

1919.

NEW ZEALAND

## PUBLIC WORKS STATEMENT.

BY THE HON. SIR WILLIAM FRASER, KT. BACH.,  
MINISTER OF PUBLIC WORKS.

MR. SPEAKER,—

I regret to say that the scarcity of labour was as apparent during last financial year as it was during the previous one. It is true that as the soldiers returned to New Zealand a slight improvement in numbers of men available for my work was manifest, but that was only during February and March. Since April, however, a marked change has taken place, but the number in my employ is still fully fifteen hundred below the pre-war mark.

The truth is that the manhood of the Dominion, including also the returned soldiers, has very slightly increased in numbers since the war began, as the lads who have passed into manhood do not much outnumber those who have been killed or maimed. It is owing to this fact that only £522,092 has been expended on railways, roads, and bridges out of £976,055 provided on the estimates.

I am in hope, however, that the results of the operations during the current financial year will show a marked improvement. A considerable amount of machinery has been ordered, and some has actually come to hand.

The results from the Lake Coleridge undertaking continue to be increasingly remunerative. The net revenue for the year ended the 31st March last exceeded the cost of working the scheme by £20,186. The interest on the capital sunk in the undertaking amounted to £15,692, leaving a balance towards Depreciation Account of £4,494. The result for the six months ended the 30th September, 1919, is that the revenue exceeded the estimate for that period by £2,864, and the expenditure fell short of the estimate by £645, showing a net gain beyond the estimate of £3,509. If the returns for the second six months are on the same scale, then on the 31st March, 1920, there will have been received as net revenue more than sufficient to defray both interest and depreciation charges—viz., 6 per cent. on total capital cost.

As soon as it is possible to erect the plant necessary to generate the full power available at Lake Coleridge the net receipts from this undertaking will largely increase.

*Arapuni*.—A shaft is being sunk on each side of the river at the site of the proposed dam, to be followed by a tunnel connecting these shafts, with the view of testing the stability of the strata which will have to support the foundations and wings of the dam. As soon as the Engineer-in-Chief is satisfied from these investigations that it will be safe to proceed, the main work will at once be started and carried to completion with all possible despatch.

*Mangahao*.—At Mangahao, since the 1st of April last, the construction of the road to give access to the various sections of the work has been pushed on. The formation has been completed beyond the central reservoir to the top of the hill overlooking the Mangahao, and a start is now being made with the metalling. A complete steam-generating power plant of 360 horse-power capacity has been ordered to supply power to the machinery required in the construction of the tunnels and other works. Arrangements have been made to establish a small sawmill on the site to cut the requisite timber. Difficulty has been found in obtaining a supply of suitable labour. Temporary boardinghouses have been established for the men employed, and plans are ready for the erection of huts and dining and recreation rooms when timber is available.

The hydro-electric works at Horahora have been purchased from the Waihi Gold-mining Company on satisfactory terms. The amount of power which can now be developed is 8,000 horse-power. A maximum of 3,325 horse-power has to be supplied to the vendors, leaving 4,675 horse-power available for distribution throughout the surrounding districts. The present available supply of power can be increased by erecting two more turbines, and steps will be taken to give effect to this as soon as practicable.

Statutory provision for the full cost of establishing these works will be made this session. Provision will also be made for the completion of plans for the erection of hydro-electric works at Waikaremoana, and the survey of transmission-lines therefrom to Gisborne and Napier and thence to Wairarapa. The intention is, as soon as labour and funds are available, that the works at Waikaremoana should be commenced. An equal sum will also be provided for elaborating schemes for the South Island, and, similarly, it is intended when labour and funds are available that such schemes will be set in operation. It would not be just that all parts of the Dominion, other than those proposed to be served by the Mangahao, Arapuni, Lake Coleridge, and Horahora plants, should have to await the completion of those schemes before having their respective districts provided for. In view, however, of the difficulty in procuring labour, it would be manifestly improper to pretend that such large new schemes as Waikaremoana and whatever may be decided on for the South Island could be undertaken at present.

The following table shows briefly the particulars of expenditure during the financial year ended 31st March, 1919, 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 :—

## EXPENDITURE.

Class of Work.	Expenditure.	
	Expenditure for Year ended 31st March, 1919.	Total Expenditure to 31st March, 1919.
Railways—	£	£
New construction ... ..	296,020	25,763,061
Additions to open lines ... ..	91,903	9,831,601
Roads ... ..	226,073	11,621,216
Public buildings ... ..	235,846	7,330,748
Immigration ... ..	Cr. 12,018	2,330,110
Purchase of Native lands ... ..	...	2,061,906
Lighthouses, harbour-works, and harbour-defences ... ..	5,392	1,148,443
Tourist and health resorts... ..	1,620	261,060
Telegraph-extension ... ..	198,611	3,823,599
Development of mining ... ..	518	889,014
Defence-works (general) ... ..	8,809	1,051,578
Departmental ... ..	115,419	1,431,254
Electric-power supply and development ... ..	9,254	9,254
Irrigation and water-supply ... ..	13,665	160,720
Payment to Midland Railway bondholders ... ..	...	150,000
Lands-improvement ... ..	Cr. 4,268	135,340
Minor works and services ... ..	...	312,607
Plant, material, and stores ... ..	20,638	111,614
Cost and discount, raising loans, &c. ... ..	...	1,253,073
	1,207,482	69,676,198
Wellington-Hutt Railway and Road Improvement { Railway	...	228,374
Account { Road ...	...	101,658
Railways Improvement Account ... ..	...	641,275
Railways Improvement Authorization Act 1914 Account ...	39,375	516,447
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 ...	51,355	261,030
National Endowment Account—Roads to open up endowment lands ...	...	53,401
Aid to Water-power Works and Electric Supply Account ...	24,794	412,312
Irrigation and Water-supply Account ... ..	...	...
Waihou and Ohinemuri Rivers Improvement Account... ..	27,402	92,019
Telegraph Extension Account ... ..	...	...
Totals ... ..	1,350,408	72,886,748

## WAYS AND MEANS.

On the 1st April, 1918, the available ways and means for public-works purposes were .. .. .	£	295,540
Additional funds were received as follows :—		
Under Finance Act, 1917, section 77 .. .. .	725,000	
Under Finance Act, 1918 (No. 2), section 29 .. .. .	360,000	
Other receipts and recoveries .. .. .	13,141	
Making a gross total of .. .. .	£1,393,681	
The net expenditure on all works and services chargeable against the Public Works Fund for the year 1918–19 amounted to .. .. .	£1,207,482	
This left a credit balance in the Ways and Means Account at 31st March, 1919, of .. .. .	186,199	
Authority exists for providing further funds :—		
In terms of the Finance Act, 1918 (No. 2), to the extent of .. .. .	2,140,000	
Making a total of .. .. .	£2,326,199	
In addition it is proposed to ask for authority to provide a further .. .. .	750,000	
Thus making available for expenditure during the current financial year ending 31st March, 1920, a sum of .. .. .	£3,076,199	

The estimated expenditure on public works for the current year (exclusive of accounts which have their own ways and means) is £2,986,257, leaving an estimated credit balance of £89,942 to be carried forward to next year (1920–21).

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 .. .. .	50,000	
	101,000	
Statutory authority is being asked for the hydro-electric development of Mangahao and Arapuni 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	
	£6,931,000	

## RAILWAY-CONSTRUCTION.

Construction and maintenance have been continued on twenty-nine sections of railway with all the available man-power that could be obtained at reasonable rates. No sections were handed over to the Working Railways Department, however, although I anticipate being in a position to do so during the ensuing twelve months. In all cases where the lines were in a forward state of completion goods have been carried for the convenience of settlers, and in some cases passengers were also accommodated.

The total expenditure on railway construction and improvements during the financial year amounted to £467,297, particulars of which are as follows :—

Construction of new lines .. .. .	£	296,019
Additions to open lines .. .. .	91,904	
Railways Improvement Authorization Act 1914 Account .. .. .	79,375	

The following is a brief summary of the works in progress during the year just closed, fuller details of which will be found in Appendix B.

## KAIHU RAILWAY EXTENSION.

Owing to the limited number of men offering for employment consequent upon the conditions then prevailing as the result of the war, and the absence of a large proportion of my engineering and clerical staff with the Expeditionary Forces, work on this railway was temporarily suspended in 1916. I am pleased, however, to record the fact that in January last a resumption of work was possible, and at 31st March forty men were employed. Three washouts caused by floods have been repaired, and stone walls have been renewed and strengthened.

Formation is completed to 20 miles 40 chains, and work is proceeding as far as 22 miles 25 chains. A stone-crushing plant is being procured for the ballast-quarry, and it is hoped to commence platelaying and ballasting at an early date.

## NORTH AUCKLAND MAIN TRUNK.

*Ranganui Northwards.*

*Bickerstaffe Section* (83 miles 75 chains to 86 miles 67 chains).—This section has been kept open for traffic, but considerable difficulty has been experienced with the maintenance of two embankments, which necessitated cutting out portions of one bank, repacking with stone, extending culvert outlet, &c. Slips have been cleared and fences maintained.

*Maungaturoto Section* (86 miles 67 chains to 88 miles 48 chains).—Station buildings in Maungaturoto station-yard have been completed by contract, and general maintenance work has been carried out.

*Huarau Section* (88 miles 48 chains to 90 miles 27 chains).—A deviation has been made between 88 miles 17 chains and 89 miles 70 chains, siding in Huarau station-yard completed, and station-buildings contract finished. A considerable amount of work has been undertaken in constructing cattle-stops and providing proper access to cattle-yards, including fencing, gates, and metalling. Slips have been removed, and cutting at 88 miles 40·5 chains has been stone-drained throughout.

The whole of these three sections—Bickerstaffe, Maungaturoto, and Huarau—from 83 miles 75 chains to 90 miles 27 chains, will shortly be in a satisfactory state of completion for handing over to the Working Railways Department.

*Paparoa Section* (90 miles 27 chains to 92 miles 15 chains).—Formation on this section is completed for the first 13 chains to Huarau Tunnel. One bank, however, is still settling and spreading, and will require further attention.

Huarau Tunnel on this section when completed will be  $16\frac{3}{4}$  chains long.

Approximately 8,000 cubic yards of crushed metal and boulders were taken from the Hoteo quarry during the year, although the output was limited for several months owing to the shortage of labour, and particularly during October and November, when it was practically idle on account of the influenza epidemic.

*Waiotira Southwards.*

*Waikiekie Section* (96 miles 45 chains to 107 miles 28 chains).—A commencement was made in July, 1918, the most important works being two tunnels; one of these, the Waikiekie, is well advanced. Formation between the junction station at Waiotira and this tunnel is being pushed on. One platelayer's cottage was erected.

*Waiotira Northwards.*

*Kirikopuni Section* (107 miles 28 chains to 121 miles 40 chains).—A commencement was made on this section simultaneously with the Waikiekie, but work has been almost entirely confined to the approach cutting at Tokatoka Tunnel. This cutting has so far proved very troublesome on account of heavy slips.

*Ngapuhi Northwards.*

*Okaihau Section* (16 miles 25 chains to 24 miles 45 chains).—Work on this section, although continuous throughout the year, has been difficult owing to the slippery nature of the country. Between 16 miles 25 chains and 19 miles 45 chains 18,000 cubic yards of slips were removed. The bank just beyond the  $19\frac{1}{2}$ -miles peg

has given a great deal of trouble. A steam navy was employed, but had to cease work during four months of the year owing to the wet and heavy nature of the ground. About 26,000 cubic yards of heavy clay pug were, however, excavated by the navy in the eight working-months.

Between Kaikohe and Okaihau  $2\frac{1}{2}$  miles of the service road has been metalled.

Over 3 miles of telephone communication has been established along the works, and a platelayer's cottage is being erected at Okaihau Station. An average of from fifty to sixty men were employed during the year, although the works were entirely closed for about two months during the influenza epidemic.

*Okoro Section* (24 miles 45 chains to 34 miles 19 chains).—Operations were commenced in August, 1918. The formation generally between 24 miles 45 chains and 25 miles is well on towards completion, and culverting is in progress.

A quarry has been opened and a crushing plant established at 25 miles, and metal is being carted ahead to the culverts at 28 miles. All activities were suspended for seven weeks during the influenza epidemic, which caused considerable delay in the progress of the work. An average number of 110 men were employed during the year on these two sections.

#### WHANGAREI BRANCH.

*Oakleigh Section* (0 miles 0 chains to 7 miles 60 chains).—The first 5 miles 23 chains of this section was completed in July, 1918, but owing to heavy subsidence in the banks it could not be handed over to the Working Railways Department. It is, however, being maintained and goods traffic is being run by my Department. I hope shortly to hand it over to the Railway Department for ordinary passenger traffic. Formation beyond 5 miles 23 chains is in progress.

The construction of the Katetoke Bridge is progressing satisfactorily.

Ballasting is proceeding, and the approach roads to Oakleigh Station were metalled.

*Tauraroa Section* (7 miles 60 chains to 14 miles 67 chains).—This section is practically completed. Subsidence of banks and slips in cuttings have given a great deal of trouble, but all have been efficiently dealt with.

A 30,000-gallon reinforced-concrete reservoir for Oakleigh Station was erected near 10 miles 12 chains, and an oil-engine installed to pump water from the Tauraroa River. The crushing plant has been working continuously at the Tauraroa quarry. A third platelayer's cottage and a goods-shed were erected at Tauraroa station-yard.

*Waiotira Section* (14 miles 67 chains to 19 miles 79 chains).—Platelaying and ballasting have been completed from 15 miles to 16 miles 54 chains, and, with the exception of one bank, formation finished as far as 17 miles 73 chains.

Good progress has been made with the erection of Waiotira Bridge, and from thence onward to 19 miles 60 chains the formation is in hand, and should be completed in another three months.

Heavy slips have, unfortunately, occurred on this section, which have somewhat retarded ballasting operations.

On the average 225 men were employed on this railway (Oakleigh, Tauraroa, and Waiotira Sections) during the year.

#### WAIPU BRANCH.

A commencement was made on this work at the end of March last, and operations will be continued during the current year.

#### WAIUKU BRANCH.

The only formation work of any magnitude remaining to be done to complete to the 10-mile peg is a bank and cutting at Mauku Creek. Operations are in progress between 10 miles and 12 miles.

The foundations for the 12 ft. arched culvert at Mauku Stream, owing to the soft nature of the ground, have proved a very troublesome undertaking. 143 chains of fencing has been done, and the necessary maintenance has been attended to.

Arrangements were made which enable the Railway Department to carry goods on the unopened line between Patumahoe and Mauku, and a weekly service is run in conjunction with the train from Paerata to Patumahoe.

#### EAST COAST MAIN TRUNK.

##### *Waihi Eastwards.*

Work is in hand as far as the 10-mile peg, and fair progress has been made. Stone is being crushed for culvert-building, and two platelayers' cottages have been erected. The permanent survey of the line beyond the 10-mile peg has been carried on well in advance of formation requirements.

##### *Tauranga Westwards.*

*Tauranga Section.*—The only work done on this section during the year was stone pitching along the Strand harbour-front. Construction work has been resumed since the end of the year.

##### *Tauranga Eastwards.*

*Te Maunga Section.*—Cylinders for piers C, D, E, and F of Tauranga Bridge have been constructed and partly sunk.

*Rangitaiki Section.*—This line has been permanently pegged to 96 miles 40 chains, or within half a mile of the summit on the saddle between Waioho and Whakatane valleys.

The survey of the drainage areas of the different drains of the Rangitaiki Swamp has been completed, also a traverse of the Rangitaiki River for stop-bank purposes.

*Mount Manganui—Te Puke—Matata Section.*—This opened section for passengers and goods is 40 miles in length, and has carried a considerable amount of traffic during the year just closed—freight, fares, carriage of mails, &c.

The whole line from the Mount to Matata, although not completed, has been efficiently maintained.

##### *Mount Branch.*

Only ordinary maintenance has been done on this section during the year. The swamp banks have not given as much trouble as previously, owing partly to the exceptionally dry year experienced. Some of these, however, will require widening, and will be attended to when necessary. So far, however, a good running-surface has been maintained.

#### NAPIER—GISBORNE.

##### *Gisborne—Wairoa.*

*Ngatapa Section.*—Passenger and goods traffic has been working over this section, and the necessary maintenance to keep it in an efficient state has been attended to. Banks have been widened where necessary, and additional ballast deposited where required.

##### *Napier—Wairoa.*

*Eskdale Section* (0 miles 0 chains to 10 miles 60 chains).—Construction work has been practically confined to the Inner Harbour embankment, which undertaking is in the hands of the Napier Harbour Board. Better progress than in previous years has been made. A quarry was opened at Pandora Point, two temporary bridges constructed over branches of the Tutaekuri River, and a service road constructed from the quarry.

Towards the end of the year a commencement was made with further construction of the section.

A strong survey party was engaged during the year, and 38½ miles of trial survey beyond this section was made.

#### OPUNAKE BRANCH.

No work was undertaken on this line until the last month of the year, when the construction of the Waingongoro Bridge was resumed. It is proposed to push on this work, and provision is being made on the estimates accordingly.

## STRATFORD—MAIN TRUNK.

*West End.*

*Tahora Section.*—Formation work is now completed on this section to 47 miles 24 chains. Tahora station-yard and all embankments have been widened to full width. Ballasting, however, had to be discontinued owing to the temporary closing of the Railway Department's metal-pit at Mount Egmont.

Private crossings have been made by the erection of several small bridges. Culverts have been constructed, permanent fences totalling 1 mile 67 chains in length erected, and the service road efficiently maintained.

A bi-weekly passenger and goods service for the convenience of settlers has been run to connect with the Railway Department's service at Tahora.

*Heao Section.*—Trial surveys have been undertaken to investigate the possibilities of (a) a square crossing at the Tangarakau, (b) a more direct route from there to Mangatatoka, and (c) a deviation between 54 and 57 miles. The location of over 4 miles of service road has been completed, and to expedite future operations the pack-track to Tangarakau has been improved.

*East End.*

*Matiere Section.*—Formation was continued in banks and cuttings; 11½ chains of top-heading and full excavation in Okahu Tunnel were completed, as well as a similar amount of side and arch lining.

Good progress was also made with two smaller tunnels. The abutments and piers of Ongarue Bridge were completed, but further progress is retarded pending the arrival of steel girders.

## OTIRA—BEALEY.

*Otira Tunnel.*—At the Otira end all work has been carried out by day labour. The bottom heading has been driven 691 ft., and approximately 200 ft. of this timbered.

Slow progress was made with the enlargement and lining, owing to the difficulty of obtaining suitable labour.

At the Bealey end work for the first half of the year continued on the day-labour system, but was changed to contract in September. The bottom heading was driven 413 ft., where it met the drive from the Otira end. The progress of enlargement was hampered for the same reason as at the Otira end.

## CULVERDEN—WAI-AU.

A daily goods-service has been maintained throughout the year. Four plate-layers' cottages, one Stationmaster's residence, and two workmen's huts were erected. Ballasting operations over about 8½ miles were carried out. This latter work, however, was retarded by the flooding of the pit last winter and early spring, as well as by the heavy snow experienced. A 4-ton crane was erected in Waiau station-yard, and a 55 ft. cast-iron turntable partly assembled. The line is, however, now in a forward condition, and should be finally completed before Christmas.

## OTAGO CENTRAL.

*Clyde-Cromwell Section.*—Since January last a regular passenger-train service has been maintained between Cromwell and Clyde, connecting with the Railway Department's service at Clyde. This necessitated the removal of all workmen, locomotives, &c., to the Cromwell end. One Stationmaster's house, five plate-layers' cottages, and one passenger-station building were erected. A small reservoir, together with a pipe-line for water-supply to the Cromwell Station building, was completed.

Ballasting has been finished, except boxing, between 48 miles 60 chains and Cromwell.

## ADDITIONS TO OPEN LINES.

The expenditure out of the Public Works Fund under the heading "Additions to Open Lines" amounted to £91,904. Of this sum £56,438 was expended in the provision of additional rolling-stock, tarpaulins, Westinghouse brakes, and work-

shops machinery. The balance covered expenditure upon improvements to workshops, station facilities, water-services, locomotive depots, stock-yards, tablet-installation, telegraph and telephone facilities, and purchase of land.

## PUBLIC BUILDINGS.

### GENERAL.

*Parliamentary Buildings.*—The energies of the contractor during the first half of the year were concentrated on pushing forward work in the chamber in the House of Representatives and lounge lobby to admit of its occupation by honourable members last session, and since that time the work has been chiefly in connection with the Legislative Council chamber. The Council chamber has been advanced sufficiently to admit of its being occupied this session.

Most of the stone required for completion is worked and ready for setting as soon as the cornice and column stones can be obtained. When these latter are placed in position the three cranes will be removed, the large holes in the roof and floors finished, after which the final completion of the whole structure should be in sight.

*Departmental Buildings.*—The principal operations under this head were :  
(1) The acquisition of a suitable site for a store and yard at Penrose, Auckland ;  
(2) the conversion of the old police-station at Dunedin into offices for the accommodation of Government Departments ; and (3) alterations to the Government Printing Office, Wellington.

### COURTHOUSES.

No new buildings were erected during the year.

### PRISONS.

*Auckland.*—The principal building-work at the Auckland Prison has now been completed.

The provision of additional cottages for the accommodation of prison officers is, however, required, and it is hoped to proceed with their erection during the current year.

*Waikeria Reformatory.*—The administrative division of this reformatory has been finished, concrete-block cottages have been erected, and roadmaking continued.

*Paparua.*—The erection of the permanent prison at Templeton has proceeded satisfactorily. Two additional concrete-block cottages have been erected and roadmaking continued.

*Invercargill.*—The programme at Invercargill has, as usual, been on a comprehensive scale, and all the different sections carried through satisfactorily.

### POLICE-STATIONS.

The expenditure during the year out of the vote for police-stations has been limited to a few urgent works. The new buildings at Oamaru and Wairoa which were put in hand during the preceding year have been completed, and a new station has also been erected at Houhora. A suitable house and section for use as a police-station were purchased at Karori (Wellington), and sites were acquired at Blenheim and Tokanui.

### POST AND TELEGRAPH.

Expenditure on new buildings, and additions and alterations to existing buildings, has been kept down as much as possible.

During the year post-offices were erected at French Farm, Makotuku, and Patearoa. Additions and alterations were made to the office buildings at Devonport, Kaeo, Matamata, Ohakune, Palmerston North, Sydenham, and Whitianga.

In addition to the appropriations previously authorized but not expended, it is proposed to make provision for new post-office buildings at those towns where the need is most urgent, but where building-operations have been postponed owing to the war.



## AGRICULTURAL.

The expenditure under this head has been low during the past year. A property was acquired at Stratford for a Stock Inspector's residence. Wooden cisterns were completed in connection with the water-supply for Te Kauwhata Horticultural Station.

The proposals for this year include housing-accommodation for responsible officers in certain centres, where it has been found impossible to otherwise secure residences; the erection of a caretaker's cottage at Motuihi Island; new Chemical and Biological Laboratory buildings; and increased accommodation at the Milton Poultry-station.

## MENTAL HOSPITALS.

*Tokanui*.—The fifth unit is nearing completion, and additions have been made to the machinery in the engineering workshop.

Buildings to accommodate working patients and a staff supervisor have been erected, which will admit of conveniently and economically working a remote part of the estate; also an abattoir has been built.

*Porirua*.—A complete automatic telephone system has been installed, and the new drainage system is being pushed on to completion.

*Sunnyside*.—The new reception and hospital block is completed and is now being furnished, and electricity has been installed.

*Seacliff*.—Accommodation for the patients removed from The Camp has been added. A reservoir has been constructed and a new sanitary service installed at Simla.

*Waitati*.—The new male ward has been extended, and plans prepared for another unit addition to the female ward.

*Nelson and Hokitika*.—Minor repairs have been carried out at both these institutions, and it is proposed to call tenders for the erection of a reception-house at the former.

## HOSPITAL AND CHARITABLE INSTITUTIONS.

A considerable increase in expenditure under this vote will be incurred this year. The new St. Helens Hospital in Christchurch, an item for which has appeared annually in the estimates, will be erected at an estimated cost of £16,000.

Additional hospital accommodation has been provided at Rotorua, and certain necessary works at Te Waikato and Otaki Sanatoria. A heavy item of expenditure is that of providing proper accommodation at the quarantine stations, in connection with which £14,000 will be required at Auckland and £22,450 at Wellington, with a further expenditure of £6,000 at each station for equipment. Certain necessary expenditure will also be undertaken at Lyttelton and Port Chalmers, making the proposed expenditure during the current year for the quarantine stations amount to £64,450.

## EDUCATION BUILDINGS.

The finance for Education buildings for the remainder of the present year and the four following years has been established by the Education Purposes Loans Act recently passed by both Houses. It is estimated that the moneys already expended and the liabilities already incurred under this class amount to £450,000, for which provision has to be made in addition to the moneys authorized under the special Act. Of the £450,000 thus to be provided separately from the Public Works Fund it is estimated that not more than £250,000 will actually come to account during the present financial year, and a vote for that amount is proposed for appropriation accordingly. Any part of that £250,000 unexpended during the present financial year, together with the balance of £200,000, will be provided on the public-works estimates of the financial year commencing on the 1st April, 1920, in addition to any moneys raised under the special Act.

The effect will be that, in addition to the £500,000 for the present year and £750,000 for each of the four successive years (provision for which is made by the Education Purposes Loans Act), a further sum of £450,000 will be provided out of ordinary Loan Account to discharge past liabilities already incurred, and that, of the latter sum of £450,000, £250,000 is proposed to be voted in the present year, and £200,000, together with any unexpended balance of the £250,000, to be voted in the next financial year. The moneys authorized by the special Act will be thus rendered available for future commitments only, without any charge thereon for past expenditure and commitments.

## WORKERS' DWELLINGS.

There was an expenditure of £7,293 in connection with dwellings in the course of erection and other works. During the current year it is anticipated that £150,000 will be required.

## LIGHTHOUSES.

The construction of the tower for an automatic light on Flat Rock, in Auckland Harbour, has been completed, and the light is now exhibited and has proved a great benefit to navigation.

It is proposed to make provision during the current financial year for automatic lights near Gable End Foreland, Ohina Island, near Mercury Islands, and the Ninepins (Chetwode Islands, Cook Strait).

## HARBOUR-WORKS.

Owing to the need for economy and to the high cost of materials very little has been done in the way of works in the harbours under the control of the Government, but it is probable that the carrying-out of works of which plans have been approved will be authorized in the near future.

The construction of wharves at Raglan, Te Akau, Mahurangi Heads, and Tutukaka has been gone on with during the year, and a commencement made with the clearing of certain rocks which formed a danger to navigation in the Waikato River near Cambridge.

## TOURIST AND HEALTH RESORTS.

Very little expenditure has been incurred during the past year. The total amount expended was £1,620, against £931 for the previous year; but provision will be made this year for a considerable number of improvements and new works at the different resorts.

## ROADS. CONSTRUCTION AND MAINTENANCE.

*General.*—The activities under this class have been carried on partly by the Department itself and partly by local bodies under departmental supervision.

The amount placed at my disposal for this very important work under all heads was £535,630. Of this, £55,050 was provided under the Consolidated Fund for maintenance.

In addition there was a vote for "roads and other works on goldfields," which was administered by my colleague the Hon. Minister of Mines, and the Land for Settlement Account, under the control of the Hon. Minister of Lands.

Unfortunately the expenditure did not reach anticipations, owing to the difficulty of obtaining labour as well as material. Steel for bridges was unprocureable, and owing to shortage of shipping-space hardwood could not be imported.

## ROADS AND OTHER WORKS ON GOLDFIELDS.

The total vote under this head amounted to £10,375. The actual expenditure, however, amounted to £4,186 only, as it was decided by the Minister of Mines to hold over the expenditure of all votes except those for urgent works.

## TELEGRAPH-EXTENSION.

Owing to the difficulties in obtaining regular supplies of material, the completion of certain lines was delayed and in other instances works authorized could not be commenced.

Among the principal land lines completed or under construction during the year 1918-19 are the following: Greymouth-Otira metallic circuit; Waikari-Hawarden metallic circuit; Palmerston-Naseby metallic circuit; Dunedin-Maniototo telephone circuit; Omarama-Broken Hut telephone-line; Omarama-Ben-

More telephone-line; Miller's Flat-Roxburgh metallic circuit; Tangoio-Koraki telephone-line; Otaki-Manakau metallic circuit; Te Puia Junction-Kahukura telephone-line; Riariaki telephone-line; Motuhora telephone-line; Brunswick Junction-Maxwelltown telephone-line; Tokoroa telephone-extension; Waingaro-Raglan telephone-line; Auckland-Thames-Paeroa metallic circuit; Thames-Hauraki Plains telephone-line.

In Central Otago, North Canterbury, and Marlborough snowstorms caused such damage that many miles of lines had to be rebuilt.

Reliable telegraph and telephone services have been maintained throughout the year. The telephone-exchange system is steadily expanding. Eight new exchanges were opened during the year, and one was closed. It was found necessary to provide additional switchboard accommodation at twenty-six 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 is 4,100.

The telegraph and interurban telephone system has been extended by the erection of 126 miles of poles and 451 miles of wire; 386 miles of poles and 1,164 miles of wire were added to the telephone-exchange plant; 3,749 miles of telegraph and interurban telephone-lines were overhauled and reconstructed.

Fourteen new coin-in-the-slot telephones were installed. This makes a total for the Dominion of 275 machines.

The policy of providing for telephone-exchange subscribers' circuits by means of underground cable is being continued, and during the year cables were laid providing for 6,511 miles of wire.

The party-line system was extended by the addition of 621 lines and 2,154 subscribers.

Provision has been made for communicating at any hour day or night with all coastal and isolated telephone-stations.

#### LANDS IMPROVEMENT.

*Improved-farm Settlements.*—The roading of the 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 the formation of deviations, &c.

*Miscellaneous.*—The only item calling for special mention under this head is that of £5,000 for the formation and construction of roads in Hauraki pastoral areas. This is an instalment on account of £20,000, which is the estimated cost of forming the roads and payment of claims for compensation. A commencement has been made with the survey of road routes in the Hauraki Peninsula, but owing to the absence of many of the surveyors on war service, and to the fact that the remainder were required for the subdivision of land for settlement by returned soldiers, only slow progress has been made. An endeavour will be made to prosecute this work as vigorously as possible during the coming year.

#### IRRIGATION AND WATER-SUPPLY.

##### IDA VALLEY SCHEME (INCLUDING GALLOWAY BRANCH).

The untouched portions of the Galloway distribution race have been constructed.

The survey of a drainage scheme for the lower parts of Galloway Flats was also completed, and another survey for a scheme of considerable magnitude for Ida Valley is in progress. Survey and borings for foundations were completed for a diverting weir in Dip Creek, and a further survey in connection with diverting additional catchment areas into Manorburn dam was carried out.

During the irrigation season water was supplied to twelve farmers in Ida Valley.

The revenue derived in water rentals for the past season was approximately £1,000, but shortage of farm labour prevented a more extensive use of the water.

## MANUHERIKIA SCHEME.

*Intake Tunnel.*—Only  $4\frac{1}{2}$  chains of the tunnel, which will divert the Manuherikia River water into the main race, remain to be done.

Operations were proceeding with machine drills, three shifts working at each end, up to the end of May, when the power plant unfortunately was destroyed by fire. Owing to the high cost of purchasing and running machinery, together with the difficulty of obtaining experienced workmen for its efficient use, it was decided to proceed by hand. This method continued till August, when the shortage of labour necessitated the curtailment of work to one end only, where two shifts were continued for the remainder of the year.

*Race-construction.*—During the first half of the year work was confined to the first 2 miles of the rocky Manuherikia Gorge.

At the end of September scooping operations were recommenced on the construction of the main race, and work has been continued on both sections to the end of the year.

The main race has been completed from 4 miles to 7 miles 19 chains, and a bench has been excavated for a distance of 3 miles 11 chains on the sidling out of which the race proper will be excavated.

*Chatto Creek Siphon.*—Pipes have been purchased from a gold-mining company, dismantled, and carted to the site.

## HYDRO-ELECTRIC SUPPLY.

## DEVELOPMENT OF WATER-POWER.

*North Island Schemes.*

The surveys of the Mangahao and Waikato Rivers and Lake Waikaremoana have been completed to a point enabling definite proposals to be submitted for the development of each of these sources of power. After a very exhaustive investigation of the alternative methods of general distribution a complete scheme has been drawn up for the North Island, consisting of a network of high-tension transmission-lines covering practically the whole Island, with 50,000, 33,000, and 11,000 volt reticulations to all the main centres, and supplying the country districts *en route*.

This system will ultimately be supplied with power from the three main power-houses at Mangahao (24,000 horse-power), Arapuni (96,000 horse-power), and Waikaremoana (40,000 horse-power), with connections to the existing power-stations—Horahora Rapids (8,400 horse-power) and Wairua Falls (3,300 horse-power).

During the year the surveys have been carried on of the transmission-lines from Mangahao to Wellington, Wanganui, Dannevirke, and Wairarapa, and from Arapuni to Auckland.

The work at Mangahao was commenced with the construction of the roads, and at Arapuni by driving trial levels and shafts to thoroughly explore the foundations of the proposed dam.

*South Island Hydro-electric-power Developments.*

The extension of the reticulation of Lake Coleridge to the districts surrounding Christchurch has been pushed on to the limited extent permitted by the restricted amount of power available, but plans are in hand for further extensions as soon as the war restrictions permit, particularly to the Akaroa Peninsula and to South Canterbury, Ashburton, and Timaru.

An exhaustive scheme for the supply of the South Island on the same lines as that laid out for the North Island is in hand, but owing to pressure of work and the limited staff available it has not yet been completed. A preliminary investigation has been made indicating the main lines on which it will be laid out.

*Regulations for Electric Lines.*

Revised regulations for the control of electric lines have been drawn up after very exhaustive investigation which has extended over the whole year. Owing to the rapid evolution which is taking place in the development of electric supply this matter has been given very careful attention.

## LAND FOR SETTLEMENTS ACCOUNT.

*Opening up Roads for Settlement.*—In order to provide additional funds for the roading and development of Crown lands for the settlement of returned soldiers, the borrowing authority provided for under section 62 of the Land Laws Amendment Act, 1913, was increased last year from £100,000 to £250,000 by section 42 of the Appropriation Act. When labour conditions improve the whole of this authority will be available.

## WAIHOU AND OHINEMURI RIVERS IMPROVEMENT ACCOUNT.

*Dredging.*—Dredging operations were continued during April and May widening the Ngararahi cut to a uniform width of 108 ft. From the end of June to December the dredge was employed pumping sand into the stop-bank at Te Puke Wharf and Ngahina, about 53,000 cubic yards being deposited during that period. After January the Tirohia-Ngararahi cut (left bank) was commenced, and by March 31,000 cubic yards had been deposited, thus completing 15 chains.

*Stop-banks.*—Work has been continued at Thorp's Bend, on the Paeroa side of Maari, and 12 chains completed. Puke-Ngahina bank has been completed except a culvert at Stock's outfall drain, and works have also been pushed forward at Wright's Hill—Thorp's, Ngahina—Komata Creek, and Tirohia-Ngararahi (left) stop-banks.

Ngahina Wharf and goods-shed extension was commenced in July, but was suspended owing to inability to obtain timber.

A flood-gate has been constructed at the Ngahina-Waimarie stop-bank, and that at Kaouiti repaired.

Considerable drain-cutting has been done in the Tirohia-Rotokohu drainage area, about  $5\frac{3}{4}$  miles having been completed, together with an additional 2 miles of surface drains.

## DEPARTMENTAL.

The total permanent staff at 31st March was 624. The number (apart from temporary workmen) who joined the Expeditionary Forces was 202, three of whom gained the Distinguished Service Order, six the Military Cross, two the Distinguished-conduct Medal, one the Military Medal, and six gained other distinctions. The casualties were—killed in action, 9; died of wounds, 10; died of sickness, 2; missing, 1; accidentally killed, 1; wounded, 64; gassed, 1: making a total of killed and wounded, 88.

## CONCLUSION.

Let me say, in conclusion, that realizing the very natural anxiety on the part of each section of settlers now that the war is over to have its respective roads of access and main roads completed and metalled I have placed on my estimates sums exceeding £1,000,000 for roads and bridges alone. To have attempted to comply with all requests would have necessitated providing over £2,000,000, which would have been absurd for one year's operations.

I have been careful to inquire as to the roads leading to and through returned soldiers' settlements, and have endeavoured in every case to make provision for same.



# PUBLIC WORKS STATEMENT, 1919.

## INDEX.

### TABLES.

	Page
No. 1.—TOTAL EXPENDITURE: Summary showing Total Expenditure out of Public Works Fund to 31st March, 1919, and Liabilities at that Date .. .. .	2
No. 2.—YEARLY EXPENDITURE OUT OF PUBLIC WORKS FUND, 1896 TO 1919 .. .. .	3
No. 3.—RAILWAYS: Statement showing Expenditure on Construction of Railways to 31st March, 1919, and Liabilities at that Date .. .. .	7
No. 4.—EXPENDITURE OUT OF SEPARATE ACCOUNTS UNDER THE CONTROL OF THE PUBLIC WORKS DEPARTMENT .. .. .	10
No. 5.—DEVELOPMENT OF WATER-POWER: Statement of Accounts as at 31st March, 1919 .. .. .	11

### APPENDICES.

Appendix A.—EXPENDITURE FOR THE YEAR: Audited Statement of Expenditure out of the Public Works Fund for the Year 1918-1919 .. .. .	17
" B.—ANNUAL REPORT ON PUBLIC WORKS, by the Engineer-in-Chief .. .. .	19
" C.—ANNUAL REPORT ON PUBLIC BUILDINGS, by the Government Architect .. .. .	38
" D.—ANNUAL REPORT ON ELECTRICAL WORK AND WATER-POWER SCHEMES, by the Chief Electrical Engineer .. .. .	42

**TABLE NO. 1.**  
**SUMMARY SHOWING THE TOTAL EXPENDITURE ON PUBLIC WORKS AND OTHER SERVICES OUT OF PUBLIC WORKS FUND TO 31ST MARCH, 1919, AND THE LIABILITIES ON THAT DATE.**

Number of Table containing Details.	Works.	Total Net Expenditure to 31st March, 1918.	Expenditure during Twelve Months ended 31st March, 1919.	Recoveries on Account of Services of Previous Years.	Total Net Expenditure to 31st March, 1919.	Liabilities on 31st March, 1919.	Total Net Expenditure and Liabilities.	Works.
3	Railways* ..	£ 35,211,663	£ 387,923	£ 4,924	£ 35,594,662	£ 229,397	£ 35,824,059	Railways.
..	Roads ..	11,396,140	226,073	997	11,621,216	156,409	11,777,625	Roads.
..	Development of mining ..	839,496	518	1,000	839,014	..	839,014	Development of mining.
..	Telegraphs ..	3,624,988	198,611	..	3,823,599	15,907	3,839,506	Telegraphs.
..	Public buildings ..	7,094,902	235,846	..	7,330,748	71,646	7,402,394	Public buildings.
..	Lighthouses, harbour-works, and harbour-defences ..	1,143,051	5,392	..	1,148,443	..	1,148,443	Lighthouses, harbour-works, and harbour-defences.
..	Departmental ..	1,319,954	115,419	4,119	1,431,254	973	1,432,227	Departmental.
18 of 1878	Electric power supply and development ..	..	9,254	..	9,254	372	9,626	Electric power supply and development.
11 of 1877	Coal-exploration and mine-development ..	10,835	..	..	10,835	..	10,835	Coal-exploration and mine-development.
..	Aiding works on Thames goldfields ..	50,000	..	..	50,000	..	50,000	Aiding works on Thames goldfields.
..	Immigration ..	2,342,128	Cr. 12,018	..	2,330,110	..	2,330,110	Immigration.
..	Purchase of Native lands ..	2,061,906	..	..	2,061,906	..	2,061,906	Purchase of Native lands.
..	Defence ..	1,043,691	8,809	922	1,051,578	321	1,051,899	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 ..	259,440	1,620	..	261,060	4,250	265,310	Tourist and health resorts.
..	Lands improvement ..	139,608	Cr. 4,268	..	135,340	..	135,340	Lands improvement.
..	Payment to Midland Railway bond-holders ..	150,000	..	..	150,000	..	150,000	Payment to Midland Railway bond-holders.
..	Irrigation and water-supply† ..	147,055	13,865	..	160,720	1,360	162,080	Irrigation and water-supply.
..	Plant, material, and stores ..	91,007	20,638	31	111,614	38,621	150,235	Plant, material, and stores.
..	Totals ..	68,480,709	1,207,482	11,993	69,676,198	519,256	70,195,454	Totals.

\* Exclusive of expenditure on Hutt Railway and Road Improvement and Railways Improvement Accounts.

† Includes £115,000 previously expended under Irrigation and Water-supply Account 1911-12 to 1915-16 and part 1917-18, now included in Public Works Fund.



TABLE NO. 2.

## GENERAL SUMMARY.

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1896-97 to 1918-19.

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, 1897.	Expenditure.										
		1897-98.	1898-99.	1899-1900.	1900-1.	1901-2.	1902-3.	1903-4.	1904-5.	1905-6.	1906-7.	1907-8.
Immigration ..	£ 2,146,945	£ 70	£ 105	£ 385	£ 214	£ 139	£ 142	£ Cr. 7	£ 6,481	£ 8,753	£ 14,353	£ 9,132
Public Works, Departmental ..	414,033	9,689	10,090	12,572	12,932	17,771	13,949	16,088	12,814	13,517	16,710	18,219
Development of Water-power ..	..	..	..	..	..	..	..	..	468	2,901	4,664	315
Irrigation and Water-supply ..	..	..	..	..	..	..	..	..	..	..	..	..
Railways ..	£ 15,306,574	351,600	374,192	417,937	717,723	1,333,940	759,752	828,704	779,891	1,021,265	1,227,880	1,093,535
Payment to Midland Railway Bondholders ..	..	..	..	..	..	..	..	150,000	..	..	..	..
Roads :—	..	..	..	..	..	..	..	..	..	..	..	..
Miscellaneous Roads and Bridges ..	£ 3,765,326	241,209	248,934	237,351	207,374	354,687	230,349	316,248	202,850	306,065	308,500	285,248
Roads on Goldfields..	Cr. 365	Cr. 365	Cr. 365	Cr. 347	48,417	47,573	51,690	45,594	26,112	45,139	38,970	38,494
Development of Thermal Springs and Natural Scenery ..	205,304	49,569	46,550	48,039	..	..	..	..	..	..	..	..
Lands Improvement Account*	£ 16,023	..	..	..	..	..	..	..	..	..	..	..
300,930	..	..	..	..	..	..	..	..	..	..	..	..
Total, Roads ..	£ 4,377,583	290,413	295,119	285,043	315,791	402,260	282,039	361,842	228,962	351,204	347,470	323,742
Development of Mining ..	598,159	33,117	17,355	21,815	15,907	15,326	24,213	16,278	6,258	18,533	11,064	8,633
Purchase of Native Lands ..	£ 1,297,817	61,503	53,182	32,025	28,688	18,261	15,782	5,352	6,281	13,777	9,135	2,190
Native Lands Purchase Account	Cr. 225	..	..	..	..	..	..	..	..	..	..	..
491,980	..	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases ..	£ 1,789,797	61,503	52,957	32,025	28,688	18,261	15,782	5,352	6,281	13,777	9,135	2,190
Telegraph Extension ..	771,351	29,384	28,551	26,771	50,101	31,729	68,578	47,228	79,298	77,186	114,068	155,491

\* 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, 1896-97 to 1918-19—continued.

Description of Services.	Total Net Expenditure to 31st March, 1897.	Expenditure.										
		1897-98.	1898-99.	1899-1900.	1900-1.	1901-2.	1902-3.	1903-4.	1904-5.	1905-6.	1906-7.	1907-8.
Public Buildings :—												
General (including Miscellaneous)	£ 210,811	£ 14,797	£ 8,764	£ 3,957	£ 5,594	£ 12,513	£ 9,031	£ 10,964	£ 9,021	£ 2,231	£ 14,216	£ 16,260
Parliamentary	21,002	466	20,636	9,883	3,039	4,424	1,503	602	697	71	1,047	4,119
Judicial	336,979	12,727	11,109	19,682	29,630	28,728	33,224	25,978	13,083	15,899	35,192	28,938
Post and Telegraph	171,832	5,888	5,168	13,483	20,954	40,361	74,686	53,918	16,008	38,419	43,918	43,724
Customs	6,535	385	..	107	875	2,066	6,630	8,719	13,018	7,903	414	47
Quarantine-stations	3,834	..	..	..	2,607	424	..	..	..	..	..	..
Mental Hospitals	390,471	14,130	17,667	17,712	18,872	16,743	10,167	15,812	15,949	16,235	8,049	7,987
Public Health	..	..	..	..	..	..	..	6,315	4,265	7,926	1,765	7,497
Hospitals and Charitable Institutions	48,444	..	..	..	5,141	1,200	3,540	4,291	1,204	4,786	10,259	15,576
School Buildings	899,157	23,864	43,403	49,256	33,681	38,606	57,790	87,089	42,721	69,223	109,459	100,197
Agricultural	2,943	1,328	520	447	971	535	883	2,504	1,362	2,618	2,707	1,690
Workers' Dwellings	..	..	..	..	..	..	..	..	..	..	..	..
Total, Public Buildings	2,092,008	73,585	107,267	115,426	121,364	145,600	197,454	216,192	117,328	165,311	227,026	226,035
Lighthouses, Harbour-works, and Harbour-defences :—												
Lighthouses..	135,121	2,180	3,727	3,333	1,017	2,060	6,082	6,206	2,167	962	..	1,417
Harbour-works	315,484	568	1,777	365	1,540	3,421	1,373	1,773	1,308	2,684	2,963	2,867
Harbour-defences	478,508	2,547	10,158	5,328	3,960	6,678	6,126	2,885	2,515	1,300	1,541	2,579
Total, Lighthouses, &c.	929,113	5,295	15,662	9,026	6,517	12,159	13,581	10,864	5,990	4,946	4,504	6,863
Rates on Native Lands	62,306	156	347	744	673	571	471	666	631	548	695	837
Contingent Defence	445,273	10,360	13,867	42,810	37,650	146,875	37,005	38,723	46,588	35,569	14,874	18,574
Tourist and Health Resorts	..	..	..	..	..	11,260	10,949	15,643	17,508	15,888	42,271	45,048
Lands Improvement*	..	..	..	..	..	1,741	2,349	2,019	2,248	1,052	5,605	9,561
Charges and Expenses of raising Loans	1,027,765	5 Cr. 5	224	28,322	1,460	5,620 Cr. 516	88,180	87,249	10,764	236	Cr. 5,175	Cr. 8,487
Interest and Sinking Funds	218,500	..	..	..	..	..	..	..	..	..	..	..
Coal-exploration and Mine-development	10,835	..	..	..	..	..	..	..	..	..	..	..
Thermal Springs	14,600	..	..	..	..	..	..	..	..	..	..	..
Total Ways and Means Credits	705	370	590	347	1,309,020	516	1,514,444	1,796,841	1,321,510	1,730,686	5,175	8,487
Grand Total—Net Expenditure	30,204,842	865,172	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

\* 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, 1896-97 to 1918-19—continued.

Description of Services.	Expenditure.										Total Net Expenditure to 31st March, 1919.	
	1908-9.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.		1918-19.
Immigration .. .. .	£ 15,075	£ 17,003	£ 9,441	£ 11,681	£ 14,694	£ 33,914	£ 33,219	£ 10,010 <i>Cr. 10</i>	£ 6,533	£ 3,856 <i>Cr. 12,018</i>	£ ..	£ 2,330,110
Public Works, Departmental .. .. .	24,512	41,176	42,733	49,864	57,426	66,650	100,719	111,489	131,701	127,962 <i>Cr. 2,662</i>	115,419 <i>Cr. 4,119</i>	1,431,254
Development of Water-power .. .. .	..	..	1,021	9,082	..	..	..	..	..	<i>Cr. 18,451</i>	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	160,720
Railways .. .. .	1,116,184	1,128,400	1,104,071	1,125,905	1,148,832	1,104,897	2,146,753†	1,065,171	620,947	495,771 <i>Cr. 110</i>	387,923 <i>Cr. 4,924</i>	35,594,662
Payment to Midland Railway Bondholders .. .. .	..	..	..	..	..	..	..	..	..	..	..	150,000
Roads :—												
Miscellaneous Roads and Bridges .. .. .	422,174	297,932	229,537	383,511	337,584	353,836 <i>Cr. 515</i>	484,365	400,062	203,746	128,730 <i>Cr. 600</i>	221,887 <i>Cr. 997</i>	..
Roads on Goldfields .. .. .	47,375	40,830	25,626	41,067	36,761	24,143	30,065	24,432	17,099	6,912	4,186	..
Development of Thermal Springs and Natural Scenery .. .. .	..	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account .. .. .	..	..	..	..	..	..	..	..	..	..	..	..
Total, Roads .. .. .	469,549	338,762	255,163	424,578	374,345	377,464	514,430	424,494	220,845	135,042	226,073	11,621,216
Development of Mining .. .. .	32,859	18,597 <i>Cr. 1,000</i>	10,845 <i>Cr. 1,000</i>	21,244 <i>Cr. 30</i>	10,644 <i>Cr. 1,015</i>	4,889	2,384 <i>Cr. 255</i>	6,602	4,592	27 <i>Cr. 6,545</i>	518 <i>Cr. 1,000</i>	889,014
Purchase of Native Lands .. .. .	2,099	30,567	2,976 <i>Cr. 2,286</i>	..	..	..	..	..	..	..	..	2,061,906
Native Lands Purchase Account .. .. .	..	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases .. .. .	2,099	30,567	690	..	..	..	..	..	..	..	..	..
Telegraph Extension .. .. .	163,032	123,423	111,867	147,692*	251,375	392,648	288,395	249,554	203,311	213,955	198,611	3,823,599

\* Previously included under Lands Improvement.

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

[Continued on page 6.]

**TABLE NO. 2—continued.**  
**GENERAL SUMMARY—continued.**  
 Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1896-97 to 1918-19—continued.

Description of Services.	Expenditure.										Total Net Expenditure to 31st March, 1919.
	1908-9.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.	1918-19.
<b>Public Buildings :—</b>											
General (including Miscellaneous)	39,635	41,964	44,044	34,721	44,719	43,199	52,239	22,030	12,648	11,046	43,168
Parliamentary	5,172	3,157	237	2,004	18,806	23,612	31,478	17,133	22,586	Cr. 15,067	..
Judicial	37,211	31,606	22,293	44,133	45,431	28,445	38,808	4,902	15,685	13,195	..
Post and Telegraph	62,262	68,574	117,815	130,815	122,999	78,815	60,838	25,184	21,147	18,814	16,299
Customs	2,507	233	..	..	..	..	..	35,258	22,744	33,325	6,157
Quarantine-stations	..	..	..	..	..	..	..	..	..	..	26,072
Mental Hospitals	15,296	19,839	12,707	8,809	46,181	26,001	53,996	54,898	44,602	26,302	..
Public Health	4,402	319	..	..	376	..	..	Cr. 15	..	..	14,640
Hospitals and Charitable Institutions	11,153	7,259	1,484	12,745	8,750	1,435	..	..	7,370	4,080	..
School Buildings	102,340	98,103	124,926	90,535	105,000	121,954	122,940	97,972	70,367	63,082	2,332
Agricultural	5,543	6,103	1,160	3,684	6,475	4,398	2,428	2,972	3,046	5,685	115,656
Workers' Dwellings	..	..	..	22,644	46,455	41,741	68,275	55,893	35,437	15,505	4,229
Total, Public Buildings	285,521	277,157	324,668	350,090	445,192	369,600	431,966	335,759	256,131	214,221	235,846
<b>Lighthouses, Harbour-works, and Harbour-defences :—</b>											
Lighthouses	7,481	6,762	1,470	5,428	9,031	5,174	3,887	1,415	449	561	1,663
Harbour-works	4,439	4,548	4,092	6,004	7,415	3,346	12,563	9,355	2,280	2,359	3,729
Harbour-defences	7,297	5,372	2,865	1,144	339	Cr. 1,462	681	2,903	1,038	56	..
Total, Lighthouses, &c.	19,217	16,682	8,427	12,576	16,785	7,297	17,131	13,673	3,767	2,976	5,392
Rates on Native Lands	27	..	..	..	..	..	..	..	..	..	..
Contingent Defence	10,766	4,977	6,071	10,437	23,790	30,186	15,221	37,619	9,742	6,714	8,809
Tourist and Health Resorts	24,286	14,507	5,912	13,361	12,906	14,989	8,232	5,167	1,094	931	Cr. 922
Lands Improvement*	19,542	6,910	11,125	20,394	22,550	16,996	13,810	5,936	Cr. 2,731	1,838	1,620
Charges and Expenses of raising Loans	575	17,715	66,367	67,470	72,950	105,449	35,495	5,037	35	1	261,060
Interest and Sinking Funds	..	..	..	..	..	..	..	..	..	..	1,051,578
Coal-exploration and Mine-development	..	..	..	..	..	..	..	..	..	..	Cr. 4,268
Thermal Springs	..	..	..	..	..	..	..	..	..	..	135,340
Plant, Material, and Stores	..	..	..	..	..	..	..	..	..	..	1,253,073
Total Ways and Means Credits	2,183,245	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	218,500
Grand Total—Net Expenditure	..	..	..	..	..	..	..	..	..	..	10,835
	..	..	..	..	..	..	..	..	..	..	14,600
	..	..	..	..	..	..	..	..	..	..	20,638
	..	..	..	..	..	..	..	..	..	..	Cr. 31
	..	..	..	..	..	..	..	..	..	..	111,614
	..	..	..	..	..	..	..	..	..	..	38,279
	..	..	..	..	..	..	..	..	..	..	1,207,482
	..	..	..	..	..	..	..	..	..	..	69,676,198

\* 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, 1919.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1918.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1918-19.					Expenditure under Special Acts during Year 1918-19.*	Amounts previously charged to "Surveys of New Lines," now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1919.	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.		Total New Works.						
			£	Permanent-way.							
Kaihu Valley .. .. .	£ 104,130	£ ..	£ 854	£ ..	£ 854	£ ..	£ ..	£ ..	£ 104,984	£ ..	
Otaria to Ngāpuhi .. .. .	176,601†	..	..	..	..	..	..	..	176,601	..	
Opua Wharf to Whangarei and Onerahi .. .. .	522,718	..	..	..	..	17	..	..	522,735	..	
Whangarei to Waioitira .. .. .	187,292	..	50,077	4,781	54,858	..	..	..	242,150	..	
Waipn Branch .. .. .	369	..	38	..	38	..	..	..	407	..	
Helensville Northwards—	..	..	..	..	..	..	..	..	..	..	
Ngāpuhi Northwards .. .. .	31,450†	..	25,430	..	25,430	..	..	..	56,880	..	
Helensville Northwards .. .. .	848,634	..	33,921	398	34,319	8,813	..	53,822	945,588	..	
Helensville to Te Awamutu .. .. .	2,285,532	..	..	..	..	..	..	..	2,285,532	..	
Waikū Branch (Paerata to Waituku) .. .. .	76,711	..	16,666	86	16,752	..	..	..	93,463	..	
Huntly to Awaroa .. .. .	107,856	..	Cr. 554	..	Cr. 554	..	..	..	107,302	..	
Waikato to Thames—	..	..	..	..	..	..	..	..	..	..	
Frankton to Te Aroha .. .. .	154,117	..	..	..	..	..	..	691	154,808	..	
Te Aroha to Thames .. .. .	207,649	..	..	..	..	..	..	690	208,339	..	
Cambridge Branch (Ruakura Junction to Cambridge)	51,500	..	..	..	..	..	..	..	51,500	..	
Paeroa to Waihi and Tauranga .. .. .	185,902†	..	11,696	..	11,696	..	..	..	197,598	..	
Thames Valley to Rotorua—	..	..	..	..	..	..	..	..	..	..	
Morrinsville to Lichfield .. .. .	167,100	..	..	..	..	..	..	837	167,937	..	
Putaruru to Rotorua .. .. .	200,671	..	..	..	..	..	1	838	201,510	..	
Marton to Te Awamutu .. .. .	2,729,708	35	..	..	..	5,966	..	4,739	2,740,378	..	
Raeiti Branch .. .. .	83,940	..	141	..	141	..	..	..	84,081	..	
Tauranga to Taneatua, including Te Maunga—	352,561†	..	45,544	271	45,815	..	..	..	398,376	..	
Maunganui Branch .. .. .	..	..	..	..	..	..	..	..	..	..	
Gisborne to Motu .. .. .	626,649	..	Cr. 4,481	..	Cr. 4,481	880	52	..	623,100	..	
Gisborne to Ormond Tramway .. .. .	4,975	..	..	..	..	..	..	..	4,975	..	
Napier to Gisborne—	..	..	..	..	..	..	..	..	..	..	
Gisborne Southwards .. .. .	178,279	..	13,227	247	13,474	..	..	..	191,753	..	
Waioa Northwards .. .. .	1,640	..	117	..	117	..	..	..	1,757	..	
Napier Northwards .. .. .	52,043	..	Cr. 4,431	..	Cr. 4,431	..	..	..	47,612	..	
Wellington to Napier—	..	..	..	..	..	..	..	..	..	..	
Napier to Woodville and Palmerston North .. .. .	925,154	..	..	..	..	2,593	..	2,255	927,747	..	
Wellington to Woodville, including Te Aro Extension	1,631,605	..	..	..	..	2,282	..	..	1,636,142	..	
Featherston to Martinborough .. .. .	399	..	..	..	..	..	..	..	399	..	
Wellington to Waitara—	..	..	..	..	..	..	..	..	..	..	
Wellington to Longburn .. .. .	1,017,272	30	..	..	..	744	..	689	1,018,675	..	
Foxton to Waitara .. .. .	1,559,417	..	..	..	..	2,708	..	1,457	1,563,582	..	
Mount Egmont Branch .. .. .	72,080	..	..	..	..	..	..	..	72,080	..	
Opunake Branch (Te Roti to Opunake) .. .. .	56,769	..	484	..	484	..	..	..	57,253	..	
Manāia Branch (Kapuni to Manāia) .. .. .	4,782	..	773	..	773	..	..	..	5,555	..	
Rangitikei River Quarry Line .. .. .	206	..	..	..	..	..	..	..	206	..	

\* Railways Improvement Authorization Act 1914 Account.

† £31,450 expended on portion of line from Ngāpuhi Northwards now shown separately. surveys westward from Tauranga—Taneatua now transferred to "Waikā-Tauranga."

‡ £200 expended on

TABLE NO. 3—continued.  
EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1919—continued.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1918.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1918-19.						Expenditure under Special Acts during Year 1918-19.*	Amounts previously charged to "Surveys of New Lines," now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1919.	Valuation of Works constructed by Provinces and Midland Railway Company.		
			New Works.		Works on Open Lines.	Land Claims and other Old Liabilities.	Total New Works.							
			Construction and Surveys.	Permanent way.			£	Cr.					£	Cr.
Stratford to Okahukura (East End)	190,868	100	22,525	364	22,889	..	..	..	..	213,657	..	£		
Stratford to Okahukura (West End)	700,088	..	10,586	189	10,775	..	..	..	..	710,863	..	..		
Nelson to Belgrove	199,982	..	..	..	..	..	..	..	..	199,982	..	..		
Midland Railway—														
Belgrove to Inangahua	261,633	..	Cr. 54	..	Cr. 54	..	..	..	..	261,579	78,307	..		
Stillwater to Inangahua	204,023	..	Cr. 47	..	Cr. 47	..	..	..	..	203,976	543,574	..		
Brunnerton to Bealey	817,738	..	38,222	..	38,222	..	..	..	..	855,960	..	..		
Springfield to Bealey	744,364	..	401	..	401	114	..	..	..	744,879	61,579	..		
Westport to Ngakawau	188,009	..	..	..	..	..	..	..	..	188,009	..	..		
Westport to Inangahua	152,806	..	12	..	12	..	..	..	..	152,818	..	..		
Ngahere to Blackball	147,532	..	..	..	..	..	..	..	..	147,532	..	..		
Greymouth to Rewanui	255,026	..	..	..	..	..	..	..	..	255,026	..	..		
Greymouth to Brunerton	150,651	..	..	..	..	..	..	..	..	150,651	..	..		
Greymouth to Ross and Mikonui	338,480	..	..	..	..	431	..	..	..	338,911	..	..		
Pictou to Waipara—														
Pictou Southwards	653,655	..	149	..	149	252	..	..	..	654,056	..	..		
Waipara Northwards	374,254	..	Cr. 377	..	Cr. 377	..	..	..	..	373,877	..	..		
Culverden to Hanmer (motor-cars and sheds)	3,834	3,834	..	..	..	..	..	..	..	..	..	..		
Culverden to Waiau	46,558	475	9,697	446	10,143	..	..	..	..	56,226	..	..		
Hurunui to Waitaki—														
Main Line (Culverden-Waitaki)	1,877,492	..	..	..	..	6,784	7,575	..	..	1,891,851	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	..	..		
Springfield and Whitecliffs Branches	95,860	..	..	..	..	..	..	..	..	95,860	..	..		
Fairlie Creek Branch (Washdyke Junction to Fairlie)	67,251	450	..	..	..	..	..	..	..	66,801	75,124	..		
Waimate Branch	70,281	..	1,004	..	1,004	..	..	..	..	71,285	..	..		
Rakaia to Methven	74,640	..	..	..	..	..	..	..	..	74,640	..	..		
Ashburton to Springfield	61,639	..	..	..	..	..	..	..	..	61,639	..	..		
Little River Branch (Lincoln to Little River)	108,524	..	..	..	..	..	..	..	..	108,524	..	..		
Canterbury Interior Main Line—														
Oxford to Malvern	53,721	..	..	..	..	284	..	..	..	54,005	..	..		
Whitecliffs to Rakaia	542	..	..	..	..	..	..	..	..	542	..	..		
Tenuka to Rangitata	5,152	..	..	..	..	..	..	..	..	5,152	..	..		
Waitaki to Bluff—														
Main Line, including Port Chalmers Branch	3,297,216	..	..	..	..	4,048	5,744	..	..	3,307,008	82,259	..		
Duntroon Branch (Pukeuri to Kurow)	97,099	..	..	..	..	..	..	..	..	97,099	37,500	..		
Ngapara Branch (Waiakeka Junction to Ngapara)	26,090	..	..	..	..	..	..	..	..	26,090	58,009	..		

\* Railways Improvement Authorization Act 1914 Account.

## EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1919—continued.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1918.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1918-19.					Expenditure under Special Acts during Year 1918-19.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1919.	Valuation of Works constructed by Provinces and Midland Railway Company.
			New Works.		Land Claims and other Old Liabilities.	Work on Open Lines.	Total New Works.				
			Construction and Surveys.	Permanent-way.							
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—Tuapeka Mouth	1,943	..	..	..	..	..	..	..	..	1,943	..
Catlin's River Branch (Balclutha to Tahakopa)	462,693	..	..	..	..	Cr. 2	..	..	..	462,691	..
Heriotburn Branch (Waipahi to Edievale)	123,788	..	..	..	..	..	..	..	..	123,788	..
Waikaka Branch (McNab to Waikaka)	67,821	..	..	..	..	..	..	..	..	67,821	..
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)	1,363,843	..	20,354	534	20,888	..	..	..	..	1,384,731	..
Invercargill to Kingston—	..	..	..	..	..	..	38	..	..	359,008	91,937
Main Line	358,970	..	..	..	..	..	..	..	..	27,217	..
Mararoa Branch (Lumsden to Mossburn)	27,217	..	..	..	..	..	..	..	..	231	..
Winton to Heddon Bush	231	..	..	..	..	..	..	..	..	..	..
Makarewa to Orepuki and Waiau	..	..	..	..	..	..	..	..	..	..	..
Thornbury to Wairoa	336,698	..	Cr. 359	..	Cr. 359	..	..	..	..	336,339	60,297
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	6,676,078	..	..	..	55,987	..	..	..	..	6,732,065	..
Stock of Permanent-way Materials, 31st March, 1918	49,834	..	..	..	..	..	..	..	..	..	..
Stock of Permanent-way decreased by £2,962	36,558,383	..	..	..	..	..	..	..	..	..	..
Stock of Permanent-way Materials, 31st March, 1919	..	..	..	..	..	..	..	..	..	46,872	..
Total	36,555,421	4,924	291,615	7,316	293,931	51	79,375	..	..	37,020,757	1,787,741†

\* Railways Improvement Authorization Act 1914 Account.  
 † Includes value for £150,000 paid to debenture-holders under the Midland Railway Petitions Settlement Act Amendment Act, 1903.

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

Year.	Loans to Local Bodies Account. Roads to open up Crown Lands.	Opening up Crown Lands for Settlement Account. Roads to open up Crown Lands.	Land for Settlements Account. Opening up Crown Lands for Settlement Account. Roads to open up Crown Lands.	National Endowment Account. Roads to open up National- endowment Lands.	Land for Settlements Account. Roads to open up Land for Settlements.	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
1818-19 .. ..	..	..	..	..	51,355	27,402
	697,408	206,626	165,679	53,401	95,351	92,019

\* 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.





## LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY.

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1919, COMPARED WITH YEAR ENDED 31ST MARCH, 1918.

## Gross Revenue Account.

1917-18.		1918-19.		1917-18.		1918-19.		1917-18.		1918-19.		1917-18.		1918-19.	
£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.
<b>To Generating expenses, headworks, and power-house—</b>															
Salaries ..	1,441 16 10	..	..	..	..	2,103 16 2	29,165 16 8	By Sale of energy—	..	..	..	..	..	34,531 5 2	..
Wages ..	1,145 13 0	..	..	..	..	1,512 10 10	1,880 16 0	Wholesale ..	..	..	..	..	..	1,515 12 1	..
Supplies ..	164 19 6	..	..	..	..	161 5 11	..	Retail ..	..	..	..	..	..	..	36,046 17 3
Transport of stores, &c. ..	..	..	..	..	..	372 0 4	31,046 12 8	Discounts forfeited ..	..	..	..	..	..	..	..
Maintenance and repairs—	..	..	..	..	..	..	6 6 1	Meter-rents ..	..	..	..	..	..	..	..
Headworks ..	50 0 1	..	..	..	..	91 9 11	..	Rents—	..	..	..	..	..	..	..
Pipe-lines ..	1 12 6	..	..	..	..	5 4 1	19 11 0	Lands and buildings ..	..	..	..	..	..	589 6 3	..
Power-house building ..	24 18 6	..	..	..	..	82 5 3	..	Electric lines ..	..	..	..	..	..	126 18 6	..
Power-house machinery ..	196 9 9	..	..	..	..	214 0 8	505 6 8	" plant ..	..	..	..	..	..	21 0 0	..
Roads and fences ..	117 11 5	..	..	..	..	136 15 10	123 1 0	Fees for retesting installations	..	..	..	..	..	..	..
Staff residences, &c. ..	94 5 7	..	..	..	..	80 4 2	30 10 7	" testing and repairing electrical appliances ..	..	..	..	..	..	116 10 10	..
	3,737 7 2						4,759 13 4	Stand-by provision : Fees from wholesale consumers ..	..	..	..	..	..	..	169 0 0
<b>Transmission-line—</b>															
Salaries ..	291 1 8	..	..	..	..	464 6 10	658 18 3	Supervision charges on works not connected with Lake Coleridge, carried out by staff	..	..	..	..	..	..	23 0 0
Wages ..	209 6 10	..	..	..	..	118 7 7	5 15 0	Royalty on shingle sold ..	..	..	..	..	..	..	34 1 9
Transport, including upkeep of horses, traps, cars, and cycles ..	1,007 3 4	..	..	..	..	920 9 7	174 15 1	Interest from Local Bodies in respect of reticulations sold on deferred payment ..	..	..	..	..	..	..	187 7 9
Repairs to power-lines ..	667 0 11	..	..	..	..	1,491 9 5	180 10 1								
Repairs and alterations to telephone-system ..	20 5 3	..	..	..	..	51 14 4	..								
	2,194 18 0						3,046 7 9								
<b>Substation, Addington—</b>															
Salaries ..	730 16 8	..	..	..	..	1,307 19 10	..								
Wages ..	718 1 4	..	..	..	..	487 14 0	29 0 0								
Supplies ..	31 7 10	..	..	..	..	68 15 5	..								
Maintenance and repairs—	..	..	..	..	..	..	..								
Buildings and yards ..	304 14 9	..	..	..	..	211 0 10	..								
Machinery ..	99 0 3	..	..	..	..	97 15 6	..								
	1,884 0 10						2,173 5 7								
<b>Distribution—</b>															
Salaries ..	163 9 2	..	..	..	..	186 7 11	..								
Wages ..	30 15 8	..	..	..	..	1 13 4	..								
Supplies ..	47 7 2	..	..	..	..	..	..								
Transport, including upkeep of motor lorry and car ..	225 14 8	..	..	..	..	225 15 7	..								
Maintenance of feeder cables, trans-former stations, and tools ..	1,352 15 10	..	..	..	..	1,234 4 0	..								
Maintenance of secondary distribution ..	267 13 1	..	..	..	..	472 8 2	..								
Maintenance of and testing meters ..	..	..	..	..	..	146 5 7	..								
	2,087 15 7						2,266 14 7								

Stand-by provision—			
Payment to Christchurch Tramway Board ..	1,104 0 0	1,350 0 0	
Payment to Christchurch Tramway Board, for energy supplied ..	..	'317 14 10	1,667 14 10
	1,104 0 0		
Management and general expenses—			
Salaries ..	1,522 19 10	1,675 0 5	
Sick and holiday pay to workmen ..	294 19 7	371 4 7	
Travelling expenses ..	187 15 10	412 5 1	
Office-rent ..	200 0 0	200 0 0	
Rent of other buildings ..	..	31 10 0	
Postages and telegrams ..	107 5 6	107 13 4	
Telephone subscriptions ..	91 11 11	87 10 0	
Printing and stationery ..	177 12 2	184 11 5	
Advertising ..	12 1 5	29 5 0	
Accident insurance ..	14 15 0	9 7 0	
Fire insurance ..	19 4 0	21 9 2	
Legal expenses ..	25 6 6	12 5 6	
Meter-reading and line inspection ..	275 15 4	171 5 9	
Commission on collection of accounts ..	84 12 2	59 7 8	
Electrical testing ..	396 15 11	144 16 6	
Bad debts ..	0 10 0	1 2 2	
Miscellaneous trade expenses ..	29 7 5	5 4 1	
	3,440 12 7	3,223 17 8	
	14,448 14 2	17,137 13 9	
	17,643 3 11	20,186 5 1	
Balance to Net Revenue Account ..	£32,091 18 1	£37,323 18 10	£32,091 18 1
			£37,323 18 10

## Net Revenue Account.

£	s.	d.	£	s.	d.	£	s.	d.
7,013	6	5	7,329	9	2	17,643	3	11
14,870	13	8	15,692	6	10	4,240	16	2
£21,884 0 1			£23,021 16 0			£21,884 0 1		
To Depreciation at 2 per cent. per annum on completed work ..			By Balance from Gross Revenue Account ..			20,186 5 1		
Interest for year ended 31st March, 1919 ..			Balance to Profit and Loss Appropriation Account..			2,835 10 11		
						£23,021 16 0		

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY—continued.

### PROFIT AND LOSS APPROPRIATION ACCOUNT.

	1917-18.			1917-18.			1918-19.		
	£	s.	d.	£	s.	d.	£	s.	d.
To Balance from previous year's statement	30,528	5	11	..	..	..	..	..	..
Additional interest charges from 1st March, 1915, to 31st March, 1917	102	1	1	..	..	..	..	..	..
Balance from Net Revenue Account	4,240	16	2	..	..	..	..	..	..
				2,835	10	11			
				£37,706	14	1			
				£34,871	3	2			
				£37,706	14	1			

## DEPRECIATION FUND ACCOUNT.

[illegible]

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

BALANCE-SHEET AT 31ST MARCH, 1919.

1917-18.			1918-19.			1917-18.			Assets.			1918-19.					
Liabilities.																	
£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.			
Depreciation Fund Account ..						27,393	9	7	Works at Lake Coleridge—						4,223	6	5
Sundry creditors—									Land, including fencing and planting ..						5,317	4	6
On open accounts ..									Coalgate Gorge Road ..						7,566	3	8
On contracts ..									Service roads ..						279	12	8
Wages accrued ..									Service telephones ..								
Payment for current in advance ..									Headworks—						73,367	19	11
									Tunnel, including inlet and outlet works						22,794	0	9
									Pipe-lines ..						1,861	16	6
									Tram-line ..						396	16	4
									Weir at lake-outlet, gauges, and fencing								
Balance carried to general balance sheet—																	
Total assets as <i>per contra</i> ..						469,131	13	2	Power-house—						22,223	1	4
Total liabilities as above ..						31,225	14	5	Buildings, &c. ..						50,302	14	4
									Machinery, &c. ..						333	19	3
									Office furniture, fittings, &c... ..								
									Accommodation for staff and workmen—								
									Buildings, fencing, &c. ..								
									Transmission-line—						4,876	14	8
									Land ..						38,653	11	2
									Power-lines ..						2,342	0	11
									Telephone-system ..								
									Linemen's cottages, depots, tools, and equipment ..						469	9	10
									Alterations to public telegraph-lines						6,540	12	3
									Addington Substation—								
									Land, including cottages ..						2,812	19	2
									Substation buildings ..						3,889	2	3
									Machinery, &c. ..						13,488	1	11
									Store buildings and workshops ..						2,311	9	1
																	</

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY—continued.  
BALANCE-SHEET AT 31ST MARCH, 1919—continued.

1917-18.		Liabilities.	1918-19.		1917-18.		Assets.	1918-19.	
£	s. d.		£	s. d.	£	s. d.		£	s. d.
451,365	6 7	Brought forward .. .. .	..	..	269,342	3 11	Brought forward .. .. .	..	276,265 9 6
							Primary distribution—		
					8,755	12 7	Supply cables—Christchurch City	8,755	12 7
					2,958	11 3	Christchurch Tramways	2,961	3 4
					5,894	12 8	Lytelton	6,121	11 8
					11,216	6 11	Northern	13,839	16 5
					6,747	7 3	Southern	7,026	14 1
					622	9 9	Lightning-arresters	622	9 9
					1,142	14 4	Tools and equipment	1,143	13 4
					1,113	3 7	Alterations to public telegraph-lines	1,342	1 11
					38,450	18 4		41,813	3 1
							Secondary distribution—		
					18,369	7 1	Supply cables and reticulation	16,847	17 11
					6,002	1 1	Local substations	6,886	12 0
					11,627	5 9	Service transformers and meters	..	..
					3,988	4 4	Motor cars, lorry, and cycles, &c.	..	..
					..	..	Test-room equipment	..	..
					..	..	Loose plant, tools, and equipment	..	..
					1,654	6 2	Public telephones to the lake	..	..
					160	6 11	Telephones to Christchurch City Council and	..	..
					93	6 7	Tramway Board and local officers	..	..
					15,901	11 10	Christchurch office—Furniture and fittings	..	..
					9,844	10 4	Engineering, office, and general expenses on	..	..
					14,319	14 2	preliminary surveys and during construction..	..	..
					..	..	Salaries of Engineers and others on preliminary	..	..
					..	..	surveys and during construction	..	..
					..	..	Interest during construction—	..	..
					..	..	On completed works	14,285	14 2
					..	..	On uncompleted works	278	14 0
					81,960	14 3		14,564	8 2
					389,753	16 6	Stocks of material, &c., on hand at date	403,156	9 4
					20,275	7 4	Telephone subscriptions and fire insurance paid	15,407	13 8
					76	14 11	in advance	..	..
					..	..	In suspense—Payments (on Capital Account)	..	..
					..	..	made in London..	..	..
					5,278	18 1	Sundry debtors—	..	..
					1,109	6 7	For current and rent	6,308	4 3
					..	..	For work carried out, &c..	2,252	11 10
					..	..	For reticulations sold on deferred payments..	4,158	0 4
					416,494	3 5		12,718	16 5
					34,871	3 2	Balance from Profit and Loss Appropriation	431,424	19 1
					..	..	Account	37,706	14 1
					£451,365	6 7		£469,131	13 2

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.

APPENDICES TO THE PUBLIC WORKS STATEMENT, 1919.

APPENDIX A.

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS  
OUT OF THE PUBLIC WORKS FUND FOR THE YEAR 1918-19.

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

SIR,—  
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.,  
W. FRASER,  
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 1918-19.

Class.	Votes.	Summary.	Appropriation.	Expenditure.			Credits.			Net Expenditure.		
		PUBLIC WORKS FUND.	£	£	s.	d.	£	s.	d.	£	s.	d.
XIX	83	Public Works, Departmental ..	120,320	134,241	6	10	18,822	7	4	115,418	19	6
XX	84-85	Railways .. ..	670,100	428,428	17	7	40,506	3	2	387,922	14	5
XXI	86-95	Public Buildings .. ..	649,500	239,179	7	4	3,333	0	0	235,846	7	4
XXII	96-98	Lighthouses, Harbour-works, and Harbour-defences	15,700	5,487	3	3	95	1	4	5,392	1	11
XXIII	99	Tourist and Health Resorts ..	8,000	1,620	7	2	..	..	..	1,620	7	2
XXIV	100	Immigration .. ..	20,000	23,675	0	1	35,693	9	1	Cr.12,018	9	0
XXV	101-163	Roads, Bridges, and other Public Works	490,955	241,284	12	10	15,212	2	7	226,072	10	3
XXVI	104	Development of Mining .. ..	1,450	518	6	9	..	..	..	518	6	9
XXVII	105	Telegraph Extension .. ..	280,000	265,232	4	9	66,621	4	8	198,611	0	1
XXVIII	106	Contingent Defence .. ..	15,000	8,818	2	3	8	13	9	8,809	8	6
XXIX	107-108	Lands Improvement .. ..	7,000	707	12	1	4,975	2	11	Cr.4,267	10	10
XXX	109	Irrigation and Water-supply ..	20,000	15,385	10	1	1,721	1	4	13,664	8	9
XXXI	110	Plant, Material, and Stores ..	25,000	40,690	9	9	20,052	14	2	20,637	15	7
XXXII	111	Electric Supply .. ..	150,000	9,253	13	0	..	..	..	9,253	13	0
..	..	Unauthorized .. ..	..	100	0	0	100	0	0	..	..	..
		Total, Public Works Fund ..	2,473,025	1,414,622	13	9	207,141	0	4	1,207,481	13	5

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

P. S. WALDIE,  
Acting-Accountant.  
  
G. C. GODFREY,  
Acting Under-Secretary.

NOTE.—Charges and expenses of raising loans not included in above figures.  
(Details on next page.)

## APPENDIX A—continued.

	Name of Vote.	Appropriation.	Expenditure.	Credits.	Net Expenditure.
		£	£ s. d.	£ s. d.	£ s. d.
83	<b>PUBLIC WORKS FUND.</b>				
	Public Works, Departmental .. .. .	120,320	134,241 6 10	18,822 7 4	115,418 19 6
	<b>Railways—</b>				
	Railway-construction—				
	Kaihu Railway Extension .. .. .	6,000	862 3 5	7 15 0	854 8 5
	North Auckland Main Trunk—				
	Ranganui Northwards .. .. .	20,000	27,942 1 5	2,618 0 5	25,324 1 0
	Waiotira Southwards .. .. .	20,000	7,226 2 8	..	7,226 2 8
	Waiotira Northwards .. .. .	10,000	1,386 6 8	15 0 10	1,371 5 10
	Ngapuhi Northwards .. .. .	20,000	25,644 15 10	214 18 3	25,429 17 7
	Whangarei Branch .. .. .	30,000	51,776 13 0	1,699 11 5	50,077 1 7
	Waipu Branch .. .. .	2,500	37 10 7	..	37 10 7
	Waiuku Branch .. .. .	15,000	16,851 16 7	185 11 2	16,666 5 5
	Huntly-Awaroa .. .. .	3,000	Cr. 248 2 0	305 19 8	Cr. 554 1 8
	East Coast Main Trunk—				
	Waihi Eastwards .. .. .	15,000	11,674 15 2	38 16 2	11,635 19 0
	Tauranga Westwards .. .. .	10,000	59 17 8	..	59 17 8
	Tauranga Eastwards .. .. .	45,000	53,224 2 5	8,534 8 9	44,689 13 8
	Mount Branch .. .. .	4,000	853 13 11	..	853 13 11
	Gisborne-Motu .. .. .	500	Cr. 4,377 9 5	104 2 11	Cr. 4,481 12 4
	Napier-Gisborne—				
	Gisborne-Wairoa .. .. .	15,000	14,264 7 6	1,037 8 9	13,226 18 9
	Wairoa-Gisborne .. .. .	5,000	116 10 7	0 5 0	116 5 7
	Wairoa-Napier .. .. .	3,000	..	..	..
	Napier-Wairoa .. .. .	15,000	5,604 18 4	10,035 14 1	Cr. 4,430 15 9
	Mount Egmont Branch .. .. .	100	..	..	..
	Opunake Branch .. .. .	20,000	2,209 2 2	952 8 8	1,256 13 6
84	Stratford—Main Trunk—				
	East End .. .. .	32,000	26,015 7 10	3,490 5 7	22,525 2 3
	West End .. .. .	15,000	11,253 18 10	668 2 7	10,585 16 3
	Raetihi—Main Trunk .. .. .	500	224 9 11	82 15 11	141 14 0
	Stone-quarry Line, Rangitikei River .. .. .	100	..	..	..
	Featherston-Martinborough .. .. .	2,100	..	..	..
	South Island Main Trunk .. .. .	5,000	245 9 3	473 6 11	Cr. 227 17 8
	Midland Railway—				
	Nelson End .. .. .	5,000	53 10 0	107 4 6	Cr. 53 14 6
	Reefton End .. .. .	4,000	..	46 9 6	Cr. 46 9 6
	Otira-Bealey .. .. .	40,000	39,123 14 2	901 18 0	38,221 16 2
	Broken River—Bealey .. .. .	1,000	498 14 6	98 8 9	400 5 9
	Westport-Inangahua .. .. .	100	13 6 8	0 19 6	12 7 2
	Culverden-Waiiau .. .. .	15,000	11,306 5 7	1,608 16 5	9,697 9 2
	Waimate Branch Extension .. .. .	4,000	1,437 18 9	433 14 1	1,004 4 8
	Otago Central .. .. .	15,000	23,360 10 9	3,007 1 9	20,353 9 0
	Balclutha—Tuapeka Mouth .. .. .	600	..	..	..
	Winton—Heddon Bush .. .. .	2,500	..	..	..
	Orepuki—Waiiau Extension .. .. .	2,500	0 10 0	359 13 3	Cr. 359 3 3
	Land Claims, &c. .. .. .	5,500	53 4 6	2 5 0	50 19 6
	Surveys, New Lines of Railways .. .. .	1,000	..	..	..
	Permanent-way Materials .. .. .	75,000	4,853 7 8	499 6 1	4,354 1 7
	<b>Total Vote, Railway-construction</b> .. .. .	485,100	333,549 14 11	37,530 8 11	296,019 6 0
85	Additions to Open Lines .. .. .	185,000	94,879 2 8	2,975 14 3	91,903 8 5
	<b>Public Buildings—</b>				
86	General .. .. .	70,000	43,189 18 2	22 5 3	43,167 12 11
87	Courthouses .. .. .	2,000	..	..	..
88	Prisons .. .. .	20,000	16,326 11 6	27 9 0	16,299 2 6
89	Police-stations .. .. .	21,000	8,881 15 4	2,725 0 0	6,156 15 4
90	Postal and Telegraph .. .. .	57,000	26,147 9 10	75 2 8	26,072 7 2
91	Agricultural .. .. .	7,000	4,287 0 4	57 19 6	4,229 0 10
92	Mental Hospitals .. .. .	45,000	14,936 7 3	296 8 7	14,639 18 8
93	Hospitals and Charitable Institutions .. .. .	7,500	2,331 16 0	..	2,331 16 0
94	School Buildings .. .. .	400,000	115,777 11 6	121 5 0	115,656 6 6
95	Workers' Dwellings .. .. .	20,000	7,300 17 5	7 10 0	7,293 7 5
	<b>Lighthouses, Harbour-works, and Harbour-defences—</b>				
96	Lighthouses .. .. .	2,600	1,732 7 7	69 16 0	1,662 11 7
97	Harbour-works .. .. .	11,100	3,754 15 8	25 5 4	3,729 10 4
98	Harbour-defences .. .. .	2,000	..	..	..
99	Tourist and Health Resorts .. .. .	8,000	1,620 7 2	..	1,620 7 2
100	Immigration .. .. .	20,000	23,675 0 1	35,693 9 1	Cr. 12,018 9 0
	<b>Construction and Maintenance of Roads, Bridges, and other Public Works—</b>				
101	Roads, &c. .. .. .	410,580	212,585 19 3	13,946 0 4	198,639 18 11
102	Backblocks Roads, &c. .. .. .	70,000	24,513 5 5	1,266 2 3	23,247 3 2
103	Road and other Works on Goldfields and Mineral Lands .. .. .	10,375	4,185 8 2	..	4,185 8 2
104	Development of Mining .. .. .	1,450	518 6 9	..	518 6 9
105	Telegraph Extension .. .. .	280,000	265,232 4 9	66,621 4 8	198,611 0 1
106	Contingent Defence .. .. .	15,000	8,818 2 3	8 13 9	8,809 8 6
	<b>Lands Improvement—</b>				
107	Improved-farm Settlements .. .. .	2,000	472 17 5	394 13 10	78 3 7
108	Lands, Miscellaneous .. .. .	5,000	234 14 8	4,580 9 1	Cr. 4,345 14 5
109	Irrigation and Water-supply .. .. .	20,000	15,385 10 1	1,721 1 4	13,664 8 9
110	Plant, Material, and Stores .. .. .	25,000	40,690 9 9	20,052 14 2	20,637 15 7
111	Electric Supply .. .. .	150,000	9,253 13 0	..	9,253 13 0
	Unauthorized—Services not provided for .. .. .	..	100 0 0	100 0 0	..
	<b>Total, Public Works Fund</b> .. .. .	2,473,025	1,414,622 13 9	207,141 0 4	1,207,481 13 5



## APPENDIX B.

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

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

SIR,—

Wellington, 1st July, 1919.

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, 1918, to the 30th June, 1919.

The Department's operations are still affected by the aftermath of war conditions, but notwithstanding this handicap the number of men employed is steadily increasing.

The influenza epidemic caused considerable delay in the progress of all the works, many having been closed down for several weeks. No sections have been handed over to the Working Railways Department this year.

The prospects of obtaining plant and material are slowly improving, but prices are still highly inflated.

## RAILWAYS.

## ABSTRACT.

The following table shows the expenditure on Government railways in New Zealand up to the 31st March, 1919:—

Name of Railway.	Total Length of Railway or Section.	Open for Traffic.	Expenditure to 31st March, 1919.
	M. ch.	M. ch.	£
Kaihu Valley .. .. .	24 30	19 58	104,984
Otiria-Ngapuhi .. .. .	45 25	16 25	176,601
Opua Wharf—Onerahi .. .. .	58 6	58 6	522,735
Whangarei-Waiotira .. .. .	19 77	..	242,557
North Auckland Main Trunk Railway (from Helensville) .. .. .	85 22	47 77	1,002,468
Helensville—Te Awamutu, with Branches .. .. .	163 48	150 39	2,486,297
Frankton Junction—Thames, with Branches .. .. .	127 35	87 20	£12,245
Thames Valley—Rotorua .. .. .	69 33	69 33	369,447
Tauranga-Opotiki, with Branches .. .. .	138 27	..	398,376
Gisborne-Opotiki .. .. .	93 45	49 32	623,100
Napier-Gisborne .. .. .	206 52	..	241,122
Wellington—Napier and Palmerston North (including Te Aro Extension and Greytown and Martinborough Branches) .. .. .	249 44	233 12	2,564,288
Wellington—Waitara, with Branches .. .. .	350 11	285 59	2,717,351
Stratford—Okahukura .. .. .	104 47	42 26	924,520
North Island Main Trunk (Marton—Te Awamutu), including Raetihi Branch .. .. .	218 39	218 39	2,824,459
Picton—Waipara (South Island Main Trunk Railway)—			
Picton southwards .. .. .	92 38	56 6	654,056
Waipara northwards .. .. .	90 45	44 14	373,877
Nelson-Belgrove .. .. .	22 73	22 73	199,982
Midland Railway .. .. .	239 75	179 67	2,066,394
Westport—Ngakawau .. .. .	19 56	19 56	188,009
Westport—Ngakawau Extension to Mokihinui* .. .. .	7 12	7 12	..
Mokihinui Colliery Linet .. .. .	3 69	3 69	..
Westport—Inangahua .. .. .	26 0	5 74	152,818
Ngahere—Blackball .. .. .	3 40	3 40	147,532
Greymouth—Rewanui .. .. .	8 70	8 70	255,026
Greymouth—Brunner .. .. .	7 51	7 51	150,651
Greymouth—Waitaha .. .. .	50 32	38 68	338,911
Hurunui—Waitaki, with Branches .. .. .	501 52	443 8	2,696,170
Canterbury Interior Main Line—Oxford—Temuka .. .. .	83 0	11 44	59,699
Waitaki—Bluff, with Branches .. .. .	600 21	546 12	4,960,671
Otago Central .. .. .	182 51	134 78	1,384,731
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	336,339
Preliminary surveys .. .. .	..	..	41,652
Miscellaneous .. .. .	..	..	10,337
Stock of permanent-way on hand .. .. .	..	..	46,872
Rolling-stock .. .. .	..	..	6,732,065
Total .. .. .	4,118 78	2,993 3	\$37,015,782

\* 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, 1919.
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 .. .. .	4,118 78	2,993 3	38,803,498

\* 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.)

After the lapse of three years work was recommenced on this railway in January, 1919. Wash outs at 19 m. 30 ch., 19 m. 58 ch., and 20 m. 4 ch. have been repaired. A stone wall at 19 m. 58 ch. has been renewed, thus completing the formation to 20 m. 70 ch. Work is now proceeding on the length 20 m. 70 ch. to the end. Sundry pipe culverts have been completed. Preparations have been made to install a stone-crushing plant at the ballast-quarry at 19 m. 48 ch. Platelaying has been completed from 19 m. 38 ch. to 19 m. 65 ch.

## KAWAKAWA-HOKIANGA RAILWAY.

*Okaihau Section* (16 m. 25 ch. to 24 m. 45 ch. ; length, 8 miles 20 chains).—Work has been proceeded with throughout the period, and, considering the number of men available, satisfactory progress has been made. Between 16 m. 25 ch. and 19 m. 45 ch. 19,000 cubic yards of slips have been removed. Formation is complete from 16 m. 25 ch. to 19 m. 50 ch., and from 19 m. 70 ch. to 21 m. 53 ch. ; while from 23 m. 40 ch. to 24 m. 45 ch. it is nearing completion. A steam-navvy on this section has helped progress greatly. All pipes and concrete culverts have been completed. The formation of the approach road to Okaihau Station has been completed. The service road between Kaikohe and Okaihau has been metalled for a length of  $1\frac{1}{2}$  miles, and the whole road has been maintained. The telephone-line has been erected from 19 m. to 19 m. 60 ch. A platelayer's cottage has been built at Okaihau Station.

*Okoro Section* (24 m. 45 ch. to 34 m. 18 ch. ; length, 9 miles 53 chains).—Work was commenced on this section during August, 1919. Formation between 24 m. 45 ch. and 25 m. is almost completed. A quarry has been opened up and a crushing plant is in operation near 25 m., metal being carted ahead as required for culvert and road construction. Three pipe and one 8 ft. concrete culverts have been completed. 63 chains of fencing have been erected.

## WHANGAREI—NORTH AUCKLAND RAILWAY.

*Oakleigh Section* (0 m. to 7 m. 60 ch.).—Owing to heavy subsidences in the banks the Railway Department was unwilling to take over the completed length from 0 m. to 5 m. 21 ch. The Public Works Department has therefore maintained this portion, and has run goods traffic over it. Formation has been completed to 5 m. 61 ch., and is being continued to the end of the section. A second lift of ballast has been put in from 7 m. 40 ch. to 7 m. 60 ch. and under the Oakleigh Station and wharf sidings. The piers of the Katetoki Bridge at 7 m. 30 ch. have been completed, and temporary stringers have been laid.

*Tauraroa Section* (7 m. 60 ch. to 15 m. ; length, 7 miles 20 chains).—Slips and subsidences on this length have been troublesome, but are all well in hand. The third (final) lift of ballast has been put down from 8 m. 50 ch. to 14 m. 67 ch., formation and ballasting being completed. An oil-engine pump for the Oakleigh Station water-supply, to pump water from the Tauraroa River, has been installed. The stone-crushing plant at Tauraroa has been running continuously, practically half of the output having been used for metalling roads. At Tauraroa station-yard the third platelayer's cottage has been completed, and a goods-shed has been erected.

*Waiotira Section* (15 m. to junction at Waiotira with the North Auckland Main Trunk Railway at 19 m. 5 ch. ; length, 4 miles 75 chains).—A steam-navvy employed on this section has given excellent results, completing cuttings at 16 m. 33 ch. and 17 m. With the exception of the cutting at 16 m. 60 ch. and bank at 17 m. 13 ch. the formation has been completed to Waiotira Bridge at 17 m. 73 ch. In the former case, however, a temporary line has been run round the cutting, while in the latter trestles have been erected, thus enabling the platelaying to be pushed ahead. The balance of the formation is almost complete. Owing to the shortage of rails a temporary track only is being laid to Waiotira Junction Station. Platelaying has been completed from 15 m. to 16 m. 54 ch., and from 17 m. 19 ch. to 18 m. 50 ch. A temporary 40 lb. track has been laid from 16 m. 54 ch. to 17 m. 19 ch., and from 18 m. 50 ch. to 19 m. 25 ch. Two lifts of ballast have been put down from 15 m. to 16 m. 54 ch. Heavy slips have occurred in almost all the cuttings, thus causing delay with the ballasting. Eight concrete and five earthenware pipe culverts have been completed. A start has been made on the piers of the Waiotira Bridge. Overbridge at 16 m. 31 ch. has been completed. Fencing has been completed for a length of 1 mile 57 chains.

## WAIPU BRANCH RAILWAY.

(Length, 16 miles.)

Formation work along the first 4 miles has been put in hand.

## NORTH AUCKLAND MAIN TRUNK RAILWAY.

*Maungaturoto Section* (83 m. 75 ch. to 88 m. 21 ch. ; length, 4 miles 26 chains).—This length has been kept open for traffic, but great difficulty has been experienced owing to slips and subsidences. Considerable work was entailed in cutting out and repacking with boulders portions of bank at 86 m. 37 ch. A concrete culvert under this bank has been extended. All fences have been put in order. Owing to swelling ground at northern end of Maungaturoto Tunnel it was found necessary to load this portion of the tunnel. The work has been completed with satisfactory results. Maungaturoto Station buildings have been completed. General maintenance work has been carried out.

*Paparoa Section* (88 m. 21 ch. to 92 m. 6 ch. ; length, 3 miles 65 chains).—Cutting at 88 m. 45 ch. has been stone-drained throughout. A deviation between 89 m. 17 ch. and 89 m. 70 ch. has been completed. The sidings and station buildings in Huarau station-yard have been completed. Considerable work has been involved in the way of providing cattle-stops, access to cattle-yards, fencing, gates, and metalling. Formation work is complete to 91 m. 40 ch., but bank at 91 m. 30 ch. is still settling and spreading. Work on the Huarau Tunnel was recommenced at the south end in August, 1918. Owing to the particularly heavy ground slow progress was made until February, 1919, when harder country was met with and greater progress was made. Work has also been resumed in the northern end. The work yet remaining comprises  $8\frac{1}{2}$  chains of enlarging and concreting. The total length will be  $16\frac{3}{4}$  chains. Owing to the scarcity of labour only 11,000 cubic yards of crushed metal and boulders were taken from the Hoteo quarry during the past year.

The two preceding sections—viz., Maungaturoto and Paparoa—from 83 m. 75 ch. to 92 m. 6 ch., will shortly be ready for handing over to the New Zealand Working Railways Department.

*Mareretu Section* (92 m. 6 ch. to 96 m. 45 ch. ; length, 4 miles 39 chains).—Owing to shortage of labour no further work has been done on this section.

*Waikiekie Section* (96 m. 45 ch. to 107 m. 28 ch.—Waiotira Junction ; length, 9 miles 55 chains).—Work was commenced on this section in July, 1918. The approach cuttings to Waikiekie Tunnel at 105 m. 25 ch. have been excavated. The bottom heading of the tunnel has been driven. Formation work between the Waikiekie Tunnel and Waiotira Junction at 107 m. 28 ch. is well advanced. Four 24 in. earthenware pipe culverts have been completed. A platelayer's cottage has been erected at Waiotira Station. Various workshops for construction and repair of plant have been erected.

*Kirikopuni Section* (107 m. 28 ch. to 121 m. 40 ch. ; length, 14 miles 12 chains).—Work was commenced on this section in July, 1918. The approach cutting at south end of Tokatoka Tunnel at 108 m. 30 ch. is well in hand, and a start will soon be made with the tunnel. A 3 ft. concrete-pipe culvert has been completed.

## WAIUKU BRANCH RAILWAY.

(Length, 12 miles 15 chains.)

With the exception of the bank at 5 m. 48 ch. the formation has been practically completed to 10 m. Between 10 m. and 12 m. 15 ch. the formation is well in hand. Pukeoware Station at 9 m. 43 ch. has been widened to its full width. Four 2 ft. concrete-pipe culverts have been completed. The foundations for the treble 12 ft. arched concrete culvert at Mauku proving troublesome special piling became necessary, which has been completed, and the concreting of culvert is well in hand. Overbridges and approaches at 10 m. 6 ch. and 11 m. 48-50 ch. are complete. 1 mile 63 chains of fences have been erected. Arrangements were made whereby the Working Railways Department runs a weekly goods service on the unopened line between Patunahoe and Mauku Stations.

## EAST COAST MAIN TRUNK RAILWAY.

*Waiki Eastwards—Athenree Section* (0 m. to 12 m. 35 ch.).—Work is in hand as far as 10 m., and fair progress has been made. Stone is being crushed for the culverts and bridges on this section. Foundations for the Waimata Bridge at 2 m. 62 ch. have been excavated. Two platelayers' cottages have been built at Athenree Station.

*Tauranga Westwards—Tauranga Section* (37 m. to 41 m. 5 ch. ; length, 4 miles 5 chains).—A start has been made on this section ; fencing and formation are in progress between 37 m. and 39 m. Between 40 m. 28 ch. and 40 m. 35 ch. 1,500 cubic yards of stone spauls were placed as pitching along the Strand harbour-front.

*Tauranga Eastwards—Matapihi Section* (41 m. 5 ch. to 45 m. ; length, 3 miles 75 chains).—Further work on the sinking of the bridge-cylinders for Tauranga Bridge has been carried out.

*Mount Branch—Matapihi Junction to Maungamui* (0 m. 21 ch. to 4 m. 28 ch. ; length, 4 miles 7 chains).—Ordinary maintenance has been carried out on this section. Considerable traffic has been dealt with on this branch.

*Te Puke Section* (45 m. to 54 m. ; length, 9 miles).—Banks on this section have been widened. Maintenance work has been carried out.

*Paengaroa Section* (54 m. to 59 m. 65 ch. ; length, 5 miles 65 chains).—The Kaituna Bridge, at 56 m. 5 ch., consisting of two 80 ft. and six 20 ft. spans, has been completed. The line has also been maintained.

*Pongakawa Section* (59 m. 65 ch. to 64 m. 15 ch. ; length, 4 miles 30 chains).—A concrete arch overbridge at 65 m. 56 ch. has been erected. Maintenance work has also been carried out.

*Otamaraka Section* (64 m. 15 ch. to 71 m. 5 ch.; length, 6 miles 70 chains).—Banks on this section have been raised as the swamp has settled, and the line has been maintained. A concrete arch overbridge at 69 m. 33 ch. has been completed.

*Matata Section* (71 m. 5 ch. to 79 m. 16 ch.; length, 8 miles 11 chains).—The raising of the banks on this section has kept pace with their subsiding, but a considerable amount of making up will be required before the ballasting can be completed. A running surface over this length has been maintained.

*Rangitaiki Section* (79 m. 16 ch. to 87 m. 71 ch.; length, 8 miles 55 chains).—Formation is in progress on the first 4 miles.

*General*.—Goods and passenger traffic have been carried from Mount Maunganui to the Matata Station, a length of 40 miles, throughout the year. A fire destroyed the workshops at Maunganui, but they are being rebuilt as energetically as possible. The length of this line from Waihi to Opotiki is approximately 130 miles, including 4 miles of branch line from Mount Maunganui to Matapihi.

*Gisborne-Napier (North End).*

*Ngatapa Section* (length, 11 miles 18 chains).—The banks damaged by floods in May, 1918, have been widened. As all the ballast is being obtained from the Waipaoa River work could be carried out intermittently only. The third lift of ballast has been laid for a length of 5 miles 28 chains and through the Ngatapa station-yard. Sundry repairs to fences have been completed. A passenger and goods service has been maintained between Makaraka and Ngatapa.

*Waikura Section* (10 m. 29 ch. onwards).—Very little work has been carried out on this section.

*Gisborne-Napier (South End).*

*Eskdale Section* (length, 11 miles 36 chains).—Good progress on the Inner Harbour embankment has been made by the Napier Harbour Board. Bank at 0 m. 60 ch. has been built to full width. Altogether 57,700 cubic yards of dredged material and quarry-metal have been placed in this bank. Since the beginning of March, 1919, further clearing and culverting have been put in hand.

STRATFORD—MAIN TRUNK RAILWAY.

*West End.*

*Tahora Section* (42 m. 26 ch. to 47 m. 30 ch.; length, 5 miles 4 chains).—Although slips have been troublesome between 44 m. 28 ch. and 46 m. 18 ch. formation has been completed to 47 m. 24 ch. The remainder of the section is well in hand. The first lift of ballast is complete to 46 m. 72 ch. and the second to 44 m. As the Railway Department's stone-crushing plant at Mount Egmont has temporarily closed down no further ballasting could be done. Overhead bridges for private crossings at 42 m. 47 ch., 42 m. 64 ch., and 43 m. 54 ch. have been completed. Road-bridge over railway-line at 47 m. 1 ch. has been temporarily completed for traffic. Four bridges at Tahora station-yard (on approach road) have been completed. Four water-tunnels have been lined with concrete; four concrete-pipe culverts have been completed; 2 miles 63 chains of permanent fences have been erected. A bi-weekly passenger and goods train, connecting with the Railway Department's services at Kohuratahi, has been run, the output of the Tahora Timber Company's mill being railed at the same time.

*East End.*

*Matiere Section* (0 m. to 10 m. 21 ch.).—A fair amount of formation has been carried out, but work with men available has been concentrated mainly on the tunnels. In the Okahu Tunnel 13½ chains of top heading and excavation to full size have been completed, while 12¾ chains of walls and arch have been lined; 3½ chains of excavation to full size have been completed in tunnel at 4 m. 68 ch. The bottom heading of the tunnel at 6 m. 10 ch. is complete, the remaining 2 chains having been driven. The manufacture of bricks for use on the works has continued, 438,000 having been made. The abutments and piers for the Ongarue River Bridge at 0 m. 7 ch. have been completed, but further progress is impossible until the steel girders arrive. A siding has been laid into ballast-pit at Manunui. Some metalling has been carried out on service road between Okahukura and Ohura.

OPUNAKE BRANCH RAILWAY.

*Kapuni Section* (0 m. 6 ch. to 7 m.; length, 6 miles 74 chains).—Owing to shortage of labour work on this railway ceased in December, 1917, but was recommenced at the beginning of March, 1919. Work on the Waiongongoro Bridge is in hand. On the remaining sections of this line no further work has been done.

SOUTH ISLAND MAIN TRUNK RAILWAY.

*Kekerangu Section* (56 m. 6 ch. to 63 m. 6 ch.; length, 7 miles).—Owing to shortage of labour work was temporarily suspended on this line in August, 1917. Since that date no further work has been carried out.

MIDLAND RAILWAY.

*Nelson-Westland (North End).*

*Kawatiri Section* (59 m. 17 ch. to 63 m. 10 ch.; length, 3 miles 73 chains).—No further work has been done on this section since February, 1917.

*Arthur's Pass Tunnel.*

The bottom headings met on 20th July, 1918, at a point 1 mile 37 chains from the eastern portal on the Bealey side. All the shifts worked were "wet" i.e., six-hour shifts. The rock passed

through was greywacke and slate, as previously. The total heading driven at both ends during the period is 2 chains 68 links: enlarging and lining completed, 24 chains. The distance between completed portions of the tunnel is 1 mile 6 chains; total length of tunnel, 5 miles 25 chains 18 links. Work on this tunnel has been considerably hampered by the shortage of labour. As more men become available progress will be increased. At the Otira end work is being carried out by day labour, while at the Bealey end work by day labour was carried out only until 29th September, 1918, when the co-operative contract system was adopted and still remains in force.

#### CULVERDEN-WAIAU RAILWAY.

(Length, 13 miles.)

The third (final) lift of ballast has been placed along the total length of 13 miles. Delay was caused for several months owing to the heavy snowfalls and to the flooding of the ballast-pit. A boulder and earth buffer stop-bank has been completed at 13 m. At Culverden two platelayers' cottages have been built. At Waiau two platelayers' cottages, one Stationmaster's house, two workmen's huts, and a 4-ton crane have been erected. A daily goods service has been run between Culverden and Waiau. This line should be completed by the end of the year.

#### WAIMATE BRANCH RAILWAY EXTENSION.

(Length, 4 miles 60 chains.)

No further work has been done on this section during the period.

#### OTAGO CENTRAL RAILWAY.

*Cromwell Section* (44 m. 52 ch. to 57 m. 6 ch.; length, 12 miles 34 chains).—Cuttings and banks have been widened at 46 m. 40 ch., 47 m. 5 ch., and 47 m. 55 ch. View at level crossing at 48 m. 37 ch. has been improved. Formation of road and railway deviation, 50 m. 65 ch. to 51 m. 7 ch., has been completed, while that from 55 m. 50 ch. to 56 m. 30 ch. is well in hand. The main line has been extended from 57 m. to 57 m. 6 ch., and the sidings from 56 m. 71 ch. to 57 m. The final lift of ballast has been placed from 56 m. 71 ch. to 57 m., and the second lift has been completed through the sidings. Seventeen pipe and culvert outlets have been stone-pitched to prevent scour. A 6 ft. concrete arch culvert at 55 m. 19 ch. has been completed. Bridges at 46 m. 23 ch., 48 m. 38 ch., and 49 m. 71 ch. have been erected, and bridges at 47 m. 19 ch. and 51 m. 23 ch. are well in hand. Four platelayers' cottages, one passenger station building and platform front, a stockyard, two ash-pits, two concrete buffer stops, and a 6,000-gallon water-tank with stand have been completed. A pipe-line for the water-supply of Cromwell Station buildings has been placed in position. Since 1st January of this year a regular passenger and goods service has been maintained between Cromwell and Clyde.

#### OREPUKI-WAIAU RAILWAY EXTENSION.

*Orawia Section* (48 m. 23 ch. to 56 m. 40 ch.; length, 8 miles 17 chains).—Work on this line is still suspended owing to the shortage of labour.

#### SURVEYS OF RAILWAYS UNDER CONSTRUCTION, NEW LINES OF RAILWAY, LAND-PLANS, ETC.

##### NORTH AUCKLAND MAIN TRUNK RAILWAY.

Plans of the permanent line north of Kaikohe have been completed from 42 m. to 45 m. 40 ch. Plans for a wharf at Te Tio Point near 45 m. 20 ch. have been completed.

##### EAST COAST MAIN TRUNK RAILWAY.

*Waihi to Tauranga*.—Trial lines have been run between 16 m. and 20 m. Permanent line has been pegged from 15 m. to 20 m. Permanent-line pegging is in hand between 20 m. and 35 m. Plans have been prepared to 15 m.

*Rangitaiki Section*.—Permanent pegging has been completed between 91 m. 18 ch. and 96 m. 70 ch. The surveys of the drainage areas of the different drains in the Rangitaiki Swamp have been completed. A traverse has been run along the Rangitaiki River for the purpose of locating stop-banks.

##### Gisborne-Napier (South End).

From 10 m. 60 ch. onwards a strong survey party has been employed, and 38 miles 40 chains of trial lines have been completed. Trial survey and plans have been completed to 44 m. 60 ch.

##### STRATFORD—MAIN TRUNK RAILWAY.

*West End*.—Trial surveys were undertaken to investigate the possibilities of a square crossing over the Tangarakau River at 50 m. 40 ch., also of a more direct route from the Tangarakau to the Mangatatoko. A trial line was also made for a deviation from 54 m. to 57 m. The route for a service road from 50 m. 40 ch. onwards towards the Heao Valley has been surveyed. The permanent line has been pegged from 49 m. to 50 m. 55 ch., the end of Tahora Station being at 47 m. 30 ch.

*East End*.—Investigations with the object of improving the alignment from 16 m. to 19 m. have been made. Land-plan survey has been completed to 10 m. 23 ch., Matiere Station.

#### RIVER CONSERVATION.

##### WAIRAU RIVER SURVEY.

Thirty miles of river traverse, with levels and cross-sections, have been surveyed to enable scheme of flood-prevention works to be prepared.

## ROADS, BRIDGES, ETC.

The amounts available for expenditure have been less than in the years preceding the war, but even if more money had been available it would have been impossible to carry out more work, as the supplies of labour and material were so restricted. Maintenance work on the roads under the control of the Department has been carried out as efficiently as possible. Extensive surveys have been made in all districts. Of the many and varied works carried out during the year the following have been selected for brief mention :—

*Duncan Road.*—46 chains of road were widened from 6 ft. to 12 ft., and in addition 72 chains of 12 ft. formation, previously under construction, were completed, including one 20 ft. and one 16 ft. bridge.

*Pareokawa Road.*—1 mile 58 chains of road were widened, and 1 mile 18 chains of metalling completed.

*Foster's Bridge.*—On Main North Road a 30 ft. span bridge with approaches has been completed.

*McKay's Bridge (Waipu to Ferry Farm Road)* has been completed.

*Barker Bridge*, consisting of a 26 ft. 6 in. reinforced-concrete span, has been erected.

*Omaumau River Bridge.*—26 ft. 6 in. reinforced-concrete span has been erected.

*Puhoi to Puhoi River Bridge Road.*—53 chains of metalling have been completed.

*Burch's to Wairere Road.*—1 mile of metalling has been completed.

*Maungaturoto to Ruawai.*—On this road 1 mile of deviation has been formed, and 1 mile 18 chains of metalling have been completed.

*Topuni Bridge.*—A reinforced-concrete pile bridge, with five 25 ft. jarrah spans, has been erected.

*Makarau to Tahekeroa Road.*—3 miles 65 chains of this road have been handed over to the Kaukapakapa Road Board.

*Wainui to Kaukapakapa Railway-station.*—1 mile 73 chains of re-forming and 1 mile 30 chains of metalling have been completed by the Waitemata County Council.

*Kitchener Road Bridge.*—The old bridge has been replaced by a 12 ft. by 12 ft. concrete culvert with a reinforced top.

*Waihoehoe Stream Bridge*, consisting of a 20 ft. span in hardwood with concrete abutments, has been constructed by the Franklin County Council.

*Kaimarama to Guntown.*—This road has been widened to 12 ft. for a length of 5 miles.

*Kennedy Bay Bridge.*—This bridge, consisting of a 25 ft. span with wooden wing walls, has been completed.

*Kirihone to Walton Road.*—1 mile 28 chains of this road have been completed by the Piako County Council.

*Waihou River Bridge at Tirohia.*—This bridge, consisting of eighteen 25 ft. and one 61 ft. spans, has been completed.

*Ohairo Creek Bridge.*—This bridge, consisting of two 25 ft. and one 16 ft. spans, has been erected by the Raglan County Council.

*Port Waikato to Tuakau Road.*—3 miles of 16 ft. road have been formed.

*Great South Road (Hamilton to Ngaruawahia).*—5 miles 20 chains of metalling have been completed by the Waipa County Council.

*Waikato River Bridge (Ngaruawahia).*—The cylinders have been sunk to the required depths, and the erection of the bridge is well in hand.

*Hamilton to Rotorua Road.*—Approximately 9 miles of this road through the Mamaku Bush have been regraded and culverted by the Matamata County Council.

*Tokatoka Stop-banks.*—These are in hand, and 50 chains of stop-bank roads have been raised.

*Mangawai Embankment.*—14 chains of retaining-wall have been built.

*Uraura Block.*—4 miles 46 chains of roading have been formed in this block.

*Taylor Block.*—13 miles of 12 ft. road have been formed.

*Wanganui River Bridge (Taumarunui).*—Owing to inability of contractor to procure truss-rods very little progress has been made with this bridge. Two 80 ft. spans have been completed.

*Owepanga Stream Bridge*, which is of two 25 ft. and one 14 ft. spans, has been erected.

*Taringamutu Stream Bridge.*—This bridge, consisting of four 24 ft. spans, has been completed.

*Pukehina Swamp Road.*—2 miles of 24 ft. formation have been completed.

*Rotorua to Lake Rotoma Road.* 7 miles of this road have been formed with a tractor and grader, and 7 miles patched with pumice.

*Rotorua-Paengaroa (Te Ngae to County Boundary).*—11 miles of this road have been regraded, and three deviations formed.

*Rotorua to Taupo.*—14 miles of this road have been re-formed.

*Tarawera Bridge (Lake Rotorua to Te Teko Road).*—This bridge, consisting of five 26 ft. spans, has been removed from its original site, and has been re-erected over the new channel of the Tarawera Stream. New approaches have also been formed.

*Raparapahoe Stream Bridge.*—This truss bridge, of one 110 ft. span across a rocky gully and 74 ft. above stream-level, has been completed.

*Wairoa Bridge Protection Works.*—An additional span of 25 ft. has been built, and 2,500 concrete blocks, 3 ft. by 3 ft. by 1 ft. 3 in., have been placed in position around two of the cylinder piers.

*Tutaetoko to Pakihi Stock Reserve Road.*—This road was damaged by flood, and 76 chains have now been repaired.

*Motu River Bridge.*—The bridge spanning the Motu River at Motu Village was destroyed by flood in 1918. This has been replaced by a substantial temporary structure 110 ft. long.

*Purahotangohia Block.*—A further 4 miles 40 chains of 14 ft. dray-road have been formed, and one 25 ft. span bridge has been erected.

*Otamauri Block*.—20 chains of road have been formed, and one 60 ft. span bridge has been completed.

*Porangahau River Bridge*.—This bridge, consisting of one 60 ft., four 25 ft., and one 15 ft. spans, has been erected.

*Waipawa River Bridge*. Extensive repairs to both the bridge and approaches have been carried out by the Waipawa County Council.

*Napier-Wairoa Road*.—33 miles of this road have been maintained. In addition the approaches to the Matahouira Bridge were improved, and three bridges were extensively repaired.

*Napier-Taupo Road*.—59 miles of this road have been maintained.

*Putikitunga Road Bridges*.—Two 25 ft. span and one 40 ft. span bridges have been erected by the Whangamomona County Council.

*Awakino Valley Bridges*.—Three bridges have been erected.

*Mangaohia River Bridge*.—A 33 ft. span bridge on concrete abutments has been erected by the Awakino County Council.

*Moki Bridge*.—A new bridge of one 35 ft. span has been erected.

*Punehu Bridge* of concrete arches has been completed.

*Mangoira Block*.—2 miles of 6 ft. track have been formed.

*Tiratu Block*.—10 miles 53 chains of clearing have been completed, and 8 miles of dray-road formed.

*Kopuaranga Bridge*.—This reinforced-concrete bridge, consisting of one 35 ft. and two 22 ft. 6 in. spans, has been erected.

*Oroua Block*.—3 miles of dray-road have been formed.

*Clay Bank Bridge*.—This bridge, consisting of one 16 ft. and two 25 ft. spans, has been completed. The piers and abutments are of concrete.

*Murchison to Eight-mile Section*.—16 miles of this road have been maintained.

*Tadmor River Bridge*.—This bridge, consisting of three 40 ft. truss spans, has been erected by the Waimea County Council.

*Kaikoura to Parnassus Road*.—This road has been maintained and repairs effected to flood damages. Sundry bridges have been protected.

*Clarence River Protective Works*.—Three large groynes on the north bank above the bridge have been repaired.

*Leader River Bridge*.—Three additional spans, with approaches and protective works, have been completed.

*Pukaki—Mount Cook Road*.—40 miles of this road have been maintained, and minor improvements carried out.

*Ashley Gorge Road*.—Great damage was caused by floods and snowfalls. Extensive repairs have been effected, and about 10,000 cubic yards of slips have been removed. Several sharp bends have been straightened, and 1,000 cubic yards of broken metal have been laid.

*Conway River Road (Bluffs Section)*.—Retaining-walls and groynes have been erected as protection against future floods.

*Lees Valley Settlement Roads*.—3 miles 40 chains of road have been formed and metalled.

*Arthur's Point Bridge*.—This reinforced-concrete arch bridge, 140 ft. long, over the Shotover River at Arthur's Point, has been completed.

*McChesney's Bridge*.—This bridge is being erected.

*Gore Protective Works*.—A commencement has been made on these works.

*Kaitangata Flood-gate*.—Considerable difficulty was experienced through the seepage of water and floods. All difficulties were overcome, and the gate has been erected.

*Flood Damage, Otago and Southland*.—Heavy floods in January of this year damaged protective banks and roads at Bamego, Stirling, Kaitangata, and Lumsden. The majority of these have since been repaired.

## IRRIGATION.

### IDA VALLEY SCHEME.

During the season water was supplied to twelve farmers in Ida Valley and to fifteen farmers on Galloway Flat. The shortage of farm labour prevented a more extensive use of the water. The Galloway Distribution Race has been completed. General maintenance work was carried out. Surveys in connection with diverting additional water into Manorburn Dam have been made. The survey of a drainage scheme for the lower parts of Galloway Flat has been completed, and a survey for a similar scheme of considerable magnitude for Ida Valley is in hand. Other minor surveys have been completed.

### MANUHERIKIA SCHEME.

Owing to the difficulty in obtaining skilled men great progress has not been made on the intake tunnel. Work on the race-construction through the Manuherikia Gorge is in hand, but heavy slips have considerably delayed progress. The main race has been completely excavated from 4 m. to 7 m. 20 ch., and from 9 m. 35 ch. to 12 m. 38 ch. Trial surveys for the site of a proposed dam in the Manuherikia River have been carried out.

### BENMORE RUNS.

A race  $4\frac{1}{2}$  miles long, to irrigate certain sections in the Benmore Runs, has been completed. Several slips have been cleared.

## WAIHOU AND OHINEMURI RIVERS IMPROVEMENT.

This work, in common with others, has been carried out as rapidly as possible, but until additional plant can be procured greater progress is impossible.

*Dredging.*—The dredge has been employed at pumping material to form a stop-bank between Te Puke Wharf and Ngahina, and then was moved to opposite 0 m. 0 ch., on the left bank of the Tirohia-Ngararahi Cut, where a second stop-bank was completed. The two works involved the pumping of 84,000 cubic yards of material.

*Paeroa—Thorp's Bend Stop-bank.*—12 chains of this bank have been completed this year.

*Puke-Ngahina Stop-bank.*—This has been completed. A five-roomed house formerly belonging to the Waihi Gold Extraction Company has been removed clear of the stop-bank site.

*Wright's Hill, Thorp's Stop-bank.*—This has been completed.

*Ngahina—Komato Creek (Right Bank).*—The preliminary excavation has been completed, and formation is in hand.

*Tirohia-Ngararahi (Left Bank).*—Between 2 m. 59 ch. and 4 m. 59 ch. this stop-bank has been completed and grassed, and further formation is in progress between 1 m. and 2 m. 59 ch.

*Ngahina Wharf and Goods-shed Extension.*—Owing to inability to secure timber work has been temporarily suspended.

*Tirohia-Rotokohu Drainage.*—Considerable work on this has been carried out, 2½ miles of drains having been completed. The road-bridge on the Paeroa—Te Aroha Road across the Rotokohu Drain has been erected.

*Tidal Records.*—Automatic tide-gauges are being installed at Tararu Point (Thames), Kopu, Kaimanawa Wharf (Hikutaia), and Ngahina. The precise levelling for connecting up the gauges has been completed.

*Surveys.*—A considerable amount of surveying and levelling has been carried out.

*General.*—Clearing of willows, &c., on the river-banks has been in hand. Several minor stream-diversions have been made.

## TRAMWAYS.

In accordance with the provisions of the Tramways and Public Works Acts the Department's Engineers have inspected portions of the various municipal tramways and their rolling-stock. Some of the matters dealt with by this Department are mentioned below.

*Auckland.*—Several inspections and reports have been made.

*Takapuna Steam Tramways.*—Sundry inspections and investigations have been called for.

*Christchurch (McCormack's Bay).*—The loop into the new quarry has been completed.

„ *(Woolston Loop).*—This loop, for the storage of trailers, has been finished.

Sixteen trailer cars have been inspected and certificates given.

## 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:—

*Flat Rock Beacon.*—An automatic acetylene light has been erected on Flat Rock, off Kawau Island.

*Tiritiri Lighthouse.*—Two old keepers' cottages have been dismantled and new ones erected in their stead.

*Waitakaruru Landing.*—Leading-lights have been erected.

*Wanganui.*—A report has been prepared on the sea erosion at the mouth of the river, &c.

*Dog Island Lighthouse.*—The tower has been strengthened, and various alterations have been carried out.

*Puysegur Point Lighthouse.*—The three new cottages and outbuildings for the keepers which were in course of erection last year have been completed.

## DEFENCE WORKS.

*Invercargill Rifle Range.*—30 chains of the bank necessary to reclaim the land required have been completed, while the trestling used during construction has been extended another 14 chains.

I have, &c.,

R. W. HOLMES, Engineer-in-Chief.





TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—*continued*.  
NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Siding.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Plate-laying.	Date.	Opened.					
											—	1915-16	1916-17	1917-18	1918-19	Total.
1	Whangarei - North Auckland Railway Waipatu Branch Kaipara-Newmarket Onehunga Branch .. Auckland-Waikato .. Auckland-Penrose— Deviation via Beach Auckland City Branch —Kingsland Station to Auckland Station via Western Park and Freeman's Bay Waikato Branch Waikato Railway Huntly-Awaroa .. Paeroa-Pokeno .. Waikato-Thames .. Hamilton-Cambridge Paeroa-Waihi .. Waihi - Ootiki, or East Coast Railway	M. ch 19 79  16 45 35 73 2 73 100 13 6 50 2 60  12 69 9 0 40 15 62 58 12 2 12 40 138 27	M. ch. 19 79  16 45 35 73 2 73 100 13 6 50 2 60  { Paerata-Patumahoe Patumahoe-Waikato Huntly-Awaroa .. Paeroa-Pokeno .. Frankton Junction- Thames Ruakura Junction- Cambridge Paeroa-Waihi .. Waihi-Tauranga .. Tauranga-Te Maunga Junction Te Maunga Junction- Te Puke Te Puke-Paengaroa... Paengaroa - Ponga- kawa Pongakawa-Otamaraka Otamarakau-Matata	M. ch. 19 79  16 45 35 73 2 73 100 13 6 50 2 60  4 20 8 49 9 0 40 15 62 58 12 2 12 40 41 60 3 20 8 65 5 65 4 30 6 72 9 8	M. ch. 1 76  .. 6 66 1 70 16 66 .. ..  0 78 1 3 .. .. 10 17 3 14 1 30 .. .. 1 23 1 16 0 47 0 26 0 43	M. ch. 21 75  16 45 42 59 4 63 116 79 6 50 2 60  5 18 9 52 9 0 40 15 72 75 15 16 13 70 41 60 3 20 10 8 7 01 4 77 7 18 9 51	M. ch. ..  11 0 .. .. .. 6 50 2 60  .. 7-23 .. 40 15 ..<									

\* Trial survey.

† Te Maunga Survey.

‡ Otamarakau.

§ Matata Yard.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—continued.  
NORTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sliding.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Plate-laying.	Opened.						
										Date.	—	1915-16	1916-17	1917-18	1918-19	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
East Coast Railway— <i>contd.</i>	Waihi-Opotiki— <i>ctd.</i>	M. ch.	Matata-Taneatua ..	M. ch. 20 0	M. ch. ..	M. ch. 20 0	M. ch. { 13 0 7 0	M. ch. Permt. Prelim.	M. ch.	..	M. ch.	..	..	..	..	..
	Branch Lines	..	Taneatua-Opotiki ..	30 0	Prelim. Survey	30 0	..	..	..	..	..	..	..	..	..	..
		..	Mount Maunganui - Te Maunga Junction	4 27	0 67	5 14	..	..	..	..	..	..	..	..	..	..
		..	Te Puke Quarry ..	3 0	0 20	3 20	..	..	..	..	..	..	..	..	..	..
Thames Valley-Rotorua	Thames Valley-Rotorua	69 33	Moturiki Quarry ..	1 0	0 10	1 10	..	..	..	..	..	..	..	..	..	..
		..	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-Rakauaroa ..	6 60	0 32	7 12	..	..	..	2 Nov., 1914	..	..	..	..	..	..
		..	Rakauaroa-Matawai ..	5 65	0 50	6 35	..	..	..	2 Nov., 1914	..	..	..	..	..	..
		..	Matawai-Motuhora ..	4 78	0 61	5 59	..	..	..	26 Nov., 1917	..	..	..	4 78	..	..
		..	Motuhora-Motu ..	2 10	..	2 10	2 10	..	..	..	..	..	..	..	..	..
		..	Motu-Opotiki ..	41 2	..	41 2	41 2	Estim.	..	..	..	..	..	..	..	..
		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	1 65	3 0	..	..	..	..	..	..	..
		..	Eskdale-Wairoa ..	46 21	..	46 21	46 21	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	..	..	..	..	..	..	..

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—continued.  
NORTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Siding.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Plate-laying.	Date.	Opened.					
											—	1915-16	1916-17	1917-18	1918-19	Total.
1 New survey —contd.	2 Napier-Gisborne—ctd.	3 M. ch.	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Napier-Woodville and Palmerston North Wellington-Woodville	Napier-Woodville ..	96 65	Waikura-Waterfall	M. ch. 5 0	M. ch. 5 0	M. ch. 5 0	M. ch. 5 0	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Waterfall-Hangaroa	M. ch. 4 0	M. ch. 4 0	M. ch. 4 0	M. ch. 4 0	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Hangaroa - Te Reinga	M. ch. 17 11	M. ch. 17 11	M. ch. 17 11	M. ch. 17 11	M. ch. Prelim.	M. ch. Prelim.	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Te Reinga-Marumaru	M. ch. 12 40	M. ch. 12 40	M. ch. 12 40	M. ch. 12 40	M. ch. Prelim.	M. ch. Prelim.	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
Rimutaka Incline Deviation Surveys	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Marumaru - Wairoa River	M. ch. 7 0	M. ch. 7 0	M. ch. 7 0	M. ch. 7 0	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Wairoa Wharf Siding	M. ch. 1 64	M. ch. 1 64	M. ch. 1 64	M. ch. 1 64	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Wairoa-Napier ..	M. ch. 2 55	M. ch. 2 55	M. ch. 2 55	M. ch. 2 55	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Napier Spit-Woodville	M. ch. 96 65	M. ch. 15 5	M. ch. 111 70	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 96 65
Wellington-Woodville	Woodville-Palmerston North	17 21 115 79	Woodville-Palmerston North	M. ch. 17 21	M. ch. 0 51	M. ch. 17 72	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 17 21
			Woodville-Wellington	M. ch. 115 79	M. ch. 21 73	M. ch. 137 72	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 115 79
			Greytown Branch ..	M. ch. 3 7	M. ch. 0 64	M. ch. 3 71	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 3 7
			Featherston - Martin-borough	M. ch. 11 50	M. ch. ..	M. ch. 11 50	M. ch. 11 50	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
Wellington-Manawatu Foxton-Patea Route Improvement Surveys	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Greytown - Martin-borough	M. ch. 4 62	M. ch. ..	M. ch. 4 62	M. ch. 4 62*	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Coach-road Route ..	M. ch. 9 0	M. ch. ..	M. ch. 9 0	M. ch. 9 0	M. ch. Prelim.	M. ch. Prelim.	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Tauherenikau Route	M. ch. 21 30	M. ch. ..	M. ch. 21 30	M. ch. 21 30	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Wainui-o-mata Route	M. ch. 31 40	M. ch. ..	M. ch. 31 40	M. ch. 31 40	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
Foxton-New Plymouth	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Petone - Pigeon Bush	M. ch. 52 0	M. ch. ..	M. ch. 52 0	M. ch. 52 0	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Petone-Carterton, via Martinborough	M. ch. 70 0	M. ch. ..	M. ch. 70 0	M. ch. 70 0	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Wellington-Longburn	M. ch. 83 37	M. ch. 15 76	M. ch. 99 33	M. ch. ..	M. ch. ..	M. ch. ..	7 Dec., 1908†	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 83 37
			Foxton-Patea ..	M. ch. 120 44	M. ch. 14 75	M. ch. 135 39	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 120 44
Wellington-Manawatu Foxton-Patea Route Improvement Surveys	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Turakina-Matarawa	M. ch. 11 67	M. ch. ..	M. ch. 11 67	M. ch. 11 67	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Aramoho-Goat Valley Tunnel	M. ch. 7 40	M. ch. ..	M. ch. 7 40	M. ch. 7 40	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Kai Iwi - Okehu ..	M. ch. 3 60	M. ch. ..	M. ch. 3 60	M. ch. 3 60	M. ch. Prelim.	M. ch. Prelim.	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..
			Nukumarua-Waitotara	M. ch. 3 0	M. ch. ..	M. ch. 3 0	M. ch. 3 0	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..

\* Trial survey. † Date of purchase.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—continued.

NORTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.										Total.	
							Surveyed.	Under Formation.	Under Plate-laying.	Date.	Opened.							
											—	1915-16	1916-17	1917-18	1918-19			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
Foxton-New Plymouth —contd.	Patea - Waitara and New Plymouth	M. ch. 72 29	Patea-New Plymouth	M. ch. 72 29	M. ch. 11 52	M. ch. 84 1	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 72 29		
	Bull's Branch	3 79	Breakwater	3 79	..	3 79	..	..	..	..	..	..	..	..	..	..		
	Wanganui Branch ..	3 29	Aramoho-Wanganui	3 29	2 23	5 52	3 79	Prelim.	..	..	..	..	..	..	..	3 29		
	Stratford-Main Trunk	104 47	Stratford-Toko	6 26	0 40	6 66	..	..	..	1 Mar., 1905	..	..	..	..	..	..		
Stratford-Main Trunk	Toko-Oruru	..	..	4 72	0 36	5 28	..	..	..	1 April, 1908	..	..	..	..	..	..		
	Oruru-Huiroa	..	..	4 50	0 35	5 5	..	..	..	20 June, 1910	..	..	..	..	..	..		
	Huiroa-Te Wera	..	..	6 77	1 16	8 13	..	..	..	1 Aug., 1912	..	..	..	..	..	..		
	Te Wera-Pohokura	..	..	8 55	0 65	9 40	..	..	..	1 July, 1914	..	..	..	..	..	..		
	Pohokura - Whangamomona	..	..	6 13	0 45	6 58	..	..	..	..	..	..	..	..	..	..		
	Whangamomona - Kohurutahi	..	..	4 53	0 29	5 02	..	..	..	7 Jan., 1918	..	..	..	4 53	..	..		
	Kohurutahi-Tahora	..	..	5 14	0 37	5 51	..	0 47	4 47	..	..	..	..	..	..	..		
	Tahora-Heao	..	..	1 40	..	1 40	..	..	..	..	..	..	..	..	..	..		
	Heao-Matiere	..	..	35 57	..	35 57	..	35 57	..	..	..	..	..	..	..	..		
	Okahukura-Matiere	..	..	10 23	0 75	11 18	..	..	..	..	..	..	..	..	..	..		
	Matiere-Ohura	..	..	9 47	..	9 47	..	8 30	..	..	..	..	..	..	..	..		
	Mangaroa-Puketutu	33 40	..	33 40	..	33 40	..	33 40	..	..	..	..	..	..	..	..		
	Deviations	14 0	Aramatai-Hangatiki	14 0	..	14 0	..	14 0	Prelim.	..	..	..	..	..	..	..	..	
Puketutu - Mangaroa Deviation	Opunake-Mountain Rd.	23 10	..	23 10	..	23 10	..	Prelim.	..	..	..	..	..	..	..	..		
	Te Roti-Moturoa	55 65	Opunake-Eitham	23 10	..	23 10	..	..	..	..	..	..	..	..	..	..		
	..	..	Te Roti-Kapuni	7 0	1 19	8 19	..	7 0	..	..	..	..	..	..	..	..		
	..	..	Kapuni-Auroa	5 0	0 33	5 33	..	4 65	..	..	..	..	..	..	..	..		
Manaia Branch	..	..	Auroa-Pihama	4 42	..	4 42	..	..	..	..	..	..	..	..	..	..		
	..	..	Pihama-Opunake	5 68	..	5 68	..	..	..	..	..	..	..	..	..	..		
	..	..	Opunake-Stony River	18 70	..	18 70	..	..	..	..	..	..	..	..	..	..		
	..	5 50	Stony River-Moturoa	14 45	..	14 45	..	..	..	..	..	..	..	..	..	..		
Mount Egmont Branch	..	..	Manaia-Kapuni	5 50	0 78	6 48	..	5 50	..	..	..	..	..	..	..	..		
	..	8 77	Manganui Section	5 74	2 3	7 77	..	..	..	1 April, 1908	..	..	..	..	..	..		
	Quarry Section	..	Quarry Section	3 3	0 60	3 63	..	1 58	1 25	..	..	..	..	..	..	6 0		

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—continued.  
NORTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.										
							Surveyed.	Under Formation.	Under Plate-laying.	Opened.							
										Date.	—	1915-16	1916-17	1917-18	1918-19	Total.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
North Island Main Trunk Railway	Marton-Te Awamutu	M. ch. 209 69	Marton Junction - Mangaweka	M. ch. 31 67	M. ch. 4 61	M. ch. 36 48	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	
			Mangaweka-Taihape	13 1	1 61	14 62	..	..	..	..	10 Sep., 1904	..	..	..	..	..	..
			Taihape-Mataroa	5 70	0 61	6 51	..	..	..	..	1 June, 1907	..	..	..	..	..	..
			Mataroa-Waiouru	18 10	..	..	..	..	..	..	30 June, 1908	..	..	..	..	..	..
			Waiouru-Erua	30 63	12 50	97 28	..	..	..	..	13 Feb., 1909	..	..	..	..	..	..
			Erua-Taumarunui	35 65	..	..	..	..	..	..	9 Nov., 1908	..	..	..	..	..	..
			Taumarunui-Te Awamutu	74 33	6 20	80 53	..	..	..	..	..	..	..	..	..	..	..
			Raetihi Section	8 50	1 7	9 57	..	..	..	..	18 Dec., 1917	..	..	..	..	..	..
			Central Route Deviation Surveys	30 0	Ohakune to Mokau	30 0	..	30 0	30 0	Prelim.	..	..	..	..	..	..	..
				34 0	Retaruke Divide	34 0	..	34 0	34 0	Prelim.	..	..	..	..	..	..	..
				20 0	Maikato Gorge - Marae-Kowhai	20 0	..	20 0	20 0	Explor.	..	..	..	..	..	..	..
				103 58	Valley	38 73	..	38 73	38 73	..	..	..	..	..	..	..	..
			Ngairi-Ongarie	..	Ngairi Section	26 0	..	26 0	26 0	..	..	..	..	..	..	..	..
				..	Tangaraku Section	10 70	..	10 70	10 70	..	..	..	..	..	..	..	..
		..	Heao Section	27 75	..	27 75	27 75	..	..	..	..	..	..	..	..		
	Waitara-Tangaraku	46 75	Ohura 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 ..	..	2708 14	..	2708 14	208 65	2916 79	1187 44	106 77	82 72	..	1248 45	7 20	..	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, 1919.  
SOUTH ISLAND.

NOTE.—Column 11: For detail information as to dates of openings of lines as are not given in this table see tables of lengths of lines in Public Works Statements, 1904-15.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.										Total.	
							Surveyed.	Under Formation.	Under Plate-laying.	Date.	Opened.							
											—	12	13	14	15	16		17
				M. ch.	M. ch.	M. ch.	8	9	10	11	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		
1 Nelson-Midland Railway	2 Nelson-Belgrove... Stillwater - Belgrove (via Tadmor)	3 M. ch. 22 73	4 Nelson-Belgrove ..	5 M. ch. 22 73	6 M. ch. 2 52	7 M. ch. 25 45	8 M. ch. ..	9 M. ch. ..	10 M. ch. ..	11 ..	12 M. ch. ..	13 M. ch. ..	14 M. ch. ..	15 M. ch. ..	16 M. ch. ..	17 M. ch. 22 73		
</																		

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—continued.  
SOUTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.										Total.	
							Sur-veyed.	Under For- mation.	Under Plate- laying.	Date.	Opened.							
											12	13	14	15	16	17		18
		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.	M. ch.	M. ch.	M. ch.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
State Col- liery, or CoalCreek Railway	Greymouth-Point Elizabeth Col- lieries Extension	5 1	Greymouth-Runanga Colliery	5 1	2 10	7 11	..	..	..	1 Dec., 1904	..	..	..	..	..	..	..	..
		3 69	Runanga Colliery-Point Elizabeth Collieries	3 69	2 20	6 9	..	..	..	21 Jan., 1914	..	..	..	..	3 69	3 69	..	..
Greymouth-Hokitika Kumara Branch	Greymouth-Hokitika	24 37	Greymouth-Hokitika	24 37	2 10	26 47	..	..	..	..	..	..	..	..	..	..	..	..
		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	..	..	..	..	..	..	..	..
		..	Ruatapu-Ross	7 21	0 69	8 10	..	..	..	1 April, 1909	..	..	..	..	..	..	..	..
		..	Survey to Ross Town- ship	1 44	..	1 44	1 44	..	..	..	..	..	..	..	..	..	..	..
New survey Picton-Waipara	Ross-Waitaha	10 0	Ross-Waitaha	10 0	..	10 0	2 54	..	..	..	..	..	..	..	..	..	..	..
	Picton - Kalkoura	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	..	..	..	..	..	..	..	..	..	..	..	..
		..	Ward-Mirza	3 38	0 30	3 68	..	..	..	..	..	..	..	..	..	..	..	..
		..	Mirza-Wharanui	4 38	0 34	4 72	..	..	..	..	..	..	..	..	..	..	..	..
		..	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	Hapuka River-Lime- stone Creek	40 50	Hapuka River-Lime- stone Creek	23 0	..	23 0	23 0	Prelim.	..	..	..	..	..	..	..	..	..	..
		..	Limestone Creek-Con- way River	7 0	..	7 0	..	..	..	..	..	..	..	..	..	..	..	..
		..	Conway River - Men- dip Hills	10 50	..	10 50	..	..	..	..	..	..	..	..	..	..	..	..
Mendip Hills-Parnassus	Mendip Hills	5 61	Mendip Hills	5 61	..	5 61	2 0	3 61	..	..	..	..	..	..	..	..	..	..
		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	..	..	..	..	..	..	..	..
		..	Ethelton-Seargill	8 51	0 51	9 22	..	..	..	..	..	..	..	..	..	..	..	..
		..	Seargill-Waipara	14 59	1 2	15 61	..	..	..	3 Nov., 1905	..	..	..	..	..	..	..	..
		..	Culverden-South Wai- taki	206 7	64 68	270 75	..	..	..	..	..	..	..	..	..	..	..	..
Hurunui-Waitaki	Main Line	206 7	Culverden-Achray	5 23	0 10	5 33	..	..	5 23	..	..	..	..	..	..	..	..	..
		13 0	Achray-Rotherham	1 75	0 43	2 38	..	..	1 75	..	..	..	..	..	..	..	..	..
		..	Rotherham-Waiatu	5 62	1 3	6 65	..	..	5 62	..	..	..	..	..	..	..	..	..



SOUTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Sur-veyed.	Under For-mation.	Under Plate-laying.	Date.	Opened.					
											11	12	13	14	15	16
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total.
Hurunui-Waitaki—contd	Branches,—	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.
	Rangiora-Oxford	21 76	Rangiora-Oxford West	21 76	2 36	24 32	..	..	..	..	..	..	..	..	..	21 76
	Eyreton (from Main Line)	20 7	Eyreton-Bennett's	20 7	1 61	21 68	..	..	..	..	..	..	..	..	..	20 7
	Lytelton	6 26	Lytelton - Christ-church	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
	Springfield	30 60	Reconnaissance	19 44	..	19 44	19 44	Prelim.	..	..	..	..	..	..	..	..
	Whitecliffs	11 38	Rolleston-Springfield	29 63	3 7	32 67	..	..	..	..	..	..	..	..	..	30 60
	Rakaia-Ashburton Forks	22 20	Springfield-Coal-mine	0 77	..	..	..	..	..	..	..	..	..	..	..	11 38
	Ashburton	29 46	Darfield-Whitecliffs	11 38	1 53	13 11	..	..	..	..	..	..	..	..	..	22 20
	Opawa and Al-bury to Fairlie Creek and Burke's Pass	55 8	Whitecliffs to Bridge	0 5	2 65	25 5	..	..	..	..	..	..	..	..	..	27 29
	Waimate	17 43	Rakaia-Methven	22 20	1 52	29 1	2 17	..	..	..	..	..	..	..	..	..
	Canterbury Interior Main Line	Branches,—		Extension	2 17	..	2 17	..	..	..	..	..	..	..	..	..
Waimate		17 43	Washdyke-Eversley	36 5	2 45	38 50	..	..	..	..	..	..	..	..	..	36 5
			Preliminary survey	19 3	..	19 3	19 3	Prelim.	..	..	..	..	..	..	..	..
			Studholme-Waimate	4 42	1 3	5 45	..	..	..	..	..	..	..	..	..	12 63
			Waimate-Waihao Downs	8 21	0 54	8 75	..	..	..	..	..	..	..	..	..	..
			Waihao Downs - Ser-pentine	2 65	..	2 65	..	2 65	..	..	..	..	..	..	..	..
			Serpentine-Kelcher's	1 75	..	1 75	..	1 75	..	..	..	..	..	..	..	..
			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.	..	..	..	..	..	..	..	..
			South Waitaki-Bluff	246 69	59 13	306 2	..	..	..	..	..	..	..	..	..	246 69
			Pukeuri-Dunroon	21 75	1 35	23 30	..	..	..	..	..	..	..	..	..	21 75
			Dunroon - Hakatera-mea	15 38	1 5	16 43	..	..	..	..	..	..	..	..	..	15 38
Waitaki-Bluff and Branches			Waiakeke-Ngapara	14 76	1 31	16 27	..	..	..	..	..	..	..	..	..	14 76
			Windsor-Tokorahi	12 0	0 50	12 50	..	0 5	..	..	..	..	..	..	..	11 75
			Survey (trial)	4 40	4 40	4 40	4 40	Prelim.	..	..	..	..	..	..	..	..
			Palmerston-Dunback	8 55	0 54	9 29	..	..	..	..	..	..	..	..	..	8 55
	hemo	0 65	Surveyed	0 65	..	0 65	0 65	..	..	..	..	..	..	..	..	..

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—continued.  
SOUTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sittings.	Total.	State of Line.											Total.
							Sur- veyed.	Under For- mation.	Under Plate- laying.	Date.	Opened.							
											12	13	14	15	16	17	18	
		M. ch.		M. ch.	M. ch.	M. ch.	8	9	10	11	12	13	14	15	16	17		
1 Waitaki- Bluff and Branches — contd.	Branches—contd. Inch Valley Rail- way	2 29	Inch Valley-Lime Kiln	2 29	0 23	2 52	..	..	..	..	..	..	..	..	..	..	17 M. ch.	
	Port Chalmers..	1 9	Glendernid - Port Chalmers	1 9	3 40	4 49	..	..	..	..	..	..	..	..	..	..	2 29	
	Green Island ..	2 44	Burnside-Saddle Hill	2 44	0 52	3 16	..	..	..	..	..	..	..	..	..	..	1 9	
	Green Island to Brighton	4 65	Surveyed ..	4 65	..	4 65	4 65	..	..	..	..	..	..	..	..	..	2 44	
	Fernhill Colliery Line	1 60	Abbotsford to Fern- hill Colliery	1 60	0 24	2 4	..	..	..	..	..	..	..	..	..	..	..	
	Kaikorai Valley Railway	2 60	Surveyed ..	2 60	..	2 60	2 60	..	..	..	..	..	..	..	..	..	1 60	
	Outram ..	8 78	Mosgiel-Outram ..	8 78	0 68	9 66	..	..	..	..	..	..	..	..	..	..	..	
	Lawrence ..	21 76	Clarksville-Lawrence	21 76	2 2	23 78	..	..	..	..	..	..	..	..	..	..	8 78	
	Lawrence-Rox- burgh	37 10	Lawrence-Big Hill ..	7 33	0 44	7 77	..	..	..	1 Aug., 1910 15 Dec., 1914	..	..	..	..	..	..	34 65	
	Lovell's Flat - Tuapeka Mouth	23 20	Big Hill-Beaumont..	5 36	0 45	6 1	24 21	..	..	..	..	..	..	..	..	..	..	
	Balcutha - Tua- peka Mouth	22	Beaumont-Roxburgh	24 21	..	23 20	23 20	..	..	..	..	..	..	..	..	..	..	
	Crichton-Tua- peka Mouth	11 60	Surveyed ..	23 20	7 0	7 0	11 60	..	..	..	..	..	..	..	..	..	..	
	Balcutha-Apple- by Junction, or Catlin's - Sea- ward Bush	105 49	Trial Survey	15 0	15 0	11 60	..	..	..	..	..	..	..	..	..	..	..	
			Surveyed ..	11 60	19 20	1 63	21 3	..	..	..	..	..	..	..	..	..	..	
			Balcutha-Owaka ..	19 20	3 38	0 30	3 68	..	..	..	1 Aug., 1904 17 Dec., 1909	..	..	..	..	..	..	42 67
		Owaka-Catlin's ..	3 38	2 30	0 9	2 39	..	..	..	..	..	..	..	..	..	..	..	
		Catlin's-Houipapa ..	2 30	7 11	0 43	7 54	..	..	..	..	..	..	..	..	..	..	..	
		Houipapa-Puketiro ..	7 11	5 29	0 59	6 8	..	..	..	1 Feb., 1915 1 Feb., 1915	..	..	..	..	..	..	..	
		Puketiro-McLennan ..	5 29	5 19	0 38	5 57	..	..	..	..	..	..	..	..	..	..	..	
		McLennan-Tahakopa ..	5 19	23 63	..	23 63	23 63	Prelim.	..	..	..	..	..	..	..	..	..	
		Tahakopa-Marinui ..	23 63	6 0	..	6 0	6 0	..	..	..	..	..	..	..	..	..	..	
		Marinui-Tokanui ..	6 0	8 27	0 64	9 11	..	..	..	20 Sept. 1911	..	..	..	..	..	..	32 79	
		Tokanui-Waimahaka ..	8 27	24 52	1 50	26 22	..	..	..	..	..	..	..	..	..	..	..	
		Waimahaka-Appleby ..	24 52	20 3	2 3	22 6	..	..	..	..	..	..	..	..	..	..	26 23	
	Waipahi - Heriot Burn	26 23	Waipahi-Heriot ..	20 3	2 3	22 6	..	..	..	..	..	..	..	..	..	..	..	
	Extension to Roxburgh, via Rae's Junction and Ettrick Via Splyaw ..	28 10 25 70	Heriot-Edievale Surveyed	6 20 28 10	0 45 ..	6 65 28 10	.. 28 10	Prelim. ..	.. ..	15 Feb., 1905	..	..	..	..	..	..	..	

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1919—*continued*.  
SOUTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.										Total.	
							Sur-veyed.	Under For-mation.	Under Plate-laying.	Date.	Opened.							
											12	13	14	15	16	17		18
		M. ch.		M. ch.	M. ch.	M. ch.	7	8	9	10	11	12	13	14	15	16	17	
1 Waitaki-Bluff and Branches—contd.	2 Branches—contd. Waimea Plains District Ry.	36 39	Gore-Lumsden	36 39	1 34	37 73	..	..	..	..	..	..	..	..	..	..	..	
	Kelso-Gore	24 0	Surveyed	9 58	..	9 58	9 58	..	..	..	..	..	..	..	..	..	..	
	Gore-Waikaka	12 65	Preliminary survey	14 22	..	14 22	14 22	Prelim.	..	..	..	..	..	..	..	..	..	
	Riversdale-Switzer	13 70	Waikaka Section	12 65	1 51	14 36	..	..	..	..	26 Nov., 1908	..	..	..	..	..	12 65	
	Edendale-Toitois	19 30	Riversdale-Waikaka	13 70	1 40	15 30	..	..	..	..	1 Oct., 1909	..	..	..	..	..	13 70	
Otago Central	Waitaki Bluff Main Line to Lake Hawea	182 51	Edendale-Glenham	9 36	0 72	10 28	..	..	..	..	..	..	..	..	..	..	9 36	
			Surveyed	9 74	..	9 74	9 74	..	..	..	..	..	..	..	..	..	..	
			Wingatui-Ida Valley	98 18	5 62	104 0	..	..	..	..	1 Sept., 1904	..	..	..	..	..	134 78	
			Ida Valley-Omakau	13 20	1 16	14 36	..	..	..	..	14 July, 1906	..	..	..	..	..	..	
			Omakau-Chatto Creek	7 36	0 34	7 70	..	..	..	..	15 Dec., 1906	..	..	..	..	..	..	
Invercargill-Kingston and Branch, Lumsden-Mararoa	Chatto Ok-Alexandra	10 39	Alexandra-Clyde	5 45	1 6	11 45	..	..	..	..	27 Mar., 1907	..	..	..	..	..	..	
			Clyde-Cromwell	5 45	0 77	6 42	..	..	..	12 35	..	..	..	..	..	..	..	
			Surveyed	12 35	0 79	13 34	..	..	..	..	..	..	..	..	..	..	..	
			Invercargill-Kingston Wharf	35 18	..	35 18	..	..	..	..	..	..	..	..	..	..	87 4	
			Lumsden-Mossburn	87 4	5 15	92 19	..	..	..	..	..	..	..	..	..	..	10 40	
Forest Hill Railway Western Railways, Orepuki-Waiau River	Winton - Heddon Bush	11 0	Surveyed	8 20	..	8 20	8 20	..	..	..	..	..	..	..	..	..	..	
	Winton to Hedgehope	12 40	Reconnaissance	11 20	..	11 20	11 20	Prelim.	..	..	..	..	..	..	..	..	..	
	Orepuki-Waiau	60 73	Surveyed	11 0	..	11 0	11 0	..	..	..	..	..	..	..	..	..	..	
			Winton - Hedgehope	12 40	0 65	13 25	..	..	..	..	..	..	..	..	..	..	12 40	
			Makarewa-Orepuki	35 41	6 37	41 78	..	..	..	..	..	..	..	..	..	..	..	
Otautau Branch Orawia Branch	Orepuki-Waiohaka	4 48	Waihaka-Tuatapere	8 7	0 58	5 26	..	..	..	..	1 Oct., 1909	..	..	..	..	..	48 16	
			Waihaka-Tuatapere	8 17	1 10	9 17	..	..	..	..	..	..	..	..	..	..	..	
			Tuatapere-Orawia	4 40	..	8 17	3 40	4 57	..	..	..	..	..	..	..	..	..	
			Orawia-Clifden	4 40	..	4 40	4 40	..	..	..	..	..	..	..	..	..	..	
			Thornbury-Wairio	22 15	..	..	..	..	..	..	..	..	..	..	..	..	..	22 15
Totals		2937 11	..	2937 11	257 66	2594 77	489 28	28 64	29 57	..	1,706 61	7 76	..	..	..	..	1714 57	

## APPENDIX C.

## ANNUAL REPORT ON BUILDINGS BY THE GOVERNMENT ARCHITECT.

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

SIR,—

Public Works Office, Wellington, 1st April, 1919.

I have the honour to submit the following report on the various building operations of the Department for the year ended 31st March, 1919. In this report I have not only included the construction work chargeable against the Public Works Fund, but also that undertaken out of funds provided under the Consolidated Fund, as well as the Public Trust and Government Life Insurance Departments, and under "War Expenses" for the Defence.

## GENERAL.

*New Parliamentary Buildings.*

The work done during the year has been almost entirely confined to the Legislative Council chamber and its surrounding corridor.

That portion of the marble masonry facing Museum Street and in front of the Council chamber has been completed, thus enabling one of the four large electric cranes, the supports of which were an obstruction inside the building, to be removed. The offices in connection with this chamber for the Leader of the Council, the Clerk, the Assistant Clerk, the Chairman of Committees, the members' sitting-room, together with the Whips' rooms, are almost completed.

The Legislative Council chamber, although far from completion, has been sufficiently advanced to permit of the opening of this session of Parliament being held therein. At the main entrance to the building facing Molesworth Street the granite steps have been placed in position and the parapet walls of same partially erected. A large proportion of the stones for this front are worked, and it is hoped that the marble masonry will now be more expeditiously carried on. The contractors for installing the mechanical ventilation of the House of Representatives have practically completed that work, and a trial run of the large air-propulsion fan proved to be capable of accomplishing all and more than was specified, for the rapid changing of the air in the chamber when such is desired during brief recesses. This means of ventilation will not, however, be made use of during the present session, as the dust-laden atmosphere, owing to building operations, renders its use inadvisable.

*Vice-Regal Residences.*

Both residences (Auckland and Wellington) have been efficiently maintained. At the former the hearths on the ground floor have been built up solid and the woodwork cut clear to avoid fire.

*Departmental Buildings.*

*Auckland.*—Alterations have been commenced to provide accommodation for the North Auckland Land Board, and it is proposed to connect this building and Endean's Building by means of a closed passage or tube.

*Wanganui.*—A strong-room was built and lavatory accommodation provided.

*New Plymouth.*—A strong-room was constructed for use of the Public Trust Department.

*Wellington.*—The hot-water heating-system was repaired and additional heating-accommodation provided. General repairs were effected to electric light, bells, and domestic telephones. Numerous offices were renovated, and a commencement made with tea- and luncheon-room accommodation for ladies.

*Nelson.*—General maintenance was effected and a new office erected for the Clerk of the Court.

*Christchurch.*—The roof was again tarred in places and generally repaired. Soakage in the basement has been dealt with by means of a sump in the yard and the installation of a Gould's rotary pump.

*Provincial Buildings.*—Offices, &c., were renovated and furnished as required. An intercommunication system of electric bells was installed in the Lands Offices, and electric light and heating connections were concentrated on one meter-board.

## POST-OFFICES.

*Dargaville.*—Inside of Postmaster's house was papered and painted.

*Hikurangi.*—Drainage scheme completed.

*Kaeo.*—Two additional bedrooms, bathroom, passage, and exchange were erected. New tanks and stand put in, and the living-quarters were papered and painted. New wire and close-boarded fences were also erected.

*Kamo.*—Repairs were carried out to spouting, roof, doors, windows, &c., and three new tanks were erected.

*Russell*.—Painting and repairs were completed.

*Whangarei*.—A new hood was erected over loading-platform, and several small repairs effected.

*Te Kopuru*.—A new bureau was erected.

*Chief Post-office, Auckland*.—Renovations to dead-letter office, Pacific Cable Board's office, and retiring-room on ground floor have been carried out. Additional strong-room accommodation has been provided for the money-order department, and sanitary conveniences have been provided on the roof for wireless operators.

*Wellesley Street Post-office*.—The erection of this building was commenced at the beginning of the year. The superstructure has been built up three stories, and the roof parapets are ready for the reinforced-concrete roof. Considerable difficulty is being experienced by the contractor in procuring steel for the manufacture of the roof trusses. A considerable amount of external and internal plastering has been done. The contract price for this building is £17,772, and up to the end of the year work to the value of £9,446 has been carried out.

*Devonport Post-office*.—A new strong-room was provided, and extensive alterations and renovations were carried out to the office portion of the building.

*Ellerslie Post-office*.—Extensive renovations have been carried out to the whole of the interior of building, and all exterior woodwork has been painted.

*Whitianga Post-office*.—Alterations have been carried out at the Postmaster's old residence, and the building fitted up as a post-office.

*Hamilton Post-office*.—All the plaster walls and ceilings of the telephone exchange and ladies' retiring-room have been repaired and distempered. Electric light and power circuits, also two electric fans, were supplied and installed.

*Matamata Post-office*.—Extensive alterations and additions have been carried out to this building. The whole of the residential portion has been renovated.

*Pirongia Post-office*.—Owing to defective piles and plates which caused this building to sink, it has been necessary to renew the under-timbers.

*Thames Post-office*.—Repairs have been carried out, and the whole of the building has been painted.

*Wharepoa Post-office*.—A new post-office has been erected in wood at a cost of £224.

*Waitomo Caves Post-office*.—This building was completed and handed over to the Postal authorities in May.

*Gisborne*.—New temporary premises have been fitted out for money-order and savings-bank in Peel Street; brick safe built, electric light installed, and various alterations made therein.

*Kahukura Lineman's Cottage*.—A contract has been let, and the erection is in hand.

*Toatoa*.—Materials are being ordered for the erection of a new office.

*Post-office, Napier*.—A retiring-room was provided and the main building repainted. The buildings on site of proposed new post-office were pulled down, and with the material a new parcels-office and a motor-garage built in present post-office block.

*Post and Telegraph Store, Napier*.—A large store was erected at Coote Road.

*Wanganui Automatic Telephone Exchange*.—A new brick building was completed except painting and finishing work and the hot-water heating-system, the material for which is not yet available.

*Ohakune*.—Two bedrooms were added to the Postmaster's residence, and a hot-water service and drainage system were installed.

*Taihape*.—The residence was renovated, improved ventilation provided for office, alterations made to telephone exchange, and general maintenance attended to.

*Waverley*.—Alterations were made in order to improve the office accommodation, and portions of the exterior of the building were painted.

*General Post Office, Wellington*.—Extensive alterations were effected to the interior of the building to meet requirements of the Post and Telegraph Department. On the roof of the old building additional lavatory accommodation was provided for the staff.

*Heretaunga*.—The contract for the erection of this building was completed early in the year.

*Palmerton North*.—Cables were laid under the foundations, and alterations were effected to the new doorway in the mail-room. Seventy-two additional private letter-boxes were supplied, and alterations were effected to the money-order and savings-bank counter.

*Shannon Post-office*.—This office was renovated, painted, and papered, and repairs were effected to the fencing.

*Greytown*.—Drainage system was installed by contract and repairs were effected.

*Masterton Post-office*.—Alterations were effected to the telegraph and telephone bureau rooms, additional private letter-boxes were supplied, and the fencing was repaired.

*Levin*.—Drainage and hot-water service was installed, and additional lavatory accommodation was provided.

*Khandallah Automatic Exchange*.—A contract was let for the erection of a brick building, and a commencement made with the work.

*Cheviot*.—The water-supply was overhauled and a hot-water service installed by contract.

*French Farm*.—A portable post-office was built at the workshops and carted to the site.

*Hanmer*.—Electric lighting was installed and additional sanitary arrangements provided.

*Lyttelton*.—The ceiling was repaired and alterations carried out. A quantity of furniture was made and new fittings supplied.

*Oamaru Post-office*.—A contract for alterations and additions was completed in September.

*Pembroke Post-office*.—Contract for new bathroom, drainage, &c., has been completed.

*Balclutha*.—Renovation to Postmaster's residence completed. A contract for sinking 11 in. pipes in gravel for drainage is in hand.

## COURTHOUSES.

*Russell*.—The whole of this building was painted inside and out. New fences were erected and several repairs effected.

*Whangarei*.—Electric light was installed at this office, and several other small repairs were carried out.

*Supreme Court, Auckland*.—A new fence with concrete posts and wrought-iron railings has been erected on the northern frontage of the Supreme Court Buildings.

*Hamilton Courthouse*.—The whole of the plaster walls and ceilings throughout this building have been repaired and painted.

*Kawhia Courthouse*.—General repairs have been carried out to the interior, and the whole of the exterior, including roof, has been painted.

*Thames*.—Sanitary accommodation has been provided.

*Supreme Court, Wellington*.—Repairs were effected to the roof, downpipes, sanitary fittings, and to the electric bells, lights, and telephones throughout the building. The entrance, passages to the cells, and portions of the custodian's quarters were painted.

*Magistrate's Court, Wellington*.—Extensive alterations were effected to that portion of the building previously occupied by the Police Headquarters to fit it for use by Government Departments.

*Woodville*. The building was painted and repaired, and damage caused by fire was repaired.

*Greytown*.—The drainage system was installed by contract. Repairs were effected to the building and fences.

## GAOLS.

*Waikeria Reformatory Administration Block*.—This building, which is of concrete blocks made by prison labour, is now practically complete.

*No. 1 Camp Building*.—A camp has been established at the north end of the farm, consisting of seven huts to accommodate twenty men and two officers. A temporary kitchen and bathroom has also been provided. A water-supply has been obtained for this camp by sinking a well 56 ft. deep and lining it with 3 ft. concrete pipes.

*Gisborne Gaol*.—Concrete wall practically completed. Warder's cottage renovated, repainted, and additions added. Electric light installed. Various maintenance-works carried out.

*Terrace Gaol*.—A new 1 in. gas-supply was installed in Gaoler's house and matron's quarters. A renewal of the sanitary fittings was effected in the male and female quarters. Repairs were effected to the "Ideal" hot-water boilers.

*Addington*.—Fire-extinguishers were installed, and general repairs to the electric-light system were carried out.

*Templeton*.—The erection of the west cell-range was completed, and the plastering of the interior is proceeding. The excavations for the east cell-range and kitchen block were completed, and both buildings are now in course of erection. The plastering of the cottage is proceeding. A septic tank was constructed. The temporary buildings were wired for lighting.

## POLICE-STATIONS.

*Aralapu*.—Painting, papering, and renovations were effected.

*Dargaville*.—A new water service and new bath were installed.

*Hohoua*.—A new police-station and outbuildings were completed.

*Kaitia*.—Wire entanglements were erected at this office, and repairs were effected to fence.

*Whangarei*.—The sergeant's residence, constable's residence, and the lock-up, together with all outbuildings, were painted. Electric light was installed, new range put in constable's quarters, and fire appliances were installed.

*Newmarket*.—The interior of residence and office have been renovated, and all exterior woodwork painted.

*Pukekohe Police-station*.—The whole of the interior of the sergeant's residence has been papered and painted and generally renovated. Electric lighting has been installed throughout the building.

*Hamilton*.—Owing to evidence of the borer it was found necessary to renew the under-timbers throughout the building and veranda, and new flooring and weather-boards were put in where affected.

*Thames*.—Extensive alterations and additions to building have been carried out, comprising the erection of a new bathroom and complete hot-water service, fire-escapes, new porch and partition, repairs to roof-spouting, scrimming and papering new partitions, and painting of roof, and all external and internal new woodwork.

*Wairoa*.—New residence erected and completed. Three additional tanks erected.

*Gisborne*.—Padded cell fitted up, and various maintenance-works carried out.

*Johnsonville*.—Drainage system and gas service were installed.

*Wellington South*.—Cast-iron enamel bath was fixed, two rooms were papered, and repairs were effected to the guttering and sanitary fittings.

*Lincoln*.—A contract was let and completed for repairs and renovations to this building.

*Rangiora*.—General repairs and drainage-work were done by contract.

*Southbridge*.—Extensive repairs and renovations were carried out at this building under contract.

*Oamaru*.—The contract let in October, 1917, for a new police-station is still in hand.

*Invercargill*.—Contract let for installing electric light is in hand.

## MENTAL HOSPITALS.

*Tokanui Mental Hospital: Unit No. 5*.—The construction of this unit was started at the beginning of the year and is now practically completed. The building, which is of wood, comprises two large dormitories and one small one, also large day-room with double fireplace in the centre. Adjacent to

the day-room on the eastern side are twelve single rooms for patients; on the western side are the nurses' quarters, consisting of six single-bed rooms, also storeroom, scullery, and all kitchen conveniences. Leading off the day-room, patients are provided with extensive lavatory and bathroom accommodation.

*Porirua*.—Repairs were effected to the malthoid roofs. Electric light was installed in the doctor's cottage. The installation of the new drainage system was commenced early in the year and is still proceeding.

*Sunnyside*.—The Vigilant automatic fire-alarm system has been installed.

#### NATIVE SCHOOLS.

Plans and specifications were prepared for additions and renovations to the Te Araroa, Tikitiki, Waiorongomai, Reporua, and Tuparoa Native Schools, and work in each case has been completed.

#### EDUCATION.

*Boys' Training-farm, Stoke*.—The whole of the buildings, outbuildings, shops, stables, &c., have been fitted with electric light, the current being supplied by the Waimea Electric Supply Company.

*Special School for Girls, Richmond*.—The ground round the front and side of two Cottage Homes has been regraded and drained. Drainage for a length of 12 chains was laid down from the end of the existing drainage to carry the water to the foreshore.

*Summer School for the Deaf*.—General repairs were carried out. A new dormitory was built by contract.

#### DEFENCE DEPARTMENT.

At the Ruakura Experimental Farm two buildings are in course of erection, both of wood, for the use of returned soldiers requiring instruction in agriculture. One of these comprises thirty-two cubicles, thirty of which are sleeping-quarters for men, and one for a cloak-room, and one contains the boiler which provides hot water for baths, &c. The second building comprises a kitchen complete with pantry, servery, scullery, meat and vegetables store, and coal-bunker. Attached to this kitchen is a dining-room, also a recreation-room, and a laundry for the use of the soldiers is being erected.

In Wellington extensive office accommodation is under construction for the War Expenses and Pay Branch of the Department. The building is a two-storied temporary structure, but the internal accommodation and furnishings are of a very convenient type, and are really the best Government offices so far as light and conveniences are concerned in Wellington. The building is heated with an "Ideal" hot-water service.

At Hanmer Military Hospital the following buildings were erected:—Staff quarters—a building 104 ft. by 20 ft., with all sanitary conveniences; a massage-room, 50 ft. by 20 ft., with baths and conveniences; library and pack-store fitted with all necessary lockers and shelving, for use as a library and store. Extensive repairs were carried out at the Hospital owing to the damage done by heavy snow and frost, which caused the water-mains to burst and guttering to break down. Electric lighting was installed at the Hospital staff quarters, massage-room, Red Cross workshops, electrician's cottage, and pack-store. A Red Cross workshop for basketmaking and carpentry was erected, and the necessary benches and fittings constructed. A five-roomed cottage with all conveniences has been erected under contract for the use of the electrician in charge of lighting at the Hospital. Contracts have been let for the following additional works: Medical inspection and ordnance store, soiled-linen room, operating-theatre, Red Cross workshop, and a Y.M.C.A. building. A building was removed from Featherston to Hanmer and re-erected to serve as a cinema-hall, and accommodation provided for vocational training. In addition to these works drill-halls throughout the Dominion have been efficiently maintained on behalf of the Department concerned.

Many other works of a minor nature, too numerous to mention, and which included renovations, installations of lighting, water-supply, drainage, &c., have been carried out on behalf of various Departments, in addition to which furniture has been supplied to all Government offices throughout the Dominion.

JOHN CAMPBELL,  
Government Architect.

## APPENDIX D.

## ANNUAL REPORT ON ELECTRICAL WORK AND POWER-SUPPLY UNDERTAKINGS, BY THE ACTING CHIEF ELECTRICAL ENGINEER.

The ACTING CHIEF ELECTRICAL ENGINEER to the Hon. the MINISTER OF PUBLIC WORKS.  
SIR,—

I have the honour to submit the following report on the existing electric-power installations of the Dominion in service on 31st March, 1919, for public electric supply and controlled by the Department under the regulations issued under section 2 of the Public Works Amendment Act, 1911. The table herewith is a complete list of such installations. Of the total of sixty-six distributing authorities taking energy from fifty-four plants the sources of energy are as follows :—

	Number.	Capacity. Kilowatts.	Proportion per Cent.
Water-power .. .. .	26	24,307	55.4
Steam-power .. .. .	8	15,022	34.2
Gas-engines .. .. .	17	2,280	5.2
Oil-engines .. .. .	3	2,290	5.2
Bulk supply .. .. .	12	(No generating plant.)	
Totals .. .. .	66	43,899	100.0

Out of the total installed capacity thus more than one-half already consists of water-power, about one-third of steam-power, and only 5 per cent. each of gas- and oil-engine power.

Owing to the large number of isolated power-stations the total capacity was not efficiently used, as each station has had to maintain its own standby provision. The sum of maxima outputs from the whole of the stations was only 27,996 kilowatts, thus leaving a margin of 15,933 kilowatts, or 36.4 per cent., as standby provision. With a completely interconnected system 10 to 20 per cent. would be ample provision for this purpose, thus indicating the large economy of plant which will be possible as the general interconnected system of the Dominion is built up.

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

	Number.	Capacity. Kilowatts.	Proportion per Cent.
Government Departments .. .. .	2	8,700	19.8
City Councils .. .. .	4	17,250	39.3
Borough Councils .. .. .	39	6,628	15.1
Town Boards .. .. .	8	442	1.0
County Councils .. .. .	2	(Bulk)	..
Electric-supply companies .. .. .	9	2,079	4.8
Industrial companies (Wairua Falls power-house)	1	2,500	5.7
Mining companies (Horahora Rapids power-house) .. .. .	1	6,300	14.3
Totals .. .. .	66	43,899	100.0

Thus, apart from the Waihi Gold-mining Company's plant at Horahora Rapids (6,300 kilowatts), which has since been purchased by the Government, there is only 10.5 per cent. of the installed electric-power capacity in the hands of private companies, and 55.4 per cent. in the hands of the local authorities.

The 54,926 consumers of electricity are distributed as follows :—

	Number of Consumers.	Proportion per Cent.
4 cities .. .. .	32,665	59.5
39 boroughs .. .. .	16,812	30.6
2 Government Departments .. .. .	1,047	1.9
11 electric-supply companies .. .. .	2,304	4.2
8 Town Boards .. .. .	848	1.5
2 County Councils .. .. .	1,250	2.3
Totals .. .. .	54,926	100.0

From this it is obvious that the benefits of electric supply are so far confined almost entirely to the cities and larger borough centres. In addition to those classed under cities and boroughs, one of the Government Departments (Tourist Department, Rotorua), seven of the electric-supply companies, and the greater portion of the two counties Waimairi and Heathcote, supply what are practically suburban areas, and there are thus probably less than 1 per cent. of the total number of consumers located in farming or country districts. Farm supply is the sphere in which the greatest advantages will ultimately be obtained from electric power, and the future installations should be developed generally along such lines as will meet this special demand.

Owing to war conditions the capacity of the power plants has not increased during the past three years in proportion to the demand, which, owing to the steadily rising prices of fuel has been very insistent. But since the Armistice practically all the supply authorities are providing for extensive increases in their installed capacity, and the demand for the development of the water-power is especially urgent.



## REGULATIONS FOR ELECTRIC LINES.

Revised regulations for the control of electric lines have been drawn up after very exhaustive investigation which has extended over the whole year. Owing to the rapid evolution which is taking place in the development of electric supply this matter has been given very careful attention. The British precedents are not as useful as would otherwise be the case owing to the fact that in Great Britain electric supply is practically limited to the cities and industrial areas, whereas in New Zealand it is found that most profitable use of electrical energy can be made on the farm and in the country districts. The regulations have been amended especially to meet these circumstances, and it is expected that extensive use will be made of light overhead country lines for supplying the farms and dairies throughout the districts in which electric supply is available.

## LICENSES FOR ELECTRIC LINES.

Licenses were issued during the year for the following electrical-supply installations: Eyre County; Kaiapoi Borough; Rangiora Borough; Dunedin City Council (amending); New Plymouth Borough (amending); Opotiki County (portion); and for seven private installations.

## INSPECTION OF ELECTRIC LINES.

Owing to shortage of staff due to the war only one officer has been available during the year for routine inspection work, but this has been carried on as fully as was possible under the circumstances.

LAWRENCE BIRKS, B.Sc. M.Inst.C.E.,

Acting Chief Electrical Engineer.

## ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND.

Place.	Authority.	Population.	Consumers.	Power.	Capacity in Kilowatts.		
					Installed.	Maximum Load.	
North Island.							
Auckland .. ..	City .. ..	64,951	2,696	Steam ..	5,650	3,750	
Bull's .. ..	Private .. ..	483	118	Gas ..	26	18	
Devonport .. ..	Company .. ..	7,613	400	Gas ..	240	130	
Eketahuna .. ..	Borough .. ..	754	194	Gas ..	65	29	
Feilding .. ..	Borough .. ..	3,438	611	Oil ..	150	120	
Gisborne .. ..	Borough .. ..	9,174	1,364	Oil ..	300	..	
				Steam ..	350	335	
Hamilton .. ..	Borough .. ..	7,538	374	Steam ..	180	150	
Hastings .. ..	Borough .. ..	7,918	1,550	Oil ..	360	340	
Havelock North ..	Town Board ..	870	50*	Bulk ..	..	..	
Hawera .. ..	Company .. ..	3,375	400*	Water ..	405	242	
Huntly .. ..	Town Board ..	1,535	220	Steam ..	225	40	
Inglewood .. ..	Borough .. ..	1,199	380	Water ..	120	149	
Kaponga .. ..	Town Board ..	397	73	Water ..	45	38	
Mangaweka .. ..	Town Board ..	390	90	Water ..	35	24	
Martinborough ..	Town Board ..	725	170	Gas ..	27	30	
Napier .. ..	Borough .. ..	12,704	926	Gas ..	490	503	
Ngaruawahia .. ..	Borough .. ..	950	184	Gas ..	70	30	
New Plymouth ..	Borough .. ..	8,704	2,107	Water ..	740	542	
Ohakune .. ..	Borough .. ..	1,371	140	Water ..	120	43	
Opotiki .. ..	Private .. ..	1,073	210	Gas ..	36	40	
Pahiatua .. ..	Borough .. ..	1,300	38	Gas ..	35	14	
Patea .. ..	Borough .. ..	1,010	120	Water ..	90*	75*	
Pukekohe .. ..	Borough .. ..	1,533	120	Gas ..	75	84	
Raetihi .. ..	Town Board ..	508	135	Water ..	60	40	
Rotorua .. ..	Government ..	2,845	714	Water ..	200	200	
Stratford .. ..	Borough .. ..	2,713	860	Water ..	90	..	
				Oil ..	145	160	
Taihape .. ..	Borough .. ..	1,927	412*	Water ..	100	103	
Tauranga .. ..	Borough .. ..	1,685	420*	Water ..	160	150	
Te Aroha .. ..	Borough .. ..	1,452	402	Water ..	90	..	
				Gas ..	60	..	
				Oil ..	180	65	
Te Kuiti .. ..	Borough .. ..	1,982	117	Gas ..	185	85	
Thames .. ..	Borough .. ..	3,273	830	Water ..	100	..	
				Oil ..	105	214	
Waihi (Horahora) ..	Company .. ..	..	..	Water ..	6,300	3,000	
Wairoa .. ..	Borough .. ..	1,530	250	Gas ..	56	56	
Wairua Falls .. ..	Company .. ..	..	..	Water ..	2,500	1,375	
Waitara .. ..	Borough .. ..	1,422	267	Gas ..	82	56	
Wanganui .. ..	Borough .. ..	14,380	12	Gas ..	375	227	
Waverley .. ..	Town Board ..	625	70	Water ..	30	8	
Wellington .. ..	City .. ..	73,305	16,520	Steam ..	4,800	3,399	
Whangarei .. ..	Borough .. ..	3,294	500*	Bulk ..	..	..	
Totals .. ..	.. ..	249,946	34,044	..	25,452	15,864	

\* Figure assessed, returns not to hand.

## ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND—continued.

Place.	Authority.	Population.	Consumers.	Power.	Capacity in Kilowatts.	
					Installed.	Maximum Load.
South Island.						
Akaroa .. ..	Borough .. ..	540	77	Water ..	30	30
Ashburton .. ..	Company .. ..	2,808	523	Gas ..	240*	..
				Oil ..	240*	182
Bluff .. ..	Borough .. ..	1,823	241	Steam ..	50*	50*
Brightwater .. ..	Company .. ..	872	350	Water ..	45	..
				Gas ..	35	45
Lake Coleridge .. ..	Public Works De- partment	..	333	Water ..	6,000	..
				Steam ..	2,500	5,900
Christchurch .. ..	City .. ..	55,860	6,124	Bulk ..	..	..
Waimairi .. ..	County .. ..	11,914	873	Bulk ..	..	..
Heathcote .. ..	County .. ..	3,277	377	Bulk ..	..	..
Lyttelton .. ..	Borough .. ..	3,766	74	Bulk ..	..	..
Sumner .. ..	Borough .. ..	2,287	225	Bulk ..	..	..
Woolston .. ..	Borough .. ..	3,990	200	Bulk ..	..	..
Riccarton .. ..	Borough .. ..	2,890	200	Bulk ..	..	..
Spreydon .. ..	Borough .. ..	4,289	220	Bulk ..	..	..
Kaiapoi .. ..	Borough .. ..	1,560	291	Bulk ..	..	..
Tai Tapu .. ..	Company .. ..	814	103	Bulk ..	..	..
Dunedin .. ..	City .. ..	68,716	7,325	Water ..	6,000	..
				Oil ..	800	4,860
Gore .. ..	Borough .. ..	3,551	350*	Water ..	150	120
Havelock .. ..	Town Board .. ..	290	40	Water ..	10	..
				Oil ..	10	10
Invercargill .. ..	Borough .. ..	22,000	1,103	Steam ..	930	460
Kaitangata .. ..	Borough .. ..	1,681	2	Steam ..	50	40
Hokitika .. ..	Company .. ..	2,238	Nil	Water ..	700	Nil.
Mataura .. ..	Borough .. ..	950	140	Water ..	75	20
Oamaru .. ..	Borough .. ..	5,140	215	Water ..	100	74
Picton .. ..	Borough .. ..	1,121	226	Gas ..	40	..
				Water ..	12	49
Reefton .. ..	Company .. ..	1,900	200	Steam ..	112	88
Timaru .. ..	Borough .. ..	12,238	948	Gas ..	100	..
				Steam ..	175	184
Winton .. ..	Borough .. ..	586	122	Gas ..	43	20
Totals .. ..	.. ..	217,101	20,882	..	18,447	12,132
Totals for New Zealand	.. ..	467,047	54,926	..	43,899	27,996

\* Figure assessed, returns not to hand.

## LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY.

1. The year under review is the fourth year of operation. From its commencement the plant has operated under war conditions, and the outstanding event of the year has been the cessation of the war in November last. This was immediately followed by the influenza epidemic, which seriously threatened the continuity of service. Earlier in the year the worst snowstorm recorded in Canterbury was experienced, resulting in a serious interruption of service and a temporary isolation of the power-house. In spite of these unprecedented experiences and the abnormal war conditions, the financial results of operation have shown satisfactory progress, the revenue of £37,324 exceeding interest and operating charges by £4,494. Depreciation reserve at the rate of 2 per cent. on the capital outlay is provided for by statute, amounting to £7,329. The revenue, therefore, does not yet provide for the whole of the charges, but normal development has not been possible under existing conditions. The non-arrival of new plant ordered two years ago has indefinitely extended the period during which heavy capital charges are being paid on portions of installed plant which cannot yet earn their share of revenue. Under the circumstances, therefore, the financial position may be considered satisfactory.

2. *Capital Outlay.*—The capital outlay at the end of the year was £403,156, as compared with £389,754 at the end of the previous year. Details of capital expenditure are shown under various heads in Table A.

3. *Financial Results of Operation.*—Detailed results of financial operation and load output are given in Table B, which shows an increase of  $8\frac{1}{2}$  per cent. in the power-house maximum load during the year, and a 22-per-cent. increase in the units output; while the total cost per kilowatt sold and per unit sold continue to show a satisfactory decrease.

The working-costs for the year are compared in detail with those of the previous year in Table C. These tables give only the expenditure and revenue to the Department, but the full statement of the Lake Coleridge undertaking should include the activities of the local bodies who purchase from the Department and administer their own supply systems. An examination of the statements of all the distributing bodies connected with Lake Coleridge produces the gross financial results given in Table D, the figures being correct to within a very close limit. From the table it will be seen that the 23,387,546 units sold last year to wholesale consumers (subject, of course, to ordinary distribution losses) cost them £87,787, or an average of 0.9d. per unit; or, allowing a loss of 20 per cent. in retailing, 1.125d.; as against 1,260,725 units sold at an average price of 3.74d. per unit in 1914—the last complete year of operation of the City Council steam generating plant now superseded by the Lake Coleridge scheme.

4. *Extensions.*—The additions to the plant at the power-house are still delayed as a result of war conditions. Preparations for the installation of the fifth unit have progressed to the extent of providing the necessary foundations, draught-tube, and tail-race, but war conditions in England continue to delay the completion of the generator and pipe-line.

The 11,000-volt distribution system has been increased during the year from  $60\frac{1}{4}$  miles to  $65\frac{1}{4}$  miles, all main feeders being in duplicate. The Department's 3,000-volt reticulation has been increased by half a mile during the year, making a total of  $10\frac{1}{2}$  miles. Six additional transformer-stations have been erected by the Department during the year, representing a further installed transformer capacity of 200 kw. Five additional wholesale consumers were also connected up during the year, making a total of thirty-seven wholesale consumers, exclusive of local bodies.

In connection with local-body reticulation, an outstanding feature is the extent of street-lighting now installed, more particularly in country districts previously considered outside the range of such advantages. The total number of street-lamps now installed is 3,168.

5. *Connected Load.*—The total connected load (Table F) shows an increase for the year of 3,202 kw., making the present total connected load 23,189 kw., an increase of 16 per cent. This was supplied without exceeding a maximum load on the Addington substation of 5,340 kw. The relation between the connected load and the maximum load necessary to supply it was therefore 4.34. This diversity factor indicates that with the nature of load met with in Christchurch district the use of energy by consumers at different periods during the twenty-four hours makes it possible to supply a given amount of electrical equipment with a plant capacity of less than one-quarter the aggregate of the load connected. This diversity factor of over 4 compares very favourably with that on similar plants elsewhere.

6. *Plant-operation.*—The general operation of the plant during the past year, apart from the snow and epidemic, which are referred to separately, has been characterized by the need of continued restriction of load, and the running of the whole plant during day hours without having available a spare generator—any attention required to operating equipment being done at night or on Sundays. In spite of this inability to lay off a machine for repairs or overhaul, the whole plant has operated satisfactorily, and no troubles arising from this circumstance have been experienced.

The transmission-line insulators continue to give a considerable amount of trouble, but it is satisfactory to note that up to the present no insulator which has been put up as a replacement has failed, indicating that the method now adopted of drying out and varnishing the joints, and carefully testing, has made it possible to eliminate faulty insulators before they are put into service.

Apart from that due to the snow, no interruption of service of more than a few seconds has occurred during the year. The total insulator replacements during the year were eighty-four, or  $1\frac{1}{2}$  per cent. on the number of insulators in service. Trial lots of new insulators purchased during the year showed a marked improvement in the design and manufacture since the original purchase for the Lake Coleridge line was made. A considerable number of insulator troubles have been traced to the effects of bark from gum-trees. An endeavour to deal with this trouble by the removal of trees has resulted in a certain amount of opposition. The matter is, however, a vital one, directly affecting continuity of service.

7. *Water-storage*.—The rainfall records taken at the power-house show the fall has been well maintained. It is, however, upon the snowfall on the hills rather than the rain that the lake-supply depends. The lake-level during the year under review fell lower (2 ft. 9 in. below normal) and rose less rapidly than during the previous year, but in December reached a height of 1,668.6 ft., or 1 ft. above normal. The lake-levels since commencement of operations are shown in the curves attached.

The average consumption of water during the year ended 31st March, 1917, was about 80 cusecs; during the year ended 31st March, 1918, 90 cusecs; and during that ended 31st March, 1919, 100 cusecs.

8. *Snowstorms*.—On Sunday, 30th June, a heavy fall of snow occurred throughout Canterbury. At the power-house a depth of 2 ft. was recorded, and the district from Coalgate and Hororata to the power-house was for several days impassable.

At 2.50 a.m. on Monday, 1st July, the south transmission-line failed, and at 7 a.m. on the same day the north line failed, services being completely interrupted till 4.27 p.m. that day, when the south line was again put into service. Supply from the tramway plant was available during this interruption. At 7.18 on the Monday evening, the north telephone-line being already out of service, the south telephone-line and the public telephone-line both failed, completely cutting off communication with the power-house.

At 10.40 a.m. on Tuesday morning, 2nd July, the south power-line failed, the north power-line being still out of service. All power and all communication with the power-house was thus cut off. No material damage was done to the power-lines, but both of the transmission-line telephones as well as the public line were extensively damaged. Without communication with the power-house it was impossible to put power on the lines. Strenuous endeavours were made to reach the power-house, but for three days without success. Finally, Boris Daniel, a youth employed at the substation, reached the point on skis, and there met a party from the power-house consisting of Messrs. Blackwood, Swaney, and Peach, who had with great difficulty made their way through on horseback. Communication was then established by using one of the power circuits as a telephone-line. Several insulators were replaced, and service on the south line restored at 10 p.m. on Thursday, 4th July, after a complete interruption of service of fifty-nine hours. During this period a partial service was maintained by the Tramway Board's steam plant, and all essential industries kept going.

Three weeks later, on Sunday, 21st July, a second severe snowfall was experienced, on this occasion chiefly in the city and suburbs. No total interruption to supply took place, but very considerable trouble was experienced with all the local 11,000-volt feeders.

These two experiences gave rise to many suggestions, but the circumstances were altogether unprecedented and unlikely to recur. No serious omissions or inherent weaknesses were disclosed, and in spite of the very serious nature and extent of the "shutdown," public confidence in the reliability of the supply has not apparently suffered. The main difficulties were those of communication and transport over deep snow too soft to bear. Both of these difficulties have been provided for in case of a recurrence.

9. *The Epidemic*.—In November, 1918, the settlement at the power-house, in common with the whole Dominion, suffered severely from the influenza epidemic. Situated within easy reach of the city by car in the case of sickness or emergency, no special provision for dealing with sickness had been previously required. The disease in its worst form appeared in the village at a time when the city epidemic was at its height and medical or nursing aid was almost unobtainable. The settlement suffered with exceptional severity. Among fifty adults and thirty children there were forty cases of influenza, seven being of the pneumonic type. On the 22nd November, during the first days of the epidemic, when the trouble was spreading rapidly, Mr. McKeown, the Department's car-driver, succumbed to double pneumonia and was buried near the village, the plot having since been set apart and suitably railed off. The epidemic also seriously affected the staff in Christchurch, involving the loss of a valuable officer in Mr. W. H. Brook, who since the commencement of the works had carried out the duties of distribution foreman. The plant was kept running with a minimum of staff and a fortunate freedom from operating trouble.

10. *Electric-storage-battery Vehicles*.—The combined circumstances of cheap hydro-electric power and level country ensured the development of this use of electrical energy in the Christchurch district. The number of vehicles continues to increase, the total now being thirty-three. Several private charging-stations have been installed, and the City Council has completed the erection and equipment of a charging-garage capable of accommodating fifty vehicles. In addition to the usual commercial vehicle, there are now several private cars of this type in the city. This class of business, taking power only at night, is not affected by shortage of power, and is capable of very much further expansion.

11. *Special Industrial Developments*.—Of the special industrial developments associated with a supply of cheap hydro-electric power which have taken place during the year, the position is as follows:—

- (a.) Iron oxide for paint, prepared electro-chemically from waste sheet iron such as empty tins, &c.: This industry has now been established on a commercial basis, and the paint is being successfully marketed.
- (b.) The electrolytic manufacture of oxygen gas has proved a definite commercial success. The oxygen is produced by direct electrolysis from water, the hydrogen so far not being utilized, but processes are under contemplation for using this gas in connection with the recovery of lower-grade oils and in soap-manufacture.
- (c.) Steel-smelting: The ferro-concrete building for the works is nearing completion, and the bulk of the electrical equipment has been delivered. The installation of this 6-ton 1,200 kw. Heroult steel furnace by a New Zealand company is an enterprise of considerable magnitude and interest, and marks an important step in the country's industrial and electrical development.

- (d.) Freezing for the Canterbury Frozen Meat Company (night power only): The substation at the works is completed and ready for service, but the company have not yet obtained their plant.
- (e.) Lyttelton Borough water-supply pumping: Two 80 h.p. motors, superseding suction-gas engines, have now been installed, and are regularly driving the pumps for night load only.

The two electro-chemical industries—carbide and caustic-soda manufacture—more directly resulting from war conditions have not survived competition with the imported article, which has again become available since the cessation of the war. Both enterprises experienced many initial difficulties, but both succeeded in turning out a sample product of satisfactory quality. In each case the plant had all the inherent disabilities of small experimental equipments. Therefore, though it is still a question whether such industries can be successfully established in this country, the failure of these particular attempts is by no means a conclusive indication that their local development is impracticable.

12. *General.*—As a result of the rapidly extending appreciation of the value of hydro-electric supply, and more particularly as a result of the present acute coal-shortage, the demand for supply from the Lake Coleridge system has been continually increasing during the year. Unfortunately, this increased demand has occurred simultaneously with the enforced restrictions of output due to non-arrival of plant ordered over two years ago for extensions. This has embarrassed the Department and caused disappointment to prospective power-users, and in many ways has resulted in a substantial delay in the development of the scheme. In spite of these unfortunate circumstances, however, the present limited development of the Lake Coleridge scheme has proved an economic asset of national as well as local importance, the power-output for the year from Addington substation representing at a moderate estimate the equivalent of 100,000 tons of coal.

A number of local bodies have taken action under the Electric Power Boards Act providing for the formation of special Boards to take supply in bulk from the Department and administer the local reticulations. Stimulated by the activity of the Canterbury Progress League, local bodies in all parts of Canterbury are carrying out preliminary investigation into the possibilities of their districts.

The route of the 66,000-volt transmission-line to Timaru has been surveyed in detail, and routes selected for extensions to the 11,000-volt feeders.

During the year under review nine employees have returned from active service and have resumed their duties with the Department, leaving about thirteen yet to come back. Two other returned soldiers are now in training, and every effort is being made to give such training where possible. In general, the past year has been one of exceptional circumstances—in each case with a tendency to affect adversely the development of the scheme. But the year closed with satisfactory indications that these disabilities are passing, and a period of vigorous development may be expected.

LAWRENCE BIRKS, B.Sc., M.Inst.C.E., M.I.E.E.,  
Acting Chief Electrical Engineer.

## TABLES.

TABLE A.—DETAILS OF CAPITAL OUTLAY.

Item.	Capital Outlay.		Increase.
	31st March, 1918.	31st March, 1919.	
	£	£	£
Land, roading, and fencing .. .. .	17,250	17,386	136
Tunnel and headworks .. .. .	94,390	98,421	4,031
Power-house and machinery .. .. .	70,976	72,860	1,884
Staff village .. .. .	11,333	12,215	882
Transmission-lines .. .. .	52,884	52,882	Decrease 2
Addington distributing-station .. .. .	22,510	22,502	Decrease 8
Primary distribution .. .. .	38,451	41,813	3,362
Secondary distribution .. .. .	24,371	23,734	Decrease 637
Service transformers and meters .. .. .	11,627	11,848	221
Motor vehicles and loose equipment .. .. .	3,988	4,466	478
Telephone-lines .. .. .	1,815	1,828	13
Office furniture .. .. .	93	105	12
Survey, engineering, and general expenses .. .. .	25,746	28,532	2,786
Interest during construction .. .. .	14,320	14,564	244
Totals .. .. .	389,754	403,156	13,402

TABLE B.—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.
Capital outlay .. .. .	£320,330	£366,984	£389,754	£403,157
Costs—				
Working-costs .. .. .	£9,383	£12,889	£14,449	£17,138
Interest, 4 per cent. .. .. .	£11,398	£13,743	£14,871	£15,692
Depreciation, 2 per cent. .. .. .	£5,386	£6,078	£7,013	£7,329
Total costs .. .. .	£26,167	£32,710	£36,333	£40,159
Revenue—				
City Council .. .. .	£6,200	£8,500	£11,338	£13,556
Tramways .. .. .	..	£3,962	£7,024	£6,885
Wholesale consumers .. .. .	£1,523	£6,559	£10,804	£14,090
Retail consumers .. .. .	£537	£983	£1,912	£1,529
Miscellaneous .. .. .	£258	£750	£1,014	£1,264
Total revenue .. .. .	£8,518	£20,754	£32,092	£37,324
Maximum load (kilowatts)—				
Power-house .. .. .	1,372	4,366	5,438	5,900
Substation .. .. .	1,220	3,900	4,800	5,340
City Council .. .. .	1,020	1,600	2,260	2,625
Tramways .. .. .	..	1,700	1,660	1,580
Output (units)—				
Power-house .. .. .	4,860,260	14,774,960	22,403,660	27,495,720
Substation .. .. .	4,128,232	12,934,230	20,539,430	24,548,554
Sold (units)—				
City Council .. .. .	3,417,040	6,137,110	9,183,700	10,886,290
Tramways .. .. .	..	3,162,583	5,634,403	5,485,370
Wholesale consumers .. .. .	500,801	2,175,268	4,719,283	6,770,488
Retail consumers .. .. .	76,926	190,000	307,290	245,398
Total units sold .. .. .	3,994,767	11,664,961	19,844,676	23,387,546
Losses—				
Transmission losses .. .. .	752,028	1,840,730	1,864,230	2,947,166
Percentage .. .. .	15.0	12.5	8.3	10.7
Distribution losses .. .. .	133,465	1,269,269	694,754	1,161,008
Percentage .. .. .	3.2	9.8	3.4	4.7
Average weekly load factor (percentage)—				
Power-house .. .. .	44.3	52.9	58.0	59.1
Substation .. .. .	43.3	53.1	58.4	58.4
City .. .. .	39.0	49.2	54.8	52.6
Working-costs—				
Per kilowatt (power-house maximum) .. .. .	£6.80	£2.95	£2.66	£2.90
Per kilowatt (substation maximum) .. .. .	£7.70	£3.32	£3.01	£3.21
Per unit generated .. .. .	0.46d.	0.208d.	0.155d.	0.149d.
Per unit sold .. .. .	0.56d.	0.265d.	0.175d.	0.176d.
Capital charges—				
Per kilowatt (power-house maximum) .. .. .	£12.20	£4.55	£4.04	£3.90
Per kilowatt (substation maximum) .. .. .	£13.70	£5.08	£4.56	£4.31
Per unit generated .. .. .	0.83d.	0.322d.	0.234d.	0.201d.
Per unit sold .. .. .	1.01d.	0.410d.	0.265d.	0.236d.
Total cost—				
Per kilowatt (power-house maximum) .. .. .	£19.00	£7.50	£6.70	£6.80
Per kilowatt (substation maximum) .. .. .	£21.40	£8.40	£7.57	£7.52
Per unit generated .. .. .	1.29d.	0.530d.	0.389d.	0.350d.
Per unit sold .. .. .	1.57d.	0.675d.	0.440d.	0.412d.
Revenue—				
Per kilowatt (power-house maximum) .. .. .	£6.20	£4.75	£5.90	£6.32
Per kilowatt (substation maximum) .. .. .	£7.00	£5.30	£6.69	£7.00
Per unit generated .. .. .	0.420d.	0.337d.	0.344d.	0.326d.
Per unit sold .. .. .	0.512d.	0.450d.	0.388d.	0.383d.

TABLE C.—WORKING-EXPENSES.

The operating or working costs for the year compared with the previous year were as follows :—

Expenditure.	1918.		1919.	
	Cost.	Per Unit sold.	Cost.	Per Unit sold.
	£	d.	£	d.
Generation .. .. .	3,737	0·045	4,760	0·049
Transmission .. .. .	2,195	0·027	3,046	0·031
Main distributing-station .. .. .	1,884	0·023	2,173	0·023
H.T. distribution .. .. .	1,820	0·022	1,648	0·017
L.T. distribution .. .. .	268	0·003	619	0·006
Stand-by plant .. .. .	1,104	0·013	1,668	0·017
Management and general expenses ..	3,441	0·012	3,224	0·033
Total working-expenses ..	14,449	0·175	17,138	0·176

Of the above increase in operating-expenses, £850 is due to the snowstorm in July, 1918.

TABLE D.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY, YEAR ENDED 31ST MARCH, 1919.

Distributing Authority.	Number of Consumers.	Capital Outlay	Revenue from Consumers.	Paid for Electricity.	Management and Working Expenses.	Interest.	Sinking Fund.	Depreciation.	Balance.	
									Profit.	Loss.
		£	£	£	£	£	£	£	£	£
Public Works Department .. .. .	333	403,156	20,459*	..	17,138	15,692	..	7,329	..	2,835
Christchurch City Council .. .. .	6,124	286,175	53,443*	11,754*	13,716	11,390	..	14,327	2,256	..
Waimairi County Council .. .. .	873	36,225	4,387	1,231†	1,208	1,948	..	..	..	..
Heathcote County Council .. .. .	377	9,850	1,989	926†	456	446	77	..	84	..
Lyttelton Borough Council .. .. .	74	4,050	669	329†	141	203	..	..	..	4
Sumner Borough Council .. .. .	225	5,893	1,105	377†	236	201	60	118	113	..
Woolston Borough Council .. .. .	200	7,515	1,061	427†	218	333	70	..	13	..
Riccarton Borough Council .. .. .	200	4,600	1,157	384†	308	200	..	..	265	..
Spreydon Borough Council .. .. .	220	6,108	949	358§	145	300	60	..	86	..
Kaiapoi Borough Council .. .. .	291	4,126	1,498	610†	168	187	..	..	533	..
Tai Tapu Dairy Company .. .. .	103	5,100	1,070	469†	250	250	..	..	101	..
Totals .. .. .	9,020	772,798	87,787	16,865	33,984	31,150	267	21,774	3,451	2,839

\* After deducting amount of sales to other distributing bodies.

† Paid partly to Public Works Department and partly to Christchurch City Council.

‡ Paid to Public Works Department.

§ Paid to Christchurch City Council.

TABLE E.—NUMBER OF STREET-LAMPS INSTALLED AS AT 31ST MARCH, 1918 AND 1919.

—			At 31st March, 1918.	At 31st March, 1919.	Increase.
Christchurch City Council .. .. .	..	..	1,712	1,737	25
Waimairi County Council .. .. .	..	..	386	407	21
Lyttelton Borough Council .. .. .	..	..	14	104	90
Woolston Borough Council .. .. .	..	..	121	122	1
Sumner Borough .. .. .	..	..	28	78	50
Spreydon Borough .. .. .	..	..	133	150	17
Riccarton Borough .. .. .	..	..	132	132	..
New Brighton Borough .. .. .	..	..	63	130	67
Kaiapoi Borough .. .. .	..	..	58	60	2
Heathcote County .. .. .	..	..	182	192	10
Eyre County .. .. .	..	..	5	6	1
Halswell County .. .. .	..	..	5	5	..
Tai Tapu Dairy Company .. .. .	..	..	4	4	..
Paparua County .. .. .	..	..	..	41	41
Totals .. .. .	..	..	2,843	3,168	325

TABLE F.—TOTAL CONNECTED LOAD IN KILOWATTS.

	Light.	Heat.	Power.	Total.
Direct Public Works Department wholesale consumers—				
Tramways (car-motors, &c.) .. ..	85	..	4,110	4,195
Freezing-works (3) .. ..	72	6	1,594	1,672
Flour-mills (3) .. ..	3	..	232	235
Dairy factories (2) .. ..	4	2	92	98
Quarry .. ..	1	1	123	125
Tanneries and fellmongeries, &c. (6) .. ..	27	4	713	744
Seed-cleaning (3) .. ..	3	1	108	112
Brick-yard .. ..	..	..	78	78
Railway workshops .. ..	25	..	53	78
Harbour Board .. ..	37	..	99	136
Institutions (8) .. ..	90	105	98	293
Soapworks .. ..	3	..	7	10
Sawmill .. ..	..	..	22	22
Bacon-factory .. ..	1	15	15	31
Woollen-mill .. ..	..	..	4	4
Carbide-works .. ..	..	..	100	100
Caustic-soda works .. ..	..	..	43	43
Aviation company .. ..	6	9	6	21
	357	143	7,497	7,997
Local authority reticulations—				
Christchurch City Council .. ..	4,003	2,800	6,062	12,865
Waimairi County Council (Hillmorton) .. ..	20	13	4	37
Riccarton Borough Council .. ..	31	42	43	116
Lytelton Borough Council .. ..	41	18	74	133
Sumner Borough Council .. ..	106	198	28	332
Woolston Borough Council .. ..	70	86	29	185
Kaiapoi Borough Council .. ..	73	127	33	233
Heathcote County Council .. ..	124	184	35	343
Paparua County Council .. ..	110	142	61	313
Halswell County Council .. ..	11	18	..	29
Eyre County Council .. ..	15	31	18	64
Tai Tapu districts .. ..	52	82	61	195
Lake Coleridge .. ..	17	148	..	165
Power-house and substation .. ..	19	30	110	159
Rangiora County Council .. ..	6	10	10	26
Totals .. ..	5,055	4,072	14,065	23,192

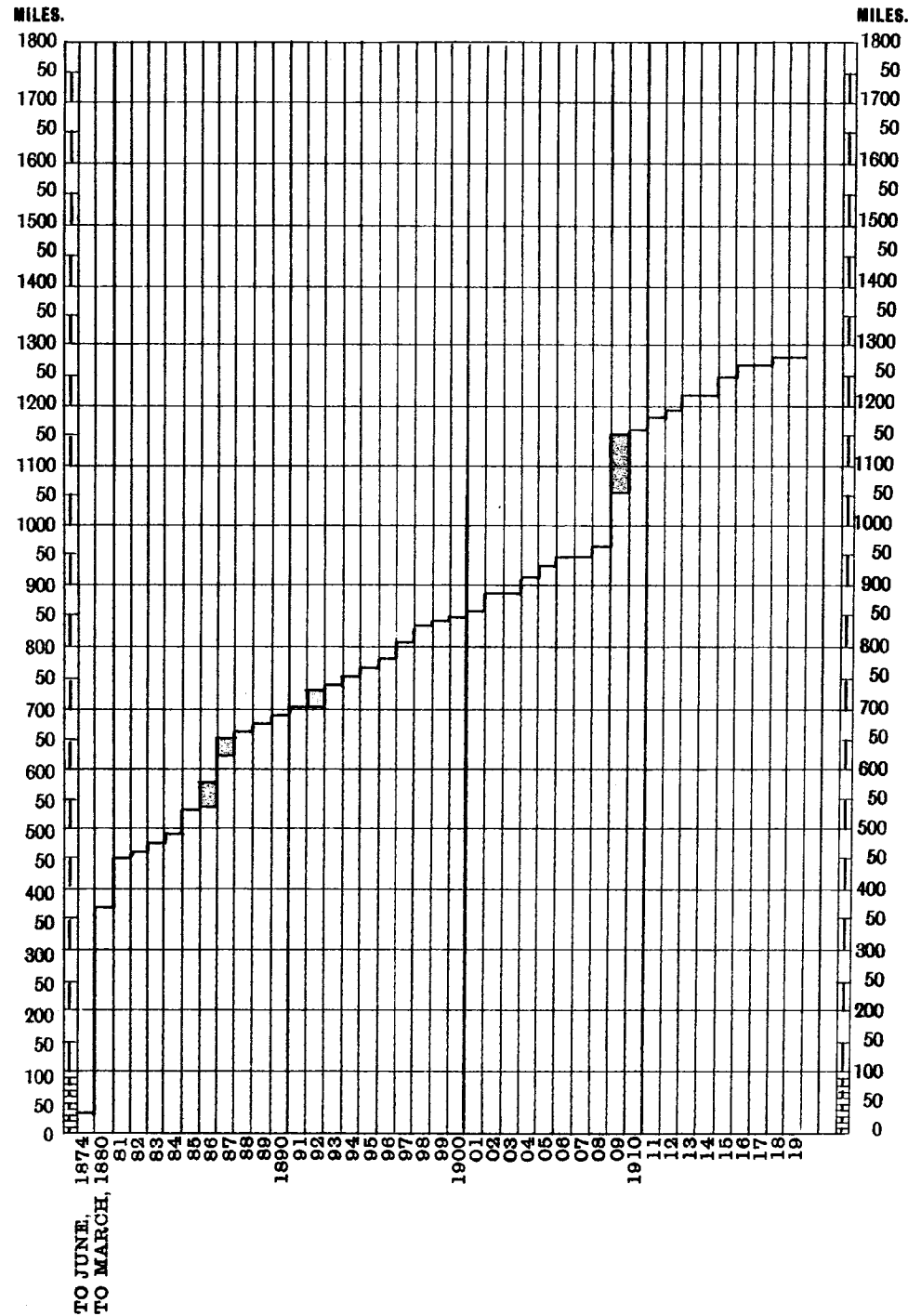
By Authority : MARCUS F. MARKS, Government Printer, Wellington.—1919.

Price, 0d.]



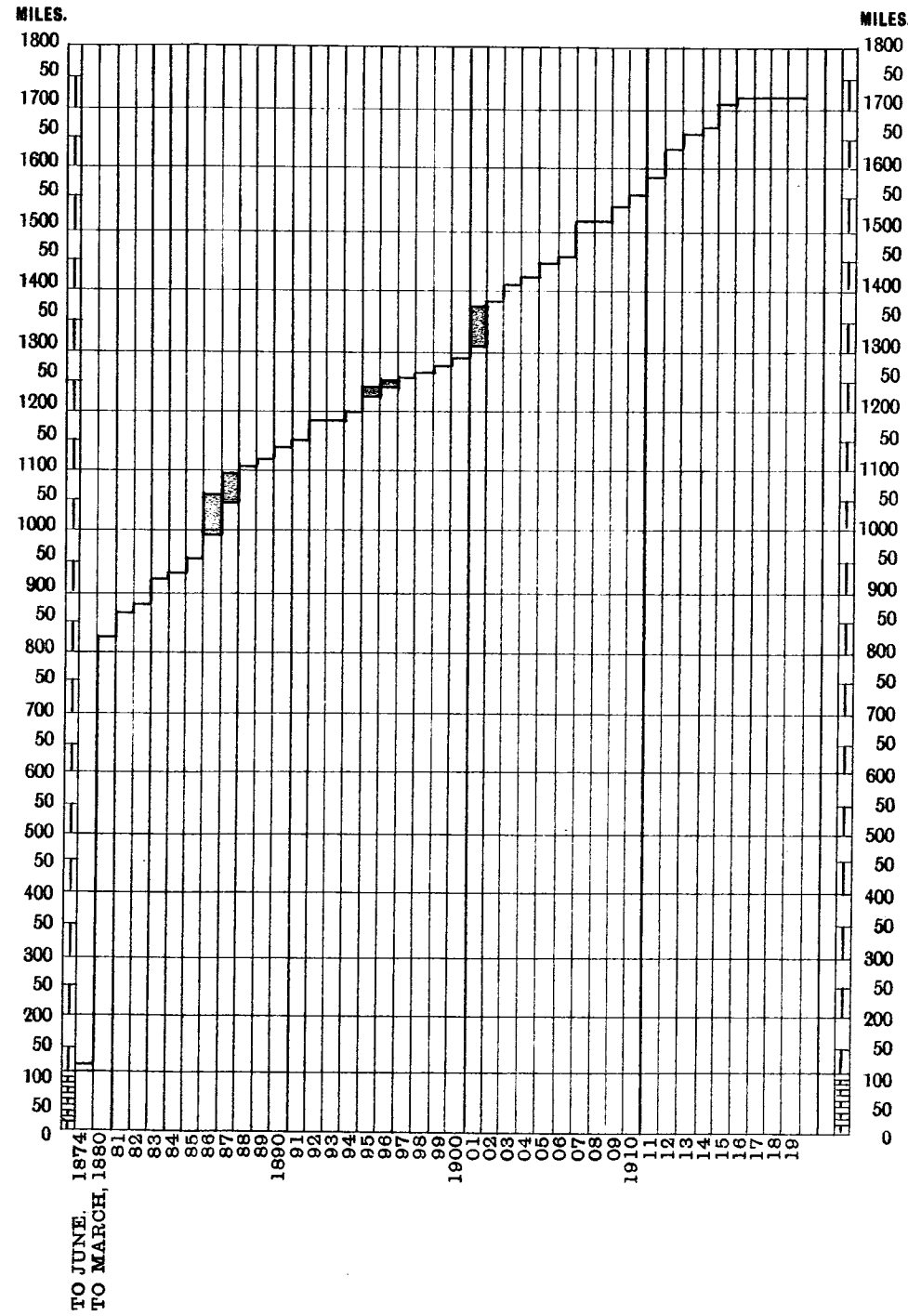
NUMBER OF MILES OPEN  
OF  
GOVERNMENT LINES.

NORTH ISLAND.



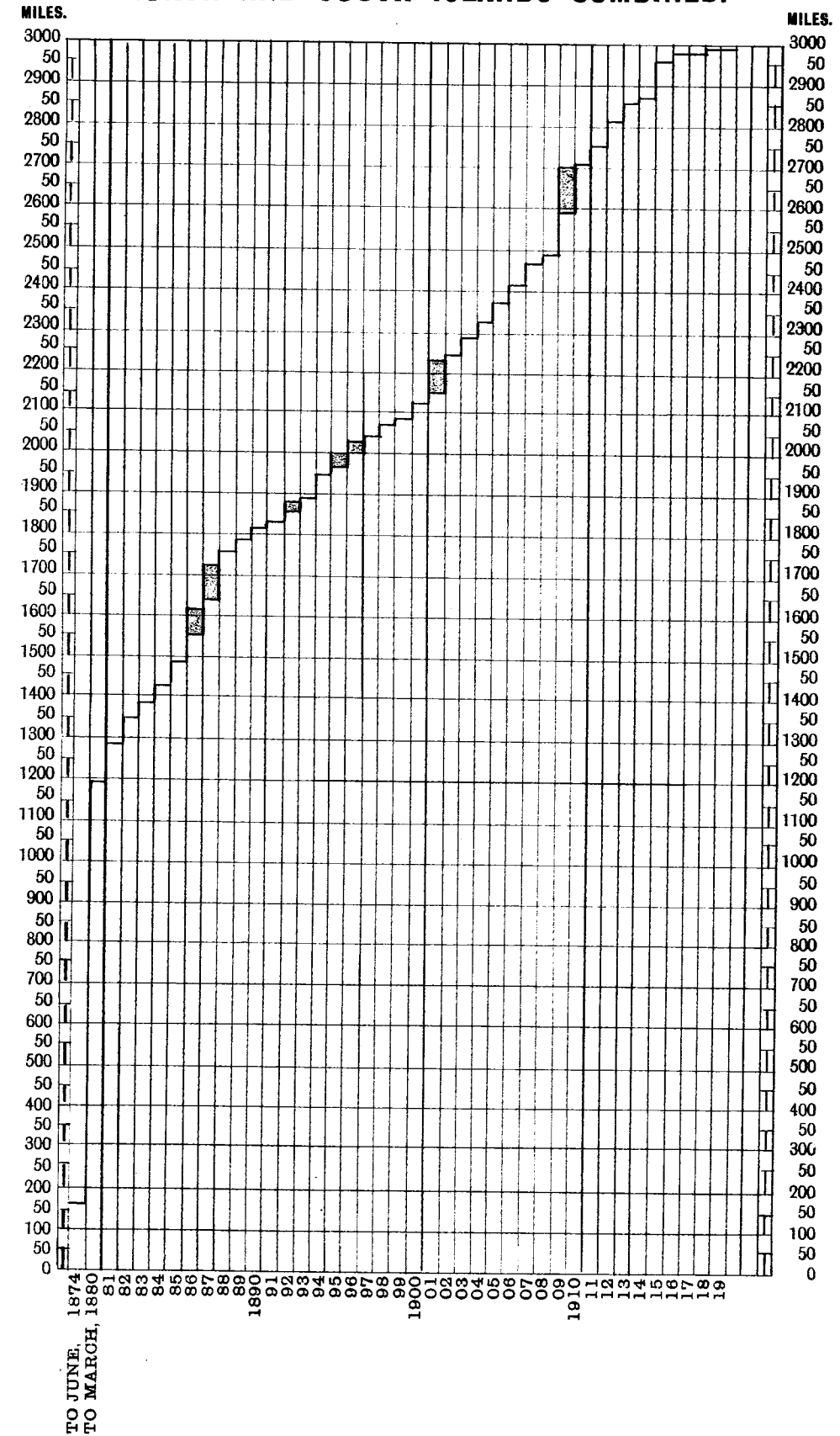
NUMBER OF MILES OPEN  
OF  
GOVERNMENT LINES.

SOUTH ISLAND.

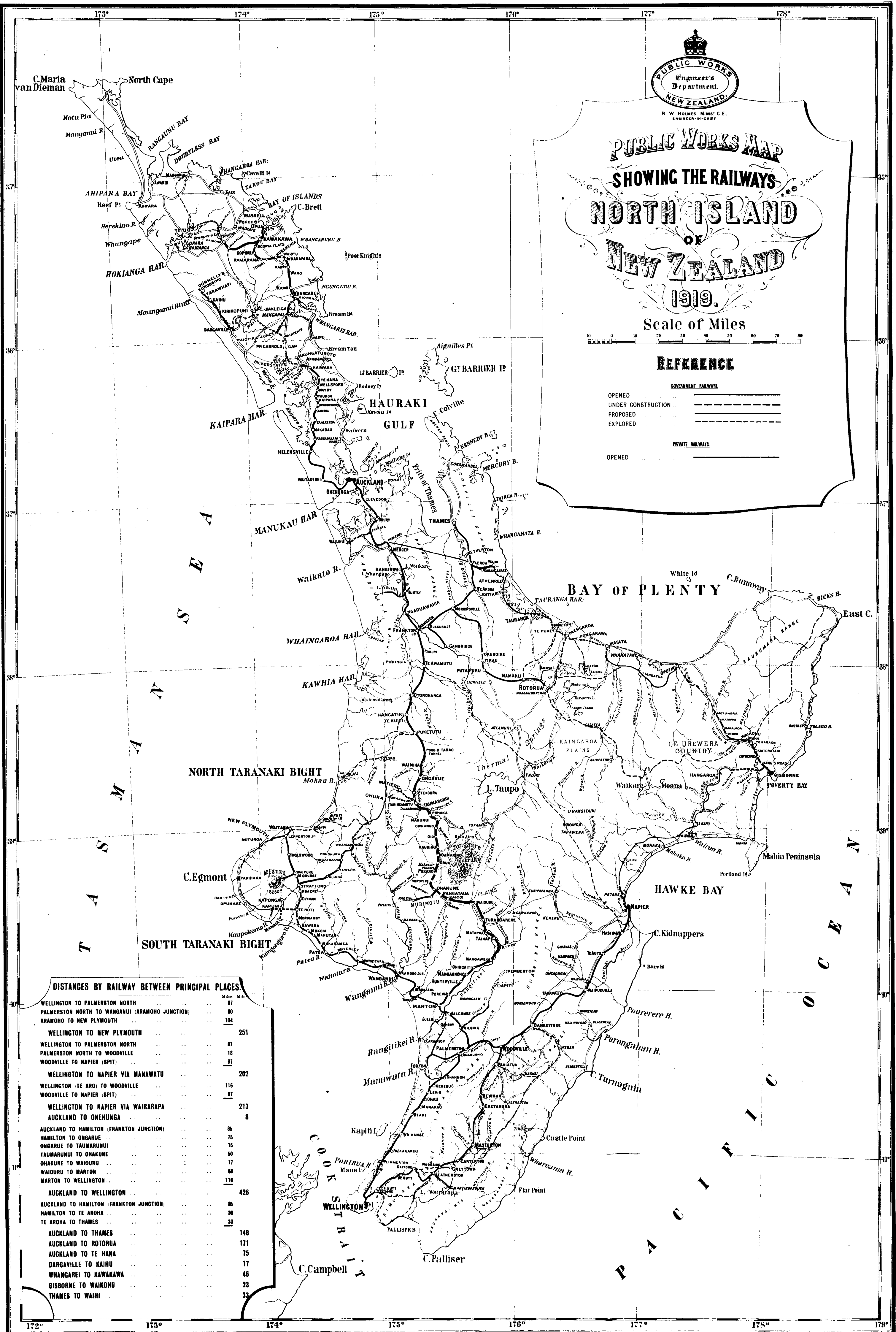


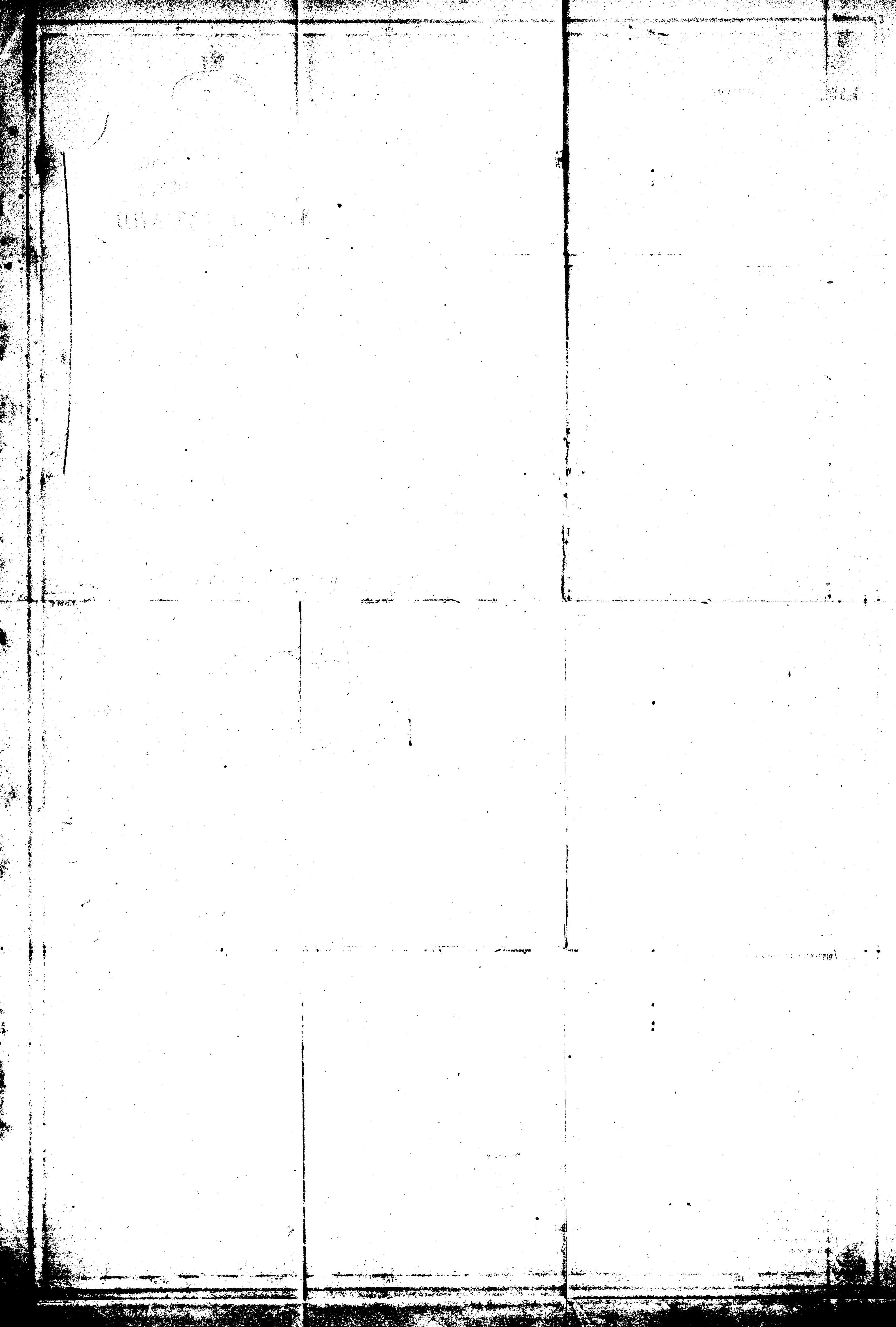
NUMBER OF MILES OPEN  
OF  
GOVERNMENT LINES.

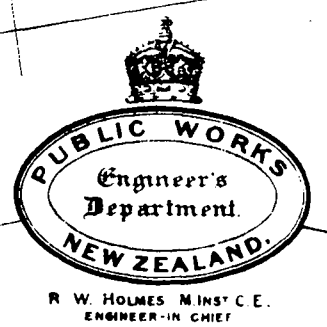
NORTH AND SOUTH ISLANDS COMBINED.



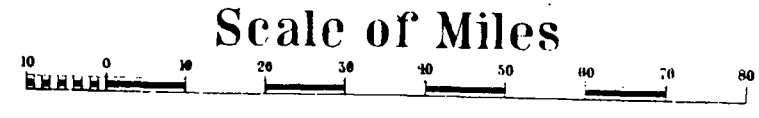






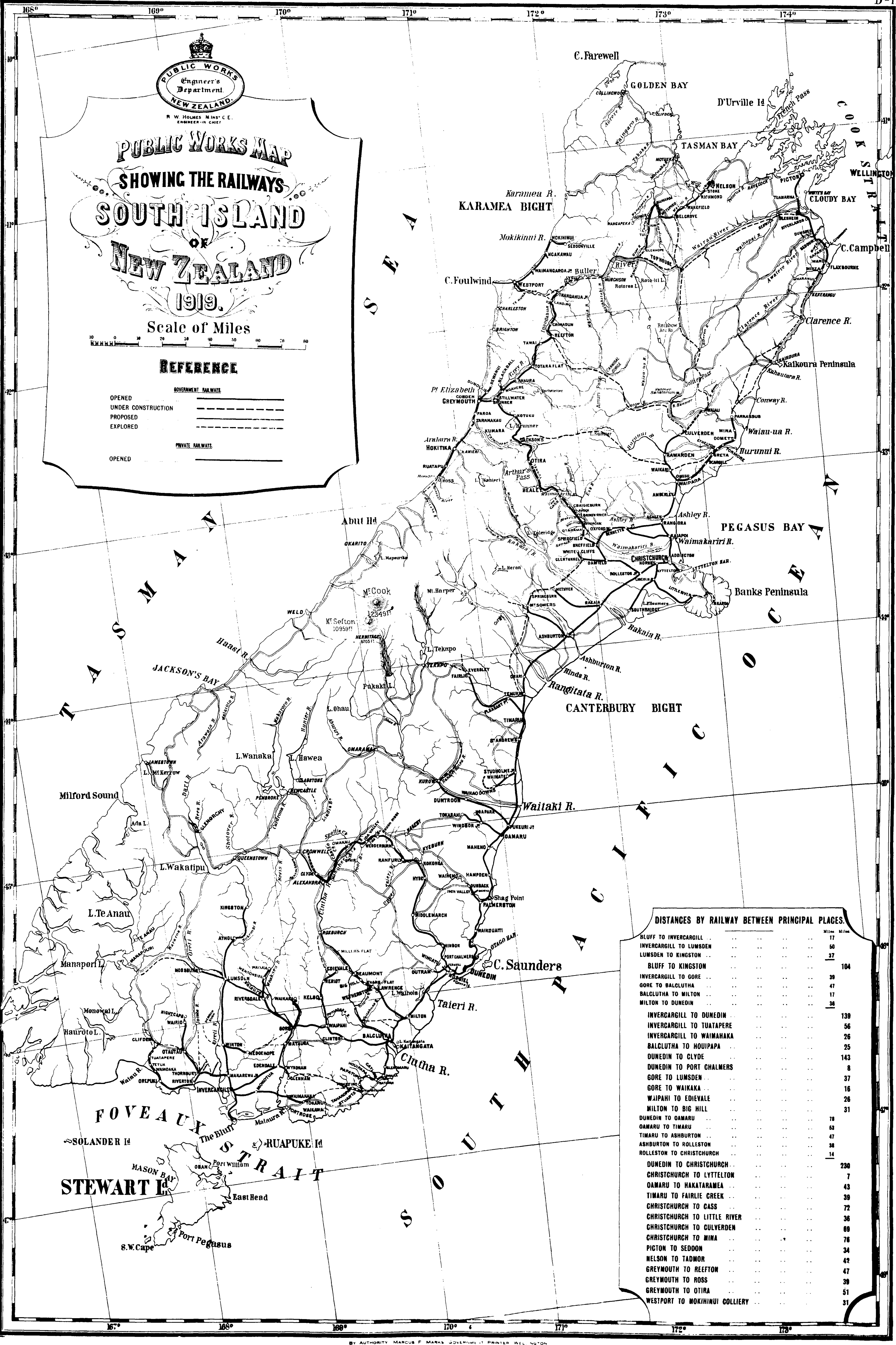


# PUBLIC WORKS MAP SHOWING THE RAILWAYS SOUTH ISLAND OF NEW ZEALAND 1919.



## REFERENCE

GOVERNMENT RAILWAYS	
OPENED	
UNDER CONSTRUCTION	
PROPOSED	
EXPLORED	
PRIVATE RAILWAYS	
OPENED	



### DISTANCES BY RAILWAY BETWEEN PRINCIPAL PLACES.

	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	34
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
WAIKAKA 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	89
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



DATE: 12/15/74

**THE FBI**