

SESSION II.
1918.
NEW ZEALAND.

PUBLIC WORKS STATEMENT,

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

MR. SPEAKER,—

The difficulty I anticipated of being able to procure a sufficient supply of labour whilst the war lasted was, I regret to say, only too manifest during last year. Indeed, as time went on it became increasingly accentuated. The fact that on the 31st March, 1918, the unexpended authorities in the hands of local bodies and of the officers of my Department amounted to £209,962 for roads and bridges alone clearly proves that it was the scarcity of labour and material, and not of money, which accounted for only £135,642 having been expended during the financial year on such work.

Happily the war is now brought to a victorious conclusion, but a considerable period must almost necessarily elapse before we can hope to see any appreciable number of our soldiers back in New Zealand. Should this period prove to be shorter than is at present anticipated I have made ample provision, both on the estimates and in the Public Works Fund, to ensure that work will be available for all who need it. In the meantime no appreciable increase of rate of expenditure can be expected.

I regret to say that the damage caused to roads and bridges by flood during the past year has again been very serious. In every instance, however, substantial assistance has been given to the local bodies whose districts were affected.

The financial results for the past year from the operations of the Lake Coleridge electric works are particularly satisfactory. Notwithstanding the fact that this undertaking is still incomplete the revenue earned during the year from the sale of electric power has more than sufficed to defray all costs of administration, including interest on capital outlay, as well as providing a portion of the amount required to be set aside for a depreciation fund.

This work has passed beyond the experimental stage, and is now an exceedingly valuable asset. The above result is an object-lesson as to what may be expected from similar undertakings in other parts of the Dominion.

The sum of £150,000 is provided for initiatory work on the proposed Auckland and Wellington schemes, details of which will be found in the Chief Electrical Engineer's special report on this subject.

The following table shows the brief particulars of the expenditure of the year, and also the total under each class of work from the inauguration of the public-works policy up to the 31st March last :—

TOTAL EXPENDITURE.

Class of Work.	Expenditure.	
	Expenditure for Year ended 31st March, 1918.	Total Expenditure to 31st March, 1918.
Railways—	£	£
New construction	295,609	25,471,965
Additions to open lines	200,162	9,739,698
Roads	135,642	11,396,140
Public buildings	229,288	7,094,902
Immigration	3,856	2,342,128
Purchase of Native lands	...	2,061,906
Lighthouses, harbour-works, and harbour-defences	2,976	1,143,051
Tourist and health resorts... ..	931	259,440
Telegraph-extension	117,266	3,324,988
Development of mining	27	889,496
Defence-works (general)	6,714	1,043,691
Departmental	127,962	1,319,954
Development of water-power	...	...
Irrigation and water-supply	11,650	32,055
Payment to Midland Railway bondholders	...	150,000
Lands-improvement	1,838	139,608
Minor works and services	...	312,607
Plant, material, and stores	6,811	91,007
Cost and discount, raising loans, &c.	1	1,253,073
	1,140,733	68,065,709
Wellington-Hutt Railway and Road Improvement Account	Railway ...	228,374
	Road ...	101,658
Railways Improvement Account	...	641,275
Railways Improvement Authorization Act 1914 Account	111,721*	477,072
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	43,996	209,675
National Endowment Account—Roads to open up endowment lands	...	53,401
Aid to Water-power Works and Electric Supply Account	9,835	387,518
Irrigation and Water-supply Account	...	115,000
Waihou and Ohinemuri Rivers Improvement Account... ..	12,025	64,617
Telegraph Extension Account	96,689	300,000
Totals	1,414,999	71,548,333

* Including £1, cost of raising loan.

† Now transferred to Electric Supply Account.

WAYS AND MEANS.

On the 1st April, 1917, the available ways and means for public-works purposes were	£	521,525
And further funds were received as under :—		
Under the Aid to Public Works and Land Settlement Act, 1914		45,100
Under Finance Act, 1916, section 49		700,000
Under Finance Act, 1917, section 77		125,000
Other receipts and recoveries		44,648
Making a gross total of		1,436,273

The ordinary expenditure of the year amounted to £1,140,732, plus the expenses of raising loans £1, thus bringing the total disbursements up to £1,140,733

This left a balance to the credit of the Ways and Means Account at 31st March, 1918, of 295,540

For the current year it is proposed to provide additional funds as under :—

In terms of section 77, Finance Act, 1917	725,000
Under Finance Act, 1918	2,500,000

Making the total ways and means for 1918–19 .. £3,520,540

The estimated expenditure for public works for the current year (excluding separate accounts having their own ways and means) amounts to £2,460,050, leaving an estimated balance of £1,060,490 to be carried forward to next year (1919–20).

In addition to the amounts described above we have authority to raise the following sums :—

Under the Aid to Water-power Works Act, 1910 ..	£76,000
Under the Waihou and Ohinemuri Rivers Improvement Act, 1910	£50,000

RAILWAY-CONSTRUCTION.

Four short sections were opened for traffic during the year, and construction-work has been carried on with all the labour available at eleven different places. Supplies of rails, steel, and hardwood timber for bridges have been practically unobtainable owing to conditions due to the war, and the absence with the Expeditionary Forces of more than half of the Department's engineers has had the effect of delaying some of the location and survey work, which must be done in advance of construction.

The following sections were completed and handed over to the Railway Department for traffic during the past year :—

	M. ch.	
Paerata to Patumahoe ..	4 7	(10th December, 1917.)
Matawai to Motuhora ..	4 78	(26th November, 1917.)
Whangamomona to Kohuratahi	4 53	(7th January, 1918.)
Ohakune to Raetihi ..	8 53	(18th December, 1917.)
Total	22 31	

Besides which the Culverden–Waiau Extension (13 miles) and Clyde to Cromwell Section (12½ miles) are sufficiently advanced to permit of train services being run daily over their whole respective lengths.

The total expenditure on railway construction and improvement-work during the last financial year amounted to £607,491, as under :—

Construction of new lines	£ 295,609
Additions to open lines	200,162
Railways Improvement Account	111,720

The following is a summary of the works which have been in progress during the year just closed :—

KAIHU VALLEY.

No construction-work of any nature has been done on this line during the year.

KAWAKAWA–HOKIANGA.

Work has been in progress throughout the year on the 8-mile section between Kaikohe and Okaihau with reduced man-power, but results have been affected by continuous wet weather and frequent slips of the unstable material in cuttings after formation had been completed. A steam-navvy is at work here in a deep clay cutting, showing satisfactory results. It will require about another year's work under prevailing conditions to complete the formation to Okaihau.

WHANGAREI—NORTH AUCKLAND MAIN TRUNK.

The line which will connect Whangarei district with the North Auckland system at Waiotira Junction is just 20 miles in length, and construction-work is completed or in some stage of progress over $16\frac{1}{4}$ miles, commencing at the Whangarei end. The first 4 miles was let in one contract in May, 1914, and the contract has only recently been completed, about two years after the stipulated time. A further length of $1\frac{1}{4}$ miles has been completed for some time, and the section from Whangarei to Portland Station, $5\frac{1}{4}$ miles, is practically ready for traffic. There is a gap, on which little work has been done, of 2 miles to Oakleigh, where there is a wharf, and where the projected Waipu Branch will some day come in; but from that point onwards formation is complete, rails laid and ballasted for nearly 9 miles, and a ballast-train operates over this length. There have been many small slips in cuttings on this line, but no serious damage, and the rate of progress has been affected by the unusual rainfall and the dearth of suitable labour. Over the last 3 miles to the junction-point formation-work is in progress, and will be carried to completion as early as available funds and labour will permit, so that the new line from Oakleigh to Waiotira may be used as a means of conveying material and supplies for construction-work on the Main Trunk line north and south of the junction.

NORTH AUCKLAND MAIN TRUNK.

The terminus of the open line remains at Ranganui, on the Otamatea waterway, 87 miles from Auckland, but a temporary goods and passenger service is in operation from that point to Huarau, nearly 7 miles beyond. Formation-work has been carried out over 13 miles of route from the terminus of the open line, but weather and labour conditions have been difficult during the year, and the diminishing number of workmen available led to the cessation of work in the Huarau and Golden Stairs Tunnels, as well as on earthworks farther ahead. The clay country traversed is very unstable, and slips in cuttings are very frequent. The headings in each of the tunnels mentioned are 12 chains apart, and until these are pierced rapid progress with works farther north cannot be expected.

WAIUKU BRANCH.

The section from Paerata Junction to Patumahoe, over 4 miles in length, was completed and opened for traffic on the 10th December, 1917. Rails have been laid and ballasting completed as far as Mauku Station, $1\frac{1}{2}$ miles farther on, to which point goods will be carried pending the completion of another section.

EAST COAST MAIN TRUNK.

Northern Section.—Construction-work with a small number of men has been in progress since January last on the section from Waihi southwards towards Tauranga Harbour.

Tauranga Section.—The line has for some time been open from Maunganui to Paengaroa, a distance of 20 miles, and a regular goods and passenger service has been in operation over this length under the control of the Public Works Department. During the year the goods service has been extended to Matata, 20 miles beyond Paengaroa. The banks over swampy parts of the route still show a little settlement, and have to be added to from time to time as required. Steelwork for the permanent bridge over the Kaituna River has arrived after long delay, and the contractor has resumed the erection of the bridge. The formation on many portions of this line suffered considerable damage from heavy floods in February last, but repairs have been effected, and over a short length the formation-height was raised to guard against risk of similar damage in future. Station buildings are being erected at Matata.

The construction of the bridge across the Tauranga Harbour alongside the town has been carried forward as far as material procurable would permit, but progress has been very moderate.

Gisborne Northward.—The section from Matawai to Motuhora, 5 miles in length, was handed over to the Railway Department for traffic on the 26th November, 1917. No construction-work is being done beyond Motuhora.

Gisborne Southward.—Rails are laid and partly ballasted from Makaraka Junction to Ngatapa, 11 miles distant. A bi-weekly goods and passenger service is in operation over this section, which has been maintained in running-order, but construction-work beyond Ngatapa is suspended. The route is being accurately laid off for a long distance ahead to permit of the energetic resumption of formation-works on the return of normal conditions.

Napier Northward.—The fine concrete bridge which is to carry the road and railway over the Inner Harbour between Napier and Westshore was completed in March last. The long embankment on the Westshore side is finished, but the similar embankment which is to connect the bridge with the shore on the Napier side is only about half-finished. It is being constructed under agreement by the Napier Harbour Board. The line has been located for 10 miles to Eskdale, but no construction-work is in progress.

STRATFORD—MAIN TRUNK.

At the western end the length from Whangamomona to Kohuratahi, 4 miles 53 chains, was completed and handed over to the Railway Department for traffic on the 7th January last. Work has been in progress during the year over the 5-mile section to Tahora Station, earthwork being nearly finished, rails laid, and line partly ballasted to within half a mile of the station-site. Beyond Tahora the line is being laid out with a view to the vigorous prosecution of construction-work when financial and labour conditions return to the normal.

The heavy works on the 10½-mile section from Okahukura to Matiere have been kept fairly well manned throughout the year. The concrete-work on the bridge which is to carry road and railway over the Ongarue River is finished, but some time must elapse before the steel superstructure can be built, owing to the impossibility of obtaining materials. The Okahu Tunnel was taken out of the contractor's hands on the 20th June, 1917, since when the excavation has been carried on by the Department with a small number of men. Better progress is looked for in the future. The other works on the section are not heavy, and will give little concern once the completion of the Ongarue Bridge and Okahu Tunnel is in sight. For the present, construction-work is not in progress beyond Matiere.

RAETIHI BRANCH.

The branch line from Ohakune to Raetihi, 8½ miles in length, was handed over to the Railway authorities and opened for regular traffic on the 18th December, 1917.

OPUNAKE BRANCH.

The construction of piers for the large bridge which is to carry the line over the Waingongoro River has advanced steadily after overcoming some difficulties with the foundations. Plant and concrete material has been brought on to the site in readiness for the resumption of construction when suitable labour is available. Earthworks are practically finished to Kapuni, 7 miles from the junction-point, but work was suspended at the end of December last, and there seems to be no immediate prospect of its being resumed. The staff has been transferred to other works for the present.

MIDLAND.

Work at both ends of Arthur's Pass Tunnel has been in progress throughout the year with decreasing numbers of workmen, and after nearly eleven years of effort the bottom headings met on the 20th July last at a point 1 mile 37 chains from the eastern portal on the Bealey side. It is to the credit of the Engineers under whose control the work was carried out that there was a difference of only about 1 in. in the alignment, and somewhat less in the levels, when the tunnel was pierced. I had the privilege of formally breaking down the rock barrier at the meeting-point on the 21st August, in the presence of representative citizens from the Canterbury and Westland Provinces. The enlargement and lining of the tunnel is still far from completion, and while war conditions prevail but little progress can be made with the development of electrical energy for use in hauling trains through the tunnel and over the mountain sections on either side.

SOUTH ISLAND MAIN TRUNK.

The present terminus is at Wharanui Station; rails are laid over a further length of $3\frac{1}{4}$ miles, but work is suspended because of the impossibility of obtaining material for two small steel bridges on the section.

CULVERDEN-WAIAU.

Formation is completed and rails laid over the whole 13 miles of this line. Only a little ballasting and minor finishing-work remains to be done, on completion of which the section can be opened for regular traffic. A daily goods service is now in operation over the whole length.

OTAGO CENTRAL.

Construction of the section from Clyde to Cromwell, about $12\frac{1}{2}$ miles in length, and mostly in a narrow river-gorge, is practically completed, and for some time past a train service has been in operation right up to the Cromwell Station site. The damage caused by the phenomenal thunderstorm in November, 1916, has been repaired, and only a couple of small concrete bridges, besides work in Cromwell Station yard, require completion before this section can be opened for regular traffic.

TOTAL APPROPRIATIONS FOR RAILWAY-CONSTRUCTION.

In addition to the votes for construction of specific lines of railway an appropriation of £500 is required to provide for old land claims and other liabilities on Construction Account, £1,000 for surveys of projected new lines of railway, and £80,000 for permanent-way material. The total vote proposed this year for railway-construction amounts to £485,000.

OTHER RAILWAY-WORKS.

The expenditure out of the Public Works Fund under the heading "Additions to Open Lines" amounted to £200,162. Of this sum, £149,081 was expended in the provision of additional rolling-stock, Westinghouse-brake equipment, steam-heating gear, and workshops machinery. The balance covered expenditure upon improvements to station accommodation and yards; additions to workshops, tablet, telegraph, and telephone facilities, interlocking, improvements to wharves and bridges, and purchase of land.

ROADS ON GOLDFIELDS (MINES DEPARTMENT).

The total allocations under this head last year amounted to £28,458, on account of which a vote of £20,200 was taken. The actual expenditure during the year, however, amounted to £6,912 only, as it was decided to hold over the expenditure of all votes except those for urgent works.

DEVELOPMENT OF MINING.

The expenditure under this head was quite small—viz., £72—and against this there was a credit of £45, thus leaving the net amount at £27 only. A vote of £1,450 is proposed to be taken this year.

PUBLIC BUILDINGS.

The total amount voted and expended on construction of public buildings during the last financial year amounted to—

New buildings (Class XVIII, Public Works Fund)—Voted, £316,940;
expended, £229,288.

For the current year an appropriation of £648,500 for new buildings is proposed.

GENERAL.

Slow but steady progress is being made by the contractors with the erection of the new Parliament Buildings, parts of which have been prepared for occupation during the present session.

No general departmental buildings of any magnitude have been commenced during the year. Additions to the Government Printing Office were completed, and there was some expenditure upon the conversion of the old Post-office building, Auckland, and Dunedin Police-station into offices for various Departments.

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 Aria, Heretaunga, Horotiu, Piopio, Tauherenikau Military Camp, Te Karaka, and Turua, a Postmaster's residence at Rakaia, and an automatic exchange at Roslyn. Additions were made to the office buildings at Ferry Road, Kaitaia, Taumarunui, Te Kuiti, and Te Puke.

In addition to the appropriations previously authorized but not expended, it is proposed to make provision for new post-office buildings at Lumsden, Tiraumea, Wharepoa, and Whatatutu, additions at Palmerston North, and a lineman's cottage at Whakatane.

JUDICIAL.

Courthouses.—No new buildings were erected during the past year, and only necessary maintenance works were carried out.

Police-stations.—The new headquarters station at Wellington was completed, and is now occupied by the Police Head Office staff and officers formerly located in Lambton Quay Station, which has been converted for use by other Departments. Additions to the Auckland Central Station were completed, and the erection of new stations at Oamaru and Wairoa put in hand. A site for a new station at Lower Hutt was purchased.

PRISONS.

At Auckland Prison internal exercise-yards have been completed, a workshop built, and the excavation of building-stone and road-metal carried on as usual. At Waikeria the erection of an administrative division has been carried on vigorously, dairy building and cottages erected. The formation of the new road from Waimarino to Roto-Aira has been carried forward as well as the inclement weather experienced in the locality would permit. The erection of the new prison at Paparua is advancing steadily despite the difficulty of obtaining building-material. A temporary cell-block has been erected to accommodate the prisoner employed on the permanent work. A varied programme of works has been carried out at Invercargill, including boundary and internal walls, the manufacture of concrete poles, erection of dairy buildings, and development of reclamation-work in the estuary. Prison labour is utilized for all the works mentioned, and stone or concrete blocks produced by the prisons are largely utilized for the building-works.

MENTAL HOSPITALS.

At Auckland additions have been carried out in the hospital block, and the kitchen has been removed.

At Porirua the new receiving-home and hospital, a separate building at some distance from the main institution, is completed, has been furnished and is now in occupation. The pipes are being laid to convey the septic-tank effluent of the institution into the harbour. The Mitchell property, a farm of 110 acres, adjoining the Hospital Estate, has been purchased, with buildings, which have been adapted for staff accommodation.

At Sunnyside the receiving-home and hospital, distinct from the main institution, is practically completed. An automatic fire-alarm system is now installed.

At Tokanui a fourth unit has been completed, and a fifth is under construction. A freezing plant has been installed.

At Seacliff additional accommodation for quiet patients is under construction, and additions have been made to the epileptic ward at Waitati.

HOSPITALS.

Owing to the great increase in the cost of building-works nothing was undertaken during the year beyond minor necessary works and the acquisition of sites.

New Buildings for St. Helens Hospitals are contemplated at Auckland, Christchurch, and Dunedin, but probably only that for Christchurch will be commenced during the current year. In consequence of arrangements made with the Defence authorities in connection with the treatment of soldiers, extensive buildings which were proposed at Otaki and Te Waikato Sanatoria are not now necessary, although some expenditure at both places will have to be incurred.

WORKERS' DWELLINGS.

There was an expenditure of £15,505 during the year under this heading, also a liability of £95 for dwellings in course of erection. Expenditure during the current year will be on a similar moderate scale.

SCHOOL BUILDINGS.

The expenditure out of the Public Works Fund on school buildings was £63,082 out of a vote of £100,500. Of this amount, £55,000 was paid to Education Boards and other controlling authorities for the erection of new buildings, additions, &c., for the purposes of primary, secondary, technical, and University education. The balance, £8,000, represents the cost of works carried out directly under the control of the Government, including Native schools and industrial and special schools.

For the current year a much larger sum will be needed. During the past four years, the cost of buildings being abnormally high, operations have been confined to cases where extra accommodation was absolutely necessary to carry on, and as a consequence a large sum is required to provide for buildings the erection of which can no longer be postponed. Increased votes are being provided for buildings for public schools, technical schools, secondary schools, and University buildings. Applications for sums amounting to over £400,000, including grants made during the current year, are now before the Education Department, and provision for this sum has been made.

TELEGRAPH-EXTENSION.

Among the principal land lines completed or under construction during the year 1917-18 are the following: Titahi Bay - Queen Charlotte Sound cable; Balclutha-Milton metallic circuit; Otago Central trunk telephone circuit (Middlemarch-Clyde); Milton-Lawrence metallic circuit; Newton Flat-Lyell telephone-wire; Greymouth-Otira metallic circuit; Christchurch-Glenavy metallic circuit; Okere-Paengaroa metallic circuit; Thames-Hauraki Plains telephone-wire; Auckland-Thames-Paeroa metallic circuit; Puketurua-Aniwaniwa metallic circuit; Auckland-Dargaville metallic circuit; Helensville-Paparoa metallic circuit; Auckland-Puhoi metallic circuit; Tauranga-Whakatane metallic circuit; Ohaeawai-Kawakawa metallic circuit; Blenheim-Seddon metallic circuit; Gisborne-Kaiteratahi metallic circuit; Tuatapere-Puysegur Point telephone-wire; Sockburn-Dunsandel metallic circuit.

The line from Tuatapere to Puysegur Lighthouse, a distance of ninety-three miles, has been rebuilt.

Reliable telegraph and telephone services have been maintained throughout the year. The telephone-exchange system is steadily expanding. Thirteen new exchanges were opened during the year, and it was found necessary to provide additional switchboard accommodation at twenty-eight others. The work of converting earth-working systems to metallic circuit is being systematically continued. The increase in the number of exchange connections for the year is 4,940.

The telegraph and interurban telephone system has been extended by the erection of 121 miles of poles and 683 miles of wire. Included in the latter is 42 knots of submarine cable laid from Titahi Bay to Dieffenbach Point, in Queen Charlotte Sound; 506 miles of poles and 12,330 miles of wire were added to the telephone-exchange plant; 1,735 miles of telegraph and interurban telephone lines were overhauled and reconstructed.

Twenty-six new coin-in-the-slot telephones were installed. This makes a total for the Dominion of 263 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 7,930 miles of wire.

IRRIGATION.

Works in connection with the important scheme to serve the Ida Valley, in Central Otago, were restricted to the improvement of two main races, and the old Bonanza Race was put into working-order. Water was supplied to settlers in parts of the valley during the summer, and temporary arrangements were made to supply several settlers on the Galloway Flat from the Manorburn Dam.

The scheme which is to supply the country between Alexandra and Clyde from the Manuherikia River was advanced as far as the available supply of labour would permit. The tunnel at the intake in the river-gorge is being driven steadily, and the headings are now only a few chains apart. Very little in the way of race-construction could be accomplished during the year, but it is hoped that better progress will be possible during the coming summer.

A small scheme to serve the recently subdivided Benmore Run, between the Waitaki River and its main tributary the Ahuriri, was undertaken during the year and carried practically to completion.

WAIHOU AND OHINEMURI RIVERS IMPROVEMENT.

The special dredge built for this work has been kept fully employed during the year completing the excavation of the Ngararahi Cut, formation of a stop-bank at Thorp's Bend, near Paeroa, and removing a shoal near the old wharves at Paeroa. Two miles of stop-banks designed to protect valuable dairying-land in the Netherton district have been completed, and extensions to wharves and goods-sheds built at Ngahina.

In deference to the wishes of the settlers chiefly concerned, some modification of the original protective scheme is being made, eliminating the proposed straight cut to divert the river between Waimarie and Hikutaia. Protective walls of a modified height will probably be built where required along the present river-channel between the points mentioned.

Much work still remains to be done before finality is reached in carrying these improvement-works into effect, and the end is not yet in sight.

DEVELOPMENT OF WATER-POWER.

The general disorganization of business caused by the prolonged war has to some degree affected the Lake Coleridge power-supply scheme. The volume of business soon outgrew the capacity of the original 6,000 horse-power plant, and in 1916 another unit of 2,000 horse-power was installed, which helped to keep the supply level with the demand for a time. It soon became evident, however, that more generating machinery would be required, and in May, 1916, an additional unit of 4,000 horse-power was ordered, besides steel plates for a third pipe-line to feed the turbine. The turbine has been delivered, but there has been great delay in England over the manufacture of the generator, and the latest advices are that it may be expected early in 1919. The steel plates for the pipe-line have been held up by the Minister of Munitions in Great Britain and taken over for urgent shipbuilding purposes. Repeated attempts have been made to obtain from the authorities in England a priority certificate to permit of the manufacture and export of the plates, but so far without success.

The business is still growing, and applications for most of the 4,000 horse-power of the additional plant have already been received. It is probable that in the near future the growing demand will call for the installation of still another generating unit at Lake Coleridge, which will about exhaust the capacity of the present headworks at the lake.

The capital expenditure now amounts to £389,754, including £14,320 interest on capital during construction; the gross revenue during the year amounted to £32,092, and the working-expenses to £14,449, leaving a balance to net revenue account of £17,643. Deducting interest charges, amounting to £14,871, there remains a balance

of £2,772 towards depreciation. Having regard to the fact that this is only the third year of working, and also that the growth of the business has been checked for the last two years because of the difficulty experienced in getting machinery, the result is to be regarded as a most satisfactory one.

During the year investigations have been made of suitable sources of supply for current to haul trains through the Arthur's Pass Tunnel, the completion of which is now within measurable distance. Alternative schemes have been evolved for carrying the train service through the tunnel only, and over considerable lengths of the mountain section of railway on both eastern and western sides, but no definite decision has yet been reached as to which scheme will be adopted.

The provision of an adequate general supply of power for the North Island has engaged the attention of the Electrical Engineering Staff throughout the year, and preliminary investigations of possible sources, as well as of prospective demands, indicate that the most effective means of meeting the requirements of the community will be the development of three main schemes in different parts of the island. Mangahao and either the Awapuni Gorge or the Aratiatia Rapids, both on the Waikato River, offer prospects which make their selection practically certain, to be followed later by linking up with Waikaremoana. Investigations as to the volume of power available at all three locations have been made, and surveys of routes for transmission-lines from the sources to the main centres of demand are in progress. Much valuable information is being compiled to facilitate arrival at a definite decision as to the best order in which schemes for the North Island should be developed when financial conditions permit of construction-work being undertaken.

DEPARTMENTAL.

The total number of permanent officers and employees in this Department on the 31st March, 1918, was 660, and of these 21 have been discharged from the Expeditionary Forces as unfit for active service and 136 are either in camp or serving abroad with the Expeditionary Force.

The total casualties suffered by the permanent officers of the Department since the outbreak of war are as follows: Killed in action, 6; died of wounds, 10; died of sickness, 2; missing (believed to be dead, result of Court of Inquiry), 1; wounded, 55; gassed, 1.

In place of permanent officers and employees who have joined the Forces the Department has taken on 50 officers, most of whom are employed in a temporary capacity.

CONCLUSION.

We have every reason to rejoice at the victorious termination of this most barbarous war. New Zealand has done its share right nobly. It may well be proud of those who have taken part in this struggle for freedom. It remains now for all of us to bind up our wounds and exert out utmost energies in building up the prosperity and happiness of this Dominion.

Good roads, railways, irrigation, and an abundant supply of cheap electric power throughout the land are each and all important factors in this direction. May they soon be accomplished facts.

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TABLE NO. 1.

SUMMARY SHOWING THE TOTAL EXPENDITURE ON PUBLIC WORKS AND OTHER SERVICES OUT OF PUBLIC WORKS FUND TO 31ST MARCH, 1918, AND THE LIABILITIES ON THAT DATE.

Number of Table containing Details.	Works.	Total Net Expenditure to 31st March, 1917.	Expenditure during Twelve Months ended 31st March, 1918.	Recoveries on Account of Services of Previous Years.	Total Net Expenditure to 31st March, 1918.	Liabilities on 31st March, 1918.	Total Net Expenditure and Liabilities.	Works.
3	Railways*..	£ 34,716,002	£ 495,771	£ 110	£ 35,211,663	£ 150,492	£ 35,362,155	Railways.
..	Roads ..	11,261,098	135,642	600	11,396,140	129,710	11,525,850	Roads.
..	Development of mining ..	846,014	27	6,345	839,496	..	839,496	Development of mining.
..	Telegraphs ..	3,207,722	417,266†	..	3,624,988	10,888	3,635,876	Telegraphs.
..	Public buildings ..	6,880,681	229,288	15,067	7,094,802	117,774	7,212,676	Public buildings.
..	Lighthouses, harbour-works, and harbour-defences	1,140,075	2,976	..	1,143,051	56	1,143,107	Lighthouses, harbour-works, and harbour-defences.
..	Departmental ..	1,194,654	127,962‡	2,662	1,319,954	691	1,320,645	Departmental.
15 of 1878	Development of water-power§	18,451	..	18,451	..	..	..	Development of water-power.
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 ..	2,338,272	3,856	..	2,342,128	..	2,342,128	Immigration.
..	Purchase of Native lands ..	2,061,963	..	57	2,061,906	..	2,061,906	Purchase of Native lands.
..	Defence ..	1,036,977	6,714	..	1,043,691	510	1,044,201	Defence.
..	Charges and expenses of raising loans ..	1,253,072	1	..	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 ..	258,509	931	..	259,440	70	259,510	Tourist and health resorts.
..	Lands improvement ..	137,770	1,838	..	139,608	..	139,608	Lands improvement.
..	Payment to Midland Railway bond-holders	150,000	..	..	150,000	..	150,000	Payment to Midland Railway bond-holders.
..	Irrigation and water-supply	20,405	11,650	..	32,055	681	32,736	Irrigation and water-supply
..	Plant, material, and stores ..	84,196	6,811	..	91,007	13,962	104,969	Plant, material, and stores
	Totals ..	66,968,468	1,440,733	43,492	68,365,709	424,834	68,790,543	Totals.

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

1917-18, £96,689.

† Includes £64 charged to "Unauthorized."

1916-17 is under separate special account.

‡ Expenditure under Telegraph Extension now included—1916-17, £203,311; 1915-16, £203,311; 1914-15, £203,311; 1913-14, £203,311; 1912-13, £203,311; 1911-12, £203,311; 1910-11, £203,311; 1909-10, £203,311; 1908-09, £203,311; 1907-08, £203,311; 1906-07, £203,311; 1905-06, £203,311; 1904-05, £203,311; 1903-04, £203,311; 1902-03, £203,311; 1901-02, £203,311; 1900-01, £203,311; 1899-00, £203,311; 1898-99, £203,311; 1897-98, £203,311; 1896-97, £203,311; 1895-96, £203,311; 1894-95, £203,311; 1893-94, £203,311; 1892-93, £203,311; 1891-92, £203,311; 1890-91, £203,311; 1889-90, £203,311; 1888-89, £203,311; 1887-88, £203,311; 1886-87, £203,311; 1885-86, £203,311; 1884-85, £203,311; 1883-84, £203,311; 1882-83, £203,311; 1881-82, £203,311; 1880-81, £203,311; 1879-80, £203,311; 1878-79, £203,311; 1877-78, £203,311; 1876-77, £203,311; 1875-76, £203,311; 1874-75, £203,311; 1873-74, £203,311; 1872-73, £203,311; 1871-72, £203,311; 1870-71, £203,311; 1869-70, £203,311; 1868-69, £203,311; 1867-68, £203,311; 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1389-90, £203,311; 1388-89, £203,311; 1387-88, £203,311; 1386-87, £203,311; 1385-86, £203,311; 1384-85, £203,311; 1383-84, £203,311; 1382-83, £203,311; 1381-82, £203,311; 13

TABLE NO. 2.

GENERAL SUMMARY.

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1896-97 to 1917-18.

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, 1896.	Expenditure.										
		1896-97.	1897-98.	1898-99.	1899-1900.	1900-1.	1901-2.	1902-3.	1903-4.	1904-5.	1905-6.	1906-7.
Immigration	£ 2,146,644	£ 301	£ 70	£ 105	£ 385	£ 214	£ 139	£ 142	£ Cr. 7	£ 6,481	£ 8,753	£ 14,353
Public Works, Departmental	399,141	14,892	9,689	10,090	12,572	12,932	17,771	13,949	16,088	12,814	13,517	16,710
Development of Water-power	..	..	..	..	..	..	..	..	..	468	2,901	4,664
Irrigation and Water-supply	..	..	..	..	..	..	..	..	..	..	..	..
Railways	15,099,677	207,231 <i>Cr. 334</i>	351,600	374,192	417,937	717,723	1,333,940	759,752	828,704	779,891	1,021,265	1,227,880
Payment to Midland Railway Bondholders	..	..	..	..	..	..	..	..	150,000	..	..	..
Roads :—												
Miscellaneous Roads and Bridges	3,750,000	15,691 <i>Cr. 365</i>	241,209	248,934	237,351	267,374	354,687	230,349	316,248	202,850	306,065	308,500
Roads on Goldfields	262,726	32,578	49,569	46,550	48,039	48,417	47,573	51,090	45,594	26,112	45,139	38,970
Development of Thermal Springs and Natural Scenery	..	16,023	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account*	197,375	103,555	..	..	..	..	..	..	..	..	..	..
Total, Roads	4,210,101	167,482	290,413	295,119	285,043	315,791	402,260	282,039	361,842	228,962	351,204	347,470
Development of Mining	587,651	10,508	33,117	17,355	21,815	15,907	15,326	24,213	16,278	6,238	18,533	11,064
Purchase of Native Lands	1,297,854	<i>Cr. 37</i>	61,503	53,182	32,025	28,688	18,261	15,782	5,352	6,281	13,777	9,135
Native Lands Purchase Account	362,980	129,000	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	1,660,834	128,963	61,503	52,957	32,025	28,688	18,261	15,782	5,352	6,281	13,777	9,135
Telegraph Extension	734,560	36,791	29,384	28,551	26,771	50,101	31,729	68,578	47,228	79,298	77,186	114,068

* 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 1917-18—continued.

Description of Services.	Total Net Expenditure to 31st March, 1896.	Expenditure.										
		1896-97.	1897-98.	1898-99.	1899-1900.	1900-1.	1901-2.	1902-3.	1903-4.	1904-5.	1905-6.	1906-7.
Public Buildings :—												
General (including Miscellaneous)	202,633	8,178	14,797	8,764	3,957	5,594	12,513	9,031	10,964	9,021	2,231	14,216
Parliamentary	20,993	9	466	20,636	9,883	3,039	4,424	1,503	602	697	71	1,047
Judicial	322,173	14,806	12,727	11,109	19,682	29,630	28,728	33,224	25,978	13,083	15,899	35,192
Post and Telegraph	164,328	7,504	5,888	5,168	13,483	20,954	40,361	74,686	53,918	16,008	38,419	43,918
Customs	6,519	16	385	..	107	875	2,066	6,630	8,719	13,018	7,903	414
Quarantine-stations	3,834	..	..	..	..	2,607	424	..	..	..	..	..
Mental Hospitals	374,067	16,404	14,130	17,667	17,712	18,872	16,743	10,167	15,812	15,949	16,235	8,049
Public Health	..	..	..	..	..	..	..	..	6,315	4,265	7,926	1,765
Hospitals and Charitable Institutions	47,744	700	..	..	899	5,141	1,200	3,540	4,291	1,204	4,786	10,259
School Buildings	877,014	22,143	23,864	43,403	49,256	33,681	38,606	57,790	87,089	42,721	69,223	109,459
Agricultural	2,124	819	1,328	520	447	971	535	883	2,504	1,362	2,618	2,707
Workers' Dwellings	..	..	..	..	..	..	..	..	..	..	..	..
Total, Public Buildings	2,021,429	70,579	73,585	107,267	115,426	121,364	145,600	197,454	216,192	117,328	165,311	227,026
Lighthouses, Harbour-works, and Harbour-defences :—												
Lighthouses..	129,054	6,067	2,180	3,727	3,333	1,017	2,060	6,082	6,206	2,167	962	..
Harbour-works	314,618	866	568	1,777	365	1,540	3,421	1,373	1,773	1,308	2,684	2,963
Harbour-defences	473,841	4,667	2,547	10,158	5,328	3,960	6,678	6,126	2,885	2,515	1,300	1,541
Total, Lighthouses, &c.	917,513	11,600	5,295	15,662	9,026	6,517	12,159	13,581	10,864	5,990	4,946	4,504
Rates on Native Lands	61,974	332	156	347	744	673	571	471	666	631	548	695
Contingent Defence	434,719	10,554	10,360	13,867	42,810	37,650	146,875	37,005	38,723	46,588	35,569	14,874
Tourist and Health Resorts	..	..	..	..	..	..	11,260	10,949	15,643	17,508	15,858	42,271
Lands Improvement*	..	..	..	..	..	..	1,741	2,349	2,019	2,248	1,052	5,605
Charges and Expenses of raising Loans	1,026,828	943	5	224	28,322	1,460	5,620	88,180	87,249	10,764	236	Cr. 5,175
		Cr. 6	Cr. 5				Cr. 516					
Interest and Sinking Funds	218,500	..	..	..	..	..	..	..	..	..	..	..
Coal-exploration and Mine-development	10,835	..	..	..	..	..	..	..	..	..	..	..
Thermal Springs	14,600	..	..	..	..	..	..	..	..	..	..	..
Total Ways and Means Credits	29,544,556	705	370	590	347	1,309,020	2,142,736	1,514,444	1,796,841	1,321,510	1,730,686	5,175
Grand Total—Net Expenditure	..	659,836	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

* 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 1917-18—continued.

Description of Services.	Expenditure.										Total Net Expenditure to 31st March, 1918.
	1907-8.	1908-9.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.
Public Buildings:—											
General (including Miscellaneous)	£ 16,260	£ 39,635	£ 41,994	£ 44,044	£ 34,721	£ 44,719	£ 43,199	£ 52,239	£ 22,050	£ 12,648	£ 11,646
Parliamentary	4,119	5,172	3,137	237	2,004	18,806	23,612	31,478	17,133	22,586	Cr. 15,067
Judicial	28,938	37,211	31,606	22,295	44,133	45,431	28,445	38,808	4,902	209	37,233
Police-stations	43,724	62,262	68,574	117,815	130,815	122,909	78,815	60,838	25,484	21,147	13,195
Post and Telegraph	47	2,507	233	..	..	..	..	..	35,258	22,744	18,814
Customs	..	..	..	..	..	..	..	..	..	..	33,525
Quarantine-stations	7,987	15,296	19,839	12,707	8,809	46,181	20,001	53,996	54,898	44,602	26,502
Mental Hospitals	..	..	..	..	..	..	..	..	Cr. 15	..	..
Public Health	7,497	4,402	319	..	12,745	376	1,435	..	..	..	..
Hospitals and Charitable Institutions	15,576	11,153	7,259	1,484	90,535	8,750	1,435	998	1,426	7,570	4,080
School Buildings	100,197	102,340	98,103	124,926	6,004	105,000	121,954	122,940	97,972	70,367	63,082
Agricultural	1,690	5,543	6,103	1,160	3,684	6,475	4,398	2,428	2,972	3,046	5,685
Workers' Dwellings	..	..	..	..	22,644	46,455	41,741	68,275	55,893	35,437	15,505
Total, Public Buildings	226,035	285,521	277,137	324,668	350,090	445,192	369,600	431,966	335,759	256,131	214,221
Lighthouses, Harbour-works, and Harbour-defences:—											
Lighthouses	1,417	7,481	6,762	1,470	5,428	9,031	5,174	3,887	1,415	449	561
Harbour-works	2,867	4,439	4,548	4,092	6,004	7,415	3,346	12,563	9,355	2,280	2,359
Harbour-defences	2,579	7,297	5,372	2,865	1,144	339	539	681	2,903	1,038	56
Total, Lighthouses, &c.	6,863	19,217	16,682	8,427	12,576	16,785	7,297	17,131	13,673	3,767	2,976
Rates on Native Lands	837	27	..	..	..	..	..	..	..	..	68,672
Contingent Defence	18,574	10,766	4,977	6,071	10,437	23,790	30,186	15,221	37,619	9,742	6,714
Tourist and Health Resorts	45,048	24,286	14,507	5,912	13,361	12,906	14,989	8,232	5,167	1,094	931
Lands Improvement*	9,561	19,542	6,910	11,125	20,394	22,550	16,996	13,810	5,936	Cr. 2,731	1,838
Charges and Expenses of raising Loans	Cr. 8,487	575	17,715	66,367	67,470	72,950	105,449	35,495	5,037	35	1
Interest and Sinking Funds	..	..	..	..	..	..	..	..	..	..	1,253,073
Coal-exploration and Mine-development	..	..	..	..	..	..	..	..	..	..	218,500
Thermal Springs	..	..	..	..	..	..	..	..	..	..	10,835
Plant, Material, and Stores	..	..	..	..	..	..	..	..	..	..	14,600
Total Ways and Means Credits	8,487	2,183,245	2,022,876	1,891,918	2,190,731	2,347,965	2,421,464	2,565,019	2,333,784	1,278,483	43,492
Grand Total—Net Expenditure	1,909,688	2,183,245	2,022,876	1,891,918	2,190,731	2,347,965	2,421,464	2,565,019	2,333,784	1,278,483	43,492

* 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, 1918.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1917.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1917-18.					Expenditure under Special Acts during Year 1917-18.*	Amounts previously charged to "Surveys of New Lines," now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1918.	Valuation of Works constructed by Provinces and Midland Railway Company.
			New Works.		Works on Open Lines.	Land Claims and other Old Liabilities.					
			Construction and Surveys.	Permanent-way.							
	£	£	£	£	£	£	£	£	£	£	£
Kaihu Valley	104,163	Cr. 33	..	Cr. 33	..	..	..	..	..	104,130	..
Ōtiria to Hokitanga	195,943	11,621	487	12,108	..	..	..	..	..	208,051	..
Opua Wharf to Whangarei and Onerahi	522,548	42,238	9,813	52,051	170	..	..	..	..	522,718	..
Whangarei to North Auckland Main Trunk (Waiohira)	135,241	..	..	..	..	..	..	..	..	187,292	..
Waipu Branch	369	..	..	..	..	..	..	..	..	369	..
Helensville Northwards	829,453	17,700	20	17,720	..	..	1,461	..	..	848,634	..
Helensville to Te Awamutu	2,182,340	..	..	..	10,092	..	93,100	..	..	2,285,532	..
Waikato Branch (Paerata to Waikato)	62,624	10,734	3,353	14,087	..	..	..	..	..	76,711	..
Huntly to Awaroa	107,602	254	..	254	..	..	..	..	..	107,856	..
Waikato to Thames—Frankton to Te Aroha	153,672	..	..	..	..	..	445	..	..	154,117	..
Te Aroha to Thames	207,649	..	..	..	..	..	..	..	..	207,649	..
Cambridge Branch (Ruakura Junction to Cambridge)	51,500	..	..	..	..	..	..	..	..	51,500	..
Paeroa to Waihi and Tauranga	182,928	2,774	..	2,774	..	..	..	..	..	185,702	..
Thames Valley to Rotorua—Morrinsville to Lichfield.. .. .	166,750	..	..	..	..	..	350	..	..	167,100	..
Putaruru to Rotorua	200,245	..	..	..	..	4	422	..	..	200,671	..
Marton to Te Awamutu	2,718,501	..	..	..	10,003	..	1,204	..	..	2,729,708	..
Raeitihi to Ohakune	68,465	15,307	168	15,475	..	..	..	..	..	83,940	..
Tauranga to Taneatua, including Te Maunga—Maunganui Branch	309,786	35,252	7,723	42,975	..	..	..	..	..	352,761	..
Gisborne to Motu	615,091	10,619	243	10,862	696	..	..	..	..	626,649	..
Gisborne to Ormond Tramway	4,975	..	..	..	..	..	..	..	..	4,975	..
Napier to Gisborne—Gisborne Southwards	172,446	4,135	1,698	5,833	..	..	..	..	..	178,279	..
Wairoa Northwards	1,633	7	..	7	..	..	..	..	..	1,640	..
Napier Northwards	42,702	9,341	..	9,341	..	..	..	..	..	52,043	..
Wellington to Napier—Napier to Woodville and Palmerston North	920,848	..	..	..	4,275	..	31	..	..	925,154	..
Wellington to Woodville, including Te Aro Extension	1,626,347	..	..	..	4,755	..	503	..	..	1,631,605	..
Featherston to Martinborough	399	..	..	..	..	..	..	..	..	399	..
Wellington to Waitara—Wellington to Longburn	1,008,224	..	..	..	7,023	..	2,025	..	..	1,017,272	..
Foxton to Waitara	1,555,839	..	..	..	3,486	..	92	..	..	1,559,417	..
Mount Egmont Branch	72,099	Cr. 19	..	19	..	..	..	..	..	72,080	..
Opunake Branch (Te Roti to Opunake)	45,221	10,078	1,470	11,548	..	..	..	..	..	56,769	..
Mania Branch (Kapuni to Mania)	2,194	2,588	..	2,588	..	..	..	..	..	4,782	..
Rangitikei River Quarry Line	206	..	..	..	..	..	..	..	..	206	..

* Railways Improvement Authorization Act 1914 Account.

TABLE NO. 3—continued.
EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1918—continued.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1917.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1917-18.					Expenditure under Special Acts during Year 1917-18.*	Amounts previously charged to New Lines," now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1918.	Valuation of Works constructed by Provinces and Midland Railway Company.
			New Works.		Works on Open Lines.	Land Claims and other Old Liabilities.					
			Construction and Surveys.	Permanent- way.			Total New Works.				
Stratford to Okahukura (East End)	£ 159,562	..	£ 31,306	..	£ 31,306	..	£ ..	£ ..	£ 190,868	..	£ 78,307
Stratford to Okahukura (West End)	686,753	..	10,004	3,256	13,260	..	75	..	700,088	..	543,574
Nelson to Roundell	199,964	110	..	..	..	..	128	..	199,982	..	61,579
Midland Railway—											
Belgrove to Inangahua ..	261,721	..	Cr. 88	..	Cr. 88	..	26	..	261,633	..	
Stillwater to Inangahua..	203,939	..	58	..	58	..	25	..	204,023	..	
Brunnerton to Bealey ..	774,802	..	42,911	..	42,911	..	..	..	817,738	..	
Springfield to Bealey ..	743,035	..	1,329	..	1,329	..	..	..	744,364	..	
Westport to Ngakawau ..	188,009	..	..	..	..	..	..	..	188,009	..	
Westport to Inangahua ..	152,575	..	231	..	231	..	..	..	152,806	..	
Ngahere to Blackball ..	147,532	..	..	..	..	..	..	..	147,532	..	
Greymouth to Point Elizabeth	254,999	..	27	..	27	..	..	..	255,026	..	
Greymouth to Brunnerton..	150,651	..	..	..	..	..	256	..	150,651	..	
Greymouth to Ross and Mikonui	338,274	..	..	..	..	..	..	..	338,480	..	
Picton to Waipara—											
Picton Southwards ..	650,905	..	375	..	375	2,375	..	..	653,655	..	
Waipara Northwards ..	374,377	..	Cr. 123	..	Cr. 123	..	..	..	374,254	..	
Culverden to Hamner (motor-cars and sheds)	3,834	..	..	..	..	..	..	..	3,834	..	
Culverden to Waiau ..	33,902	..	10,690	1,966	12,656	..	..	..	46,558	..	
Hurunui to Waitaki—											
Main Line (Culverden-Waitaki) ..	1,859,162	..	..	..	..	9,262	..	9,068	1,877,492	..	316,135
Oxford Branch (Rangiora to Oxford West)	51,521	..	..	..	..	1,261	..	..	52,782	..	
Eyretown Branch (Kaipoi to Bennett's)	44,277	..	..	..	..	..	..	..	44,277	..	
Lyttelton Branch ..	80,908	..	..	..	..	..	..	..	80,908	..	340,500
Southbridge Branch (Hornby to Southbridge)	90,560	..	..	..	..	817	..	..	91,377	..	
Springfield and Whitecliffs Branches	95,860	..	..	..	..	..	..	..	95,860	..	
Fairlie Creek Branch (Washdyke Junction to Fairlie)	67,251	..	..	..	..	..	..	..	67,251	..	75,124
Waimate Branch ..	70,298	..	Cr. 17	..	Cr. 17	..	..	..	70,281	..	
Rakaia to Methven ..	74,640	..	..	..	..	..	..	..	74,640	..	
Ashburton to Springburn ..	61,639	..	..	..	..	..	..	..	61,639	..	
Little River Branch (Lincoln to Little River)	108,524	..	..	..	..	..	..	..	108,524	..	
Canterbury Interior Main Line—											
Oxford to Malvern ..	53,668	..	..	..	..	53	..	..	53,721	..	
Whitecliffs to Rakaia ..	54,542	..	..	..	..	..	..	..	54,542	..	
Temuka to Rangitata ..	5,152	..	..	..	..	..	..	..	5,152	..	
Waitaki to Bluff—											
Main Line, including Port Chalmers Branch	3,290,384	..	..	..	..	3,874	..	2,958	3,297,216	..	82,259
Dunroon Branch (Pukeuri to Kurow)	97,099	..	..	..	..	..	..	..	97,099	..	37,500
Ngapara Branch (Waiareka Junction to Ngapara)	26,090	..	..	..	..	..	..	..	26,090	..	58,009

* Railways Improvement Authorization Act 1914 Account.

TABLE NO. 3—continued.

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1918—continued.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1917.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1917-18.					Expenditure under Special Acts during Year 1917-18.*	Amounts previously charged to "Surveys of New Lines," now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1918.	Valuation of Works constructed by Provinces and Midland Railway Company.
			New Works.			Works on Open Lines.	Land Claims and other Old Liabilities.				
			Permanent-way.		Total New Works.						
			Construction and Surveys.								
	£	£	£	£	£	£	£	£	£		
Waitaki to Bluff—continued.											
Livingstone Branch (Windsor to Tokarahi)	82,785	..	..	..	..	..	..	..	..	82,785	..
Waitemo Branch (Palmerston to Dunback)	33,191	..	..	..	..	..	..	..	..	33,191	..
Fernhill Railway Purchase	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 ..	305,285	..	..	..	..	..	..	..	..	305,334	..
Balclutha—Tuapeka Mouth ..	1,961	..	Cr. 18	..	Cr. 18	..	..	..	..	1,943	..
Catlin's River Branch (Balclutha to Tahakopa)	462,702	..	Cr. 9	..	Cr. 9	..	..	..	..	462,693	..
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 ..	52,743	..	..	..	..	585	..	..	..	53,328	..
Riversdale to Switzer's ..	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)	1,339,905	..	18,319	5,619	23,938	..	..	..	..	1,363,843	..
Invercargill to Kingston—											
Main Line ..	358,842	..	..	..	..	66	..	62	..	358,970	91,937
Mararoa Branch (Lumsden to Mossburn) ..	27,217	..	..	..	..	..	..	..	..	27,217	..
Winton to Heddon Bush ..	231	..	..	..	..	..	..	..	..	231	..
Makarewa to Orepuki and Waiau ..	336,653	..	45	..	45	..	..	..	..	336,693	60,297
Thornbury to Wairoa ..	22,984	..	..	..	..	..	..	..	..	22,984	..
Forest Hill (Winton to Hedgehope) ..	10,337	..	..	..	..	..	..	..	..	10,337	..
Expenses of Railway Commissions and other Expenditure not chargeable to Individual Lines											
Surveys of New Lines—											
North Island ..	35,900	..	..	..	..	..	..	..	..	35,900	..
Middle Island ..	5,752	..	..	..	..	..	..	..	..	5,752	..
Rolling-stock ..	6,535,094	..	..	..	..	140,984	..	..	..	6,676,078	..
Stock of Permanent-way Materials, 31st March, 1917 ..	77,805	..	..	..	..	..	..	..	..	..	..
Stock of Permanent-way decreased by £27,971	35,951,001	..	..	..	..	..	..	..	..	..	..
Stock of Permanent-way Materials, 31st March, 1918 ..	27,971	..	..	..	..	..	..	..	..	49,834	..
Total ..	35,923,030	110	287,685	35,816	323,501	200,162	79	111,721	..	36,558,383	1,787,741†

* Railways Improvement Authorization Act 1914 Account.
 † Also 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.	Electric Supply Account. Development of Water-power.	Irrigation and Water-supply Account. Irrigation and Water-supply.	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	35,009	14,689	9,555
1913-14 ..	..	63,245	..	4,282	142,828	33,602	9,632
1914-15 ..	..	..	92,975	9,151	74,291	32,090	10,004
1915-16 ..	..	..	47,974	13,344	55,410	29,874	9,225
1916-17 ..	..	..	24,730	6,787	49,032	4,745	10,407
1917-18 ..	..	..	43,996	..	30,948	..	12,025
	697,408	206,626	209,675	53,401	387,518	115,000	64,617

* 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.

|| Includes £21,113 previously expended out of Public Works Fund, now transferred to the Electric Supply Account.

Stand-by provision—					
495 16 8	Payment to Christchurch Board	Tramway	1,104 0 0		
42 7 0	Payment to Christchurch Board, for energy supplied ..	Tramway	..	1,104 0 0	
538 3 8					
Management and general expenses—					
1,225 5 7	Salaries		1,522 19 10		
21 13 7	Wages		294 19 7		
	Sick and holiday pay to workmen ..		187 15 10		
139 5 5	Travelling expenses		200 0 0		
200 0 0	Office-rent		107 5 6		
108 0 0	Postages and telegrams		91 11 11		
87 1 7	Telephone subscriptions		177 12 2		
113 7 10	Printing and stationery		12 1 5		
13 7 2	Advertising		14 15 0		
209 1 5	Accident insurance		19 4 0		
17 1 5	Fire insurance		25 6 6		
87 5 6	Legal expenses		275 15 4		
217 19 7	Meter-reading		84 12 2		
34 13 1	Commission on collection of accounts ..		386 15 11		
174 1 4	Electrical testing		0 10 0		
0 18 1	Bad debts		29 7 5		
17 16 1	Miscellaneous trade expenses			3,440 12 7	
2,666 17 8				14,448 14 2	
7,865 9 9	Balance to Net Revenue Account ..		..	17,643 3 11	
£20,754 4 6				32,091 18 1	£32,091 18 1

Net Revenue Account.

£	s.	d.	£	s.	d.	£	s.	d.
6,078 12 5	To Depreciation at 2 per cent. per annum on completed work ..	7,013 6 5	7,865 9 9	By Balance from Gross Revenue Account ..	17,643 3 11	4,240 16 2		
13,743 2 1	Interest for year ended 31st March, 1918 ..	14,870 13 8	11,956 4 9	Balance to Profit and Loss Appropriation Account ..	..	..		
£19,821 14 6		£21,884 0 1	£19,821 14 6		£21,884 0 1			

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY—continued.
BALANCE-SHEET AT 31ST MARCH, 1918.

1916-17.		Liabilities.		1917-18.		1916-17.		Assets.		1917-18.		
£	s. d.		£	s. d.	£	s. d.	£	s. d.		£	s. d.	
12,165	19 8	Depreciation Fund Account ..	..	..	19,411	8 11	4,023	1 1	Works at Lake Coleridge—	..	4,086	17 8
							5,317	4 6	Land, including fencing and planting	..	5,317	4 6
							7,566	3 8	Coalgate Gorge Road ..	..	7,566	3 8
							279	12 8	Service roads ..	..	279	12 8
1,242	9 8	Sundry creditors—	..	..					Service telephones ..	..		
944	9 7	On open accounts	..	1,197	2 1				Headworks—			
631	17 1	On contracts ..	..	1,531	6 9				Tunnel, including inlet and outlet works	69,679	17 5	
29	2 6	Wages accrued ..	..	334	6 10				Pipe-lines ..	22,451	7 0	
		Payment for current in advance ..	..	316	6 8				Tram-line ..	1,861	16 6	
									Weir at lake-outlet, gauges, and fencing	396	14 9	
2,847	18 10											
		Balance carried to general balance-sheet—										
418,760	4 1	Total assets as <i>per contra</i>	..	451,365	6 7				Power-house—			
15,013	18 6	Total liabilities as above	..	22,707	11 3				Buildings, &c. ..	21,302	10 1	
									Machinery, &c. ..	49,361	16 1	
403,746	5 7								Office furniture, fittings, &c. ..	312	1 3	
									Accommodation for staff and workmen—			
									Buildings, fencing, &c. ..	..	11,332	11 6
									Transmission-line—			
									Land ..	4,881	2 2	
									Power-lines ..	38,650	11 1	
									Telephone-system ..	2,342	0 11	
									Linemen's cottages, depots, tools, and equipment ..	469	9 5	
									Alterations to public telegraph-lines	6,540	12 3	
									Addington Substation—			
									Land, including cottages	3,394	19 2	
									Substation buildings ..	3,889	2 3	
									Machinery, &c. ..	13,325	14 6	
									Store buildings and workshops ..	1,899	19 1	
		</										

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY—continued.

BALANCE-SHEET AT 31ST MARCH, 1918—continued.

1916-17.		1917-18.		1916-17.		Assets.		1917-18.	
£	s. d.	£	s. d.	£	s. d.			£	s. d.
418,760	4 1	..	..	257,677	4 1	Brought forward ..	..	269,342	3 11
						Primary distribution—	..		
						Supply cables—	..		
				8,755	12 7	Christchurch City ..	..	8,755	12 7
				2,889	5 2	Christchurch Tramways	..	2,958	11 3
				5,584	5 1	Lyttelton ..	..	5,894	12 8
				10,743	19 3	Northern ..	..	11,216	6 11
				6,467	5 5	Southern ..	..	6,747	7 3
				622	9 9	Lightning-arresters	..	622	9 9
				1,276	4 3	Tools and equipment ..	..	1,142	14 4
				984	5 1	Alterations to public telegraph-lines	..	1,113	3 7
				37,323	6 7			38,450	18 4
						Secondary distribution—			
				14,819	14 1	Supply cables and reticulation ..	..	18,369	7 1
				5,425	6 5	Local substations ..	..	6,002	1 1
				20,245	0 6			24,371	8 2
						Service transformers and meters	..	11,627	5 9
				10,925	11 1	Motor cars, lorry, and cycles, &c.	..	3,88	4 4
				2,816	8 10	Public telephones to the lake	..	1,654	6 2
				1,654	6 2	Telephones to Christchurch City Council and	..		
				161	19 5	Tramway Board ..	..	160	6 11
				84	2 1	Christchurch office—Furniture and fittings	..	93	6 7
				14,753	2 6	Engineering, office, and general expenses on	..	15,901	11 10
				8,194	17 9	preliminary surveys and during construction ..	..	9,844	10 4
				13,148	14 0	Salaries of Engineers and others on preliminary	..	14,319	14 2
				366,984	13 0	surveys and during construction ..	..		
				12,628	18 1	Interest during construction ..	..	389,753	16 6
				76	3 6	Stocks of material, &c., on hand at date	..	20,275	7 4
				634	10 0	Telephone subscriptions and fire insurance paid	..		
				4,423	16 6	in advance ..	..	76	14 11
				3,332	13 9	Material lost on s.s. "Rangitira," covered by	..		
				388,080	14 10	insurance but not yet adjusted ..	..	5,278	18 1
						Sundry debtors for current and rent ..	..	1,109	6 7
						Sundry debtors for work carried out, &c.	..	6,388	4 8
						Balance from Profit and Loss, Appropriation		416,494	3 5
						Account ..	..	34,871	3 2
						Balance from Accident Insurance Fund Account	..		
								£451,365	6 7
								£451,365	6 7

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

ROBERT J. COLLINS,
Controller and Auditor-General.

P. S. WALDIE, Acting-Accountant.

APPENDICES TO THE PUBLIC WORKS STATEMENT, 1918.

APPENDIX A.

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS
OUT OF THE PUBLIC WORKS FUND FOR THE YEAR 1917-18.*Prepared in compliance with Section 8 of the Public Works Act, 1908.*

SIR,—

Public Works Department, Wellington, 3rd June, 1918.

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 1917-18.

Class.	Votes.	Summary.	Appropriation.	Expenditure.	Credits.	Net Expenditure.
		PUBLIC WORKS FUND.	£	£ s. d.	£ s. d.	£ s. d.
XVI	90	Public Works, Departmental ..	135,000	132,125 1 0	4,226 15 5	127,898 5 7
XVII	91-92	Railways	650,000	545,223 19 11	49,452 10 2	495,771 9 9
XVIII	93-102	Public Buildings	316,940	231,842 7 6	2,554 4 9	229,288 2 9
XIX	103-105	Lighthouses, Harbour-works, and Harbour-defences	7,765	3,282 2 9	306 8 3	2,975 14 6
XX	106	Tourist and Health Resorts ..	5,200	966 14 0	35 0 0	931 14 0
XXI	107	Immigration	7,500	10,229 2 9	6,373 9 7	3,855 13 2
XXII	108-110	Roads, Bridges, and other Public Works	451,085	147,140 7 9	11,498 6 1	135,642 1 8
XXIII	111	Development of Mining	1,450	72 5 4	44 18 11	27 6 5
XXIV	112	Telegraph Extension	250,000	150,607 16 6	33,342 8 7	117,265 7 11
XXV	113	Contingent Defence	15,000	6,713 15 6	..	6,713 15 6
XXVI	114-115	Lands Improvement	15,000	2,929 2 4	1,091 1 1	1,838 1 3
XXVII	116	Irrigation and Water-supply ..	30,000	11,953 6 6	303 0 11	11,650 5 7
XXVIII	117	Plant, Material, and Stores ..	15,000	20,628 11 7	13,818 6 9	6,810 4 10
..	..	Unauthorized	..	4,175 14 3	4,111 16 11	63 17 4
		Total, Public Works Fund ..	1,899,940	1,267,890 7 8	127,158 7 5	1,140,732 0 3

P. S. WALDIE,
Acting-Accountant.

W. S. SHORT,
Under-Secretary.

Examined and found correct.

ROBERT J. COLLINS,
Controller and Auditor-General.

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.	£	s.
	PUBLIC WORKS FUND.								
90	Public Works, Departmental	135,000	132,125	1	0	4,226	15	127,898	5
	Railways—								
	Railway-construction—								
	Kaihu Railway Extension	1,000	2	5	0	35	3	Cr.	32
	Kawakawa-Hokianga	20,000	11,704	6	11	83	3	11,621	3
	North Auckland Main Trunk—								
	Kirikopuni Southwards	10,000	79	10	0	14	2	65	8
	Kaiwaka Northwards	20,000	18,948	1	1	1,313	8	17,634	12
	Whangarei-North Auckland Main Trunk	40,000	42,547	12	4	310	8	42,237	3
	Waipu Branch	500							
	Waiuku Branch	15,000	11,300	13	8	566	17	10,733	16
	Huntly-Awaroa	4,000	1,337	5	3	1,083	15	253	9
	East Coast Main Trunk—								
	Waihi-Tauranga	5,000	2,784	4	2	9	18	2,774	5
	Tauranga-Te Maunga	10,000	2,890	7	9	21	3	2,869	4
	Maunganui-Taneatua	25,000	39,833	19	9	7,450	11	32,383	8
	Gisborne-Motu	12,000	11,569	12	9	950	8	10,619	3
	Napier-Gisborne—								
	Gisborne-Wairoa	10,000	5,083	15	8	948	12	4,135	2
	Wairoa-Gisborne	10,000	6	13	9			6	13
	Wairoa-Napier	1,000							
	Napier-Wairoa	20,000	17,657	0	11	8,315	13	9,341	7
	Mount Egmont Branch	100	Cr.	2	5	16	13	Cr.	18
	Opunake Branch	25,000	12,847	8	4	180	18	12,666	10
	Stratford-Main Trunk—								
	East End	30,000	32,769	11	3	1,464	0	31,305	10
	West End	20,000	11,501	19	10	1,498	8	10,003	10
91	Raetihi-Main Trunk	18,000	19,235	7	10	3,928	4	15,307	2
	Stone-quarry Line, Rangitikei River	100							
	Featherston-Martinborough	100							
	South Island Main Trunk	5,000	1,716	3	11	1,464	7	251	16
	Midland Railway—								
	Nelson End	5,000	228	17	1	316	11	Cr.	87
	Reefton End	100	57	17	6			57	17
	Otira-Bealey	60,000	43,343	17	5	432	16	42,911	1
	Broken River-Bealey	5,000	1,344	5	6	15	0	1,329	5
	Westport-Inangahua	500	296	10	0	65	2	231	7
	Greymouth-Point Elizabeth	100	27	5	1			27	5
	Culverden-Waiau	20,000	12,160	2	2	1,469	12	10,690	9
	Waimate Branch Extension	1,000	1	11	0	19	5	Cr.	17
	Lawrence-Roxburgh	100	48	12	5			48	12
	Otago Central	15,000	20,171	11	3	1,852	17	18,318	13
	Balclutha-Tuapeka Mouth	100	1	0	0	18	17	Cr.	17
	Catlin's-Waimahaka	100	45	14	3	54	16	Cr.	9
	Winton-Heddon Bush	500							
	Orepuki-Waiau Extension	500	51	1	8	5	12	45	9
	Land Claims, &c.	500	78	19	8			78	19
	Surveys, New Lines of Railways	700							
	Permanent-way Materials	50,000	22,715	10	2	14,870	6	7,845	3
	Total	461,000							
	Total Vote, Railway-construction	400,000	344,386	10	4	48,777	0	295,609	10
92	Additions to Open Lines	250,000	200,837	9	7	675	9	200,161	19
	Public Buildings—								
93	General	41,250	49,416	14	2	537	11	48,879	3
94	Courthouses	2,000	35	4	11	14	0	21	4
95	Prisons	16,000	13,271	5	3	76	12	13,194	13
96	Police-stations	25,000	18,814	3	9			18,814	3
97	Postal and Telegraph	50,190	34,532	14	2	1,008	5	33,524	8
98	Agricultural	7,000	5,684	14	2			5,684	14
99	Mental Hospitals	45,000	26,643	6	9	141	3	26,502	2
100	Hospitals and Charitable Institutions	10,000	4,125	17	7	45	12	4,080	5
101	School Buildings	100,500	63,813	0	10	730	19	63,082	1
102	Workers' Dwellings	20,000	15,505	5	11			15,505	5
	Lighthouses, Harbour-works, and Harbour-defences—								
103	Lighthouses	765	560	13	1			560	13
104	Harbour-works	5,000	2,663	2	1	304	3	2,358	18
105	Harbour-defences	2,000	58	7	7	2	5	56	2
106	Tourist and Health Resorts	5,200	966	14	0	35	0	931	14
107	Immigration	7,500	10,229	2	9	6,373	9	3,855	13
	Construction and Maintenance of Roads, Bridges, and other Public Works—								
108	Roads, &c.	358,505	120,996	17	2	10,854	8	110,142	9
109	Backblocks Roads, &c.	72,380	19,231	7	2	643	7	18,587	19
110	Road and other Works on Goldfields and Mineral Lands	20,200	6,912	3	5	0	10	6,911	13
111	Development of Mining	1,450	72	5	4	44	18	27	6
112	Telegraph Extension	250,000	150,607	16	6	33,342	8	117,265	7
113	Contingent Defence	15,000	6,713	15	6			6,713	15
	Lands Improvement—								
114	Improved-farm Settlements	2,000	612	1	4	1,091	1	Cr.	478
115	Lands, Miscellaneous	13,000	2,317	1	0			2,317	1
116	Irrigation and Water-supply	30,000	11,953	6	6	303	0	11,650	5
117	Plant, Material, and Stores	15,000	20,628	11	7	13,818	6	6,810	4
	Unauthorized—Services not provided for		4,175	14	3	4,111	16	63	17
	Total, Public Works Fund	1,899,940	1,267,890	7	8	127,158	7	1,140,732	0

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, 1918.

I have the honour to submit the following report upon the various works completed and in progress throughout the Dominion during the period from the 1st April, 1917, to the 30th June, 1918.

In view of the early session of Parliament last year my last report dealt with the period up to the 31st March, 1917, instead of up to the 30th June, as usual. This report therefore covers a period of fifteen months instead of twelve.

The Department's operations are still severely restricted owing to war conditions. The number of men employed continued to dwindle until the end of the year 1917, but latterly there has been a slight upward tendency. The more important items of material and plant are still unprocurable, and there appears to be little prospect of any improvement of the position in the near future.

RAILWAYS.

ABSTRACT.

The following table shows the expenditure and liabilities on Government railways in New Zealand up to the 31st March, 1918 :—

Name of Railway.	Total Length of Railway or Section.	Open for Traffic.	Expenditure to 31st March, 1918.
	M. ch.	M. ch.	£
Kaihu Valley	24 30	19 58	104,130
Kawakawa-Hokianga	45 25	16 25	208,051
Opua Wharf - Grahamtown (Onerahi)	58 6	58 6	522,718
Whangarei southward	19 77	..	187,661
North Auckland Main Trunk Railway (from Helensville)	86 22	47 77	848,634
Helensville - Te Awamutu, with Branches	163 48	150 39	2,470,099
Frankton Junction-Thames, with Branches	127 35	87 20	598,968
Thames Valley - Rotorua	69 33	69 33	367,771
Tauranga-Opotiki, with Branches	138 27	..	352,761
Gisborne-Opotiki	93 45	49 32	626,649
Napier-Gisborne	206 39	..	231,962
Wellington-Napier and Palmerston North (including Te Aro Extension and Greytown and Martinborough Branches)	249 44	233 12	2,557,158
Wellington-Waitara, with Branches	350 11	285 59	2,710,526
Stratford-Okahukura	101 27	42 26	890,956
North Island Main Trunk (Marton - Te Awamutu), including Raetihi Branch	218 39	218 39	2,813,648
Picton-Waipara (South Island Main Trunk Railway)—			
Picton southwards	92 38	56 6	653,655
Waipara northwards	90 45	44 14	374,254
Nelson-Belgrove	22 73	22 73	199,982
Midland Railway	239 75	179 67	2,027,758
Westport-Ngakawau	19 56	19 56	188,009
Westport-Ngakawau Extension to Mokihinui*	7 12	7 12	..
Mokihinui Colliery Line†	3 69	3 69	..
Westport-Inangahua	26 0	5 74	152,806
Ngabere-Blackball	3 40	3 40	147,532
Greymouth-Coal Creek	8 70	8 70	255,026
Greymouth-Brunner	7 51	7 51	150,651
Greymouth-Waitaha	50 32	38 68	338,480
Culverden-Hammer Motor-cars and Sheds	..	..	3,834
Hurunui-Waitaki, with Branches	501 52	443 8	2,671,589
Canterbury Interior Main Line—Oxford-Temuka	83 0	11 44	59,415
Waitaki-Bluff, with Branches	600 21	546 16	4,950,881
Otago Central	182 51	134 78	1,363,843
Invercargill-Kingston, with Mararoa Branch	117 4	97 44	386,418
Forest Hill Railway—Winton-Hedgehope‡	12 40	12 40	22,984
Western Railways	94 8	70 31	336,698
Preliminary Surveys	..	..	41,652
Miscellaneous	..	..	10,337
Stock of Permanent-way on hand	..	..	49,834
Rolling-stock	..	..	6,676,078
Total	4,116 45	2,993 7	\$36,553,408

* 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, 1918.
	M. ch.	M. ch.	£
PROVINCIAL GOVERNMENT LINES, ETC.			
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	4,116 45	2,993 7	38,346,124

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

During the year four sections of railway, totalling 22 miles 41 chains in length, as shown in the following table, were handed over to the Railway Department for general traffic:—

Plan Mileage.	Railway.	Section.	Length.	Date.
M. ch. M. ch.			M. ch.	
0 0 to 4 20	Waiuku Branch	Patumahoe ..	4 20	10 Dec., 1917.
44 10 to 49 8	East Coast Main Trunk	Motuhora ..	4 78	26 Nov., 1917.
0 0 to 8 50	Raetihi Branch	Raetihi ..	8 50	18 Dec., 1917.
37 53 to 42 26	Stratford—Main Trunk (West End) ..	Kohuratahi ..	4 53	7 Jan., 1918.

KAIHU VALLEY RAILWAY.

No work has been done on this line during the period.

KAWAKAWA—HOKIANGA RAILWAY.

Okaihau Section (16 m. 25 ch. to 24 m. 44 ch.; length, 8 miles 19 chains).—Work has been going on throughout the period, but the number of men available was very small, so that progress has been slow. Moreover, the work has been hindered by continual rains and consequent slips, including some very heavy ones. A trestle has been constructed over the site of the bank at 19 m. 54 ch., which is being formed with material obtained from the large cutting between 19 m. 58 ch. and 19 m. 74 ch. A steam-navvy has been employed in this cutting and showed excellent results, but the material, a heavy clay pug, is now too wet to handle, and the machine is being transferred to the borrow-pit at 19 m. 45 ch. for a couple of months, the material there being sandy. Formation-work up to 22 m. 65 ch. is nearing completion, and several concrete culverts have been constructed as far ahead as 24 m. 33 ch., in Okaihau station-yard. Earth-work is now in hand up to this point. A road-deviation between 23 m. 25 ch. and 23 m. 50 ch. has been formed and metalled, and the main road between Kaikohe and Okaihau, which is used as a service road, has been re-metalled for a distance of about 1 mile, the metal for this and other purposes being obtained from a quarry at 21 m. Concrete piers for a subway at 19 m. 58 ch. were completed, and a telephone-line has been erected from Kaikohe to 19 m.

Some Jugoslavs are now at work on this line, and better progress is being made, but the number of men available is by no means sufficient.

WHANGAREI—NORTH AUCKLAND RAILWAY.

Oakleigh Section (0 m. to 7 m. 60 ch.).—The Kioreroa contract (0 m. to 4 m.) has been completed, about two years after due date, the contractors having been delayed by scarcity of labour and unfavourable weather. The work done during the period includes the completion of the southern approach to the Otaika Bridge, 63 chains of stone pitching, and 2 miles of fencing. Beyond 4 m. co-operative work has been carried on by the Department with the object of completing the line to Portland Station (5 m. 21 ch.). The formation of this length is complete, and the rails are laid and ballasted. An overbridge has been erected at 4 m. 70 ch., and the line has been fenced throughout. A station building, goods-shed, and two platelayers' cottages at Portland have been erected, also one cottage at Kioreroa. The whole of the work on this length has been delayed by very severe storms, which have caused serious damage from time to time.

On the remainder of the section little has been done, except some ballasting in the vicinity of Oakleigh Station and the erection of the Katetoki Stream Bridge (7 m. 30 ch.), which is well in hand.

Tauraroa Section (7 m. 60 ch. to 14 m. 75 ch.; length, 7 miles 15 chains).—Although the formation of this section was completed last year, it has been found necessary to employ the ballast-train throughout the period in clearing slips from the various cuttings, about 30,000 cubic yards having been removed by the train, besides a very large quantity disposed of by other means. Some of the banks, also, have been very troublesome in the matter of slips and subsidences, while the abutments of two overbridges had to be replaced by pile piers owing to slips on the slopes of the cuttings. The Tauraroa station-yard filling was completed with material excavated by a steam-navvy on the section ahead. Two lifts of ballast have been put on the whole section, and a third lift has been commenced, but the output of the quarry is required at present to metal the main road between Oakleigh and Mangapai. Only one stone-crusher is at work in the quarry, there being no engine available to drive the second crusher, but a sufficient supply of stone for pre-

sent requirements is being obtained at moderate cost. A small quantity of broken stone has been supplied to local authorities, and two lifts of ballast have been placed on the quarry siding. A circular concrete reservoir, to hold 30,000 gallons, has been constructed opposite 10 m. 12 ch. in connection with the Oakleigh Station water-supply. Fencing has been completed throughout the section, and a third platelayer's cottage at Tauraroa Station is approaching completion.

Waiotira Section (14 m. 75 ch. to junction with North Auckland Main Trunk Railway at 19 m. 75 ch.; length, 5 miles).—Formation is completed to 16 m. 20 ch., except for two banks over which trestles have been built. A steam-navvy is working in the cutting at 16 m. 30 ch., and is making very good progress. Earthwork is in hand beyond this point to the end of the section. Eight concrete culverts and six earthenware pipe culverts have been constructed, and others are in hand. A temporary track has been laid and lightly ballasted to 16 m. 20 ch., and a temporary telephone-line has been provided to the same point, and is now being extended to Waiotira. A platelayer's cottage at Waiotira is nearly completed.

Lately a number of Jugoslavs have commenced work on this section, enabling the whole length to be manned. As the earthwork parties complete their contracts they will be transferred to the Main Trunk line north and south of Waiotira Junction.

NORTH AUCKLAND MAIN TRUNK RAILWAY.

Maungaturoto Section (83 m. 75 ch. to 88 m. 21 ch.; length, 4 miles 26 chains).—This section was completed over a year ago, and the work in hand is only maintenance, but a good deal of trouble has been experienced with slips and subsidences. Station buildings are being erected at Maungaturoto. Traffic is carried on under the control of this Department.

Paparoa Section (88 m. 21 ch. to 92 m. 6 ch.; length, 3 miles 65 chains).—Slips have been very troublesome on this section, which traverses a belt of extremely treacherous country, and the work train has been almost continuously employed in removing slipped material and making good the damage. The line has been kept open for traffic, which is carried on as far as Huarau (90 m. 15 ch.), but it has been a difficult matter to do so at times during the exceptionally wet and stormy weather experienced. The Huarau Tunnel was completed to 91 m. 40 ch. 50 lk. (= 3½ chains) at the south end, and to 91 m. 52 ch. 70 lk. (= 1 chain) at the north end. The men employed in the tunnel ceased work on the 6th September last, and no work has been done since, except that the faces were made safe by the permanent staff. Steps are now being taken to resume work at this tunnel.

Mareretu Section (92 m. 6 ch. to 96 m. 45 ch.; length, 4 miles 39 chains).—The Golden Stairs Tunnel was completed to 93 m. 49 ch. 50 lk. (= 1½ chains), and the bottom heading was driven to 93 m. 56 ch. 80 lk. (= 9 chains) at the southern end. At the northern end the work was completed to 93 m. 70 ch. 95 lk. (= 2 chains), and the bottom heading was driven to 93 m. 68 ch. 95 lk. (= 4 chains), but the work was suspended in August owing to shortage of labour, the few men remaining being transferred to the Huarau Tunnel. No work has been done in the cuttings on this section, and most of those where work had been commenced are being filled by slips.

Waikiekie Section (96 m. 45 ch. to 107 m. 28 ch.; length, 9 miles 55 chains).—Work has just been commenced on the two approaches to the Waikiekie Tunnel, at 105 m. 11 ch. and 105 m. 38 ch.

This line has been affected perhaps to a greater extent than others by the prevailing scarcity of labour. The few men available are occupied almost entirely with maintenance-work and the running of traffic, so that there is not much progress to report.

Kirikopuni Section (107 m. 28 ch. to 115 m.; length, 7 miles 52 chains).—This section extends from the junction with the Whangarei Branch, now under construction, to the Wairoa River. Some years ago construction-works were commenced at the northern end, but owing to war conditions work was suspended in November, 1915. It is now practicable to resume work on the section from the southern end, in conjunction with the work on the Whangarei Branch, and accordingly the southern approach to the Tokatoka Tunnel (108 m. 30 ch.) has been commenced. Work will also proceed southward from the junction in order to connect as soon as possible with the section northward of Ranganui, and so provide rail communication between Whangarei and Auckland.

WAIUKU BRANCH RAILWAY.

(Length, 12 miles 15 chains.)

The number of men employed during the year has been very small, and formation-work has been confined to the length between Paerata Junction and Mauku Station (5 m. 46 ch.). The formation of Paerata and Mauku station-yards was completed, and the rails were laid as far as Mauku, and ballasted. An overbridge was erected at 5 m. 30 ch., and approaches formed. Road-deviations at 2 m. 45 ch. and 5 m. 30 ch. were formed. Fencing was erected for a total distance of ¾ mile. Station buildings have been erected at Helvetia (2 m. 3 ch.), Patumahoe (4 m. 7 ch.), and Mauku. The length from Paerata Junction to Patumahoe was handed over to the Railway Department on the 10th December, 1917.

A few Jugoslavs have now been obtained for work on this line, and formation beyond Mauku has been commenced.

EAST COAST MAIN TRUNK RAILWAY.

Waihi-Tauranga. (Length, 40 miles.)

Athenree Section (0 m. to 12 m. 35 ch.).—Work on this section, which was suspended in March, 1917, was resumed in January last, and fair progress has been made considering the small amount of labour available and the nature of the formation, which is largely in rock. A small stone-crusher has been placed on the works to provide broken stone for concrete culverts.

Tauranga-Opotiki. (Length, 86 miles.)

Te Maunga Section (40 m. to 44 m. 58 ch.; length, 4 miles 58 chains).—This section is completed from Te Maunga Junction back to the site of the Tauranga Harbour Bridge. The track has been put in good order to facilitate the conveyance of stone to face the reclamation-work on the waterfront at Tauranga. Some further work has been done at the bridge-site, a few concrete cylinders having been made and sunk to various depths to form some of the piers in readiness for the superstructure of the bridge when steel is available.

Maunganui Branch Line (Maunganui to Te Maunga Junction, 0 m. 21 ch. to 4 m. 28 ch.; length, 4 miles 7 chains).—This length was completed some time ago, and carries a considerable and increasing traffic to and from the wharf at Maunganui, on Tauranga Harbour, where trains connect with the steamer service to Auckland.

Te Puke Section (44 m. 58 ch. to 54 m.; length, 9 miles 22 chains).—This section of the main line has been completed sufficiently to allow of train traffic, passenger and goods. The railway-line suffered considerable damage in consequence of an extraordinary rainfall on the night of 15th February last. The washouts were immediately repaired, traffic being interrupted for only two days. Another flood occurred in March, but no damage was done.

Paengaroa Section (54 m. to 59 m. 65 ch.; length, 5 miles 65 chains).—This section is also completed, with the exception of the Kaituna River Bridge. This has been delayed by difficulty in obtaining materials, but these are now coming to hand, and erection is in progress. An over-bridge, with approaches, was constructed at Canaan Landing. A washout occurred at Waiere Stream (54 m. 62 ch.) during the heavy flood mentioned above. A regular train service has been run throughout the period.

Pongakawa Section (59 m. 65 ch. to 64 m. 15 ch.; length, 4 miles 30 chains).—This section is also completed, with the exception of a few details.

Otamarakau Section (64 m. 15 ch. to 71 m. 5 ch.; length, 6 miles 70 chains).—Material has been obtained from the cliffs at about 70 m. to form banks ahead and raise some of those which have already been partly formed. The material is distributed by means of a train fitted with an automatic unloading-device. The fencing of the section has been completed, the posts used being made on the works of reinforced concrete. Rails are laid on the whole section, and ballasted sufficiently for present requirements.

Matata Section (71 m. 5 ch. to 79 m. 16 ch.; length, 8 miles 11 chains).—The formation-work has been continued, and is now practically completed. Permanent-way is laid throughout, including sidings at Pikowai and Matata station-yards, and ballasting is in progress. Station buildings are being erected. Goods traffic has been carried to Matata since the end of 1917, and it is expected that passengers can be carried after October next. Considerable areas of sand-dunes along the line are being planted with marram-grass to prevent drifting.

General.

Sundry additions have been made to the plant in the workshop at Maunganui, where rolling-stock is built and repaired, and ironwork manufactured for the works generally. A well-equipped quarry and stone-crushing plant are in operation near Te Puke, supplying all the broken stone and spalls required for ballast, road-metal, concrete, stone pitching, &c. A steam-navvy is in use in connection with the train and unloader, material being taken from a borrow-pit to make up subsidences in the various banks. Such subsidences are considerable on this line, as it traverses a great deal of swampy country, some of which is being drained by settlers, local authorities, and the Lands Department.

The length of this line from Waihi to Opotiki is about as follows: Main line, 126 miles; Maunganui Branch, 4 miles: total, 130 miles. The present position as regards construction is—Formation completed, 48 miles; platelaying completed, 41 miles; under traffic, 38 miles.

Gisborne-Motu.

Motu Section—44 m. 10 ch. (Matawai) to 49 m. 8 ch. (Motuhora); length, 4 miles 78 chains.—The formation-work executed during the year comprised chiefly the making-up of banks to standard heights and widths, removal of slips, and general-maintenance work. The permanent-way was also maintained in good order, and traffic was handled by the Public Works Department until the 26th November, 1917, when the section was handed over to the Railway Department for regular working. A 6,000-gallon water-vat, with pumping-station and pipe-line, has been constructed at Motuhora, also a platform and loading-bank. Station buildings were erected under contract, the joinery and fittings being manufactured at the Department's workshop.

Gisborne-Napier (North End).

Ngatapa Section (length, 11 miles 18 chains).—The work on this section comprises principally the maintenance of formation and permanent-way and the running of traffic. Serious floods have been experienced, entailing much work in clearing and removing silt-deposits and replacing ballast. Piers and abutments have been constructed for bridges at 5 m. 38 ch. and 5 m. 62 ch., and temporary superstructures have been placed on these, also at 9 m. 66 ch. A bi-weekly train service has been maintained between Makaraka Junction and Ngatapa, carrying passengers, mails, and goods.

Waikura Section.—A considerable amount of formation-work was done on this section prior to October, 1915, but since that date practically nothing has been done, there being no labour available in the district. About half a mile of fencing was erected during the period, and a little maintenance-work was carried out.

Gisborne-Napier (South End).

Eskdale Section (length, 11 miles 36 chains).—The works carried out on this section comprise the construction of the Westshore Bridge and approach banks, crossing the Inner Harbour at Napier.

The Westshore Bridge is the largest structure of its kind in the Dominion, consisting of twenty-one 50 ft. spans, five 25 ft. spans braced to resist longitudinal pressure, and one 57 ft. bowstring truss span having extra height above water-level to enable boats to pass under it. The whole structure is of reinforced concrete, and carried on reinforced-concrete pile piers. The bridge is of unusual width, having side by side a 6 ft. footpath, an 18 ft. roadway, and a 14 ft. space for the railway-line. The manufacture of the piles was commenced in July, 1915, and the first pile was driven in March, 1916. Progress was rather slow at first owing to scarcity of suitable labour, but as the workmen gained experience and the organization was perfected progress was accelerated, and the whole structure is now complete. Some idea of the magnitude of the work may be obtained from the following figures: Reinforced-concrete piles made and driven, 598; temporary (timber) piles driven, 658; steel placed in position, 494 tons; concrete placed, 5,672 cubic yards. The work was carried out by the Department, without the intervention of a contractor, at a cost which was over £4,000 below the estimate, and in a manner which reflects the greatest credit upon the officers concerned.

The Napier Harbour Board is forming the southern approach bank under contract with the Department. The Board's dredge has been engaged upon this work throughout the period. Stone pitching is being done on both sides of the bank, and to facilitate this work a service tramway is being laid from a quarry at Pandora Point. The northern approach bank was completed some time ago. The Board's contract includes a diversion of the Tutaekuri River and some incidental works.

STRATFORD—MAIN TRUNK RAILWAY.

West End.

Tahora Section (37 m. 53 ch. to 47 m. 40 ch.; length, 9 miles 62 chains).—The length from Whangamomona to Kohuratahi (42 m. 26 ch.), which was practically completed last year, was handed over to the Railway Department on the 7th January last. Formation is in progress on the rest of the section, and may be said to be approaching completion to 47 m. 22 ch., in Tahora station-yard. A considerable amount of earthwork is required at Tahora, with extensive road-deviations, including five small bridges, which are in course of erection. A number of culverts and water-tunnels have been constructed, also four private crossings. Permanent-way has been laid from 45 m. 19 ch. to 46 m. 72 ch., with one lift of ballast. No more ballast is available at present. A portion of the main Ohura Road between Toi Road junction and Tahora Township has been maintained as a service road. A telephone-line is complete to 46 m. 72 ch., and the fencing of the railway reserve is in hand.

This line has made poor progress owing to the prevailing scarcity of labour, there being only about fifty men employed at present.

East End.

Matiere Section (0 m. to 10 m. 21 ch.).—Some additional reinforced-concrete work has been carried out in connection with the Ongarue River Bridge. Two large and one small culverts were completed, also the excavation for a 12 ft. arch culvert at 6 m. 64 ch. A water-tunnel at 5 m. 17 ch. was lined with brickwork. Road-deviations at 6 m. 60 ch., 8 m. 76 ch., and 10 m. 30 ch., totalling 24 chains, were completed, and the main Ohura Road between Okahukura and Matiere was maintained as a service road. An explosives-magazine was constructed at Okahukura. The contractors for the construction of the Okahu Tunnel carried on under difficulties until June, 1917, when the Department took over the unfinished work. This has been continued, but progress is slow, only a small party of men being available. Prospects for the coming year are somewhat brighter. The bottom headings have met, and the work in hand is enlargement to full size and lining. A service tramway is being constructed at the western end of the tunnel. The contractor for the smaller tunnel at 8 m. 35 ch. also abandoned his contract in 1916. In June, 1917, the Department resumed the work, finished the excavation, lined $5\frac{1}{2}$ chains of tunnel, and built the portals. The manufacture of bricks for tunnel-lining, culverts, &c., has been continued, and the output of the works has been improved by the introduction of a new process. A platelayer's cottage has been erected at Matiere station-yard to accommodate the staff.

RAETIHI BRANCH RAILWAY.

The works carried out during the year comprise the completion of the ballasting, water-services for Makaranui and Raetihi Stations, and erection of station buildings. The line, which is 8 miles 50 chains in length, including 15 chains of duplication of the North Island Main Trunk Railway, was handed over to the Railway Department on the 18th December, 1917.

OPUNAKE BRANCH RAILWAY.

Kapuni Section (0 m. 6 ch. to 7 m.; length, 6 miles 74 chains).—The earthwork on this section is near completion. All culverts and drains were completed some time ago. Two overbridges for private crossings were erected, and the Hastings Road overbridge and approaches were completed. At the site of the Waingongoro River Bridge (0 m. 25 ch.) some further concrete-work was done, but it was found necessary to sink cylinders as a foundation for two of the piers, and preparations were made accordingly. No work has been done at the Mangatoki and Kapuni Bridges. To the length of this section must be added 54 chains of duplication of the existing line, to reach Te Roti Station.

Auroa Section (7 m. to 12 m.).—Nothing has been done during the period.

Manaia Branch (0 m. to 5 m. 50 ch.).—Fencing has been completed for over 5 miles. Eight culverts of various sizes were constructed, two creek-diversions were cut, and a considerable amount of earthwork was carried out.

Owing to acute shortage of labour, work on this railway was suspended in December last.

SOUTH ISLAND MAIN TRUNK RAILWAY (NORTH END).

Kekerangu Section (56 m. 6 ch. to 63 m. 6 ch.; length, 7 miles).—There being practically no labour available, work on this section was closed down in August, 1917. Prior to that date a little formation and river-protection work, and some marram-grass planting, had been done.

MIDLAND RAILWAY.

Nelson—Westland (North End).

Kawatiri Section (59 m. 17 ch. to 63 m. 10 ch.).—Work on this line was suspended in February, 1917, and nothing has been done since.

ARTHUR'S PASS TUNNEL.

There has been a further falling-off in the number of men employed, and a consequent reduction in the rate of progress. About three weeks were lost through a labour dispute. Very little enlargement or lining could be done, all the men available being required to push on the advanced headings. At the Otira end considerably over 70 per cent. of the shifts were "wet"—i.e., six-hour shifts—and at the Bealey end all shifts were "wet." The rock is slate and greywacke, as before, and the greater part of the length driven required timbering. The total length of bottom heading driven at both ends of the tunnel during the period is about 57 chains; lining completed, 15½ chains. The total length of heading driven to date is 5 miles 22 chains 50 links; lining completed, 3 miles 75 chains 56 links. Distance between headings, 2 chains 68 links; between completed portions of tunnel, 1 mile 29 chains 62 links. Total length of tunnel, 5 miles 25 chains 18 links.

(N.B.—Since the above report was drafted the advanced headings have met. The meeting was very accurate indeed, the error in levels being about 1½ in., in alignment ¾ in., and in the chainage about 1 yard—a most remarkable performance and highly creditable to the officers concerned, particularly the Assistant Engineers entrusted with the first survey and the subsequent setting-out of the work.)

CULVERDEN-WAIAU RAILWAY.

(Length, 13 miles.)

Formation is completed to the terminus, and rails are laid throughout, except some short lengths of dead-end sidings in Waiau station-yard. Ballasting is still in progress, and is practically the only work remaining to be done. The second lift of ballast is about completed, and the third lift is proceeding. Delay has occurred during the last two or three months owing to the ballast-pit being partly flooded. Station buildings have been erected by contract at Achray (5 m. 15 ch.), Rotherham (7 m.), and Waiau station-yards, and in addition the Department has constructed loading-bank and gates at Achray, and stock-yards, 50-ton coal-store, engine-pit, and windmill at Waiau. An engine-shed is nearing completion. A combined culvert and cattle-stop was constructed at 5 m. 23 ch., and the fencing has been finished. Station-approach roads were formed and metalled at Rotherham and Waiau. A goods service has been maintained between Culverden and Waiau.

WAIMATE BRANCH RAILWAY EXTENSION.

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

OTAGO CENTRAL RAILWAY.

Cromwell Section (44 m. 52 ch. to 57 m. 3 ch.; length, 12 miles 31 chains).—Formation was practically completed during the period, and rails were laid for a distance of 1 mile 59 chains, nearly completing the main line. The siding at Waenga Station (53 m. 51 ch.) was laid and ballasted. First and second lifts of ballasting were completed throughout, being about 2 miles of first lift and 3 miles of second lift for the period. The platform and turntable at Cromwell, and a 6 ft. culvert at 48 m. 18 ch., are under construction. The Italian Creek Bridge (49 m. 21 ch.) is more than half-finished. Cromwell station-yard was formed and ballasted, and the approach roads formed and gravelled. A goods-shed and Stationmaster's residence were erected at Cromwell, and a platelayer's cottage is nearing completion. Goods have been carried between Clyde and Cromwell throughout the period.

OREPUKI-WAIAU RAILWAY EXTENSION.

Work on this line is still suspended owing to shortage of labour.

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

KAWAKAWA-HOKIANGA RAILWAY.

A trial survey has been made between 39 m. and 46 m. The permanent line has been pegged from 36 m. to 45 m. 20 ch., and plans were completed from 28 m. to 42 m. Soundings were taken in connection with a proposed wharf at Te Tio Point (45 m. 20 ch.) on Hokianga Harbour, and a station-site and approach roads at the same place were surveyed.

WHANGAREI—NORTH AUCKLAND RAILWAY.

A land-plan survey is in hand between 15 m. and 19 m. 79 ch.

NORTH AUCKLAND MAIN TRUNK RAILWAY.

A land-plan survey is being made, under contract, from 11 m. 25 ch. to 120 m. 5 ch.

EAST COAST MAIN TRUNK RAILWAY.

The permanent survey of the railway between Athenree and Tauranga was commenced in December last, and fair progress has been made. Traversing, chaining, and levelling were completed from 10 m. to 18 m. Plans up to 13 m. are in a forward state.

The line beyond Matata was permanently located from 81 m. to 91 m. 18 ch., including the portion across the Rangitaiki Swamp. Several surveys were also made in connection with overhead bridges and drainage areas. The party is now engaged upon the survey of drainage areas and lines of stop-banks in connection with the railway across the Rangitaiki Swamp. On completion of this work the railway survey will be continued to Taneatua (100 m.).

Survey-work in the vicinity of Wairoa (Hawke's Bay) has been suspended for some time.

The location of the line northward of Eskdale was commenced early in March, 1918, about 10 miles of trial lines having been surveyed.

STRATFORD—MAIN TRUNK RAILWAY (WEST END).

The preliminary exploration of the proposed line from about 45 m. to the Haeo-Tikipuiti Junction is in progress. This is a very difficult stretch of country, and several alternative routes will require close investigation before the located parts at each end of this line can be linked up.

TE ROTI—OPUNAKE RAILWAY.

The field-work in connection with the survey of a probable extension of this line to connect with the existing railway near New Plymouth was completed last year. Plans and estimates are being prepared as opportunity offers.

ROADS, BRIDGES, ETC.

The amounts available for expenditure have been much less than usual, being chiefly unexpended balances of items on previous appropriations; but even if more money had been available it would have been impossible to carry out much more work, owing to scarcity of labour and materials. There has been more than the usual amount of flood damage in various districts, involving a considerable expenditure in repairs. Maintenance-work on the roads under the control of the Department has been carried out as efficiently as possible with the ways and means available.

Of the many and varied works carried out during the year the following have been selected for brief mention:—

Peria River Bridges.—Two first-class bridges, respectively 170 ft. and 130 ft. in length, were erected, and in conjunction therewith road approaches were formed 30 ft. wide for a distance of 14 chains, with metalling 10 ft. wide. The bridges take the place of two troublesome fords, and have proved a boon to the public.

Onetoki—Runaruna—Te Karae Road.—This road has been formed for a distance of about 7½ miles, and metalled for 5½ miles, by the Hokianga County Council, over 7,000 cubic yards of broken metal being used. It is required at present chiefly for access to a dairy factory, but it also serves a number of Crown tenants and freehold settlers, and forms part of the main road from Kohukohu to Kaitaia via Broadwood and Herekino.

Pareokawa Block Road.—This road will connect the Pareokawa Block with the port of Kohukohu, on Hokianga Harbour. It has been widened, straightened, and re-formed for a distance of 128 chains and metalled for 48 chains. It has been found impossible, however, to procure metal at present, and this work will have to be suspended until the spring.

Tangowahine Creek Bridge.—A bridge, consisting of one 61 ft. truss span and one 20 ft. and one 16 ft. stringer span, on the Tangowahine Valley Road is being constructed by the local authority under Government subsidy.

Opouteke Bridges.—Under the "flood damage" item, one bridge, comprising one 61 ft., one 35 ft., and one 20 ft. span, has been erected and approaches formed.

Tangowahine Block (additional).—One mile of road-formation, 12 ft. wide, has been completed, besides 105 chains of bushwork, ditching, culverts, &c. A quantity of timber and ironwork has been delivered at bridge-sites, and two small bridges have been erected. Several large truss bridges are required to complete the roading scheme, which is otherwise well advanced towards completion.

Wainui Block.—The work carried out in this block includes bushfelling, 1 chain wide, for a distance of 130 chains and ½ chain wide for a distance of 90 chains. A 12 ft. road has been formed for 142 chains, and a 6 ft. bridle-track for 98 chains.

Omaumau River Bridge.—The Rodney County Council has completed the erection of a reinforced-concrete bridge, consisting of one span of 30 ft., having 11 ft. roadway.

Te Hana River Bridge.—A bridge of four 25 ft. spans, on pile piers, with 12 ft. roadway, has been erected by the Rodney County Council, assisted by a Government subsidy.

Matakohe-Paparua-Maungaturoto Road.—The Otamatea County Council has metalled about 2 miles of this road.

Brooklyn Bridge.—A reinforced-concrete bridge of two 22 ft. 6 in. and one 35 ft. spans, on concrete pile piers, and carrying a 12 ft. roadway, has been completed by the Department.

Great North Road Deviation.—The Waitemata County Council has completed the formation of $1\frac{1}{2}$ miles of 18 ft. road which was commenced in 1914 but was suspended until after the completion of the Taikata Creek Bridge.

Waikato River Bridge (Rangiriri).—The erection of this bridge was completed during the year by contract under the Department. It comprises three 123 ft. truss spans and thirty-one 25 ft. stringer spans of Australian hardwood, on reinforced-concrete pile piers. The roadway is 12 ft. wide. The approaches have been formed and fenced.

Piako River Bridge (Orchard).—This structure consists of ten 25 ft. stringer spans and a central 36 ft. steel lifting span and gantry, the whole carried on pile piers. It has been completed under contract by the Thames County Council.

Waihou River Bridge (Tirohia).—A bridge, consisting of one truss span of 61 ft., seventeen 25 ft. spans, and one 9 ft. approach span, has been practically completed by the Department. The work was commenced in July, 1917.

Waipa River Bridge (Ngaruawahia).—Tenders were invited for the re-erection of this bridge, which collapsed under a mob of cattle, but those received were not satisfactory, and all were declined.

Waikato River Bridge (Ngaruawahia).—The contractor is making fair progress with the erection of this bridge, which comprises a timber superstructure of three 123 ft., one 43 ft., and one 20 ft. spans, on reinforced-concrete piles and cylinders. Some little difficulty was experienced through unsatisfactory foundations, and additional piles had to be driven in some of the piers. Cylinder-sinking is now in progress. The greater part of the timber for the superstructure has arrived, and is being worked up. Plans have been prepared for the formation of the approaches, and some extra land has been acquired to accommodate the southern approach bank.

Topuni Bridge.—Under the "flood damage" item the Department is erecting a bridge of eight 25 ft. spans, of hardwood, on reinforced-concrete pile piers. The work is nearing completion, and approaches are being formed. The Otamatea and Rodney County Councils are contributing part of the cost.

Manaia Creek Bridge.—This bridge, consisting of two 45 ft. and one 30 ft. spans, of reinforced concrete, on reinforced-concrete pile piers, was completed in October, 1917, and the approaches in January last.

Moerangi Block.—Approximately 8 miles of 6 ft., 8 ft., and 12 ft. formation have been completed, mostly in heavy bush country, and further work is in hand. Materials are arriving for a number of bridges within the block.

Pongakawa Stream Bridge.—A bridge, consisting of one 41 ft. truss span, has been erected over the Pongakawa River on the Waihi Swamp Road, and the road is now open for traffic. This considerably reduces the distance by road between Te Puke and Otamarakau.

Te Puke to Otamarakau.—The Tauranga County Council has metalled about 70 chains of the worst portion of this road with metal obtained from the Department's quarry at Te Puke.

Raparapahoe Stream Bridge.—This bridge, consisting of one 110 ft. truss span, over a rocky gorge 74 ft. deep, has been completed by the Department's staff, and the approaches have been metalled and left in good order.

Oamaru No. 5 Block.—About $1\frac{1}{2}$ miles of 6 ft. track have been constructed along the Wahaatu Stream, and over 2 miles of 4 ft. track along the Tokanui Stream. Recent heavy rains have caused numerous slips, however, and the workmen are at present engaged in removing them.

Opotiki to Motu.—An extraordinary flood in the Motu River in April last carried away a portion of the bridge near Motu Township and seriously damaged the road, which is a very important one. Every effort is being made to repair the damage, and the road is now passable by vehicles, but a great deal remains to be done to restore it to its former condition. The remains of the bridge have been removed, and a new temporary structure is in course of erection.

Wairoa River Bridge (Hawke's Bay).—The Wairoa River is developing a tendency to erode its bank and bed at one end of this bridge, and threatens to undermine the abutment and two of the piers. It is therefore intended to deposit a quantity of concrete blocks around the piers and to construct an additional short span. The necessary plant is arriving, and work will be commenced shortly.

Wanganui River Protective Works (Taumarunui).—At the request of the Waikato-Maniapoto Maori Land Board the Department has constructed a series of boulder and wire-net groynes and stop-bank to prevent erosion by the river, which tended to encroach upon some valuable land.

West Taupo County Roads.—In the West Taupo County (where the Counties Act is not in force) the Department has constructed about 9 miles of dray-roads, converted $5\frac{1}{2}$ miles of bridle-track into dray-road, formed about 8 miles of bridle-track, and metalled nearly 2 miles of dray-road. The greater part of the formation-work is for the purpose of providing access to newly settled blocks of Crown land. In addition, several small bridges have been erected.

Ohura River Bridge (Roto Road).—A bridge, comprising one 81 ft., three 24 ft., and two 20 ft. spans, has been erected by the Department.

Wanganui River Bridge (Taumarunui).—A contract was let in April, 1917, for the erection of a bridge, consisting of five 81 ft. and two 25 ft. spans, in Australian hardwood. Work was commenced in September, 1917, but the work has been delayed owing to the swollen state of the river. Pile-driving is still in progress.

Wanganui River Road (Right Bank).—The formation of about $1\frac{1}{2}$ miles of this road is in hand, and a considerable portion is approaching completion.

Local Authorities' Works.—The Waitomo, Awakino, and Kaitieke County Councils have metalled about 20 miles of the Mangaotaki, Mangapohue, Te Ahuroa, Kumara, Te Kuiti—Mokau, and Wanganui River roads under Government subsidy and supervision, besides over 1 mile of new formation. Further metalling is in progress.

Waimarino—Roto-a-ra Road.—The improvement of this road (by prison labour) has been continued throughout the year. The principal work done was 2 miles of formation, $1\frac{1}{2}$ miles of metalling, and the sawing of timber for three bridges.

Mangaowata Stream Bridge (Rerekino Road).—Plans have been prepared for the construction of a suspension bridge, and the work will be commenced shortly.

Waiwakaiho River Protective Works.—The construction of a weir to protect the foundations of the Waiwakaiho River Bridge is in progress by contract, but poor progress has been made, owing to unseasonable weather and difficulty in obtaining efficient labour. Some of the concrete blocks have been placed in position, and the others have been cast ready to be deposited when conditions become more favourable.

Tongaporutu River Bridge (Mangatoro Road).—Materials are coming to hand for the construction of a suspension bridge of 168 ft. span.

Mangoira Block.—During the year about 5 miles of bushwork and track-formation was completed, including a number of timber culverts and small bridges. Further work is in hand.

Raoraomouku Block.—The roading of this block has been completed as far as funds in hand will permit. The work done during the year includes the formation of 50 chains of 12 ft. dray-road and over $5\frac{1}{2}$ miles of bridle-tracks.

Marakopa Valley Road.—The Department has constructed two small bridges on this road. The Awakino County Council has re-formed and metalled the road from Marakopa Wharf and Post-office to Te Karaka Bridge, under Government subsidy.

Punehu Bridge.—Under Government subsidy the Egmont County Council is erecting a concrete arch bridge of two 50 ft. spans, having 16 ft. roadway.

Erua Road.—During the year 69 chains of 14 ft. formation was completed, making a total of $4\frac{3}{4}$ miles to date. A further $\frac{1}{2}$ mile of widening is in hand.

Kaiwakanka Block.—The work carried out in this block includes the formation of about $\frac{1}{4}$ mile of 14 ft. dray-road in heavy country; about $4\frac{1}{2}$ miles of 8 ft. and 5 ft. horse-tracks; the widening of about $\frac{1}{2}$ mile of track to 14 ft. dray-road; felling and clearing of bush on about 3 miles of road-line; construction of culverts and water-tunnels, and preparation of timber for bridges; clearing of slips; corduroying swampy parts of roads; and a considerable amount of engineering survey-work.

Putorino Settlement.—The roading of this block, which is being settled by returned soldiers, was entrusted to the Rangitikei County Council, which has formed about $2\frac{1}{4}$ miles of road and gravelled 1 mile. The Department carried out a considerable amount of survey-work with a view to providing a gravitation water-supply to the various sections, but the dam-site proved unsuitable, and it was therefore decided to install a temporary pumping plant to lift water from the Rangitikei River. This was completed and handed over to the Lands Department in working-order.

Matahouira Stream Bridge (Waikare Inland Road).—This structure, consisting of four 25 ft. spans, on concrete piers, was completed by the Wairoa County Council.

Waipawa River Bridge (Fletcher's Crossing).—A bridge, consisting of six 42 ft. spans, in reinforced concrete, was erected by the Waipawa County Council. The approaches are in hand.

Purahotangahia Block.—The greater part of the labour available in the Napier district has been concentrated upon the roading of this important block. About $8\frac{3}{4}$ miles of road has been formed, $4\frac{1}{2}$ miles being handed over to the local authority for maintenance. A considerable amount of survey-work has also been carried out.

Mangaorapa Block.—About $2\frac{3}{4}$ miles of road has been formed, including the whole of the access road from Te Uri Road, 1 mile in length. A bridge of one 60 ft., four 25 ft., and one 15 ft. spans, on pile piers, is being erected over the Porangahau River on the access road from Oakburn. All the piles have been driven, and the truss span is under construction. Work is in progress on the heavy approach bank. The works carried out in this block include $2\frac{1}{2}$ miles of fencing, bushwork, many culverts and drains, and a considerable length of engineering survey.

Flood Damage, Hawke's Bay.—Extremely heavy floods in May and June, 1917, caused a great deal of damage throughout the Hawke's Bay District. The main roads to Wairoa, Taupo, and Taihape, especially the first named, suffered through extensive slips and destruction of bridges. The Department was called upon not only to repair the damage on the lengths of road under its direct control, but to subsidise the local authorities affected. The Waikohau Bridge was washed away, and a new structure of five 25 ft. spans has been erected by the Wairoa County Council. The Matahouira Bridge, on a length of road under the control of the Department, was also destroyed, and has been replaced by a new bridge of two 25 ft. spans, on concrete piers. Five spans of the Waipawa River Bridge (Ongaonga-Tikokino Road) were washed out, and repairs are being carried out by the Waipawa County Council. Stop-banks along the Tutaekuri River and the Ngaruroro River were washed out at many places, and nearly all the county roads throughout the district were more or less affected by slips and washouts.

Kopuaranga Bridge.—A reinforced-concrete structure of one 35 ft. and two 22 ft. spans, on reinforced-concrete pile piers, is being erected by the Department. The piers and abutments are completed, and the superstructure is well in hand.

Opawa Bridge (Blenheim).—This bridge, comprising eight bowstring truss spans, in reinforced concrete, was completed and opened for traffic on the 11th December, 1917.

Kaikoura—Parnassus Road.—Abnormal floods have caused considerable damage along this important main road, entailing a great deal of repair work, particularly in the vicinity of the river-crossings. Sundry bridge approaches are being protected by stone pitching, gabion groynes, &c.

Dove River Bridge.—A suspension footbridge of 133 ft. span was erected by the Dovedale Road Board, under a Government grant.

Mapua Roads.—For the purpose of connecting sundry orchard settlements with the port of Mapua, 16 ft. formation has been carried out for a distance of about 6 miles on the Mapua—Upper Moutere, Mapua—Motueka (via Moutere Bluffs), and Mapua—Motueka to Upper Moutere Roads.

Moutere Mud-flat Road.—The original formation, which was not sufficiently above high-water mark, has been raised throughout, a distance of over 3 miles, to improve the drainage, and the road has been lightly gravelled for a distance of nearly 5 miles.

Anatoki River Bridge.—This bridge, comprising two 20 ft. spans and two 52 ft. truss spans, on ironbark piles, has been completed according to contract, but it has been found advisable to add two 25 ft. spans, and the material is being obtained.

Gowan Block.—During the year $3\frac{1}{2}$ miles of bushwork and about $3\frac{1}{2}$ miles of 12 ft. road-formation, including numerous culverts, were completed.

Cobden Bridge.—A contract has been let for the construction of a new superstructure on the existing piers of this bridge. One of the old spans has been dismantled, and the new span is practically completed.

Maintenance, Nelson and Westland Districts.—The Department maintains a considerable length of main roads in the Nelson and Westland Districts, notably the Kohatu—Westport—Reefton Road, connecting Nelson and Westland; the road over Arthur's Pass, between Canterbury and Westland; and the Main South Road from Kumara southward. The expenditure during the year shows a slight increase over that for the previous year. The work comprises metalling and metal patching; grading; cleaning out water-tables, culverts, and drains; clearing scrub; repairs to bridges and other structures; maintenance and improvement of fords, ferries, &c. Some new formation and minor improvements have been carried out at various places.

Leader River Bridge.—This bridge was completed last year, but as an abnormal flood damaged the new work on the right approach bank before it became consolidated, three additional spans are being erected. Material is at the site and erection in progress.

Ashley River Gorge Bridge.—A structure, consisting of eight 25 ft. spans, on pile piers, was completed during the year.

Hurunui River Bridge (Lower).—This bridge, which consists of three 52 ft., one 51 ft., one 25 ft., and one 11 ft. spans, has been completed by the Waipara County Council.

Makerikeri River Bridge.—The Department has completed the erection of this bridge, of eight 25 ft. spans, with road approaches and protective works.

Okuku River Bridge.—The new bridge, comprising thirty-seven 25 ft. spans, has been completed under contract, and the old bridge has been dismantled. Approaches and protective works have been constructed by the Ashley County Council.

Greta River Bridges.—The Waipara County Council is carrying out extensive improvements on the Waipara—Cheviot Road at the crossings of the Greta River and Cobold's Creek, comprising three bridges and a stream-diversion, with gabion protective works and a considerable length of new road. Two bridges are completed, also approaches and protective works.

Jollie River Bridge.—A bridge, consisting of twelve 20 ft. spans, having 9 ft. roadway, has been completed. The approach banks, with gabion protection and fencing, are nearing completion.

North Kowai River Bridge.—This bridge, comprising three 25 ft. spans, with 12 ft. roadway, has been practically completed. The Kowai County Council has let a contract for the construction of the approaches and protective works.

Orari River Bridge.—A contract was in progress at date of last report for the erection of a bridge of fourteen 25 ft. spans. This has since been completed, including approach banks and fencing.

Arthur's Point Bridge.—The bridge over the Shotover River at Arthur's Point, which had become unsafe, is being replaced by a concrete arch structure. The arch span is 108 ft., and the height above water-level is 90 ft. The total length of the bridge, including abutment spans, is 140 ft., and the width of roadway 14 ft. The main-arch ribs have been completed, and the walings, studs, and bracing are well in hand. The old bridge is being removed.

Taieri River Bridge (Linnburn Ford).—A traffic-bridge, 150 ft. in length, was constructed by the Maniototo County Council, under Government subsidy.

Kakanui River Bridge.—A light-traffic bridge, 200 ft. in length, was erected by the Waitaki County Council, with the assistance of a Government grant.

Flood Damage, Otago and Southland.—Extensive flood damage occurred in various parts of this district. In this connection the Department has carried out a considerable amount of survey-work, and plans, estimates, and reports have been prepared. The Department is erecting a new flood-gate and bridge at Kaitangata, and reinstating a flood-gate at Puerua. Protective works at Barnego and Lunsden were repaired, and assistance was rendered to the Gore Borough Council in connection with a scheme for extensive protective works along the Mataura River in and near the town. The Western Taieri Drainage Board has carried out sundry new protective works, as well as repairs to existing works, with the assistance of a Government grant.

IRRIGATION.

IDA VALLEY SCHEME.

Two spillways were constructed on the Alexandra Bonanza Water-race. The Syndicate Race was enlarged to carry 10 heads from 0 m. to 2 m., and for 5 heads from 3 m. 42 ch. to 7 m. 77 ch. All private crossings over the race were completed, and twenty gauge-boxes were placed in position. This race is now in order for use in irrigation. A concrete culvert, five spillways, and two private crossings were constructed on the Moa Creek to Black's No. 3 Race. Temporary arrangements have been made to supply water from the Manorburn Dam to sundry settlers on the Galloway

Flat, and a distributary race has been cut for a distance of 30 chains. A considerable amount of water was used by the Ida Valley settlers during the irrigation season.

MANUHERIKIA—ALEXANDRA—CLYDE SCHEME.

The intake tunnel has been driven a total distance of about 17 chains during the year, the distance between the headings being now about $7\frac{3}{4}$ chains. Suitable labour has been scarce, and progress consequently slow. Difficulty has also been experienced with the power plant, which was only a makeshift, and eventually, the power plant having been destroyed by fire, it was decided to discontinue the use of air-drills altogether. Very little work has been done in race-construction. Survey and plan work has been continued throughout the year.

BENMORE RUNS.

At the request of the Lands Department a race is being constructed to irrigate certain sections in the Benmore Runs. The work comprises $4\frac{3}{4}$ miles of water-races, with fluming, &c., and is practically completed.

Progress on this and other irrigation works has been hampered to some extent by the very severe weather experienced during the last month or two.

WAIHOU AND OHINEMURI RIVERS IMPROVEMENT.

This work has been continued throughout the year as rapidly as present conditions permit, but before satisfactory progress can be made additional dredging and other plant must be obtained, and this is impossible until after the war.

Dredging.—The excavation of the Ngararahi Cut was completed throughout to a width of 80 ft. and a depth of 12 ft., the length of the cut being 63 chains. The dredge was then thoroughly overhauled and set to work in the Ohinemuri River, pumping sand and mining silt to form the Paeroa—Thorp's Bend stop-bank, the length of bank completed being 45 chains, of an average height of 8 ft., the width on top being 20 ft., and the side slopes 3 to 1. After removing some shoals which were obstructing navigation on the Waihou River, the dredge proceeded with the widening of the Ngararahi Cut to 108 ft., working from the lower end. This work was suspended in May last, and the dredge commenced pumping material to form the Puke—Ngahina stop-bank.

Paeroa—Thorp's Bend Stop-bank.—This is practically a continuation of the Paeroa stop-bank, and is designed to protect the Town of Paeroa and suburban lands from the river-floods. In addition to the length constructed by the dredge, about 12 chains have been completed by petty contract, the remainder, to link up with existing work at Paeroa Railway Bridge, being now in hand. The construction of this bank in a populated area has involved a great deal of negotiation and correspondence with private owners over access roads, tramways, gates, and approaches to houses. Temporary roads and bridges were required, and much incidental work which is not apparent when the whole is completed.

Upper Waihou Stop-banks (Left Bank).—A length of 2 miles 50 chains has been under construction, and is approaching completion. The work has been greatly hampered by an abnormally wet season and consequent floods in the river. Three large flood-gates have been constructed on this section.

Manning's Flood-gate, Mangaiti.—This work, which is designed to protect against floods an area of 200 acres, was completed during March last.

Ngahina Wharves and Goods-sheds.—These works, which were built by the Department to meet the requirements of the district, already require extension, and a contract has been let accordingly, but little progress has yet been made. An office has been built for the wharf staff, as well as some minor works done.

Tirohia-Rotokohu Drainage.—This is a special drainage area included in the Waihou and Ohinemuri Rivers district. A very considerable amount of survey-work was carried out, and a drainage scheme was outlined. Co-operative parties commenced the excavation of drains in February, 1918, and so far nearly 3 miles of surface drains have been cut, but the work is greatly hampered by the frequent flooding of the area by the river, while the large quantity of buried timber makes excavation difficult. Some of the work to be done in this block is quite unsuitable for ordinary hand labour, and an attempt was made to import an excavating-machine, but the price was prohibitive and delivery uncertain. An endeavour is now being made to devise some appliance that can be manufactured locally.

Waihou—Awaiti Canal.—At the request of several local authorities surveys were made and a report, with plans and estimates, was prepared in connection with a proposal to construct a navigation canal connecting the Waihou and Piako Rivers. This will be an undertaking of some magnitude, the cost of the canal by the least expensive route being estimated at about £22,000, but it would be fully justified by the saving to the settlers along the Piako and its tributaries in the carriage of their dairy and other produce to the factory and railway at Paeroa. At present the launches have to descend the Piako to its mouth and proceed across open water at the head of the gulf, then ascend the Waihou to the factory or other place of delivery. This canal is not a part of the Waihou and Ohinemuri Rivers scheme, but is closely related thereto.

Tidal Records.—For the purposes of the rivers-improvement scheme it is necessary to obtain very full and accurate information regarding the tidal flow in the lower reaches of the rivers. For this purpose four automatic tide-gauges are being established, and connected with each other and with the general survey-work by a series of precise levels referred to permanent bench-marks. This levelling is now being carried out.

Surveys.—In addition to that mentioned incidentally in the foregoing paragraphs, a great deal of survey-work has been carried out. The Tirohia—Ngarahi stop-bank (right bank) has been set out and levelled, and cross-sections have been taken for a length of $4\frac{1}{2}$ miles. A land-

plan survey was made of an area over which 12 chains of stop-bank have been constructed for the acquisition of the necessary land. An area of approximately 4 square miles on the left bank of the Waihou River, from Ngahina to Waimarie, was levelled, and a contour plan prepared for drainage purposes. The Komata Creek has been surveyed for a distance of $2\frac{1}{4}$ miles, also an area of land between this creek and Wight's Hill, to enable a topographical plan to be prepared to fix the position of the outfall for the main drain. Space will not permit the inclusion of a full account of the survey-work carried out, but the above will give some idea of its nature and extent.

General.—A special appliance has been built for the purpose of removing shoals in the river. A new cut has been made to straighten the Waitoki Creek, and a considerable improvement in drainage has resulted; some further work is still required in the upper part of the creek. A party has been engaged in clearing and ring-barking willows along both banks of the Ohinemuri River for a distance of about 70 chains.

TRAMWAYS.

As usual, the Department's Engineers have inspected portions of the various municipal tramways and their rolling-stock in accordance with the provisions of the Tramways and Public Works Acts. All these undertakings are seriously affected by war conditions, materials being almost unobtainable, consequently extensions of the lines and plant have been reduced to a minimum. Some of the matters dealt with by this Department are mentioned below.

Takapuna Steam Tramway.—A proposal to haul road-metal over this line was investigated and reported upon.

Gisborne.—One new car was passed as fit for traffic.

Napier.—Considerable trouble has been experienced with broken car-axes, and the Department is co-operating with the Borough Council in an endeavour to ascertain the cause, various tests of the material having been made and reported upon.

Wellington.—A duplication of the line in Cuba Street, and an extension of a loop on the Island Bay route near Duppa Street, have been inspected and passed.

Christchurch.—A loop was constructed on the Cashmere Hills route, at Barrington Street; and the Opawa line has been relaid with railway-pattern rails as a temporary expedient, regular tramway rails being unobtainable. Three new trailer-cars were inspected and certificates given.

Dunedin.—In connection with the Eglinton Road extension of the Mornington Cable Tramway, a proposal to use petrol-driven cars as a temporary expedient was approved, subject to certain experiments showing satisfactory results.

MARINE.

Numerous inspections and reports have been made on behalf of the Marine Department, particularly in the northern districts, in connection with harbour-works, reclamations, wharves and landings, foreshore leases, &c., and various works have been carried out, notably the following:—

Paihia Wharf (Bay of Islands).—A new wharf, with approach roads, was constructed at this place, but unfortunately it suffered serious damage through exceptionally high tides and heavy gales in February last, so that extensive repairs are necessary.

Tiritiri Lighthouse.—Two new cottages and outbuildings are in course of erection and nearing completion.

Ventilating-cowls.—Copper cowls for ventilating purposes have been manufactured under contract for Akaroa, Portland Island, Moeraki, and Cape Foulwind Lighthouses.

Waitakaruru Stream.—Snags have been removed from the channel, and arrangements have been made for the construction of a breastwork and leading-light.

Flat Rock Beacon.—A concrete pedestal is being constructed for a beacon light on Flat Rock, off Kawau Island. This work is extremely difficult, as the rock is practically awash at high water whenever the sea is at all rough, so that it is only occasionally, and for short periods at a time, that it is possible to work on the rock, while exceptionally heavy seas have seriously damaged the unfinished work on more than one occasion. However, the pedestal is now above the reach of the waves, and better progress can be made. It is expected that this part of the work will be completed very shortly. The iron surmount to accommodate the gas-cylinders and carry the lantern is being manufactured in Dunedin.

Tauranga.—A dolphin to carry an acetylene beacon light was constructed on behalf of the Tauranga Harbour Board.

Whakatane.—A plan and description of the limits of the Whakatane Harbour were prepared.

Castle Point Lighthouse.—The roofs of the keepers' cottages were repaired.

Marine Yard, Pipitea, Wellington.—A 5-ton crane which was purchased by the Marine Department for handling heavy stores has been fitted up.

Dog Island Lighthouse.—The existing masonry tower is being strengthened by the addition of a sheathing of reinforced concrete.

Puysegur Point Lighthouse.—Three new cottages have been erected.

DEFENCE WORKS.

Sundry new works have been carried out for the Defence Department, and existing works and buildings have been maintained and improved.

I have, &c.,

R. W. HOLMES, M.Inst.C.E.,
Engineer-in-Chief.

Enclosure to Appendix B.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1918.

NORTH ISLAND.

NOTE.—Column 11 : For detail information as to dates of openings of such portions of lines as are not given in this table see tables of lengths of lines in Public Works Statements, 1904–10.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Siding.	Total.	State of Line.														
							Surveyed.	Under Formation.		Under Plate-laying.	Date.	Opened.									
								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	18	19	20	21	
Kawakawa-Grahamtown (Onerahi)	Kawakawa	M. ch. 7 16	Opua Wharf - Kawakawa	M. ch. 7 16	M. ch. 0 57	M. ch. 7 73	M. ch. ..	M. ch. ..	M. ch. ..	..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. ..	M. ch. 7 16	
	Kawakawa-Kamo	41 48	Kawakawa-Towai	21 18	0 61	21 79	..	..	..	12 April, 1911	..	..	21 18	..	..	..	..	..	..	21 18	
			Towai-Hukerenui	4 30	0 33	4 63	..	..	..	2 May, 1910	..	4 30	..	..	..	..	..	..	..	27 2	
	Kamo-Grahamtown	9 22	Hukerenui-Kamo	16 0	3 29	19 29	..	..	..	..	..	..	..	..	..	..	..	..	..	2 50	
Kaihu Valley			Kioreroa-Grahamtown	2 50	1 16	3 66	..	..	..	2 Oct., 1911	..	..	2 50	..	..	..	..	..	..	16 25	
	Kawakawa-Hokianga	45 25	Wharf	16 25	1 45	17 70	..	..	..	1 May, 1914	..	..	..	..	..	16 25	..	..	..	16 25	
			Kaikohe-Hokianga	29 0	0 40	29 40	12 0	8 18	..	..	..	..	..	..	..	..	..	..	..	..	
	Kaihu Valley	24 30	Dargaville-Booms	17 21	0 75	18 16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
North Auckland Railway			Booms-Parawhati	2 37	0 25	2 62	..	..	..	1 June, 1914	..	..	..	..	..	2 37	..	..	..	..	
			Tarawhati-Donnelly's Crossing	4 52	0 38	5 10	..	4 33	0 19	..	..	..	..	..	..	..	..	..	..	..	
	Kaipara Northwards	86 22	Extension	25 55	..	25 55	25 55	..	..	..	..	..	..	..	..	..	..	..	..	..	
			McCarroll's-Paparoa	4 30	0 25	4 55	4 30	1 75	..	..	..	..	..	..	..	..	..	..	..	..	
			Paparoa-Bickerstaffs	3 75	0 63	4 58	..	0 68	3 07	..	..	..	..	..	..	..	..	..	..	..	
			Bickerstaffs-Ranganui	4 25	0 61	5 06	..	..	4 25	..	..	..	..	..	..	..	..	..	..	..	
			Ranganui-Kaiwaka	2 35	0 62	3 17	..	..	..	1 Aug., 1914	..	..	..	..	..	..	..	..	..	2 35	
			Kaiwaka - Te Hana	8 65	1 03	9 68	..	..	..	18 Mar. 1913	..	..	..	..	8 65	..	..	..	..	2 35	
			Te Hana-Wellsford	3 27	0 58	4 5	..	..	..	16 May, 1910	..	3 27	..	..	..	..	..	..	..	..	
			Wellsford-Wayby	3 18	0 28	3 46	..	..	..	1 April, 1909	..	..	..	..	..	..	..	..	..	..	
			Wayby-Hoteo	3 40	0 13	3 53	..	..	..	13 May, 1908	..	..	..	..	..	..	..	..	..	..	
			Hoteo-Kaipara Flats	2 45	0 13	2 58	..	..	..	11 June, 1907	..	..	..	..	..	..	..	..	..	..	
			Kaipara Flats-Woodcock's	3 5	0 16	3 21	..	..	..	17 Nov., 1905	..	..	..	..	..	..	..	..	..	45 42	
			Woodcock's-Ahuroa	2 41	0 16	2 57	..	..	..	18 May, 1905	..	..	..	..	..	..	..	..	..	..	
			Ahuroa-Helensville	18 41	1 75	20 36	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
							..	..	..	..	..	..	..	..	..	..	..	..	..	..	

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, (CONSTRUCTED, AND SURVEYED UP TO 31st MARCH, 1918—continued.

[illegible]

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, (CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1918—continued.
NORTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Siding.	Total.	State of Line.													
							Under Construction.		Opened.											
							Surveyed.	Under Formation.	Under Plate-laying.	Date.										Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
New survey—contd.	Napier-Gisborne—ctd.	M. ch.	Waikura-Waterfall	5 0	M. ch. 5 0	M. ch. 5 0	M. ch. 5 0	M. ch. 5 0	M. ch. 5 0	..	..	..	..	..	..	..	..	..	..	M. ch. 5 0
			Waterfall-Hangaroa	4 0	..	4 0	4 0	..	..	..	..	..	..	..	..	..	..	..	..	..
			Hangaroa - Te Reinga	17 11	..	17 11	17 11	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..
			Te Reinga-Marumaru	12 40	..	12 40	9 40	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..
Napier-Woodville and Palmerston North Wellington-Woodville	Napier-Woodville ..	96 65	Marumaru - Wairoa	7 0	..	7 0	7 0	..	..	..	..	..	..	..	..	..	..	..	..	..
			River Wharf Siding	1 64	..	1 64	1 64	..	..	..	..	..	..	..	..	..	..	..	..	..
			Wairoa-Napier ..	2 55	..	2 55	2 55	..	..	..	..	..	..	..	..	..	..	..	..	..
			Napier Spit-Woodville	96 65	15 5	111 70	..	..	..	..	..	..	..	..	..	..	..	..	..	96 65
Rimutaka Incline Deviation Surveys	Woodville-Palmerston North Wellington-Woodville	17 21 115 79 3 7 11 50 4 62	Woodville-Palmerston North	17 21	0 51	17 72	..	..	..	..	..	..	..	..	..	..	..	..	..	17 21
			Woodville-Wellington [Te Aro]	115 79	21 73	137 72	..	..	..	..	..	..	..	..	..	..	..	..	..	115 79
			Greytown Branch - Featherston - Martinborough	3 7 11 50	0 64	3 71 11 50	..	..	..	..	..	..	..	..	..	..	..	..	..	3 7
			Greytown-Martinborough	4 62	..	4 62	4 62*	..	..	..	..	..	..	..	..	..	..	..	..	..
Foxton-New Plymouth	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Coach road Route	9 0	..	9 0	9 0	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..
			Tauheranika Route	21 30	..	21 30	21 30	..	..	..	..	..	..	..	..	..	..	..	..	..
			Wainui-o-mata Route	31 40	..	31 40	31 40	..	..	..	..	..	..	..	..	..	..	..	..	..
			Coast Route	52 0	..	52 0	52 0	..	..	..	..	..	..	..	..	..	..	..	..	..
Foxton-New Plymouth	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Coast Route	70 0	..	70 0	70 0	..	..	..	..	..	..	..	..	..	..	..	..	..
			Petone-Pigeon Bush	52 0	..	52 0	52 0	..	..	..	..	..	..	..	..	..	..	..	..	..
			Petone-Carterton, via Martinborough	70 0	..	70 0	70 0	..	..	..	..	..	..	..	..	..	..	..	..	..
			Wellington-Longburn	83 37	15 76	99 33	..	..	..	7 Dec., 1908†	..	..	..	..	..	..	..	..	..	83 37
Foxton-New Plymouth	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Foxton-Patea	120 44	14 75	135 39	..	..	..	..	..	..	..	..	..	..	..	..	..	120 44
			Turakina-Matarawa	11 67	..	11 67	11 67	..	..	..	..	..	..	..	..	..	..	..	..	..
			Aramoho-Coast Valley Tunnel	7 40	..	7 40	7 40	..	..	..	..	..	..	..	..	..	..	..	..	..
			Kai Iwi - Okehu	3 60	..	3 60	3 60	..	..	..	..	..	..	..	..	..	..	..	..	..
Foxton-New Plymouth	Wellington-Manawatu Foxton-Patea Route Improvement Surveys	83 37 120 44 26 7	Nukumaru-Waitotara	3 0	..	3 0	3 0	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

* Trial survey. † Date of purchase.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1918—continued.
SOUTH ISLAND.

NOTE.—Column 11: For detail information as to dates of openings of such portions of lines as are not given in this table see tables of lengths of lines in Public Works Statements, 1904-10.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Stidings.	Total.	State of Line.													
							Sur-veyed.	Under For-mation.	Under Plate-laying.	Date.	Opened.									
											12	13	14	15	16	17	18	19	20	Total.
							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	Nelson - Roundell Midland Railway	22 73	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Nelson-Belgrove..	22 73		22 73	2 52	25 45	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.
	Stillwater - Belgrove (via Tadmor)	147	7	37 30	4 79	42 29				31 Mar., 1907										
				1 30	1 0	2 30				7 Aug., 1908										
				5 38	0 56	6 14				June, 1914						8 40				57 32
				8 40	0 45	9 5										4 54				
				6 0	0 10	6 10	1 26													
				46 43		46 43	46 43													
				4 5	0 15	4 20	4 5	3 11												
				9 42	0 55	10 17				2 Sept., 1912				9 42						
				3 17	0 34	3 51								3 17						
				5 9	0 29	5 38				18 Dec., 1908										37 61
				10 29	0 69	11 18				7 Aug., 1906										
				9 44	0 62	10 26														42 27
				42 27	2 68	45 15														
				1 2		1 2														
				8 0		8 0														
				13 79	0 20	14 19				1 July, 1914						0 68				
				15 22	1 29	16 51				1 July, 1914						13 79				
				7 40	0 30	7 70				10 Dec., 1910										42 27
										29 Oct., 1906										
				4 58	0 16	4 74														
				3 40	1 20	4 60				16 July, 1910		3 40								3 40
				7 51	6 18	13 69														7 51
				19 56	8 12	27 68														19 56
				7 12	1 18	8 30														7 12
				3 69	0 25	4 14														3 69
				26 0	0 10	6 4				1 April, 1912				5 74						5 74
				20 6		20 6	16 6	4 0												

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1918—continued.

SOUTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.													
							Sur-veyed.	Under For-mation.	Under Plate-laying.	Opened.										
										Date.	—	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.	Total.
Hurunui- Waitaki —contd.	2	3 M. ch.	4	5 M. ch.	6 M. ch.	7 M. ch.	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.	18 M. ch.	19 M. ch.	20 M. ch.	21 M. ch.
	Branches,—																			
	Rangiora-Oxford	21 76	Rangiora-Oxford West	21 76	2 36	24 32	..	..	..	..	..	..	..	..	..	..	..	..	..	21 76
	Eyreton (from	20 7	Main Line - West	20 7	1 61	21 68	..	..	..	..	..	..	..	..	..	..	..	..	..	20 7
	Main Line)		Eyreton-Bennett's				..	..	..	..	..	..	..	..	..	..	..	..	..	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	42 10	Lincoln-Little River	22 46	2 5	24 51	..	..	..	..	..	..	..	..	..	..	..	..	..	22 46
	Akaroa																			
	Springfield ..	30 60	Reconnaissance	19 44	..	19 44	19 44	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..
Canterbury Interior Main Line	..		Rolleston-Springfield	29 63	3 7	32 67	..	..	..	..	..	..	..	..	..	..	..	..	..	30 60
	Whitecliffs ..	11 38	Springfield-Coal-mine	0 77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11 38
	Rakaiia-Ash-	22 20	Darfield-Whitecliffs	11 38	1 53	13 11	..	..	..	..	..	..	..	..	..	..	..	..	..	22 20
	burton Forks	29 46	Whitecliffs to Bridge	0 5	2 65	25 5	..	..	..	..	..	..	..	..	..	..	..	..	..	29 46
	Ashburton ..	55 8	Rakaia-Methven ..	22 20	2 65	25 5	..	..	..	..	..	..	..	..	..	..	..	..	..	55 8
	Opawa and Al-	17 43	Tinwald-Springburn	27 29	1 52	29 1	..	..	..	..	..	..	..	..	..	..	..	..	..	17 43
	bury to Fairlie		Extension	2 17	..	2 17	2 17	..	..	..	..	..	..	..	..	..	..	..	..	27 29
	Creek and		Washdyke-Eversley	36 5	2 45	38 50	..	..	..	..	..	..	..	..	..	..	..	..	..	36 5
	Burke's Pass																			
	Waimate ..		Preliminary survey ..	19 3	..	19 3	19 3	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..
Waitaki- Bluff and Branches	..		Studholme-Waimate	4 42	1 3	5 45	..	..	..	..	..	..	..	..	..	..	..	..	..	..
			Waimate-Waihao	8 21	0 54	8 75	..	..	..	..	..	..	..	..	..	..	..	..	..	12 63
			Downs	2 65	..	2 65	..	2 65	..	..	..	..	..	..	..	..	..	..	..	..
			Waibao Downs Ser- pentine	1 75	..	1 75	..	1 75	..	..	..	..	..	..	..	..	..	..	..	..
	Oxford-Temuka ..	83 0	Serpentine-Kelcher's	11 44	0 27	11 71	..	1 75	..	..	..	..	..	..	..	..	..	..	..	11 44
			Oxford-Sheffield	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
			Surveyed	21 7	..	21 7	21 7	..	..	..	..	..	..	..	..	..	..	..	..	..
			Reconnaissance	50 29	..	50 29	50 29	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..
	Main Line	246 69	South Waitaki-Bluff	246 69	59 13	306 2	..	..	..	..	..	..	..	..	..	..	..	..	..	246 69
	Branches,—																			
Duntroon-Haka- teramea	87 33	Pukeuri-Duntroon ..	21 75	1 35	23 30	..	..	..	..	..	..	..	..	..	..	..	..	..	21 75	
		Duntroon - Hakatera- mea	15 38	1 5	16 43	..	..	..	..	..	..	..	..	..	..	..	..	..	15 38	
										</										

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1918—continued.

SOUTH ISLAND—continued.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.															
							Under For- mation.	Under Plate- laying.	Date.	Opened.										Total.		
										1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.					
W a i t a k i- Bluff and Branches — contd.	2	3 M. ch.	4	5 M. ch.	6 M. ch.	7 M. ch.	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.	18 M. ch.	19 M. ch.	20 M. ch.	21 M. ch.		
	Gore-Waikaka Branches	36 39	Gore-Lumsden	36 39	1 34	37 73	..	..	..	..	..	..	..	..	..	..	..	..	..	36 39		
	— contd.	24 0	Surveyed	9 58	..	9 58	9 58	..	..	..	..	..	..	..	..	..	..	..	..	..		
		12 65	Preliminary survey	14 22	..	14 22	14 22	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..	..	
		13 70	Waikaka Section	12 65	1 51	14 36	..	..	..	..	26 Nov., 1908	..	..	..	..	..	..	..	..	..	12 65	
Otago Cen- tral		19 30	Riversdale-Waikaka	13 70	1 40	15 30	..	..	..	1 Oct., 1909	..	..	..	..	..	..	..	..	..	13 70		
		182 51	Edendale-Glenham	9 36	0 72	10 28	..	..	..	..	..	..	..	..	..	..	..	..	..	9 36		
		182 51	Surveyed	9 74	..	9 74	9 74	..	..	..	..	..	..	..	..	..	..	..	..	..		
		182 51	Wingaiti-Ida Valley	98 18	5 62	104 0	..	..	..	..	1 Sept., 1904	..	..	..	..	..	..	..	..	134 78		
		182 51	Ida Valley-Omakau	13 20	1 16	14 36	..	..	..	..	14 July, 1906	..	..	..	..	..	..	..	..	..		
Invercar- gill-King- ston and Lumsden- Mararoa		10 39	Omakau-Chatto Creek	7 36	0 34	7 70	..	..	..	15 Dec., 1906	..	..	..	..	..	..	..	..	..	..		
		5 45	Chatto Ck.-Alexandra	10 39	1 6	11 45	..	..	..	27 Mar., 1907	..	..	..	..	..	..	..	..	..	..		
		12 35	Alexandra-Clyde	5 45	0 77	6 42	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
		35 18	Clyde-Cromwell	12 35	0 79	13 34	..	..	12 35	..	..	..	..	..	..	..	..	..	..	87 4		
		87 4	Surveyed	35 18	..	35 18	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Forest Hill Railway Western Railways. Orepuki- Waiau River		30 0	Invercargill-Kingston Wharf	87 4	5 15	92 19	..	..	..	..	..	..	..	..	..	..	..	..	..	10 40		
		11 0	Lumsden-Mosburn	10 40	1 0	11 40	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
		11 0	Surveyed	8 20	..	8 20	8 20	..	..	..	..	..	..	..	..	..	..	..	..	..		
		11 0	Reconnaissance	11 20	..	11 20	11 20	Prelim.	..	..	..	..	..	..	..	..	..	..	..	..		
		12 40	Winton - Heddon Bush	11 0	..	11 0	11 0	..	..	..	..	..	..	..	..	..	..	..	..	..		
Otautau Branch Orawia Branch .. Totals ..		12 40	Winton - Hedgehope	12 40	0 65	13 25	..	..	..	..	..	..	..	..	..	..	..	..	..	12 40		
		60 73	Makarewa-Orepuki ..	35 41	6 37	41 78	..	..	..	..	..	..	..	..	..	..	..	..	..	48 16		
		22 15	Orepuki-Waihoaka ..	4 48	0 58	5 26	..	..	..	1 Oct., 1909	..	..	..	..	..	..	..	..	..	..		
		11 0	Waihoaka-Tuatapere	8 7	1 10	9 17	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
		11 0	Tuatapere-Orawia ..	8 17	..	8 17	3 40	4 57	..	..	..	..	..	..	..	..	..	..	..	22 15		
	22 15	Orawia-Clifden	4 40	..	4 40	4 40	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
	22 15	Thornbury-Wairio ..	22 15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
	11 0	Surveyed ..	11 0	..	11 0	11 0	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
	Totals ..	2337 11	..	2337 11	257 66	2594 77	489 28	28 64	29 57	..	1,371 50	29 78	22 72	27 16	3 69	51 16	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, 1918.

I have the honour to submit the following report on the various building-works throughout the Dominion during the twelve months ended 31st March last :—

NEW PARLIAMENT BUILDINGS.

Work has continued without cessation throughout the year, but progress has been slow and, as regards the marble masonry work, rather disappointing. The Museum Street frontage has been carried up to the ceiling-level of the first floor, being now at the same height as the principal frontage to Molesworth Street. The output of marble at the quarry has been affected by the scarcity of suitable labour. Fair progress has been made internally towards completion of the chamber of the House of Representatives, the lounge lobby, rooms for the Speaker, Chairman of Committees, Clerk, Assistant Clerks, and *Hansard* staff, which have been pushed on with a view to having the chamber in the new building ready for occupation for the coming session of Parliament. Plastering, heating, ventilation, and electric-lighting works in the new building have been carried forward as far as practicable.

GENERAL.

Old Post-office, Auckland.—Extensive alterations were made to accommodate several Departments.

Departmental Buildings, New Plymouth.—Conveniences were provided and tell-tale clock installed.

Departmental Buildings, Napier.—Extensive alterations were carried out and a retiring-room added.

Departmental Buildings, Nelson.—Caretaker's cottage was erected.

Special School for Girls, Richmond.—A laundry and outhouses were added.

Puységur Point.—Three cottages are being erected for the lighthouse staff.

POST-OFFICES.

Kaitia.—Additions were made to office building, lighting and hot-water services installed.

Ohaewai.—Additions were made to the telephone exchange.

Auckland (Wellesley Street).—Foundations were put in, and a contract let for the erection of a building in brick.

Devonport.—Extensive alterations to building were completed.

Turua.—A wooden office building with quarters was erected.

Te Kuiti.—Extensive additions were made and a clock installed.

Piopia.—A wooden building was erected under contract.

Taumarunui.—A retiring-room for ladies was provided.

Whakatane.—Additions and alterations were made to the office building and a clock provided.

Te Puke.—Substantial additions to office building were made.

Mokau.—A small office building was erected by contract.

New Plymouth.—One room was converted into a strong-room.

Wanganui.—Retiring-room for ladies was added to building.

Featherston.—A new storeroom was erected.

Wellington General Post-office.—Lavatory accommodation was extended.

Te Karaka.—An office building in wood was erected.

Port Awanui.—A small wooden building was erected.

Gisborne.—Additions were made to Telegraph store.

Hastings.—Extensive alterations and repairs were carried out.

Palmerston North.—Substantial additions were completed by contract.

Heretaunga.—An office building was completed under contract.

Richmond.—Sanitary accommodation was provided.

Upper Moutere.—A wooden building was erected under contract.

Money-order Office, Christchurch.—Foundations have been put in.

Rakaia.—A Postmaster's residence was erected by contract.

Oamaru.—Accommodation for an automatic-telephone exchange is being provided.

Roslyn.—An automatic-telephone exchange has been completed.

St. Clair.—The old school building was converted to serve as a post-office.

POLICE-STATIONS.

Auckland Central.—Substantial additions in brick were completed under contract.

Wairoa.—A new residence was erected under contract.

Oamaru.—A contract was let for the erection of a new station in stone.

Dunedin.—Station building is being converted for use by various Departments.

PRISONS.

Gisborne.—Repairs were effected and electric light installed.

Waikeria.—The erection of the administrative wing has been in progress throughout the year, and the work is approaching completion. Cottages, dairy, and cow-sheds have been erected.

Paparua.—The west cell-range of main building is under construction

Addington.—A hospital cell was provided.

Invercargill.—Boundary and partition walls have been built by the prisoners.

MENTAL HOSPITALS.

Tokanui.—The erection of the fourth unit was completed, and a commencement made with the fifth unit.

Porirua.—A new receiving-block was completed and equipped.

Nelson.—A kitchen block is being erected in brick.

Sunnyside.—The erection of a receiving-block was carried to completion.

AGRICULTURAL.

Weraroa Farm.—Residences for Manager and Biologist have been erected.

Quail Island.—A concrete water-supply reservoir was completed.

Ranfurly.—Stock Inspector's residence has been built under contract.

NATIVE SCHOOLS.

Maungatapu.—An open-air class-room was added.

Whakarewareware.—A class-room was added.

Te Araroa.—Additions to school building were made under contract.

Whakiki.—Additions were completed.

MILITARY BUILDINGS.

Auckland Drill-hall.—Kitchen, sleeping-accommodation, and lavatory were provided.

Base Records Office, Wellington.—Additions were completed.

Defence Reserve, Wellington.—Caretaker's cottage was completed.

Greymouth.—A contract was let for the erection of an explosives-magazine.

Hammer Convalescent Home.—A meat-store and accommodation for laundresses have been provided.

King Edward Barracks, Christchurch.—Portion of roof has been reconstructed, and an additional room built.

Chain Hills (Otago).—Explosives-magazine and caretaker's residence were completed.

Central Battery, Dunedin.—Quarters for Military Police were provided.

Kensington Drill-hall.—Orderly-room and store were built.

Defence Stores, Wellington.—Substantial additions were carried to completion.

Recruiting Office, Wellington.—Lavatory accommodation was provided in Clarkson's Buildings.

Defence Headquarters, Wellington.—New offices were completed.

In addition to those specially mentioned in the foregoing report a large number of minor works, comprising small buildings, additions, alterations, installation of lighting, water, and drainage services, have been carried out by petty contract, day labour, or the Department's own staff. Renovations, painting, and repairs to buildings throughout the Dominion owned by the Government have been attended to as required, and fittings and furniture supplied mostly from the Department's workshops in the principal centres.

JOHN CAMPBELL,
Government Architect.

APPENDIX D.

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

The CHIEF ELECTRICAL ENGINEER to the MINISTER OF PUBLIC WORKS.

SIR,—

Public Works Department, Wellington, 1st April, 1918.

I have the honour to submit the following report respecting the development of water-power by the State, the issue of licenses for the utilization of water-power by other parties, and for the distribution of electricity.

NORTH ISLAND POWER SCHEMES.

A considerable amount of office-work has been done in design of power-stations for sites already surveyed at Mangahao and on the Waikato. Various proposals for a general scheme of distribution have been considered, and the transmission routes roughly located.

As far as the limited staff available would permit, the surveys necessary to prepare for this general supply have been carried on. Transmission-line routes have been surveyed from the Waikato above Cambridge into Auckland, from Shannon to Wanganui, and from a junction on this line at Bunnythorpe to Dannevirke and south through the Wairarapa as far as Carterton. These surveys will be continued as opportunity offers to enable all the main sources of power to be linked up into one system.

A personal investigation of the Aratiatia Rapids and of the Kaituna River as alternative sources of power to Arapuni was made from existing surveys. The conclusion reached was that the Kaituna River was somewhat limited in its ultimate economic capacity, and was too expensive for partial developments to warrant further work on it. It is, moreover, not nearly so well situated to fit into the general scheme of distribution, as it is too far east to serve the western and Taranaki districts, and as a supply for the East Coast districts it is not comparable with Lake Waikaremoana. The Aratiatia Rapids gave a very good alternative up to 66,000 horse-power, but for an ultimate larger development than this the scheme would have to be laid out on altered lines from the commencement, and it was decided to have further surveys made to determine the relative merits of Arapuni and this scheme when developed on lines which will permit of the maximum ultimate capacity.

Surveys have been completed at Lake Waikaremoana to enable the works to be laid out in detail, and this work will be taken in hand shortly. This scheme, while an excellent one from the hydraulic point of view, is not so conveniently situated for transmission of its power to payable markets as are the Mangahao and Waikato schemes. It has also been found that the estimates of the amount of power to be economically developed have had to be considerably reduced.

Some further work has been done on the investigation of power requirements in the Wellington District, and the whole of the results between Wellington and the Rangitikei have been tabulated.

LAKE COLERIDGE.

I attach hereto a report of the working of the Lake Coleridge undertaking for the year ending 31st March, 1918, together with a comparison with previous years, by the Electrical Engineer, Mr. Lawrence Birks.

The capital expenditure now amounts to £389,754, including £14,320 interest on capital during construction; the gross revenue during the year amounted to £32,092, and the working-expenses to £14,449; leaving a balance to net revenue account of £17,643. Deducting interest charges, amounting to £14,871, there remains a balance of £2,772 towards depreciation. Having regard to the fact that this is only the third year of working, and also that the growth of the business has been checked for the last two years because of the difficulty experienced in getting machinery, the result is to be regarded as a most satisfactory one.

The plant at the power-station consists of four units, aggregating 6,000 kilowatts, and all four units are run daily without any spare. The demand for more power is so insistent that the delivery of the fifth generator and the necessary pipe-line is a matter of urgent necessity. The turbine for the fifth unit has been received, but there is very little prospect of obtaining the generator, and still less of obtaining delivery of the material for the pipe-line. During the year efforts have been made to obtain steel plates from Canada, the United States, and Australia, but the prices are excessive and the delivery uncertain, and under the circumstances it was deemed better to take further steps to press for the completion of the contract for the third pipe-line, and further steps have been taken in the endeavour to secure a priority certificate for the plates.

With reference to the transmission-lines, the maintenance has proved somewhat troublesome during the year owing to inherent defects in the insulators, and it is desirable in the interest of economy of working and continuity of supply that the insulators should be replaced by others of a newer type as opportunity offers.

During the year application was received from a London firm for 2,500 horse-power in the neighbourhood of Christchurch for electric smelting purposes, but the application had to be refused because of the insufficiency of the plant. This is most regrettable, as I feel sure that this would have been the beginning of a large electric smelting industry which would treat various classes of complex ores. An application was also received for 1,000 horse-power for steel-smelting, and in this case also the application had to be refused.

Steady progress was made during the year with an extension of the lines into the country districts. Many insistent demands have been received from various districts in Canterbury, and in view of the requirements steps should be taken very shortly to enlarge the headworks and to duplicate the tunnel, and to provide the necessary transmission and distribution lines.

The rainfall during the year has exceeded the average of the last few years, and enabled a sufficient supply of water to be maintained without having recourse to the Harper River, and I have decided to postpone for another year the proposal to deviate a portion of the waters of the Harper River. If the present rate of rainfall is maintained there is a probability that this expenditure on the deviation, which is estimated at £6,000, may be deferred until the fifth unit is in operation.

The State Supply of Electrical Energy Bill was passed during the year. This Act authorizes the setting-up of a special Electric Supply Account, thus separating the electric supply accounts from the Consolidated Fund, and directing that the electric supply accounts shall be kept on a commercial basis of profit and loss, charging to the net revenue account all the usual commercial capital charges—interest, depreciation, sinking fund, and reserve fund. The provisions of the Act thus enable a true knowledge of the actual profit or loss made by the scheme to be ascertained at once from the annual accounts.

ELECTRIC LIGHT AND POWER LICENSES.

The following electric light and power licenses have been issued during the year :—

Electric Lines.—Pukekohe Borough Council (Pukekohe Borough), Ross Borough Council (Ross Borough), Waitara Borough Council (Waitara Borough), Devonport Borough Council (portion of Takapuna Borough), Picton Borough Council (Picton Borough), Stevenson and Cook Engineering Company (Limited), (Beach Street, in Port Chalmers Borough), Lion Brewery (Limited), (Khyber Pass Road, in Auckland City), Hamilton Borough Council (portion of Waipa County), Wellington City Council (portion of Wellington City), Christchurch Tramway Board (portion of Sumner Borough), Patea Borough Council (Patea Borough and portion of Patea County), New Zealand Refrigerating Company (Limited), (portion of Gonville Township), Otorohanga Town Board (Otorohanga Town District), Petone Borough Council (portion of Petone Borough), Christchurch City Council (New Brighton Borough), James Stewart (portion of Helensville Township), Joseph Cobine and Hugh Graham Cecil Ernest (portion of Papatoetoe Township), Tikitiki Hall and Motor Company (Limited), (portion of the Waiapu County), Waiuku Town Board (Waiuku Town District), Te Kuiti Borough Council (Te Kuiti Borough) (amended).

Water-power and Electric Lines.—Stratford Borough Council (Stratford Borough and County), Akaroa Borough Council (Akaroa Borough).

I have, &c.,

E. PARRY,
Chief Electrical Engineer.

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY.

Public Works Department, Christchurch (Electrical Branch), 1st April, 1918.

I BEG to report on the operation of the above plant for the year ending 31st March, 1918, as follows :—

The year under review is the third year of operation, and has proved a critical one in the history of the undertaking, as it is the first year in which the revenue, £32,092, covered all outgoings—i.e., working-expenses, £14,449, and interest charges, £14,871, leaving a balance of £2,772 towards depreciation. The statutory amount of the depreciation reserve for the year at 2 per cent. on the capital outlay amounts to £7,013. The growth in output and revenue indicates that all charges would have been more than covered but for the restrictions on the output due to war conditions preventing the arrival of the necessary plant. For the third year of operation the position is thus very satisfactory.

CAPITAL OUTLAY.

The capital outlay at the end of the year was £389,754, as compared with £366,984 at the beginning of the year, distributed as follows :—

Item.	Capital Outlay.		Increase.
	31st March, 1917.	31st March, 1918.	
	£	£	£
Land, roading, and fencing	17,186	17,250	64
Tunnel and headworks	93,345	94,390	1,045
Power-house and plant	63,624	70,976	7,352
Staff village	9,662	11,333	1,671
Transmission-lines	53,049	52,884	Decrease 165
Addington distributing-station	20,811	22,510	1,699
Primary distribution	37,323	38,451	1,128
Secondary distribution	20,245	24,371	4,126
Service transformers and meters	10,926	11,627	701
Motor vehicles	2,816	3,988	1,172
Telephone-lines	1,816	1,815	Decrease 1
Office furniture	84	93	9
Survey and engineering expenses	22,948	25,746	2,798
Interest during construction	13,149	14,320	1,171
Totals	366,984	389,754	22,770

WORKING-EXPENSES.

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

Expenditure.	1917.		1918.	
	Cost.	Per Unit sold.	Cost.	Per Unit sold.
	£	d.	£	d.
Generation	3,741	0·077	3,737	0·045
Transmission	2,559	0·052	2,195	0·027
Main distributing-station	1,661	0·034	1,884	0·023
H.T. distribution	1,723	0·035	1,820	0·022
L.T. distribution	..	..	268	0·003
Stand-by plant	538	0·012	1,104	0·013
Management and general expenses ..	2,667	0·055	3,441	0·042
Total working-expenses ..	12,889	0·265	14,449	0·175

FINANCIAL RESULTS OF YEAR'S OPERATION.

The growth of the output and the financial results of working for the three complete years of operation are as follows :—

	First Year, ending March, 1916.	Second Year, ending March, 1917.	Third Year, ending March, 1918.
Capital outlay	£320,330	£366,984	£389,754
Costs—			
Working-costs	£9,383	£12,889	£14,449
Interest, 4 per cent.	£11,398	£13,743	£14,871
Depreciation, 2 per cent.	£5,386	£6,078	£7,013
Total costs	£26,167	£32,710	£36,333
Revenue—			
Wholesale consumers	£7,723	£19,021	£29,166
Retail consumers	£537	£983	£1,912
Miscellaneous	£258	£750	£1,014
Total revenue	£8,518	£20,754	£32,092
Maximum load (kilowatts)—			
Power-house	1,372	4,366	5,438
Substation	1,220	3,900	4,800
Units output—			
Power-house	4,860,260	14,774,960	22,403,660
Substation	4,128,232	12,934,230	20,539,430
Units sold—			
Wholesale consumers	3,917,841	11,474,961	19,537,386
Retail consumers	76,926	190,000	307,290
Total units sold	3,994,767	11,664,961	19,844,676
Losses—			
Transmission losses	752,028	1,840,730	1,864,230
Percentage	15·0	12·5	8·3
Distribution losses	133,465	1,269,269	694,754
Percentage	3·2	9·8	3·4
Average weekly load factor (percentage)—			
Power-house output	44·3	52·9	58·0
Substation output	43·3	53·1	58·4
Annual load factor (percentage)—			
Power-house	40·5	38·6	47·2
Substation	38·6	38·0	48·9
Working-costs—			
Per kilowatt (power-house maximum) ..	£6·80	£2·95	£2·66
Per kilowatt (substation maximum) ..	£7·70	£3·32	£3·01
Per unit generated	0·46d.	0·208d.	0·155d.
Per unit sold	0·56d.	0·265d.	0·175d.
Capital charges—			
Per kilowatt (power-house maximum) ..	£12·20	£4·55	£4·04
Per kilowatt (substation maximum) ..	£13·70	£5·08	£4·56
Per unit generated	0·83d.	0·322d.	0·234d.
Per unit sold	1·01d.	0·41d.	0·265d.
Total cost—			
Per kilowatt (power-house maximum) ..	£19·00	£7·50	£6·70
Per kilowatt (substation maximum) ..	£21·40	£8·40	£7·57
Per unit generated	1·29d.	0·53d.	0·389d.
Per unit sold	1·57d.	0·675d.	0·44d.
Revenue—			
Per kilowatt (power-house maximum) ..	£6·20	£4·75	£5·90
Per kilowatt (substation maximum) ..	£7·00	£5·30	£6·69
Per unit generated	0·42d.	0·337d.	0·344d.
Per unit sold	0·512d.	0·427d.	0·388d.

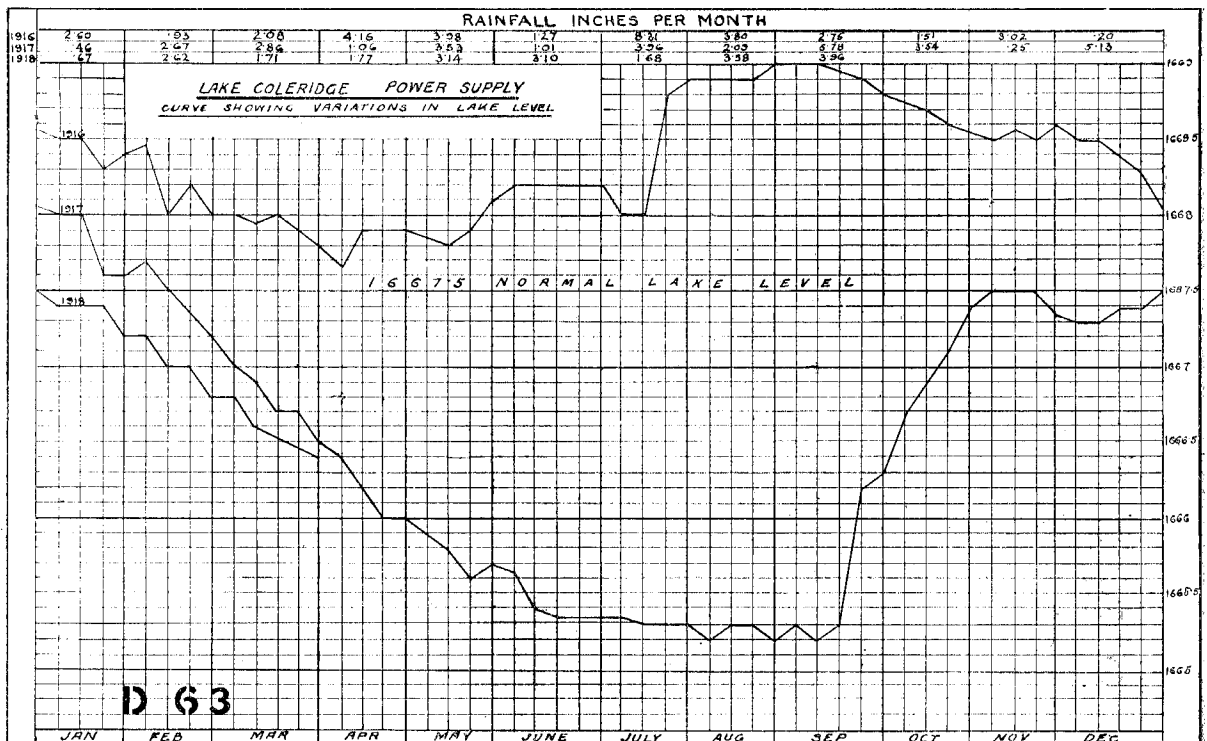
WATER-STORAGE.

The water drawn off from the lake during the autumn and winter of the past two years has exceeded the inflow, and as a result the storage has been drawn upon to the extent of 27 in. in 1917, and 33 in. in 1918, below the overflow level of 1,667.5 ft. The actual lake-levels from week to week during the three years of operation are shown herewith. The monthly rainfall observations at the power-house have been as follows:—

	1914.	1915.	1916.	1917.	1918.
	In.	In.	In.	In.	In.
January	3.55	2.22	2.60	0.46	0.67
February	1.83	2.08	0.93	2.67	2.62
March	1.37	1.35	2.08	2.87	1.72
April	4.83	0.68	4.06	1.06	..
May	2.35	2.36	3.98	3.53	..
June	1.71	2.09	1.27	1.01	..
July	0.91	2.43	8.31	3.96	..
August	1.34	0.93	3.80	2.09	..
September	1.91	1.37	2.75	5.78	..
October	1.63	3.00	1.51	3.54	..
November	2.10	2.78	3.02	0.25	..
December	2.90	1.44	0.20	5.13	..
Totals	26.43	22.73	34.51	32.35	..

The rate of inflow is, however, determined rather by the melting of the snow on the high lands than by the rainfall, and hence the level falls off in autumn, remains low throughout the winter, and recovers in early spring.

Preliminary preparations were made during the year for the diversion of a portion of the Harper River into the lake, giving an additional flow of 300 cusecs, equivalent to an additional 8,500 kilowatts for continuous operation, or 17,000 kilowatts on a 50-per-cent. load factor.



GENERATING PLANT.

The plant capacity was increased at the beginning of the year from 4,500 to 6,000 kilowatts. Provision has been made during the year for accommodating the fifth generating unit, which will be of 3,000 kilowatts capacity. The turbine for this unit has been delivered, but shipment of the generator and pipe-line has been indefinitely delayed owing to war conditions.

TRANSMISSION.

An exhaustive series of tests has been carried out during the year with the object of locating as far as possible a weakness which has been progressively developing in the high-tension transmission-line insulators. The whole of the spare stock of insulators, as well as a large number

taken off the line, have been thoroughly tested with the 125,000-volt oscillator, 100,000-volt transformer, and 1,000-megohm megger, and these tests in conjunction with those being made elsewhere have enabled the trouble to be fairly definitely determined as consisting in an undue concentration of electrostatic stress, due to the design of the insulator and to incipient porosity in the material, resulting in occasional breakdowns of the transmission-line with no apparent external cause. Sample shipments of other standard types of insulators are on order, and an ideal design has been worked out which it is anticipated will overcome the greater part of the difficulty.

In addition to this cause of breakdown, several interruptions occurred owing to pieces of bark being blown across the lines from the adjacent gum-trees. This source of trouble is also being dealt with drastically by the removal of gum-trees in the proximity of the lines.

In spite of these difficulties a very satisfactory record for continuity of service has been maintained, due to the high state of efficiency to which the patrol and breakdown organization has been developed.

There was a total of sixteen actual interruptions to service during the year, thirteen of these being momentary interruptions of less duration than one minute. Of the three interruptions in excess of one minute, only one was of a serious nature, but being at night (1.43 a.m.) it caused no industrial inconvenience. Particulars of these three stoppages are as follows :—

Date.	Hour.	Period of Interrup- tion.
April 30	1.43 a.m. ..	51 minutes.
May 19	12.26 p.m. ..	3 ..
October 18	7.24 p.m. ..	1½ ..

The total number of insulators replaced during the year owing to failure from all causes was forty-seven out of 5,220 insulators in service—that is less than 1 per cent. compared with the usual replacements of extra-high-tension insulators in American systems, amounting to 10 to 25 per cent. each year.

DISTRIBUTION SYSTEM.

Several additions have been made to the reticulation system during the year. The length of primary 10,500-volt feeders in service has been increased from 57¾ to 60¼ miles, made up as follows, all feeders being in duplicate :—

					On 31st March, 1917.	On 31st March, 1918.
					Miles.	Miles.
City Council (Armagh Street)	..	..	..	..	2¼	2¼
City Council (Montreal Street)	..	..	..	..	1½	1½
Tramway Power-station	..	..	..	..	2½	2½
Northern feeder	..	..	..	..	19	20
Southern feeder	..	..	..	..	23	24
Lyttelton feeder	..	..	..	..	9½	9½
Addington local feeder	..	..	..	..	..	½
Totals	..	..	..	..	57¾	60¼

The 3,000-volt reticulation has been increased during the year from 6½ to 10 miles. Low-tension 400/230-volt reticulations have been carried out by the Department in the following districts during the year :—

District.					Number of Consumers	
					On 31st March, 1917.	On 31st March, 1918.
Kaipoi Borough	..	..	..	..	..	214
Paparua County	..	..	..	..	118	137
Halswell County	..	..	..	..	..	27
Eyre County	..	..	..	..	..	49
Rangiora County	..	..	..	..	6	13
Totals	..	..	..	..	124	440

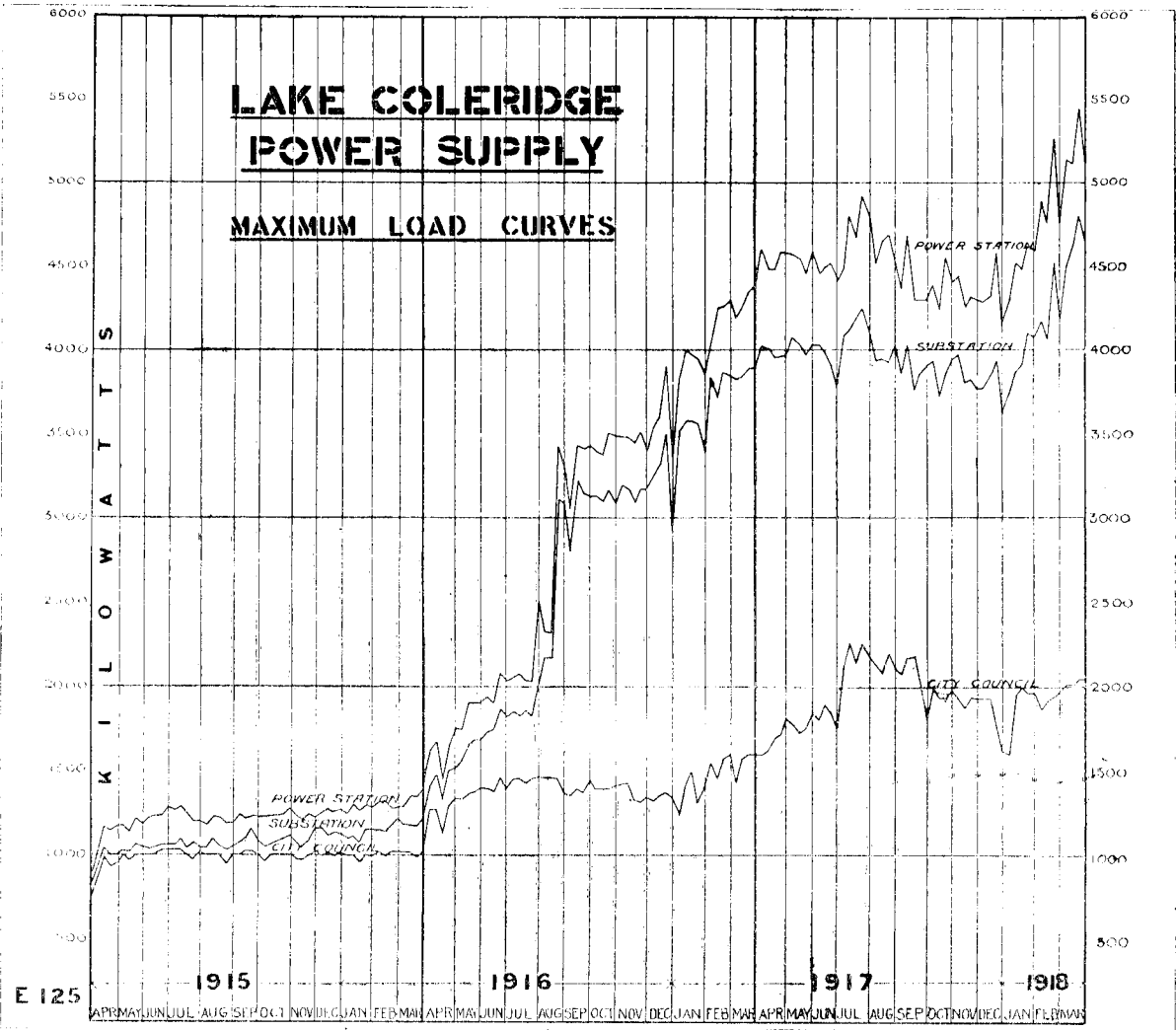
A very striking feature of the year's development has been the increasing insistence of the demand from country districts for a supply of power. The supply of electricity is much appreciated in the country districts already supplied, there being twenty-five milking plants driven by electric motors in the Tai Tapu Company's area of supply, and twenty in the Eyre County.

SUPPLY TO LOCAL AUTHORITIES.

Large extensions of the reticulation system have been carried out during the year by the Christchurch City Council, the Waimairi County, Lyttelton and Sumner Boroughs, and the Tai Tapu Dairy Company. The Kaiapoi Borough Council took over the reticulation within their boundary at the end of the financial year. The Eyre County, Rangiora County, and Rangiora Borough Councils are installing reticulations, which will be put in service during the ensuing year. The Christchurch Drainage Board's sewerage pumping plant was converted to electric driving, the supply being given through the City Council. The change has effected a substantial reduction in the cost of pumping. The Sumner Borough waterworks pumping plant was converted from an oil-engine drive to an electric drive, and a contract was entered into for operating the Lyttelton Borough pumping plant, the electric supply being restricted to night service.

BULK-SUPPLY CONSUMERS.

A contract was entered into during the year with Messrs. Waddell and Sons for a supply of power for steel-smelting. A contract was completed with a syndicate for the supply of electric energy for the manufacture of caustic soda and hydrochloric acid. Arrangements were made during the year to supply the last of the tanneries and fellmongeries, seven in all, within reach of the existing power-lines. All five flour-mills in the area of supply are now being supplied with power from Lake Coleridge. A supply to a seed-cleaning plant was effected during the year, the electric motor in this case replacing a suction-gas engine.



ELECTRIC VEHICLE TRACTION.

Remarkably successful results have been obtained during the year in the application of the electric battery to road traction in Christchurch. There are now about twenty-five vehicles in regular commercial operation in the city, two electric lorries being in use by the Public Works Department and four by the Christchurch City Council. The rated mileage of fifty to sixty miles per day is being well maintained in practice, and the cost of running is proving less than half that of petrol. The advantage of electric-battery traction from an electric supply point of view is that the batteries are charged during the night when the power plant is lightly loaded. This offers the possibility of a further improvement in the load factor, and the City Council are making preparations for developing the business on a very large scale.

SELLING-RATES.

The rates for the supply of electric power have not been increased during the past year in spite of the increasing cost of labour, amounting to 10 to 20 per cent. over pre-war rates, and of materials, amounting to 50 to 300 per cent. over pre-war rates. Of the alternative sources of light, heat, and power, kerosene has increased by 112 per cent. (*i.e.*, from 8s. to 17s.), gas by 16 per cent. (from 5s. 9d. to 6s. 8d. per thousand feet), and coal by 72 per cent. (from 35s. to 60s. per ton). But in order to ensure the most economical use of the limited power available, and to enable the benefits of electric supply to be extended as far as the generating plant in service will permit, it is essential that every unit should be utilized with increasing care. The most effective way to ensure this would be to raise the selling-rates irrespective of the cost of production. But, apart from this, the restriction in the output due to the difficulty in obtaining additional plant during the war has prevented the increased cost of supply being counterbalanced by increased output, and in view of the above figures showing that the plant is not yet paying its way there is every reason for the consideration of an increase in the selling-rates.

STAFF.

In common with all other industries, work has been carried out under considerable difficulties owing to enlistments and shortage of staff due to the war conditions. Out of an average staff of seventy-seven there have been since the war thirty-seven enlistments. Three of these have made the supreme sacrifice—J. Tennant, E. Aitken, and W. W. Summers.

Owing to the shortage of skilled men to replace those called in the ballot it has been found necessary to appeal for twelve. Of these, one has been sent into camp, three have been classed C2 on the medical examination, three have not yet been called, and five have been adjourned. The operation and maintenance of a plant of this description with safety both to life and to continuity of supply requires very special training. There are only three other similar plants in operation in New Zealand—viz., Waipori Falls (Dunedin), Horahora Rapids (Waihi Gold-mining Company), and Wairua Falls (Whangarei)—all of which are working with heavily depleted staffs, and the opportunities for getting trained men are thus very limited. During the three years of operation, out of a staff of eight power-house shift engineers, five have enlisted, and eight have left to take up senior positions in other power plants, thus involving an unusual number of changes and the training of new men in each case, and it would have been quite impossible to carry on without the nucleus of trained men appealed for.

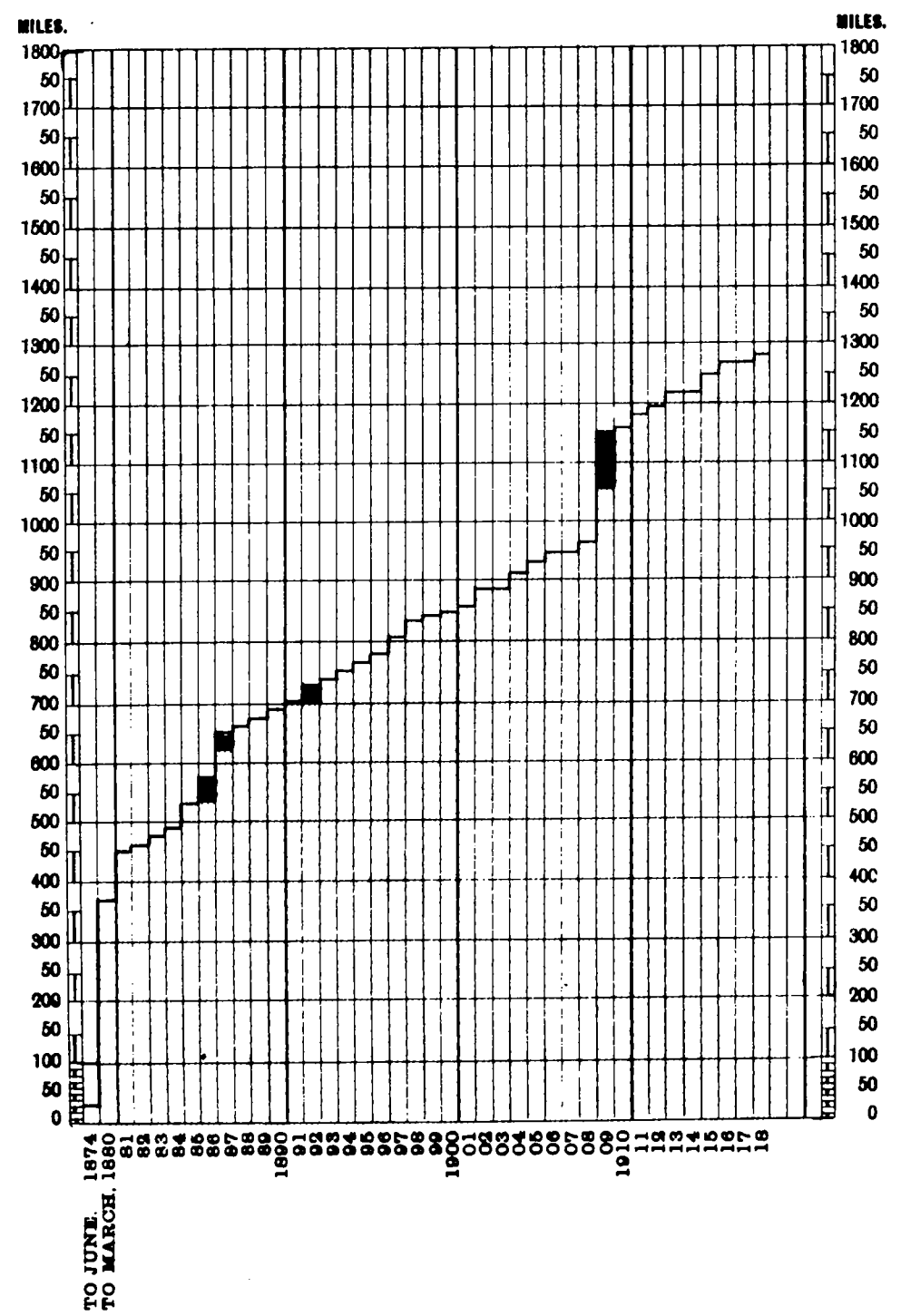
At the same time every effort is being made to take on and train suitable returned soldiers—both disabled and otherwise. Eight returned soldiers are now employed, of whom two are being especially trained under the provisions of the Discharged Soldiers' Assistance Department. For future employment in the maintenance of small electric-supply reticulations and large factory motor installations, a large number will be required later on in positions which can be filled by partially disabled men, and the training of such men is being kept in view in filling casual vacancies as far as possible by returned partially disabled soldiers.

LAWRENCE BIRKS,
Electrical Engineer.

The Chief Electrical Engineer. Public Works, Wellington.

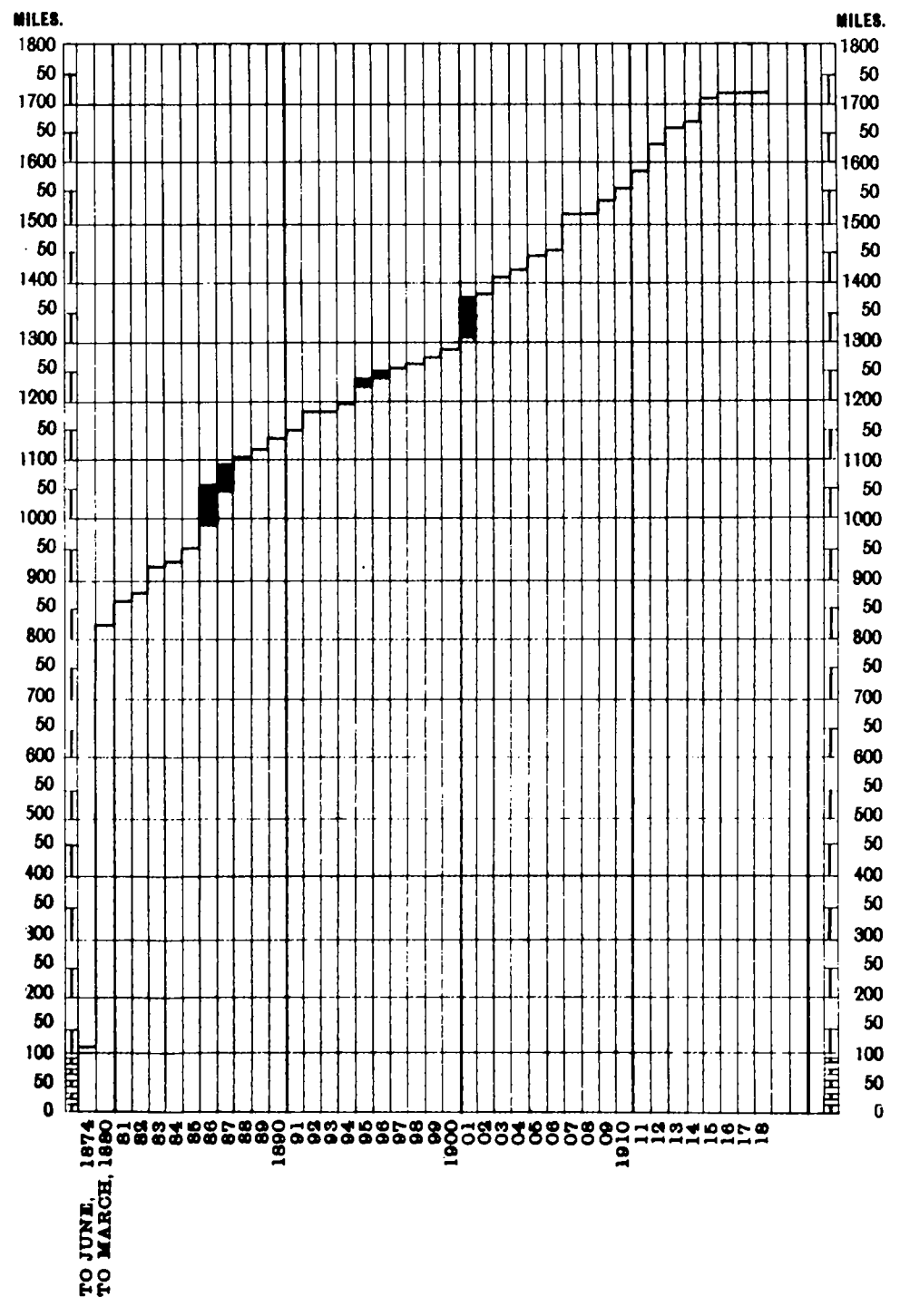
NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

NORTH ISLAND.



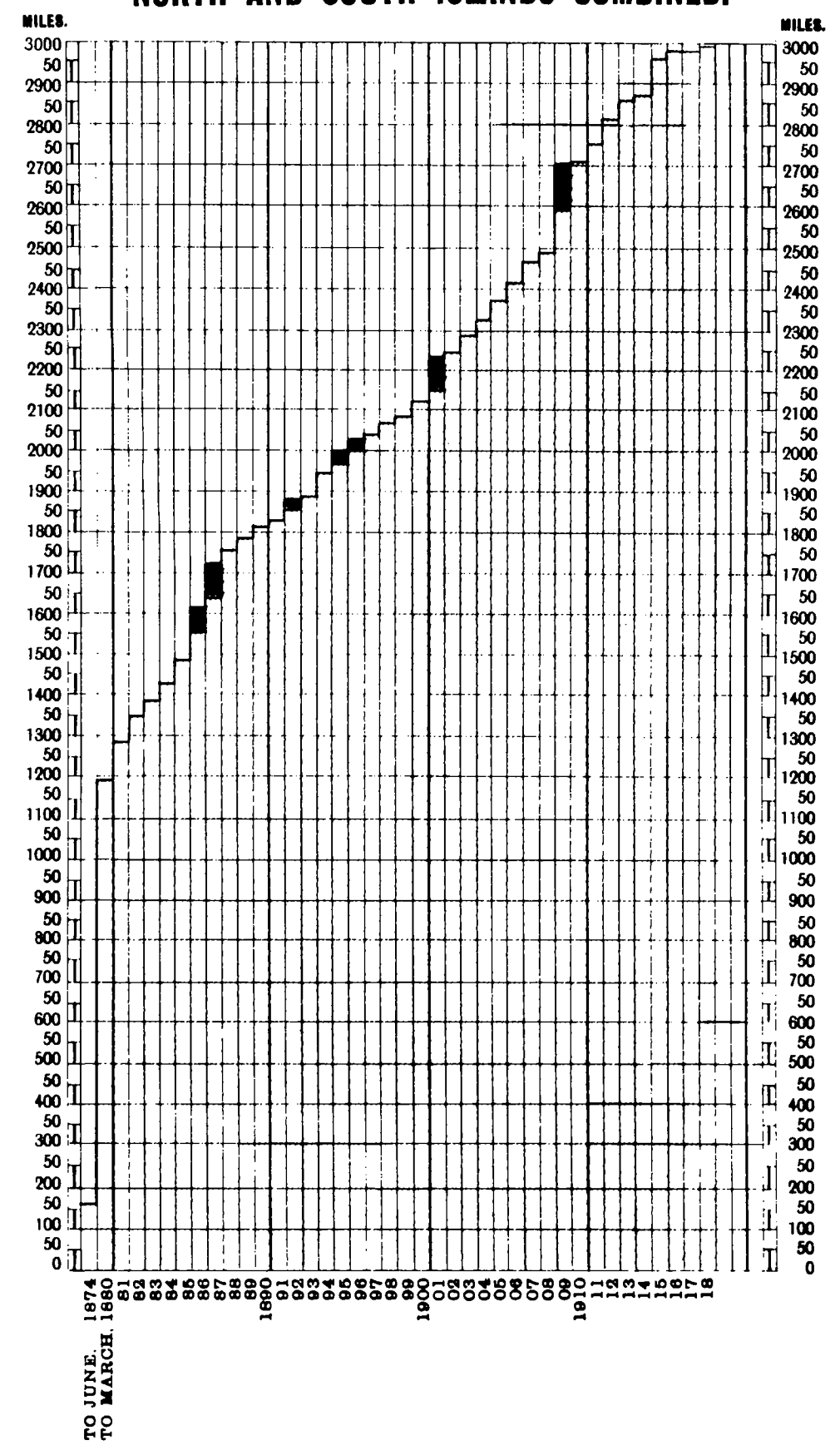
NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

SOUTH ISLAND.



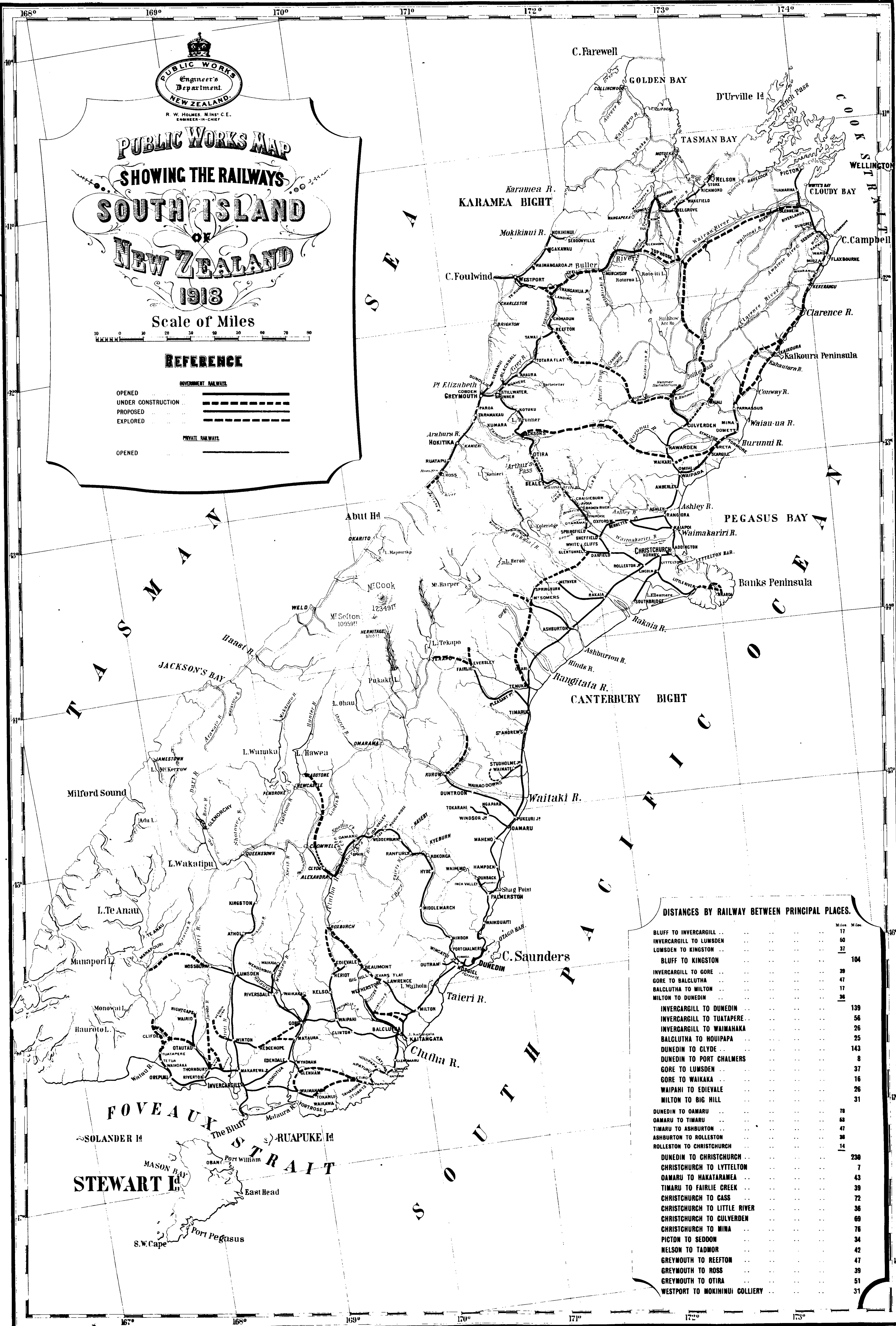
NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

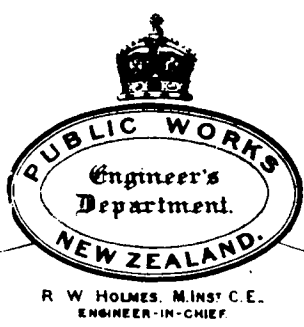
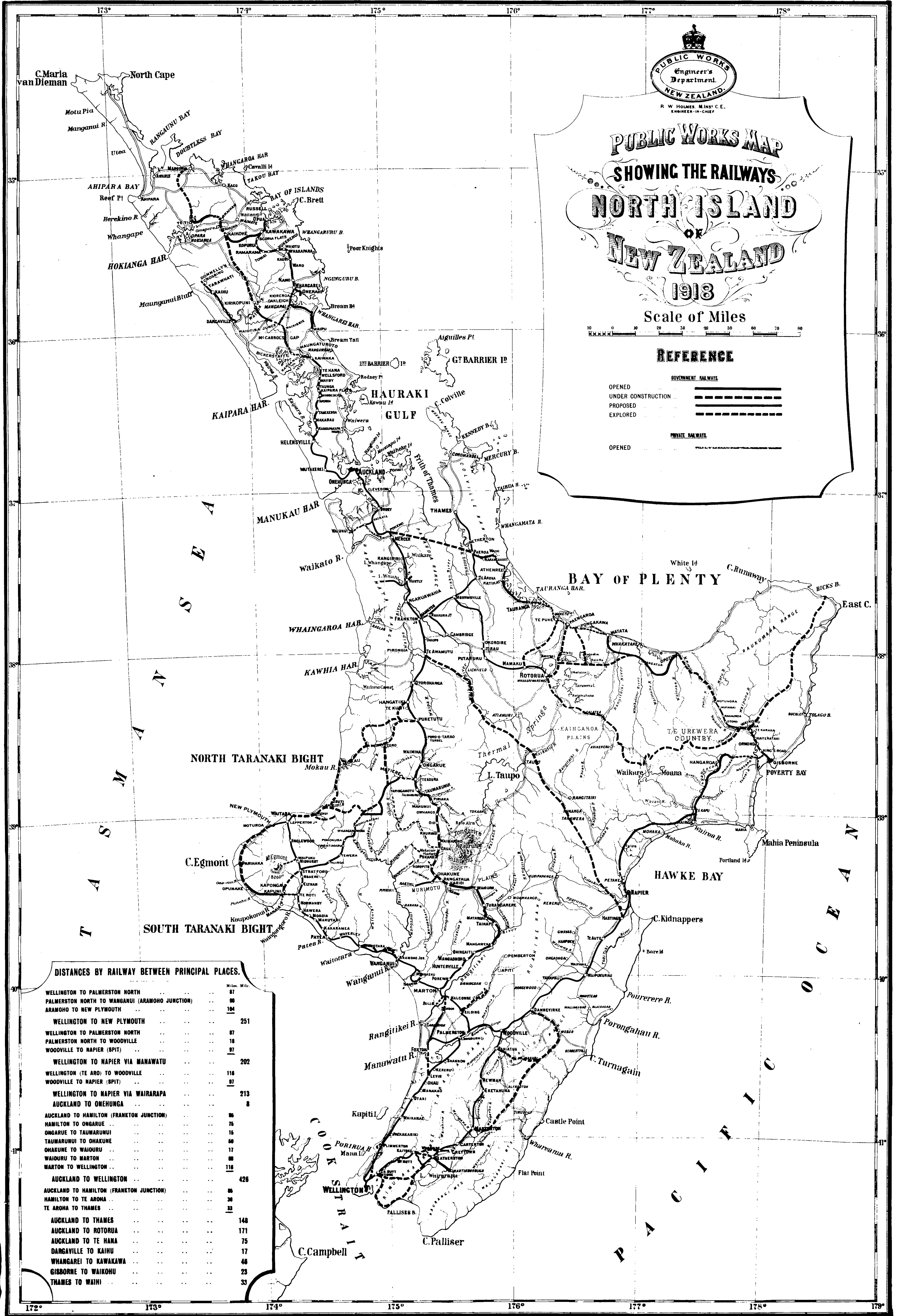
NORTH AND SOUTH ISLANDS COMBINED.



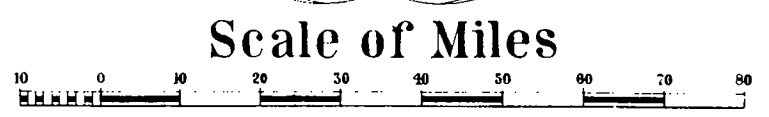
PRIVATE RAILWAYS ACQUIRED BY THE GOVERNMENT SHOWN [REDACTED]







PUBLIC WORKS MAP SHOWING THE RAILWAYS NORTH ISLAND OF NEW ZEALAND 1918



- REFERENCE**
- GOVERNMENT RAILWAYS**
- OPENED
 - UNDER CONSTRUCTION
 - PROPOSED
 - EXPLORED
- PRIVATE RAILWAYS**
- OPENED

DISTANCES BY RAILWAY BETWEEN PRINCIPAL PLACES.

	Miles.	Miles.
WELLINGTON TO PALMERSTON NORTH	87	
PALMERSTON NORTH TO WANGANUI (ARAMOHO JUNCTION)	88	
ARAMOHO TO NEW PLYMOUTH	104	
WELLINGTON TO NEW PLYMOUTH	251	
WELLINGTON TO PALMERSTON NORTH	87	
PALMERSTON NORTH TO WOODVILLE	18	
WOODVILLE TO NAPIER (SPIT)	87	
WELLINGTON TO NAPIER VIA MANAWATU	202	
WELLINGTON (TE ARO) TO WOODVILLE	116	
WOODVILLE TO NAPIER (SPIT)	87	
WELLINGTON TO NAPIER VIA WAIRARAPA	213	
AUCKLAND TO ONEHUNGA	8	
AUCKLAND TO HAMILTON (FRANKTON JUNCTION)	86	
HAMILTON TO ONGARUE	76	
ONGARUE TO TAUMARUNUI	16	
TAUMARUNUI TO OHAKUNE	60	
OHAKUNE TO WAIKOU	17	
WAIKOU TO MARTON	88	
MARTON TO WELLINGTON	118	
AUCKLAND TO WELLINGTON	428	
AUCKLAND TO HAMILTON (FRANKTON JUNCTION)	86	
HAMILTON TO TE AROHA	38	
TE AROHA TO THAMES	33	
AUCKLAND TO THAMES	148	
AUCKLAND TO ROTORUA	171	
AUCKLAND TO TE HANA	75	
DARGAVILLE TO KAIHU	17	
WHANGAREI TO KAWAKAWA	46	
GIBBORNE TO WAIKOU	23	
THAMES TO WAIHI	33	