1920.

NEW ZEALAND.

PUBLIC WORKS STATEMENT.

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

MR. SPEAKER,—

Though nominally assuming office as Minister of Public Works on the 1st April, I did not actually take over the administrative control of the Department until some weeks later. I desire to express my gratitude to my predecessor in office, the Hon. Sir William Fraser, for his valuable assistance both at the period of my initiation and on many occasions since. Sir William Fraser held this portfolio for eight years, and no one realizes better than myself the splendid work he accomplished during one of the most difficult periods in the history of this country. I desire also to refer to the retirement of Mr. R. W. Holmes, Engineer-in-Chief and Under-Secretary to the Department. For many years Mr. Holmes took a leading part in the administration of the Department, and the Dominion has greatly benefited from his wide experience and his exceptional engineering qualifications. Mr. F. W. Furkert succeeds him.

To meet the urgent demands upon the Department at this period, when so much leeway, due to the almost total cessation of operations during the war, has to be overtaken, further reorganization has been effected. Office administration has been separated from the engineering branches, and both have been further sectionalized. The number of Inspecting Engineers has been increased. The object aimed at is decentralization, and the placing of more direct responsibility on the officials.

In order to ensure a contented and efficient body of employees every effort is now made to properly house and provide for the comfort of the men. Collapsible huts, amusement-halls, and Y.M.C.A. canteens have been erected at some works, and others are being arranged. The men themselves are encouraged to take a practical interest in all matters pertaining to the work in hand. I intend to encourage the straight-out contract system, and to give every assistance to groups of men by providing machinery and material on charge. I feel confident that the course pursued will be to the country's advantage. It will secure expedition and the full energy of the men in the carrying-out of our constructive works.

The task of developing as rapidly as possible our latent hydro-electric energy is of urgent importance. The Government is fully aware of this fact, and every possible provision will be made accordingly. A separate Hydro-electric Branch has been formed, and Mr. L. Birks has been placed in charge, with a staff of Engineers and with the necessary clerical assistance. An Advisory Board will be set up to further advise the Government, and, later, to control generally the business side.

RAILWAYS.

To detail future railway-construction would take up too much space. Generally speaking, the lines to be constructed have been classified in order of importance, consideration at the same time being given to the amount of money available. New and more economical methods of construction have been adopted by the greater employment of mechanical aids. With this object in view a sum of £200,000 has been agreed to by Cabinet for the purchase of necessary machinery. Details of the plant are given later. It is not intended to distribute this machinery all over the country on various small works, but to concentrate it on certain definite works. When these undertakings have been completed it will be removed with its personnel to other lines next in order of importance.

Legislation will be introduced this session to enable light railways of a less gauge than 3 ft. 6 in. to be constructed.

EXPENDITURE.

The total expenditure on all works and services borne upon the public-works estimates amounted to the sum of £2,269,176; or, if the special accounts having their own ways and means are excluded, the actual charges against the Public Works Fund amounted to £2,020,714, as compared with the expenditure of £1,207,482 in the previous year.

The following table shows briefly the particulars of expenditure during the financial year ended 31st March, 1920, also the total expenditure in respect to each class of work from the date of the inauguration of the Public Works policy to the 31st March last:—

Class of Work.	Expenditure.	
	Expenditure for Year ended 31st March, 1920.	Total Expenditure to 31st March, 1920.
	£	£
Railways—		
New construction	588,325	26,246,190
Additions to open lines	160,324	9,991,925
Roads	388,562	12,009,175
Public buildings	469,195	7,799,943
Immigration	*Cr.* 62,561	2,267,549
Purchase of Native lands	. .	2,061,849
Lighthouses, harbour-works, and harbour-defences	3,498	1,151,941
Tourist and health resorts	6,194	267,254
Telegraph-extension	249,379	4,072,978
Development of mining	1,173	883,179
Defence-works (general)	10,187	1,061,765
Departmental	121,677	1,552,931
Electric-power supply and development	...	9,254
Irrigation and water-supply	34,115	194,835
Payment to Midland Railway bondholders	...	150,000
Lands-improvement	2,964	138,304
Minor works and services	...	312,607
Plant, material, and stores	47,682	159,296
Cost and discount, raising loans, &c.	...	1,253,073
	2,020,714	71,584,048
Wellington–Hutt Railway and Road Improvement Account { Railway	...	228,374
Wellington–Hutt Railway and Road Improvement Account { Road	...	101,658
Railways Improvement Account	...	641,275
Railways Improvement Authorization Act 1914 Account	92,994	609,441
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
Land for Settlements Account—Roads to open up Crown lands	61,692	322,722
National Endowment Account—Roads to open up endowment lands	...	53,401
Aid to Water-power Works and Electric Supply Account	35,184	447,496
Irrigation and Water-supply Account	...	
Waihou and Ohinemuri Rivers Improvement Account	34,806	126,825
Totals	2,245,390	75,019,274

WAYS AND MEANS.

	£
On the 1st April, 1919, the available ways and means for public-works purposes were	186,198
Additional funds were received as follows:—	
Under Finance Act, 1918 (No. 2), section 29	1,940,000
Other receipts and recoveries	114,456
Making a gross total of	£2,240,654
The net expenditure on all works and services chargeable against the Public Works Fund for the year 1919–20 amounted to	£2,021,152
This left a credit balance in the Ways and Means Account at 31st March, 1920, of	219,502
Authority exists for providing further funds:—	
In terms of the Finance Act, 1918 (No. 2), to the extent of ..	200,000
In terms of the Finance Act, 1919	750,000
Making a total of	£1,169,502
Authority has been asked to provide a further	2,500,000
Thus making available for expenditure during the current financial year ending 31st March, 1921, a sum of	£3,669,502

The estimated expenditure on public works for the current year (exclusive of accounts which have their own ways and means) is £3,572,500, leaving an estimated credit balance of £97,002 to be carried forward to next year (1921–22).

In addition to the amounts above described statutory authority exists for raising the balances under the following accounts, viz.:—

	£	£
Aid to Water-power Works Act, 1910	51,000	
Waihou and Ohinemuri Rivers Improvement Act, 1910	20,000	
In terms of the Finance Act, 1919 (additional for Waihou and Ohinemuri Rivers improvement) ..	150,000	
		221,000
Statutory authority has been obtained for the hydro-electric development of Arapuni and Mangahao schemes, and further extensions of Lake Coleridge; also for the purchase of Horahora, the extension thereof, and the erection of transmission-lines, amounting in all to		6,830,000
		£7,051,000

RAILWAY-CONSTRUCTION.

Only one section (Culverden to Waiau, 13 miles in length) was actually handed over to the New Zealand Railway Department for ordinary traffic during the financial year (ended 31st March, 1920), although several sections were in a sufficiently advanced stage of construction to admit of both goods and passenger traffic being handled by my Department for the convenience of settlers and the public generally. Construction has proceeded, with all the labour available, on no less than thirty-nine sections. The total expenditure, including maintenance and improvement, for the year amounted to £841,643, the details being:—

	£
Construction of new lines	588,325
Additions to open lines	160,324
Railways Improvement Authorization Act, 1914, Account	92,994
Total	£841,643

Concentration.

Supplies of rails, steel, and hardwoods for bridges have been difficult to obtain, and essential machinery, except to a very limited extent, has been and is still almost unprocurable. Labour has been difficult to obtain, and the ability to earn high wages has not attracted sufficient men of a satisfactory class. Carrying on a number of works with insufficient employees increases overhead expenses, and renders satisfactory progress impossible. It is far better to fully man and vigorously prosecute a smaller number of works. With the idea of concentrating available resources in men, plant, and money certain proposals for the temporary postponement of works which are now being carried on in a small way will be read below.

Plant.

To cope with the shortage of efficient labour increasing use is being made of machinery, and such improved results have already been demonstrated that, in spite of the exorbitant prices now demanded, arrangements are being made to greatly increase the mechanical plant. The Department now has eleven steam-shovels, with ten locomotives attending on them, engaged on earthwork, and, if promised deliveries are fulfilled, will have thirty-four steam-shovels and thirty-four locomotives within the next few months. Increasing use is being made of mechanical traction not only for transport, but for operating grading machinery, &c. Stone-crushing and concrete-mixing machinery is being installed whenever work of any magnitude is in hand.

The cement shortage has been also a continual source of anxiety. Many works cannot be commenced, and others cannot be carried out in proper sequence. Such important works as the Arthur's Pass and other tunnels have been held up owing to the impossibility of obtaining regular supplies.

The progress at all works under the difficult circumstances, however, has been satisfactory, as will be seen from the following summary and appendices.

Kaihu Railway Extension.

(19 miles 17 chains to 23 miles 71 chains = 4 miles 54 chains.)

The formation of the whole of this line has been completed, with the exception of five small cuttings totalling about 15,000 cubic yards. None of the bridges have been commenced, owing to shortage of material, but three temporary structures have been erected. Rails have been laid from 19 miles 40 chains to 21 miles, and all the permanent-way material is on the works. Formation as well as platelaying should be completed this spring. A stone-crushing plant has been installed, and ballasting operations are proceeding satisfactorily. The stone is of excellent quality; it is suitable for road-metalling and also is the very best possible ballast for railway purposes. Sixty-six men are at present engaged on the work. It is hoped that, though there will still be some finishing-work to do, the line will be ready for traffic by the end of the present financial year.

North Auckland Main Trunk.

Ngapuhi Northwards.

Okaihau Section (16 miles 25 chains to 24 miles 45 chains = 8 miles 20 chains).—The whole of the formation is practically completed. Little difficulty was experienced except in the large cutting at 19 miles 68 chains, the bank at 19 miles 53 chains, and the Okaihau station-yard at 24 miles 47 chains. A steam-navvy was utilized at the cutting, but the material removed was unsuitable for the filling at 19 miles 68 chains, and other and drier filling had to be procured. This bank still continues to slip, making it very difficult to keep the temporary line in good order. Some very bad slips have also occurred at the Okaihau station-yard, but these will be removed in the summer. With these exceptions the formation is in a fairly stable condition, and should be ready for the rails to Okaihau by the time the platelaying reaches that point early next year.

Ballast will be obtained from a quarry about a mile from the main line, and a commencement has been made to lay the rails on this branch. A steam-driven crushing and screening plant of suitable capacity is being installed at the quarry. Investigations are being made to ascertain if this can later be driven by hydro-electric power.

Permanent rail-laying has been done to 19 miles 50 chains. Additional rails and sleepers are now arriving, and it is anticipated the track will be laid to Okaihau early this summer.

The service road between Kaikohe and Okaihau has been completely metalled.

Okoro Section (24 miles 45 chains to 34 miles 18 chains = 9 miles 53 chains).—Owing to shortage of labour practically nothing has been done during the last four months between 24 miles 45 chains and 27 miles, and very little during the previous quarter. From 24 miles 45 chains to 24 miles 79 chains the formation is completed, and from there to 27 miles is about one-third completed. Twelve cuttings are ready between 25 and 27 miles, but only sufficient labour is available to man two of these. Two oil-driven crushing plants are in use for providing metal for roads and concrete culverts. Three and three-quarter miles of fencing has been done, and the Okaihau–Rangiahua road-deviation, 63 chains long, was formed and metalled. The very wet weather of the last three months has further delayed progress. The number of men employed on the whole line at present is 107.

Waiotira Northwards.

Kirikopuni Section (107 miles 28 chains to 121 miles 40 chains = 14 miles 12 chains).—The Tokatoka and Omana Tunnels, at 108 miles 29 chains and 115 miles 46 chains respectively, are the most important works on this section.

A commencement was made in the bottom drive of the Tokatoka Tunnel, but he work had to be abandoned owing to want of good tunnel-men. The drive has been carried 3½ chains only. The ground appears to be better than in the tunnels farther south. Formation between Waiotira Station and Tokatoka Tunnel (about a mile) is one-third completed. A steam-shovel was brought into use on this section in February last, and it will be used for all the formation up to the tunnel. Beyond this (Tokatoka) tunnel a start was made with formation, but work had to be abandoned for want of men. A service road has been constructed from Waiotira Junction Station to 111 miles 40 chains.

No work has been done at the Omana Tunnel, but a tramway, 2½ miles in length, is being constructed to transport materials from Pukehina Wharf (on the Wairoa River) to the works. Nineteen workmen's huts have been erected.

Twenty-two men are at present employed. Should it be found that these men can be more profitably employed in order to hasten the closing of the gap between Waiotira and Ranganui, they will be transferred, but this should in no way lengthen the period required for the completion to Kirikopuni, as these concentrated forces will be replaced north of Waiotira as soon as the southward connection is completed.

Waiotira Southwards.

Waikiekie Section (96 miles 45 chains to 107 miles 28 chains = 9 miles 55 chains).—Work has proceeded over this section, but the serious shortage of men has hampered progress. Formation between Mareretu and Waikiekie Tunnels is well in hand, being about half completed. From the north end of Waiotira Tunnel to Waiotira Junction Station the formation is completed, with the exception of two banks. A steam-shovel is employed on the section.

As in the case of the Kirikopuni Section, the two tunnels on this section are by far the most important features of the construction, but work at both tunnels has been seriously hampered for lack of experienced workmen—in fact, operations at the Mareretu Tunnel had to be entirely suspended and all available men concentrated at Waikiekie. The nature of the ground at the latter place has proved to be very treacherous. 18 in. invert concrete lining had to be adopted, and indications point to 2 ft. lining being required in some of the remaining length. Only 8 chains remain to be completed, but, owing to the nature of the country and the scarcity of men, I do not anticipate its completion for at least another ten months.

A gravitation water-supply has been provided for Waiotira Station, and four platelayers' cottages have been erected. A sawmill has been erected near Mareretu Tunnel to cut timber for construction-works and workmen's huts.

Sixty single men's huts and sixteen married men's quarters have been erected, and at Waikiekie Tunnel a dining-room and bathhouses have been built for the additional comfort of the workmen.

The employees at present engaged on this section number 145.

Ranganui Northwards.

Marereta Section (92 miles 6 chains to 96 miles 45 chains = 4 miles 39 chains).—The treacherous nature of the country has been responsible for heavy slips on this section, retarding progress with formation; and, owing to the disagreeableness of the work, considerable difficulty has been experienced in retaining workmen. Fair progress, however, has been made with the cutting at 92 miles 48 chains and the adjacent embankment, but slips on other cuttings are causing much extra work.

Paparoa Section (90 miles 30 chains to 92 miles 6 chains = 1 mile 56 chains).—The principal items uncompleted on this section are (*a*) the embankment at 91 miles 39 chains, (*b*) the Huarau Tunnel, and (*c*) further excavation at the Paparoa Station.

The embankment still shows no signs of stability, its spreading and sinking rendering it unsafe to carry a locomotive; and, moreover, little can be done to improve matters until the Huarau Tunnel is completed, of which less than 2 chains now remain to be driven.

The three sections (Bickerstaffe, Maungaturoto, and Huarau) extending from 83 miles 75 chains to 90 miles 30 chains (6 miles 35 chains in length) have been thoroughly repaired, and (since the 31st March last) have been handed over to the New Zealand Railway Department for ordinary traffic.

Exceptionally heavy floods occurred on the 27th March last in the Paparoa and Waipu districts, unfortunately resulting in loss of life. Considerable damage was also caused to the railway embankment at 92 miles 13 chains, and numerous slips were brought down at other points.

There are now 179 men employed on this work.

WHANGAREI BRANCH.

Oakleigh Section (0 miles to 7 miles 60 chains = 7 miles 60 chains).—The first 5 miles 23 chains of this section have been completed, and, since the end of the financial year, handed over to the New Zealand Railway Department for ordinary traffic. Formation on the balance is more than two-thirds completed. A steam-shovel is being utilized in the largest cutting. Large slips have occurred at 7 miles 15 chains, which may necessitate a slight deviation of the line. The Portland Cement Company's tram-line runs under this line at 7 miles 74 chains through a subway constructed by my Department at the expense of the company.

Tauraroa Section (7 miles 60 chains to 15 miles = 7 miles 20 chains).—The formation and ballasting of this section is practically completed. It has been maintained throughout the year for the purpose of running goods and passenger traffic as well as for conveying railway material to Waiotira Junction. Only about 16,000 cubic yards of ballast could be crushed at the Tauraroa quarry, owing to the men being required to remove slips from the line before the stone could be conveyed to where it was required. What was not utilized on this and the North Auckland Main Trunk line was used for road-metalling. About forty workmen's huts have been erected.

Waiotira Section (15 miles to 19 miles 75 chains = 4 miles 75 chains).—Formation, with the exception of one cutting at 16 miles 60 chains and a few culverts, is completed.

Work on this and the Tauraroa Section has been most difficult and expensive owing to the treacherous nature of the country through which it passes. Some idea of this may be gathered from the fact that 36,000 cubic yards of slips have been removed from this section alone. This work was effected by means of a steam-shovel. The track is now sufficiently opened to admit of traffic being run to Waiotira, but there is still a large quantity to be removed to render the cuttings absolutely safe. Ninety-one men are now employed on this line.

The whole route of the North Auckland Main Trunk Railway and the Whangarei Branch lies in country of a most treacherous nature, which makes the construction of railways probably more difficult than in any other part of the Dominion. The cuttings, almost without exception, immediately after they have been excavated commence to slip, even though the batters have been taken out at a much flatter slope than is usual. The slopes of cuttings, as low as 6 ft. in depth, break away as soon as the cuttings are taken out, and, apparently without any reason, slip for distances of 200 ft. to 300 ft. back. The banks also cause endless trouble by sliding outwards as soon as they are made, resulting in subsidences

which have to be continually raised in order to keep a track fit to run construction trains. It would be no exaggeration to say that the actual quantity of earthwork to be done on these railways is 50 per cent. in excess of the originally estimated quantity. The fact of its having to be removed after slipping, and its reduction to slurry by rain, also adds considerably to the cost of the work.

Waipu Branch.

Ruakaka Section (0 miles to 9 miles 20 chains = 9 miles 20 chains).—The greater part of this section will be easily constructed. The first two miles will consist of banks across mud-flats, which will be commenced when a steam-shovel and locomotive are available. Formation over the balance is proceeding, and with the exception of the culverts nearly 5 miles have been completed. About twenty-five men are employed. This cannot be considered a satisfactory state of affairs, and until cement for culverts is available, and sufficient men also, I propose to discontinue work on this line.

North Island Main Trunk.

Waiuku Branch.

Patumahoe–Waiuku (4 miles 20 chains to 12 miles 15 chains = 7 miles 75 chains).—A goods service from Patumahoe to Mauku has been maintained. Platelaying beyond Mauku has reached the 7-miles peg, and beyond this point banks and culverts at various points have been completed. Contracts have been let for the erection of the Pukeowhare and Fernleigh station buildings, and orders have been placed for the timber for the Waiuku station buildings. Fifty-three men are engaged. The completion of the line will depend largely on the ability of the Railway Department to convey the ballast from near Auckland. At present the shortage of trucks is acute. Provided materials arrive, rails will be to Waiuku at the end of November, and fit for goods traffic at the end of March.

Huntly Branch.

Bridge Section (7 miles 20 chains onwards).—Work on this section was closed during the war period, but was recommenced last December. Formation is proceeding; stream-diversion at 7 miles 50 chains has been completed; fencing is in progress, and culvert-sites are being excavated. Permanent pegging has been finished to 8 miles 70 chains and trial survey extended to 10 miles. Want of supplies (cement and timber) has somewhat delayed operations. About thirty employees are engaged.

Waikokowai Branch.

This line has been located to 8 miles 73 chains, and permanent pegging has been commenced. The Mines Department being extremely anxious that this line should be completed as early as possible a commencement has been made with the formation, although insufficient men are available to carry on the work satisfactorily. I may have to transfer the greater number of the men at the Huntly Bridge mentioned above to expedite the line.

East Coast Main Trunk.

Waihi Eastwards.

Athenree Section (0 miles to 8 miles 68 chains = 8 miles 68 chains).—Formation has been continued, the Athenree station-yard formed, as well as the approach road to the passenger-platform, and a deviation of the main road completed. The concrete piers for Waimata Stream bridges have been erected.

Katikati Section (8 miles 68 chains onwards).—A commencement with formation was made in September last, and three parties have since been continually employed. Sixty-three men are at present engaged on this work.

Tauranga Westwards.

Tauranga Section (36 miles to 41 miles 5 chains = 5 miles 5 chains).—Some formation is being proceeded with to the extent of the man-power available.

Tauranga Eastwards.

Goods and passenger traffic has been continued throughout the year between Mount Maunganui and Matata, a distance of approximately 40 miles, without interruption, and the whole line has been efficiently maintained and improved.

Matapihi Section (41 miles 5 chains to 45 miles = 3 miles 75 chains).—Erection of the Tauranga Bridge is proceeding to the full capacity of the skilled and experienced labour available. Five cylinders have been finished, and six others are well forward.

Rangitaiki Section (79 miles 16 chains to 87 miles 71 chains = 8 miles 55 chains).—Forming and trimming has proceeded uninterruptedly during the whole year and good progress has been made. Platelaying was commenced from the Matata end in June, and banks have been made up with spoil from the steam-shovel at Awaponga. Rails are now laid to 84 miles 41 chains, and a commencement is being made with the Rangitaiki River temporary bridge.

Awakiri Section (87 miles 71 chains onwards).—Formation work is in hand, and several miles of service road have been constructed. Flying surveys have been made and 19 miles of trial lines run.

General.—Tauranga Workshops: A new workshop to replace that destroyed by fire in June, 1919, is almost completed. Some new machinery has been installed, and orders placed for the balance. Railway rolling-stock was efficiently repaired in this shop, and ironwork was manufactured for bridges in Gisborne, Auckland, and Taumarunui districts, as well as for several bridges in the Tauranga district. Including those on maintenance, traffic, construction, and location survey, 310 men are employed. It is anticipated that the rails will be laid into Awakeri Station by the end of 1920, and to Whakatane Junction within another six months. Owing to the character of the swamp country, the rails are being laid practically on the natural surface, and the banks built with material brought by train from pits where it is excavated by mechanical means.

Gisborne–Wairoa.

Ngatapa Section (0 miles to 10 miles 29 chains; actual length, 11 miles 18 chains).—This section is nearly completed and has been efficiently maintained. Passenger and, in addition, goods traffic has been worked twice weekly. The usual ballast and works trains, &c., have been run. The Repongaere quarry has been worked intermittently producing metal and pulverized agricultural lime as required.

Waikura Section (10 miles 29 chains onwards).—Formation is proceeding with what labour is available. Seventy-four men are now employed. The railway between Gisborne and Napier will traverse extremely difficult and treacherous country, and, as throughout a great deal of its length it does not follow the present line of road, it will be many years, even with the most vigorous prosecution before it will be of material assistance to through passengers. It seems to me, therefore, that the proper policy will be to push on as energetically as possible with the construction of a metalled road between these two important centres. As soon as this is done there will be at least one sure avenue of communication, and the men engaged on this road-work can all be placed on the railway-works; and, furthermore, by that time, with the completion of some of the other work in hand, more plant and men will be available. By their concentration then on the railway between Napier and Gisborne the connection will be made at as early a date as would result from an attempt at the present time to push on with the very limited supply of labour and material at present available.

Wairoa–Gisborne.

Frasertown Section (0 miles onwards).—Labour shortage prior to December last materially hampered work on this section, but men have been more plentiful since. Formation is proceeding, service roads are being formed, and fencing erected. Shortage of cement has delayed the construction of culverts, &c. A number of temporary buildings have been erected. Fifty-four men are now at work.

Napier–Wairoa.

Eskdale Section (length, 11 miles 51 chains).—The formation of the whole length of this section is completed and ready for platelaying, with the exception of the first 30 chains, on which a steam-shovel is employed. There are also small gaps

where the o'd channels of the Tutaekuri River are crossed, which cannot be closed until the river-diversion on the left of the line is completed. All fencing has been done except along the Inner Harbour embankment and along portions of Petane Beach. Fifty workmen's huts have been erected, and the concrete foundations laid for a platelayer's cottage at Eskdale Station.

Tutira Section (11 miles 51 chains onwards).—The formation works on the first two miles of this section are fully manned. The service road is being constructed, fencing erected, and culverts built. Permanent survey has been made from 10 miles 60 chains to 14 miles, and 3 miles 60 chains of trial survey made, which completes this latter class of work, as far as the Mohaka River. The number of men employed is 190.

Waikokopu Branch.

Nuhaka Section (0 miles to 17 miles 12 chains = 17 miles 12 chains).—Work was commenced in March last by the letting of a number of co-operative contracts to returned Maori soldiers. Approximately two hundred horses and fifty scoops are at present engaged on the works, the Natives providing the horses and the Department the scoops. 107 employees are at present engaged. About 6 miles of formation has been completed, and it is anticipated that the rails will be laid on 20 miles within the next twelve months.

STRATFORD – MAIN TRUNK.

East End.

Matiere Section (0 miles to 10 miles 21 chains = 10 miles 21 chains).—The formation work on this section is now practically complete, and the labour available is concentrated principally on the tunnels. Only 7 chains of the Okahu Tunnel (76 chains in length) remain to be done. Of the other three, one is finished throughout, and the excavation of the other two is completed, and a commencement has been made with the lining of one of these. The bricks used in the tunnel have been made on the works. A steam stone-crushing plant is operating at Manunui. Metal thus obtained is being sold to local bodies when not required for the railway-works. All materials for the steel bridge over the Ongarue River are on hand, and a contract has been let for the erection. As it is anticipated that this contract will take about twelve months to complete, and as there is a considerable length of formation ready for the rails, I propose to erect a temporary bridge to enable the platelaying and ballasting to be carried on beyond the bridge, thus saving many months in the final completion of the line. Several bridges which occur on this length will consist of concrete piers with steel superstructure. The concrete piers will be erected this summer. The steel for the bridges has already been ordered. Immediately it arrives the contract will be entered into. In view of the difficulties in obtaining cement, &c., I do not think that even with the aid of the temporary bridge previously referred to the rails can reach Matiere under twelve months.

Ohura Section (10 miles 21 chains to 19 miles 70 chains = 9 miles 49 chains).—Permanent survey plans have been completed, and the land-plan survey is in hand. About 1½ miles of formation has been completed. Sixty-two men are at work.

West End.

Tahora Section (42 miles 26 chains to 47 miles 40 chains = 5 miles 14 chains).—Work during the year was confined principally to the completion of the formation of this section and service roads for the section immediately beyond. Platelaying has been extended into the Tahora yard, and ballasting has been continued. The cattle and sheep yards at Tahora were completed and are in use. A bi-weekly passenger and goods service connecting with the Railway Department's service at Kohuratahi has been maintained. A large number of huts and other buildings have been moved forward to the Raekohua Section. Beyond Tahora there is little settlement, and it can be served by a terminus at Tahora. The work beyond is heavy, and I propose to discontinue extensive operations, and to complete the line to Tahora and hand it over to the Railway Department. Later, when some of the other lines are completed, work can be recommenced beyond Tahora with greater vigour, and the time of ultimate connection will not thus be appreciably delayed.

Raekohua Section (47 miles 40 chains to 50 miles 60 chains).—Formation has been commenced, service roads are under construction, fencing is in course of erection, and bridges are being built. I propose discontinuing on this section as indicated above, and transferring the men to the Ohura end.

Heao Section (50 miles 60 chains onwards).—5½ miles of trial survey has been made from near the Tangarakau River towards the Heao, leaving 1 mile of trial line to reach the Heao River. The permanent survey from 50 miles to 53 miles has also been completed and a service road laid off. Eighty men are engaged on this line.

Opunake Branch.

Kapuni Section (0 miles 6 chains to 7 miles = 6 miles 74 chains).—All earthwork formation is completed with the exception of a small gap at 1 mile 22 chains. The construction of the Waingongoro Bridge proceeds satisfactorily when cement is available, but work on the Kapuni Bridge had to be discontinued owing to shortage of skilled men and cement.

Auroa Section (7 miles to 12 miles = 5 miles).—Formation is being pushed on to the full extent of the labour offering.

Manaia Branch Section (0 miles to 5 miles 49 chains = 5 miles 49 chains).—Satisfactory progress has been made with formation works on this section. A special contract is in hand for the formation of the Manaia station-yard, which is more than half completed. About forty double huts were erected on this line during the year for the better housing of workmen, who number fifty at present. Completion of the line to Manaia is the goal at present aimed at.

Mount Egmont Branch.

Work on this line was discontinued during the war, but the increasing demand for road-metal in Taranaki suggests that the line should be brought to the producing-point. Before work is resumed, however, I propose to have agreements with all the local bodies interested for them to take crushed metal regularly in definite quantities. If this is not done, and the demand is spasmodic, the works cannot be made to pay.

Wellington–Woodville Railway (Rimutaka Deviation).

The Department has in hand the collection of information as to the relative merits of numerous routes which have been suggested in connection with the deviation for obviating the present incline crossing the Rimutaka divide. Some of these routes have already been surveyed, and as soon as suitable officers can be spared from other works a definite decision as to the route to be followed will be made. It must be realized that this is a very important matter which cannot be delegated to junior officers.

Midland.

Otira–Bealey (Arthur's Pass Tunnel).

Otira End.—All work was carried out by day labour prior to last May, since when the co-operative system has been in operation. 19 chains of lining have been completed during the year. Bad ground was encountered at this end.

Bealey End.—Work at this end continued on the co-operative principle during the whole year. Exactly the same number of chains of lining (19) was finished as at the Otira end, making 38 for the year. Only 54·51 chains now remain to complete the whole work. 183 men are employed. Arrangements for the electrification are well forward, and for this work very substantial votes will be required this and next year. If the contracts now entered into and the further works complementary thereto are carried out within the contract time, it is expected that an expenditure of £500,000 will be incurred next year, and it may be necessary to curtail expenditure on some less important lines on account of this high figure.

Kawatiri Section (59 miles 17 chains to 63 miles 8 chains = 3 miles 71 chains).—After having been closed for a lengthened period, operations have recently been resumed on this section, but only preparatory work has been done to date. It is proposed to continue construction with all the labour available in the district. Only eleven men are at present employed.

Greymouth – Point Elizabeth.

Work on this line was commenced in April of last year with the letting of a co-operative contract for bushfelling. This has been completed, and further contracts have been let for clearing and formation. The work is proceeding satisfactorily. The employees number sixteen, but arrangements are being made to greatly increase this number.

Culverden–Waiau.

Final ballasting was completed during the early part of the year; and a passenger and goods service was maintained by the Public Works Department until December last, when the line was formally handed over to the Railway Department for permanent traffic.

Waimate Branch.

Serpentine Section.—Progress on this section has been generally slow, owing to the difficulty of procuring men. A commencement was made early in the year with preparatory work. Formation in the Serpentine station-yard has been completed, 8 chains of Serpentine Creek diversion finished, and general formation work proceeded with. The survey of a ballast-pit line at Waihao Forks River has been finished. The formation will shortly be in such a forward state that the erection of bridges will become necessary to enable the platelaying to be commenced. Twenty-three men are now at work. The number of men available for the three last-mentioned railways suggests that work on them should be stopped until labour conditions are more favourable. In the case of the Greymouth – Point Elizabeth Railway the extension will open up a new coal area, which it is desirable to tap before the existing State mines on the line are worked out.

Otago Central.

Cromwell Section (44 miles 52 chains to 57 miles 6 chains = 12 miles 34 chains).—This section is practically completed, and a regular passenger and goods railway service is being maintained, connecting with the Railway Department's trains at Clyde. Only one interruption of the service occurred. This was at the beginning of February, and it was caused by a severe thunderstorm, which brought down numerous slips. Ninety-five men are employed.

Lawrence–Roxburgh.

Work on this line extending the formation beyond Beaumont will be resumed as the men become available from the Otago Central Railway. Meanwhile the work is being pegged out.

Orepuki–Waiau Extension.

Orawia Section (48 miles 23 chains onwards).—Construction, which was suspended in 1915 owing to war conditions, was resumed in October, 1919. Owing to the scarcity of labour, work was concentrated mostly on the completion of culverts to enable formation to be pushed on vigorously when additional labour becomes available. Fifteen men are engaged.

Additions to Open Lines.

The expenditure under this heading amounted to £160,324. Of this sum £80,662 was expended in the provision of additional rolling-stock, tarpaulins, Westinghouse brake, and workshop machinery. The balance covered expenditure on improvements to workshops and engine-depots, station facilities, water-services, additional dwellings, waterproofing the lining in the Spiral Tunnel, tablet-installations, and purchase of land.

Railways Improvement Authorization Act, 1914.

Expenditure under this Act amounted to £92,994 for grade easements, duplications, new stations, station-yards, goods-sheds, and terminal facilities at Auckland; additions to workshops; signalling, interlocking, and safety appliances.

PUBLIC BUILDINGS.

General.

Parliamentary Buildings.—During the year the contractor has pushed on with the Legislative Council chamber and the rooms and corridors of the principal and first floors of the Museum Street frontage. The Council Chamber requires only four columns in the gallery, and the balustrading of the gallery-front, to complete it. The chamber was used for the opening of the last session of Parliament. The panelling of the walls and ceilings of the Legislative Council chamber has been completed, and a considerable amount of carpenter's and joiner's work in connection with flooring, screen partition, mantelpieces, &c., has been carried out. About 500 yards of second-coat asphalting has been laid on roof around Legislative Council chamber.

About 6,000 cubic feet of stone was worked and about the same quantity was set during the year. The short delivery of stone largely accounts for the delay in the completion of the building. Thirty-two column and nine cap stones are still required to complete the portico at the front entrance. The plaster-work of rooms and corridors on the principal and first floors has practically been finished, and other portions have been completed as far as practicable.

The heating and ventilation contract has been completed as far as the progress of the building will allow. The installation of electric light and power mains in the newly finished portion of the building has been carried out by the Public Works workshops staff.

Courthouses.

The only new Courthouse erected during the year was at Raetihi. With this exception only necessary maintenance has been done.

Prisons.

Building operations have been somewhat hampered during the greater part of the year, owing to the difficulty in obtaining cement. Additional concrete-block and stone cottages for the occupation of officers have been commenced at Auckland. At Waikeria a reservoir of 35,000 gallons capacity has been finished; one cottage and another building were erected, but two other cottages as well as the officers' quarters are now awaiting the necessary timber to admit of the roofs being completed. Building has been carried on as vigorously as circumstances permitted at Point Halswell, Wi Tako (Trentham), Templeton, and Invercargill. The Prisons Department has completed arrangements to supply the Housing Department with concrete blocks and roofing-tiles for use in the erection of workers' dwellings, but the shortage of cement has prevented even a commencement being made with the manufacture of this material. Concrete-block and tile making have been carried on at Paparua, and drainage, reclamation, and other work at Invercargill.

Police-stations.

On account of the scarcity of labour and the abnormal cost of building, very little was done in the erection of new police-stations during the year. Owing, however, to the Police Department's tenancy of rented premises being terminated, it has been necessary in several cases to purchase properties to enable police-stations to be kept open, and to provide accommodation for members of the Police Force in charge of stations.

New stations were erected at Raetihi and Lower Hutt, and the following properties were purchased: Houses and sections for use as police-stations at Freeman's Bay, Fendalton, Mornington, Duntroon, Greytown, Terrace End (Palmerston North), Lyall Bay (Wellington), and Waikiwi; site for sergeant's residence at Blenheim; site for new police premises at Dannevirke; Superintendent's residence at Dunedin; Inspectors' residences at Wanganui and Palmerston North; constable's residence at Picton; site for new police-station at Upper Hutt; and site for constables' cottages at Petone.

Many of the older buildings occupied as police-stations are now beyond repair and are reaching the limit of their useful life. The erection of new buildings in these cases will be put in hand immediately tenders at a reasonable figure are obtained.

Post and Telegraph Buildings.

Expenditure on new buildings and additions during the year has been comparatively small.

New post-offices have been erected at Henderson, Packakariki, Reikorangi, Tiraumea, Toatoa, Walton, and Wharepoa, and new automatic-telephone-exchange buildings at Khandallah and Wanganui. Residences have been purchased for Postmasters at Cromwell, Mercer, and Picton, and for linemen at Darfield, Havelock, Rakaia, and Te Awamutu; while a lineman's residence has been erected at Kahukura.

There have been additions and alterations to office buildings at Eketahuna, Fairlie, Ngaruawahia, Palmerston North, and Rongotea.

Many important works postponed during the war period are being put in hand where satisfactory tenders are obtainable.

Agricultural.

The work of erection by contract of an up-to-date rabbit-poison-mixing depot at Frankton Junction is well advanced. Repairs and improvements were effected to various residences throughout the Dominion. A poison-mixing depot is required at Dunedin, and field drainage at Ruakura, and it is proposed to proceed with these works during the ensuing year. An adequate water-supply for Moumahaki Experimental Farm, a model milking-shed at Weraroa, and repairs to the fruit-fumigating depot at Auckland will also be proceeded wi h. With a view to encouraging wheat-growing the Department has purchased and intends to install a small model flour-mill for the purpose of testing the flour-producing qualities of different varieties of locally grown wheat.

Mental Hospitals.

General repairs and renovations have been effected at Auckland, and a commencement made with a large addition to Park House. At Tokanui the fifth unit has been completed, and the admission blocks for both male and female patients are being proceeded with. A new drainage system has been installed at Porirua, which entailed a considerable amount of work, and included the construction of a tunnel 350 ft. long to carry the pipes. This tunnel had to be lined with bricks, and, owing to the flaky nature of the ground, work had to be proceeded with slowly and great care exercised in removing the tunnel-timbers.

A contract was let for a new reception block at Nelson. At Sunnyside and Seacliff urgent repairs have been effected, and at the former institution the electric cooking facilities have been extended.

A private residence at Hornby, situated on 50 acres of suitably planted land, has been purchased for selected patients who are able and willing to pay more than the usual maintenance charges. The construction of an additional unit to accommodate fifty patients at Waitati has been commenced.

Hospital and Charitable Institutions.

Extensive building operations have been carried out at Motuihi Island Quarantine Station, Auckland, including the erec ion of six large hutments, one bulk store, Nurses' Home, Convalescent Hospital, Observation Hospital, and cookhouse with accommodation for stores. In addition, alterations have been made to the main Hospital, as well as to the barracks and the caretaker's old cottage. A drainage system has been installed, and a new wharf is in course of construction.

At Somes Island, Wellington, a brick and concrete reservoir was constructed, a tram-line connecting the buildings with the wharf was laid, and alterations effected to the old buildings, besides the erection of additional huts.

New buildings for St. Helens Hospitals at Auckland and Christchurch are urgently needed. For the former (estimated to cost £28,000) plans have been finally decided upon, and an endeavour will be made to put the work in hand at an early date. The new building at Christchurch is estimated to cost £40,000, of which not more than an estimated amount of £10,000 will be expended during the present financial year. An expenditure of £2,700 is required to cover the cost of fitting up as a St. Helens Hospital, Wanganui, the property donated to the State for that purpose.

About £22,500 is required to complete the new quarantine-station buildings and other improvements at Auckland and Wellington. This sum should provide accommodation to meet all emergencies.

Education.

The expenditure out of the Public Works Fund on education buildings during the financial year was £195,500, an increase of £79,844 over that for the previous year. The commitments for new buildings at the end of the year amounted to £560,051, but had increased to about £850,000 at the end of July. As explained last year, it is proposed to charge only £250,000 of the expenditure for the current year to the Public Works Fund, and to provide whatever further funds are required for education buildings in accordance with the Education Purposes Loans Act, 1919. This Act provides for loans aggregating £3,500,000 during the current and the next three years for education buildings and sites, a sum that should under ordinary conditions be ample for all reasonable requirements. The Education Boards, Secondary School Boards, and other controlling authorities are, however, finding it increasingly difficult to arrange by contract or otherwise for the erection of

buildings. The Government's efforts to meet the insistent demand for better school accommodation are therefore limited not by its financial resources, but by the difficulties experienced in obtaining supplies of timber, cement, hardware, and other building-material, and in securing workmen to erect the buildings. Embarrassing delays are thus caused in the erection of many school buildings, the need for which is most urgent in the interests of all concerned. The Government is endeavouring to relieve the position as much as possible by giving preference to the most urgent works in the matter of supplies of material, and by postponing the making of grants for those buildings which, though necessary, are not absolutely essential.

Workers' Dwellings.

The expenditure under this heading from the 1st April, 1919, to the passing of the Housing Act in November was £26,673, made up as follows: Acquisition of land, £15,566; purchase of dwellings already erected, £7,304; erection of dwellings, £3,803. Since the Housing Act came into force all expenditure has been charged against the Housing Account.

Lighthouses.

The erection of the automatic fog-signal on Tiritiri Island, in the Hauraki Gulf, is now practically completed.

The necessary apparatus for the lights on Ninepins Rocks, on Gable-end Foreland, and in Mercury Island passage have been ordered, and are expected to arrive in the Dominion shortly.

Quotations are being obtained for a lighting outfit to be installed at Rarotonga, in the Cook Group. It is proposed to place this light about 100 ft. above sea-level, on a suitable platform to be attached to the wireless mast. It will be of 2,000 candle-power, and have a range, geographically, of sixteen miles.

HARBOUR-WORKS.

Improvement to the navigation of Taheke River, Hokianga; erection of landing-stage at Waitakaruru; the improvement of navigation between Awaroa Landing and Waikato River; widening channel and blasting rocks at Tamahere Narrows, Waikato River; and the erection of wharves at Raglan and Te Akau have been undertaken.

Owing to the high cost of and difficulty of procuring material, very little has been done in the matter of harbour-works, but the activities of the Department will be resumed immediately it is obtainable.

The buoys and beacons in the harbours under the control of the Department have been regularly overhauled, cleaned, and painted, and new moorings have been put down where necessary.

TOURIST AND HEALTH RESORTS.

Material is being assembled at Waikaremoana Hostel for alterations, renovations, and drainage. The fencing of the Te Puia Hot Springs Reserve is in hand. Copeland Track has been repaired, and a new hut at Clarke is in course of erection. Provision is made this year for a number of new works at the various resorts.

IMMIGRATION.

It has been decided to extend the "nominated passages" system to enable any permanent resident of the Dominion to nominate persons residing in the United Kingdom. This can be done irrespective of questions of relationship or occupation, provided that an undertaking is given that employment will be awaiting the nominees on arrival, and that adequate provision will be made for their maintenance after arrival. A considerable number of immigrants are awaiting opportunities to secure berthing-accommodation to enable them to proceed to the Dominion.

In future suitable domestic servants will be granted free third-class passages, together with an allowance of £2 for expenses. It is hoped that this may be the means of securing a much larger number of suitable girls for the Dominion.

The Imperial Government has commenced its free immigration scheme for ex-service men—viz., officers and men of the Royal Navy, the British Army, or the Royal Air Force (excluding Dominion and Colonial Forces) who have served in the present war and who wish to settle within the Empire overseas. These ex-service men, with their dependants, will receive free third-class passages, provided

they are approved under one of the agricultural-settlement schemes of the overseas Governments or are proceeding to assured employment, and are otherwise acceptable to the Government of the territory to which they desire to go. This privilege will also be extended to the widows and dependants of ex-service men who are entitled to a pension from Imperial funds under the terms of the pensions warrant. A number of immigrants under this heading have already arrived in the Dominion.

ROADS CONSTRUCTION AND MAINTENANCE.

The operations under this head have been carried out partly by the Department and partly by the various local bodies, under departmental supervision. My officers have attended primarily to the location and construction of roads and bridges, and the local bodies generally to metalling, although this rule has not been rigidly adhered to. The total sum voted last session for roads, &c., roads on goldfields, and maintenance of roads (this latter from the Consolidated Fund) was £707,085, and of this £447,931 was expended. In addition, funds have been provided by the Department of Lands and Survey for roading returned-soldier settlement and other blocks, which in most cases have been entrusted to my Department for expenditure. It is regretted, however, that very little labour was offering for road-construction generally, especially in remote localities, and even in the more settled districts men were hard to get. Furthermore, the construction of bridges has been materially hampered owing to the difficulty of obtaining steel and hardwood, consequent upon the state of the steel-market and the scarcity of shipping-space. It is hoped, however, with the co-operation and assistance of settlers, and the possibility of improved markets and shipping facilities, that better progress will be made this financial year. The increased use of machinery is contemplated. At the present time graders are used wherever possible, but steam-shovels are now being utilized, and, in addition, a considerably increased number of graders, to be drawn by mechanical traction, are on order. It is hoped in this way to make up for the shortage of efficient labour.

Main Roads.

Legislation is in course of preparation, and will be brought before the House, making provision for the Government taking over the control and maintenance of main roads. With the aid of this legislation it is hoped to improve and maintain the main roads of the Dominion in accordance with the standard demanded by modern transport requirements. Should my proposals be carried out, I hope to be able to employ the most up-to-date methods in connection with roadmaking and maintenance. The work will be carried out on a large scale in accordance with a definite programme and under the control of a well-organized staff.

TELEGRAPH EXTENSION.

Among the principal land lines completed or under construction during the year 1919–20 were the following: Auckland–Papatoetoe, Taupaki metallic circuit, Auckland–Thames, Greymouth–Reefton, Fernside–Springbank, Oaro–Kaikoura, Dunedin – Pine Hill, Dunedin – Pelichet Bay, Mosgiel–Dunedin, Omimi–Seacliff, Wyllie's Crossing – Outram, North-east Harbour – Broad Bay, Moeraki extension, Hawera–Eltham–Stratford, Palmerston North – Feilding, and Blenheim–Seddon.

The work in connection with the Dunedin underground system proceeded steadily during the year, the Roslyn area and the Mornington section of the city area being completed. The South Dunedin area was put in hand, and work proceeded satisfactorily in spite of the difficult nature of the ground. A further section of the city area, extending from the Octagon to Pitt Street, was commenced; the work has continued without interruption.

The telephone-exchange system is steadily expanding. Five new exchanges were opened during the year and none were closed. It was found necessary to provide additional switchboard accommodation at sixty-eight others. The work of converting earth-working systems to metallic circuit is being systematically continued. The increase in the number of exchange connections for the year was 8,318.

The telephone-exchange plant has been extended by the erection of 322 miles of poles and 11,547 miles of wire; and the telegraph and inter-urban telephone system now consists of 50,751 miles of wire, making a total length of 228,284 miles of wire in the whole telegraph and telephone system of the Dominion.

Eighteen new coin-in-the-slot telephones were installed. The total in the Dominion now stands at 295.

The policy of providing for telephone-exchange subscribers' circuits by means of underground cable is being continued. During the year 8,045 miles of underground cable wires were run out.

The party-line system was extended by the addition of 577 lines and 1,906 subscribers.

Toll lines throughout the Dominion are congested, and additional circuits are required in every district. The provision of additional lines will involve heavy expenditure for copper wire and other material.

Extensions to the manual and automatic exchanges are required in the centres as well as in many smaller towns. The construction of underground cable systems at Christchurch and Dunedin in preparation for automatic exchanges will be proceeded with.

Scarcity of material still hampers the constructional operations of the Department.

CONTINGENT DEFENCE.

The construction of the Invercargill rifle range necessitates the reclamation of about 270 acres. The material for filling is being obtained and conveyed to the site by tram, and latterly a dredge has also been employed to assist in this work. An additional 140 acres have been purchased as a danger-zone. It is anticipated that the whole undertaking will be completed during the present financial year, and a sum is being provided on the estimates for this purpose. Prison labour is being used on the work.

Various rifle ranges throughout the Dominion were repaired and improved.

A mobilization store is required at Auckland, garages at Wellington and Trentham for mechanical-transport vehicles, and a shed at Trentham for mobilization equipment.

LANDS IMPROVEMENT.

Improved Farm Settlements.—The roading of improved-farm settlements has now been completed. A small sum, however, is being provided on the estimates this year to meet special cases as they arise, such as formation of deviations, &c.

Miscellaneous.—The only item calling for special mention under this head is that of £5,000 for the construction of roads in the Hauraki pastoral areas. This is a repetition of a similar item provided last year, against which £2,388 was spent in legalizing and forming road access to settlers. An engineering survey of roads which are required is being made.

LAND FOR SETTLEMENTS ACCOUNT.

Roads to open up Crown Lands.—A sum of £250,000 was appropriated last year for this purpose, but labour difficulties and shortage of material retarded progress.

IRRIGATION AND WATER-SUPPLY.

Ida Valley Scheme.—About half a mile of race-renovation and an extension of a length of 15 chains and a distributory have been completed and extended as a tail-race to Poolburn Creek. Extensive drainage-works were commenced. During the non-irrigation season the races were maintained and cleaned. This work was somewhat heavy, owing to a thunderstorm in January last. The drainage-scheme survey was completed, and the resurvey of Moa Creek to German Hill race was commenced and is now well in hand.

Galloway Flat Scheme.—Excavation for the diverting weir at Dip Creek is being carried out by means of a hydraulic elevator, and is in an advanced state of completion. 3 miles 16 chains of the Galloway main race was completed except for trimming and the necessary fluming. Two miles of drains to deal with surplus water were cut. The survey and plans of the amended main race were made during the year.

Manuherikia Scheme.—Only 1·22 chains of the tunnel to divert the waters of the Manuherikia River into the main drain remain to be driven, 3·31 chains having been completed during the year. Only a limited number of men were available for this class of work, and many of those employed (even though they earned over £1 per day) left to engage in the more lucrative and less strenuous occupation of rabbiting. The main race was extended towards Clyde and was practically completed as far as 21 miles.

Chatto Creek Siphon.—Cleaning and repairing the second-hand pipes purchased for the siphon across Chatto Creek is in hand.

Surveys.—The survey and plans of the Manuherikia River from Chatto Creek to the mouth of the Manorburn River were completed, and the preliminary survey of the possible Lauder scheme reservoir was commenced.

HYDRO-ELECTRIC POWER.

Lake Coleridge Electric-power Supply.

The financial result of the operation of the Lake Coleridge system for the year ending 31st March, 1920, has been still more satisfactory than for the previous years. The power-house load has been increased during the year to such an extent that at the end of the year it was carrying an overload of 1,400 horse-power, or 17 per cent. The revenue for the year was £45,831, and the expenses were as follow :—

	£
Working-expenses	17,759
Interest	16,863
Depreciation reserve	7,624
	£42,246

The result of the year's operations is thus a net profit of £3,585 towards the reduction of the deficit on the four previous years of working. This result is very satisfactory.

From other points of view the results have been even more satisfactory. The output for the year from the power-house was over 33,000,000 units. To have generated this in a large economical steam plant using the class of coal now available would have taken 45,000 tons of fuel, worth from £100,000 to £120,000. But the steam plants that have actually been replaced by Lake Coleridge power were by no means as efficient as is assumed above, and in practical running they actually consumed up to three or four times the above amount of coal, or its value in oil, kerosene, and petrol. Thus the saving in fuel to the public of Canterbury is probably in the neighbourhood of £300,000, for which they have paid to the Department £45,831 —or, allowing for the distributing-costs of the twelve retailing authorities, about £110,000. The shipping and handling alone of the above 45,000 tons of coal per year (150 tons per day) would have been a large item. And, apart from the saving, the comfort that has been given in ten thousand homes, the increasing efficiency in dozens of workshops and factories, and the security and reliability of the hydro-electric-power supply during the trying period of the railway restrictions and coal shortage, are advantages of even greater importance to the consumers than the cash saving of £200,000.

As the result of this success the demand now in sight is far in excess of the supply, and even of the capacity of the scheme as now laid out—with a total of 16,000 horse-power. Plans are in hand for further extension to a capacity of an additional 26,000 horse-power (20,000 kilowatts), with distribution-lines to Banks Peninsula, Kowai County, Oxford, Ellesmere County, Methven, Ashburton, and Timaru.

It is anticipated that the fifth unit (4,000 h.p.), the pipe-line for which is now under construction, will be completed by the winter of 1921. This will only serve to relieve the overload on the present plant, to give a reasonably safe margin of standby capacity (2,000 h.p.), and to enable a few urgent consumers who have been waiting for some time to be connected up.

Contracts were recently placed for the generating-plant for the final unit (4,000 h.p.), and it is anticipated that this will be ready for operation for the winter of 1922. One thousand horse-power of the capacity of this unit is to be reserved for the South Canterbury line.

Horahora Power-station.

During the year the Horahora power-station was purchased from the Waihi Gold-mining Company, and was operated on behalf of the Department for the last five months of the financial year. The maximum load reserved for the Waihi Mine is 3,300 h.p., out of a total plant capacity of 8,400 h.p. Allowing one unit of 1,400 h.p. as a standby and 1,300 h.p. to cover special industries and losses, this leaves 2,400 h.p. available for distribution by the local authorities.

Four Electric-power Boards have been formed to undertake this distribution—viz., Thames Valley, Cambridge, Te Awamutu, and Central—together with the Hamilton and Waihi Boroughs, and as soon as the necessary plant is available for effecting the distribution the available power will be rapidly absorbed.

The greater part of the material for the distribution-lines has already arrived, but owing to shipping difficulties the delivery of the poles has only recently commenced, and until more are available it will be impossible to commence the erection of the lines.

An agreement has also been negotiated with the Waihi Grand Junction Gold Company under which their spare steam plant is to be at the disposal of the Government over periods of heavy load or of breakdown, thus enabling the spare unit of 1,400 h.p. at Horahora to be put into regular service, and rendering this additional output available for sale.

Electric-power Boards.

The function of the Government in connection with hydro-electric supply consists essentially in the construction of main generation stations and the main transmission-lines and substations from which the power will be sold in bulk to the local distributing authorities. The latter will be left the duty of reticulation and retail sale. The Government policy will be to throw upon local organizations practically the whole business side of the undertakings other than the primary generation, high-tension transmission, and sale in bulk. In the past the only local authorities available have been the Borough and County Councils, but in order to provide a stronger and a specialized organization the Electric-power Boards Act, 1918, was passed. This Act provides that several adjacent local districts may unite and set up an elected Power Board, with rating-powers. The provisions of this Act have now been taken advantage of by ten electric-power districts. Although the Act provides for inner and outer areas, most of the Boards have taken in the whole of their district as an inner area irrespective of the density of settlement, thus expressing their confidence in the development of the back country and in its settlement by farmers who will be sufficiently progressive to make full use of the advantages of electric-power supply.

With regard to the future the principles on which the boundaries of electric-power districts should be determined are not set out in the Act, but under clause 3 the responsibility of deciding whether proposed boundaries are desirable or otherwise is cast on the Governor-General in Council. Hitherto no amendment has been made in the districts as sought in the petitions submitted, but it is obvious that if the whole Dominion is to be dealt with in the best manner possible it is essential that a comprehensive scheme should be drawn up. This has been done, and in future it will be necessary for the petitions to be submitted to the Minister for approval before they are circulated, and any necessary alterations made in the boundaries. Difficulties will probably be encountered in the districts which include the larger of the power-supply undertakings, owing to the fact that country distribution, though the most important part of the Power Boards' activities, and the most profitable from the national point of view, cannot be as remunerative as the city supply because of the longer lines that are required. The cities and larger towns, however, must realize the extent to which they are dependent for their prosperity on the country business, and co-operate heartily in comprehensive systems even including in each case substantial portions of less remunerative country reticulations.

Five of the Power Board districts already constituted have submitted their loan proposals to the ratepayers, amounting in all to £1,980,000. This amounts to over £20 per head of the populations of the districts concerned, and it gives some indication of the future extent and importance of the Electric-power Board activities. The almost unanimous votes by which these loan proposals have been carried indicate, however, the public opinion in the matter.

Other Local Electric-power Supply Authorities.

There are now seventy-one local electric-supply authorities operating in the Dominion, with a total capacity of 45,805 kilowatts, as compared with 43,899 kilowatts last year. The demand for additional power has been very urgent, but the extensions have in most cases been delayed owing to the difficulty in obtaining plant and materials. It is now expected that with the reversion to more normal conditions these difficulties will be overcome. Each of the main cities is proposing large extensions. The seven main local authorities have proposals in hand which will add 33,500 kilowatts to their installed capacity—at a proposed capital outlay of £1,582,000. In each case there is provision that the proposed plant shall work in with the Government hydro-electric supply when available.

Government Hydro-electric Proposals.

The main Government scheme proposed for each Island consists of a complete high-tension transmission-system connecting all the main points of supply of the Electric-power Board districts and of the local electric-power authorities. These transmission-systems will be fed from three or four large hydro-electric-power sources in each case, and will also be connected up with the chief existing local sources of supply, including both the hydro-electric and steam power plants already in operation. Hence the urgent necessity of standardizing the system of electrical distribution throughout the Dominion. In all recent installations the standard three-phase fifty-cycle system has been adopted, and several of the older plants are being changed over to this system in order to enable them to take advantage economically of the Government supply. Out of the fifty-five generating-stations now in operation, twenty-two are operating on the standard system, comprising 26,690 kilowatts, or 58·3 per cent. of the installed capacity of the Dominion.

The main sources of supply selected for the North Island are Mangahao (24,000 h.p.), Arapuni (96,000 h.p., capable of extension to 162,000 h.p.), and Waikaremoana (40,000 h.p., capable of extension to 136,000 h.p.). In addition supplementary supplies will be obtained from Horahora power-house (8,400 h.p.), Wairua Falls (2,600 h.p.), New Plymouth Borough (ultimately 8,000 h.p.), and a standby service from the large steam plants at Auckland (ultimately 26,000 h.p.) and Wellington (12,000 h.p.). Regarding the North Island, the construction of Mangahao is now well in hand. The investigation of the Arapuni dam site is practically completed, and work will be commenced at Waikaremoana forthwith. For the main transmission-lines the specifications for the materials have been drawn up and the delivery of the poles has commenced.

Provided that no undue delay occurs in the delivery of plant from abroad, and coal for driving the construction plant is obtainable, and cement, the supply from Mangahao can be made available within three years.

The construction plant at Waikaremoana (1,000 horse-power) has been designed to form part of the permanent installation and to be large enough to give a local supply in the meanwhile to Wairoa County and Borough. This construction plant should be in operation within two years, and the main supply from Waikaremoana within two years thereafter.

The reliability of the foundations of the Arapuni dam has now been fully investigated, and in view of the importance of the work it is proposed to refer the whole of the data collected to a committee of engineers for a final decision.

In regard to the South Island the details of the transmission-system and supply points have not yet been laid out, but the system will incorporate the existing power plant at Lake Coleridge, the Dunedin City Council's plant at Waipori Falls, and the proposed Southland Electric-power Board's station at Lake Monowai, each of which should be developed as early as possible to its fullest extent. Proposals are now being investigated for the extension of the Lake Coleridge plant to the full capacity of the site (42,000 h.p.) and the survey and construction of the line to South Canterbury is in hand. Surveys of the Hawea–Wanaka and Teviot River schemes have been carried out to locate the most economical source of supply in Central Otago in order to complete the system in the southern end of the Island, and surveys will be put in hand as early as possible to locate the best sources of supply for the northern end (Marlborough, Nelson, and Buller districts), and the western districts (Grey and Westland), and for laying out transmission routes to complete the whole system on the same lines as in the North Island.

The estimates of 1918 for the North Island system (160,000 h.p.) amounted to £7,303,402. At the present enhanced costs of labour and material this will considerably exceed £10,000,000, and the South Island system will probably cost almost as much.

The prosecution of these works at a satisfactory rate of progress will call for more skilled and unskilled labour than is at present available; but it is hoped that the efforts of my colleague the Minister of Immigration will result in the early arrival in New Zealand of a sufficient number of suitable men.

The success of the schemes already in operation, and the ever-increasing difficulties in obtaining supplies of coal and fuel oil, have combined to create an insistent, widespread, and fully justified demand for the immediate development of New Zealand's water-power resources. Financial considerations require that schemes once launched should be brought to a paying stage as quickly as the available supply of labour and material will permit. Special officers, Engi-

neers and other experts, together with the necessary office assistance, have therefore been, as I have already stated, to deal specially with electric undertakings. The whole of the energies of these officers will be concentrated on the completion of the schemes, and on the supervision and the assisting of the Power Boards and other distributing authorities. As circumstances require, their numbers will be added to. Further legislation dealing with hydro-electric matters is under careful consideration. In the meantime it is proposed to set up an advisory Board consisting of business men of standing to advise the Government on various questions connected with the business management of its power undertakings, and on questions of policy in connection with the development, distribution, and sale of hydro-electric power.

WAIHOU AND OHINEMURI RIVERS IMPROVEMENT ACCOUNT.

The larger stop-banks have been built by dredge on the left bank of the Upper Waihou River to a length of 93 chains; and the smaller preliminary stop-bank, by hand, on the right bank, to a length of 113 chains. In addition to these, the stop-bank on the right bank of the Ohinemuri River has been closed up so as to positively protect the town of Paeroa. Two concrete culverts of three and two barrels have been completed. The dipper dredge has worked on the Rotokohu drain since last September and has done 103 chains of dredging, chiefly solid material.

The Ngahina Wharf has been completed. Ringbarking and clearing has been in hand. Timber is on hand for construction of Naghina Bridge extension, right bank, Waihou River.

In October, 1919, the Rivers Commission sat at Paeroa and reported upon the works proposed along the Waihou River below Ngahina Bridge, and its recommendations have been adopted.

CONCLUSION.

In putting forward the above statement it has been my endeavour to so allocate the funds placed at my disposal as will best serve the interests of the Dominion as a whole. While it has been impossible to proceed this year with all the works for which requests have been made, I am of opinion that concentration on fewer works will result in all the necessary undertakings being carried out not only more cheaply, but also more expeditiously in the long-run than would result from an attempt to carry on simultaneously a greater number of works than can be adequately supplied with men and material.

Though the sums placed on the estimates exceed the amounts appropriated during the last few years, it must be borne in mind that the cost of everything has so much increased that the larger sums on the estimates, when expended, will not produce as great a result as similar amounts have produced in pre-war times.

PUBLIC WORKS STATEMENT, 1920.

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TABLES.

APPENDICES.

TABLE No. 1.

SUMMARY SHOWING THE TOTAL EXPENDITURE ON PUBLIC WORKS AND OTHER SERVICES OUT OF PUBLIC WORKS FUND TO 31ST MARCH, 1920, AND THE LIABILITIES ON THAT DATE.

Number of Table containing Details.	Works	Total Net Expenditure to 31st March, 1919.	Expenditure during Twelve Months ended 31st March, 1920.	Recoveries on Account of Services of Previous Years.	Total Net Expenditure to 31st March, 1920.	Liabilities on 31st March, 1920.	Total Net Expenditure and Liabilities.	Works.
		£	£	£	£	£	£	
3	Railways*	35,594,662	748,649	105,196	36,238,115	240,240	36,478,355	Railways.
..	Roads	11,621,216	388,562	603	12,009,175	304,313	12,313,488	Roads.
..	Development of mining	839,014	1,173	7,008	833,179	..	833,179	Development of mining.
..	Telegraphs	3,823,599	249,379	..	4,072,978	266,273	4,339,251	Telegraphs.
..	Public buildings	7,330,748	469,195	..	7,799,943	64,969	7,864,912	Public buildings.
..	Lighthouses, harbour-works, and harbour-defences	1,148,443	3,498	..	1,151,941	..	1,151,941	Lighthouses, harbour-works, and harbour-defences.
..	Departmental	1,431,254	121,677‡	..	1,552,931	869	1,553,800	Departmental.
..	Electric-power supply and development	9,254	..	..	9,254	..	9,254	Electric-power supply and development.
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	2,330,110	*Cr.* 62,561	..	2,267,549	..	2,267,549	Immigration.
..	Purchase of Native lands	2,061,906	..	57	2,061,849	..	2,061,849	Purchase of Native lands.
..	Defence	1,051,578	10,187	..	1,061,765	..	1,061,765	Defence.
..	Charges and expenses of raising loans ..	1,253,073	..	..	1,253,073	..	1,253,073	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	14,600	..	..	14,600	..	14,600	Thermal springs.
..	Tourist and health resorts	261,060	6,194	..	267,254	187	267,441	Tourist and health resorts.
..	Lands improvement	135,340	2,964	..	138,304	..	138,304	Lands improvement.
..	Payment to Midland Railway bondholders	150,000	..	..	150,000	..	150,000	Payment to Midland Railway bondholders.
..	Irrigation and water-supply† ..	160,720	34,115	..	194,835	4,322	199,157	Irrigation and water-supply.
..	Plant, material, and stores	111,614	47,682	..	159,296	72,898	232,194	Plant, material, and stores.
	Totals	69,676,198	2,020,714	112,864	71,584,048	954,071	72,538,119	Totals.

* Exclusive of expenditure on Hutt Railway and Road Improvement and Railways Improvement Accounts Account 1911–12 to 1915–16 and part 1917–18, now included in Public Works Fund.

† Includes £115,000 previously expended under Irrigation and Water-supply

‡ Includes £242 expended out of Public Works Fund "Unauthorized."

TABLE No. 2.

GENERAL SUMMARY.

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1897–98 to 1919–20.

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.
Expenditure from 1892–93 to 1896–97, inclusive, includes expenditure under Native Lands Purchase Account; and from 1894–95 to 1896–97, inclusive, expenditure under Lands Improvement Account

Description of Services.	Total Net Expenditure to 31st March, 1898.	Expenditure.										
		1898–99.	1899–1900.	1900–1.	1901–2.	1902–3.	1903–4.	1904–5.	1905–6.	1906–7.	1907–8.	1908–9.
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	2,147,015	105	385	214	139	142	*Cr.* 7	6,481	8,753	14,353	9,132	15,075
Public Works, Departmental	423,722	10,090	12,572	12,932	17,771	13,949	16,088	12,814	13,517	16,710	18,219	24,512
Development of Water-power	..	..	..	..	..	..	..	468	2,901	4,664	315	..
Irrigation and Water-supply	..	..	..	..	..	..	..	..	..	..	..	..
Railways	15,658,174	374,192	417,937	717,723	1,333,940	759,752	828,704	779,891	1,021,265	1,227,880	1,093,535	1,116,184
Payment to Midland Railway Bondholders	..	..	..	..	..	..	150,000	..	..	..	..	..
Roads :—												
Miscellaneous Roads and Bridges	4,006,170	248,934	237,351	267,374	354,687	230,349	316,248	202,850	306,065	308,500	285,248	422,174
		Cr. 365	*Cr.* 347									
Roads on Goldfields	344,873	46,550	48,039	48,417	47,573	51,690	45,594	26,112	45,139	38,970	38,494	47,375
Development of Thermal Springs and Natural Scenery ..	16,023	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account*	300,930	..	..	..	..	..	..	..	..	..	..	..
Total, Roads	4,667,996	295,119	285,043	315,791	402,260	282,039	361,842	228,962	351,204	347,470	323,742	469,549
Development of Mining	631,276	17,355	21,815	15,907	15,326	24,213	16,278	6,258	18,533	11,064	8,633	32,859
Purchase of Native Lands	1,359,320	53,182	32,025	28,688	18,261	15,782	5,352	6,281	13,777	9,135	2,190	2,099
		Cr. 225										
Native Lands Purchase Account	491,980	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	1,851,300	52,957	32,025	28,688	18,261	15,782	5,352	6,281	13,777	9,135	2,190	2,099
Telegraph Extension	800,735	28,551	26,771	50,101	31,729	68,578	47,228	79,298	77,186	114,068	155,491	163,032

* 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, 1897-98 to 1919-20—*continued.*

Description of Services.	Total Net Expenditure to 31st March, 1898.	Expenditure. 1898-99.	1899-1900.	1900-1.	1901-2.	1902-3.	1903-4.	1904-5.	1905-6.	1906-7.	1907-8.	1908-9.
Public Buildings:—	£	£	£	£	£	£	£	£	£	£	£	£
General (including Miscellaneous)	225,608	8,764	3,957	5,594	12,513	9,031	10,964	9,021	2,231	14,216	16,260	39,635
Parliamentary	21,468	20,636	9,883	3,039	4,424	1,503	602	697	71	1,047	4,119	5,172
Judicial	349,706	11,109	19,682	29,630	28,728	33,224	25,978	13,083	15,899	35,192	28,938	37,211
Post and Telegraph	177,720	5,168	13,483	20,954	40,361	74,686	53,918	16,008	38,419	43,918	43,724	62,262
Customs	6,920	..	107	875	2,066	6,630	8,719	13,018	7,903	414	47	2,507
Quarantine Stations	3,834	..	..	2,607	424	..	..	..	..	..	..	..
Mental Hospitals	404,601	17,667	17,712	18,872	16,743	10,167	15,812	15,949	16,235	8,049	7,987	15,296
Public Health	..	..	..	..	..	..	6,315	4,265	7,926	1,765	7,497	4,402
Hospitals and Charitable Institutions	48,444	..	899	5,141	1,200	3,540	4,291	1,204	4,786	10,259	15,576	11,153
School Buildings	923,021	43,403	49,256	33,681	38,606	57,790	87,089	42,721	69,223	109,459	100,197	102,340
Agricultural	4,271	520	447	971	535	883	2,504	1,362	2,618	2,707	1,690	5,543
Workers' Dwellings	..	..	..	..	..	..	..	..	..	..	..	..
Total, Public Buildings	2,165,593	107,267	115,426	121,364	145,600	197,454	216,192	117,328	165,311	227,026	226,035	285,521
Lighthouses, Harbour-works, and Harbour-defences:—												
Lighthouses	137,301	3,727	3,333	1,017	2,060	6,082	6,206	2,167	962	..	1,417	7,481
Harbour-works	316,052	1,777	365	1,540	3,421	1,373	1,773	1,308	2,684	2,963	2,867	4,439
Harbour-defences	481,055	10,158	5,328	3,960	6,678	6,126	2,885	2,515	1,300	1,541	2,579	7,297
Total, Lighthouses, &c.	934,408	15,662	9,026	6,517	12,159	13,581	10,864	5,990	4,946	4,504	6,863	19,217
Rates on Native Lands	62,462	347	744	673	571	471	666	631	548	695	837	27
Contingent Defence	455,633	13,867	42,810	37,650	146,875	37,005	38,723	46,588	35,569	14,874	18,574	10,766
Tourist and Health Resorts	..	..	..	..	11,260	10,949	15,643	17,508	15,888	42,271	45,048	24,286
Lands Improvement*	..	..	..	..	1,741	2,349	2,019	2,248	1,052	5,605	9,561	19,542
Charges and Expenses of raising Loans	1,027,765	224	28,322	1,460	5,620 *Cr. 516*	88,180	87,249	10,764	236	*Cr. 5,175*	*Cr. 8,487*	575
Interest and Sinking Funds	218,500	..	..	..	..	..	..	..	..	..	..	..
Coal-exploration and Mine-development	10,835	..	..	..	..	..	..	..	..	..	..	..
Thermal Springs	14,600	..	..	..	..	..	..	..	..	..	..	..
Total Ways and Means Credits	..	*590*	*347*	..	*516*	..	*7*	..	..	*5,175*	*8,487*	..
Grand Total—Net Expenditure	31,070,014	915,736	992,876	1,309,020	2,142,736	1,514,444	1,796,841	1,321,510	1,730,686	2,035,144	1,909,688	2,183,245

* 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, 1897–98 to 1919–20—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1920.
	1909–10.	1910–11.	1911–12.	1912–13.	1913–14.	1914–15.	1915–16.	1916–17.	1917–18.	1918–19.	1919–20.	
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	17,003	9,441	11,681	14,694	33,914	33,219	10,010 *Cr. 10*	6,533	3,856	*Cr. 12,018*	*Cr. 62,561*	2,267,549
Public Works, Departmental	41,176	42,733	49,864	57,426	66,650	100,719	111,489	131,701	127,962 *Cr. 2,662*	115,419 *Cr. 4,119*	‡121,677	1,552,931
Development of Water-power	..	1,021	9,082	..	..	..	..	..	*Cr. 18,451*	9,254	..	9,254
Irrigation and Water-supply*	..	1,562	2,794	14,689	33,602	32,090	29,874	20,794	11,650	13,665	34,115	194,835
Railways	1,128,400	1,104,071 *Cr. 652*	1,125,905 *Cr. 6,987*	1,148,832 *Cr. 29,528*	1,104,897 *Cr. 5,485*	2,146,753† *Cr. 6,022*	1,065,171 *Cr. 4,633*	620,947 *Cr. 4,845*	495,771 *Cr. 110*	387,923 *Cr. 4,924*	748,049 *Cr. 105,196*	36,238,115
Payment to Midland Railway Bondholders	..	..	..	..	..	..	..	..	..	..	..	150,000
Roads :—												
Miscellaneous Roads and Bridges	297,932	229,537	383,511	337,584	353,836 *Cr. 515*	484,365	400,062	203,746	128,730 *Cr. 600*	221,887 *Cr. 997*	376,097 *Cr. 603*	..
Roads on Goldfields	40,830	25,626	41,067	36,761	24,143	30,065	24,432	17,099	6,912	4,186	12,465	..
Development of Thermal Springs and Natural Scenery	..	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account	..	..	..	..	..	..	..	..	..	..	..	..
Total, Roads	338,762	255,163	424,578	374,345	377,464	514,430	424,494	220,845	135,042	225,076	387,959	12,009,175
Development of Mining	18,597 *Cr. 1,000*	10,845 *Cr. 1,000*	21,244 *Cr. 30*	10,644 *Cr. 1,015*	4,889	2,384 *Cr. 255*	6,602	4,592	27 *Cr. 6,545*	518 *Cr. 1,000*	1,173 *Cr. 7,008*	883,179
Purchase of Native Lands	30,567	2,976 *Cr. 2,286*	*Cr. 2,466*	*Cr. 917*	*Cr. 857*	*Cr. 1,060*	*Cr. 972*	*Cr. 868*	*Cr. 57*	..	*Cr. 57*	..
Native Lands Purchase Account	..	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	30,567	690	*Cr. 2,466*	*Cr. 917*	*Cr. 857*	*Cr. 1,060*	*Cr. 972*	*Cr. 868*	*Cr. 57*	..	*Cr. 57*	2,061,849
Telegraph Extension	123,423	111,867	147,692	251,375	392,648	288,395	249,554	203,311	213,955	198,611	249,379	4,072,978

* Previously included under Lands Improvement. † Includes £1,000,000 expended 1908–9 and 1909–10 under Wellington–Manawatu Railway Purchase Account. ‡ Includes £242 charged to Unauthorized.

[*Continued on page 6.*

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1897–98 to 1919–20—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1920.
	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.	1918-19.	1919-20.	
Public Buildings :—	£	£	£	£	£	£	£	£	£	£	£	£
General (including Miscellaneous)	41,964	44,044	34,721	44,719	43,199	52,239	22,050	12,648	11,646 *Cr. 15,067*	43,168	64,207	..
Parliamentary	3,157	237	2,004	18,806	23,612	31,478	17,133	22,586	37,233	..	..	..
Judicial—Courthouses							4,902	299	21	..	868	..
Judicial—Prisons	31,606	22,295	44,133	45,431	28,445	38,808	17,786	15,685	13,195	16,299	20,981	..
Judicial—Police-stations							25,484	21,147	18,814	6,157	24,944	..
Post and Telegraph	68,574	117,815	130,815	122,999	78,815	60,838	35,258	22,744	33,525	26,072	66,543	..
Customs	233	..	..	..	..	..	..	..	..	..	..	..
Quarantine Stations	..	..	..	..	..	..	..	..	..	..	..	..
Mental Hospitals	19,839	12,707	8,809	46,181	26,001	53,996	54,898 *Cr. 15*	44,602	26,502	14,640	18,277	..
Public Health	319	..	..	376	..	..	..	..	..	..	..	..
Hospitals and Charitable Institutions	7,259	1,484	12,745	8,750	1,435	998	1,426	7,570	4,080	2,332	43 974	..
School Buildings	98,103	124,926	90,535	105,000	121,954	122,940	97,972	70,367	63,082	115,656	195,50	..
Agricultural	6,103	1,160	3,684	6,475	4,398	2,428 *Cr. 34*	2,972	3,046	5,685	4,229	7,227	..
Workers' Dwellings	..	..	22,644	46,455	41,741	68,275	55,893	35,437	15,505	7,295	26,674	..
Total, Public Buildings	277,157	324,668	350,090	445,192	369,600	431,966	335,759	256,131	214,221	235,846	469,195	7,799,943
Lighthouses, Harbour-works, and Harbour-defences :—												
Lighthouses	6,762	1,470	5,428	9,031	5,174	3,887	1,415	449	561	1,663	253	..
Harbour-works	4,548	4,092	6,004	7,415	3,346 *Cr. 1,462*	12,563	9,355	2,280	2,359	3,729	3,245	..
Harbour-defences	5,372	2,865	1,144	339	539 *Cr. 300*	681	2,903	1,038	56	..	..	..
Total, Lighthouses, &c.	16,682	8,427	12,576	16,785	7,297	17,131	13,673	3,767	2,976	5,392	3,498	1,151,941
Rates on Native Lands	..	..	..	..	..	..	..	..	..	..	..	68.672
Contingent Defence	4,977	6,071	10,437	23,790	30,186	15,221	37,619	9,742	6,714	8,809 *Cr. 922*	10,187	1,061,765
Tourist and Health Resorts	14,507	5,912	13,361	12,906	14,989	8,232 *Cr. 12*	5,167 *Cr. 500*	1,094	931	1,620	6,194	267,254
Lands Improvement*	6,910	11,125	20,394	22,550 *Cr. 383*	16,996 *Cr. 432*	13,810 *Cr. 522*	5,936	*Cr. 2,731*	1,838	*Cr. 4,268*	2,964	138,304
Charges and Expenses of raising Loans	17,715 *Cr. 12,000*	66,367 *Cr. 66,392*	67,470 *Cr. 66,954*	72,950 *Cr. 71,681*	105,449 *Cr. 96,741*	35,495 *Cr. 34,865*	5,037 *Cr. 5,030*	35	1	..	..	1,253,073
Interest and Sinking Funds	..	..	..	..	..	..	..	..	..	..	..	218,500
Coal-exploration and Mine-development	..	..	..	..	..	..	..	..	..	..	..	10,835
Thermal Springs	..	..	..	..	..	..	..	..	..	..	..	14.600
Plant, Material, and Stores	..	..	..	..	..	..	74,418	9,778	6,811	20,638 *Cr. 31*	47,682	159,296
Total Ways and Means Credits	..	..	*10,530*	*103,524*	*105,792*	*43,400*	*11,160*	*5,713*	*43,492*	*11,993*	*112,864*	..
Grand Total—Net Expenditure	2,022,876	1,891,918	2,190,731	2,362,654	2,455,066	2,597,109	2,363,658	1,502,588	1,237,422	1,207,482	2,020,714	71,584,048

* Includes expenditure on Irrigation and Water-supply—1905–6, £22; 1906–7, £750; 1907–8, £1,554; 1908–9, £1,966.

TABLE No. 3.

Expenditure on Railways to 31st March, 1920.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1919.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1919-20.					Expenditure under Special Acts during Year 1919-20.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1920.	Valuation of Works constructed by Provinces and Midland Railway Company.
			New Works.			Work on Open Lines.	Land Claims and other Old Liabilities.				
			Construction and Surveys.	Permanent-way.	Total New Works.						
	£	£	£	£	£	£	£	£	£	£	
Kaihu Valley	104,984	..	15,893	926	16,819	..	..	..	..	121,803	..
Opua Wharf to Whangarei and Onerahi	522,735	..	..	..	..	901	..	..	..	523,636	..
Otiria to Ngapuhi	176,601	50,830†	..	..	..	..	..	..	..	125,771	..
Whangarei (Kioreroa) to Waiotira	242,150	..	31,735	7,952	39,687	..	..	..	..	281,837	..
Waipu Branch	407	..	9,371	..	9,371	..	..	..	..	9,778	..
Helensville Northwards—											
Ngapuhi Northwards	56,880	*Dr.*50,830†	33,351	5,271	38,622	..	..	..	..	146,332	..
Helensville Northwards	945,588	62,635‡	117,818	248	118,066	..	..	..	..	1,001,019	..
Helensville to Te Awamutu	2,285,532	*Dr.*62,635‡ 119§	..	..	..	11,224	..	52,663	..	2,411,935	..
Waiuku Branch (Paerata to Waiuku)	93,463	..	22,601	525	23,126	..	..	..	..	116,589	..
Huntly to Awaroa	107,302	*Dr.* 119§	1,545	..	1,545	4	..	..	..	108,970	..
Waikokowai Branch	..	..	52	..	52	..	..	..	..	52	..
Waipa Gravel Access Branch	..	..	90	..	90	..	..	..	..	90	..
Frankton to Thames	363,147	..	..	..	..	..	..	1,513	..	364,660	..
Cambridge Branch (Ruakura Junction to Cambridge)	51,500	..	..	..	..	343	..	..	..	51,843	..
Morrinsville to Rotorua	369,447	..	..	..	..	3,609	1	..	..	373,057	..
Marton to Te Awamutu	2,740,378	..	..	..	..	11,312	..	2,721	..	2,754,411	..
Ractihi Branch	84,081	..	6	..	6	64	..	..	..	84,151	..
Paeroa to Waihi and Tauranga	197,598	..	20,504	..	20,504	..	..	..	..	218,102	..
Tauranga to Taneatua, including Te Maunga to Maunganui Branch	398,376	..	68,523	11,824	80,347	..	..	..	..	478,723	..
Gisborne to Motu	623,100	..	48	..	48	182	..	..	..	623,330	..
Gisborne to Ormond Tramway	4,975	..	..	..	..	..	..	..	..	4,975	..
Napier to Gisborne—											
Gisborne Southwards	191,753	..	11,671	398	12,069	..	..	..	..	203,822	..
Wairoa Northwards	1,757	..	5,597	..	5,597	..	..	..	..	7,354	..
Napier Northwards	47,612	1	25,598	..	25,598	..	..	..	..	73,209	..
Waikokopu Branch	..	..	1,775	..	1,775	..	..	..	..	1,775	..
Wellington to Napier—											
Napier to Woodville and Palmerston North	927,747	..	..	..	..	846	..	3,815	..	932,408	..
Wellington to Woodville, including Te Aro Extension	1,636,142	..	..	..	..	6,591	..	4,706	..	1,647,439	..
Featherston to Martinborough	399	..	..	..	..	..	..	..	..	399	..
Wellington to Waitara—											
Wellington to Longburn	1,018,675	..	..	..	..	1,497	..	442	..	1,020,614	..
Foxton to Waitara and Moturoa	1,563,582	5,000	..	..	..	5,101	..	8,037	..	1,571,720	..
Mount Egmont Branch	72,080	..	..	..	..	..	..	..	..	72,080	..
Moturoa to Opunake	..	..	754	..	754	..	..	..	..	754	..
Opunake Branch (Te Roti to Opunake)	57,253	..	10,481	..	10,481	..	..	..	..	67,734	..
Manaia Branch (Kapuni to Manaia)	5,555	..	..	..	..	..	..	..	..	5,555	..
Rangitikei River Quarry Line	206	..	..	..	..	..	..	..	..	206	..

* Railways Improvement Authorization Act 1914 Account. † Adjustment of expenditure between lines on account of construction beyond Kaikohe. ‡ Adjustment of expenditure between lines (work on open line wrongly charged last year). § Old survey expenditure on Huntly Branch previously included in item for main line.

TABLE No. 3—*continued.*

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1920—*continued.*

Lines of Railway.	Total Expenditure by General Government to 31st March, 1919.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1919-20.					Expenditure under Special Acts during Year 1919-20.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1920.	Valuation of Works constructed by Provinces and Midland Railway Company.
			New Works.			Work on Open Lines.	Land Claims and other Old Liabilities.				
			Construction and Surveys.	Permanent-way.	Total New Works.						
	£	£	£	£	£	£	£	£	£	£	£
Stratford to Okahukura (East End) ..	213,657	..	37,705	..	37,705	..	..	..	..	251,362	..
Stratford to Okahukura (West End) ..	710,863	..	13,719	694	14,413	8	..	..	..	725,284	..
Nelson to Greymouth—											
Nelson to Inangahua	461,561†	100,171	26	..	26	..	..	6	..	361,422	78,307
Stillwater to Inangahua	203,976	..	..	..	..	117	..	..	..	204,093	279,685
Ngahere to Blackball	147,532	..	..	..	..	..	..	..	..	147,532	..
Westport to Ngakawau	188,009	..	..	..	..	..	..	..	..	188,009	..
Westport to Inangahua	152,818	..	2	..	2	..	..	..	..	152,820	..
Greymouth to Rewanui	255,026	..	..	..	..	50	..	..	..	255,076	..
Point Elizabeth Branch	..	..	197	..	197	..	..	..	..	197	..
Greymouth to Ross and Mikonui	338,911	..	..	..	..	137	..	..	..	339,048	..
Picton to Waipara—											
Picton Southwards	654,656	..	133	..	133	183	..	..	..	654,372	..
Waipara Northwards	373,877	..	..	..	..	..	..	..	..	373,877	..
Christchurch to Greymouth—											
Rolleston to Bealey	815,718‡	..	4	..	4	..	..	..	..	815,722	61,579
Whitecliffs Branch	25,021	..	..	..	..	..	..	..	..	25,021	..
Greymouth to Bealey	1,006,611§	..	63,571	..	63,571	972	..	..	..	1,071,154	263,889
Hurunui to Waitaki—											
Main Line (Waiau to Waitaki)	1,948,077	..	6,811	9,250	16,061	11,491	..	738	..	1,976,367	316,135
Oxford Branch (Rangiora to Oxford West)	52,782	..	..	..	..	..	..	..	..	52,782	..
Eyreton Branch (Kaiapoi to Bennett's) ..	44,277	..	..	..	..	..	..	..	..	44,277	..
Lyttelton Branch	80,908	..	..	..	..	..	..	..	..	80,908	340,500
Southbridge Branch (Hornby to Southbridge)	91,377	..	..	..	..	..	..	..	..	91,377	..
Little River Branch (Lincoln to Little River)	108,524	..	..	..	..	..	..	..	..	108,524	..
Rakaia to Methven	74,640	..	..	..	..	..	..	..	..	74,640	..
Ashburton to Springburn	61,639	..	..	..	..	..	..	..	..	61,639	..
Fairlie Branch (Washdyke Junction to Fairlie)	66,801	..	..	..	..	..	..	..	..	66,801	75,124
Waimate Branch	71,285	..	1,835	..	1,835	..	..	..	..	73,120	..
Canterbury Interior Main Line—											
Oxford to Malvern	54,005	..	..	..	..	235	..	..	..	54,240	..
Whitecliffs to Rakaia	542	..	..	..	..	..	..	..	..	542	..
Temuka to Rangitata	5,152	..	..	..	..	..	..	..	..	5,152	..
Waitaki to Bluff—											
Main Line, including Port Chalmers Branch	3,307,008	..	..	..	..	3,412	..	4,177	..	3,314,597	82,259
Duntroon Branch (Pukeuri to Kurow) ..	97,099	..	..	..	..	..	..	..	..	97,099	37,500
Ngapara Branch (Waiareka Junction to Ngapara)	26,090	..	..	..		..	..	..	..	26,090	58,009

* Railways Improvement Authorization Act 1914 Account.

† Includes the items previously shown as Nelson to Belgrove, £199,982, and Belgrove to Inangahua, £261,579.

‡ Includes the item previously shown as Springfield to Bealey, £744,879, and £70,839 of the item previously shown as Springfield and Whitecliffs branches. The remaining £25,021 of this latter item is now shown separately as Whitecliffs Branch.

§ Includes the items previously shown as Greymouth to Brunnerton, £150,651, Brunnerton to Bealey, £855,960 and £70,839.

‖ The section Culverden to Waiau, £56,226, previously shown separately, is now included.

TABLE No. 3—*continued.*

Expenditure on Railways to 31st March, 1920—*continued.*

Lines of Railway.	Total Expenditure by General Government to 31st March, 1919.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1919-20.					Expenditure under Special Acts during Year 1919-20.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1920	Valuation of Works constructed by Provinces and Midland Railway Company.
			New Works.			Works on Open Lines.	Land Claims and other Old Liabilities.				
			Construction and Surveys.	Permanent-way.	Total New Works.						
Waitaki to Bluff—*continued.*	£	£	£	£	£	£	£	£	£	£	£
Livingstone Branch (Windsor to Tokarahi)	82,785	..	..	..	..	..	..	..	..	82,785	..
Waihemo Branch (Palmerston to Dunback)	33,191	..	..	..	..	..	..	..	..	33,191	..
Fernhill Railway	1,415	..	..	..	..	..	..	..	..	1,415	..
Brighton Road Branch	6,474	..	..	..	..	..	..	..	..	6,474	12,829
Outram Branch (Mosgiel to Outram) ..	11,951	..	..	..	..	..	..	..	..	11,951	29,691
Lawrence Branch	305,334	..	..	..	..	..	..	..	..	305,334	..
Balclutha to Tuapeka Mouth	1,943	..	..	..	..	..	..	..	..	1,943	..
Catlin's River Branch (Balclutha to Tahakopa)	462,691	..	..	..	..	..	..	..	..	462,691	..
Heriotburn Branch (Waipahi to Edievale) ..	123,788	..	..	..	..	..	..	..	..	123,788	..
Waikaka Branch (McNab to Waikaka) ..	67,821	*Dr.* 602†	..	..	..	..	..	..	..	68,423	..
Gore to Lumsden	111,966	..	..	..	..	..	..	..	..	111,966	..
Edendale to Glenham	53,328	..	..	..	..	..	..	..	..	53,328	..
Riversdale to Switzers	82,304	..	..	..	..	..	..	..	..	82,304	..
Kelso to Gore	602	602†	..	..	..	..	..	..	..	..	..
Seaward Bush to Catlin's (Appleby to Tokanui)	184,881	..	..	..	..	..	..	..	..	184,881	..
Otago Central (Wingatui to Cromwell) ..	1,384,731	..	18,931	405	19,336	..	..	..	..	1,404,067	..
Invercargill to Kingston—											
Main Line	359,008	..	..	..	..	..	..	..	..	359,008	91,937
Mararoa Branch (Lumsden to Mossburn) ..	27,217	..	..	..	..	..	..	..	..	27,217	..
Winton to Heddon Bush	231	..	..	..	..	..	..	..	..	231	..
Makarewa to Orepuki and Waiau	250,454	..	1,445	..	1,445	..	..	..	..	251,899	37,097
Thornbury to Wairio	85,885	..	..	..	..	..	..	..	..	85,885	23,200
Forest Hill (Winton to Hedgehope)	22,984	..	..	..	..	..	..	..	..	22,984	..
Expenses of Railway Commissions and other Expenditure not chargeable to Individual Lines	10,337	..	..	..	..	..	..	..	..	10,337	..
Surveys of New Lines—											
North Island	35,900	..	..	..	..	..	..	..	..	35,900	
Middle Island	5,752	..	..	..	..	..	..	..	..	5,752	
Rolling-stock	6,732,065	..	..	..	..	102,044	..	14,176	..	6,848,285	
Stock of Permanent-way Materials, 31st March, 1919 .. .. £46,872	46,872	23	..	..	..	..	..	..	..	..	..
	37,020,757										
Stock of Permanent-way increased by £29,039	29,039	..	..	..	..	..	..	..	..	..	..
Stock of Permanent-way Materials, 31st March, 1920 .. .. £75,888	..	..	..	..	..	..	..	..	..	75,888	..
Total	37,049,796	105,195	521,792	37,493	559,285	160,323	1	92,994	..	37,757,204	1,787,741‡

* Railways Improvement Authorization Act 1914 Account. † Old survey expenditure now transferred to Waikato Branch. ‡ 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.	Waihou and Ohinemuri Rivers Improvement Account. Waihou 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	..	9,632
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
	697,408	206,626	165,679	53,401	157,043	126,825

* 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.

DEVELOPMENT OF WATER-POWER.

STATEMENT OF ACCOUNTS AT 31st MARCH, 1920.

GENERAL BALANCE-SHEET AT 31st MARCH, 1920, COMPARED WITH POSITION AT 31st MARCH, 1919.

1918–19.	*Liabilities.*	1919–20.		1918–19.	*Assets.*	1919–20.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
	Consolidated Fund—				Lake Coleridge—		
	Interest on Lake Coleridge expenditure to			431,424 19 1	Assets as per separate balance-sheet ..	445,025 17 5	
31,145 7 8	31st March, 1920	..	27,147 0 7	37,706 14 1	Profit and Loss Appropriation Account ..	34,120 14 7	
				469,131 13 2			479,146 12 0
	Public Works Fund—				Horahora—		
9,253 13 0	Electric supply	..	9,253 13 0		Assets as per separate balance-sheet ..	220,974 1 7	
					Profit and Loss Appropriation Account ..	2,122 8 0	
	Aid to Water-power Works and Electric-supply Accounts—			1,211 7 0			223,096 9 7
449,000 0 0	Debentures issued	..	449,000 0 0	34 5 10	Arapuni	..	5,984 15 10
				1,434 8 7	Mangahao River	..	22,748 10 9
	Lake Coleridge—						
27,393 9 7	Depreciation Fund Account ..	35,389 4 2			Other Schemes: Surveys and Investigation,—		
3,832 4 10	Sundry creditors	3,825 12 6			North Island—		
			39,214 16 8	374 5 4	Aratiatia	376 13 11	
31,225 14 5				393 9 6	Huka Falls	403 9 6	
	Horahora—			2,830 5 11	Hutt River (including purchase of dam-site)	2,802 19 3	
	Purchase-price of plant taken over on			38 9 0	Makuri River	38 9 0	
	1st November, 1919	212,500 0 0		1,108 4 7	Rotoiti-Kaituna	1,108 4 7	
	Interest accrued to 31st March, 1920 ..	4,427 1 8		879 16 8	Tauherenikau	879 16 8	
	Payments by Waihi Gold-mining Company (Limited) on behalf of Department	1,890 13 4		712 13 11	Waikaremoana	723 1 7	
				236 6 8	Wairua	236 6 8	
			218,817 15 0		South Island—		6,569 1 2
	Depreciation Fund Account ..	1,628 8 0		803 1 9	Clarence River	803 1 9	
	Sundry creditors	97 9 10		5 0 0	Kanieri Lake	5 0 0	
				..	Timaru to Oamaru line	92 18 0	
			1,725 17 10	519 12 7	Opihi River	519 12 7	
				17 7 0	Toaroha	17 7 0	
				76 16 6	Teviot	255 17 9	
				11 19 0	Upper Taieri	11 19 0	
				..	Hawea	286 7 11	
							1,992 4 0
				4,117 5 10	General expenditure not chargeable to any individual scheme	..	4,117 5 10
				14,804 15 8	Balance in the Electric Supply Account at 31st March, 1920—		
				36,658 12 9	Cash in Public Account	929 9 2	
				29 13 6	Imprests and advances outstanding ..	574 14 9	
				36,688 6 3			1,504 3 11
£520,624 15 1			£745,159 3 1	£520,624 15 1			£745,159 3 1

The balance-sheet has been duly audited with the various supporting books, vouchers, and documents, and found to correspond therewith.

ROBERT J. COLLINS,
Controller and Auditor-General.

P. S. WALDIE,
Accountant, Public Works Department.

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY.

Profit and Loss Account for Year ended 31st March, 1920, compared with Year ended 31st March, 1919.

Gross Revenue Account.

1918–19.		1919–20.			1918–19.		1919–20.		
£ s. d.	To Generating expenses, headworks, and power-house—	£ s. d.	£ s. d.		£ s. d.	By Sale of energy—	£ s. d.	£ s. d.	
2,103 16 2	Salaries	2,857 19 10			34,531 5 2	Wholesale	42,424 4 5		
1,512 10 10	Wages	835 17 9			1,515 12 1	Retail	1,952 7 10		
161 5 11	Supplies	108 10 1			36,046 17 3			44,376 12 3	
372 0 4	Transport of stores, &c.	631 2 2							
	Maintenance and repairs—				4 14 6	Discounts forfeited	..	11 6 9	
91 9 11	Headworks	50 5 3							
5 4 1	Pipe-lines	16 13 5			8 2 0	Meter-rents	..	..	
82 5 5	Power-house building	131 8 1							
214 0 8	Power-house machinery	310 3 5				Rents—			
136 15 10	Roads and fences	168 18 10			589 6 3	Lands and buildings	620 19 5		
80 4 2	Staff residences, &c.	192 6 2			126 18 6	Electric lines	152 15 0		
			5,303 5 0		21 0 0	„ plant	20 14 9		
4,759 13 4								794 9 2	
					737 4 9				
	Transmission-line—								
464 6 10	Salaries	477 10 0			6 0 0	Fees for retesting installations	..		
118 7 7	Wages	79 8 11				„ testing and repairing electrical ap-			
	Transport, including upkeep of horses,				116 10 10	pliances	183 13 0		
920 9 7	traps, cars, and cycles	625 9 8						183 13 0	
1,491 9 5	Repairs to power-lines	793 1 3			122 10 10				
	Repairs and alterations to telephone-								
51 14 4	system	..				Stand-by provision: Fees from wholesale			
			1,975 9 10		160 0 0	consumers	..	160 0 0	
3,046 7 9									
						Supervision charges on works not connected			
	Substation, Addington—				23 0 0	with Lake Coleridge, carried out by staff	..	30 0 0	
1,307 19 10	Salaries	1,159 0 2			34 1 9	Royalty on shingle sold	..	29 17 6	
487 14 0	Wages	688 19 3			187 7 9	Interest from local bodies in respect of			
68 15 5	Supplies	171 3 10				reticulations sold on deferred payment ..	..	104 15 7	
	Maintenance and repairs—				..	Earnings motor-vehicles	..	140 17 10	
211 0 10	Buildings and yards	269 3 8							
97 15 6	Machinery	124 6 5							
			2,412 13 4						
2,173 5 7									
	Distribution—								
186 7 11	Salaries	209 10 3							
1 13 4	Wages	4 11 7							
..	Supplies	..							
	Transport, including upkeep of motor								
225 15 7	lorry and car	138 14 6							
	Maintenance of feeder cables, trans-								
1,234 4 0	former stations, and tools ..	1,559 14 7							
472 8 2	Maintenance of secondary distribution	662 16 4							
146 5 7	Maintenance of and testing meters ..	313 16 8							
			2,889 3 11						
2,266 14 7									

			Stand-by provision—									
1,350	0	0	Payment to Christchurch Tramway Board	1,350	0	0						
317	14	10	Payment to Christchurch Tramway Board, for energy supplied ..	438	10	11						
1,667	14	10					1,788	10	11			
			Management and general expenses—									
1,675	0	5	Salaries	1,762	6	6						
371	4	7	Sick and holiday pay to workmen ..	280	3	6						
112	5	1	Travelling-expenses	73	7	4						
200	0	0	Office-rent	200	0	0						
31	10	0	Rent of other buildings	45	15	0						
107	13	4	Postages and telegrams	97	11	9						
87	10	0	Telephone subscriptions	86	17	1						
184	11	5	Printing and stationery	161	5	4						
29	5	0	Advertising	44	12	0						
9	7	0	Accident insurance	9	6	8						
21	9	2	Fire insurance	27	1	6						
12	5	6	Legal expenses	2	8	0						
..			Audit fees	89	6	8						
171	5	9	Meter-reading and line inspection ..	260	18	6						
59	7	8	Commission on collection of accounts ..	77	15	6						
144	16	6	Electrical testing	161	8	8						
1	2	2	Bad debts	2	3	4						
5	4	1	Miscellaneous trade expenses ..	7	8	10						
3,223	17	8					3,389	16	2			
							17,758	19	2			
17,137	13	9										
20,186	5	1	Balance to Net Revenue Account ..	..			28,072	12	11			
£37,323	18	10					£45,831	12	1	£37,323	18	10

£37,323	18	10					£45,831	12	1	£37,323	18	10

Net Revenue Account.

£	s.	d.		£	s.	d.	£	s.	d.		£	s.	d.
7,329	9	2	To Depreciation at 2 per cent. per annum on completed work ..	7,623	11	2	20,186	5	1	By Balance from Gross Revenue Account ..	28,072	12	11
15,692	6	10	Interest for year ended 31st March, 1920	16,863	2	3	2,835	10	11	Balance to Profit and Loss Appropriation Account ..	..		
..			Balance to Profit and Loss Appropriation Account ..	3,585	19	6							
£23,021	16	0		£28,072	12	11	£23,021	16	0		£28,072	12	11

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

Profit and Loss Appropriation Account.

1918–19.	——	1919–20.	1918–19.	——	1919–20.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
34,871 3 2	To Balance from previous year's statement	37,706 14 1	37,706 14 1	By Balance from Net Revenue Account	3,585 19 6
2,835 10 11	Balance from Net Revenue Account	..	..	Balance to balance-sheet	34,120 14 7
£37,706 14 1		£37,706 14 1	£37,706 14 1		£37,706 14 1

Depreciation Fund Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
123 17 4	To Renewal of motor vehicles	708 11 0	19,411 8 11	By Balance from previous year's statement	27,393 9 7
..	Renewal of sundry reticulations	15 0 0	776 8 10	Interest at 4 per cent. per annum	1,095 14 5
27,393 9 7	Balance to balance-sheet	35,389 4 2	7,329 9 2	Amount set aside as per Profit and Loss Account	7,623 11 2
£27,517 6 11		£36,112 15 2	£27,517 6 11		£36,112 15 2

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

BALANCE-SHEET AT 31ST MARCH, 1920.

1918–19.	*Liabilities.*	1919–20.		1918–19.	*Assets.*	1919–20.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
27,393 9 7	Depreciation Fund Account	..	35,389 4 2	4,223 6 5	Works at Lake Coleridge— Land, including fencing and planting ..	..	4,229 16 4
				5,317 4 6	Coalgate Gorge Road	..	5,317 4 6
				7,566 3 8	Service roads	..	7,566 3 8
	Sundry creditors—			279 12 8	Service telephones	..	279 12 8
1,612 16 3	On open accounts	2,358 18 4					
1,242 0 5	On contracts	641 3 5			Headworks—		
660 2 4	Wages accrued	509 16 1		73,367 19 11	Tunnel, including inlet and outlet works	73,789 4 4	
317 5 10	Payment for current in advance	315 14 8		22,794 0 9	Pipe-lines	24,125 17 4	
				1,861 16 6	Tram-line	1,974 12 10	
3,832 4 10			3,825 12 6	396 16 4	Weir at lake-outlet, gauges, and fencing	410 17 7	
				..	Harper River Diversion Works ..	46 5 4	
	Balance carried to general balance-sheet—						100,346 17 5
469,131 13 2	Total assets as *per contra*	479,146 12 0		98,420 13 6			
31,225 14 5	Total liabilities as above	39,214 16 8					
			439,931 15 4		Power-house—		
437,905 18 9				22,223 1 4	Buildings, &c.	23,028 0 6	
				50,302 14 4	Machinery, &c.	50,872 16 0	
				333 19 3	Office furniture, fittings, &c... ..	333 19 3	
							74,234 15 9
				72,859 14 11			
					Accommodation for staff and workmen—		
				12,214 12 7	Buildings, fencing, &c.	..	12,771 17 11
					Transmission-line—		
				4,876 14 8	Land	4,904 4 8	
				38,653 11 2	Power-lines	39,043 5 1	
				2,342 0 11	Telephone-system	2,356 15 6	
					Linemen's cottages, depots, tools, and		
				469 9 10	equipment	486 15 7	
				6,540 12 3	Alterations to public telegraph-lines ..	6,587 8 11	
							53,378 9 9
				52,882 8 10			
					Addington Substation—		
				2,812 19 2	Land, including cottages	3,078 14 11	
				3,889 2 3	Substation buildings	3,889 2 3	
				13,488 1 11	Machinery, &c.	15,304 18 11	
				2,311 9 1	Store buildings and workshops	2,458 4 6	
							24,731 0 7
				22,501 12 5			
469,131 13 2	Carried forward	..	479,146 12 0	276,265 9 6	Carried forward	..	282,855 18 7

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

BALANCE-SHEET AT 31ST MARCH, 1920—*continued.*

1918–19.	*Liabilities.*	1919–20.		1918–19.	*Assets*	1919–20.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
469,131 13 2	Brought forward	..	479,146 12 0	276,265 9 6	Brought forward	..	282,855 18 7
					Primary distribution—		
				8,755 12 7	Supply cables—Christchurch City ..	6,882 12 7	
				2,961 3 4	Christchurch Tramways ..	4,846 4 2	
				6,121 11 8	Lyttelton	6,904 8 3	
				13,839 16 5	Northern	14,737 5 10	
				7,026 14 1	Southern	7,683 8 5	
				622 9 9	Lightning-arresters	622 9 9	
				1,143 13 4	Tools and equipment	1,142 5 4	
				1,342 1 11	Alterations to public telegraph-lines ..	1,516 12 8	
				41,813 3 1			44,335 7 0
					Secondary distribution—		
				16,847 17 11	Supply cables and reticulation	19,450 4 11	
				6,886 12 0	Local substations	7,779 2 11	
							27,229 7 10
				11,847 12 11	Service transformers and meters	..	12,593 15 0
				4,105 7 6	Motor cars, lorries, and cycles, &c.	..	5,429 12 6
				71 3 8	Test-room equipment	..	74 16 10
				289 15 11	Loose plant, tools, and equipment	..	799 19 5
				1,654 6 2	Public telephones to the lake	..	1,654 6 2
				173 19 1	Telephones to Christchurch City Council and Tramway Board and local officers ..	..	173 19 1
				105 0 2	Christchurch office—Furniture and fittings ..	..	202 9 9
				17,003 6 7	Engineering, office, and general expenses on preliminary surveys and during construction..	..	17,788 19 3
				11,528 6 8	Salaries of Engineers and others on preliminary surveys and during construction	..	13,641 15 1
				..	Survey and investigation, Timaru line route ..	..	411 17 7
					Interest during construction—		
				14,285 14 2	On completed works	14,291 13 7	
				278 14 0	On uncompleted works	591 17 9	
				85,077 16 9			14,883 11 4
				403,156 9 4			422,075 15 5
				15,407 13 8	Stocks of material, &c., on hand at date ..	..	13,444 19 5
				71 3 11	Telephone subscriptions and fire insurance paid in advance	..	116 14 11
				70 15 9	In suspense—Payments (on Capital Account) made in London..	..	..
					Sundry debtors—		
				6,308 4 3	For current and rent	7,946 18 6	
				2,252 11 10	For work carried out, &c...	1,441 9 2	
				4,158 0 4	For reticulations sold on deferred payments..	..	
							9,388 7 8
				431,424 19 1			445,025 17 5
				37,706 14 1	Balance from Profit and Loss Appropriation Account	..	34,120 14 7
£469,131 13 2			£479,146 12 0	£469,131 13 2			£479,146 12 0

The balance-sheet has been duly audited with the various supporting books, vouchers, and documents, and found to correspond therewith.

ROBERT J. COLLINS, Controller and Auditor-General.

J. J. GIBSON,
Accountant, Electrical Branch,
Public Works Department, Christchurch.

WAIKATO HYDRO-ELECTRIC-POWER SUPPLY—HORAHORA SCHEME.

PROFIT AND LOSS ACCOUNT FOR FIVE MONTHS, 1ST NOVEMBER, 1919, to 31ST MARCH, 1920.

Gross Revenue Account.

To	£ s. d.	£ s. d.	By	£ s. d.
Generating-expenses: Headworks and power-house—			Sales of electrical energy to wholesale consumers	5,798 10 9
Salaries	824 2 2		Rents of houses	4 16 4
Wages	81 10 6			
Supplies	22 14 3			
Transport of stores, &c. ..	28 7 2			
Maintenance and repairs—				
Headworks	32 2 5			
Power-house machinery	35 7 6			
		1,024 4 0		
Transmission-line, Horahora to Waihi—				
Wages	197 4 4			
Supplies	26 8 10			
Transport	54 5 9			
		277 18 11		
Waikino Substation—				
Wages (half)	220 11 2			
Supplies	4 3 5			
		224 14 7		
Management and general—				
Payment to Waihi Company for supervision and management ..	270 16 8			
Postages and telegrams ..	7 10 11			
Fire insurance and rates ..	36 6 10			
Accident insurance ..	27 3 4			
Miscellaneous expenses ..	1 10 2			
		343 7 11		
		1,870 5 5		
Balance to Net Revenue Account		3,933 1 8		
		£5,803 7 1		£5,803 7 1

Net Revenue Account.

To	£ s. d.	By	£ s. d.
Interest at 5 per cent. on purchase-money for plant purchased from Waihi Gold-mining Company	4,427 1 8	Balance from Gross Revenue Account ..	3,933 1 8
Depreciation on completed works (2 per cent.)	1,628 8 0	Balance to Profit and Loss Appropriation Account	2,122 8 0
	£6,055 9 8		£6,055 9 8

Profit and Loss Appropriation Account.

To	£ s. d.	By	£ s. d.
Balance from Net Revenue Account ..	2,122 8 0	Balance to balance-sheet	2,122 8 0
	£2,122 8 0		£2,122 8 0

Depreciation Fund Account.

To	£ s. d.	By	£ s. d.
Balance to balance-sheet	1,628 8 0	Amount set aside as per Net Revenue Account	1,628 8 0
	£1,628 8 0		£1,628 8 0

BALANCE-SHEET AT 31ST MARCH, 1920.

Liabilities.	£	s.	d.	£	s.	d.
Depreciation Fund Account				1,628	8	0
Sundry creditors				97	9	10
Waihi Gold-mining Company (Limited)—						
Purchase price of plant taken over at 1st November, 1919	212,500	0	0			
Accrued interest on same	4,427	1	8			
Payments made by the company on behalf of the Department	1,890	13	4			
				218,817	15	0
Development of Water-power Account				2,552	16	9
				£223,096	9	7

Assets.	£	s.	d.	£	s.	d.
Works, &c., at Horahora—						
Roads and bridges	2,052	12	11			
Freehold land	762	5	8			
Properties, dwellings, &c.	4,192	14	5			
Headworks	86,190	2	7			
Generating-station	25,874	8	1			
Transformer building and machinery	14,914	1	8			
				133,986	5	4
Transmission-line, Horahora–Waihi	43,699	7	9			
Lineman's cottage	804	2	3			
				44,503	10	0
Substation, Waikino—						
Substation and oil-boiling buildings	4,995	19	10			
Transformers and machinery in same	12,728	9	2			
				17,724	9	0
Motor-cycle				100	0	0
Engineering, office, and general expenses on preliminary surveys and investigations				1,671	3	9
Interest during construction of works by Waihi Gold-mining Company				14,537	8	8
Stocks of material and stores on hand at date				2,541	5	6
Insurance premiums paid in advance				33	3	6
	£	s.	d.			
Debtors for current	5,798	10	9			
Sundry debtors	78	5	1			
				5,876	15	10
				220,974	1	7
Balance from Profit and Loss Appropriation Account				2,122	8	0
				£223,096	9	7

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

Hamilton, 24th June, 1920.

APPENDICES TO THE PUBLIC WORKS STATEMENT, 1920.

APPENDIX A.

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS OUT OF THE PUBLIC WORKS FUND FOR THE YEAR 1919–20.

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

SIR,— Public Works Department, Wellington, 12th June, 1920.

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,
Minister of Public Works.

The Controller and Auditor-General, Wellington.

STATEMENT OF NET EXPENDITURE ON ALL WORKS AND SERVICES CHARGEABLE TO THE PUBLIC WORKS FUND FOR THE YEAR 1919–20.

Class.	Vote.	Summary.	Appropriation.	Expenditure.	Credits.	Net Expenditure.
		PUBLIC WORKS FUND.	£	£ s. d.	£ s. d.	£ s. d.
XIX	37	Public Works, Departmental ..	145,184	144,842 15 6	23,407 18 7	121,434 16 5
XX	38, 39	Railways	850,000	781,168 5 3	32,519 14 1	748,648 11 2
XXI	40–49	Public Buildings	848,510	473,834 4 4	4,639 8 1	469,194 16 3
XXII	50–52	Lighthouses, Harbour-works, and Harbour-defences	28,164	3,510 5 7	12 12 5	3,497 13 2
XXIII	53	Tourist and Health Resorts ..	36,000	6,198 9 4	4 10 0	6,193 19 4
XXIV	54	Immigration	25,047	79,652 6 5	142,212 19 5	*Cr.*62,560 13 0
XXV	55, 56	Roads, Bridges, and other Public Works	637,085	415,299 15 1	26,737 14 11	388,562 0 2
XXVI	57	Development of Mining	2,000	1,615 8 0	442 8 2	1,172 19 10
XXVII	58	Telegraph Extension	300,000	319,528 13 1	70,149 16 10	249,378 16 3
XXVIII	59	Contingent Defence	15,000	10,439 16 4	252 19 4	10,186 17 0
XXIX	60, 61	Lands Improvement	8,497	3,106 19 0	142 10 5	2,964 8 7
XXX	62	Irrigation and Water-supply ..	25,000	35,655 16 6	1,541 0 8	34,114 15 10
XXXI	63	Plant, Material, and Stores ..	120,000	101,513 2 3	53,831 1 2	47,682 1 1
..	..	Unauthorized	..	15,720 2 0	15,477 12 6	242 9 6
		Total, Public Works Fund ..	3,040,487	2,392,085 18 2	371,372 6 7	2,020,713 11 7

P. S. WALDIE,
Accountant.

R. W. HOLMES,
Under-Secretary.

Examined and found correct.
ROBERT J. COLLINS,
Controller and Auditor-General.

(Details on next page.)

APPENDIX A—*continued.*

	Name of Vote.	Appropriation.	Expenditure.	Credits.	Net Expenditure.
	PUBLIC WORKS FUND.	£	£ s. d.	£ s. d.	£ s. d.
37	Public Works, Departmental	145,184	144,842 15 0	23,407 18 7	121,434 16 5
	Railways—				
	Railway-construction—				
	Kaihu Railway Extension	10,000	15,964 15 10	71 14 7	15,893 1 3
	North Auckland Main Trunk—				
	Ngapuhi Northwards	25,000	33,408 13 7	58 0 1	33,350 13 6
	Ngapuhi Southwards	5,000	..	..	..
	Waiotira Southwards	50,000	51,753 5 1	65 10 2	51,687 14 11
	Waiotira Northwards	20,000	8,814 7 5	..	8,814 7 5
	Ranganui Northwards	30,000	58,858 19 7	1,542 15 7	57,316 4 0
	Whangarei Branch	20,000	35,345 11 3	3,610 17 7	31,734 13 8
	Waipu Branch	10,000	9,371 7 6	..	9,371 7 6
	North Island Main Trunk—				
	Waiuku Branch	20,000	22,813 3 4	212 1 7	22,601 1 9
	Huntly Branch	5,000	1,546 9 7	1 17 10	1,544 11 9
	Waikokowai Branch	5,000	51 11 6	..	51 11 6
	Waipa Gravel-access Branch	1,000	90 6 7	..	90 6 7
	Raetihi Branch..	100	6 0 0	..	6 0 0
	Stone-quarry Line, Rangitikei River ..	100	..	..	..
	Packakariki Deviation	1,000	..	..	..
	East Coast Main Trunk—				
	Paeroa–Pokeno	5,000	..	..	..
	Waihi Eastwards	25,000	13,820 5 6	4 18 11	13,815 6 7
	Tauranga Westwards	20,000	6,691 7 0	2 6 3	6,689 0 9
	Tauranga Eastwards	60,000	76,887 4 5	13,068 2 4	63,819 2 1
	Mount Branch	1,000	4,704 3 6	..	4,704 3 6
	Gisborne–Motu	1,000	47 15 5	..	47 15 5
	Gisborne–Wairoa	20,000	13,858 15 0	2,188 0 9	11,670 14 3
	Wairoa–Gisborne	20,000	5,652 14 3	55 16 6	5,596 17 9
38	Wairoa–Napier	5,000	..	..	..
	Napier–Wairoa	30,000	26,199 13 4	601 17 8	25,597 15 8
	Waikokopu Branch	20,000	1,774 17 4	..	1,774 17 4
	Mount Egmont Branch	1,000	..	..	..
	Opunake Branch	20,000	10,897 9 3	416 6 8	10,481 2 7
	Stratford–Main Trunk—				
	East End	30,000	39,157 8 9	1,452 4 4	37,705 4 5
	West End	20,000	14,725 10 11	1,007 0 10	13,718 10 1
	Featherston–Martinborough	4,000	..	..	..
	South Island Main Trunk	15,000	215 15 7	83 0 0	132 15 7
	Midland Railway—				
	Nelson End	6,500	27 19 5	1 10 0	26 9 5
	Reefton End	5,000	..	..	..
	Otira–Bealey	50,000	65,727 11 6	2,156 5 4	63,571 6 2
	Broken River–Bealey	1,000	4 1 6	..	4 1 6
	Westport–Inangahua	100	9 10 7	7 7 7	2 3 0
	Greymouth–Point Elizabeth	10,000	197 5 0	..	197 5 0
	Culverden–Waiau	5,000	7,958 14 0	1,147 15 9	6,810 18 3
	Waimate Branch Extension	5,000	1,843 15 5	8 8 9	1,835 6 8
	Otago Central	10,000	23,067 11 11	4,136 19 1	18,930 12 10
	Balclutha–Tuapeka Mouth	6,000	..	..	..
	Winton–Heddon Bush	8,000	..	..	..
	Orepuki–Waiau Extension	5,000	1,466 19 9	21 12 10	1,445 6 11
	Lawrence–Roxburgh	8,000	..	..	..
	Land Claims, &c.	1,200	1 4 6	..	1 4 6
	Surveys, New Lines of Railway	5,000	964 13 10	211 5 4	753 8 6
	Permanent-way Materials	100,000	66,675 10 2	143 8 9	66,532 1 5
		725,000			
	Total Vote, Railway-construction ..	600,000	620,602 9 1	32,277 5 1	588,325 4 0
39	Additions to Open Lines	250,000	160,565 16 2	242 9 0	160,323 7 2
	Public Buildings—				
40	General	70,000	64,234 15 6	27 13 8	64,207 1 10
41	Courthouses	7,500	868 0 0	..	868 0 0
42	Prisons	25,000	21,029 7 4	47 17 0	20,981 10 4
43	Police-stations	25,556	24,945 12 1	1 4 9	24,944 7 4
44	Postal and Telegraph	194,910	66,717 13 2	174 11 6	66,543 1 8
45	Agricultural	16,100	10,906 14 9	3,679 16 8	7,226 18 1
46	Mental Hospitals	45,000	18,279 7 9	2 12 9	18,276 15 0
47	Hospitals and Charitable Institutions	64,450	44,032 2 5	58 3 7	43,973 18 10
48	School Buildings	250,000	196,138 0 2	638 8 2	195,499 12 0
49	Workers' Dwellings	150,000	26,682 11 2	9 0 0	26,673 11 2
	Lighthouses, Harbour-works, and Harbour-defences—				
50	Lighthouses	3,310	259 9 5	6 4 3	253 5 2
51	Harbour-works	16,854	3,250 16 2	6 8 2	3,244 8 0
52	Harbour-defences	8,000	..	..	..
53	Tourist and Health Resorts	36,000	6,198 9 4	4 10 0	6,193 19 4
54	Immigration	25,047	79,652 6 5	142,212 19 5	*Cr.* 62,560 13 0
	Construction and Maintenance of Roads, Bridges, and other Public Works—				
55	Roads, &c.	626,335	402,834 5 11	26,737 14 11	376,096 11 0
56	Road and other Works on Goldfields and Mineral Lands	10,750	12,465 9 2	..	12,465 9 2
57	Development of Mining	2,000	1,615 8 0	442 8 2	1,172 19 10
58	Telegraph Extension	300,000	319,528 13 1	70,149 16 10	249,378 16 3
59	Contingent Defence	15,000	10,439 16 4	252 19 4	10,186 17 0
	Lands Improvement—				
60	Improved-farm Settlements	450	142 0 0	142 10 5	*Cr.* 0 10 5
61	Lands, Miscellaneous	8,047	2,964 19 0	..	2,964 19 0
62	Irrigation and Water-supply	25,000	35,655 16 6	1,541 0 8	34,114 15 10
63	Plant, Material, and Stores	120,000	101,513 2 3	53,831 1 2	47,682 1 1
	Unauthorized—Services not provided for	..	15,720 2 0	15,477 12 6	242 9 6
	Total, Public Works Fund	3,040,487	2,392,085 18 2	371,372 6 7	2,020,713 11 7

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, 1919, to the 30th June, 1920.

Although it is now nearly two years since the war closed, matters throughout the world have not reverted to pre-war conditions at anything like the speed it was anticipated before the close of hostilities. This, coupled with the heavy mortality amongst the able-bodied men of the Dominion, has resulted in the Department still having great difficulty in carrying on works vigorously. The immense amount of development work and new construction being carried out by private enterprise still further limited the supply of labour. However, arrangements have been made to house the men and, in general, improve conditions in connection with public works, and it is hoped this will result in the Department being able to man its works more satisfactorily.

The universal inflation of prices has been the cause of very much increased costs of all works.

RAILWAYS.

Abstract.

The following table shows the expenditure on Government railways in New Zealand up to the 31st March, 1920:—

Name of Railway.	Total Length of Railway or Section.	Open for Traffic.	Expenditure to 31st March, 1920.
	M. ch.	M. ch.	£
Kaihu Valley	24 30	19 58	121,803
Otiria–Ngapuhi	45 25	16 25	125,771
Opua Wharf–Onerahi	58 6	58 6	523,636
Whangarei–Waiotira	19 79	..	291,615
North Auckland Main Trunk Railway (from Helensville)	85 22	47 77	1,147,351
Helensville–Te Awamutu, with Branches	163 48	150 39	2,637,546
Frankton Junction–Thames, with Branches	127 35	87 20	634,605
Thames Valley–Rotorua	69 33	69 33	373,057
Tauranga–Opotiki, with Branches	138 27	..	478,723
Gisborne–Opotiki	93 45	49 32	623,330
Napier–Gisborne	230 64	..	286,160
Wellington–Napier and Palmerston North (including Te Aro Extension and Greytown and Martinborough Branches)	249 44	233 12	2,580,246
Wellington–Waitara, with Branches	350 11	285 59	2,738,663
Stratford–Okahukura	112 47	42 26	976,646
North Island Main Trunk (Marton–Te Awamutu), including Raetihi Branch and Waipa Gravel-access Branch	225 79	218 39	2,838,652
Picton–Waipara (South Island Main Trunk Railway)—			
Picton southwards	92 38	56 6	654,372
Waipara northwards	90 45	44 14	373,877
Nelson–Greymouth	170 0	118 6	565,515
Greymouth–Arthur's Pass	49 78	49 78	1,071,154
Rolleston–Arthur's Pass (including Whitecliffs Branch)	92 59	84 45	840,743
Westport–Ngakawau	19 56	19 56	188,009
Westport–Ngakawau Extension to Mokihinui*	7 12	7 12	..
Mokihinui Colliery Line†	3 69	3 69	..
Westport–Inangahua	26 0	5 74	152,820
Ngahere–Blackball	3 40	3 40	147,532
Greymouth–Rewanui and Branches	8 70	8 70	255,273
Greymouth–Waitaha	50 32	38 68	339,048
Hurunui–Waitaki, with Branches	459 34	413 70	2,630,435
Canterbury Interior Main Line—Oxford–Temuka	83 0	11 44	59,934
Waitaki–Bluff, with Branches	600 21	546 12	4,968,260
Otago Central	182 51	134 78	1,404,067
Invercargill–Kingston, with Mararoa Branch	117 4	97 44	386,456
Forest Hill Railway—Winton–Hedgehope‡	12 40	12 40	22,984
Western Railways	94 8	70 31	337,784
Preliminary surveys	..	..	41,652
Miscellaneous	..	..	10,337
Stock of permanent-way on hand	..	..	75,888
Rolling-stock	..	..	6,848,285
Total	4,158 52	3,006 3	§37,752,229

* The funds for this extension—namely, £35,501 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.

ABSTRACT—*continued.*

Name of Railway.	Total Length of Railway or Section.	Open for Traffic.	Expenditure to 31st March, 1920.
PROVINCIAL GOVERNMENT LINES, ETC.	M. ch.	M. ch.	£
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
Grand total	4,158 52	3,006 3	39,544,945

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

KAIHU VALLEY RAILWAY EXTENSION.

(19 m. 17 ch. to 23 m. 71 ch.; length, 4 miles 54 chains.)

Good progress has been made on this railway, and the formation is complete with the exception of a few small cuttings which will shortly be finished. Flood damage which occurred during the winter months has been repaired. Three temporary bridges have been erected pending the building of permanent structures. Rails have been laid from 19 m. 40 ch. to 21 m., and all the permanent-way material is on the site; ballast has been run out to 21 m., and the first lift of ballasting completed from 19 m. 17 ch. to 20 m. 70 ch. It is anticipated that with favourable weather the ballasting will be completed about April next.

NORTH AUCKLAND MAIN TRUNK RAILWAY.

Ngapuhi Northwards—Okaihau Section (16 m. 25 ch. to 24 m. 45 ch.; length, 8 miles 20 chains).—The formation of this section is practically complete. At 19 m. 68 ch. a large cutting was excavated; at 19 m. 53 ch. a difficult bank was completed; and at 24 m. 27 ch. the Okaihau station-yard was formed, though bad slips which occurred on the upper side will not be removed until the summer months. Although the prodigious slips experienced on other lines have not been met with on this section, those which have taken place have greatly increased the ratio of work done to that originally estimated. Rails have been laid to 19 m. 50 ch., and a 40 lb. track from 19 m. 50 ch. across a bad bank to 19 m. 60 ch. It is estimated that in three or four months the platelaying will be completed to Okaihau. A platelayer's cottage was erected at Kaikohe. In order to obtain broken stone ballast, which is necessary owing to the difficulty in running scoria ballast over the open railways, a quarry of good basalt rock was opened up on the Utakura Stream, necessitating the laying-down of a branch line, the formation of which has been completed. The laying of a 40 lb. track from the main line at 21 m. 35 ch. to the quarry has been commenced. Up-to-date plant—*i.e.*, steam-driven stone crushing and screening plant, air-drills, steam-navvy, &c.—has been made use of on this line, and very satisfactory progress has been made.

Okoro Section (24 m. 45 ch. to 34 m. 18 ch.; length, 9 miles 53 chains)—Owing to the shortage of labour, progress on the formation work on this section has been delayed, and the rate of progress is not what was hoped earlier in the year. Formation has been completed from 24 m. 45 ch. to 24 m. 79 ch., and from 24 m. 79 ch. to 27 m. The earthworks are about one-third completed. Twelve cuttings between 25 m. and 27 m. were in hand, but owing to insufficiency of labour only two could be manned. Slips which occurred in the cuttings have all been removed. A deviation of the Okaihau-Rangiahua Road, 63 chains in length, had to be fenced, formed, metalled, and blinded with quarry-chips, while 3 miles of fencing were erected along the railway reserves. Unfavourable weather conditions have retarded progress during the last three months, but in the circumstances the greatest possible amount of work has been carried out.

WHANGAREI BRANCH RAILWAY.

Oakleigh Section (0 m. to 7 m. 60 ch.; length, 7 miles 60 chains).—A length of 5 miles 23 chains of this section was maintained and worked by the Public Works Department up till the end of the financial year, when it was handed over to the Railway Department. From 5 m. 23 ch. to 7 m. 60 ch. earthworks have been in progress throughout the year, while formation to 5 m. 72 ch. has been completed, and thence to 7 m. 60 ch. two-thirds completed. Up-to-date plant has been utilized and the cutting at 6 m. 20 ch. is well advanced, leaving one other cutting at 7 m. 15 ch. It is hoped to complete formation of this section in about four months' time if circumstances are favourable. At 5 m. 74 ch. a concrete subway was necessary to carry a private tramway under the rail. A platelayer's cottage (concrete) is being erected at Oakleigh station-yard.

Tauraroa Section (7 m. 60 ch. to 15 m.; length, 7 miles 20 chains).—Earthwork on this section has been completed with the exception of clearing slips and lifting subsiding banks. The approach roads to the station were metalled during the year, and ballasting is now practically complete. An overbridge was erected at 11 m. 45 ch. This section was maintained during the year for goods and material to Waiotira Junction and the North Auckland Main Trunk line. The Tauraroa quarry has been worked during the year, but considerable delays have been occasioned owing to the necessity of utilizing the services of the quarrymen to clear slips occurring on the line before stone could be transported to the places required. About forty workmen's huts have been erected on this and the Waiotira Section, and a dining-room has been erected for the use of the men employed near the ballast-quarry.

Waiotira Section (15 m. to junction at Waiotira with the North Auckland Main Trunk Railway at 19 m. 75 ch.; length, 4 miles 75 chains).—With the exception of one cutting at 16 m. 60 ch. and six culverts, the formation of this section has been completed. A temporary line has been laid around this cutting which will be taken out later with a steam-shovel. A large number of slips occurred on this section, and 36,000 cubic yards were cleared up till February last. Traffic can be maintained to Waiotira, but a large quantity of earth remains to be shifted in order to make the cuttings safe. The subsidence of the banks, particularly at 17 m. 10 ch., caused a great deal of trouble. Temporary lines were laid round five bad slips in cuttings, but with the exception of one at 19 m. 75 ch. these lines are not now required. Rails are laid to Waiotira Junction, but 50 ch. of this length is only 40-lb. track. The bottom lift of ballast has been laid except for 30 ch., while the second lift is complete to 16 m. 55 ch., and in bad places extra ballast has been laid. Goods traffic is being run to Waiotira Junction. The piers on the Waiotira Bridge at 17 m. 74 ch. have been completed and temporary stringers erected. There remains to be done 1½ miles of fencing.

Waipu Branch Railway.

Ruakaka Section (0 m. to 9 m. 20 ch.; length, 9 miles 20 chains).—Formation on this section is well forward. On the first two miles, consisting of banks across mud-flats, practically no work was done, as it will be more economical to work this length from borrow-pits when a steam-navvy and locomotive are available. From 2 m. 5 ch. to 8 m. 40 ch. formation is nearing completion, and 4¾ miles of this distance has, with the exception of culverting, been fully completed. Seventeen plough and scooping teams, supplied by local settlers, were working on this section during the summer, and good work was done. Thirty-one earthenware-pipe culverts were laid, as also one concrete-pipe culvert. A 1¼-mile deviation (from 3 m. 20 ch. to 4 m. 40 ch.) of the Main North Road was carried out.

Waipu Section (9 m. 20 ch. to 16 m., approximately).—No work was done on this section during the financial year.

North Auckland Main Trunk Railway.

Maungaturoto Section (83 m. 75 ch. to 88 m. 21 ch.: length, 4 miles 26 chains).—This section was completed and handed over to the Working Railways Department since the 31st March, 1920. The telephone-line was improved, general maintenance carried out, and a considerable amount of reballasting and cleaning-up work done preparatory to handing over to the Working Railways Department.

Paparoa Section (88 m. 21 ch. to 92 m. 6 ch.; length, 3 miles 65 chains).—A private overbridge at 89 m. 61 ch. was erected, and a considerable amount of cleaning-up of water-tables, culvert inlets and outlets, &c., was carried out, as also the usual ballasting for topping up. Constant repairs to the bank at 89 m. 72 ch. owing to slices sliding out from the upper side were required. The cattle-stops at Huarau station-yard (north end) were completed in addition to the stock-paddock and race leading thereto. Portion of this section to 90 m. 30 ch. was handed over to the Working Railways Department since the end of the financial year. The embankment at 91 m. 30 ch., which shows no sign of stability; the Huarau Tunnel, which still requires 1·9 chains concreting to link up the ends; and Paparoa station-yard, where considerable excavation will be necessary before the yard can be deemed ready for structures, are still incomplete. The spreading and sinking of the bank at 91 m. 30 ch. renders it unsafe to carry a locomotive, and little in the way of permanent improvement can be done until completion of the Huarau Tunnel. At the south end of the Huarau Tunnel fair progress was made between June and September, at which latter time the prevailing treacherous swelling material gave place to a belt of rock requiring blasting, thus enabling the invert to be dispensed with. At both ends, however, soft country generally prevailed, and the progress of finished work seldom exceeded 20 ft. per month at either end. At the north end progress rarely averaged more than 10 ft. per month, the ordinary difficulties due to bad ground being accentuated by coal and cement shortages, and also the strike of workmen, which continued for about one month. The incomplete portion between the two ends of complete work is 1·9 chains.

Paparoa Station-yard.—Heavy excavation in this yard is complete save for further requirements for additional trucks, but a considerable amount of trimming, &c., remains to be done Three plate-layers' cottages have been erected and are practically complete.

Marcretu Section (92 m. 6 ch. to 96 m. 45 ch.; length, 4 miles 39 chains).—Although considerable work has been done on this section, progress has been hampered by the heavy slips from 93 m. onwards. Owing to the somewhat disagreeable nature of the work great difficulty has been experienced in retaining workmen. The largest cutting completed is at 92 m. 22 ch., though at this point, as elsewhere, a very considerable amount of extra material had to be shifted. With the cutting at 92 m. 48 ch. and embankment at 92 m. 57 ch. fair progress is recorded, but much extra work is being caused at the 92 m. 32 ch. and 72 ch. cuttings. Between 93 m. and the end of the section three stream-diverts have been excavated. From 94 m. 36 ch. to 95 m. 30 ch. fencing on both sides of the line has been erected.

Waikiekie Section (96 m. 45 ch. to 107 m. 28 ch.; length, 9 miles 55 chains).—During this year work has extended from the south end of the Marcretu Tunnel, at 102 m. 25 ch., to Waiotira Junction Station, at 107 m. 28 ch., but owing to the serious shortage of labour the length has been only half-manned. Formation between 102 m. 40 ch. and 105 m. 20 ch. is about half-completed. From 105 m. 30 ch. to 107 m. 20 ch. formation is practically completed except for two banks which have been trestled. A steam-shovel has been utilized on formation-work between tunnels and on cuttings. One large cutting at 103 m. will be taken out with the steam-shovel. The two tunnels are the most important works on the section, and both of them were in hand for about four months, but, as a result of insufficient skilled labour, work on the Marcretu Tunnel had to be discontinued. The ground in

the Waikiekie Tunnel proved very heavy, but fair progress was being made when a slip took place and delayed the work a good deal. A further 8 chains remain incomplete, but owing to the heavy ground and shortage of skilled labour this will take about ten months. The Waiotira Stream has been diverted for 27 chains, and the approach road to Waikiekie Station has been formed and is being metalled. The road culvert, &c., metal is being crushed by a stone-crushing plant which has been erected at 104 m. 6 ch., and a tram-line has been laid from this quarry to Waikiekie Tunnel. The permanent-way has been laid from Waiotira Station for a distance of 1¼ miles, though part of this is in 40 lb. track; a siding has been laid, gravitation water-supply arranged, 85 chains of fencing erected, and four platelayers' cottages built. Near Mareretu Tunnel a sawmill has been erected to cut timber for construction-work, workmen's huts, and other temporary buildings. A dining-room, bathhouses, and about sixty single men's huts have been erected.

Kirikopuni Section (107 m. 28 ch. to 121 m. 40 ch.; length, 14 miles 12 chains).—Owing to the shortage of suitable labour very little work has been carried out on this section during the year, that available being utilized on other lines. The absence of sufficient labour was the cause of abandonment of work in the Tokatoka Tunnel after the drive had been carried 3½ chains despite bad slips at the tunnel-mouth. The formation of the line between Waiotira Station (107 m. 28 ch.) and the tunnel (108 m. 29 ch.) is about one-third completed. A steam-shovel was transferred to this section in February, and will do all the formation at the tunnel. At 108 m. 19 ch. a 3 ft. circular concrete pipe was put in, 78 chains of fencing erected, and a service road made from Waiotira Junction Station to 111 m. 40 ch. For the transport to Omana Tunnel of the necessary materials and plant 2½ miles of tramway has been laid. Formation is well advanced, but the rails have not so far been delivered Nineteen workmen's huts were erected on this section.

Waiuku Branch Railway.

(4 m. 20 ch. to 12 m. 15 ch.; length, 7 miles 75 chains).

Glenbrook Section.—The completed line between Patumahoe and Mauku Stations has been maintained in good order and the weekly goods service sustained. The triple 12 ft. culvert at Mauku has been completed, as also the bank at 5 m. 49 ch. and the approach cutting. A contract has been entered into for the erection of station building at Glenbrook. Platelaying from Mauku Station has been commenced, and rails have been laid to 7 m. 2 ch. As a locomotive is now available, ballasting will be at once put in hand.

Waiuku Section.—The double 10 ft. culvert at 8 m. 78 ch., the 4 ft. culvert at 10 m. 28 ch., and the 10 ft. culvert at 11 m. 39 ch., have all been completed. Banks at 8 m. 78 ch. and 10 m. 28 ch., together with cuttings at 10 m., 10 m. 38 ch., 11 m. 20 ch., and 11 m. 50 ch., have been completed, and Waiuku station-yard and approach roads are now formed to full width. The bank at 11 m. 40 ch. is nearing completion, while the overbridge and approaches at 10 m. 38·5 ch. and private crossing at 10 m. 21 ch. have been completed. Approaches to the overbridge at 10 m. 74 ch. have been formed as far as possible without unduly interfering with the traffic, and the road deviation and crossing at 11 m. 66 ch. are nearly completed.

Huntly-Awaroa Railway.

(7 m. 20 ch. to 10 m.; length, 2 miles 60 chains.)

Work on this line was recommenced in December last. Earthworks are in progress from between 7 m. 20 ch. and 7 m. 70 ch., and several culverts have been completed. A stream-diversion to the right of 7 m. 50 ch. has also been completed. The line has been permanently pegged to 8 m. 70 ch. and a trial line completed to 10 m. This work has been delayed owing to the shortage of timber and cement, while the quality of labour offering has been a contributory factor.

Waikokowai Branch Railway.

Trial surveys have been made, and surveys are now in hand for location of mine-sidings. Permanent pegging is proceeding.

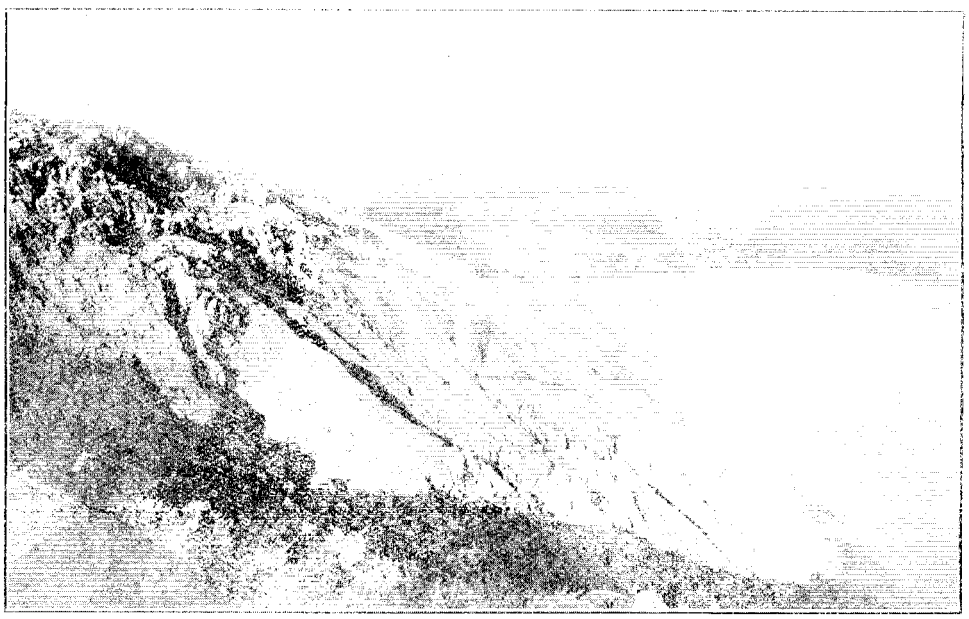
East Coast Main Trunk Railway.

Waihi Eastwards—Athenree Section (0 m. to 8 m. 68 ch.; length, 8 miles 68 chains).—The bank from 7 m. 25 ch. to 7 m. 40 ch. has been widened. The Athenree station-yard was formed, and the main-road deviation and approach road to passenger-platform have been completed. The formation of the goods-shed road is in hand and well forward. A number of cuttings have been completed, and that at 9 m. 44·6 ch. will be finished in a very short time. Five concrete culverts have been put in, the metal for concrete having been obtained from the quarry at 8 m. 20 ch. The concrete piers of the Waimata Stream bridge have been erected.

Katikati Section (8 m. 68 ch. onwards).—Work was commenced in September, 1919, and light formation and cuttings at 10 m. 18 ch. and 10 m. 77 ch. have been completed. A 2 ft. circular concrete pipe has been laid at 10 m. 44·12 ch. A land-plan survey from 5 m. 40 ch. to 12 m. was made.

Tauranga Westwards—Tauranga Section (36 m. to 41 m. 5 ch.; length, 5 miles 5 chains).—Work on this section was commenced in March, 1919, one cutting having been opened up in that month. Since then one cutting at 37 m. 13 ch. has been opened up and completed to 37 m. 11 ch., one at 37 m. 37 ch. completed to 37 m. 40 ch., one at 37 m. 43 ch. completed to 37 m. 40·8 ch.; those at 44 ch. and 46·5 ch. have also been completed, as have those at 38 m. 44 ch. to 38 m. 34·30 ch. and 38 m. 61 ch. to 38 m. 58·40 ch. Seven side drains have been dug; fencing has been erected from 37 m. 5 ch. to 38 m. 70 ch. and from 37 m. 50 ch. to 38 m. 70 ch. Two temporary private crossings have been provided.

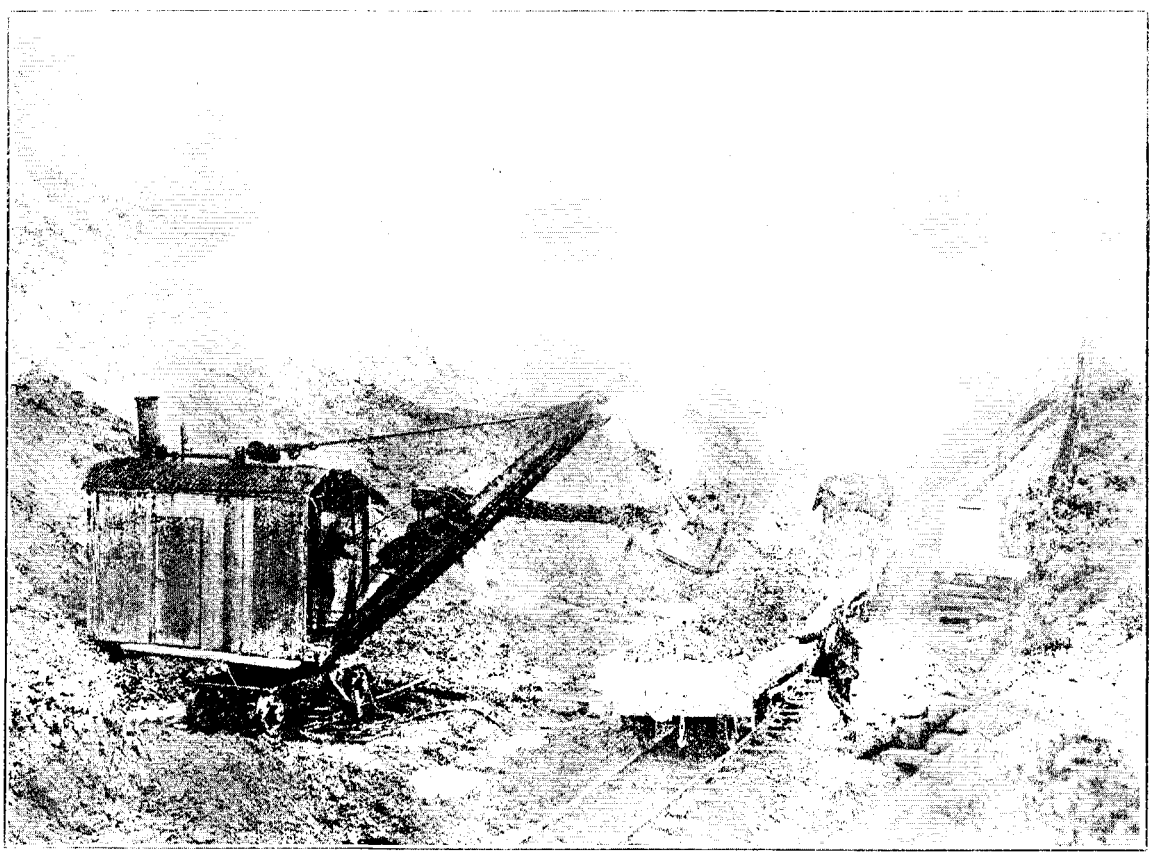
Large Slip in Cutting at 7 m. 15 ch.



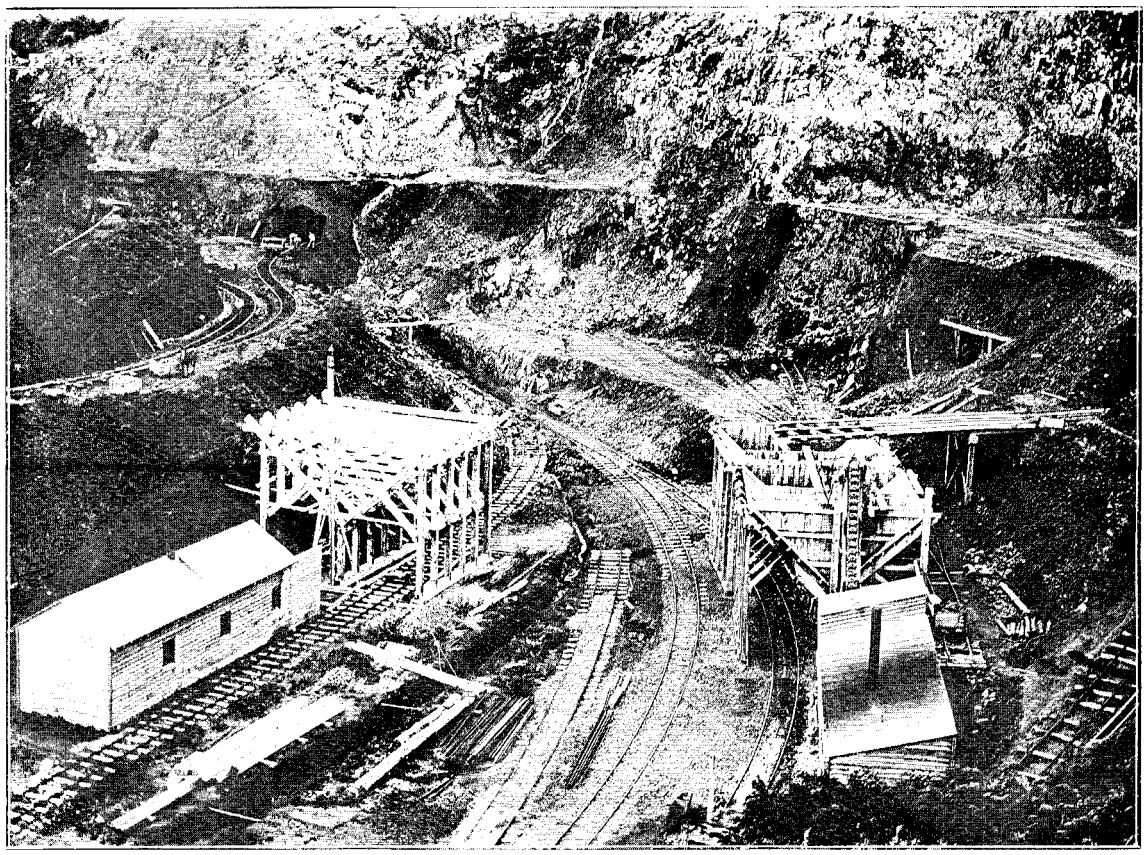
Very Large Slip at 7 m. 15 ch.
Oakleigh Station in distance. Junction of Whangarei and Waipu Branch Railways.

Slips in Bank at 7 m. 0 ch.

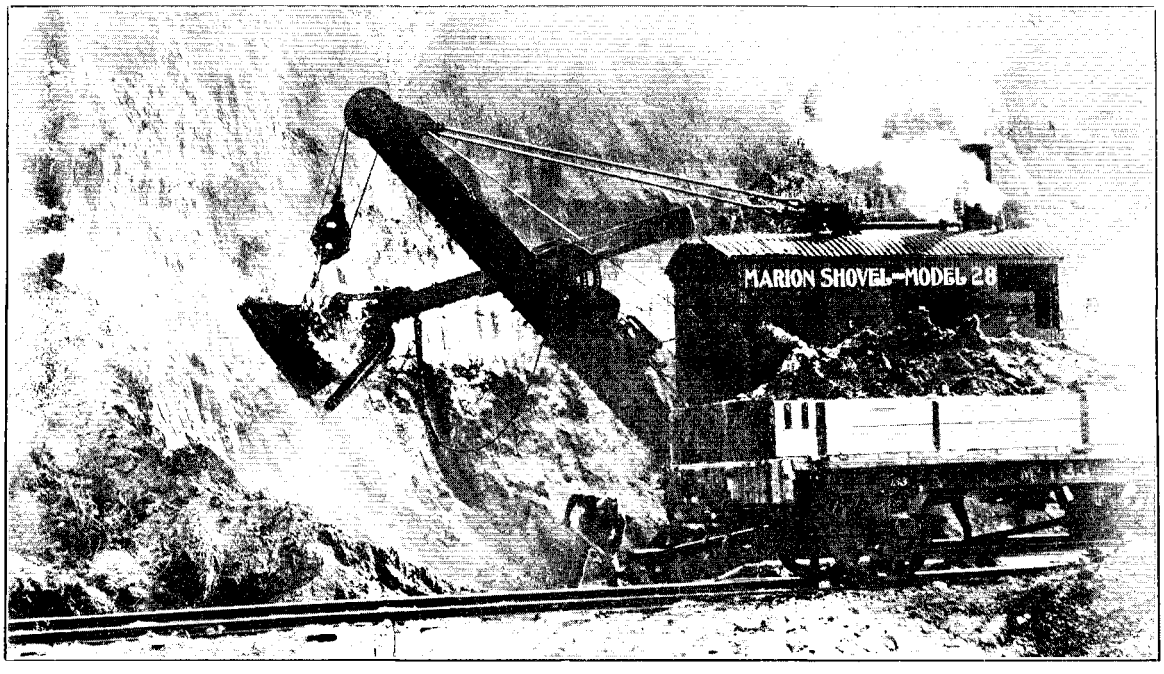
NORTH AUCKLAND MAIN TRUNK RAILWAY.—NGAPUHI NORTHWARDS.



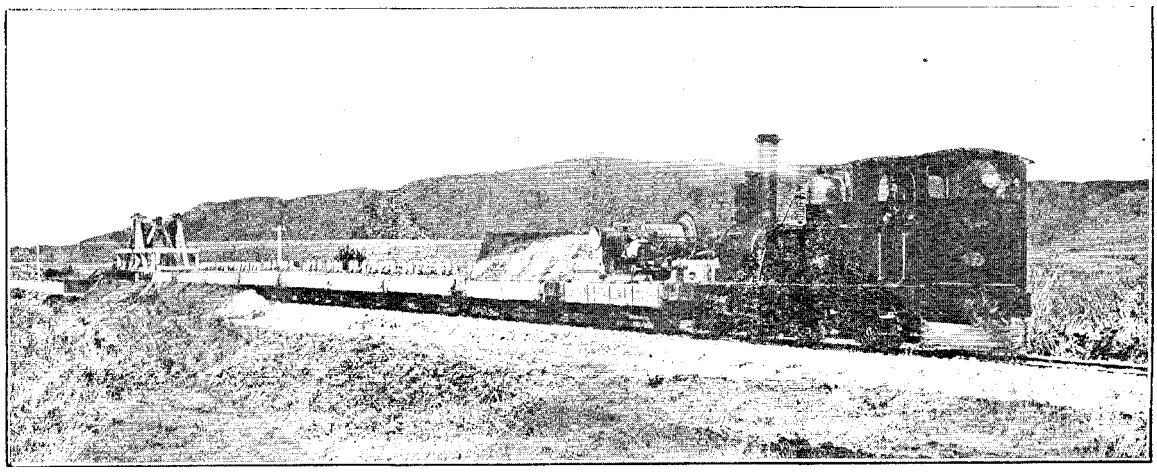
"Marion" Steam shovel removing Slips in Cutting near 10 m. 0 ch.
This shovel excavated 32,000 yards in six months in a cutting at 13 m. 67 ch.



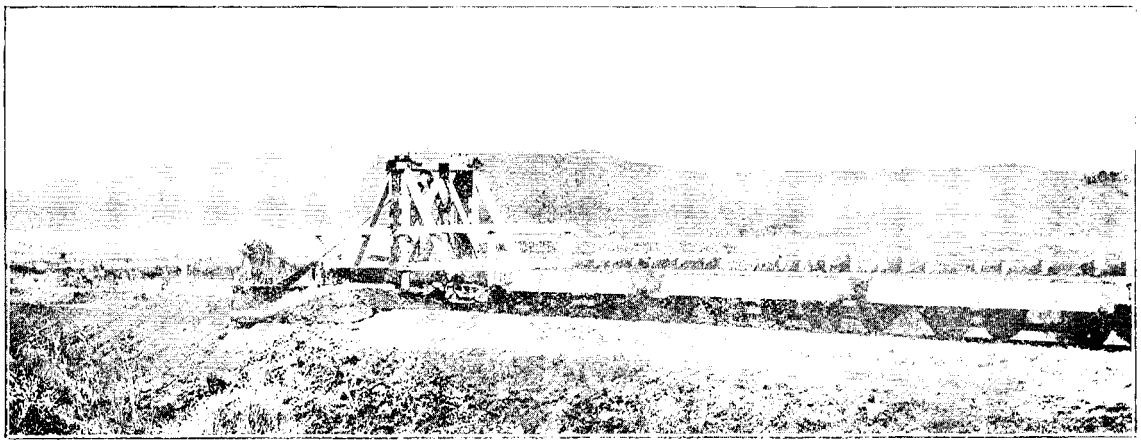
Looking into Te Puke Quarry from Ridge above, showing Workings and Stripping.
Air-pipe line on extreme left.



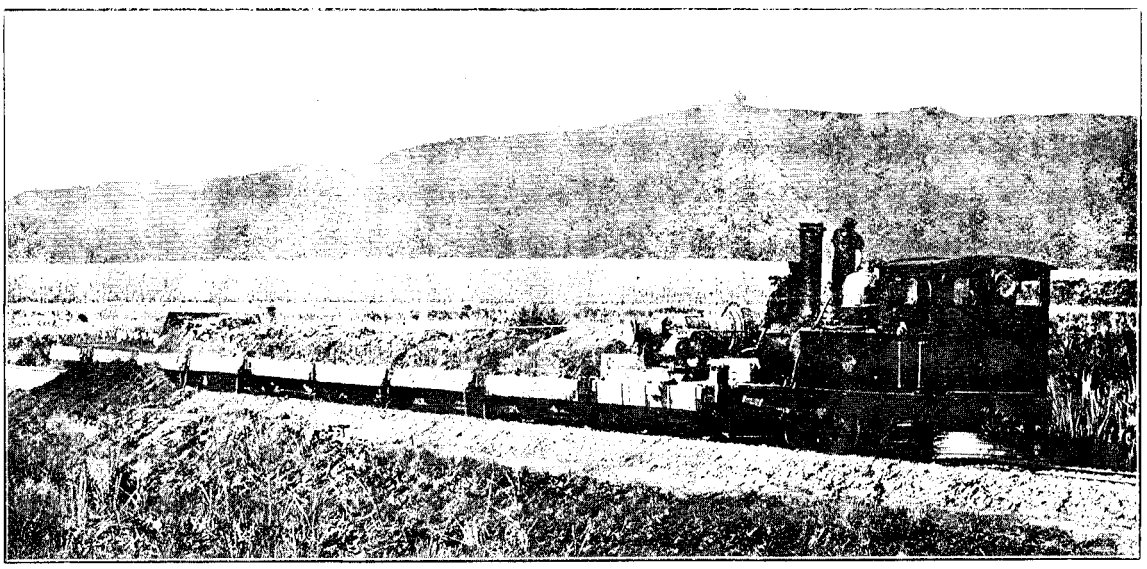
Shovel ready to shift forward.



Spreader-plough starting.



SPREADER-PLOUGH FINISHED.

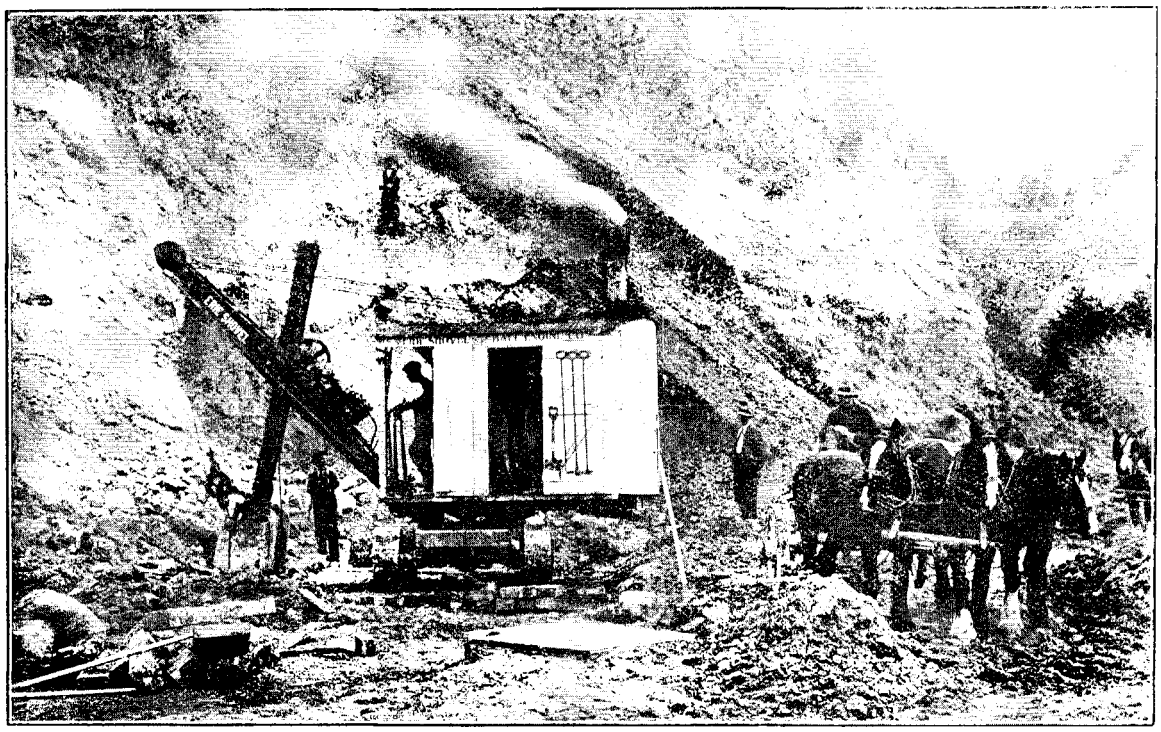


UNLOADER-PLOUGH STARTED.

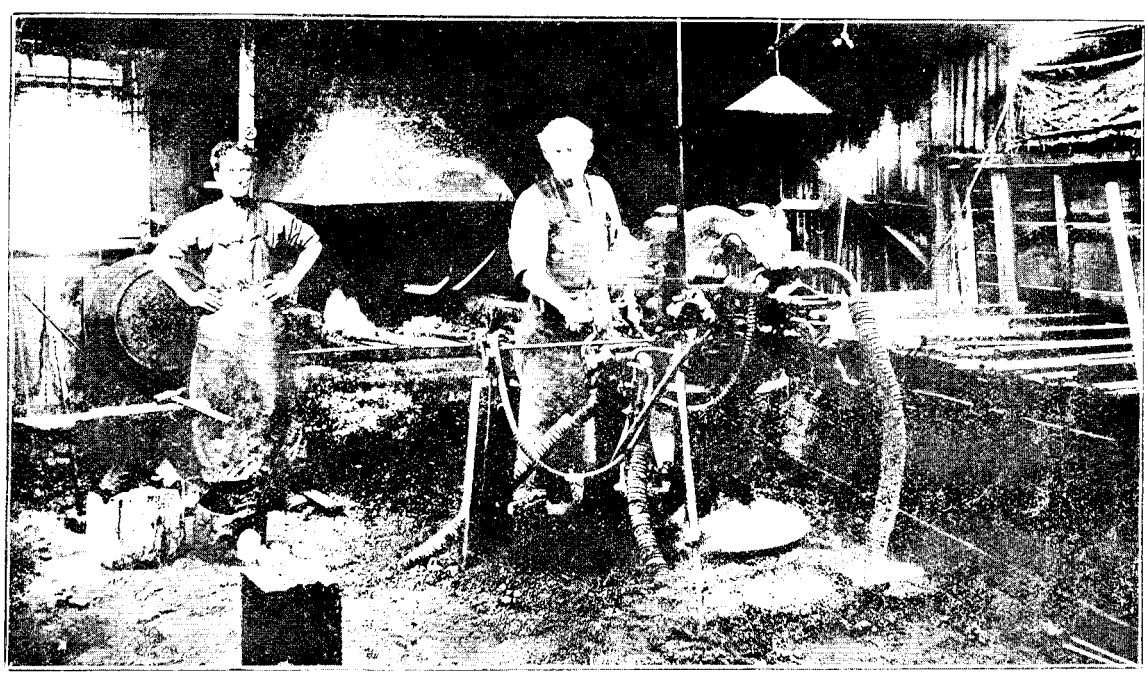
LETTING DOWN SIDES AND DOORS.

UNLOADER FINISHED.

NAPIER-WAIROA RAILWAY.

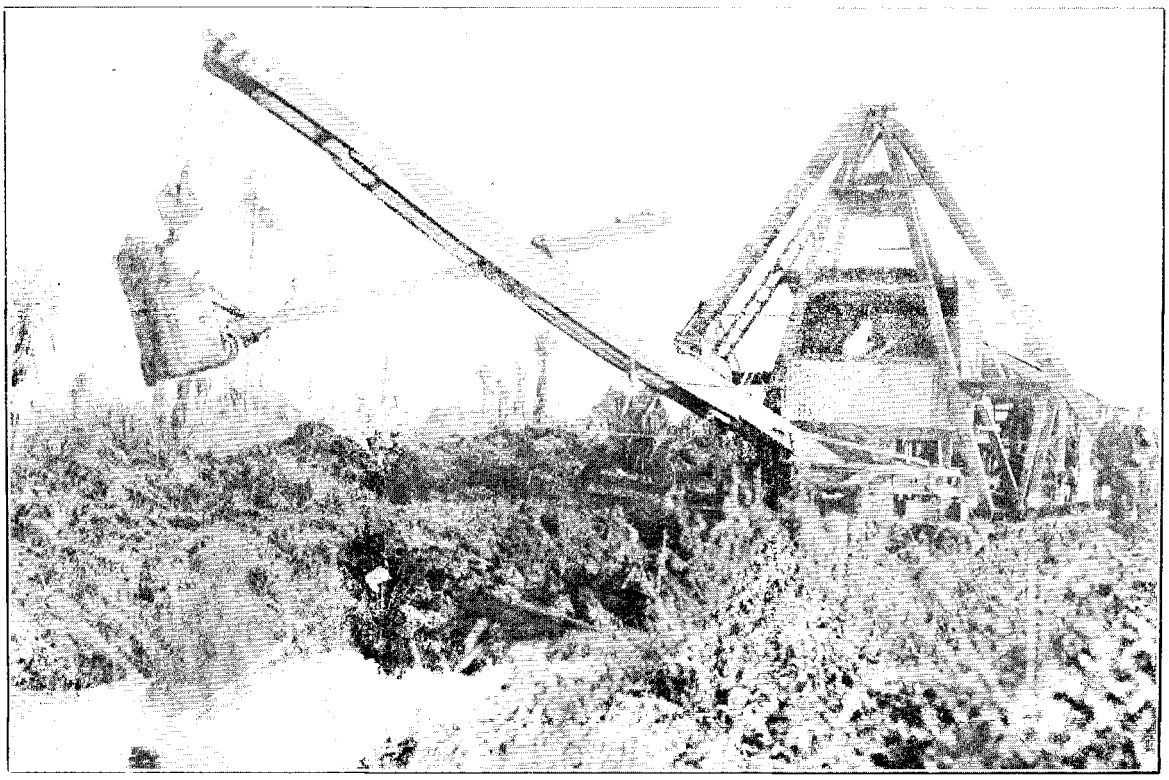


"Erie" Steam-shovel at Work, Hyderabad Quarry, Napier.

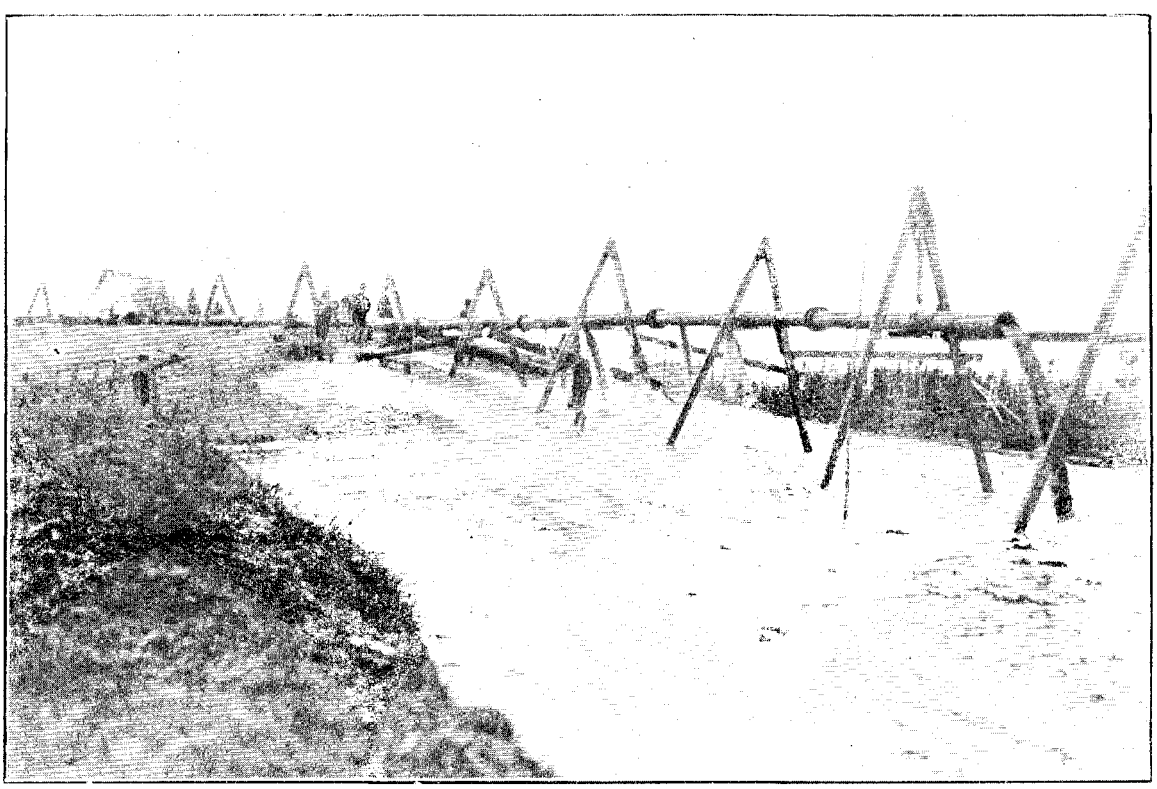


"Leyner" Drill-sharpener.

WAIHOU OHINEMURI RIVERS IMPROVEMENT



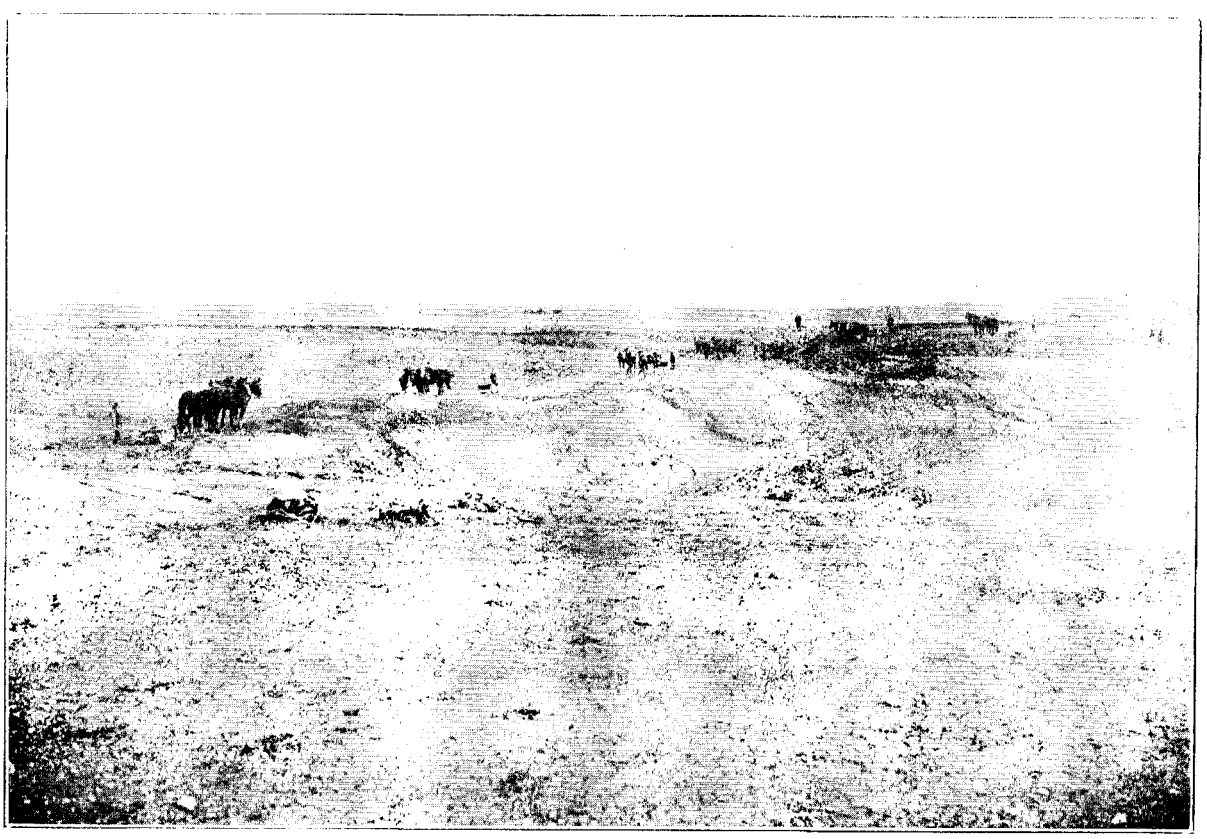
Dipper Dredge (built in New Zealand) working at Rotokohu Swamp Drainage, near Paeroa.



Suction Dredge "Waihou." Discharge from Pipes forming Stop bank.

MANUHERIKIA ALEXANDRA CLYDE IRRIGATION SCHEME

Cutting Irrigation Races.—Central Otago.



Cutting Irrigation Races.—Central Otago.

Tauranga Eastwards—Matapihi Section (41 m. 5 ch. to 45 m.; length, 3 miles 75 chains).—Little work was done on this section until May, when sinking of cylinders at pier E of the Tauranga Bridge was completed. Later cylinders at pier F were commenced, and other cylinders up to and including K were put in hand and are now well advanced. Work on cylinders at pier L has been started, and concreting and reinforcing commenced, but the shortage of suitable labour has caused difficulty in this direction.

Mount Branch (0 m. to 4 m. 7 ch.; length, 4 miles 7 chains).—Ordinary maintenance has been carried out on this section and a very satisfactory goods and passenger service is in operation. The old workshops were destroyed by fire in June, 1919, but erection of the new shops was immediately put in hand and the work is now almost complete. A good proportion of the new machinery has been delivered and erected, and further plant is on order. Ironwork for nine different bridges has been manufactured, as also that for fourteen tip trucks and a travelling crane.

Te Puke Section (45 m. to 54m.; length, 9 miles).—Ordinary maintenance has been carried out during the year.

Paengaroa, Pongakawa, Otamarakau, and Matata Sections (54 m. to 79 m. 16 ch.; length, 25 miles 16 chains).—On these sections the usual maintenance work incidental to traffic-working has been carried out, whilst the time-table now in force has met with great public approval. Between Otamarakau and Matata some of the bridges are of a temporary nature and ballasting is incomplete.

Rangitaiki Section (79 m. 16 ch. to 87 m. 71 ch.; length, 8 miles 55 chains).—Platelaying was commenced in June, but progress has been slow as formation had first to be completed. Rails are laid to 84 m. 47 ch. The bank on the Rangitaiki Swamp has been built to a low level, and is being raised to its correct level by material obtained from a borrow-pit at Awakaponga by means of a steam-shovel, the output of which has averaged so far 280 cubic yards per day.

Awakiri Section (87 m. 71 ch. to 96 m.; length, 8 miles 9 chains).—From 87 m. 71 ch. onwards earthworks and fencing are in progress. A length of 5 m. 40 ch. of service road was completed to the foot of the saddle at 97 m.

General: At the Te Puke Quarry the shortage of locomotives precluded more extensive work, but 12,200 yards of metal was distributed to local bodies.

Gisborne–Napier (North End).

Ngatapa Section (0 m. to 10 m. 29 ch.; length, 11 miles 18 chains).—Ordinary maintenance has been carried out, and the traffic over the section includes passenger and goods trains. A number of banks have been widened. Ballast-crushing has been intermittently carried on at the Repongaere quarry, from which 614 tons of pulverized agricultural lime has been supplied to farmers.

Waikura Section (10 m. 29 ch. onwards).—The centre-line between 11 m. 64 ch. and 13 m. 64 ch. was repegged and levelled and cross-sectioned, access roads near 13 m. 30 ch. were re-formed, and earthworks at various points commenced. On this line, too, difficulty has been experienced owing to the inferior quality of the labour offering.

Frasertown Section (0 m. onwards).—The work on this section was put in hand in September, 1919. The fencing of the first 1¾ miles, in addition to that for a length of 1 m. 15 ch. on the right-hand side of the deviation, is practically completed. A number of temporary buildings have been erected. Progress had been hindered by the shortage of cement and, in the early part of the work, scarcity of labour.

Waikokopu Branch—Nuhaka Section (0 m. to 17 m. 12 ch.; length, 17 miles 12 chains).—In March last co-operative contracts were let for works from 8 m. 30 ch. Between forty and fifty scoops have been employed, and formation is now being done between 0 m. and 9 m. and at 14 m. 55 ch.

Gisborne–Napier (South End).

Eskdale Section (0 m. to 10 m. 51 ch.; length, 11 miles 51 chains).—The line has been cleared, fenced, and culverted for a considerable length. Fair progress has been made during the year, and between 1 m. 69 ch. and 6 m. 20 ch. formation is almost ready for platelaying. From 8 m. 69 ch. to 10 m. 38 ch. a new bank has been constructed and a considerable amount of widening done. Fifty workmen's huts and three cookhouses have been erected, and a platelayer's concrete cottage is under construction.

Tutira Section (10 m. 51 ch. onwards).—The line has been cleared for its whole length, and 70 chains of fencing on both sides of the railway has been erected. Earthworks are being vigorously proceeded with and the permanent survey is now up to 14 m.

Stratford – Main Trunk Railway.

West End.

Tahora Section (42 m. 26 ch. to 47 m. 40 ch.; length, 5 miles 14 chains).—Good progress has been made during the year, and the track has been extended into the Tahora yard. A passenger- and goods train service operated on this section, connecting with the Railway Department's service at Kohuratahi. The Tahora station-yard work received a great amount of attention and is very well advanced. Bridges at 47 m. 22·50 ch., 49 m. 1 ch., 47 m. 10 ch. have been completed, and a large amount of culvert, fencing, &c., work has been carried out.

Raekohua Section (47 m. 40 ch. onwards).—Work on this section has been principally confined to service and main-road formation and railway formation to 47 m. 63 ch. 3 m. 25 ch. of telephone-wire was erected, fencing completed, and at 49 m. 16 ch. a bridge constructed. A deposit of gravel near Tangarakau River crossing has been prospected, and indications are very good. A trial survey was made of the Haco length (50 m. 60 ch. to 57 m.).

Matiere Section (0 m. to 10 m. 21 ch.; length, 10 miles 21 chains).—Owing to the lack of suitable labour, work on this section was concentrated on the tunnels. Of the total length of this tunnel (76 chains) only 7 chains remain incomplete. Excavation of the tunnels at 4 m. 68 ch. and 6 m. 10 ch. has been completed, and the brick lining has been commenced. The tunnel at 7 m. 55 ch. is now complete and lined. Formation on this section is practically complete.

Ohura Section (10 m. 21 ch. to 19 m. 70 ch.).—Permanent survey has been completed and land-plan survey is in hand. About 1½ miles of formation has been carried out.

Opunake Branch Railway.

Kapuni Section (0 m. 6 ch. to 7 m.; length, 6 miles 74 chains).—Earthwork has been completed with the exception of a small block at 1 m. 22 ch., which will form the approach to the road over-bridge. Good progress has been made with the Waingongoro Bridge, but work on the Kapuni Bridge at 4 m. 69 ch. had to be discontinued owing to there being an insufficient amount of labour offering.

Auroa Section (7 m. to 12 m.; length, 5 miles).—Cuttings (less batters) and banks have been completed to Rowan Road, 8 m. 29 ch. From 8 m. 64 ch. to 9 m. the formation has been almost completed. At 9 m. 50 ch. the cutting has been completed and adjacent bank formed to 9 m. 44 ch. 1,100 yards of formation at Mangawhero station-yard has been excavated. A number of culverts have been laid, but shortage of cement has hindered operations.

Moturoa–Opunake: Two deviations from Moturoa–Opunake line to give direct access to New Plymouth Breakwater were surveyed and plans have been prepared.

Manaia Branch (Kapuni to Manaia) (0 m. to 5 m. 49 ch.).—One cottage has been and one is being removed. Shallow earthwork has been completed between 17 ch. and 64 ch. except batters in cuttings. Light formation was carried out between 1 m. 24 ch. and 1 m. 62 ch. Between 2 m. 22 ch. and 2 m. 67·5 ch. formation is complete. From 3 m. 64 ch. to 4 m. 24 ch. and from 4 m. 30 ch. to 4 m. 65 ch. formation is practically complete. Forty double huts have been erected and a number of old huts repaired.

South Island Main Trunk Railway.

Kekerangu Section (56 m. 6 ch. to 63 m. 6 ch.; length, 7 miles).—No work has been done on this section during the past year.

Midland Railway.

Nelson–Westland (North End).

Kawatiri Section (59 m. 17 ch. to 63 m. 8 ch.; length, 3 miles 7 chains).—Work on this section was suspended during the war, but has been recommenced. To date preparatory work only has been carried out.

Arthur's Pass Tunnel.

Otira End.—The progress of the enlargement and lining has been impeded by the nature of the ground worked. During the year 783 shifts were worked, the average number of men per shift being 23·75, as compared with 670 shifts of an average of 18·4 men for the preceding year.

Bealey End.—During the year 572 shifts were worked, the average number of men per shift being 13·3, as compared with 682 and 12·5 for the previous twelve months.

The completed lining at each end is 19 chains, the total bottom heading driven 5 miles 25·18 chains, total lining completed 4 miles 50·67 chains. Tenders for the electrification of the tunnel have been invited, and are due on the 7th August next.

Greymouth – Point Elizabeth Railway Extension.

Work was commenced in April last, a contract having been let for bushfelling. Further contracts for clearing and formation have since been let, and the work is proceeding satisfactorily.

Culverden–Waiau Railway.

(Length, 13 miles.)

This section of line was handed over to the Working Railways on 15th December, 1919, for traffic. Up till this date a daily goods service had been run between the two terminals.

Waimate Branch Railway Extension.

(0 m. to 4 m. 60 ch.; length, 4 miles 60 chains).

Construction on this line was recommenced early in the New Year after a lapse of four years. Good progress has been made with the preliminary work of clearing, and the stream-diversion of Serpentine Creek has been completed for a length of 8 chains, and the railway-bank has been finished between 2 m. 27 ch. and 2 m. 32 ch. Serpentine station-yard formation (2 m. 50 ch. to 2 m. 64 ch.) is complete. Progress generally has been somewhat slow owing to the difficulty of procuring suitable labour.

Otago Central Railway.

Cromwell Section (44 m. 52 ch. to 57 m. 6 ch.; length, 12 miles 34 chains).—The bridge at 46 m. 22 ch. was completed during the year, and those at 48 m. 38 ch. and 48 m. 52 ch. were practically completed. Owing to subsidence at 47 m. 19·4 ch. the piles of the railway-bridge had to be redriven.

The piers of the road-bridge are complete at 51 m. 32 ch. A 44-ft.-span bridge at 51 m. 23 ch. was completed except for end planking. A good deal of formation, road-deviation, and grading, &c., was done, and final lift of ballast in Cromwell station-yard was put down. A platelayer's cottage was erected and the station painted. The construction-works on this section were greatly delayed as the result of a thunderstorm in January last, but all slips have been removed, and a regular passenger-train service has been maintained to connect with the Railway Department's train at Clyde.

ROADS, BRIDGES, ETC.

Owing to the increased rates of wages now being paid and the high price of materials, roadworks carried out by the Department have absorbed a greater proportionate amount than previously, but the quality of work is of the usual high standard. Some of the principal works put in hand are:

Whangarei.

Kaingaroa–Mangonui.—76 chains were cleared or repaired. The County Council are tar-sealing portions of this road.

Awanui–Mangonui.—108 ft. of culverts were put into position and covered. 16 chains were widened to dray width. This through road from Awanui to Mangonui is considerably shorter than that via Peria.

Awanui–Mangatiti via Oturu Block.—84 chains were widened to dray width, 70 chains cleared, and 254 lineal feet of culverts placed in position and covered.

Ororu – Fern Flat – Mangamuka.—58 chains of bush were felled and cleared, 269 chains widened to dray width, and 69 chains new formation completed. This road affords access to a soldier's section.

Paranui–Otukai.—120 chains of engineering survey was carried out, 111 chains bush felled and cleared, and 112 chains of new formation completed.

Waitarare Stream Bridge.—This bridge, consisting of three 25 ft. spans, was completed during the year.

Mangamuka – Victoria Valley.—270 chains were widened and 15 chains of new formation completed. Filling, removal of slips, metalling, and culverting were also carried out.

Awakino Valley – Dargaville.—6 miles 15 chains of engineering survey was completed, 70 chains of stumping and clearing carried out, and 470 ft. of culverts placed in position. This road provides access to a soldier's settlement.

Auckland.

Warkworth – Mahurangi Heads.—167 chains have been formed to dray width, widened and culverted.

Mangatangi–Miranda.—6 miles 46 chains of dray-road formation was carried out by the Franklin County Council.

Mangatangi–Kaiaua.—6 miles 63 chains of dray-road formation was carried out by the Franklin County Council.

Pokeno–Waitakaruru Road, via Maramarua.—A commencement has been made with the re-formation and metalling of 4 miles 42 chains, the work being undertaken by the Whangamarino Road Board.

Whangamarino River Bridge (Kopuku–Whangamarino Road).—Five 25 ft. spans on driven piles have been erected, but approaches are not yet completed.

Huntly–Pukemiro.—The Raglan County Council has completed the formation and culverting of 1 mile 31 chains and metalling of 1 mile 2 chains.

Huntly – Rangiriri West.—4 miles of dray-road formation has been carried out.

Port Waikato – Tuakau Bridge.—7 miles of dray-road formation has been completed by the Raglan County Council.

Waipa River Bridge, Ngaruawahia.—The materials for this bridge have been ordered, and 60,000 ft. of timber is on the site.

Ohaupo – Te Awamutu.—2 miles 40 chains of this road has been metalled.

Waikato River Bridge, Ngaruawahia.—This bridge, consisting of one 20 ft. and three 122 ft. spans on reinforced-concrete cylinder piers, was completed, and the formation of approaches is well in hand.

Lichfield – Southern County Boundary.—6 miles 10 chains have been formed.

Ngatira–Okohiriki.—The Matamata County Council has constructed three miles of 14 ft. dray-road.

Turitea.—This road (4 miles 60 chains) has been widened and re-formed and handed over to the Waitomo County Council.

Tauranga.

Rotorua – Rotorua County Boundary, via Ngawaro.—39 chains of metal was laid and a length of 1 mile 20 chains was metalled in bad places. Widening and pumicing was also put in hand. Near Te Pu School a deviation was formed and metalled.

Rotorua – Lake Rotoma.—1½ miles were re-formed and a small length was widened, the bad points being cut off.

Rotorua–Paengaroa.—4 miles were re-formed and widened.

Rotorua – Taupo, via Waiotapu.—Five bridges on this road were repaired and one redecked; 1½ miles were regraded and 70 chains of deviation formed.

Minden Block.—5 miles 56 chains of dray-roads were formed. A number of smaller bridges were repaired and painted during the year 1919–20.

GISBORNE.

Opotiki-Matawai (Waioeka-Matawai).—Work done during the year includes 27½ chains of formation, 13 chains widening, 2 miles of dray-road repairs, and 7 miles of 6-ft.-track repairs.

Opotiki-Motu Track.—This track, which is 5 miles in length, has been repaired and handed to the County Council for maintenance.

Opotiki-Motu Road.—Maintenance has been carried out over a length of 24 miles, and 1 mile 72 chains of metal has been laid.

Mangapoike Valley.—On this road 5¼ miles of dray-road formation has been completed.

Waioeka River Suspension Bridge (near Oponae).—This bridge has now been erected.

Pakarae River Bridge.—Material has been delivered, and a contract let for the erection.

Waiapu River Bridge.—The material for this bridge is practically all on the ground, and a contract is in progress.

NAPIER.

Puruhotangahia Block.—A further 12 miles 30 chains of dray-road has been formed.

Awa-o-totara Block.—7 miles of dray-road has been formed.

Heru-a-tureia Block.—A total length of 15 miles of engineering survey has been made, and 7 miles 60 chains of dray-road formed.

Dartmoor Road.—5 miles 31 chains of dray-road has been formed.

Patangata Bridge (Tukituki River).—This bridge, consisting of twenty-five 52 ft. spans, is being carried out by the County Council under the control of the Department, and is well in hand.

Maungaturanga Bridge (Putere Road).—Four 25 ft. spans on concrete piers have been completed.

Napier-Wairoa.—33 miles of this road has been maintained, 8 miles 40 chains metalled, and a further 2 miles 55 chains is in hand.

Waikari-Mohaka Deviation.—The engineering survey has now been completed for a length of 13 miles 63 chains.

Napier-Taupo.—Maintenance of 26 miles has been carried out, 2 miles 15 chains has been formed, and 4 miles 36 chains metalled.

TAUMARUNUI.

Wanganui River Bridge (Taumarunui).—This bridge, consisting of two 27 ft. and five 82 ft. truss spans, was erected.

Ongarue River Bridge (Owepango Loan Block).—Work has now been completed.

Ohura River Suspension Bridge (Turoto Road).—This bridge has been rebuilt.

Wanganui River Road (Right Bank).—About 1 mile of formation and 1 mile of metalling was carried out.

STRATFORD.

Whakahau.—A commencement has been made with the widening of 3 miles of this road.

Makino Stream Bridge (Rerekino Road).—A 100-ft.-span suspension bridge has been erected.

Mangaone Stream Bridge (Rerekino Road).—A 120-ft.-span suspension bridge has been erected.

Mangaowata Stream Bridge (Rerekino Road).—A 120-ft.-span suspension bridge has been completed.

Tongaporutu River Bridge.—A multiple-cable suspension bridge of one 188 ft. span has been erected.

Stratford Mountain House Road.—2 miles 69 chains was traversed and levelled.

WANGANUI.

Karioi-Rangiwaea.—5 miles 36 chains of metalling has been laid by the County Council.

Mataroa-Ruanui.—The Rangitikei County Council has opened up a ballast-pit.

Kokakoriki.—4 miles 40 chains was widened, and maintenance of 2 miles of horse-road has been carried on.

Retaruke River Bridge (Lacey's).—A suspension bridge of one 120 ft. main and one 30 ft. and one 40 ft. end spans has been erected.

Retaruke Valley.—1 mile 68 chains of formation was practically completed, and 3½ miles of maintenance carried out.

WELLINGTON.

Waingawa River Bridge, Kaituna.—This bridge is in course of erection.

Gorge Road.—127 chains of engineering survey was carried out, 45 chains dray-road constructed, and 45 chains maintained.

Waikanae - Upper Hutt.—1 mile 42 chains of dray-road was constructed.

Tiratu Block Roads.—195 chains of engineering survey was carried out; 1 mile 24 chains road-line felled and cleared; 4 miles 36 chains dray-road constructed; 191 chains road widened. 7 miles 33 chains was metalled, while four bridges were erected.

Manawatu Gorge Block.—138½ chains of bridle-track was constructed, 89½ chains road widened, and 7 miles of bridle-track maintained for portion of the year.

Paekakariki Hill Road.—70 chains of road was widened and improved, and dangerous parts taken off; the road was regraded and fenced.

OREPUKI-WAIAU RAILWAY.

Orawia Section (48 m. 23 ch. onwards).—Work on this section was resumed in October last. The amount of labour offering was small, and work was therefore concentrated on completion of culverts, which will enable earthwork to be vigorously proceeded with when more labour is available. A small amount of formation-work was also completed.

IRRIGATION.

Ida Valley Scheme.

Extensive drainage-works were put in hand during the last year and ordinary maintenance has been carried out. In January last a thunderstorm occasioned damage, but this was quickly repaired. During the season water was supplied to fifteen settlers in Ida Valley and sixteen on Galloway Flat. In connection with the Galloway Flat scheme a survey for the amended main race was completed.

Manuherikia Scheme.

The work of driving the tunnel was confined to the outlet end, and only 1·22 chains remain to be done. The main race was extended towards Clyde, and completed as far as 21 m., except for various flumes and a portion from 19 m. 61 ch. to 20 m. 30 ch., which is in hand.

WAIHOU AND OHINEMURI RIVERS IMPROVEMENT.

This work has been carried on during the year, and the following shows the principal operations :—

Puke-Ngahina Stop-bank.—A three-barrelled concrete standard culvert, fitted with flood-gates and sluices, was built at Stock's drain, and the necessary filling done to formation level. The road on the top of the stop-bank was metalled.

Ngahina Wharf and Goods-shed.—The existing shed was extended, and the wharf lengthened by 65 ft. A 7 ton stiff-legged crane has been erected on the up-stream end.

Kuaoiti Stream Flood-gate.—The old timber flood-gate was shored up and repaired.

Tirohia-Ngararahi Left Stop-bank.—93 chains of stop-bank were formed with material dredged from the river-bed. All necessary clearing to the point where the partly constructed stop-bank commences has been completed.

Tirohia-Ngararahi Right Stop-bank.—2 miles of the site has been cleared with the help of steam log-hauler, 12 chains of the complete bank formed, and 1 mile 33 chains of modified section bank formed.

Rotokohu Drainage.—A dipper dredge has been employed on this work with good results. The dipper has done 103 chains of ditch.

Cooper's Drain Flood-gate.—The box culvert has been replaced by a standard two-barrel 115 ft. culvert. The outlet drain to Mill Road was enlarged to final dimensions.

Awaiti Gap Stop-bank.—40 chains of stop-bank has been completed.

Ohinemuri River.—Willows have been cleared of overhanging branches on both banks between the old junction and Criterion traffic-bridge.

Groyne at Puke.—A 50 ft. totara groyne was constructed, and has proved successful in diverting the current and preventing erosion.

Paeroa Stop-bank.—Right bank has been completed so as to positively protect the Town of Paeroa.

Ngahina Bridge Extension.—Timber is on hand for construction of the extension of the bridge on the right bank of the Waihou River.

The Rivers Commission sat at Paeroa in October, 1919, and reported upon the Waihou River below Ngahina Bridge. Their recommendations have been adopted.

TRAMWAYS.

Auckland.—Inspection of several lengths of duplication, totalling 99 chains, has been carried out and the work approved.

Napier.—The usual inspection of tramways in this town was made.

Wellington.—A small loop-line has been approved, and minor inspections have been made.

Christchurch.—Proposals for relaying portions of the line have been approved, as also the laying of new lengths. Designs for new cars and alterations to trailers and cars have also been approved.

Dunedin.—A number of minor inspections were made. Plans of new bogie cars and trailers have been inspected, while proposals for a balloon loop have been approved. Plans of reinstatement of the Mary Hill cable-tramway line were also approved.

MARINE.

Numerous inspections and reports have been made on behalf of the Marine Department, mainly in connection with harbour-works, reclamations, wharves, foreshore leases, &c. Among the various works dealt with during the year the following are selected for brief mention :—

Cape Maria van Diemen.—Joinery repairs have been carried out, and two new dwellings are shortly to be erected.

Russell Harbour.—A plan has been prepared indicating improvements required.

Helensville Rivers.—An order has been placed for an automatic light to replace that at the entrance to the river from Kaipara Harbour, which latter will be removed and re-erected on the South Head at the entrance to Kaipara Harbour.

Mercury Island Passage.—A powerful automatic light is on order and will be placed on Ohena Island.

Gable End Foreland.—An automatic light, which is on order, will be placed on the nearest available site to the Gable End Foreland.

Elmslie Bay Wharf.—A new section of wharf is being constructed.

Taiaroa Head.—A powerful oxy-acetylene light, which will be visible at about twice the distance as the present lamp, is being installed.

Ninepin Beacon, Chetwode Islands.—A contract has been let for the steel pedestal of an automatic light which is to be replaced at the inside of the Chetwode Islands on *Ninepin Rock*.

NELSON.

Glenhope–Westport-Reefton Road.—A large amount of general maintenance and improvement work was carried out on the various sections of the above road.

BLENHEIM.

Sounds County Tracks.—These tracks have been maintained, and those of importance are in good repair.

CHRISTCHURCH.

Parnassus–Kaikoura.—This road has been widened at the dangerous points and made safe for traffic generally.

Summit Road.—A length of about 3 miles has been widened.

DUNEDIN.

Gore Protective Works.—Extension of the traffic and reinforced-concrete bridges has been completed, and various earthworks carried out.

Kaitangata Flood and Protection Works.—The reinforced-concrete tidegate was completed, and gates are in position, also the reinforced-concrete bridge over the canal.

GREYMOUTH.

Cobden Bridge.—The work on this bridge is nearing completion.

Little Wanganui to Karamea.—Considerable formation-work has been carried out, and a metalling contract for 3½ miles is in progress.

Blue Duck Creek Road.—2 miles 34 chains of formation and metalling have been completed, and a bridge over Webb Creek is in course of erection.

Westport-Glenhope–Buller Road.—A deviation has been formed, and various works, including bridges and culverts, carried out.

MANGAHAO HYDRO-ELECTRIC WORKS.

The construction-work in connection with the above power scheme is progressing as speedily as possible, and no effort is lacking to prevent any avoidable delay.

A commencement was made in May, 1919, with the construction of the access road, which is now formed and metalled for a length of 3 miles 34 chains, to a point whence access will be given to Mangahao tunnel No. 1 and dam by means of an inclined tramway 726 ft. in length and reaching a height of 472 ft. 20 chains of tramway have been laid from Arapeti to the outlet of No. 1 tunnel. To enable the old road to serve the present works 4 miles 60 chains of metal was laid, and considerable improvements effected at corners and narrow parts.

Tokomaru Dam: Tests for rock at the foundation have been made, and the results are now being investigated.

At Mangahao Dam the testing of foundations is in hand.

Excavation in connection with the erection of the pipe-line was commenced last month, and good progress is being made. It is anticipated the work will be in such a forward state as to enable tenders for erection of the pipe-line to be called in about September next.

To house the staff four cottages are under construction, and two are nearly completed. An access road to these cottages has been formed and partly metalled.

The delay experienced in obtaining constructional plant has impeded tunnelling-work, and very little progress in this direction can be recorded.

A sawmill was erected and commenced cutting in April last, but the difficulty of securing suitable labour prevents the full output being secured. The timber actually cut, however, resulted in a considerable saving of expenditure.

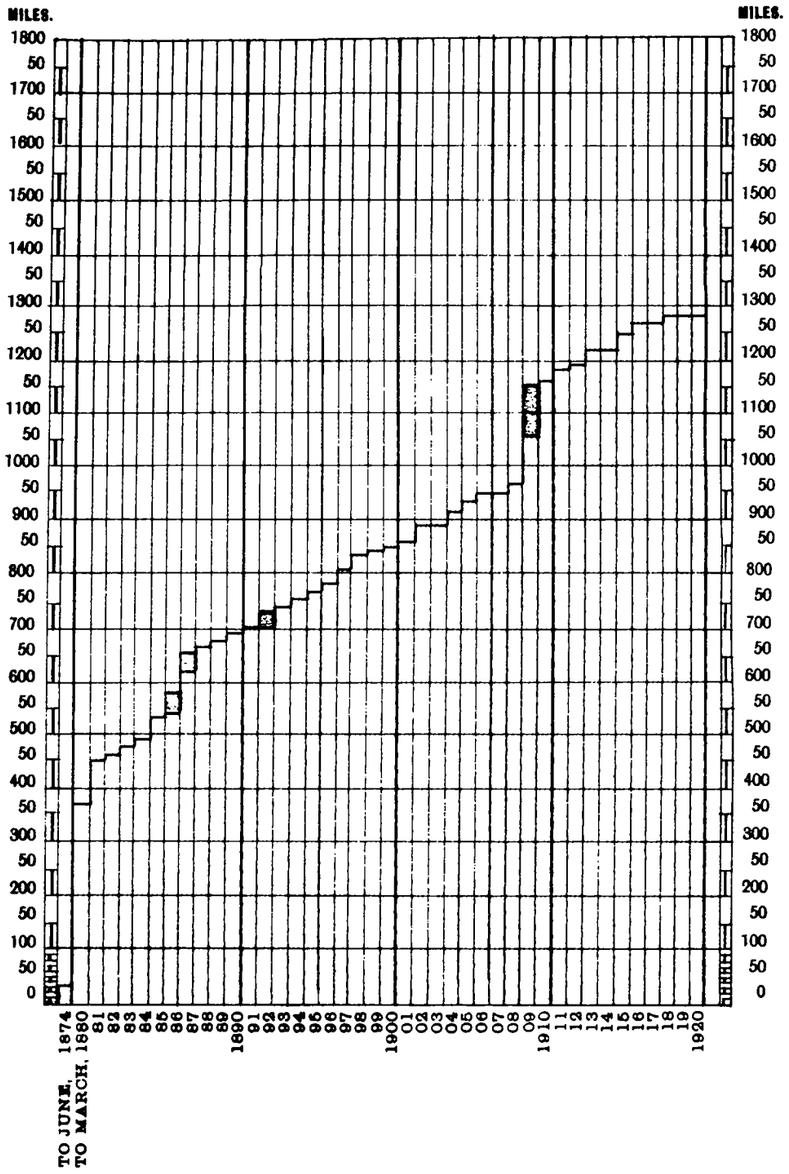
A telephone-line connecting Mangahao and Shannon—ten miles in length—has been erected, and proved of considerable assistance.

DEFENCE WORKS.

Invercargill Rifle Range.—The embankment is now nearing completion, and arrangements have been made to obtain stone for the protection of the seaward slopes of the bank.

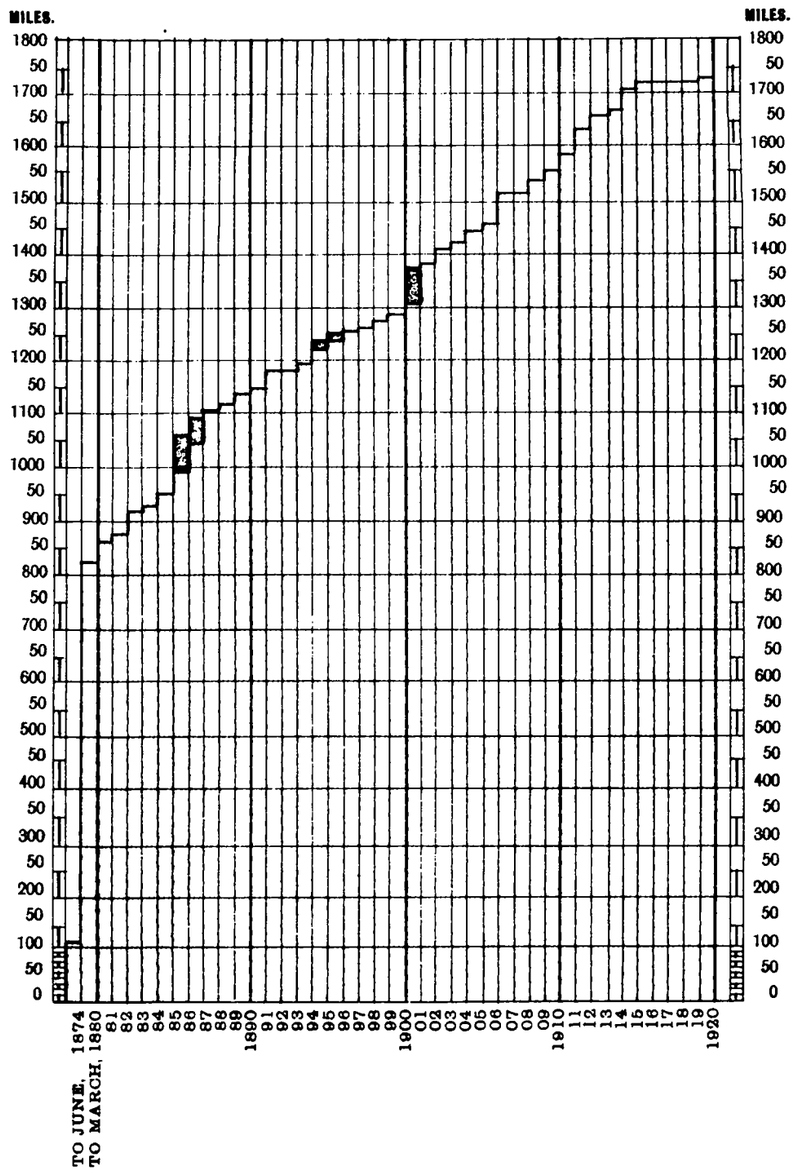
NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

NORTH ISLAND.



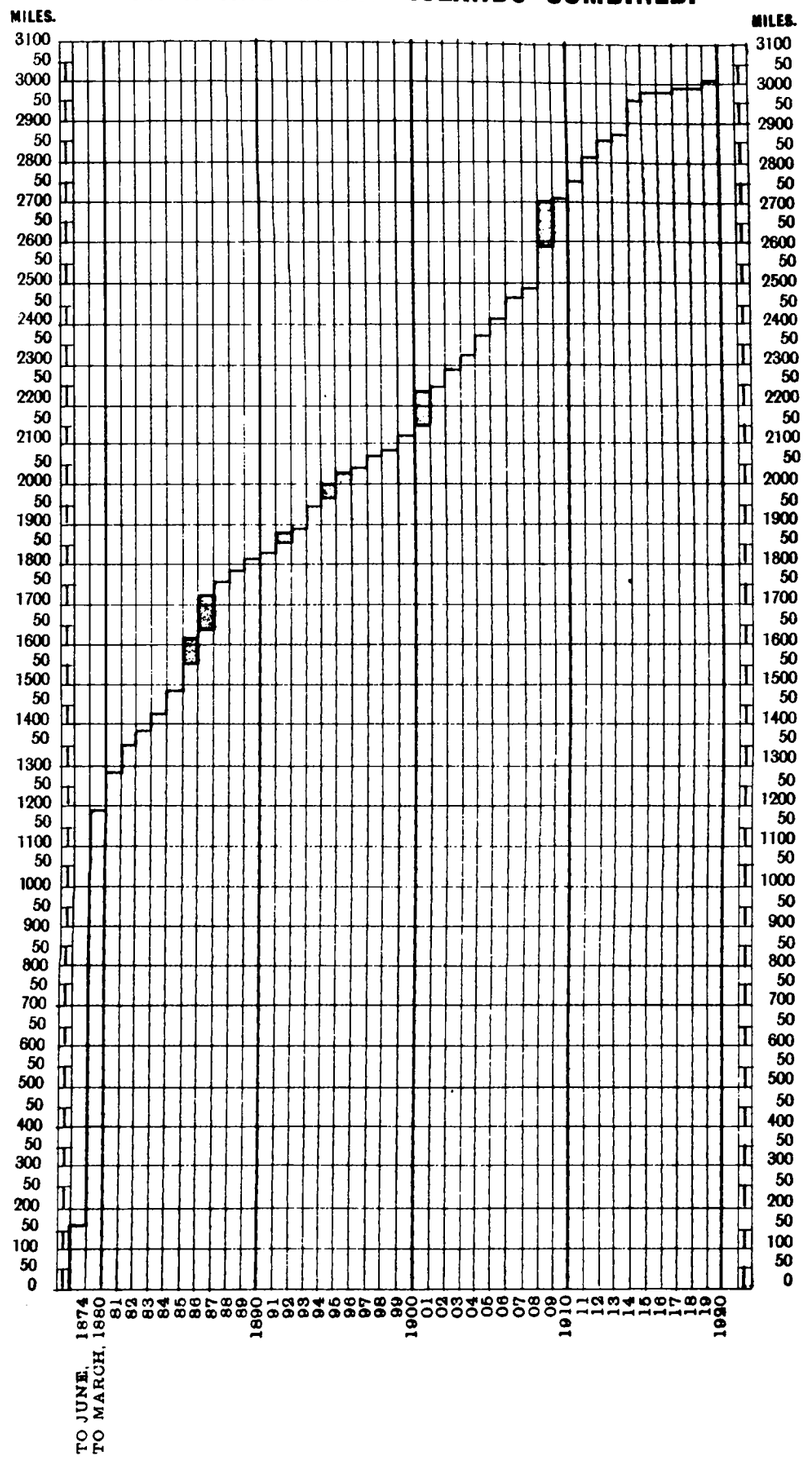
NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

SOUTH ISLAND.



NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

NORTH AND SOUTH ISLANDS COMBINED.



PRIVATE RAILWAYS ACQUIRED BY THE GOVERNMENT SHOWN

PUBLIC WORKS
Engineer's Department.
NEW ZEALAND.

R. W. HOLMES, I.S.O. M.INST. C.E.
ENGINEER-IN-CHIEF

PUBLIC WORKS MAP
SHOWING THE RAILWAYS
NORTH ISLAND
OF
NEW ZEALAND
1920.

Scale of Miles

10 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.

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 (Spit)		97
Wellington to Napier via Manawatu		**202**
Wellington (Te Aro) to Woodville		116
Woodville to Napier (Spit)		97
Wellington to Napier via Wairarapa		**213**
Auckland to Onehunga		**8**
Auckland to Hamilton (Frankton Junction)		85
Hamilton to Ongarue		75
Ongarue to Taumarunui		15
Taumarunui to Ohakune		50
Ohakune to Waiouru		17
Waiouru 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 Te Hana		**75**
Dargaville to Kaihu		**17**
Whangarei to Kawakawa		**46**
Gisborne to Waikohu		**23**
Thames to Waihi		**33**

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PUBLIC WORKS
Engineer's Department.
NEW ZEALAND.

R. W. HOLMES, I.S.O., M.INST. C.E.,
ENGINEER-IN-CHIEF.

PUBLIC WORKS MAP
SHOWING THE RAILWAYS
SOUTH ISLAND
OF
NEW ZEALAND
1920.

Scale of Miles

10 0 10 20 30 40 50 60 70 80

REFERENCE

GOVERNMENT RAILWAYS.

OPENED
UNDER CONSTRUCTION
PROPOSED
EXPLORED

PRIVATE RAILWAYS.

OPENED

168° 169° 170° 171° 172° 173° 174°

40° 41° 42° 43° 44° 45° 46° 47° 48°

TASMAN SEA

PACIFIC OCEAN

C. Farewell
GOLDEN BAY
D'Urville Id
French Pass
COOK STRAIT
WELLINGTON
TASMAN BAY
Karamea R.
KARAMEA BIGHT
Mokikinui R.
C. Foulwind
Buller River
Wairau River
C. Campbell
Clarence R.
Kaikoura Peninsula
Pt Elizabeth
Arahura R.
Abut Hd
Ashley R.
PEGASUS BAY
Waimakariri R.
Banks Peninsula
Haast R.
JACKSON'S BAY
Rakaia R.
Ashburton R.
Hinds R.
Rangitata R.
CANTERBURY BIGHT
Milford Sound
Waitaki R.
L. Wakatipu
L. Te Anau
Manapouri L.
Taieri R.
Clutha R.
Shag Point
C. Saunders
DUNEDIN
OTAGO HAR.
FOVEAUX STRAIT
SOUTH
SOLANDER Id
The Bluff
RUAPUKE Id
STEWART Id
MASON BAY
Port William
East Head
Port Pegasus
S.W. Cape

COLLINGWOOD · GOLDEN BAY · CLIFDEN · MOTUEKA · NELSON · STOKE · RICHMOND · WAKEFIELD · BELGROVE · PICTON · WHITE'S BAY · CLOUDY BAY · TUAMARINA · BLENHEIM · RIVERLANDS · RENWICK · WAIRAU RIVER · WAITOHI R. · DUNCREEK · SEDDON · KAPARU · WARD · MIRZA · FLAXBOURNE · WHARANUI · KEKERANGU · KAIKOURA · Kahautara R. · Conway R. · Waiau-ua R. · Hurunui R. · Jollies Pass · Hanmer Sanatorium · WAIAU · PARNASSUS · CULVERDEN · MINA · DOMETT · ETHELTON · TORLESSE · GRETA · SCARGILL · HAWARDEN · WAIKARI · OMIHI · WAIPARA · AMBERLEY · Ashley R. · RANGIORA · KAIAPOI · CHRISTCHURCH · HORNBY · ADDINGTON · LYTTELTON · LITTELTON HAR. · LITTLE RIVER · AKAROA · SPRINGBURN · METHVEN · MT SOMERS · RAKAIA · SOUTHBRIDGE · L. Ellesmere · ASHBURTON · L. Coleridge · SPRINGFIELD · SHEFFIELD · WHITE CLIFFS · GLENTUNNEL · DARFIELD · ROLLESTON JC · LINCOLN · L. Heron · Mt. Harper · L. Tekapo · TEKAPO · EVERSLEY · FAIRLIE · OHARI · TEMUKA · PLEASANT PT · TIMARU · ST ANDREWS · STUDHOLME JC · WAINATE · KUROW · WAIHAO DOWNS · DUNTROON · TOKARAHI · NGAPARA · WINDSOR JC · PUKEURI JC · OAMARU · MAHENO · HAMPDEN · DUNBACK · INCH VALLEY · PALMERSTON · MIDDLEMARCH · WAIKOUAITI · HINDON · PORTCHALMERS · WINGATUI · OUTRAM · MOSGIEL · DUNEDIN · BEAUMONT · EVANS FLAT · LAWRENCE · L. Waihola · HERIOT · BIG HILL · WESTERTOWN · EDIEVALE · ROXBURGH · MILLERS FLAT · ALEXANDRA · CLYDE · CROMWELL · Cromwell to Oamaru · WILDERBURN · RANFURLY · KYEBURN · KOKONGA · HYDE · WAIHEMO · NASEBY · TAIERI GORGE · MILTON · BALCLUTHA · L. Kaitangata · KAITANGATA · CLINTON · WAIPAHI · GORE · MATAURA · HEDGEHOPE · EDENDALE · WYNDHAM · GLENHAM · MAKAREWA JC · WINTON · INVERCARGILL · MOKOTUA · WAIMAHAKA · TOKANUI · WAIKAWA · FORTROSE · Mataura R. · ORAKAU · TAHAKOPA · STUARTS · PAPATURU · HOUIPAPA · CATLINS · OWAKA · CLINTON · OREPUKI · RIVERTON · THORNBURY · TUATAPERE · TETUA · WAIHOAKA · OTAUTAU · CLIFDEN · NIGHTCAPS · WAIRIO · OHAI · Monowai L. · Hauroto L. · Waiau R. · Aparima R. · Oreti R. · Mataura R. · Waikaia R. · Jacobs R. · Hunter R. · Makarora R. · Wanaka L. · L. Hawea · L. McKerrow · JAMESTOWN · GLENORCHY · QUEENSTOWN · L. Wakatipu · Ada L. · Dart R. · Rees R. · Shotover R. · Nevis R. · Cardrona R. · Lindis Pr. · Spotlis Ck · Kawarau R. · Kawarau Gorge · Roaring Meg · Cairn Burn · Kyeburn Diggings · Hyde Diggings · Manuherikia R. · Ida Valley · Rough Ridge · Poolburn · Taieri R. · Upper Taieri · Waipori R. · Waikaka R. · Waitahuna R. · Tuapeka Mouth · Waitahuna · Lawrence · Gabriels Gully · Switzers · Waipahi · Waikaia · Wendonside · Wreys Bush · Waikaka · Mossburn · Lumsden · Athol · Kingston · Te Anau · Manapouri · Monowai · Orepuki · Riverton · Invercargill · Gore · Waimahaka · Tokanui · Waikawa · Fortrose · Mataura R. · Clutha R. · Port Chalmers · Otago Har. · Dunedin · Mosgiel · Outram · Wingatui · Portchalmers · Hindon · Waikouaiti · Palmerston · Shag Point · Middlemarch · Roxburgh · Alexandra · Clyde · Cromwell · Wanaka · Hawea · Omarama · Kurow · Duntroon · Waitaki R. · Oamaru · Maheno · Hampden · Dunback · Inch Valley · Ashburton · Rangitata R. · Hinds R. · Ashburton R. · Rakaia R. · Taieri R. · Clutha R. · Ashley R. · Waimakariri R. · Hurunui R. · Waiau-ua R. · Conway R. · Kaikoura Peninsula · Banks Peninsula · C. Saunders · Shag Point · Mt Cook 12349ft · Mt Sefton 10959ft · Hermitage 8705ft · Pukaki L. · L. Ohau · L. Tekapo · L. Wanaka · L. Hawea · L. Wakatipu · L. Te Anau · Manapouri L. · Monowai L. · Hauroto L. · Ada L. · L. McKerrow · L. Mapourika · L. Kaniere · L. Kumeri · L. Brunner · L. Sumner · L. Ellesmere · L. Waihola · L. Kaitangata · Rakaia R. · Arthur's Pass · Otira · Jackson's · Kumara · Greymouth · Cobden · Stillwater · Brunner · Paroa · Taramakau · Kotuku · Hokitika · Kaniere · Ruatapu · Ross · Abut Hd · Okarito · Weld · Haast R. · Jackson's Bay · Milford Sound · Ada L. · Dart R. · Rees R. · Glenorchy · Queenstown · Kingston · Te Anau · Manapouri · Mossburn · Lumsden · Riversdale · Waikaka · Kelso · Gore · Mataura · Winton · Invercargill · Orepuki · Riverton · Thornbury · Otautau · Tuatapere · Clifden · Nightcaps · Wairio · Ohai · Monowai L. · Hauroto L. · Waiau R. · Aparima R. · Oreti R. · Mataura R. · Waikaia R. · Jacobs R. · Hunter R. · Makarora R. · Wanaka L. · L. Hawea · L. McKerrow · Jamestown · Glenorchy · Queenstown · L. Wakatipu · L. Te Anau · Manapouri L. · Monowai L. · Hauroto L. · Ada L. · Dart R. · Rees R. · Shotover R. · Nevis R. · Cardrona R. · Lindis Pr. · Spotlis Ck · Kawarau R. · Kawarau Gorge · Roaring Meg · Cairn Burn · Kyeburn Diggings · Hyde Diggings · Manuherikia R. · Ida Valley · Rough Ridge · Poolburn · Taieri R. · Upper Taieri · Waipori R. · Waikaka R. · Waitahuna R. · Tuapeka Mouth · Waitahuna · Lawrence · Gabriels Gully · Switzers · Waipahi · Waikaia · Wendonside · Wreys Bush · Waikaka · Mossburn · Lumsden · Athol · Kingston · Te Anau · Manapouri · Monowai · Orepuki · Riverton · Invercargill · Gore · Waimahaka · Tokanui · Waikawa · Fortrose · Mataura R. · Clutha R. · Port Chalmers · Otago Har. · Dunedin · Mosgiel · Outram · Wingatui · Portchalmers · Hindon · Waikouaiti · Palmerston · Shag Point · Middlemarch · Roxburgh · Alexandra · Clyde · Cromwell · Wanaka · Hawea · Omarama · Kurow · Duntroon · Waitaki R. · Oamaru · Maheno · Hampden · Dunback · Inch Valley · Ashburton · Rangitata R. · Hinds R. · Ashburton R. · Rakaia R. · Taieri R. · Clutha R. · Ashley R. · Waimakariri R. · Hurunui R. · Waiau-ua R. · Conway R. · Kaikoura Peninsula · Banks Peninsula · C. Saunders · Shag Point · Mt Cook 12349ft · Mt Sefton 10959ft · Hermitage 8705ft · Pukaki L. · L. Ohau · L. Tekapo · L. Wanaka · L. Hawea · L. Wakatipu · L. Te Anau · Manapouri L. · Monowai L. · Hauroto L. · Ada L. · L. McKerrow · L. Mapourika · L. Kaniere · L. Kumeri · L. Brunner · L. Sumner · L. Ellesmere · L. Waihola · L. Kaitangata · Rakaia R. · Arthur's Pass · Otira · Jackson's · Kumara · Greymouth · Cobden · Stillwater · Brunner · Paroa · Taramakau · Kotuku · Hokitika · Kaniere · Ruatapu · Ross · Abut Hd · Okarito · Weld · Haast R. · Jackson's Bay · Milford Sound · Ada L. · Dart R. · Rees R. · Shotover R. · Nevis R. · Cardrona R. · Lindis Pr. · Spotlis Ck · Kawarau R. · Kawarau Gorge · Roaring Meg · Cairn Burn · Kyeburn Diggings · Hyde Diggings · Manuherikia R. · Ida Valley · Rough Ridge · Poolburn · Taieri R. · Upper Taieri · Waipori R. · Waikaka R. · Waitahuna R. · Tuapeka Mouth · Waitahuna · Lawrence · Gabriels Gully · Switzers · Waipahi · Waikaia · Wendonside · Wreys Bush · Waikaka · Mossburn · Lumsden · Athol · Kingston · Te Anau · Manapouri · Monowai · Orepuki · Riverton · Invercargill · Gore · Waimahaka · Tokanui · Waikawa · Fortrose · Mataura R. · Clutha R. · Port Chalmers · Otago Har. · Dunedin · Mosgiel · Outram · Wingatui · Portchalmers · Hindon · Waikouaiti · Palmerston · Shag Point · Middlemarch · Roxburgh · Alexandra · Clyde · Cromwell · Wanaka · Hawea · Omarama · Kurow · Duntroon · Waitaki R. · Oamaru · Maheno · Hampden · Dunback · Inch Valley · Ashburton · Rangitata R. · Hinds R. · Ashburton R. · Rakaia R. · Taieri R. · Clutha R. · Ashley R. · Waimakariri R. · Hurunui R. · Waiau-ua R. · Conway R. · Kaikoura Peninsula · Banks Peninsula · C. Saunders · Shag Point

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 Waimahaka		26
Balclutha to Houipapa		25
Dunedin to Clyde		143
Dunedin to Port Chalmers		8
Gore to Lumsden		37
Gore to Waikaka		16
Waipahi to Edievale		26
Milton to Big Hill		31
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 Cass		72
Christchurch to Little River		36
Christchurch to Culverden		69
Christchurch to Mina		76
Picton to Seddon		34
Nelson to Tadmor		42
Greymouth to Reefton		47
Greymouth to Ross		39
Greymouth to Otira		51
Westport to Mokihinui Colliery		31

By Authority: MARCUS F. MARKS, Government Printer, Wellington

Enclosure to Appendix B.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920.

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, 1904–17.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line									
							Surveyed.	Under Formation.	Under Plate-laying.	Opened.						
										Date.	—	1917–18.	1918–19.	1919–20.	—	Total.
1	2	3	4	5	6	7	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.
Kawakawa-Grahamtown (Onerahi)	Kawakawa ..	7 16	Opua Wharf - Kawakawa	7 16	0 57	7 73	..	..	..	..	..	..	..	..	..	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	..	..	..	..	..	
			Hukerenui-Kamo ..	16 0	3 29	19 29	..	..	..	..	..	..	..	..	..	27 2
	Kamo-Grahamtown	9 22	Kamo-Kioreroa ..	6 52	2 27	8 79	..	..	..	..	..	..	..	..	..	
			Kioreroa-Onerahi ..	2 50	1 16	3 66	..	..	..	2 Oct., 1911	..	..	..	..	..	2 50
	Kawakawa-Hokianga	45 25	Otiria-Kaikohe ..	16 25	1 45	17 70	..	..	..	1 May, 1914	..	..	..	..	..	16 25
			Kaikohe-Hokianga ..	29 0	2 40	31 40	18 0	8 0	3 0	..	..	..	..	..	..	..
Kaihu Valley	Kaihu Valley ..	24 30	Dargaville-Booms ..	17 21	0 75	18 16	..	..	..	..	..	..	..	..	..	
			Booms-Tarawhati ..	2 37	0 25	2 62	..	..	..	1 June, 1914	..	..	..	..	..	19 58
			Tarawhati-Donnelly's Crossing	4 52	0 38	5 10	..	2 70	1 62	..	..	..	..	..	..	..
North Auckland Main Trunk Railway	Kaipara Northwards	84 24	Extension	23 57	3 7	26 64	14 0	9 57	..	..	..	..	..	..	..	..
			McCarrol's - Paparoa	4 30	0 25	4 55	4 30	1 75	..	..	..	..	..	..	..	..
			Paparoa-Huarau ..	1 70	0 38	2 28	..	..	1 70	..	..	..	..	..	..	..
			Huarau-Bickerstaffe	2 05	0 13	2 18	..	..	2 05	..	..	..	..	..	..	..
			Bickerstaffe-Ranganui	4 25	0 61	5 06	..	..	4 25	..	..	..	..	..	..	..
			Ranganui-Kaiwaka ..	2 35	0 62	3 17	..	..	..	1 Aug., 1914	..	..	..	..	..	2 35
			Kaiwaka - Te Hana ..	8 65	1 03	9 68	..	..	..	18 Mar. 1913	..	..	..	..	..	
			Te Hana-Wellsford ..	3 27	0 58	4 5	..	..	..	16 May, 1910	..	..	..	..	..	
			Wellsford-Wayby ..	3 18	0 28	3 46	..	..	..	1 April, 1909	..	..	..	..	..	
			Wayby-Hoteo ..	3 40	0 13	3 53	..	..	..	13 May, 1908	..	..	..	..	..	
			Hoteo-Kaipara Flats	2 45	0 13	2 58	..	..	..	11 June, 1907	..	..	..	..	..	45 42
			Kaipara Flats-Woodcock's	3 5	0 16	3 21	..	..	..	17 Nov., 1905	..	..	..	..	..	
			Woodcock's-Ahuroa	2 41	0 16	2 57	..	..	..	18 May, 1905	..	..	..	..	..	
			Ahuroa-Helensville ..	18 41	1 75	20 36	..	..	..	..	..	..	..	..	..	

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued*.

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
Whangarei Branch Railway	Whangarei Branch ..	19 79	Kioreroa-Portland ..	5 23	0 37	5 60	..	..	5 23	..	..	..	..	..	..	..
			Portland-Waiotira ..	14 56	1 39	16 15	..	2 40	12 16	..	..	..	..	..	..	..
Waipu Branch	Waiapu Branch Rly.	16 45	Oakleigh-Waipu ..	16 45	0 25	16 70	2 40	8 40	..	..	..	..	..	..	..	..
Kaipara-Waikato	Kaipara-Newmarket	35 73	Helensville-Newm'rk't	35 73	6 66	42 59	..	..	..	..	..	..	..	..	..	35 73
	Onehunga Branch ..	2 73	Penrose - Onehunga Wharf	2 73	1 70	4 63	..	..	..	..	..	..	..	..	..	2 73
	Auckland-Waikato ..	100 13	Auckland-Te Awamutu	100 13	16 66	116 79	..	..	..	..	..	..	..	..	..	100 13
	Auckland-Penrose—Deviation via Beach	6 50	Deviation via Beach	6 50	..	6 50	6 50	..	..	..	..	..	..	..	..	..
	Auckland City Branch—Kingsland Station to Auckland Station via Western Park and Freeman's Bay	2 60	Auckland City Branch	2 60	..	2 60	2 60	Prelim.	..	..	..	..	..	..	..	..
Waiuku Branch	Waiuku Branch Railway	12 69	Paerata-Patumahoe	4 20	0 78	5 18	..	..	..	10 Dec., 1917	..	4 20	..	..	..	4 20
			Patumahoe-Waiuku	8 49	1 3	9 52	..	7 23	1 26	..	..	..	..	..	..	..
Huntly-Awaroa	Huntly-Awaroa ..	9 0	Huntly-Awaroa ..	9 0	..	9 0	..	0 25	..	..	..	..	..	..	..	7 20
Surveys, new lines	Paeroa-Pokeno ..	40 15	Paeroa-Pokeno ..	40 15	..	40 15	40 15	..	..	..	..	..	..	..	..	..
Waikato-Thames	Waikato-Thames ..	62 58	Frankton Junction-Thames	62 58	10 17	72 75	..	..	..	..	..	..	..	..	..	62 58
Hamilton-Cambridge	Hamilton-Cambridge	12 2	Ruakura Junction-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
East Coast Railway	Waihi-Opotiki, or East Coast Railway	138 27	Waihi-Tauranga ..	41 60	..	41 60	9 0 15 0*	17 60	..	..	..	..	..	..	..	..
			Tauranga-Te Maunga Junction	3 20	..	3 20	..	..	3 20	..	..	..	..	..	..	..
			Te Maunga Junction-Te Puke	8 65	1 23	10 8	..	..	8 65†	..	..	..	..	..	..	..
			Te Puke-Paengaroa ..	5 65	1 16	7 01	..	..	5 65	..	..	..	..	..	..	..
			Paengaroa - Pongakawa	4 30	0 47	4 77	..	..	4 30	..	..	..	..	..	..	..
			Pongakawa-Otamarakau	6 72	0 26	7 18	..	..	6 72‡	..	..	..	..	..	..	..
			Otamarakau-Matata	9 8	0 43	9 51	..	0 44	9 8§	..	..	..	..	..	..	..

* Trial survey. † Te Maunga survey. ‡ Otamarakau. § Matata yard.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued*.

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
East Coast Railway—*contd.*	Waihi-Opotiki—*ctd.*		Matata-Taneatua ..	20 0	..	20 0	6 0* / 2 0†	7 40	4 40	..	..	..	..	..	..	..
			Taneatua-Opotiki ..	30 0	Prelim. Survey	30 0	14 0	Prelim.	..	..	..	..	..	..	..	..
	Branch Lines ..	..	Mount Maunganui-Te Maunga Junction	4 27	0 67	5 14	..	..	..	..	..	..	..	..	..	..
			Te Puke Quarry ..	3 0	0 20	3 20	..	..	..	..	..	..	..	..	..	..
			Moturiki Quarry ..	1 0	0 10	1 10	..	..	..	..	..	..	..	..	..	..
Thames Valley-Rotorua	Thames Valley-Rotorua	69 33	Morrinsville-Rotorua	69 33	5 27	74 60	..	..	..	..	..	..	..	..	..	69 33
Gisborne-Rotorua	Gisborne-Opotiki ..	92 44	Gisborne Wharf-Kaiteratahi	13 10	2 45	15 55	..	..	..	..	..	..	..	..	..	
			Kaiteratahi-Karaka	5 5	0 71	5 76	..	..	..	13 April, 1905	..	..	..	..	..	
			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-Rakauroa ..	6 60	0 32	7 12	..	..	..	2 Nov., 1914	..	..	..	..	..	
			Rakauroa-Matawai ..	5 65	0 50	6 35	..	..	..	2 Nov., 1914	..	..	..	..	..	
			Matawai-Motuhora	4 78	0 61	5 59	..	..	..	26 Nov., 1917	..	4 78	..	..	..	
			Motuhora-Motu ..	2 10	..	2 10	2 10	..	..	..	..	..	..	..	..	
			Motu-Opotiki ..	41 2	..	41 2	41 2	Estim.	..	..	..	..	..	..	..	..
New survey	Napier-Gisborne ..	130 01	Napier-West Shore ..	3 12	0 58	3 70	..	3 12	..	..	..	..	..	..	..	..
			West Shore-Petane ..	3 63	..	3 63	..	3 63	..	..	..	..	..	..	..	..
			Petane-Eskdale ..	4 65	..	4 65	..	4 65	..	..	..	..	..	..	..	..
			Eskdale-Tutira ..	17 47	..	17 47	2 32 / 15 15	Permt. / Prelim.	..	..	..	..	..	..	..	..
			Tutira-Wairoa ..	28 54	..	28 54	18 65	Prelim.	..	..	..	..	..	..	..	..
			Wairoa River-Gisborne	72 0	..	72 0	44 0	12 67	2 17	..	..	..	..	..	..	..
	Gisborne-Napier ..	76 51	Gisborne Station-Makaraka	3 5	..	3 5	..	..	..	..	..	..	..	..	..	..
			Makaraka-Patutahi	4 66	0 40	5 26	..	..	4 66	..	..	..	..	..	..	..
			Patutahi-Ngatapa ..	6 50	0 69	7 39	..	..	6 50	..	..	..	..	..	..	..
			Ngatapa-Waikura ..	12 0	..	12 0	8 13	2 17	1 50	..	..	..	..	..	..	..

* Permanent. † Preliminary.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued.*

NORTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
New survey —*contd.*	Napier-Gisborne—*ctd*		Waikura-Waterfall	5 0	..	5 0	5 0	..	..	..	..	..	..	..	..	..
			Waterfall-Hangaroa	4 0	..	4 0	4 0	..	..	..	..	..	..	..	..	..
			Hangaroa - Te Reinga	17 11	..	17 11	17 11	Prelim.	..	..	..	..	..	..	..	..
			Te Reinga-Marumaru	12 40	..	12 40	9 40	Prelim.	..	..	..	..	..	..	..	..
			Marumaru - Wairoa River	7 0	..	7 0	7 0	..	..	..	..	..	..	..	..	..
			Wairoa Wharf Siding	1 64	..	1 64	1 64	..	..	..	..	..	..	..	..	..
			Wairoa-Napier ..	2 55	..	2 55	2 55	..	..	..	..	..	..	..	..	..
	Wairoa-Waikokopu..	24 12	Wairoa-Nuhaka ..	17 12	..	17 12	..	..	..	..	..	..	..	..	..	..
			Nuhaka-Waikokopu	7 0	..	7 0	..	..	..	..	..	..	..	..	..	..
Napier-Woodville and Palmerston North	Napier-Woodville ..	96 65	Napier Spit-Woodville	96 65	15 5	111 70	..	..	..	..	..	..	..	..	..	96 65
	Woodville-Palmerston North	17 21	Woodville-Palmerston North	17 21	0 51	17 72	..	..	..	..	..	..	..	..	..	17 21
Wellington-Woodville	Woodville-Wellington	115 79	Woodville-Wellington [Te Aro]	115 79	21 73	137 72	..	..	..	..	..	..	..	..	..	115 79
	Greytown Branch ..	3 7	Woodside-Greytown	3 7	0 64	3 71	..	..	..	..	..	..	..	..	..	3 7
	Featherston - Martinborough	11 50	Featherston - Martinborough	11 50	..	11 50	11 50	..	..	..	..	..	..	..	..	..
	Greytown - Martinborough	4 62	Greytown - Martinborough	4 62	..	4 62	4 62*	..	..	..	..	..	..	..	..	..
Rimutaka Incline Deviation Surveys	Coach-road Route ..	9 0	Kaitoke-Featherston	9 0	..	9 0	9 0	Prelim.	..	..	..	..	..	..	..	..
	Tauherenikau Route	21 30	Upper Hutt-Woodside	21 30	..	21 30	21 30	..	..	..	..	..	..	..	..	..
	Wainui-o-mata Route	31 40	Petone-Pigeon Bush	31 40	..	31 40	31 40	..	..	..	..	..	..	..	..	..
	Coast Route ..	52 0	Petone - Pigeon Bush	52 0	..	52 0	52 0	..	..	..	..	..	..	..	..	..
	Coast Route ..	70 0	Petone-Carterton, via Martinborough	70 0	..	70 0	70 0	..	..	..	..	..	..	..	..	..
	Wellington-Manawatu	83 37	Wellington-Longburn	83 37	15 76	99 33	..	..	..	7 Dec., 1908†	..	..	..	..	..	83 37
Foxton-New Plymouth	Foxton-Patea ..	120 44	Foxton-Patea ..	120 44	14 75	135 39	..	..	..	..	..	..	..	..	..	120 44
	Route Improvement Surveys	26 7	Turakina-Matarawa	11 67	..	11 67	11 67	..	..	..	..	..	..	..	..	..
			Aramoho - Goat Valley Tunnel	7 40	..	7 40	7 40	..	..	..	..	..	..	..	..	..
			Kai Iwi - Okehu ..	3 60	..	3 60	3 60	..	..	..	..	..	..	..	..	..
			Nukumaru-Waitotara	3 0	..	3 0	3 0	Prelim.	..	..	..	..	..	..	..	..

* Trial survey. † Date of purchase.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued*.

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
Foxton-New Plymouth —*contd.*	Patea - Waitara and New Plymouth	72 29	Patea-New Plymouth Breakwater	72 29	11 52	84 1	..	..	..	..	..	..	..	..	..	72 29
	Bull's Branch ..	3 79	Bull's Branch ..	3 79	..	3 79	3 79	Prelim.	..	..	..	..	..	..	..	..
	Wanganui Branch ..	3 29	Aramoho-Wanganui	3 29	2 23	5 52	..	..	..	..	..	..	..	..	..	3 29
Stratford-Main Trunk	Stratford-Main Trunk	112 47	Stratford-Toko ..	6 26	0 40	6 66	..	..	..	..	..	..	..	..	..	
			Toko-Oruru ..	4 72	0 36	5 28	..	..	..	1 Mar., 1905	..	..	..	..	..	
			Oruru-Huiroa ..	4 50	0 35	5 5	..	..	..	1 April, 1908	..	..	..	..	..	
			Huiroa-Te Wera ..	6 77	1 16	8 13	..	..	..	20 June, 1910	..	..	..	..	..	
			Te Wera-Pohokura ..	8 55	0 65	9 40	..	..	..	1 Aug., 1912	..	..	..	..	..	42 26
			Pohokura - Whangamomona	6 13	0 45	6 58	..	..	..	1 July, 1914	..	..	..	..	..	
			Whangamomona - Kohurutahi	4 53	0 29	5 02	..	..	..	7 Jan., 1918	..	4 53	..	..	..	
			Kohurutahi-Tahora	5 14	0 37	5 51	..	0 32	4 62	..	..	..	..	..	..	..
			Tahora-Heao ..	9 40	..	9 40	3 40	1 40	..	..	..	..	..	..	..	..
			Heao-Matiere ..	35 57	..	35 57	35 57	Prelim.	..	..	..	..	..	..	..	..
			Okahukura-Matiere ..	10 23	0 75	11 18	..	10 23	..	..	..	..	..	..	..	..
			Matiere-Ohura ..	9 47	..	9 47	7 47	2 0	..	..	..	..	..	..	..	..
	Stratford - Ongarue—Deviations	33 40	Mangaroa-Puketutu	33 40	..	33 40	33 40	Prelim.	..	..	..	..	..	..	..	..
		14 0	Aramatai-Hangatiki	14 0	..	14 0	14 0	Prelim.	..	..	..	..	..	..	..	..
	Puketutu - Mangaroa Deviation	30 0	..	30 0	..	30 0	30 0	Prelim.	..	..	..	..	..	..	..	..
	Opunake-Mountain Rd.	23 10	Opunake-Eltham ..	23 10	..	23 10	23 10	..	..	..	..	..	..	..	..	..
	Te Roti-Moturoa ..	55 65	Te Roti-Kapuni ..	7 0	1 19	8 19	..	7 0	..	..	..	..	..	..	..	..
			Kapuni-Auroa ..	5 0	0 33	5 33	5 0	5 0	..	..	..	..	..	..	..	..
			Auroa-Pihama ..	4 42	..	4 42	4 42	..	..	..	..	..	..	..	..	..
			Pihama-Opunake ..	5 68	..	5 68	5 68	..	..	..	..	..	..	..	..	..
			Opunake-Stony River	18 70	..	18 70	18 70	..	..	..	..	..	..	..	..	..
			Stony River-Moturoa	14 45	..	14 45	14 45	..	..	..	..	..	..	..	..	..
	Manaia Branch ..	5 50	Manaia-Kapuni ..	5 50	0 78	6 48	..	5 50	..	..	..	..	..	..	..	..
	Mount Egmont Branch	8 77	Manganui Section ..	5 74	2 3	7 77	..	..	..	1 April, 1908	..	..	..	..	..	6 0
			Quarry Section ..	3 3	0 60	3 63	..	1 58	1 25	..	..	..	..	..	..	..

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued.*

NORTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
North Island Main Trunk Railway	Marton-Te Awamutu	209 69	Marton Junction-Mangaweka	31 67	4 61	36 48	..	..	..	..	..	..	..	..	..	
			Mangaweka-Taihape	13 1	1 61	14 62	..	..	..	10 Sep., 1904	..	..	..	..	..	50 58
			Taihape-Mataroa ..	5 70	0 61	6 51	..	..	..	1 June, 1907	..	..	..	..	..	
			Mataroa-Waiouru ..	18 10	12 50	97 28	..	..	..	30 June, 1908	..	..	..	..	..	
			Waiouru-Erua ..	30 63			..	..	..	13 Feb., 1909	..	..	..	..	..	84 58
			Erua-Taumarunui ..	35 65			..	..	..	9 Nov., 1908	..	..	..	..	..	
			Taumarunui-Te Awamutu	74 33	6 20	80 53	..	..	..	..	..	..	..	..	..	74 33
	Waipa Gravel Access Branch	7 40	Otorohanga ..	7 40	..	7 40	..	..	..	..	..	..	..	..	..	..
	Raetihi Branch ..	8 50	Raetihi Section ..	8 50	1 7	9 57	..	..	..	18 Dec., 1917	..	8 50	..	..	..	8 50
	Central Route Deviation Surveys	30 0	Ohakune to Mokau-Retaruke Divide	30 0	..	30 0	30 0	Prelim.	..	..	..	..	..	..	..	..
		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.	..	..	..	..	..	..	..	..
	Ngaire-Ongarue ..	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	..	..	..	..	..	..	..	..	..
	Waitara-Tangarakau	46 75	Waitara Section ..	46 75	..	46 75	46 75	..	..	..	..	..	..	..	..	..
	Urenui Route ..	12 0	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 ..	..	2746 70	..	2746 70	210 02	2956 72	1156 42	127 21	95 77	..	1255 65	22 41	..	..	..	1278 26

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, 1920.

SOUTH 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, 1904-17.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line									
							Surveyed.	Under Formation.	Under Plate-laying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
Nelson-Roundell	Nelson-Belgrove ..	22 73	Nelson-Belgrove ..	22 73	2 52	25 45	..	..	..	..	..	..	..	..	..	22 73
Midland Railway	Stillwater-Belgrove (via Tadmor)	147 7	Stillwater-Reefton S.	37 30	4 79	42 29	..	..	..	..	..	..	..	..	..	
			Reefton S.-Reefton N.	1 30	1 0	2 30	..	..	..	31 Mar., 1907	..	..	..	..	..	
			Reefton N.-Cronadun	5 38	0 56	6 14	..	..	..	7 Aug., 1908	..	..	..	..	..	57 32
			Cronadun-Landing ..	8 40	0 45	9 5	..	..	..	June, 1914	..	..	..	..	..	
			Landing-Inangahua	6 0	0 10	6 10	1 26	..	..		..	..	..	..	..	
			Inangahua-Kawatiri	46 43	..	46 43	46 43	..	..	..	..	..	..	..	..	..
			Glenhope-Kawatiri ..	4 5	0 15	4 20	4 5	3 11	..	..	..	..	..	..	..	..
			Glenhope-Tui ..	9 42	0 55	10 17	..	..	..	2 Sep., 1912	..	..	..	..	..	
			Tui-Kiwi	3 17	0 34	3 51	..	..	..		..	..	..	..	..	
			Kiwi-Tadmor ..	5 9	0 29	5 38	..	..	..	18 Dec., 1908	..	..	..	..	..	37 61
			Tadmor-Kohatu ..	10 29	0 69	11 18	..	..	..	7 Aug., 1906	..	..	..	..	..	
			Kohatu-Belgrove ..	9 44	0 62	10 26	..	..	..	..	..	..	..	..	..	
	Brunner-Springfield	92 68	Brunner-Otira ..	42 27	2 68	45 15	..	..	..	..	..	..	..	..	..	42 27
			Rolleston Section ..	1 2	..	1 2	..	..	1 2	..	..	..	..	..	..	..
			Tunnel Contract ..	8 0	..	8 0	..	7 12	..	1 July, 1914	..	..	..	..	..	
			Tunnel Contract-Cass	13 79	0 20	14 19	..	..	..	1 July, 1914	..	..	..	..	..	
			Cass-Broken River ..	15 22	1 29	16 51	..	..	..	10 Dec., 1910	..	..	..	..	..	42 27*
			Broken River-Otarama	7 40	0 30	7 70	..	..	..	29 Oct., 1906	..	..	..	..	..	
			Otarama-Springfield	4 58	0 16	4 74	..	..	..	29 Oct., 1906	..	..	..	..	..	
Blackball Railway	Ngahere-Blackball ..	3 40	Ngahere-Blackball ..	3 40	1 20	4 60	..	..	..	16 July, 1910	..	..	..	..	..	3 40
Greymouth-Nelson Creek	Greymouth-Nelson Creek	7 51	Greymouth-Brunnerton-Stillwater	7 51	6 18	13 69	..	..	..	..	..	..	..	..	..	7 51
Westport-Ngakawau	Westport-Ngakawau	19 56	Westport-Ngakawau	19 56	8 12	27 68	..	..	..	..	..	..	..	..	..	19 56
Westport-Ngakawau Extension	Ngakawau-Mokihinui	7 12	Ngakawau-Mokihinui	7 12	1 18	8 30	..	..	..	..	..	..	..	..	..	7 12
	Mokihinui Colliery Line	3 69	Mokihinui-Seddonville	3 69	0 25	4 14	..	..	..	..	..	..	..	..	..	3 69
Westport-Inangahua	Westport-Inangahua Junction	26 0	Westport-Te Kuha ..	5 74	0 10	6 4	..	..	..	1 April, 1912	..	..	..	..	..	5 74
			Te Kuha-Inangahua Junction	20 6	..	20 6	13 6	4 0	..	..	..	..	..	..	..	..

* Including 68 chains of tunnel contract.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued*.

SOUTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
State Colliery, or Coal Creek Railway	Greymouth - Point Elizabeth Collieries	5 1	Greymouth-Runanga Colliery	5 1	2 10	7 11	..	..	..	1 Dec., 1904	..	..	..	..	..	5 1
	Extension ..	3 69	Runanga Colliery-Point Elizabeth Collieries	3 69	2 20	6 9	..	..	..	21 Jan., 1914	..	..	..	..	3 69	3 69
Greymouth-Hokitika	Greymouth-Hokitika	24 37	Greymouth-Hokitika	24 37	2 10	26 47	..	..	..	..	..	..	..	..	..	24 37
Kumara Branch	Kumara Branch ..	4 10	Kumara Branch ..	4 10	..	4 10	4 10	..	..	..	..	..	..	..	..	..
Hokitika-Ross	Hokitika-Ross ..	15 75	Hokitika-Ruatapu ..	7 10	0 61	7 71	..	..	..	9 Nov., 1906	..	..	..	..	..	7 10
			Ruatapu-Ross ..	7 21	0 69	8 10	..	..	..	1 April, 1909	..	..	..	..	..	7 21
			Survey to Ross Township	1 44	..	1 44	1 44	..	..	..	..	..	..	..	..	..
New survey	Ross-Waitaha ..	10 0	Ross-Waitaha ..	10 0	..	10 0	2 54	..	..	..	..	..	..	..	..	..
Picton-Waipara	Picton - Kaikoura ..	92 38	Picton-Seddon ..	33 45	3 26	36 71	..	..	..	..	..	..	..	..	..	
			Seddon-Kaparu ..	6 30	0 76	7 26	..	..	..	13 April, 1911	..	..	..	..	..	
			Kaparu-Ward ..	8 15	1 20	9 35	..	..	..		..	..	..	..	..	56 6
			Ward-Mirza ..	3 38	0 30	3 68	..	..	..	4 Dec., 1915	3 38	..	..	..	..	
			Mirza-Wharanui ..	4 38	0 34	4 72	..	..	..		4 38	..	..	..	..	
			Wharanui-Kekerangu	7 0	..	7 0	7 0	1 18	3 20	..	..	..	..	..	..	..
			Kekerangu - Hapuka River	29 32	..	29 32	29 32	..	..	..	..	..	..	..	..	..
	Hapuka River-Mendip Hills	40 50	Hapuka River-Limestone Creek	23 0	..	23 0	23 0	Prelim.	..	..	..	..	..	..	..	..
			Limestone Creek-Conway River	7 0	..	7 0	..	..	..	..	..	..	..	..	..	..
			Conway River - Mendip Hills	10 50	..	10 50	..	..	..	..	..	..	..	..	..	..
	Mendip Hills - Parnassus	5 61	Mendip Hills ..	5 61	..	5 61	2 0	3 61	..	..	..	..	..	..	..	..
	Parnassus-Wa ipara	44 14	Parnassus-Mina ..	8 43	1 14	9 57	..	..	..	1 Sept., 1912	..	..	..	..	..	
			Mina-Domett ..	3 63	0 70	4 53	..	..	..	1 Aug., 1910	..	..	..	..	..	
			Domett-Tormore ..	3 10	0 66	9 24	..	..	..	14 Nov., 1906	..	..	..	..	..	
			Tormore-Ethelton ..	5 28			..	..	..	21 Mar., 1907	..	..	..	..	..	44 14
			Ethelton-Scargill ..	8 51	0 51	9 22	..	..	..	3 Nov., 1905	..	..	..	..	..	
			Scargill-Waipara ..	14 59	1 2	15 61	..	..	..	..	..	..	..	..	..	
Hurunui-Waitaki	Main Line.. ..	206 7	Culverden-South Waitaki	206 7	64 68	270 75	..	..	..	..	..	..	..	..	..	206 7
		13 0	Culverden-Achray ..	5 23	0 10	5 33	..	..	..							
			Achray-Rotherham..	1 75	0 43	2 38	..	..	..	15 Dec., 1919	..	..	..	13 0	..	13 0
			Rotherham-Waiau ..	5 62	1 3	6 65	..	..	..							

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued.*

SOUTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
Hurunui-Waitaki—*contd.*	*Branches,—*															
	Rangiora - Oxford	21 76	Rangiora-Oxford West	21 76	2 36	24 32	..	..	..	..	..	..	..	..	..	21 76
	Eyreton (from Main Line)	20 7	Main Line - West Eyreton-Bennett's	20 7	1 61	21 68	..	..	..	..	..	..	..	..	..	20 7
	Lyttelton ..	6 26	Lyttelton - Christchurch	6 26	..	6 26	..	..	..	..	..	..	..	..	..	6 26
	Southbridge ..	25 31	Hornby-Southbridge	25 31	3 17	28 48	..	..	..	..	..	..	..	..	..	25 31
	Little River-Akaroa	42 10	Lincoln-Little River	22 46	2 5	24 51	..	..	..	..	..	..	..	..	..	22 46
			Reconnaissance ..	19 44	..	19 44	19 44	Prelim.	..	..	..	..	..	..	..	..
	Springfield ..	30 60	Rolleston-Springfield	29 63	3 7	32 67	..	..	..	..	..	..	..	..	..	30 60
			Springfield-Coal-mine	0 77												
	Whitecliffs ..	11 38	Darfield-Whitecliffs	11 33	1 53	13 11	..	..	..	..	..	..	..	..	..	11 38
			Whitecliffs to Bridge	0 5												
	Rakaia - Ashburton Forks	22 20	Rakaia-Methven ..	22 20	2 65	25 5	..	..	..	..	..	..	..	..	..	22 20
	Ashburton ..	29 46	Tinwald-Springburn	27 29	1 52	29 1	..	..	..	..	..	..	..	..	..	27 29
			Extension ..	2 17	..	2 17	2 17	..	..	..	..	..	..	..	..	..
	Opawa and Albury to Fairlie Creek and Burke's Pass	55 8	Washdyke-Eversley	36 5	2 45	38 50	..	..	..	..	..	..	..	..	..	36 5
			Preliminary survey ..	19 3	..	19 3	19 3	Prelim.	..	..	..	..	..	..	..	..
	Waimate ..	17 43	Studholme-Waimate	4 42	1 3	5 45	..	..	..	..	..	..	..	..	..	12 63
			Waimate-Waihao Downs	8 21	0 54	8 75	..	..	..	..	..	..	..	..	..	
			Waihao Downs-Serpentine	2 65	..	2 65	..	2 65	..	..	..	..	..	..	..	..
			Sepentine-Kelcher's	1 75	..	1 75	..	1 75	..	..	..	..	..	..	..	..
Canterbury Interior Main Line	Oxford-Temuka ..	83 0	Oxford-Sheffield ..	11 44	0 27	11 71	..	..	..	..	..	..	..	..	..	11 44
			Surveyed ..	21 7	..	21 7	21 7	..	..	..	..	..	..	..	..	..
			Reconnaissance ..	50 29	..	50 29	50 29	Prelim.	..	..	..	..	..	..	..	..
Waitaki-Bluff and Branches	Main Line ..	246 69	South Waitaki-Bluff	246 69	59 13	306 2	..	..	..	..	..	..	..	..	..	246 69
	Branches,—															
	Duntroon - Hakateramea	37 33	Pukeuri-Duntroon ..	21 75	1 35	23 30	..	..	..	..	..	..	..	..	..	21 75
			Duntroon - Hakateramea	15 38	1 5	16 43	..	..	..	..	..	..	..	..	..	15 38
	Ngapara ..	14 76	Waiareka-Ngapara ..	14 76	1 31	16 27	..	..	..	..	..	..	..	..	..	14 76
	Livingstone ..	16 40	Windsor-Tokorahi ..	12 0	0 50	12 50	..	0 5	..	..	..	..	..	..	..	11 75
			Survey (trial) ..	4 40	..	4 40	4 40	Prelim.	..	..	..	..	..	..	..	..
	Palmerston - Waihemo	8 55	Palmerston-Dunback	8 55	0 54	9 29	..	..	..	..	..	..	..	..	..	8 55
		0 65	Surveyed ..	0 65	..	0 65	0 65	..	..	..	..	..	..	..	..	..

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued.*

SOUTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917-18.	1918-19.	1919-20.	—	Total.
1	2	3	4	5	6	7	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.
Waitaki-Bluff and Branches —*contd.*	*Branches*—contd.															
	Inch Valley Railway	2 29	Inch Valley-Lime Kiln	2 29	0 23	2 52	..	..	..	..	..	..	..	..	..	2 29
	Port Chalmers ..	1 9	Glendermid - 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	..	..	..	..	..	..	..	..	..	
	Lawrence-Roxburgh	37 10	Lawrence-Big Hill ..	7 33	0 44	7 77	..	..	..	1 Aug., 1910	..	..	..	..	..	34 65
			Big Hill-Beaumont..	5 36	0 45	6 1	..	..	..	15 Dec., 1914	..	..	..	..	..	
			Beaumont-Roxburgh	24 21	..	24 21	24 21	..	..	..	..	..	..	..	..	..
	Lovell's Flat - Tuapeka Mouth	23 20	Surveyed	23 20	..	23 20	23 20	..	..	..	..	..	..	..	..	..
	Balclutha - Tuapeka Mouth	22 0	Surveyed	7 0	..	7 0	..	..	..	..	..	..	..	..	..	..
			Trial Survey ..	15 0	..	15 0	..	..	..	..	..	..	..	..	..	..
	Crichton-Tuapeka Mouth	11 60	Surveyed	11 60	..	11 60	11 60	..	..	..	..	..	..	..	..	..
	Balclutha - Appleby Junction or Catlin's - Seaward Bush	105 49	Balclutha-Owaka ..	19 20	1 63	21 3	..	..	..	..	..	..	..	..	..	
			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	..	..	..	..	..	42 67
			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	..	..	..	..	..	
			Waimahaka-Appleby	24 52	1 50	26 22	..	..	..	..	..	..	..	..	..	32 79
	Waipahi - Heriot Burn	26 23	Waipahi-Heriot ..	20 3	2 3	22 6	..	..	..	..	..	..	..	..	..	
			Heriot-Edievale ..	6 20	0 45	6 65	..	..	..	15 Feb., 1905	..	..	..	..	..	26 23
	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.	..	..	..	..	..	..	..	..

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1920—*continued.*

SOUTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	—	1917–18.	1918–19.	1919–20.	—	Total.
1	2	3	4	5	6	7	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.
Waitaki-Bluff and Branches—*contd.*	*Branches*—contd.															
	Waimea Plains District Ry.	36 39	Gore-Lumsden ..	36 39	1 34	37 73	..	..	..	..	..	..	..	.	..	36 39
	Kelso-Gore ..	24 0	Surveyed ..	9 58	..	9 58	9 58	..	..	..	..	..	..	..	..	..
			Preliminary survey ..	14 22	..	14 22	14 22	Prelim.	..	..	..	..	..	..	..	..
	Gore-Waikaka ..	12 65	Waikaka Section ..	12 65	1 51	14 36	..	..	..	26 Nov., 1908	..	..	..	..	..	12 65
	Riversdale-Switzers	13 70	Riversdale-Waikaia	13 70	1 40	15 30	..	..	..	1 Oct., 1909	..	..	..	..	..	13 70
	Edendale-Toitois ..	19 30	Edendale-Glenham	9 36	0 72	10 28	..	..	..	..	..	..	..	..	..	9 36
			Surveyed ..	9 74	..	9 74	9 74	..	..	..	..	..	..	..	..	..
Otago Central	Waitaki Bluff Main Line to Lake Hawea	182 51	Wingatui-Ida Valley	98 18	5 62	104 0	..	..	..	..	..	..	..	..	..	
			Ida Valley-Omakau	13 20	1 16	14 36	..	..	..	1 Sept., 1904	..	..	..	..	..	
			Omakau-Chatto Creek	7 36	0 34	7 70	..	..	..	14 July, 1906	..	..	..	..	..	134 78
			Chatto Ck.-Alexandra	10 39	1 6	11 45	..	..	..	15 Dec., 1906	..	..	..	..	..	
			Alexandra-Clyde ..	5 45	0 77	6 42	..	..	..	27 Mar., 1907	..	..	..	..	..	
			Clyde-Cromwell ..	12 35	0 63	13 18	..	..	12 35	..	..	..	..	..	..	..
			Surveyed ..	35 18	..	35 18	..	..	..	..	..	..	..	..	..	..
Invercargill-Kingston and Branch, Lumsden-Mararoa	Invercargill-Kingston	87 4	Invercargill-Kingston Wharf	87 4	5 15	92 19	..	..	..	..	..	..	..	..	..	87 4
	Lumsden-Mararoa ..	30 0	Lumsden-Mossburn	10 40	1 0	11 40	..	..	..	..	..	..	..	..	..	10 40
			Surveyed	8 20	..	8 20	8 20	..	..	..	..	..	..	..	..	..
			Reconnaissance ..	11 20	..	11 20	11 20	Prelim.	..	..	..	..	..	..	..	..
	Winton-Heddon Bush	11 0	Surveyed	11 0	..	11 0	11 0	..	..	..	..	..	..	..	..	..
Forest Hill Railway	Winton to Hedgehope	12 40	Winton - Hedgehope	12 40	0 65	13 25	..	..	..	..	..	..	..	..	..	12 40
Western Railways, Orepuki-Waiau River	Orepuki-Waiau ..	60 73	Makarewa-Orepuki ..	35 41	6 37	41 78	..	..	..	..	..	..	..	..	..	
			Orepuki-Waihoaka ..	4 48	0 58	5 26	..	..	..	..	..	..	..	..	..	
			Waihoaka-Tuatapere	8 7	1 10	9 17	..	..	..	1 Oct., 1909	..	..	..	..	..	48 16
			Tuatapere-Orawia ..	8 17	..	8 17	3 40	4 57	..	..	..	..	..	..	..	
			Orawia-Clifden ..	4 40	..	4 40	4 40	..	..	..	..	..	..	..	..	
	Otautau Branch ..	22 15	Thornbury-Wairio ..	22 15	..	22 15	..	..	..	..	..	..	..	..	..	22 15
	Orawia Branch ..	11 0	Surveyed	11 0	..	11 0	11 0	..	..	..	..	..	..	..	..	..
	Totals ..	2337 11	..	2337 11	257 50	2594 61	489 28	28 64	16 57	..	1714 57	..	..	13 0	..	1727 57

APPENDIX C.

ANNUAL REPORT ON BUILDINGS BY THE GOVERNMENT ARCHITECT.

The Government Architect to the Hon. Minister of Public Works.

Sir,— Public Works Department, Wellington, 1st April, 1920.

I have the honour to submit the following report on the various building operations of the Department for the year ended 31st March, 1920.

New Parliamentary Buildings.

The work done during the year was mainly in the completion of the rooms facing Museum Street and the plastering of the corridors and rooms beneath the Lounge Lobby on the ground floor. The external marble work has made only slow progress, but the columns of the front loggia have been completed, and the superstructure carried up sufficiently to permit the flat concrete roof over same to be laid. The stonework on this portion and on the north end feature in Museum Street front will soon be completed up to the top, as most of the stones required are worked ready for setting. The plasterers are now engaged executing the preliminary coating of the rooms along the main front, and in three or four months it is believed the Speaker's, the Cabinet, and the Ministers' rooms will be completed. There will then only remain the front centre entrance lobby and staircase to complete: but as much mason-work remains to be done at this portion it is uncertain when final completion will be reached. It is hoped, however, that after the session this part of the structure will receive special attention, and, as work will then be concentrated on it, that steady progress will be made.

Vice-Regal Residences.

At both the Auckland and Wellington residences additional accommodation was provided preparatory to the visit of His Royal Highness the Prince of Wales. The dismantling and repapering of nine rooms at Wellington is in hand.

Departmental Buildings.

Auckland.—General repairs and renovations have been effected. A new strong-room and office furniture have been supplied for the Native Department, and a strong-room, fitted with numerous drawers, tables, &c., provided for the Lands and Survey Department.

Napier.—A motor-garage has been built, renovations effected, and various offices fitted and furnished.

New Plymouth.—Renovations were carried out and office fittings supplied. Brick partitions were erected in the benzine-store, to isolate each Department's supply.

Wanganui.—Fittings and furniture were provided for Repatriation Office, Boarding-out Office, and office of Registrar of Births, Deaths, and Marriages. Sundry additions, repairs, and general maintenance were carried out at other offices.

Wellington.—Asphalt paths around Government Buildings were repaired. The hydraulic lift was overhauled and repaired. The electric lift in the Customs Buildings was overhauled, the hotwater heating-apparatus attended to, and the drainage improved. Ministerial residences were renovated. At Old Parliament Buildings the "Vigilant" automatic fire-alarm system was installed by the Department, alterations effected to the electric-light-supply main in the library and the top floor rewired. A number of the cellars beneath the New Parliament Buildings were fitted up for storage of records for the convenience of various Government Departments. Minor alterations and repairs were effected to many other offices, and a considerable quantity of furniture and fittings supplied.

Nelson.—Two strong-rooms have been renovated, the existing fittings in several offices altered, floor-coverings supplied, and the general maintenance of buildings and fittings attended to.

Christchurch.—Furniture and fittings have been supplied to all Departments as required. Removal of offices has been attended to, general renovations have been effected, as well as the thorough maintenance of all buildings and offices throughout the year.

Dunedin and Invercargill.—General maintenance was effected and renovations carried out as required, as well as office furniture and fittings supplied to the various Government offices.

The Government Buildings at Auckland, Wellington, Christchurch, and Dunedin were tastefully decorated on the occasion of the visit of His Royal Highness the Prince of Wales.

Courthouses.

Dargaville.—This office was painted, a new fence erected, and drainage repaired.

Whangarei.—Several small repairs were effected as were found necessary.

Auckland Magistrate's Court.—All exterior wood and iron work has been cleaned and painted, and the yard and paths tarred and sanded.

Te Aroha.—A strong-room and outbuildings have been erected, drain laid, and buildings generally renovated.

Rotorua.—Small repairs were effected.

Waipiro Bay.—A contract has been accepted for painting, renovations, and repairs.

Gisborne.—Heating-apparatus has been installed, and painting is in hand.

Napier and Hastings.—Electric light has been installed in both buildings, and repairs effected to the latter.

Hawera.—Exterior painting has been completed.

New Plymouth.—Extensive alterations have been carried out, including erection of separate waiting-room and lavatory for female witnesses.

Raetihi.—A new wooden building, with the necessary outbuildings, has been erected.

Wellington Supreme Court.—Additions to the custodian's quarters were erected and electric light installed therein; also, several rooms were renovated.

Wellington Magistrate's Court.—Telephone system has been altered, electric bells and lights maintained, and several rooms renovated.

Petone.—The floors of three rooms were covered with felt and linoleum.

Featherston.—A new drainage system in conformity with the borough by-laws was installed.

Christchurch Magistrate's Court.—The roof has been repainted and fittings supplied.

Christchurch Supreme Court.—The exterior of the old wooden portion of the custodian's quarters was repainted.

Timaru.—A destructor was built and general renovations carried out; alterations were made, and an electric-lighting system installed; extensive repairs were effected to the roof.

Dunedin Law Courts.—Additions and renovations were made, a hot-water service installed, and repairs carried out.

Hampden.—The renovation of wood and iron work, including fencing, is now in hand.

Kaitangata.—Repainted, and fencing erected

Mosgiel.—Exterior repainted, and minor repairs effected.

Tapanui.—A new picket fence has been erected, and water accommodation improved.

Gore.—Sanitary connection with sewer system has been made, besides general maintenance.

Police-stations.

Dargaville.—The buildings were painted outside and renovated inside.

Hikurangi.—The living-quarters were renovated and repaired.

Russell.—Several small repairs were effected.

Whangarei.—Several small repairs were effected, but extensive additions are now in hand.

Auckland Central.—Alterations have been made to stables to provide for the housing of two motor-cars, and a destructor and benzine-store have been built. A room for the accommodation of plain-clothes constables has been renovated, alterations made, and a sink and gas grill provided.

Hamilton.—The whole of the interior of the sergeant's residence has been renovated, repaired, and painted, a new porcelain bath and lavatory basin provided, also a new range fixed and hot-water service provided.

Carlyle, Byron Street, Taradale, and *Porangahau Stations* have been renovated.

Eltham.—A hot-water service has been installed, also a porcelain bath, and the interior has been repainted.

Fitzroy.—Exterior painting has been completed.

Manaia.—Outside has been repainted, and inside painted and repapered.

New Plymouth.—Exterior has been repainted, and electric light installed.

Patea.—The drainage has been connected with the borough system.

Waitara.—Repapering has been completed.

Opunake, Hawera, Inglewood, and *Normanby Stations* have been renovated and minor repairs effected.

Raetihi.—The erection of a new station with cells and stables has been completed, and electric light has been installed throughout.

Ohakune.—New additions consisting of kitchen, scullery, bathroom, washhouse, pantry, and wood-shed were completed, and electric light installed.

Palmerston North (Sergeant's residence and Terrace End Police-station).—Alterations and general repairs were effected.

Otaki.—The premises have been enclosed with fence, and the building painted.

Kimbolton.—Several rooms were repapered, general repairs carried out, and a new tank supplied and fixed.

Greytown.—The buildings were renovated, papered, and painted.

Lower Hutt.—A new building was erected by contract.

Wellington (Johnston Street).—A heating-apparatus was installed in the cells. A brick motor-garage was erected. Alterations were effected to the electric lights in the gymnasium, and several cubicles were repaired.

Wellington (Mount Cook).—Extensive renovations were carried out to the main building. A new sink and gas cooker were installed, alterations made to the hot-water service, and the roof and drains repaired.

Kilbirnie.—Drains and lavatories have been repaired.

Johnsonville.—A drainage system has been installed, and gas and water laid on.

Nelson and Port Nelson.—General maintenance.

Wakefield.—Both station quarters and outbuildings were externally painted and generally maintained.

Hokitika.—A contract has been let for the erection of a police-station and sergeant's residence, but owing to the difficulty of procuring seasoned timber the contractor has been unable, so far, to make a commencement.

Christchurch.—Electric light was installed in the Sub-Inspector's residence. Staff houses were repainted and repapered, and the old morgue and van-shed were altered to provide a motor-garage.

Little River.—Renovations and repairs were effected.

Papanui.—The hot-water system was overhauled, and the buildings repainted and repapered.

Phillipstown.—Extensive renovations and repairs were carried out.

Timaru.—Alterations were made to the main buildings, including the erection of a new chimney. Additional furniture was supplied. The Senior Sergeant's residence was renovated, and the interior repapered and painted. The Chief Detective's residence was also thoroughly renovated, and the whole of the exterior painted.

Dunedin.—A residence was purchased for the accommodation of the Superintendent.

Dunedin South.—Paths were asphalted, electric light installed.

Hampden.—Hot- and cold-water system was provided, and buildings repainted both inside and out.

Lawrence.—Small additions were made to the constable's residence, and a hot- and cold-water system installed.

Mornington.—A residence was purchased and renovated.

Oamaru.—The new station was completed.

Palmerston.—New kitchen-range was installed, and three bedrooms, kitchen, and scullery renovated.

Otautau, Gore, Invercargill, and *Bluff Stations* were repaired and renovated, and a number of others were maintained.

POST-OFFICES.

Aratapu.—General repairs to doors, windows, grates, chimneys, fences, &c., were effected.

Awanui.—Repairs were completed; one new bedroom erected; the building painted outside.

Broadwood.—The building purchased was converted into a post-office, and two new bedrooms were added. A road was formed to the office.

Dargaville.—Several repairs were effected at this office, and the Postmaster's residence was painted and renovated.

Hikurangi.—Small repairs were carried out and three rooms were papered.

Kawakawa.—General repairs and renovations. The whole of the living-quarters were painted and papered.

Kawakawa.—Old post-office repaired and renovated.

Kawakawa.—Lineman's residence painted and papered inside and out.

Kaikohe.—General repairs to drainage and sanitary arrangements. A new water service was also installed.

Mangonui.—Small repairs were effected. Three rooms were painted and papered.

Onerahi.—General repairs.

Ohaeawai.—Renovations and repairs to the office were effected during the year. The renovating of the living-quarters is now in hand. The whole of the buildings were painted.

Russell.—Several small repairs were carried out. Two rooms in the living-quarters were papered and painted.

Rawene.—A new residence was erected during the year. Small repairs were also carried out at the office.

Whangarei.—Several small repairs were carried out during the year. Extensive additions are now in hand.

Waipu.—Small repairs were effected during the year, and two rooms were painted and papered.

Whakapara.—Small repairs were carried out, and two rooms were papered and painted.

Auckland Chief Post-office.—Alterations have been carried out to the Money-order and Savings-bank Department, to provide additional accommodation for the public. This entailed moving back and alterations to screens, counter, &c. Extensive alterations have also been carried out to the stamp-rotunda in the main office. The work of recovering the main roof with Neuchatel asphalt is well in hand.

Parcels Office, Auckland.—New accommodation has been provided for in Albert Street. The new building acquired for this purpose has been fitted up, including the erection of partitions; building strong-room in basement, 40 ft. by 16 ft.; flooring over cart-docks; forming platform and concrete roadway at the back of building; erecting tables, racks, &c.; also providing sanitary accommodation.

Wellesley Street Post-office and Telephone Exchange, Auckland.—This building, with a frontage of 50 ft. to Wellesley Street, 50 ft. to Coburg Place, and 114 ft. 10 in. to Lorne Street, containing three stories and basement, is built of brick, with reinforced-concrete floors carried on concrete encased steel columns and steel beams, and is of fireproof construction throughout. The Wellesley Street front and also a return feature to Lorne Street is finished in white cement. The building is heated by hot-water radiators, and is lit throughout with electric lights. The basement, reached by five steps down from Lorne Street, accommodates the battery and power rooms, heating-chamber, and storage. The ground floor, reached by nine steps up through main entrance doors from Wellesley Street, contains the public vestibule, finished with tiled floor and tiled dado, where posting facilities are available. Swing doors lead from here into the public space, which is fitted up with sixteen desks and counter, executed in polished Tasmanian blackwood, and also with two slot-telephone cabinets. Three steps up from Lorne Street lead to the parcels counter and also to the private-letter-box lobby on the ground floor, where 105 private letter-boxes are placed. The roof is covered with Neuchatel asphalt, 1 in. thick, while the underside of roof and also walls of the second floor are finished in hydrated lime plaster. The concrete foundations were built by the Department by day labour, and the erection of the building was let by contract on the 23rd February, 1918, and completed on the 4th March, 1920, at a total cost of £20,589.

Ngaruawahia.—Additional accommodation in brick has been provided for the mail-room. New furniture and fittings have also been provided, and the whole of the office renovated.

Walton.—A new post-office in wood has been erected, consisting of mail-room, public office, and telephone exchange for official purposes. A residence has also been erected. Furniture and fittings of the usual description have been provided and fixed.

Cambridge Post-office.—A contract has been let and work is now in progress, comprising the removal of some of the internal walls, in order to give greater mail-room and counter accommodation. A new room has been built for the Postmaster.

Henderson.—A wooden building has been erected for temporary use.

General maintenance and minor renovations have been effected at the following offices: Manukau, Katikati, Matata, Taneatua, Tauranga, Mokai, Taupo, Te Puke, Waimana, and Rotorua.

Tolaga Bay.—The contractor for this work has been delayed owing to scarcity of timber.

Wairoa.—Additions are in course of construction under contract.

Te Araroa.—Additions are now in hand under contract.

Maintenance, general repairs, or repainting, &c., have been effected at the following: Napier, Hastings, Havelock, Ongaonga, Hunterville, Takapau, Port Ahuriri, and Ormondville.

Eltham.—Alterations to provide additional exchange accommodation were made.

Inglewood.—The interior has been repapered and painted.

New Plymouth.—The interior of telephone exchange has been repainted and additional garage accommodation provided.

Minor repairs and renovations have been carried out at Marakopa, Okato, Patea, Stratford, Urenui, Whangamomona, Waitara, Hawera, Kaponga, Manaia, and Rahotu.

Wanganui.—The erection of the new automatic telephone exchange has been completed. Additions to the money-order office are in hand, and extra lavatory accommodation has been provided.

Several other offices in this district have been repaired and efficiently maintained.

Tiraumea Post-office.—A new office has been erected by day labour.

Alterations, additions, and efficient maintenance were carried out at the Eketahuna, Foxton, Te Horo, Tinui, and Feilding offices.

Khandallah Automatic Telephone Exchange.—The contract for the erection of this building was completed early in the year.

General Post Office.—A number of rooms and corridors, including the Postmaster-General's room, tea-room, kitchen, and social hall were renovated and painted. The roofs were repaired and painted. The heating-apparatus was overhauled and an additional radiator was installed. The electric-light system was overhauled, and additions were made thereto. Other minor repairs, renovations, and installations were carried out.

Paekakariki.—This new post-office building was erected during the year by contract, and a water-supply was laid on.

Pongaroa.—Additions and renovations were effected to this building.

Lower Hutt.—The electric-light system was installed, and general repairs were effected to the building. A fence was shifted, and alterations were effected to the telephone exchange.

Rongotea.—Additions were erected by contract, and electric light was installed.

Levin Post-office.—Alterations were effected to the gas fittings, and a new gas-stove and screen was installed. The office was painted and repaired, and several of the rooms were papered.

Kelburn Automatic Telephone Exchange.—The contract for the erection of this building was commenced early in the year, and the contractor completed the work in connection with the necessary excavation, laying concrete foundations, &c., and laid about three courses of brickwork around the building. The work on the contract was then discontinued, and nothing has been done since for want of material.

Post and Telegraph Stores.—Several small repairs and installations were carried out during the year.

Palmerston North Post-office.—Repairs were effected to the skylights, and additional private letter-boxes were supplied and fitted. Additions were erected to the despatch clerks' social hall.

Featherston Post-office.—New drainage system was installed to connect with the borough system.

At several other offices both in and out of Wellington minor repairs, alterations, renovations, and installations, as well as general maintenance, were attended to.

Nelson.—A sanitary drain has been laid to connect the building with the new sewer.

Collingwood.—Lavatory accommodation has been provided, comprising septic tank, sanitary drainage, windmill, and tank-stand; alterations to existing outbuildings, and the existing drain converted into a storm-water drain.

Takaka Post-office.—A glass partition has been erected to separate the mail-room from the telegraph-room.

Motueka.—The wall between the public space and mail-room has been partly removed, and a new counter inserted in the opening; new private letter-boxes and posting-slots built in; collapsible iron gate fixed to main-entrance porch; mail-room, Postmaster's office, public space, and main-entrance porch renovated.

General maintenance has been effected at Motueka, Wakefield, Murchison, and Port Nelson offices.

Westport.—The contract for connecting with the town sanitary system was completed, and general maintenance of all offices in the Westland District was attended to.

Christchurch.—This building was effectively maintained, and numerous minor alterations for the convenience of the officers were made. A contract has been let for extensive additions, but not yet commenced.

St. Albans.—The interior of the residential quarters was papered and repainted.

Riccarton (Upper).—A contract for the erection of a new post-office has been let. The work has not yet been commenced.

Waiau.—A hot-water system has been installed.

Rakaia.—Renovations, including painting the interior, were carried out, and a building for housing the newly installed gas plant was erected.

Timaru.—The work in connection with the additions and alterations to Timaru Post-office was commenced on the 5th May. The various outbuildings were removed from the site of the additions, and excavations for the foundations dug. The concrete foundations were commenced on the 4th June. The old stone sewer was removed, and a new 4 ft. circular sewer laid the full width of the building. The brickwork was carried out to the first-floor level. All necessary window and door frames have been fixed in position. All floor-joists were fixed and braced. A contract was let for the supply and delivery of doors, windows, and frames, and is well under way. A contract for the manufacture of cast-iron columns was also let.

Rangiora.—A contract for additions has been let but not yet commenced.

The following additional offices were effectively maintained, renovated, and repaired during the year: Akaroa, Ashburton, Culverden, Fairlie, Kaiapoi, Lyttelton, Mayfield, Pleasant Point, Puaha, and Woodend.

Cromwell.—New strong-room door, partition, and shelving erected, and Postmaster's residence improved.

Tapanui.—Postmaster's residence, outbuildings, and fences were repainted, and the interior of the residence repainted and repapered.

Wedderburn.—Repainted inside and out, and general repairs effected.

The following additional offices were repaired and renovated: Alexandra, Caversham, Dunedin, Dunedin North, Port Chalmers, Waipiata, Bluff, Fortrose, Gore, Invercargill, Mataura, Otautau, Riverton, and Waikaka.

Agriculture.

Ruakura.—A new building to house an engine in connection with the electric-lighting system is in course of erection. The accommodation for returned soldiers has been completed.

Somes Island.—Watering facilities for stock have been provided in the paddocks. Water was laid on to the caretaker's cottage, and renovations were effected to the interior, and the exterior painted.

Fairlie.—A hot-water service was installed in the Stock Inspector's residence, and renovations effected.

Balclutha and Owaka.—Both residences were renovated and repainted, and those at Middlemarch and Naseby repaired.

Invercargill.—Sanitary connection with the city sewerage system was made at the poison-mixing depot.

Otautau.—Inspector's residence was renovated and office furniture provided.

Mental Hospitals.

Auckland Mental Hospital.—Main chimney-stack of boiler erected, house repaired, also a fireplace in No. 2 auxiliary, and general repairs, &c., have been effected.

Tokanui Mental Hospital, Unit No. 5.—This work was started in January, 1918, and was completed and handed over in November, 1919.

Camp Buildings.—Work was commenced in April, 1919, and completed in November, 1919.

Male and Female Admission Block.—Work was commenced in October, 1919. All screeds for damp-course level have been fixed to their respective levels, and the greater portion of damp-course laid. The chimney-foundations have been fixed and filled with concrete. All brickwork has been carried up to damp-course level, and day-room portion up to sleeper height.

Female Block.—In this block the concrete foundations are now complete and the drains are being put in. A start has been made with the painting of unit No. 1 and roofs of No. 1 dormitory.

Porirua.—The principal work done during the year was the completion of the new drainage system.

Nelson.—Work is proceeding under contract at the new reception block (in brick), let at a cost of £6,647 4s. The concrete foundations were commenced on the 31st March, 1920, and at the present time the brickwork is laid up to the damp-course all round the building and 3 ft. high on the back wall.

Sunnyside.—The only work carried out at this institution consisted of testing and maintenance of the automatic fire-alarm system.

Education (Native Schools).

Pupuke and Tautoro.—General repairs and painting have been carried out. A new bathroom was erected and alterations made to the kitchen at the former, and a range installed at the latter.

Plans and specifications have been prepared for Native-school buildings at Waiohau and Matata, and for a teacher's residence at Waimahana.

Manutahi.—Completed except fencing.

Tihiomanono.—Difficulty is being experienced in obtaining material, which prevented a commencement being made.

Wharekahika.—The contract for additions has been delayed for want of timber.

Rangitukia.—Tenders have been invited for the erection of a new class room and shelter shed.

General.

In addition to the foregoing, a considerable volume of work has been carried out in the maintenance of drill-halls; the Observatory and Dominion Laboratory, both in Wellington; Public Trust Offices throughout the Dominion; St. Helens Hospitals; Customs buildings; Ministerial residences, Wellington; tourist resorts, repatriation offices, receiving-homes, &c.

John Campbell,
Government Architect.

APPENDIX D.

ANNUAL REPORT OF CHIEF ELECTRICAL ENGINEER.

The Chief Electrical Engineer to the Hon. the Minister of Public Works.

Sir,—

I have the honour to submit herewith the annual report on the development of electric power within the Dominion for the year ending 31st March, 1920.

Lake Coleridge Hydro-electric Supply.

The year under review is the fifth year of operation, and marks a stage when the earnings of the plant have met all expenses, leaving a credit balance on the year's operation. Though no emergencies comparable with the previous year's snowstorm and the influenza epidemic have been experienced during the past year, all branches of electrical work are still suffering from the effects of the war, both as regards difficulty in obtaining material and the high prices. A severe winter was again experienced, with considerable transmission-line trouble as the result of snow, but the operation of the plant was carried on satisfactorily, and an urgent demand was experienced in many directions for the supply of power. The revenue for the year was £45,831, being an amount of £3,585 in excess of all charges, thus allowing the first contribution to be made towards the accumulated loss of the past four years.

Capital Outlay.

The capital outlay at the end of the year was £422,076, as compared with £403,156 at the end of the previous year. This outlay is analysed in Table B herewith.

Financial Results of Operation.

General and detailed results of financial operation and load records are given in Table A, showing an increase of 20 per cent. in power-house maximum load during the year, and of 20 per cent. in the units output. The total generating-cost per kilowatt sold and per unit sold show a further reduction on those of previous years.

The increase in working-costs for the year under various heads, as compared with those for the previous year, is shown in Table C. This table covers only the figures relative to the Department's operations, but in order fully to appraise the operations of the whole of the Lake Coleridge supply it is necessary to include the activities of the local bodies who purchase in bulk from the Department and carry out independent supply systems. These figures have been tabulated in Table D.

Extensions.

Some progress has been made with the long-overdue extensions at the power-house. No. 5 unit was ordered in May, 1916. The turbine was received and has been erected during the year. The generator has recently been delivered, but cannot be put into operation until the third pipe-line is installed. The material for this pipe-line was also ordered in May, 1916, but owing to the action of the Imperial authorities during the war the work has been repeatedly delayed, and the prospects are that it is unlikely that it will be installed before the winter of 1921.

Work has been in progress on the whole of the concrete piers and anchor blocks for both third and fourth pipe-lines, and these are now nearing completion.

Additional switch-gear for the power-house and substation has been purchased for extensions, but at prices ranging from four to six times the cost of similar material in the original contracts.

Extensions to Addington Substation are required before further installations can be completed, but the lack of material has hampered all work of this kind.

Owing to the inability to supply power no vigorous policy of extensions to the distribution system could be carried out during the year. The 11,000-volt lines have been increased from 65¼ to 72¾ miles, the 3,000-volt lines from 10½ to 11 miles.

In spite of the shortage of power several consumers were connected for temporary supply or supply under special conditions, and the low-tension reticulation has been extended in several districts to meet such cases.

Connected Load.

Every effort has been made during the year to discourage additional consumers owing to the shortage of power, but in spite of these endeavours the total connected load (Table E) has increased 32 per cent.—from 23,192 kw. to 30,584 kw. This connected load has been supplied by a total demand at the substation of 6,260 kw., giving a diversity factor of 4·86, slightly higher than that of last year's figures of 4·35, due to the steel furnace coming on during the year and restricted to night supply. This satisfactory diversity factor is due largely to the restrictions imposed with a view to giving a greater supply without increasing the maximum demand on the power-house.

Operation.

Owing to the overloaded condition of the plant its operation during the past year has been a matter of great anxiety. The maximum load recorded at the power-house was 7,066 kw., representing an overload of 18 per cent. on each of the four generators. With a view to obtaining the maximum output from the plant, instructions have been issued for the generators to be worked up to a definite limiting temperature before load is cut off at the substation. It is usual that heavy peak loads occur on cold days, and this fortunately ensures the generators being overloaded when best able to carry the higher loads without overheating.

Though the generators have operated without mishap, the turbines have now begun to give a considerable amount of trouble, and frequent replacements of certain spare parts have had to be made within the last few months. It is hoped, however, that the trouble is a passing one, and indications are that the matter has been remedied for the present.

The transmission-line insulators have given further indications of an increasing deterioration in quality. At one period the replacements became so frequent that the stock of spare insulators was seriously reduced, and very considerable delay and difficulty has occurred in obtaining delivery of spares on order.

No serious trouble occurred during the year on any of the distribution-lines, and all the switchgear and transformers have operated satisfactorily.

Interruptions to Service.—Transmission-line.

During the past twelve months only three breakdowns occurred which involved interruptions to the service of over fifteen minutes' duration, and of these two were due to abnormal snow conditions, causing both lines to be affected simultaneously.

The first interruption was on the evening of the 1st September, the fall of snow being of unusual severity both in the city and towards the power-house. The north line failed at 6.28 p.m., but service on the south line was maintained during the night. At 10.45 a.m. on the following day the south line also failed. Despite all efforts to locate the faults, it was not until 1.30 p.m. that the service could be restored, causing a total interruption of two hours forty-five minutes.

The second interruption occurred on the 21st September. After a severe gale heavy snow fell in the area beyond Snowdon, and the south line failed at 9.45 p.m. Before it could be restored the north line also failed, at 11 p.m. The severe weather conditions caused considerable trouble and delay in restoring the service, which was not resumed until 6.50 a.m., thus involving a total interruption of seven hours fifty minutes, fortunately during an off-load period.

The third interruption occurred on the 6th March, 1920, when very foggy conditions existed on the plains. Unfortunately both lines broke down simultaneously, at 1.14 a.m., and owing to the great number of insulators on both lines requiring replacing it was 5.30 a.m. before the service could be resumed. The period of interruption in this case, four hours sixteen minutes, occurred during night hours, and therefore with a minimum of inconvenience.

Apart from these serious cases due to special circumstances, the total period of interruptions for the year does not exceed fifty minutes.

Serious as the interruptions have been, the circumstances were in each case abnormal, and, though snow in such quantities may not be expected frequently, it is obvious that the line-construction will require to be of such a nature as not to be affected when such snowfalls do occur. The present insulators do not give a standard of construction providing this degree of reliability, but, from the indications already obtained as to the improvement in the manufacture of pin type porcelain insulators, there is every reason to believe that when the present insulators have been entirely replaced by a later type a much greater degree of reliability will result.

While the bulk of the interruptions have been due to faulty insulators, a certain number have occurred as the result of breaks in the aluminium wire on windy sections of the line, and arrangements have already been made to replace the aluminium with copper.

Water-storage.

Though snowstorms were experienced during last year, the winter was not consistently wet, and the frequent rains resulted in there being no sustained accumulation of snow, and the consequent absence of any pronounced thaw in the spring. As a result the lake-level did not recover as has been the case in previous years. The chart giving a record of lake-levels shows a recovery of only 18 in. above last year's lowest level—*i.e.*, a rise from 1,664½ ft. in September to 1,666 ft. in November—the maximum level recorded during the year being 18 in. below overflow level. Since then the fall has been at practically the same rate as in previous years. Though the tunnel enters the lake at about 20 ft. below its surface, the lip of rock between the tunnel-mouth and the intake gates is the limiting level controlling the flow of water. It has therefore been necessary to reduce the level of the lip as the lake-level fell.

The diversion of the Harper River has always been included as part of the hydraulic development required with the installation of the fifth generator, and is now in hand, but work on the intake lip must be completed before the diversion of the Harper River is carried out. The deepening of the lip is therefore a recognized part of the work, and is being carried out under those conditions which were known to be necessary for its completion.

Selling-rates.

The Department is still giving supply on rates published in June, 1918, and in the case of the majority of wholesale consumers supply is being continued upon contracts negotiated four or five years ago, at prices which then compared favourably with any alternative source of power, and which at the present time provide supply at a rate recognized to be exceedingly favourable.

New Industrial Developments.

Owing to the restrictions placed upon supply as the result of the shortage of power, it has not been possible to give any encouragement to the development of new industries or special applications of electric power.

The Canterbury Frozen Meat Company at Belfast has installed electric plant for operating the freezing-works, but at present is limited to night supply only. Messrs. Kempthorne Prosser are erecting chemical-works at Hornby, but cannot be given supply for the present. A new woollen-mill has been erected by the Kaiapoi Woollen Company in Woolston, but power cannot for the present be supplied for its operation. Messrs. Waddell's 1,200 kw. steel furnace at Sockburn has been operated to the extent of burning in the refractory lining of the furnace, and the observations made during this operation indicate that the furnace load should be carried without any serious disturbance to the supply voltage. It is also restricted to night supply only in the meantime.

Electric Vehicles.

The sale and use of electric vehicles has been hampered by the difficulty of obtaining delivery and by the high cost of new vehicles. This form of transport continues to play an important part in the industrial life in the city, and will doubtless increase rapidly when deliveries at reasonable prices can be obtained. The Department now has three battery trucks in use on the Lake Coleridge system, and there are forty-two other vehicles in operation in the district, ranging from ½ ton to 3½ tons capacity. The uses include five runabouts, one taxi, twenty delivery-vans, and fourteen heavy lorries.

Waikato Electric-power Supply.

On the 1st November last, in terms of the agreement entered into between the Department and the Waihi Gold-mining Company (Limited), the company's electric-power plant was acquired by the Department for £212,500.

The main features of the plant acquired are the headworks and generating-station on the Waikato River at Horahora, seventeen miles from Cambridge, with a plant capacity of six generators, each capable of generating 1,050 kw., or a total of 6,300 kw.; the transmission-line of three No. 0 S.W.G. copper conductors on steel towers, from Horahora to Waikino (fifty miles); and the transformer station at Waikino for transforming the energy supplied to the Waihi Company's mine.

Results of Operation.

During the five months from the 1st November until the end of the financial year the Waihi Company operated the plant on behalf of the Department. Practically the only consumer supplied during that period was the Waihi Company itself, for whom the Department is committed to reserve 2,500 kw.

As shown in the accounts, the operations for the five months mentioned resulted in a gross revenue of £5,803, or £3,933 in excess of working-expenses. Interest on the purchase-money amounted to £4,427, and depreciation at 2 per cent. per annum, as required by law, to £1,628, leaving a deficiency, after paying all working and capital charges, of £2,122.

The total number of units generated over the five months was 6,415,150, and the number delivered to consumers was 5,630,200, so that 784,950 units, or 12·3 per cent. of the amount generated, were lost in transmission. The maximum demand on the power-house was 2,700 kw.

The following shows the average cost of production :—

	Cost.	Per Unit generated.	Per Unit sold.	Per Kilowatt, Power-house Maximum per Year.
	£	d.	d.	£
Generating	1,024	0·040	0·043	0·91
Transmission	278	0·010	0·012	0·23
Distribution	225	0·008	0·010	0·20
Management	343	0·013	0·015	0·30
Total working-costs	1,870	0·071	0·080	1·64
Interest	4,427	0·165	0·189	3·93
Depreciation	1,628	0·061	0·069	1·45
Total costs	7,925	0·297	0·338	7·02

The revenue represented a return of 0·217d. per unit generated, 0·247d. per unit sold, and £5·16 per annum per kilowatt of power-house maximum.

Arrangements for Distribution.

A District Office has been opened at Hamilton to deal with the administration of the Department's electrical undertakings in the Waikato district. The area which it is proposed to serve from Horahora comprises the counties of Matamata, Piako, Ohinemuri, Waikato; parts of Waipa, West Taupo, and Waitomo Counties; together with the towns situated within that area. It measures approximately 3,000 square miles, and consists mostly of rich dairying-country. The power-station at Horahora is situated near the south of this area, and the maximum distance of transmission in a straight line is about sixty-five miles in the direction of Thames and about the same distance in the direction of Taupiri.

Electric-power Boards have been formed under the Electric-power Boards Act, 1918, covering practically the whole of the area mentioned except Hamilton and Waihi Boroughs, which will be dealt with through the Borough Councils in each case. The Boards are :—

(1.) Thames Valley Power Board, with an area of approximately 2,300 square miles, embracing the counties of Matamata, Hauraki Plains, Thames, Piako, and Ohinemuri, and the towns of Putaruru, Tirau, Matamata, Morrinsville, Te Aroha, Waihou, Paeroa, and Thames.

(2.) Te Awamutu Power Board, with an area of about 300 square miles, consisting of parts of the counties of Waipa, West Taupo, Waikato, and Waitomo, the chief centres being Kihikihi, Te Awamutu, Pirongia, Te Rore, and Ohaupo, with the Otorohanga district as "outer area."

(3.) Cambridge Power Board: This district is about 100 square miles in extent, and consists of the country adjoining Cambridge Borough, which it includes.

(4.) Central Power Board: This contains part of Waipa County and part of Waikato County, and includes the towns of Ngaruawahia and Taupiri, with an area of about 300 square miles.

Power available.

The areas mentioned include several large consumers, particularly factories dealing in milk products, and as in some cases it will be found desirable for the Department to supply direct to these concerns it is proposed to reserve 500 h.p. of the available supply to meet demands from these consumers.

The total power installed at Horahora is 6,300 kw., or 8,400 h.p., which will be dealt with as follows :—

	Horse-power.
Spare standby unit	1,400
For Waihi Gold-mining Company	3,300
For Arapuni construction-works	200
For special industries	500
For losses in transmission	600
Available for local authorities	2,400
	8,400

Allocation of Power available.

In allocating the power the population and other considerations such as existing installations have been taken into account, and the following allocation is the result of a careful investigation into the whole of the factors :—

	Horse-power.
Thames Valley Power Board	900
Te Awamutu Power Board	600
Cambridge Power Board	200
Central Power Board..	350
Hamilton Borough Council	300
Waihi Borough Council	50
	2,400

The capacity of the existing steam plants in the district is also being carefully investigated, as it is probable that arrangements will be made whereby a supplementary supply of power will be obtained during peak-load or low-water periods, thus enabling the water-power to be utilized to its fullest extent.

Distribution.

Contracts for supply of material for erection of lines and substations to a value of approximately £50,000 have been entered into. Some of this is now coming to hand, but delay owing to the shipping difficulty has arisen regarding the delivery of the main contracts, particularly those for poles. In the meantime line routes and points of supply are being determined, and negotiations completed with the various consumers, and the staffs and plant are being assembled in readiness to proceed vigorously with the distribution-lines as soon as the material comes to hand.

NORTH ISLAND SCHEME.

The general scheme of the North Island distribution provides for supply from three main power-stations—viz., Mangahao, Waikaremoana, and Arapuni—together with a complete reticulation joining up these three sources of power.

Mangahao.

Substantial progress has been made with the works at Mangahao during the year. The road-formation is practically complete, and the testing of the foundations for the dams is under way. Great delay has been experienced in the delivery of the construction steam-power plant, the boilers for which have been erected. The sawmill has been erected, and has started cutting timber for the housing of the staff, and four of the permanent staff cottages have been erected.

Arapuni.

Extensive exploration work was required at the site of the proposed dam, and is now nearing completion. In testing the character of the rock and its suitability for foundations, and the distance to which the concrete-work should extend, a total of 3,474 ft. of shafts, stopes, drives, and adits has been put in at the site of the dam, gate-wall, and spillway weir. One of these drives runs right under the river, and will be used eventually to form a cut-off wall at the base of the dam. Another drive runs the greater part of the length of the diversion tunnel which will be required to carry the river during the period of construction of the dam.

Important tests are nearing completion to determine the waterproofness and the strength of the rock which forms the sides and bottom of the gorge, and other tests are in hand to determine the suitability for use in concrete of the stone and sand available in the district. A geological report has been made by the Geological Survey Department, and chemical tests are being carried out at the Dominion Laboratory.

Owing to shortage of staff nothing has been done during the year in connection with the Waikaremoana and transmission-line surveys.

SOUTH ISLAND MAIN SCHEMES.

During the year a detail survey has been completed of the proposed Central Otago schemes, the results of which are now being prepared. Owing to shortage of staff it has not been possible to carry the general South Island scheme any further during the year.

ELECTRIC-POWER BOARDS.

The policy of the Department generally is to supply power in bulk, leaving the reticulation and retail supply in the hands of the local authorities. In the past the only local authorities available have been the cities, boroughs, counties, and Town Boards ; but with the extension of electric supply into the country areas a stronger organization became necessary, and this has been provided under

the Electric-power Boards Act of 1918. This Act provides for several local districts to combine for the purpose of electric-power distribution, and to set up a special Electric-power Board to carry out the work, with rating-powers over the district concerned.

The provisions of this Act have now been taken advantage of by ten districts, details of which are set out in the attached table. The total area covered by these ten districts is 17,179 square miles, being 16·6 per cent. of the total area of the Dominion, and the total population included is 137,960, being 12·5 per cent. of the population of the Dominion. Five of the Boards have laid out their reticulation systems and submitted the necessary loans to the ratepayers for approval. Of these one (Southland) includes a generating-station at Lake Monowai, and the other four provide for taking power in bulk from the Public Works Department.

The total amount of the loans authorized by the ratepayers of these five districts amounts to £1,980,000. This is ££0 6 per head of population concerned, and 7·25 per cent. of the unimproved rateable value. It is anticipated that the revenue from the distribution of electric power will cover the whole of the interest charges, but the above figures indicate that the average rate necessary to pay 5 per cent. interest on the whole of the loans would not amount to ⅞d. in the pound on the unimproved value. The security for the loans is therefore ample, apart from the actual assets and revenues of the Boards.

The unanimity in support of the five loans already carried was remarkable, the total number of votes cast being 8,907 for and 469 against the loans, showing a majority of nearly twenty to one. In one case, Te Awamutu district, there was not a single vote against the loan.

NEW ZEALAND ELECTRIC-POWER DISTRICTS.

Name of Electric-power District.	Proclamation constituting District gazetted.	Number of Members on Board.	Approximate Area of District.	Population.	Value of Rateable Property (unimproved).	Amount of Loan.	Voting for Loan Poll.	
							For.	Against
			Sq. miles.		£	£		
Southland	19/11/19	12	9,986	65,450	13,600,471	1,500,000	6,516	415
Thames Valley ..	8/1/20	12	2,304	16,000	6,814,993	200,000	1,503	28
Te Awamutu ..	8/1/20	10	309	6,000	1,759,558	120,000	359	..
Cambridge	8/1/20	8	104	5,000	1,683,632	60,000	198	3
Banks Peninsula ..	8/1/20	7	372	3,500	3,430,817	100,000	331	23
Wairarapa	25/3/20	9	2,073	21,800	3,114,718	Poll not yet	taken.	
Central	8/7/20	7	300	9,110	3,667,904	,,	,,	
Teviot	22/7/20	7	120	1,800	169,137	,,	,,	
Wairoa	29/7/20	10	1,369	3,900	2,417,251	,,	,,	
Springs-Ellesmere ..	8/7/20	7	242	5,400	2,627,468	,,	,,	
Totals	..	..	17,179	137,960	39,285,949	1,980,000	8,907	469

FUTURE DEVELOPMENTS.

With regard to the future developments under the Electric-power Boards Act, the principles on which the boundaries of new districts should be determined are not set out in the Act, but the responsibility of deciding whether proposed boundaries are advisable or otherwise is cast on the Governor-General in Council, and it is obvious that if the whole Dominion is to be dealt with in the best way possible it is essential that a comprehensive scheme should be drawn up, and in future new districts should be arranged as far as possible to comply with this scheme. In order to decide the correct areas into which the Dominion should be divided for the purposes of the Act the following considerations must be taken into account:—

(*a.*) The district must be large enough to have financial strength. For this purpose the demand should be at least 800 h.p. to 1,000 h.p., yielding a revenue to the Board of £12,000 to £15,000 per year, and involving a population of at least four thousand to five thousand persons. This is the minimum size in cases in which geographical and other considerations do not permit of a larger district. In the general case the district should be three to five times this size, and in special cases in which a supply will not be available for some years, and the Board has to establish its own power-station, the district should be as large as can be economically supplied from the available power source at the ratio of five head of population per horse-power.

(*b.*) The district should include both town and country areas, but should have a distinct community of commercial and industrial interests. The country districts should be included with the towns through which their produce is sold and their necessities purchased, and the whole of the back country trading through any one centre should be included with that centre. The boundaries must be designed to foster and encourage this natural community of trading interests.

(*c.*) The district must be designed to give convenient road access for the distribution-lines to ensure both economical construction and effective patrol and maintenance. From this point of view the boundaries will consist, whenever possible, of mountain-ranges or large impassable rivers, such as the Waimakariri and Rakaia.

(*d.*) The district must be designed to utilize as far as possible the points of distribution selected as most suitable for the purposes of the main Government transmission-system, and as far as possible the whole output of each of the main Government substations should be taken over by a single Power Board. This will not always be possible owing to the geographical configuration of the district, but should generally be complied with.

(*e.*) For rating and statistical purposes it will be advisable as far as possible to utilize existing county boundaries whenever they conform approximately to the above considerations.

Taking these considerations into account, a suggested scheme of subdivision of the whole Dominion into electric-power districts is appended herewith, and should be made the basis of future

applications for the formation of Electric-power Boards. This scheme leaves the following districts practically unaltered—Southland, Thames Valley, Banks Peninsula, Ellesmere, Wairoa, Wairarapa; but it is not proposed to insist on any immediate alterations in the other districts already formed.

List of Suggested Electric-power Districts.

This allocation of suggested power districts represents what is considered to be the minimum areas for the most economical distribution, but in some instances, where community of interest is proved, the merging of adjacent areas to form a larger district will be approved. The subdivision of these proposed areas should be avoided wherever possible unless substantial reasons are advanced.

North Island.

No.	Name.	Population.	Estimated Horse-power.
1	Whangaroa	10,917	2,200
2	Hobson	6,504	1,300
3	Whangarei	13,045	2,600
4	Rodney	8,314	1,700
5	Waitemata	24,327	5,000
6	Auckland	103,268	21,000
7	Manukau	22,403	4,500
8	Franklin	15,908	3,200
9	Hamilton	24,199	4,800
10	Thames Valley	32,837	6,500
11	Te Awamutu	8,587	1,800
12	Te Kuiti	5,684	1,200
13	Taumarunui	9,667	2,000
14	Waimarino	5,791	1,200
15	Taihape	6,330	1,300
16	New Plymouth	20,582	4,100
17	Hawera	14,479	3,000
18	Stratford	14,356	3,000
19	Patea	8,234	1,600
20	Wanganui	22,970	4,600
21	Rangitikei	9,688	2,000
22	Manawatu	32,382	6,400
23	Horowhenua	11,534	2,300
24	Wellington	84,049	17,000
25	Hutt Valley	20,359	4,000
26	Wairarapa	21,028	4,200
27	Pahiatua	10,284	2,000
28	Dannevirke	12,271	2,500
29	Waipawa	7,018	1,400
30	Hawke's Bay	33,971	6,800
31	Wairoa	3,862	800
32	Poverty Bay	23,547	4,700
33	Whakatane	5,908	1,200
34	Rotorua	7,090	1,400
35	Tauranga	6,197	1,200
36	East Taupo	515	100
		667,805	134,700

South Island.

No.	Name.	Population.	Estimated Horse-power.
1	Nelson	23,566	4,700
2	Buller	15,221	3,000
3	Greymouth	12,382	2,500
4	Westland	7,292	1,500
5	Marlborough	16,507	3,300
6	Waipara	5,118	1,000
7	Rangiora	12,319	2,500
8	Christchurch	96,927	20,000
9	Banks Peninsula	3,963	800
10	Selwyn	5,027	1,000
11	Ellesmere	5,226	1,000
12	Ashburton	18,598	3,700
13	Timaru	37,235	7,400
14	Waitaki	14,834	3,000
15	Otago	91,051	18,000
16	South Otago	22,480	4,500
17	Southland	58,892	11,800
18	Queenstown	2,713	500
		449,351	90,200

Note.—Details of the constitution of the above districts follows Table G., page 62.

LOCAL ELECTRIC-POWER-SUPPLY SYSTEMS.

Outside the Power Boards the existing local supply authorities are showing great activity, but owing to the war disturbances they have not yet been able to make up the arrears in the normal expansion of their installations. In the seven principal cities and boroughs proposals are under consideration involving the installation of new plant to a capacity of 33,500 kilowatts at an estimated cost of £1,582,000, as follows :—

Authority.	Power.	Present Power.	Proposed Addition.	Estimated Cost.
		Kw.	Kw.	£
Auckland City	Steam ..	13,000	13,000	500,000
Wellington City	,, ..	7,500	6,000	386,000
Dunedin City	Water ..	6,000	6,000	200,000
Wanganui Borough	Steam ..	375	1,500	84,000
Palmerston North Borough	Gas	Nil	1,000	127,000
New Plymouth Borough	Water ..	850	5,000	235,000
Invercargill Borough	Steam ..	975	1,000	50,000
Total	..	..	..	1,582,000

In each case provision is being made that the proposed plant shall work in with the main Government hydro-electric-power-supply system.

During the year one additional steam-power plant has been put into service (Waiuku Town Board), and four additional local authorities have undertaken the reticulation of energy purchased in bulk from the Government viz., Eyre County Council, Halswell County Council, Rangiora County Council, and Rangiora Borough Council. The total number of local supply authorities in the Dominion is now seventy-one, details of which are given in the tables herewith.

The demand for increased power-supply has been very insistent owing to the increasing cost of fuel and labour, but the difficulty in obtaining plant has delayed the extensions required. The only station that has succeeded in increasing its capacity substantially during the year is the Auckland City Council, for which orders were placed in 1914.

At the end of the financial year the capacities of the supply stations, analysed according to the sources of power, were as follow :—

	Number.	Capacity. Kilowatts.	Proportion per Cent.
Water-power	26	23,998	52·4
Steam	9	16,122	35·2
Gas-engines	17	3,209	7·0
Oil-engines	3	2,476	5·4
Bulk supply	16	(No generating plant.)	
Totals	71	45,805	100·0

The sum of the maxima outputs of the whole fifty-five power plants for the year was only 30,736 kw. out of the total capacity of 45,805 kw., leaving a margin of 15,069 kw., or 33 per cent., as standby plant—a margin which can be very much reduced when the whole of the stations are interconnected, so that each will serve as standby for its neighbours.

With regard to the authorities operating the various installations, they are as follows :—

	Number.	Capacity. Kilowatts.	Proportion. per Cent.
Government Departments	3	15,000	32·7
City Councils	4	18,300	40·0
Borough Councils	39	7,905	17·2
Town Boards	10	529	1·2
County Councils	5	(Bulk)	..
Electric-supply companies	9	2,071	4·5
Industrial companies	1	2,000	4·4
Totals	71	45,805	100·0

The increase during the year in the proportion operated by the Government from 19·8 to 32·7 per cent. is due to the purchase of the Horahora power plant.

The total number of consumers at the end of the year was 58,449, as compared with 54,926 last year, an increase of 3,523 consumers, or 6·4 per cent. These are distributed as follows :—

	Number of Consumers.	Proportion.
3 Government Departments	1,228	2·1
4 City Councils	30,452	52·3
39 Borough Councils	19,511	33·4
10 Town Boards	1,412	2·4
5 County Councils	1,990	3·3
10 Electric-supply companies	3,856	6·5
71 Totals	58,449	100·0

As compared with last year these figures show a larger proportion of country supply, there being 1,990 county consumers as against 1,250 last year. With the development of the Electric-power Board districts it is anticipated that in the early future the number of country consumers will increase very rapidly, thus fulfilling the main object of hydro-electric supply in stimulating the output of primary products, and attracting the population to the country districts.

With regard to the systems of supply, the fifty-five stations of the Dominion (Table F) are operating on the following systems :—

	Number.	Kilowatts.	Proportion.
Three-phase, 50 cycles	18	26,690	58·3
Three-phase, 60 cycles	1	550	1·2
Single-phase, 40 cycles	1	235	0·5
Single-phase, 50 cycles	4	1,335	2·9
Single-phase, 60 cycles	1	75	0·2
Single-phase, 80 cycles	1	4,500	9·8
D.C., 3-wire, 460 volts	21	11,251	24·6
D.C., 2-wire, 230 volts	7	794	1·7
D.C., 2-wire, 550 volts	1	375	0·8
	55	45,805	100·0

The three-phase 50-cycle system has been adopted as the standard for the Dominion. To enable supply to be taken economically from the Government hydro-electric-supply systems it is necessary that all the distribution-systems as far as possible should be changed over to this standard system. Already 58·3 per cent. of the plant capacity installed is on the standard system, and several other plants are making arrangements to change over in the near future. It is thus anticipated that within a couple of years over 75 per cent. of the installed capacity of the Dominion will be on the standard system, with consequent economy in interchange of power and convenience in keeping spares and stocks.

With regard to the cost of operation (Table G), twenty-seven out of fifty-five systems are operating at a profit after paying capital charges, and the balance at a loss. This is due mainly to the rapidly increasing costs. These should be met as early as possible, either by increased economy in operation, increased output, or, where these are not available, by increased charges.

The comparison between the gross operating results of the North Island and the South Island systems (Table G) is valuable in view of the larger proportion of hydro-electric power in operation in the South Island. The figures for last year are as follows :

	North Island.	South Island.	Total.
Population supplied	307,489	229,354	536,843
Number of consumers	34,107	24,342	58,449
Power installed (kilowatts)	27,099	18,706	45,805
Maximum load (kilowatts)	16,717	13,999	30,716
Capital outlay	£1,642,269	£1,611,601	£3,253,870
Units generated	42,233,651	57,661,879	99,895,530
Units sold	33,619,138	45,809,980	79,429,118
Units non-productive	8,614,513	11,851,899	20,466,412
Percentage, units non-productive	20·4	20·5	20·4
Total load factor	28·7	47·0	37·0
Total revenue	£372,940	£280,709	£653,649
Revenue per unit sold	2·66d.	1·46d.	1·98d.
Revenue per kilowatt P.H. maximum	£22·3	£20·0	£21·1
Total working-expenses	£233,158	£141,703	£374,861
Working-expenses per unit sold	1·66d.	0·74d.	1·13d.
Working-expenses per kilowatt P.H. maximum	£13·9	£10·1	£12·2
Total capital charges	£102,417	£109,741	£212,158
Capital charges per unit sold	0·74d.	0·57d.	0·64d.
Capital charges per kilowatt P.H. maximum	£6·1	£7·8	£6·9
Total annual costs	£330,048	£249,085	£579,133
Total annual cost per unit sold	2·40d.	1·31d.	1·75d
Total annual cost per kilowatt P.H. maximum	£20·0	£17·9	£19·1

The present total capital outlay on electric-power supply in each of the two Islands is approximately the same (£1,600,000), but owing to the higher capital cost of hydro-electric plant the installed hydro-capacity in the North Island is less than in the South Island, where the majority of the plant is operated by water-power. On the other hand, the load factor and the output in units are higher in the South Island (45,800,000 units sold) than in the North (33,600,000 units sold) owing to the cheaper cost of production, and the total cost per unit sold is 1·3d. in the South Island as compared with 2·4d. in the North.

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Chief Electrical Engineer.

TABLES.

Table A.—Operating Results.

Results of Operation.	First Year, ending March, 1916.	Second Year, ending March, 1917.	Third Year, ending March, 1918.	Fourth Year, ending March, 1919.	Fifth Year, ending March, 1920.
Capital outlay	£320,330	£366,984	£389,754	£403,156	£422,076
Costs—					
Working-costs	£9,383	£12,889	£14,449	£17,138	£17,759
Interest, 4 per cent. ..	£11,398	£13,743	£14,871	£15,692	£16,863
Depreciation, 2 per cent. ..	£5,386	£6,078	£7,013	£7,329	£7,624
Total costs	£26,167	£32,710	£36,333	£40,159	£42,246
Revenue—					
City Council	£6,200	£8.500	£11,338	£13,556	£16,029
Tramways	..	£3,962	£7,024	£6,885	£7,660
Wholesale consumers ..	£1,523	£6,559	£10,804	£14,090	£18,735
Retail consumers	£537	£983	£1,912	£1,529	£1,952
Miscellaneous	£258	£750	£1,014	£1,264	£1,455
Total revenue	£8,518	£20,754	£32,092	£37,324	£45,831
Accumulated depreciation fund	£5,853	£12,116	£19,666	£27,393	£35,389
Net debit balance profit and loss account	£18,572	£30,528	£34,871	£37,707	£34,121
Maximum load (kilowatts)—					
Power-house	1,372	4,366	5,438	5,900	7,066
Substation	1,220	3,900	4,800	5,340	6,260
City Council	1,020	1,600	2,260	2,625	2,966
Tramways	..	1,700	1,660	1,580	1,760
Output (units)—					
Power-house	4,860,260	14,774,960	22,403,660	27,495,720	33,010,130
Substation	4,128,232	12,934,230	20,539,430	24,548,554	29,572,160
Sold (units)—					
City Council	3,417,040	6,137,110	9,183,700	10,886,290	12,936,340
Tramways	..	3,162,583	5,634,403	5,485,370	6,417,900
Wholesale consumers ..	500,801	2,175,268	4,719,283	6,770,488	8,348,174
Retail consumers	76,926	190,000	307,290	245,398	315,562
Total units sold	3,994,767	11,664,961	19,844,676	23,387,546	28,017,976
Losses—					
Transmission losses ..	752,028	1,840,730	1,864,230	2,947,166	3,437,960
Percentage	15·0	12·5	8·3	10·7	10·1
Distribution losses	133,465	1,269,269	694,754	1,161,008	1,472,414
Percentage	3·2	9·8	3·4	4·7	4·4
Average weekly load factor (percentage)—					
Power-house	44·3	52·9	58·0	59·1	59·9
Substation	43·3	53·1	58·4	58·4	58·6
City	39·0	49·2	54·8	52·6	53·1
Working-costs—					
Per kilowatt (power-house max.)	£6·80	£2·95	£2·66	£2·90	£2·51
Per kilowatt (substation max.)	£7·70	£3·32	£3·01	£3·21	£2·83
Per unit generated	0·46d.	0·21d.	0·15d.	0·15d.	0·13d.
Per unit sold	0·56d.	0·26d.	0·17d.	0·17d.	0·15d.
Capital charges—					
Per kilowatt (power-house max.)	£12·20	£4·55	£4·04	£3·90	£3·46
Per kilowatt (substation max.)	£13·70	£5·08	£4·56	£4·31	£3·91
Per unit generated	0·83d.	0·32d.	0·23d.	0·20d	0·18d.
Per unit sold	1·01d.	0·41d.	0·26d.	0·24d.	0·21d.
Total cost—					
Per kilowatt (power-house max.)	£19·00	£7·50	£6·70	£6·80	£5·98
Per kilowatt (substation max.)	£21·40	£8·40	£7·57	£7·52	£6·75
Per unit generated	1·29d.	0·53d.	0·39d.	0·35d.	0·31d.
Per unit sold	1·57d.	0·68d.	0·44d.	0·41d.	0·36d.
Revenue—					
Per kilowatt (power-house max.)	£6·20	£4·75	£5·90	£6·32	£6·48
Per kilowatt (substation max.)	£7·00	£5·30	£6·69	£7·00	£7·32
Per unit generated	0·42d.	0·34d.	0·34d.	0·33d.	0·33d.
Per unit sold	0·51d.	0·45d.	0·39d.	0·38d.	0·39d.
Per unit sold to City Council	0·43d.	0·33d.	0·30d.	0·30d.	0·30d.
Per unit sold to Tramways ..	..	0·31d.	0·30d.	0·30d.	0·29d.
Per unit sold to wholesale consumers	0·73d.	0·72d.	0·55d.	0·50d.	0·54d.
Per unit sold to retail consumers	1·67d.	1·24d.	1·50d.	1.50d.	1·50d.

TABLE B.—DETAILS OF CAPITAL OUTLAY.

Item.	Capital Outlay.		Increase.
	31st March, 1919.	31st March, 1920.	
	£	£	£
Land, roading, and fencing	17,386	17,393	7
Tunnel and headworks	98,421	100,347	1,926
Power-house and machinery	72,860	74,235	1,375
Staff village	12,215	12,772	557
Transmission-lines	52,882	53,378	496
Addington Substation	22,502	24,731	2,229
Primary distribution	41,813	44,335	2,522
Secondary distribution	23,734	27,229	3,495
Service transformers and meters	11,848	12,594	746
Vehicles and loose equipment	4,466	6,304	1,838
Telephone-lines	1,828	1,828	..
Office furniture	105	202	97
Surveys, preliminary expenses, &c.	28,532	31,843	3,311
Interest during construction	14,564	14,885	321
Totals	403,156	422,076	18,920

TABLE C.—OPERATING OR WORKING COSTS FOR THE YEAR, COMPARED WITH PREVIOUS YEAR.

Expenditure	1919.		1920.	
	Cost.	Per Unit sold.	Cost.	Per Unit sold.
	£	d.	£	d.
Generation	4,760	0·049	5,303	0·046
Transmission	3,046	0·031	1,975	0·017
Main distributing-station	2,173	0·023	2,413	0·020
H.T. distribution	1,648	0·017	1,912	0·016
L.T. distribution	619	0·006	977	0·008
Stand-by plant	1,668	0·017	1,789	0·015
Management and general expenses ..	3,224	0·033	3,390	0·029
Totals	17,138	0·176	17,759	0·151

TABLE D.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR YEAR ENDED 31ST MARCH, 1920.

Distributing Authority.	Number of Consumers.	Capital Outlay.	Revenue from Consumers.	Paid for Electricity.	Maintenance and Working expenses.	Interest.	Sinking Fund.	Depreciation.	Balance.	
									Profit.	Loss.
		£	£	£	£	£	£	£	£	£
Public Works Department ..	359	422,076	24,780*	..	17,759	16,863	..	7,624	3,585	..
Christchurch City Council ..	6,632	302,185	66,662*	P.W. 16,029	19,342	11,610	..	15,628	5,933	..
Halswell County Council ..	78	5,000	264	,, 105	50	120	50	..	..	61
Heathcote County Council ..	432	9,700	2,310	,, 1029	671	401	77	..	131	..
Kaiapoi Borough Council ..	326	4,320	1,792	,, 722	445	161	..	..	464	..
Lyttelton Borough Council ..	108	5,000	1,560	,, 677	390	214	100	..	179	..
Riccarton Borough Council ..	325	4,998	1,521	,, 217	354	237	..	240	164	..
				C.C. 309						
Rangiora Borough Council ..	171	5,500	708	P.W. 279	174	289	55	..	..	89
Rangiora County Council ..	121	6,659	639	,, 189	54	151	50	..	195	..
Spreydon Borough Council ..	303	6,162	1,230	C.C. 370	277	300	60	125	98	..
Sumner Borough Council ..	292	6,465	1,565	P.W. 495	435	315	60	129	131	..
Tai Tapu Dairy Company ..	109	5,344	1,606	,, 720	423	318	194	..	..	49
Waimairi County Council ..	1,289	37,650	5,659	,, 83	1,785	1,938	..	..	651	..
				C.C. 1,201						
Woolston Borough Council ..	286	7,515	1,319	P.W. 506	395	343	70	..	5	..
Totals ..	10,831	828,574	111,615	22,931	42,554	33,260	716	23,746	11,536	199

* After deducting amount of sales to other distributing bodies. P.W. Paid to Public Works Department. C.C. Paid to Christchurch City Council.

Net profit of the whole system, £11,337.

TABLE E.—TOTAL CONNECTED LOAD IN KILOWATTS.

——	Light.	Heat.	Power.	Total.
Direct Public Works Department wholesale consumers—				
Tramways	85·0	..	4,110·0	4,195·0
Freezing-works	74·7	6·0	1,869·1	1,949·8
Flour-mills	3·8	1·2	275·9	280·9
Dairy factories	4·0	2·0	92·2	98·2
Quarries	1·0	1·0	123·5	125·5
Tanneries, fellmongeries, &c.	29·7	7·0	767·6	804·3
Seed-cleaning	3·6	1·0	108·5	113·1
Brick-yards	0·3	..	93·5	93·8
Railway workshops	25·0	..	207·8	232·8
Harbour Board	37·0	..	99·0	136·0
Institutions	127·2	229·2	136·5	492·9
Soapworks	3·1	..	21·7	24·8
Sawmills	..	..	22·5	22·5
Bacon-factory	0·7	..	15·0	15·7
Steelworks	2·6	1,200·0	20·8	1,223·4
Lyttelton Pumping-station	0·3	..	115·9	116·2
Waikuku Twine-mills	..	..	37·2	37·2
Aviation company	5·4	9·6	6·0	21·0
Total Public Works Department consumers	403·4	1,457·0	8,122·7	9,983·1
Local authority reticulations—				
Christchurch City Council	5,367·8	954·4	11,093·8	17,415·6
Waimairi County Council	23·9	18·0	4·0	45·9
Riccarton Borough Council	39·2	62·0	50·4	151·6
Lyttelton Borough Council	92·8	44·0	192·4	329·2
Woolston Borough Council	88·6	129·4	29·5	247·5
Sumner Borough Council	92·8	153·2	53·8	299·8
Kaiapoi Borough Council	79·6	142·0	36·2	257·8
Rangiora Borough Council	73·6	52·4	100·5	226·5
Heathcote County Council	142·4	223·9	30·1	396·4
Paparua County Council	106·8	139·1	103·4	349·3
Halswell County Council	28·4	44·6	23·4	96·4
Eyre County Council	15·1	32·4	20·5	68·0
Rangiora County Council	27·8	56·8	84·4	169·0
Tai Tapu District	55·0	87·4	63·1	205·5
Lake Coleridge	17·3	155·4	0·1	172·8
Power-house and substation	20·2	36·2	113·9	170·3
Totals	6,674·7	3,787·8	20,122·2	30,584·7

Maximum load, distributing-station, 6,260 kilowatts; diversity, 4·86; unit output, distributing-station, 29,572,160; annual load factor, 54 per cent.

Table F.—Electric-supply Stations of New Zealand at 31st March, 1920.

North Island.

Locality.	Authority.	Population.	Consumers.	Power.	Static Head in Feet.	Capacity in Kilowatts. Installed.	Capacity in Kilowatts. Max. Load.	System of Supply.	Supply Voltage.	Retail Selling-prices. Lighting.	Retail Selling-prices. Power.
										s. d.	s. d.
Auckland	City	95,917	4,156	Steam		7,000*	4,200	D.C. A.C.	460/230 400/230	0 6	0 2¼
Bull's	Private	483	130	Gas		27	18	D.C.	230	1 0	0 6
Devonport	Company	7,613	700	Gas		200	175	D.C.	460/230	0 6	0 3
Eketahuna	Borough	754	225	Gas		70	30	D.C.	230	0 8	0 4
Feilding	Borough	3,438	752	Gas Oil		180 130	147	A.C.	230 S.P.	1 0	0 4
Gisborne	Borough	14,366	1,513	Oil Steam		300 350	362	D.C.	440/220	0 8	0 3
Hamilton	Borough	7,538	561	Steam		170	185	D.C.	460/230	0 7	0 3
Hastings	Borough	8,500	1,552	Oil		360	360	D.C.	460/230	0 6	0 3
Havelock North	Town Board	870	218	Bulk supply			29	A.C.	400/230	0 7	0 4
Hawera	Company	3,375	1,410	Water Oil	55	445 154	362	A.C.	400/230	0 7	0 3½
Huntly	Town Board	1,535	237	Steam		225	70	D.C.	460/230	0 9	0 5
Inglewood	Borough	1,199	338	Water	40	120	60	A.C.	400/230	0 7	0 2
Kaponga	Town Board	397	113	Water	30	45	42	D.C.	230	0 9	0 4
Mangaweka	Town Board	390	70	Water	35	30	23	A.C.	400/230	0 9	0 4
Martinborough	Town Board	725	178	Gas		27	31	D.C.	230	0 10	0 5
Napier	Borough	12,704	1,191	Gas Oil		940 110	900	D.C.	460/230	0 6½	0 3
Ngaruawahia	Town Board	900	202	Gas		70	33	D.C.	460/230	0 9	0 5
New Plymouth	Borough	8,704	2,621	Water	120	850	750	A.C.	440/220	0 6	0 1½
Ohakune	Borough	1,371	173	Water	44	90	45	A.C.	400/230	0 9	0 4
Opotiki	Private	1,073	225	Gas		86	58	D.C.	460/230	0 9	0 4
Pahiatua	Borough	1,300	117	Gas		35	30	D.C.	460/230	0 10	0 5
Patea	Borough	1,600	210	Water Gas	70	50 45	50	A.C.	100 S.P.	0 7½	..
Pukekohe	Borough	1,533	180	Gas		85	70	D.C.	460/230	0 8	0 4
Raetihi	Town Board	508	201	Water	360	48	45	A.C.	400/230	0 10	0 3
Rotorua	Government	2,845	868	Water	14	200	184	A.C.	200/115	0 6	0 2
Stratford	Borough	2,713	878	Water Oil	36	90 145	187	A.C.	100 S.P.	0 8	0 4
Taihape	Borough	1,927	290	Water Gas	28	100 75	128	D.C.	460/230	0 8	0 2
Tauranga	Borough	1,685	566	Water	108	160	150	A.C.	400/230	0 8	0 2
Te Aroha	Borough	1,802	416	Water Oil	560	135 187	100	A.C.	400/230	0 6	0 2
Te Kuiti	Borough	2,300	375	Gas		175	75	D.C.	460/230	0 10	0 4
Thames	Borough	5,298	674	Water Oil	130	105 105	105	D.C.	460/230	0 10	0 4
Waikato (Horahora)	Public Works Department	..	1	Water	27	6,300	2,700	A.C.	11,000	..	..
Wairoa	Borough	1,530	256	Gas		56	57	D.C.	460/230	0 9	0 5
Wairua Falls	Company	..	27	Water	130	2,000	1,460	A.C.	400/230	..	..
Whangarei	Borough	3,294	630	Bulk supply		..	(150)	A.C.	400/230	0 5½	0 2
Waitara	Borough	1,422	275	Water Gas	200	23 62	63	D.C.	440/220	0 9	..
Waiuku	Town Board	850	67	Steam		24	17	D.C.	460/230	Fixed rate.	
Wanganui	Borough	14,380	20	Gas		375	286	D.C.	550	..	0 4½
Waverley	Town Board	650	140	Water	60	40	30	A.C.	400/230	0 10	..
Wellington	City	90,000	11,351	Steam		4,500†	3,200	A.C.	105 S.P.	0 6	0 3
Totals for North Island		..	34,107	..	..	27,099	16,717	..	..	..	..

* Does not include 6,000 kilowatts installed for tramway. † Does not include 3,000 kilowatts installed for tramway. S.P.: Single phase.

Note.—All A.C. systems are standard frequency, 50 cycles, except Wellington (80 cycles) and Stratford (40 cycles).

Table F.—Electric-supply Stations of New Zealand—*continued.*

South Island.

Locality.	Authority.	Population.	Consumers.	Power.	Static Head in Feet.	Capacity in Kilowatts.		System of Supply.	Supply Voltage.	Retail Selling-price	
						Installed.	Max. Load.			Lighting.	Power.
										s. d.	s. d.
Akaroa	Borough	540	155	Water ..	310	30	30	D.C.	230/115	0 6	0 3
				Gas ..	..	66					
Ashburton	Company	5,452	675	Oil	..	165	224	A.C.	400/230	0 8	0 4
				Gas ..	..	186		D.C.	230		
Bluff	Borough	1,823	258	Steam ..	..	50	30*	D.C.	460/230	0 7½	0 4
Brightwater	Company	872	330	Water ..	10	40	42	A.C.	230 S.P.	0 9	0 4
				Gas ..	..	40					
Lake Coleridge	Public Works Department ..	..	359	Water ..	490	6,000	7,066	A.C.	400/230	..	..
				Steam ..	..	2,500					
Christchurch	City	55,860	6,632	Bulk supply ..	..	..	(2,966)	A.C.	400/230	0 5	0 1½
Eyre	County	1,806	60	Bulk supply ..	..	..	(41)	A.C.	400/230	Fixed rate.	
Halswell	County	1,628	78	Bulk supply ..	..	..	(28)	A.C.	400/230	Fixed rate.	
Heathcote	County	3,277	432	Bulk supply ..	..	..	(127)	A.C.	400/230	Fixed rate.	
Kaiapoi	Borough	1,560	326	Bulk supply ..	..	..	(91)	A.C.	400/230	Fixed rate.	
Lyttelton	Borough	3,766	108	Bulk supply ..	..	..	(64)	A.C.	400/230	Fixed rate.	
Riccarton	Borough	2,890	325	Bulk supply ..	..	..	(55)	A.C.	400/230	Fixed rate.	
Rangiora	Borough	1,808	171	Bulk supply ..	..	..	(50)	A.C.	400/230	Fixed rate.	
Rangiora	County	2,747	121	Bulk supply ..	..	..	(40)	A.C.	400/230	Fixed rate.	
Spreydon	Borough	4,289	303	Bulk supply ..	..	..	..	A.C.	400/230	Fixed rate.	
Sumner	Borough	2,287	292	Bulk supply ..	..	..	(50)	A.C.	400/230	Fixed rate.	
Tai Tapu	Company	814	109	Bulk supply ..	..	..	150*	A.C.	400/230	Fixed rate.	
Waimairi	County	11,914	1,289	Bulk supply ..	..	..	(210)	A.C.	400/230	Fixed rate.	
Woolston	Borough	3,990	286	Bulk supply ..	..	..	(52)	A.C.	400/230	Fixed rate.	
Dunedin	City	68,716	8,313	Water ..	665	6,000	5,420	A.C.	400/230	0 6	0 2
				Oil	..	800					
Gore	Borough	3,551	360*	Water ..	20	150	100	A.C.	400/230	0 7	0 3
Havelock	Town Board	290	44	Water ..	270	20	11	D.C.	460/230	1 0	0 6
Invercargill	Borough	22,000	1,528	Steam ..	..	975	580	A.C.	400/230	0 7½	0 3½
Kaitangata	Borough	1,681	4	Steam ..	..	50	5	A.C.	400/230	..	..
Hokitika	Company	2,091	Nil	Water ..	250	550	Nil	A.C.	400/230	..	..
Mataura	Borough	1,239	162	Water ..	20	75	30	A.C.	440/220 S.P.	0 6	0 2½
Oamaru	Borough	5,140	265	Water ..	244	250	75	A.C.	400/230	0 6½	0 3
Picton	Borough	1,121	225	Water ..	266	15	73	D.C.	460/230	Fixed rate.	
				Gas ..	..	85					
Reefton	Company	1,900	202	Water ..	27½	75	80	D.C.	230	Fixed rate.	
				Steam ..	..	103					
Timaru	Borough	13,716	800	Gas ..	..	250	198	D.C.	460/230	0 11	0 4
				Steam ..	..	175					
Winton	Borough	586	130	Gas ..	..	56	35	A.C.	400/230	0 9	..
Totals for South Island ..	..	..	24,342	..	..	18,706	13,999	..	..	..	..
Totals for New Zealand ..	..	..	58,449	..	..	45,805	30,716	..	..	..	..

* Assessed. Returns not to hand. S.P.: Single phase.

Note.—All A.C. systems are standard frequency, 50 cycles, except Hokitika (60 cycles) and Mataura (60 cycles).

Table G.—Summary of Returns of Operating Results for Year ending 31st March, 1920.

North Island.

Station.	Capital Outlay at 31st March, 1920.	Units.		Non-productive Units.		Revenue.	Working-expenses. (*a*)	Capital Charges. (*b*)	Total Annual Costs.	Average Revenue.		Working Costs.		Capital Costs.		Total Costs.	
		Generated or purchased.	Sold.	Number.	Per Cent.					Per Unit sold.	Per KW. P.H. Max.	Per Unit sold.	Per KW. P.H. Max.	Per Unit sold.	Per KW. P.H. Max.	Per Unit sold.	Per KW. P.H. Max.
	£					£	£	£	£	d.	£	d.	£	d.	£	d.	£
1. Auckland(*c*) ..	457,080	11,165,554	9,209,063	1,956,491	17·6	89,051	49,826	24,459	74,285	2·3	21·2	1·3	11·8	0·6	5·8	1·9	17·6
2. Bull's	5,100	*d*(27,000)	21,520	..	..	1,036	684	..	..	11·5	57·6	7·6	37·9	..	..	..	..
3. Devonport ..	32,937	350,770	228,004	122,766	35·0	4,505	3,620	1,492	5,112	4·8	25·7	3·8	20·7	1·6	8·6	5·4	29·3
4. Eketahuna ..	7,000	33,490	26,184	7,316	21·9	1,481	1,094	218	1,312	13·6	49·5	10·0	36·5	2·0	7·2	12·0	43·7
5. Feilding ..	20,292	202,980	180,755	22,225	11·0	4,801	4,408	1,385	5,793	6·4	32·6	5·9	30·0	1·8	9·4	7·7	39·4
6. Gisborne ..	43,306	942,547	763,120	179,427	19·1	15,874	13,719	2,310	16,029	5·0	44·0	4·3	37·9	0·7	6·4	5·0	44·3
7. Hamilton ..	15,923	522,515	341,412	181,103	34·8	9,184	7,604	933	8,537	6·4	49·4	5·3	41·1	0·7	5·0	6·0	46·1
8. Hastings ..	46,992	1,045,567	951,263	94,304	9·05	16,755	12,121	3,912	16,033	4·2	46·5	3·0	33·6	1·0	10·8	4·0	44·4
9. Havelock North	3,620	58,213	51,427	6,786	11·65	1,319	1,106	210	1,316	6·2	45·5	5·2	38·1	1·0	7·2	6·2	45·3
10. Hawera ..	38,525	1,048,112	*d*(733,678)	..	..	12,789	3,232	4,301	7,533	..	35·4	..	8·9	..	11·9	..	20·8
11. Horahora ..	212,523	6,415,150	5,630,200	784,950	12·2	*e*5,803	*e*1,870	6,055	7,925	0·25	5·2	0·1	1·6	0·3	5·4	0·4	7·0
12. Huntly ..	8,600	53,078	44,060	9,018	16·9	1,351	1,323	530	1,853	7·4	19·3	7·2	18·9	2·9	7·6	10·1	26·5
13. Inglewood ..	8,500	144,535	128,000	16,535	11·45	3,131	2,308	510	2,818	5·9	52·1	4·3	38·5	1·0	8·5	5·3	47·0
14. Kaponga ..	6,058	*d*(33,400)	26,622	..	..	838	304	343	647	7·5	20·0	2·7	7·2	3·1	8·2	5·8	15·4
15. Mangaweka ..	*d*4,000	20,000	12,000	8,000	40·0	427	448	*d*200	648	8·5	18·5	8·9	19·4	4·0	8·7	12·9	28·1
16. Martinborough ..	6,641	*d*(67,900)	*d*(54,300)	..	..	1,962	1,050	498	1,548	..	63·2	..	33·9	..	16·0	..	49·9
17. Napier.. ..	62,700	*f*1,182,980	1,050,890	132,090	11·5	16,596	11,898	7,573	19,471	3·8	18·4	2·7	13·2	1·7	8·4	4·4	21·6
18. Ngaruawahia ..	8,848	57,856	33,589	24,267	42·0	1,271	985	391	1,376	9·0	38·6	7·0	29·7	2·8	11·8	9·8	41·5
19. New Plymouth ..	114,355	*f*2,519,000	1,717,500	801,500	31·8	19,305	7,618	7,647	15,265	2·7	25·7	1·1	10·1	1·1	10·2	2·2	20·3
20. Ohakune ..	9,100	*d*(72,000)	57,655	..	..	1,635	740	273	1,013	6·8	36·4	3·1	16·4	1·1	6·0	4·2	22·4
21. Opotiki ..	6,172	60,000	57,800	2,200	*g*3·68	1,972	1,662	310	1,972	8·2	34·1	6·9	28·7	1·3	5·4	8·2	34·1
22. Pahiatua ..	10,175	*d*(32,400)	25,838	..	..	730	1,028	662	1,690	6·8	24·2	9·6	34·2	6·2	22·1	15·8	56·3
23. Patea	3,698	119,225	107,060	12,165	10·1	1,488	1,572	430	2,002	3·3	29·8	3·5	31·5	1·0	8·6	4·5	40·1
24. Pukekohe ..	6,000	*d*(51,700)	41,440	..	..	1,368	926	126	1,052	7·9	19·6	5·4	13·2	0·7	1·8	6·1	15·0
25. Raetihi ..	13,864	*d*(93,100)	64,252	..	..	1,408	1,169	..	..	5·3	31·3	4·4	26·0	..	..	..	..
26. Rotorua ..	32,985	515,229	352,701	152,528	29·6	5,775	3,674	..	..	3·9	31·3	2·5	19·9	..	..	..	..
27. Stratford ..	17,100	*d*(263,000)	210,592	..	..	5,469	4,098	1,723	5,821	6·2	29·2	4·6	21·8	2·0	9·2	6·6	31·0
28. Taihape ..	13,047	278,864	242,492	36,372	13·05	4,026	2,331	730	3,061	4·0	31·5	2·3	18·2	0·7	5·7	3·0	23·9
29. Tauranga ..	21,405	486,000	398,800	87,200	17·90	3,936	3,878	1,787	5,665	2·4	26·1	2·3	25·8	1·1	11·9	3·4	37·7
30. Te Aroha ..	15,400	*d*(90,500)	72,260	..	..	2,750	2,921	710	3,631	9·1	27·5	9·7	29·2	2·4	7·1	12·1	36·3
31. Te Kuiti ..	14,692	146,207	121,755	24,452	16·7	3,796	2,221	857	3,078	7·5	50·7	4·4	29·7	1·7	11·4	6·1	41·1
32. Thames ..	18,032	224,765	218,655	6,110	*g*2·68	4,743	2,460	1,268	3,728	5·2	45·0	2·7	23·4	1·4	12·1	4·1	35·5
33. Wairoa ..	11,600	84,544	82,844	1,700	*g*2·02	2,761	2,223	1,468	3,691	8·0	48·7	6·4	39·0	4·3	25·8	10·7	64·8
34. Wairua Falls ..	86,870	5,240,250	4,237,208	1,003,042	19·1	10,071	3,150	9,210	12,360	0·6	6·9	0·2	2·2	0·5	6·3	6·7	8·5
35. Whangarei ..	19,202	275,000	248,878	26,122	9·55	4,741	1,797	1,335	3,132	4·6	31·5	1·7	12·0	1·3	8·9	3·0	20·9
36. Waitara ..	8,300	52,560	49,000	3,560	*g*6·79	2,067	1,973	585	2,558	10·1	33·0	9·6	31·3	2·9	9·3	12·5	40·6
37. Waiuku(*h*) ..	2,348	*d*(11,500)	9,211	..	..	444	*h*1,092	690	1,782	11·6	26·1	28·5	64·0	17·9	40·5	46·4*h*	104·5*h*
38. Wanganui ..	..	*f*969,273	124,797	Not separated from tramways		1,507	Tramway Account	..	..	2·9	..	..	..	..	..	..	..
39. Waverley ..	4,861	*d*(29,950)	23,962	..	..	781	394	291	685	7·8	26·0	3·9	13·1	2·9	9·7	6·8	22·8
40. Wellington(*c*) ..	224,417	7,580,150	5,968,616	1,542,509	20·4	103,993	68,631	16,995	85,626	4·2	32·5	2·8	21·4	0·7	5·3	3·5	26·7
	£					£	£	£	£	d.	£	d.	£	d.	£	d.	£
Totals ..	1,642,269	42,233,651 (*i*)	33,619,138 (*i*)	8,614,513	20·4	372,940	233,158	102,417	330,048	2·66 (average)	22·3 (average)	1·66 (average)	13·9 (average)	0·74 (average)	6·15 (average)	2·4 (average)	20·0 (average)

(*a*) Includes wages, fuel, and maintenance of generating and distributing system. (*b*) Includes interest, depreciation, and sinking fund. (*c*) Not including tramways. (*d*) Assessed from incomplete returns.
(*e*) From November, 1919, to March, 1920. (*f*) Including tramways. (*g*) From assessment by local authority. (*h*) First year of operation. (*i*) Includes assessed units shown in brackets.

TABLE G.—SUMMARY OF RETURNS OF OPERATING RESULTS FOR YEAR ENDING 31ST MARCH, 1920—*continued.*

South Island.

Station.	Capital Outlay at 31st March, 1920.	Units.		Non-productive Units.		Revenue.	Working Expenses. (*a*)	Capital Charges. (*b*)	Total Annual Cost.	Average Revenue.		Working Costs.		Capital Charges.		Total Cost.	
		Generated or Purchased.	Sold.	Number.	Per Cent.					Per Unit sold.	Per KW. P.H. Max.	Per Unit sold.	Per KW. P.H. Max.	Per Unit sold.	Per KW. P.H. Max.	Per Unit sold.	Per KW. P.H. Max.
	£					£	£	£	£	d.	£	d.	£	d.	£	d	£
1. Akaroa ..	7,760	*c*(59,100)	47,326	..	..	1,733	901	463	1,364	8·8	57·8	4·6	30·0	2·3	15·4	6·9	45·4
2. Ashburton ..	30,679	403.637	387,239	16,398	*d*4·06	7,664	5,308	1,514	6,822	4·8	34·2	3·3	23·7	0·9	6·8	4·2	30·5
3. Bluff	4,000	*c*(70,000)	55,793	..	..	727	705	193	898	3·1	24·1	3·0	23·4	0·8	6·4	3·8	29·8
4. Brightwater ..	6,500	*c*(92,100)	*c*(73,400)	..	..	2,454	1,508	465	1,973	..	58·5	..	35·9	..	11·0	..	46·9
5. Lake Coleridge ..	422,076	33,010,130	*e*28,017,976	4,992,154	*f*15·1	45,831	17,759	24,487	42,246	0·4	6·5	0·2	2·5	0·2	3·5	0·4	6·0
6. Christchurch City Council(*g*)	302,185	12,936,340	10,185,815	2,750,525	21·2	68,542	35,371	27,238	62,609	1·6	23·1	0·8	11·9	0·6	9·2	1·4	21·1
7. Eyre County ..	1,608	67,366	..	..	..	Included	in P.W.D.	figures for	Lake Cole	ridge till	1/7/20.	..	..	..	..	..	..
8. Halswell County	5,000	34,441	..	..	..	264	155	170	325	2·3	9·4	1·3	5·5	1·5	6·1	2·8	11·6
9. Heathcote County	9,700	491,368	..	..	..	2,310	1,700	478	2,178	1·1	18·2	0·8	13·4	0·2	3·8	1·0	17·2
10. Kaiapoi ..	4,320	346,880	..	..	..	1,792	1,167	161	1,328	1·6	19·7	1·0	12·8	0·2	1·8	1·2	14·6
11. Lyttelton ..	5,000	131,475	..	..	..	1,560	1,067	313	1,380	3·6	24·4	2·4	16·7	0·7	4·9	3·1	21·6
12. Riccarton ..	4,998	147,381	..	..	..	1,521	880	477	1,357	2·5	27·7	1·4	16·0	0·8	8·7	2·2	24·7
13. Rangiora ..	5,500	77,283	..	..	..	708	453	344	797	2·8	14·3	1·8	9·1	1·3	6·8	3·1	15·9
14. Rangiora County	6,659	157,218	..	..	..	639	243	201	444	1·0	11·9	0·5	6·1	0·4	5·0	0·9	11·1
15. Spreydon ..	6,162	81,580	..	..	..	1,230	647	485	1,132	4·5	..	2·4	..	1·8	..	4·2	..
16. Sumner ..	6,465	247,680	..	..	..	1,565	930	504	1,434	1·9	31·3	1·1	18·5	0·6	10·1	1·7	28·6
17. Tai Tapu ..	5,344	324,028	..	..	..	1,606	1,143	512	1,655	1·5	10·7	1·1	7·6	0·5	3·4	1·6	11·0
18. Waimairi County	37,650	781,350	..	..	..	5,659	3,069	1,938	5,007	2·2	26·9	1·2	14·6	0·5	9·2	1·7	23·8
19. Woolston ..	7,515	193,530	..	..	..	1,319	901	413	1,314	2·1	25·4	1·4	17·3	0·6	7·9	2·0	25·2
20. Dunedin(*e*) ..	526,181	19,983,790	14,202,787	5,781,003	28·9	84,720	34,132	40,760	74,892	1·4	15·6	0·6	6·3	0·7	7·5	1·3	13·8
21. Gore	11,000	*c*(365,000)	256,421	..	..	5,742	3,608	567	4,175	5·4	57·4	3·4	36·1	0·5	5·7	3·9	41·8
22. Havelock ..	2,057	*c*(24,100)	*c*(19,270)	..	..	279	355	39	394	..	25·4	..	32·2	..	3·5	..	35·7
23. Invercargill(*e*) ..	77,139	2,142,180	1,757,518	384,662	17·9	17,800	10,844	2,636	13,480	2·4	30·7	1·5	18·7	0·4	4·5	1·9	23·2
24. Kaitangata ..	194	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25. Hokitika ..	25,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26. Mataura ..	2,528	36,138	26,299	9,839	27·1	625	442	120	562	5·7	20·7	4·0	14·7	1·1	4·0	5·1	18·7
27. Oamaru ..	25,554	210,934	164,994	45,940	21·8	2,321	1,546	1,315	2,861	3·4	31·0	2·2	20·6	1·9	17·5	4·1	38·1
28. Picton	8,970	*c*(159,000)	*c*(128,000)	..	..	1,656	1,947	421	2,368	..	22·7	..	26·7	..	5·8	..	32·5
29. Reefton ..	3,000	*c*(174,200)	*c*(139,500)	..	..	2,472	2,359	..	..	..	30·9	..	29·6	..	..	..	..
30. Timaru ..	46,778	915,970	520,867	395,103	43·2	17,362	11,959	3,322	15,281	8·0	88·0	5·5	60·5	1·5	16·8	7·0	77·3
31. Winton ..	4,079	*c*(15,600)	12,500	..	..	608	604	205	809	11·6	17·3	11·6	17·2	3·9	5·8	15·5	23·0
	£					£	£	£	£	d.	£	d.	£	d.	£	d.	£
Totals ..	1,611,601	57,661,879 (*h*)	45,899,980 (*h*)	11,851,899	20·5	280,709	141,703	109,741	249,085	1·46 (average)	20·0 (average)	0·74 (average)	10·1 (average)	0·57 (average)	7·8 (average)	1·31 (average)	17·9 (average)

(*a*) Includes wages, fuel, and maintenance of generating and distributing system. (*b*) Includes interest, depreciation, and sinking fund. (*c*) Assessed from incomplete returns. (*d*) From assessment by local authority.
(*e*) Including tramways. (*f*) Does not include any distribution losses. (*g*) Not including tramways. (*h*) Includes assessed units shown in brackets.

SUGGESTED ELECTRIC-POWER DISTRICTS.

North Island.

1. Whangaroa:—

	Population.
Whangaroa County	797
Mongonui County	3,739
Hokianga County	2,792
Bay of Islands County ..	3,589
	10,917

Horse-power—2,200.

No electric supply at present.

2. Hobson:—

Dargaville Borough	1,776
Hobson County	4,728
	6,504

Horse-power—1,300.

No electric supply at present.

3. Whangarei:—

Whangarei Borough	3,294
Hikurangi Town District ..	775
Whangarei County	8,976
	13,045

Horse-power—2,600.

This district includes the Wairua Falls Power Plant (2,500 h.p.) belonging to Wilson's (N.Z.) Portland Cement Company, who hold a license to distribute over a large portion of the area.

4. Rodney:—

Warkworth Town District ..	624
Rodney County	4,043
Otamatea County	3,647
	8,314

Horse-power—1,700.

No electric supply at present.

5. Waitemata:—

Birkenhead Borough	2,116
Northcote Borough	1,651
Takapuna Borough	2,756
Devonport Borough	7,613
Helensville Town District ..	837
Waitemata County	9,354
	24,327

Horse-power—5,000.

Existing gas-power plant at Devonport, 260 h.p.

6. Auckland:—

Population—	
Auckland City	68,888
Newmarket Borough	2,863
Mount Eden Borough	12,555
Mount Albert Borough ..	9,654
New Lynn Town District ..	1,041
Eden County (part)	8,267
	103,268

Horse-power—21,000.

Existing steam-power plant in Auckland City (two stations) (17,000 h.p.), to be consolidated and extended to 26,000 h.p.

7. Manukau:—

	Population.
Onehunga Borough	5,913
Otahuhu Borough	2,328
Ellerslie Town District ..	1,363
Eden County (part)	9,000
Manukau County	6,799
	22,403

Horse-power—4,500

8. Franklin:—

Pukekohe Borough	1,533
Waiuku Town District ..	641
Tuakau Town District.. ..	390
Papakura Town District ..	821
Franklin County	9,397
Waikato County (part) ..	2,099
Raglan County (part)	1,027
	15,908

Horse-power—3,200.

Small electric-power plants now in service in Pukekohe (110 h.p.) and Waiuku (32 h.p.).

9. Hamilton:—

Hamilton Borough	7,538
Cambridge Borough	1,507
Huntly Town District	1,535
Ngaruawahia Town District ..	755
Raglan County (part)	3,000
Waikato County (part) ..	6,000
Waipa County (part)	3,864
	24,199

Horse-power—4,800.

This includes the existing Cambridge and Central Electric-power Boards' districts as well as Hamilton Borough, with the following electric-power plants: Hamilton (240 h.p.), Huntly (300 h.p.), and Ngaruawahia (100 h.p.).

10 Thames Valley:—

Thames Borough	5,298
Waihi Borough	4,774
Te Aroha Borough	1,802
Paeroa Borough	1,376
Morrinsville Town District ..	934
Matamata Town District ..	505
Thames County	2,665
Ohinemuri County	4,661
Piako County	4,663
Matamata County	3,903
Coromandel County	2,256
	32,837

Horse-power—6,500.

This coincides with the Thames Valley Electric-power District with the addition of Coromandel County, which should be taken in as an outer area. It includes existing power plants in Thames (280 h.p.) and Te Aroha (400 h.p.).

SUGGESTED ELECTRIC-POWER DISTRICTS—*continued.*

North Island—continued.

11. Te Awamutu :—

	Population.
Te Awamutu Borough	1,064
Waipa County (part)	3,000
West Taupo County (part) ..	1,351
Waitomo County (part) ..	2,181
Kawhia County	991
	8,587

Horse-power—1,800.

This includes the existing Te Awamutu Electric-power District as well as Kawhia County, which should be taken in as an outer area. No electric supply at present.

12. Te Kuiti :—

Te Kuiti Borough	1,982
Waitomo County (part) ..	3,000
Awakino County	702
	5,684

Horse-power—1,200.

Existing 150 h.p. gas-engine plant at Te Kuiti Borough, and proposal to develop 1,000 h.p. water-power.

13. Taumarunui :—

Taumarunui Borough	1,875
Manunui Town District ..	813
Ohura County	2,382
Kaitieke County	3,597
West Taupo County (part) ..	1,000
	9,667

Horse-power—2,000.

No existing electric-power supply.

14. Waimarino :—

Ohakune Borough	1,371
Raetihi Town District ..	508
Rangataua Town District ..	410
Waimarino County	3,502
	5,791

Horse-power—1,200.

Existing water-power plants at Ohakune (120 h.p.) and Raetihi (60 h.p.).

15. Taihape :—

Taihape Borough	1,927
Mangaweka Town District ..	390
Wanganui County (part) ..	1,000
Rangitikei County (part) ..	3,013
	6,330

Horse-power—1,300.

Existing electric plants at Taihape (240 h.p.) and Mangaweka (40 h.p.).

16. New Plymouth :—

New Plymouth Borough ..	8,704
Waitara Borough	1,422
Inglewood Borough	1,200
Taranaki County	7,100
Clifton County	2,156
	20,582

Horse-power—4,100.

Existing water-power plant at New Plymouth (1,000 h.p.). License issued for extensions to 5,000 h.p. Small plants at Inglewood (160 h.p., water) and Waitara (100 h.p., gas).

17. Hawera :—

	Population.
Hawera Borough	3,375
Manaia Town District	606
Hawera County	4,599
Egmont County	3,264
Waimate West County	2,635
	14,479

Horse-power—3,000.

Existing water-power plant at Hawera (600 h.p.).

18. Stratford :—

Stratford Borough	2,713
Eltham Borough	1,711
Stratford County	5,152
Eltham County	3,393
Whangamomona County ..	1,387
	14,356

Horse-power—3,000.

Existing plant : Stratford Borough (300 h.p.).

19. Patea :—

Patea Borough	1,010
Waverley Town District ..	623
Patea County	3,759
Waitotara County (part) ..	2,842
	8,234

Horse-power—1,600.

Existing water-power plants : Patea Borough (100 h.p.) and Waverley Town Board (150 h.p.).

20. Wanganui :—

Wanganui Borough	14,380
Gonville Town District ..	2,693
Castlecliff Town District ..	760
Wanganui County (part) ..	1,337
Waitotara County (part) ..	3,000
	22,970

Horse-power—4,600.

Existing tramway gas plant at Wanganui (500 h.p.), and steam plant (2,000 h.p.) on order.

21. Rangitikei :—

Marton Borough	1,650
Hunterville Town District ..	555
Bull's Town District	483
Rangitikei County (part) ..	7,000
	9,688

Horse-power—2,000.

Existing gas plant at Bull's (40 h.p.).

22. Manawatu :—

Palmerston Borough ..	12,829
Feilding Borough	3,438
Manawatu County	4,521
Kiwitea County	2,585
Oroua County	3,304
Pohangina County	1,581
Kairanga County	4,124
	32,382

Horse-power—6,400.

Existing electric plant at Feilding (400 h.p.).

SUGGESTED ELECTRIC-POWER DISTRICTS—*continued.*

North Island—continued.

23. Horowhenua :—

	Population.
Levin Borough	1,630
Otaki Town District	806
Shannon Borough	1,031
Foxton Borough	1,772
Horowhenua County	5,895
Hutt County (part)	400
	11,534

Horse-power—2,300.

24. Wellington :—

Wellington City	75,496
Miramar Borough	2,158
Karori Borough	1,647
Johnsonville Town District ..	886
Makara County	3,862
	84,049

Horse-power—17,000.

Existing steam plant in Wellington City (two stations) (10,000 h.p.), to be consolidated and extended to 13,000 h.p.

25. Hutt Valley :—

Petone Borough	7,115
Lower Hutt Borough	4,893
Eastbourne Borough	952
Upper Hutt Town District ..	1,399
Hutt County (part)	6,000
	20,359

Horse-power—4,000.

No existing supply plant.

26. Wairarapa :—

Masterton Borough	5,894
Carterton Borough	1,614
Greytown Borough	1,186
Featherston Borough	1,159
Martinborough Town District ..	715
Masterton County	3,746
Wairarapa County	2,744
Featherston County	3,960
	21,028

Horse-power—4,200.

Includes the existing Wairarapa Power District with small extensions. Existing gas plant in Martinborough (40 h.p.).

27. Pahiatua :—

Pahiatua Borough	1,300
Eketahuna Borough	754
Pahiatua County	3,210
Eketahuna County	2,312
Mauriceville County	771
Castlepoint County	621
Akitio County	1,416
	10,284

Horse-power—2,000.

Existing borough gas-engine plants in Pahiatua (50 h.p.) and Eketahuna (90 h.p.).

28. Dannevirke :—

	Population.
Dannevirke Borough	3,336
Woodville Borough	1,078
Dannevirke County	4,538
Woodville County	1,819
Weber County	420
Patangata County (part) ..	1,080
	12,271

Horse-power—2,500.

No existing supply plants. Proposal on foot to form district.

29. Waipawa :—

Waipawa Borough	1,000
Waipukurau Borough	1,167
Waipawa County	3,084
Waipukurau County	667
Patangata County (part) ..	1,000
	7,018

Horse-power—1,400.

30. Hawke's Bay :—

Napier Borough	12,704
Hastings Borough	7,918
Taradale Town District ..	1,012
Havelock Town District ..	870
Hawke's Bay County	11,467
	33,971

Horse-power—6,800.

Existing plants : Napier (gas, 1,400 h.p.) and Hastings (oil, 500 h.p.).

31. Wairoa :—

Wairoa Borough	1,530
Wairoa County	2,332
	3,862

Horse-power—800.

Existing gas plant : Wairoa (80 h.p.). Electric-power district constituted.

32. Poverty Bay :—

Gisborne Borough	9,654
Mangapapa Town District ..	1,140
Cook County	6,846
Waikohu County	3,035
Waiapu County	2,055
Uawa County	819
	23,547

Horse-power, 4,700.

Existing plant : Gisborne (oil and steam, 1,000 h.p.). License issued for whole area except Waiapu County to hydro-electric company.

SUGGESTED ELECTRIC-POWER DISTRICTS—*continued.*

North Island—continued.

33. Whakatane :—

	Population.
Whakatane Borough	900
Opotiki Borough	1,073
Whakatane County	1,054
Opotiki County	1,881
	5,908

Horse-power—1,200.

Existing plant : Opotiki (120 h.p.). Proposal to develop 300 h.p. of water-power for Whakatane Borough.

34. Rotorua :—

Rotorua Borough	2,845
Rotorua County	4,245
	7,090

Horse-power—1,400.

Existing plant at Okere Falls (300 h.p.). Proposal to extend it to ultimate capacity of 10,000 h.p.

35. Tauranga :—

	Population
Tauranga Borough	1,685
Te Puke Town District ..	565
Tauranga County	3,947
	6,197

Horse-power—1,200.

Existing Tauranga Borough water-power plant (250 h.p.). Large extensions proposed.

36. East Taupo :—

East Taupo County	515

Horse-power—100.

Does not justify any general development at present.

South Island.

1. Nelson :—

	Population.
Nelson City	8,774
Richmond Borough	922
Motueka Borough	1,475
Waimea County	9,284
Takaka County	1,858
Collingwood County	1,253
	23,566

Horse-power—4,700.

Power Board petition being prepared. Existing supply : Private company, water-power (60 h.p.).

2. Buller :—

Westport Borough	4,067
Buller County	5,773
Murchison County	1,251
Inangahua County	4,130
	15,221

Horse-power—3,000.

Existing public supply : Reefton private company (150 h.p.). Alternatively the counties of Murchison and Inangahua might form separate districts.

3. Greymouth :—

Greymouth Borough	4,863
Runanga Borough	1,411
Brunner Borough	598
Grey County	5,510
	12,382

Horse-power—2,500.

No existing supply.

4. Westland :—

Hokitika Borough	2,091
Kumara Borough	623
Ross Borough	491
Westland County	4,087
	7,292

Horse-power—1,500.

5. Marlborough :—

	Population.
Blenheim Borough	3,822
Picton Borough	1,121
Marlborough County	6,915
Sounds County	1,201
Awatere County	1,542
Kaikoura County	1,906
	16,507

Horse-power—3,300.

Existing gas plant : Picton Borough (60 h.p.).

6. Waipara :—

Cheviot County	1,224
Amuri County	1,836
Waipara County	2,058
	5,118

Horse-power—1,000.

No existing plants.

7. Rangiora :—

Rangiora Borough	1,808
Kaiapoi Borough	1,560
Rangiora County	2,747
Eyre County	1,806
Oxford County	1,756
Kowhai County	1,914
Ashley County	728
	12,319

Horse-power—2,500.

Partly supplied from Lake Coleridge.

8. Christchurch :—

Christchurch City	55,860
Lyttelton Borough	3,766
Sumner Borough	2,287
New Brighton Borough ..	2,310
Spreydon Borough	4,289
Riccarton Borough	2,890
Woolston Borough	3,990
Waimairi County	11,914
Paparua County	4,716
Heathcote County	3,277
Halswell County	1,628
	96,927

Horse-power—20,000.

Already supplied from Lake Coleridge with 8,000 h.p. distributed by each local authority.

SUGGESTED ELECTRIC-POWER DISTRICTS—*continued.*

South Island—continued.

9. Banks Peninsula :—

	Population.
Akaroa Borough	540
Akaroa County	1,982
Wairewa County	1,036
Mount Herbert County ..	405
	3,963

Horse-power 800.

Power Board formed.

10. Selwyn :—

Selwyn County	1,423
Malvern County	2,757
Tawera County	847
	5,027

Horse-power—1,000.

No existing supply.

11. Ellesmere :

Ellesmere County	3,441
Springs County	1,785
	5,226

Horse-power—1,000.

Power Board formed. Might be included in a larger district if formed.

12. Ashburton :—

Ashburton Borough	3,109
Hampstead Town District ..	1,278
Tinwald Town District ..	1,075
Ashburton County	13,136
	18,598

Horse-power—3,700.

Existing: Ashburton Borough gas plant (500 h.p.).

13. Timaru :—

Timaru Borough	12,238
Temuka Borough	1,633
Geraldine Borough	869
Pleasant Point Town District ..	482
Waimate Borough	1,867
Levels County	5,100
Geraldine County	5,194
Waimate County	6,984
Mackenzie County	2,868
	37,235

Horse-power—7,400.

Existing: Timaru Borough gas plant (350 h.p.).

14. Waitaki :—

Oamaru Borough	5,140
Waitaki County	9,694
	14,834

Horse-power—3,000.

Existing: Oamaru Borough water-power (100 h.p.).

15. Otago :—

	Population.
Dunedin City	55,256
Green Island Borough ..	1,904
Waikouaiti Borough	611
Palmerston Borough ..	752
Mosgiel Borough	1,719
St. Kilda Borough	5,520
West Harbour Borough ..	1,631
Port Chalmers Borough ..	2,615
Alexandra Borough	679
Cromwell Borough	549
Naseby Borough	276
Peninsula County	1,793
Taieri County	5,599
Waikouaiti County	4,094
Maniototo County	2,527
Vincent County	3,930
Waihemo County	1,446
	91,051

Horse-power—18,000.

Existing: Dunedin City water-power plant at Waipori (8,000 h.p., capable of extension to 16,000 or 20,000 h.p.).

16. South Otago :—

Balclutha Borough	1,409
Kaitangata Borough	1,681
Lawrence Borough	837
Milton Borough	1,317
Roxburgh Borough	449
Clutha County	6,901
Bruce County	4,763
Tuapeka County	5,123
	22,480

Horse-power—4,500.

Might be included in Otago District No existing power plant. Dunedin City mains to be extended to Milton. Roxborough district has formed small Power Board to develop 500 h.p. from Teviot River.

17. Southland :—

Invercargill Borough ..	15,866
Bluff Borough	1,823
Gore Borough	3,551
Mataura Borough	1,129
Riverton Borough	837
Winton Borough	586
Southland County	25,661
Wallace County	9,432
Fiord County	17
	58,892

Horse-power—11,800.

Power Board formed to develop Lake Monowai (12,000 h.p.) to 20,000 h.p.; portions of Clutha and Taieri Counties have been included in Board, which should go with South Otago.

18. Queenstown :—

Queenstown Borough	657
Arrowtown Borough	307
Lake County	1,749
	2,713

Horse-power—500.

Queenstown Borough proposes to develop 100 h.p. locally.

By Authority: Marcus F. Marks, Government Printer, Wellington.—1920.