular section.

Numerous slips occurred between Huarau and Portland as the result of the very wet weather in the winter of 1924, and their removal necessitated the employment of a number of work-trains and the construction of heavy stone drains and walls to drain cuttings and control the slips. The work has been completed except for minor subsidences, and the efficacy of the drainage was demonstrated by the subsequent cessation of slips. The whole length should be ready for handing over at an early date.

#### AUCKLAND—WESTFIELD DUPLICATION.

This important duplication work was commenced in March last, and is being vigorously prosecuted. It is 9 miles 67 chains in length, and there will be a double track for the whole distance. The maximum grade will be 1 in 132 and the sharpest curve 20 chains radius. The adoption of this alternative route will materially reduce haulage costs and permit of increased speeds. It is hoped to have this duplication completed in three years.

The new formation from 1 m. onwards is being carried out by the Public Works Department, while the reconstruction of the Auckland station-yard from 0 m. to 1 m. is in the hands of the Railway Department. The work involves some comparatively heavy construction, the two outstanding features being the building of an embankment across Judges Bay, Hobson Bay, and the Orakei basin, approximately 2 miles in length, and the driving of a double-track tunnel, 27 chains in length, under the Auckland—St. Heliers Bay Road, between 4 m. 59 ch. and 5 m. 6 ch. The embankment involves the placing of nearly half a million cubic yards of earthwork, which will be obtained from the large cuttings at Campbell's Point and Orakei Neck. It will be protected from wave-action by stone protection, which is being erected in advance of the filling.

A bottom heading is being driven through the approach cutting at the north end of the Purewa Tunnel, for the dual purpose of providing earlier access to the tunnel and to cheapen the cost of excavating the approach cutting. 262 ft. of heading has been driven to date. At the south end of the tunnel a steam-shovel is excavating the approach cut, and access to both portals will be available in about three months' time. The formation work between 3 m. 20 ch. and 5 m. 65 ch. is being opened out by manual labour, which will be reinforced by steam-shovels as soon as they are available and can be got on to the site. Culverting is also in hand. The formation is lighter from the tunnel to Westfield, the main feature being the construction of station-yards at close intervals to cater for suburban traffic. All road-crossings are to be dealt with by means of overbridges or subways, so that the level-crossing menace will not exist as far as this section of line is concerned. Special attention is being paid to the accommodation of workmen employed at the tunnel, and an up-to-date construction camp is being built, with metalled access roads, water-supply, electric light, drainage, &c.

#### EAST COAST MAIN TRUNK RAILWAY.—WAIHI EASTWARDS.

*Athenree Section* (0 m. to 8 m. 68 ch.; length, 8 m. 68 ch.).—The actual formation of this section was completed prior to the period under review, but alterations and extensions to station-yards at Waimata and Athenree involved removal of 9,500 cubic yards of spoil, which was used for widening banks and completing bridge approaches. All fencing has been erected except a small gap where the branch line from Athenree Quarry joins the main line. Several cattle-stops have been provided. Girders were placed on Waiau Stream Bridge at 7 m. 7 ch., 7 m. 23 ch., 7 m. 69 ch., and 7 m. 76 ch., and the erection of bridges on this section is now complete. The permanent rails have been laid from 6 m. 19 ch. to 8 m. 68 ch., as well as sidings at Waimata and Athenree Stations.

A quarry was opened in the Athenree Gorge, opposite 7 m. 24 ch. and a branch line 16 ch. long constructed thereto, together with necessary siding, crushing plant, bins, &c. A large shot of 3,750 lb. blasting-gelatin was fired in July, 1924, with satisfactory results. About 8,300 cubic yards of ballast have been already obtained from this quarry. Ballast supplies were obtained previously from a private quarry at Karangahake. The first lift of ballast is completed throughout the section, and second lift has been placed from 0 m. to 4 m. 60 ch. and from 6 m. 60 ch. to 8 m. 40 ch.

A goods-shed, loading-bank, and shelter-shed with ramp have been erected at Waimata Station, and station-buildings, platform, latrines, loading-bank, 2,000-gallon water-vat, and three platelayers' cottages have been erected at Athenree. All temporary hutments, engine-shed, &c., have been removed from Waihi to Athenree, and the work's office previously at Waihi has been shifted to Katikati.

The Department has been running goods traffic on this section since December, 1924, with satisfactory results.

*Katikati Section* (8 m. 68 ch. to 16 m. 28 ch.; length, 7 m. 40 ch.).—On this section the earth-works are completed as far as 14 m. with the exception of a cutting at 11 m. 63 ch. and some bank-widening. Several culverts have been built, and side drains and stream diversion cut. Overbridges at 9 m. 19 ch. and 12 m. 59.5 ch. have been completed, and the concrete piles for bridge at 10 m. 61 ch., and for Tuapiro Bridge at 12 m., have been transported to the site. The riveting of the girders for the Tuapiro Bridge is being undertaken in the Department's workshop at The Mount and they will be barged to the site. Permanent-way has been laid from 8 m. 68 ch. to 11 m. 51 ch., and the first lift of ballast has been placed to 11 m. 51 ch.

A platform and loading-bank have been completed at Tahawai Station, and a temporary station has been provided at 11 m. 46 ch. for goods traffic, which commenced running to this point on the 1st March last. This temporary station serves the Katikati district, and so far the traffic has shown satisfactory results.



*Aongatete Section* (16 m. 28 ch. to 21 m. 5 ch. ; length, 4 m. 57 ch.).—Earthworks have been started by hand labour at 18 m. 59 ch. to 19 m. 18 ch., and 19 m. 38 ch. to 20 m. 31 ch., while cutting at 20 m. 9 ch. and most of the excavation for the Aongatete station-yard is completed. Stream-diversion at Aongatete yard has been completed ; a 12 in. earthenware pipe 22 ft. long was placed at 20 m. 60 ch., and two 12 in. earthenware pipes under the Aongatete Station access road. A 10 ft. arched concrete culvert is in hand at 20 m. 13.79 ch. The contractors have erected a small crusher and bin, with tram-line from the river-bed, to obtain metal for concrete-work, and have commenced the erection of the main crusher and ballast outfit, including a drag-line scoop.

*Apata Section* (21 m. 5 ch. to 27 m. 70 ch. ; length, 4 m. 14 ch.).—Short chainage due to a deviation from the original survey. The clearing has been completed, and the contractors have the section fully manned. The permanent fencing is in hand, and some side drains have been excavated on the left side of the line. The earthworks have been completed from 21 m. 5 ch. to 22 m. 60 ch., and seven cuttings are in hand between 22 m. 27 ch. and 26 m. 61 ch. The construction of a 3 ft. arched culvert at 22 m. 5.83 ch. and a 4 ft. arched concrete culvert at 22 m. 69.15 ch. is in hand, and a considerable quantity of concrete piping has also been laid. The overbridge and road diversion at 21 m. 25 ch. are practically completed, and a private overbridge at 21 m. 78 ch. is in hand. A start has been made with the driving of the piles for the Wainui Bridge at 23 m. 3 ch.

*Te Puna Section* (27 m. 70 ch. to 34 m. 78 ch. ; length, 7 m. 8 ch.).—Clearing has been carried out wherever necessary to enable earthworks to be commenced, and a considerable mileage of fencing has been erected. Two cuttings have been completed between 28 m. 6 ch. and 32 m. 3 ch. and fourteen others are in hand on that length. The formation is complete from 32 m. 11 ch. to 33 m. 10 ch., and four cuttings are in progress between 33 m. 40 ch. and 34 m. 33 ch. The material from the cutting at 34 m. 33 ch. is being utilized for the formation of Te Puna station-yard. A 12 ft. arched culvert is being constructed at 33 m. 15 ch. with the necessary stream-diversion, and a number of smaller culverts have been completed. Temporary overbridges have been erected at 31 m. 44 ch. and 33 m. 73 ch. The erection of the Mangawhai Bridge at 31 m. 3 ch. is proceeding. Twenty-one piles have been driven in piers B to F, and abutment A is in course of erection.

The portion of this line from 14 m. to 34 m. 78 ch. comprising Katikati (part), Aongatete, Apata, and Te Puna Stations, is being constructed by Sir W. G. Armstrong, Whitworth, and Co., under contract to the New Zealand Government. They have, in addition to the work detailed above, erected a service wharf at Mount Maunganui, and landing-stages at several tidal estuaries of the Tauranga Harbour to facilitate transfer of material. They also have a receiving and stacking yard at The Mount, where a considerable quantity of both permanent and service materials has been collected. The company has erected 100 two-men, thirteen four-men, and sixty-six six-men hutments for single men, and forty-six married quarters, three cookhouses, four bathhouses, and two recreation-rooms, besides quarters for field engineers. The firm has two steam-locomotives, six steam-navvies, six petrol-locomotives with muck-trucks, two steam-hammer pile-driving outfits, besides concrete-mixers, launches, punts, motor-lorries, ballast-trucks, &c. The total quantity of earthwork in the contract is 1,229,000 cubic yards and the contractors have removed about 345,000 cubic yards to date.

*Tauranga Section* (34 m. 78 ch. to 41 m. 5 ch. ; length, 6 m. 7 ch.).—Fencing has been completed at Tauranga Station, and also on right between 40 m. 20 ch. and 41 m. 5 ch. Two 16 ft. gates with wickets were placed at Tauranga Station, and cattle-stops erected at 40 m. 52 ch. and 40 m. 65 ch. Twin corrugated metal culverts, 6 ft. diameter, with automatic flood-gates, have been completed at 36 m. 70 ch. All earthwork has been completed except for a small portion at 36 m. 70 ch., the Waikareao Bridge approaches, and widening in a few other places.

A large amount of reclamation necessary for the Tauranga Station has been completed, as well as stone pitching at this station.

The bank to connect with the Tauranga Wharf is in hand, and also the stone pitching under the wharf, the erection of which has been started by the Tauranga Harbour Board. The borrow at 40 m. 25 ch. was completed by steam-shovel which moved 10,400 cubic yards since last year, and was then transferred to the Matapihi Station.

Ninety-six 16 in. concrete piles, 40 ft. long, spliced to timber piles, have been made and driven for the Waikareao Bridge. The piers of that bridge are finished with the exception of three, and the nineteen 25 ft. girders required have been riveted up at The Mount, and some of them transported to the site. One hundred and sixty-six 14 ft. concrete piles, 40 ft. long, some of which will be spliced to timber piles, were also made for the Wairoa Bridge, and are now being driven by three pile-driving outfits. The thirteen 60 ft. girders required for this bridge are being assembled at The Mount.

Platelaying was extended from 39 m. 70 ch. back to 39 m. 66 ch. and all sidings laid in Tauranga yard. Ballasting has been completed from 39 m. 65 ch. to end of section, including Tauranga station-yard, except engine-shed siding. Metalling of approach roads is complete, and about 7 chains of the low-level road from the Strand to the station has been metalled.

The station-buildings and latrines for the Tauranga Station have been completed. Foundations have also been prepared for two tanks, and two extra platelayers' cottages have been erected, and one enlarged by the addition of a new scullery.

This section is open for all classes of traffic from Tauranga Station to 41 m. 5 ch.

*Te Maungā (late Matapihi) Section* (41 m. 5 ch. to 45 m. ; length, 3 m. 75 ch.).—This section is open for all classes of traffic, and has been properly maintained. New work undertaken consisted of formation of station-yard at Matapihi, where a steam-shovel excavated 19,076 cubic yards of material, which was used chiefly for filling at Tauranga Station. A further 10,000 cubic yards were borrowed for low-level road and station at Tauranga. Permanent 70 lb. rails have been laid on the Tauranga Bridge, and the laying of check-rail is in hand. Two 1-in-9 and one 1-in-7½ crossings have been laid at Matapihi yard.

*Te Puke Section* (45 m. to 54 m.; length, 9 m.).—This section was operated for traffic and adequately maintained. New work consisted of formation and metalling of approach roads at Otaimatua Station and erection of two 12 ft. gates. An extra pile was driven in bridge at 52 m. 28 ch., and the bridge approach banks trimmed and stone-pitched. Hot-water service was installed in three cottages at Te Puke. The Te Puke branch line was maintained. 21,688 cubic yards of crushed metal and 16,914 cubic yards of spawls were obtained from the quarry.

*Paengaroë Section* (54 m. to 59 m. 67 ch.; length, 5 m. 67 ch.).—This section was maintained for traffic. A 20 ft. span bridge on pile piers was erected at 55 m. 14 ch., and additional waterway provided at 54 m. 44 ch. and 54 m. 77 ch.

*Pongakawa Section* (59 m. 67 ch. to 64 m. 15 ch.; length, 4 m. 28 ch.).—This section was open for traffic and satisfactorily maintained.

*Otamarakau Section* (64 m. 15 ch. to 71 m. 5 ch.; length, 6 m. 60 ch.).—This section was open for traffic and usual maintenance was undertaken. The formation and platelaying of Ohinepanea yard, including 18 chains of sidings and three sets of points and crossings, were completed, and further bank-widening undertaken. Formation generally is now complete on this section except for the new station at Pukehina. The deepening of the outlet drain at 67 m. 5 ch. is in hand, and 82 chains have been completed to date. 3,300 cubic yards of Matata ballast were placed on this section, and ballasting is well advanced, except for metalling at station-yards. A shelter-shed, platform with cart-dock, loading-bank, and cattle-yards were erected at Ohinepanea, and platform and loading-bank fronts, stock-yard, and latrines at Otamarakau. 625 cubic yards of sand and 335 cubic yards of pumice were obtained from this section for departmental concrete work and private sales.

*Matata Section* (64 m. 15 ch. to 71 m. 5 ch.; length, 8 m. 11 ch.).—This section was open for traffic and general maintenance was undertaken. A further 8,000 cubic yards of spoil from Matata pit were used for widening of banks, and about 10,300 cubic yards of Matata metal were also obtained for ballasting on this section. About 185 cubic yards of spawls were used at bridge abutments. The formation of this section is now practically complete.

A shelter-shed and a loading-bank front were erected at Pikowai Station. A concrete sewer has been laid to drain platelayers' cottages at Matata Station, and hot- and cold-water services have been installed in three cottages.

Matata pit has been worked continuously, and two steam-shovels are now engaged on stripping and loading ballast. The output for the year was 36,054 cubic yards of strippings, used for bank-widening, and 36,408 cubic yards metal, of which 15,248 cubic yards were sold to local bodies, and remainder used for ballasting on various sections. About four months were occupied in prospecting and proving a further seam of metal, but a large face is now exposed, and the output of metal for the coming year should be much larger than it was last year.

*Rangitaiki Section* (79 m. 16 ch. to 87 m. 45 ch., length, 8 m. 29 ch.).—This section has been carrying all classes of traffic, but a considerable amount of new construction work was undertaken. Thirty chains of side drains were dug, and about 22,000 cubic yards of strippings from Matata pit were used for bank widening and lifting. Piles have been driven for permanent bridge at 81 m. 28 ch. and driving at 83 m. 16 ch. is in hand, while permanent platelaying has been completed over the Tarawera Bridge and on sidings at Awakaponga, Tarawera, and Rangitaiki Stations.

A total of 15,355 cubic yards of ballast was placed on this section—11,200 cubic yards from Matata pit and 4,155 cubic yards from Whakatane pit. The metalling of approach roads at several stations is practically completed. The whole section is partially ballasted, and ballasting is well advanced for most of the distance. This makes for easier, safer, and quicker working of passenger-trains.

Stock-yard, platform, and loading-bank have been completed at Awakaponga; stock-yards, platform, and goods-shed at Tarawera; and loading-bank at 87 m. 25 ch.

A heavy flood—considered to be the highest on record—occurred in the Rangitaiki River on the 25th June, 1925. Several washouts occurred at temporary bridges, and traffic was disorganized. Repairs are in hand, but the continual wet weather has delayed this work. The Tarawera River also caused trouble by overflowing. When the operations of the Land Drainage Department are complete this should not occur again.

*Awakeri Section* (87 m. 45 ch. to 91 m. 40 ch.; length, 3 m. 75 ch.).—This section was open for all classes of traffic. New construction consists of 10 chains of fencing on right between 91 m. 10 ch. and 91 m. 20 ch., and one set of cattle-stops at 91 m. 21 ch. The formation of the Rangitaiki Bridge approach is in hand. Ten chains of trestle has been erected, while about 5,800 cubic yards of Matata strippings have been placed.

The Awakeri yard-formation has been completed with spoil obtained from road-deviation at 91 m. 10 ch., which is also completed. The formation and metalling of road-deviation for subway at 87 m. 74 ch. are well advanced.

The driving of seventy-two 50 ft. spliced timber and concrete piles at the Rangitaiki Bridge at 88 m. completed the pile-driving. Five piers, A to E, have been concreted, and remaining piers are in hand. Temporary staging was erected across the river, and most of the girders are assembled at The Mount yard.

The platelaying in Awakeri yard is finished, and the ballasting in that yard, including road approaches, is also practically completed, while the remainder of this section has had one lift. A total of 4,400 cubic yards ballast was deposited—4,040 from the Whakatane River and 360 from Matata. A platform and loading-bank front were erected in Awakeri yard, and the buildings on this section are now completed.

The flood in the Rangitaiki on the 25th June last also caused minor washouts on this section.

*Taneatua Section* (91 m. 40 ch. to 100 m. 6 ch.; length, 8 m. 46 ch.)—A further 184 chains of fencing was erected, and formation of Kiwinui yard completed. 9,200 cubic yards of earthwork was shifted by steam-shovel, while 10,727 was removed by hand labour.

The Mission Flat bridge, at 95 m. 38 ch., consisting of three 20 ft. reinforced-concrete spans, was completed.

The erection was completed of the Whakatane Bridge, at 98 m. 30 ch., consisting of two 30 ft. and nineteen 60 ft. steel-plate girder spans. The work undertaken during the year included driving 90 linear feet of temporary piles, erecting 36,000 square feet of staging, driving 5,935 linear feet of permanent concrete piles, stripping 202 pile-heads, and concreting piers A, D, and W. The total amount of concrete placed was 1,063 cubic yards, while 300 cubic yards of earth was excavated. The girders were riveted together at The Mount shops, conveyed to site on a UB wagon, and swung into position by means of derrick and wire ropes. The total weight of steel in the plate girder spans is approximately 460 tons. The pile-driving and pier-work was somewhat delayed by continuous floods, but excellent time was made with the girder-erection.

All piles for bridge at 98 m. 65 ch. have been driven and girders forwarded to site. Pile-driving is in hand for bridge at 99 m. 5 ch., and girders have been riveted-up at The Mount. The overbridge at 99 m. 17 ch. has been completed, and formation of approaches is in hand.

The railhead has been extended from 98 m. 30 ch. to 98 m. 65 ch., and 18 chains of siding laid in the Pekatahi yard.

A ballast-pit was opened in the Whakatane River at Pekatahi, a siding laid, and a steam-shovel installed. 21,200 cubic yards of ballast has been removed; 3,145 cubic yards of this was sold for roadworks, and the balance placed on various sections of the railway. The Awakeri Section has had 9,410 cubic yards of ballast placed, and the bottom lift is finished to the railhead.

A cableway drag-line scoop is being erected to work a further pit in the Whakatane River. This will also help in preventing erosion on the opposite side at an acute bend.

Stock-yards, platform, and loading-bank have been erected at Pekatahi, and a commencement has been made with the station-buildings there and at Kiwinui.

This section has been opened for goods traffic throughout the year as far as Pekatahi, and it is hoped to extend to Taneatua for all traffic in about two months.

A heavy flood, which occurred in the Whakatane River late in May, 1925, washed away a small amount of filling at 98 m. 65 ch. This was hardly repaired when a further flood—the highest for many years—happened on the 24th June, and washed out the bank again. This flood rose to within 3 ft. 3 in. of the bottom of the bridge-girders. Repairs are in hand. The bridge is 1,200 ft. long and 24 ft. above the river-bottom.

*Mount Branch* (0 m. to 4 m. 7 ch.; length, 4 m. 7 ch.)—This section was open for traffic, and usual maintenance was undertaken. At The Mount shops a large amount of work was performed for the Department in the Tauranga district and elsewhere, and for other Departments, local bodies, and Sir W. G. Armstrong, Whitworth, and Co., railway contractors. Rolling-stock used on the several sections of railway, including 226 wagons, four passenger-cars and locomotives were kept in good repair. Twenty-five new piles were driven in the Railway Wharf, and about 38,000 C.B.M. of timber was machined, chiefly hut-lining. All huts in use on the works are now lined. Two 105 ft. steel truss spans were fabricated for Kirikopuni Bridge over the Northern Wairoa on the North Auckland Main Trunk Railway. A steel dredge hull, 70 ft. by 30 ft. was fabricated together with part deck-house, gantry-arm, and cutting-arm, and launched on the 1st December, 1924, and towed to Paeroa by the Northern Steamship Company.

*Traffic*.—Goods and passenger service has been maintained between The Mount and Tauranga to Awakeri, and goods traffic to Pekatahi. The time-table is a suitable one, and trains have run well to time. The total revenue was £26,800 (approximately).

*General Works akin to Railway*.—Atuaroa dredge cut: Widening in hand, now practically complete. A total of 11,260 cubic yards was removed during the year.

#### GISBORNE - NAPIER RAILWAY (NORTH END).

*Ngatapa Section* (0 m. to 10 m. 40 ch.; length, 10 m. 40 ch.)—The bridges were repaired and painted, and platelaying and ballasting completed from 5 m. to 10 m. 40 ch., and the whole section generally cleaned up and handed over to the Railway Department on the 15th December last.

*Waikura Section* (10 m. 40 ch. to 16 m.; length, 5 m. 40 ch.)—Little or no work has been done on this section during the period under review, owing to the decision to abandon the route via Waikura and Hangaroa in favour of one by a route nearer the coast, only such work as was necessary to render the work done safe has been done.

#### NAPIER-GISBORNE (SOUTH END).

*Tutira Section* (10 m. 56 ch. to 28 m. 20 ch.; length, 7 m. 44 ch.)—Fencing has been erected on the left from 15 m. to 22 m. 12 ch., and on the right from 15 m. 40 ch. to 15 m. 60 ch., and 20 m. 35 ch. to 20 m. 75 ch.

The formation work on this section is exceptionally heavy, but owing to a vigorous and concentrated construction policy very good progress has been made with the culverting and earthworks. An average of seven steam-shovels has been engaged during the period. Most of the culverts, other than sub-formation pipes, have been completed, thus enabling the earthwork to proceed without delay. Nineteen water-drives, seven pipe culverts, one flume, and two retaining-walls were constructed.

The formation, including the two large embankments at 15 m. 20 ch. and 15 m. 40 ch., on either side of the Waipunga station-yard has been practically completed to 18 m. 5 ch., with the exception of a large cutting at 16 m., which is not quite finished, but rail communication has been provided round it.

and will remain until the cutting is completed in about two months' time. The work is fully manned onward from 18 m. 5 ch. to 20 m., and by the time this portion of the formation is completed practically all other work should be finished to Waikoau at 23 m. 16 ch. The formation is also in hand over the remainder of the section.

Two tunnels, both 6 chains long, were completed during the year, at 18 m. 30 ch. and 19 m. 76 ch. respectively.

A total of 383,351 cubic yards of earthwork was shifted during the year, of which the steam-shovels were responsible for 142,604, the balance being dealt with by hand-labour and scoop teams.

The Esk River Bridge, consisting of nine 40 ft. steel spans on concrete piers, was completed in the early part of the year.

The foundations of the Waikoau Viaduct have been tested, and aggregate delivered in readiness for making a commencement with the construction of the foundations. An access road has also been formed to the north side. Tenders have been called for the erection of the superstructure, one span of 250 ft. and two spans of 100 ft.

The bridge at 11 m. 40 ch. still remains to be completed. The piers have not been replaced since the flood of March, 1924, but twenty-eight concrete piles were cast during the year, and the line is being carried on a temporary structure.

The permanent-way has been laid from 13 m. 30 ch. to 17 m., and at the present rate of progress it is hoped to have the railhead to Waikoau Gorge, at 27 m. 60 ch., by the end of 1926. Ballasting has been pushed on during the last few months, and is now practically complete to 16 m. A steam-shovel has been installed in the ballast-pit at 13 m. 60 ch., and is giving good service.

The Department's sawmill at the Makomako Bush has provided most of the timber required during the year. Some metalling has been done on the access road to the mill, and this should be completed shortly. The final plate-layer's cottage at Waipunga station-yard was completed early in the year, and two cottages were erected at Waikoau.

Arrangements have been made to utilize permanent steel block moulds for the cottages on this line, and it is proposed thereby to erect all remaining cottages of concrete blocks in preference to wood.

The service road has been maintained and metal put on where required. Telephone-line has been erected from 21 m. to 22 m., and is to be pushed on to Wairoa as the material arrives.

Special attention has been paid to accommodation for employees, and 119 huts, nineteen married men's houses, and four cookhouses have been erected, as well as a recreation-hall, which has been in use for about nine months. This latter has proved popular, and is well patronized and appreciated.

*Putorino Section* (28 m. 20 ch. to 37 m. 35 ch.; length, 9 m. 15 ch.).—Work was commenced on this section during the latter part of the year. Generally speaking, the formation is easier than that of the preceding section, and the work undertaken has consisted principally of culverting; but four water-drives have been constructed, and scoop teams have been employed on formation between 28 m. 20 ch. and 30 m. as the culverting was completed. As much of the formation as possible is to be done with scoops, but plant and men will be moved forward as they finish on Tutira Section. It is expected that earthworks on Putorino Section will be almost completed when the Waikoau and Matahaura Viaducts have been erected.

*Mohaka Section* (37 m. 35 ch. to 50 m. 56 ch.; length, 13 m. 21 ch.).—On this section the line again runs into heavy formation, and three tunnels, aggregating approximately 70 chains have to be driven, and there are also two large viaducts to be erected. With a view to getting these tunnels in hand an organization has been set up and camps erected between two of the tunnels at Chimney Creek, and it is hoped to commence these tunnels in a few months. The work undertaken to date consists of clearing at 46 m. 10 ch. and a water-drive at 45 m. 57 ch.

*Waihua Section* (50 m. 56 ch. to 58 m. 58 ch.; length, 8 m. 2 ch.).—Arrangements are being made to start work at the tunnel approach at 52 m. 70 ch., but very little has so far been done.

*Wairoa Section* (58 m. 58 ch. to 70 m. 14 ch.; length, 11 m. 36 ch.).—The approaches at each end of the Waihua Tunnel, at 60 m. 61 ch. to 60 m. 77 ch., are in hand, and materials for concrete culverts are being delivered to the sites. An access road, 20 chains in length, is being constructed to the Waihua Beach for the purposes of obtaining shingle for this tunnel and for culverts. Surveys have been made of alternative sites for a bridge over the Wairoa River, and borings are in hand to test the foundations.

#### WAIKOKOPU BRANCH RAILWAY.

*Nuhaka Section* (0 m. to 17 m. 12 ch.; actual length, 18 m. 65 ch.).—One 48 in. corrugated metal culvert, 30 ft. long, has been placed at 4 m. 6 ch. The Tuhara station-yard loop has been laid and ballasted, and the formation of the yard is nearing completion. The points for the loop at the Whakaki station-yard have been laid, and about 75 per cent. of the formation has been completed. The third lift of ballast is practically completed throughout. Permanent tops have been placed on five bridges, which is as much as the available bridge gangs could do in the period.

*Waikokopu Sections* (17 m. 12 ch. to 23 m. 28 ch.; length, 6 m. 16 ch.).—The main-line formation has been completed to the wharf approach, and the formation of the Waikokopu station-yard is also finished. The bridge at 21 m. 23 ch. is in hand, and the concrete piers have been erected. During the year 24 chains of permanent-way was laid, and the railhead is now at 23 m. 19 ch., where the approach to the wharf begins. Two loops have been laid in the Waikokopu station-yard. The ballasting is complete except for 1½ miles of third lift. Three pairs of 12 ft. hardwood gates have been placed at private crossings.

The stone approach to the Waikokopu Wharf is well in hand, and the timber approach is complete except for the bracing. The construction of the wharf itself has been pushed on, and it is now practically complete. It is expected that the permanent double line on to the wharf, and the scissors crossing, will be laid next summer. The Harbour Board shed is being moved to a suitable position to

cope with the increased shipping. During the year fifty-one boats worked the harbour, and 3,000 tons of outward cargo and 3,400 tons of inward cargo were handled at the wharf, most of the latter being railed to Wairoa.

*Waikokopu Harbour.*—During the year two leading beacons were erected, and the erection of two anchorage beacons is in hand for the Wairoa Harbour Board at Waikokopu. A 6 ft. track, about 25 chains long, leading to the front anchorage beacon is completed.

All the meat exported by the Wairoa Farmers' Co-operative Company was railed to Waikokopu and lightered on to Home boats, which anchored in the Waikokopu roadstead. Flax from the Wairoa Flax-mill was similarly lightered. Sand has been shipped regularly to Gisborne, and sheep have been shipped to Lyttelton (two boats) and Napier (two boats).

Goods traffic was maintained between Wairoa and Waikokopu, in conjunction with the construction work, and sheep were entrained along the line for the local meat-works.

#### STRATFORD MAIN TRUNK RAILWAY (EAST END).

*Matiere Section* (0 m. to 10 m. 23 ch.; length, 10 m. 23 ch.).—The formation of this section was practically complete last year, but slips have been cleared and banks widened between 0 m. and 2 m. 20 ch. Cutting batters have also been completed, and bank-widening between 7 m. and 7 m. 40 ch. Cattle-stops were erected at 9 m. 40 ch. and 9 m. 69 ch., and road-deviations have been constructed and metalled where necessary.

The platelaying and ballasting at the Tuhua station-yard were completed on main line and sidings, and the station-buildings there, as well as those at Matiere, are approaching completion.

Extensive damage was caused by the heavy downpours on the 15th and 22nd May last, principally at the Okahukura Tunnel. The two entrances to this tunnel are located in gullies, and vast accumulations of timber and slurry were brought down from the steep log-littered hillsides overhanging the portals, and completely blocked the approach cuttings for traffic for over a week.

The construction of this section is now complete with the exception of permanent track on bridges, the final trimming lift of ballast, and the renovation of the Okahukura station-buildings. The staff headquarters and temporary buildings, &c., have been moved from Okahukura to Matiere. Goods and passenger traffic were run on this line during the year, and a large amount of timber was carried.

*Ohura Section* (10 m. 23 ch. to 19 m. 10 ch.; length, 8 m. 67 ch.).—The formation is complete to 15 m. 40 ch. with the exception of 2 chains of cutting. A steam-shovel is working in a cutting at 15 m. 20-30 ch. with locomotive and earth-wagons. Between 15 m. 40 ch. and 16 m. 70 ch. 45,000 cubic yards will have to be excavated to complete fillings, of which 11,000 cubic yards will be for filling between 15 m. 40 ch. and 15 m. 67 ch., and the balance principally at the Ryan Road station-yard. The formation work is well in hand between 16 m. 70 ch. and the end of the section.

The road-deviation and traffic-bridge at 11 m. 26-50 ch. are completed, and surveys are being made for road-deviations and overhead bridge-crossings at 12 m. 76 ch. and 17 m. 23 ch.

The formation of the Nihoniho station-yard is nearly complete, and a temporary loop has been laid. The earthwork at the Ohura station-yard is in hand.

Four miles of fencing was erected, and 448 linear feet of culverts, ranging from 1 ft. to 3 ft., constructed. Stream-diversions at 13 m. 15 ch. and 18 m. 12 ch. have been constructed as far as is possible at present.

The bridges at 11 m. 39 ch. and 13 m. 15 ch. have been completed with the exception, in the latter case, of the decking, which is being laid. The concrete piers of the Ohura River Bridge at 14 m. 64 ch. are complete, and the steel girder spans are riveted ready for launching. The foundations for the concrete piers of the bridge at 15 m. 47 ch. have been laid, and the timber piers of the bridge at 15 m. 68 ch. are complete and the three concrete piers are in course of erection. The piles, &c., for the Waitewhena River bridges at 17 m. 36 ch. and 18 m. 12 ch. have been received, and the manufacture of concrete piles for the Mangaroa River Bridge at 18 m. 30 ch. is proceeding.

No permanent platelaying has been undertaken this year, but the temporary service-line to Toi Toi (16 m.) has been completed, and has been in use for traffic for the greater part of the year. The first lift of ballast has been completed to 14 m. 50 ch. and the second lift to 13 m. 48 ch.

The floods of the 15th and 22nd May last considerably retarded construction on permanent bridges, and temporary bridges had to be guarded day and night to protect them from drifting logs and timber jams.

Accommodation for workers has received constant attention. At present forty single huts and forty married men's quarters (aggregating the equivalent of 177 single huts) are on the works, and more are under construction.

Freight and passengers have been carried since the 21st July, 1924, to Toi Toi, via the temporary tramway.

#### STRATFORD MAIN TRUNK RAILWAY (WEST END).

*Tahora Section* (42 m. 26 ch. to 47 m. 40 ch.; length, 5 m. 14 ch.).—As mentioned in last year's report, men were transferred from this section and Te Wera quarry to assist with the repair of damage caused to the open line by the heavy flood of April, 1924. The No. 3 bridge was repaired on the 7th July, 1924, and the Public Works train then worked the Whangamomona Tunnel, which was cleared by the 16th of that month, when the first train since the 5th April, 1924, was run through to Whangamomona. The repair to the open line was completed by the 2nd August, and the men were then transferred to repair flood damage on the unopened portion of the line and back to the quarry. The damage to fences on the unopened section was extensive, and 150 posts had to be replaced. The unopened section was fettled throughout, and 536 cubic yards of extra ballast placed. Passenger and goods service over the unopened line was recommenced on the 5th August.

The Tahora station-yard was cleared of slips and otherwise repaired on the 13th October last, and this section was handed over to the Working Railways Department on the 21st of the next month. A room to provide for the post-office was added to the Tahora station-buildings.

*Rackohua Section* (47 m. 40 ch. to 50 m. 60 ch.; length, 3 m. 20 ch.).—The principal work on this section was the construction of a tramway from the railhead, 47 m. 60 ch., to the Tangarakau Flat, 50 m. 50 ch., where a main camp is to be erected for working the Heao Section. 127 chains of bush-felling and clearing were completed on the main line, tramway, and jig line. The railway-cutting was taken out full width from 47 m. 73.50 ch. to 47 m. 76 ch., and 8 ft. wide to 48 m. 1 ch., and the bank built 8 ft. wide to 48 m. 6 ch. (This chainage, 48 m. 6 ch., is 0 m. 0 ch. on the tram-line.) The tram formation was completed to the Tangarakau Stream, 3 m. 10 ch., and across the stream, 3 m. 12 ch., to 3 m. 17 ch., and slips on the tram-line, as the result of heavy rain, were removed. 3,850 sleepers were split in the district and delivered on the works: 300 were transferred from Te Roti, 1,200 were obtained from mills; and 800 hardwoods were received. Three miles of rails and fastenings were delivered, and 1 m. 6 ch. of platelaying completed. 2,043 cubic yards of ballast was received from Te Wera and dumped in convenient places along the line for construction-work ahead. The tram-line was ballasted for 66 chains.

The telephone-line was extended from Tahora to Tangarakau Flat, and a water-supply was provided by means of a water drive, 154 ft. long, to the proposed camp there. Sixty huts and ten washhouses are ready in sections for this camp, and a similar number is being constructed. No bridges were erected during the year, but timber and ironwork have been received for four road-bridges.

*Heao Section* (50 m. 60 ch. to 57 m.; length, 6 m. 20 ch.).—The surveys of deviations of the permanent line from 50 m. 40 ch. to 54 m. were completed, including preparation of plans. The permanent-line survey from 54 m. to 56 m. has been completed, and plans are in hand, and the trial-line survey from 56 m. to 57 m. is in hand.

*Te Wera Quarry* (21 m. 60 ch.).—Operations were recommenced at this quarry on the 5th August last, when flood damage had been repaired on the open line. Additional stripping was undertaken to keep the face clear of slips. The quantity of metal crushed during the remainder of the year totalled 19,457 cubic yards, and averaged 86.8 yards per working-day. The Public Works Department used 3,288 yards of this metal on its own works, 4,907 yards were sold to the Railway Department, and 11,262 yards to local bodies. Washhouses, baths, and stoves were provided for married quarters, and all buildings were maintained in good repair.

#### OPUNAKE BRANCH RAILWAY.

*Kapuni Section* (0 m. to 7 m.; length, 7 m.).—The only earthwork carried out on this section during the year has been the widening of the Kapuni station-yard, which is now complete, and the third lift of ballast throughout the sidings. The permanent sleepers have been laid on the Mangatoki Bridge at 1 m. 49 ch. and on the Kapuni River bridge at 4 m. 69 ch. The erection of a passenger-platform and station-buildings have been completed at Matapu, Duthie Road, Palmer Road, and Kapuni Stations, and approach roads metalled. This section was open for goods traffic throughout the year. The track is being put in first-class order, gates hung, fences repaired, and the metalling of the Palmer Road and Kapuni station-yards is being completed in readiness to hand this section over to the Working Railways Department at an early date.

*Auroa Section* (7 m. to 12 m.; length, 5 m.).—Three sets of cattle-stops were constructed, and the permanent telephone-line was erected between 9 m. and 12 m. Girders were placed on Dunn's Creek No. 1 at 7 m. 41 ch., Dunn's Creek No. 2 Bridge, at 7 m. 62 ch., and on the Mangawhero River Bridge at 9 m. 41 ch. The laying of permanent sleepers on the last-mentioned bridge was also completed. Platelaying was completed on the main line from 11 m. 37 ch. to 12 m., and the first and second lifts of ballast from 11 m. 37 ch. to 12 m., and the third lift from 11 m. 25 ch. to 11 m. 37 ch. The erection of a passenger-platform and station buildings was completed at Mangawhero Road Station, and station buildings at Auroa Road. Goods traffic has been run on this section from the 1st March last.

*Pihama Section* (12 m. to 16 m. 40 ch.; length, 4 m. 40 ch.).—All formation work in this section is now complete. All banks were brought up to full width throughout the section, and the batters of all cuttings have been completed. 39 chains of permanent telephone-line was erected, as well as cattle-stops at 16 m. 39 ch. The concreting of the piers of the Ouri River Bridge at 16 m. 10.50 ch. was completed, and girders were placed in position on that bridge as well as on the bridge over the Oeo River at 15 m. 64 ch. The approaches to the overhead bridge at 13 m. 53 ch. across the main road were completed and metalled. Platelaying of the main line from 12 m. to 16 m. 40 ch. was also completed, and the first siding of the Pihama station-yard. 4 miles 40 chains of first-lift ballasting was completed on the main line, and 2 miles 66 chains of second-lift, and also the first lift of the first siding of Pihama station-yard. Goods traffic was run on this section from the 1st June last, and a passenger-train was run on one special occasion.

*Opunake Section* (16 m. 40 ch. to 23 m.; length, 7 m. 40 ch.).—During the period the main-line formation and the majority of the station-yard excavation was completed. The most important piece of earthwork was the completion of cutting at 21 m., which is practically a mile in length, the spoil from which was run to bank between 21 m. 75 ch. and 22 m. 20 ch. A steam-shovel was utilized in the cutting to load into muck-wagons for transportation to the bank. Very good progress was made with this shovel. During the year 6 miles 62 chains of fencing was erected. Three 6 ft. flat-topped and one 4 ft. arch culvert were constructed.

The deviation of Watino Road at Punehu Station has been formed and metalled, and the excavation for the widening of the station-yard is progressing. The widening of the Opunake station-yard has been completed, as well as the formation of the approach road on the right, and one platelayer's cottage was erected.

Concrete piers were built and girders placed on the Punehu bridge at 17 m. 52 ch.; the Taungatara River Bridge, at 18 m. 48 ch.; and the Mangahume Stream Bridge, at 20 m. 75 ch. The remaining four piers of the Waiau Stream Bridge, at 22 m. 8 ch., were also completed during the year and girders placed in position.

The platelaying of the main line was completed from 16 m. 40 ch. to 22 m. 55 ch., and the first lift of ballast was also completed over that length. Goods traffic was run over this section from the 1st June last. Fourteen 8 ft. by 10 ft. huts were erected during the year for employees.

#### WELLINGTON - TAWA FLAT RAILWAY DEVIATION.

The centre-line proclamation of this deviation was gazetted on the 22nd December, 1924, and the permanent survey, which was commenced in March last, is nearly finished. Tenders were recently called for the necessary stonework along the harbour-front from Kaiwarra Railway-station to the turn-off near Ngahauranga. Until this stone is placed it is practically impossible to make a start on the tunnel into which the line will enter immediately it crosses the Hutt Road.

#### HUTT VALLEY RAILWAY DUPLICATION.

This line was authorized last session. The survey was commenced on the 30th September, 1924, and the centre-line proclamation gazetted on the 11th December last. Preparatory work, clearing, &c., was commenced on the first mile in March, and the first sod turned by yourself on the 16th April, 1925.

Ten chains of embankment has been formed between 7 m. 10 ch. and 7 m. 20 ch. by removing a portion of the old Petone stop-bank. Bores have been sunk and test piles driven at the site of the proposed bridge over the Hutt River at 8 m. 30 ch., and a commencement made with the erection of a temporary low-level bridge, in order that earthworks may proceed while the permanent bridge is under construction. The necessary plant for vigorously prosecuting the work, including a drag-line excavator, is being procured.

#### MIDLAND RAILWAY.

*Kawatiri Section* (59 m. 17 ch. to 63 m. 10 ch.; length, 3 m. 73 ch.).—The earthwork on this section is practically completed. The work undertaken during the year has consisted of formation of banks at subway, 61 m. 50 ch., and construction of road-diversions between 61 m. 50 ch. and 62 m. 40 ch., and between 62 m. 60 ch. and 62 m. 69 ch. The abutments of the 35 ft. plate-girder-span railway-bridge over Sandy Creek at 6 m. 36.6 ch. have been completed, and the span is riveted ready for placing in position. A road-bridge of similar construction and span over the same water-course is complete with the exception of the handrails. The piers are erected of the Hope River Bridge at 62 m. 41.13 ch., and the three spans, each 51 ft. in length, have been placed in position and are now being fastened down. The subway bridge at 61 m. 50 ch., consisting of three spans of plate girders on pile piers, has also been completed. Rails have been laid to 61 m. 10 ch., and the first lift of ballast completed to 60 m. 60 ch.

*Murchison Section*.—The formation on this section has been almost completed to 64 m. 20 ch., and clearing, &c., to 65 m. 65 ch. A large 10 ft. arched culvert has been completed at 64 m. 22 ch. The permanent-line section has been completed and plans prepared to 73 m., and trial line survey is in hand to 81 m.

*Otira - Arthur's Pass Section*.—A few items which were uncompleted when this section was handed over to the Railways Department on the 26th May, 1924, have since received attention. The principal ones were an auxiliary intake at the 1,660 ft. level for the pipe-line at Goat Creek; completion of a coal-ramp at Arthur's Pass, and laying of tracks to the ramp, and electric-locomotives shed; and installation at Otira of an engine and pump to return condenser-water to the lower reservoir in case of shortage of supply from Goat Creek.

#### WESTPORT-INANGAHUA RAILWAY.

*Cascade Section* (5 m. 70 ch. to 9 m.; length, 3 m. 10 ch.).—The formation on this section had, with the exception of the portion between 8 m. 70 ch. and 8 m. 74 ch., been completed some years ago. The principal work to be done in this direction, therefore, consisted of removing slips and trimming the formation ready for platelaying. The portion of new formation mentioned above will be completed shortly. A stone diversion drive, 90 ft. long, has been completed, and culverts and pipes placed.

No bridges had been erected, and, as several of these are fairly large, it has been necessary to erect staging so that the platelaying might proceed without delay while the actual bridge-work was being carried out.

The bridge at 6 m. 37 ch., consisting of five 20 ft. steel spans on hardwood pile piers and abutments, has been finished. Excavation for the foundations of piers and abutments of the bridge at 7 m. 65 ch. has been completed with the exception of abutment A, where difficulty is being experienced in getting a foundation, and the concreting of the centre pier is in progress. A start has been made with the foundation work for the piers and abutments of the bridge at 8 m. 7 ch., and also for the bridge over Little Cascade Creek at 8 m. 40 ch. Suitable aggregate for the concrete piers of the latter bridge is being hauled to the site. Piers D and F are in hand, and the necessary pumping plant installed to deal with the water.



At Cascade Creek Bridge (9 m.) test pits have been sunk to determine the depth of foundations, and the concrete-work will be commenced shortly.

Material for the permanent-way has been supplied, and the rails have been laid to 8 m. 7 ch., and a 1-in-7½ crossing, with the necessary track, has been laid into the engine-shed.

Various areas were prospected for a ballast-pit, and it was finally decided to acquire 5 acres from Section 250, Block XII, Kawatiri Survey District for this purpose. A 1-in-9 crossing off the main line, together with 8 chains of track, was laid into this ballast-pit, which is now being worked with satisfactory results.

A telephone-line has been erected between Westport and Te Kuha. A store, 50 ft. by 30 ft. fitted with office and the necessary shelving, has been erected at Te Kuha, as well as an engine-shed, blacksmith's shop, and small explosives-magazine. Twelve huts have been erected at Te Kuha for accommodation of workers, and a boardinghouse has been fitted up.

The relocation of the centre-line beyond Cascade Creek has been surveyed and pegged to 16 m.

#### LAWRENCE-ROXBURGH RAILWAY.

*Miller's Flat Section* (34 m. 70 ch. to 49 m. to 45 ch.; length, 14 m. 55 ch.).—During the year the railway formation was completed to 49 m. 59 ch., including formation of Ridd's siding at 47 m. 25 ch. and Miller's Flat station-yard at 49 m. 25 ch. The rail-head was extended to 49 m. 58.8 ch. and Ridd's siding laid, as well as two sidings and a portion of the engine-shed siding in Miller's Flat yard.

The first and second lifts of ballast are complete throughout this section, except the dead-end and engine-shed siding at Miller's Flat, and the third lift is nearing completion. A steam-shovel was used for lifting ballast at 43 m. 65 ch.

All bridges have been completed and painted, and permanent-way has been laid over them. The approaches to bridges have been stone-pitched, and an overbridge erected at 46 m. 29 ch. A check-rail has been laid over the Corstorphine Bridge. All culverts have been completed with inlets and outlets, but a few box drains still have to be put in. Seven sets of cattle-stops were constructed; 2 miles of fencing was erected, and the telephone-line was completed to Miller's Flat.

The approach roads to both goods and passenger sides of the Miller's Flat Station have been metalled. The concrete fronts for platform and for loading-bank have been constructed, and the greater part of the filling is in position. The inside engine-pit and outside ashpit are finished, and a temporary station office and goods-shed have been erected for the goods service.

A contract was let in December, 1924, for the erection of station-buildings at Miller's Flat, but the contractor has not made as good progress as was hoped. The goods-shed and the coal-store are nearing completion, and four platelayers' cottages are well advanced, while a start has been made with the passenger-station and the engine-shed.

A daily goods service was run between Beaumont and Miller's Flat from the 15th December to the 27th May last, when it was limited to three days a week. The inwards consignments consisted of 4 horses, 280 sheep, 814 tons of timber, 1,662 tons of general goods; and the outwards traffic, 2 horses, 6,115 sheep, 5 tons of timber, and 3,713 tons of fruit and general goods.

#### OREPUKI-WAIAU RAILWAY.

*Orawia Section* (48 m. 23 ch. to 56 m. 47 ch.; length, 8 m. 24 ch.).—All formation work on this section had been completed during the previous period. The platelaying was finished this year by the laying of 1½ miles of main line and one station-yard. Ballasting is also completed, and the erection of bridges is finished with the exception of the permanent top on bridge over the Orawia at 55 m. This is now being placed.

During the year an additional siding at Pikopiko was decided upon, and this has been constructed complete with loading-bank and stock-yards. The shelter-shed, loading-bank, and stock-yards at Pukemaori are also finished.

A platform, loading-bank, goods-shed, and stock-yards have been erected at Orawia Station, and a contract is in progress for the station-building, latrines, and two cottages. The turntable has been delivered, and a commencement has been made with the foundations.

A goods service has been run by the Department since the 17th September, 1924, and this section should be ready for handing over to the Working Railways Department at an early date.

### SURVEYS OF LINES UNDER CONSTRUCTION, NEW RAILWAYS, ETC.

#### NORTH AUCKLAND MAIN TRUNK RAILWAY.

Four trial lines have been run in connection with the extension of this railway from Rangiahua to Mangamuka, and estimates of costs are now being prepared. The country is of such a nature that no self-evident best route exists, and all reasonable possibilities must be surveyed in detail. A trial-line survey is also in hand at both ends for a branch line between Kirikopuni and Dargaville.

#### EAST COAST MAIN TRUNK RAILWAY (PAEROA-POKENO).

The trial-line survey has been completed over the whole length, and the permanent survey from 12 m. to 19 m. The preparation of the plans is now in hand. Borings have also been undertaken where necessary to determine depths of peat.

## EAST COAST MAIN TRUNK RAILWAY (WAIHI EASTWARDS).

The permanent survey was completed to 126 m. 33 ch. on western side of the Waioeka River at Opotiki. Land-plan survey of road-deviation through the Waimana Gorge is in hand, where the road must be moved to the opposite side of the river to make room for the railway.

## ROTORUA-TAUPO RAILWAY.

The trial-line survey was completed from 28 m. to 53 m. 20 ch. (Taupo), and plans plotted and paper location made. Various routes were investigated, and altogether 36 m. 20 ch. of trial line were surveyed. The permanent survey has been carried out from 0 m. (Rotorua) to 5 m. 20 ch.

## GISBORNE-WAIROA RAILWAY (VIA NUHAKA).

Preliminary work for the location of possible tunnel-sites under the Wharerata Range was commenced in June, 1924, and continued into July. The main survey party went into camp in September, and continued running trial grades, &c., from the tunnel-portals. Early in November the party commenced running the trial for the location of a line up the Nuhaka Valley, and at the end of June work was completed to 30 m., leaving 2 m. 4 ch. to the main-tunnel portal at 32 m. 4 ch. still to be done. Altogether 15½ miles of trial line have been done in this valley. About the middle of March a second party went into camp in the Kopuawhara, and were engaged in continuing investigations for a line up that valley. Later they carried out an investigation for a scheme combining the Kopuawhara and the coastal valleys. At present they are engaged on the commencement of a trial line for this proposal.

## GISBORNE-WAIROA RAILWAY (VIA WHARERATA).

A commencement was made in April, 1925, of a survey across the flats from Ngatapa line at about 2 m. 40 ch. through Te Arai and Murawai towards Kopua Valley, and generally co-operating with the party working on the same line in the Napier district.

## STRATFORD MAIN TRUNK RAILWAY (EAST END).

Location surveys beyond Ohura are in hand for the purpose of comparing rival routes into the Heao Valley. The first mile, which would be common to all routes, has been finally located, and a start is being made on permanent pegging.

## MIDLAND RAILWAY (GLENHOPE-MURCHISON).

Permanent line surveyed and plans completed to 73 m., a total of 9 miles. Trial-line survey is in hand to 81 m., the trial-line plans being plotted to 79 m., but location not completed.

## LAWRENCE-ROXBURGH RAILWAY.

A trial survey was run from Miller's Flat to Roxburgh following up the left bank of the Clutha River. The permanent pegging is now in hand, and has been completed up to 53 m.

## OTAGO CENTRAL RAILWAY.—CROMWELL NORTHWARDS.

A reconnaissance survey of another route for the above railway has been made on the opposite side of the river from that on which the original survey was made. The authorization was based on the original survey, but owing to the decline of mining and the scattered nature of settlement the position has been altered, and it now seems that, if it were decided to proceed, the new survey would give a more suitable line. The estimates of the two routes are being further considered in the District and Head Offices, but until the results have been co-ordinated with the opinions of other Departments and brought to a common focus I am not in a position to express an opinion.

## CONSTRUCTION AND MAINTENANCE OF ROADS AND BRIDGES.

*Kirikopuni-Parakao Road (Hobson and Whangarei Counties).*—This road is being constructed to provide access for the Mangakahia and subsidiary valleys to the railhead at Kirikopuni: 5 miles 70 chains of 24 ft. formation has been constructed. It is anticipated that the road will be open for traffic on completion of the railway to Kirikopuni.

*Waimamaku-Donnelly's Crossing Road (Hobson County).*—Surveys have been made of various possible routes, and plans and estimates prepared. Further investigations are now in hand with a view to ascertaining the most favourable route.

*Wairoa River Bridge, Dargaville (Hobson County).*—The work on the original contract has been completed. Additional spans on the Dargaville and Horehore side have been added, and approaches formed and metalled. A double-leaf shifting-span has been installed, and trials have proved satisfactory. The bridge is now open for traffic.

*Broadwood-Takahue Road (Hokianga and Mongonui Counties).*—143 chains of widening to 12 ft. formation has been completed; 2,092 cubic yards of metal, 9 ft. by 9 in., has been placed.

*Iwitava Road (Hokianga County).*—Formation to 14 ft. width and bushfelling 40 ft. wide over a length of 186 chains has been in hand. Slips have been removed, and 284 cubic yards of metal, 9 ft. by 9 in., placed.

*Mangamuka to Victoria Valley (Hokianga and Mongonui Counties).*—Hokianga County: Widening and removal of slips has been in hand; approximately 18,770 cubic yards of spoil has been removed. A creek-diversion through solid rock of dimensions 68 ft. by 14 ft. by 8 ft. has been completed. One bridge to first-class standard, 22 ft. by 14 ft., has been erected. Twenty 28 ft. by 12 in. and five 27 ft. by 18 in. concrete culverts have been placed.

Mongonui County: Formation, removal of slips, trimming batters, and rewidening to 16 ft. over a length of 130 chains have been completed; 6,780 cubic yards of spoil removed. Metalling: Broken metal in position, 2,170 cubic yards, 12 ft. by 9 in.; shale blinding, metal in position, 320 cubic yards, 12 ft. by 9 in.; 1,770 cubic yards of river-shingle, 12 ft. by 6 in. has been placed. Five 27 ft. by 12 in. culverts have been placed, and one first-class design, 12 ft. by 14 ft., bridge has been erected.

*Mohuiti-Kohukohu Mangamuka Road (Hokianga County).*—Widening of formation and raising mud embankment to 18 ft. width, involving 3,600 cubic yards of spoil, has been in hand over a length of 22 chains. Widening of formation on siding from 12 ft. and 14 ft. width to 18 ft. width and over, and improvement of sharp corners to 24 ft. width over a length of 174 chains, has also been in hand. Nine 24 ft. by 12 in. socket-pipe culverts have been placed, and lengthening culverts, involving 210 lineal feet of 12 in. pipes, has also been in hand.

*Oakleigh-Waipu Road (Whangarei County).*—This road is being re-formed, widened, metalled, and surfaced by the Department in lieu of the construction of the proposed Waipu Branch Railway. Operations commenced in August, 1924, with a complete engineering survey, after which construction of culverts, bridges, and formation and development of a quarry commenced. The proposed railway route is being used to 10 m. 60 ch. from Oakleigh, and the existing road-line is being followed therefrom to Waipu Central at 16 m. 60 ch. Slight deviations have been made to obtain improved grades: 1-in-50 grades have been obtained across the tidal flats in the vicinity of Oakleigh, and a 1-in-40 grade across the divide from 2 m. onwards. The divide between 11 m. and 13 m. is crossed on a 1-in-25 grade. 1,098 ft. of 12 in., 27 ft. of 15 in., 165 ft. of 18 in., and 150 ft. of 36 in. pipe culverts have been laid. Formation has been practically completed from Oakleigh to 6 m. 20 ch., and formation over the remaining length is well in hand, and portions have been completed. 330 ft. of bridging has been completed, and materials for the remaining bridges are available. Metal is being obtained principally from the Tauraroa quarry on the Whangarei Branch Railway, and from Allison's quarry, in the neighbourhood of 12 m. 20 ch., and will be delivered on the road by means of a light railway. It is anticipated that the road will be fully metalled to Waipu by next winter.

*Waiotira-Mangapai and Oakleigh (Whangarei County).*—This road has now been metalled, rolled, and fully completed right through to Waiotira.

*Coromandel-Colville (Coast) Road (Coromandel County).*—67 chains of formation to 14 ft. width has been completed, involving the removal of a large number of slips. Twenty 12 in. timber box and ten concrete-pipe culverts have been installed.

*Stony Bay-Holland's Road (Coromandel County).*—7 miles 6 chains of 6 ft. track has been reconditioned.

*Kawaroa Road (Kawhia County).*—86 chains of road widened to 14 ft. width.

*Te Maika (Kawhia County).*—146 chains of bridle-track widened to 14 ft. width dray-road.

*Makomako Road (Raglan County).*—417½ chains of bridle-track widened to 12 ft. and 14 ft. widths.

*Hoteo River Bridge, Mangakura (Rodney County).*—Work has been commenced on the ground; camp and cement-shed erected, and site prepared for pile-making and metal and sand dumps.

*Waiteitei Soldiers' Settlement Road (Rodney County).*—86 chains of 16 ft. dray-road and the necessary culverting have been completed.

*Tapu-Coroglen Road (Thames County).*—1 mile 72 chains of 14 ft. road completed in very heavy country; total length completed to date, 11 miles.

*Wharepuhunga Extension No. 4 Block (Otorohanga County).*—191 chains of 14 ft. dray-road completed during year, and erection of Mangaere Stream Bridge in hand.

*Kaiwua-Tologa Road (Uawa County).*—95 chains formation completed and 120 lineal feet culverts installed.

*Tutamoe Road (Uawa County).*—60 chains formation completed and 300 lineal feet culverts installed.

*Moanui Road (Waikohu County).*—80 chains formation completed, together with 95 lineal feet culverting.

*Taurangakautuku Valley Road (Mutakaoua County).*—50 chains formation and 66 chains metalling completed; 194 lineal feet culverts installed.

*Te Maire-Kokakonui Road (Kaitieke County).*—Work involving the placing of 279 lineal feet of culverts and the surfacing of 1 mile 72 chains of road has been in hand.

*Watershed Road (Waitotara County).*—A 6 ft. track has been formed for 5 miles 5 chains, and serves as a stock route from lands west of the Wanganui River.

*Ractihi-Ohura Road (Harris's Hill Deviation), (Waimarino County).*—Formation of this deviation, which shortens the road by about 1 mile and cuts out very steep grades, has been in hand.

*Mohakatino Valley Road (Clifton County).*—Dray-road formation has been extended over a length of 69 chains, and three small bridges have been erected.

*Retaruke River Bridge, Kouturoa East Road (Kaitieke County).*—Erection of one 82 ft. bridge is in hand.

*Mangaohutu Stream Bridge, Wanganui River Road, Left Bank (Kaitieke County).*—Erection of one 123 ft. bridge completed.

*Waitawhemua Road (Ohura County).*—Re-formation, culverting, and gravelling over 80 chains in hand.

*Waikoau River Bridge, Parahotangahia Settlement Road (Hawke's Bay County).*—The erection of three 30 ft. rolled-steel-joist spans on massed concrete base was completed.

*Mohaka-Putere Road (Wairoa County).*—The formation of this road was completed.

*Wairoa - Waikaremoana Road (Wairoa County).*—Formation and metalling has been in hand by the Department. The road has been re-graded and culverted, and 1 mile 50 chains of a 4 in. coating of metal has been laid.

*Ti-tree Point - Akitio Road, Dummy Hill Deviation (Akitio County).*—The formation and culverting of this deviation over a length of  $2\frac{1}{2}$  miles was completed during the year. Slips, involving the removal of 4,000 cubic yards of material, were also dealt with.

*Tinui - Pakowai Road (Castlepoint County).*—2 miles 24 chains of formation, 14 ft. wide, was completed, and 720 ft. of culverting installed. The maintenance of 3 miles of road was also attended to by the Department.

*Otamakapua Soldiers' Settlement Road (Kiwitea County).*—40 chains of formation was completed, together with  $2\frac{1}{2}$  chains of metalling, and 27 ft. of culverts placed. Two miles of metalling is at present in hand.

*Esk River Bridge, Waipunga Road (Hawke's Bay County).*—Erection of one 240 ft. rolled-steel-joist bridge on ironbark piles completed.

*Branch River Bridge and Approaches, Blenheim - Hope Junction Road (Marlborough County).*—The work of erecting five 40 ft. spans (10 ft. 6 in. roadway) on rolled-steel joists carried on pile piers and abutments is approaching completion; also protective groynes and approach embankments.

*Wairau River Bridge (Upper) Blenheim - Hope Junction Road (Marlborough County).*—A contract was let in January for erection of this bridge, consisting of span of nominally 140 ft. and three spans of nominally 80 ft. with 12 ft. roadway, carried on mass and reinforced-concrete piers and abutments.

*Rai River Bridge and Approaches, Bull's Ford (Marlborough County).*—The work of erecting three spans of nominally 61 ft. and two spans of 19 ft. 2 in., together with necessary approaches, was completed.

*Tutaki River Bridge, Braeburn - Murchison Road (Murchison County).*—Bridge completed, consisting of nominally two 61 ft. Howe truss spans and two 25 ft. end spans on pile piers and abutments. Road deviated, and approach banks, with culverts, &c., now in hand and nearing completion.

*Springlands Junction - Maruia Hot Springs Road (Murchison County).*—A survey has been made for a road round the large bluff at the Maruia River, and a contract let for the formation of 15 chains of this work at the eastern end. This will eliminate the crossing of the Maruia River.

*Brunner Bridge, Greymouth - Reefton Main Road (Brunner Borough).*—The concreting for three new anchors is now completed, and concreting of the fourth and profiling for pier is also in hand.

*Charleston to Grey County Boundary, Westport - Greymouth Coast Road (Buller County).*—The survey of the section from the Church to Brighton has been completed, and an agreement has been reached in connection with the taking of the necessary land. Between Fox's River and Bullock Creek 29 chains of formation have been completed. A contract was let for metalling 1 mile of road from Bullock Creek northwards, and 14 chains were completed.

*Grey Valley - Taramakau Road, Lady Lake to Bell Hill Section (Grey County).*—37 chains of formation and metalling have been completed, bringing the road to within 2 miles of the Junction of the Kotuku - Bell Hill Road.

*Waiho River Bridge, Ross - Waiho Road (Westland County).*—A contract has been let in England for the supply of steel for this bridge. The necessary hardwood and New Zealand timber has been ordered.

*Waikukupa Bridge, Main South Road (Westland County).*—This bridge, consisting of five 40 ft. truss spans in New Zealand timbers, has been completed.

*Big Totara Bridge, Westport - Greymouth Coast Road (Buller County).*—Bridge, consisting of seven 30 ft. ironbark stringer spans on ironbark pile piers, completed.

*Double Hill Runs Road (Ashburton County).*—A deviation between 5 m. 23 ch. and 5 m. 36 ch., covering formation, culverting, and metalling, has been completed, together with a deviation round Terrible Gully, involving formation, construction of open fords, and metalling.

*Pukaki - Mount Cook Road (Levels and McKenzie Counties).*—The 40 miles of road from Pukaki to the Hermitage was maintained and improved.

*Ashley Gorge Road (Ashley and Oxford Counties).*—The 12 miles of road from the main Rangiora-Oxford highway to the Lees Valley was maintained and improved by clearing slips and water-tables, filling in ruts, and placing earthenware-pipe culverts.

*Coalgate - Lake Coleridge Road (Selwyn County).*—34 miles of road was maintained, and improvements effected by metalling, grading in loose shingle, and filling in ruts, together with the clearing of slips and water-tables and repairing of bridges.

*Houipapa - Kahuka Road (Clutha County).*—Formation and metalling of 80 chains has been in hand.

*Maerewhenua River Bridge, Dansey's Pass Road (Waitaki County).*—The erection of two 25 ft. and one 20 ft. spans in hardwood timber has been in hand.

## HYDRO-ELECTRIC WORKS.

### LAKE COLERIDGE.

The work in connection with the duplication of this plant, consisting of the new tunnel intake and pipe-line, together with the extensions to the power-house, has been carried on vigorously.

The tunnel, which is being carried out under contract by Messrs. J. Beban and party, has been driven for a total distance of 51.25 chains, and has been lined for a distance of 46.50 chains. The

contractors have met with a considerable amount of difficulty owing to the amount of water that has been encountered in the excavation of the tunnel, particularly in the vicinity of the central shaft. Judging by the experience with the original tunnel it was not anticipated that so much water would be met with. Had it not been for this difficulty considerably better progress would have been made.

After the centre shaft had been sunk and exploratory drive put in at the foot of the shaft it was decided to alter the location of the central portion of No. 2 tunnel, as it was considered that a large amount of water encountered came from No. 1 tunnel. The contractors were then instructed to sink a new shaft approximately 1,000 ft. distant from the old one. The excavation of this shaft was completed to water-level in November, and a cross-drive approximately 20 ft. above the level of the tunnel was driven from the shaft to connect with the exploratory drive previously mentioned. In this drive a pumping-main 1,300 ft. in length was laid, and two 8 in. centrifugal pumps were installed in a chamber near the new shaft. This enabled water to be pumped from the new shaft into the centre shaft of the existing tunnel. Much trouble was experienced in opening out into the tunnel proper, on account of the water. Eventually the difficulties were overcome, and present indications are that the maximum amount of water being pumped to date, which is approximately 1,000 gallons per minute, will not be exceeded. The length of tunnel excavated from the centre shaft by the 30th June was 3.75 chains towards the lake and 3.25 chains towards the surge-chamber. The deviation of the tunnel decided upon resulted in approximately an additional 500 ft. in the length of the tunnel.

At the intake end of the tunnel the excavation and lining have been proceeded with steadily. The excavation in rock terminated much sooner than was anticipated, and it became necessary to install pumps. The maximum amount of water being pumped is yet small, amounting to only 40 gallons per minute after excavation had proceeded a length of 3 chains in shingle. The junction of rock and shingle occurred at 0 m. 16 ch.

At the outlet end a bad slip was encountered at the end of July. This resulted in a considerable delay and loss of excavated tunnel. Otherwise steady progress has been made. Practically no water has yet been encountered at this face. The total length of the completed tunnel will be 111 chains.

The excavation of the surge-chamber has been completed with the exception of a circular core approximately 30 ft. in diameter. This core was left in so as to assist in holding the profiling for the concrete walls of the surge-chamber, which have been completed to a height of 22 ft., 750 yards of concrete being deposited. Two of the pipe-tunnels leading out of the surge-chamber have been fully excavated, and the other one partially so.

The excavation of the pipe-bench has been completed, and the excavation for anchor-blocks and supporting-piers has been completed. Concrete anchor-blocks Nos. 1 and 8 have been completed to within 6 in. of pipe invert. All concrete supporting-piers between anchor-blocks Nos. 1 and 8 have been completed.

The excavation of the power-house site was completed by the Department early in the year, and a contract for the erection of the power-house extension was then let to Messrs. P. Graham and Son. This work is proceeding very satisfactorily. The walls of the power-house building are now practically completed, and the roof-beams and slab are at present being placed. To date 811 cubic yards of reinforced concrete have been put in. It is anticipated that the contract will be completed in September next.

A start has been made with the excavation of the tail-race by means of a drag-line excavator, and so far approximately 4,000 cubic yards have been taken out. Prior to this work the weir-basins were completed by the same machine. No concrete has yet been placed.

A contract has been let for the manufacture and erection of the pipe-line, and a portion of the material has been delivered, and is in the course of erection.

A contract has also been let for the supply and delivery of the new unit, consisting of a 12,650 h.p. turbine and a 7,500 k.v.a. generator.

#### HORAHORA.

At the start of the period the principal work which had been carried out on the above scheme consisted of the concreting of the main portion of the power-house extension, the foundations for the transformer-house, and portion of the tail-race deepening. The power-house extension has now been completed, involving the placing of 5,876 cubic yards of concrete, mostly reinforced, including the head and tail-race walls. The head-race slope has been excavated to the correct batter to conform with the existing slopes, and sown down in grass, while the excavation of the tail-race batters is in hand.

The two new units (Nos. 7 and 8) of 3,100 h.p. turbines and 2,500 k.v.a. generators have been erected and fixed in position. No. 7 machine has been supplying power since the 14th April, and No. 8 is at present drying out preparatory to testing.

The new concrete bay in the transformer-house has been completed, and minor alterations were carried out to the electrical workshop.

The deepening of the old tail-race was continued and completed. This work necessitated the removal of 8,753 cubic yards of material, over which there was an average depth of 7 ft. of water travelling at an average velocity of 3.5 ft. per second. The total area requiring deepening was approximately 7,000 square yards, and the depth of material to be removed varied from 2 ft. to 7 ft. The bottom of one-third of the area was composed of hard volcanic tuff necessitating drilling and blasting, and the remainder of sand and river shingle. All drilling was operated from a barge by pneumatic drills, holes being at 5 ft. spaces and charges fired electrically. After the ground had been loosened the excavation was carried out by means of a drag-line, which was erected in such a position as to command the whole of the area requiring deepening. The average lead was 570 ft., and while digging in broken tuff the output per twenty hours was 100 cubic yards, and in shingle 200 cubic yards.

A start was made on the concrete spillway weir in July last, but a considerable amount of temporary protection-work was necessary before the site was ready for excavation. The Waikato River at this point is divided into three channels, and in order to proceed with the excavation it was necessary to block the main channel with a sand-bag, timber, and stone gabion wall, 573 ft. long; this enabled excavation work to proceed.

While the excavation was being carried on, the preliminary work of erecting the concreting-plant, storage-sheds, shingle-bins, and cableway for transporting the shingle and material across the headrace was completed. Concreting has progressed steadily, and the weir extended across two channels, a length of 400 ft. In this portion of the weir provision has been made for two gate-openings, one 42 ft. by 14 ft. deep, to receive a power-operated sluice-gate of the Stoney type, and the other 50 ft. by 8 ft. deep, for a Boving automatic crest. Considerable difficulty was experienced in carrying out this work, owing to the great amount of work necessary to divert the water from time to time, and also on account of the very heavy floods which occurred. On the 23rd May the heaviest recorded flood in the Waikato for the last eighteen years was experienced, and generally throughout the work the average river-level was the highest recorded for a number of years.

During the year a great deal of material, including the machinery for two 2,000-kilowatt units, was transported by traction-engine and trailer from Hinuera Railway-station, a distance of 11 miles, and repairs to the Hinuera Valley Road were carried out where necessary.

#### ARAPUNI.

A contract was let in July, 1924, for the main constructional works involved in the above scheme. Prior to the letting of the contract a certain amount of developmental work was carried out, and during the early part of the year the formation of the access roads was completed and metalling finished. The branch road to the power-house is also formed, and the bridges over the Waikato and headrace were completed. These access roads were then handed over to Messrs. Armstrong, Whitworth, and Co. for maintenance under the terms of their contract.

The Department has also commenced the formation of the deviation of the Waotu-Arapuni Road. The Waiteti Flat deviation has been located, and arrangements have been made for the land-plan survey. The Department is also putting down bores with a calyx drill for the purpose of further investigating the nature of the rock at the spillway and at the dam-site.

Immediately the contract was let the contractors started to erect the necessary accommodation for their workmen, and excellent progress has been made with this. Sufficient provision has been made for 325 single men and 82 married men. The staff cottages and hostel are well in hand. Satisfactory progress has been made with the sewerage systems, and water-supply pipes are now being laid, and the construction of the reinforced-concrete reservoir is in hand. A commodious recreation-hall has been provided, and a regular moving-picture entertainment is supplied twice a week.

The erection of the poles and cables for the permanent reticulation of the village is in hand, a temporary service having been provided in the meantime.

The most important work on this contract during the early stages of construction is the driving of the diversion tunnel, through which the river will be turned, in order to enable the dam to be erected in the present bed of the river. A start was made in October with the clearing of the talus from the outlet, and the excavation of the arch section of the tunnel was commenced at the outlet end in January, and at the intake in April. In February a start was made to cut an incline at the outlet end down to the invert level, but considerable trouble was experienced with water, and after trying out several methods it has been found necessary to install a 10 in. centrifugal pump. Better progress would have been made with this diversion tunnel had it not been for three floods occurring, two in May and one in June, which held up the work to a considerable extent.

At the dam-site and cut-off walls excavation work was carried down as far as possible pending the completion of the diversion tunnel and consequent lowering of the water-table. The contractors are now installing a cableway for use in the erection of the dam proper, as well as for the completion of the excavation and cut-off walls. It was at first proposed to put in a series of large blasts in the gorge in order to form a temporary dam to divert the river through the diversion tunnel, but the contractors, after investigation, decided that the work was unsuitable, and they therefore now propose to construct a needle dam.

A start was made with the excavation of the head-race at both ends, but so far not very much progress has been made. The excavation for the penstock gates and for the spillway weir is in hand. The excavation for the power-house was commenced in November, and fair progress has been made. The spoil from this excavation is being dumped into the river and carried away by the current.

The construction of the anchors and piers for the suspension-bridge across the Waikato River is approaching completion.

After considerable investigation, the contractors opened up an outcrop of greywacke about 60 chains down the river from the Muku Creek quarry-site. The rock proved to be of good quality, and will be quite suitable for the work. In order to transport this metal from the quarry to the dam-site (a distance of approximately 10 miles), the contractors are erecting a cableway capable of transporting 40 tons per hour. The wooden towers of this are now being erected.

At the quarry itself accommodation has been built for the workmen, and a portion of the quarry-face has been stripped, while the foundations, &c., for crushers and machinery generally are being prepared.

Stores, cement-sheds, workshops, and offices have been erected at Putaruru and at the sites of the various works, while temporary substations have been installed at various points of the work; power transmitted electrically from Horahora is being utilized to drive most of the contractors' plant.

## WAIKAREMOANA.

The preliminary plant which was installed to supply Wairoa and district has been in operation satisfactorily during the period, and the Wairoa Power Board has added  $18\frac{1}{2}$  miles of distribution-line to their system. The workshop at the power-house has been completed, and the transmission-line to the Waikaremoana Hostel has been surveyed and is under construction. The work of the major scheme has been wholly confined to the survey and boring for alternative pipe-lines. Foundations at the intake and the power-house are being tested.

## MANGAHAO.

This scheme was officially opened by the late Right Hon. W. F. Massey on the 3rd November, 1924. Between the end of the previous period and that date a very strenuous construction programme was carried out, and the general finishing-off and final details had still to be completed after that date.

The lining of No. 1 and No. 2 tunnels was completed. The concreting of the control shafts in the by-pass tunnel and No. 2 tunnel was finished, and the Stoney sluice-gates and operating mechanism installed and housed. Similar work was completed at the intake to the No. 2 tunnel and the outlet from the surge-chamber, where in each case two independently operated screens and gates were installed. The grillage at the entrance to No. 1 tunnel and the outlet portal of No. 1 tunnel were built, and cement grouting was systematically carried out at the outlet end of No. 2 tunnel. The slipjoints in the tunnel pipes leading from the surge-chamber were electrically welded as an additional precaution against leaks, and an examination of the tunnels after a full head test disclosed no evidence of any weakness.

The concreting of the central gap in the Mangahao dam, which had been purposely left as an opening, necessitated by local construction conditions, was commenced in July, and by the end of August the concrete level was sufficiently high to enable water to be supplied to the power-house; this was made possible by an accumulated reserve of 8,000 cubic yards of crushed aggregate and sand. Prior to filling in the gap referred to, all plant, material, construction lines, and buildings on the up-stream side were removed, together with a multiple-cable suspension bridge. A lighter bridge was erected across the gorge slightly below the dam. Of a total of 21,848 square yards of concrete in the dam, the balance carried to completion during the year was 5,829 cubic yards. This included two automatic tilting-gates, each 64 ft. wide and 10 ft. high, from the pivot-line axis, with associated siphon-chambers, water-ports, lower operating chambers and tunnels, counter-weights, and sill slabs. Various floods were experienced during the completion of this work, but fortunately very little material loss occurred. 6,716 cubic yards of selective filling was placed in the earth-fill part of the dam during the year, giving a completed volume of 13,450 cubic yards.

The Tokomaru dam was completed in August, and of the total concrete volume (22,600 cubic yards), 3,900 cubic yards were placed after the 30th June. Other works included a reinforced hand-railing on each side of the top, extending full length, together with concrete steps near the east and west abutments. Back filling at the retaining-walls on the west abutment was also completed, and all plant, buildings, and material removed from the reservoir area.

General finishing-work on the surge-chamber was carried out, which involved 30 yards of concrete.

During July and August, 919 ft. of pipe-line was completed, being the balance of a total length of 4,366 ft. placed under contract by the Dunedin Engineering Company. Repainting and caulking were also carried out over the full length. A concrete portal was erected where the pipe-lines emerged from the hillside. Other work included the completion of 264 pedestals, and the placing of a balance of 84 cubic yards in the anchor-blocks. The ground surface under the pipe-lines was graded, and trimmed and sown in grass, and cross-drains provided to prevent scour on the steep slopes.

At the power-station various minor works were completed, including the roof balustrades, internal partitions, floor-plastering, entrance steps, stairways, interior painting, and the laying-down of a waterproof roofing-material.

The major part of the substation building was carried out during the present year. Main substations at Bunnythorpe, Dannevirke, Mangamaire, and Masterton, were completed, also the switching-station at Woodville. A cottage and stable were erected at Otaki. The substation at Waipukurau is nearing completion, while preparations are being made for commencing those at Wanganui and Napier. The substations include switch-room, workshop, garage, stable, and oil-store in brick or concrete, together with staff cottages in timber.

*Upper Mangahao Dam.*—The construction of an additional dam higher up the river forms an essential part of the completed development, and it has been considered advisable to proceed with this work now. A considerable amount of exploration and survey has been carried out in order to decide the most convenient location for the access road to this upper dam. The work involved the construction of  $3\frac{1}{2}$  miles of road, the first mile of which has now been formed and metalled, while the formation of the balance is nearing completion.

For the preliminary work of roading and general construction at the upper dam, advantage has been taken of the 2 miles of waterway formed by the reservoir of the No. 1 dam, for the transport of workmen, plant, and material, a tram-line, on road formation level, having been constructed and ballasted from the head of this reservoir to the upper dam.

The geological formation at the upper-dam site is being thoroughly investigated by means of a Keystone drill. Extensive contour surveys of the upper-dam basin and of the dam-site have been completed, and the bush has been felled and cleared in order that the erection of the workers' accommodation, service buildings, and cookhouse (which are now in hand) might proceed. The bush is also being cleared on the line of the permanent transmission and telephone line, and from the dam-site and general layout.

A light access suspension bridge and a ropeway for the transport of material across the Mangahao River has been completed. A considerable amount of repair work has been carried out to miscellaneous articles of plant, stores, &c., which have been transferred to other districts.



## RIVERS IMPROVEMENT AND PROTECTIVE WORKS.

## WAIROA RIVER.

*Tokatoka Stop-banks.*—Good progress has been made with the construction of new stop-banks down the Wairoa River from Ruawai, to prevent damage by flood-waters and high tides. A mechanical excavator has been used, and has worked two shifts. This machine has excavated 118,000 cubic yards of material to date, and 6 miles of stop-bank are completed.

## WAIHOU AND OHINEMURI RIVERS.

*Upper Waihou River.*

*Mangaiti-Tirohia.*—Left bank: 2 miles 48 chains of stop-bank were completed during the year by the Waihou dredge No. 1, which worked two shifts throughout the period. Soiling and sowing of 2 miles 50 chains of stop-bank have been completed, and four flood-gates were installed, comprising one 12 in. concrete culvert and three 4 ft. corrugated-metal culverts.

*Tirohia-Ngararahi.*—Right bank: The raising of stop-bank to final level on section between 4 m. 50 ch. to 5 m. 12 ch. was completed by means of a drag-line excavator.

Left bank: A total length of 5 miles 78·5 chains of bank has been raised to final level and section by two drag-line excavators between 0 m. and 4 m. 27·50 ch. and 4 m. 30 ch. and 6 m. 1 ch.

*Lower Waihou River.*

*Ngahina-Netherton.*—Right bank: Preliminary bank between 0 m. and 3 m. has been strengthened by hand-labour. The spoil-banks on each side of railway outlet-drain have been trimmed over the total length of 40 chains of drain.

Left bank: The preliminary bank from 0 m. and 2 m. 26 ch. was raised and strengthened by a drag-line, and from 2 m. 26 ch. to 3 m. 4 ch. by hand-labour. The erection of the concrete retaining-wall at Netherton Dairy Factory is in hand, and 77 chains of drain have been widened and deepened, and a 20 ft. M.A.H. bridge erected over it at Pukahu Road.

*Netherton-Wharepoa.*—Right bank: Alexander's drain has been completed by the dipper dredge, which dug 1 mile 51·60 chains during the year. A 20 ft. span hardwood bridge was also erected over this drain at its crossing with the Netherton Ferry Road, and a temporary 4 ft. corrugated-metal culvert installed at the mouth of the drain.

*Ohinemuri River.*—Right bank: The preliminary stop-bank has been raised to final level and section, and soiled and grassed over a total length of 1 mile 66·5 chains, from 0 m. to 0 m. 13·50 ch., 0 m. 26 ch. to 0 m. 31 ch., and 0 m. 55 ch. to 2 m. 23 ch.

Left bank: Stop-bank has been built to final level and section over a total length of 1 mile 29 chains, from 3 m. 56·50 ch. to 3 m. 64 ch., 4 m. 68 ch. to 5 m. 30 ch., 5 m. 73 ch. to 6 m. 6 ch., 6 m. 28·50 ch. to 6 m. 40 ch., and 7 m. 46 ch. to 7 m. 71 ch., and is now complete except for gaps at Criterion traffic and Paeroa railway bridges.

*Ohinemuri River (Willow-clearing).*—The stump-extractor has completed the clearing and stacking of willows over a length of 3 miles 61 chains of river, commencing from the new junction and working up-stream.

*Hikutaia Creek.*—Ringbarking of willows has been completed.

*General.*—A total of 489,110 cubic yards of material was removed by machinery during the year.

*Waihou Dredge No. 2.*—The construction of the Waihou No. 2 dredge is almost completed. The steel hull, 80 ft. by 29 ft., was built in this Department's workshops at Tauranga, and erection of superstructure, machinery, &c., has been undertaken on these works. This dredge will be driven electrically, current at 11,000 volts, from the Thames Valley Power Board transmission-line, being brought on board by means of an armoured cable, and transformed on board down to 400 volts. A 250 h.p. motor, connected direct to a 12 in. gravel-pump, will provide the main power. Two 25 h.p. service motors are provided to work winches, service-pumps, &c., and a 16 h.p. oil-engine provides stand-by power to work winches in event of failure of the current. A 48 ft. towing-barge has been built, and pontoons erected for discharge pipe-line.

*Surveys.*

A considerable number of surveys have been made, of which chief items are as follows:—

Mangaiti—Te Aroha: River traverse completed.

Ngahina-Netherton: 11,000-volt transmission-line survey completed for a length of 3 miles.

Ngahina-Wharepoa: Contour survey of lower Waihou completed for 12 miles.

## TAIERI RIVER.

This work which is designed to protect the fertile Taieri Plains from periodical inundations such as have occurred in the past, is now being actively prosecuted. In order to determine and provide for the necessary waterways a great deal of survey work and investigation has been necessary. This portion of the work is now almost complete, and in addition detailed surveys have been carried out at particularly important places, such as Outram Railway-bridge, Allanton and Otokia Railway-bridge, in order to determine the flood capacities at these places and to try out alternative lines for the stop-banks.

Headquarters for the construction works have been established at Allanton, where an office, store, carpenter's shop, and garage have been erected, as well as accommodation for workmen and staff.

The erection of the stop-bank by means of ploughs and scoops was commenced at the lower end of the plain, 15 m. 54 ch. to 17 m., in September, 1924, and has been continued with increasing numbers of teams, with the result that the work to be undertaken by this method is nearing completion. The length of stop-bank completed to date with ploughs and scoops totals approximately 4 miles. A total of approximately 120,000 cubic yards of material has been placed by this method.

Since January, 1925, a steam-shovel with locomotive and trucks has been operating at Outram, widening the existing stop-bank. Some 13,000 cubic yards have been placed in the bank, which is in varying stages of completion between 0 m. 6 ch. and 0 m. 65 ch.

A drag-line with 60 ft. boom has been obtained for the erection of the bank between Allanton (5 m. 52 ch.) and Henley (13 m. 63 ch.), and this machine is now being assembled on the job.

A suction-dredge with 10 in. gravel-pump is being erected on the Waipori River for stop-bank erection and river-improvement round the shores of Lake Waipori and in the Waipori River.

The Taieri River has been cleared of willows in places by means of a traction-engine to give improved waterway. So far this work has been confined to the vicinity of Outram and at the Outram Railway-bridge, but operations will be commenced at Allanton at an early date.

## MARINE.

### LIGHTHOUSES.

*Three Kings Islands.*—A further series of direction-finding tests was carried out in Auckland Harbour in the presence of members of the Shipmasters' Guild and representatives of the Harbour Board and other interested bodies. The tests fully demonstrated the efficiency of the apparatus, and convinced all parties that it was a much more efficient aid to navigation than any auditory fog-signal. Arrangements are being made to procure the necessary equipment for establishing a direction-finding station at Cape Maria Van Diemen. This installation will then be operated by the personnel employed at the lighthouse, and will, it is considered, give better aid to navigation than a light and fog-signal on the Three Kings Islands themselves.

*Cape Brett.*—A new landing-crane has been erected at this station to replace the one which was destroyed by the phenomenal storm experienced here some time ago. This crane is exposed at times to very violent wave-action, and a special design had to be adopted to overcome the difficulties inherent to this place.

*Tiritiri.*—This light has been converted from a watched oil-burning light to an automatic flashing one. It was originally an important making-light for vessels approaching the coast, but owing to the diversion of trade through the Panama Canal and the provision of other powerful lights its importance is not so great as formerly. For this reason arrangements were made when converting to reduce the range of the light somewhat. The apparatus as converted is highly efficient, and is giving full satisfaction.

*Piako River Leading-lights.*—It is now proposed to replace the existing oil-burning lights with a single automatic flashing light, and details are being prepared to that end.

*East Cape.*—The new lenses required to replace the damaged ones in the old light have been received and placed in position. Improvements to the existing access road and landing have been also carried out. A special telephone-line has been erected and a toll station established here to serve the requirements of the light station and to enable the necessary meteorological information to be supplied.

*Matakaoa Point.*—The apparatus for this new light has been received and landed at the site. Suitable arrangements have been made for the land and access road, and a commencement with the work of erection is to be put in hand immediately. This light will serve a twofold purpose. Owing to the shifting of the East Coast lighthouse from the island to the mainland. There is a small dark section to the northward. The new light at Matakaoa Point will be of great assistance to shipmasters coming from the north for turning the Matakaoa Point before they come actually within the range of East Cape light; secondly, it will act as a port light in connection with the port of Hicks Bay, where a new wharf is now being constructed by the Hicks Bay Harbour Board.

*Cape Palliser.*—A new water-supply has been provided for this station. The original provision consisted of rain-water tanks only. Considerable storage is required here, and, as the existing tanks required renewal, it was decided to provide a concrete reservoir fed by pumping from a nearby spring and providing a gravity supply to the various cottages and utilities.

*Cape Foulwind.*—Orders have been placed for the supply of the necessary apparatus for the conversion of this light from a watched oil-burning light to an automatic flashing gas light. Portion of the apparatus has been already received, and the remainder, consisting of the lens and lantern, is expected very shortly. Immediately the whole outfit is received the construction of the tower will be put in hand. This lighthouse will be the first one in this country to be equipped with the Dalen incandescent acetylene burner with automatic mantle-exchanger. The operation of this light will be wholly automatic, including the changing of the incandescent mantles in case of breakage, and it will be the most powerful unattended light so far installed on the New Zealand coast. The annual saving as a result of its use will amount to several hundreds of pounds per annum.

*Puyssegur Point.*—Additions have been carried out to the buildings at this station, and work in connection with the installation of a radio transmitting and receiving outfit will be put in hand shortly to obviate the present difficulties of communication.

*Dog Island.*—An examination of the optical and illuminating apparatus of this lighthouse has been made, and it has been decided to dismantle the existing light system and replace it with a standard second-order dioptric lens and incandescent oil-burner. This plant is now in stock, and the alterations will be put in hand shortly. The present apparatus, the only one of its kind in New Zealand, has been in continuous use since 1868.

*Chatham Islands.*—A fifth-order dioptric lens fitted with two incandescent electric lamps has been, with the permission of the Post and Telegraph Department, erected on the wireless mast at Waitangi. This light, which is lit from the batteries of the wireless station, has proved to be of great assistance to shipmasters trading to this port.

*Anglem Point.*—A small automatic acetylene-burning light has been erected at this point to replace the oil-burning light which has been established here for some time. This light is used principally by fishermen, but the difficulty and expense of getting any one to give it regular attention resulted in the alteration.

*Kakurangi Point.*—This lighthouse, which is isolated, and a difficult one to tender, is now being converted to automatic operation. It is not proposed to leave the light wholly unattended, one keeper being retained in place of the three now required. It is anticipated that the alteration will show a considerable economy. During the year the question of automatic control for a number of other lights has been investigated, and after careful consideration it has been decided to increase the gas-storage capacity at some of the more inaccessible automatic installations, with a view to reducing the number of times per year that these lights must be tendered. The s.s. "*Tutaneka*," which is the sole tender for all lighthouses, is at present hard pushed to keep up to schedule, and with the increased number of lights it will be a considerable advantage if the interval between tendering can be increased.

#### HARBOUR-WORKS.

*Gisborne.*—Plans in detail in connection with this harbour have been the subject of very considerable discussion between myself and the Board's Engineer, and the whole question of inner *versus* outer harbour has been thrashed out, as a result of which the Board quite recently decided by a very large majority to proceed with the works of an outer harbour in accordance with plans prepared by their Engineer some years ago, and which plans I have approved.

*Napier.*—In accordance with instructions, I reported fully on the question of harbour facilities at Napier, as the result of which report the Board ceased operations in connection with the inner harbour, and has made arrangements to obtain a further comprehensive report from the Engineers who reported on harbour questions at this port in 1913. To enable the Engineers to report more definitely, borings are being taken, both in the area which will be enclosed if the outer harbour is completed and also in the channel leading to the inner harbour, and throughout the area of the inner harbour which would require to be dredged if that harbour were adopted.

*Westport.*—The most important work at this port is the maintenance of an adequate depth on the bar, and (except when weather conditions were unsuitable) the *Eileen Ward* has been constantly at work to this end. During the year she dredged and conveyed to sea 589,410 tons. A satisfactory depth has been maintained throughout to adequately serve all shipping wishing to use the port. Last year repairs were carried out to the breakwater, additional stone being tipped at the ends. This work was well done, and has given very satisfactory service, consequently no further maintenance has been necessary during the year.

*Waikokopu Harbour.*—During the year the new wharf has been practically completed. This wharf, including piled approaches, is 376 ft. long, and, together with the formation of stone-protected earth access bank, has been erected by the Public Works Department. The traffic over this wharf, which is considerable and increasing, has been handled by the Public Works Department, but arrangements are being made to hand the control over to the Wairoa Harbour Board, under agreement with the Minister of Public Works.

#### GENERAL.

A large number of applications has been received from local bodies and private individuals for the approval of works involving Marine interests. Each of these has been carefully investigated and, where desirable, approved; among these various applications were the following:—

*Wharves.*—Wharf and tram-line, Maori Beach, Port William, Stewart Island; Tolaga Bay; Port Ahuriri, Napier; Rattray Street Wharf, Dunedin; Whananaki, Whangarei; Sandy Bay; Bayswater, Auckland Harbour; Big Omaha; Te Kopura; Rona Bay and Queen's Wharf, Wellington; King's Wharf, Auckland; Whangaroa, Chatham Islands; The Mount, Tauranga; Whangaparaoa; Tokatoka; Rawene, Hokianga; Maraetai; Paritu Bay, Coromandel; Tiritiri, Auckland Harbour; Island Bay, Wellington; Devonport, Auckland; Opotiki; Foxton.

*Wharf-sheds.*—Tokatoka; Rawene, Hokianga.

*Boat-sheds and Landings.*—Matawhi Bay, Russell; Paremata Boating Club.

*Foreshore Licenses.*—Paremata; Mangawhare, Wairoa River; Murray's Bay, Hauraki Gulf; Rawene, Hokianga River; Half-moon Bay, Stewart Island; Opononi, Hokianga; Purakanui; Mercury Island cattle-race; Rawene, Hokianga; Wade River; Hauraki Gulf; Tangawahine; Bragg's Bay, Stewart Island; Pahi River, Kawhia; Kokimarama, Hauraki Gulf; Golden Bay; Te Kopuru; Rapuke River, Whangaroa; Waiaro, Coromandel.

*Harbour-works.*—Gisborne; Wanganui; Thames; Napier; Whangarei; Nelson; Tauranga; Opunake; Bluff.

*Electric-power Cables Crossing Navigable Rivers.*—Thames Valley Power Board, Piako River; Wanganui Power Board, Wanganui River.

*Boat-slips.*—Port Jackson; Wade River; Bragg's Bay, Stewart Island; Mill Bay, Mongonui Harbour; Rocky Bay, Waiheke; Bravo Island, Stewart Island.

*Timber Booms.*—Dargaville; Tangawahine Creek, Kaipara.

*Bridges over Navigable Waters.*—Turanganui, Gisborne; Oputuru Creek, Raglan; Wairoa River, Dargaville; Avon River, New Brighton.

*Reclamation.*—Evans Bay, Wellington.

## DEFENCE WORKS.

## NGARUAWAHIA MOBILIZATION BASE.

Good progress has been made with the construction of the railway-siding into the camp. Plate-laying and ballasting have been completed at the railway end, and 27 chains of the camp end of the siding have been laid and partly ballasted, and the balance will be completed shortly. The single-men's quarters, which consist of twelve rooms, kitchen, mess-room, and ante-room have been erected, but require plastering, papering, and painting. Married-men's quarters No. 5 and 6, which are concrete-block houses, are in course of construction. Two temporary cookhouses, together with the necessary benches, &c., were erected for the Territorial camp held in January last. The excavation of sites for four concrete magazine buildings is completed, and good progress has been made with the excavation for seven other magazines. The erection of No. 1 and No. 2 magazines has also been completed, with the exception of the installation of electric light. The foundation for No. 3 magazine has been laid, and the concrete walls and roof of No. 5 are built and the foundation for No. 3 is complete.

Approximately 100 acres of gorse and scrub have been cleared, and 30 acres of the land deeply ploughed. Materials are on hand for fencing the magazines area, and most of the fence-line has been cleared. A portion of the old Ngaruawahia-Taupiri Road has been sanded, and cleared of gorse and blackberry.

A water-supply is to be obtained from the Waikato River. A concrete settling-tank has been constructed alongside the river, 10 ft. below low-water mark, and a six inch cast-iron main leads from it to a concrete reservoir of 80,000 gallons capacity in the camp. Water percolates from the river into the settling-tank, and will be pumped from the tank to the reservoir by a motor-driven pump. The excavation around the settling-tank, and for the motor and pump, is almost finished, and the pump and motor are on the works. A satisfactory test has been made of percolation of water from the river to the settling-tank.

## DEVONPORT FUEL-OIL DEPOT.

In June, 1924, sites were chosen near Calliope Dock, Auckland, for two large steel tanks with a combined capacity of 2,250,000 gallons for storage of fuel oil for naval purposes. Foundation work was commenced almost immediately, and No. 1 tank was erected and tested in January of this year. The reinforced impounding-wall, with a diameter of 131 ft. and height of 11 ft. above ground-level, also the foundation for tank No. 2, were completed by the end of February; the construction of the second tank will be commenced as soon as the necessary materials are delivered. A galvanized-iron building, 95 ft. long and 50 ft. wide, was also erected and fitted up for holding Admiralty stores.

## IRRIGATION.

No new works were commenced during the year, and the Department's operations have been confined to surveys and investigation of new schemes, and the vigorous prosecution of those under construction. The Ida Valley and Galloway schemes have been completed, and most of the others are nearing completion. All settlers requiring water were supplied last season. The area of land being irrigated under Government schemes is 19,897 acres, occupied by 239 settlers, as compared with 14,677 acres and 200 settlers last year. The development to date has involved the construction of approximately 380 miles of race.

## PROGRESS OF INDIVIDUAL WORKS.

*Ida Valley Scheme.*—Three miles of the German Hill Race, between Moa Creek and Poolburn Weir, have been enlarged, and the Syndicate Race extended  $\frac{1}{2}$  mile, and 3 miles 32 chains of distributary races constructed. A large amount of work, consisting mainly of concrete-lining and stone-wall rebuilding, has been done on the Upper Bonanza Race, from the Manorburn to Moa Creek, to reduce leakage. The replacement of the Bonanza flume with a twin siphon is in hand, and will be completed before next season. A concrete measuring-weir has been installed at the head of the Lower Bonanza Race, and one is being constructed at the end of the Upper Bonanza Race. The flumes at Moa, Maori, and Dovedale Creeks have been tarred, including all woodwork, and numerous sheep-crossings, &c., installed. During the past season water was supplied to forty-six irrigators on 7,929 acres.

*Galloway Scheme.*—Work has been confined to the completion of the distribution races. Two miles of old mining race were reconditioned, and a measuring-weir installed, and these are now in use; 47 chains of distributary race were constructed, and 120 ft. of 15 in. siphon and 100 ft. of fluming installed. Traffic and stock bridges have been placed over races where required, as well as face culverts under roads. Of the 2,250 acres commanded, 1,949 were irrigated last season by twenty-four settlers.

*Manuherikia Scheme.*—6 miles 51 chains of distributary race, with all necessary crossings and culverts, were completed during the year. A concrete floor has been laid throughout the intake tunnel, portions of the sides concreted, and the intake gates overhauled and improved. The concrete race in the gorge has been overhauled and leaks patched, and 593 ft. of metal flume installed. The installation of the new 36 in. pipe-line at Chatto Creek siphon is in hand, and will ensure a full supply

for future requirements of all irrigators. The scheme is practically completed, and will serve all parts of the area commanded next season. Last season fifty settlers had 2,462 acres under irrigation.

*Earnsclough Scheme.*—The extension to this scheme has not been long authorized, but the erection of the pipe-line, which comprises the major portion of the work, is in hand. In addition,  $1\frac{3}{4}$  miles of race has been enlarged, and  $1\frac{1}{2}$  miles of distributary race completed. A special section, comprising 2 miles of race and 20 chains of pipe-line, to supply three settlers, is nearly completed. Work on the first portion of the scheme has mainly consisted of installation of additional gauge-boxes. Thirty-seven irrigators were supplied with water, the total area under irrigation being 1,194 acres.

*Ardgour Scheme.*—This scheme was in working-order throughout last season, and only maintenance work has been undertaken. 1,416 acres were irrigated by thirteen settlers.

*Last Chance Scheme.*—This scheme is nearing completion, and will be finished by next season with the exception of the distribution to some unoccupied Crown land, which has not yet been opened for settlement. Five miles of main race,  $3\frac{1}{2}$  of distributary race, and 1,200 ft. of siphon were completed, and 30 chains of small flume is in hand. Five measuring-weirs and all necessary stock-crossings, &c., have been completed. Twenty-one irrigators watered 1,217 acres.

*Tarras Scheme.*—This scheme is nearing completion, and it is anticipated that nearly all the settlers will be supplied with water next season. A limited number of settlers received a partial supply this season. During the year  $6\frac{1}{2}$  miles of the main race was completed,  $3\frac{1}{2}$  miles of this being concrete-lined. Three siphons, of 34-in.-diameter pipe, of a total length of 1,970 ft., have been constructed in the gorge. Numerous concrete culverts and stock-crossings have been installed, and  $4\frac{1}{4}$  miles of the lower main race built.

*Teviot River Scheme.*—This scheme is practically completed, and will be finished before next irrigation season. Water was supplied throughout last season, except that during the first part it was not possible to run a full supply through the upper race owing to slips. This was remedied as the season progressed. 5 miles 6 chains of main and distributary races have been constructed, and also 6,200 ft. of pipe siphon, in addition to the detail work necessary for the distribution of water. Water was supplied to thirty-four irrigators for 2,506 acres, and the combined irrigation and power scheme has worked very satisfactorily.

*Bengerburn Scheme.*—Maintenance work only has been done. Fourteen irrigators were supplied, for 104 acres.

*Hawkdun Irrigation Scheme.*—Repairs to Eweburn reservoir are nearly completed. This scheme, which absorbs Mount Ida Water-race, has been further investigated.

#### GENERAL SURVEYS.

A survey has been made of the Upper Manuhirikia dam reservoir for the purpose of determining its correct capacity. A detail survey has also been made of the dam-site and its surroundings, and the access road to the dam-site. The plans of these surveys are in course of preparation. The plans of the Roaring Meg survey are being prepared, and a survey is in progress for a scheme out of the Luggateburn to serve Crown lands. A scheme for the Miller's Flat district, out of the Minzionburn, has been surveyed, and the details are now being worked out, and the measure of public demand investigated. A survey of the Arrow irrigation scheme is in hand, and will be far enough advanced to enable agreements to be obtained and work commenced next summer.

#### WATER-SUPPLY AND DRAINAGE.

*Rotorua.*—The new water-supply system has now been completed. 262 chains of 12 in. cast-iron mains were laid during the year, and all the old wooden pipes were removed, trenches filled in, and tunnel at 3 m. packed with stone. Considerable survey and investigation work was done during the year in connection with drainage works at this tourist and health resort, and plans and specifications were prepared and tenders invited recently.

*Tokanui Mental Hospital.*—A 6-in.-diameter concrete pressure pipe-line, 3 miles 72 chains in length, has been laid from the Te Awamutu Borough Council's main on Frontier Road, to provide an improved water-supply to Tokanui Mental Hospital, and a  $2\frac{1}{2}$  m. line of galvanized piping, with regulating-valve, has been run from the main pipe to the hospital reservoir.

*Hanmer.*—A new water-supply is being provided at Hanmer, and practically all the materials required have been delivered. Concrete anchor-blocks and supporting-cradles have been erected, and the 12 in. main has been laid for a distance of 2 miles 33 chains with suitably constructed road-crossings over it where necessary. A commencement has also been made with the laying of the 6 in. and 4 in. pipes for the reticulation of the township: this is to take the place of the wood-stave pipes which were originally laid and are now past their usefulness.

#### TRAMWAYS.

*Auckland.*—The Auckland City Council has duplicated 54·75 chains of single track between Vincent Avenue and Upland Road, on the Remuera line. The first section of the Edendale Extension, 76 chains in length, as far as Parrish Street, was completed, passed by the Department, and opened for traffic on the 9th February last; and the second section, 59 chains in length, from Parrish Street to the terminus at Calgary Street, was completed, passed, and opened for traffic on the 2nd March last. Nine new cars were tested by the Department and passed for use.

*New Plymouth.*—A loop was constructed in Devon Street, between Hobson and Watson Streets, and passed by the Department on completion. One new car was tested and passed for use.

*Wellington.*—The main works completed by the City Council were the Johnston Street loop line, Thorndon Quay duplication, siding in Kent Terrace with cross-over from Elizabeth Street, and siding at Clyde Quay. Fourteen new cars were added to the plant after being tested and passed.

*Christchurch.*—The principal works undertaken by the Christchurch Tramway Board were the Moorhouse Avenue duplication, track alteration in Westenra Street, and the construction of the New Brighton Racecourse, Barbadoes Street, and Barrington Street loops.

*Dunedin.*—Five new cars were tested and passed for traffic.

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#### GENERAL.

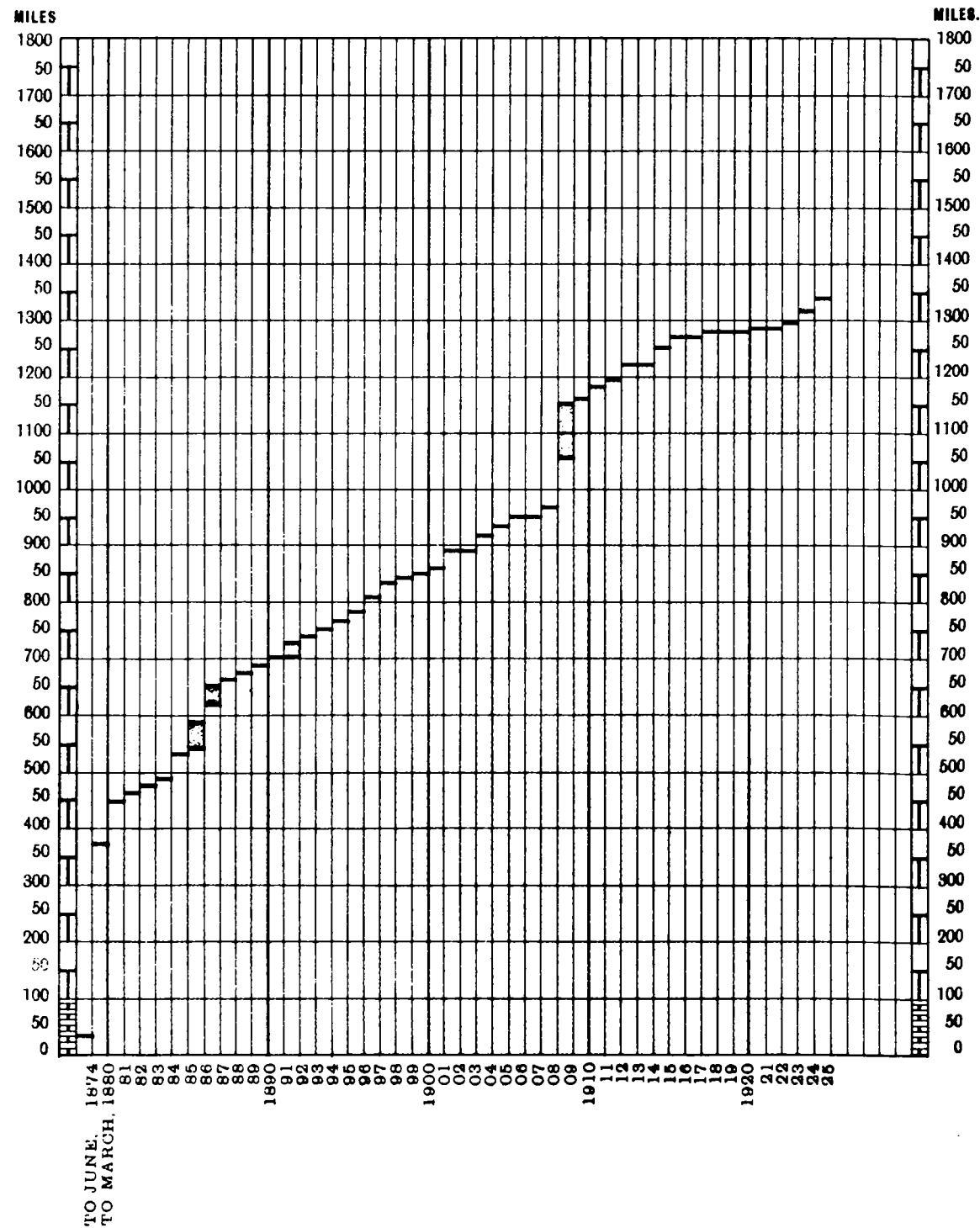
For details of the public-building works and electrical operations see separate reports by Government Architect and Chief Electrical Engineer.

The past year has been one of great activity for all branches of the Department, and the prompt and loyal response of all officers has been reflected in the successful results attained. I therefore take this opportunity of expressing my appreciation of the excellence of the service rendered by the whole staff.

F. W. FURKERT, M.Inst.C.E., Assoc.M.I.Mech.E.,  
Engineer in Chief.

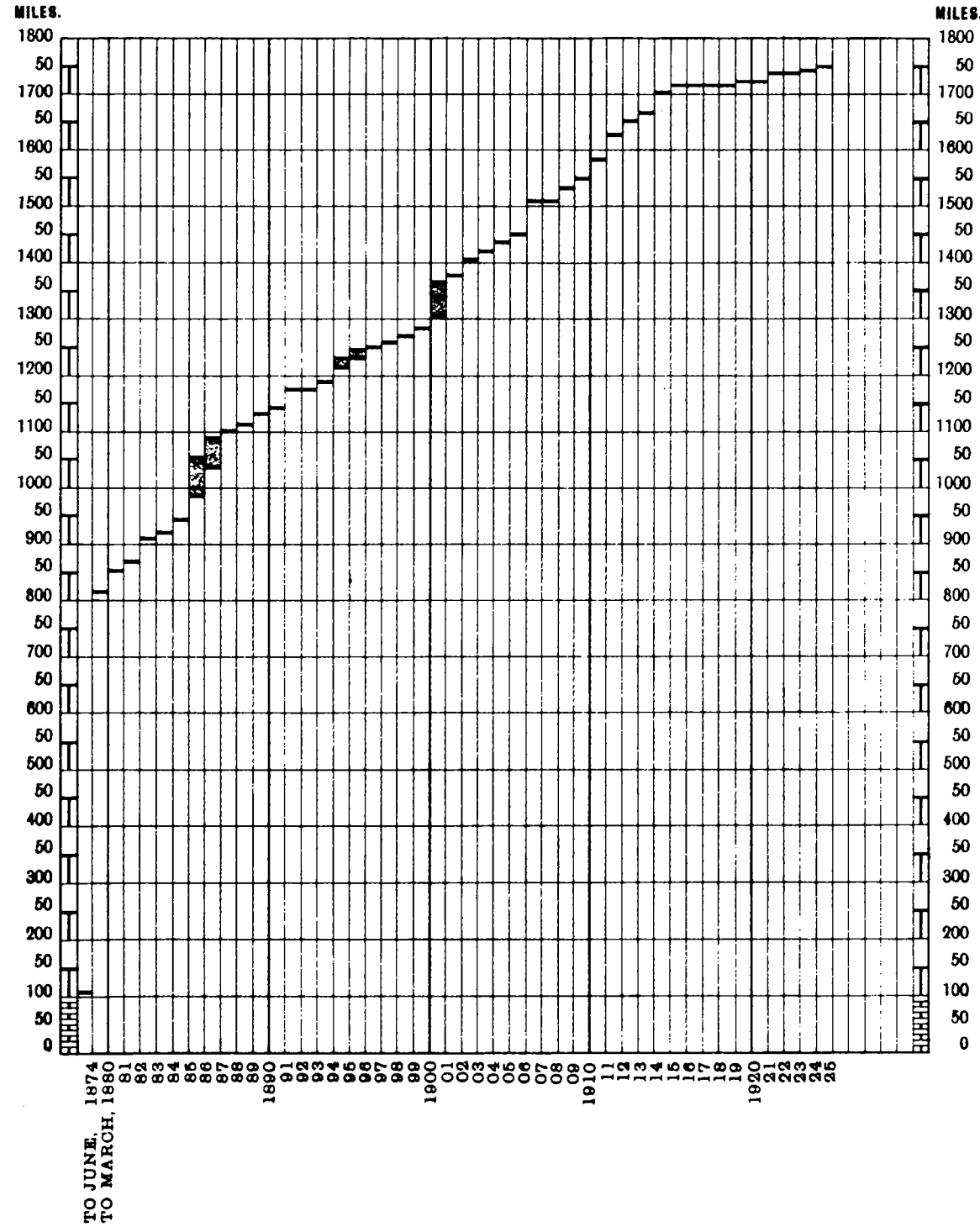
NUMBER OF MILES OPEN  
OF  
GOVERNMENT LINES.

NORTH ISLAND.

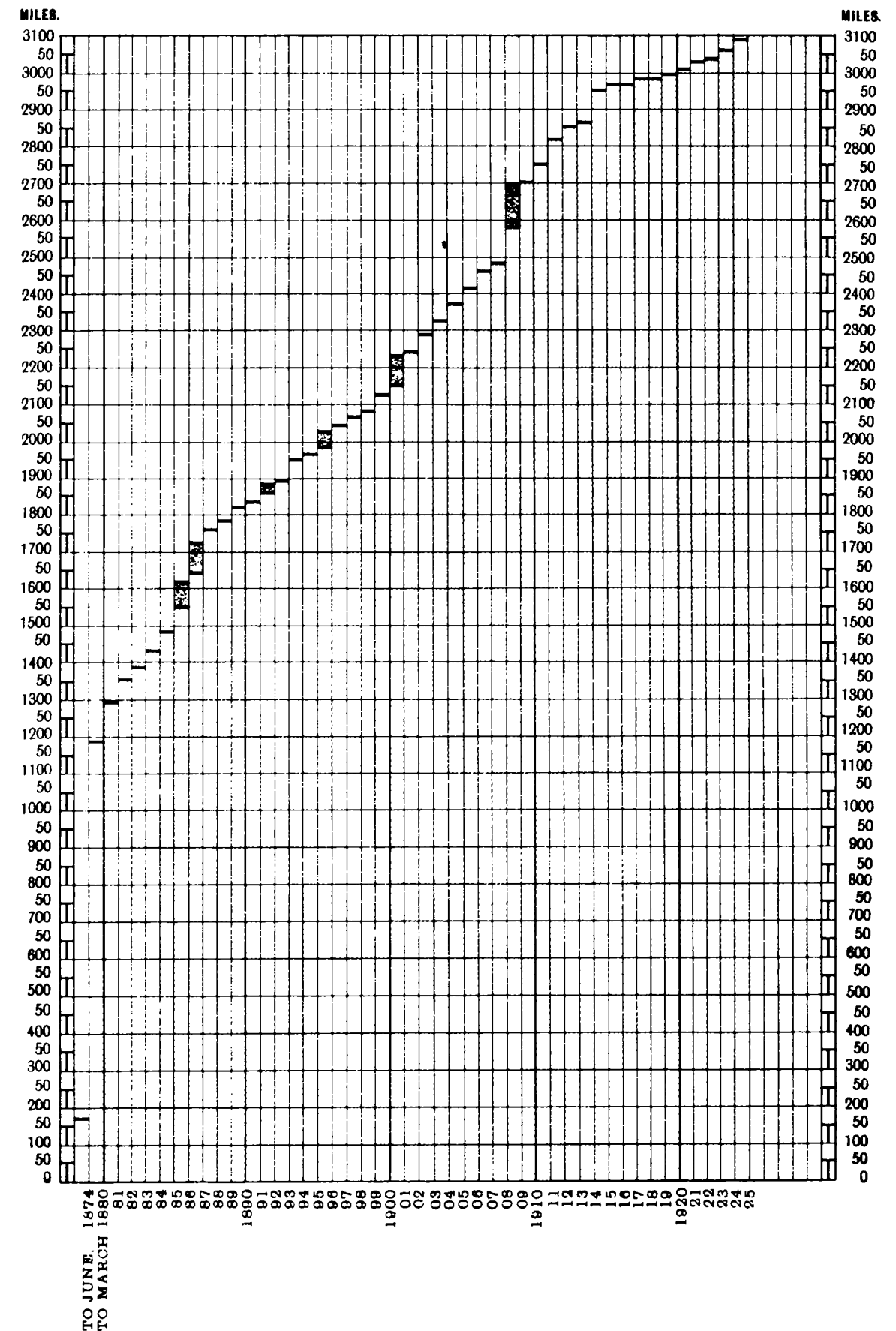


NUMBER OF MILES OPEN  
OF  
GOVERNMENT LINES.

SOUTH ISLAND.



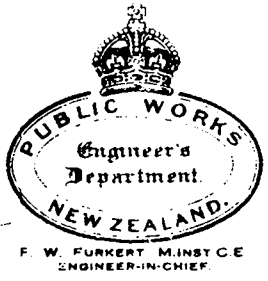
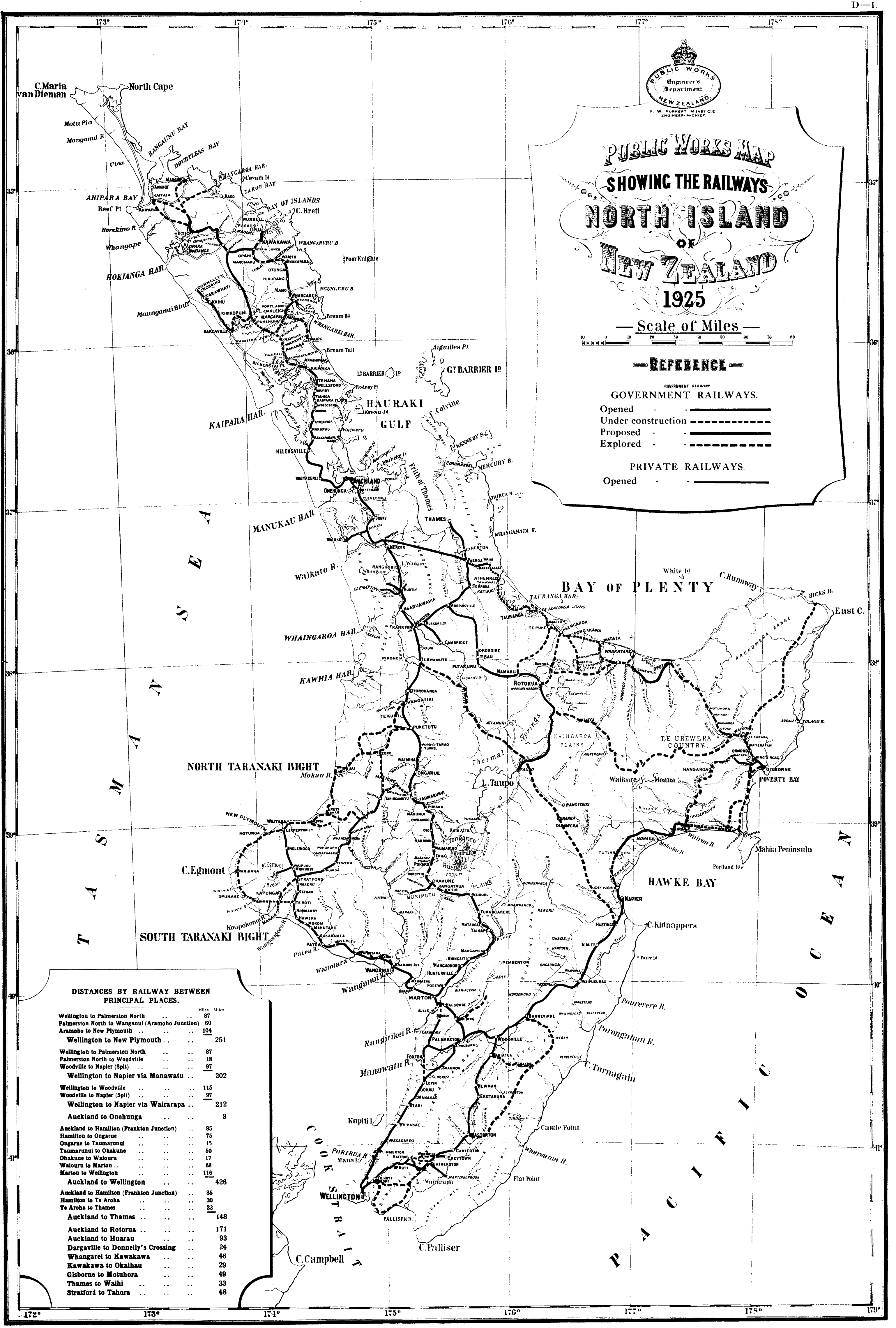
NUMBER OF MILES OPEN  
OF  
GOVERNMENT LINES.  
NORTH AND SOUTH ISLANDS COMBINED.



Private railways acquired by the Government shown thus: 







**PUBLIC WORKS MAP**  
**SHOWING THE RAILWAYS**  
**NORTH ISLAND**  
**OF**  
**NEW ZEALAND**  
**1925**

— Scale of Miles —  
0 10 20 30 40 50 60 70 80

— REFERENCE —

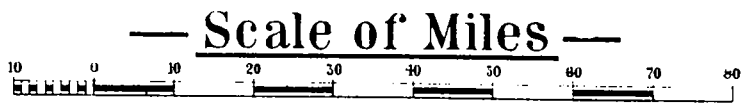
- GOVERNMENT RAILWAYS.
- Opened —————
  - Under construction - - - - -
  - Proposed - - - - -
  - Explored - - - - -
- PRIVATE RAILWAYS.
- Opened —————

**DISTANCES BY RAILWAY BETWEEN PRINCIPAL PLACES.**

|                                                    | Miles. | Miles. |
|----------------------------------------------------|--------|--------|
| Wellington to Palmerston North .. .. .             | 87     |        |
| Palmerston North to Wanganui (Aramoho Junction) .. | 60     |        |
| Aramoho to New Plymouth .. .. .                    | 104    |        |
| Wellington to New Plymouth .. .. .                 | 251    |        |
| Wellington to Palmerston North .. .. .             | 87     |        |
| Palmerston North to Woodville .. .. .              | 18     |        |
| Woodville to Napier (Spl) .. .. .                  | 97     |        |
| Wellington to Napier via Manawatu .. .. .          | 202    |        |
| Wellington to Woodville .. .. .                    | 115    |        |
| Woodville to Napier (Spl) .. .. .                  | 97     |        |
| Wellington to Napier via Wairarapa .. .. .         | 212    |        |
| Auckland to Onehunga .. .. .                       | 8      |        |
| Auckland to Hamilton (Frankton Junction) .. .. .   | 85     |        |
| Hamilton to Otago .. .. .                          | 75     |        |
| Otago to Taumarunui .. .. .                        | 15     |        |
| Taumarunui to Ohakune .. .. .                      | 50     |        |
| Ohakune to Wairoa .. .. .                          | 17     |        |
| Wairoa to Marton .. .. .                           | 68     |        |
| Marton to Wellington .. .. .                       | 116    |        |
| Auckland to Wellington .. .. .                     | 426    |        |
| Auckland to Hamilton (Frankton Junction) .. .. .   | 85     |        |
| Hamilton to Te Aroha .. .. .                       | 30     |        |
| Te Aroha to Thames .. .. .                         | 33     |        |
| Auckland to Thames .. .. .                         | 148    |        |
| Auckland to Rotorua .. .. .                        | 171    |        |
| Auckland to Huarau .. .. .                         | 93     |        |
| Dargaville to Donnelly's Crossing .. .. .          | 24     |        |
| Whangarei to Kawakawa .. .. .                      | 46     |        |
| Kawakawa to Okaihau .. .. .                        | 29     |        |
| Gisborne to Motuhora .. .. .                       | 49     |        |
| Thames to Waihi .. .. .                            | 33     |        |
| Stratford to Tahora .. .. .                        | 48     |        |



# PUBLIC WORKS MAP SHOWING THE RAILWAYS SOUTH ISLAND OF NEW ZEALAND 1925



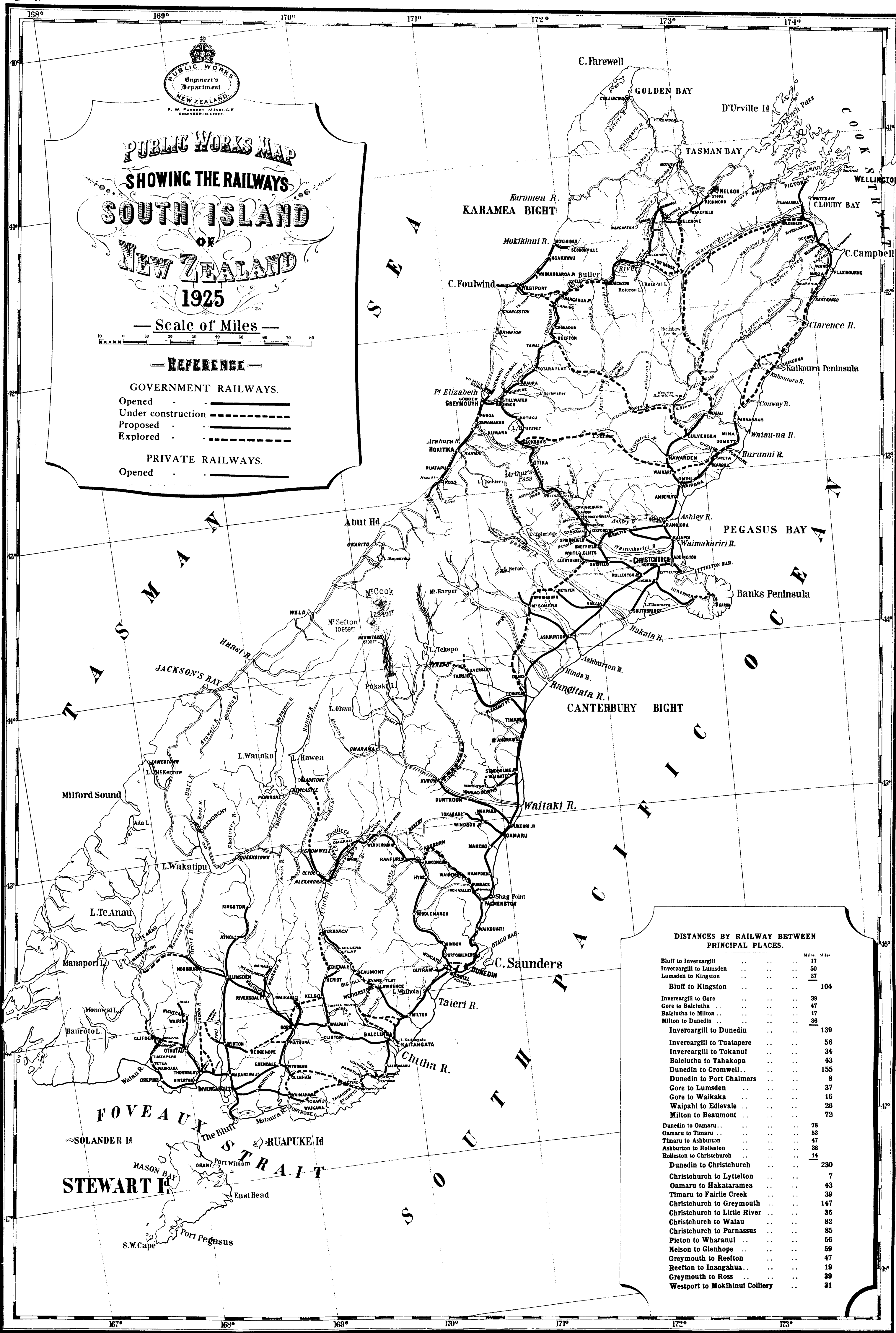
— REFERENCE —

GOVERNMENT RAILWAYS.

- Opened —————
- Under construction - - - - -
- Proposed - - - - -
- Explored - - - - -

PRIVATE RAILWAYS.

- Opened —————



DISTANCES BY RAILWAY BETWEEN  
PRINCIPAL PLACES.

|                                        | Miles. | Miles. |
|----------------------------------------|--------|--------|
| Bluff to Invercargill .. .. .          | 17     |        |
| Invercargill to Lumsden .. .. .        | 50     |        |
| Lumsden to Kingston .. .. .            | 37     |        |
| Bluff to Kingston .. .. .              | 104    |        |
| Invercargill to Gore .. .. .           | 39     |        |
| Gore to Balclutha .. .. .              | 47     |        |
| Balclutha to Milton .. .. .            | 17     |        |
| Milton to Dunedin .. .. .              | 36     |        |
| Invercargill to Dunedin .. .. .        | 139    |        |
| Invercargill to Tuatapere .. .. .      | 56     |        |
| Invercargill to Tokanui .. .. .        | 34     |        |
| Balclutha to Tahakopa .. .. .          | 43     |        |
| Dunedin to Cromwell .. .. .            | 155    |        |
| Dunedin to Port Chalmers .. .. .       | 8      |        |
| Gore to Lumsden .. .. .                | 37     |        |
| Gore to Waikaka .. .. .                | 16     |        |
| Waipahi to Edievale .. .. .            | 26     |        |
| Milton to Beaumont .. .. .             | 72     |        |
| Dunedin to Oamaru .. .. .              | 78     |        |
| Oamaru to Timaru .. .. .               | 53     |        |
| Timaru to Ashburton .. .. .            | 47     |        |
| Ashburton to Rolleston .. .. .         | 38     |        |
| Rolleston to Christchurch .. .. .      | 14     |        |
| Dunedin to Christchurch .. .. .        | 230    |        |
| Christchurch to Lyttelton .. .. .      | 7      |        |
| Oamaru to Hakataramea .. .. .          | 43     |        |
| Timaru to Fairlie Creek .. .. .        | 39     |        |
| Christchurch to Greymouth .. .. .      | 147    |        |
| Christchurch to Little River .. .. .   | 36     |        |
| Christchurch to Waiau .. .. .          | 82     |        |
| Christchurch to Parnassus .. .. .      | 85     |        |
| Pieton to Wharanui .. .. .             | 56     |        |
| Nelson to Glenhope .. .. .             | 59     |        |
| Greymouth to Reefton .. .. .           | 47     |        |
| Reefton to Inangahua .. .. .           | 19     |        |
| Greymouth to Ross .. .. .              | 39     |        |
| Westport to Mokihinui Colliery .. .. . | 31     |        |

ANNEXURE I TO APPENDIX B.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1925.

NORTH ISLAND.

NOTE.—Column 11: For detail information as to dates of openings of such portions of lines as are not given in this table see tables of lengths of lines in Public Works Statements, 1904–21.

| Appropriation.                    | Division.          | Mileage.    | Section.              | Main Line.  | Siding.     | Total.      | State of Line. |                  |                     |                |              |           |           |           |           |             |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|-----------------------------------|--------------------|-------------|-----------------------|-------------|-------------|-------------|----------------|------------------|---------------------|----------------|--------------|-----------|-----------|-----------|-----------|-------------|--------------------------|------|------|------|----|----|----|----|----|----|----|----|----|----|----|----|
|                                   |                    |             |                       |             |             |             | Surveyed.      | Under Formation. | Under Plate-laying. | Opened.        |              |           |           |           | Total.    |             |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   |                    |             |                       |             |             |             |                |                  |                     | Date.          | 1920-21.     | 1921-22.  | 1922-23.  | 1923-24.  |           | 1924-25.    |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
| 1                                 | 2                  | 3           | 4                     | 5           | 6           | 7           | 8              | 9                | 10                  | 11             | 12           | 13        | 14        | 15        | 16        | 17          |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
| Kawakawa-Grahamtown (Onerahi)     | Kawakawa           | M. ch. 7 16 | Opua Wharf - Kawakawa | M. ch. 7 16 | M. ch. 0 57 | M. ch. 7 73 | M. ch. ..      | M. ch. ..        | M. ch. ..           | ..             | M. ch. ..    | M. ch. .. | M. ch. .. | M. ch. .. | M. ch. .. | M. ch. 7 16 |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   | Kawakawa-Kamo      | 41 48       | Kawakawa-Towai        | 21 18       | 0 61        | 21 79       | ..             | ..               | ..                  | 12 April, 1911 | ..           | ..        | ..        | ..        | ..        | 21 18       |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   |                    |             | Towai-Hukerenui       | 4 30        | 0 33        | 4 63        | ..             | ..               | ..                  | 2 May, 1910    | ..           | ..        | ..        | ..        | ..        | 27 2        |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   | Kamo-Grahamtown    | 9 22        | Hukerenui-Kamo        | 16 0        | 3 29        | 19 29       | ..             | ..               | ..                  | ..             | ..           | ..        | ..        | ..        | ..        | 2 50        |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
| Kaihu Valley                      | Kawakawa-Hokianga  | 48 38       | Kioreroa-Onerahi      | 2 50        | 1 16        | 3 66        | ..             | ..               | ..                  | 2 Oct., 1911   | ..           | ..        | ..        | ..        | ..        | 16 25       |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   |                    |             | Oiria-Kaikohu         | 16 25       | 1 45        | 17 70       | ..             | ..               | ..                  | 1 May, 1914    | ..           | ..        | ..        | 8 20      | ..        | 8 20        |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   |                    |             | Kaikohu-Okaihau       | 8 20        | 0 34        | 8 54        | ..             | ..               | ..                  | 29 Oct., 1923  | ..           | ..        | ..        | ..        | ..        | ..          |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   | Kaihu Valley       | 24 32       | Okaihau-Hokianga      | 23 73       | 2 06        | 25 79       | 18 0           | 2 63             | ..                  | ..             | 1 June, 1914 | ..        | ..        | ..        | ..        | 19 58       |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
| North Auckland Main Trunk Railway | Kaipara Northwards | 83 76       | Extension ..          | 23 57       | 2 64        | 26 41       | ..             | 5 0              | 18 57               | ..             | ..           | ..        | ..        | ..        | ..        | ..          |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | McCarroll's - Paparoa    | 4 16 | 0 25 | 4 41 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Paparoa-Huarau           | 1 56 | 0 36 | 2 12 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Huarau-Maungaturoto      | 2 5  | 0 38 | 2 43 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Maungaturoto-Ranganui    | 4 25 | 0 61 | 5 6  | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Ranganui-Kaiwaka         | 2 35 | 0 62 | 3 17 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Kaiwaka - Te Hana        | 8 65 | 1 3  | 9 68 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Te Hana-Wellsford        | 3 27 | 0 58 | 4 5  | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Wellsford-Wayby          | 3 18 | 0 28 | 3 46 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Wayby-Hoteco             | 3 40 | 0 13 | 3 53 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Hoteco-Kaipara Flats     | 2 45 | 0 13 | 2 58 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             |                       |             |             |             |                |                  |                     |                |              |           |           |           |           |             | Kaipara Flats-Woodcock's | 3 5  | 0 16 | 3 21 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
|                                   |                    |             | Woodcock's-Ahuroa     | 2 41        | 0 16        | 2 57        | ..             | ..               | ..                  | ..             | ..           | ..        | ..        | ..        | ..        | ..          |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |
|                                   |                    |             | Ahuroa-Helensville    | 18 41       | 1 75        | 20 86       | ..             | ..               | ..                  | ..             | ..           | ..        | ..        | ..        | ..        | ..          |                          |      |      |      |    |    |    |    |    |    |    |    |    |    |    |    |



TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1925—continued.  
NORTH ISLAND—continued.

| Appropriation.           | Division                                                                            | Mileage.        | Section.                                             | Main Line.              | Sliding.               | Total.                  | State of Line.     |                       |                     |                               |                      |                    |                    |                    |                    |                      |
|--------------------------|-------------------------------------------------------------------------------------|-----------------|------------------------------------------------------|-------------------------|------------------------|-------------------------|--------------------|-----------------------|---------------------|-------------------------------|----------------------|--------------------|--------------------|--------------------|--------------------|----------------------|
|                          |                                                                                     |                 |                                                      |                         |                        |                         | Surveyed.          | Under Formation.      | Under Plate-laying. | Opened.                       |                      |                    |                    |                    |                    | Total.               |
|                          |                                                                                     |                 |                                                      |                         |                        |                         |                    |                       |                     | Date.                         | 1920-21.             | 1921-22.           | 1922-23.           | 1923-24.           | 1924-25.           |                      |
| 1                        | 2                                                                                   | 3               | 4                                                    | 5                       | 6                      | 7                       | 8                  | 9                     | 10                  | 11                            | 12                   | 13                 | 14                 | 15                 | 16                 | 17                   |
| Whangarei Branch Railway | Whangarei Branch..                                                                  | M. ch.<br>19 79 | Kioreroa-Portland ..<br>Portland-Waotira ..          | M. ch.<br>5 23<br>14 56 | M. ch.<br>0 37<br>1 39 | M. ch.<br>5 60<br>16 15 | M. ch.<br>..<br>.. | M. ch.<br>..<br>14 56 | M. ch.<br>..<br>..  | 3 April, 1920<br>..           | M. ch.<br>5 23<br>.. | M. ch.<br>..<br>.. | M. ch.<br>..<br>.. | M. ch.<br>..<br>.. | M. ch.<br>..<br>.. | M. ch.<br>5 23<br>.. |
| Kaipara-Waikato          | Kaipara-Newmarket<br>Onehunga Branch ..                                             | 35 73<br>2 73   | Helensville-Newmarket<br>Penrose - Onehunga<br>Wharf | 35 73<br>2 73           | 6 66<br>1 70           | 42 59<br>4 63           | ..<br>..           | ..<br>..              | ..<br>..            | ..<br>..                      | ..<br>..             | ..<br>..           | ..<br>..           | ..<br>..           | ..<br>..           | 35 73<br>2 73        |
|                          | Auckland-Waikato ..                                                                 | 100 13          | Auckland-Te Awamutu                                  | 100 13                  | 16 66                  | 116 79                  | ..                 | ..                    | ..                  | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | 100 13               |
|                          | Auckland-Westfield                                                                  | 9 68            | Deviation via Orakei                                 | 9 68                    | 1 10                   | 10 78                   | 9 68               | 9 68                  | ..                  | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | Auckland City Branch                                                                | 2 60            | Auckland City Branch                                 | 2 60                    | ..                     | 2 60                    | 2 60               | Prelim.               | ..                  | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | — Kingsland Station<br>to Auckland Station<br>via Western Park<br>and Freeman's Bay |                 |                                                      |                         |                        |                         |                    |                       |                     |                               |                      |                    |                    |                    |                    |                      |
| Waikato Branch           | Waikato Branch ..                                                                   | 12 69           | (Paerata-Paumahoe<br>Paumahoe-Waikato                | 5 4<br>7 65             | 0 78<br>1 3            | 6 2<br>8 68             | ..<br>..           | ..<br>..              | ..<br>..            | 10 Dec., 1917<br>10 May, 1922 | ..<br>..             | ..<br>..           | 7 65               | ..<br>..           | ..<br>1 55         | 5 4<br>7 65          |
| Huntly-Awaroa            | Huntly-Awaroa ..                                                                    | 8 75            | Huntly-Awaroa ..                                     | 8 75                    | 1 18                   | 10 13                   | ..                 | ..                    | ..                  | 16 June, 1924                 | ..                   | ..                 | ..                 | ..                 | ..                 | 8 75                 |
| Survey, new lines        | Waikokowai Branch<br>Railway                                                        | 8 25            | Waikokowai ..                                        | 8 25                    | ..                     | 8 25                    | 8 25               | ..                    | ..                  | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
| Surveys, new lines       | Paeroa-Pokeno ..                                                                    | 40 15           | Paeroa-Pokeno ..                                     | 40 15                   | ..                     | 40 15                   | 40 15              | ..                    | ..                  | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
| Waikato-Thames           | Waikato-Thames ..                                                                   | 62 58           | Frankton Junction-<br>Thames                         | 62 58                   | 10 17                  | 72 75                   | ..                 | ..                    | ..                  | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | 62 58                |
| Hamilton-Cambridge       | Hamilton-Cambridge                                                                  | 12 2            | Ruakura Junction-<br>Cambridge                       | 12 2                    | 3 14                   | 15 16                   | ..                 | ..                    | ..                  | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | 12 2                 |
| Paeroa-Waihi             | Paeroa Waihi ..                                                                     | 12 40           | Paeroa-Waihi ..                                      | 12 40                   | 1 30                   | 13 70                   | ..                 | ..                    | ..                  | 9 Nov., 1905                  | ..                   | ..                 | ..                 | ..                 | ..                 | 12 40                |
| Waihi East Coast Railway | Waihi - Opotiki, or<br>East Coast Railway                                           | 140 28          | Waihi-Tauranga ..                                    | 38 33                   | 1 39                   | 39 72                   | ..                 | 25 46                 | 12 67               | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | Tauranga-Te Maunga<br>Junction                                                      |                 | Tauranga-Te Maunga<br>Junction                       | 3 75                    | 0 17                   | 4 12                    | ..                 | ..                    | 3 75                | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | Te Maunga Junction-<br>Te Puke                                                      |                 | Te Maunga Junction-<br>Te Puke                       | 9 0                     | 1 38                   | 10 38                   | ..                 | ..                    | 9 0                 | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | Te Puke-Paengaroa..                                                                 |                 | Te Puke-Paengaroa..                                  | 5 67                    | 1 16                   | 7 3                     | ..                 | ..                    | 5 67                | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | Paengaroa - Pongakawa                                                               |                 | Paengaroa - Pongakawa                                | 4 28                    | 0 56                   | 5 4                     | ..                 | ..                    | 4 28                | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | Pongakawa-Otara-kau                                                                 |                 | Pongakawa-Otara-kau                                  | 6 70                    | 0 52                   | 7 42                    | ..                 | ..                    | 6 70                | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |
|                          | Ota-marakau-Mata-ta                                                                 |                 | Ota-marakau-Mata-ta                                  | 8 11                    | 0 46                   | 8 57                    | ..                 | ..                    | 8 11                | ..                            | ..                   | ..                 | ..                 | ..                 | ..                 | ..                   |

\* Double track.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1925—continued.  
NORTH ISLAND—continued.

| Appropriation.                    | Division.                  | Mileage. | Section.                  | Main Line. | Sidings. | Total. | State of Line. |                  |                     |               |                |          |          |          |          |        |       |
|-----------------------------------|----------------------------|----------|---------------------------|------------|----------|--------|----------------|------------------|---------------------|---------------|----------------|----------|----------|----------|----------|--------|-------|
|                                   |                            |          |                           |            |          |        | Surveyed.      | Under Formation. | Under Plate-laying. | Opened.       |                |          |          |          |          |        |       |
|                                   |                            |          |                           |            |          |        |                |                  |                     | Date.         | 1920-21.       | 1921-22. | 1922-23. | 1923-24. | 1924-25. | Total. |       |
| 1                                 | 2                          | 3        | 4                         | 5          | 6        | 7      | 8              | 9                | 10                  | 11            | 12             | 13       | 14       | 15       | 16       | 17     |       |
| East Coast Railway— <i>contd.</i> | Waihi-Opotiki— <i>ctd.</i> | M. ch.   | Matata-Rangitaiki ..      | M. ch.     | M. ch.   | M. ch. | M. ch.         | M. ch.           | M. ch.              | ..            | M. ch.         | M. ch.   | M. ch.   | M. ch.   | M. ch.   | M. ch. |       |
|                                   |                            | ..       | Rangitaiki-Awakeri ..     | 8 29       | 1 77     | 10 26  | ..             | ..               | 8 29                | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Awakeri-Taneatua ..       | 4 2        | 0 65     | 4 67   | ..             | ..               | 4 2                 | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Taneatua-Opotiki ..       | 8 47       | 0 37     | 9 4    | ..             | ..               | 1 57                | 6 70          | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
| Thames Valley-Rotorua             | Branch Lines               | ..       | Mount Maunganui ..        | 4 27       | 0 67     | 5 14   | ..             | ..               | 4 27                | ..            | ..             | ..       | ..       | ..       | ..       | ..     |       |
|                                   |                            | ..       | Te Maunga Junction        | ..         | ..       | ..     | ..             | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Te Puke Quarry ..         | 3 0        | 0 20     | 3 20   | ..             | ..               | 3 0                 | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Moturiki Quarry § ..      | 1 0        | 0 10     | 1 10   | ..             | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Whakatane Branch          | 7 5        | ..       | 7 5    | 7 5†           | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Whakatane Ballast Siding  | 1 8        | ..       | 1 8    | ..             | ..               | 0 33                | 0 55          | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Morrinsville-Rotorua      | 69 33      | 5 27     | 74 60  | ..             | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | 69 33 |
|                                   |                            | ..       | Rotorua-Taupo ..          | 53 30      | ..       | 53 30  | 53 30*         | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Gisborne Wharf-Kaiterahi  | 13 10      | 2 45     | 15 55  | ..             | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Kaiterahi-Karaka          | 5 5        | 0 71     | 5 76   | ..             | ..               | ..                  | ..            | 13 April, 1905 | ..       | ..       | ..       | ..       | ..     | ..    |
| Gisborne-Napier                   | Napier-Wairoa              | ..       | Karaka-Puha ..            | 1 75       | 0 24     | 2 19   | ..             | ..               | ..                  | 20 May, 1907  | ..             | ..       | ..       | ..       | ..       | ..     |       |
|                                   |                            | ..       | Puha-Waikohu Bridge       | 3 29       | ..       | 3 29   | ..             | ..               | ..                  | ..            | 28 May, 1908   | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Waikohu Bridge-Waikohu    | 0 35       | 0 32     | 0 67   | ..             | ..               | ..                  | ..            | 1 April, 1909  | ..       | ..       | ..       | ..       | ..     | 49 32 |
|                                   |                            | ..       | Waikohu-Otoko ..          | 7 75       | 0 32     | 8 27   | ..             | ..               | ..                  | ..            | 6 April, 1912  | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Otoko-Rakauaroa ..        | 6 60       | 0 32     | 7 12   | ..             | ..               | ..                  | ..            | 2 Nov., 1914   | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Rakauaroa-Matawai ..      | 5 65       | 0 50     | 6 35   | ..             | ..               | ..                  | ..            | 2 Nov., 1914   | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Matawai-Motuhora          | 4 78       | 0 61     | 5 59   | ..             | ..               | ..                  | ..            | 26 Nov., 1917  | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Motuhora-Motu ..          | 2 10       | ..       | 2 10   | 2 10           | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Motu-Opotiki ..           | 41 2       | ..       | 41 2   | 41 2           | Estim.           | ..                  | ..            | ..             | ..       | ..       | ..       | 11 73    | ..     | ..    |
|                                   |                            | ..       | Napier-Eskdale ..         | 11 73      | 1 31     | 13 24  | ..             | ..               | ..                  | ..            | 23 July, 1923  | ..       | ..       | ..       | ..       | ..     | ..    |
| Gisborne-Wairoa                   | ..                         | 71 39    | Eskdale-Tutira ..         | 17 52      | 0 71     | 18 43  | ..             | 13 12            | 4 40                | ..            | ..             | ..       | ..       | ..       | ..       | ..     |       |
|                                   |                            | ..       | Tutira-Putorino ..        | 9 15       | ..       | 9 15   | 7 35†          | 1 60             | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Putorino-Mohaka ..        | 13 21      | ..       | 13 21  | 13 21          | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Mohaka-Waihua ..          | 8 02       | ..       | 8 02   | 8 02           | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
| Gisborne-Wairoa                   | ..                         | 72 42    | Waihua-Wairoa ..          | 11 36      | ..       | 11 36  | 10 56†         | 0 60             | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     |       |
|                                   |                            | ..       | Gisborne Station-Makaraka | 3 5        | ..       | 3 5    | ..             | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Makaraka                  | 11 51      | 1 29     | 13 0   | ..             | ..               | 11 51               | 15 Dec., 1924 | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
|                                   |                            | ..       | Makaraka-Ngatapa ..       | 4 69       | ..       | 4 69   | 0 19           | 3 0              | 1 50                | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |
| Gisborne-Wairoa                   | ..                         | ..       | Ngatapa-Wharekopae        | 5 40       | ..       | 5 40   | 5 40           | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     |       |
|                                   |                            | ..       | Wharekopae-Waikura        | 5 40       | ..       | 5 40   | 5 40           | ..               | ..                  | ..            | ..             | ..       | ..       | ..       | ..       | ..     | ..    |

\* Trial survey. † Preliminary survey. ‡ Permanent survey. § Rails taken up.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1925—continued.  
NORTH ISLAND—continued.

| Appropriation.                     | Division.                                     | Mileage.       | Section                                              | Main Line.     | Slidings.    | Total.         | State of Line.          |                            |                     |         |              |              |              |              |              |              |       |    |
|------------------------------------|-----------------------------------------------|----------------|------------------------------------------------------|----------------|--------------|----------------|-------------------------|----------------------------|---------------------|---------|--------------|--------------|--------------|--------------|--------------|--------------|-------|----|
|                                    |                                               |                |                                                      |                |              |                | Surveyed.               | Under Formation.           | Under Plate-laying. | Opened. |              |              |              |              |              |              |       |    |
|                                    |                                               |                |                                                      |                |              |                |                         |                            |                     | Date.   | 1920-21.     | 1921-22.     | 1922-23.     | 1923-24.     | 1924-25.     | Total.       |       |    |
| 1                                  | 2                                             | 3              | 4                                                    | 5              | 6            | 7              | 8                       | 9                          | 10                  | 11      | 12           | 13           | 14           | 15           | 16           | 17           |       |    |
| Gisborne-Napier                    | Gisborne - Wairoa —<br><i>continued.</i>      | M. ch.         | Waikura-Waterfall ..                                 | M. ch.<br>6 66 | M. ch.<br>.. | M. ch.<br>6 66 | M. ch.<br>{ 5 6<br>1 60 | M. ch.<br>Perm.<br>Prelim. | M. ch.<br>..        | ..      | M. ch.<br>.. | M. ch.<br>.. | M. ch.<br>.. | M. ch.<br>.. | M. ch.<br>.. | M. ch.<br>.. |       |    |
|                                    |                                               |                | Waterfall-Hangaroa ..                                | 4 0            | ..           | 4 0            | 4 0                     | "                          | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    | .. |
|                                    |                                               |                | Hangaroa-Te Reinga ..                                | 17 11          | ..           | 17 11          | 17 11                   | "                          | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    | .. |
|                                    |                                               |                | Te Reinga-Marumaru ..                                | 9 40           | ..           | 9 40           | 9 40                    | "                          | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    | .. |
| New surveys                        | Wairoa - Gisborne<br>(Nuhaka Route) ..        | { 54 0<br>54 0 | Marumaru-Wairoa ..                                   | 10 0           | ..           | 10 0           | { 4 0<br>6 0            | Perm.<br>Prelim.           | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Wairoa-Nuhaka ..                                     | 18 65          | 1 61         | 20 46          | ..                      | ..                         | 18 65               | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    |    |
|                                    |                                               |                | Nuhaka-Waikokopu ..                                  | 6 7            | 0 55         | 6 62           | ..                      | ..                         | 6 7                 | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    |    |
|                                    |                                               |                | Wairoa-Nuhaka ..                                     | 18 65          | 1 61         | 20 46          | ..                      | ..                         | 18 65               | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    |    |
|                                    |                                               |                | Nuhaka-Waikokopu ..                                  | 6 11           | 0 49         | 6 60           | ..                      | ..                         | 6 11                | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    |    |
|                                    |                                               |                | Nuhaka Gisborne ..                                   | 38 0           | ..           | 10 0*          | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    | .. |
| Napier                             | Napier-Woodville ..                           | 96 65          | Waikokopu, to junction with Nuhaka-Gisborne Route .. | 16 0           | ..           | 28 0†<br>16 0† | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Napier Spit-Woodville ..                             | 96 65          | 15 5         | 111 70         | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           | 96 65 |    |
| Rimutaka Incline Deviation Surveys | Woodville-Palmerston North                    | 17 21          | Woodville-Palmerston North                           | 17 21          | 0 51         | 17 72          | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | 17 21        |       |    |
|                                    |                                               |                | Woodville-Wellington [Te Aro]                        | 115 79         | 21 73        | 137 72         | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | 115 79       |       |    |
|                                    |                                               |                | Greytown Branch ..                                   | 3 7            | 0 64         | 3 71           | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | 3 7          |       |    |
|                                    |                                               |                | Featherston - Martin-borough                         | 11 50          | ..           | 11 50          | 11 50                   | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
| Foxton-New Plymouth                | Wellington-Manawatu Route Improvement Surveys | 83 37          | Greytown - Martin-borough                            | 4 62           | ..           | 4 62           | 4 62*                   | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Coast road Route ..                                  | 9 0            | ..           | 9 0            | 9 0                     | Prelim.                    | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Tauberanikau Route ..                                | 21 30          | ..           | 21 30          | 21 30                   | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Wainui-o-mata Route                                  | 31 40          | ..           | 31 40          | 31 40                   | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Coast Route ..                                       | 52 0           | ..           | 52 0           | 52 0                    | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Coast Route ..                                       | 70 0           | ..           | 70 0           | 70 0                    | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           | ..    |    |
| 7 Dec., 1908†                      | Wellington-Patea ..                           | 120 44         | Wellington-Longburn                                  | 83 37          | 15 76        | 99 33          | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | 83 37        |       |    |
|                                    |                                               |                | Foxton-Patea ..                                      | 120 44         | 14 75        | 135 39         | ..                      | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | 120 44       |       |    |
|                                    |                                               |                | Turakina-Matarawa                                    | 11 67          | ..           | 11 67          | 11 67                   | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
|                                    |                                               |                | Aramoho-Goat Valley Tunnel                           | 7 40           | ..           | 7 40           | 7 40                    | ..                         | ..                  | ..      | ..           | ..           | ..           | ..           | ..           | ..           |       |    |
| Kai Iwi - Okehu ..                 | 3 60                                          | 3 0            | 3 0                                                  | 3 0            | 3 0          | 3 0            | 3 0                     | 3 0                        | 3 0                 | 3 0     | 3 0          | 3 0          | 3 0          | 3 0          | 3 0          |              |       |    |

\* Trial survey. † Preliminary. ‡ Date of purchase.





TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1925—continued.  
NORTH ISLAND—continued.

| Appropriation.                  | Division.                       | Mileage.                | Section.                                                                                                                                                     | Main Line.   | Stations.   | Total.       | State of Line. |                  |                     |         |           |           |           |           |           |           |           |    |
|---------------------------------|---------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|--------------|----------------|------------------|---------------------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----|
|                                 |                                 |                         |                                                                                                                                                              |              |             |              | Surveyed.      | Under Formation. | Under Plate-laying. | Opened. |           |           |           |           |           |           |           |    |
|                                 |                                 |                         |                                                                                                                                                              |              |             |              |                |                  |                     | Date.   | 1920-21.  | 1921-22.  | 1922-23.  | 1923-24.  | 1924-25.  | Total.    |           |    |
| 1                               | 2                               | 3                       | 4                                                                                                                                                            | 5            | 6           | 7            | 8              | 9                | 10                  | 11      | 12        | 13        | 14        | 15        | 16        | 17        |           |    |
| North Island Main Trunk Railway | Marton-Te Awamutu               | M. ch. 209 69           | Marton Junction-Mangaweka<br>Mangaweka-Taihape<br>Taihape Mataroa ..<br>Mataroa-Waiouru ..<br>Waiouru-Erua ..<br>Erua-Taumarunui ..<br>Taumarunui-Te Awamutu | M. ch. 31 67 | M. ch. 4 61 | M. ch. 36 48 | M. ch. ..      | M. ch. ..        | M. ch. ..           | ..      | M. ch. .. | M. ch. .. | M. ch. .. | M. ch. .. | M. ch. .. | M. ch. .. | M. ch. .. |    |
|                                 |                                 | 13 1                    |                                                                                                                                                              | 1 61         | 14 62       | ..           | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        | .. |
|                                 |                                 | 5 70                    |                                                                                                                                                              | 0 61         | 6 51        | ..           | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        | .. |
|                                 |                                 | 18 10                   |                                                                                                                                                              | ..           | ..          | ..           | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        | .. |
|                                 |                                 | 30 63                   |                                                                                                                                                              | 12 50        | 97 28       | ..           | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        | .. |
|                                 |                                 | 35 65                   |                                                                                                                                                              | ..           | ..          | ..           | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        | .. |
|                                 |                                 | 74 33                   |                                                                                                                                                              | 6 20         | 80 53       | ..           | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        | .. |
|                                 | Waipara Gravel Access Branch    | 7 40                    | Otorohanga                                                                                                                                                   | 7 40         | ..          | 7 40         | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 | Raetihi Branch                  | 8 50                    | Raetihi Section                                                                                                                                              | 8 50         | 1 7         | 9 57         | ..             | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 | Central Route Deviation Surveys | 30 0                    | Ohakune to Mokau-Retaruke Divide                                                                                                                             | 30 0         | ..          | 30 0         | 30 0           | Prelim.          | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
| Waitara-Tangarakau Urenui Route | Ngaire-Ongarue                  | 34 0                    | Makatote Gorge - Marae-Kowhai                                                                                                                                | 34 0         | ..          | 34 0         | 34 0           | Prelim.          | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 |                                 | 20 0                    | Marae-Kowhai-Ohura Valley                                                                                                                                    | 20 0         | ..          | 20 0         | 20 0           | Explor.          | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 |                                 | 103 58                  | Ngaire Section                                                                                                                                               | 38 73        | ..          | 38 73        | 38 73          | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 |                                 | ..                      | Tangarakau Section                                                                                                                                           | 26 0         | ..          | 26 0         | 26 0           | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 |                                 | ..                      | Heao Section                                                                                                                                                 | 10 70        | ..          | 10 70        | 10 70          | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 |                                 | ..                      | Ohura Section                                                                                                                                                | 27 75        | ..          | 27 75        | 27 75          | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 |                                 | 46 75                   | Waitara Section                                                                                                                                              | 46 75        | ..          | 46 75        | 46 75          | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 | ..                              | Urenui to Tangitu River | 12 0                                                                                                                                                         | ..           | 12 0        | 12 0         | Prelim.        | ..               | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        |           |    |
|                                 | Hastings-Te Awamutu             | 170 0                   | Hastings-Te Awamutu                                                                                                                                          | 170 0        | ..          | 170 0        | 170 0          | Prelim.          | ..                  | ..      | ..        | ..        | ..        | ..        | ..        | ..        | ..        |    |
|                                 | Totals                          | ..                      | 2796 9                                                                                                                                                       | ..           | 2796 9      | 226 69       | 3022 78        | 1099 73          | 75 70               | 223 57  | ..        | 11 50     | ..        | 7 65      | 24 67     | 18 40     | 1341 75   |    |

NOTE.—Taonui and Lichfield Branches not mentioned above, as the rails have been taken up.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1925—continued.  
SOUTH ISLAND.

NOTE.—Column 11: For detail information as to dates of openings of such portions of lines as are no given in this table see tables of lengths of lines in Public Works Statements, 1904-21.

| Appropriation.                                                                                        | Division.                                                                                                                                                               | Mileage.                                                  | Section.                                                                                                                                                                                                                                                                                                                                                                                                                 | Main Line.                                                                                                                                                                     | Stations.                                                                                                                                                           | Total.                                                                                                                                                                           | State of Line. |                  |                     |               |           |           |           |           |           |           |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------|---------------------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | Surveyed.      | Under Formation. | Under Plate-laying. | Date.         | 12 M. ch. | 13 M. ch. | 14 M. ch. | 15 M. ch. | 16 M. ch. | 17 M. ch. |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  |                |                  |                     |               |           |           |           |           |           |           |
| Nelson and Midland Railway                                                                            | 2 Nelson-Belgrove<br>Stillwater - Belgrove<br>(via Tadmor)                                                                                                              | 3 M. ch.<br>22 73                                         | 4 Nelson-Belgrove<br>Stillwater-Reefton S.<br>Reefton S.-Reefton N.<br>Reefton N.-Cronadun<br>Cronadun-Landing<br>Landing-Inangahua<br>Inangahua-Murchison<br>Murchison-Kawatiri<br>Kawatiri-Glenhope<br>Glenhope-Tui<br>Tui-Kiwi<br>Kiwi-Tadmor<br>Tadmor-Kohatu<br>Kohatu-Belgrove<br>Brunner-Otira<br>Otira-Arthur's Pass<br>Arthur's Pass-Cass<br>Cass-Broken River<br>Broken River - Otarama<br>Otarama-Springfield | 5 M. ch.<br>22 73<br>37 30<br>1 30<br>5 38<br>8 40<br>6 0<br>23 53<br>22 70<br>3 73<br>9 42<br>3 17<br>5 9<br>10 29<br>9 44<br>42 27<br>8 14<br>14 67<br>15 22<br>7 40<br>4 58 | 6 M. ch.<br>2 52<br>4 79<br>1 0<br>0 56<br>0 45<br>0 10<br>..<br>..<br>0 15<br>0 55<br>0 34<br>0 29<br>0 69<br>0 62<br>2 68<br>5 38<br>0 20<br>1 29<br>0 30<br>0 16 | 7 M. ch.<br>25 45<br>42 29<br>2 30<br>6 14<br>9 5<br>1 26<br>23 53<br>22 70<br>4 8<br>10 17<br>3 51<br>5 38<br>11 18<br>10 26<br>45 15<br>13 52<br>15 7<br>16 51<br>7 70<br>4 74 | 8 M. ch.       | 9 M. ch.         | 10 M. ch.           | 11            | 12 M. ch. | 13 M. ch. | 14 M. ch. | 15 M. ch. | 16 M. ch. | 17 M. ch. |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | 31 Mar., 1907 | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | 7 Aug., 1908  | ..        | ..        | ..        | ..        | ..        | 57 32     |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | June, 1914    | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
| Blackball Railway<br>Greymouth-Nelson<br>Creek<br>Westport-Ngakawau<br>Ngakawau<br>Ngakawau Extension | 2 Ngahere-Blackball ..<br>Greymouth - Nelson<br>Creek<br>Westport-Ngakawau<br>Ngakawau - Moki-<br>hinui<br>Mokihinui Colliery<br>Line<br>Westport-Inangahua<br>Junction | 3 M. ch.<br>3 40<br>7 51<br>19 56<br>7 12<br>3 69<br>26 0 | 4 Ngahere-Blackball ..<br>Greymouth-Brunner-<br>ton-Stillwater<br>Westport-Ngakawau<br>Ngakawau-Mokihini<br>Mokihinui-Seddonville<br>Westport-Te Kuha-<br>Te Kuha-Inangahua<br>Junction                                                                                                                                                                                                                                  | 5 M. ch.<br>3 40<br>7 51<br>19 56<br>7 12<br>3 69<br>20 6                                                                                                                      | 6 M. ch.<br>1 20<br>6 18<br>8 12<br>1 18<br>0 25<br>0 10<br>..                                                                                                      | 7 M. ch.<br>4 60<br>13 69<br>27 68<br>8 30<br>4 14<br>6 4<br>20 6                                                                                                                | 8 M. ch.       | 9 M. ch.         | 10 M. ch.           | 11            | 12 M. ch. | 13 M. ch. | 14 M. ch. | 15 M. ch. | 16 M. ch. | 17 M. ch. |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | ..            | ..        | ..        | ..        | ..        | ..        | ..        |
| Westport-Inangahua                                                                                    | 2 Westport-Inangahua<br>Junction                                                                                                                                        | 3 M. ch.<br>26 0                                          | 4 Westport-Te Kuha-<br>Te Kuha-Inangahua<br>Junction                                                                                                                                                                                                                                                                                                                                                                     | 5 M. ch.<br>5 74<br>20 6                                                                                                                                                       | 6 M. ch.<br>0 10<br>..                                                                                                                                              | 7 M. ch.<br>6 4<br>20 6                                                                                                                                                          | 8 M. ch.       | 9 M. ch.         | 10 M. ch.           | 11            | 12 M. ch. | 13 M. ch. | 14 M. ch. | 15 M. ch. | 16 M. ch. | 17 M. ch. |
|                                                                                                       |                                                                                                                                                                         |                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                |                                                                                                                                                                     |                                                                                                                                                                                  | ..             | ..               | ..                  | 1 April, 1912 | ..        | ..        | ..        | ..        | ..        | ..        |

\* Preliminary. † Permanent





TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1925—continued.

SOUTH ISLAND—continued.

| Appropriation.                           | Division.                                               | Mileage. | Section.                        | Main Line. | Buildings. | Totals. | State of Line.   |                     |         |                |          |          |          | Total. |          |        |
|------------------------------------------|---------------------------------------------------------|----------|---------------------------------|------------|------------|---------|------------------|---------------------|---------|----------------|----------|----------|----------|--------|----------|--------|
|                                          |                                                         |          |                                 |            |            |         | Under Formation. | Under Plate-laying. | Opened. |                |          |          |          |        |          |        |
|                                          |                                                         |          |                                 |            |            |         |                  |                     | Date.   | 1920-21.       | 1921-22. | 1922-23. | 1923-24. |        | 1924-25. |        |
|                                          |                                                         |          |                                 |            |            |         | 8                | 9                   | 10      | 11             | 12       | 13       | 14       | 15     | 16       | 17     |
|                                          |                                                         | M. ch.   |                                 | M. ch.     | M. ch.     | M. ch.  | M. ch.           | M. ch.              | M. ch.  |                | M. ch.   | M. ch.   | M. ch.   | M. ch. | M. ch.   | M. ch. |
| 1 Waitaki - Bluff and Branches - -contd. | 2 Branches - -contd.                                    | 3        | 4                               | 5          | 6          | 7       | 8                | 9                   | 10      | 11             | 12       | 13       | 14       | 15     | 16       | 17     |
|                                          | Inch Valley Railway                                     | 2 29     | Inch Valley-Lime Kiln           | 2 29       | 0 23       | 2 52    | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 2 29   |
|                                          | Port Chalmers ..                                        | 1 9      | Glendernid - Port Chalmers      | 1 9        | 3 40       | 4 49    | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 1 9    |
|                                          | Green Island ..                                         | 2 44     | Burnside-Saddle Hill            | 2 44       | 0 52       | 3 16    | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 2 44   |
|                                          | Green Island to Brighton                                | 4 65     | Surveyed ..                     | 4 65       | ..         | 4 65    | 4 65             | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Fernhill Colliery Line                                  | 1 60     | Abbotsford to Fernhill Colliery | 1 60       | 0 24       | 2 4     | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 1 60   |
|                                          | Kaikorai Valley Railway                                 | 2 60     | Surveyed ..                     | 2 60       | ..         | 2 60    | 2 60             | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Outram ..                                               | 8 78     | Mosgiel-Outram                  | 8 78       | 0 68       | 9 66    | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 8 78   |
|                                          | Lawrence ..                                             | 21 76    | Clarksville-Lawrence            | 21 76      | 2 2        | 23 78   | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 34 65  |
|                                          | Lawrence - Roxburgh                                     | 37 44    | Lawrence - Big Hill             | 7 33       | 0 44       | 7 77    | ..               | ..                  | ..      | 1 Aug., 1910   | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Big Hill - Beaumont             | 5 36       | 0 45       | 6 1     | ..               | ..                  | ..      | 15 Dec., 1914  | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Beaumont - Miller's Flat        | 14 55      | 0 38       | 15 13   | ..               | ..                  | 14 55   | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Miller's Flat - Roxburgh        | 10 0       | ..         | 10 0    | 10 0             | Prelim.             | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Surveyed ..                     | 23 20      | ..         | 23 20   | 23 20            | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Lovell's Flat - Tuapeka Mouth                           | 23 20    | Surveyed ..                     | 23 20      | ..         | 23 20   | 23 20            | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Balclutha - Tuapeka Mouth                               | 22 0     | Surveyed ..                     | 7 0        | ..         | 7 0     | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Crichton-Tuapeka Mouth                                  | 11 60    | Trial Survey                    | 15 0       | ..         | 15 0    | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Surveyed ..                     | 11 60      | ..         | 11 60   | 11 60            | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Stirling - Hill End (via Stony Creek)                   | 11 43    | Trial Survey                    | 11 43      | ..         | 11 43   | 11 43            | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Balclutha - Appleby Junction or Catlin's - Seaward Bush | 105 49   | Balclutha-Owaka                 | 19 20      | 1 63       | 21 3    | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 42 67  |
|                                          |                                                         |          | Owaka-Catlin's                  | 3 38       | 0 30       | 3 68    | ..               | ..                  | ..      | 1 Aug., 1904   | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Catlin's-Houipapa               | 2 30       | 0 9        | 2 39    | ..               | ..                  | ..      | 17 Dec., 1909  | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Houipapa-Puketiro               | 7 11       | 0 43       | 7 54    | ..               | ..                  | ..      | 1 Feb., 1915   | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Puketiro-McLennan               | 5 29       | 0 59       | 6 8     | ..               | ..                  | ..      | 1 Feb., 1915   | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | McLennan-Tahakopa               | 5 19       | 0 38       | 5 57    | ..               | ..                  | ..      | 1 Feb., 1915   | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Tahakopa-Marinui                | 23 63      | ..         | 23 63   | 23 63            | Prelim.             | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Marinui-Tokanui                 | 6 0        | ..         | 6 0     | 6 0              | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          |                                                         |          | Tokanui-Waimahaka               | 8 27       | 0 64       | 9 11    | ..               | ..                  | ..      | 20 Sept., 1911 | ..       | ..       | ..       | ..     | ..       | 32 79  |
|                                          |                                                         |          | Waimahaka-Appleby               | 24 52      | 1 50       | 26 22   | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Waipahi - Heriot Burn                                   | 26 23    | Waipahi-Heriot                  | 20 3       | 2 3        | 22 6    | ..               | ..                  | ..      | ..             | ..       | ..       | ..       | ..     | ..       | 26 23  |
|                                          |                                                         |          | Surveyed                        | 6 20       | 0 45       | 6 65    | ..               | ..                  | ..      | 15 Feb., 1905  | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Extension to Roxburgh, via Rae's Junction and Ettrick   | 28 10    | Surveyed                        | 28 10      | ..         | 28 10   | 28 10            | Prelim.             | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |
|                                          | Via Spylaw ..                                           | 25 70    | Surveyed                        | 25 70      | ..         | 25 70   | 25 70            | Prelim.             | ..      | ..             | ..       | ..       | ..       | ..     | ..       | ..     |





## APPENDIX C.

## ANNUAL REPORT ON BUILDINGS BY THE GOVERNMENT ARCHITECT.

The GOVERNMENT ARCHITECT to the Hon. MINISTER OF PUBLIC WORKS.

SIR,—

I have the honour to submit the following report on the activities of the Architectural Branch of the Department for the year ended 30th June, 1925.

During the period plans and sketches were prepared for new works of a total estimated value of £548,000, and tenders were accepted for buildings, since completed or under construction, of a total value of £269,849. Of the latter amount £166,944 represents works designed and estimated for prior to the 30th June, 1924, and £92,905 works designed since.

In addition, a large amount of minor alterations and repairs and general maintenance has been carried out through the District Offices, and a considerable quantity of furniture and fittings has been manufactured in the Public Works workshops for other Government Departments.

I have to report that the arrangement whereby this Department designs and erects secondary-school buildings for the Education Department is working very satisfactorily, and the above totals include £111,540 estimated cost of schools designed, and £75,413 for work carried out or under construction.

During the year a number of Hospital Boards elected to have their plans prepared in this office, and hospital buildings of an estimated value of £41,060 were designed for seven Boards, and contracts let of a total value of £13,987 on their behalf.

There has been keen competition for Government work in the majority of cases, and the standard of workmanship has been satisfactory. The position with regard to the supply of timber and bricks has somewhat improved, but there is still difficulty in obtaining sufficient thoroughly seasoned timber. Labour generally has been sufficiently available, except for plastering-work, and delay in completion of buildings has been caused in many cases through lack of plasterers.

The following is a schedule of the works carried out during the year :—

## GOVERNMENT HOUSES.

*Auckland and Wellington.*—General repairs and maintenance as required.

## DEPARTMENTAL BUILDINGS.

Maintenance and general upkeep of buildings, including renovations, repairs, fittings, &c., to departmental buildings in larger towns.

A contract has been let for a large extension of the Departmental Buildings, Wellington, consisting of a four-story temporary wooden building in the courtyard at the back of the main building, connected thereto by corridors. The top floor will consist of a large dining-hall, with kitchen, &c., for the use of the staffs of the various Departments. The other three floors will contain office accommodation.

## POST-OFFICES, ETC.

*Whangarei District.*—Repairs and renovations have been carried out to ten post-offices.

*Auckland District.*—General repairs, renovations, and alterations have been carried out to thirty-two post-offices; new post-offices have been erected, and fittings supplied, at Ngatea, Pokeno, Puke-miro, St. Heliers Bay, Silverdale, Te Uku, and Waikino; a large two-story brick post-office is in the course of erection at Paeroa; and extensions have been made at Chief Post-office, Auckland, Matamata, Netherton, and Thames. Extensive additions and alterations have been made to eight automatic-telephone exchanges.

*Taumarunui.*—Renovations have been carried out to four post-offices; and a new post-office erected at Mokauiti.

*Tauranga District.*—Repairs and renovations have been carried out at ten post-offices; at Whakatane additions have been made, and furniture and fittings provided.

*Gisborne District.*—Extensive additions in brick and reinforced concrete are being made to Gisborne Post-office, and fittings are being supplied. A new building has been erected at Motu, and fittings supplied. Renovations were carried out to seven post-offices.

*Stratford District.*—Additions and alterations were made to post-offices at Wanganui, New Plymouth, and Horopito, and general maintenance work done to thirty-four post-offices in the district.

*Napier District.*—Renovations and repairs were carried out to twenty post-offices, and a large addition made to the garage at Napier Post-office.

*Wellington District.*—The new Automatic-telephone Exchange, Stout Street, Wellington, is completed, and the fittings, including a large air-conditioning plant, are being installed. A two-story post-office, in brick and rough-cast, is nearing completion at Eastbourne; a wooden-frame building with cement-plastered exterior at Pongaroa, and a wooden building at Ohau, are completed. Extensive renovations and repairs have been carried out to nine post-offices, and general maintenance work to a large number of others.

*Nelson District.*—Renovations and repairs were carried out to twelve post-offices, and a small post-office was erected at Flat Creek.

*Christchurch District.*—New post-offices have been erected at Springburn, Orari, Hawarden, St. Andrews, and Darfield, and a new post-office in brick is in course of erection at New Brighton. Extensive internal alterations and renovations have been carried out at the Chief Post-office, Christchurch, and renovations and repairs to eleven other offices.

*Greymouth District.*—Renovations and repairs carried out to fourteen post-offices. A new garage and store in brick has been erected at Greymouth Post-office.

*Dunedin District.*—Renovations and repairs were carried out to fifty-two post-offices, and a new post-office erected at Tarras.

## COURTHOUSES, ETC.

A new Courthouse has been erected at Whakatane, and a new Courthouse is being erected in brick at Balclutha. Alterations, renovations, and repairs have been carried out to about fifty Courthouses throughout the Dominion.

## POLICE-STATIONS AND GAOLS.

*Whangarei District.*—Renovations and repairs were carried out to four police-stations, and a new building completed at Rawene.

*Auckland District.*—General maintenance work has been carried out to Mount Eden Gaol and Waikeria Reformatory. New police-stations have been erected at Kawhia and Mercer, and one is in course of erection at Morrinsville. Additions, repairs, and renovations have been carried out to forty-one stations.

*Taumarunui District.*—Renovations were carried out to police-stations as required.

*Tauranga District.*—Renovations and repairs were carried out to three police-stations.

*Gisborne District.*—Renovations were carried out to six police-stations.

*Stratford District.*—A new residence was erected at Rahotu, and renovations and general maintenance carried out to seventeen police-stations.

*Napier District.*—Renovations and repairs were carried out to fifteen police-stations.

*Wellington District.*—A new police residence and office in brick has been erected at Foxton. Additions and alterations are being carried out to the prison at Watts Peninsula (between Point Halswell and Miramar). Two new ranges of cells are nearing completion, and an extensive reinforced-concrete boundary-wall is being built. The work is being carried out principally by prison labour under the direction of this Department.

*Nelson District.*—Repairs, &c., were carried out to twelve police-stations; a new brick building at Port Nelson has been completed.

*Christchurch District.*—New station and quarters were erected at Leeston, and renovations and repairs carried out to eleven stations. At Paparua Prison the eastern range of cells has been practically completed, and the administrative block is in the course of erection. Exercise-yards, drainage, water-supply, and roading have been carried out, as well as general maintenance and repairs. Concrete blocks have been manufactured extensively for the administrative block, and a large area of ground has been planted in trees.

*Greymouth District.*—Repairs and renovations were carried out to twelve police-stations.

*Dunedin District.*—Repairs and renovations were carried out to thirty-three police-stations, and to the Borstal Institute, Invercargill, where a cottage has been built, a bathhouse is in the course of erection, and water-supply and sewerage have been installed as required.

## MENTAL HOSPITALS.

*Avondale.*—Extensive alterations, painting, renovations, and repairs have been carried out, and electric light installed throughout.

*Tokanui.*—New administration block, stores, &c., have been completed, and the female admission block is nearing completion. A new water-supply main has been laid to the institution, and extensive alterations and repairs made as required.

*Porirua.*—Two large day-rooms, lavatory accommodation, large verandas, and sun-rooms in brick and concrete have been added to the main building. Five complete villa blocks, each to accommodate thirty-four patients, are in course of erection, in accordance with the Department's new policy, two being completed. A wooden building to accommodate eleven workmen, and a block containing a kitchen, kitchen offices, and dining-room, have been erected during the year.

*Nelson.*—Good progress is being made with the erection of a "closed villa" (two-story) in brick and concrete, at Stoke. General maintenance, drainage, &c., has been carried out. A large new store has been built at Nelson, electric light installed, extensive alterations and renovations carried out, and furniture supplied.

*Sunnyside.*—New quarters for male attendants have been completed. General maintenance works have been carried out, and the brickwork for the latrine block completed on up-to-date lines. Owing to the existing buildings having become obsolete, this institution requires rebuilding.

*Hokitika.*—Unit No. 1 of the new scheme is completed. Furniture and fittings are being made in the hospital workshops. The attendants' quarters have been moved to a new site, and renovated. The Medical Superintendent's house and the night nurses' cottage are completed.

*Seacliff.*—No new buildings have been erected, but a large amount of general maintenance work has been carried out.

## EDUCATION.

New teachers' residences are being erected at Waikeri and Karakanui.

*Whangarei District.*—Renovations, alterations, and repairs were carried out to ten Native schools. Good progress is being made with the erection of a new high school in brick and concrete at Whangarei. The plans provide for what will be a very extensive two-story building when eventually completed, but only a portion, comprising ten class-rooms, &c., is being built at present.

*Auckland District.*—Maintenance work, &c., has been carried out to Ponsonby Receiving Home, Auckland Seddon Technical College, and Hamilton High School; additions are being made to Thames High School. A Native school and residence are in course of erection at Makomako, and renovations and repairs were carried out to five Native schools.

*Tauranga District.*—Renovations and repairs were carried out to five Native schools, and a school and residence are being erected at Huiarau.

*Gisborne District.*—New Native schools have been erected at Whakawhitira and Tokamaru Bay. Renovations were carried out to four schools. A large addition, in brick and concrete, consisting of eight class-rooms, is being made to the Gisborne High School, and renovations to the main building have been completed.

*Stratford District.*—A new music-room was erected at New Plymouth Boys' High School, and extensive repairs made here and at Wanganui Technical School. Repairs and renovations were carried out to several other schools.

*Napier District.*—Repairs were carried out to the Greenmeadows Receiving Home, and two Native schools. A technical high school is in course of erection at Hastings. It consists of a two-story administration block, with class-rooms, laboratories, cloakroom, and lavatory accommodation in two wings, connected to the main building by covered ways; the whole of the buildings being of brick and concrete.

*Wellington District.*—A contract has been let and work started on a new high school for Hutt Valley. The completed building, of which only a portion is being built at present, will consist of a central block, containing administration rooms, library, and class-rooms, and two wings, containing class-rooms, laboratories, &c. The whole building will be two stories high, and is being built in brick and concrete. Two class-rooms and corridors, in brick, have been added to Palmerston North Boys' High School, and improvements effected to the ventilation of existing building. A caretaker's cottage has been built at Wairarapa High School.

*Christchurch District.*—Alterations and improvements have been carried out at Timaru Girls' High School, and additional class-rooms, with verandas and corridors, are being built in brick at Timaru Boys' High School.

*Dunedin District.*—Good progress has been made with the Southland Boys' High School, the work being practically completed. Fittings and furniture are being installed. Renovations, drainage, &c., have been carried out at Anderson's Bay Probation Home and Otekaike Special School.

#### PUBLIC HEALTH DEPARTMENT.

*Auckland District.*—Fittings have been supplied for the St. Helens Hospital, Auckland, and renovations carried out there and at Motuihi Quarantine Station.

*Rotorua.*—Alterations are being made at King George V Hospital in preparation for the new steam-laundry, machinery for which has been ordered.

*Gisborne.*—Extensive additions in brick are being carried out to St. Helens Hospital, and are nearing completion.

*Stratford District.*—Extensive alterations and renovations were carried out at St. Helens Hospital, Wanganui.

*Napier District.*—A contract has been let for extensive additions and alterations at Pukeora Sanatorium, and general maintenance and repairs have been carried out during the year. A new incinerator was built. At Waipukurau Hospital a new Nurses' Home, in brick, is in course of erection. The building will provide complete accommodation for thirty nurses.

*Wellington.*—An addition to the Nurses' Home was erected at Otaki Sanatorium.

*Christchurch District.*—A large new hospital for women is in course of erection, in reinforced concrete, at Hanmer, and a residence for the Medical Superintendent has been completed. Additions, repairs, and maintenance have been carried out to St. Helens Hospital, Christchurch. Two cottages are being erected at Ashburton Hospital.

*Greymouth District.*—An extension of the male ward, in brick, is in course of erection, and a contract has been let for a laundry at Grey River Hospital, Greymouth.

*Dunedin District.*—Renovations were carried out to St. Helen's Hospital, Dunedin. General maintenance and repairs were carried out to buildings as required. Alterations and repairs were carried out at St. Helens Hospital, Invercargill.

#### DEFENCE DEPARTMENT.

*Whangarei District.*—Various works were carried out to rifle range and drill-hall at Whangarei.

*Auckland District.*—Repairs, alterations, and renovations were carried out to eight drill-halls, and to buildings at five forts. Repairs and renovations were carried out at Narrow Neck Camp and several depots.

*Tauranga District.*—Repairs were carried out at Rotorua and Tauranga.

*Napier District.*—Renovations and repairs were carried out at three drill-halls at Napier Artillery Barracks, and at Roy's Hill rifle range.

*Nelson District.*—Renovations and repairs were carried out to several drill-halls, and rifle ranges at Nelson, Stoke, and Blenheim.

*Christchurch District.*—At Burnham Camp three staff cottages have been built; a large concrete ammunition-store and a 15,000-gallon reinforced water-tower are in course of erection. Various buildings have been renovated and repaired, and improvements made to drainage, septic tank, &c. Renovations and repairs were carried out to eleven drill-halls, rifle ranges, &c.

*Greymouth District.*—A large addition has been made to Greymouth Drill-hall, and repairs and renovations carried out to Westport and Reefton Drill-halls.

*Dunedin District.*—Renovations and repairs were carried out at six drill-halls.

#### GENERAL.

Various works, alterations, repairs, &c., were carried out in a large number of offices for different Departments, including Defence, Public Trust, Marine, Tourist, Valuation, Agriculture, Customs, Electoral, Internal Affairs, Government Life, State Fire, and Mines; also to Ministerial residences.

A large quantity of furniture and fittings was made, and supplied to various offices.

In conclusion, I again desire to place on record my appreciation of the efficient and loyal manner in which the members of the staff have carried out their duties.

JOHN T. MAIR, A.R.I.B.A.,  
Government Architect.

## APPENDIX D.

### ANNUAL REPORT OF THE CHIEF ELECTRICAL ENGINEER.

The CHIEF ELECTRICAL ENGINEER to the Hon. the MINISTER OF PUBLIC WORKS.

SIR,—

I beg to report on the position of the development of electric power in the Dominion for the past year as follows :—

#### GOVERNMENT SCHEMES IN OPERATION.

##### LAKE COLERIDGE ELECTRIC SUPPLY.

The year ending 31st March, 1925, marks the tenth year of operation of the plant, and the most successful since its inception, there being a very satisfactory credit balance shown. Tables C, D, and E show the analysed results of operation of the scheme, and records of the connected load are shown in Table F.

##### *Financial Results.*

The capital outlay at the close of the year was £1,008,491, as against £892,801 for the year previous, an increase of £115,690. Details of capital expenditure are shown under Table D. The total revenue for the year was £92,163, and after payment of all charges, including interest and depreciation, but not sinking fund, an excess of £5,434 was shown. The accumulated deficiency on the Profit and Loss Account has been reduced from £23,172 to £17,738. Under Table C will be found particulars of financial results and load records.

The power-house maximum output was 13,180 kw., an increase of 2,380 kw., or 21·9 per cent., in excess of the previous year's maximum, and representing an overload of approximately 10 per cent. on the normal capacity of the plant—viz., 12,000 kw. Units output for the power-house totalled 59,528,216, as against 50,614,955 for the preceding year, an increase of 17·6 per cent. The annual load-factor was 51·8 per cent., slightly lower than that for last year.

The total costs per unit generated are 0·349d., being a reduction of 0·033d., due to the fact that the plant has been operating up to its full capacity. Operating-costs have increased by £2,493, mainly accountable by the increased staff and maintenance of transmission-lines. Particulars of operating-costs will be found under Table E.

##### *Connected Load.*

The total connected load at the end of the year was 74,231 kw., being an increase of 18·8 per cent. on the previous year. Details of connected load will be found under Table F.

##### *Operation.*

The repairs to No. 6 unit were successfully carried out, and the set was recommissioned in April. Despite the overload experienced during the year, the plant has operated successfully, and no trouble has been experienced. Opportunity was taken during the summer load of overhauling the sets in anticipation of next winter's load, the condition of the machines being good. During the year two siphon pipes were installed and put into commission at the intake; the results obtained have been very satisfactory, as an appreciable gain in head was accomplished.

##### *Transmission-lines.*

No extensions were made to the transmission-lines during the year, but arrangements were made for the erection of a second transmission-line to Timaru. This line will run from Hororata to Timaru and thence to Oamaru, and will be suitable for operation at 110,000 volts at a later date. Suspension insulators will be used throughout, the object being not only to provide an alternative supply to Ashburton and Timaru, but also to provide a trunk line to connect the several stations in the south and north.

##### *Interruption, Christchurch Line.*

During the year there were seven interruptions to supply of over one minute, the total duration of these being 4 hours 32 minutes. The longest period of interruption occurred on Tuesday, 27th May, at 4.27 p.m. The weather at the time was very bad, with strong north-easterly wind and driving misty rain. Both lines failed simultaneously, due to insulator breakdowns and flashovers, in one case resulting in the wire being burned through. The Tramway Board's standby plant was called upon, and supply was restored after an interruption of 4 hours 12 minutes. The insulator failures were definitely traced to one particular make which, though good electrically, developed mechanical faults after erection. Steps were immediately taken to remove as many of these insulators as was possible, and temporarily to make available the third transmission-line (pending the permanent connection). A repetition of the above is not likely to occur. The total number of insulators replaced during interruptions was twenty.

*Timaru Line.*

There were eighty-nine interruptions during the year on this line, of a total duration of 90 hours 8 minutes. While the majority of these interruptions were of short duration, a certain number extended to some hours. The most serious of these occurred on the 30th December, when a pole was washed out in the Orari River during the excessive floods experienced. Supply was not restored for 18 hours 55 minutes. The majority of the outages were due to bark, branches of trees, magpies, and defective insulators. These troubles are being dealt with, and the insulators for replacing those of defective manufacture arrived at the close of the year, and will be erected as soon as possible. The erection of the second line to Timaru should reduce the total interruptions to a minimum.

## GENERAL.

A third bank of transformers, of 12,000 K.V.A. capacity, was ordered in May for the power-house. This bank, now being erected, will be of similar capacity to the two existing banks, and will bring the transformer capacity of the station up to 36,000 K.V.A., equal to total generator capacity in the station when the present duplication works are completed.

The extensions to Addington Substation are practically completed, and the work of installing the third bank of 4,500 kw. transformers has commenced. A contract was let in August for the supply of a 6,000 K.V.A. synchronous condenser. Shipment of this machine has been made, and it should be in operation before the close of the present year. With the projected increased capacity of the generating plant, and the additional 11 k.v. feeders required at Addington Substation, it was found necessary to increase the capacity of the switchgear, and tenders were called for the supply of this equipment, and a contract let on the 2nd June, 1925.

The South Canterbury Power Board commenced the reticulation of Geraldine County, and supply was given at the close of the year to Temuka. It is anticipated that the Board will be in a position to supply Geraldine County and Waimate during the coming year.

Arrangements were completed with the Springs-Ellesmere Power Board for the purchase of the Department's reticulation in Paparua County, this area being taken over by the Board in December.

*Lake Coleridge Duplication.*

The civil-engineering portion of the duplication works is being reported on separately by the General Branch.

In July a contract was let to Messrs. Andersons Limited for the supply and erection of Nos. 5 and 6 pipe-lines. These pipe-lines will supply the water for the two 7,500 kw. turbines and generators. At the close of the year practically all the material was to hand, and the contractors have made good progress with the manufacture of the pipes, and arrangements had been made to commence erection.

A contract was let in September to Messrs. Vickers Limited, for the supply of two 12,650 h.p. turbines, and to Messrs. Bruce Peebles and Co. (Limited) for two 7,500 kw. generators. A contract for the necessary switch-gear was let in January to Messrs. Metropolitan-Vickers (Limited), and delivery dates of this equipment are such that the additional plant capacity of 15,000 kw. should be available by about June, 1926.

*Rainfall.*

The rainfall at the power-house for the year was 36.53 in., a record for the ten years during which readings have been taken. The highest daily rainfall and the highest monthly rainfall were both in April—2.30 in. and 6.59 in. respectively.

## WAIKATO ELECTRIC SUPPLY.

*Capital Outlay.*

The capital outlay at the end of the year was £522,973, as compared with £474,817 at the end of last year, an increase of £48,156. This is analysed in Table J herewith. Of this outlay, £128,550 represents assets not in operation, principally extensions to the power-station.

*Financial Results of Operation and Future Prospects.*

The year ended with a profit of £17,053, after paying working costs, interest, depreciation, and sinking fund. The annual revenue increased from £59,924 last year to £65,184 this year, an increase of £5,260, or slightly under 9 per cent.

Table H gives the financial results of operation and operating figures, and the revenue from different classes of consumers is shown in the following statement:—

|                           |    |    |    | 1923.          | 1924.          | 1925.          |
|---------------------------|----|----|----|----------------|----------------|----------------|
| Revenue from—             |    |    |    | £              | £              | £              |
| Large mining companies    | .. | .. | .. | 20,177         | 24,635         | 18,086         |
| Power Boards              | .. | .. | .. | 14,728         | 26,007         | 35,302         |
| Hamilton Borough          | .. | .. | .. | 2,911          | 4,621          | 5,461          |
| Other wholesale consumers | .. | .. | .. | 2,565          | 3,281          | 4,264          |
| Miscellaneous             | .. | .. | .. | 1,437          | 1,380          | 2,071          |
|                           |    |    |    | <u>£41,818</u> | <u>£59,924</u> | <u>£65,184</u> |

It will be seen from the figures that the revenue from mines has decreased by about £6,600, due to the stoppage of the Grand Junction Company's operations. The increase of over £9,000 in revenue

from Power Boards (over 35 per cent.) and of £2,500 from other sources has more than made up for the decrease from the mines.

The growth in revenue from the Power Boards (35 per cent.) has been accompanied by a growth in the sum of their maximum loads from 3,038 kw. (4,050 h.p.) to 4,523 kw. (6,050 h.p.), or 49 per cent.

For the present year it is estimated that the mining load will be about the same; there will be an increase in the load and revenue from Power Boards and other consumers. On the other hand, there will be a considerable increase in capital charges on the extensions at Horahora, and additional transmission-lines, so the net revenue in this year will probably be about the same as in the year just ended.

It is intended that supply will be given during the present year to the Auckland, Waitomo, Franklin, and Waitemata Power Boards, and to Rotorua Borough.

Working-costs during the year are shown in Table K. These show—

- (1.) Decrease in generating-costs per unit, owing to less work done on maintenance of power-house machinery and headworks:
- (2.) Decrease in transmission costs per unit:
- (3.) Increase in costs per unit at main substations, due partly to increased maintenance, and partly to the fact that this is the first full year of operation of one of the substations:
- (4.) Increase in cost of management. This is due principally to increase in general office expenses, largely owing to a fire in the office, and to increase in the amount of work done for consumers and paid for by them, but included for the accounts under the heading of "Management."

#### *Extensions during the Year and Future Extensions.*

*General, Additional Consumers, and Connected Load.*—No additional large consumers have been supplied during the year. The total system supplied from Horahora (on 31st March) consisted of 86 miles of 50,000-volt lines and 38 miles of 11,000-volt lines belonging to the Department, and 403·5 miles of 11,000-volt lines, 469 miles of 3,300-volt lines, and 398·5 miles of 400-volt lines belonging to local authorities. The above are "route miles" of lines. If account is taken of lines of different voltage on the same poles—i.e., of circuit miles—the total would be considerably increased.

The connected load has increased during the year from 25,123 kw. to 31,757 kw., an increase of 6,634 kw., or 26·4 per cent.

The increase in maximum load has been 200 kw. on Horahora and 900 kw. on the system (supplied by Horahora and the Grand Junction plant). The diversity has increased from 3·395 to 3·83.

Arrangements have been made to get additional power (1,800 kw. for eight hours a day) from the Tauranga Borough's new plant at McLaren's Falls. This, with extensions at Horahora to 10,300 kw. capacity, should provide for a maximum load of 12,100 kw. on the system at ordinary times, and of 10,300 kw. in case of extreme low water at Horahora.

Arrangements have also been made whereby power, if available from the Auckland Power Board's steam plant, will be purchased by the Department for general distribution over the system to the point where it may be required; and by the end of the year 1925–26 all plants in the district, at Horahora and Auckland, with smaller plants at Thames, Te Aroha, McLaren's Falls, and Rotorua, should be connected together by 50,000-volt and 11,000-volt or 6,600-volt lines, giving supply at the following points: Horahora, Waikino, Waihou, Ngongotaha, Hamilton, Te Awamutu, Hangatiki, Bombay, Penrose, Takapuna, and one other point in the Waitemata Board's district.

*Extensions at Horahora.*—The extensions to the power-house building, and alterations to the head-race and tail-race, were completed during the year, and one of the two new 2,000 kw. units was installed and ready for service in November. Owing to the breakage of a casting on the Auckland wharf, which casting had to be replaced by the makers in England, the other unit has only recently been completed.

Delay in the arrival of the switch-gear prevented its being installed until towards the end of March, preventing any use being made of the new unit until that time.

The erecting of two motor-driven exciters, a new bank of 5,000/50,000-volt transformers, and new 50,000-volt switch-gear, was completed during the year.

Considerable progress has been made on the construction of a new concrete weir across the river above the head-gates, to ensure making the whole low-water flow of the river available for power purposes.

*Additional Transmission-lines.*—The wood-pole 110,000-volt line, Hamilton to Penrose (to be operated at 50,000-volt to supply the Auckland and Franklin Power Boards) was almost completed during the year, and has since been put into operation, enabling Horahora to run in parallel with the Auckland Power Board's steam plant.

Considerable progress has been made on the 50,000-volt lines to Ngongotaha (Rotorua) and Hangatiki (Waitomo), which should both be completed at a very early date.

Surveys are in hand of the following lines: Arapuni–Penrose steel-tower line, 110,000 volts; Katikati–Waikino (completed), 50,000 volts; Penrose–Takapuna (almost completed), 50,000 volts; Waikino–Bombay (commenced), 50,000 volts; Bombay–Pukekohe, 11,000 volts; Hangatiki–Waitomo, 11,000 volts.

The future line-construction programme is as follows: Te Awamutu–Hangatiki (completion, September, 1925), 50,000 volts; Arapuni–Rotorua (completion, September, 1925), 50,000 volts; Katikati–Waikino (completion, October, 1925), 50,000 volts; Penrose–Takapuna (completion, June, 1926), 50,000 volts; Waikino–Bombay (completion, June, 1926), 50,000 volts; Arapuni–Penrose (completion, August, 1927), 110,000 volts.

*Substations.*—Penrose (110,000 volts): A contract was let for the building (two bays of the complete substation), and it has been erected. The transformers (four 5,000 K.V.A.) arrived in February, and have since been erected and are now in operation.

Hamilton Substation (50,000 volts): Arrangements have been made and transformers ordered to substitute three 500 K.V.A. transformers for the six 250 K.V.A. transformers now in service, and to allow for increasing the substation to 3,000 K.V.A. capacity when required.

Ngongotaha, Hangatiki, Arapuni, and Bombay Substations (50,000 volts): Transformers and most of the switch-gear are to hand or on order for these substations.

#### *Operation.*

*Headworks and Power-house.*—Until the new 2,000 kw. unit was placed in service in March, 1925, some difficulty was experienced in carrying the total load on Horahora, and from October, 1924, onwards it was found necessary to get the Grand Junction steam plant to run, first in the afternoons (3.30–7.30 p.m.) only, and later on both mornings and afternoons, in accordance with their contract with the Department, supplying power up to 700 kw., as a rule. In addition, the Grand Junction plant was called on for emergency or overhaul purposes on eleven occasions during the year, supplying 97,200 units, with a maximum of 1,800 kw. On eight out of these eleven times the power was required to enable the Horahora plant to be shut down and the race emptied to remove part of the old head-race wall and enlarge the head-race for the extended power-house.

As for last year, this co-operation between the two plants was of great value, and credit is due to the Junction Company and their staff for the manner in which it has been carried out. Credit is due also to the Superintendent and staff at Horahora for having maintained good service on a plant which has now been on almost daily overload for nearly three years.

*Transmission-line, Horahora-Waikino (50,000 Volts).*—There were eleven accidental stoppages on this line, for a total time of 44 hours 33 minutes. The worst of these was for 27 hours 25 minutes, on the 27th May, when a gale of exceptional severity blew the roof off the half-way switch-house. A temporary connection was made, with the assistance of men lent by the Thames Valley Power Board, over the top of the remains of the building until more permanent repairs could be effected. Eight of the stoppages were for two minutes each or less.

On this line during the year four insulators were replaced on breakdown, and five pin and one strain disc on overhaul. On the Waiorongomai-Waihou section no insulators were replaced on breakdown, and four were replaced on overhaul.

*Horahora-Hamilton Line (50,000 Volts).*—There were seventeen accidental interruptions on this line, for a total time of 15 hours 10 minutes. Fourteen of these were of duration of nine minutes or less. One insulator was replaced on breakdown during the year and twelve on overhaul. A considerable number of insulators on this line are showing slight cracks, and new insulators of different make have been ordered to replace these. The possibility of getting supply from the Auckland Power Board to Hamilton in the near future will minimize the inconvenience to consumers involved in shutting down this line to replace insulators.

*50,000-volt Substations.*—Owing to increase of load at Hamilton, the capacity of this substation was increased from 750 K.V.A. to 1,500 K.V.A. by connecting three additional transformers of 250 K.V.A. each in parallel with the three existing. Arrangements have now been made for installing new transformers—three of 500 K.V.A. each. Waihou Substation also has been overloaded, and arrangements are being made to double its capacity.

*11,000-volt Lines and Substations.*—Little trouble has been experienced on these during the year, except that two poles have had to be replaced. In one case a tree fell across the line, breaking the wires, but all other interruptions have been momentary only. One or two insulators, damaged probably by being shot at, have been replaced, but there have been no interruptions due to defective insulators.

*Power purchased.*—During the year, at times of interruption or overload, power to the amount of 573,014 units was purchased, at a total cost of £1,256. Of this amount the Grand Junction Company supplied 547,500 units, with a maximum of about 1,500 kw., and the remainder was supplied by the dairy companies.

#### MANGAHAO ELECTRIC SUPPLY.

The past year has seen the scheme brought into operation, the plant having been officially opened by the late Prime Minister on the 3rd November, when supply was given to the Horowhenua Power Board.

#### *Construction.*

*Headworks.*—Mangahao No. 1 and Arapeti dams, both tunnels, surge-chamber, pipe-lines, and power-house were completed, as detailed in the report of the Engineer-in-Chief.

*Power-house.*—In the power-house the erection of bus-pipes and valves was completed, and, although the valves at present are not satisfactory, they have operated without mishap. The contractor for this section is supplying new operating mechanism for these, and this will be to hand shortly and installed. The five turbines and generators were erected, and have operated satisfactorily. Switch-gear was completely erected, and instruments and relays tested out. Transformers were dried out and successfully put into operation. During the year the work inside the power-house was practically completed, the only work remaining to be done being the drying-out of the spare 110,000/11,000-volt transformer, painting of machines, and efficiency tests on the machines. The power-house roof has been covered, and the floors painted.



*Substations.*—At Khandallah Substation the buildings were completed, transformers dried out, and switch-gear erected. The only work remaining to be done is the drying-out of the spare transformer, repairs to windows, and further fencing. The substation was put into operation on the 24th December, when power was supplied to the Hutt Valley Power Board.

Bunnythorpe, Masterton, Mangamaire, and Dannevirke Substations and Woodville Switching Station have all been completed and are in service. On all these substations the air-break switches caused several shut-downs owing to insulator-failure. It was found necessary to dismantle all these defective insulators and convert the switches into disconnecting switches.

At Waipukurau Substation the outdoor steelwork is erected, and the buildings are nearing completion. It is anticipated that supply will be available from this substation in August. Tenders have been invited for the erection of Wanganui Substation, and plans are ready for Napier Substation.

*Transmission-lines.*—During the year seventy-six miles of main transmission-lines and thirty-three miles of telephone-lines were erected, making a total of 276 miles of transmission-line and 196 miles of telephone-line erected.

The double lines to Khandallah and Bunnythorpe, and single lines to Woodville, Masterton, and Dannevirke, were completed and put into service. The line from Dannevirke to Waipukurau is completed and ready for service, but the substation is not yet completed. Beyond Waipukurau nine miles of lines are completed. On the Bunnythorpe-Wanganui line nineteen miles of line are completed.

It is anticipated that the line to Napier will be completed by December, 1925, and the line to Wanganui by October, 1925. In addition to the above 110,000-volt lines, the following 11,000-volt lines have been built: Mangaore to Shannon, three miles; Khandallah to Petone, four miles and a quarter; Khandallah to Ngahauranga, three-quarters of a mile.

*Power-supply Contracts.*—Contracts for the supply of power have been signed with Wellington City Corporation, Hutt Valley, Horowhenua, Manawatu-Oroua, Wairarapa, Tararua, Dannevirke, Central Hawke's Bay Power Boards, and Wellington Meat Export Company; and, although the contract is not yet signed, agreement has been reached with the Wanganui-Rangitikei Power Board. Negotiations are under way with the Hawke's Bay Power Board. Arrangements have also been made to supply the Railway Department at Petone Workshops.

In practically all cases the loads are greater than was anticipated, and until the second Mangahao dam is built it may be necessary to call on Wellington steam plant in dry weather. It is also probable that in three years' time the plant will be overloaded, and Waikaremoana will be required.

*Dates of Operation.*—The following gives the dates on which apparatus was put into operating service: Pipe-line valves, October, 1924; No. 5 unit and its L.T. switch-gear, November, 1924; No. 4 unit and its L.T. switch-gear, November, 1924; No. 3 unit and its L.T. switch-gear, December, 1924; No. 2 unit and its L.T. switch-gear, February, 1925; No. 1 unit and its L.T. switch-gear, June, 1925; Mangaore-Shannon line and switch-gear, November, 1924; main transformers and switch-gear December, 1924; Wellington east and west lines, December, 1924; Hutt Valley line, December, 1924; Khandallah Substation, December, 1924; Bunnythorpe west line (at 11,000 volts), December, 1924; Bunnythorpe east line (at 110,000 volts), March, 1925; Bunnythorpe Substation, March, 1925; Bunnythorpe-Woodville line, 6th April, 1925; Woodville-Mangamaire line, 7th April, 1925; Mangamaire-Masterton line, 17th May, 1925; Woodville-Dannevirke line, 19th May, 1925; Woodville switching-station, 6th April, 1925; Mangamaire Substation, 7th April, 1925; Masterton Substation, 17th May, 1925; Dannevirke Substation, 19th May, 1925; 11,000-volt regulators, 27th May, 1925.

#### *Operation to 31st March, 1925.*

The power-house equipment during this period operated on the whole satisfactorily. It was found necessary to repair the main valve on No. 3 machine, and minor generator and governor troubles occurred. Considerable welding was required on the main-transformer tanks.

The apparatus at Khandallah Substation functioned satisfactorily; the only trouble was a leaky transformer bushing, which was replaced by a sound one.

At Bunnythorpe Substation the air-break switch insulators gave trouble, as mentioned before. It was also found necessary to change the current-transformers, on account of the light loading on them.

The 110,000-volt lines operated satisfactorily during the period. The only interruption on these (other than prearranged ones) was in January, when the leakage relay tripped. The switch was closed again and the line held in. Subsequent experience points to the fact that the relay is not properly set.

The 11,000-volt line to Shannon operated without trouble, and on the Hutt line one insulator failure occurred on an air-break switch.

Considerable trouble was experienced with the telephone system.

Supply of power was given to the Horowhenua Power Board on the 3rd November, 1924, and supply maintained throughout the period under review, except for a prearranged shut-down of 8 hours 38 minutes to remove the chimney on the steam plant.

The Manawatu-Oroua Power Board was given supply on the 19th December. There was one interruption of seven hours' duration due to a faulty insulator on an air-break switch, and one prearranged shutdown of three hours and a half to change current-transformers and to alter main-transformer taps.

Supply of power was given to the Hutt Valley Power Board on the 24th December. Until the 10th March this was only night supply, on account of work on Hutt Valley 11,000-volt line. Excluding the daily shut-downs, there were seven interruptions, totalling fourteen hours. One of these (for thirteen hours) was due to a flash-over on an insulator on an air-break switch on Hutt line; four, totalling thirteen minutes, were due to switching operations when an air-break switch insulator broke down; one of four minutes, due to a mistake in switching; and one of forty-three minutes, due to turbine trouble.

Power-supply for testing purposes was given to Wellington City Council on the 26th March, and continued to the end of the period. During this period there was one interruption of eight minutes, due to a mistake in switching.

Up till the 31st March, 1925, the following are the operating figures :—

Maximum load (in kilowatts)—

|                            |    |    |    |    |       |
|----------------------------|----|----|----|----|-------|
| Power-house                | .. | .. | .. | .. | 7,160 |
| Khandallah Substation      | .. | .. | .. | .. | 6,700 |
| Horowhenua Power Board     | .. | .. | .. | .. | 410   |
| Manawatu-Oroua Power Board | .. | .. | .. | .. | 360   |
| Hutt Valley Power Board    | .. | .. | .. | .. | 460   |
| Wellington City Council    | .. | .. | .. | .. | 5,856 |

Units—

|                            |    |    |    |    |           |
|----------------------------|----|----|----|----|-----------|
| Power-house                | .. | .. | .. | .. | 1,640,940 |
| Horowhenua Power Board     | .. | .. | .. | .. | 411,645   |
| Manawatu-Oroua Power Board | .. | .. | .. | .. | 429,289   |
| Hutt Valley Power Board    | .. | .. | .. | .. | 111,500   |
| Wellington City Council    | .. | .. | .. | .. | 194,000   |
| Local lines                | .. | .. | .. | .. | 173,379   |
| Testing and losses         | .. | .. | .. | .. | 321,127   |

The revenue from sale of power during the same period was £3,237. This has been credited to capital, as for accounting purposes the system was not put on to an operating basis until the 1st April, 1925.

*Operations from 31st March, 1925, to 30th June, 1925.*

During this period the power-house equipment and headworks have operated satisfactorily. On the 110,000-volt lines there has been no trouble, but the telephone system has been unsatisfactory, and the help of the Post and Telegraph Department is being sought. At Khandallah Substation the sealing-bells on the low-tension side of the main transformers gave trouble, three of them breaking down. These have all now been refilled.

At Woodville switching-station and Mangamaire Substation the air-break switch insulators gave trouble, and it was necessary to dismantle them from all substations pending alterations. Of the 11,000-volt lines, the Mangaore-Shannon one has operated without trouble. On the Khandallah-Petone line a piece of wire on one of the lines caused an interruption, and during a heavy gale a pair of wires came into contact, causing another interruption.

Supply to Horowhenua Power Board was maintained. There were three small interruptions totalling three minutes, due to faults on the Power Board's system, and one prearranged interruption of nine minutes.

The Manawatu-Oroua Power Board's supply was subject to one interruption of twenty-six minutes, due to a faulty connection at Woodville switching-station, and there were three prearranged shut-downs, of a total duration of eight hours and three-quarters. During part of this time Palmerston Borough carried the Power Board's load.

Hutt Valley Board's supply suffered six interruptions, totalling one hour and three-quarters. Two of these were due to faulty relays at the power-house, two due to sealing-bell failure at Khandallah, and the other two respectively were due to a piece of wire on a line and to a heavy gale swinging the lines together on the Hutt line. There were also three prearranged shut-downs, of eleven hours and three-quarters total duration.

Supply to Wellington City Corporation was discontinued on the 31st March on account of having to examine a tunnel-gate. Regular supply under the contract was started on the 14th April. There were four interruptions during the period, totalling twenty-four minutes; two were due to faulty relays at the power-house, and two due to sealing-bell failures at Khandallah Substation. The Wellington Corporation steam plant at Evans Bay has been paralleling each day for peak-reduction purposes, and has on four occasions supplied power back to Khandallah Substation.

The Tararua Power Board was supplied with power on the 7th April, but, on account of trouble with the air-break switch insulators, it was night supply only, and subjected to many interruptions. Supply under contract was given on the 1st June.

The Wairarapa Power Board was given supply for the first time on the 17th May, but, on account of adjustments necessary on the Power Board's switchboard, supply under the contract was not started until the 10th June.

Dannevirke Power Board was given supply on the 19th May, the contract dating from the 1st June.

The following table gives approximate operating figures from the 1st April to the 30th June, 1925 :—

|                                 |    |    |    | Maximum Demand in Kilowatts. | Units.    |
|---------------------------------|----|----|----|------------------------------|-----------|
| Power-house (generated)         | .. | .. | .. | 9,080                        | 9,463,375 |
| Power-house (local consumption) | .. | .. | .. | 118                          | 137,335   |
| Wellington City Council         | .. | .. | .. | 6,336                        | 6,263,360 |
| Hutt Valley Power Board         | .. | .. | .. | 700                          | 866,370   |
| Horowhenua Power Board          | .. | .. | .. | 530                          | 511,298   |
| Manawatu-Oroua Power Board      | .. | .. | .. | 492                          | 440,684   |
| Wairarapa Power Board           | .. | .. | .. | 120                          | 9,500     |
| Tararua Power Board             | .. | .. | .. | 140                          | 9,600     |
| Dannevirke Power Board          | .. | .. | .. | 140                          | 8,600     |
| Losses and testing              | .. | .. | .. | ..                           | 1,216,628 |

## WAIKAREMOANA POWER DEVELOPMENT.

### *Preliminary Scheme.*

The plant installed preliminary to the major scheme has been running satisfactorily, and has been supplying Wairoa and district and helping to build up the load for the major scheme. The total connected load has been 1,565 kw. and the observed maximum load 588 kw., equal to four-fifths of the power-house plant.

The lessees of the plant, the Wairoa Power Board, have added eighteen miles and a half of distribution-line to their system, and the total number of connected consumers now is 565.

A transmission-line to the Waikaremoana Hostel has been surveyed, and is under construction. The total length will be about four miles and a half.

During the year the workshop at the power-house has been completed, and has proved invaluable to the power-house staff when undertaking repairs.

The financial results, considering the plant simply as an operating station, are not very satisfactory, but, as the plant is really an advance portion of the large scheme of development at Waikaremoana, the capital investment is considerably greater than would have been necessary if the scheme had been put in purely for its present purpose of supplying power to the Wairoa Power Board. The capital outlay at the end of the financial year was £77,314, in addition to which there has been an accumulated loss of £7,160. Capital charges (interest and depreciation) amounted to £5,735, and the revenue to £2,440, resulting in a loss of £3,295 for the year.

### *Major Scheme.*

Work on this scheme has been confined to survey. An alternative pipe-line and bores on same have been completed. Pits and bores at the intake and power-house to test foundations are in hand.

## ELECTRIC-POWER BOARDS.

It is gratifying to note the interest that is being taken in Power Board business throughout the country, and the substantial progress made by the various Boards during the year. The attached coloured map shows the various Power Boards at present constituted.

The total area covered is 62,520 square miles or 61 per cent. of the total area of the Dominion. The total population concerned is 776,510, or 59 per cent. of the total population of the Dominion; and the unimproved value of the land included in the electric-power districts and outer areas is £231,485,074, or 70 per cent. of the total unimproved value of the Dominion. Considerably more than one-half of the Dominion is thus covered.

So far, many of the Boards have been engaged solely on preparatory and construction work and have not begun their all-important function of supplying power. It is felt that the recent completion of the Department's hydro-electric generating-station at Mangahao, and the extensions which are in hand at Lake Coleridge and at Horahora, and the prospect of large additional power at Arapuni, will make an extra amount of bulk power available which will greatly stimulate the Boards' activities.

The Boards already formed are carrying out their functions energetically. Fifteen Boards—viz., Thames Valley, Cambridge, Central, Te Awamutu, Banks Peninsula, Springs-Ellesmere, Ashburton, Hutt Valley, Horowhenua, Manawatu-Oroua, Dannevirke, Tararua, Wairarapa, Malvern, and South Canterbury—have carried out fairly complete reticulation of their areas, and are distributing power taken in bulk from the Public Works Department's hydro-electric-power plants at Horahora, Mangahao, or Lake Coleridge. The Auckland Board has taken over the city steam-power station, and is providing for extensions both of plant and mains. It has also entered into a contract to take the whole of its power, with a minimum of 15,000 kw., from the Government when the Arapuni Station is completed, which is estimated to be in 1928; meanwhile it is using power from Horahora to the extent to which this is available. Taranaki, while pushing on with its reticulation in anticipation of a general supply of hydro-electric power, is giving a partial supply from smaller stations in the meanwhile. Wairoa is taking power in bulk from the Department's station at Lake Waikaremoana, and supplies the borough and a few consumers in the neighbourhood. Three—viz., Southland, Oponake, and Teviot—have local water-power stations in operation. Eight others—viz., Rangitikei, Waitemata, Central Hawke's Bay, Poverty Bay, Waitaki, Franklin, Hawke's Bay, and Waitomo—are arranging to take power in bulk from the Government hydro-electric sources, and are preparing their systems of reticulation with this end in view. The Grey Power Board is erecting a steam station of its own; the Wairere and Marlborough Power Boards are each erecting local water-power stations. The Tauranga, Otago, and Otago Central Boards have arranged to purchase power in bulk from other authorities. The other four—viz., Buller, Westland, Reefton, and Hobson—are making arrangements which have not yet been finalized.

Table N herewith gives details of the dates of construction, the area, population, and rateable value included in each of the thirty-nine power districts already formed, also the amounts of the loans already authorized, and the voting on each poll taken. The total amount of the loans authorized by the thirty-four districts which have already taken their polls is £9,372,238. The population of the districts concerned is 701,036, so that the loans authorized amount of £13·3 per head of population, as compared with £15·2 last year. The unimproved valuation of the districts is £260,990,882, so that the loans authorized amount to 3·6 per cent. of the unimproved rateable value of the lands

pledged as security for the loans. The voting at the polls amounted to 37,606 to 5,016—i.e., a majority of 87 per cent.

Table O herewith shows the capital expenditure incurred by each Board up to the end of the financial year, the revenue and expenditure, and the amount of rates struck and collected. The total capital outlay by the twenty-eight Boards which have started construction is £6,002,092, but a great part of this is on works not yet in service. The gross revenue from the sale of electricity by the twenty Boards which had commenced supply was £538,615, of which 59 per cent. was received by the Auckland Board. The general result is a profit over the whole business of the Power Boards of £22,802. A substantial portion of the interest on lines still under construction was charged to capital, so that the total amount raised by rating in order to cover the initial losses of those Boards not yet in active operation was only £11,289. With many of the schemes in the very early stages of supply this result is quite satisfactory.

During last year eight of the Boards struck a general rate, which was only collected in three cases; and twelve of the Boards struck special rates for the security for loans, none of which was collected.

Several of the Boards are passing through a critical stage owing to the high cost and high interest rates ruling in 1921 when they started construction work, and to the fact that they have undertaken the construction of many lines without requiring the guarantees from consumers authorized by clause 7 (d) of the regulations. But costs and rates of interest are now substantially lower, and the other Boards are profiting by such experiences, and much better results will be attained by the Power Boards generally in future as the result of the experience of these earlier districts.

#### LOCAL ELECTRIC-SUPPLY SYSTEMS.

Including the Government plants, there are now fifty-six public electric-power stations in the Dominion, as detailed in Tables P and Q herewith.

The total installed capacity has increased during the year by 15,922 kw., or 24 per cent. (from 65,954 kw. to 81,876 kw.), while the sum of the maximum loads has increased by 13,976 kw., or 26 per cent. (from 54,112 kw. to 68,088 kw.).

The proportion of installed plant is now as follows :—

|             |    |    |    | Stations. | Kilowatts. | Proportion<br>per Cent. |
|-------------|----|----|----|-----------|------------|-------------------------|
| Water-power | .. | .. | .. | .. 33     | 38,354     | 46·8                    |
| Steam-power | .. | .. | .. | .. 7      | 38,925     | 47·5                    |
| Gas-power   | .. | .. | .. | .. 14     | 3,491      | 4·3                     |
| Oil-power   | .. | .. | .. | .. 2      | 1,106      | 1·4                     |
|             |    |    |    | 56        | 81,876     | 100·0                   |

Next year the proportion of water-power will be considerably increased owing to the completion of the Government station at Mangahao and by additional plant under construction at the Coleridge and Hora Hora stations.

The number of consumers supplied has increased from 124,705 to 148,699, an increase of 23,994 or 19 per cent., for the year.

The total population included in the various areas of electric-power supply is 930,980, or over 70 per cent. of the total population of the Dominion; so that the ideal of a supply being available to every home in the Dominion is well on the way to realization.

The maximum demand per head of population in the areas supplied is 0·073 kw., practically one-half of the allocation of 0·15 kw., or 0·2 h.p. per head of population, which is the basis of the design of the Government schemes. The units sold per head of population supplied were 214 as compared with 211 last year.

The total length of distributing-line is 6,011 route-miles, as compared with 4,878 last year, an increase of 1,133 miles, or 23 per cent. The number of consumers per route-mile is 24·8, as compared with 25·6 last year, the reduction being due to the large mileage of new lines erected during the year to which the full number of services are not yet connected and to the increased proportion of country lines.

The power-demand per route-mile of line is now 11·4 kw., the sales 33,200 units, and the revenue £276. These are substantially smaller than last year, for the same reasons, but are still remunerative returns over the whole business.

The revenue per kilowatt of output of all stations was £24·4, as compared with £26·3 last year. The water-power stations show a revenue of £23·6 per kilowatt, steam stations of £24·1 per kilowatt, and gas stations of £37 per kilowatt. These are valuable figures for use in forecasting the revenue from systems of various descriptions. The water-power systems include the largest proportion of large consumers, and the gas-engine stations the largest proportion of small consumers.

Out of the eighty-seven distributing authorities, fifty-nine showed a profit for the year amounting to £162,376, and twenty-eight showed a loss amounting to £36,492. The general result is a net profit for the whole Dominion of £125,884 after paying working-costs (£780,826) and capital charges (£732,086) at the rate of 7·6 per cent. on the total capital outlay of £9,566,589. This shows a net profit of 1·31 per cent., as compared with 1·85 per cent. last year. The business on the whole is thus a thoroughly sound and remunerative one, as well as supplying a public necessity to 70 per cent. of the population of the Dominion.

TABLE A.—*Electric-power Supply of New Zealand for the Year ended 31st March, 1925.*

|                                                            | Water.      | Steam.     | Gas.      | Oil.      | Total.      |
|------------------------------------------------------------|-------------|------------|-----------|-----------|-------------|
| Number of stations .. ..                                   | 33          | 7          | 14        | 2         | 56          |
| Average capacity (kilowatts) .. ..                         | 1,160       | 5,560      | 249       | 553       | 1,462       |
| Number of consumers .. ..                                  | 84,134      | 50,993     | 10,234    | 3,338     | 148,699     |
| Installed capacity (kilowatts), (main plant only)          | 38,354      | 38,925     | 3,491     | 1,106     | 81,876      |
| Maximum load (kilowatts) .. ..                             | 38,813      | 26,016     | 2,504     | 755       | 68,088      |
| Units generated .. ..                                      | 163,786,074 | 82,342,500 | 5,812,643 | 1,858,701 | 253,799,918 |
| Annual load factor (per cent.) .. ..                       | 48.2        | 36.2       | 26.5      | 28.1      | 42.5        |
| Units sold .. ..                                           | 128,766,428 | 64,296,213 | 4,679,052 | 1,570,210 | 199,311,903 |
| Total capital outlay* .. ..                                | £6,181,893  | £2,755,505 | £528,277  | £100,914  | £9,566,589  |
| Total capital per kilowatt installed* .. ..                | £161        | £71        | £151      | £91       | £117        |
| Total annual working-costs .. ..                           | £384,162    | £319,120   | £62,829   | £14,715   | £780,826    |
| Total annual working-cost per unit sold .. ..              | 0.72d.      | 1.19d.     | 3.22d.    | 2.25d.    | 0.94d.      |
| Total annual working-cost per kilowatt, maximum            | £9.9        | £12.2      | £25.1     | £19.5     | £11.5       |
| Total annual capital charges .. ..                         | £449,011    | £244,115   | £31,507   | £7,453    | £732,086    |
| Total annual capital charges per unit sold                 | 0.84d.      | 0.91d.     | 1.62d.    | 1.14d.    | 0.88d.      |
| Total annual capital charges per kilowatt, maximum         | £11.6       | £9.4       | £12.6     | £9.9      | £10.8       |
| Total annual capital charges, percentage of capital outlay | 7.3         | 8.9        | 6.0       | 7.4       | 7.6         |
| Total annual costs .. ..                                   | £833,173    | £583,755   | £94,336   | £22,168   | £1,533,432  |
| Total annual cost per unit sold .. ..                      | 1.56d.      | 2.10d.     | 4.84d.    | 3.39d.    | 1.85d.      |
| Total annual cost per kilowatt, maximum                    | £21.5       | £21.6      | £37.7     | £29.4     | £22.5       |
| Total annual revenue .. ..                                 | £913,638    | £627,158   | £92,683   | £25,836   | £1,659,315  |
| Total annual revenue per unit sold .. ..                   | 1.70d.      | 2.34d.     | 4.76d.    | 3.95d.    | 2.0d.       |
| Total annual revenue per kilowatt, maximum                 | £23.6       | £24.1      | £37.0     | £34.2     | £24.4       |
| Net profit .. ..                                           | £80,466     | £43,403    | ..        | £3,668    | £127,537    |
| Net loss .. ..                                             | ..          | ..         | £1,653    | ..        | £1,653      |
| Total net profit .. ..                                     | ..          | ..         | ..        | ..        | £125,884    |

\* Includes distribution.

## DAILY LOAD CURVES.

The question of the daily load curve and the ratio of the average load to the maximum load or the load-factor is an important one in determining the selling-price of electric power. Each station must ascertain its own load-factor and determine its selling policy accordingly. As a general guide the daily load curves of fourteen of the larger stations of the Dominion have, by the kind co-operation of the engineers to these places, again been obtained for two days of the current year—viz., Friday, 13th March (representing equinoctial conditions), and Friday, 26th June (representing midwinter conditions). Friday has been selected as the late-shopping night in most places, thus representing the most extreme conditions of loading. These fourteen stations have an installed capacity of 74,313 kw., or 91 per cent. of the total installed capacity of the Dominion, so that the resultant curves may be taken to represent quite accurately the shape of the load curve of the combined output of the whole Dominion. Water-power and fuel stations are proportionately represented, including all the large stations of each type, and the diagram includes not only the total output, but the water-power and fuel-power outputs separately. The summation curves are plotted in Fig. 3, and the results are as follows:—

TABLE B.—*Summer and Winter Typical Loads.*  
(Fourteen Power-stations.)

|                   | Installed Capacity. | Maximum Load. | Units.  | Daily Load-factor. |
|-------------------|---------------------|---------------|---------|--------------------|
| March 13th, 1925— | Kilowatts.          | Kilowatt      |         | Per Cent.          |
| Water-power .. .. | 32,925              | 29,072        | 497,794 | 71.3               |
| Fuel-power .. ..  | 40,988              | 24,315        | 219,380 | 37.6               |
| Totals .. ..      | 73,913              | 48,001*       | 717,174 | 62.3               |
| June 26th, 1925—  |                     |               |         |                    |
| Water-power .. .. | 32,925              | 32,890        | 537,720 | 68.2               |
| Fuel-power .. ..  | 41,388              | 32,120        | 266,305 | 34.6               |
| Totals .. ..      | 74,313              | 56,325*       | 804,025 | 59.5               |

\* Combined maximum.

These are daily load-factors. The annual load-factors are, of course, substantially lower, being 48.2 per cent. for water-power, 36.2 per cent. for steam-power, and 42.5 per cent. for the whole output of the Dominion.

## REGULATIONS.

The regulations governing the erection of electric lines have been under revision during the year, and the revised draft has been submitted to the different supply authorities' engineers for criticism. Much helpful advice has been received in this way, particularly at the general conference of supply authorities' engineers held recently in Wellington. In previous issues of regulations this Department has not issued detailed rules dealing with the installations on consumers' premises, but has been content to embody in its regulations the rules issued by the Council of Fire Underwriters' Association. Some dissatisfaction with this action has been expressed from time to time by supply authorities, who consider that all regulations relating to electrical apparatus should be issued by the one authority. Negotiations are now taking place with the authorities concerned to see if the Rules for Wiring now being revised, and which would shortly be reissued, cannot be issued by the Public Works Department as part of our regulations covering the other sections of work.

Another matter somewhat allied with the regulations is the question of testing and approving of all kinds of apparatus brought into the country for use by consumers. A certain amount of this inspection is being done by the local authorities and by the fire underwriters, but the electrical development in the past few years has been so great that it is extremely doubtful if this important matter has been receiving the attention that is necessary to maintain a high standard of installation throughout the country. Consideration is being given to the establishment of a central testing laboratory and Approval Board, specially to deal with all types of appliances imported into the country, to carry out tests on plant and apparatus for local authorities, and at the same time to do a certain amount of experimental and research work on problems peculiar to electrical development in the country.

## REGISTRATION OF ELECTRIC WIREMEN.

The Bill which was prepared for the last session of Parliament, but which it was not possible to introduce last year, has been revised and is ready for introduction this session. There has been such an enormous increase in the number of electrical installations throughout the country that the question of maintaining a proper and uniform standard throughout the country has become of the utmost importance. The fact that all wiremen after the passing of this Act will be required to work to the same standard, and be subject to inspection by registered Inspectors, should do much to improve the general standard of installation.

## GROWTH OF LOAD.

Most of the newly formed Boards, particularly on the Mangahao system, are building up their loads at a faster rate than was contemplated, and the loads will considerably exceed the amounts they have guaranteed. It is anticipated that there will be a considerable increase in the domestic loading, particularly in electric ranges and hot-water heaters. Returns have been obtained of the electric ranges in service in the areas of the different electric-supply authorities. The total number of ranges connected is 1,526, which means that 1.02 per cent. of the total number of consumers are enjoying the advantages of electric cooking. The total number of supply authorities is eighty-seven, and of these fifty-five, or 62.5 per cent., have electric ranges connected to their systems. One supply authority has no less than 475 ranges connected. The total number of consumers in this district is 22,491, which gives a figure slightly in excess of two ranges to every 100 consumers. Three other supply authorities, however, have figures corresponding to over five ranges to every 100 consumers.

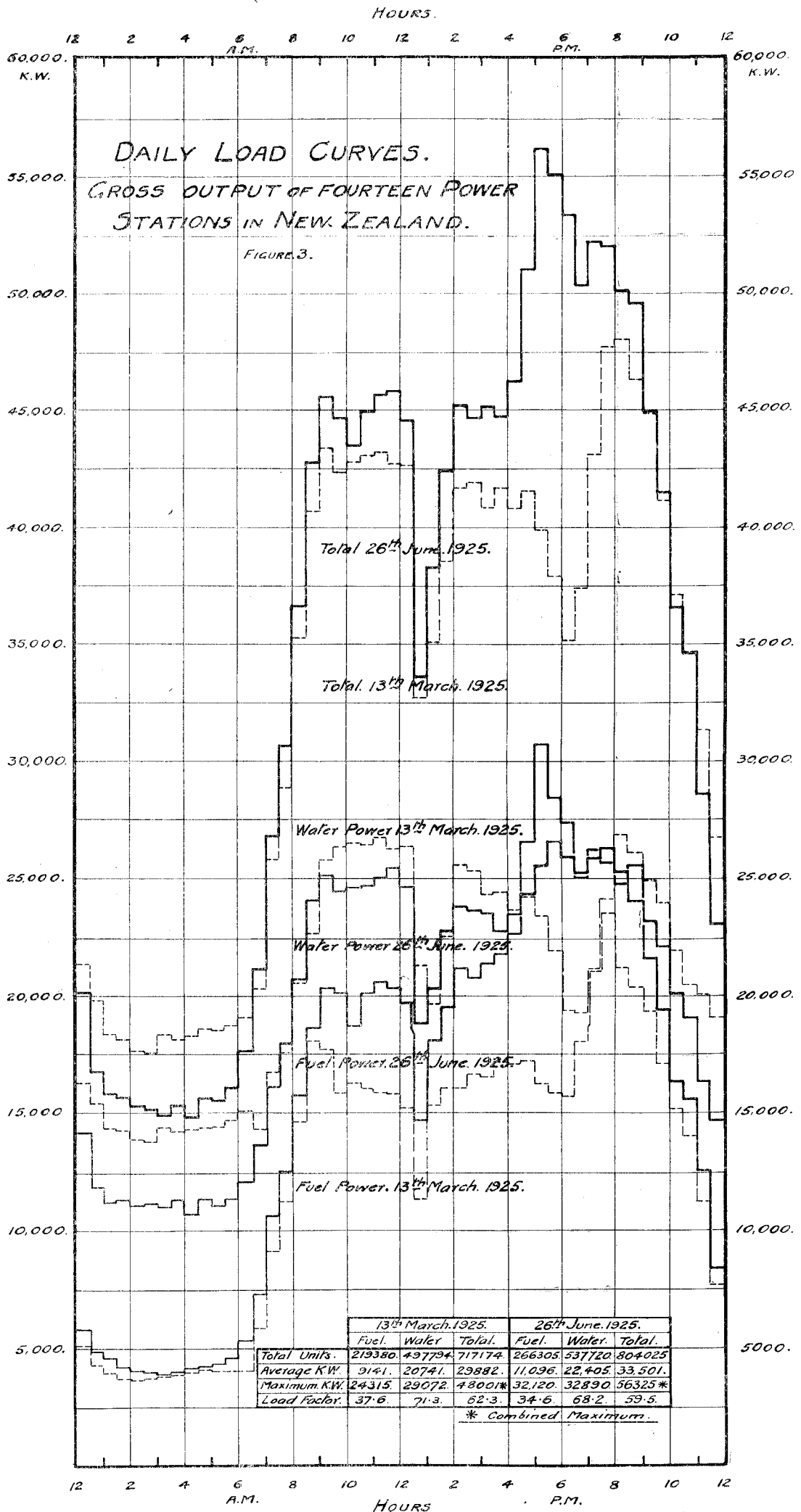
When it is realized that some of the largest percentages are being obtained in districts in which power has only been available for a few months, it is evident that a large increase in demand can be looked for in this direction once the authorities embark on an active canvas for this type of load. It is also particularly gratifying to see that the advent of electric power is bringing conveniences to the rural districts which should greatly improve the conditions of living therein.

A return of the number of electrified milking-machines in different districts gives an indication of the extent to which electric power is being utilized in this most important New Zealand industry. In the Thames Valley Power Board district there are already 1,083 electrified machines in operation, or one to every three consumers in the district. The total number of milking-machines throughout the Dominion in 1923 was 14,553, and allowing for an increase equivalent to that of previous years, the number for 1925 should be approximately 18,750. Of this total number no less than 3,581 were electrified at March, 1925, or a percentage of 19 per cent. compared with 9 per cent. in 1923; and this percentage will be still further increased during the present year.

## ELECTRICAL ACCIDENTS.

With the very rapid increase in the length of lines and uses of electric power it is inevitable that there must be an increase in the number of accidents resulting from electric shock. Supply authorities are required to supply to the Department reports of all electrical accidents occurring in their districts. The particulars of these accidents are considered in detail with a view to making any amendments in the regulations, &c., which may be indicated as being necessary to safeguard consumers and the general public. During the past year there have been seven fatal accidents. Of these three were to workmen working on electric lines, and four were due to persons coming into contact with fallen or broken wires or material made alive by contact with power wires.

F. T. M. KISSEL, B.Sc., Assoc.M.Inst.C.E., M.I.E.E.,  
Chief Electrical Engineer.





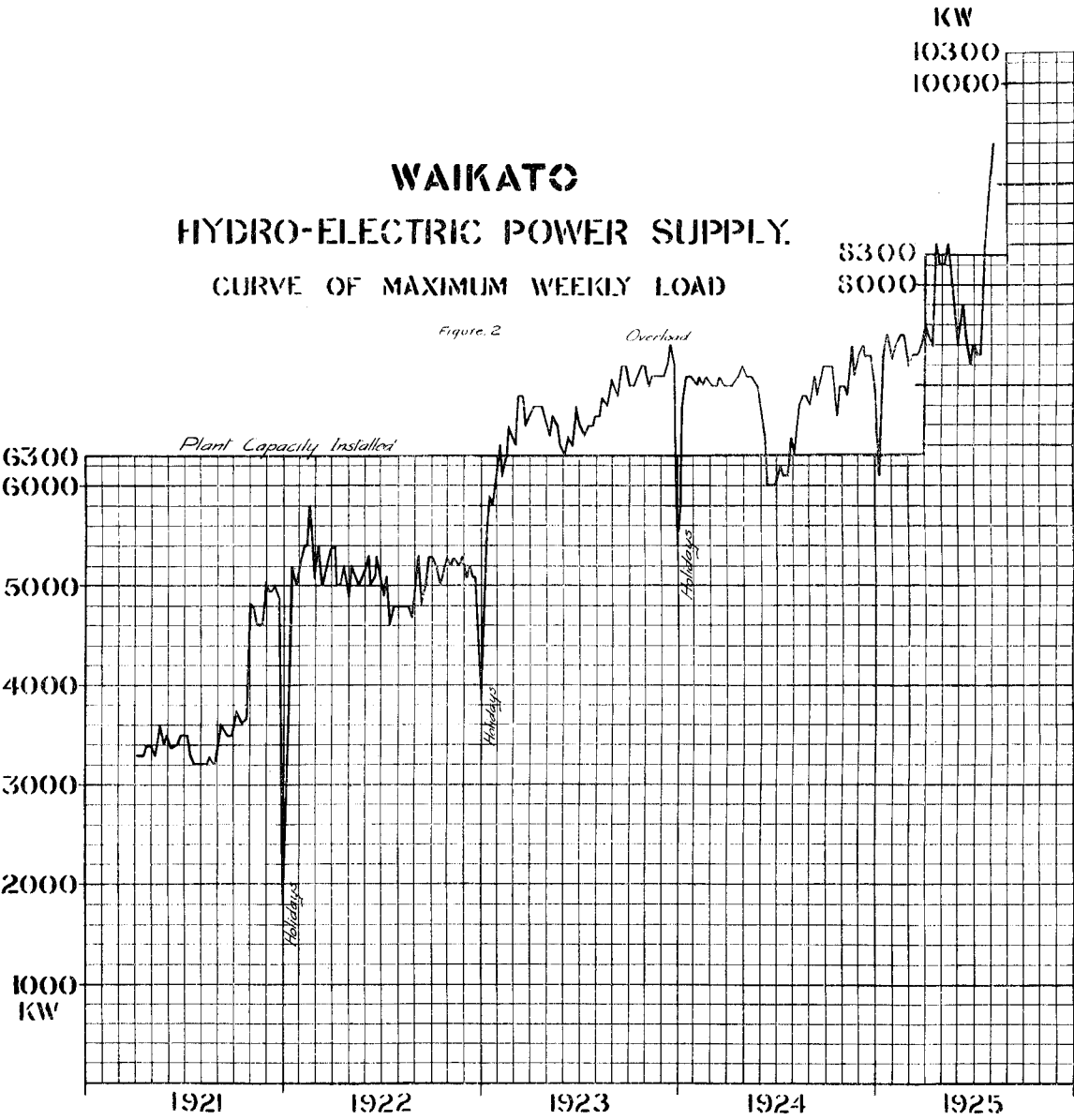


TABLE C.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—RESULTS OF OPERATION.

|                                              | Seventh Year,<br>March, 1922. | Eighth Year,<br>March, 1923. | Ninth Year,<br>March, 1924. | Tenth Year,<br>March, 1925. |
|----------------------------------------------|-------------------------------|------------------------------|-----------------------------|-----------------------------|
|                                              | £                             | £                            | £                           | £                           |
| Capital outlay .. .. .                       | 671,608                       | 848,033                      | 892,801                     | 1,008,491                   |
| Costs—                                       |                               |                              |                             |                             |
| Working costs .. .. .                        | 25,911                        | 19,271                       | 20,777                      | 23,270                      |
| Interest .. .. .                             | 20,981                        | 35,275                       | 44,444                      | 47,780                      |
| Depreciation .. .. .                         | 8,424                         | 9,307                        | 12,584                      | 15,679                      |
| Total costs .. .. .                          | 55,316                        | 63,853                       | 77,805                      | 86,729                      |
| Accumulated Depreciation Fund .. .. .        | 54,537                        | 61,275                       | 72,594                      | 88,631                      |
| Accumulated deficiency .. .. .               | 29,175                        | 23,876                       | 23,172                      | 17,738                      |
| Revenue—                                     |                               |                              |                             |                             |
| City Council .. .. .                         | 18,890                        | 21,641                       | 26,055                      | 28,925                      |
| Tramways .. .. .                             | 7,957                         | 8,909                        | 9,189                       | 9,477                       |
| Wholesale consumers .. .. .                  | 26,019                        | 34,344                       | 39,280                      | 49,822                      |
| Retail consumers .. .. .                     | 1,880                         | 2,118                        | 2,289                       | 1,880                       |
| Miscellaneous .. .. .                        | 2,068                         | 2,141                        | 1,695                       | 2,059                       |
| Total revenue .. .. .                        | 56,814                        | 69,153                       | 78,508                      | 92,163                      |
| Maximum load (kilowatts)—                    |                               |                              |                             |                             |
| Power-house .. .. .                          | 7,600                         | 9,390                        | 10,800                      | 13,180                      |
| Substations .. .. .                          | 6,720                         | 8,420                        | 9,490                       | 11,190                      |
| City Council .. .. .                         | 3,750                         | 4,290                        | 5,344                       | 6,216                       |
| Tramways .. .. .                             | 2,120                         | 2,480                        | 2,740                       | 2,760                       |
| Average load (kilowatts)—                    |                               |                              |                             |                             |
| Power-house .. .. .                          | 4,453                         | 5,024                        | 5,722                       | 6,820                       |
| Substations .. .. .                          | 3,875                         | 4,528                        | 5,158                       | 5,680                       |
| City Council .. .. .                         | 1,760                         | 2,006                        | 2,438                       | 2,930                       |
| Tramways .. .. .                             | 702                           | 842                          | 870                         | 897                         |
| Units output—                                |                               |                              |                             |                             |
| Power-house .. .. .                          | 38,419,102                    | 44,008,106                   | 50,614,955                  | 59,528,216                  |
| Fed to village tunnel and intake .. .. .     | 427,921                       | 556,446                      | 1,837,069                   | 1,865,344                   |
| Fed to transmission-lines .. .. .            | 37,929,750                    | 43,451,660                   | 48,777,886                  | 56,935,840                  |
| Substations (various) .. .. .                | 33,947,100                    | 39,665,420                   | 45,778,007                  | 53,261,142                  |
| Units sold—                                  |                               |                              |                             |                             |
| City Council .. .. .                         | 15,419,100                    | 17,575,610                   | 21,664,830                  | 25,616,445                  |
| Tramways .. .. .                             | 6,499,258                     | 7,360,035                    | 7,623,900                   | 7,851,060                   |
| Wholesale consumers and local bodies .. .. . | 10,746,697                    | 12,449,239                   | 14,198,034                  | 17,420,138                  |
| Retail consumers .. .. .                     | 278,879                       | 76,743                       | 305,608                     | 399,390                     |
| Total units sold .. .. .                     | 32,943,934                    | 37,561,627                   | 43,792,372                  | 51,287,033                  |
| Losses—                                      |                               |                              |                             |                             |
| Transmission-line losses .. .. .             | 3,982,650                     | 3,786,240                    | 2,999,879                   | 3,676,518                   |
| Percentage .. .. .                           | 10.5                          | 8.7                          | 6.2                         | 6.4                         |
| Distribution losses .. .. .                  | 1,003,166                     | 1,977,256                    | 1,985,635                   | 1,973,199                   |
| Percentage .. .. .                           | 3.0                           | 5.2                          | 4.3                         | 3.7                         |
| Average load-factor (per cent.)—             |                               |                              |                             |                             |
| Power-house .. .. .                          | 62.9                          | 53.5                         | 53.0                        | 51.8                        |
| Substations .. .. .                          | 62.0                          | 53.6                         | 54.3                        | 50.8                        |
| City Council .. .. .                         | 53.6                          | 47.0                         | 45.6                        | 47.1                        |
| Working-costs—                               |                               |                              |                             |                             |
| Per kilowatt (power-house maximum) .. .. .   | £3.40                         | £2.05                        | £1.92                       | £1.76                       |
| Per kilowatt (substations maximum) .. .. .   | £3.85                         | £2.29                        | £2.19                       | £2.08                       |
| Per unit generated .. .. .                   | 0.161d.                       | 0.106d.                      | 0.102d.                     | 0.094d.                     |
| Per unit sold .. .. .                        | 0.188d.                       | 0.123d.                      | 0.113d.                     | 0.109d.                     |
| Capital charges—                             |                               |                              |                             |                             |
| Per kilowatt (power-house maximum) .. .. .   | £3.87                         | £4.74                        | £5.28                       | £3.63                       |
| Per kilowatt (substations maximum) .. .. .   | £4.37                         | £5.29                        | £6.00                       | £4.27                       |
| Per unit generated .. .. .                   | 0.184d.                       | 0.246d.                      | 0.280d.                     | 0.193d.                     |
| Per unit sold .. .. .                        | 0.214d.                       | 0.284d.                      | 0.313d.                     | 0.224d.                     |
| Total cost—                                  |                               |                              |                             |                             |
| Per kilowatt (power-house maximum) .. .. .   | £7.27                         | £6.80                        | £7.20                       | £6.58                       |
| Per kilowatt (substations maximum) .. .. .   | £8.23                         | £7.58                        | £8.20                       | £7.75                       |
| Per unit generated .. .. .                   | 0.350d.                       | 0.352d.                      | 0.382d.                     | 0.349d.                     |
| Per unit sold .. .. .                        | 0.403d.                       | 0.408d.                      | 0.426d.                     | 0.406d.                     |
| Revenue—                                     |                               |                              |                             |                             |
| Per kilowatt (power-house maximum) .. .. .   | £7.47                         | £7.36                        | £7.27                       | £6.99                       |
| Per kilowatt (substations maximum) .. .. .   | £8.45                         | £8.21                        | £8.27                       | £8.23                       |
| Per unit generated .. .. .                   | 0.354d.                       | 0.382d.                      | 0.386d.                     | 0.372d.                     |
| Per unit sold .. .. .                        | 0.414d.                       | 0.441d.                      | 0.430d.                     | 0.431d.                     |
| Per unit sold (city) .. .. .                 | 0.295d.                       | 0.295d.                      | 0.288d.                     | 0.271d.                     |
| Per unit sold (trams) .. .. .                | 0.293d.                       | 0.290d.                      | 0.289d.                     | 0.290d.                     |
| Per unit sold (wholesale consumers) .. .. .  | 0.585d.                       | 0.662d.                      | 0.664d.                     | 0.686d.                     |
| Per unit sold (retail consumers) .. .. .     | 1.61d.                        | 2.88d.                       | 1.80d.                      | 1.13d.                      |

TABLE D.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—ANALYSIS OF CAPITAL OUTLAY.

| Item.                                      | Capital Outlay.   |                   | Expenditure during Year. |
|--------------------------------------------|-------------------|-------------------|--------------------------|
|                                            | 31st March, 1924. | 31st March, 1925. |                          |
|                                            | £                 | £                 | £                        |
| Land, roading, and fencing .. .. .         | 17,537            | 20,704            | 3,167                    |
| Harper diversion .. .. .                   | 21,432            | 22,996            | 1,564                    |
| Tunnel and headworks .. .. .               | 154,486           | 171,884           | 17,398                   |
| Second tunnel .. .. .                      | 10,333            | 71,112            | 60,779                   |
| Power-house and machinery .. .. .          | 120,975           | 128,695           | 7,720                    |
| Staff village .. .. .                      | 14,709            | 23,463            | 8,754                    |
| Transmission-lines .. .. .                 | 259,694           | 262,022           | 2,328                    |
| Addington substation .. .. .               | 44,640            | 49,920            | 5,280                    |
| Primary distribution .. .. .               | 57,910            | 55,946            | —1,964                   |
| Secondary distribution .. .. .             | 72,460            | 67,777            | —4,683                   |
| Service transformers and meters .. .. .    | 9,329             | 8,910             | —419                     |
| Vehicles and loose tools .. .. .           | 18,384            | 22,149            | 3,765                    |
| Telephone-lines .. .. .                    | 1,903             | 1,903             | ..                       |
| Office furniture .. .. .                   | 250               | 253               | 3                        |
| Surveys, preliminary expenses, &c. .. .. . | 55,935            | 64,242            | 8,307                    |
| Interest during construction .. .. .       | 32,824            | 36,515            | 3,691                    |
| Totals .. .. .                             | 892,801           | 1,008,491         | 115,690                  |

NOTE.—Reduction in primary and secondary distribution is accounted for by sale of Darfield line to Malvern Power Board and part southern line to Springs—Ellesmere Power Board in former, and Paparua reticulation in latter case

TABLE E.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—OPERATING OR WORKING COSTS.

| Expenditure.                            | 1924.  |                | 1925.  |                |
|-----------------------------------------|--------|----------------|--------|----------------|
|                                         | Cost   | Per Unit sold. | Cost.  | Per Unit sold. |
|                                         | £      | d.             | £      | d.             |
| Harper diversion .. .. .                | 683    | 0-003          | 991    | 0-004          |
| Generation .. .. .                      | 5,774  | 0-032          | 6,390  | 0-030          |
| Transmission-line .. .. .               | 1,523  | 0-008          | 3,162  | 0-015          |
| Main distribution .. .. .               | 2,106  | 0-011          | 2,249  | 0-011          |
| H.T. distribution .. .. .               | 2,852  | 0-016          | 1,952  | 0-009          |
| L.T. distribution .. .. .               | 2,026  | 0-011          | 2,607  | 0-012          |
| Standby plant .. .. .                   | 1,421  | 0-008          | 1,377  | 0-007          |
| Management and general expenses .. .. . | 4,392  | 0-024          | 4,542  | 0-022          |
| Totals .. .. .                          | 20,777 | 0-113          | 23,270 | 0-110          |

TABLE F.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—CONNECTED LOAD IN KILOWATTS AT 31ST MARCH, 1925.

|                                      | Light. | Heat. | Power. | Total. |
|--------------------------------------|--------|-------|--------|--------|
| <i>Local Bodies.</i>                 |        |       |        |        |
| Ashburton Power Board .. ..          | 848    | 498   | 1,929  | 3,275  |
| Banks Peninsula Power Board .. ..    | 310    | 602   | 272    | 1,184  |
| Eyre County Council .. ..            | 37     | 57    | 84     | 178    |
| Halswell County Council .. ..        | 61     | 110   | 41     | 212    |
| Heathcote County Council .. ..       | 299    | 781   | 98     | 1,178  |
| Kaiapoi County Council .. ..         | 120    | 180   | 60     | 360    |
| Kowai County Council .. ..           | 80     | 142   | 43     | 265    |
| Lyttelton Borough Council .. ..      | 250    | 233   | 443    | 926    |
| Rangiora County Council .. ..        | 109    | 167   | 240    | 516    |
| Rangiora Borough Council .. ..       | 185    | 141   | 111    | 437    |
| Riccarton Borough Council .. ..      | 448    | 880   | 305    | 1,633  |
| Springs Ellesmere Power Board .. ..  | 440    | 859   | 470    | 1,769  |
| Sumner Borough Council .. ..         | 218    | 320   | 97     | 635    |
| South Canterbury Power Board .. ..   | 1,314  | 496   | 942    | 2,752  |
| Waimairi County Council (Hillmorton) | 10     | 18    | 3      | 31     |
| <i>Direct Wholesale Consumers.</i>   |        |       |        |        |
| Christchurch Tramways Board .. ..    | 85     | ..    | 7,075  | 7,160  |
| Freezing-works (4) .. ..             | 164    | 43    | 2,278  | 2,485  |
| Flour-mills (3) .. ..                | 5      | 9     | 179    | 193    |
| Dairy Factories (2) .. ..            | 77     | 123   | 291    | 491    |
| Bye Products (1) .. ..               | 3      | 3     | 26     | 32     |
| Tanneries, &c. (5) .. ..             | 29     | 11    | 635    | 675    |
| Seed-cleaning (4) .. ..              | 3      | 1     | 147    | 151    |
| Brickyard (1) .. ..                  | 4      | 1     | 122    | 127    |
| Railway workshops (1) .. ..          | 34     | ..    | 291    | 325    |
| Railway-stations (4) .. ..           | 67     | 10    | 57     | 134    |
| Harbour Board (1) .. ..              | 59     | 2     | 814    | 875    |
| Institutions (4) .. ..               | 141    | 362   | 136    | 639    |
| Soapworks (1) .. ..                  | 3      | ..    | 32     | 35     |
| Steelworks (1) .. ..                 | 3      | 1,200 | 26     | 1,229  |
| Glueworks .. (1) .. ..               | 4      | 1     | 103    | 108    |
| Woollen-mills (2) .. ..              | 9      | ..    | 82     | 91     |
| Twine-mills (1) .. ..                | 2      | 1     | 118    | 121    |
| Chemical-works (1) .. ..             | 15     | 11    | 317    | 343    |
| Substations, Stores, &c. .. ..       | 17     | 78    | 106    | 201    |
| Electric signalling (N.Z.R.) .. ..   | 6      | ..    | 41     | 47     |
| Totals .. ..                         | 5,459  | 7,340 | 18,014 | 30,813 |
| Christchurch City Council .. ..      | ..     | ..    | ..     | 43,068 |
| Lake Coleridge village, &c. .. ..    | ..     | ..    | ..     | 450    |
|                                      |        |       |        | 74,231 |

Power-house maximum, 13,180 kw. Diversity factor, 5.6.

TABLE G.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY : GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR YEAR ENDED 31ST MARCH, 1925.

| Distributing Authority.       | Number of Consumers. | Capital Outlay. | Revenue.   |        |                  | Expenditure.   |                       |               |           |                 | Balance.                              |         |        |       |
|-------------------------------|----------------------|-----------------|------------|--------|------------------|----------------|-----------------------|---------------|-----------|-----------------|---------------------------------------|---------|--------|-------|
|                               |                      |                 | Consumers. | Rates. | Trading Account. | Other Sources. | Paid for Electricity. | Main-tenance. | Interest. | Depre- ciation. | Sinking Fund and Other Ex- penditure. | Profit. | Loss.  |       |
|                               |                      | £               | £          | £      | £                | £              | £                     | £             | £         | £               | £                                     | £       | £      |       |
| Public Works Department       | 119                  | 1,008,490       | 37,246*    | ..     | ..               | 2,059          | 23,270                | 47,780        | 15,679    | ..              | ..                                    | 5,434   | ..     |       |
| Ashburton Power Board         | 1,870                | 161,495         | 13,493     | ..     | 24               | 196            | 3,740                 | 1,851         | ..        | 1,000           | ..                                    | 3,529   | ..     |       |
| Banks Peninsula Power Board   | 837                  | 91,354          | 8,202      | 4,550  | 322              | 69             | 1,344                 | 5,729         | ..        | 882             | ..                                    | 1,917   | ..     |       |
| Christchurch City Council     | 22,491               | 559,143         | 144,306*   | ..     | 2,499            | 2,494          | 27,359†               | 33,561        | 21,690    | 46,688          | 15,606                                | 4,395   | ..     |       |
| Eyre County Council           | 124                  | 5,888           | 1,462      | ..     | ..               | ..             | 654                   | 160           | 272       | ..              | 50                                    | 326     | ..     |       |
| Halswell County Council       | 174                  | 6,482           | 1,171      | ..     | ..               | 14             | 566                   | 568           | 263       | ..              | 50                                    | ..      | 262    |       |
| Heathcote County Council      | 840                  | 20,329          | 5,066      | ..     | ..               | 236            | 2,520                 | 1,328         | 580       | ..              | 421                                   | 428     | ..     |       |
| Kaipoi Borough Council        | 465                  | 4,500           | 2,457      | ..     | ..               | ..             | 1,016                 | 576           | 236       | 61              | 45                                    | 523     | ..     |       |
| Kowai County Council          | 236                  | 17,561          | 1,849      | ..     | ..               | 18             | 242                   | 149           | ..        | ..              | 161                                   | 305     | ..     |       |
| Lyttelton Borough Council     | 421                  | 5,000           | 3,606      | ..     | 49               | ..             | 1,305                 | 1,572         | 235       | ..              | 100                                   | 443     | ..     |       |
| Rangiora Borough Council      | 391                  | 8,626           | 2,773      | ..     | 183              | 15             | 788                   | 662           | 349       | 408             | 75                                    | 689     | ..     |       |
| Rangiora County Council       | 384                  | 23,878          | 4,013      | ..     | ..               | ..             | 1,613                 | 575           | 1,271     | ..              | 255                                   | 299     | ..     |       |
| Riccarton Borough Council     | 945                  | 13,147          | 5,539      | ..     | ..               | 633            | 1,563                 | 1,091         | 451       | ..              | 132                                   | 2,935   | ..     |       |
| Springs-Ellesmere Power Board | 1,278                | 74,099          | 6,696      | 237    | 497              | 30             | 1,379                 | 2,728         | 3,655     | 211             | 600                                   | 520     | 1,633  |       |
| Sumner Borough Council        | 715                  | 10,435          | 3,833      | ..     | ..               | ..             | 976                   | 571           | 449       | 204             | 81                                    | 270     | 1,282  |       |
| Tai Tapu Dairy Company        | 193                  | 8,756           | 3,141      | ..     | 18               | ..             | 1,438                 | 822           | ..        | 577             | ..                                    | 387     | ..     |       |
| Timaru Borough Council        | 2,009                | 91,688          | 19,972     | ..     | ..               | 207            | 4,115                 | 7,619         | 4,658     | ..              | 2,016                                 | 36      | 1,735  |       |
| Waimairi County Council       | 2,235                | 48,493          | 12,841     | 80     | ..               | 4              | 2,240                 | 4,606         | 2,012     | ..              | 400                                   | 3       | 3,664  |       |
| Totals                        | 35,727               | 2,159,364       | 277,666    | 4,867  | 3,592            | 5,975          | 52,858                | 86,722        | 91,481    | 63,828          | 21,874                                | 1,546   | 28,609 | 1,960 |

\* After deducting amount of sales to other distributing bodies, totalling—Public Works Department, £52,858; and Christchurch City Council, £2,240.  
† After deducting amount paid by other distributing body, £2,240.

|                 |                |
|-----------------|----------------|
| Gross profit    | £              |
| Raised by rates | .. 26,649      |
| Net profit      | .. 4,867       |
|                 | <u>£21,782</u> |

TABLE H.—WAIKATO ELECTRIC-POWER SUPPLY.—RESULTS OF OPERATION.

|                                                           | Third Year,<br>March, 1923. | Fourth Year,<br>March, 1924. | Fifth Year,<br>March, 1925. |
|-----------------------------------------------------------|-----------------------------|------------------------------|-----------------------------|
|                                                           | £                           | £                            | £                           |
| Capital outlay .. .. .                                    | 395,022                     | 474,817                      | 522,973                     |
| Costs—                                                    |                             |                              |                             |
| Working-costs .. .. .                                     | 9,721                       | 12,474                       | 14,106                      |
| Interest (capital costs) .. .. .                          | 19,208                      | 21,231                       | 20,129                      |
| Depreciation (capital costs) .. .. .                      | 6,620                       | 10,393                       | 9,757                       |
| Sinking Fund .. .. .                                      | ..                          | ..                           | 4,139                       |
| Total costs .. .. .                                       | 35,549                      | 44,098                       | 48,131                      |
| Revenue—                                                  |                             |                              |                             |
| Cambridge Electric-power Board .. .. .                    | 1,837                       | 2,319                        | 3,527                       |
| Central Electric-power Board .. .. .                      | 2,216                       | 4,436                        | 6,202                       |
| Te Awamutu Electric-power Board .. .. .                   | 2,119                       | 3,196                        | 4,251                       |
| Thames Valley Electric-power Board .. .. .                | 8,556                       | 16,056                       | 21,322                      |
| Hamilton Borough Council .. .. .                          | 2,911                       | 4,621                        | 5,461                       |
| Waihi Gold-mining Company .. .. .                         | 15,927                      | 15,305                       | 16,649                      |
| Waihi Grand Junction Gold Company .. .. .                 | 4,250                       | 9,330                        | 1,437                       |
| New Zealand Railways, Frankton .. .. .                    | 450                         | 1,590                        | 2,887                       |
| Other consumers .. .. .                                   | 2,115                       | 1,691                        | 1,377                       |
| Miscellaneous (rents, &c.) .. .. .                        | 1,437                       | 1,380                        | 2,071                       |
| Total revenue .. .. .                                     | 41,818                      | 59,924                       | 65,184                      |
| Profit .. .. .                                            | 6,269                       | 15,826                       | 17,053                      |
| Accumulated surplus (Reserve Fund) .. .. .                | 386                         | 3,494                        | 20,547                      |
| Accumulated Depreciation Fund .. .. .                     | 16,605                      | 24,832                       | 31,681                      |
| Accumulated Sinking Fund .. .. .                          | ..                          | 12,718                       | 16,983                      |
| Maximum load (kilowatts)—                                 |                             |                              |                             |
| System for year (Horahora and Grand Junction) .. .. .     | ..                          | ..                           | 8,300                       |
| Power-house for year .. .. .                              | 6,900                       | 7,400                        | 7,600                       |
| Power-house, average weekly .. .. .                       | 5,382                       | 6,852                        | 6,963                       |
| Units output—                                             |                             |                              |                             |
| System total .. .. .                                      | ..                          | ..                           | 45,643,664                  |
| Power-house total .. .. .                                 | 33,732,150                  | 45,077,150                   | 45,070,650                  |
| Substations total .. .. .                                 | 30,435,036                  | 40,614,013                   | 41,461,299                  |
| Units sold—                                               |                             |                              |                             |
| Cambridge Electric-power Board .. .. .                    | 519,450                     | 780,370                      | 1,367,000                   |
| Central Electric-power Board .. .. .                      | 657,000                     | 1,320,827                    | 2,439,978                   |
| Te Awamutu Electric-power Board .. .. .                   | 622,040                     | 887,570                      | 1,660,051                   |
| Thames Valley Electric-power Board .. .. .                | 3,776,065                   | 7,019,366                    | 10,185,190                  |
| Hamilton Borough Council .. .. .                          | 860,000                     | 1,500,818                    | 1,796,454                   |
| Waihi Gold-mining Company .. .. .                         | 19,116,114                  | 18,776,851                   | 21,399,225                  |
| Waihi Grand Junction Gold Company .. .. .                 | 4,079,700                   | 8,957,300                    | 1,379,200                   |
| New Zealand Railways, Frankton .. .. .                    | ..                          | 247,613                      | 485,059                     |
| Other consumers .. .. .                                   | 400,000                     | 424,139                      | 569,002                     |
| Total units sold .. .. .                                  | 30,030,369                  | 39,914,854                   | 41,281,159                  |
| Losses—                                                   |                             |                              |                             |
| Transmission losses (units) .. .. .                       | 3,297,114                   | 4,463,137                    | 4,182,365                   |
| Percentage .. .. .                                        | 9.8                         | 9.9                          | 9.2                         |
| Distribution losses (units) .. .. .                       | 3,701,781                   | 5,162,296                    | 4,362,505                   |
| Percentage .. .. .                                        | 11.0                        | 11.3                         | 9.6                         |
| Load-factor—                                              |                             |                              |                             |
| System, annual (per cent.) .. .. .                        | ..                          | ..                           | 62.7                        |
| Power-house, annual (per cent.) .. .. .                   | 55.8                        | 69.6                         | 67.6                        |
| Power-house, average weekly (per cent.) .. .. .           | 71.2                        | 75.3                         | 71.9                        |
| Working-costs (less power purchased)—                     |                             |                              |                             |
| Per kilowatt (power-house annual maximum) .. .. .         | £1.41                       | £1.69                        | £1.69                       |
| Per kilowatt (power-house average weekly maximum) .. .. . | £1.81                       | £1.82                        | £1.85                       |
| Per unit generated .. .. .                                | 0.069d.                     | 0.067d.                      | 0.068d.                     |
| Per unit sold .. .. .                                     | 0.078d.                     | 0.075d.                      | 0.076d.                     |
| Capital charges—                                          |                             |                              |                             |
| Per kilowatt (power-house annual maximum) .. .. .         | £3.76                       | £4.28                        | £4.47                       |
| Per kilowatt (power-house average weekly maximum) .. .. . | £4.80                       | £4.62                        | £4.88                       |
| Per unit generated at Horahora .. .. .                    | 0.184d.                     | 0.168d.                      | 0.181d.                     |
| Per unit sold (less power purchased) .. .. .              | 0.206d.                     | 0.194d.                      | 0.200d.                     |
| Total costs—                                              |                             |                              |                             |
| Per kilowatt (power-house annual maximum) .. .. .         | £5.15                       | £5.96                        | £6.17                       |
| Per kilowatt (power-house average weekly maximum) .. .. . | £6.61                       | £6.40                        | £6.73                       |
| Per unit generated at Horahora .. .. .                    | 0.253d.                     | 0.235d.                      | 0.250d.                     |
| Per unit sold (less units purchased) .. .. .              | 0.283d.                     | 0.277d.                      | 0.277d.                     |
| Total costs on system—                                    |                             |                              |                             |
| Per kilowatt (system annual maximum) .. .. .              | ..                          | ..                           | £5.80                       |
| Per unit generated and purchased .. .. .                  | ..                          | ..                           | 0.253d.                     |
| Per unit sold .. .. .                                     | ..                          | ..                           | 0.279d.                     |
| Revenue—                                                  |                             |                              |                             |
| Per kilowatt (system annual maximum) .. .. .              | ..                          | ..                           | £7.85                       |
| Per kilowatt (power-house annual maximum) .. .. .         | £6.07                       | £8.10                        | £8.58                       |
| Per kilowatt (power-house average weekly maximum) .. .. . | £7.77                       | £8.73                        | £9.34                       |
| Per unit generated and purchased .. .. .                  | 0.298d.                     | 0.319d.                      | 0.343d.                     |
| Per unit sold .. .. .                                     | 0.334d.                     | 0.360d.                      | 0.379d.                     |
| Per unit sold Cambridge Electric-power Board .. .. .      | 0.849d.                     | 0.712d.                      | 0.620d.                     |
| Per unit sold Central Electric-power Board .. .. .        | 0.810d.                     | 0.806d.                      | 0.610d.                     |
| Per unit sold Te Awamutu Electric-power Board .. .. .     | 0.818d.                     | 0.865d.                      | 0.614d.                     |
| Per unit sold Thames Valley Electric-power Board .. .. .  | 0.544d.                     | 0.547d.                      | 0.506d.                     |
| Per unit sold Hamilton Borough Council .. .. .            | 0.812d.                     | 0.739d.                      | 0.730d.                     |
| Per unit sold Waihi Gold-mining Company .. .. .           | 0.199d.                     | 0.196d.                      | 0.188d.                     |

TABLE J.—WAIKATO ELECTRIC-POWER SUPPLY.—ANALYSIS OF CAPITAL OUTLAY.

|                                                   | 31st March, 1924. | 31st March, 1925. | Expenditure during Year. |
|---------------------------------------------------|-------------------|-------------------|--------------------------|
|                                                   | £                 | £                 | £                        |
| Land, roading, and fencing at Horahora .. ..      | 3,208             | 3,208             | ..                       |
| Headworks .. .. .                                 | 134,842           | 158,113           | 23,271                   |
| Generating-station transformers and machinery ..  | 97,588            | 113,559           | 15,971                   |
| Staff village, Horahora .. .. .                   | 11,054            | 11,354            | 300                      |
| Transmission-lines .. .. .                        | 113,245           | 114,817           | 1,572                    |
| Distribution-lines .. .. .                        | 705               | 705               | ..                       |
| Main substations .. .. .                          | 41,123            | 41,266            | 143                      |
| Distribution substations .. .. .                  | 7,414             | 7,406             | —8                       |
| Vehicles and loose construction equipment ..      | 8,418             | 7,291             | —1,127                   |
| Land, stores, and railway-siding, Ruakura ..      | 11,342            | 11,342            | ..                       |
| Staff residences, Ruakura .. .. .                 | 3,521             | 3,512             | —9                       |
| Office furniture, Hamilton .. .. .                | 494               | 867               | 373                      |
| Surveys, supervision, and preliminary expenses .. | 17,639            | 19,667            | 2,028                    |
| Interest during construction .. .. .              | 24,224            | 29,866            | 5,642                    |
| Totals .. .. .                                    | 474,817           | 522,973           | 48,156                   |

TABLE K.—WAIKATO ELECTRIC-POWER SUPPLY.—OPERATING OR WORKING COSTS.

| Expenditure.                                | 1924.  |                | 1925.  |                |
|---------------------------------------------|--------|----------------|--------|----------------|
|                                             | Cost.  | Per Unit sold. | Cost.  | Per Unit sold. |
|                                             | £      | d.             | £      | d.             |
| Generating .. .. .                          | 5,583  | 0-034          | 5,239  | 0-031          |
| Transmission .. .. .                        | 2,495  | 0-015          | 2,068  | 0-012          |
| Main substations .. .. .                    | 1,805  | 0-011          | 2,339  | 0-014          |
| H.T. distribution .. .. .                   | 265    | 0-002          | 346    | 0-002          |
| Management and general .. .. .              | 2,238  | 0-013          | 2,858  | 0-017          |
| Miscellaneous and stand-by expenses .. .. . | 88     | ..             | 1,256  | 0-007          |
| Totals .. .. .                              | 12,474 | 0-075          | 14,106 | 0-083          |

TABLE L.—WAIKATO ELECTRIC-POWER SUPPLY.—CONNECTED LOAD IN KILOWATTS.

|                                                     | Light. | Heat.  | Power. | Total. |
|-----------------------------------------------------|--------|--------|--------|--------|
| Waihi Gold-mining Company ..                        | 100    | 103    | 5,717  | 5,920  |
| Waihi Grand Junction Gold Company ..                | 38     | 38     | 2,452  | 2,528  |
| Cambridge Co-operative Dairy Company ..             | 2      | 1      | 184    | 187    |
| New Zealand Co-operative Dairy Company, Frankton .. | 15     | 18     | 560    | 593    |
| State Farm, Ruakura .. .. .                         | 10     | 1      | 5      | 16     |
| New Zealand Railways, Frankton ..                   | 57     | 27     | 667    | 751    |
| Cambridge Electric-power Board ..                   | 270    | 1,074  | 480    | 1,824  |
| Central Electric-power Board ..                     | 844    | 1,199  | 1,165  | 3,208  |
| Te Awamutu Electric-power Board ..                  | 354    | 830    | 853    | 2,037  |
| Thames Valley Electric-power Board ..               | 1,595  | 2,984  | 5,591  | 10,170 |
| Hamilton Borough Council .. .. .                    | 1,610  | 909    | 1,065  | 3,584  |
| Public Works Department, Horahora ..                | 12-15  | 153-50 | 90-10  | 255-75 |
| Public Works Department, Arapuni ..                 | 4-50   | 102-00 | ..     | 106-50 |
| Public Works Department, Hamilton ..                | 3-60   | 10-50  | 42-15  | 56-25  |
| Armstrong-Whitworth Company, Arapuni ..             | 30-00  | 180-00 | 311    | 521-00 |
| Totals .. .. .                                      | 4,945  | 7,630  | 19,182 | 31,757 |

Power-house maximum load, 8,300 k.w.

Diversity factor = 3-8.

TABLE M.—WAIKATO ELECTRIC-POWER SUPPLY.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR THE YEAR ENDED 31ST MARCH, 1925.

| Distributing Authority.     | Number of Consumers. | Capital Outlay. | Revenue.   |        |                  | Expenditure.   |                       |                   |           |                    | Balance.         |                         |         |       |
|-----------------------------|----------------------|-----------------|------------|--------|------------------|----------------|-----------------------|-------------------|-----------|--------------------|------------------|-------------------------|---------|-------|
|                             |                      |                 | Consumers. | Rates. | Trading Account. | Other Sources. | Paid for Electricity. | Mainten-<br>ance. | Interest. | Deprecia-<br>tion. | Sinking<br>Fund. | Other Ex-<br>penditure. | Profit. | Loss. |
|                             |                      | £               | £          | £      | £                | £              | £                     | £                 | £         | £                  | £                | £                       | £       |       |
| Public Works Department     | 12                   | 522,973         | 22,350*    | ..     | ..               | 2,071          | 1,256                 | 12,175            | 20,129    | 9,757              | 4,139            | 675                     | 17,053  | ..    |
| Cambridge Power Board       | 903                  | 95,188          | 11,219     | ..     | 32               | 328            | 3,527                 | 2,904             | 5,778     | 100                | 984              | ..                      | ..      | 1,714 |
| Central Power Board         | 2,102                | 195,257         | 23,525     | ..     | 980              | ..             | 6,202                 | 4,617             | 2,730     | 8,200              | 1,560            | 340                     | 856     | ..    |
| Hamilton Borough Council    | 2,582                | 51,570          | 24,712     | ..     | 19               | ..             | 5,461                 | 7,555             | 3,380     | 2,130              | 1,697            | ..                      | 4,508   | ..    |
| Te Aroha Borough Council    | 578                  | 16,681          | 5,385      | ..     | ..               | 443            | 1,372                 | 1,497             | 709       | ..                 | 55               | 86                      | 2,109   | ..    |
| Te Awamutu Power Board      | 1,018                | 131,610         | 14,581     | 2,132  | 198              | 398            | 4,251                 | 5,061             | 9,182     | ..                 | 1,400            | ..                      | ..      | 2,585 |
| Thames Borough Council      | 957                  | 29,306          | 8,682      | ..     | ..               | 351            | 2,112                 | 2,297             | 1,059     | ..                 | 209              | 482                     | 2,874   | ..    |
| Thames Valley Power Board.. | 4,894                | 530,289         | 55,512*    | 4,000  | 7,000            | 2,862          | 17,793*               | 4,984             | 32,166    | ..                 | 6,385            | 5,574                   | 2,472   | ..    |
|                             | 13,046               | 1,572,874       | 165,966    | 6,132  | 8,229            | 6,453          | 41,974                | 41,090            | 75,133    | 20,187             | 16,429           | 7,157                   | 29,872  | 4,299 |

\* After deducting amount of sales to other distributing bodies totalling—Public Works Department, £40,763; and Thames Valley Power Board, £3,489.

|                 |    |    |                |
|-----------------|----|----|----------------|
| Gross profit    | .. | .. | £              |
| Raised by rates | .. | .. | 25,573         |
|                 | .. | .. | 6,132          |
| Net profit      | .. | .. | <u>£19,441</u> |



TABLE N.—ELECTRIC-POWER BOARDS OF NEW ZEALAND AS CONSTITUTED ON 31ST MARCH, 1925.

| Name of Electric-power Board. | Proclamation constituting Power Board Area gazetted. | Number of Members on Board. | Approximate Area (Square Miles). |             | Population. |             | Value of Rateable Property. |             | Valuation Basis. | Amount of Loan authorized. | Voting for Loan Poll. |          |
|-------------------------------|------------------------------------------------------|-----------------------------|----------------------------------|-------------|-------------|-------------|-----------------------------|-------------|------------------|----------------------------|-----------------------|----------|
|                               |                                                      |                             | District.                        | Outer Area. | District.   | Outer Area. | District.                   | Outer Area. |                  |                            | For.                  | Against. |
| 1. Ashburton                  | 17/11/21                                             | 12                          | 1,193                            | 1,349       | 17,224      | 533         | £ 9,346,863                 | £ 700,181   | Unimproved       | £ 296,500                  | 1,590                 | 96       |
| 2. Auckland                   | 1/4/22                                               | 12                          | 300                              | ..          | 150,000     | ..          | 50,491,865                  | ..          | Capital ..       | 1,722,500                  | 4,179                 | 288      |
| 3. Banks Peninsula            | 8/1/20                                               | 7                           | 387                              | ..          | 4,000       | ..          | 5,089,798                   | ..          | "                | 100,000                    | 331                   | 23       |
| 4. Buller                     | 11/5/22                                              | 5                           | 1,987                            | ..          | 9,197       | ..          | 696,374                     | ..          | Unimproved       | Poll not yet taken.        | 474                   | 71       |
| 5. Cambridge                  | 23/6/20                                              | 8                           | 137                              | ..          | 6,000       | ..          | 2,650,705                   | ..          | Capital ..       | 113,238                    | 515                   | 19       |
| 6. Central                    | 8/7/20                                               | 8                           | 520                              | ..          | 11,700      | ..          | 4,170,999                   | ..          | Unimproved       | 200,000                    | 543                   | 41       |
| 7. Central Hawke's Bay        | 19/10/22                                             | 9                           | 1,305                            | ..          | 3,980       | ..          | 6,839,951                   | ..          | "                | 175,000                    | 646                   | 95       |
| 8. Dannevirke                 | 11/8/21                                              | 10                          | 568                              | 105         | 11,648      | 433         | 4,177,743                   | 488,970     | "                | 200,000                    | 1,030                 | 145      |
| 9. Franklin                   | 25/9/24                                              | 8                           | 628                              | 194         | 13,610      | 834         | 6,763,874                   | 997,523     | Capital ..       | 80,000                     | 630                   | 134      |
| 10. Grey                      | 26/10/22                                             | 9                           | 640                              | 810         | 10,000      | 2,000       | 514,694                     | 100,000     | Unimproved       | 4,000*                     | 57                    | 2        |
| 11. Hawke's Bay               | 19/6/24                                              | 8                           | 1,679                            | 5           | 29,260      | 11,725      | 14,223,258                  | 3,008,057   | Capital ..       | Poll not yet taken.        | 973                   | 26       |
| 12. Hobson                    | 29/3/23                                              | 8                           | 778                              | ..          | 7,180       | ..          | 1,424,942                   | ..          | Unimproved       | 260,000                    | 1,748                 | 146      |
| 13. Horowhenua                | 1/12/21                                              | 9                           | 630                              | ..          | 11,795      | ..          | 3,403,255                   | ..          | "                | 240,000                    | 326                   | 22       |
| 14. Hutt Valley               | 6/7/22<br>11/12/24                                   | 11                          | 530                              | ..          | 26,725      | ..          | 3,119,920                   | ..          | "                | 40,000                     | 1,144                 | 96       |
| 15. Malvern                   | 28/6/23                                              | 6                           | 308                              | 1,833       | 3,550       | 1,500       | 2,433,080                   | 1,458,588   | "                | 500,000                    | 1,334                 | 300      |
| 16. Manawatu-Oroua            | 1/12/21                                              | 12                          | 1,301                            | ..          | 38,000      | ..          | 13,955,493                  | ..          | Capital ..       | 70,000                     | 170                   | 20       |
| 17. Marlborough               | 25/10/23                                             | 8                           | 3,198                            | ..          | 14,696      | ..          | 9,442,042                   | ..          | "                | 200,000                    | 961                   | 162      |
| 18. Opuake                    | 9/8/21                                               | 7                           | 197                              | ..          | 4,000       | ..          | 1,727,168                   | ..          | Unimproved       | 50,000                     | 252                   | 11       |
| 19. Otago                     | 18/10/23                                             | 6                           | 676                              | 1,605       | 10,604      | 13,478      | 1,882,990                   | 2,813,458   | Capital ..       | Poll not yet taken.        | ..                    | ..       |
| 20. Otago Central             | 26/10/22<br>4/12/24                                  | 9                           | 232                              | 2,452       | 3,085       | 2,085       | 528,839                     | 1,270,106   | "                | 145,000                    | 978                   | 299      |
| 21. Poverty Bay               | 20/12/23                                             | 11                          | 1,900                            | ..          | 23,986      | ..          | 16,502,852                  | ..          | Unimproved       | 1,650,000                  | 6,516                 | 415      |
| 22. Reefton                   | 30/6/21                                              | 5                           | 24                               | ..          | 1,850       | ..          | 220,042                     | ..          | Capital ..       | 114,000                    | 797                   | 41       |
| 23. South Canterbury          | 26/10/22                                             | 12                          | 1,673                            | 3,429       | 35,618      | 6,000       | 12,946,839                  | 2,536,815   | "                | 350,000                    | 635                   | 190      |
| 24. Southland                 | 19/11/19                                             | 12                          | 7,798                            | 3,059       | 66,000      | 9           | 15,356,035                  | 137,513     | Unimproved       | 200,000                    | 714                   | 83       |
| 25. Springs-Ellesmere         | 8/7/20                                               | 11                          | 412                              | 1,419       | 11,270      | ..          | 6,540,577                   | 5,344,111   | Capital ..       | 100,000                    | 421                   | 277      |
| 26. Taranaki                  | 18/5/22                                              | 7                           | 218                              | ..          | 10,000      | 12,000      | 5,238,319                   | 1,136,986   | Unimproved       | 145,000                    | 565                   | 39       |
| 27. Taranua                   | 23/3/22                                              | 10                          | 702                              | 558         | 10,122      | 1,800       | 2,824,292                   | ..          | Capital ..       | 38,500                     | 191                   | 27       |
| 28. Tauranga                  | 14/6/23                                              | 7                           | 636                              | 3           | 4,656       | 3,400       | 962,424                     | 517,597     | Unimproved       | 310,000                    | 1,786                 | 114      |
| 29. Te Awamutu                | 8/1/20                                               | 10                          | 270                              | ..          | 8,500       | ..          | 3,681,842                   | ..          | "                | 38,500                     | 1,703                 | 225      |
| 30. Teviot                    | 22/7/20                                              | 7                           | 120                              | 200         | 1,800       | 600         | 45,910                      | 165,657     | Capital ..       | 38,500                     | 82                    | 8        |
| 31. Thames Valley             | 8/1/19                                               | 12                          | 2,300                            | ..          | 30,000      | ..          | 13,000,000                  | ..          | Unimproved       | 100,000                    | 504                   | 31       |
| 32. Wairarapa                 | 25/3/20                                              | 9                           | 302                              | 1,694       | 17,500      | 1,000       | 7,282,726                   | 5,457,271   | Capital ..       | 135,000                    | 2,940                 | 1,196    |
| 33. Wairere                   | 18/1/23                                              | 7                           | 147                              | 260         | 1,500       | 1,000       | 332,434                     | 480,000     | "                | 70,000                     | 270                   | 36       |
| 34. Wairoa                    | 29/7/20                                              | 10                          | 1,354                            | ..          | 4,800       | ..          | 4,327,674                   | ..          | Unimproved       | 375,000                    | 1,315                 | 214      |
| 35. Waitaki                   | 9/8/23                                               | 9                           | 520                              | 2,813       | 17,113      | 933         | 6,562,673                   | 255,558     | Capital ..       | Poll not yet taken.        | ..                    | ..       |
| 36. Waitemata                 | 18/10/23<br>14/11/24                                 | 9                           | 630                              | 2           | 19,860      | 1,565       | 6,933,364                   | 347,005     | "                | 200,000                    | 2,940                 | 1,196    |
| 37. Waitomo                   | 6/3/24                                               | 7                           | 160                              | 1,000       | 5,000       | 3,500       | 1,066,152                   | 2,500,000   | Unimproved       | ..                         | ..                    | ..       |
| 38. Wanganui-Rangitikei       | 1/12/21                                              | 12                          | 1,648                            | 972         | 47,364      | 650         | 22,089,627                  | 1,408,210   | Capital ..       | ..                         | ..                    | ..       |
| 39. Westland                  | 28/10/20                                             | 9                           | 750                              | ..          | 3,272       | ..          | 196,268                     | ..          | Unimproved       | ..                         | ..                    | ..       |
| Totals                        | ..                                                   | ..                          | 38,758                           | 23,762      | 711,465     | 65,045      | 269,063,903                 | 31,123,606  | ..               | 9,372,238                  | 37,606                | 5,016    |

\* For part area only.

TABLE O.—ELECTRIC-POWER BOARDS.—RETURN FOR YEAR ENDED 31ST MARCH, 1925.

| Board.              | Main Supply commenced. | Capital Outlay. | Revenue.                      |                              |          | Expenditure.     |         |          | Profit. | Loss.   | General Rate. |            | Special Rates. |            | Valuation Basis.     |
|---------------------|------------------------|-----------------|-------------------------------|------------------------------|----------|------------------|---------|----------|---------|---------|---------------|------------|----------------|------------|----------------------|
|                     |                        |                 | Sale of Electricity. (Gross.) | Sale of Materials. (Profit.) | General. | Capital Charges. | Power.  | General. |         |         | Levied.       | Collected. | Levied.        | Collected. |                      |
| Ashburton           | 1923                   | £ 161,495       | £ 13,494                      | £ 24                         | £ 195    | £ 2,851          | £ 3,740 | £ 3,594  | £ 3,528 | £ ..    | d. ..         | £ ..       | d. ..          | £ ..       | Unimproved. Capital. |
| Auckland ..         | 1908                   | 1,618,368       | 318,573                       | ..                           | 9,489    | 165,063          | 150,507 | ..       | 12,492  | ..      | ..            | ..         | 1-05           | ..         | Capital.             |
| Banks Peninsula     | 1922                   | 91,354          | 8,177                         | 322                          | 94       | 6,611            | 1,344   | 3,271    | ..      | 2,633   | 0-1           | 4,550      | 0-14           | Nil        | Capital.             |
| Cambridge           | 1921                   | 95,188          | 10,790                        | 32                           | 758      | 6,761            | 3,527   | 3,004    | ..      | 1,712   | ..            | ..         | 1-06           | Nil        | Capital.             |
| Central ..          | 1921                   | 195,257         | 22,283                        | ..                           | 2,222    | 12,490           | 6,202   | 4,957    | 856     | ..      | ..            | ..         | ..             | ..         | Unimproved.          |
| Central Hawke's Bay | ..                     | 90,000          | ..                            | ..                           | 87       | 56,186           | ..      | ..       | ..      | ..      | 0-4           | ..         | ..             | ..         | Unimproved.          |
| Dannevirke          | ..                     | 85,961          | ..                            | ..                           | 159      | 6,032            | ..      | 174      | ..      | ..      | ..            | ..         | 1-03           | Nil        | Unimproved.          |
| Franklin ..         | ..                     | 783             | ..                            | ..                           | ..       | ..               | ..      | ..       | ..      | ..      | ..            | ..         | ..             | ..         | Capital.             |
| Grey ..             | ..                     | ..              | ..                            | ..                           | ..       | ..               | ..      | ..       | ..      | ..      | ..            | ..         | ..             | ..         | Capital.             |
| Hawke's Bay         | ..                     | ..              | ..                            | ..                           | ..       | ..               | ..      | 3,404    | ..      | ..      | ..            | ..         | 1-03           | Nil        | Unimproved.          |
| Hobson ..           | ..                     | ..              | ..                            | ..                           | ..       | ..               | ..      | 605      | ..      | ..      | 0-02          | Nil        | 1-37           | Nil        | Unimproved.          |
| Horowhenua          | 1924                   | 117,321         | 4,358                         | 241                          | 444      | ..               | 1,758   | 876      | ..      | ..      | 0-10          | 345        | ..             | ..         | Unimproved.          |
| Hutt Valley         | 1925                   | 128,233         | 864                           | ..                           | 205      | ..               | 562     | 245      | ..      | ..      | ..            | ..         | ..             | ..         | Unimproved.          |
| Malvern ..          | ..                     | 8,629           | ..                            | ..                           | ..       | ..               | ..      | 1,352    | ..      | ..      | 0-25          | Nil        | ..             | ..         | Capital.             |
| Manawatu-Oroua      | 1924                   | 272,869         | 8,911                         | 964                          | 352      | 1,119            | 2,646   | 2,313    | 4,149   | ..      | ..            | ..         | ..             | ..         | Unimproved.          |
| Marlborough         | ..                     | 69,236          | 5,292                         | ..                           | 54       | 4,790            | ..      | 864      | ..      | 999     | ..            | ..         | ..             | ..         | Capital.             |
| Opunake ..          | 1923                   | 18,947          | ..                            | 192                          | ..       | ..               | ..      | 1,747    | ..      | ..      | ..            | ..         | ..             | ..         | Capital.             |
| Otago ..            | ..                     | ..              | ..                            | 2                            | ..       | ..               | ..      | ..       | ..      | ..      | 0-12          | Nil        | 1-25           | Nil        | Capital.             |
| Otago Central       | ..                     | 26,901          | ..                            | ..                           | ..       | ..               | ..      | ..       | ..      | ..      | ..            | ..         | ..             | ..         | Capital.             |
| South Canterbury    | ..                     | 34,300          | ..                            | ..                           | ..       | ..               | ..      | ..       | ..      | ..      | ..            | ..         | ..             | ..         | Capital.             |
| Southland           | ..                     | 1,386,419       | 12,822                        | 3,464                        | 1,793    | 1,956            | 10,616  | 1,262    | 4,244   | ..      | ..            | 2,300*     | ..             | ..         | Unimproved.          |
| Springs-Ellesmere   | ..                     | 74,099          | 6,696                         | 497                          | 30       | 4,466            | 1,379   | 3,248    | ..      | 1,870   | ..            | 237*       | ..             | ..         | Unimproved.          |
| Taranaki ..         | 1922                   | 188,576         | 2,096                         | 527                          | 1        | ..               | 694     | 733      | ..      | ..      | ..            | 386*       | ..             | ..         | Capital.             |
| Taranui ..          | ..                     | 92,673          | 4,169                         | 419                          | 105      | 1,481            | 2,571   | 970      | ..      | 329     | ..            | ..         | 1-25           | Nil        | Unimproved.          |
| Tauranga ..         | ..                     | 4,466           | ..                            | ..                           | ..       | ..               | ..      | ..       | ..      | ..      | ..            | ..         | ..             | ..         | Unimproved.          |
| Te Awamutu          | 1921                   | 131,610         | 14,174                        | 198                          | 804      | 10,286           | 4,251   | 5,357    | ..      | 4,718   | 0-14          | 2,132      | ..             | ..         | Capital.             |
| Teviot ..           | 1924                   | 34,395          | 2,472                         | ..                           | ..       | 3,325            | ..      | ..       | ..      | 853     | 1-00          | Nil        | 4-00           | ..         | Unimproved.          |
| Thames Valley       | 1921                   | 530,289         | 59,001                        | 7,000                        | 2,862    | 38,550           | 21,282  | 10,559   | ..      | 1,528   | ..            | 479*       | 0-25           | Nil        | Capital.             |
| Wairapa             | 1924                   | 229,601         | 12,340                        | 3,779                        | 631      | 4,266            | 762     | 3,654    | 8,068   | ..      | ..            | ..         | 0-96           | Nil        | Capital.             |
| Wairoa ..           | 1920                   | 54,381          | 6,761                         | 754                          | 224      | 2,614            | 2,440   | 3,252    | ..      | 567     | ..            | ..         | ..             | ..         | Capital.             |
| Waitaki ..          | 1918                   | 46,461          | 11,020                        | 54                           | 53       | 5,684            | 3,212   | 2,207    | 24      | ..      | ..            | ..         | ..             | ..         | Capital.             |
| Waitemata           | ..                     | ..              | ..                            | ..                           | ..       | ..               | ..      | ..       | ..      | ..      | ..            | ..         | 0-56           | Nil        | Capital.             |
| Wanganui-Rangitikei | ..                     | 204,181         | 14,322                        | ..                           | 38       | 3,090            | 5,337   | 1,283    | 4,650   | ..      | ..            | ..         | ..             | ..         | Capital.             |
| Totals              | ..                     | 5,993,028       | 538,615                       | 18,469                       | 20,600   | 337,621          | 222,830 | 59,062   | 38,011† | 15,209† | ..            | 11,289     | ..             | Nil        |                      |

Buller, Poverty Bay, Reefton, Wairere, Waitomo, and Westland Boards not yet in operation.

\* Arrears.

† Boards capitalizing whole of interest and sinking funds not included.

TABLE P.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1925

(G = gas; O = oil; S = steam; W = water.)

| Title.                                   | Ownership.  | Supply commenced. | Population supplied. | Number of Consumers. | Capacity, in Kilowatts. |                | Connected Load (Kilowatts). | Diversity Factor. | Units.        |                         |            | Annual Load-factor. | System of Supply. | Supply Voltage. | Route-miles of Lines. | Static Head, in Feet. |                 |
|------------------------------------------|-------------|-------------------|----------------------|----------------------|-------------------------|----------------|-----------------------------|-------------------|---------------|-------------------------|------------|---------------------|-------------------|-----------------|-----------------------|-----------------------|-----------------|
|                                          |             |                   |                      |                      | Main Plant.             | Standby Plant. |                             |                   | Maximum Load. | Generated or purchased. | Sold.      |                     |                   |                 |                       |                       | Non-productive. |
| <i>Steam Stations.</i>                   |             |                   |                      |                      |                         |                |                             |                   |               |                         |            |                     |                   |                 |                       |                       |                 |
| 1. Auckland ..                           | Power Board | 1908              | 150,000              | 22,208               | 26,000                  | ..             | 13,000                      | ..                | ..            | 46,853,560              | 36,599,488 | 10,254,072          | 21.9              | D.C./A.C.       | 460/400/230           | 135                   | ..              |
| 2. Gisborne ..                           | Borough     | 1912              | 13,000               | 2,571                | 650                     | ..             | 530                         | 3,419             | 6.5           | 1,340,221               | 1,085,441  | 254,780             | 19.0              | D.C.            | 440/220               | 33                    | ..              |
| 3. Invercargill ..                       | Borough     | 1913              | 27,000               | 3,491                | 1,525                   | 450            | 1,410                       | 6,918             | 4.9           | 5,098,200               | 4,591,499  | 506,701             | 9.9               | A.C.            | 400/230               | 111                   | ..              |
| 4. Kaitangata ..                         | Borough     | 1917              | 1,708                | 204                  | Bulk                    | ..             | 6                           | ..                | ..            | 21,974                  | 17,487     | 4,487               | 20.4              | A.C.            | 400/230               | 9                     | ..              |
| 5. Nelson ..                             | City        | 1923              | 10,000               | 1,169                | 600                     | ..             | 270                         | 1,692             | 6.3           | 646,644                 | 430,201    | 216,443             | 33.5              | A.C.            | 400/230               | 35                    | ..              |
| 6. Wanganui-Rangitikei*                  | Power Board | 1908              | 47,364               | 2,850                | 1,650                   | ..             | 1,600                       | 7,200             | 4.5           | 1,679,570               | 1,383,770  | 295,800             | 17.6              | A.C.            | 400/230               | 150                   | ..              |
| 7. Wellington ..                         | City        | 1888              | 105,000              | 18,500               | 8,500                   | ..             | 9,200                       | ..                | ..            | 26,702,331              | 20,188,327 | 6,514,004           | 24.4              | A.C.            | 400/230/105           | 200                   | ..              |
| Totals ..                                | ..          | ..                | 354,132              | 50,993               | 38,925                  | 450            | 26,016                      | ..                | ..            | 82,342,500              | 64,296,213 | 18,046,287          | 21.9              | ..              | ..                    | 673                   | ..              |
| <i>Gas Stations.</i>                     |             |                   |                      |                      |                         |                |                             |                   |               |                         |            |                     |                   |                 |                       |                       |                 |
| 1. Devonport ..                          | Borough     | 1915              | 9,480                | 1,563                | 400                     | ..             | 318                         | 2,116             | 6.7           | 781,180                 | 560,291    | 220,889             | 28.3              | D.C.            | 460/230               | 20                    | ..              |
| 2. Franklin Electric Supply Co. (Waiuku) | Company     | 1918              | 3,000                | 190                  | 150                     | 30 (G)         | 58                          | 319               | 5.5           | 65,637                  | 52,510     | 13,127              | 20.0              | A.C.            | 400/230               | 7                     | ..              |
| 3. Kaikoura ..                           | County      | 1922              | 600                  | 130                  | 47                      | ..             | 30                          | 81                | 2.7           | 42,150                  | 28,595     | 13,555              | 32.2              | A.C.            | 400/230               | 6                     | ..              |
| 4. Lettis Bros. (Opotiki) ..             | Private     | 1914              | 1,100                | 301                  | 99                      | ..             | 65                          | 138               | 2.1           | 112,500                 | 86,500     | 26,000              | 23.1              | D.C.            | 460/230               | 11                    | ..              |
| 5. Motueka ..                            | Borough     | 1921              | 1,490                | 235                  | 52                      | ..             | 44                          | 93                | 2.1           | 55,414                  | 37,846     | 17,568              | 31.7              | A.C.            | 400/230               | 11                    | ..              |
| 6. Napier ..                             | Borough     | 1913              | 14,100               | 2,815                | 830                     | ..             | 809                         | 4,468             | 5.5           | 2,209,329               | 1,907,031  | 302,298             | 13.7              | D.C.            | 460/230               | 30                    | ..              |
| 7. Palmerston North ..                   | Borough     | 1924              | 18,000               | 2,103                | 1,000                   | ..             | 550                         | 3,155             | 5.7           | 1,268,282               | 970,037    | 298,245             | 23.4              | A.C.            | 400/230               | 62                    | ..              |
| 8. Picton ..                             | Borough     | 1917              | 1,400                | 308                  | 130                     | ..             | 78                          | 387               | 5.0           | 170,800                 | 153,720    | 17,080              | 10.0              | D.C.            | 460/230               | 10                    | 279             |
| 9. Pukekohe ..                           | Borough     | 1917              | 2,300                | 495                  | 215                     | ..             | 110                         | 423               | 3.8           | 281,935                 | 232,085    | 49,850              | 17.7              | A.C.            | 400/230               | 15                    | ..              |
| 10. Tamaki West ..                       | Road Board  | 1922              | 2,000                | 518                  | 150                     | ..             | 90                          | 535               | 5.9           | 190,408                 | 129,238    | 61,170              | 32.1              | A.C.            | 400/230               | 15                    | ..              |
| 11. Taranua (Eketahuna) ..               | Power Board | 1909              | 876                  | 231                  | 63                      | ..             | 41                          | 215               | 5.2           | 47,960                  | 39,800     | 8,160               | 17.0              | A.C.            | 400/230               | 7                     | ..              |
| 12. Te Kuiti ..                          | Power Board | 1918              | 1,360                | 353                  | 105                     | ..             | 83                          | 319               | 3.8           | 99,675                  | 83,200     | 16,475              | 16.5              | A.C.            | 400/230               | 10                    | ..              |
| 13. Waipukurau ..                        | Borough     | 1913              | 2,350                | 590                  | 170                     | ..             | 140                         | 590               | 4.2           | 280,507                 | 214,407    | 66,100              | 23.6              | D.C.            | 460/230               | 11                    | ..              |
| ..                                       | ..          | 1923              | 2,000                | 402                  | 80                      | ..             | 88                          | 494               | 5.6           | 206,866                 | 183,792    | 23,074              | 11.2              | A.C.            | 400/230               | 11                    | ..              |
| Totals ..                                | ..          | ..                | 60,056               | 10,234               | 3,491                   | 30             | 2,504                       | 13,333            | 5.3           | 5,812,643               | 4,679,052  | 1,133,591           | 19.5              | ..              | ..                    | 226                   | ..              |
| <i>Oil Stations.</i>                     |             |                   |                      |                      |                         |                |                             |                   |               |                         |            |                     |                   |                 |                       |                       |                 |
| 1. Hastings ..                           | Borough     | 1912              | 10,000               | 2,449                | 826                     | ..             | 560                         | 3,415             | 6.1           | 1,396,960               | 1,264,213  | 132,747             | 9.5               | D.C./A.C.       | 460/400/230           | 33                    | ..              |
| 2. Stratford ..                          | Borough     | 1898              | 9,000                | 889                  | 280                     | ..             | 195                         | 1,135             | 5.8           | 461,741                 | 305,997    | 155,744             | 33.7              | A.C./S.P.       | 250/110               | 25                    | 27              |
| Totals ..                                | ..          | ..                | 19,000               | 3,338                | 1,106                   | ..             | 755                         | 4,550             | 6.0           | 1,858,701               | 1,570,210  | 288,491             | 15.5              | ..              | ..                    | 58                    | ..              |

\* Returns for six months only.

TABLE P.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31st MARCH, 1925—continued.  
(G = gas; O = oil; S = steam; W = water.)

| Title.                                     | Ownership.         | Supply commenced. | Population supplied. | Number of Consumers. | Capacity in Kilowatts. |                |               | Connected Load (Kilowatts). | Diversity Factor. | Units.                  |            |                 | Annual Load Percentage.    | System of Supply. | Supply Voltage. | Route-miles of Lines. | Static Head, in Feet. |
|--------------------------------------------|--------------------|-------------------|----------------------|----------------------|------------------------|----------------|---------------|-----------------------------|-------------------|-------------------------|------------|-----------------|----------------------------|-------------------|-----------------|-----------------------|-----------------------|
|                                            |                    |                   |                      |                      | Main Plant.            | Standby Plant. | Maximum Load. |                             |                   | Generated or purchased. | Sold.      | Non-productive. | Percentage Non-productive. |                   |                 |                       |                       |
| <i>Hydro Stations.</i>                     |                    |                   |                      |                      |                        |                |               |                             |                   |                         |            |                 |                            |                   |                 |                       |                       |
| 1. Bluff ..                                | Borough            | 1903              | 1,800                | 315                  | Bulk                   | ..             | 36            | 452                         | 12.6              | 177,016                 | 113,968    | 63,048          | 35.6                       | A.C./D.C.         | 400/230/440/220 | 8                     | ..                    |
| 2. Coleridge ..                            | Public Works Dept. | 1915              | 210,000              | 119                  | 12,000                 | 1,500 (S)      | 13,180        | 74,231                      | 5.6               | 56,935,840              | 51,287,003 | 5,648,837       | 9.9                        | A.C.              | 11,000          | 376                   | 480                   |
| .. Ashburton ..                            | Power Board        | 1908              | (16,691)             | 1,870                | Bulk                   | 160 (O)        | (570)         | (3,275)                     | 5.8               | (1,326,850)             | 1,191,852  | 134,998         | 10.2                       | A.C.              | 400/230         | 448                   | ..                    |
| .. Banks Peninsula ..                      | Power Board        | 1920              | (4,000)              | 837                  | Bulk                   | 30 (W)         | (189)         | (1,184)                     | 6.3               | (588,886)               | 308,355    | 280,501         | 47.6                       | A.C.              | 400/230         | 189                   | 310                   |
| .. Christchurch ..                         | City Council       | 1904              | (95,000)             | 22,491               | Bulk                   | 750 (S)        | (6,460)       | (43,068)                    | 6.7               | (25,660,130)            | 22,511,181 | 3,148,949       | 12.3                       | A.C.              | 400/230         | 251                   | ..                    |
| .. Eyre ..                                 | County             | 1920              | (1,020)              | 124                  | Bulk                   | ..             | (118)         | (178)                       | 1.5               | (218,714)               | 174,971*   | 43,743*         | 20.0*                      | A.C.              | 400/230         | 21                    | ..                    |
| .. Halswell ..                             | County             | 1919              | (1,800)              | 174                  | Bulk                   | ..             | (86)          | (212)                       | 2.5               | (190,981)               | 152,785*   | 38,196*         | 20.0*                      | A.C.              | 400/230         | 22                    | ..                    |
| .. Heathcote ..                            | County             | 1914              | (5,000)              | 840                  | Bulk                   | ..             | (210)         | (1,178)                     | 5.6               | (722,534)               | 686,408    | 36,126          | 5.0                        | A.C.              | 400/230         | 26                    | ..                    |
| .. Kaipoi ..                               | Borough            | 1917              | (1,800)              | 465                  | Bulk                   | ..             | (134)         | (360)                       | 2.7               | (405,400)               | 324,320*   | 81,080*         | 20.0*                      | A.C.              | 400/230         | 20                    | ..                    |
| .. Kowai ..                                | County             | 1923              | (2,080)              | 236                  | Bulk                   | ..             | (26)          | (265)                       | 10.2              | (405,400)               | 324,320*   | 81,080*         | 20.0*                      | A.C.              | 400/230         | 20                    | ..                    |
| .. Lyttelton ..                            | Borough            | 1917              | (3,840)              | 421                  | Bulk                   | ..             | (152)         | (926)                       | 6.1               | (434,700)               | 408,184    | 26,516          | 6.1                        | A.C.              | 400/230         | 48                    | ..                    |
| .. Rangiora ..                             | Borough            | 1919              | (2,000)              | 391                  | Bulk                   | ..             | (86)          | (437)                       | 5.1               | (233,000)               | 186,400    | 46,600          | 20.0                       | A.C.              | 400/230         | 11                    | ..                    |
| .. " ..                                    | County             | 1918              | (3,135)              | 384                  | Bulk                   | ..             | (201)         | (516)                       | 2.6               | (382,461)               | 305,969*   | 76,492*         | 20.0*                      | A.C.              | 400/230         | 51                    | ..                    |
| .. Riccarton ..                            | Borough            | 1916              | (4,640)              | 945                  | Bulk                   | ..             | (157)         | (1,633)                     | 10.4              | (585,610)               | 500,193    | 85,417          | 14.6                       | A.C.              | 400/230         | 18                    | ..                    |
| .. Springs-Ellesmere ..                    | Power Board        | 1921              | (11,270)             | 1,278                | Bulk                   | ..             | (252)         | (1,769)                     | 7.0               | (503,754)               | 268,861    | 234,893         | 46.6                       | A.C.              | 400/230         | 165                   | ..                    |
| .. Sumner ..                               | Borough            | 1915              | (3,250)              | 715                  | Bulk                   | ..             | (100)         | (635)                       | 6.4               | (442,965)               | 354,372*   | 88,593*         | 20.0*                      | A.C.              | 400/230         | 18                    | ..                    |
| .. Tai Tapu Dairy Co. ..                   | Company            | 1915              | (5,600)              | 193                  | Bulk                   | ..             | (187)         | (431)                       | 2.3               | (481,679)*              | 385,343*   | 96,336*         | 20.0*                      | A.C.              | 400/230         | 37                    | ..                    |
| .. Timaru ..                               | Borough            | 1908              | (14,500)             | 2,009                | Bulk                   | 475 (S&G)      | (570)         | (3,539)                     | 6.2               | (1,769,180)             | 1,298,470  | 470,710         | 26.6                       | A.C.              | 400/230         | 52                    | ..                    |
| .. Waimairi ..                             | County             | 1916              | (11,535)             | 2,235                | Bulk                   | ..             | (351)         | (3,578)                     | 10.5              | (1,219,000)             | 975,200    | 243,800         | 20.0                       | A.C.              | 400/230         | 130                   | ..                    |
| 3. Dunedin (Waipori) ..                    | City               | 1907              | 78,000               | 15,412               | 9,000                  | 860 (O)        | 7,910         | 26,698                      | 3.4               | 30,987,230              | 23,120,676 | 7,866,554       | 25.4                       | A.C.              | 400/230         | 415                   | 700                   |
| 4. Gore ..                                 | Borough            | 1905              | 3,750                | 853                  | 240                    | ..             | 220           | 840                         | 3.8               | 480,340                 | 432,306    | 48,034          | 10.0                       | A.C.              | 400/230         | 34                    | 23                    |
| 5. Havelock North ..                       | Town Board         | 1915              | 1,500                | 267                  | 176                    | ..             | 110           | ..                          | ..                | 410,300                 | 237,981    | 172,319         | 42.0                       | A.C.              | 400/230         | 17                    | 50                    |
| 6. Havelock South ..                       | Town Board         | 1918              | 300                  | 70                   | 15                     | ..             | 16            | ..                          | ..                | 29,800*                 | 23,840*    | 5,960*          | 20.0*                      | D.C.              | 460/230         | 2                     | 225                   |
| 7. Hawera County Electric Co. (Limited) .. | Company            | 1903              | 6,248                | 2,084                | 625                    | 135 (O)        | 438           | 3,462                       | 7.9               | 1,091,770               | 932,755    | 159,015         | 14.6                       | A.C.              | 400/230         | 73                    | 57                    |
| 8. Kanieri Electric Limited, (Hokitika) .. | Company            | 1908              | 2,500                | 366                  | 700                    | 150 (S)        | 580           | 10,258                      | 1.8               | 2,522,700               | 2,074,730  | 447,970         | 17.8                       | A.C.              | 400/230         | 18                    | 250                   |
| 9. Kaponga† ..                             | Town Board         | 1916              | 800                  | 312                  | 140                    | ..             | 56            | 215                         | 3.8               | 94,863                  | 90,415     | 4,448           | 4.7                        | A.C./D.C.         | 400/230         | 37                    | 48                    |
| 10. Mackenzie County (Fairlie) ..          | County             | 1922              | 1,900                | 154                  | 40                     | ..             | 24            | 117                         | 4.9               | 50,158                  | 44,519     | 5,639           | 11.2                       | A.C.              | 400/230         | 6                     | 66                    |
| 11. Mangaweka ..                           | Town Board         | 1913              | 370                  | 109                  | 40                     | 28 (O)         | 37            | 190                         | 5.2               | 346,000                 | 46,385     | 299,615†        | 86.5                       | A.C.              | 400/230         | 7                     | 37                    |
| 12. Mataura† ..                            | Borough            | 1913              | 1,280                | 237                  | 75                     | ..             | 48*           | ..                          | ..                | 57,589                  | 48,342     | 9,247           | 16.0                       | A.C./S.P.         | 440/220         | 25                    | 23                    |
| 13. Murchison ..                           | County             | 1922              | 450                  | 106                  | 100                    | ..             | 87            | 136                         | 1.6               | 174,200                 | 110,000    | 64,200          | 36.9                       | A.C.              | 400/230         | 14                    | 105                   |
| 14. New Plymouth ..                        | Borough            | 1906              | 28,800               | 4,250                | 3,000                  | ..             | 1,400         | 7,097                       | 4.3               | 4,927,790               | 2,855,161  | 2,072,629       | 42.1                       | A.C.              | 400/230         | 230                   | 120&                  |
| .. Inglewood ..                            | Borough            | 1905              | (1,300)              | 398                  | Bulk                   | 120 (W)        | (78)          | (852)                       | 10.9              | (283,127)               | 211,209    | 71,918          | 25.4                       | A.C.              | 400/230         | 10                    | 38                    |
| .. Waitara ..                              | Borough            | 1907              | (1,500)              | 330                  | Bulk                   | 85 (G)         | (55)          | (162)                       | 2.9               | (82,500)                | 58,051     | 24,449          | 29.6                       | D.C.              | 460/230         | 10                    | ..                    |

\* Assessed from incomplete returns. † Last year's figures, this year's not available.

NOTE.—Figures in parentheses not included in totals.

‡ Includes units used for street lighting.

TABLE P.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1925—continued.  
(G = gas; O = oil; S = steam; W = water.)

| Title.                                          | Ownership.         | Supply commenced. | Population supplied. | Number of Consumers. | Capacity in Kilowatts. |                |               | Connected Load (Kilowatts). | Diversity Factor. | Units.                  |              |                 | Annual Load-factor Percentage. | System of Supply. | Supply Voltage. | Route-miles of Lines. | Static Head, in Feet. |
|-------------------------------------------------|--------------------|-------------------|----------------------|----------------------|------------------------|----------------|---------------|-----------------------------|-------------------|-------------------------|--------------|-----------------|--------------------------------|-------------------|-----------------|-----------------------|-----------------------|
|                                                 |                    |                   |                      |                      | Main Plant.            | Standby Plant. | Maximum Load. |                             |                   | Generated or purchased. | Sold.        | Non-productive. |                                |                   |                 |                       |                       |
| Hydro Stations—continued.                       |                    |                   |                      |                      |                        |                |               |                             |                   |                         |              |                 |                                |                   |                 |                       |                       |
| 15. Ohakune ..                                  | Borough            | 1914              | 2,500                | 351                  | 108                    | 113 (O)        | 85            | 296                         | 3.5               | 125,184                 | 112,012      | 13,172          | 10.5                           | A.C.              | 400/230         | 18                    | 42                    |
| 16. Opunake ..                                  | Power Board        | 1921              | 4,000                | 600                  | 320                    | ..             | 220           | 594                         | 2.7               | 461,600                 | 286,971      | 174,629         | 37.8                           | A.C.              | 400/230         | 100                   | 38                    |
| 17. Patea ..                                    | Borough            | 1901              | 1,750                | 274                  | 135                    | ..             | 79            | 168                         | 2.1               | 186,980                 | 151,480      | 35,500          | 19.0                           | A.C./S.P.         | 100             | 13                    | 78                    |
| 18. Queenstown ..                               | Borough            | 1924              | 770                  | 152                  | 60                     | ..             | 32            | 125                         | 3.9               | 29,590                  | 10,485       | 19,105          | 64.5                           | A.C.              | 400/230         | 4                     | 520                   |
| 19. Raetihi ..                                  | Borough            | 1917              | 4,500                | 441                  | 100                    | ..             | 78            | 561                         | 7.2               | 230,000                 | 202,000      | 28,000          | 12.2                           | A.C.              | 400/230         | 28                    | 350                   |
| 20. Reefton Electric Light and Power Co. (Ltd.) | Company            | 1887              | 1,200                | 241                  | 80                     | ..             | 60            | ..                          | ..                | 206,000*                | 164,800*     | 41,200*         | 20.0*                          | D.C.              | 230             | 8                     | 27                    |
| 21. Taihape ..                                  | Borough            | 1912              | 2,145                | 483                  | 175                    | ..             | 179           | 673                         | 3.8               | 281,930                 | 247,690      | 34,240          | 12.2                           | D.C.              | 460/230         | 10                    | 30                    |
| 22. Taumarunui ..                               | Borough            | 1924              | 2,800                | 550                  | 425                    | ..             | 420           | 945                         | 2.2               | 558,457                 | 396,406      | 162,051         | 29.0                           | A.C.              | 400/230         | 15                    | 25                    |
| 23. Tauranga ..                                 | Borough            | 1915              | 4,300                | 880                  | 800                    | ..             | 684           | 2,542                       | 3.7               | 3,858,225               | 2,607,490    | 1,250,735       | 32.4                           | A.C.              | 400/230         | 68                    | 110                   |
| 24. Te Puke ..                                  | Town Board         | 1921              | (900)                | 189                  | Bulk                   | ..             | (65)          | (304)                       | 4.7               | (144,500)               | 121,077      | 23,423          | 16.2                           | A.C.              | 400/230         | 9                     | ..                    |
| 25. Tourist Dept. (Rotorua)                     | Government         | 1901              | 3,886                | 1,071                | 350                    | 20 (O)         | 265           | 1,512                       | 5.7               | 816,124                 | 556,708      | 259,416         | 31.8                           | A.C.              | 200/115         | 30                    | 14                    |
| 26. Waikato (Horahora)                          | Public Works Dept. | 1913              | 79,000               | 12                   | 6,300                  | 1,500 (G)      | 8,300         | 31,757                      | 3.8               | 45,643,664              | 41,281,159   | 4,362,505       | 9.6                            | A.C.              | 11,000          | 132                   | 27                    |
| 27. Cambridge                                   | Power Board        | 1921              | (6,000)              | 903                  | Bulk                   | ..             | (381)         | (1,824)                     | 4.8               | (1,367,000)             | 1,059,050    | 307,950         | 22.5                           | A.C.              | 400/230         | 123                   | ..                    |
| 28. Central ..                                  | Power Board        | 1921              | (11,700)             | 2,102                | Bulk                   | ..             | (744)         | (3,208)                     | 4.3               | (2,462,573)             | 1,933,251    | 529,322         | 21.5                           | A.C.              | 400/230         | 310                   | ..                    |
| 29. Hamilton                                    | Borough            | 1913              | (15,000)             | 2,582                | Bulk                   | ..             | (680)         | (3,584)                     | 5.3               | (1,796,454)             | 1,405,004    | 391,450         | 21.8                           | A.C.              | 400/230         | 49                    | ..                    |
| 30. Te Aroha                                    | Borough            | 1906              | (2,250)              | 578                  | Bulk                   | 150 (W)        | (158)         | (838)                       | 5.3               | (368,616)               | 323,375      | 45,241          | 12.3                           | A.C.              | 400/230         | 15                    | 560                   |
| 31. Te Awamutu                                  | Power Board        | 1920              | (8,500)              | 1,018                | Bulk                   | ..             | (536)         | (2,037)                     | 3.8               | (1,660,051)             | 1,334,565    | 325,486         | 19.6                           | A.C.              | 400/230         | 267                   | ..                    |
| 32. Thames ..                                   | Borough            | 1914              | (5,000)              | 957                  | Bulk                   | 205 (W & O)    | (210)         | (1,278)                     | 6.1               | (762,738)               | 686,299      | 76,439          | 10.0                           | D.C./A.C.         | 460/400/230     | 19                    | 130                   |
| 33. Thames Valley                               | Power Board        | 1921              | (30,000)             | 3,361                | Bulk                   | ..             | (2,862)       | (10,170)                    | 3.6               | (10,196,688)            | 8,157,350    | 2,039,338       | 20.0                           | A.C.              | 400/230         | 499                   | ..                    |
| 26. Waimea Electric Supply Co. (Brightwater)    | Company            | 1911              | 4,000                | 476                  | 100                    | 45 (G)         | 103           | 290                         | 2.8               | 110,000                 | 88,000       | 22,000          | 20.0                           | A.C.              | 400/230         | 32                    | 11                    |
| 27. Wairarapa ..                                | Power Board        | 1923              | 17,500               | 1,847                | Bulk                   | 837 (W)        | 470           | ..                          | ..                | ..                      | ..           | ..              | ..                             | A.C.              | 400/230         | 291                   | 435 & 290             |
| 28. Wairoa (Waikaremoana)                       | Power Board        | 1923              | 4,800                | 90                   | 700                    | ..             | 588           | 1,565                       | 2.7               | 1,639,299               | 1,412,818    | 226,481         | 13.8                           | A.C.              | 400/230         | 51                    | 680                   |
| 29. Wairoa ..                                   | Borough            | 1913              | (2,100)              | 475                  | Bulk                   | ..             | (109)         | (736)                       | 6.8               | (429,010)               | 364,660      | 64,350          | 15.0                           | A.C.              | 400/230         | 13                    | ..                    |
| 30. Waitaki (Oamaru)                            | Power Board        | 1918              | 17,113               | 1,272                | 270                    | ..             | 284           | 1,950                       | 6.9               | 741,055                 | 617,489      | 123,566         | 16.7                           | A.C.              | 400/230         | 31                    | 250                   |
| 31. Waverley ..                                 | Town Board         | 1916              | 650                  | 175                  | 40                     | ..             | 15            | 147                         | 9.8               | 30,673                  | 30,673       | 3,067           | 9.1                            | A.C.              | 400/230         | 6                     | 60                    |
| 32. Whakatane                                   | Borough            | 1922              | 1,700                | 330                  | 240                    | ..             | 140           | 485                         | 3.5               | 389,970                 | 190,170      | 193,800         | 49.7                           | A.C.              | 400/230         | 30                    | 276                   |
| 33. Wilsons (N.Z.) Portland Cement Co. (Wairua) | Company            | 1916              | 6,680                | 34                   | 2,000                  | ..             | 2,200         | ..                          | ..                | 10,147,959              | 8,189,710    | 1,958,249       | 19.3                           | A.C.              | 400/230         | 31                    | 130                   |
| 34. Kamo                                        | Town Board         | 1923              | (480)                | 68                   | Bulk                   | ..             | (28)          | 97                          | 3.5               | (41,115)*               | 32,892       | 8,223*          | 20.0*                          | A.C.              | 400/230         | 5                     | ..                    |
| 35. Whangarei                                   | Borough            | 1915              | (6,000)              | 1,445                | Bulk                   | ..             | (318)         | 2,294                       | 7.2               | (879,010)               | 717,745      | 161,265         | 18.3                           | A.C.              | 400/230         | 44                    | ..                    |
| 36. Winton                                      | Borough            | 1914              | 800                  | 187                  | Bulk                   | ..             | ..            | 117                         | ..                | 40,701                  | 35,836       | 4,865           | 12.0                           | A.C.              | 400/230         | 5                     | ..                    |
| Totals                                          | ..                 | ..                | 497,792              | 84,134               | 38,354                 | 7,163          | 38,813        | 159,814                     | 4.1               | 163,786,074             | 128,766,428† | 35,019,646      | 21.4                           | ..                | ..              | 5,054                 | ..                    |

\* Assessed from incomplete returns.

† Units retained.

NOTE.—Figures in parentheses not included in totals.



TABLE Q.—SUMMARY OF RETURNS OF OPERATING RESULTS FOR THE YEAR ENDED 31ST MARCH, 1925—continued.

| Title.                                             | Capital Outlay at 31st March, 1925. | Gross Revenue (not including interest). | Working-expenses.* | Capital Charges. | Total Annual Costs. | Net Results. |        | Average Revenue. |                 | Working-costs. |                 | Capital Charges. |                 | Total Costs.   |                 | Retail Selling-rates. |          |        |
|----------------------------------------------------|-------------------------------------|-----------------------------------------|--------------------|------------------|---------------------|--------------|--------|------------------|-----------------|----------------|-----------------|------------------|-----------------|----------------|-----------------|-----------------------|----------|--------|
|                                                    |                                     |                                         |                    |                  |                     | Profit.      | Loss.  | Per Unit sold.   | Per Kw. of Max. | Per Unit sold. | Per Kw. of Max. | Per Unit sold.   | Per Kw. of Max. | Per Unit sold. | Per Kw. of Max. | Lighting.             | Heating. | Power. |
|                                                    |                                     |                                         |                    |                  |                     | £            | £      | d.               | £               | d.             | £               | d.               | £               | d.             | £               | s. d.                 | s. d.    | s. d.  |
| <i>Hydro Stations—continued.</i>                   |                                     |                                         |                    |                  |                     |              |        |                  |                 |                |                 |                  |                 |                |                 |                       |          |        |
| 1. Coleridge—continued.                            |                                     |                                         |                    |                  |                     |              |        |                  |                 |                |                 |                  |                 |                |                 |                       |          |        |
| Timaru ..                                          | 91,688                              | 20,179                                  | 11,770             | 6,674a           | 18,444              | 1,735        | ..     | 3-50             | 34-0            | 2-18           | 20-6            | 1-23             | 11-7            | 3-41           | 32-3            | 0 8                   | 0 4      | s. d.  |
| Waimairi ..                                        | 48,493                              | 12,845                                  | 6,846              | 2,415g           | 9,261               | 3,584        | ..     | 3-16             | 36-6            | 1-68           | 19-5            | 0-59             | 6-9             | 2-27           | 26-4            | 0 6                   | 0 3      | 0 3    |
| 3. Dunedin (Waipori)                               | 907,869                             | 130,186                                 | 47,328             | 68,963e          | 116,291             | 13,895       | ..     | 1-33             | 16-5            | 0-49           | 6-0             | 0-72             | 8-7             | 1-21           | 14-7            | 0 5                   | 0 2      | 0 2    |
| 4. Gore ..                                         | 27,057                              | 7,255                                   | 4,731              | 1,646a           | 3,377               | 878          | ..     | 3-75             | 30-7            | 2-63           | 21-5            | 0-92             | 7-5             | 3-55           | 29-0            | 0 7                   | 0 3      | 0 3    |
| 5. Havelock North ..                               | 23,547                              | 3,249                                   | 1,110              | 1,734a           | 2,844               | 405          | ..     | 3-27             | 29-5            | 1-12           | 10-1            | 1-75             | 15-8            | 2-87           | 25-9            | 0 7                   | 0 6      | 0 6    |
| 6. Havelock South ..                               | 1,950                               | 424                                     | 357                | ..               | 357                 | 67           | ..     | 4-27             | 27-4            | 3-59           | 23-0            | ..               | ..              | 3-59           | 23-0            | Flat rates.           | ..       | ..     |
| 7. Hawera County Electric Co., Ltd.                | 81,392                              | 21,392                                  | 8,370              | 6,556b           | 14,926              | 6,466        | ..     | 5-50             | 44-7            | 2-15           | 16-8            | 1-69             | 14-9            | 3-84           | 31-7            | 0 7½                  | 0 2½     | 0 3½   |
| 8. Kanieri Electric Limited (Hokitika)             | 34,256                              | 5,716                                   | 4,229              | 1,325d           | 5,554               | 162          | ..     | 0-65             | 9-7             | 0-49           | 7-3             | 0-15             | 2-3             | 0-64           | 9-6             | 0 6                   | 0 1½     | 0 3    |
| 9. Kaponga† ..                                     | 16,342                              | 2,115                                   | 1,199              | 581a             | 1,780               | 335          | ..     | 5-34             | 36-0            | 3-19           | 21-4            | 1-55             | 10-3            | 4-74           | 31-7            | 0 9                   | 0 4      | 0 4    |
| 10. Mackenzie County (Fairlie)                     | 10,711                              | 1,300                                   | 160                | 644a             | 804                 | 496          | ..     | 6-30             | 49-1            | 0-86           | 6-7             | 3-47             | 26-8            | 4-23           | 33-5            | 0 9                   | 0 4½     | 0 4½   |
| 11. Mangaweka ..                                   | 14,784                              | 672                                     | 640                | 301a             | 941                 | ..           | 269    | 3-38             | 17-9            | 3-31           | 17-5            | 1-56             | 8-2             | 4-87           | 25-7            | 1 0                   | 0 4½     | ..     |
| 12. Mataura† ..                                    | 4,379                               | 1,173                                   | 1,009              | 120              | 1,129               | 44           | ..     | 5-09             | 20-5            | 5-00           | 20-2            | 0-59             | 2-5             | 5-59           | 22-7            | 0 6                   | 0 2½     | 0 2½   |
| 13. Murchison ..                                   | 15,200                              | 1,455                                   | 570                | 834a             | 1,404               | 51           | ..     | 2-98             | 15-7            | 1-24           | 6-6             | 1-82             | 9-6             | 3-06           | 16-2            | Flat rates.           | ..       | ..     |
| 14. New Plymouth ..                                | 346,883                             | 38,187                                  | 13,813             | 29,190e          | 43,003              | ..           | 4,816  | 2-95             | 25-1            | 1-16           | 9-9             | 2-46             | 20-9            | 3-62           | 30-8            | 0 7                   | 0 2      | 0 2    |
| 15. Ohakune ..                                     | 11,500                              | 2,999                                   | 1,971              | 750a             | 2,721               | 278          | ..     | 3-16             | 35-8            | 2-25           | 25-3            | 0-86             | 9-6             | 3-11           | 34-9            | 0 7                   | 0 2      | 0 2    |
| 16. Ohakune ..                                     | 9,168                               | 2,233                                   | 1,404              | 570a             | 1,974               | 259          | ..     | 8-24             | 38-4            | 5-81           | 25-5            | 2-36             | 10-4            | 8-17           | 35-9            | 0 10                  | 0 3      | 0 3    |
| 17. Opunake ..                                     | 15,873                              | 2,925                                   | 1,682              | 1,052f           | 2,734               | 191          | ..     | 5-59             | 30-7            | 3-61           | 19-8            | 3-22             | 12-4            | 5-87           | 32-2            | 0 9                   | 0 4      | 0 6    |
| 18. Patea ..                                       | 69,236                              | 5,538                                   | 1,747              | 4,790i           | 6,537               | ..           | 999    | 4-43             | 24-0            | 1-46           | 8-0             | 4-10             | 21-8            | 5-56           | 29-8            | ..                    | ..       | ..     |
| 19. Patea ..                                       | 9,206                               | 2,851                                   | 1,501              | 411a             | 1,912               | 939          | ..     | 4-23             | 33-8            | 2-38           | 19-0            | 0-65             | 5-2             | 3-03           | 24-2            | 0 8½                  | 0 4      | 0 3½   |
| 20. Queenstown ..                                  | 6,375                               | 201                                     | 183                | 349a             | 532                 | ..           | 331    | 4-60             | 6-3             | 4-19           | 5-7             | 7-99             | 10-9            | 12-18          | 16-6            | 0 6                   | 0 6      | 0 6    |
| 21. Raetihi ..                                     | 22,467                              | 3,727                                   | 1,067              | 1,841b           | 2,908               | 819          | ..     | 4-28             | 46-5            | 1-27           | 13-8            | 2-19             | 23-8            | 3-46           | 37-6            | 0 8                   | 0 3      | 0 2½   |
| 22. Reefton Electric Light and Power Co. (Limited) | 5,816                               | 3,212                                   | 2,265              | ..               | 2,265               | 947          | ..     | 4-39             | 50-2            | 3-30           | 37-8            | ..               | ..              | 3-30           | 37-8            | Flat rates.           | ..       | ..     |
| 23. Taihape ..                                     | 13,692                              | 4,523                                   | 2,912              | 653a             | 3,565               | 958          | ..     | 4-01             | 23-4            | 2-82           | 16-3            | 0-63             | 3-6             | 3-45           | 19-9            | 0 8                   | 0 1½     | 0 2    |
| 24. Taumarunui ..                                  | 61,530                              | 5,804                                   | 2,199              | 2,678a           | 4,877               | 727          | ..     | 3-25             | 12-8            | 1-33           | 5-2             | 1-62             | 6-4             | 2-95           | 11-6            | 0 9                   | 0 3      | 0 2    |
| 25. Tauranga ..                                    | 134,143                             | 12,272                                  | 3,426              | 4,198a           | 7,624               | 4,652        | ..     | 1-00             | 15-9            | 0-32           | 5-0             | 0-39             | 6-1             | 0-71           | 11-1            | 0 7                   | 0 1½     | 0 2    |
| Te Puke ..                                         | 9,730                               | 2,041                                   | 817                | 975b             | 1,792               | 249          | ..     | 4-01             | 31-1            | 1-62           | 12-6            | 1-93             | 15-0            | 3-55           | 27-6            | 0 10                  | 0 3½     | 0 3½   |
| 26. Tourist Dept. (Rotorua)                        | 52,654                              | 10,293                                  | 4,997              | 4,739b           | 9,736               | 557          | ..     | 4-29             | 37-2            | 2-15           | 18-9            | 2-04             | 17-9            | 4-19           | 36-8            | 0 7                   | 0 3      | 0 3    |
| 27. Waikato (Horoara)                              | 522,973                             | 65,185                                  | 14,106             | 34,025b          | 48,131              | 17,054       | ..     | 0-33             | 7-9             | 0-08           | 1-7             | 0-20             | 4-1             | 0-28           | 5-8             | ..                    | ..       | ..     |
| 28. Cambridge ..                                   | 95,188                              | 11,580                                  | 6,431              | 6,862c           | 13,293              | ..           | 1,713  | 2-44             | 28-3            | 1-46           | 16-9            | 1-55             | 18-0            | 3-01           | 34-9            | 0 9                   | 0 3      | 0 3    |
| Central ..                                         | 195,257                             | 24,505                                  | 11,159             | 12,490c          | 23,649              | 856          | ..     | 2-76             | 30-0            | 1-38           | 15-0            | 1-55             | 16-8            | 2-93           | 31-8            | 0 9                   | 0 1½     | 0 3    |
| Hamilton ..                                        | 51,570                              | 24,731                                  | 13,016             | 7,207a           | 20,223              | 4,508        | ..     | 4-22             | 36-3            | 2-22           | 19-1            | 1-23             | 10-6            | 3-45           | 29-7            | 0 6½                  | 0 2      | 0 2    |
| Te Aroha ..                                        | 16,681                              | 5,828                                   | 2,955              | 764a             | 3,719               | 2,109        | ..     | 3-87             | 33-0            | 2-19           | 18-7            | 0-57             | 4-8             | 2-76           | 23-5            | 0 7                   | 0 3      | 0 3    |
| Te Awamutu ..                                      | 131,610                             | 15,177                                  | 9,312              | 10,582a          | 19,894              | ..           | 4,717  | 2-51             | 26-1            | 1-67           | 17-4            | 1-90             | 19-7            | 3-57           | 37-1            | 0 8                   | 0 2      | 0 3    |
| Thames ..                                          | 29,396                              | 9,033                                   | 4,891              | 1,268a           | 6,159               | 2,874        | ..     | 2-93             | 39-9            | 1-71           | 23-3            | 0-44             | 6-0             | 2-15           | 29-3            | 0 10                  | 0 3      | 0 3    |
| Thames Valley ..                                   | 530,289                             | 68,863                                  | 31,840             | 38,551a          | 70,391              | ..           | 1,528  | 1-73             | 20-7            | 0-94           | 11-2            | 1-14             | 13-5            | 2-08           | 24-7            | 0 8                   | 0 3      | 0 3    |
| Waimea Electric Supply Co. (Brightwater)           | 16,873                              | 2,284                                   | 1,780              | 833b             | 2,613               | ..           | 329    | 6-20             | 22-1            | 4-86           | 17-3            | 2-27             | 8-1             | 7-13           | 25-4            | 0 9                   | 0 4      | 0 4    |
| 29. Wairapa ..                                     | 229,601                             | 16,749                                  | 4,416              | 4,266a           | 8,682               | 8,067        | ..     | ..               | 35-6            | ..             | 9-4             | ..               | 9-1             | ..             | 18-5            | 0 7                   | 0 3½     | 0 3    |
| 30. Wairoa (Waikarenoana)                          | 54,381                              | 7,739                                   | 5,692              | 2,614a           | 8,306               | ..           | 567    | 1-15             | 11-5            | 0-97           | 9-7             | 0-44             | 4-4             | 1-41           | 14-1            | ..                    | ..       | ..     |
| Wairoa ..                                          | 12,936                              | 4,329                                   | 2,631              | 3,448            | 3,448               | 881          | ..     | 2-76             | 38-5            | 1-73           | 24-2            | 0-54             | 7-5             | 2-27           | 31-7            | 0 6                   | 0 3      | 0 3    |
| 31. Waitaki (Oamaru)                               | 46,461                              | 11,127                                  | 5,419              | 5,684e           | 11,103              | 24           | ..     | 4-30             | 38-8            | 2-12           | 19-1            | 2-22             | 20-0            | 4-34           | 39-1            | 0 9                   | 0 3      | 0 3    |
| 32. Waverley ..                                    | 5,442                               | 971                                     | 488                | 291a             | 779                 | 192          | ..     | 7-75             | 62-7            | 3-81           | 32-5            | 2-28             | 19-4            | 6-09           | 51-9            | 0 10                  | 0 6      | ..     |
| 33. Whakatane ..                                   | 47,500                              | 2,810                                   | 1,112              | 3,357a           | 4,469               | ..           | 1,659  | 3-43             | 20-1            | 1-36           | 7-9             | 4-11             | 24-0            | 5-47           | 31-9            | 0 8½                  | 0 3      | 0 3    |
| 34. Wilson's (N.Z.) Portland Cement Co. (Wairua)   | 87,909                              | 12,099                                  | 6,322              | 4,734d           | 11,056              | 1,043        | ..     | 0-36             | 5-5             | 0-19           | 2-9             | 0-14             | 2-2             | 0-33           | 5-1             | 0 5                   | 0 2½     | 0 2½   |
| 35. Kamo ..                                        | 2,885                               | 597                                     | 515                | 218a             | 733                 | ..           | 136    | 4-35             | 21-3            | 3-76           | 18-4            | 1-59             | 7-8             | 5-35           | 26-2            | 0 9                   | 0 4      | 0 4    |
| 36. Whangarei ..                                   | 38,553                              | 11,552                                  | 5,495              | 1,469c           | 6,964               | 4,588        | ..     | 3-40             | 32-0            | 1-84           | 17-3            | 0-49             | 4-6             | 2-33           | 21-9            | 0 5½                  | 0 2      | 0 3    |
| 37. Winton ..                                      | 4,632                               | 1,094                                   | 740                | 475b             | 1,213               | ..           | 119    | 6-64             | ..              | 4-95           | ..              | 3-17             | ..              | 8-12           | ..              | 0 7                   | ..       | 0 4    |
| Totals ..                                          | 6,181,893                           | 913,638                                 | 384,162            | 449,011          | 833,173             | 102,479      | 22,013 | 1-70             | 23-6            | 0-72           | 9-9             | 0-84             | 11-6            | 1-56           | 21-5            | ..                    | ..       | ..     |

\* Includes wages, fuel, and maintenance.  
† Last year's figures, this year's not available.  
‡ Includes interest, depreciation, reserve funds, and sinking funds.  
§ Includes interest, depreciation, reserve funds, and sinking funds.  
|| Includes interest and depreciation, funds.  
a Includes interest, depreciation, and sinking funds.  
b Includes interest, depreciation, and sinking funds.  
c Includes interest, depreciation, and sinking funds.  
d Includes interest, depreciation, and sinking funds.  
e Includes interest, depreciation, and sinking funds.  
f Includes interest, depreciation, and sinking funds.  
g Includes interest, depreciation, and sinking funds.  
h Includes interest and reserve funds.  
i Includes interest and reserve funds.

TABLE R.—AVAILABLE WATER-POWER IN NEW ZEALAND: SCHEMES OF 1,000 HORSE-POWER AND OVER.

| Source of Power.                | Position of Power-house. | Available<br>Flow:<br>Cubic Feet<br>per<br>Second. | Available<br>Head. | Average Power<br>on 50-per-cent.<br>Load Factor. |         | Nearest City,<br>Port, or<br>Deep Water. | Distance. |
|---------------------------------|--------------------------|----------------------------------------------------|--------------------|--------------------------------------------------|---------|------------------------------------------|-----------|
| NORTH ISLAND.                   |                          |                                                    |                    |                                                  |         |                                          |           |
| <i>North Auckland District—</i> |                          |                                                    | Ft.                | H.p.                                             | Kw.     |                                          | Miles.    |
| Wairua Falls .. ..              | Wairua Falls .. ..       | 150*                                               | 130                | 3,200                                            | 2,400   | Whangarei ..                             | 18        |
| Omapere .. ..                   | Utakura Stream ..        | 11*                                                | 550                | 1,000                                            | 750     | ..                                       | ..        |
| <i>South Auckland District—</i> |                          |                                                    |                    |                                                  |         |                                          |           |
| Kaituna .. ..                   | Kaituna River .. ..      | 500†                                               | 784                | 65,000                                           | 50,000  | Tauranga ..                              | 25        |
|                                 |                          |                                                    |                    |                                                  |         | Auckland ..                              | 125       |
| Wairoa River .. ..              | Wairoa .. ..             | 420*                                               | 80                 | 5,600                                            | 4,200   | Tauranga ..                              | 20        |
| Waikato River .. ..             | Aratiatia Rapids ..      | 4,400†                                             | 170                | 136,000                                          | 100,000 | Auckland ..                              | 154       |
| Waikato River .. ..             | Orakeikorako Rapids      | 4,400†                                             | 35                 | 14,000                                           | 10,000  | Auckland ..                              | 148       |
| Waikato River .. ..             | Aniwhaniwha Falls        | 4,400†                                             | 80                 | 32,000                                           | 24,000  | Auckland ..                              | 142       |
| Waikato River .. ..             | Atiamuri Rapids ..       | 4,400†                                             | 25                 | 10,000                                           | 7,500   | Auckland ..                              | 139       |
| Waikato River .. ..             | Arapuni Gorge .. ..      | 5,300†                                             | 165                | 163,000                                          | 120,000 | Auckland ..                              | 105       |
| Waikato River .. ..             | Horahora Rapids ..       | 5,300†                                             | 27                 | 13,000                                           | 10,000  | Auckland ..                              | 97        |
| Pokaiwhenua River               | Horahora Rapids ..       | 165*                                               | 170                | 4,600                                            | 3,400   | Auckland ..                              | 97        |
| Marakopa Falls ..               | Marakopa .. ..           | 90                                                 | 420                | 3,100                                            | 2,300   | Te Kuiti ..                              | 27        |
| Wairere Falls ..                | Wairere Falls ..         | 160*                                               | 60                 | 1,600                                            | 1,200   | Te Kuiti ..                              | 22        |
| <i>Hawke's Bay District—</i>    |                          |                                                    |                    |                                                  |         |                                          |           |
| Waikaremoana ..                 | Upper Waikaretaheke      | 530†                                               | 1,100              | 97,000                                           | 75,000  | Gisborne ..                              | 50        |
| Waikaremoana ..                 | Lower Waikaretaheke      | 530†                                               | 360                | 32,000                                           | 24,000  | Napier ..                                | 60        |
| Te Reinga Falls ..              | Te Reinga Falls ..       | 124                                                | 125                | 1,300                                            | 1,000   | Gisborne ..                              | 35        |
| Waikohu River ..                | Waikohu .. ..            | 45†                                                | 847                | 6,000                                            | 4,500   | Gisborne ..                              | 28        |
| <i>Wanganui District—</i>       |                          |                                                    |                    |                                                  |         |                                          |           |
| Mangawhero River                | Raukawa Falls ..         | 125                                                | 90                 | 1,000                                            | 750     | Wanganui ..                              | 45        |
| Mangawhero River                | Wanganui River ..        | 125                                                | 680                | 7,100                                            | 6,950   | Wanganui ..                              | 24        |
| Rangitikei River ..             | Makohine .. ..           | 1,500†                                             | 300                | 75,000                                           | 56,000  | Wanganui ..                              | 48        |
| Wangaehu River ..               | Wangaehu River ..        | 260                                                | 70                 | 1,500                                            | 1,100   | Wanganui ..                              | 25        |
| Karioi .. ..                    | Karioi .. ..             | 300*                                               | 180                | 8,800                                            | 6,600   | Wanganui ..                              | 60        |
| <i>Taranaki District—</i>       |                          |                                                    |                    |                                                  |         |                                          |           |
| Waitara River ..                | Waitara River ..         | 400                                                | 140                | 4,600                                            | 3,600   | New Plymouth                             | 12        |
| Waiwakaiho ..                   | Waiwakaiho ..            | 150†                                               | 250                | 6,200                                            | 4,800   | New Plymouth                             | 4         |
| Manganui River ..               | Waitara River ..         | 415†                                               | 340                | 26,000                                           | 19,400  | New Plymouth                             | 25        |
| <i>Wellington District—</i>     |                          |                                                    |                    |                                                  |         |                                          |           |
| Mangahao River ..               | Shannon .. ..            | 160†                                               | 895                | 24,000                                           | 18,000  | Wellington ..                            | 65        |
| Makuri River ..                 | Makuri Gorge ..          | 100*                                               | 384                | 6,400                                            | 4,800   | Pahiatua ..                              | 20        |
| Waiohine .. ..                  | Woodside .. ..           | 120*                                               | 120                | 2,400                                            | 1,800   | Masterton ..                             | 15        |
| Hutt River .. ..                | Mangaroa .. ..           | 200†                                               | 330                | 11,000                                           | 8,300   | Wellington ..                            | 24        |
| Tauherenikau ..                 | Featherston ..           | 150*                                               | 440                | 11,000                                           | 8,300   | Wairarapa ..                             | ..        |
| Kourarau .. ..                  | Kourarau .. ..           | 20                                                 | 755                | 2,680                                            | 2,000   | Masterton ..                             | 12        |
| Totals—North Island             |                          |                                                    | ..                 | 776,080                                          | 582,650 |                                          |           |

\* Signifies daily storage available to utilize 50-per-cent. load factor.

† Signifies seasonal storage made available.

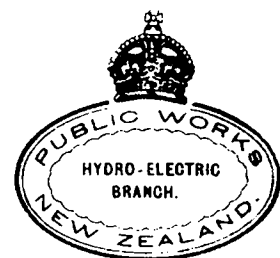


TABLE R.—AVAILABLE WATER-POWER IN NEW ZEALAND—*continued*.

| Source of Power.                     | Position of Power-house. | Available Flow: Cubic Feet per Second. | Available Head. | Average Power on 50-per-cent. Load Factor. |           | Nearest City, Port, or Deep Water. | Distance. |
|--------------------------------------|--------------------------|----------------------------------------|-----------------|--------------------------------------------|-----------|------------------------------------|-----------|
| SOUTH ISLAND.                        |                          |                                        |                 |                                            |           |                                    |           |
|                                      |                          |                                        | Ft.             | H.p.                                       | Kw.       |                                    | Miles.    |
| <i>Marlborough District—</i>         |                          |                                        |                 |                                            |           |                                    |           |
| Clarence .. ..                       | Ericaburn .. ..          | 640                                    | 158             | 8,300                                      | 6,300     | Blenheim ..                        | 45        |
| Waihopai River .. ..                 | Waihopai Gorge .. ..     | 130*                                   | 96              | 2,000                                      | 1,500     | Blenheim ..                        | 28        |
| <i>Nelson and Buller District—</i>   |                          |                                        |                 |                                            |           |                                    |           |
| Boulder Lake .. ..                   | Aorere River .. ..       | 50*                                    | 2,600           | 22,000                                     | 16,000    | Golden Bay ..                      | 10        |
| Rotoiti Lake .. ..                   | Buller River .. ..       | 200†                                   | 600             | 20,000                                     | 15,000    | Nelson ..                          | 50        |
| Rotoroa Lake .. ..                   | Gowan River .. ..        | 900†                                   | 400             | 60,000                                     | 45,000    | Nelson ..                          | 60        |
| Inangahua River .. ..                | Blackwater River .. ..   | 78                                     | 125             | 8,000                                      | 6,000     | Westport ..                        | 20        |
| Four-mile Creek .. ..                | Four-mile Creek .. ..    | 24*                                    | 450             | 2,000                                      | 1,500     | Westport ..                        | 4         |
| <i>Westland District—</i>            |                          |                                        |                 |                                            |           |                                    |           |
| Lake Brunner .. ..                   | Stillwater .. ..         | 1,750                                  | 200             | 29,000                                     | 22,000    | Greymouth ..                       | 10        |
| Kumara Water-race .. ..              | Kumara .. ..             | 87                                     | 330             | 2,400                                      | 1,800     | Greymouth ..                       | 12        |
| Otira River .. ..                    | Otira .. ..              | 40                                     | 700             | 2,300                                      | 1,700     | Greymouth ..                       | 52        |
| Rolleston River .. ..                | Otira .. ..              | 36                                     | 700             | 2,000                                      | 1,500     | Greymouth ..                       | 52        |
| Kanieri Lake .. ..                   | Kanieri River .. ..      | 100                                    | 330             | 2,800                                      | 2,100     | Hokitika ..                        | 12        |
| Toaroa River .. ..                   | Toaroa River .. ..       | 150                                    | 760             | 10,000                                     | 7,500     | Hokitika ..                        | 17        |
| Whitcombe River .. ..                | Hokitika River .. ..     | 250                                    | 800             | 16,000                                     | 12,000    | Hokitika ..                        | 20        |
| Kakapohia River .. ..                | Kakapohia River .. ..    | 100                                    | 580             | 4,800                                      | 3,600     | Hokitika ..                        | 26        |
| Wanganui River .. ..                 | Hende's Ferry .. ..      | 830                                    | 580             | 40,000                                     | 30,000    | Hokitika ..                        | 36        |
| Wataroa River .. ..                  | Wataroa .. ..            | 1,360                                  | 700             | 80,000                                     | 60,000    | Hokitika ..                        | 48        |
| <i>Canterbury District—</i>          |                          |                                        |                 |                                            |           |                                    |           |
| Clarence River .. ..                 | Jollie's Pass .. ..      | 200                                    | 1,160           | 20,000                                     | 15,000    | Christchurch ..                    | 90        |
| Clarence River .. ..                 | Conway River .. ..       | 1,150                                  | 1,050           | 100,000                                    | 75,000    | Christchurch ..                    | 90        |
| Waiau-ua River .. ..                 | Culverden .. ..          | 1,600                                  | 200             | 27,000                                     | 20,000    | Christchurch ..                    | 75        |
| Waimakariri River .. ..              | Gorge Bridge .. ..       | 1,000*                                 | 90              | 15,000                                     | 11,000    | Christchurch ..                    | 30        |
| Waimakariri River .. ..              | Otaramea .. ..           | 1,000*                                 | 150             | 30,150                                     | 22,500    | Christchurch ..                    | 42        |
| Lake Coleridge .. ..                 | Rakaia River .. ..       | 100†                                   | 480             | 8,000                                      | 6,000     | Christchurch ..                    | 65        |
| Acheron River .. ..                  | Rakaia River .. ..       | 50†                                    | 480             | 4,000                                      | 3,000     | Christchurch ..                    | 65        |
| Harper River .. ..                   | Rakaia River .. ..       | 320†                                   | 480             | 25,000                                     | 18,000    | Christchurch ..                    | 65        |
| Wilberforce River .. ..              | Rakaia River .. ..       | 1,100                                  | 480             | 44,000                                     | 33,000    | Christchurch ..                    | 65        |
| Rakaia River .. ..                   | Gorge Bridge .. ..       | 2,600                                  | 30              | 6,500                                      | 4,800     | Christchurch ..                    | 50        |
| Lake Heron .. ..                     | Rakaia River .. ..       | 300                                    | 200             | 5,000                                      | 3,750     | Christchurch ..                    | 88        |
| Opihi River .. ..                    | Opihi Gorge .. ..        | 200                                    | 400             | 6,700                                      | 5,000     | Timaru ..                          | 30        |
| Pukaki Lake .. ..                    | Pukaki .. ..             | 5,000†                                 | 460             | 50,000                                     | 37,000    | Timaru ..                          | 85        |
| Tekapo Lake .. ..                    | Fairlie .. ..            | 5,100†                                 | 900             | 400,000                                    | 300,000   | Timaru ..                          | 40        |
| Ohau Lake .. ..                      | Waitaki River .. ..      | 5,000†                                 | 300             | 125,000                                    | 90,000    | Timaru ..                          | 85        |
| <i>Otago and Southland District—</i> |                          |                                        |                 |                                            |           |                                    |           |
| Ahuriri River .. ..                  | Waitaki River .. ..      | 600                                    | 200             | 10,000                                     | 7,500     | Oamaru ..                          | 62        |
| Waitaki River .. ..                  | Waitaki River .. ..      | 15,000                                 | 30              | 37,000                                     | 28,000    | Oamaru ..                          | 60        |
| Waipori Falls .. ..                  | Waipori River .. ..      | 230†                                   | 700             | 26,800                                     | 20,000    | Dunedin ..                         | 30        |
| Lee Stream .. ..                     | Outram .. ..             | 15*                                    | 750             | 1,800                                      | 1,300     | Dunedin ..                         | 18        |
| Deep Stream .. ..                    | Taieri River .. ..       | 110                                    | 900             | 8,400                                      | 6,300     | Dunedin ..                         | 20        |
| Taieri River .. ..                   | Deep Stream .. ..        | 700                                    | 220             | 12,000                                     | 9,000     | Dunedin ..                         | 44        |
| Talla Burn .. ..                     | Clutha River .. ..       | 30                                     | 890             | 2,200                                      | 1,600     | Dunedin ..                         | 60        |
| Teviot River .. ..                   | Roxburgh .. ..           | 100†                                   | 1,900           | 30,000                                     | 21,000    | Dunedin ..                         | 90        |
| Manuherikia River .. ..              | Chatto Creek .. ..       | 200                                    | 350             | 5,800                                      | 4,400     | Dunedin ..                         | 127       |
| Hawea Lake .. ..                     | Wanaka Lake .. ..        | 2,500†                                 | 205             | 80,000                                     | 60,000    | Dunedin ..                         | 170       |
| Shotover .. ..                       | Wakatipu Lake .. ..      | 500                                    | 250             | 10,000                                     | 7,500     | Invercargill ..                    | 112       |
| Lake Hall .. ..                      | Doubtful Sound .. ..     | 220                                    | 2,625           | 48,000                                     | 36,000    | On seaboard ..                     | ..        |
| Lake Cecil .. ..                     | Lake Te Anau .. ..       | 200                                    | 900             | 15,000                                     | 11,200    | On seaboard ..                     | ..        |
| Lake Hilda .. ..                     | Lake Te Anau .. ..       | 550                                    | 1,190           | 55,000                                     | 41,080    | On seaboard ..                     | ..        |
| Lake Te Anau .. ..                   | George Sound .. ..       | 12,630                                 | 694             | 1,600,000                                  | 1,200,000 | On seaboard ..                     | ..        |
| Lake Manapouri .. ..                 | Smith Sound .. ..        | 8,400†                                 | 600             | 840,000                                    | 630,000   | On seaboard ..                     | ..        |
| Bowen Falls .. ..                    | Milford Sound .. ..      | 700                                    | 600             | 35,000                                     | 25,000    | On seaboard ..                     | ..        |
| Lake Monowai .. ..                   | Waiau River .. ..        | 500†                                   | 160             | 16,000                                     | 12,000    | Invercargill ..                    | 60        |
| Lake Hauroto .. ..                   | Tewaewae Bay .. ..       | 2,300                                  | 514             | 100,000                                    | 75,000    | Invercargill ..                    | 51        |
| Totals—South Island                  |                          |                                        | ..              | ..                                         | 4,110,950 | 3,074,430                          |           |

\* Signified daily storage available to utilize 50-per-cent. load factor.

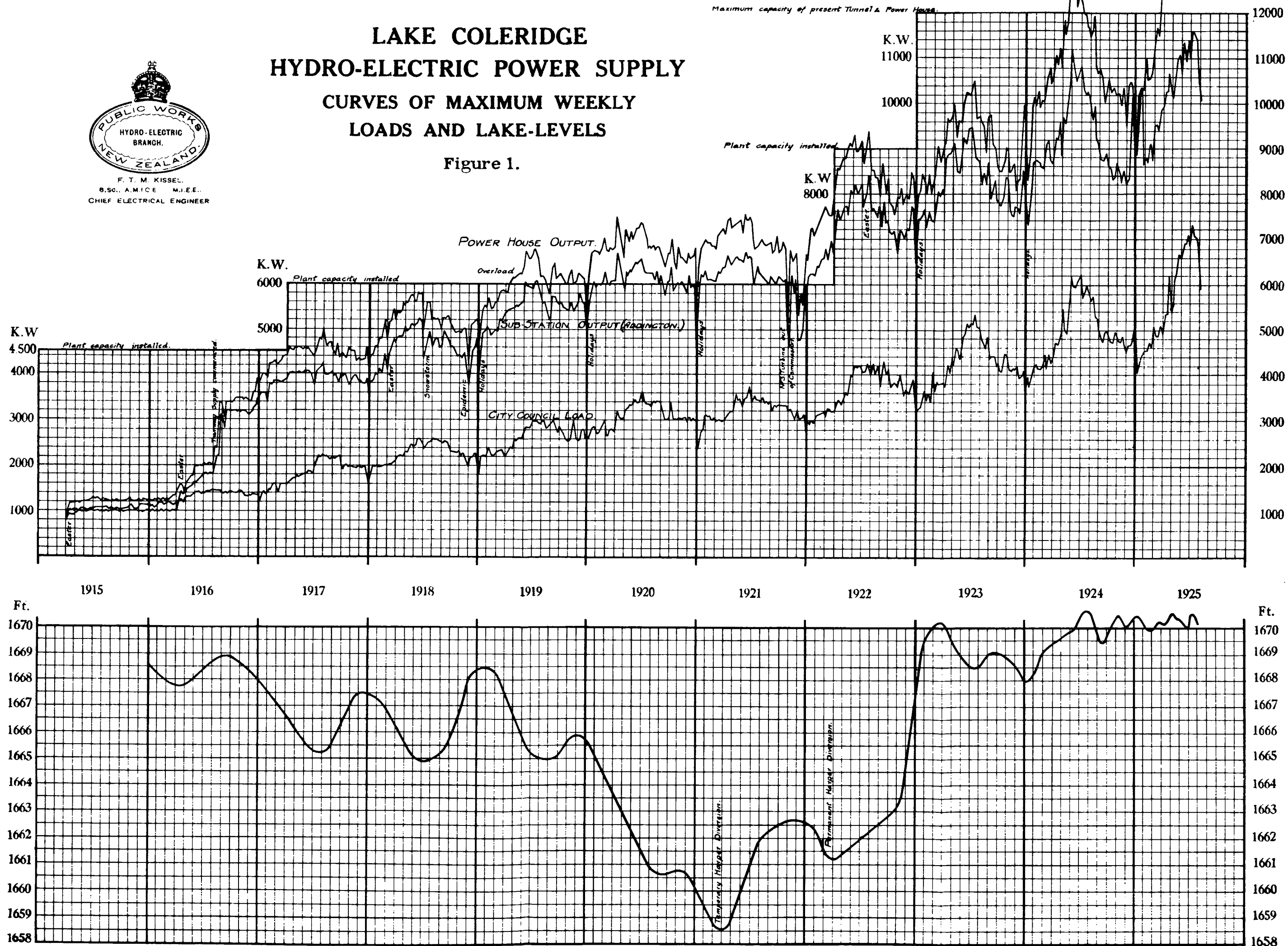
† Signifies seasonal storage made available.



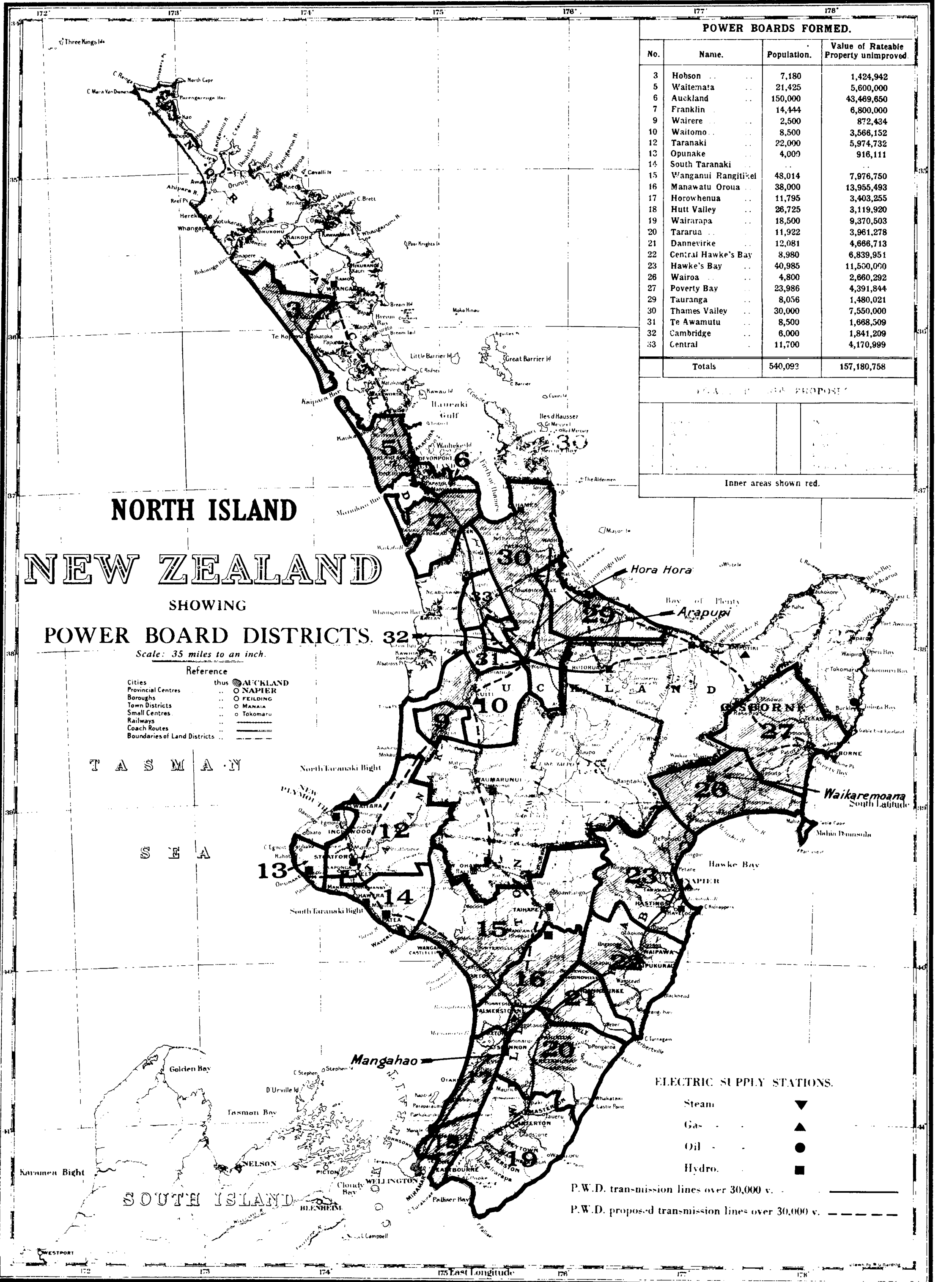
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# LAKE COLERIDGE HYDRO-ELECTRIC POWER SUPPLY CURVES OF MAXIMUM WEEKLY LOADS AND LAKE-LEVELS

Figure 1.







| POWER BOARDS FORMED. |                     |             |                                        |
|----------------------|---------------------|-------------|----------------------------------------|
| No.                  | Name.               | Population. | Value of Rateable Property unimproved. |
| 3                    | Hobson              | 7,180       | 1,424,942                              |
| 5                    | Waitemata           | 21,425      | 5,600,000                              |
| 6                    | Auckland            | 150,000     | 43,469,650                             |
| 7                    | Franklin            | 14,444      | 6,800,000                              |
| 9                    | Wairere             | 2,500       | 872,434                                |
| 10                   | Waitomo             | 8,500       | 3,566,152                              |
| 12                   | Taranaki            | 22,000      | 5,974,732                              |
| 13                   | Opunake             | 4,000       | 916,111                                |
| 14                   | South Taranaki      |             |                                        |
| 15                   | Wanganui Rangitikei | 48,014      | 7,976,750                              |
| 16                   | Manawatu Oroua      | 38,000      | 13,955,493                             |
| 17                   | Horowhenua          | 11,795      | 3,403,255                              |
| 18                   | Hutt Valley         | 26,725      | 3,119,920                              |
| 19                   | Wairarapa           | 18,500      | 9,370,503                              |
| 20                   | Tararua             | 11,922      | 3,961,278                              |
| 21                   | Dannevirke          | 12,081      | 4,666,713                              |
| 22                   | Central Hawke's Bay | 8,980       | 6,839,951                              |
| 23                   | Hawke's Bay         | 40,985      | 11,500,090                             |
| 26                   | Wairoa              | 4,800       | 2,660,292                              |
| 27                   | Poverty Bay         | 23,986      | 4,391,844                              |
| 29                   | Tauranga            | 8,056       | 1,480,021                              |
| 30                   | Thames Valley       | 30,000      | 7,550,000                              |
| 31                   | Te Awamutu          | 8,500       | 1,688,509                              |
| 32                   | Cambridge           | 6,000       | 1,841,209                              |
| 33                   | Central             | 11,700      | 4,170,999                              |
| Totals               |                     | 540,093     | 157,180,758                            |

# NORTH ISLAND NEW ZEALAND

SHOWING

## POWER BOARD DISTRICTS. 32

Scale: 35 miles to an inch.

- Reference
- Cities
  - Provincial Centres
  - Boroughs
  - Town Districts
  - Small Centres
  - Railways
  - Coach Routes
  - Boundaries of Land Districts
- thus
- AUCKLAND
  - NAPIER
  - FEILDING
  - MANAIA
  - Tokomaru

- ELECTRIC SUPPLY STATIONS.
- Steam ▼
  - Gas ▲
  - Oil ●
  - Hydro. ■

P.W.D. transmission lines over 30,000 v. ————  
P.W.D. proposed transmission lines over 30,000 v. - - - - -

# SOUTH ISLAND NEW ZEALAND

## SHOWING POWER BOARD DISTRICTS.

Scale: 35 miles to an inch.

### Reference

|                              |      |            |
|------------------------------|------|------------|
| Cities                       | thus | ● NELSON   |
| Provincial Centres           | ○    | ○ HOKITIKA |
| Boroughs                     | ○    | ○ TEMUKA   |
| Town Districts               | ○    | ○ CLINTON  |
| Small Centres                | ○    | ○ LYELL    |
| Railways                     | —    |            |
| Coach Routes                 | —    |            |
| Boundaries of Land Districts | ---  |            |

TASMAN SEA

South Latitude

### ELECTRIC SUPPLY STATIONS.

|        |   |
|--------|---|
| Steam  | ▼ |
| Gas    | ▲ |
| Oil    | ● |
| Hydro. | ■ |

P.W.D. transmission lines over 30,000 v. —

P.W.D. proposed transmission lines over 30,000 v. - - -

Other supply authorities . . . . .

### POWER BOARDS FORMED.

| No.    | Name.             | Population. | Value of Rateable Property unimproved. |
|--------|-------------------|-------------|----------------------------------------|
| 1      | Buller            | 9,197       | 696,374                                |
| 2      | Reefton           | 1,850       | 64,476                                 |
| 3      | Grey              | 12,000      | 614,694                                |
| 4      | Westland          | 3,272       | 196,268                                |
| 6      | Southland         | 66,009      | 15,493,548                             |
| 7      | Otago             | 24,082      | 4,686,448                              |
| 8      | Teviot            | 2,400       | 211,567                                |
| 9      | Otago Central     | 5,170       | 1,034,934                              |
| 10     | Waitaki           | 18,046      | 4,813,783                              |
| 11     | South Canterbury  | 41,618      | 15,483,654                             |
| 12     | Ashburton         | 17,757      | 10,047,044                             |
| 13     | Malvern           | 5,050       | 3,891,863                              |
| 14     | Springs Ellesmere | 11,270      | 6,566,696                              |
| 15     | Bank's Peninsula  | 4,000       | 5,086,935                              |
| 18     | Marlborough       | 14,696      | 5,901,809                              |
| Totals |                   | 231,417     | 74,599,703                             |

Inner areas shown red.

Stewart Island

170° East Longitude

## APPENDIX E.

## OTAGO CENTRAL RAILWAY: EXTENSION BEYOND CROMWELL.

REPORTS BY DISTRICT ENGINEER MARKS, INSPECTING ENGINEER BAKER, AND THE ENGINEER-IN-CHIEF RESPECTIVELY.

DISTRICT ENGINEER TO ENGINEER-IN-CHIEF.

CROMWELL TO HAWEA.

SECTION I.—PRELIMINARY.

*Object of the Report.*—Improved facilities for transport in the Upper Clutha Valley were asked for by the settlers, some of whom suggest the provision of an improved hard-surfaced highway, and others an extension of the Otago Central Railway beyond Cromwell. The object of this report is therefore to consider fully the merits and costs of each proposal, and to deduce therefrom—(a) Whether either or both are justified at the present state of settlement and production, and, if so, to what extent; (b) whether the future prospects of increased settlement and production will warrant either, and when.

*Description of District.*—The district concerned comprises the extensive flat lands along the Clutha Valley extending northward of Cromwell and widening to the south of Lake Hawea, and in the region of Mount Barker, Pembroke, and the Cardrona Valley, together with the Tarras flats and downlands and Ardour Settlement in the Lindis Valley. The total flat country comprises about 65,000 acres. In addition there are about 1,300,000 acres of high sheep-country bordering the valley and around the lakes which have no other outlet.

A fair amount of very old settlement exists scattered throughout the district, being more concentrated about Hawea Flat and Mount Barker.

Practically the whole of the flat area must rely upon irrigation for its usefulness as country suitable for close settlement. This has been practised in a very small way by private enterprise, but of recent years the Government has started to give attention to this region by providing extensive irrigation schemes. Of these irrigation schemes, Ardour (2,000 acres) has just been completed, and Tarras (7,000 acres) is nearing completion. Quite extensive irrigation development is now being resorted to by private enterprise about Pembroke and in the Cardrona Valley.

Preliminary investigations also show that Government works may provide irrigation for some 20,000 acres about Hawea, 1,000 acres between Luggate and Queensbury, 2,000 acres about Bendigo, and 2,000 acres between Queensbury and Lowburn. Summarizing, it would appear that at least half of the total flat area of 65,000 acres may be brought under irrigation. These irrigation-works, if pursued, might have a tremendous bearing upon the subject of transport by increasing the production of the district to an incredible extent.

Dairying is likely to take a very prominent place in the industries of the district, together with the export of large quantities of lucerne and other hay, while sheep raising and fattening will also become tremendously increased. The sheep-carrying capacity of the hill lands will also be very largely increased by the provision of winter feed produced on the irrigable lands.

*General.*—Altogether this district offers such possibilities for increased settlement and production that its claims to consideration by the Government in regard to improved transport facilities cannot be ignored. To those people like myself who, from intimate knowledge, have realized what this district is likely to attain there would not be any hesitation in recommending the Government to proceed steadily onwards with a railway, purely as a national developmental work, at such annual rate of expenditure as the national finances might permit. It would, of course, be a great many years before such a railway would pay directly on the present very liberal railway transport tariff. This fact is unfortunately very evident with respect to most branch railways, but though some of these may now prove to have been unwarranted in most cases, and particularly in respect to the present Otago Central Railway, when the amount of settlement and production is realized, it is not possible to view them other than as sound assets in the development of the Dominion. However, realizing that in the matter of national development the Dominion has reached a stage when further immediate extension might be considered to be too far ahead of a sound rate of progress, it appears necessary to take a full and careful consideration of the present and immediate future situation before a decision is made with respect to committing the Dominion to any considerable increase in its national indebtedness.

The matter of the alternative method of transport by improved highway must also be analysed in comparison with a railway.

*Terminating-point, Luggate.*—To enable a fair comparison to be made between the merits of a railway and an improved highway a terminating-point must first be decided upon. This point will be fixed first for a railway, as the limit of its extension into a district is likely to be shorter than for a road, which latter might be carried on farther or on divergent lines to lower standards of construction.

There seems to be no doubt that the vicinity of Luggate should mark the permanent terminus of a railway or specially constructed highway. At this point the lands on each side of the Clutha River are connected by a permanent heavy traffic-bridge, and roads radiate from it to the open lands both sides of the river. The greatest distance from the Luggate Bridge to the extremities of the open lands is about 9 miles, being about the same for the flats on both sides of the river. An extension beyond Luggate would slightly benefit one side without improving the situation for the other side. Therefore, for the purposes of comparison between road and railway, the length considered will be taken as ending at Luggate, and any road improvements beyond that point may be considered separately.

The distances between Cromwell and Luggate are approximately 27½ and 29 miles by the proposed routes of railway and road respectively.

## SECTION II.—PROPOSED EXTENSION OF OTAGO CENTRAL RAILWAY.

Having made an exploration survey and a study of the country in the Upper Clutha Valley from the point of view of the most suitable and economical location for any possible future extension of the above railway, I beg to report as follows :—

*Previous Trial Survey.*—From the present terminus at Cromwell a very old survey shows a proposed railway on the district lithos terminating at the north-west end of Hawea Flat, near the outlet of Lake Hawea. This location adheres throughout to the east side of the Clutha River, being fairly close to the river to opposite Luggate, and then diverging and following up Lagoon Creek and diagonally across Hawea Flat. This route entails fairly heavy rock formation from Cromwell to Rocky Point (near Bendigo), and again gets into fairly heavy work and grades in following up Lagoon Creek and grading down again on to Hawea Flat.

*Proposed Terminus (Luggate).*—I am of opinion that if any extension is made it should never at any time proceed beyond Luggate. This would cut out the heavier work and grades in Lagoon Creek, and would end at a point sufficiently near to the farthestmost good land and most suited to both sides at the river.

*Recommended Route.*—Cross to the right bank at Cromwell, follow right bank to Bendigo, recross to the left bank, and follow same to opposite Luggate.

Referring to the litho Dunedin No. M.R.S. 5, forwarded under separate cover, the original survey is shown in black, a more suitable deviation thereof in green, and the recommended alternative route in red. The latter, notwithstanding the heavy cost of crossing the Clutha River twice, shows a saving of £87,740 (see comparative estimates). It also traverses the open flat lands along the front of Mount Pisa Settlement, instead of following the useless rocky country on the opposite side.

*Length and Estimated Cost.*—The distance, Cromwell to Luggate, by the recommended route is 27½ miles, and the total estimated cost £333,920, or an average of £12,120 per mile.

Although these figures appear particularly low, they are calculated from a close exploration of the ground throughout, and are believed to be reliable. Most of the route is flat in cross-section and requiring practically no earthwork. Where the slope is sidelong, quantities have been allowed for liberally from typical cross-sections. After crossing the Clutha River at Cromwell not a cubic yard of rock will be met with for the entire length, but such light formation required will be entirely in light soil and loose gravel, which may be handed generally with ploughs, scoops, and graders. Suitable ballast can be obtained almost anywhere along the line. Cost of permanent-way materials and buildings has been based on current values.

For the purposes of an estimate *Cromwell Bridge* has been regarded as a steel structure of about 100 ft. spans on high concrete piers and cylinders.

*Bendigo Bridge.*—At this point the river is wide and does not rise much in flood. The bed is apparently gravel, and provision has been made for short-span rolled-steel joists or plate girders on timber or concrete pile piers.

## PROPOSED EXTENSION, CROMWELL TO LUGGATE.

*Estimate of Cost.*

Recommended Route (shown red on map forwarded).

|                                                                                             |    |    |    |    |    |    | £       | £        |
|---------------------------------------------------------------------------------------------|----|----|----|----|----|----|---------|----------|
| Cromwell—Bendigo Section—                                                                   |    |    |    |    |    |    |         |          |
| General construction, ½ mile at £45,000 ..                                                  | .. | .. | .. | .. | .. | .. | 22,500  |          |
| Clutha River Bridge at Cromwell, 400 ft. at £45 ..                                          | .. | .. | .. | .. | .. | .. | 18,000  |          |
| General construction—                                                                       |    |    |    |    |    |    |         |          |
| 1 mile at £25,000 ..                                                                        | .. | .. | .. | .. | .. | .. | 25,000  |          |
| 11½ miles at £11,000 ..                                                                     | .. | .. | .. | .. | .. | .. | 124,760 |          |
| Clutha River Bridge at Bendigo, 600 ft. at £20 ..                                           | .. | .. | .. | .. | .. | .. | 12,000  |          |
|                                                                                             |    |    |    |    |    |    |         | 202,260  |
| Bendigo—Luggate Section—                                                                    |    |    |    |    |    |    |         |          |
| General construction, 10¼ miles at £5,000 ..                                                | .. | .. | .. | .. | .. | .. | 51,250  |          |
| Lindis River Bridge ..                                                                      | .. | .. | .. | .. | .. | .. | 3,000   |          |
| General construction—                                                                       |    |    |    |    |    |    |         |          |
| 1½ miles at £12,200 ..                                                                      | .. | .. | .. | .. | .. | .. | 16,270  |          |
| 2½ miles at £6,000 ..                                                                       | .. | .. | .. | .. | .. | .. | 14,000  |          |
| ¾ mile at £10,000 ..                                                                        | .. | .. | .. | .. | .. | .. | 7,500   |          |
|                                                                                             |    |    |    |    |    |    |         | 92,020   |
| Stations—                                                                                   |    |    |    |    |    |    |         |          |
| Cromwell (two additional cottages) ..                                                       | .. | .. | .. | .. | .. | .. | 2,000   |          |
| Lowburn (siding, shelter-shed, and stock-yards) ..                                          | .. | .. | .. | .. | .. | .. | 2,000   |          |
| Bendigo (siding, shelter-shed, and stock-yards, plus goods-shed and three cottages) ..      | .. | .. | .. | .. | .. | .. | 7,000   |          |
| Tarras (same as Bendigo, but with four cottages) ..                                         | .. | .. | .. | .. | .. | .. | 8,000   |          |
| Small station (same as Lowburn) ..                                                          | .. | .. | .. | .. | .. | .. | 2,000   |          |
| Luggate (terminus station: Goods-shed, stock-yards, engine-shed, &c., and nine cottages) .. | .. | .. | .. | .. | .. | .. | 16,000  |          |
|                                                                                             |    |    |    |    |    |    |         | 37,000   |
| Land—440 acres at £6 ..                                                                     | .. | .. | .. | .. | .. | .. |         | 2,640    |
| Grand total ..                                                                              |    |    |    |    |    |    |         | £333,920 |

Total length, 27½ miles. Average estimated cost per mile, £12,140.

NOTE.—“General construction” includes earthwork, permanent-way, culverts, fencing, and small bridges :—



*Estimate of Cost.*

(Route shown green on map forwarded, and not recommended.)

|                                                 |    |    |    |    |    |    |         |
|-------------------------------------------------|----|----|----|----|----|----|---------|
| Cromwell-Bendigo Section—                       |    |    |    |    |    |    | £       |
| General construction—                           |    |    |    |    |    |    |         |
| 1½ miles at £45,000                             | .. | .. | .. | .. | .. | .. | 75,000  |
| 8 miles at £25,000                              | .. | .. | .. | .. | .. | .. | 200,000 |
| 3 miles at £5,000                               | .. | .. | .. | .. | .. | .. | 15,000  |
|                                                 |    |    |    |    |    |    | 290,000 |
| Estimated for same section by recommended route | .. | .. | .. | .. | .. | .. | 202,260 |
| Difference in favour of recommended route       |    |    |    |    |    |    | £87,740 |

*Commerce.*

|                                                                  |    |    |    |    |    |                |
|------------------------------------------------------------------|----|----|----|----|----|----------------|
| The length of the section, Cromwell-Luggate                      | .. | .. | .. | .. | .. | 27½ miles.     |
| Average cost of maintenance and signals on Otago Central Railway | .. | .. | .. | .. | .. | £250 per mile. |
| Car and wagon expenses per train-mile                            | .. | .. | .. | .. | .. | 67d.           |
| Average cost of traffic and general expenses per train-mile      | .. | .. | .. | .. | .. | 45d.           |

Assuming one train each way per day, the following represents the total annual expenses for the Cromwell-Luggate Section:—

|                                                    |    |    |    |    |    |    |         |
|----------------------------------------------------|----|----|----|----|----|----|---------|
|                                                    |    |    |    |    |    |    | £       |
| Maintenance and signals                            | .. | .. | .. | .. | .. | .. | 6,875   |
| Locomotive car and wagon                           | .. | .. | .. | .. | .. | .. | 4,790   |
| Traffic and general                                | .. | .. | .. | .. | .. | .. | 3,218   |
|                                                    |    |    |    |    |    |    | 14,883  |
| Interest at 5 per cent. on capital cost (£333,920) | .. | .. | .. | .. | .. | .. | 16,696  |
| Total annual expenditure                           |    |    |    |    |    |    | £31,579 |

*Estimate from Revenue from Cromwell-Luggate Railway at Present Stage of Development of Upper Clutha Valley.*

(From Railways Statement: Estimate based on Ordinary Railway Rates.)

It is assumed that half the present passenger traffic and two-thirds of the present goods traffic to and from Cromwell would be carried over the Cromwell-Luggate Section. Three-quarters of this traffic would be carried over the full section and the remainder for a distance of 17 miles.

## GOODS.

| Goods.            | Unit.          | Quantity. | Distance carried. | Rate per Mile. | Revenue.   |
|-------------------|----------------|-----------|-------------------|----------------|------------|
|                   |                |           | Miles.            | d.             | £ s. d.    |
| Grain .. .. .     | Ton .. .. .    | 700       | 27½               | 1·32           | 107 17 0   |
| " .. .. .         | " .. .. .      | 700       | 17                | 1·32           | 66 1 0     |
| Wool .. .. .      | " .. .. .      | 700       | 27½               | 4·40           | 353 0 0    |
| " .. .. .         | " .. .. .      | 700       | 17                | 4·40           | 218 3 0    |
| Timber .. .. .    | 100 C.B.M. ..  | 1,260     | 27½               | 0·40           | 59 15 0    |
| " .. .. .         | " .. .. .      | 1,260     | 17                | 0·40           | 35 14 0    |
| Class A .. .. .   | Ton .. .. .    | 370       | 27½               | 6·90           | 292 10 0   |
| " .. .. .         | " .. .. .      | 365       | 17                | 6·90           | 180 16 0   |
| Class B .. .. .   | " .. .. .      | 365       | 27½               | 5·56           | 232 10 0   |
| " .. .. .         | " .. .. .      | 365       | 17                | 5·56           | 143 15 0   |
| Class C .. .. .   | " .. .. .      | 360       | 27½               | 4·48           | 184 14 0   |
| " .. .. .         | " .. .. .      | 360       | 17                | 4·48           | 114 6 0    |
| Class D .. .. .   | " .. .. .      | 360       | 27½               | 3·66           | 150 16 0   |
| " .. .. .         | " .. .. .      | 360       | 17                | 3·66           | 93 6 0     |
| Cattle .. .. .    | Truck of 8 ..  | 170       | 27½               | 7d.            | 17 0 0     |
| " .. .. .         | " .. .. .      | 170       | 17                | 7d.            | 10 10 0    |
| Sheep and pigs .. | Truck of 60 .. | 7,390     | 27½               | 7d.            | 98 14 0    |
| " .. .. .         | " .. .. .      | 7,380     | 17                | 7d.            | 61 0 0     |
|                   |                |           |                   |                | £2,420 7 0 |



PASSENGER TRAFFIC.

|                                                |    |    |    |    | Number. | Distance. | Rate. | Revenue. |       |
|------------------------------------------------|----|----|----|----|---------|-----------|-------|----------|-------|
|                                                |    |    |    |    |         | Miles.    | s. d. | £        | s. d. |
| First class                                    | .. | .. | .. | .. | 1,333   | 27½       | 4 8   | 311      | 0 0   |
| "                                              | .. | .. | .. | .. | 445     | 17        | 3 3   | 72       | 6 0   |
| Second class                                   | .. | .. | .. | .. | 3,276   | 27½       | 3 3   | 532      | 7 0   |
| "                                              | .. | .. | .. | .. | 1,092   | 17        | 2 3   | 122      | 17 0  |
|                                                |    |    |    |    |         |           |       | 1,038    | 10 0  |
| Parcels, luggage, mails, &c.                   | .. | .. | .. | .. | ..      | ..        | ..    | 203      | 3 0   |
| Total yearly revenue from goods and passengers |    |    |    |    |         |           |       | £3,662   | 0 0   |

SECTION III.—EXAMINATION OF THE POSSIBILITY OF HIGHWAY COMMUNICATION.

ROUTE OF THE HIGHWAY.

As was shown in Section II of this report, it is expedient to terminate any specially constructed highway at Luggate for the purposes of comparison.

From Cromwell to Bendigo there are two alternatives: (a) Cromwell to Lowburn by the right bank, crossing the Clutha at Lowburn, thence along the left bank; (b) Cromwell to Lowburn and on to opposite Bendigo along the right bank, crossing the river near Bendigo, and thence following the left bank as in (a). The latter is undoubtedly the better of the two.

Route (a) traverses easy and well-settled country to Lowburn, but the left bank from Lowburn to Bendigo would entail heavy rock formation through sparsely settled land.

The bridge over the Clutha River at Bendigo would be about 600 ft. long, while that at Lowburn would be only 350 ft. long, both bridges being of the same type. The difference between the costs of the two bridges is more than compensated by the extra cost of construction on the left bank between Lowburn and Bendigo.

Route (b) traverses flat, easy country all the way to Bendigo, and would serve a district with a rapidly rising population, including the newly subdivided Mount Pisa Settlement.

From Bendigo to Luggate the eastern route is the only feasible one. The Clutha would be crossed at the point previously chosen for the railway-bridge. As the Lindis River must in any case be bridged, there is no advantage in continuing farther up the right bank of the Clutha before crossing over. Should the construction of the railway-bridge be authorized, it will be seen that with little extra expense the bridge at Bendigo could be made to serve both road and railway. The same might apply to the Lindis River Bridge; but, being much shorter, it is likely that two separate bridges would be preferable. From the Lindis to Luggate the route traverses comparatively flat country which is likely to be more closely settled in the future.

TYPE OF ROAD.

The question of a tar-sealed or tar-grouted road as compared with a gravel road is in this case not difficult to decide.

*Tar-grouted Road.*—For the construction of a road of the above type the present surface would require to be scarified, surface metal screened and re-rolled, then, after consolidation, bitumen-grouted in the usual way.

The approximate cost per mile of a 20 ft. tar-grouted road, assuming that about 4 in. of gravel will require to be added to bring the thickness of metal up to that required for heavy traffic, is as follows:—

|                                                                    |    |    |    |        |    |    |
|--------------------------------------------------------------------|----|----|----|--------|----|----|
| 1,332 cubic yards screened gravel at 10s.                          | .. | .. | .. | £      | s. | d. |
| 18,560 gallons bitumen at 1s. 2d.                                  | .. | .. | .. | 1,082  | 13 | 4  |
| 332 cubic yards screened fine gravel at 10s.                       | .. | .. | .. | 166    | 0  | 0  |
| Labour and rolling                                                 | .. | .. | .. | 160    | 0  | 0  |
|                                                                    |    |    |    | £2,074 | 13 | 4  |
| Annual cost per mile—                                              |    |    |    |        |    |    |
| Interest on capital at 5 per cent. and renewal fund at 2 per cent. | .. | .. | .. | £      | s. | d. |
| Annual maintenance                                                 | .. | .. | .. | 146    | 0  | 0  |
|                                                                    |    |    |    | 100    | 0  | 0  |
|                                                                    |    |    |    | £246   | 0  | 0  |

This road is capable of carrying over 2,000 motor-vehicles per day, including heavy motor-lorries.

*Tar-sealed Road.*—The extremely low temperatures experienced in Central Otago during the winter months preclude the use of a tar-sealed surface. The expansion of water when freezing lifts the coat of tar and sand, particularly along the edges of the seal. Low temperatures have the effect of denaturing the tar or bitumen in that its cohesion disappears and the bond becomes brittle. This

effect appears to be permanent; the bond does not regain its former tenacity when the temperature rises to normal. For these reasons a tar-sealed surface is considered unsuitable for the purpose under consideration.

*Gravel Road :—*

|                                                                 |            |
|-----------------------------------------------------------------|------------|
| Forming, per mile .. .. .                                       | £ 250      |
| Annual cost—                                                    |            |
| Interest at 5 per cent. and renewal fund at 2 per cent. .. .. . | 15         |
| Maintenance .. .. .                                             | 60         |
|                                                                 | <u>£75</u> |

A well-made gravel road will carry up to 500 vehicles per day, two-thirds of these being motor-driven. The present traffic along this road amounts to thirty vehicles per day, twenty being motor-driven.

From the foregoing it appears that the gravel road is the better of the two from the financial aspect; and, since it will cope with the traffic until it is sixteen times greater than it is at present, and the materials for its construction are conveniently available throughout its length, it is undoubtedly superior from the point of view of economy with reasonable service.

The following is an estimate of cost of a road, 20 ft. in width, from Cromwell to Luggate; 27 of the 29 miles will be gravel road; the remaining 2 miles—i.e., from the Railway-station at Cromwell for a distance of 2 miles towards Lowburn—a bitumen-grouted road has been allowed for. The first 2 miles from Cromwell extend across a sandy flat, and, besides overcoming any difficulties that might be experienced with a gravel road on sand, a tar-surfaced road is advisable within the Borough of Cromwell.

ESTIMATE OF COST OF PROPOSED HIGHWAY, INCLUDING BRIDGES AND CULVERTS.

|                                                         | £              | s.        | d.       |
|---------------------------------------------------------|----------------|-----------|----------|
| 20 ft. tar-grouted road at £2,075 per mile .. .. .      | 4,150          | 0         | 0        |
| Gravel road : 27 miles forming at £250 per mile .. .. . | 6,750          | 0         | 0        |
| Bridges—                                                |                |           |          |
| Clutha River at Bendigo .. .. .                         | 12,000         | 0         | 0        |
| Lindis River .. .. .                                    | 2,250          | 0         | 0        |
| Small bridges and culverts .. .. .                      | 7,000          | 0         | 0        |
|                                                         | <u>£32,150</u> | <u>0</u>  | <u>0</u> |
| Annual cost—                                            | £              | s.        | d.       |
| Interest on above at 5 per cent. .. .. .                | 1,607          | 10        | 0        |
| Renewal fund at 2 per cent. .. .. .                     | 643            | 0         | 0        |
| Maintenance, gravel road, 27 miles at £60 .. .. .       | 1,620          | 0         | 0        |
| Tar-grouted, 2 miles at £100 .. .. .                    | 200            | 0         | 0        |
|                                                         | <u>£4,070</u>  | <u>10</u> | <u>0</u> |

COMMERCE.

*Goods.*

(An examination of the traffic to and from Cromwell Railway-station for the year ended 31st March, 1923.)

|                 | Cattle. | Sheep. | Timber in<br>100 C.B.M. | General Goods. |
|-----------------|---------|--------|-------------------------|----------------|
|                 |         |        |                         | Tons.          |
| Inward .. .. .  | 96      | 3,305  | 3,708                   | 4,651          |
| Outward .. .. . | 413     | 18,847 | 3,774                   | 4,906          |
| Totals .. .. .  | 509     | 22,152 | 3,782                   | 9,557          |

Assume that only two-thirds of this traffic may be attributed to the Upper Clutha north of Cromwell, which gives the following amended table :—

|                                    | Cattle. | Sheep. | Timber in<br>100 C.B.M. | General Goods. |
|------------------------------------|---------|--------|-------------------------|----------------|
|                                    |         |        |                         | Tons.          |
| Inward .. .. .                     | 64      | 2,203  | 2,472                   | 3,100          |
| Outward .. .. .                    | 275     | 12,565 | 49                      | 3,271          |
| Totals .. .. .                     | 339     | 14,768 | 2,521                   | 6,371          |
| Equivalent weights in tons .. .. . | 301     | 1,576  | 504                     | 6,371          |

Grand total in tons, 8,752.

*Passengers.*

Cromwell Railway-station returns for the year ended 31st March, 1923, show that the following tickets were sold (single and return): First class, 1,778; second class, 4,368: total, 6,146. These figures represent the number of people who left Cromwell by train during the year, and it is reasonable to assume that the same number returned, making a total of 12,292 passengers. Of this number it is estimated that half can be attributed to the district distinctly north of Cromwell, or 6,146 passengers.

The present cost of conveying passengers and goods between Cromwell and Luggate (21 miles) is estimated as—Goods, 33s. per ton; passengers, 16s. per passenger (single). Some of the goods and passengers are picked up *en route*, and it is reasonable to assume that 75 per cent. of the traffic is over the whole distance. The remaining 25 per cent. is assumed to originate at Bendigo.

| COMMERCE.                              |    |    |    |    | £       |
|----------------------------------------|----|----|----|----|---------|
| <i>Goods—</i>                          |    |    |    |    |         |
| Three-fourths of 8,752 tons at 33s.    | .. | .. | .. | .. | 10,831  |
| One-fourth of 8,752 tons at 25s.       | .. | .. | .. | .. | 2,735   |
| <i>Passengers—</i>                     |    |    |    |    |         |
| Three-fourths of 6,146 at 16s.         | .. | .. | .. | .. | 3,688   |
| One-fourth of 6,146 at 12s.            | .. | .. | .. | .. | 922     |
|                                        |    |    |    |    | <hr/>   |
|                                        |    |    |    |    | 18,176  |
| Annual maintenance, 29 miles at £20 .. | .. | .. | .. | .. | 580     |
|                                        |    |    |    |    | <hr/>   |
|                                        |    |    |    |    | £18,756 |
|                                        |    |    |    |    | <hr/>   |

The total cost of conveying the present traffic between Cromwell and Luggate is therefore £18,756.

If the proposed highway is adopted the improved surface will probably reduce the transport charges to 20s. per ton for goods and to 10s. each for passengers; from Bendigo to Cromwell, 15s. and 7s. 6d. respectively.

The annual cost of transport would then be—

|                                     |    |    |    |    | £       |
|-------------------------------------|----|----|----|----|---------|
| <i>Goods—</i>                       |    |    |    |    |         |
| Three-fourths of 8,752 tons at 20s. | .. | .. | .. | .. | 6,564   |
| One-fourth of 8,752 tons at 15s.    | .. | .. | .. | .. | 1,641   |
| <i>Passengers—</i>                  |    |    |    |    |         |
| Three-fourths of 6,146 at 10s.      | .. | .. | .. | .. | 2,305   |
| One-fourth of 6,146 at 7s. 6d.      | .. | .. | .. | .. | 576     |
|                                     |    |    |    |    | <hr/>   |
|                                     |    |    |    |    | £11,086 |
|                                     |    |    |    |    | <hr/>   |

The total annual cost of transport with present-day business on the proposed improved gravel highway will therefore be £11,086.

Capital cost of 29 miles of improved highway (including bridges), £32,150.

|                                   |    |    |    |    | £       | s. | d. |
|-----------------------------------|----|----|----|----|---------|----|----|
| Annual cost of improved highway   | .. | .. | .. | .. | 4,070   | 10 | 0  |
| Annual cost of haulage            | .. | .. | .. | .. | 11,086  | 0  | 0  |
|                                   |    |    |    |    | <hr/>   |    |    |
| Total annual cost of transport .. | .. | .. | .. | .. | £15,156 | 10 | 0  |
|                                   |    |    |    |    | <hr/>   |    |    |

|                                                              |  |  |  |  | £      |
|--------------------------------------------------------------|--|--|--|--|--------|
| As shown, the total cost of transport on the present road is |  |  |  |  | 18,756 |
|                                                              |  |  |  |  | <hr/>  |
|                                                              |  |  |  |  | 15,156 |
|                                                              |  |  |  |  | <hr/>  |
|                                                              |  |  |  |  | £3,600 |
|                                                              |  |  |  |  | <hr/>  |

An improved highway will therefore reduce expenditure by about £3,600 yearly.

## SECTION IV.—COMPARISON OF ALTERNATIVES.

It appears that for one train a day an annual expenditure of £31,579 is necessitated, assuming that the present traffic does not increase. The advent of the railway would mean a saving of—

|                                                         |    |    |    |    | £       |
|---------------------------------------------------------|----|----|----|----|---------|
| Cost of haulage at present                              | .. | .. | .. | .. | 18,176  |
| Railway revenue                                         | .. | .. | .. | .. | 3,662   |
|                                                         |    |    |    |    | <hr/>   |
|                                                         |    |    |    |    | £14,514 |
| to the district each year, and a loss to the nation of— |    |    |    |    | £       |
| Total annual expenditure on railway                     | .. | .. | .. | .. | 31,579  |
| Less total cost of present road transport               | .. | .. | .. | .. | 18,756  |
|                                                         |    |    |    |    | <hr/>   |
|                                                         |    |    |    |    | £12,823 |
|                                                         |    |    |    |    | <hr/>   |

yearly. However, every indication points to rapid development and closer settlement of this country in the future. Hence it is to be expected that business on the proposed section in a few years will be several times as much as at present, and may increase perhaps tenfold in fifteen years. Sheet A shows what might be expected as business develops.

There will be practically no increase in the cost of rail transport until traffic reaches the capacity of one train per day each way, or four times the present business. After that the cost of rail transport will increase proportionally to the goods carried. From a national point of view, when the annual tonnage reaches 18,800 the railway will be as economical as a tar-grouted road, and when business reaches 22,400 tons yearly a gravel road will be no cheaper. It is clear that for annual tonnages beyond 22,400 the railway rapidly increases its superiority over both types of highway.

With the present concessions and preferential rates sheet B shows that a railway would always be a direct loser. It appears, however, unfair to consider the railway on these tariffs, as the concessions are presumably made in the general national interests, and should be corrected, as far as the Working Railways are concerned, by credits from the Consolidated Fund.

Plotted on the same graph are two curves representing flat-rate charges of 4·08d. and 4·36d. per ton-mile. These rates are arrived at by dividing the total maintenance costs of the New Zealand railways, together with the interest on capital cost of open lines at  $3\frac{3}{4}$  and 5 per cent. respectively, by the number of ton-miles per annum. These figures represent the rates which evidently should be received by the Working Railways either from actual freight charges or by credits from the Consolidated Fund. On such corrected basis the proposed line would begin to show a profit when the traffic reached 28,500 tons per annum, adopting the 4·36d. per ton-mile rate, and at 30,500 tons per annum with a rate of 4·08d. per ton-mile.

#### RECOMMENDATIONS.

(a.) That the most rapid and ultimately the most efficient development of the latent assets of this district will be realized by the extension of the Otago Central Railway from Cromwell to Luggate.

(b.) That if such extension be now authorized and proceeded with at a moderate rate, by the time it reaches Luggate, or shortly after, the annual commerce may reasonably be expected to have increased so as to make the railway the most economical means of transport from a national point of view.

(c.) That in the meantime the route of the main highway at present gazetted be altered to the route recommended herein.

(d.) That the first 2 miles of such amended highway route be immediately laid down as a tar-grouted highway, and the remainder of such amended route, where already constructed, be slightly improved as a gravel road.

(e.) That a bridge be erected over the Clutha River near Bendigo as a combined road and railway bridge, and such new roads as may be necessary to connect same with existing roads be constructed.

(f.) That a separate road-bridge be erected on the highway at the Lindis River.

(g.) That the County's suggestion to erect road-bridges over the Clutha River at Maungawera, and over the Hawea River near Camp Hill, to eliminate the present ferries, is not inconsistent with the probable future transport arrangements of the district.

J. D. MARKS,  
District Engineer.

#### CROMWELL TO HAWEA: PROPOSED RAILWAY.

Mr. FURKERT,—

I have carefully examined Mr. Marks's report on the Cromwell to Hawea Railway proposal. His report is divided into four sections: Section I (two pages), general; Section II (six pages) deals with the location of the railway Cromwell to Luggate, its estimated cost, its annual charges and anticipated revenue, based on Cromwell Railway-station returns for the year ended 31st March, 1923; Section III (four pages) deals with road alternative, its location, cost, and annual charges and cost of handling transport by road; Section IV (two pages) compares railway and road alternatives and makes recommendations. I comment as follows:—

*Section I.*—Mr. Marks advises that the logical terminus for a railway-station is at the Luggate, on right bank of river, for reasons which he details. His conclusions are sound.

*Section II.*—Mr. Marks's conclusion in favour of putting the first section of line on right bank of Clutha River and crossing the river twice is justified by an estimated difference in cost of the two alternatives of £87,740, and by the fact that the country on the right bank (the Lowburn and Pisa Run side) would help to serve a railway, and the rocky sidling on the other side of valley would not. However, I think his estimate is on the low side, and 15 per cent. should be added to it, though the comparison between right- and left-bank alternatives would still hold.

His estimate of revenue per annum from the Cromwell to Luggate Railway, based on splitting up and taking a definite fraction of traffic actually handled at Cromwell Station for year ended 31st March, 1923, arrives at a figure of £3,662 for the *total* revenue to be derived on that basis; but in view of the fact that nearly all goods would be on through consignment—that is, to or from Dunedin—his mileage rates are too high, and the figure of £3,662 should be reduced by £1,439 to £2,222.

I have also computed the revenue that would be received off the extension were the same amount of goods freighted on the *separate mileage* basis, and the result is £5,686—this, of course, including

passenger-fares and mails as before. The annual charges in respect to constructing this railway and operating one train each way per day are given by Mr. Marks as £31,579 (this would be higher if his estimate of cost is low, on account of greater interest charges).

*Section III.*—I do not think exception can be taken to the conclusions come to in discussion of Section III.

*Section IV.*—Works lately completed in this district—Clyde-Cromwell Railway, Ardgour and Tarras irrigation, and the recent cutting-up of Mount Pisa Run—have not had scope yet to very materially increase transport to or from the Upper Clutha Valley, but these developments will have material effect. It is interesting to note that total inwards and outwards tonnage for the year ended 31st March, 1924, was 11,511 tons, as against 9,557 for the previous year. Apparently the increase was in cheap-freighted goods, as revenue did not increase, and, of course, the increase may or may not have mainly come from the upper valley.

Mr. Marks, in his brief reference to probable future development, suggests that, as the proposed railway-extension becomes an accomplished fact, freight business may increase perhaps tenfold in fifteen years. I am not so optimistic. It is interesting to note the table on page ix of the Public Works Statement for 1924, giving the increase in railway business handled at Otarehua, Omakau, and Alexandra consequent on irrigation development in a period of nine years. Particulars there shown are appended, viz. :—

|              |    |    |    |    | 1913-14. | 1922-23. | Increase<br>per Cent. |
|--------------|----|----|----|----|----------|----------|-----------------------|
| Sheep        | .. | .. | .. | .. | 46,000   | 70,700   | 54                    |
| Goods (tons) | .. | .. | .. | .. | 3,010    | 6,200    | 106                   |
| Passengers   | .. | .. | .. | .. | 5,900    | 7,452    | 26                    |

I am convinced, however, as in the case of the Miller's Flat-Roxburgh Railway proposition, that the railway-extension proposal to Luggate should be contingent on the district bearing a special freight tax—for instance, such as a separate mileage tariff. If that were agreed to it will probably not be difficult to justify the railway-extension in the near future. For instance, we say that in 1923 the revenue on that basis on the Luggate Extension might have been £5,686; then production has only to increase sixfold and this railway-extension would just about pay, even without taking into account the added business on the existing opened line.

In the meantime the district urgently needs better communication, and a fair all-the-year-round road is the first step. The proposed Hawea irrigation scheme alone warrants it. Whether or not the route of main highway is immediately altered as recommended under "C" of the District Engineer's report, I consider that the road-construction, estimated at £32,150, including £12,000 for Clutha River Bridge, on the route recommended by the District Engineer, should be arranged for; and, considering that this work will be a developmental work, which the settlers, in as yet a thinly peopled back district, have been waiting a long time for, I think the Department could favourably consider finding a very big proportion of the cost. The merit of the location of road as proposed is that it directly serves all parts of the valley that are worth anything at all, and the District Engineer's analysis of cost in Section III of his report indicates that the improved road, even with 1923 thin traffic, would pay the country (viewed in the broad sense) well, and better than any other of the alternatives.

17th March, 1925.

A. J. BAKER.

#### OTAGO CENTRAL RAILWAY: EXTENSION BEYOND CROMWELL.

HON. MINISTER OF PUBLIC WORKS,----

With reference to the attached report by the District Engineer, Dunedin, into the economics of the proposal to extend the Otago Central Railway to Hawea: The report has been criticized by Mr. Baker, Inspecting Engineer, and his comments are also attached.

With a great many of the conclusions I am in agreement, but one of the principal points on which there is room for a difference of opinion is the basis on which to assess the division, as between the extension and the whole railway system, of the freights received on goods and passengers carried over the extension. If one simply took the difference between the tariff rates for the distance from Dunedin to Cromwell, and Dunedin to, say, Luggate, the amount which would thereby be credited to the extension would be extremely small; but the chief point is that the construction of the railway will result in a great deal more traffic being carried on the whole railway than what is carried at present. If the railway is not built, progress in the Clutha Valley above Cromwell must necessarily be slow. The full effects and benefits of irrigation cannot be realized unless there is a means of transit both fairly rapid and reasonably cheap, so that if the railway were not built it would not be possible a few years afterwards to prove by the development of the country whether the railway would have paid or not. It appears to come back to a question of judgment on general principles as to the stimulating effect which the railway-extension, if made, would have on development generally.

If we take the total receipts for outward goods and passengers at a number of stations in Central Otago, including the terminus, we find that the same has doubled in the past ten years, and the tendency is for the rate of improvement to increase, so that, if a rate of development approximating to the past is continued, the business will double again within ten years, and probably in less than ten years.

If all the irrigable land in the Upper Clutha Valley could be brought into a state of productivity rapidly the rate of development suggested by the District Engineer might eventuate, but experience, not only in New Zealand but everywhere else, shows that it takes time, and a considerable time, for irrigated land to be fully developed. Even now, after a number of years during which water has been

available on Central Otago lands, these lands are not yet fully irrigated, and probably will not be for many years yet. Of course, if the railway is not built, then the land will lie undeveloped still longer—in fact, it may safely be stated that it will never be developed to its full capabilities with a railway not nearer than 30 miles.

I have always held the opinion that the railway should not be extended beyond a point adjacent to Luggate, and any extension beyond that should not, in my opinion, be considered. As has been done with other railways, I think the question of the train service necessary and the cost of operating the line should be referred to the Railway Department, and the developmental possibilities to the Agriculture Department, and when these reports are obtained the whole matter should be again considered, after which I will prepare a full report on the subject.

I gathered from railway statistics that on quite a number of branch lines the revenue does not equal the expenditure. Although the Otago Central Railway is not quite in this position, nevertheless the amount of net revenue after paying all charges of operation is inadequate to meet the interest; and, while this is an unsatisfactory condition from the point of view of the railway considered only as a commercial concern, it is not necessarily unsatisfactory from the point of view of the country as a whole. There is no doubt that the removal of any of these railways will be a severe blow to the business life of the country served by them, and in the case of the Otago Central district the railway is an absolute necessity. Were it not in existence the greater part of the population would have to leave, as the transport charges on anything but wool would render the other industries of the district unprofitable. In cases where such a condition obtains I do not think any extension of the railway which cannot be shown clearly to be certain to improve the financial condition should be undertaken, unless arrangements are made whereby the further funds necessary to pay all charges and interest will be secured to the Railway Department, either by special tariff, special rate over the area served, a direct grant annually from the consolidated revenue, or a combination of some or all of these methods.

Meanwhile the Department's hands are very full, and the construction programme very extensive, so that I do not recommend any fresh authorization during the current session. When an officer is available I consider that the new line should be surveyed, so that a closer estimate of the cost can be obtained.

F. W. FURKERT,  
Engineer-in-Chief.

20th August, 1925.

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## APPENDIX F.

## FIRST ANNUAL REPORT OF THE MAIN HIGHWAYS BOARD.

The CHAIRMAN OF THE MAIN HIGHWAYS BOARD to the MINISTER OF PUBLIC WORKS, Wellington.

SIR,—

In accordance with the terms of section 24 of the Main Highways Act, 1922, we have now the honour to submit to you the first annual report on the main highways of the Dominion.

The report sets forth the operations under the Act for the year ending 31st March, 1925; but, as the first instalment of main highways was not declared till the 9th June, 1924, the period covered by the report amounts only to nine and two-thirds months.

## INTRODUCTORY.

The advent of the motor-car entirely changed the complexion of the roading problem in New Zealand, as elsewhere, and the cry for better roads arose very shortly after motor transport became an appreciable factor. Later on, with the rapid increase in the use of motor-vehicles, particularly heavy ones, the position became acute, and it was soon quite evident that the type of road that was suitable for slow-moving horse-drawn traffic was inadequate.

Prior to the Main Highways Act coming into operation it was usual for the Public Works Department, and to a lesser degree other Departments, to open up, form, bridge, and culvert new roads, and, when these were in a fit state to do so, to hand them over to the care and control of the local authorities, which in rural districts consist of County Councils, Road Boards, and Town Boards.

There were districts, particularly in the South Island, where a great deal of developmental work was done by the local authorities, with the assistance of 10 per cent. of proceeds of land sales. As a rule there was little expenditure of Government moneys on roadworks within cities and boroughs.

The latest statistics show the length of roads under the control of these bodies to be as under:—

|                    | Number. | Length of Roads. |
|--------------------|---------|------------------|
|                    |         | Miles.           |
| County Councils .. | 122     | 56,098           |
| Road Boards ..     | 41      | 4,245            |
| Town Districts ..  | 73      | 738              |
|                    | ..      | 61,081           |

In addition to the mileage of roads above shown there are also 3,544 miles of streets in the cities and boroughs, thus making a total length of roads and streets in the Dominion of 64,625 miles, of which at date 28,553 miles are metalled, 17,223 miles are unmetalled, and the balance largely undeveloped.

In counties where the country was sparsely populated, and the revenue derivable from rates was low, a certain number of roads have in the past been maintained more or less by means of grants or subsidies from the Government. It was found in New Zealand, as in other parts of the world, that under the strain of motor traffic the roads were deteriorating, while the popular clamour that they be improved to meet modern conditions was insistent. This led in 1921 to the introduction of a Main Highways Bill, which provided that all works of construction and maintenance on certain specified highways were to be carried out by the Government without any contribution from local authorities. The mileage then proposed was about 2,000 miles, but the Bill provided that these could from time to time be extended.

## MAIN HIGHWAYS ACT, 1922.

It was contended, however, by the local authorities that the creation of these main highways under direct Government operation would lead to dual control and overlapping supervision, and also that it was undesirable to deprive the local authorities of all powers over roads within the areas under their jurisdiction. Further, it was claimed that the scheme by not covering a sufficient length of roads, consequently did not give adequate relief to the local authorities. In addition the scheme proposed to spend all the money derived from then proposed motor-taxation on a limited length of roads, a great proportion of which were running parallel with railways, and depriving the roads that brought the produce of the country to the railways of any assistance. For these reasons this Bill did not become law; but in 1922 a modified Bill again came before Parliament, and was finally passed as the Main Highways Act, 1922.

## MAIN HIGHWAYS BOARD.

For the purposes of the Act (under section 5) a Board called the "Main Highways Board" was provided for. This Board was duly appointed by His Excellency the Governor-General on the 12th June, 1923, and consisted of—

Chairman—F. W. Fulkert (Wellington), Engineer-in-Chief and Under-Secretary, Public Works Department.

Members—G. C. Godfrey (Wellington), Assistant Under-Secretary, Public Works Department; G. T. Murray (Wellington), Inspecting Engineer, Public Works Department; A. E. Jull (Waipawa), representing the New Zealand Counties Association; J. D. Bruce, (Akaroa), representing the New Zealand Counties Association; M. H. Wynyard (Auckland), representing the motor-owners.

Owing to his appointment to the position of Secretary to the Marine Department, Mr. Godfrey resigned from the Board in April, 1924, and Mr. P. S. Waldie, Chief Clerk, Public Works Department, Wellington, was appointed to fill the vacancy.

#### HIGHWAY DISTRICTS.

Section 8 of the Act required that New Zealand should be divided into a suitable number of highway districts, having regard to geographical situation, community of interest, and other relevant considerations. To conform with the above requirement the Main Highways Board decided to divide the Dominion into eighteen highway districts. In the majority of cases the constituent local authorities acquiesced in the proposed grouping. In the remaining cases some slight adjustments were made to secure agreement. Counties in the several highway districts as finally adjusted and gazetted on the 4th October, 1923, are shown in schedule attached.

#### DISTRICT HIGHWAY COUNCILS.

Section 8 of the Act also required District Highway Councils to be set up in each highway district, these Councils being constituted to include a Public Works Engineer, and one person to represent each constituent county, with an executive of three to be appointed by the members of the Council. The personnel of these District Highway Councils was approved by the Main Highways Board on the 26th September, 1923.

#### DECLARATION OF MAIN HIGHWAYS.

Section 11 of the Act defined the functions of the District Highway Councils, which are to make recommendations for each year as to which roads within the several districts should be declared main highways, and what works should be done and what expenditure incurred on these highways during that period.

The Board, in a circular letter to the District Highway Councils, advised that they should be guided by the following considerations when recommending roads for declaration as main highways:—

- (a.) As to whether the roads may be regarded as arterial in that they carry appreciable volumes of through as well as local traffic:
- (b.) As to whether the roads connect large centres of population within the highway district:
- (c.) As to whether the roads carry appreciable traffic to and from seaports or railway centres within or without the highway districts.

For the purpose of gauging the respective volumes of through and of local traffic the District Highway Councils were informed that it would be advisable to obtain tallies or estimates of traffic, and this was done in the majority of cases.

The recommendations of the District Highway Councils were carefully looked into by the Board. It was found that the total length of highways so recommended was greater than could be adequately financed. In order to make a final decision, members of the Board visited quite a number of localities throughout New Zealand, and made a selection from the recommendations. By Order in Council dated 9th June, 1924, and appearing in *Gazette* issued on the 12th June, 1924, 5,931 miles were declared to be main highways. In terms of the Act the declaration should have been as from the 1st April, 1924, but the necessity for harmonizing the recommendations of the District Highway Councils with the Board's financial limitations, and the visits to the districts referred to above, resulted in the unavoidable delay indicated by the above date of gazetting.

#### DECLARATIONS OF GOVERNMENT ROADS.

On the same date 1,046 miles of main highways were gazetted Government roads, this action being in terms of section 22 of the Act, whereby the Board could declare any main highway to be a Government road, and provide a greater proportion of the cost of works of construction, reconstruction, maintenance, or repair of any main highway than prescribed by sections 18 and 19 of the Act. The highways that were so declared as Government roads were chiefly those in districts where settlement was sparse, and where the revenue from rates collectable by the local authorities was insufficient to meet the expenditure necessary for the construction, reconstruction, and maintenance of the highways therein. On the west coast of the South Island (Highway District No. 12) all the main highways were declared to be Government roads, but on the distinct understanding that the local authorities were to continue contributions towards the maintenance of these highways on at least the same scale as their average maintenance expenditure during the previous three years.

In the Rotorua district (Highway District No. 3), where tourist traffic predominates, and where settlement is sparse, most of the highways have also been declared Government roads.

Under sections 18 and 19 of the Act the basis of payment by the Board is specified as being £1 for £2 for repairs and maintenance, and £1 for £1 for construction and reconstruction. There being some doubt as to the meaning of the term "reconstruction," the Board defined it as—"Where work on a road is of such a character that it simply restores the road to its original character and standard, this shall be considered as maintenance; but where the work is of an additional character, thereby improving the character and bringing the works up to a more permanent standard, then such extra work shall be considered as reconstruction, even though there may be no alteration in the location."

#### EXTENSION OF MAIN HIGHWAYS THROUGH BOROUGHs.

Under section 23 of the Act the Board has power to contribute towards the maintenance and repair of any street in a borough which is a continuation of a main highway. Payment under this section is limited to a rate equal to that paid in respect of the maintenance and repair of the adjoining main highway.



Numerous requests were received from boroughs throughout the Dominion asking for assistance towards maintenance of their streets which were extensions of main highways, and in a small number of cases, where the traffic was overwhelmingly foreign to the borough, the Board agreed. It did not feel justified in widening the scope of this provision until the financial results of its first year's working had been demonstrated. At the 31st March, 1925, however, it decided that in all cases where the population of the borough did not exceed six thousand inhabitants assistance would be given under section 23. The length of road involved is approximately 180 miles.

FINANCE.

The Main Highways Account is subdivided as under:—

|                                                                                                                   |                 |
|-------------------------------------------------------------------------------------------------------------------|-----------------|
| (a.) <i>Revenue Fund</i> , which includes—                                                                        | £               |
| Transfer from Consolidated Fund of at least .. .. .                                                               | 35,000          |
| Proceeds of tax on tires and tubes, as collected through Customs Department (approximate) .. .. .                 | 150,000         |
| Registration and license fees of motor-vehicles to cover period to 31st March, 1926, estimated to produce .. .. . | 200,000         |
| Probable approximate total per annum .. .. .                                                                      | <u>£385,000</u> |

The net expenditure out of the Revenue Fund for the nine and two-thirds months ending 31st March, 1925, was £138,962, although when the Act is in full operation it is anticipated that this will rapidly advance. This sum was expended on maintenance and repair of main highways, administration charges, and fees relative to registration of motor-vehicles and annual licenses as scheduled below.

|                                                                                                                                                                                                                                                    |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| (b.) <i>Construction Fund</i> , which includes—                                                                                                                                                                                                    |                 |
| All moneys borrowed by the Minister of Finance as may be required for purposes of construction and reconstruction, to a limit of £3,000,000. This sum is intended to extend over a period of ten years. Annual amount available being thus .. .. . | £ 300,000       |
| Transfer from Public Works Fund, not less in any year than .. .. .                                                                                                                                                                                 | 200,000         |
|                                                                                                                                                                                                                                                    | <u>£500,000</u> |

The net expenditure out of the Construction Account for the nine and two-thirds months ending 31st March, 1925, was £233,305, though when the Act is in full operation it is anticipated that the payments necessary for works of construction and reconstruction will entail an expenditure up to the full amount available.

The estimates of amounts required for maintenance and repairs, construction and reconstruction, and all other items are forwarded by the District Highway Councils, and after review by the Board are incorporated in the Consolidated Fund Estimates and Public Works Estimates respectively, which in turn are submitted for approval to both Houses of Parliament, for inclusion in the annual appropriations.

For the year ending 31st March, 1925, the appropriations and expenditure under construction were as under:—

|                                                                  | Available for Authorization. | Appropriated. | Expenditure. | Percentage of Expenditure to Appropriations. |
|------------------------------------------------------------------|------------------------------|---------------|--------------|----------------------------------------------|
|                                                                  | £                            | £             | £            |                                              |
| North Island .. .. .                                             | 486,980                      | 397,463       | 186,716      | 47·00                                        |
| South Island .. .. .                                             | 111,014                      | 90,607        | 35,706       | 39·50                                        |
| Administration charges and compensation for accidents to workmen | 21,500                       | 21,500        | 10,867       | 50·70                                        |
| Totals .. .. .                                                   | 619,494                      | 509,570       | 233,289      | 46·00                                        |

while under maintenance the figures were,—

|                                                                                            | £       | £       | £       |       |
|--------------------------------------------------------------------------------------------|---------|---------|---------|-------|
| North Island .. .. .                                                                       | 107,115 | 107,115 | 79,766  | 74·20 |
| South Island .. .. .                                                                       | 72,454  | 72,454  | 43,909  | 61·00 |
| Administration charges .. .. .                                                             | 5,431   | 5,431   | 7,787   | ..    |
| Commission paid to Postal Department for collection of motor registration and license fees | ..      | ..      | 7,500   | ..    |
| Totals .. .. .                                                                             | 185,000 | 185,000 | 138,962 | ..    |

The details of the appropriations and expenditure in the various highway districts, under both construction and maintenance, are shown in an appendix.

In addition to the moneys indicated in the two accounts above, there will be available for expenditure on highways under the Revenue Account a sum of approximately one and a half times the Board's contributions, which sum will be found by the local bodies. Under the Construction Account, if all work were carried out under the conditions of section 19 there would be approximately half a million derivable from local-body sources, but owing to the fact that a considerable amount of developmental work will be done on Government roads it is unlikely that this sum will exceed £400,000 per annum.

#### APPORTIONMENT BETWEEN NORTH AND SOUTH ISLANDS.

Under section 21 of the Act the revenue from licensing of motor-vehicles and from taxes on tires and tubes is to be apportioned between the North Island and the South Island in the discretion of the Board, but generally so that the amount apportioned to either Island shall be fixed by reference to the number of motor-vehicles in that Island. In the first instance the Board received a very much greater number of applications for the inclusion of sums on the estimates from the North Island than from the South Island, and later on, similarly, received many more proposals from the North than from the South. Now that the expenditure is known, it is noted that, excluding works being carried out by the Public Works Department on behalf of the Board, the expenditure in the South Island is disappointingly small.

When the estimates were being considered in August, 1924, the relative numbers of motor-vehicles in the two Islands were not known, but were conjectured to be approximately in the ratio of three to two. Now that the actual numbers are known—approximately sixty-one thousand in the North Island and thirty-nine thousand in the South Island—it will be seen that the forecast was very close to the mark.

Up to the 31st March, 1925, the North Island authorities submitted final detail construction proposals for £418,000, as against £42,000 for the South Island. The provisional proposals to the same date totalled £450,000 for the North as against nil for the South Island. The South Island's expenditure under the maintenance heading was much more satisfactory. In accordance with section 21 of the Act immediately the number of motor-vehicles in each Island is known an allocation of the funds in hand will be made in accordance therewith, and brought up to date each year, taking the increase as at 31st March as the basis.

#### MOTOR-VEHICLES ACT.

Before the Main Highways Act was passed the Government recognized the reasonableness of motor-vehicle owners contributing towards the cost of the construction and upkeep of the road-surfaces which were required principally for them.

Amongst the funds laid down in the Main Highways Act as being available for the Revenue Fund, in addition to Customs duties on tires and tubes, was a sum to be derived from the licensing of motor-vehicles. When the Main Highways Act was passed it was expected that a Motor-vehicles Act dealing with the registration and licensing of motor-vehicles would be simultaneously passed, but owing to the difficulty of co-ordinating all interests it was not until November, 1924, that the Motor-vehicles Act came into being.

This Act provided for the registration and annual licensing of all motor-vehicles, the fees payable for registration to be as follows:—

|                                                                                         |   |    |    |
|-----------------------------------------------------------------------------------------|---|----|----|
| Motor-cycle .. .. .                                                                     | £ | s. | d. |
| Any other motor-vehicle .. .. .                                                         | 0 | 10 | 0  |
| Any other motor-vehicle .. .. .                                                         | 1 | 0  | 0  |
| The annual fees payable for licenses to be as follows:—                                 |   |    |    |
| (1.) For every motor-cycle .. .. .                                                      | 0 | 10 | 0  |
| (2.) For every private motor-car .. .. .                                                | 2 | 0  | 0  |
| (3.) For every public motor-car .. .. .                                                 | 2 | 0  | 0  |
| (4.) For every motor-coach or motor-omnibus .. .. .                                     | 5 | 0  | 0  |
| (5.) For trade motors—                                                                  |   |    |    |
| (a.) For every 1-ton truck fitted with pneumatic tires on all wheels .. .. .            | 2 | 0  | 0  |
| (b.) For every motor-lorry fitted with solid tires .. .. .                              | 5 | 0  | 0  |
| (c.) For every motor-lorry fitted with pneumatic tires on all wheels .. .. .            | 3 | 0  | 0  |
| (6.) For every traction-engine .. .. .                                                  | 5 | 0  | 0  |
| (7.) For every trailer with three or more wheels .. .. .                                | 3 | 0  | 0  |
| (8.) For every other trailer .. .. .                                                    | 1 | 0  | 0  |
| (9.) For every other motor-vehicle .. .. .                                              | 2 | 0  | 0  |
| In addition, the following fees are payable:—                                           |   |    |    |
| All drivers to be licensed—fee .. .. .                                                  | 0 | 5  | 0  |
| All changes of ownership to be notified .. .. .                                         | 0 | 5  | 0  |
| Special fees for manufacturers and dealers in motor-vehicles—                           |   |    |    |
| In respect of motor-cycles, each registration-plate .. .. .                             | 0 | 5  | 0  |
| In respect of any other motor-vehicle, each registration-plate or set of plates .. .. . | 0 | 10 | 0  |

All the above fees, except that for a driver's license, which is payable to the local authorities, have in terms of the Motor-vehicles Act to be credited to the Main Highways Revenue Account. In respect of each annual license fee a deduction of the sum of 1s. 6d. is made, which amount is credited to the Post Office Account to cover the expenses of administration.

The Board, realizing that the position with regard to local-body by-laws and heavy traffic had drifted into a somewhat chaotic condition, made certain proposals to the Government with a view to dealing with the matter. After consideration of the position the Public Works Amendment Act of last year was passed, the result of which, while giving security to the user of heavy traffic, will provide additional funds to local bodies towards their share of the maintenance of main highways. The Board receives no portion of these fees, which are divided among the local authorities—cities, boroughs, counties, and town boards.

#### FINANCE ACT, 1924.

Under section 33 of this Act local authorities are empowered to raise loans for the purpose of providing the whole or any portion of their contributions towards the cost of construction or reconstruction of any main highway. This section was rendered necessary as it was held by the Crown Law Office that a local authority could not raise loans to meet its contribution towards the cost of works on roads that had been declared main highways. The same section provided that contributions could be made towards maintenance of any main highway out of the general rates for the whole county, or for any riding or ridings thereof, or by special rate over the whole or any portion of the county.

#### AMENDMENTS TO THE MAIN HIGHWAYS ACT, 1922.

In the course of the administration of this Act a number of difficulties, mainly in respect to the construction of the provisions of the Act, have been encountered. In order to overcome these difficulties the Board proposes to recommend certain amendments.

#### TOLL-GATES.

In the Taranaki District there have been seven toll-gates in existence since dates ranging from 1906 to 1915. These toll-gates were instituted in order to raise revenue for the construction and maintenance of roads, and the County Councils naturally placed them on those roads on which the traffic and the maintenance charges were greatest. The proceeds from these toll-gates were mainly used in paying interest and sinking funds on loans raised by the local authorities for reconstructing the principal roads, including tar and bituminous surfacing.

The revenue from these toll-gates exceeded all expectations. This was due to the extraordinary increase in traffic, especially of motor-vehicles, which took place, largely as a result of the better road-surfaces provided.

The following table shows the chief figures in connection with toll-gates, and is of interest as an instance of the manner in which revenue has been procured by this means:—

| County.         | Locality.        | Established. | Total Funds collected since Inception. | Funds collected, 1924. | Approximate Cost of Collection, 1924. |
|-----------------|------------------|--------------|----------------------------------------|------------------------|---------------------------------------|
|                 |                  |              | £                                      | £                      | £                                     |
| Clifton .. ..   | Waihi .. ..      | 1906         | 16,974                                 | 1,895                  | 150                                   |
| Taranaki .. ..  | Puniho .. ..     | 1908         | 20,918                                 | 2,583                  | 232                                   |
| Eltham .. ..    | Mangatoki .. ..  | 1908         | 35,660                                 | 3,408                  | 410                                   |
| Eltham .. ..    | Riverlea .. ..   | 1908         |                                        |                        |                                       |
| Hawera .. ..    | Riversdale .. .. | 1909         | 24,245                                 | 2,081                  | 317                                   |
| Hawera .. ..    | Okaiawa .. ..    | 1909         | 2,778                                  |                        |                                       |
| Stratford .. .. | Waipuku .. ..    | 1915         | 19,745                                 | 3,604                  | 240                                   |

As it is not legally possible for a toll-gate to operate on a main highway, the important routes affected could not be declared main highways until some equitable financial arrangement had been arrived at so that the toll-gates could be abolished without inflicting undue hardship upon the local authorities interested.

After much negotiation and discussion it was agreed to recommend to you—

- (1.) That in the interests of the public generally the toll-gates in the Taranaki District be closed.
- (2.) That the roads upon which the toll-gates are situated be declared main highways as from the 1st April, 1925, thus automatically closing these toll-gates.
- (3.) That the local authorities controlling the toll-gates be compensated by the Board, the compensation to be in the form of annual payments equivalent to half the interest and sinking funds upon loans raised by these local authorities and expended on the roads in question, and the annual payments to be continued until the expiry of the respective loans, or alternatively until an equivalent lump-sum payment is made.

Upon your approval the toll-gates were closed on the 31st March, 1925, and the roads in question were declared to be main highways. The question of a further payment to the Taranaki County in respect of certain other payments made prior to the taking-over of the road as a highway is still under consideration.

#### RULES AND REGULATIONS.

In September, 1923, a circular setting forth the rules of procedure for District Highway Councils was issued by the Board. This dealt with terms of office, election of executives, quorums, minutes, resolutions, and correspondence.

In May, 1924, a further circular was issued for the guidance of the District Highway Councils, treating particularly with the methods in which proposals for works of construction or reconstruction were to be forwarded to the Board.

The District Highway Councils were also advised that the standards of construction recommended for adoption should be such as are warranted by the present or early prospective traffic. To ensure uniformity in construction as far as possible throughout the Dominion the following standards for first-class, second-class, and third-class roads were laid down :—

| Item.       | Unit.                  | First Class.                                                                                                                                                                   | Second Class.     | Third Class.       |
|-------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------|
| Formation   | Minimum widths in feet | 22                                                                                                                                                                             | 17                | 14                 |
| Curvature   | Chains radius          | 1 $\frac{1}{2}$                                                                                                                                                                | 1                 | 0 $\frac{3}{4}$    |
| Grades ..   | ..                     | 1 in 15 to 1 in 20                                                                                                                                                             | 1 in 15           | 1 in 12            |
| Metalling   | Feet and inches        | 16' $\times$ 9"                                                                                                                                                                | 12' $\times$ 8"   | 10' $\times$ 6"    |
| Surfacing   | ..                     | Concrete; bitumen; tar; macadam                                                                                                                                                | Macadam or gravel | Macadam or gravel. |
| Bridges ..  | Widths in feet         | 18                                                                                                                                                                             | 12                | 9                  |
| Bridges ..  | Types                  | According to sites, dimensions, convenience of materials, but generally to provide for permanent materials in substructures. In all cases standard information to be supplied. |                   |                    |
| Culverts .. | Types                  | To be of concrete, earthenware, Armco, or hardwoods.                                                                                                                           |                   |                    |

#### SKELETON SPECIFICATIONS.

As a guide to local authorities in the preparation of proposals, the Board drew up, and in January, 1925, issued, skeleton or outline specifications, dealing with formation; subgrades of pavements; gravelled roads; two-course water-bound macadam roads; tar or bituminous surfacing of water-bound macadam roads; tar or bituminous penetration roads; bituminous concrete roads; Portland-cement concrete roads.

These specifications are not laid down as hard-and-fast rules which local authorities must in every case adopt, but are to be regarded as standard practice, the following of which will result in satisfactory work. The standard of construction in all cases should, of course, be regulated by local conditions, and should be commensurate with the traffic requirements.

As practically all extensive construction work is generally financed wholly or in part by loan, it is essential that the character of the work should be such as to ensure a life at least equal to the period of the loan.

All proposals are examined by the Board to determine—(1) Whether the proposal is sound from an engineering point of view; (2) whether the proposal is justified as to cost having regard to the existing surfaces; (3) whether the proposal is economically sound, having regard to the value to the district concerned, and the capacity of the district to pay the cost; (4) whether the proposal fits into and forms part of a comprehensive plan.

Some proposals have been of altogether too elaborate a nature to agree with the principles above stated, and have had to be returned by the Board to the local authorities for amendment to designs more suited to the conditions.

There has been a general feeling that the Board would insist upon high-class and expensive surfacing on all arterial highways, and even on highways of secondary importance, but this is far from being the case, for the Board, on the other hand, has consistently encouraged the adoption of the simplest construction suitable for the present or early prospective traffic and the conditions obtaining in the particular locality.

The Board, however, has adopted the principle that bridges should, wherever practicable, be on the best possible alignment, and constructed of the most permanent materials available.

#### MAINTENANCE.

In all works, whether formation, bridges, culverts, ditches, surfacing, or any other form of construction, the Board requires provision to be made for continuous and up-to-date maintenance. The patrol system is encouraged. By dividing the highways into suitable patrol sections, by the selection of suitable patrolmen, and by the provision of satisfactory supplies of material and efficient plant, it is considered by the Board that a very much improved standard of maintenance can in most cases be obtained without undertaking expensive reconstruction. Moreover, the Board is emphatically of opinion that improved methods of maintenance will result in better and quick returns being obtained from the expenditure of the Board's funds than will be the case by the piling-up of large sums of borrowed money on elaborate construction which is possibly not warranted.

#### PLANT AND MACHINERY.

Early in the life of the Board an inventory of all plant and machinery in the hands of the local authorities was made, as well as a list of additional plant and machinery which the local authorities considered as being still required. It was then found that the estimated value of the plant and machinery in hand was £425,217, and that the local authorities considered that further plant to the aggregate amount of £140,367 was still required.

In many cases it was noticed there were items that were quite unsuitable for the purposes intended, and that, on the other hand, quite a number of local authorities had little plant of any kind. Throughout the Dominion there was a noticeable want of road-rollers.

In some instances where the local authorities are unable to finance the purchase of necessary plant the Board has agreed to purchase such plant and let it on hire-purchase terms to local bodies so that the whole cost, plus interest and contingent expenses, will be fully refunded by instalments within a period of four years.

The Board, in making the purchases, will take every precaution to ensure that the plant is capable of doing the work for which it is intended, in an economical and efficient manner.

At all times the Board is willing to advise local authorities in regard to the purchase, use, and repair of plant, but naturally it cannot adopt as a standard the machinery of any particular maker.

#### EXPERIMENTAL LENGTHS OF ROAD.

The Board has decided to arrange for the laying-down of short lengths of surfacing of various kinds in several localities as experiments, not only for its own information, but also for the information of any local authorities interested. It is hoped in this way to ascertain the initial cost of construction, and subsequently the annual cost of maintenance, of the various types under varying conditions.

In order to be continually under close supervision, and also to be in localities where the traffic conditions are severe, such lengths are to be laid in the vicinity of Wellington.

Between Paremata and Porirua there is a length of 5 miles which the Board is having re-formed to a width of 24 ft. with minimum curvature of 2-chains radius. A portion of this length is to be simply gravelled, but it is to be maintained by the Public Works Department, under the direction of the Board, in such a way as to demonstrate that an ordinary gravelled road will, when properly looked after, carry a large traffic without deterioration and with reasonable expenditure. A portion of this section of road will also be used for demonstration purposes with other types of surfacing.

#### BUREAU OF INFORMATION.

It is the intention of the Board to build up a Bureau of Information, so that all facts relating to the construction and maintenance of highways will be systematized and made available for public information. Such facts would include, *inter alia*, information on the following subjects: Initial costs of formation, culverts, bridges, surfacing of all types; cost of maintenance of all types of pavements and bridges; results of tests of rocks, sands, cement, bitumen, tar, &c.; results of experimental lengths; results of experience with various kinds of plant and machinery.

#### GEOLOGICAL INVESTIGATIONS.

A large number of quarries have been examined in order to ascertain the localities in which high-grade and sound material could be found in sufficient quantities and sufficiently accessible to warrant the opening-up and subsequent operation of these quarries. Reports upon these investigations have been submitted to the Board by a Geologist attached to the Public Works Department, and copies of these reports have been sent to the interested local authorities. The principal reports submitted deal with quarries in the Auckland, Gisborne, Hawke's Bay, Taranaki, and Wellington Districts.

#### TESTING OF MATERIALS.

A petrological laboratory has been established in Wellington. The installation of the machinery required for testing the various properties of roadmaking-materials is now almost completed, and it will soon be possible to give full reports on the various materials submitted by local authorities for use as road-metal as well as for other purposes throughout the Dominion. The machines being installed are—Deval abrasion machine for testing wearing qualities of rocks; diamond-core drill for cutting test pieces; diamond-saw and grinding-lap; Dorry hardness machine; Page impact machine.

The following important properties will be ascertained—(1) Specific gravity; (2) porosity; (3) resistance to abrasion or attrition; (4) resistance to friction or hardness; (5) resistance to impact or toughness.

Tests for bitumens, tars, &c., are carried out by the Dominion Analyst, Wellington.

The testing of steel has been carried out by the machines already in use by the Public Works or Railway Departments, or at the Canterbury School of Engineering.

It has been decided in the public interest that no charge shall in the meantime be made by the Board to local bodies for any testing by the above machines, though any information regarding tests will be at the disposal of any who are interested in the subject.

#### EXAMINATIONS OF FOREMEN, OVERSEERS, ETC.

The nature of surfacing now rendered necessary by modern traffic requires such knowledge and experience on the part of those laying such surfacing that a class of foremen and overseers with special experience and knowledge of modern road requirements superior to that which formerly was found sufficient is now necessary. On such surfacing all the men in charge should have some experience, and should possess knowledge of the use of the modern methods of construction and up-to-date machinery.

In order to afford some guarantee of experience and reliability, and to ensure that all high-class work is properly supervised, the Board has decided to arrange for examinations, oral or otherwise, of any persons who desire to qualify themselves for positions as foremen or overseers of works coming under that category. Successful candidates will be granted certificates of competence.

A syllabus was prepared and issued by the Board on the 24th October, 1924. There have already been a number of applicants for examination, but when the system becomes known, and when it is found that it is of advantage to have certificates of experience and proficiency, it is expected that more advantage will be taken of this proposal. It is hoped to make the business of road-construction and maintenance a cult which will attract young men to adopt it as a life work.

#### COSTING.

It is very necessary to collect cost data so that works in different districts may be compared. Such data is also invaluable when future estimates are being compiled. The Board has accordingly arranged that all vouchers for final payments shall provide sufficient data to enable the unit rates in every case to be ascertained. In this way the results of operations in all districts can be compared, and in all cases where the costs have been unsatisfactory steps can be taken to ensure the elimination of defects and to ensure greater future efficiency.

#### DANGER AND DIRECTION SIGNS.

Throughout New Zealand danger signs have been very generally erected, largely through the effort of the automobile and kindred associations, but owing to the lack of uniformity, and owing to the desirability of securing such uniformity on all roads, the Board gave this matter consideration, and issued a circular urging the adoption of standard danger signs, together with a general description of the sign that appeared to be most suitable. Following English precedent, the Board recommends "that standard forms be introduced as and when opportunity occurs, and with due regard to economy."

At a later date the Board will probably assist in the design and erection of a uniform system of direction signs, and will encourage the local authorities to obtain continuous mileages from the main centres and indicate these on the direction signs. In the meantime it has placed its views before the Internal Affairs Department, which is drawing up regulations under the Motor-vehicles Act, 1924.

The Board is obtaining information as to the administration and installation of a system of highway lighthouses, which it is hoped can be carried out without cost to the Government by utilizing the value of such lighthouses for advertisement purposes.

#### TALLIES OF TRAFFIC.

In order to determine the class of road that is in any case to be adopted, reliable data as to the character and volumes of traffic are required, as well as the finances that are available for the work. To obtain proper traffic tallies, not only the numbers of vehicles but also the classes of their loads, their origins and destinations, are necessary.

Tallies of traffic were taken on many roads that were claimed to be suitable for declaration as main highways, and these tallies were duly considered when the Board was making its decisions as to which roads it should recommend be declared main highways.

Although the tallies showed fair volumes of traffic, running up to five or six hundred vehicles per day in some cases, still, in no instance was the traffic comparable to that obtaining in the older countries. In fact, if we measure by mere numbers and by American experience there are no roads in this country upon which high-class pavements are really justified. Nevertheless the tallies show such rapid increases in volume that superior surfaces on certain selected sections are already warranted, especially when it is considered that improvement of the road invariably leads to an increase in the traffic.

#### LEVEL CROSSINGS.

Throughout the Dominion there are many railway level-crossings, and at many of these there is positive danger to road traffic. In the majority of cases the elimination would be a difficult and costly matter; still, there are some that could be eliminated either by detours or by overhead bridges at reasonable costs. The danger of these crossings has been intensified by the rapidly increasing motor traffic. Having this in view, the Board is obtaining reports as to the localities, the suggested means of elimination, the approximate costs, and the relative urgency of each case.

In connection with the elimination of level-crossings, the Board will endeavour to obtain some agreement with the Railway Department and the local authorities, whereby the respective contributions to be made by each of the three parties towards the costs of elimination may be determined.

#### HIGHWAY MAPS.

Highway maps showing the location of all declared main highways have been prepared and circulated. For ease of reference and easy description the highways are intended in future to be known by numbers in preference to names. The numerals are shown in red figures, within red circles, at suitable intervals, along the whole lengths of the highways. Thus No. 1 highway extends from Waipapakauri, in the far north, to Wellington, at the extreme south of the North Island system, a length of 680½ miles; while No. 101 highway, in the South Island, extends from Picton to Bluff, a length of 627 miles.

To date the North Island highways numbers run from 1 to 80, and those in the South Island from 101 to 147. As additional highways are added from time to time further numbers will be allotted.

Between every junction of highways, or important centres on highways, the mileages to the nearest quarter of a mile are marked in black figures.

It is intended that the direction signs will in future show the main-highway numbers, and also the distances to the adjacent centres, and thus obviate the present uncertainty and confusion both as regards directions and distances.

## LONGITUDINAL SECTIONS OF MAIN HIGHWAYS.

The Board has also in course of preparation reduced longitudinal sections of all highways. These will show the distances on a scale of 2 miles to the inch, and the elevation on a scale of 400 ft. to an inch. From inspection of these sections the nature of the country as regards grades can be fairly well estimated by the experienced traveller.

## LOCATION.

Large areas of New Zealand being mountainous, many of its roads have steep grades and sharp curvature. These defects are frequently unavoidable; nevertheless, in some cases careful relocation has resulted in elimination. With a view to standardizing the methods of location or relocation the Board issued circular instructions, accompanied by a typical plan, indicating the proper course to be pursued by engineers in improvements of this nature.

## DEVIATIONS.

Various difficulties in the past have resulted in the local authorities not carrying out many deviations which are desirable, if not indispensable. It is undoubtedly wrong to surface a road, especially in such a high-class manner as is required for modern traffic, when the road itself is in the wrong position, and when possibly all this work will be lost through eventually having to carry out a deviation that should in the first case have been adopted.

The Board carefully considered the matter, and resolved to make an effort to provide a more liberal scale of subsidies to cover such cases, and thus encourage the adoption of really desirable deviations. Consequently, on the 5th August, 1924, the Board issued a circular to the effect as under:—

Where particular circumstances warrant such action—

- (1.) The Board will carry out at its own cost all engineering and land-plan surveys of deviations in alignment that are wholly outside the existing road reserve.
- (2.) The Board will contribute £1 for £1 towards the cost of all engineering and land-plan surveys of approved deviations which are almost entirely within the existing road reserves.
- (3.) The Board will contribute £1 for £1 towards the cost of compensation for land, new fencing, shifting fences, severances, and other expenses of a like nature incidental to the legalization of any deviation not declared a Government road, provided it approves of the financial arrangements entered into by the local authority.
- (4.) The Board reserves the right to enter into negotiations concerning the compensation direct.

## GENERAL.

Representations were made to the Government with reference to the difficulty that local bodies are experiencing in raising the funds necessary to find their quota to meet the Board's £1 for £1 subsidies, and suggestions have been made as to how the difficulties might be overcome.

During the year the whole Board or a considerable portion of it has visited practically every part of the North Island and a good part of the South, and it is proposed before long that the whole Board should make a comprehensive tour through the South Island.

Signed on behalf of the Main Highways Board

F. W. FURKERT,  
Chairman.

SCHEDULE SHOWING BOUNDARIES OF HIGHWAY DISTRICTS AS ON 4TH OCTOBER, 1923.

- 
- Highway District No. 1: All that area comprised within the Counties of Mangonui, Hokianga, Bay of Islands, Whangaroa, Hobson, Whangarei, Otamatea, Rodney, Waitemata, and Eden.
- Highway District No. 2: All that area comprised within the Counties of Manukau, Franklin, Waikato, Raglan, Waipa, Coromandel, Thames, Hauraki Plains, Ohinemuri, Piako, and Matamata.
- Highway District No. 3: All that area comprised within the Counties of Tauranga, Rotorua, Whakatane, Opotiki, and Taupo.
- Highway District No. 4: All that area comprised within the Counties of Matakaoa, Waipapu, Uawa, Waikohu, and Cook.
- Highway District No. 5: All that area comprised within the Counties of Wairoa, Hawke's Bay, Waipawa, Waipukurau, Patangata, Dannevirke, Weber, and Woodville.
- Highway District No. 6: All that area comprised within the Counties of Waitomo, Taumarunui, Ohura, Kaitieke, Kawhia, and Otorohanga.
- Highway District No. 7: All that area comprised within the Counties of Clifton, Whangamomona, Taranaki, Inglewood, Egmont, Stratford, Waimate West, Eltham, and Hawera.
- Highway District No. 8: All that area comprised within the Counties of Patea, Waitotara, Waimarino, Wanganui, and Rangitikei.
- Highway District No. 9: All that area comprised within the Counties of Kiwitea, Pohangina, Oroua, Kairanga, Manawatu, Horowhenua, Hutt, and Makara.
- Highway District No. 10: All that area comprised within the Counties of Pahiatua, Akitio, Eketahuna, Mauriceville, Castlepoint, Masterton, Wairarapa South, and Featherston.
- Highway District No. 11: All that area comprised within the Counties of Collingwood, Takaka, Waimea, Sounds, Marlborough, and Murchison.
- Highway District No. 12: All that area comprised within the Counties of Buller, Inangahua, Grey, and Westland.
- Highway District No. 13: All that area comprised within the Counties of Awatere, Kaikoura, Amuri, Cheviot, and Waipara.
- Highway District No. 14: All that area comprised within the Counties of Tawera, Oxford, Ashley, Kowai, Rangiora, Eyre, Waimairi, Heathcote, Paparua, Halswell, Mount Herbert, Akaroa, Wairewa, Springs, Ellesmere, Malvern, and Selwyn.
- Highway District No. 15: All that area comprised within the Counties of Ashburton, Geraldine, Mackenzie, Levels, Waimate, and Waitaki.
- Highway District No. 16: All that area comprised within the Counties of Maniototo, Vincent, Lake, Waihemo, and Waikouaiti.
- Highway District No. 17: All that area comprised within the Counties of Peninsula, Taieri, Tuapeka, Bruce, and Clutha.
- Highway District No. 18: All that area comprised within the Counties of Southland, Wallace, and Fiord.
-



TABLE 1.—MAIN HIGHWAYS ACCOUNT.

| CONSTRUCTION FUND.                                                             |    |                  |        |       |                                                                               |    |                  |       |       |
|--------------------------------------------------------------------------------|----|------------------|--------|-------|-------------------------------------------------------------------------------|----|------------------|-------|-------|
| INCOME AND EXPENDITURE ON CAPITAL ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1925. |    |                  |        |       |                                                                               |    |                  |       |       |
| <i>Expenditure.</i>                                                            |    |                  |        |       | <i>Income.</i>                                                                |    |                  |       |       |
| To Expenditure on construction and improvement of main highways—               |    |                  |        |       | By Sundry recoveries on Highway Construction Account—                         |    |                  |       |       |
| No.                                                                            | 1  | Highway District | £      | s. d. | No.                                                                           | 1  | Highway District | £     | s. d. |
| 2                                                                              | 2  | ..               | 28,024 | 4 4   | 2                                                                             | 2  | ..               | 3,063 | 11 4  |
| 3                                                                              | 3  | ..               | 40,928 | 19 2  | 3                                                                             | 3  | ..               | 417   | 4 11  |
| 4                                                                              | 4  | ..               | 7,343  | 16 4  | 4                                                                             | 4  | ..               | 329   | 3 9   |
| 5                                                                              | 5  | ..               | 24,838 | 10 6  | 5                                                                             | 5  | ..               | 115   | 9 8   |
| 6                                                                              | 6  | ..               | 19,703 | 15 8  | 6                                                                             | 6  | ..               | 134   | 5 4   |
| 7                                                                              | 7  | ..               | 23,024 | 19 6  | 7                                                                             | 7  | ..               | ..    | ..    |
| 8                                                                              | 8  | ..               | 27,707 | 12 10 | 8                                                                             | 8  | ..               | 710   | 1 10  |
| 9                                                                              | 9  | ..               | 7,967  | 18 8  | 9                                                                             | 9  | ..               | ..    | ..    |
| 10                                                                             | 10 | ..               | 18,896 | 17 7  | 10                                                                            | 10 | ..               | ..    | ..    |
| 11                                                                             | 11 | ..               | 2,241  | 15 9  | 11                                                                            | 11 | ..               | 52    | 3 10  |
| 12                                                                             | 12 | ..               | 520    | 9 1   | 12                                                                            | 12 | ..               | 202   | 1 3   |
| 13                                                                             | 13 | ..               | 10,213 | 9 9   | 13                                                                            | 13 | ..               | ..    | ..    |
| 14                                                                             | 14 | ..               | 24,035 | 12 7  | 14                                                                            | 14 | ..               | ..    | ..    |
| 15                                                                             | 15 | ..               | 719    | 8 4   | 15                                                                            | 15 | ..               | ..    | ..    |
| 16                                                                             | 16 | ..               | 577    | 10 0  | 16                                                                            | 16 | ..               | 416   | 3 9   |
| 17                                                                             | 17 | ..               | 1,132  | 9 11  | 17                                                                            | 17 | ..               | ..    | ..    |
| 18                                                                             | 18 | ..               | 292    | 4 4   | 18                                                                            | 18 | ..               | ..    | ..    |
|                                                                                |    | ..               | 559    | 13 0  |                                                                               |    | ..               | ..    | ..    |
|                                                                                |    |                  |        |       | Receipts under section 15 (2), Finance Act, 1923—                             |    |                  |       |       |
|                                                                                |    |                  |        |       | From Public Works Fund, General Purposes Account .. ..                        |    |                  |       |       |
|                                                                                |    |                  |        |       | Balance, being excess of capital expenditure over capital income for year, .. |    |                  |       |       |
|                                                                                |    |                  |        |       | transferred to Main Highways Construction Fund Account .. ..                  |    |                  |       |       |
|                                                                                |    |                  |        |       | 5,440 5 8                                                                     |    |                  |       |       |
|                                                                                |    |                  |        |       | *226,000 0 0                                                                  |    |                  |       |       |
|                                                                                |    |                  |        |       | 7,289 1 8                                                                     |    |                  |       |       |
|                                                                                |    |                  |        |       | £238,729 7 4                                                                  |    |                  |       |       |



TABLE 1.—MAIN HIGHWAYS ACCOUNT—*continued*.  
GENERAL BALANCE-SHEET AS AT 31ST MARCH, 1925.

| Liabilities.                                                           | Revenue Fund. |    |    | Construction Fund. |    |    | Assets.                                                                          |    |    | Revenue Fund. |    |    | Construction Fund. |    |    | Total.   |    |    |
|------------------------------------------------------------------------|---------------|----|----|--------------------|----|----|----------------------------------------------------------------------------------|----|----|---------------|----|----|--------------------|----|----|----------|----|----|
|                                                                        | £             | s. | d. | £                  | s. | d. | £                                                                                | s. | d. | £             | s. | d. | £                  | s. | d. | £        | s. | d. |
| Excess of income over expenditure—                                     |               |    |    |                    |    |    | Cash in Treasury—                                                                |    |    |               |    |    |                    |    |    |          |    |    |
| 1922-24 .. ..                                                          | 256,791       | 14 | 4  | ..                 | .. | .. | At call .. ..                                                                    | .. | .. | 54,373        | 7  | 5  | 545                | 15 | 3  |          |    |    |
| 1924-25 .. ..                                                          | 339,103       | 3  | 8  | ..                 | .. | .. | Temporarily invested until required ..                                           | .. | .. | 527,000       | 0  | 0  | ..                 | .. | .. |          |    |    |
| Sundry creditors .. ..                                                 | 19,548        | 2  | 8  | 22,384             | 19 | 11 | Sundry debtors .. ..                                                             | .. | .. | 314           | 2  | 5  | 617                | 13 | 4  | 581,919  | 2  | 8  |
|                                                                        |               |    |    |                    |    |    |                                                                                  |    |    |               |    |    |                    |    |    | 931      | 15 | 9  |
| Writings off Suspense Account: Material and stores as per contra .. .. | 128           | 3  | 0  | 17                 | 0  | 9  | Motor-registration fees: Collected but still in hands of Postal Department .. .. | .. | .. | 10,279        | 9  | 6  | ..                 | .. | .. |          |    |    |
|                                                                        |               |    |    |                    |    |    | Due but unpaid .. ..                                                             | .. | .. | 500           | 0  | 0  | ..                 | .. | .. |          |    |    |
|                                                                        |               |    |    |                    |    |    | Tire-tax: Collected but still in hands of Customs Department .. ..               | .. | .. | 14,929        | 13 | 4  | ..                 | .. | .. | 10,779   | 9  | 6  |
|                                                                        |               |    |    |                    |    |    | Interest from investments—                                                       |    |    |               |    |    |                    |    |    | 14,929   | 13 | 4  |
|                                                                        |               |    |    |                    |    |    | Due but unpaid .. ..                                                             | .. | .. | 764           | 7  | 6  | ..                 | .. | .. |          |    |    |
|                                                                        |               |    |    |                    |    |    | Accrued .. ..                                                                    | .. | .. | 3,073         | 10 | 2  | ..                 | .. | .. |          |    |    |
|                                                                        |               |    |    |                    |    |    | Material and stores .. ..                                                        | .. | .. | 2,858         | 15 | 4  | 13,932             | 9  | 8  | 3,837    | 17 | 8  |
|                                                                        |               |    |    |                    |    |    | Material and Stores Deficit Account .. ..                                        | .. | .. | 128           | 3  | 0  | 17                 | 0  | 9  | 16,791   | 5  | 0  |
|                                                                        |               |    |    |                    |    |    | Furniture and fittings .. ..                                                     | .. | .. |               |    |    |                    |    |    |          |    |    |
|                                                                        |               |    |    |                    |    |    | Less depreciation .. ..                                                          | .. | .. |               |    |    |                    |    |    |          |    |    |
|                                                                        |               |    |    |                    |    |    |                                                                                  |    |    | 245           | 15 | 0  | ..                 | .. | .. |          |    |    |
|                                                                        |               |    |    |                    |    |    | Plant and equipment .. ..                                                        | .. | .. |               |    |    |                    |    |    |          |    |    |
|                                                                        |               |    |    |                    |    |    | Less depreciation .. ..                                                          | .. | .. | 1,104         | 0  | 0  | ..                 | .. | .. | 1,104    | 0  | 0  |
|                                                                        |               |    |    |                    |    |    | Construction Fund: Excess of capital expenditure over capital income .. ..       | .. | .. |               |    |    |                    |    |    |          |    |    |
|                                                                        |               |    |    |                    |    |    |                                                                                  |    |    |               |    |    |                    |    |    | 7,289    | 1  | 8  |
|                                                                        |               |    |    |                    |    |    |                                                                                  |    |    | £615,571      | 3  | 8  | £22,402            | 0  | 8  | £637,973 | 4  | 4  |

J. J. GIBSON, Accountant, Public Works Department.  
F. W. FURKERT, Chairman, Main Highways Board

I hereby certify that the Income and Expenditure Account and the Balance-sheet has been duly examined and compared with the relative books and documents submitted for audit and correctly state the position as disclosed thereby.—J. H. FOWLER, Deputy Controller and Auditor-General.

## TABLES.

TABLE NO. 2.—STATISTICS OF HIGHWAY DISTRICTS AS GAZETTED MAY, 1924.

| Number and Name of Highway District. | Number of Counties. | Area.   | Population. | Capital Value in Thousands. | General and Special Rates collected. | Metalled Roads. | Un-metalled Roads. | Tracks and Un-formed Roads. | Total Roads |
|--------------------------------------|---------------------|---------|-------------|-----------------------------|--------------------------------------|-----------------|--------------------|-----------------------------|-------------|
|                                      |                     | Sq. m.  |             | £                           | £                                    | Miles.          | Miles.             | Miles.                      | Miles.      |
| 1. Auckland North ..                 | 9                   | 5,966   | 42,297      | 19,622                      | 146,401                              | 978             | 2,481              | 1,624                       | 5,083       |
| 2. Auckland South ..                 | 12                  | 5,566   | 72,360      | 40,584                      | 235,900                              | 1,414           | 2,369              | 1,368                       | 5,150       |
| 3. Tauranga ..                       | 5                   | 7,400   | 13,105      | 8,226                       | 42,018                               | 321             | 1,283              | 1,322                       | 2,926       |
| 4. Gisborne ..                       | 5                   | 3,079   | 12,889      | 18,297                      | 122,146                              | 352             | 706                | 412                         | 1,471       |
| 5. Napier ..                         | 8                   | 4,992   | 27,945      | 29,476                      | 131,211                              | 2,054           | 653                | 733                         | 3,440       |
| 6. King-country ..                   | 6                   | 3,984   | 15,710      | 11,288                      | 63,059                               | 550             | 1,474              | 486                         | 2,510       |
| 7. Taranaki ..                       | 9                   | 2,485   | 31,370      | 20,611                      | 147,221                              | 1,244           | 661                | 394                         | 2,299       |
| 8. Wanganui ..                       | 5                   | 4,084   | 20,625      | 21,825                      | 117,003                              | 1,131           | 859                | 673                         | 2,663       |
| 9. Wellington West ..                | 8                   | 2,427   | 33,035      | 25,908                      | 112,842                              | 1,861           | 142                | 281                         | 2,284       |
| 10. Wellington East ..               | 8                   | 3,260   | 17,500      | 18,996                      | 109,871                              | 1,350           | 471                | 317                         | 2,138       |
| Totals, North Island                 | 75                  | 43,243  | 286,836     | 214,833                     | 1,227,672                            | 11,255          | 11,099             | 7,010                       | 29,964      |
| 11. Nelson ..                        | 6                   | 6,710   | 23,180      | 11,001                      | 44,105                               | 1,458           | 425                | 1,327                       | 3,210       |
| 12. West Coast ..                    | 4                   | 8,600   | 18,710      | 4,328                       | 27,837                               | 1,125           | 75                 | 1,145                       | 2,345       |
| 13. Canterbury North ..              | 5                   | 5,555   | 9,885       | 12,602                      | 45,046                               | 786             | 295                | 1,272                       | 2,353       |
| 14. Canterbury Central ..            | 17                  | 4,155   | 46,896      | 29,195                      | 95,358                               | 2,690           | 537                | 685                         | 3,912       |
| 15. Canterbury South ..              | 6                   | 9,977   | 44,655      | 34,520                      | 111,529                              | 3,586           | 1,406              | 1,222                       | 6,214       |
| 16. Otago Central ..                 | 5                   | 8,289   | 13,815      | 5,734                       | 30,075                               | 1,025           | 1,068              | 1,117                       | 3,211       |
| 17. Otago South ..                   | 5                   | 3,808   | 24,100      | 10,304                      | 67,945                               | 1,056           | 1,321              | 1,356                       | 3,733       |
| 18. Southland ..                     | 3                   | 10,511  | 35,097      | 18,484                      | 101,459                              | 2,260           | 742                | 3,040                       | 6,042       |
| Totals, South Island                 | 51                  | 57,605  | 216,338     | 126,168                     | 523,354                              | 13,987          | 5,869              | 11,167                      | 31,020      |
| Totals, Dominion ..                  | 126                 | 100,848 | 503,174     | 341,001                     | 1,751,026                            | 25,242          | 16,968             | 18,777                      | 60,984      |
| Average, Dominion                    | 7                   | 5,603   | 27,954      | 18,944                      | 97,279                               | 1,402           | 943                | 1,043                       | 3,388       |

TABLE NO. 3.—LENGTHS OF MAIN HIGHWAYS.

| Number and Name of Highway District. |    |    | Ordinary Main Highways. |     | Main Highways declared Government Roads. |     | Total all Main Highways. |     |
|--------------------------------------|----|----|-------------------------|-----|------------------------------------------|-----|--------------------------|-----|
|                                      |    |    | M.                      | ch. | M.                                       | ch. | M.                       | ch. |
| 1. Auckland North ..                 | .. | .. | 462                     | 5   | 92                                       | 0   | 554                      | 5   |
| 2. Auckland South ..                 | .. | .. | 373                     | 51  | 30                                       | 55  | 404                      | 26  |
| 3. Tauranga ..                       | .. | .. | 157                     | 40  | 240                                      | 0   | 397                      | 40  |
| 4. Gisborne ..                       | .. | .. | 122                     | 60  | 124                                      | 20  | 247                      | 0   |
| 5. Napier ..                         | .. | .. | 393                     | 70  | 36                                       | 50  | 430                      | 40  |
| 6. King-country ..                   | .. | .. | 110                     | 10  | 123                                      | 50  | 233                      | 60  |
| 7. Taranaki ..                       | .. | .. | 127                     | 40  | 99                                       | 70  | 227                      | 30  |
| 8. Wanganui ..                       | .. | .. | 271                     | 0   | 40                                       | 60  | 311                      | 60  |
| 9. Wellington West ..                | .. | .. | 270                     | 22  | 23                                       | 8   | 293                      | 30  |
| 10. Wellington East ..               | .. | .. | 303                     | 70  | 14                                       | 0   | 317                      | 70  |
| Totals, North Island                 | .. | .. | 2,592                   | 48  | 824                                      | 73  | 3,417                    | 41  |
| 11. Nelson ..                        | .. | .. | 169                     | 76  | 113                                      | 64  | 283                      | 60  |
| 12. West Coast ..                    | .. | .. | ..                      | ..  | 331                                      | 5   | 331                      | 5   |
| 13. Canterbury North ..              | .. | .. | 265                     | 0   | 38                                       | 20  | 303                      | 20  |
| 14. Canterbury Central ..            | .. | .. | 288                     | 0   | 54                                       | 0   | 342                      | 0   |
| 15. Canterbury South ..              | .. | .. | 430                     | 40  | ..                                       | ..  | 430                      | 40  |
| 16. Otago Central ..                 | .. | .. | 240                     | 40  | ..                                       | ..  | 240                      | 40  |
| 17. Otago South ..                   | .. | .. | 196                     | 20  | ..                                       | ..  | 196                      | 20  |
| 18. Southland ..                     | .. | .. | 409                     | 61  | ..                                       | ..  | 409                      | 61  |
| Totals, South Island                 | .. | .. | 1,999                   | 77  | 537                                      | 9   | 2,537                    | 6   |
| Totals, Dominion                     | .. | .. | 4,592                   | 45  | 1,362                                    | 2   | 5,954                    | 47  |

TABLE NO. 4.—ENGINEERING SURVEYS.

| Number and Name of Highway District. | Length of Survey in hand. | Length of Survey completed. | Plans in hand. | Plans completed. |
|--------------------------------------|---------------------------|-----------------------------|----------------|------------------|
|                                      | M. ch.                    | M. ch.                      | M. ch.         | M. ch.           |
| 1. Auckland North ..                 | 6 9                       | 28 79                       | 20 1           | 4 6              |
| 2. Auckland South ..                 | ..                        | 14 31                       | ..             | 3 10             |
| 3. Tauranga ..                       | ..                        | 0 58                        | ..             | 0 58             |
| 4. Gisborne ..                       | ..                        | 25 47                       | ..             | 23 2             |
| 5. Napier ..                         | 0 24                      | 5 38                        | 0 24           | 5 38             |
| 6. King-country ..                   | ..                        | 21 21                       | ..             | 21 21            |
| 7. Taranaki ..                       | ..                        | 20 14                       | ..             | 20 14            |
| 8. Wanganui ..                       | ..                        | 28 27                       | 15 58          | 17 49            |
| 9. Wellington West ..                | 5 0                       | 5 22                        | 5 0            | 5 22             |
| 10. Wellington East ..               | 9 40                      | 2 0                         | 2 0            | 2 0              |
| 11. Nelson ..                        | ..                        | ..                          | ..             | ..               |
| 12. West Coast ..                    | ..                        | 2 1                         | ..             | 1 1              |
| 13. Canterbury North ..              | ..                        | 1 46                        | ..             | 1 46             |
| 14. Canterbury Central ..            | ..                        | 0 69                        | ..             | 0 69             |
| 15. Canterbury South ..              | ..                        | 1 20                        | ..             | 1 20             |
| 16. Otago Central ..                 | ..                        | ..                          | ..             | ..               |
| 17. Otago South ..                   | ..                        | 1 0                         | 1 0            | ..               |
| 18. Southland ..                     | ..                        | 0 20                        | ..             | 0 20             |
| Totals ..                            | 20 73                     | 159 13                      | 44 3           | 107 56           |

TABLE NO. 5.—FORMATION.

| Number and Name of Highway District. | Proposals provisionally approved. |        | Proposals in hand. |       | Proposals completed. |        |
|--------------------------------------|-----------------------------------|--------|--------------------|-------|----------------------|--------|
|                                      | Length.                           | Cost.  | Length.            | Cost. | Length.              | Cost.  |
|                                      | M. ch.                            | £      | M. ch.             | £     | M. ch.               | £      |
| 1. Auckland North ..                 | 9 21                              | 7,892  | 3 62               | 1,893 | 6 38                 | 4,722  |
| 2. Auckland South ..                 | 0 24                              | 225    | 0 14               | 157   | ..                   | ..     |
| 3. Tauranga ..                       | ..                                | ..     | 0 55               | 212   | 5 37                 | 1,537  |
| 4. Gisborne ..                       | ..                                | ..     | 1 0                | 763   | 4 26                 | 4,909  |
| 5. Napier ..                         | 2 14                              | 2,036  | 1 59               | 1,682 | 1 0                  | 1,061  |
| 6. King-country ..                   | ..                                | ..     | 0 61               | 1,800 | 0 50                 | 213    |
| 7. Taranaki ..                       | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| 8. Wanganui ..                       | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| 9. Wellington West ..                | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| 10. Wellington East ..               | 0 12                              | 1,500  | ..                 | ..    | ..                   | ..     |
| 11. Nelson ..                        | 0 17                              | 200    | ..                 | ..    | ..                   | ..     |
| 12. West Coast ..                    | 0 32                              | 220    | ..                 | ..    | 0 32                 | 212    |
| 13. Canterbury North ..              | 0 47                              | 3,533  | 0 5                | 1,000 | 0 37                 | 1,694  |
| 14. Canterbury Central ..            | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| 15. Canterbury South ..              | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| 16. Otago Central ..                 | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| 17. Otago South ..                   | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| 18. Southland ..                     | ..                                | ..     | ..                 | ..    | ..                   | ..     |
| Totals ..                            | 13 7                              | 15,606 | 8 16               | 7,507 | 18 60                | 14,348 |

TABLE NO. 6.—GRAVELLING AND METALLING.

| Number and Name of Highway District. |    |    |    | Proposals provisionally approved. |         | Proposals in hand. |         | Proposals completed. |        |
|--------------------------------------|----|----|----|-----------------------------------|---------|--------------------|---------|----------------------|--------|
|                                      |    |    |    | Length.                           | Cost.   | Length.            | Cost.   | Length.              | Cost.  |
|                                      |    |    |    | M. ch.                            | £       | M. ch.             | £       | M. ch.               | £      |
| 1. Auckland North .. ..              | .. | .. | .. | 52 66                             | 64,952  | 29 77              | 44,905  | 26 4                 | 31,232 |
| 2. Auckland South .. ..              | .. | .. | .. | 7 62                              | 3,958   | 29 49              | 39,640  | 10 53                | 11,660 |
| 3. Tauranga .. ..                    | .. | .. | .. | ..                                | ..      | 9 11               | 9,889   | 4 50                 | 5,716  |
| 4. Gisborne .. ..                    | .. | .. | .. | 14 0                              | 54,747  | 21 65              | 54,160  | 4 61                 | 4,413  |
| 5. Napier .. ..                      | .. | .. | .. | ..                                | ..      | ..                 | ..      | ..                   | ..     |
| 6. King-country .. ..                | .. | .. | .. | 3 79                              | 6,170   | 17 21              | 30,324  | 3 12                 | 6,786  |
| 7. Taranaki .. ..                    | .. | .. | .. | 11 40                             | 25,468  | 11 40              | 25,468  | ..                   | ..     |
| 8. Wanganui .. ..                    | .. | .. | .. | 11 49                             | 14,475  | 11 49              | 14,475  | 0 28                 | 1,534  |
| 9. Wellington West .. ..             | .. | .. | .. | 9 40                              | 13,000  | 7 61               | 26,045  | 6 48                 | 6,504  |
| 10. Wellington East .. ..            | .. | .. | .. | 9 40                              | 12,000  | 2 20               | 2,900   | 1 20                 | 1,050  |
| 11. Nelson .. ..                     | .. | .. | .. | 0 45                              | 738     | 0 45               | 738     | ..                   | ..     |
| 12. West Coast .. ..                 | .. | .. | .. | ..                                | ..      | ..                 | ..      | ..                   | ..     |
| 13. Canterbury North .. ..           | .. | .. | .. | 1 40                              | 900     | 1 40               | 900     | ..                   | ..     |
| 14. Canterbury Central .. ..         | .. | .. | .. | 0 30                              | 238     | ..                 | ..      | 0 30                 | 120    |
| 15. Canterbury South .. ..           | .. | .. | .. | 1 17                              | 800     | ..                 | ..      | ..                   | ..     |
| 16. Otago Central .. ..              | .. | .. | .. | ..                                | ..      | ..                 | ..      | 3 10                 | 751    |
| 17. Otago South .. ..                | .. | .. | .. | ..                                | ..      | ..                 | ..      | ..                   | ..     |
| 18. Southland .. ..                  | .. | .. | .. | ..                                | ..      | ..                 | ..      | 2 0                  | 991    |
| Totals .. ..                         | .. | .. | .. | 124 28                            | 197,446 | 142 78             | 249,444 | 62 76                | 70,757 |

TABLE NO. 7.—TAR, BITUMINOUS, AND CONCRETE SURFACING.

| Number and Name of Highway District. | Proposals provisionally approved. |                |             | Proposals in hand.         |                |             | Proposals completed. |                 |            |
|--------------------------------------|-----------------------------------|----------------|-------------|----------------------------|----------------|-------------|----------------------|-----------------|------------|
|                                      | Nature.                           | Length.        | Cost.       | Nature.                    | Length.        | Cost.       | Nature.              | Length.         | Cost.      |
| 1. Auckland North .. ..              | Concrete .. ..                    | M. ch.<br>5 19 | £<br>50,612 | Concrete .. ..             | M. ch.<br>5 19 | £<br>50,612 | .. ..                | M. ch.<br>.. .. | £<br>.. .. |
| 2. Auckland South .. ..              | Bitumen and concrete .. ..        | 34 6           | 83,776      | Bitumen and concrete .. .. | 16 48          | 57,687      | Bitumen .. ..        | 2 40            | 7,016      |
| 3. Tauranga .. ..                    | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| 4. Gisborne .. ..                    | .. ..                             | .. ..          | .. ..       | Bitumen .. ..              | 7 0            | 11,200      | .. ..                | .. ..           | .. ..      |
| 5. Napier .. ..                      | .. ..                             | 7 11           | 8,654       | Bitumen .. ..              | 3 61           | 5,007       | Bitumen .. ..        | 3 40            | 3,647      |
| 6. King-country .. ..                | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| 7. Taranaki .. ..                    | Bitumen .. ..                     | 15 20          | 31,253      | Bitumen .. ..              | 12 47          | 24,113      | Bitumen .. ..        | 2 53            | 7,320      |
| 8. Wanganui .. ..                    | Bitumen .. ..                     | 5 27           | 11,637      | Bitumen .. ..              | 5 27           | 11,637      | .. ..                | .. ..           | .. ..      |
| 9. Wellington West .. ..             | Bitumen .. ..                     | 135 21         | 405,751     | .. ..                      | .. ..          | .. ..       | Bitumen .. ..        | 1 31            | 657        |
| 10. Wellington East .. ..            | .. ..                             | .. ..          | .. ..       | Tar .. ..                  | 2 38           | 4,775       | .. ..                | .. ..           | .. ..      |
| 11. Nelson .. ..                     | .. ..                             | 0 70           | 2,753       | .. ..                      | .. ..          | .. ..       | Bitumen .. ..        | 0 32            | 1,079      |
| 12. West Coast .. ..                 | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| 13. Canterbury North .. ..           | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| 14. Canterbury Central .. ..         | .. ..                             | 3 3            | 606         | .. ..                      | .. ..          | .. ..       | Tar .. ..            | 2 0             | 301        |
| 15. Canterbury South .. ..           | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| 16. Otago Central .. ..              | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| 17. Otago South .. ..                | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| 18. Southland .. ..                  | .. ..                             | .. ..          | .. ..       | .. ..                      | .. ..          | .. ..       | .. ..                | .. ..           | .. ..      |
| Totals .. ..                         | .. ..                             | 206 17         | 595,042     | .. ..                      | 53 0           | 165,031     | .. ..                | 12 36           | 20,020     |

TABLE NO. 8.—CONSTRUCTION OF BRIDGES.

| Number and Name of Highway District. | Proposals provisionally approved. |         |                 | Proposals in hand.      |         |                 | Proposals completed.    |         |         | Expenditure for Period. |
|--------------------------------------|-----------------------------------|---------|-----------------|-------------------------|---------|-----------------|-------------------------|---------|---------|-------------------------|
|                                      | Nature.                           | Length. | Estimated Cost. | Nature.                 | Length. | Estimated Cost. | Nature.                 | Length. |         |                         |
| 1. Auckland North                    | Reinf. conc. and R.S.J. ..        | Ft. 430 | £ 11,203        | Reinf. conc. and R.S.J. | Ft. 249 | £ 6,367         | Reinf. conc. and R.S.J. | Ft. 181 | £ 4,920 |                         |
| 2. Auckland South                    | Reinf. conc. and R.S.J. ..        | 60      | 2,326           | Reinf. conc. and R.S.J. | 386     | 13,841          | Reinf. conc. and R.S.J. | 291     | 4,670   |                         |
| 3. Tauranga                          | Reinf. conc. and timber           | 1,007   | 29,700          | Reinf. conc. and timber | 182     | 1,000           | ..                      | ..      | ..      |                         |
| 4. Gisborne                          | Reinforced concrete ..            | 56      | 2,101           | Reinf. conc. and timber | 919     | 29,028          | ..                      | ..      | ..      |                         |
| 5. Napier                            | Concrete ..                       | 540     | 6,200           | Concrete ..             | 79      | 1,300           | Timber and concrete     | 768     | 5,204   |                         |
| 6. King-country                      | ..                                | ..      | ..              | R.S.J. and concrete     | 35      | 600             | Timber ..               | 48      | 450     |                         |
| 7. Taranaki                          | Reinforced concrete ..            | 134     | 4,833           | Reinf. conc. ..         | 134     | 4,833           | ..                      | ..      | ..      |                         |
| 8. Wanganui                          | Reinf. conc. and timber           | 111     | 2,050           | Reinf. conc. and timber | 84      | 1,500           | Concrete ..             | 27      | 563     |                         |
| 9. Wellington West                   | Reinforced concrete ..            | 209     | 4,150           | Concrete ..             | 49      | 280             | ..                      | ..      | ..      |                         |
| 10. Wellington East                  | Reinf. conc. and timber           | 700     | 15,658          | Concrete ..             | 19      | 674             | Concrete ..             | 290     | 4,711   |                         |
| 11. Nelson                           | Concrete ..                       | 142     | 3,987           | Concrete ..             | 72      | 1,722           | Concrete ..             | 91      | 994     |                         |
| 12. West Coast                       | Timber ..                         | 2,888   | 37,350          | Timber and concrete     | 2,093   | 45,247          | Timber and concrete     | 218     | 6,302   |                         |
| 13. Canterbury North                 | Timber ..                         | 517     | 9,090           | Timber ..               | ..      | ..              | Timber ..               | 355     | 5,882   |                         |
| 14. Canterbury Central               | Timber ..                         | 25      | 400             | ..                      | ..      | ..              | Timber ..               | 25      | 400     |                         |
| 15. Canterbury South                 | Timber and reinf. conc. ..        | 119     | 1,532           | Timber and reinf. conc. | 44      | 1,172           | ..                      | ..      | ..      |                         |
| 16. Otago Central                    | ..                                | ..      | ..              | ..                      | ..      | ..              | Timber ..               | 140     | 1,408   |                         |
| 17. Otago South..                    | ..                                | ..      | ..              | ..                      | ..      | ..              | ..                      | ..      | ..      |                         |
| 18. Southland                        | ..                                | ..      | ..              | ..                      | ..      | ..              | ..                      | ..      | ..      |                         |
| Totals                               | ..                                | 6,938   | 130,580         | ..                      | 4,345   | 107,564         | ..                      | 2,434   | 35,504  |                         |



TABLE NO. 9.—APPROPRIATIONS AND EXPENDITURE.

| Number and Name of Highway District. | Construction.                |              |       | Maintenance.                 |              |       |
|--------------------------------------|------------------------------|--------------|-------|------------------------------|--------------|-------|
|                                      | Available for Authorization. | Expenditure. |       | Available for Authorization. | Expenditure. |       |
|                                      | £                            | £            | s. d. | £                            | £            | s. d. |
| 1. Auckland North ..                 | 67,307                       | 26,689       | 14 7  | 14,680                       | 9,128        | 11 7  |
| 2. Auckland ..                       | 78,397                       | 35,916       | 7 10  | 11,138                       | 6,739        | 16 8  |
| 3. Tauranga ..                       | 34,158                       | 6,576        | 17 4  | 9,600                        | 6,687        | 6 10  |
| 4. Gisborne ..                       | 66,957                       | 23,326       | 11 0  | 9,091                        | 4,802        | 12 8  |
| 5. Napier ..                         | 51,740                       | 18,650       | 0 6   | 13,045                       | 11,481       | 16 6  |
| 6. King-country ..                   | 21,400                       | 21,794       | 5 7   | 6,277                        | 6,718        | 13 7  |
| 7. Taranaki ..                       | 53,936                       | 26,388       | 4 7   | 12,228                       | 10,110       | 10 4  |
| 8. Wanganui ..                       | 21,796                       | 7,588        | 10 2  | 10,274                       | 6,376        | 15 3  |
| 9. Wellington West ..                | 59,731                       | 17,650       | 9 5   | 8,715                        | 10,199       | 4 0   |
| 10. Wellington East ..               | 31,558                       | 22,135       | 0 9   | 12,067                       | 7,520        | 12 5  |
| 11. Nelson ..                        | 16,465                       | 495          | 13 5  | 10,512                       | 6,761        | 4 6   |
| 12. West Coast ..                    | 35,161                       | 9,674        | 18 10 | 27,385                       | 16,478       | 16 4  |
| 13. Canterbury North ..              | 35,968                       | 22,689       | 0 3   | 4,241                        | 5,360        | 9 6   |
| 14. Canterbury Central ..            | 7,311                        | 685          | 3 2   | 6,234                        | 5,002        | 4 4   |
| 15. Canterbury South ..              | 6,650                        | 550          | 0 0   | 9,574                        | 4,579        | 2 4   |
| 16. Otago Central ..                 | 4,272                        | 1,078        | 11 4  | 3,014                        | 846          | 14 10 |
| 17. Otago South ..                   | 1,125                        | ..           | ..    | 3,651                        | 1,692        | 19 7  |
| 18. Southland ..                     | 4,062                        | 533          | 0 0   | 7,843                        | 3,187        | 13 10 |
| Total for Dominion ..                | 597,994                      | 222,422      | 8 9   | 179,569                      | 123,675      | 5 1   |
| Totals, North Island ..              | 486,980                      | 186,716      | 1 9   | 107,115                      | 79,765       | 19 10 |
| Totals, South Island ..              | 111,014                      | 35,706       | 7 0   | 72,454                       | 43,909       | 5 3   |

TABLE NO. 10.—MAINTENANCE OF MAIN HIGHWAYS (INCLUDING BRIDGES).

(NOTE.—Maintenance under Main Highways Board commenced 9th June, 1924.)

| Number and Name of Highway District. | Length Maintained. | Expenditure. |    |    |                     |    |        | Average Cost of Maintenance per Mile for 9-6 Months. | Equivalent Average Cost per Mile per Annum. |      |
|--------------------------------------|--------------------|--------------|----|----|---------------------|----|--------|------------------------------------------------------|---------------------------------------------|------|
|                                      |                    | By Board.    |    |    | By Local Authority. |    | Total. |                                                      |                                             |      |
|                                      | Miles.             | £            | s. | d. | £                   | s. | d.     | £                                                    | £                                           |      |
| 1. Auckland North .. ..              | 288.04             | 9,128        | 11 | 7  | 8,608               | 16 | 11     | 17,737 8 6                                           | 61.6                                        | 77.0 |
| 2. Auckland South .. ..              | 343.32             | 6,739        | 16 | 8  | 7,986               | 18 | 10     | 14,726 15 6                                          | 42.8                                        | 53.5 |
| 3. Tauranga .. ..                    | 410.20             | 6,687        | 6  | 10 | 2,528               | 4  | 10     | 9,215 11 8                                           | 22.5                                        | 28.1 |
| 4. Gisborne .. ..                    | 235.20             | 4,802        | 12 | 8  | 6,406               | 18 | 4      | 11,209 11 0                                          | 47.6                                        | 59.5 |
| 5. Napier .. ..                      | 367.20             | 11,481       | 16 | 6  | 10,074              | 12 | 8      | 21,556 9 2                                           | 58.7                                        | 73.4 |
| 6. King-country .. ..                | 212.60             | 6,718        | 13 | 7  | 3,235               | 2  | 5      | 9,953 16 0                                           | 46.8                                        | 58.5 |
| 7. Taranaki .. ..                    | 313.70             | 10,110       | 10 | 4  | 6,743               | 2  | 10     | 16,853 13 2                                          | 53.7                                        | 67.1 |
| 8. Wanganui .. ..                    | 302.50             | 6,376        | 15 | 3  | 6,788               | 14 | 10     | 13,165 10 1                                          | 43.5                                        | 54.4 |
| 9. Wellington West .. ..             | 289.40             | 10,199       | 4  | 0  | 11,063              | 18 | 10     | 21,263 2 10                                          | 73.4                                        | 91.7 |
| 10. Wellington East .. ..            | 295.00             | 7,520        | 12 | 5  | 10,845              | 17 | 6      | 18,366 9 11                                          | 62.2                                        | 77.7 |
| Total North Island .. ..             | 3,057.76           | 79,765       | 19 | 10 | 74,282              | 8  | 0      | 154,048 7 10                                         | 50.3                                        | 62.9 |
| 11. Nelson .. ..                     | 282.20             | 6,761        | 4  | 6  | 4,123               | 15 | 9      | 10,885 0 3                                           | 38.5                                        | 48.1 |
| 12. West Coast .. ..                 | 334.00             | 16,478       | 16 | 4  |                     |    |        | 16,478 16 4                                          | 49.3                                        | 61.6 |
| 13. Canterbury North .. ..           | 307.40             | 5,360        | 9  | 6  | 3,927               | 12 | 4      | 9,288 1 10                                           | 30.2                                        | 37.7 |
| 14. Canterbury Central .. ..         | 346.40             | 5,002        | 4  | 4  | 9,481               | 10 | 0      | 14,483 14 4                                          | 41.8                                        | 52.2 |
| 15. Canterbury South .. ..           | 432.60             | 4,579        | 2  | 4  | 9,184               | 10 | 0      | 13,763 12 4                                          | 31.8                                        | 39.7 |
| 16. Otago Central .. ..              | 237.00             | 846          | 14 | 10 | 1,553               | 0  | 0      | 2,399 14 10                                          | 10.1                                        | 12.6 |
| 17. Otago South .. ..                | 244.60             | 1,692        | 19 | 7  | 2,707               | 17 | 5      | 4,400 17 0                                           | 18.0                                        | 22.5 |
| 18. Southland .. ..                  | 401.00             | 3,187        | 13 | 10 | 4,740               | 6  | 0      | 7,927 19 10                                          | 19.7                                        | 24.6 |
| Total South Island .. ..             | 2,585.60           | 43,909       | 5  | 3  | 35,718              | 11 | 6      | 79,627 16 9                                          | 30.8                                        | 38.5 |
| Total for Dominion .. ..             | 5,643.56           | 123,675      | 5  | 1  | 110,000             | 19 | 6      | 233,676 4 7                                          | 41.4                                        | 51.7 |

TABLE 11.—SUMMARY OF MONTHLY EXPENDITURE (INCLUDING OUTSTANDING LIABILITIES, ETC.) ON CONSTRUCTION AND MAINTENANCE OF MAIN HIGHWAYS FOR THE DOMINION.

| During the Month of | Gross Expenditure. |              | Total.       |
|---------------------|--------------------|--------------|--------------|
|                     | Construction.      | Maintenance. |              |
|                     | £ s. d.            | £ s. d.      | £ s. d.      |
| June .. ..          | ..                 | ..           | ..           |
| July .. ..          | ..                 | 505 17 2     | 505 17 2     |
| August .. ..        | 19,185 3 1         | 5,454 1 2    | 24,639 4 3   |
| September .. ..     | 19,019 19 11       | 7,668 11 6   | 26,688 11 5  |
| October .. ..       | 19,025 9 8         | 8,409 9 4    | 27,434 19 0  |
| November .. ..      | 15,740 2 9         | 8,689 6 6    | 24,429 9 3   |
| December .. ..      | 23,428 2 10        | 7,309 6 3    | 30,737 9 1   |
| January .. ..       | 18,471 1 2         | 5,819 4 7    | 24,290 5 9   |
| February .. ..      | 6,443 5 7          | 7,364 9 5    | 13,807 15 0  |
| March .. ..         | 106,048 1 0        | 72,454 19 2  | 176,207 2 2* |
| Total .. ..         | 227,361 6 0        | 123,675 5 1  | 348,740 13 1 |

\* All outstanding expenditure and credits have been brought into account and adjusted in figures quoted for March.

NOTE.—The above summary does not include administrative and supervision charges by Public Works Department, fees, &c., of Board members, plant and equipment, &c.

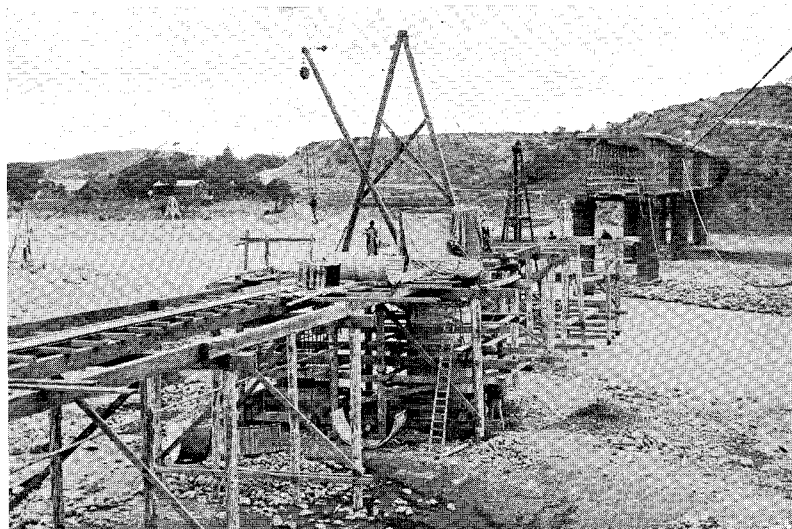
As the first instalment of main highways was not declared until 9th June, 1924, there was no expenditure on maintenance during April and May.

TABLE II.—SUMMARY OF MONTHLY EXPENDITURES (INCLUDING OUTSTANDING LIABILITIES ETC.) ON CONSTRUCTION AND MAINTENANCE OF MAIN HIGHWAYS FOR THE DOMINION.

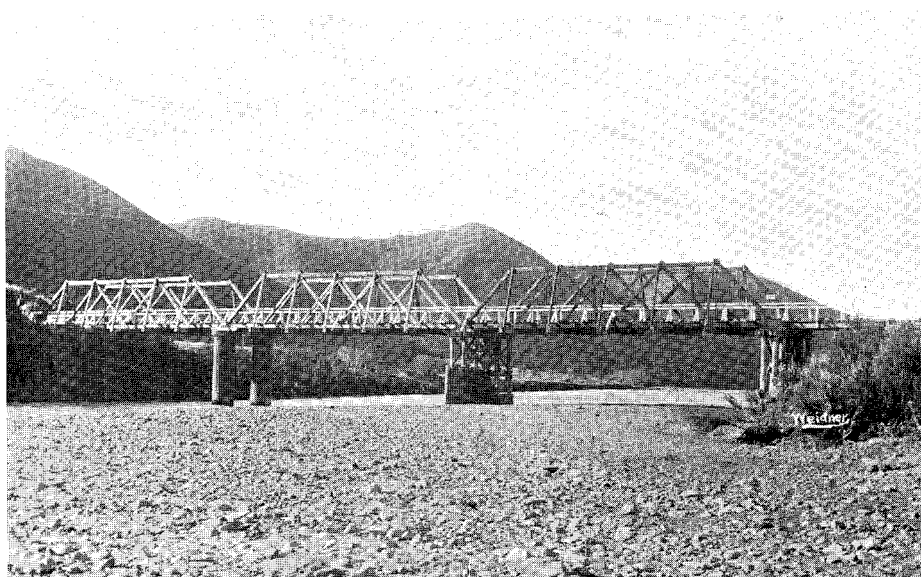
| Month of  | Gross Expenditure |             | Total        |
|-----------|-------------------|-------------|--------------|
|           | Construction      | Maintenance |              |
| March     | 100,048 1 0       | 72,184 10 2 | 172,232 2 2* |
| February  | 6,443 5 7         | 7,324 9 5   | 13,807 15 0  |
| January   | 18,171 1 2        | 5,319 4 7   | 24,290 5 9   |
| December  | 23,428 2 10       | 7,308 6 2   | 30,737 9 1   |
| November  | 13,740 2 9        | 8,620 6 6   | 24,420 9 3   |
| October   | 10,032 9 8        | 8,409 9 4   | 27,434 19 0  |
| September | 12,818 12 11      | 7,668 11 6  | 26,688 11 5  |
| August    | 19,185 2 1        | 5,434 1 2   | 24,639 4 3   |
| July      | ..                | 502 17 2    | 502 17 2     |
| June      | ..                | ..          | ..           |
| Total     | 227,361 6 0       | 122,675 2 1 | 348,746 13 1 |

\* All outstanding expenditure and credits have been brought into account and adjusted in figures quoted for March.

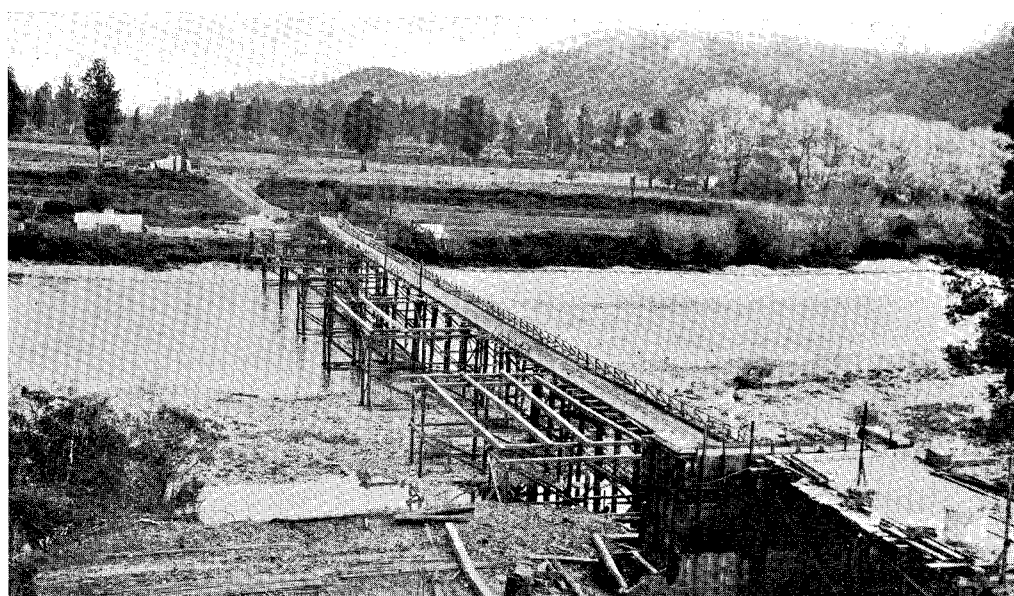
NOTE.—The above summary does not include administrative and supervision charges by Public Works Department, fees, etc., of Board members, plant and equipment, etc.  
As the first instalment of main highways was not declared until 9th June, 1921, there was no expenditure on maintenance during April and May.



CLARENCE RIVER BRIDGE.  
New portion of Bridge under construction.

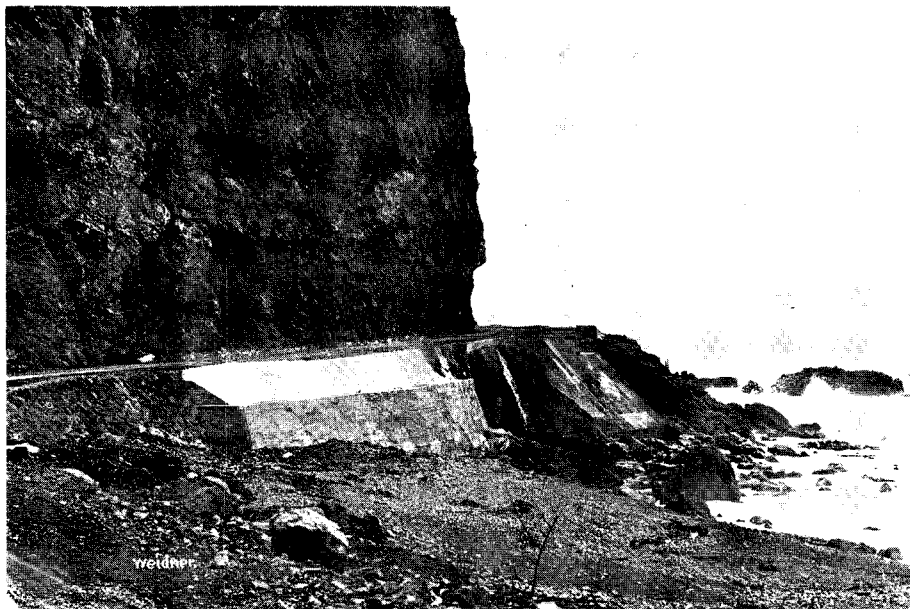


CONWAY RIVER BRIDGE RECONSTRUCTION.



INANGAHUA ROAD-BRIDGE, GREYMOUTH DISTRICT.  
View showing the temporary Bridge and the Staging for the permanent Bridge.

D.—1.



PARNASSUS-KAIKOURA ROAD.  
Concrete Retaining-wall at Kahautara Bluff.

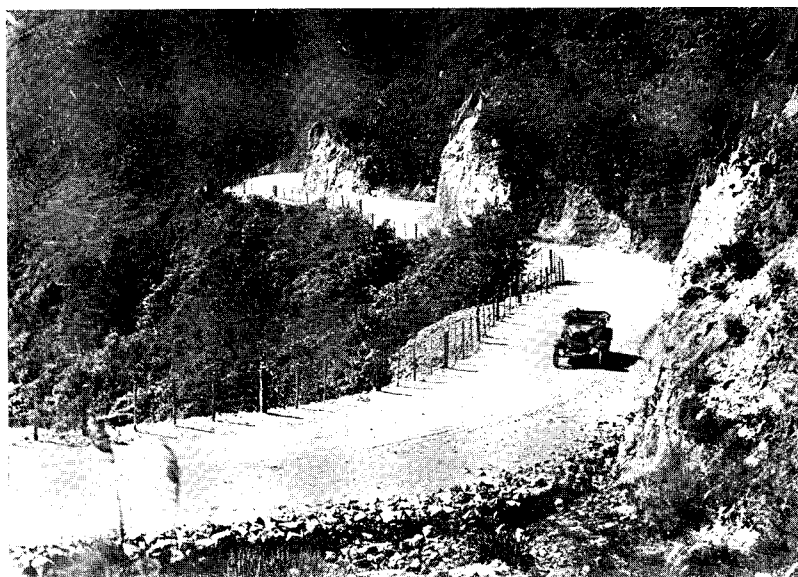


SLIP ON NELSON-WESTPORT HIGHWAY.



SLIP AT WHITECLIFFS, BULLER GORGE.  
Nelson-Westport Highway.

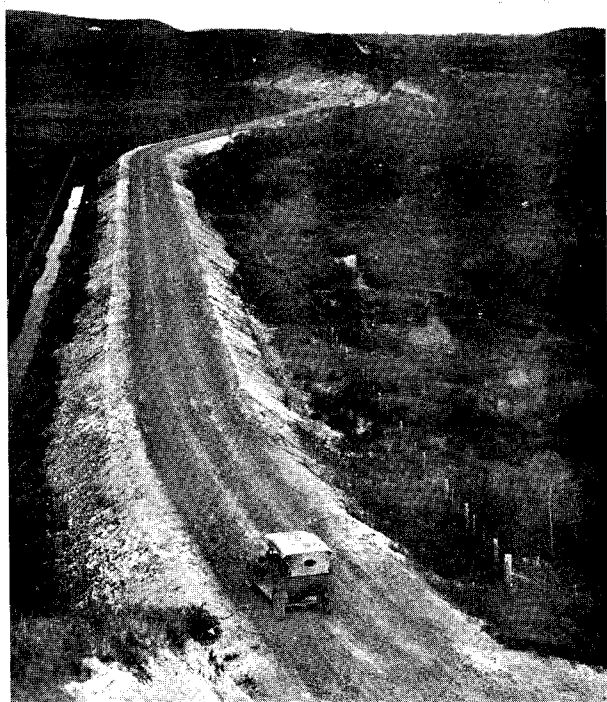




RIMUTAKA HILL.



AUCKLAND-WELLINGTON (VIA TARANAKI) MAIN HIGHWAY.  
Rangiriri Deviation : Filling over Swamp at 3 m. 3 ch.

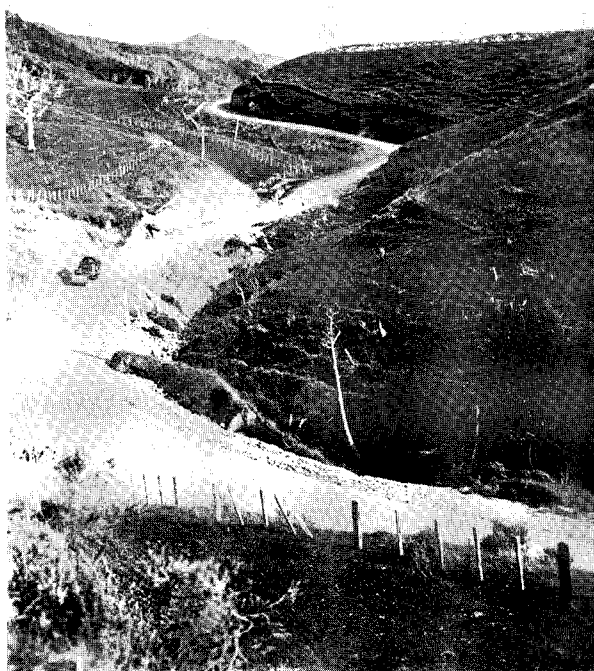


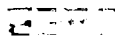
Rangiriri Deviation : Swamp filling at 1 m.



Road-tunnel, Mount Messenger.

AUCKLAND-WELLINGTON (VIA TARANAKI) MAIN HIGHWAY.



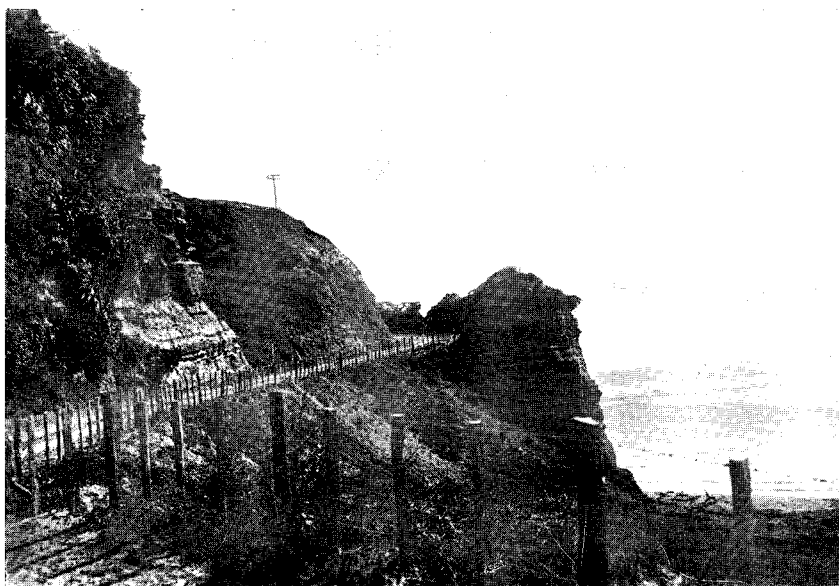
 Mokau-Awakino Section.



Mokau-Awakino Section.



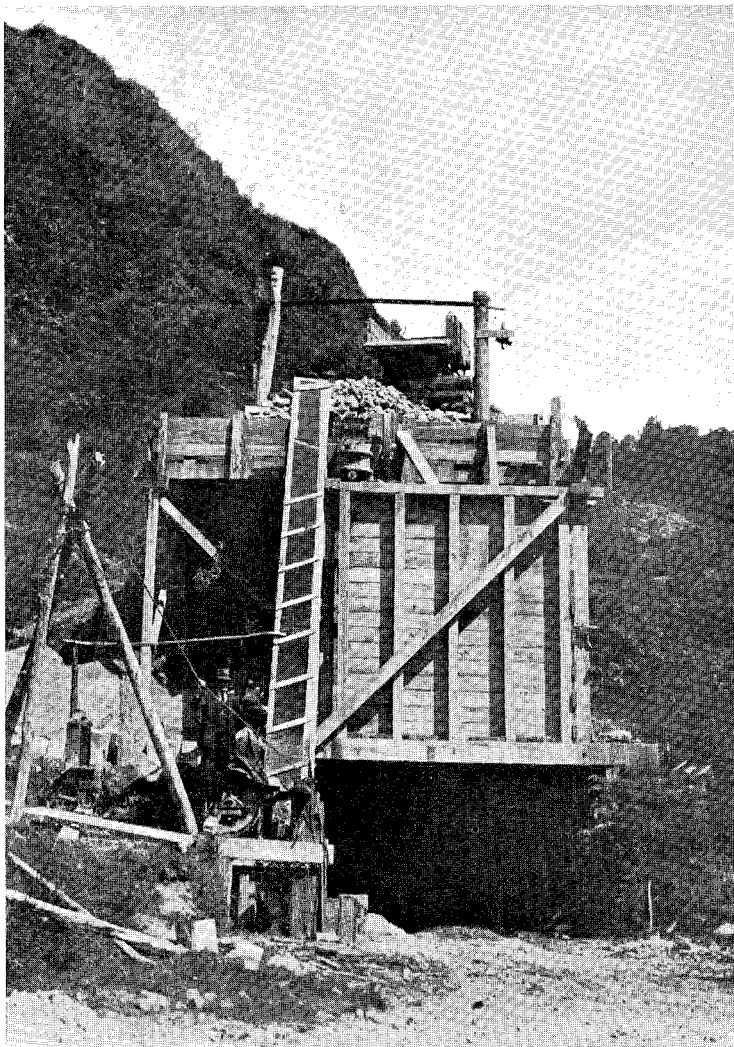
Mokau-Mohakatina Section.



Mokau Bluff.



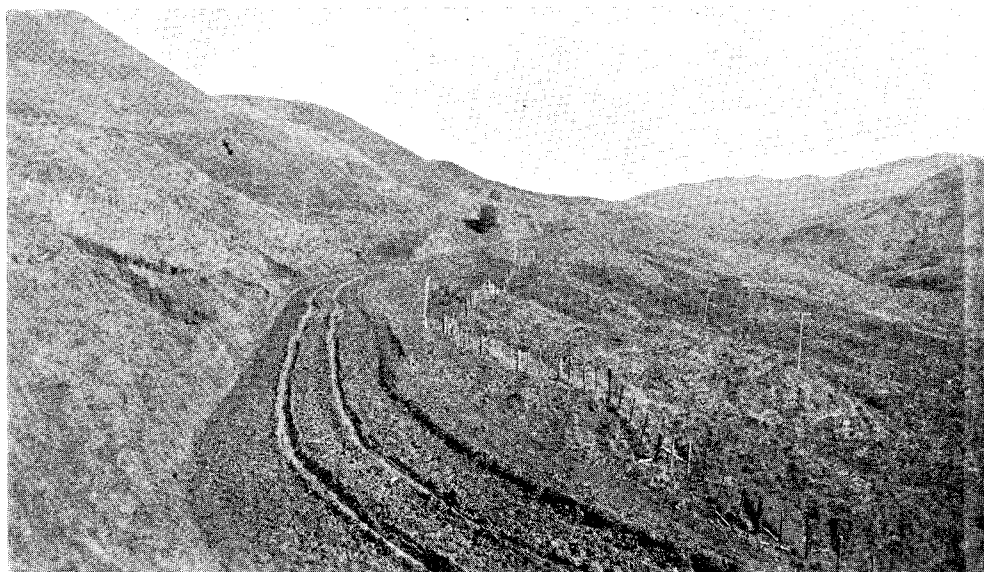
AUCKLAND—WELLINGTON (VIA TARANAKI) MAIN HIGHWAY.  
Lower Awakino Valley Road : Crushing Plant.



AUCKLAND—WELLINGTON (VIA TARANAKI) MAIN HIGHWAY.  
Crushing Plant at Uruti.



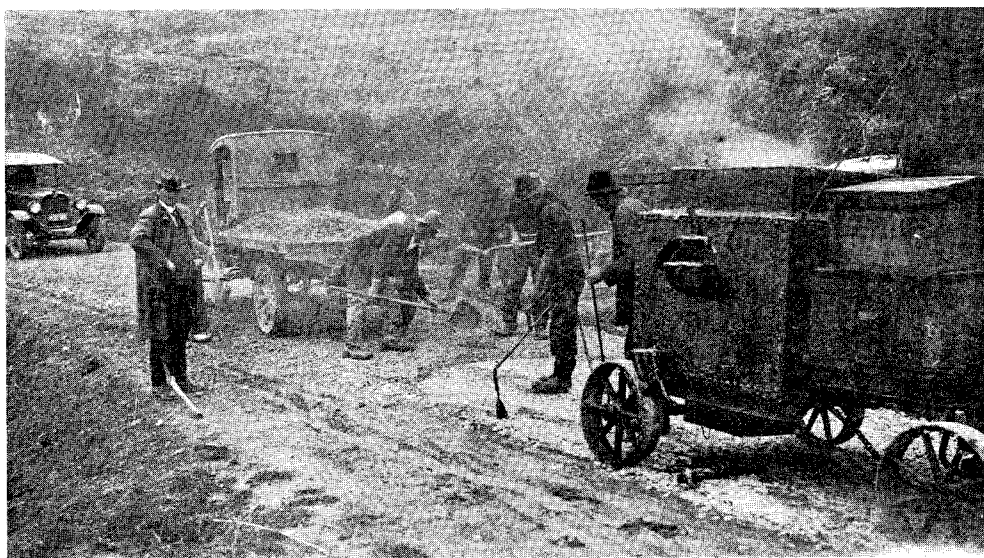
D.—1.



OTOKO HILL ROAD BEFORE METALLING.



OTOKO HILL ROAD AFTER METALLING.



GISBORNE-WAIROA ROAD: BITUMEN-SPRAYING.



WAIAPAKAURI — VICTORIA VALLEY ROAD.

(An example of how efficient organization can obtain up-to-date results, using primitive methods.)



NAPIER—WELLINGTON HIGHWAY.

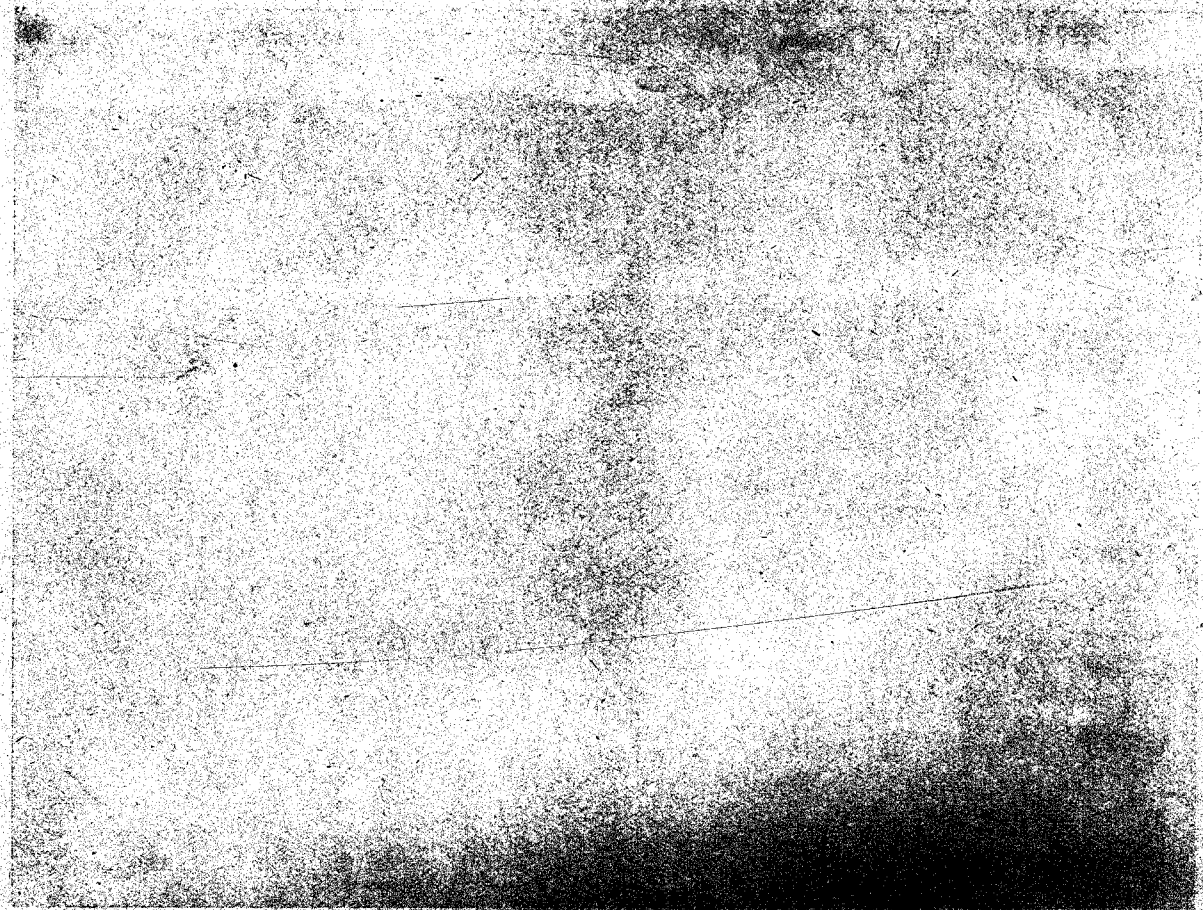
Woodville to Ngawapurua : Bitumen surface.



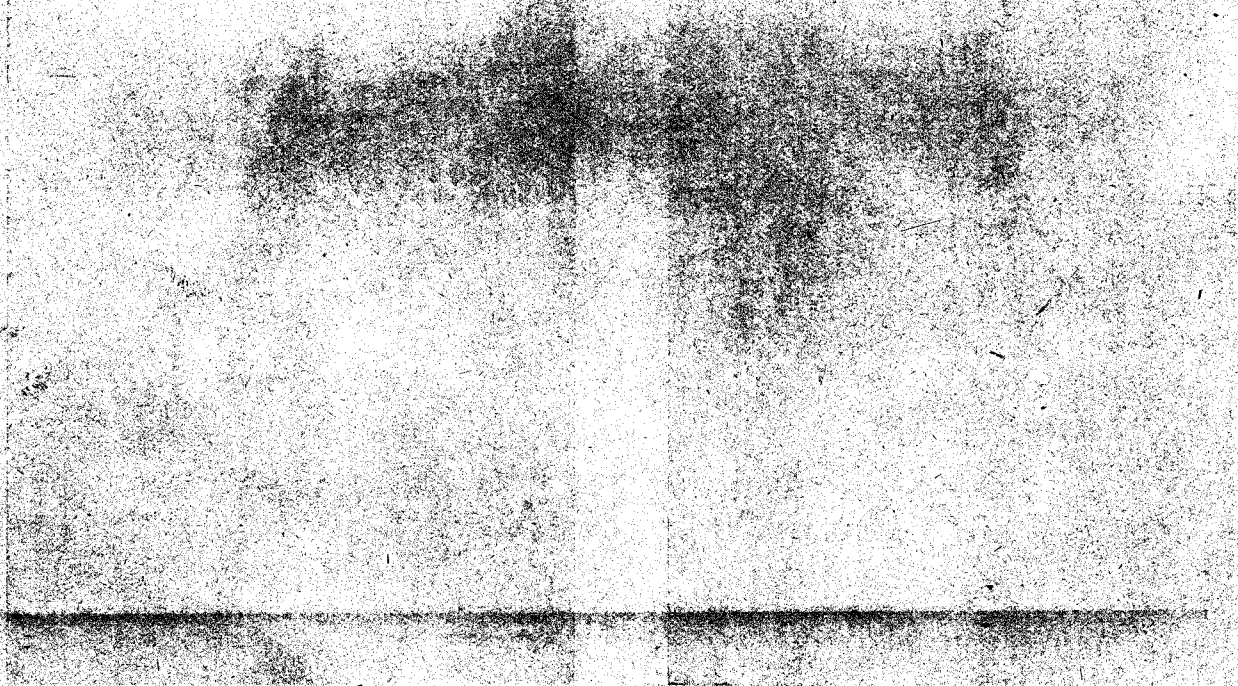
WOODVILLE—PALMERSTON HIGHWAY.

Widening and straightening in Manawatu Gorge.



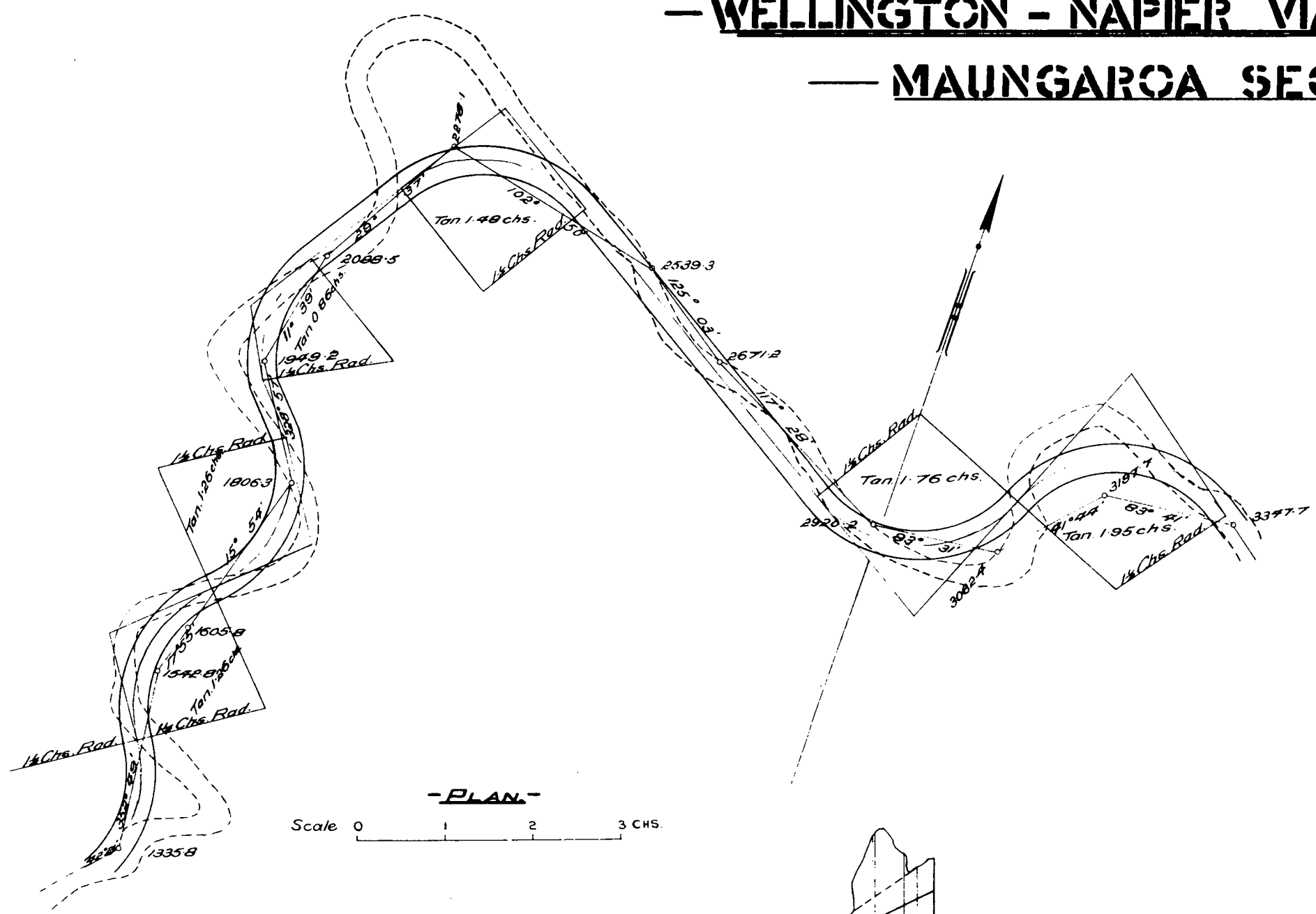


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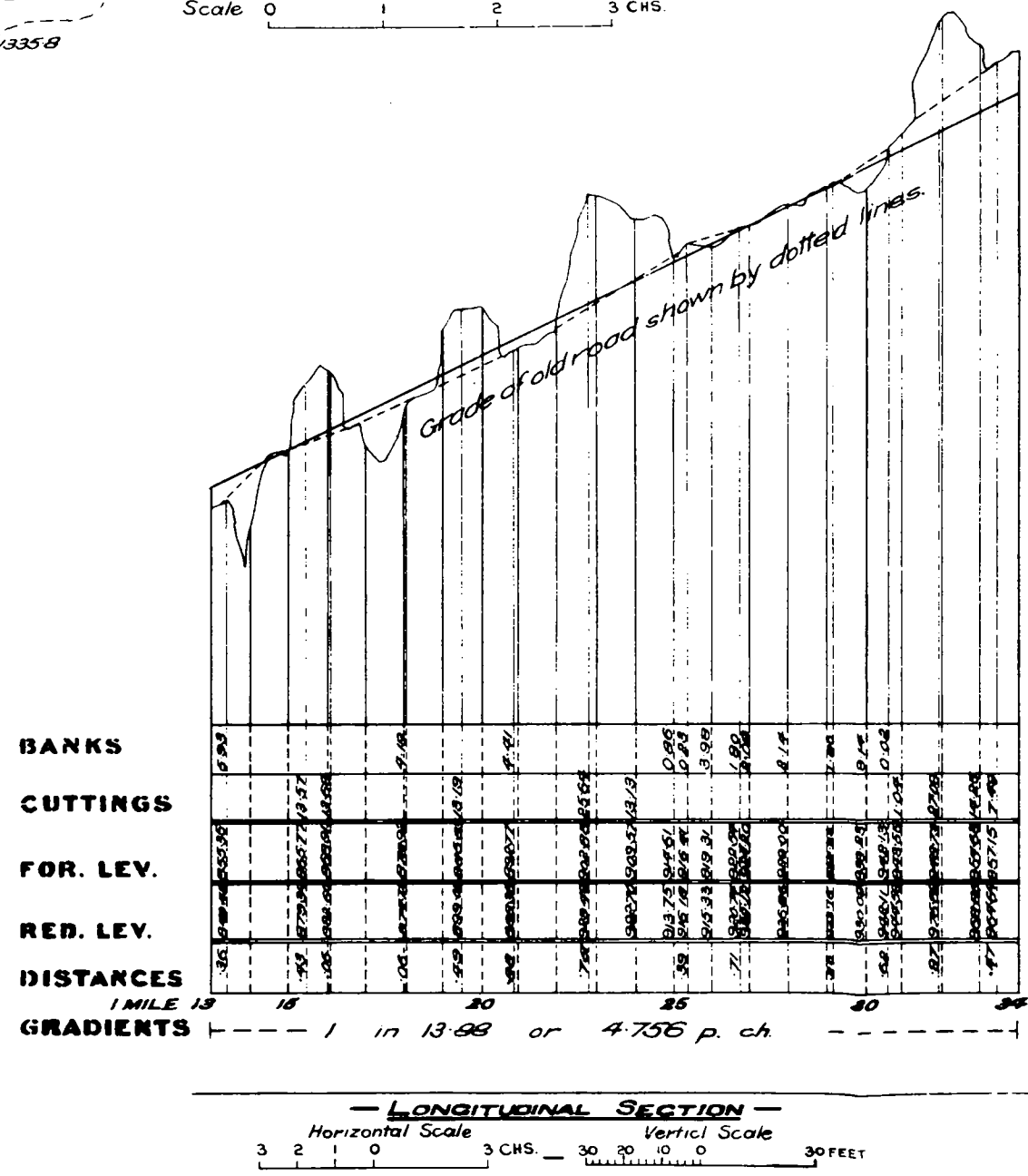


# — WELLINGTON - NAPIER VIA WAIRARAPA — — MAUNGAROA SECTION —

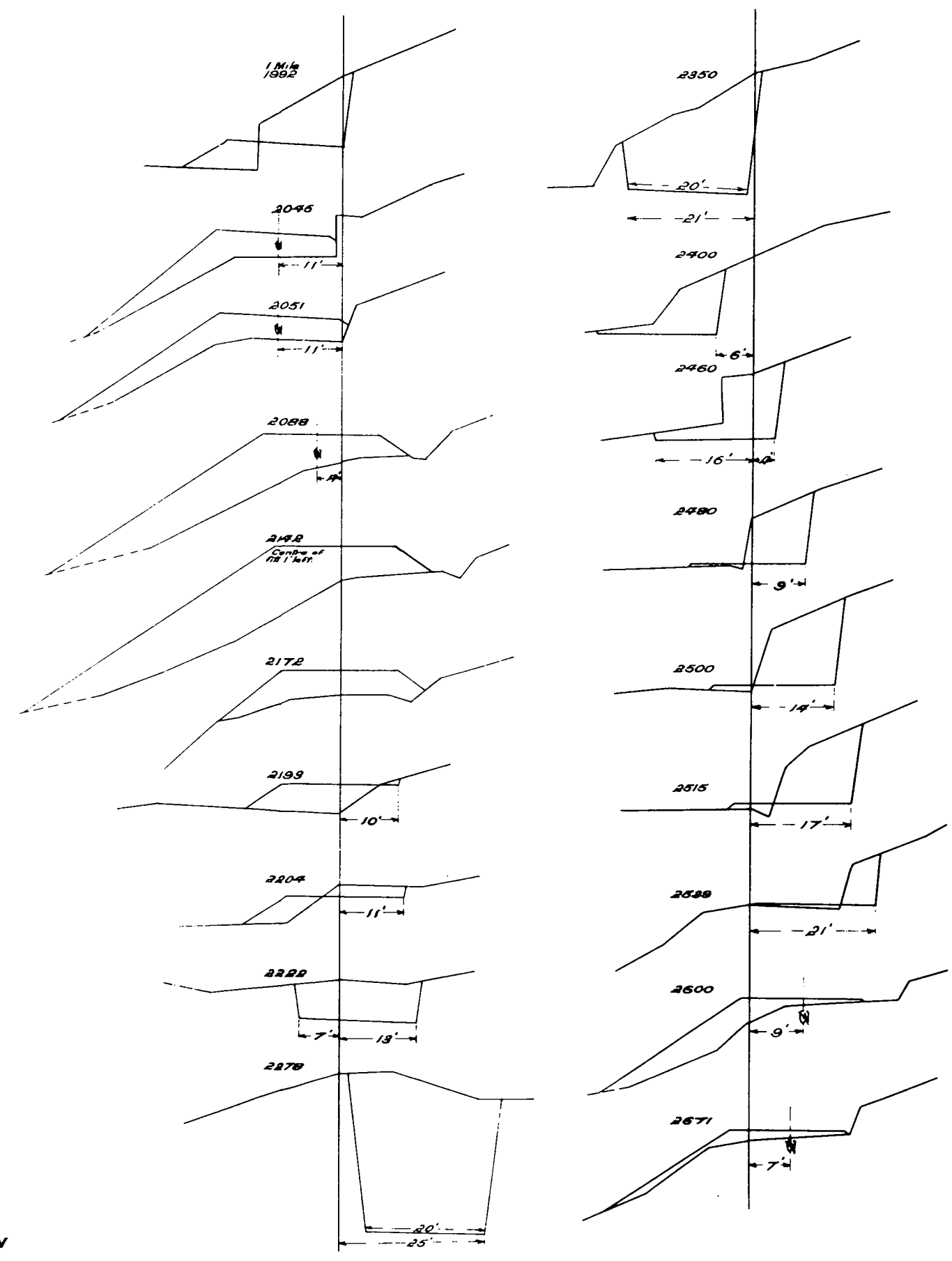
SHEET NO



— PLAN —  
Scale 0 1 2 3 CHS.



TYPICAL PLAN  
OF  
PORTION OF HIGHWAY IN ROUGH COUNTRY  
SHOWING  
IMPROVEMENTS IN ALIGNMENT AND GRADE  
CARRIED OUT BY THE  
MAIN HIGHWAYS BOARD



— CROSS SECTIONS —  
Scale 15 10 5 0 15 F

No

1

SECRET

TOP SECRET

SECRET

SECRET

SECRET

SECRET

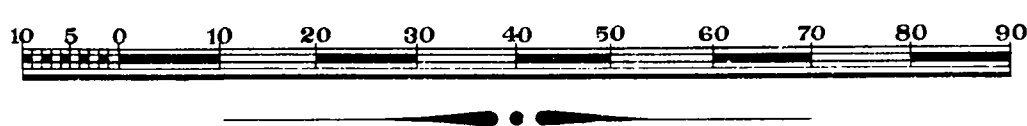
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# MAP OF THE SOUTH ISLAND (NEW ZEALAND) SHOWING MAIN HIGHWAYS

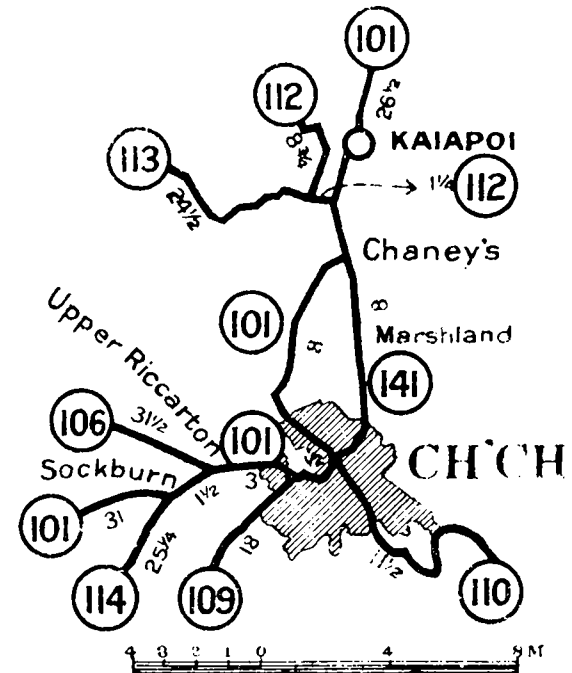
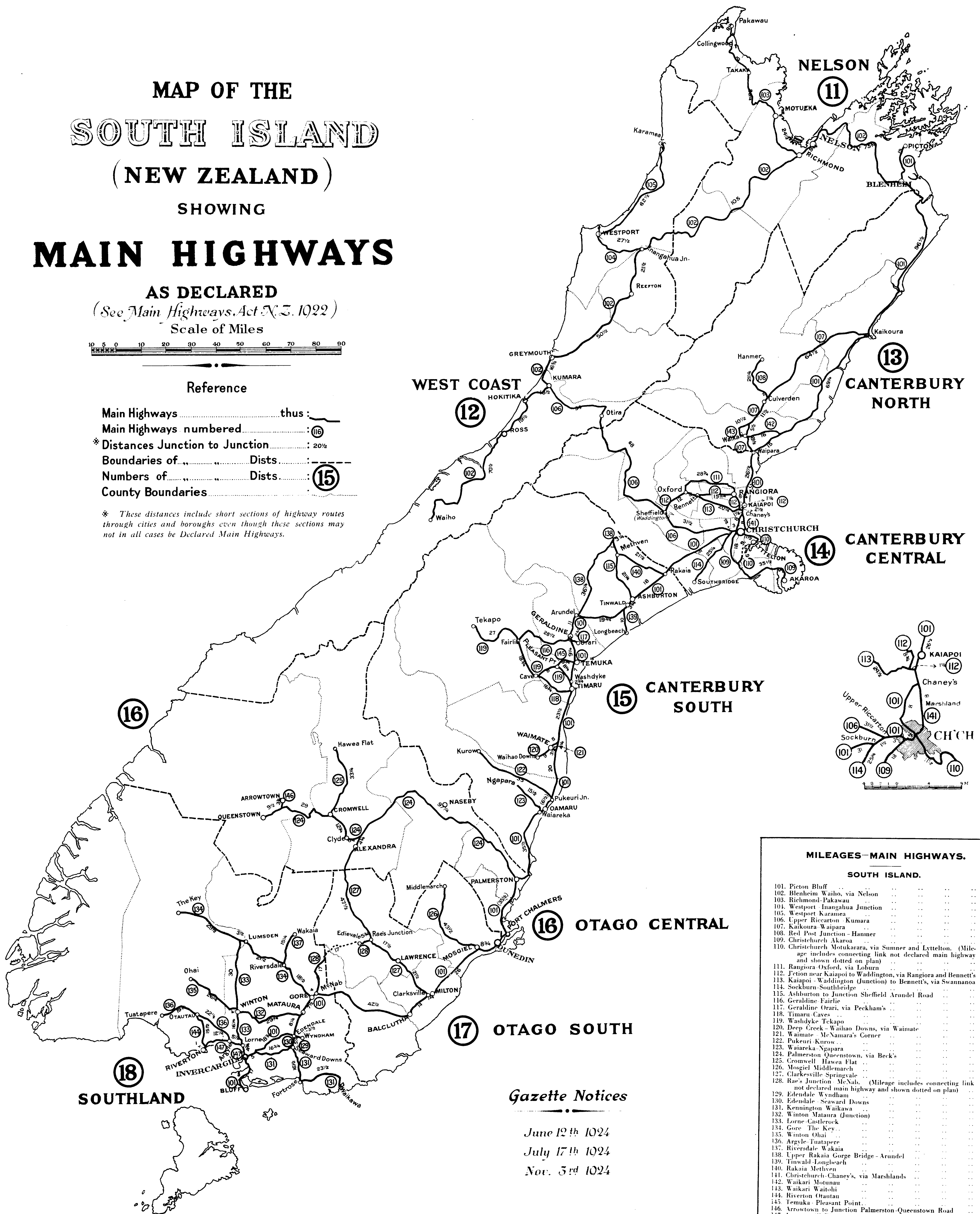
AS DECLARED  
(See Main Highways Act No. 3, 1922)  
Scale of Miles



## Reference

- Main Highways ..... thus :  
Main Highways numbered ..... (16)  
\* Distances Junction to Junction ..... 20%  
Boundaries of ..... Dists. ....  
Numbers of ..... Dists. .... (15)  
County Boundaries .....

\* These distances include short sections of highway routes through cities and boroughs even though these sections may not in all cases be Declared Main Highways.



## MILEAGES—MAIN HIGHWAYS.

| SOUTH ISLAND.                                                                                                                                 |    | Miles. |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----|--------|
| 101. Picton Bluff                                                                                                                             | .. | 627    |
| 102. Blenheim Waiho, via Nelson                                                                                                               | .. | 335½   |
| 103. Richmond-Pakawau                                                                                                                         | .. | 90     |
| 104. Westport - Inangahua Junction                                                                                                            | .. | 274    |
| 105. Westport - Kumara                                                                                                                        | .. | 62½    |
| 106. Upper Riccarton - Kumara                                                                                                                 | .. | 133½   |
| 107. Kaikoura - Waipara                                                                                                                       | .. | 92     |
| 108. Red Post Junction - Hanmer                                                                                                               | .. | 21½    |
| 109. Christchurch - Akaroa                                                                                                                    | .. | 53½    |
| 110. Christchurch - Motukara, via Sumner and Lyttelton. (Mileage includes connecting link not declared main highway and shown dotted on plan) | .. | 26½    |
| 111. Rangiora - Oxford, via Lohore                                                                                                            | .. | 28½    |
| 112. Junction near Kaikoura to Waddington, via Rangiora and Bennett's                                                                         | .. | 40½    |
| 113. Kaikoura - Waddington (Junction) to Bennett's, via Swannanoa                                                                             | .. | 20½    |
| 114. Sockburn - Southbridge                                                                                                                   | .. | 25½    |
| 115. Ashburton to Junction Sheffield Arundel Road                                                                                             | .. | 28½    |
| 116. Geraldine - Fairlie                                                                                                                      | .. | 28½    |
| 117. Geraldine - Orari, via Peckham's                                                                                                         | .. | 21     |
| 118. Timaru - Caves                                                                                                                           | .. | 16½    |
| 119. Washdyke - Tekapo                                                                                                                        | .. | 62     |
| 120. Deep Creek - Waihao Downs, via Waimate                                                                                                   | .. | 14     |
| 121. Waimate - McNamara's Corner                                                                                                              | .. | 3½     |
| 122. Pukeuri - Kurow                                                                                                                          | .. | 35     |
| 123. Waiareka - Ngapara                                                                                                                       | .. | 15½    |
| 124. Palmerston - Queenstown, via Beck's                                                                                                      | .. | 15½    |
| 125. Cromwell - Hawea Flat                                                                                                                    | .. | 33½    |
| 126. Mosgiel - Middlemarch                                                                                                                    | .. | 43½    |
| 127. Clarksville - Springvale                                                                                                                 | .. | 91½    |
| 128. Raes Junction - McNab. (Mileage includes connecting link not declared main highway and shown dotted on plan)                             | .. | 39½    |
| 129. Edendale - Wyndham                                                                                                                       | .. | 3½     |
| 130. Edendale - Seaward Downs                                                                                                                 | .. | 3½     |
| 131. Kennington - Waikawa                                                                                                                     | .. | 56½    |
| 132. Winton - Mataura (Junction)                                                                                                              | .. | 29½    |
| 133. Lorne - Castlerock                                                                                                                       | .. | 47½    |
| 134. Gore - The Key                                                                                                                           | .. | 73     |
| 135. Winton - Ohai                                                                                                                            | .. | 26½    |
| 136. Argyle - Tuatapere                                                                                                                       | .. | 42     |
| 137. Riversdale - Wakaia                                                                                                                      | .. | 15½    |
| 138. Upper Rakaia Gorge Bridge - Arundel                                                                                                      | .. | 39½    |
| 139. Tinwald - Longbeach                                                                                                                      | .. | 10     |
| 140. Rakaia - Methven                                                                                                                         | .. | 8      |
| 141. Christchurch - Chaney's, via Marshlands                                                                                                  | .. | 16     |
| 142. Waikari - Motunau                                                                                                                        | .. | 10½    |
| 143. Waikari - Waitohi                                                                                                                        | .. | 15½    |
| 144. Riverton - Otautau                                                                                                                       | .. | 9½     |
| 145. Temuka - Pleasant Point                                                                                                                  | .. | 21½    |
| 146. Arrowtown to Junction Palmerston - Queenstown Road                                                                                       | .. | 23½    |
| 147. Invercargill - Riverton                                                                                                                  | .. | 23½    |

## Gazette Notices

June 12<sup>th</sup> 1924  
July 17<sup>th</sup> 1924  
Nov. 3<sup>rd</sup> 1924

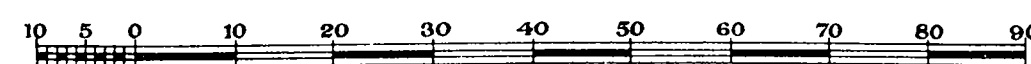


# MAP OF THE NORTH ISLAND (NEW ZEALAND)

## SHOWING MAIN HIGHWAYS

AS DECLARED  
(See Main Highways Act N.Z. 1922)

Scale of Miles



Reference

Main Highways ..... thus 15

Main Highways numbered ..... 15

\* Distances Junction to Junction ..... 17 1/2

Boundaries of ..... Dists. .... 2

Numbers of ..... Dists. .... 2

County Boundaries .....

\* These distances include short sections of highway routes through cities and boroughs even though these sections may not in all cases be Declared Main Highways.

AUCKLAND  
NORTH

### Gazette Notices

June 12<sup>th</sup> 1924

July 17<sup>th</sup> 1924

Nov. 5<sup>th</sup> 1924

Roads affected by toll gates have not been declared Main Highways, and are indicated thus:

#### SCHEDULE

- A—17 miles.  
B—13 miles 70 chains.  
C—6 miles.  
D—9 miles 20 chains.  
E—25 miles 20 chains.  
(All in No. 7 District.)

#### MILEAGES—MAIN HIGHWAYS.

##### NORTH ISLAND.

|                                                                                                                                            | Miles.  |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 1. Waipapakauri to Wellington, via Taranaki. (Mileage includes connecting links not declared main highway and shown dotted on plan)        | 680 1/2 |
| 2. Victoria Valley - Mangonui                                                                                                              | 30      |
| 3. Broadwood - Kaitiaki                                                                                                                    | 114     |
| 4. Mangamuka - One Junction                                                                                                                | 184     |
| 5. Waimamaku - Oparau                                                                                                                      | 184     |
| 6. Whangarei - Mangonui                                                                                                                    | 91      |
| 7. Omapere - Mangaturoto. (Mileage includes connecting link not declared main highway and shown dotted on plan)                            | 124     |
| 8. Whangarei - Dargaville                                                                                                                  | 124     |
| 9. Dargaville - Mangaturoto                                                                                                                | 124     |
| 10. Takapuna to Junction Birkenhead Wharf                                                                                                  | 13      |
| 11. Welsford - Port Albert                                                                                                                 | 7       |
| 12. Warkworth - Kaipara Flats                                                                                                              | 6 1/2   |
| 13. Waimu - Auckland, via Helensville                                                                                                      | 18 1/2  |
| 14. Kumeu - Pukekura                                                                                                                       | 21      |
| 15. Pokeno - Wellington, via Gisborne and Wairarapa. (Mileage includes connecting link not declared main highway and shown dotted on plan) | 651     |
| 16. Pokeno - Waihi Junction to Coromandel                                                                                                  | 36 1/2  |
| 17. Kopu - Raglan, via Te Aroha                                                                                                            | 211     |
| 18. Hamilton - Rotoma - Petane                                                                                                             | 211     |
| 19. Waitoa - Wairakei                                                                                                                      | 34 1/2  |
| 20. Matamata - Tauranga                                                                                                                    | 17 1/2  |
| 21. Kaitiaki to Junction Auckland - Wellington, via Kawa                                                                                   | 7       |
| 22. Hangatiki - Kaitiaki Caves                                                                                                             | 191     |
| 23. Auckland - Wellington Junction to Bull's, via Taumarunui                                                                               | 191     |
| 24. Rotoma - Whakareia                                                                                                                     | 54      |
| 25. Te Ngaru - Paengaroa                                                                                                                   | 123 1/2 |
| 26. Hicks Bay - Gisborne                                                                                                                   | 123 1/2 |
| 27. Rotokaitiaki Bridge - Tikiti                                                                                                           | 34 1/2  |
| 28. Taitapu - Wairoa, via Hangaroa                                                                                                         | 27 1/2  |
| 29. Napier - Tukituki River Bridge, via Omahu and Havelock                                                                                 | 11      |
| 30. Farnham - Havelock                                                                                                                     | 11      |
| 31. Otane - Elsthorpe                                                                                                                      | 11 1/2  |
| 32. Waipawa - Tikokino                                                                                                                     | 11 1/2  |
| 33. Waipawa - Otagona                                                                                                                      | 7 1/2   |
| 34. Dannevirke - Waipukurau, via Porangahau                                                                                                | 7 1/2   |
| 35. Norsewood - Whitiakura                                                                                                                 | 7 1/2   |
| 36. Lepperton Junction - Hawera, via Omapere                                                                                               | 17 1/2  |
| 37. New Plymouth - Kaitiaki, via Inglewood                                                                                                 | 17 1/2  |
| 38. Egmont Village - Mt. Egmont (radius line)                                                                                              | 17 1/2  |
| 39. Eltham - Opunake                                                                                                                       | 21 1/2  |
| 40. Stratford - Taranaki River (middle bridge)                                                                                             | 6 1/2   |
| 41. Manawatu - Mt. Egmont (radius line)                                                                                                    | 17 1/2  |
| 42. Normansby - Okauia                                                                                                                     | 17 1/2  |
| 43. Bull Road                                                                                                                              | 2 1/2   |
| 44. Kaharoa Road                                                                                                                           | 2 1/2   |
| 45. Kahi Road                                                                                                                              | 2 1/2   |
| 46. Mumohaki State Farm Road                                                                                                               | 2 1/2   |
| 47. Rangitatu East and Watershed Roads                                                                                                     | 6 1/2   |
| 48. Wanganui - Horopito                                                                                                                    | 6 1/2   |
| 49. Raetihi - Ohakune                                                                                                                      | 6 1/2   |
| 50. Fordell - Mangahau                                                                                                                     | 3 1/2   |
| 51. Taihape - Moawhango                                                                                                                    | 3 1/2   |
| 52. Mangawaka - Awahuri, via Kimbolton                                                                                                     | 24 1/2  |
| 53. Kimbolton - Apiti                                                                                                                      | 10 1/2  |
| 54. Feilding - Stawley                                                                                                                     | 10 1/2  |
| 55. Greatford - Woodville, via Feilding and Ashhurst                                                                                       | 34 1/2  |
| 56. Mt. Stewart Road                                                                                                                       | 14 1/2  |
| 57. Shannon - Palmerston North                                                                                                             | 20 1/2  |
| 58. Himatangi - Ashhurst, via Palmerston North                                                                                             | 19 1/2  |
| 59. Shannon - Foxton                                                                                                                       | 19 1/2  |
| 60. Palmerston North - Levin, via Shannon                                                                                                  | 11 1/2  |
| 61. Pahiatua - Pongaroa                                                                                                                    | 11 1/2  |
| 62. Eketahuna - Alfredton                                                                                                                  | 11 1/2  |
| 63. Waverley - Masterton, via Alfredton                                                                                                    | 24 1/2  |
| 64. Masterton - Waverley Junction to Timu                                                                                                  | 28 1/2  |
| 65. Junction Timu Road to Waverley                                                                                                         | 10 1/2  |
| 66. Masterton - Martinborough, via Gladstone                                                                                               | 10 1/2  |
| 67. Tupurupuru - Westmere                                                                                                                  | 6 1/2   |
| 68. Carterton - Longbush Junction to Gladstone                                                                                             | 6 1/2   |
| 69. Carterton - Longbush                                                                                                                   | 6 1/2   |
| 70. Greytown - Bulls, via Cutting                                                                                                          | 7 1/2   |
| 71. Martinborough - Otara Junction to Awiea                                                                                                | 6 1/2   |
| 72. Martinborough - Otara                                                                                                                  | 11 1/2  |
| 73. Kahutara Road                                                                                                                          | 11 1/2  |
| 74. Featherston - Pigeon Bush                                                                                                              | 3 1/2   |
| 75. Raurimu - Wade's Landing                                                                                                               | 29 1/2  |
| 76. Hastings - Maraekakaho                                                                                                                 | 9 1/2   |
| 77. Featherston - Martinborough                                                                                                            | 11 1/2  |
| 78. Ashhurst - Pohangina                                                                                                                   | 8 1/2   |
| 79. Stratford to Junction Mania - Mt. Egmont                                                                                               | 8 1/2   |
| 80. Kaitiaki - Mangawai - Waiyhi                                                                                                           | 26 1/2  |

AUCKLAND  
SOUTH

KING  
COUNTRY

TARANAKI

WANGANUI

WELLINGTON  
WEST

WELLINGTON

TAURANGA

HAWKES BAY

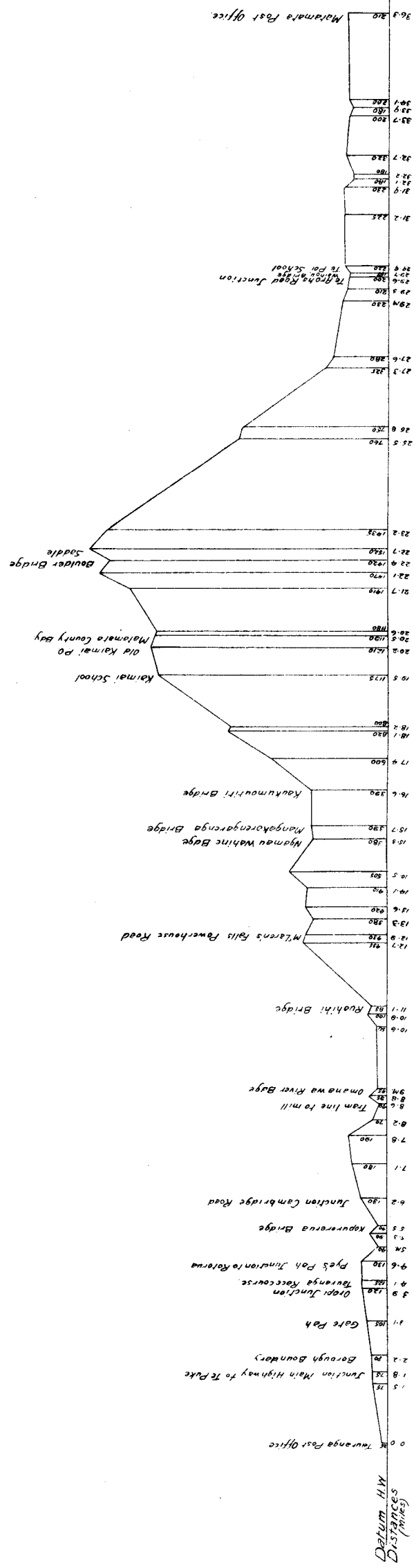
WELLINGTON  
EAST

#### DIAGRAMS

Scale



# — TAURANGA TO MATAMATA —



Scales { Horizontal 2 Miles to an Inch.  
Vertical 400 Feet " " }

(This plan is not to scale, reduced from original.)



# ATAMATAM ADIAT

