1927.

NEW ZEALAND.

PUBLIC WORKS STATEMENT

(BY THE HON. K. S. WILLIAMS, MINISTER OF PUBLIC WORKS).

MR. SPEAKER,—

As honourable members are aware, it is just a little over one year since I assumed Ministerial control of the Public Works Department. During that period I have tried to study carefully the administration of the Department in its several branches, and in making my inquiries I have always enjoyed the cheerful assistance of all members of my staff. With a view to enabling me more fully to appreciate my predecessor's policy of public works and to obtain a personal knowledge of the large enterprises in hand, as well as the many smaller local works, I spent most of last recess in systematically inspecting wherever I was able the Department's operations throughout the Dominion. By these visits I have obtained valuable personal knowledge.

I have endeavoured to view the Department's operations from a purely Dominion standpoint, believing that local interests must always be subservient to national considerations. On the administration side, I have followed the policy of concentration and expeditious achievement laid down by my predecessor in 1921. It is my endeavour to prevent waste, and so obtain good value to the State on all works undertaken by my Department.

The country is at present suffering from a temporary depression, caused by a general decrease in the value of our primary products. This state of affairs has occurred before, and will happen again in our history, and it would be wise for us to bear that in mind and prepare ourselves to meet such occasions. World prices for our primary products we cannot control; but we can increase production within our own country to ease the financial blow that this country inevitably receives on a fall of prices for our primary products. With a view to encouraging increased production from our country districts, it is my desire, by providing railway transport, hydro-electric facilities, and road improvements, to enable farming operations to be carried on economically and without hindrance, and by irrigation, flood control, and drainage to bring into full productivity lands not now fully utilized.

I feel it my duty, as far as my financial resources will allow, to assist road-construction to open up lands where production is hampered by want of access. In many places, to my knowledge, it is, until comparatively late in the season, difficult and expensive for produce to be taken from the farm to the market. This is especially so in connection with dairy-produce from backblock farms, and this hardship is reflected in reduced returns to the producer. The Main Highways Board is relieving the position with regard to the main highways, and with the services rendered by railways great facilities are given for development work in the rural districts within reach of such means of transit. There still is, however, the roadless farmer in the most remote parts whose farming operations are restricted for want of proper access to the markets. His difficulties are accentuated by deflation in land-values and the ever-increasing rate burden for the maintenance of existing roads, caused by the extraordinary increase of motor transportation. His case obviously and of necessity requires our special attention.

The hydro-electric services supplied by the Department are rapidly springing into favour both in the cities and country districts, and it requires but little imagination to realize the enormous claims that will in the future be made upon these services for power and domestic uses.

In public-works construction it is imperative that national interests be paramount where they conflict with local desires. In arriving at decisions in this respect I must be guided by the Dominion scheme of construction to ensure proper connections with existing systems; and the expert reports of my Engineers, as to economy and efficiency of construction, and subsequent service, and the business to

be obtained by the new enterprise. This policy is applicable both to railway-construction and hydro-electric installations.

I have been much impressed with the organization laid down by my predecessor with regard to the workers employed on construction-works, particularly in the case of railway works and hydro-electric installations, where large numbers of men are concentrated for a lengthy period and additional expenditure is thereby warranted. The present conditions of employment, for which he is responsible, are eminently satisfactory, and the result is a contented and efficient body of men who have confidence in the Department. I do not intend to do anything to impair that confidence. The Department has every reason to be satisfied with its workmen, and they are justified in expecting consideration from the Department, especially, so far as practicable, to receive continuous work in exchange for faithful service. At one time the policy was to make public works the dumping-ground for the unemployed. The result of this policy was inefficiency and discontent. It is my duty to the State and the men to prevent overloading the works with unemployed, with the inevitable result of inefficient and costly work and subsequent slackening of hands. At the same time the conditions in the Dominion during the past year have been such that very considerable numbers of men have been unable to find work at their regular avocations, and it became necessary for the Government to take vigorous steps to relieve the position. A great deal was done, and is being done, by local authorities in the way of starting works which were not included in their ordinary programme for the year, and to assist them still further in doing this special contributions were made by the Government in the way of subsidies on the cost of the labour employed on such works. Quite a lot of money was already raised by public subscriptions to assist those unemployed, but in spite of these avenues of assistance it became necessary for the Government to employ a great many more who required assistance, and as a result of this the number of men increased from 9,700 to 11,939 between July, 1926, and August, 1927, and the number of relief workers still shows an upward tendency, though indications point to the probability that before long a large number will find work at their ordinary avocations.

In connection with what I may call relief workers, it has not been possible either to pay standard wages or to provide the housing conditions and recreation facilities as are usual on our regular works; but, as my predecessor has said in past Statements, it is undesirable that too great a number of workers should look to borrowed money as the source from which they should derive their livelihood, and it is my desire that the employees of my Department should be reduced to the number to whom continuous employment can be reasonably assured in accordance with the Government's policy of progressive development.

While the Government recognizes that cases of hardship should be relieved, it does not wish to create in the minds of workers the feeling that there is no necessity to provide for a rainy day and that whenever they become unemployed they can look to the Government to find them work under standard conditions. As has been set out more than once, the Government has a settled policy of developing the country progressively; the amount, however, which can be borrowed usually depends upon progress not only in numbers of population but in value of exports, or, more properly perhaps, the difference between exports and imports, and the recent financial stringency points unmistakably to the necessity for a decrease in the amount of annual borrowing. The decrease must be made judiciously, however, in order that workers may have an opportunity of finding work in their usual avenues of employment.

It has for some time been quite evident that the monetary provision for the maintenance of highways and also for other roads in the Dominion is inadequate. The total expenditure for the past year by the Main Highways Board from its Revenue Fund, incurred on the highway system, which comprises approximately 13 per cent. of the total formed roads in New Zealand, or about 25 per cent. of the hard-surfaced roads, was £547,090, while the actual amount of revenue received during the year into this fund was only £544,548. This latter figure, moreover, is much inflated, due to the causes set out in the Main Highway Board's report. The estimates of revenue and expenditure for the current year show a much more unsatisfactory position, a deficit of over £200,000 being anticipated. The amount of money being found by the county ratepayers towards the upkeep of the highways has also been increasing at a very considerable rate, the figures for the three years up to the present being; £110,000 for 1924–25 (nine months only); £185,015 for 1925–26; £276,349 for 1926–27; and the estimates for the coming year indicate a still further increase. In addition, the cost of maintenance of ordinary roads has

been continually increasing in sympathy with the increasing use of motor-vehicles, so that it is quite apparent that some further assistance must be given to local authorities to cope with an increased expenditure, the greater part of which increase is directly traceable to the use of motor-vehicles. More might be done to reduce the wear and tear on the roads by restricting, in accordance with the heavy-traffic regulations, the weights and speeds of the vehicles which are permitted to travel on them, and I think this course should be followed by local authorities in cases where their roads are breaking up and funds for reconstruction are not available. This principle, if carried too far, would cause administrative difficulties and might be considered as unduly throttling road transport and thereby possibly creating hardship on the very people it was intended to help.

We have therefore reached the point where either fresh taxation must be levied or the good work which has been initiated in the past three years must ease off, which latter course will be disappointing alike to the motorists, the local authorities, and the men engaged on the work. The improved roading facilities already provided have allowed motorists of all classes an opportunity to travel more economically and into districts removed from their own. This has resulted not only in the use and wear of the main highways, but in a great deal of extra wear and tear on the subsidiary or settlers' roads, with the result that the ratepayers in a number of districts now find themselves loaded up to breaking-point with rates, and at the same time they are faced with the fact that their roads are deteriorating.

An examination of the figures representing the importation of motor-vehicles and the cost of maintaining the highway surfaces shows that as the number of cars increases maintenance of road-surfacing increases practically in the same ratio. Since 1924 the increase in the cost of maintaining the highways alone represents from £5 to £6 per annum per additional motor-vehicle registered since that year, whereas the additional contribution from motor-taxation to the highways funds represents approximately only £3 per annum per motor-vehicle. Nevertheless it is most undesirable that there be any slackening-off of maintenance, as such a step would result in the loss of much of the capital which has already been spent in bringing the roads to their present state. It is undesirable, too, for other obvious reasons, that the construction programme be interfered with. Good progress has been made in this direction, but the desire of the motorist who lives in the city to have even better facilities than the present programme and finance allow, and his willingness to pay for such are evidenced by the number of schemes for local taxation which are in operation, are being promoted, or are in the air.

Looking at the matter from all points, it appears to me that a further source of revenue is required which will provide sufficient funds to enable the present programme of highways-construction to continue, the present standard of maintenance to be kept up, and, in addition, to enable the Highways Board to grant such liberal subsidies as will enable the densely trafficked roads radiating from the principal centres of population to be surfaced with high-class paving within a reasonable time. Provision must also be made to enable assistance for maintenance being given on a pound-for-pound basis on a system of secondary highways from 2,000 miles to 3,000 miles in length. This further source of revenue will also furnish the interest and sinking fund on the loan of £3,000,000 which is authorized in the Main Highways Act, 1922. Such sinking fund will be based on a conservatively estimated life of the improvements financed by the loan. This appears to be the right policy, as we have no definite knowledge as to how long the present system of roading in New Zealand will stand the wear and tear of constantly increasing traffic, and therefore the loan indebtedness should be paid off within as short a time as possible consistent with the country's ability to pay.

The particular lengths of road to be paved in the vicinity of the centres of population will be selected by the Main Highways Board after consultation with the District Highways Councils and after any representations of organizations of motor-owners have been considered. The roads to constitute the secondary system of rural highways above mentioned will also be chosen by the Main Highways Board after District Highway Councils have submitted their recommendations.

The principle that boroughs should share to a greater extent than is the case at present (if not universally) in the benefits received by local authorities from the funds of the Main Highways Board under the present legislation has been stressed by municipal authorities. The reply to such a suggestion is that the present funds are inadequate for the purposes contemplated in the present Main Highways Act, nor does the suggested further source of revenue referred to above make any provision for direct assistance to work in boroughs. The latter can only be provided for by a still further source of revenue.

The Main Highways Board has been subjected in a few instances to local pressure directed to enforcing the carrying-out of grade easements and other improvements, which are perhaps just a little premature in the present state of development of New Zealand. It is important that the funds available, which are by no means in excess of bare requirements, should be conserved and devoted rather to the elimination of dangers and the improvement of surface than to the obtaining of ideal grades.

The economics of all projects put forward are carefully looked into, and while perhaps to the passerby some of the deviations or improvements in hand may appear extravagant, an investigation of the pros and cons will show that they have all a solid justification when upkeep and running expenses are considered as well as capital.

EXPENDITURE.

The total net expenditure under all votes and accounts appearing on the public-works estimates for the financial year ended 31st March, 1927, was £6,777,474. Of this sum £3,588,059 was expended out of General Purposes Account, and the balance, £3,189,415, out of special accounts.

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

Class of Work.	Expenditure for Year ended 31st March, 1927.	Total Expenditure to 31st March, 1927.
	£	£
Railways—		
New construction	1,096,368	34,259,198
Additions to open lines	384,439	15,557,081
Payment to Midland Railway bondholders	..	150,000
Roads	578,128	16,261,228*
Public buildings	326,039	9,920,287
Immigration	184,918	3,117,408
Purchase of Native lands	..	2,061,204
Lighthouses, harbour-works, and harbour defences	19,021	1,225,509
Tourist and health resorts	31,981	424,609
Telegraph extension	558,042	8,666,408
Development of mining	..	882,975
Defence works (general)	34,014	1,241,395
Departmental	115,866	2,372,941
Irrigation and water-supply	56,937	734,345
Lands-improvement	56,267	356,283
Minor works and services	..	312,607
Plant, material, and stores	*Cr.* 24,148	358,492
Quarries (acquisition and operating)	6,302	20,468
Timber-supply and sawmills for Public Works Department	8,512	12,686
Motor-transport services	..	33,635
Cost and discount, raising loans, &c.	155,373	2,496,325
Total General Purposes Account	3,588,059†	100,465,084
Aid to Water-power Works and Electric Supply Account	1,130,013‡	5,845,927
Waihou and Ohinemuri Rivers Improvement Account	65,856‡	548,345
Total Public Works Fund	4,783,928	106,859,356
Wellington–Hutt Railway, &c.—		
Railway	..	228,374
Road	..	101,658
Railways Improvement Account	..	641,275
Railways Improvement Authorization Act 1914 Account	880,229§	2,970,054
Loans to Local Bodies Account—Roads to open up Crown lands	..	697,408
Opening up Crown Lands for Settlement Account—Roads to open up Crown lands	..	206,626
Lands for Settlement Account—Roads to open up Crown lands	12,714	583,688
National Endowment Account	..	53,401
Education Loans Account	550,954§	3,002,947
Main Highways Account Construction Fund	549,649§	1,197,448
	6,777,474	116,542,235

* Includes £4,500 expended under section 16, subsection (1), Native Land Amendment and Native Claims Adjustment Act, 1923. † Does not include expenditure under the Ellesmere Land Drainage Act, 1905. ‡ Excludes interest during construction. § Includes proportionate cost of loan raised under these accounts.

WAYS AND MEANS.

	£
On the 1st April, 1926, the available ways and means for public-works purposes were	526,421
Additional funds were received as follows:—	
(*a*) Under Finance Act, 1924, section 2 (public works)	4,152,991
(*b*) Recoveries on account of expenditure of previous years ..	146,933
(*c*) Ellesmere and Forsyth Reclamation and Akaroa Railway Trust Account receipts	1,620
	£4,827,965

	£
The net expenditure on works and services against the General Purposes Account for the year was—	
(*a*) Under appropriations	3,832,685
(*b*) Under Lake Ellesmere Land Drainage Act, 1905 ..	439
(*c*) Under Lake Ellesmere and Akaroa Railway Trust Account	81
(*d*) Charges and expenses of raising loans	155,373
Making a total of	£3,988,578

	£
This left a credit balance in the account for general purposes at 31st March, 1927, of	839,387
Legislative authority exists for raising a further	5,061,050
It is proposed to ask for further legislative authority to borrow, when required	4,000,000
Thus making available for public works, general purposes, a total of ..	*£9,900,437

	£
The estimated expenditure under the account for the current financial year, including the transfer of £200,000 to Main Highways Construction Fund, is	4,287,750

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

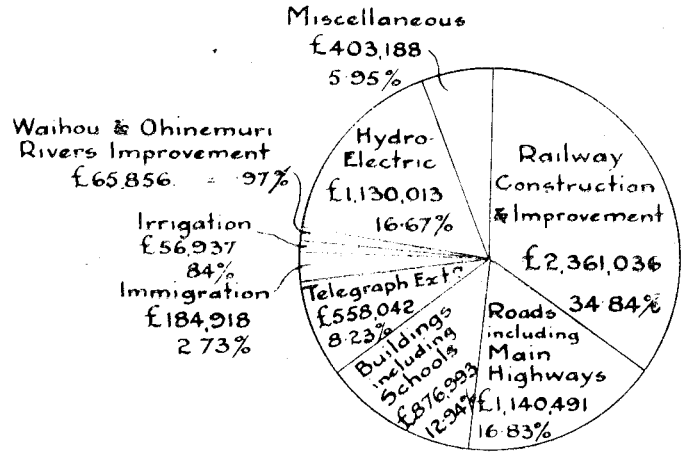
Name of Account.	Balance available at 31st March, 1927.	Unexhausted Borrowing Authority at 31st March, 1927.	Additional Borrowing Authority to be sought during year.	Total available Ways and Means.
	£	£	£	£
Electric-supply Account	274,190	4,478,990	..	4,753,180
Waihou and Ohinemuri Rivers Improvement Account	1,666	175,000	..	176,666
Railways Improvement Authorization Act 1914 Account	210,691	2,000,000	2,000,000	4,210,691
Main Highways Construction Fund	70,560	2,400,000	..	2,470,560
Totals for these special accounts.. ..	557,107	9,053,990	2,000,000	11,611,097

* In addition, surplus revenue as available will be transferred from Consolidated Fund up to £500,000.

	£
From the foregoing figures it will be observed that at the end of last financial year the unexpended balance of the Public Works Fund for general purposes, plus existing and proposed authorities for raising further moneys, amounted to	9,900,437
While the balance at the same date in respect to some of the more important public works, under special accounts, plus existing and proposed legislative authority to raise additional loans, amounted to	11,611,097
Or a total of	£21,511,534

RATIO OF EXPENDITURE, 1926–1927.

The ratios which the various classes of expenditure on works bear to the whole are indicated graphically in the diagram below.



RAILWAY-CONSTRUCTION.

During the last financial year the Opunake Branch Railway, of a length of 23 miles, was completed and handed over to the Railway Department for incorporation with the general railway system of the country.

In addition to this line, rails have been laid on 47 miles 65 chains. A passenger and goods service has been run by the Public Works Department over various lines totalling 152 miles in length, the principal sections being between Tauranga and Taneatua, Wairoa and Waikokopu, Waiotira and Pukehuia, and Okahukura and Ohura. Goods traffic only has been run over a further length of 20 miles. These services, run while sections of line are being completed, have undoubtedly been of great benefit to the districts and settlers served, although perhaps in some cases adding to the cost of construction.

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

North Island Lines.

North Auckland Main Trunk Railway.—Work on this railway is being prosecuted on two sections, widely separated—one, the Rangiahua Section, between Okaihau and Rangiahua, on the Hokianga River, and the other, the Kirikopuni Section, running from Waiotira Railway Junction to Kirikopuni, across the Wairoa River. The completion of the Rangiahua Section will extend railway communication to the waters of Hokianga Harbour and towards the large area of country north of that harbour. The Kirikopuni Section will carry rail connection across the Wairoa River, and when the Dargaville Section is complete will link the Kaihu Valley with the general railway system.

Work on the Rangiahua Section had been started some years ago, but financial considerations caused its suspension. This section of railway in grading down from Okaihau to the Rangiahua Valley is running for many miles high up on the sides of the valley. This country has proved to be of a very treacherous and unstable nature. The cuttings slip, and the banks subside. Much of the ground on which the line has to be built is old-slip country of wide extent. However, the Engineers are using stone-drain and dry-stone-wall construction on an extensive scale, and it is anticipated that in spite of the natural difficulties the line will be successfully built without undue delays.

On the Kirikopuni Section (length, 13½ miles) one of the outstanding construction features is the greatly increased extent of earthworks due to slipping cuttings and the need for widening banks on weak or slipping foundations. As a result of an unusually wet winter, almost every cutting on a length of 11 miles slipped, and to cope with the situation much additional stone-drain and similar work was necessary, and five steam-shovels were continuously employed excavating the slipped saturated

clays, the cost of the removal of which would have been excessive by any other means. The successful work done in this connection is noteworthy, and entirely justifies the policy of employing labour-aiding machinery wherever possible.

The bridging programme is another interesting feature. At the Wairoa River Bridge the concrete cylinder piers and most of the other piers, of timber piles are built, and the erection of the steelwork is well advanced, so that the bridge should be complete by October of this year. The greater part of the rest of the bridging programme on the sections is complete.

Auckland - Westfield Deviation.—The works on this double - track section, approximately 10 miles long, are unusually heavy. The big embankment across the Auckland water-front is now almost complete, and service-rail connection exists between Campbell's Point and Purewa Tunnel. The successful use of steam-shovel and work-train equipment has been a material factor in progress made. This railway-embankment work is now associated with the construction of the Auckland–Orakei Waterfront Road, and the advantages from working these in conjunction are apparent. Very substantial progress has been made with the building of the double-track Purewa Tunnel. When my last report was written the bottom heading only had been started. During the year 1,012 ft. of tunnel was completed, leaving 900 ft. to complete.

East Coast Main Trunk Railway: Waihi Eastwards.—This important work, which will give railway access to the important Bay of Plenty district, is nearing completion, and it is anticipated that the whole of the 87 miles of railway now under construction will be handed over to the Railway Department within twelve months. The controlling factor is the time required by the contractors for the completion of the Waihi-Tauranga contract.

In May of this year the Railway Department took over a completed length of 14 miles between Waihi and Tahawai, over which the Public Works Department had maintained a service.

Beyond this length comes the length of 19 miles 11 chains which is being constructed by Messrs. Sir W. G. Armstrong, Whitworth, and Co. under contract. The contractors have almost completed the formation, though a good deal of trouble and extra work has been caused through embankments on soft foundations subsiding. During the year 600,000 cubic yards of earthwork were done. Bridging is practically complete, save the reconstruction of the Wainui Stream Bridge, not yet started. The greater part of the platelaying and station-building is complete, but the ballasting-work is far behind. At the end of June last only one-third of the total ballasting on the contract had been done, approximately 55,000 cubic yards of ballast still having to be supplied. The date for completion of contract was the 27th March, 1927.

On the 68 miles of railway stretching to Taneatua, over which the Department has maintained a regular passenger and goods service, substantial progress was made towards completion of all works, including widening of banks with work-trains, ballasting, station-buildings, and bridging; 534 lineal feet of bridging in plate-girder spans were completed, approximately 50,000 yards of ballast were spread, and 150,000 cubic yards of earthwork and rock excavated.

Napier–Gisborne Railway.—Construction of this important railway has been vigorously pushed on between Eskdale, the present terminus, and Wairoa. On the Putorino Section platelaying and the first lift of ballast are complete to the site of the Waikoau Viaduct, at 26 miles 60 chains, and formation beyond is practically complete to the site of the Matahoura Viaduct, at 33 miles 42 chains.

These two viaducts, which cross deep gorges, are 490 ft. and 450 ft. long respectively, with central spans of 250 ft., and are the first two of a series of large viaducts on this length of railway. A contract was let for the fabrication of the steel in England for the Waikoau Viaduct, and this steel is now arriving. The Department has completed the construction of the concrete piers of the Waikoau Viaduct, this work being in hand when my last Statement was prepared, and has now erected the timber trestle and the transporter cableway for the erection of the steelwork, on which a commencement has actually been made. Preparations are being made to push on the platelaying from the Waikoau to the Matahoura Viaduct site.

On the Wairoa Section (length, 33 miles 32 chains) construction is being pushed on, working from Wairoa southwards. The work on this session, as on the Putorino Section, is very heavy, and includes an aggregate of 120 chains of

tunnelling and three viaducts. The objective is to push the tunnel-construction, this being the controlling feature from the point of view of time required to complete all work. The heavy earthwork is manned in such a manner as to give access to tunnel-faces, and also to complete sections of formation, in order to facilitate pushing the rail-head south from Wairoa at the earliest possible date.

In my Statement of last year I intimated that the matter of route for the railway between Wairoa and Gisborne was being most carefully investigated. Following on the completion of trial surveys and comparison of estimates, it is apparent that the coastal route is much better and more economical to construct than any other so far explored between Wairoa and Gisborne.

Stratford Main Trunk Railway.—On the eastern end most of the work has been done on the Ohura Section, with the result that Ohura Township and district now have a regular passenger and goods service, run by the Public Works Department. The formation, platelaying, and ballasting of the main line is complete to 19 miles 10 chains, and most of the same classes of work in the station-yards, including Ohura Station, is complete. The railway-bridges built or completed during the year total 495 lineal feet, and three road overbridges were also erected. Following on a thorough investigation into the relative merits of the Tatu, Tokirima, and Mangaroa routes into the Heao Valley, a commencement was made in October last with the formation on the section beyond Ohura. Two steam-shovels are at work, and the driving of the bottom heading of the Mangatawa Tunnel has been begun.

The feature of the work at the western end of this railway is the very rough country and heavy work on the Heao Section, about 7 miles in length. Here the railway will cross a series of four ridges or divides, involving a total of 2 miles 24 chains of tunnelling, in four tunnels.

Last year's Statement explained that a main construction camp was being completed at Raekohua, and one of the problems that was solved during the year under review has been the provision of access suitable for construction purposes over the several divides to enable the tunnels to be manned simultaneously. This is necessary to ensure the construction programme being completed in reasonable time, and in accordance with this programme a commencement has been made on tunnels 1, 2, and 3.

It may be said that at least one-fourth of the expenditure and work on the western end during the period under review has been on preparatory work and access construction. The benefit of that expenditure will be seen in the construction results for this and succeeding years.

Palmerston North Railway Deviation.—This work continued steadily though on a relatively small scale during the year, but towards its close a larger programme of work was started and additional plant put into use. The work so far has been confined to formation and drainage works in the vicinity of the new passenger-yard.

On the Hutt Valley Railway duplication the principal work done was in the completion of overbridges and the Hutt River Bridge, and of the ballasting-work on the line. The section was handed over to the Railway Department on the 25th May last.

South Island Lines.

Midland Railway.—Work on the Kawatiri–Murchison Section of the Midland Railway is in hand over a length of approximately 5 miles, being the length from the Kawatiri Station to the Gowan Station, of which the southern end is at 67 miles 9 chains.

An investigation into the advisability of continuing construction of the railway beyond the Gowan has been made, from which it is clear that present transport conditions do not warrant any further extension of construction. This matter will, however, be further investigated when the amount of traffic offering on this new section of railway has been ascertained.

On the Cascade Section of the Westport–Inangahua Railway, the main work has been the completion of the formation, platelaying, ballasting, and bridging on a 3-mile length to the sidings for the Cascade Coal Co. at the 9-mile. The company will flume its coal 7 miles from mine to siding. A trial run shows the flume to be successful, and it is anticipated that a considerable coal traffic is likely to develop on the section very soon.

On the adjoining Cascade – Hawk's Crag Section, a commencement has been made with preliminary work preparatory to continuing construction on the section.

Since my last Statement exhaustive surveys have been made to determine the best route for the Wharanui to Parnassus connection of the South Island Main Trunk Railway. In brief, the result of these surveys and the investigation of estimates have been to show that the original inland route must be abandoned on the ground of excessive cost, which would greatly exceed earlier estimates. The coastal route offers the best possibilities, but cost of construction by this route would still be very heavy, and would certainly not be less than estimates previously adopted for the inland route.

The construction of the Roxburgh Section of the Lawrence–Roxburgh Railway, which has been in hand for the past two years, is approaching completion. The main line is now fully ballasted into Roxburgh Station; station-yard formation and ballasting have to be completed, station-building contracts are in hand, and bridge-girder spans are now being fabricated at the Tauranga workshops.

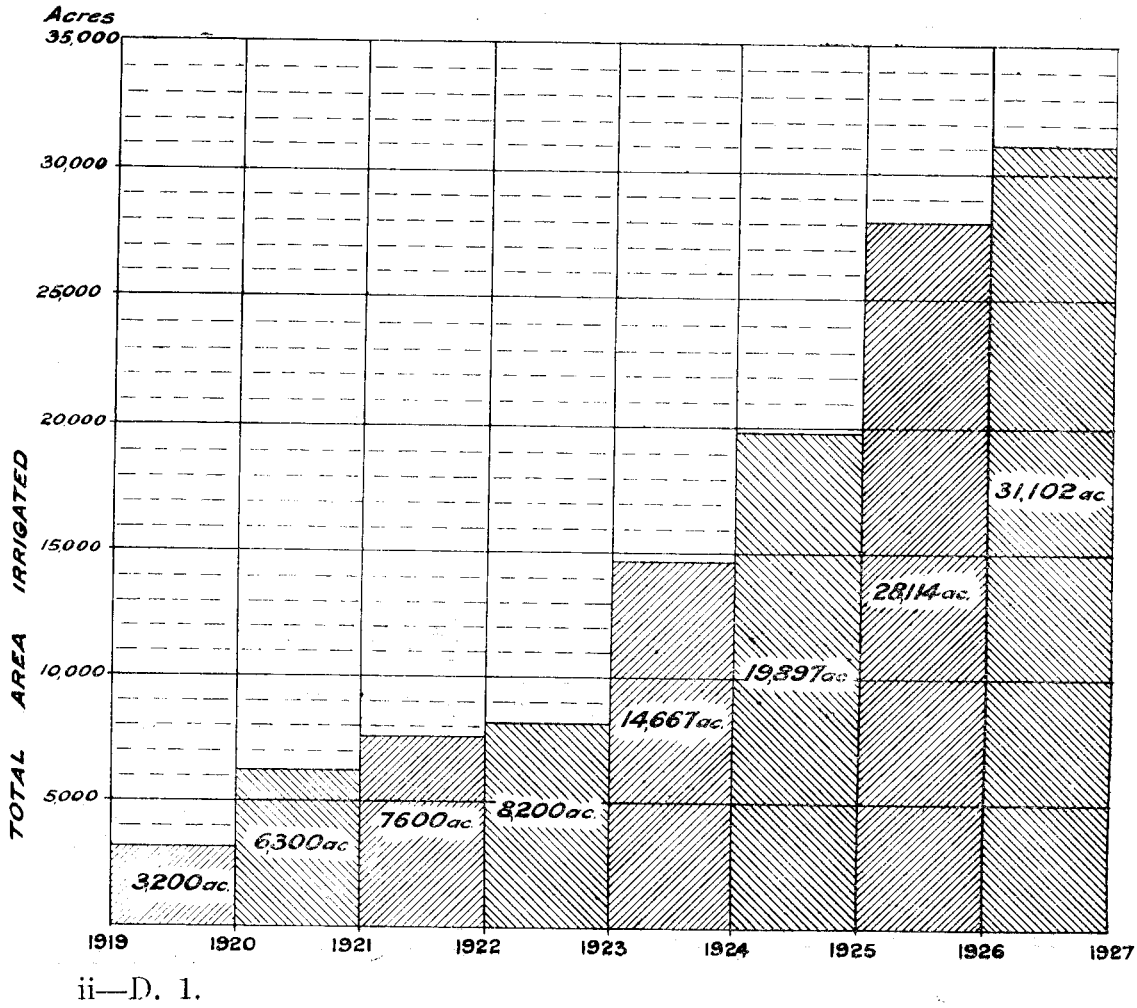
It is anticipated that the Roxburgh Section will be ready for handing over to the Railway Department early in the new year. This will then complete the railway to its logical terminus, which has been the objective for many years.

IRRIGATION AND WATER-SUPPLY.

No new scheme has been commenced during the past year, but work has been continued on the Arrow and Hawkdun schemes, on which construction had been begun the previous year. The Arrow scheme, which is designed to irrigate close on 6,000 acres, has progressed to the extent that the earthwork involved in the system of main and distributary races is practically complete.

The ordering of material for building the siphons and pipe-lines is deferred till further funds are available. On the Hawkdun scheme, which will irrigate 10,000 acres, substantial progress was made during the year with the reconditioning and enlargement of the old Mount Ida system of mining siphons and races, by which the water will be collected and delivered to the irrigation-races.

During the year the existing schemes were maintained in good condition, certain minor extensions were made, and a supply of water was given to all lands requiring it. The total area irrigated under all Government schemes was 31,102 acres, the number of irrigators being 288. The graph appearing below shows the growth of irrigation under the Government schemes during the past eight years.

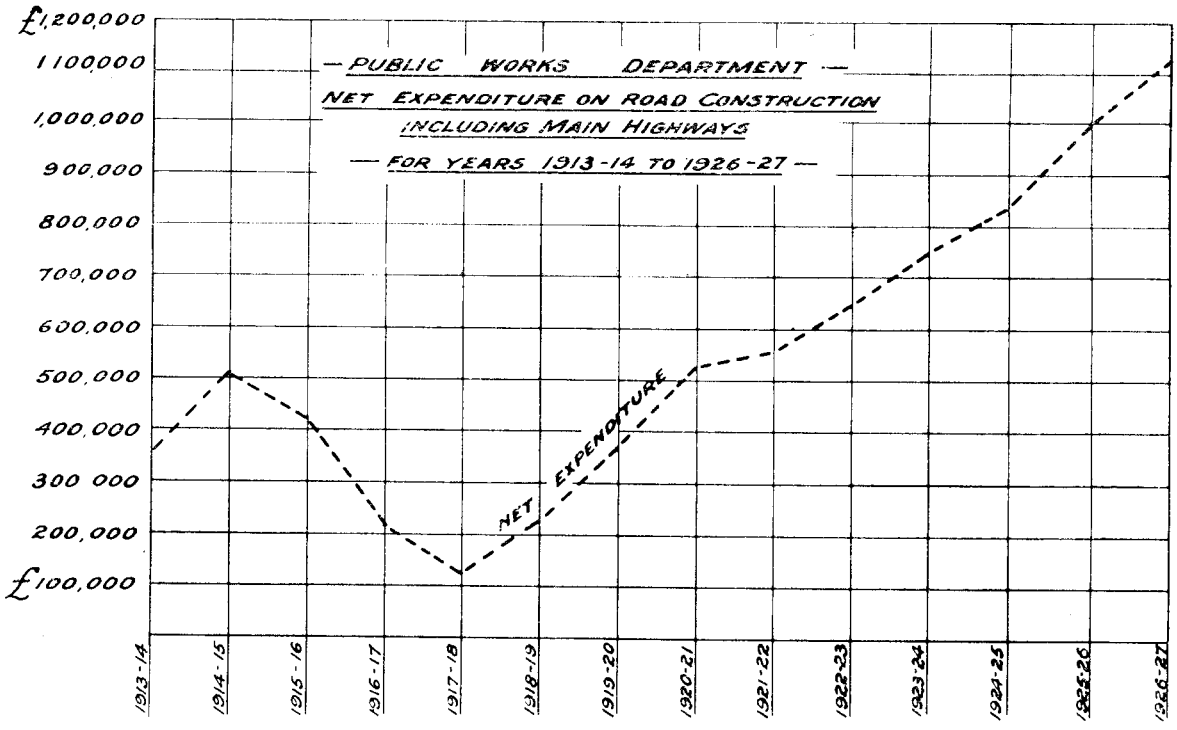


Experience of irrigation in New Zealand, confirmed by the experience on irrigation projects abroad, had shown the need of affording some assistance to irrigators in the earlier years of irrigation farming. This appeared to be best met by a deferred scale of charges, and such a scale was put into operation in the later part of 1925. Under this system, the rate for the first year of supply is on a very low basis, the scale rising in a period of six to ten years to its maximum. This policy was adopted to assist irrigators in the early years of development of an irrigation farm, and while irrigators are gaining experience in that class of farming. Irrigators generally are taking advantage of the deferred scale. In addition to this, further assistance has been granted by supplying extra water, over the agreement quantity, at a very low rate, where such extra water is available. My policy in this is to help the man on the land without in any way prejudicing the financial returns from the capital invested.

Further schemes are being investigated and will be developed as funds permit and the areas already served become fully taken up, and the necessity for further lands for closer settlement arises.

ROAD-CONSTRUCTION.

As has been the case during the past eight or nine years, expenditure on road-construction during the last financial year again shows a large increase, the amount expended being the highest so far recorded by the Department. During the year 1925–26 the expenditure almost touched the £1,000,000 mark, but last year that mark was exceeded by a substantial amount, and a figure never before reached on this section of the Department's activities was passed.



As mentioned in my Statement last year, the primary development in any country is by roading, and the figures just quoted will show the great progress that has been made towards the opening-up of back country for developmental purposes, and also in the improvements to existing roads, which should ultimately be reflected in the increased productivity of the country served.

Regarding the opening-up of the back country, I have previously mentioned that an effort was being made to devise some scheme whereby those outlying and isolated districts would receive the special consideration in the way of provision of reasonable access they undoubtedly deserve, and, as already disclosed, it has been possible to set aside a substantial sum this year for that purpose. The expenditure of this amount should to a very great extent alleviate the difficulties

under which the backblock settlers are at present labouring as a result of the sparsely populated areas not providing sufficient rates to enable the local bodies to undertake necessary roading. At the same time it will effect a desired improvement in the system of automatically allocating the funds under the Roads vote by enabling provision to be made for those sparsely settled districts in excess of what they are entitled to on a basis of allocation, which must take into account such factors as population, rateable values, &c. For next year the factors will be reviewed in an endeavour to make the automatic allocation still nearer the actual requirements of the various districts.

During the year a large number of roads and tracks were completed to a standard sufficient for present requirements and handed over to the control of the various local bodies throughout the Dominion. The policy of placing these roads and tracks under the control of the local bodies immediately they are completed to a width and standard considered sufficient to meet the present requirements of the district served has been in existence for some years, but on several occasions recently certain local authorities have protested against having to accept control of roads before they are constructed to full width. These protests have arisen from a misunderstanding by those bodies of the future attitude of the Department in respect to such roads. The handing over of a road when formed to a width of, say, 6 ft. does not mean that the local body to which it has been handed over will have to finance the whole cost of future improvements, nor does it preclude the Government from assisting with maintenance. In the event of the local authority being unable to bear the total cost of maintenance, it is at liberty to apply for Government assistance. Applications of this nature are considered on their merits, and if circumstances warrant it and funds are available assistance is granted. When the requirements of the districts served justify the cost of widening or metalling, an application from the controlling authority will be considered in the same manner and appropriate financial assistance granted. This policy is only reasonable when it is remembered that local bodies collect the rates from the properties served, and in the event of the Department retaining control until the roads are completed to full standard the Government would be called upon in the meantime to carry the burden of maintenance without cost to the local bodies, while those bodies would be in a position to expend the rates elsewhere.

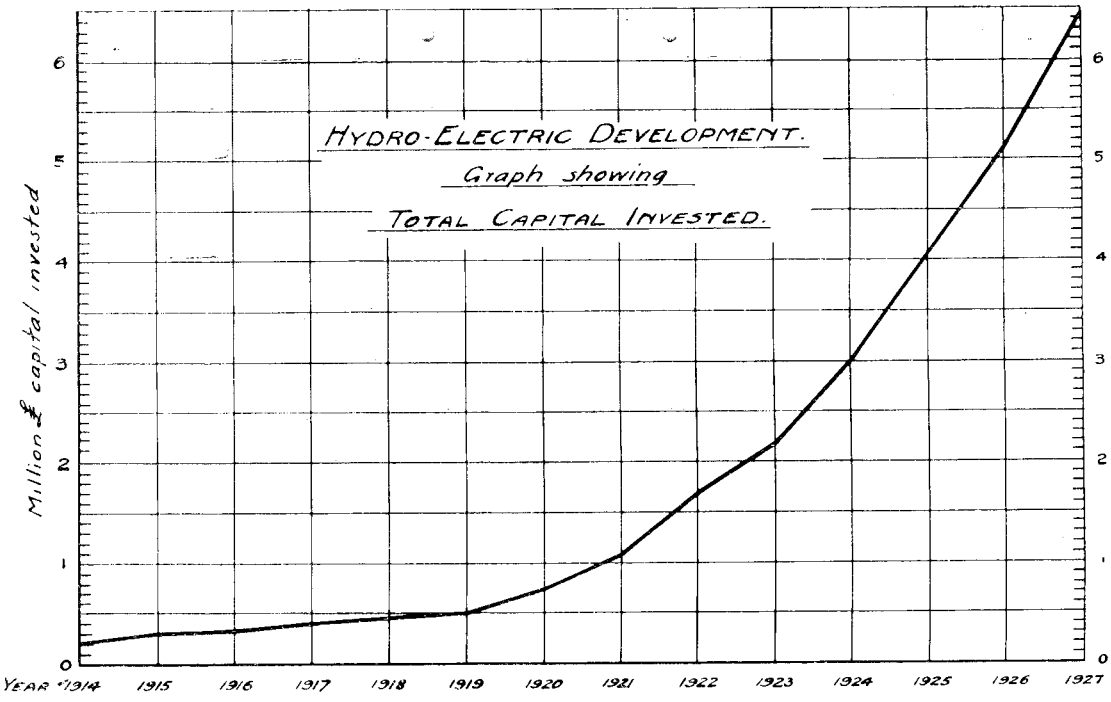
The expenditure on the restoration of flood damages was, unfortunately, high, owing to exceptional floods during the latter part of the year in many parts of the country, though the country did not suffer so severely as during the previous year. However, in several cases one disastrous flood was followed at a short interval by a second, and in these instances the Government was called upon to provide liberal assistance, as the local bodies' resources were in some cases exhausted, and in others very much depleted. Nevertheless, the funds available under this heading were judiciously administered to avoid approving grants where local bodies were in a position to reasonably meet the liability or where damage was caused or intensified by want of adequate maintenance.

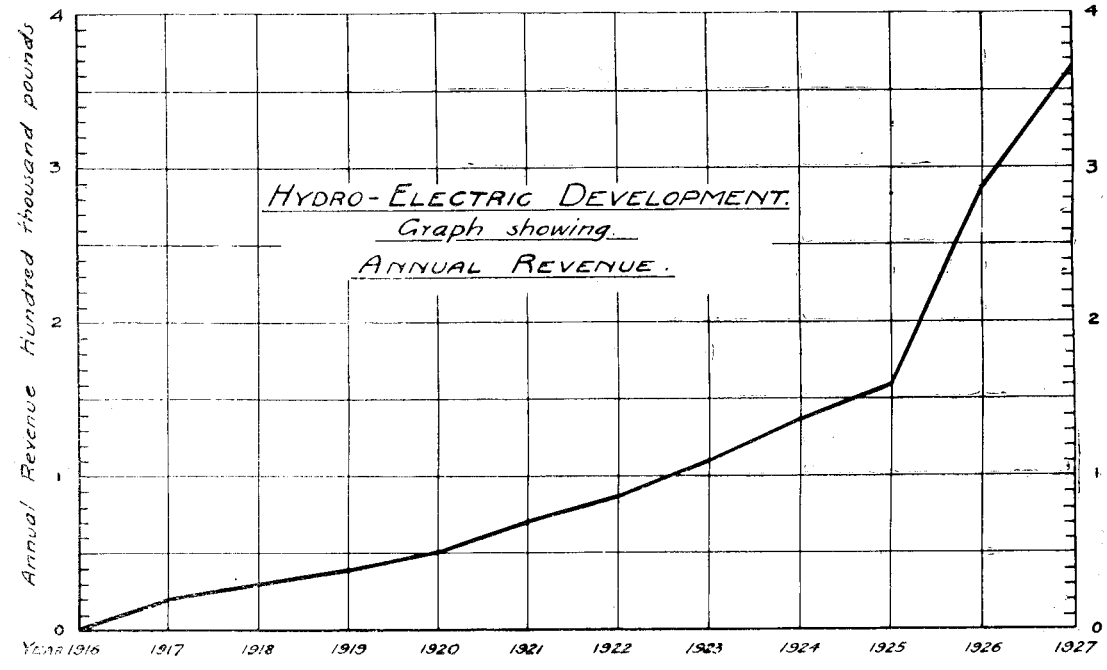
HYDRO-ELECTRIC DEVELOPMENTS.

The year just completed, the sixteenth since construction works were first commenced by the Department, has been one of considerable activity. The expenditure during the year has been £1,293,439, increasing the total capital spent on hydro-electric works from £5,134,496 to £6,427,935. Of this amount somewhat over two millions is invested in works which are still under construction and which have not yet commenced commercial operation.

Although no new scheme has come into operation during the year the annual revenue continues to increase. For the year just ended the revenue has been £364,412, as against £287,942 for the previous one, an increase of £76,470, or 26·6 per cent.

Similarly, the maximum load supplied by the Government schemes during the year has increased to 50,150 kilowatts, as compared with 40,994 in the previous year.





OPERATING RESULTS.

LAKE COLERIDGE.

Though there has been a very considerable increase in the capital investment during the year, the financial results for the year have been very satisfactory. They may be summarized as follows:—

	£
Capital investment	1,538,569
Revenue	150,239
Operating-expenses	30,728
Balance	£119,511

This balance has been used in paying interest charges, and a 2-per-cent. depreciation charge, leaving a profit on the year's working of £26,250. This has been paid into the Sinking Fund Account. This scheme now has a Depreciation Fund of £142,594 and a Sinking Fund of £35,443.

The chief event during the year has been the completion of construction and putting into operation of the extensions to headworks and generating-station, which has increased the capacity of the plant from 16,000 to 36,000 horse-power. The Department had contracted under heavy penalty to have these works in operation by the end of July, 1926, and was successful in carrying out its obligations to time, and in providing the extra power that was urgently needed in the area.

The water-supply has been well maintained and there has been no serious trouble with the plant during the year. The maximum load to the end of the financial year was 16,880 kw., but by the end of June 1927 this had grown to 21,020 kw.

It is pleasing to record that the service over the various transmission-lines indicates a reduction in the number of interruptions recorded. There was only one interruption to the Christchurch supply that could in any way be considered serious, and that lasted for a period of twenty minutes only.

During the year the second main transmission-line to Timaru was completed, and extended to Oamaru, where Coleridge power was first given to the Waitaki Power Board on Christmas Eve, 1926. Much improved service was given to South Canterbury during the year. There were, however, two interruptions, each of about three and a quarter hours' duration, in the early part of the year, before the new line was fully tested out. Since then, however, the few interruptions that have occurred have been of short duration only.

Horahora.

The financial results of operation of this plant have again been very satisfactory, and may be summarized as under:—

	£
Capital investment	844,948
Revenue	108,748
Operating expenses	28,713
Balance	£80,034

The balance has been used in paying interest and a 2-per-cent. depreciation, and has left a profit of £25,564 on the year's operation. This has been used in paying £8,448 to the Sinking Fund and £17,116 to Reserve. This scheme now has a Depreciation Fund of £63,782, a Sinking Fund of £38,515, and a Reserve Fund of £47,669. The capital investment shown above includes £268,107 on lines and substations forming part of the Arapuni scheme, but at present operated from Horahora.

There has been very little trouble with the plant during the year, even though the power-station has been operated for very long periods on heavy overload. To meet the increasing loads on the system a contract was negotiated with the Tauranga Borough Council for additional power from their generating plants, and the Department now has the right to draw 2,200 kw. from this source at certain periods of the day. Similarly, the old water-power plant of the Tourist Department at Okere, Rotorua, has been run for several hours every day. The Department has also purchased the steam generating plant belonging to the Grand Junction Mining Co., which has been run as required on peak loads. The second unit of 1,600 kw. in this plant, which was out of commission when purchased, is being reconditioned, and will be added to the plant capacity available at an early date. Consequent on the delays that have taken place on the Arapuni contract it has become evident that the existing plants were going to be very seriously overloaded during the winter of 1928, and thereafter until the Arapuni station is completed. To meet this anticipated shortage the Department has ordered for urgent delivery three Diesel-engine-driven generating-sets, each of 1,500 kw. capacity. These will be installed at Penrose, and preliminary work is being carried on, making every endeavour to have at least one of the sets in operation by June, 1928.

Waikaremoana.

Operation at this plant has been carried out during the year by the Wairoa Electric-power Board, who have leased the plant until December of this year. Both the original plant and the one recently installed to provide additional power for constructional purposes have operated without any serious difficulties during the year. The capital expenditure has been increased during the year from £80,564 to £185,703. Capital charges, interest, and depreciation on the plant in operation amounted to £6,771, the revenue received has been £2,405, leaving a loss of £4,367 on the year's operation. The accumulated loss on this plant now amounts to £15,050, against which there is an accumulated Depreciation Fund of £6,326.

Mangahao.

The second year of operation of this plant has been marked by rapid growth of load, and the financial results have been satisfactory. The total capital expenditure has been increased to £2,242,870 during the year, of which amount about £250,000 represents assets not in operation at the end of the year. The financial position may be summarized as follows:—

	£
Capital	2,242,870
Revenue	101,897
Operating-expenses	26,921
Balance	£74,976

The balance has not been sufficient to pay interest and depreciation, and leaves a deficiency of £56,902. The accumulated deficiency on this scheme now stands at £124,193, against which there is a Depreciation Fund of £64,255. The balance of revenue over working-expenses represents a payment of 4 per cent. towards capital charges, which can be considered as reasonable. It is a considerably greater percentage than was paid at a similar stage of its career by Lake Coleridge, which has since proved so successful.

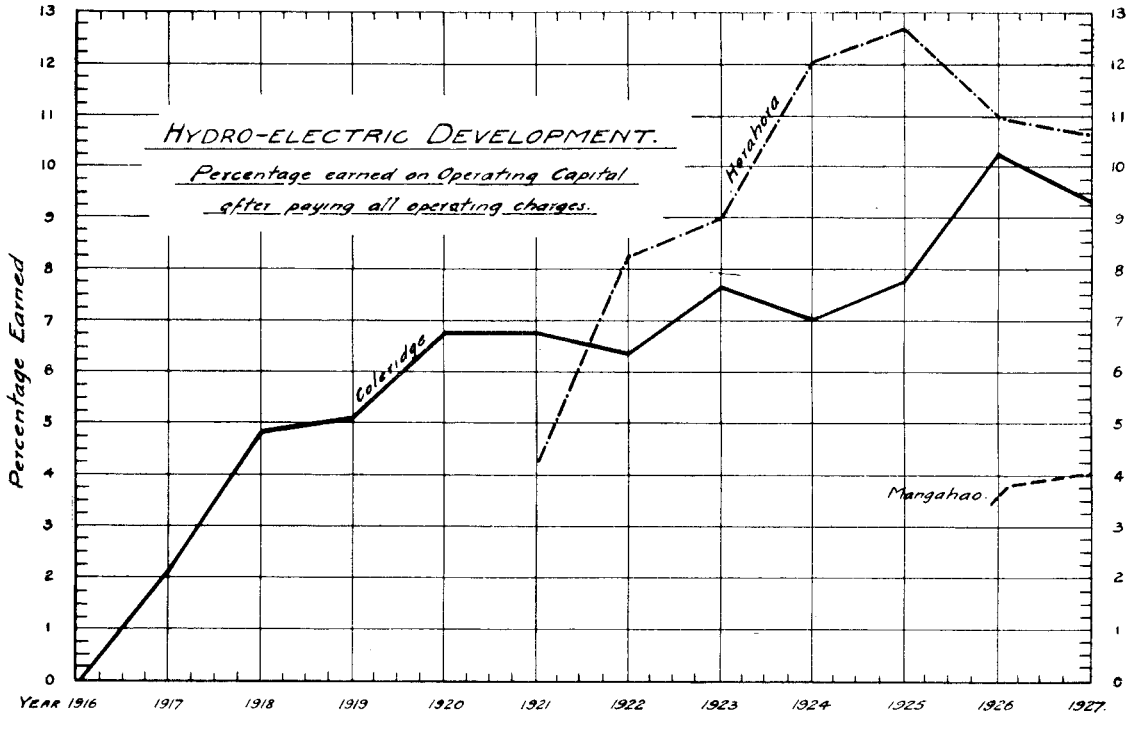
The very dry summer experienced had the effect of very considerably reducing the revenue received in the last quarter of the year, owing to the large extent to which the fuel-driven plants in the area had to be called upon to assist in supplying power to the district. The arrangements made with the fuel-generating plants in Wellington, Palmerston North, and Wanganui proved most satisfactory, and the co-operation of the authorities controlling these plants was much appreciated. There is no doubt that the advantages of electric power are being more and more appreciated in this area, and the following table indicates the annual increases that have taken place in the demand taken by different supply authorities obtaining power in bulk from this supply:—

	Quarter ending 30th June, 1926.	Quarter ending 30th June, 1927.	Percentage Increase.
Power-station output	17,703,060	21,752,550	23
Horowhenua	1,282,937	1,574,298	23
Wellington	8,905,700	8,682,150	0
Hutt Valley	1,372,120	2,230,450	62
Meat-works	263,700	473,150	80
Railway Department	131,180	237,890	82
Manawatu–Oroua	1,786,871	2,843,641	59
Dannevirke	295,877	378,821	28
Tararua	317,725	497,357	57
Wairarapa	687,900	590,910	0
Wanganui–Rangitikei	989,436	2,652,618	168
Central Hawke's Bay	239,690	449,406	88
Hawke's Bay	0	353,929	..

The fact that the Wellington consumption does not show a commensurate increase with the others does not indicate that the consumption of electricity is not growing in Wellington. The reduced consumption of Mangahao power is due to the fact that the growth of load in other districts has necessitated an increasing use being made of the Wellington City steam plant.

The peak load carried by the plant during the financial year was 18,100 kw., but during the past winter loads up to 20,040 kw. have been carried. Very little trouble has been experienced with the power-station or headworks. On the main transmission-line to Khandallah, the main Wellington and Hutt Valley Substation, there were four interruptions during the year, the total duration of interruptions being only eleven minutes.

Service over the lines to Hawke's Bay and Wairarapa was not quite so good particularly in the earlier portion of the year, where trouble was experienced owing to excessive swinging of the conductors during heavy gales. To remedy this, shut-downs were arranged on Sunday afternoons and times which would cause the least inconvenience to consumers. The modifications made to the line, and the installation of additional oil circuit-breakers, has very considerably reduced the number of interruptions, and also their duration.



On the whole capital in operation in the Electric Supply Account 6·95 per cent. has been earned after paying all operating and management expenses.

CONSTRUCTION WORKS.

Lake Coleridge.

An expenditure of £171,618 has been made in connection with the duplication of the main generating plant, which was completed in the early portion of the year. The first 7,500 kw. unit of the new plant was put into operation at the end of July, and the second unit of similar size in December. The whole of the old low-tension switch-gear was replaced with new gear of the ironclad type to provide for the increased capacity of the station. This work had to be carried out step by step while the plant was in operation, and was completed without any interruption to the supply.

Similar new switch-gear has been installed in the main Addington Substation where again the work had to be done without interrupting supply to our various consumers.

The second transmission-line to Timaru was completed and put into service during the year, and a main transmission-line erected and put into operation between Timaru and Oamaru. A new substation was erected to give supply to the Waitaki Electric-power Board, and substantial alterations and additions made to substations at Hororata, Ashburton, and Timaru to provide for the new line and for increasing loads.

Horahora.

The concrete weir and regulating-gates were completed early in the year. A considerable amount of work has been done on transmission-lines and substations which will ultimately become part of the Arapuni development, but which meanwhile are being supplied from Horahora. An 110,000-volt line between Horahora and Hamilton was completed, and is being operated at 50,000 volts meanwhile. A double-circuit 50,000-volt line from Penrose to Takapuna, with substations at Henderson and at Takapuna, was completed and put into service just before Christmas. A large amount of work has been done on the double-circuit line on steel towers between Arapuni and Penrose (Auckland) in anticipation of completion of the Arapuni Power-station. The 50,000-volt line between Bombay and Waikino has been under construction during the year, and was completed and put into operation shortly after the end of the period under review. The main substation at Penrose has been very considerably enlarged, and additional switch-gear and transformers are being installed to provide for the supply of Arapuni power to Auckland. Alterations and additions have been made to the substations at Bombay and Hamilton to provide for connection to main 110,000-volt Arapuni–Penrose lines. In addition to the Henderson and Takapuna substations, additional 50,000-volt to 11,000-volt substations have been completed at Hangatiki giving supply to the Waitomo Power Board, and at Mamaku giving supply to the Tourist Department.

Mangahao.

The expenditure during the year has been £220,555. The major portion of this has been on the upper dam on the Mangahao, which is now approaching completion. In addition the line to Taradale (Hawke's Bay) has been completed, and the substation there completed and put into operation.

Arapuni.

The expenditure for the year on this scheme has amounted to £663,012, of which £388,858 has been paid to the contractors for the headworks and plant, and the balance, £274,154, and various transmission-lines and substations described under the heading of Horahora and carried by the Department's own staff. Progress on the main contract has not been altogether satisfactory. Although fair progress has been made with the main dam, the contractor has got very far behind on the power-house section. It is anticipated that it will be possible to divert part of the water into the race very early in the New Year, but owing to delays at the power-house end it is now evident that the contractors will be very considerably behind the contract time in completing the work.

Waikaremoana.

Construction work on the first stage of the main development of this scheme has been proceeded with energetically, and good progress has been made. The first of the machinery for the power-station has just begun to arrive in New Zealand, and the major portion of it should be delivered early in 1928. Satisfactory progress is being made with the various sections of headworks, buildings, &c., and I have every reason to believe that the forecast expressed in my last year's Statement, that the scheme would be in operation by the end of June, 1929, will be realized. The surveys of the main transmission-lines to Napier and Gisborne have been completed, and the material is now arriving on the ground for erection during the present summer.

SURVEYS AND INVESTIGATIONS.

Apart from surveys on schemes on which construction is already in hand, work in this direction has been concentrated on investigations to decide on the best source for development to provide additional power for Canterbury and the districts farther south, and on surveys of the potential sources between Lakes Manapouri, Te Anau, and the West Coast Sounds.

The investigations in South Canterbury have been carried sufficiently far to enable a pronouncement to be made as to the future policy to be adopted in providing additional power for the Canterbury and North Otago districts. In making a decision on this matter due consideration has been given to the following four main points:—

(1) The cost at which power can be generated at the generating-station and supplied to the main transmission system:
(2) The location of the feed-point in respect to the centre of gravity of the load and prospective load to be supplied:
(3) The location of the feed-point on the main transmission-line as affecting the security from interruption of all substations supplied off the main transmission system:
(4) The possibility of the generating source selected being developed at reasonable cost for the capacity immediately required, and of economical extension to meet future growth.

All the various potential sources in Canterbury and North Otago were considered, including the Clarence River, the Waimakariri, the Rakaia, the Rangitata, Lakes Tekapo, Ohau, and Pukaki, and various possibilities on the Waitaki River. Taking all things into consideration, the source best suited to the conditions required above appears to be the Waitaki River, a few miles above Kurow. Surveys and borings are being made at two different sites on the river, and alternative plans are being considered. In view of the prospective increases in load in the districts to be supplied it would appear that a start will have to be made with construction work within the present financial year.

The surveys between Lakes Manapouri, Te Anau, and the Western Sounds have been continued throughout the past summer with a view of placing on record in more definite form than exists at present the potential value of these water-powers, with sufficient information to allow of accurate estimates of cost of development being made.

LOCAL ELECTRIC-SUPPLY AUTHORITIES.

The Public Works Department has two particular functions in respect to the electric supply of the Dominion. In the first place, as the owner of main generating-stations, it has to supply power in bulk to the Power Boards and other local authorities to enable them to carry out the retail distribution to the actual consumers; in the second place, as the general authority controlling electric supply, it has also to exercise a general supervision and control over all supply authorities, whether purchasing power from the Department in bulk or not. In both cases the fullest co-operation between the Department and the various other authorities interested is necessary, and I am gratified to feel is in general being observed. The business in which Government and local authorities are both concerned is growing at a very rapid rate, as indicated by the following figures: The capital expenditure by the Government itself has grown from £362,000 at March, 1916, the first complete year of supply from Government stations, to £1,072,000 in 1921, and to £6,428,000 by the end of last March. In the same period the capital investment of local authorities connected to the Government supply had increased from £200,000 in 1916 to £600,000 in 1921, and to £7,950,000 in the year just closed. Apart from the above, other electric-supply authorities not connected with the Government supply have a capital of £3,647,000 invested in electric-supply undertakings.

In conformity with the second of the above functions, the Department has during the year issued a complete new set of rules and regulations governing electric supply. In the past the regulations issued direct by the Government covered only the erection of electric lines, and the question of wiring of premises and installation of apparatus was left more to the Fire Underwriters Association, whose rules were adopted by the Government for that particular purpose. In the last revision the whole of the rules, both in respect to overhead lines and in respect to interior wiring, have been completely revised, and reissued as Government regulations. As the Department in framing these regulations has been assisted by all the various interests concerned, it is felt that the new regulations will result in harmonious working and in a general improvement in the standard and uniformity of work done.

The Board set up to register electrical wiremen has been functioning throughout the year, and, having now caught up with the initial rush of work in bringing in all existing wiremen, is hoping to again improve the standard of workmanship, and to give the ordinary consumer who is not acquainted with all the technicalities of electrical-wiring work some more definite insurance that work done for him will be done by thoroughly competent workmen.

Although the new regulations and those issued by the Wiremen's Registration Board both call for a greater amount of control over electrical work done in the Dominion, they do not mean that the Government will have to maintain an extra staff of Electrical Inspectors. Both the Wiremen's Registration Act and the Regulations under the Public Works Act require that the Inspectors appointed by the local supply authorities shall in the main carry out the inspections required for the successful administration of these Acts. As the supply authorities have to do a certain amount of inspection in their own interests while work is being carried out in their particular districts, it appears that they should be able to carry out all the inspections required of work other than what is done for themselves more cheaply that it could be done by any central inspecting authority. In one or two districts there seems to be evidence that supply authorities are not fully co-operating in this work, but it is hoped that this attitude is only a temporary one and will be remedied now that attention has been called to it.

RAILWAY ELECTRIFICATION.

The Joint Committee of the Railway and Public Works Department which has had in hand the electrification of the Christchurch–Lyttelton section of railways has made its recommendations in regard to the tenders for different sections of this work, and contracts have been made for the supply of the necessary materials. The work of providing the necessary substation and supply of power will be controlled by the Public Works Department, and the balance of the work by the Railway Department.

The Department, through its officers on the Electrical Advisory Committee, has also co-operated with the Railway Department in connection with the electrification of that Department's new workshops.

MAIN HIGHWAYS BOARD.

The Main Highways Board has completed its third year of active operation, and it must be acknowledged by all who use the highways of the Dominion that very substantial progress has been made both in maintenance of the existing roads and in the way of new construction.

A number of local authorities with the Board's assistance have embarked on comprehensive programmes extending over several years, some of which are already well advanced. Many other counties have undertaken roading improvements on a more moderate scale, commensurate with their resources and the requirements of traffic, with the result that the motoring community generally has reaped very appreciable benefits. However, in one or two localities where reconstruction of the

roads is justified by the present traffic, the local authorities concerned have not come forward with suitable proposals to the extent anticipated or intended by the original legislation, and consequently the highways in these districts are appreciably below the average standard throughout the rest of the Dominion.

During the last session amending legislation was passed empowering the Board to increase its subsidy towards the cost of maintenance from £1 for £1 to £1 10s. for £1. Thus within three years the Board's contribution has increased from 33 per cent. to 50 per cent. and then again to 60 per cent. of the total cost of highway maintenance.

To provide sufficient funds for this year's costruction programme it has been found necessary to make a transfer from the Revenue Fund to the Construction Fund in accordance with section 15 of the Main Highways Act, 1922. This transfer will be a temporary one only, it being the Government's intention to introduce during this session legislation providing for reimbursement to the Revenue Fund of any amount so transferred.

I have pleasure in recording that the Main Highways Board has willingly and effectively co-operated with the Government in providing suitable work for the relief of the unemployed.

RAILWAYS.

Additions to open Lines.

The expenditure out of the Public Works Fund amounted to £384,439 1s. 8d., for the provision of additional rolling-stock, motor-vehicles for road services, electric lighting for cars, improvements and additions to station buildings, extension of sidings, bridge-work, cranes, weighbridges, turntables, additional dwellings, and purchase of land.

Railways Improvement Authorization Act, 1914.

The expenditure under the Railways Improvement Authorization Act, 1914, amounted to £665,145 9s. 6d., including the sum of £32,233 8s. 11d., the Railway Department's proportion of the cost of raising the loan. The works included in this expenditure were new stations, station-yards, goods-sheds, and terminal facilities at Auckland, Wellington, Christchurch, Addington, Lyttelton, Timaru; duplication, Penrose–Papakura; grade easements, Frankton Junction – Te Kuiti; new lines, Auckland–Westfield and Auckland–Morningside; workshops and locomotive workshops equipments; elimination of level crossings; deviations, Ravensbourne–Burke's, Pelichet Bay, and Palmerston North; signalling, interlocking, and safety appliances and electric lighting.

PUBLIC BUILDINGS.

At Wellington new Public Works stores buildings were acquired; the workshops have been moved from Sydney Street to Pipitea Point, and on the space vacated by the workshops new offices have been erected, to assist in relieving the shortage of accommodation for Government Departments. Additions were made to the caretaker's quarters at Shelly Bay and to the Hector Observatory.

In the Taumarunui district new departmental offices and further staff accommodation were erected in the town of Taumarunui, and the fish-hatchery at Tokaanu has been completed.

Additions to departmental buildings were made at Auckland, Wellington, Christchurch, Napier, and Invercargill.

Further stores space was provided at Penrose and Greymouth, and a departmental garage erected at Dunedin.

Courthouses.

No new Courthouses were commenced during the year, but new buildings at Te Puke and Balclutha, which were under erection in the previous year, were completed, and alterations and renovations were carried out at Whakatane, Palmerston North, and Invercargill.

Prison Buildings and Works.

The policy of utilizing prison labour productively on prison buildings, farm development, and roadworks has been continued during the year with satisfactory results. The quarry has provided the most profitable outlet for prison labour at Mount Eden Prison. Every effort has been made to turn out a product suitable to current demands, and the question of adapting the crushers to enable graded metal to be produced has received attention. A properly equipped quarry repair-shop has been erected, which enables repairs to be effected on the spot expeditiously and economically. Several structural improvements have been effected during the year in the Mount Eden Prison building, the principal of which were the flooring and ventilation of the cells and the construction of a new bathroom.

Good progress has been made in the formation of the scenic road at Rangitoto Island.

At the Waikeria Borstal Institution further land has been brought into cultivation by draining and clearing. An additional area has been acquired from the Mental Hospitals Department, and it is proposed to establish immediately two additional dairies.

At Hautu and Rangipo Prison Camps development work has been pursued with marked success. 10,000 acres of pumice land were acquired during the year at Hautu, and 850 acres have been brought into cultivation and stocked, seven miles of fencing erected, and 12,500 trees planted.

Road construction and maintenance work has continued in the Waimarino district with satisfactory results. Sawmilling operations in the National Park, which were not a financial success, were discontinued during the year, and the mill plant was disposed of.

At Wanganui Prison renovations have been effected, and the prison has been equipped to make it suitable for the segregation of aged and infirm prisoners.

The construction of a new prison at Mount Crawford has proceeded simultaneously with the demolition of the Terrace Prison. It is hoped to have both works completed in twelve months' time. Several improvements, including the construction of an up-to-date laundry to enable general Government laundry-work to be undertaken, have been effected at the Point Halswell Borstal Institution. At Wi Tako an extension of the cell-ranges and the provision of improved accommodation has been effected. The brickmaking which proved to be unprofitable as a prison industry, has been discontinued, and the works have been leased to a co-operative working-party.

The prison building and administration block at Paparua are almost completed, and the walls and exercise-yards are now under construction.

At the Invercargill Borstal Institution, draining, reclamation, and bridge-construction work have been proceeded with, and a commencement has been made on the erection of accommodation for technical classes. It is proposed during the year to provide for additional accommodation, as the institution has been overcrowded for some time.

Police-stations.

The expenditure on police-stations amounted to £7,410. New stations were erected at Eketahuna and Putaruru, offices at Mokau and Waikiwi, and a lock-up at Ruatorea. The police-station at Aratapu was removed and re-erected at Ruawai, and the erection of a new station at Phillipstown (Christchurch) was commenced. A house and section for use as a police-station were purchased at Te Karaka, and sites for police-stations were acquired at St. Clair (Dunedin) and Normanby.

Post and Telegraph Buildings.

Post-office buildings were completed as follows: Brunnerton, Kaukapakapa, Marton, Ohai, Omakau, Oturehua, Outram, Paeroa, Paihia, Poolburn, Seddon (telephone exchange), Te Kauwhata, Wellsford.

The new post-office building at Marton, the foundation-stone of which was laid in 1925, was completed on the 27th April, 1927. The building is a handsome two-storied structure of brick and concrete, and is a distinct departure from the

usual types of post-office building in the Dominion. The architecture embodies many features of modern building; one is the provision throughout of ample light and air. The building is fitted with every modern appliance and convenience.

Portion of a building which was no longer required at Whenuakura was dismantled and re-erected at Kohi. This structure was originally part of the old post-office building at Patea.

As the retention of the post-office building at Parkvale was no longer warranted, the structure was moved to Koputaroa to accommodate the post-office at that place.

At Brightwater the Courthouse building was moved to a new site and converted to the purposes of the post-office.

A departmental building was provided at Moa Flat by removing to that place the old post-office building at Poolburn.

At Kopaki, the post-office site being subject to floods, the building was moved to a more suitable position.

At Omakau, Oturehua, and Outram, where the post and telegraph work was performed by the Railway Department, the business outgrew the capacity of the accommodation provided in the railway premises, and the erection of post-office buildings became necessary.

To provide accommodation for the Postmaster, a residence was purchased at Rangataua.

Combined garages and stores were erected at Helensville, Kaeo, Kaitaia, Motueka, Te Aroha, Wairoa, and Whangarei. Garages were provided at Huntly, Oamaru, and Timaru. The erection of an addition to the Public Service Garage at Wellington was completed.

A property at Feilding, consisting of a section of land, with a building thereon, adjoining the post-office, was purchased. The building was converted into a workshop, garage, and store.

Substantial additions and alterations to departmental buildings were made at the following places: Broadwood (additions); Bull's (additions); Caversham (alterations consequent upon road-widening); Christchurch Chief Post Office (alterations); Frankton Junction (additions); Gisborne (additions); Khandallah (automatic telephone exchange, additions); Kopaki (additions); Leeston (additions); Mangaweka (additions); Mount Eden (automatic telephone exchange, additions); Murchison (additions); Nuhaka (additions); Otaki (additions and alterations); Otautau (additions); Remuera (automatic telephone exchange, additions); Sanson (additions); Taihape (alterations).

Extensive additions to the Palmerston North Chief Post-office building are proceeding, and the added accommodation will be available shortly.

Notwithstanding the largely increased accommodation provided, the general need for increased floor-space on which to conduct the Department's steadily increasing business remains undiminished. The policy of utilizing the funds available strictly in the order of urgency of the Department's requirements has been firmly adhered to. Despite this, at the close of the year several departmental units remained accommodated in rented premises. In most of these cases, however, accommodation within the Department's own buildings is in sight.

It is hoped that it will be possible next year to provide additional accommodation at Hastings and Hawera, also to proceed with the erection of new post-office buildings at Dunedin, Napier, and Waverley.

Mental Hospitals.

Avondale: Neuropathic unit, Nurses' Home, and residence for Assistant Medical Officer have been erected. A new washing-machine and hydro-extractor, with motors, &c., complete, has been installed in the laundry, and considerable improvements have been carried out to the drying-room, whilst extensive painting and renovations have been carried out.

Drury: Land has been purchased for new institution.

Tokanui: A veranda and visitors' room, also outside fire-escape in iron, have been erected. Alterations and additions have been made to day-room in unit No. 3 to provide for a cinema operating-box. General repairs and renovations have also been carried out. Improved water-supply has been installed.

Porirua : Male neuropathic unit, admission unit, and three villa units for males were erected during the year. Extensive water-supply works are in hand, also installation of electric light from Mangahao.

Nelson : General repairs and renovations were carried out.

Stoke : Improved lavatory accommodation was installed ; general repairs and renovations were also carried out.

Hokitika : General repairs, additions, and renovations have been carried out.

Sunnyside : Residence for Assistant Medical Officer was erected.

Hornby : A neuropathic unit was erected.

Templeton : A contract was let for the erection of a villa hospital, and the work is in progress.

Seacliff : Neuropathic unit, admission cottage, and coal-bunkers were erected. Alterations and additions were carried out to the main institution. Additional land was purchased at Cherry Farm, improved water-supply being installed.

Agricultural Buildings.

At Green Island (Dunedin) alterations have been made to the buildings purchased for a depot for the manufacture of rabbit-poison, and the necessary machinery and plant has been installed. Buildings have been erected on the Department's property at Wallaceville (Hutt Valley) for a poultry experimental farm, and the wine-cellar at Te Kauwhata Horticultural Station has been extended to provide additional storage.

Hospital Institutions.

The sum of £15,840 was expended during the past year ; the principal items of expenditure being the purchase of addition to the site at St. Helens Hospital, Auckland, enabling further accommodation for nurses to be established, and the establishment of accommodation for an ante-natal clinic.

At Queen Mary Hospital, Hanmer Springs, the new Women's Hospital was completed during the year.

At Otaki Sanatorium further bed accommodation for twenty patients was provided.

At Pukeora Sanatorium expenditure was incurred for kitchen block, store, and engineering services mainly connected with the change-over in the electrical system, and there was expenditure upon farm buildings.

At King George V Hospital, Rotorua, a new boiler-house and laundry were erected.

Education.

Considerable progress was made during the year in the provision of school buildings, both in country districts and in town and suburban areas, to meet the increase in population, the total amount of the funds allocated by Cabinet from the Education Purposes Loans Account being expended. The policy of replacing rented accommodation has been steadily continued, and special consideration has been given to the erection of small schools in isolated and backblock districts.

Among the larger primary schools completed during the year may be mentioned the Napier Street, Milford, and Forest Lake Schools in the Auckland District ; the second portion of the Auckland Training College ; Lower Mangorei, in Taranaki ; Roseneath, in Wellington ; and Papanui, in Canterbury. The infant department at Invercargill Middle was rebuilt. Secondary departments were provided at Dargaville, Otorohanga, Methven, and Fairlie. A new secondary school has been built at Takapuna. The Medical and Dental Schools in connection with the Otago University have been completed.

Additions to existing schools were made at Avondale and Kohimarama, Auckland ; Fitzroy, Taranaki ; Raetihi, Wanganui ; Napier South, Hawke's Bay ; Miramar South, Wellington ; North New Brighton and Beckenham, Canterbury ; Wyndham, Invercargill South ; and St. George, Southland.

Among works in progress may be mentioned the new Normal School, Auckland ; the New Plymouth Girls' High School Hostel ; a new school at Rongotea, Wanganui district ; the Wellington Boys' College Memorial Hall ; a new boys' secondary school at Coutts Street, Kilbirnie ; the Marlborough Junior High School ; the

second wing of the new Christchurch Training College; additions to the Timaru Boys' High School, and additions to the Waitaki Boys' High School.

The Education Department is continuing its policy of centralizing schools in localities where the condition of the roads, the location of the existing schools, and other material factors render such a course advisable and economical.

LIGHTHOUSES.

During the year both Cape Foulwind and Kahurangi Point Lighthouses were converted to automatic operation, enabling a reduction to be made in the number of light-keepers required. These two lights are the most powerful that have so far been converted to automatic operation.

At the French Pass a new automatic beacon, replacing the original oil beacon, was installed, thus obviating the daily attention which was necessary previously.

A new automatic beacon light has been provided at Piako to take the place of the two oil-burning leading-lights there.

It has been decided to provide lighthouses at Kaikoura and the North Cape, and automatic apparatus has been ordered for both localities.

At Dog Island the original keepers' cottages have fallen into disrepair, and, as they are very old, arrangements were made to replace them with two up-to-date cottages. Contracts were let accordingly, and the work is well in hand.

A new diaphone fog-signal has been erected at Pencarrow Head, and will be in operation shortly, while another one at Godley Head will be proceeded with immediately.

HARBOUR-WORKS.

At Westport a large amount of work has been carried out in connection with protective works necessitated by the flooding of the Buller River.

The dredging on the bar has been carried on regularly and a good entrance maintained, while a start has been made with the dredging of a swinging-basin, a bucket dredger being chartered to carry out this work.

At Karamea extensive works are being put in hand in order to provide stone for the maintenance and reconstruction of the training-wall. Extensions to the wharf were also carried out.

A new wharf was erected at Little Wanganui, and subsidies were provided towards the new ferro-concrete wharf at Russell, and a timber-wharf at Paihia.

At Havelock fairly extensive wharf repairs were carried out.

Minor works were subsidized at Whangape, Horeke, Mangawai, Waikouaiti, and a number of other small centres.

TOURIST AND HEALTH RESORTS.

The expenditure for the year was £31,981, as against £43,486 for the previous year. The main expenditure incurred during the year was for improvements to the Rotorua drainage system, extensions to the Rotorua electrical system, additions and improvements at Waitomo Caves, Helensville, and Te Anau, and the purchase of a new lauch for the Waimangu round trip.

TELEGRAPH EXTENSION.

The past year has been one of steady progress, both in the matter of providing greater facilities for inter-communication by telephone between various parts of the Dominion and in extending the local exchange systems. Some idea of the vast amount of developmental work which is carried out in the course of twelve months in connection with the Dominion's telephone system may be gauged from the fact that the additions to plant during the year consisted of 1,023 miles of pole line, 32 miles of single-duct line, 168 miles of cable containing 47,415 miles wire, 8,666 miles of bare aerial wire, 1,400 miles of covered wire, 10,560 main and 2,830 extension telephones, together with a large number of improvements to plant, the extent of which cannot readily be illustrated by figures.

The most important work undertaken during the year in connection with the toll-line system was the erection of a new trunk telephone circuit between Seddon

and Christchurch, and the installation at Wellington and Seddon of repeating-apparatus (amplifiers) for the purpose of extending the range of communication over the new Cook Strait telephone-cable. Since this cable was laid in March last year its use has been confined to conversations between Wellington and the Nelson, Blenheim, Picton, and Seddon Exchanges, but when the new Christchurch–Seddon trunk circuit is completed and the repeating apparatus at Wellington and Seddon is ready for use telephonic communication will be available at any time of the day or night between Christchurch, Blenheim, and Nelson Exchanges on the one hand, and the exchanges in the North Island as far as Napier and Wanganui on the other. In addition, it is expected that subscribers in the Auckland City area will be able, by means of a special trunk circuit which exists between Wellington and Auckland, to communicate with subscribers in the Christchurch, Nelson, and Blenheim areas. It is intended by the use of additional repeating-apparatus at suitable points to extend the range of inter-Island telephone communication, but the extent to which this will be done will depend largely upon technical and other important considerations, not the least important of the latter being the extent to which the public avails itself of the new long-distance circuits. The completion of the Christchurch–Seddon line will also render possible a rearrangement of the existing circuits between Christchurch and Blenheim, which will considerably improve the toll facilities between Christchurch and the exchanges in North Canterbury.

A considerable number of toll lines of less general importance were also erected during the year. These either gave service to communities, which had previously not enjoyed the privileges and conveniences of the telephone, or provided relief between places where traffic congestion had been acute. In addition, a great deal of reconstruction work was carried out during the year both for the purpose of improving the stability and increasing the accommodation of toll lines and for rearranging the circuits so as to increase their earning-power.

The ramifications of extra-high-tension power lines, which now extend to practically every part of the Dominion, and which in many cases parallel for long distances telephone and telegraph circuits, necessitated during the year the conversion of a number of toll lines and telephone circuits to metallic-circuit working in order to eliminate inductive interference from power lines. This, and the provision of additional protective devices to safeguard users of the telephone against injury from electric shocks and to protect departmental apparatus, necessarily adds considerably to the cost of providing telephone service.

A marked improvement in the method of telegraphic communication between Napier and its two most important terminal stations, Auckland and Wellington respectively, was effected during the year by the installation at Napier of machine-printing telegraph apparatus. In addition, facilities, were provided at Napier for automatically relaying traffic between Wellington and Auckland, thus affording an alternative multiplex route between those places, which should be of great value when the normal routes are interrupted. The total length of the circuits over which the machine-printing telegraph system is now operated in New Zealand is 2,298 miles, from which are derived 9,192 miles of two-way channels of communication.

In connection with the extension of the local exchange systems, there has been added during the year a total of 10,560 new subscribers, which, although not the largest number added in any one year, nevertheless represented a very substantial increase in the number of subscribers' stations and involved a great deal of new construction and extension work, both in the matter of outside plant and switching equipment. Deferred applications on hand for telephone service on the 31st March totalled 2,286, of which numbers 1,600 are at five large exchanges where a shortage of switching-apparatus is retarding development.

A noteworthy event in the history of automatic-telephone-exchange development in New Zealand was the cutting into service at Hawera on the 29th January of the first all-British automatic exchange installed in the Dominion. Two other all-British automatic exchanges are now in the course of erection, at Dannevirke and Stratford respectively. The number of automatic-telephone stations in New Zealand on the 31st March was 45,364, being 34 per cent. of the total number of departmental connections.

Of the works upon which heavy capital expenditure was incurred during the year the following were the more important.

The erection of a new telephone trunk circuit between Christchurch and Seddon, the installation of repeating-apparatus (amplifiers) at Wellington and Seddon respectively, and the laying of a special subterranean cable between the extremities of the new Cook Strait cable and the Wellington and Seddon Exchanges respectively.

The improvement and extension of the toll facilities between Napier and Gisborne, Wanganui, and Palmerston North, and between Dunedin and Invercargill and the intermediate stations.

The conversion to automatic working of the magneto exchanges at Hawera and Takapuna.

Extensive construction work at Christchurch in connection with the conversion of the telephone cabling system from aerial to underground and the reconstruction of the other outside distributing plant.

Automatic installation work at Christchurch, Dunedin, Napier, Dannevirke, and Stratford in connection with the conversion of those exchanges to automatic working.

The establishment of five new telephone exchanges in country districts.

The extension of the switching facilities at forty-three exchanges.

The providing of telephone exchange facilities for 10,560 new subscribers.

RIVER-IMPROVEMENT AND LAND-PROTECTION WORKS.

Under this head important work has been carried out on three major schemes of river-improvement and land-protection. Brief particulars of the work accomplished during the year are as follows:—

Wairoa River: An extensive system of stop-banks is under construction to protect the rich Ruawai flats against river-encroachment, and the progress made is represented by the building of four miles and a half of stop-banks. Arrangements have also been made for the commencement of the protective work against tidal and current erosion by the Wairoa River, and a large contract is let for the delivery of rock spauls for this purpose.

Waihou and Ohinemuri Rivers: Substantial progress has been made towards the completion of this improvement scheme. Work is now concentrated on the Lower Waihou River. Three miles and a half of very heavy stop-banks have been built with suction dredges. Much work has been done enlarging tributary streams, and in clearing the beds and banks of the rivers of willows, snags, and other sunken timbers. The reconstruction of the Ohinemuri River Bridge, Paeroa, is also in hand. I anticipate that in eighteen months this important work will be completed.

Taieri Plains Protection: The purpose of this work is to protect the Taieri Plains from the floods of the Taieri and Waipori Rivers, which have caused such heavy losses in past years. During the year covered by this statement eight miles of stop-bank, together with associated works, have been completed, and some benefit is already apparent from the completed work. An important contract for the supply of the plant for the main pumping-station has been let.

DEFENCE WORKS.

Admiralty Naval Base and Fuel-oil Depot, Devonport.

The fuel-oil depot at the Naval Base includes two 5,000-ton fuel-oil tanks which have been erected by my Department for the Navy Office. The erection of these tanks had been completed during the period covered by my last Statement. During the year now under review the necessary pumping plant arrived from England and was installed, together with a stand-by power unit consisting of generator and 100 h.p. Diesel engine. The installation of the fire-fighting plant was also completed.

Training Establishments.

During the past year the development of the mobilization base and training-camp at Waikato Camp, Ngaruawahia, has been continued, particular attention being paid to the large Ordnance building, which is approaching completion. A small quartermaster's store and one married quarter were erected during the year. The Ordnance Office has been commenced. During the ensuing year one small-arm ammunition magazine, two explosives magazines, three married quarters, one vehicle-shed, one Ordnance workshop, one oil-store, one permanent latrine, one drying-room, and shower-baths will be put in hand, practically completing the camp, except for certain magazines for gun-ammunition. Noxious weeds on the area have received serious attention, fences and roads have been repaired, and the camp generally maintained.

Trentham and Burnham Camps have been maintained and various improvements effected.

At Hamilton a new drill-hall, which was an urgent necessity, is nearing completion. A site for a new hall at Ponsonby has been acquired, and it is hoped to erect a hall there this year.

As mentioned in last year's report, various buildings are urgently required elsewhere. The erection of these must, however, await the completion of Waikato Camp.

MOTOR-VEHICLE LAW.

My Department has recently been directed to take over the administration of the Motor-vehicles Act, 1924, with a view to one Department having the administration of all motor-vehicle law. It is not proposed to change the present system by which the Post and Telegraph Department undertakes the registration and licensing of cars. The main undertaking immediately in view is the issue of uniform regulations concerning motor-vehicles and motor-vehicle traffic throughout the Dominion, and this is under urgent attention.

Another activity was placed in the hands of the Department last year by the passing of the Motor-omnibus Traffic Act, 1926. In general, it may be said that this Act is operating successfully, and with benefit to the public as users of motor-omnibuses and trams. It is proposed to remedy at the earliest opportunity certain defects and anomalies which experience has shown to exist in connection with the working of the Act.

The Motor-lorry Regulations have been consolidated this year and various minor amendments have been made in them. Since the last Statement approval or amendment has been gazetted of the road-classifications under the regulations of thirty-four local bodies, but it is considered that, as a whole, full advantage is not yet being taken by local bodies of their power of road-classification.

PLANT AND MECHANICAL.

The daily papers and other popular publications contain many items of interest connected either directly or indirectly with "things mechanical," and the motor-vehicle in particular seems to be always in front of us these days, hence it is to be expected that regulations for the design and control of motor-omnibuses, and other vehicles, would be mentioned first in a statement of the important works undertaken during the year by the Mechanical Engineering staff.

Any organization that operates a comparatively large fleet of motor-vehicles should be on the alert to detect early any tendency towards inefficiency or waste in their many and varied forms, and the one safe way to effectively eliminate the unfit man or machine in such a service is through a sound, well-reasoned costing-system, which in turn should be carried by intelligent cost-analysis and regular field inspections. Such a system has been instituted during the past year, and is giving satisfaction.

These field inspections cover not only vehicles, but also departmental plant in general, and in this way the Head Office is kept more closely in touch with the actual conditions of the service, and can better serve the respective district works than was formerly the case. The question of supply of spare parts is always given first consideration, in order that the idle time of valuable machines and those who work them may be reduced to a minimum.

It is generally known that the Public Works Department does much engineering-work for other Departments, and the Mechanical Branch is entrusted with a considerable portion of the special work.

As has previously been the case, the Department has found it necessary to purchase labour-aiding machines for general purposes, and this year's schedule of new plant includes the following: Two air-compressors; three air-hoists; six concrete-mixers; seven electric motors; seventeen machine tools; five motor-trucks; one motor-velocipede; four oil-engines; four oil-locomotives; eight pumps; four road-graders; two steam boilers; one stone-screen; one tractor; one welding plant; while fourteen wagons and one van have been purchased from the Railways Department.

STAFF.

During the past year the Engineer-in-Chief and Under-Secretary, Mr. F. W. Furkert, travelled abroad, amongst other reasons in order to represent the Dominion at the World Power Conference, at Basle, and the Fifth International Road Congress, at Milan and Rome, and at the exhibition of road machinery, materials, and methods at Milan.

He visited the United States and Canada, and made himself familiar amongst other engineering matters with the latest developments of road-construction and traffic control. A notable work at which he spent some time was the Welland Ship Canal, now under construction between Lakes Erie and Ontario, by which ocean-going vessels of large size will be enabled to travel from the oceans of the world to places as far inland as Buffalo, Detroit, and Chicago.

He visited a great many of the principal engineering shops of the United States of America, England, and Scotland, in which work for the various Government Departments is produced, and was able to see material for New Zealand actually in course of manufacture, and to discuss with the manufacturers practical questions and many points, a good understanding of which leads to mutual advantage. He also investigated the methods and staff of the Department's Consulting Engineers in London.

Mr. Furkert also visited Sweden to examine in the course of manufacture the generators, transformers, &c., for the Arapuni hydro-electric installation. He visited also power-stations and electrified railways in Switzerland, Sweden, and Italy, being in the two latter cases given the fullest facilities by the respective Governments and the companies controlling the works. A very interesting installation visited, and one from which lessons for New Zealand may be learned, was that at Lardarello, where the steam from the hot springs and steam blow-holes is harnessed to generate electric power, which is delivered on to the main transmission-lines throughout the country, boric acid being also separated out from the steam and finally evaporated and concentrated by the waste steam.

While in the East he investigated methods in connection with the storage and handling of petrol, kerosene, and fuel oil, in bulk, being given the facilities to do so by all of the large oil companies to whom he applied. Throughout his travels he paid particular attention to harbour works. He visited eighty-seven large harbours, at all of which ships as large or larger than those which trade to New Zealand are handled, and eighty-two of minor importance, and also twenty-one river ports, some of very large size. These harbours were situated in thirty-six different countries and can be taken as a fair representation of the harbour-practice of most of the civilized world. At many places he had the advantage of being shown over the layout, dredges, and other plant and works by those in control, and discussing with them the pros and cons of the subject.

There is no doubt that the information and impressions retained by this officer, as the result of seeing the works and discussing their various features with foremost men of many other countries, must have a good result for New Zealand.

I regret very much that the Government lost the services by death during the past year of Messrs. P. S. Waldie, G. M. Polson, and J. E. Wright.

Mr. Waldie was a valued officer who had been connected with the Department for thirty-three years, and who, in addition to holding the position of Chief Clerk, was one of the Government representatives on the Main Highways Board, in connection with which he had been most enthusiastic and had rendered very valuable service to the State.

Mr. Polson had twenty-four years of good service to his credit, and at the time of his death was an Overseer at Invercargill.

Mr. Wright was a Buildings Overseer at Nelson, and had served the Department faithfully for eighteen years.

In addition, the following five officers—John Hannah, S. J. Harding, A. W. Horne, S. R. James, and A. J. Sutcliffe—retired on well-earned superannuation.

Mr. Hannah, at the time of his retirement, was Acting Inspecting Engineer in the Head Office, but he had previously held with distinction the positions of District Engineer at Wellington and Resident Engineer at Nelson and Tauranga. Although his continuous service dated only from 1901, he was first connected with the Department in 1877.

Mr. Harding, who was Office Engineer at Auckland, joined the Department in 1894, and since then he had occupied many engineering positions and was connected for several years with the heavy works on the central portion of the North Island Main Trunk Railway.

Mr. Horne, whose services commenced in 1903, was an Assistant Road Engineer at Gisborne at the time of his retirement through ill-health, and, I am sad to say, died less than a year after being superannuated.

Mr. James, who was Inspector of Works at Ngaruawahia, joined the service in 1900, and has left behind him a great record of bridge-building.

Mr. Sutcliffe, who at the time of his retirement held the position of Chief Clerk in the District Electrical Engineer's Office at Christchurch, had continuous service from 1896, but had been employed in temporary positions prior to that date.

CONCLUSION.

It will be abundantly clear from the particulars given in the preceding pages that during the past year the construction of all classes of developmental works that are chargeable to capital has continued on a very extensive scale. The total expenditure against the Public Works Fund and other capital accounts amounted to £6,777,474, and that sum has only once been exceeded in any one financial year. The expenditure, however, on works which are directly carried out by the Public Works Department represents a total greater than that in any previous period.

The provision of transport facilities continues to be the most important of the activities that are chargeable against these funds, and this must necessarily be so in a young country where the success of primary industries is so dependent upon a successful and adequate transport system.

Of the total expenditure from funds under my control the sum of approximately £2,360,000 was expended upon Railway development, the construction of new lines absorbing £1,096,000, while the important railway-improvements works and additions to open lines now in hand absorbed a rather larger sum.

Portions of new lines under construction represent important links in the existing system, and as these are approaching completion it is reasonable to anticipate that during the next few years there will be a decrease in the expenditure on the construction of new lines.

Next in order of importance is the expenditure upon highway and road construction and improvement. Under these heads a total sum of approximately £1,140,000 came to charge. I have in the introductory portion of this statement dealt at some length with the most important and pressing question of finance for highway and road improvement purposes.

The expenditure of the very large sum of £1,130,000 from the Water-power Works and Electric-supply Account is an ample indication of the great importance in which the utilization of electric energy is held by the Government. It is a most important and vital fact that electric energy is available for the use of town and country dweller alike, and the reticulation of country districts must go a long way towards providing the country dweller with the amenities of city life and retarding the urban drift.

It is hardly necessary to make further mention here of the many other activities, important though these be, that my Department has carried on.

I wish, however, to very briefly stress that I feel sure that economy and efficiency of management and operation are the guiding motives throughout the

whole of the operations carried on by the Department. To these ends the use of mechanical plant continues to lend itself both by increasing the output of work and by reducing the time required for its accomplishment.

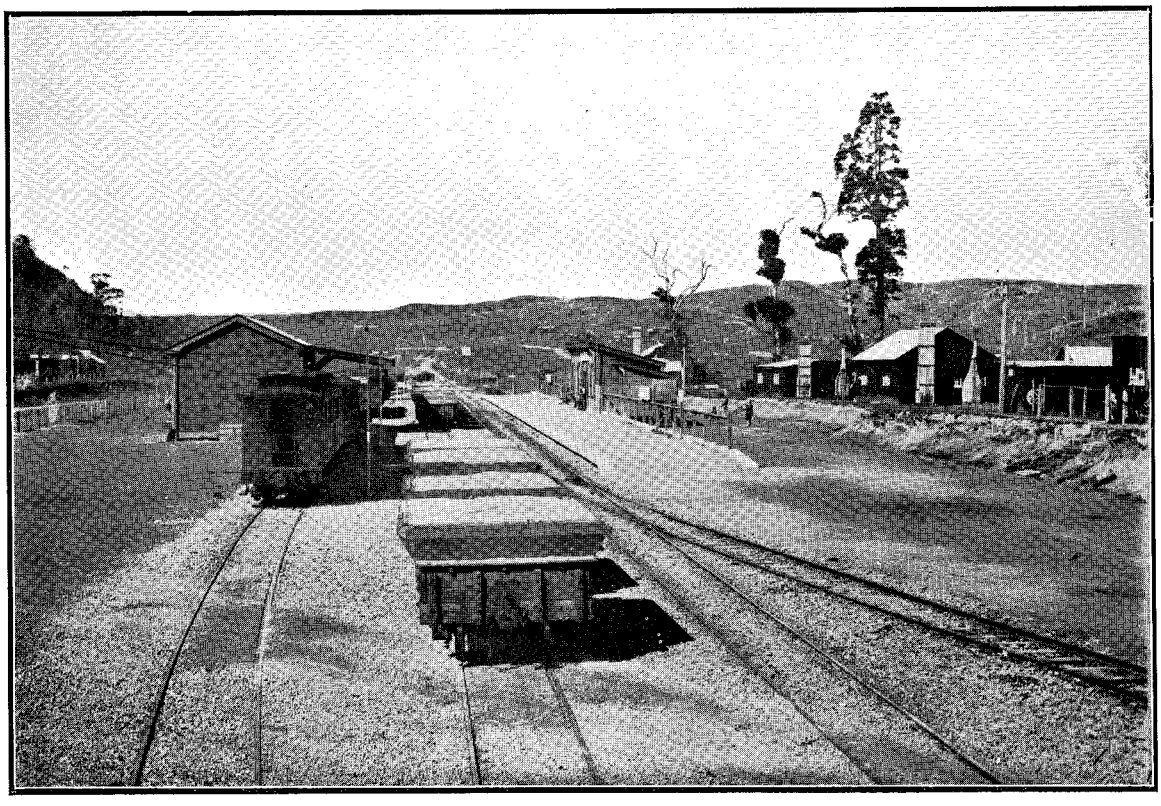
The staff throughout the Department have supported me with their customary loyalty throughout the year, and, as an indication of the way they have risen to the emergency caused through the necessity of employing over two thousand more men than last year, I would point out that this has been done with an increase in staff of only eighty-six. For the past year the expenditure has been five times what it was in 1916–17, while the staff has not increased even to twice its size at that time and the gross expenditure on supervision is only a little more than twice what it was. In other words, the amount of work, as measured by expenditure supervised per officer, is more than two-and-a-half times what it was in 1916–17, and twice what it was in 1919–20. From this it will be seen that every officer has been working at very high pressure; in fact, in a great many cases, the breaking-point is being approached, and if the number of the rank and file is to be kept at anything near its present number it will be necessary to make a very considerable increase in the number of officers in practically all ranks.

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

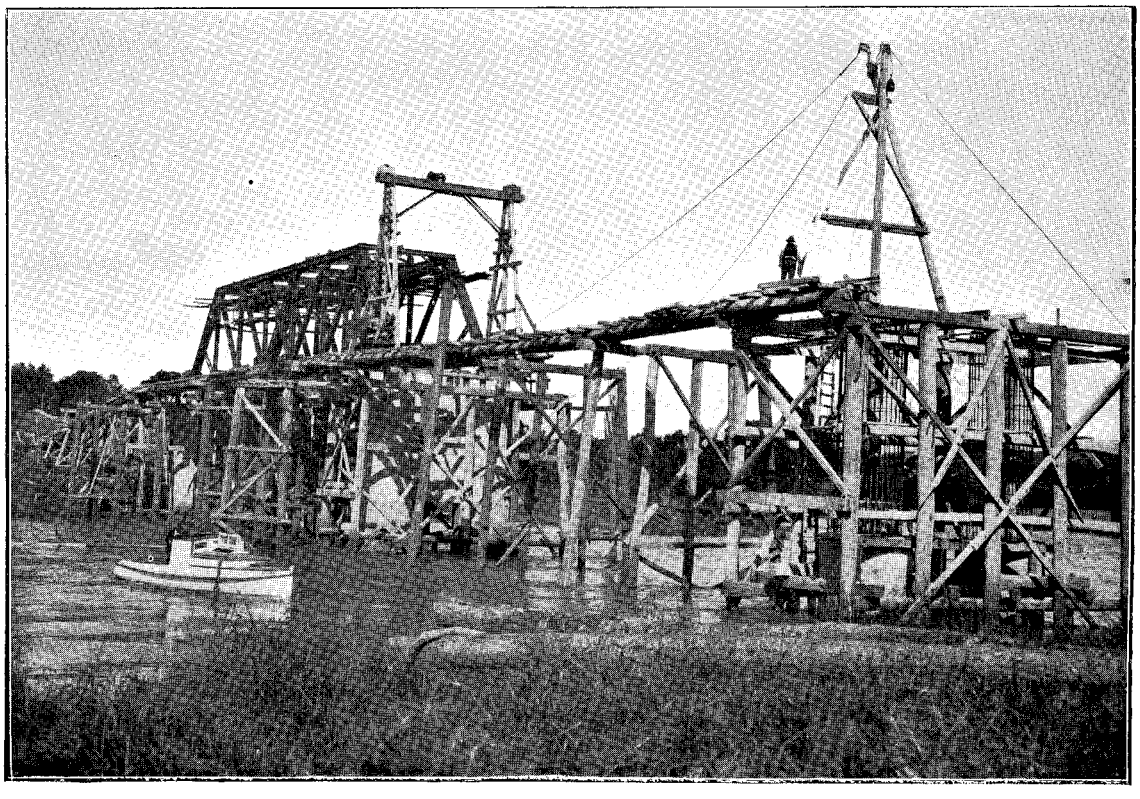
Schedule showing Particulars of Railway-lines under Construction at 1st April, 1927.

Railway.	Length of Section.	Length under Construction.	Handed over to Railway Department during Year ended 31st March, 1927.	Rails laid during Year.	Length over which Traffic is being run.	Length over which Goods Traffic only is being run.	Length ready for handing over to Railway Department.	Ready for handing over to Railway Department within One Year.	Ready for handing over to Railway Department within Two Years.	Amount spent to Date.	Estimated Amount to Complete.
	M. CH.	M. CH.	M. CH.	M. CH.	M. CH.	M. CH.	M. CH.	M. CH.	M. CH.	£	£
North Auckland Main Trunk and Branches—											
Okaihau–Mangamuka	30 0	8 0	..	1 47	..	..	..	..	..	164,925	1,100,000
Waiotira–Kirikopuni	14 0	14 0	..	2 0	12 0	..	..	14 0	..	926,099	120,000
Kirikopuni–Dargaville	18 40	..	..	..	..	..	..	..	..	11,623	342,000
Auckland–Westfield Deviation	9 67	9 67	..	..	..	..	..	..	9 67	288,218	215,000
Paeroa–Pokeno	42 0	..	..	..	..	..	..	..	..	19,997	1,018,518
East Coast Main Trunk and Branches—											
Waihi–Tauranga	38 25	38 25	..	15 15	14 0	20 0	14 0	24 25	..	902,897	150,000
Tauranga–Taneatua (including Mount Branch)	63 12	63 12	..	..	63 12	..	..	63 12	..	1,403,716	57,000
Taneatua–Opotiki	25 0	..	..	..	..	..	..	..	..	3,365	600,000
Gisborne–Wairoa	70 0	..	..	..	..	..	..	..	..	143,645	1,300,000
Wairoa–Eskdale	59 60	59 60	..	13 50	13 0	..	..	..	18 0	798,728	1,200,000
Waikokopu Branch	24 58	24 58	..	..	24 58	..	..	24 58	..	573,316	40,000
Stratford–Main Trunk—											
Tahora–Ohura	24 0	4 0	..	..	..	..	..	..	..	186,309	750,000
Ohura–Okahukura	19 10	19 10	..	..	19 10	..	..	19 10	..	633,136	59,000
Opunake Branch	23 0	..	23 0	4 40	..	..	..	..	..	457,268	..
Palmerston North Deviation	..	..	..	..	..	..	..	..	..	8,526	..
Rimutaka Deviation	13 24	..	..	..	..	..	..	..	..	6,500	970,000
Wellington–Tawa Flat Deviation	8 0	..	..	..	..	..	..	..	..	4,415	1,100,000
Hutt Valley Railway	..	3 0	..	3 0	3 0	..	3 0	..	..	255,717	..
Midland—											
Glenhope–Inangahua	55 0	4 0	3 71	..	..	..	..	..	..	376,417	1,600,000
Westport–Inangahua	22 0	4 0	..	0 40	3 0	..	..	3 0	..	151,992	650,000
South Island Main Trunk—											
Wharanui–Parnassus	76 0	..	..	..	..	..	..	..	..	44,280	2,300,000
Lawrence–Roxburgh—											
Miller's Flat–Roxburgh	9 10	9 10	..	7 33	..	..	..	9 10	..	103,695	36,000
Totals	..	261 2	26 71	47 65	152 0	20 0	17 0	157 35	27 67	7,464,784	13,607,518

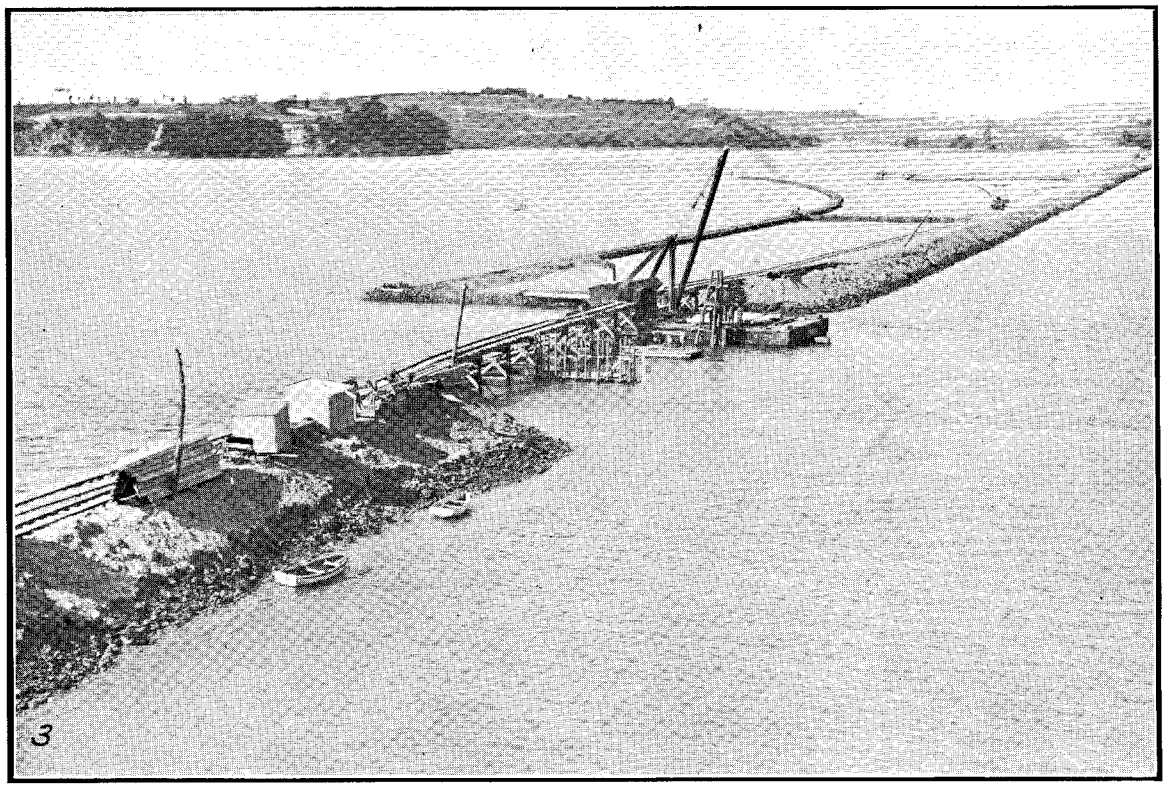
Note.—Estimates to complete include amounts required for maintenance and running traffic where traffic is being run.



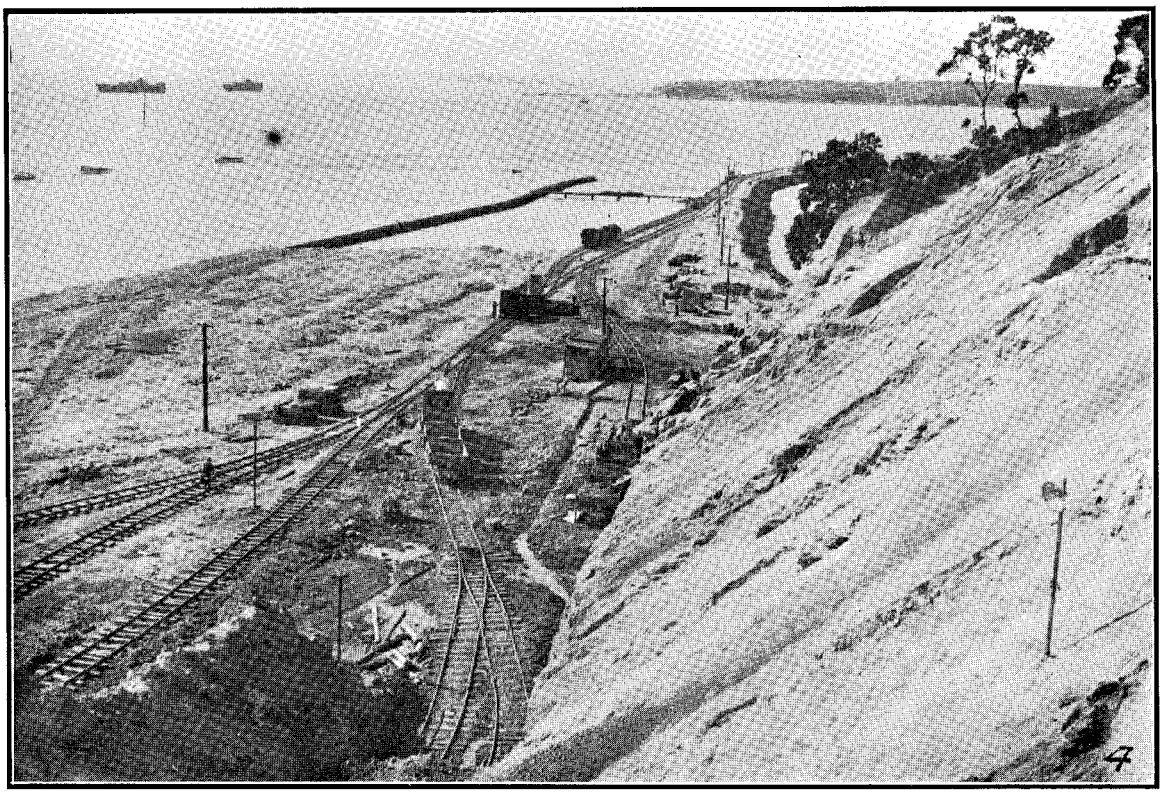
Pukehuia Station-yard.



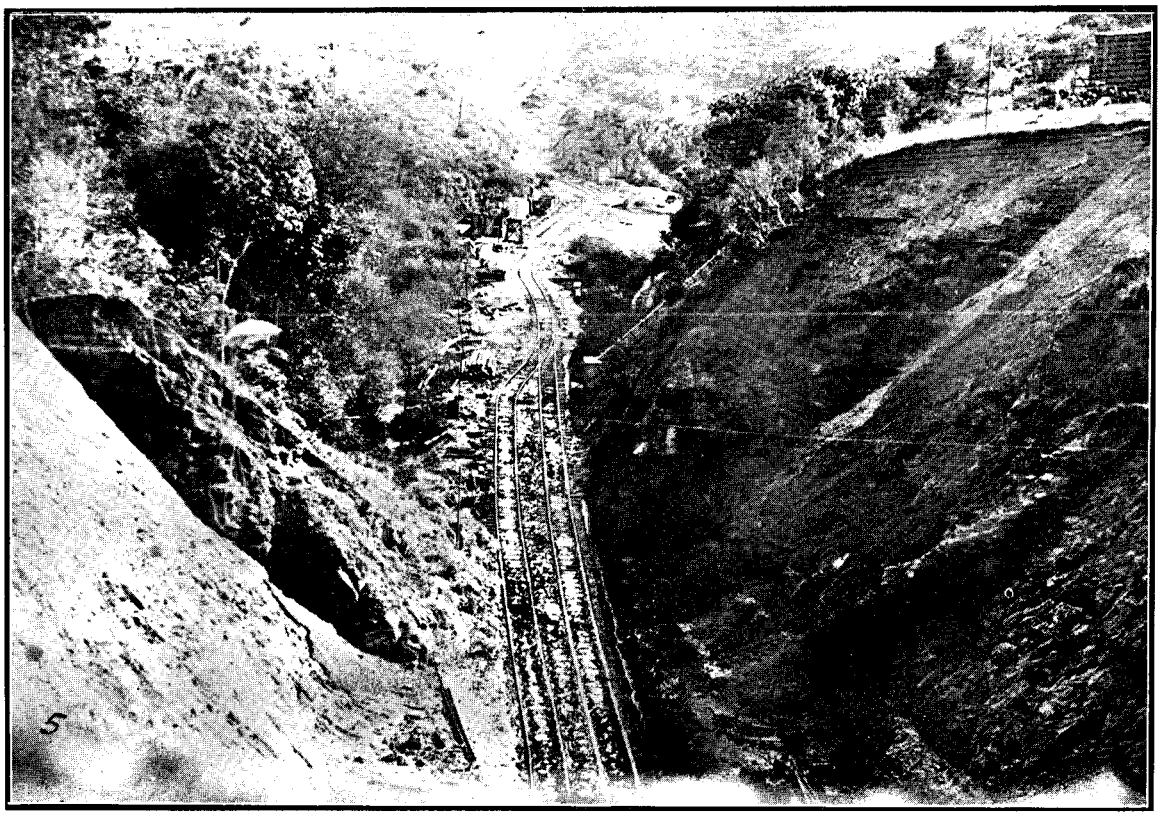
Northern Wairoa Bridge under construction.
One 105 ft. span in place.



EMBANKMENT ACROSS HOBSON BAY AND BRIDGE NO. 1.
Showing also stone protection for construction of new waterfront road to Orakei.

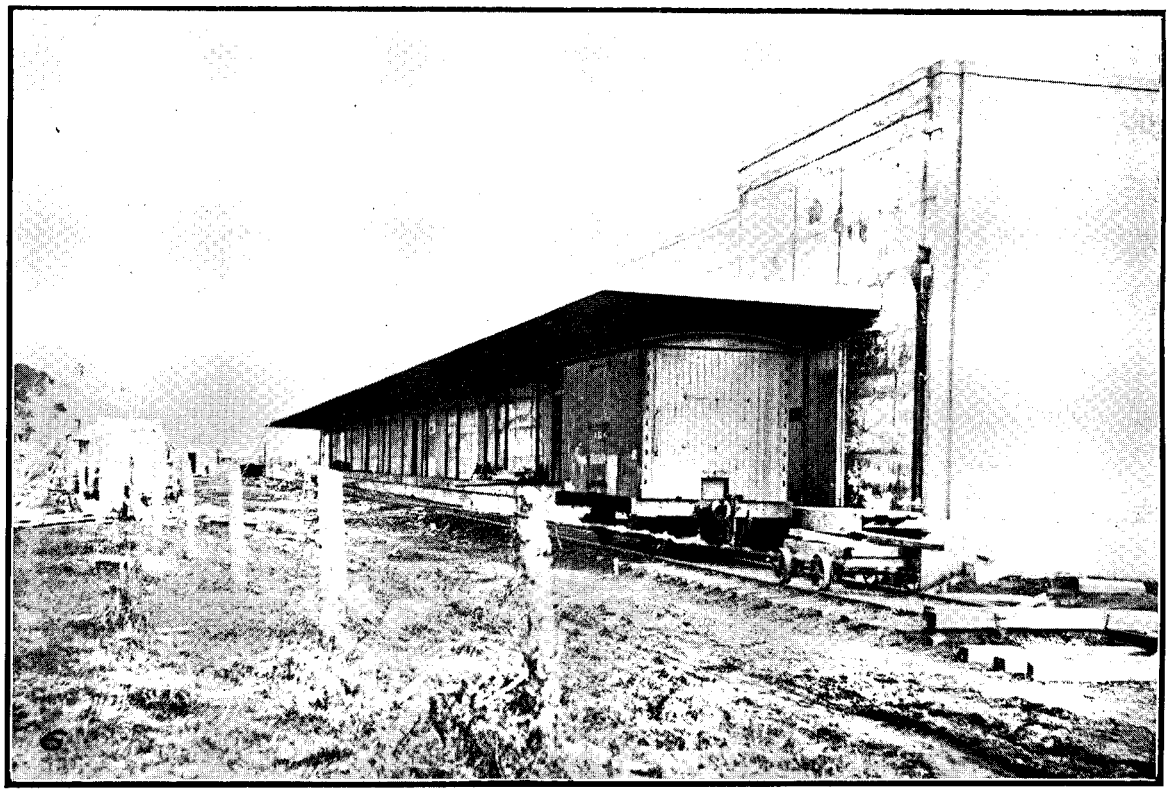


CUTTING AND EMBANKMENT AT CAMPBELL'S POINT.
Orakei waterfront road on left.



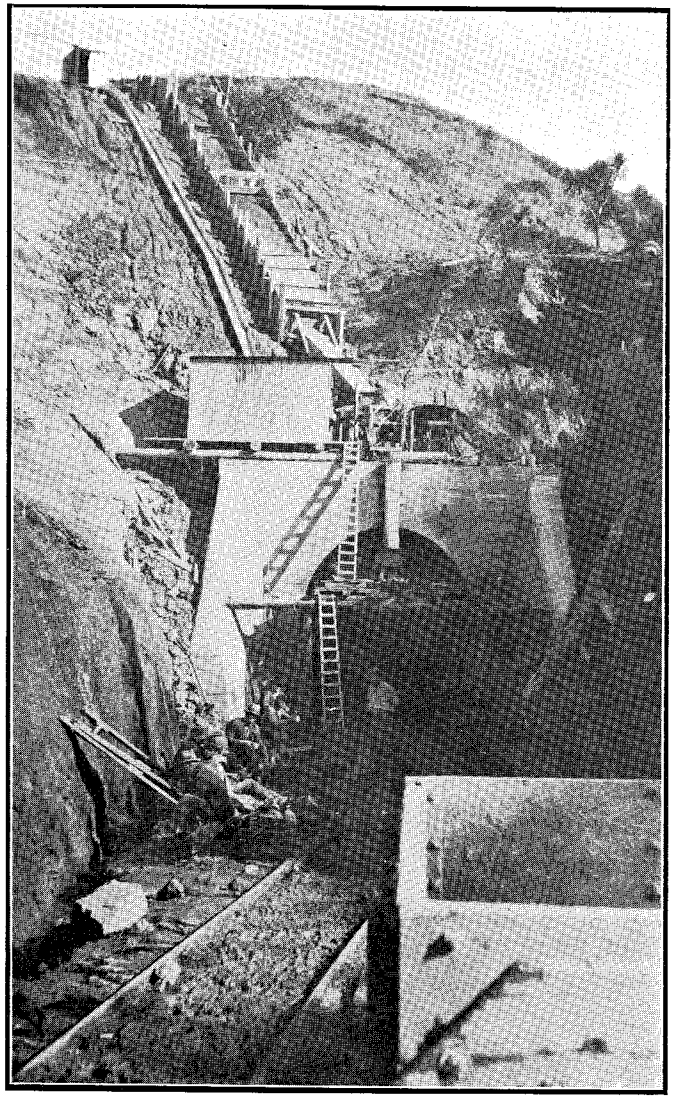
Approach Cutting to Purewa Tunnel, North End.

AUCKLAND–WESTFIELD RAILWAY.

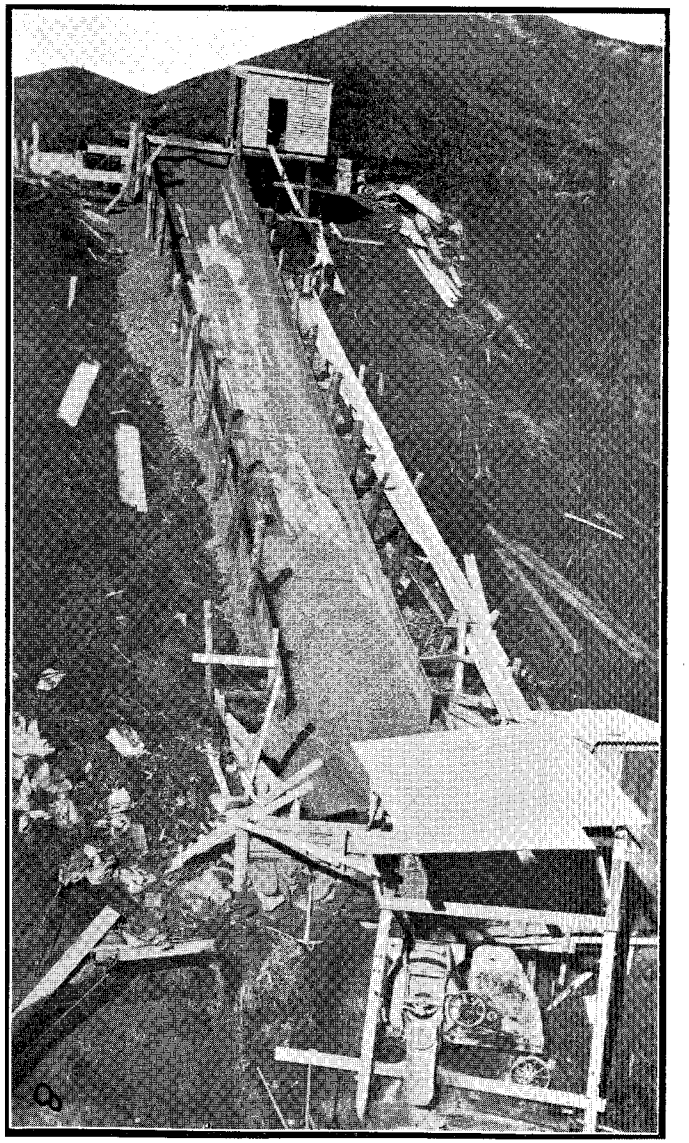


Ordnance Building, looking West.

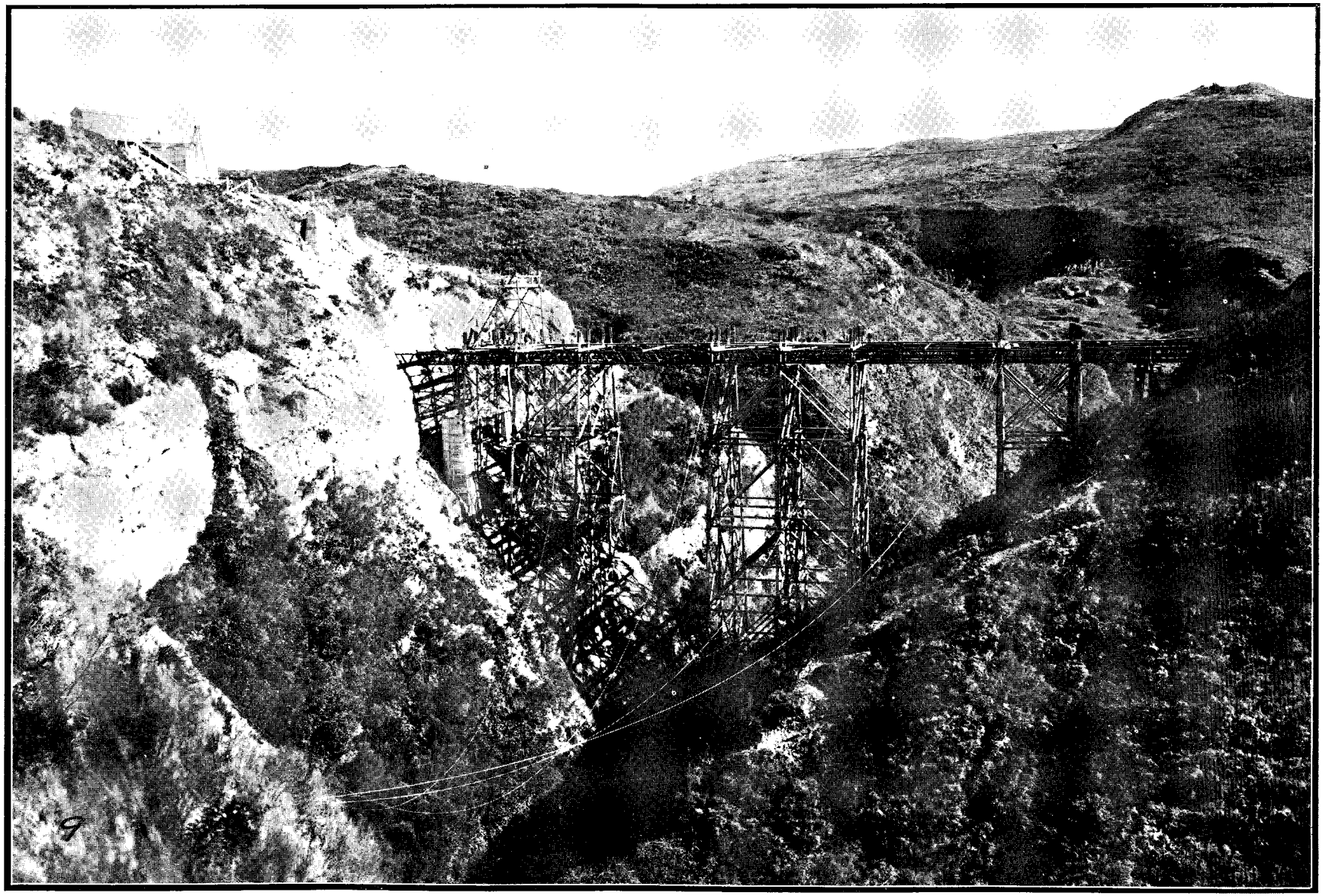
NGARUAWAHIA MOBILIZATION BASE, WAIKATO.



CHIMNEY CREEK TUNNEL No. 1, AT 46 M. 31 CH.
North end portal, shingle-chute, &c.



CHIMNEY CREEK TUNNEL No. 2, AT 47 M. 17 CH.
North end concreting layout.



WAIKOAU VIADUCT UNDER CONSTRUCTION.

Trestling for erection of main 250 ft. span. (Shed at top left is on railway formation level.)

NAPIER WAIROA RAILWAY.

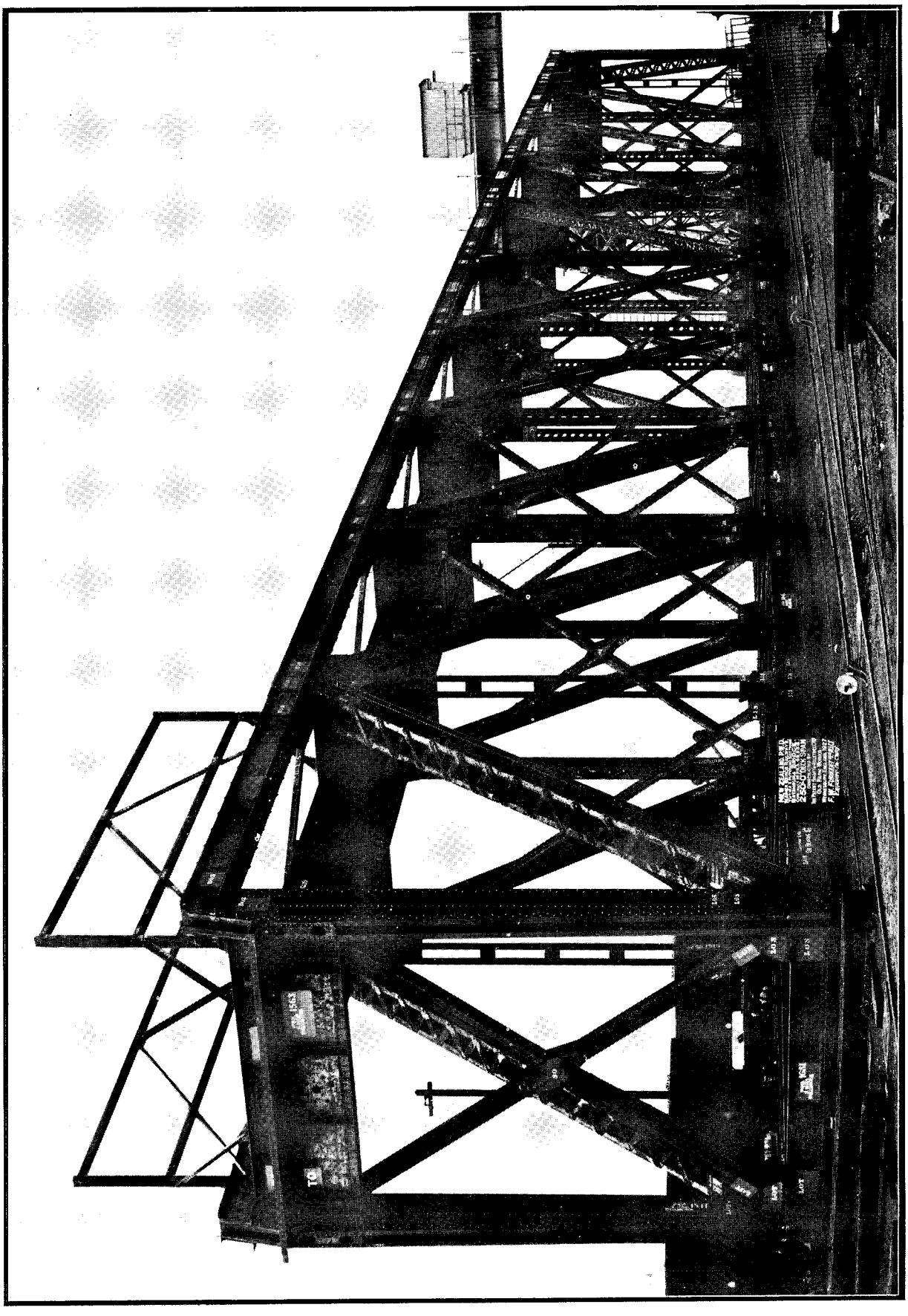


WAIKOAU VIADUCT UNDER CONSTRUCTION.
Trestling for erection of main 250 ft. span.
NAPIER–WAIROA RAILWAY.

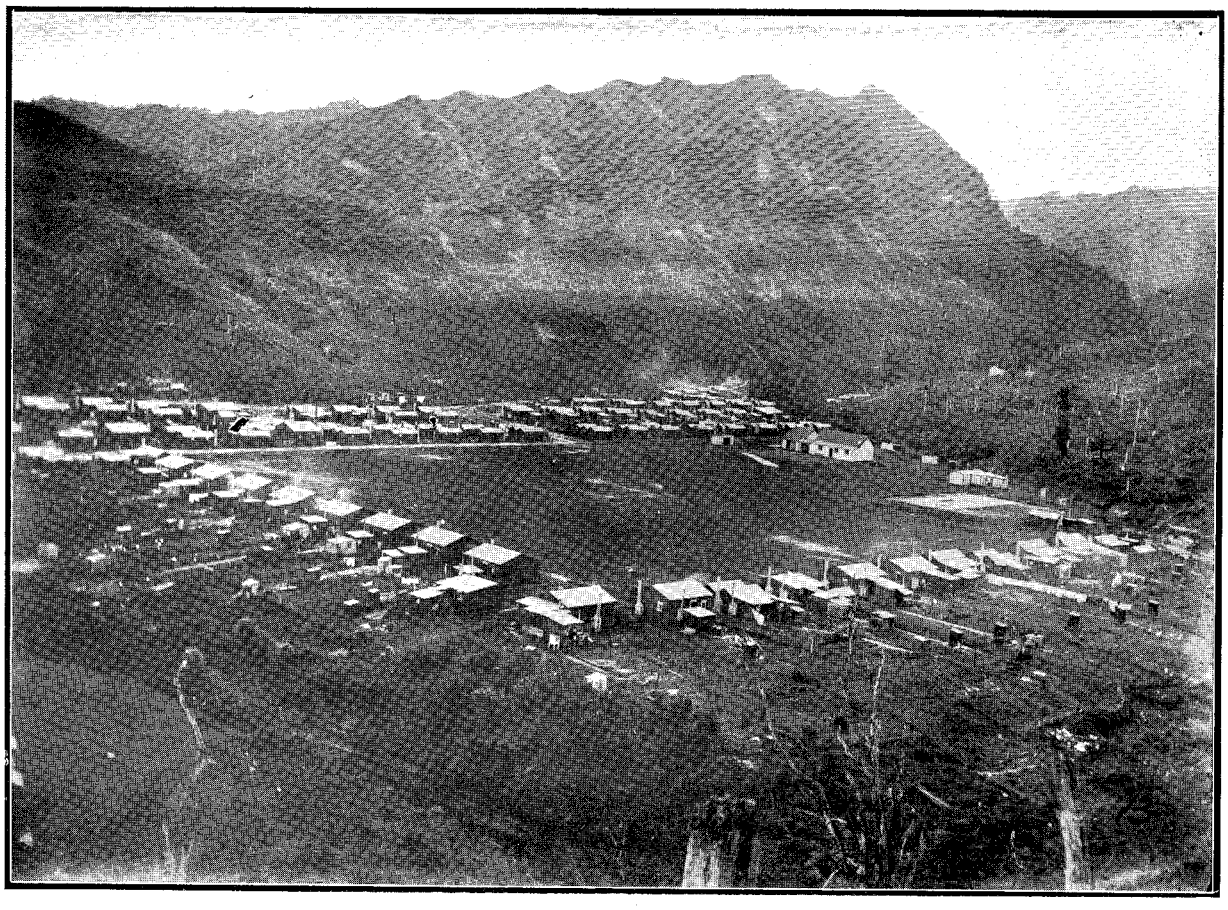


250 FT. SPAN FOR MATAHOURA VIADUCT.
End view of span erected in maker's yard.

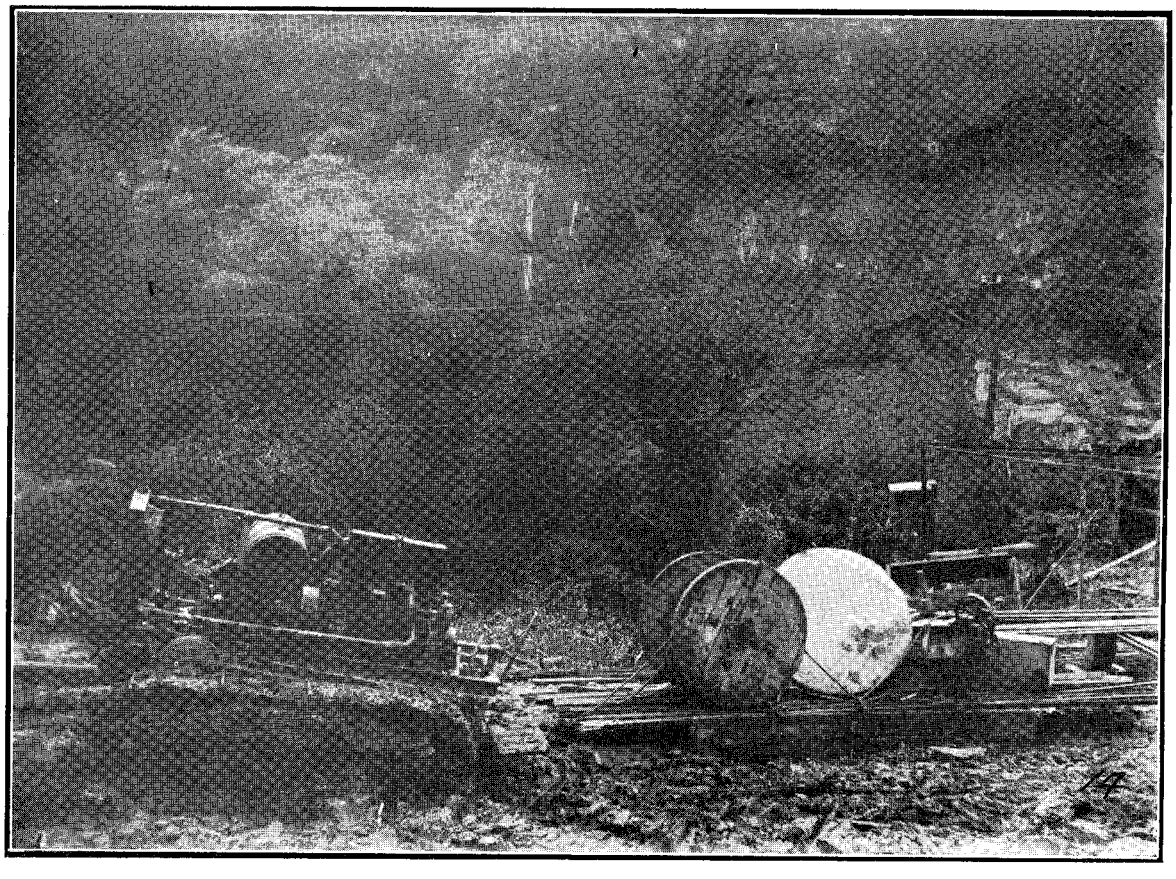
NAPIER–WAIROA RAILWAY.



250 FT. SPAN FOR MATAHOURA VIADUCT.
Diagonal view of span erected in maker's yard.
NAPIER WAIROA RAILWAY.

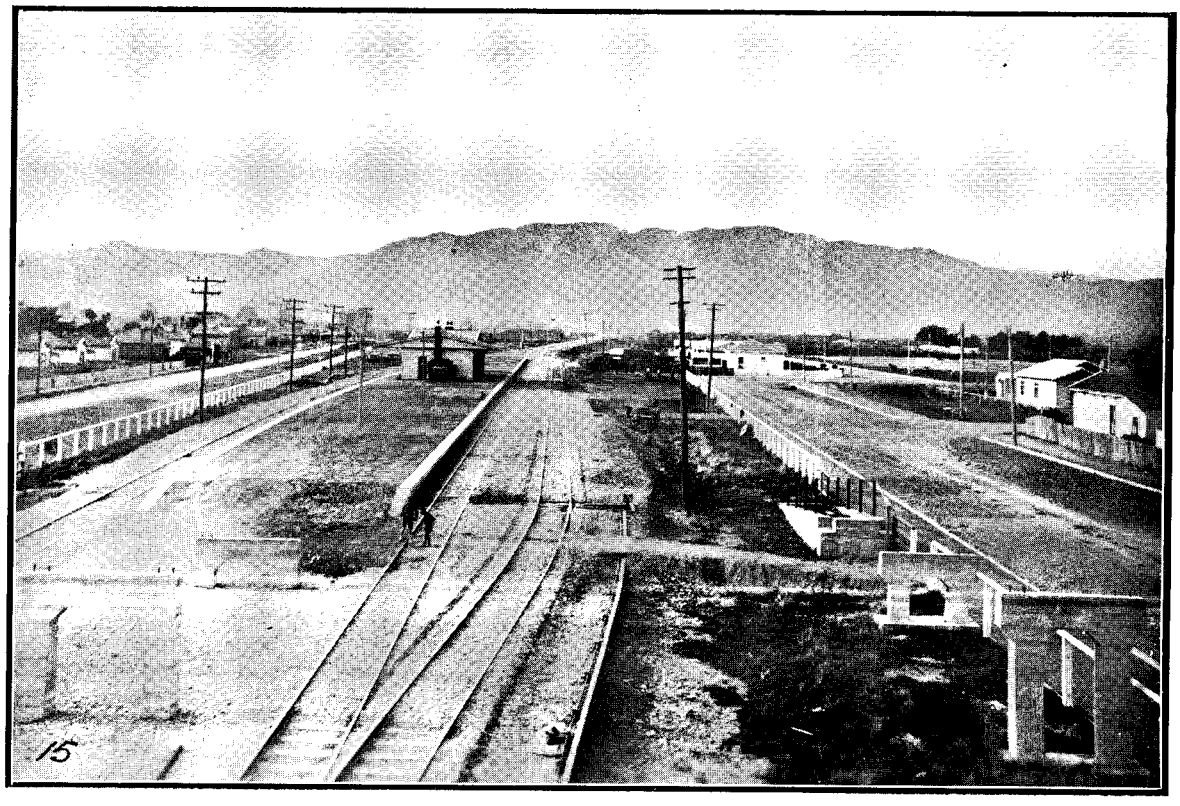


Tangarakau Camp: Married Men's Quarters.
Playing-field in centre.

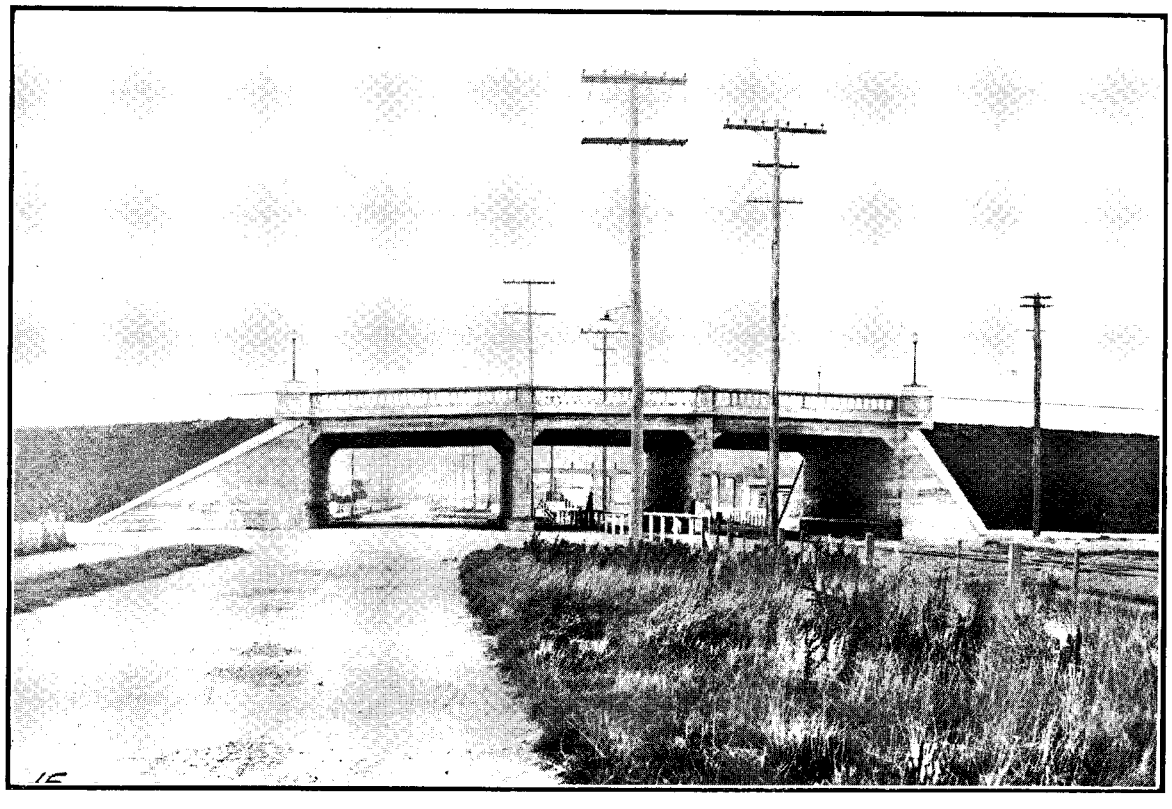


Caterpillar Tractor ready to haul Load of 2 Tons up 1 in 7 Grade.

STRATFORD–MAIN TRUNK RAILWAY, WESTERN END.

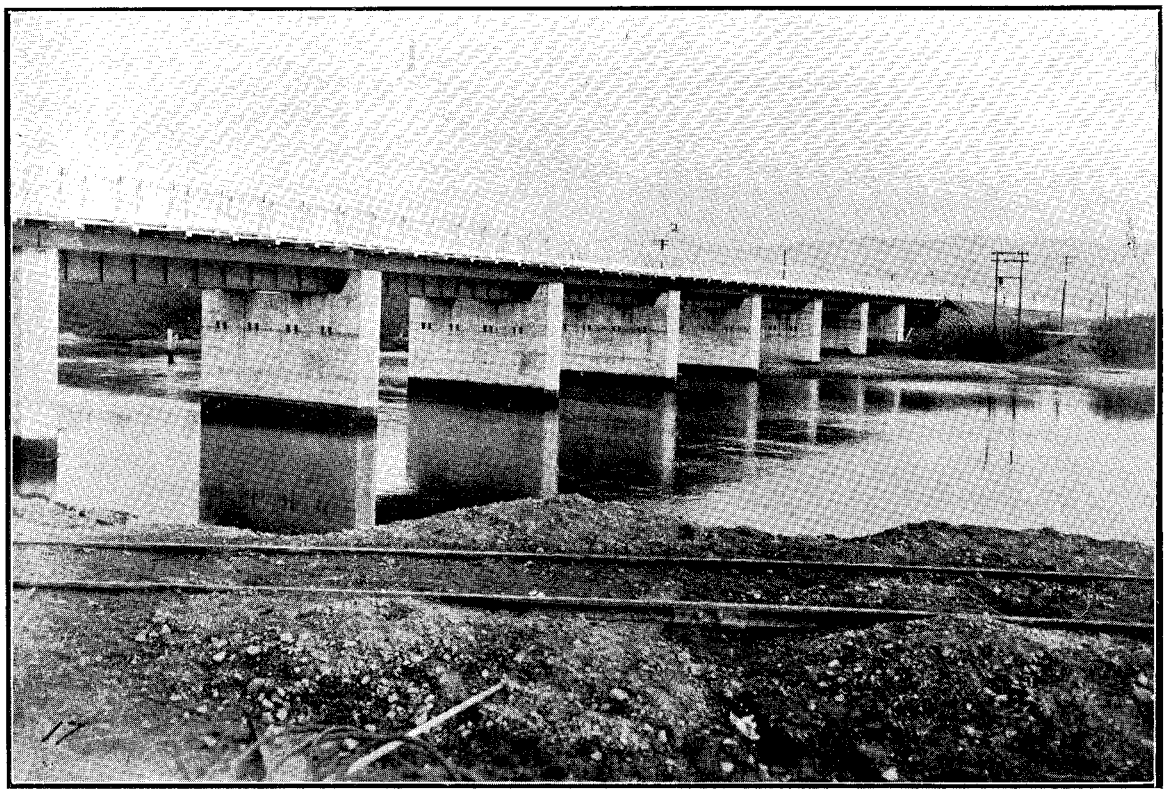


CUBA STREET STATION-YARD.

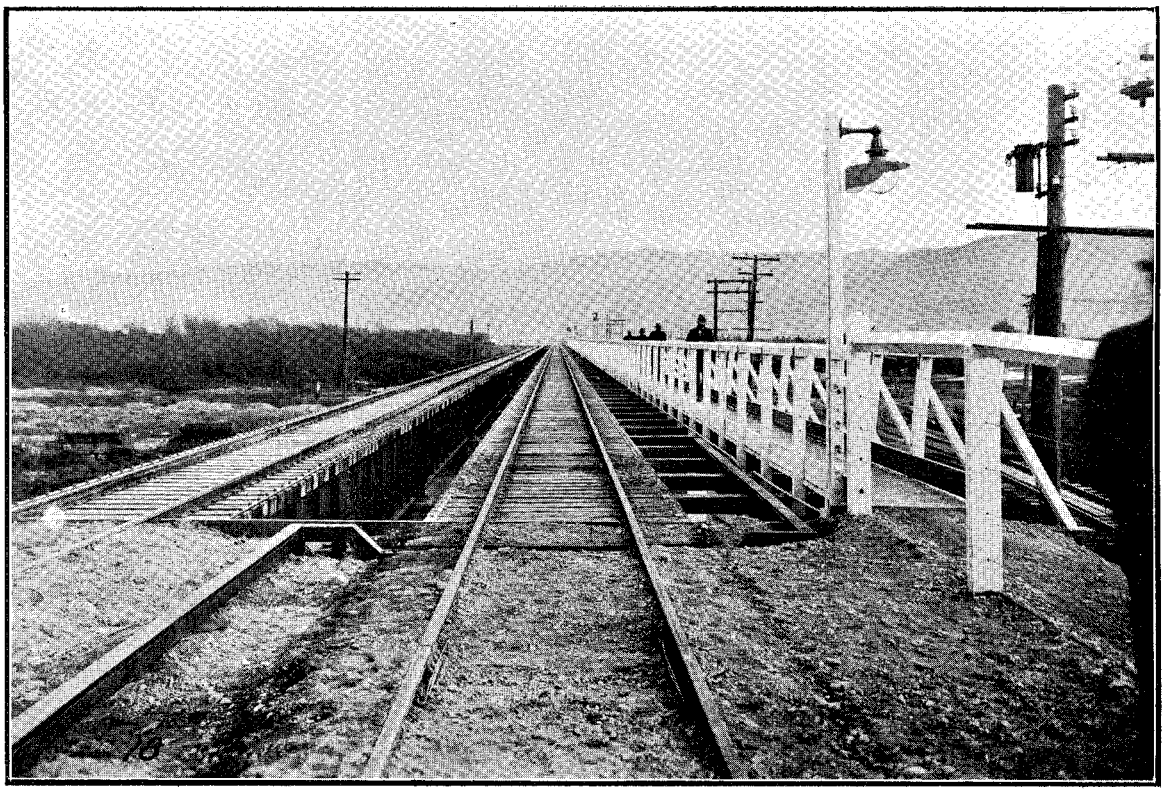


CUBA STREET OVERBRIDGE.

HUTT VALLEY RAILWAY.



HUTT RIVER BRIDGE.



HUTT RIVER BRIDGE.

HUTT VALLEY RAILWAY.



PLACING AND LOADING ROAD-METAL.

KIRIKOPUNI–PARADISE ACCESS ROAD.



LOADING METAL AT KIRIKOPUNI.

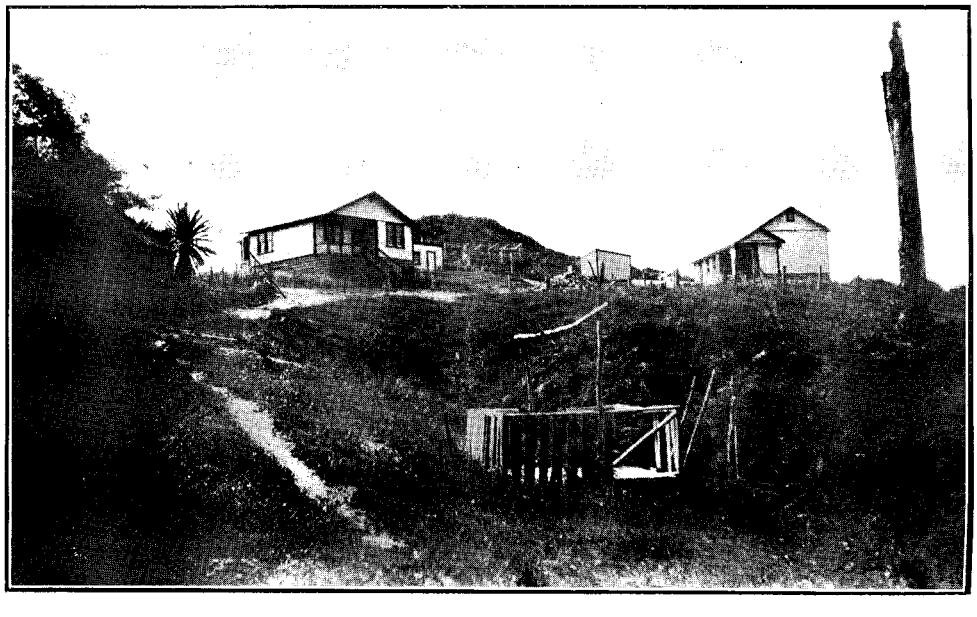
KIRIKOPUNI – PARAKAO ROAD.



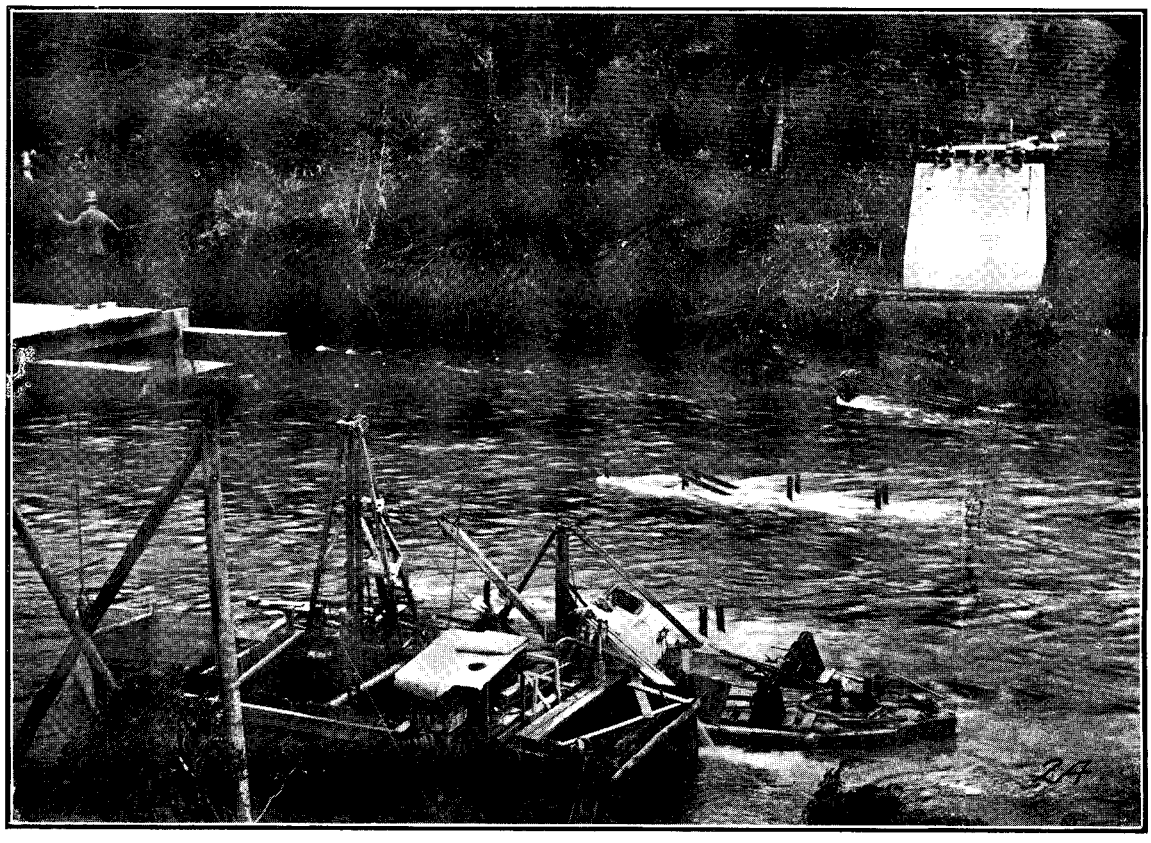
Widening Road to Dray-road Width.
RUATAHUNA—WAIKAREMOANA ROAD.



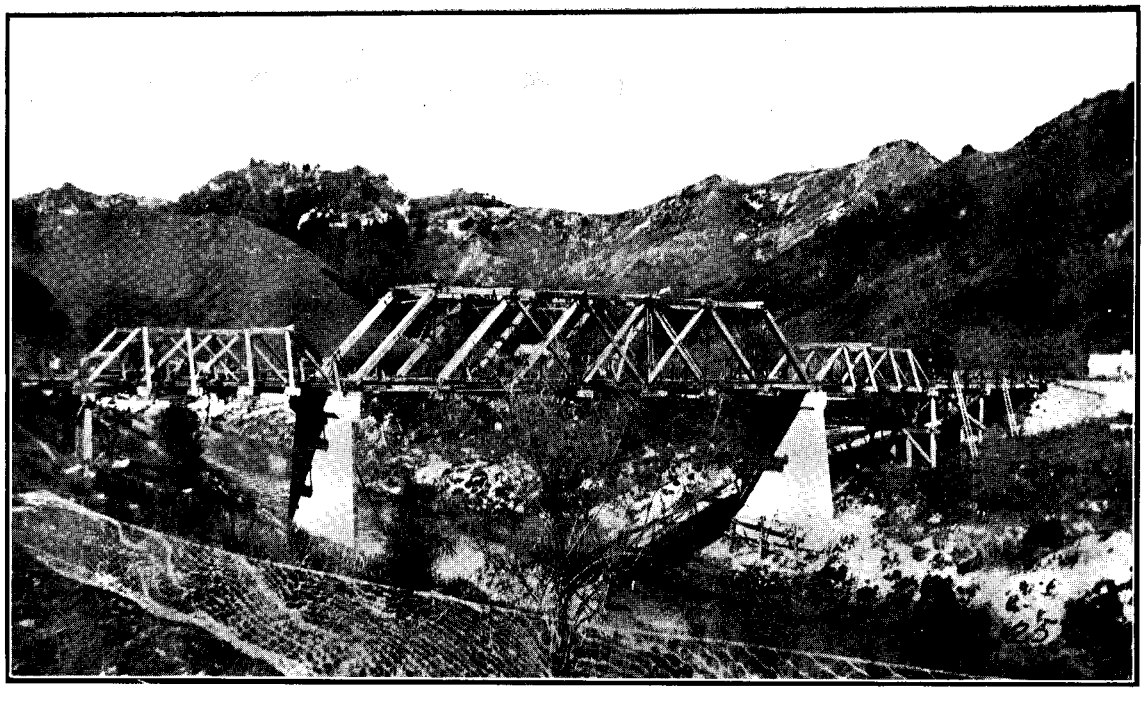
Mangapouri Bridge: Rolled-steel Joists on Reinforced-concrete Piers.
ROTORUA TAURANGA ROAD (DIRECT ROUTE).



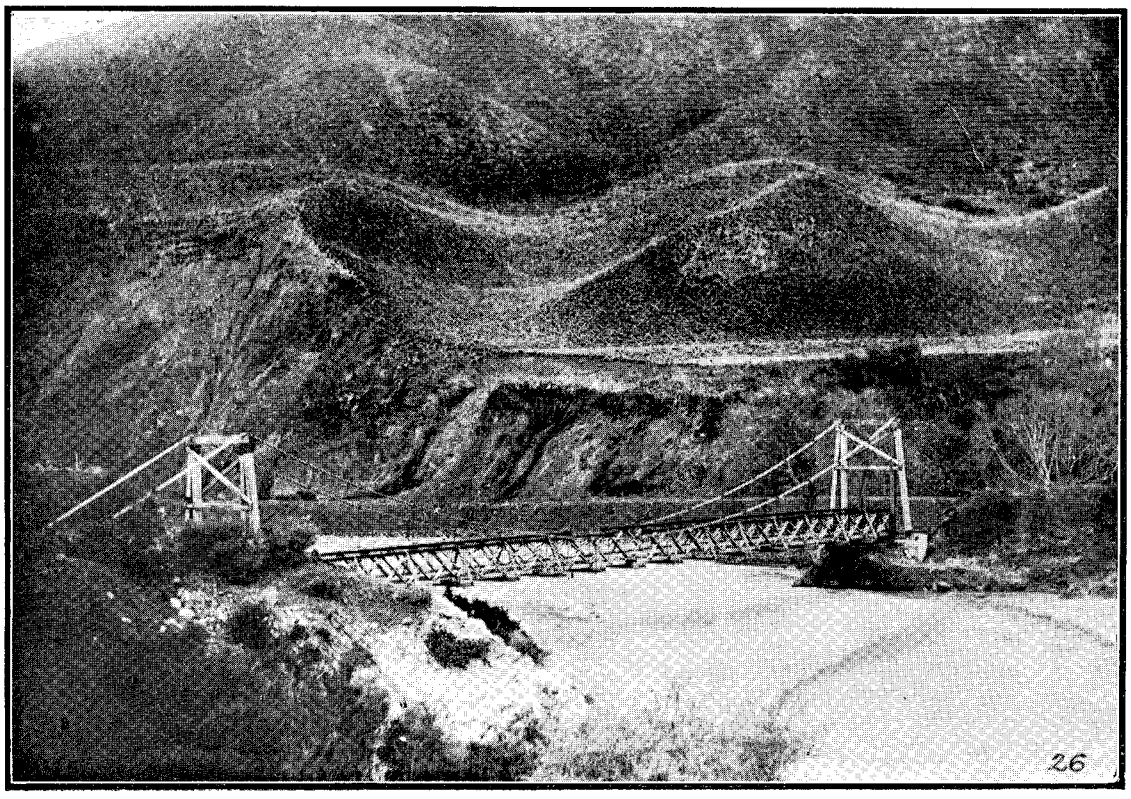
Huiarau Native School and Residence, Ruatahuna.



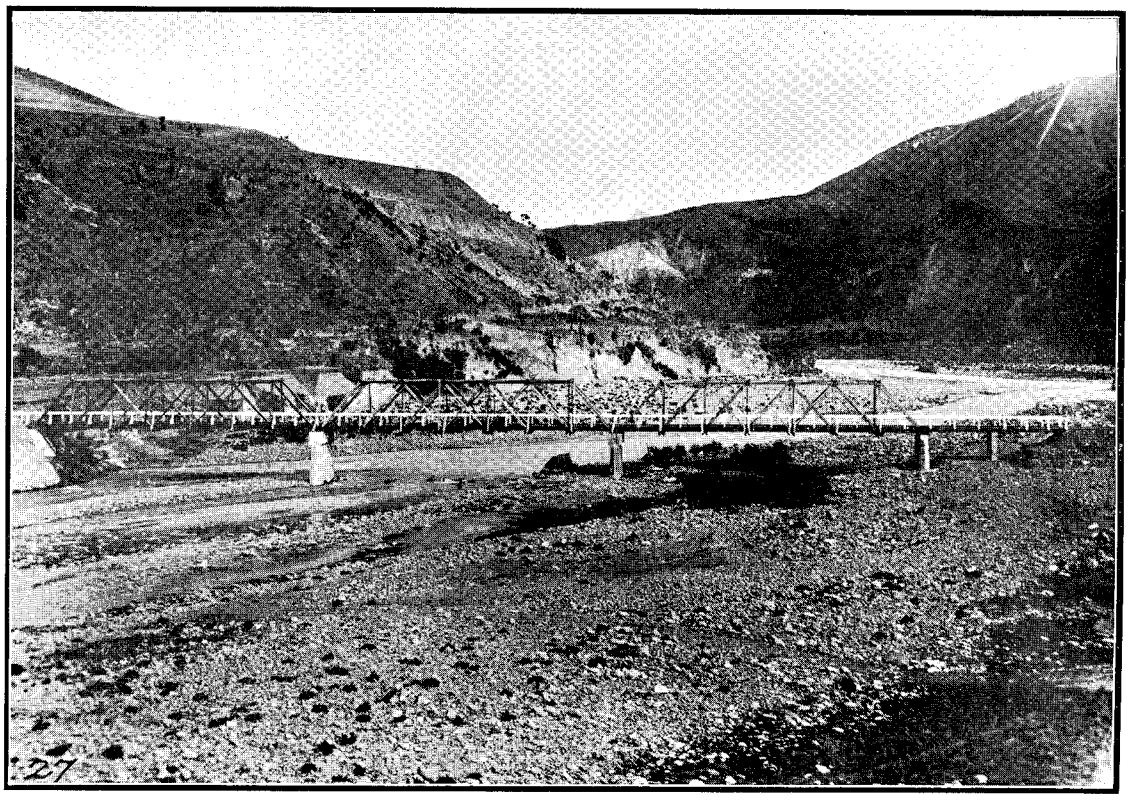
Te Maire Bridge, Wanganui River (8 m. below Taumarunui), under construction.
View showing cofferdam for one of the main piers.



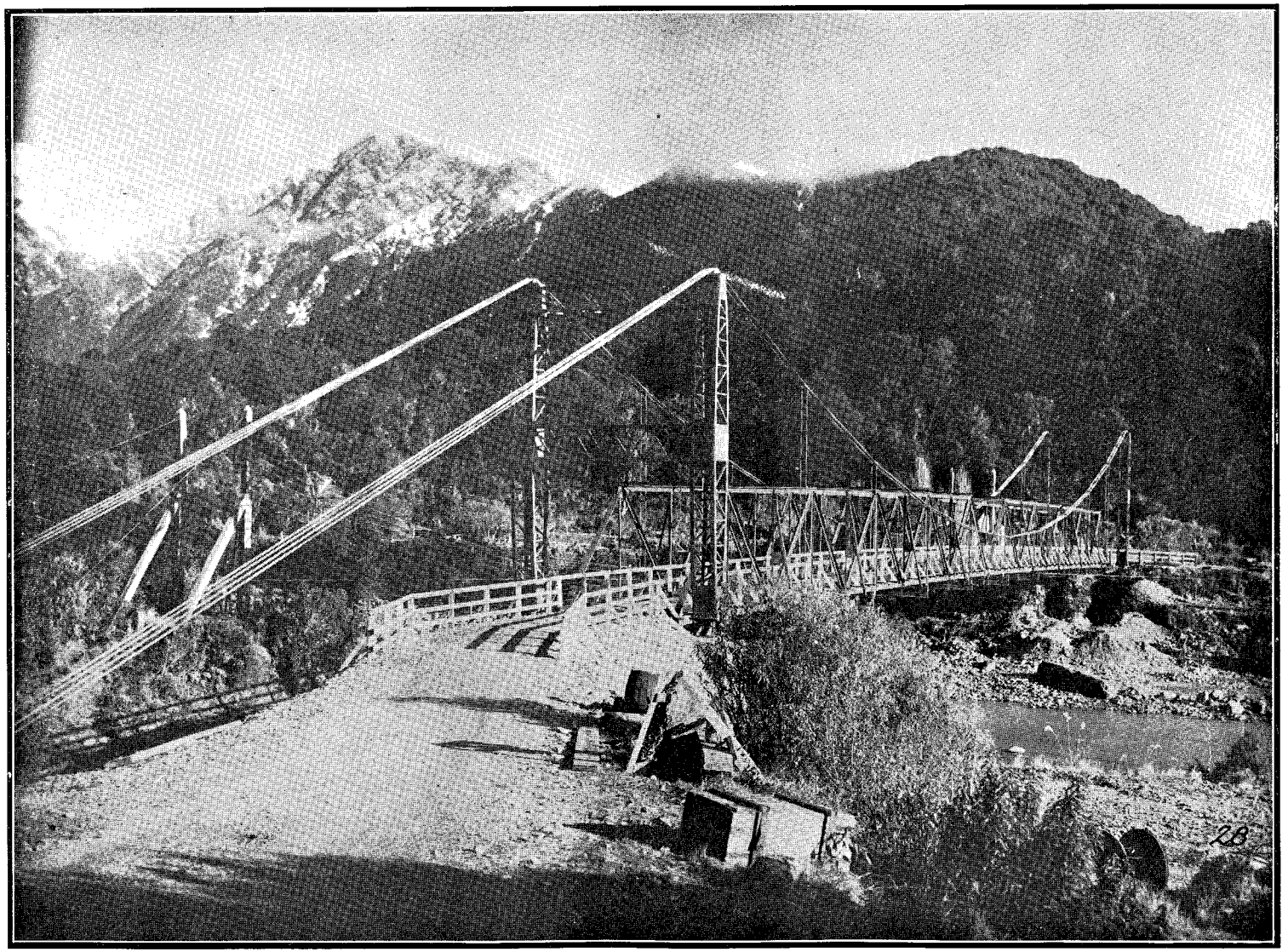
Waitotara River Bridge, Waitotara Valley Road.
(Main span, 120 ft.)



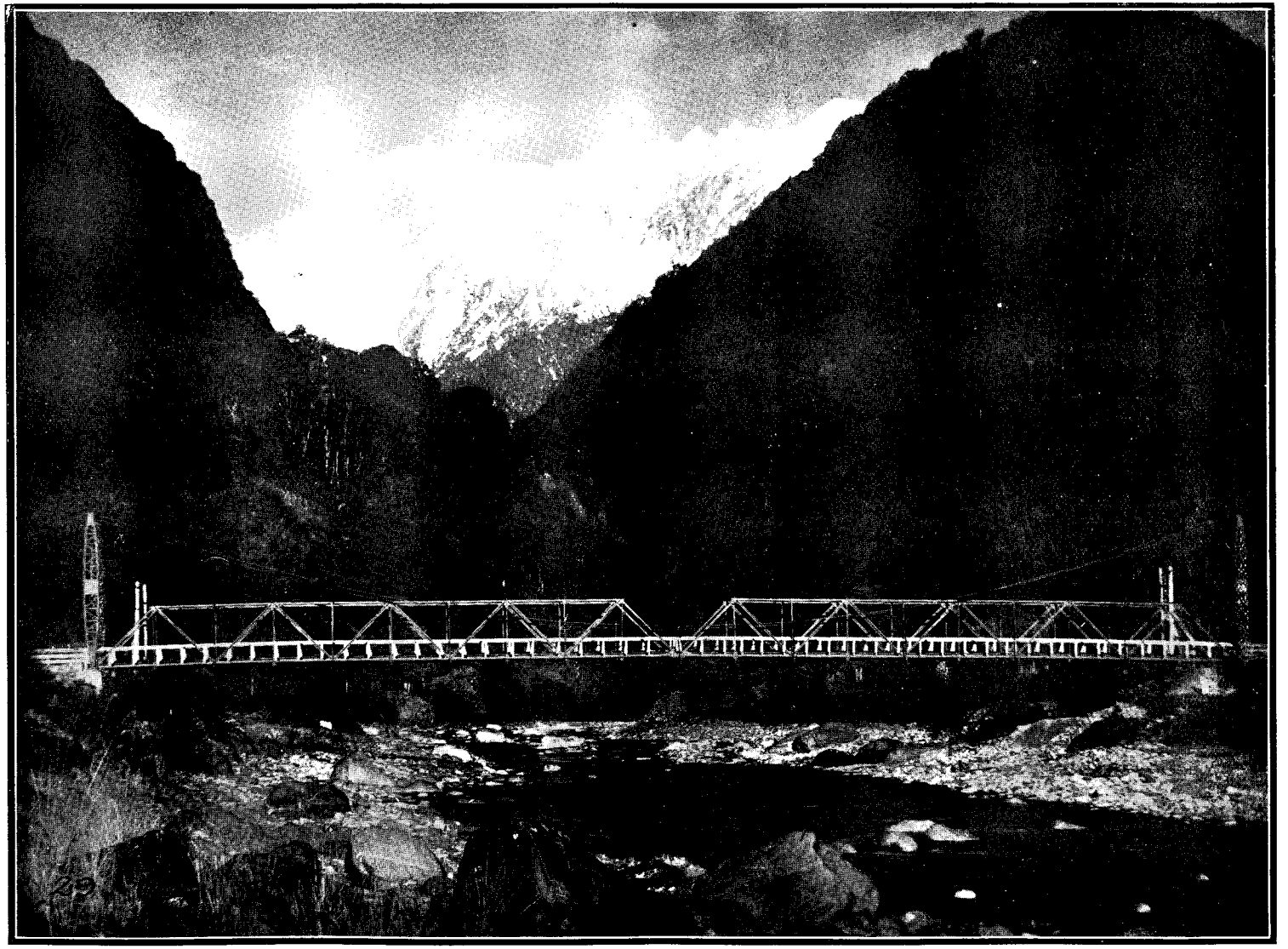
Awatere River Road-bridge, Limestone Ford.
200 ft. suspension span.



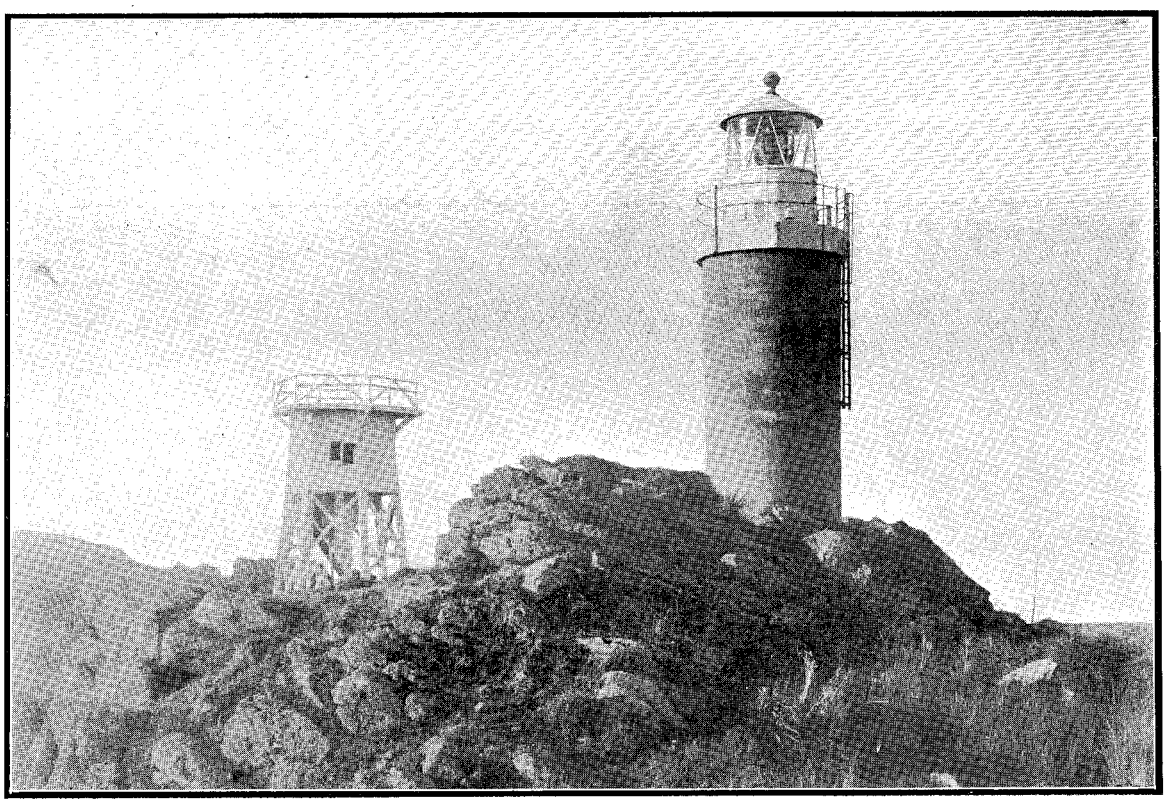
Awatere River Road-bridge: Access to Medway.
Three 110 ft. spans and three 25 ft. spans.



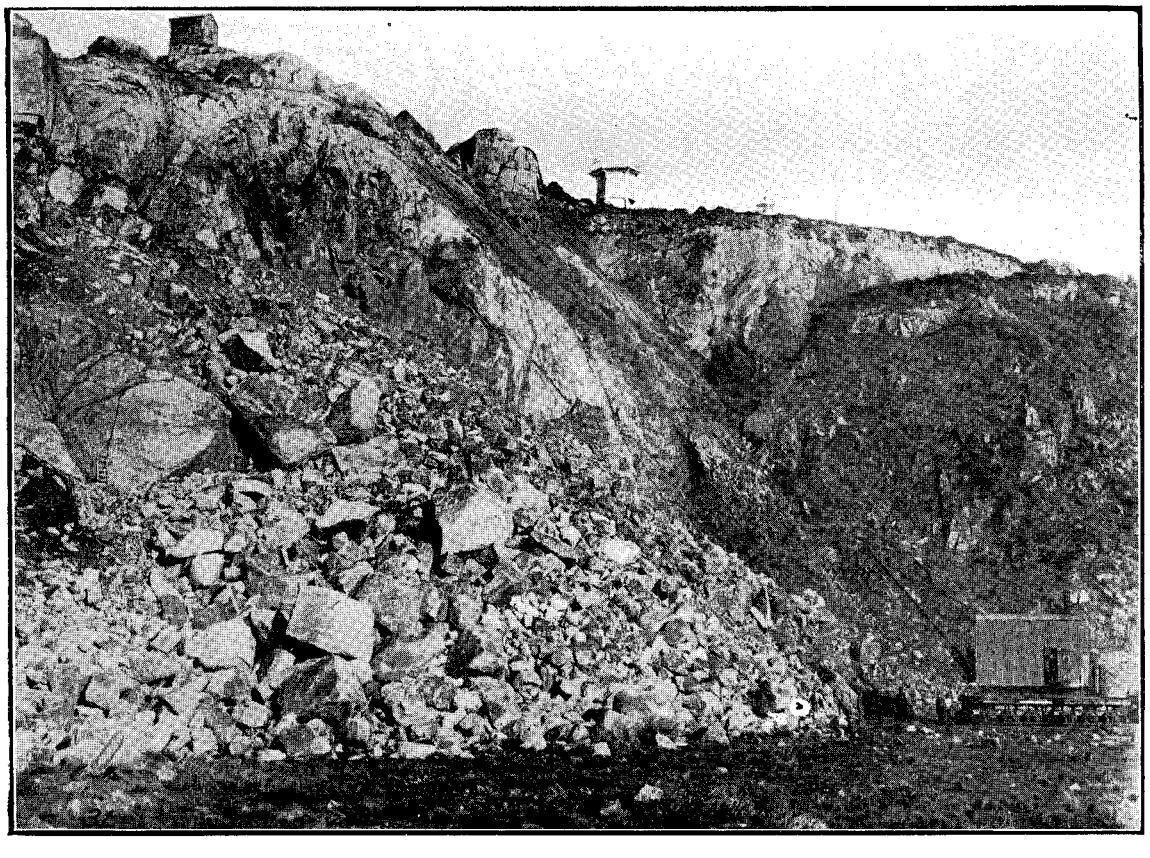
WAIHO GORGE SUSPENSION BRIDGE, SOUTH WESTLAND.
One 300 ft. suspension span with steel stiffening trusses and braced steel towers.



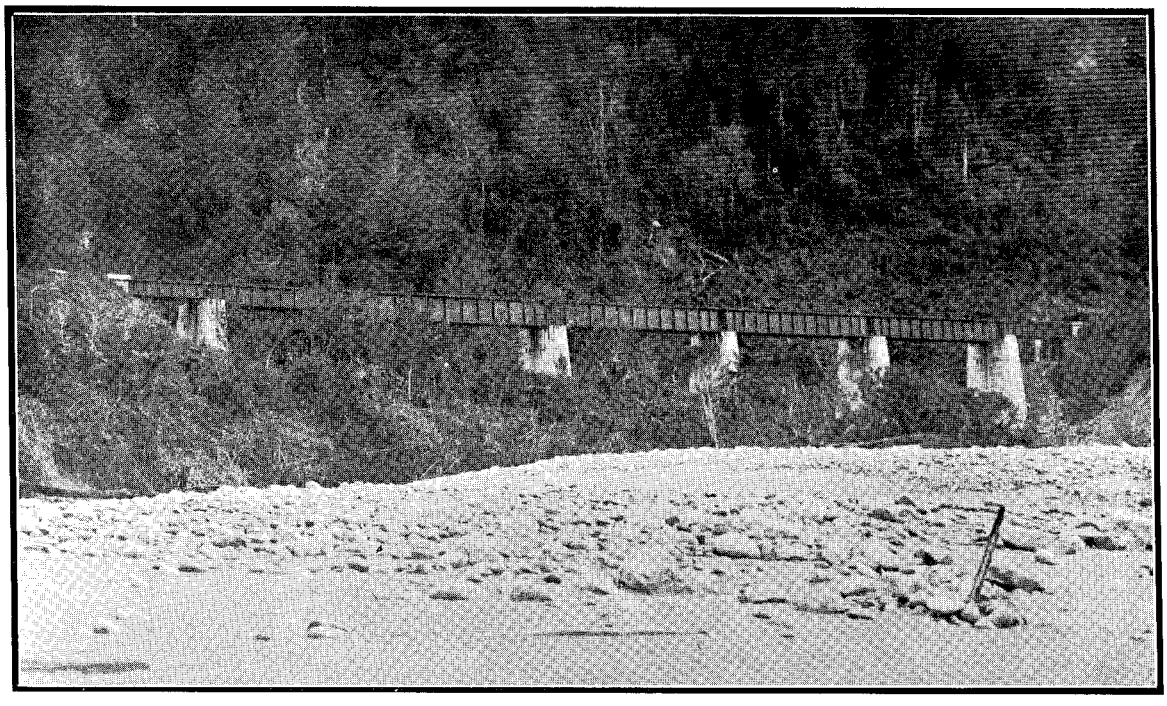
WAIHO GORGE SUSPENSION BRIDGE, SOUTH WESTLAND.
Side view.



Cape Foulwind Automatic Light.
Old lighthouse on left.

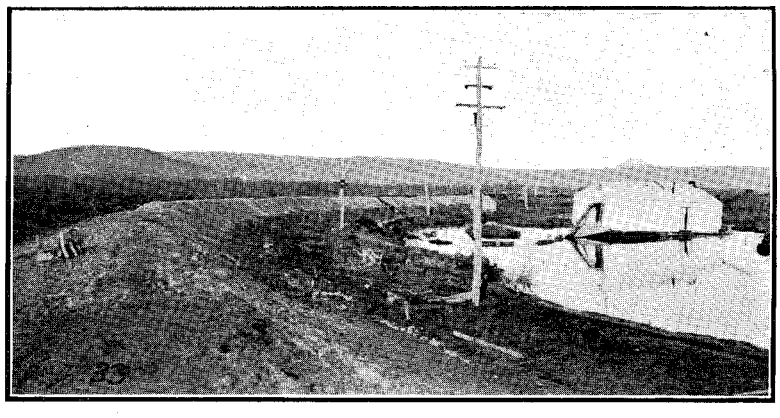


Westport Harbour-works: Cape Foulwind Quarry.

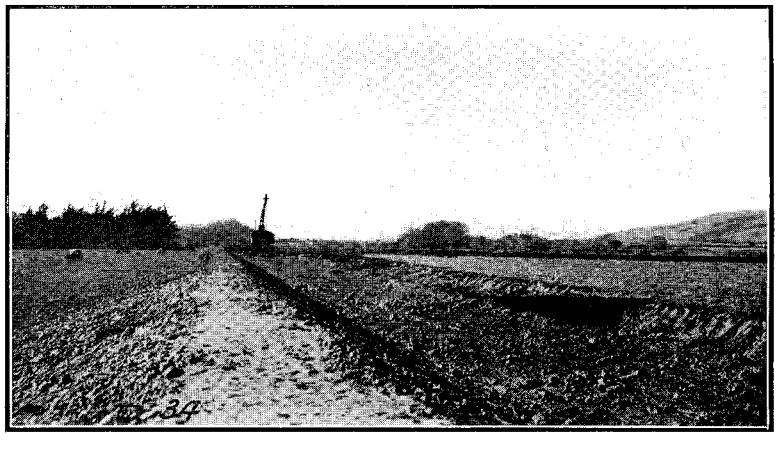


LITTLE CASCADE CREEK BRIDGE.
Four 50 ft., two 30 ft., and one 20 ft. spans.

WESTPORT–INANGAHUA RAILWAY.

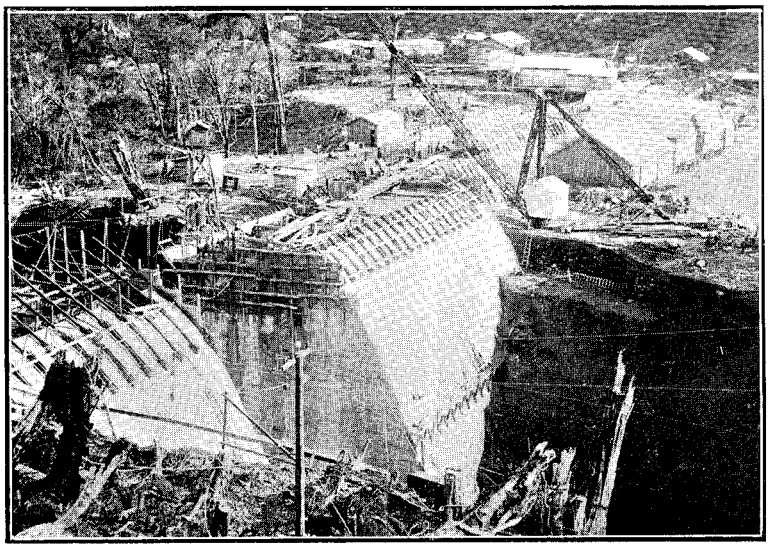


ELECTRIC SUCTION DREDGE FORMING EMBANKMENT.

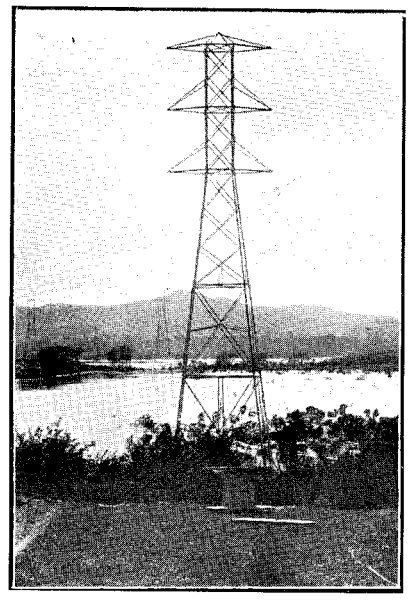


DRAG-LINE EXCAVATOR AT WORK FORMING LEVEE.

TAIERI RIVER FLOOD PROTECTION.



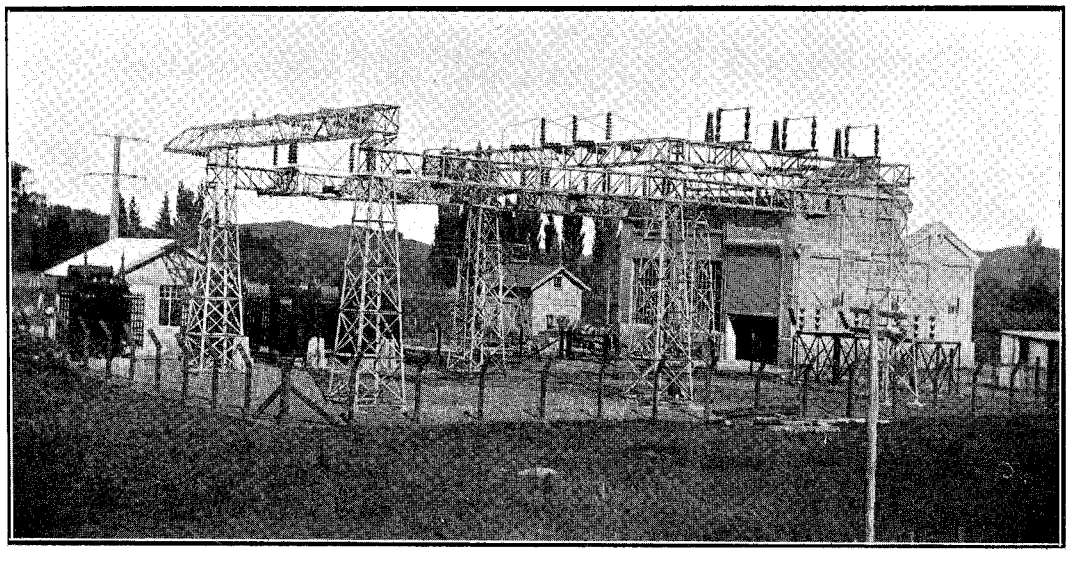
Mangahao No. 3 Dam under construction.



Transmission-line Towers on Main Auckland-Arapuni Line.

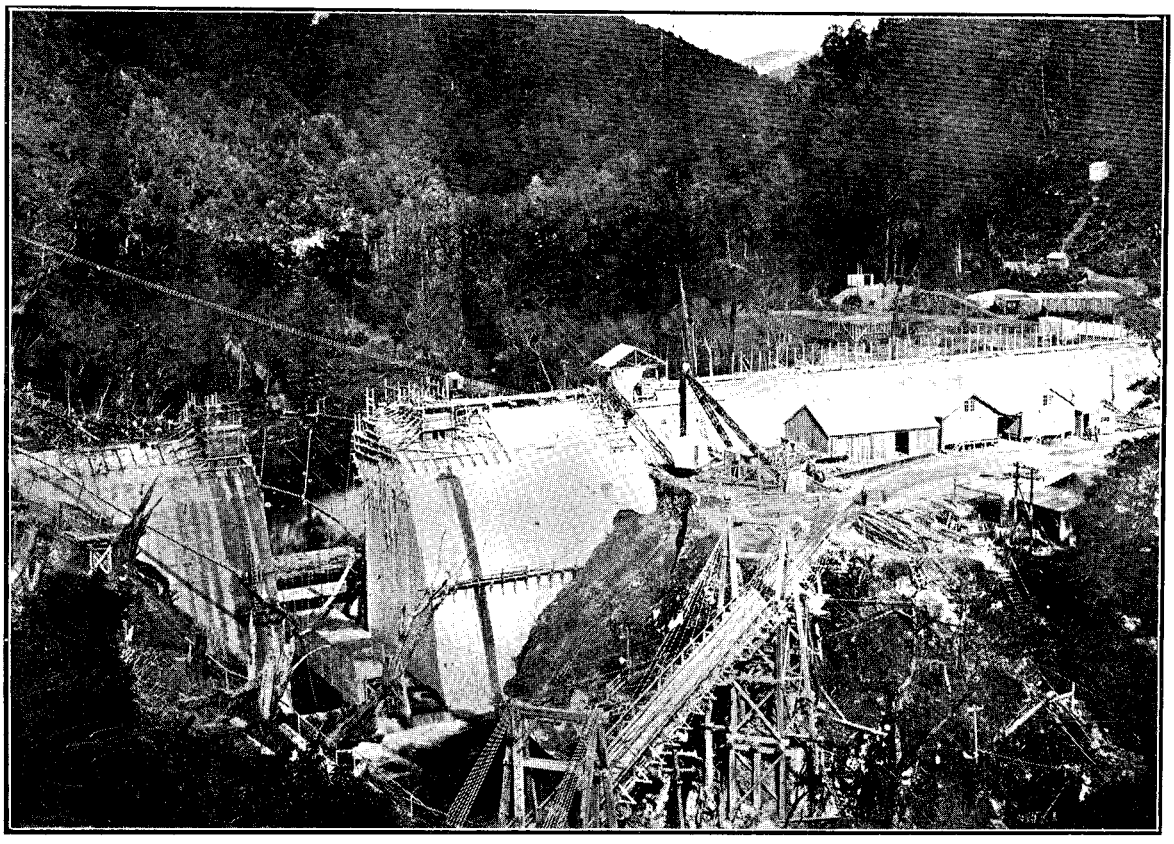


No. 3 Dam: Camp at Night.

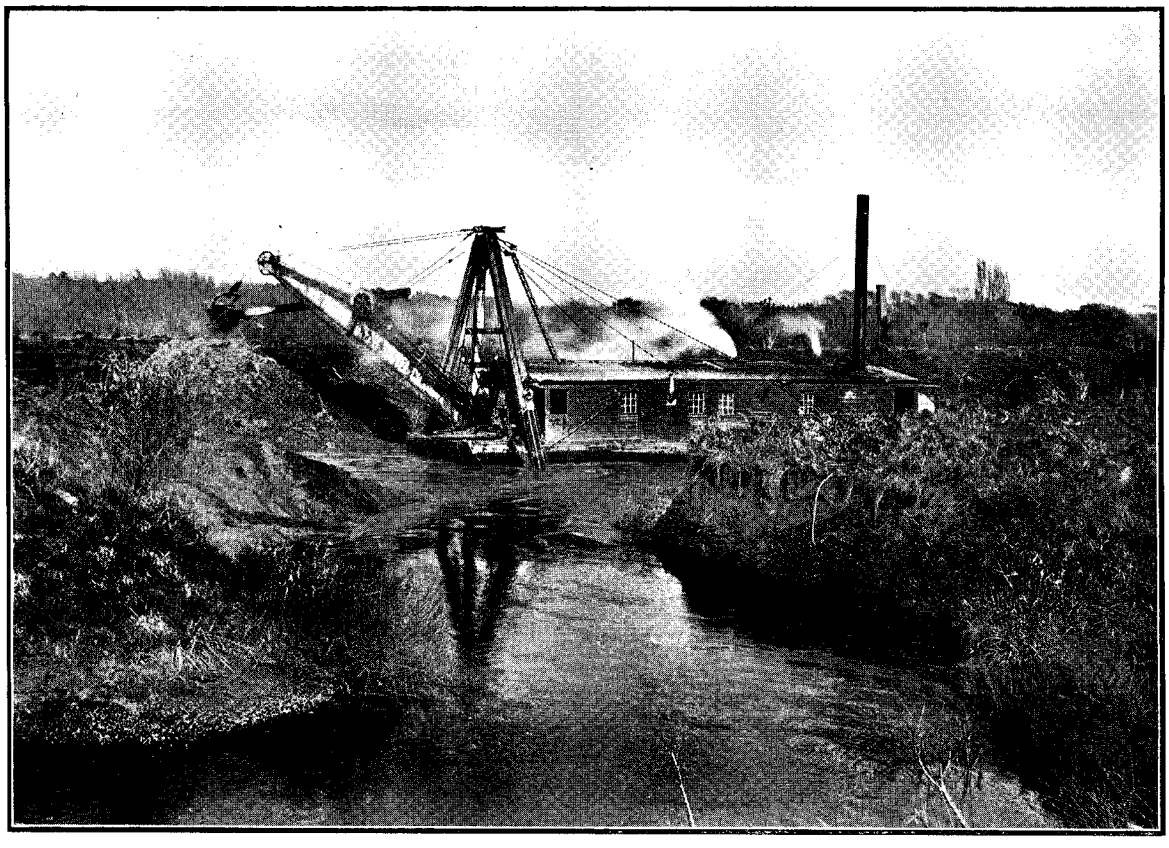


Napier Substation.

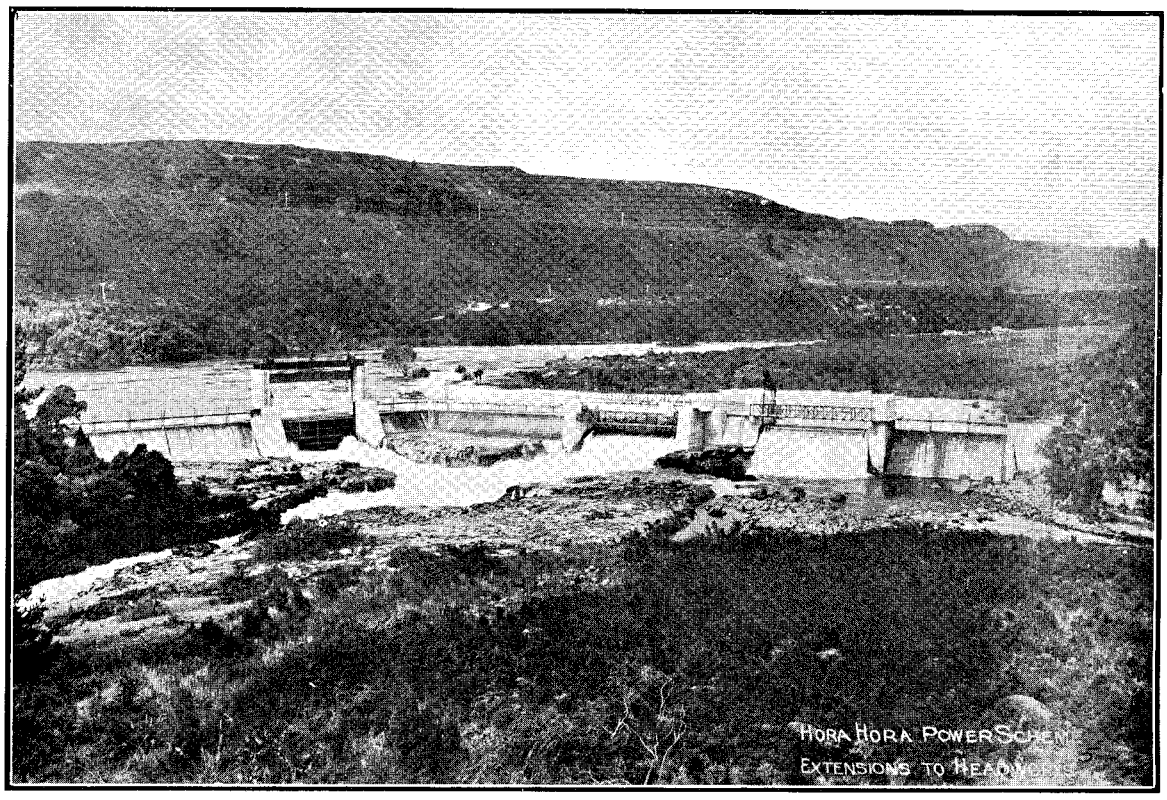
MANGAHAO HYDRO-ELECTRIC SCHEME.



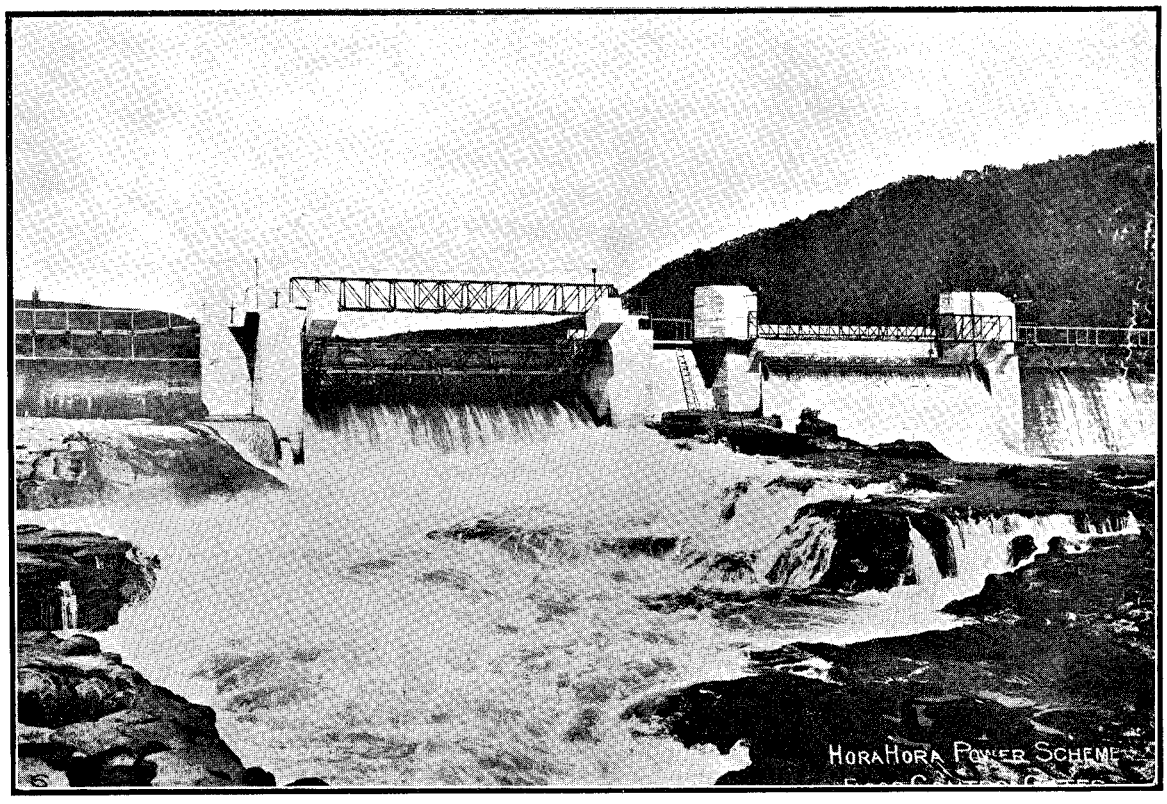
No. 3 Dam under construction.



Dredge working on Improvement of Tail-race Channel to Manawatu River.

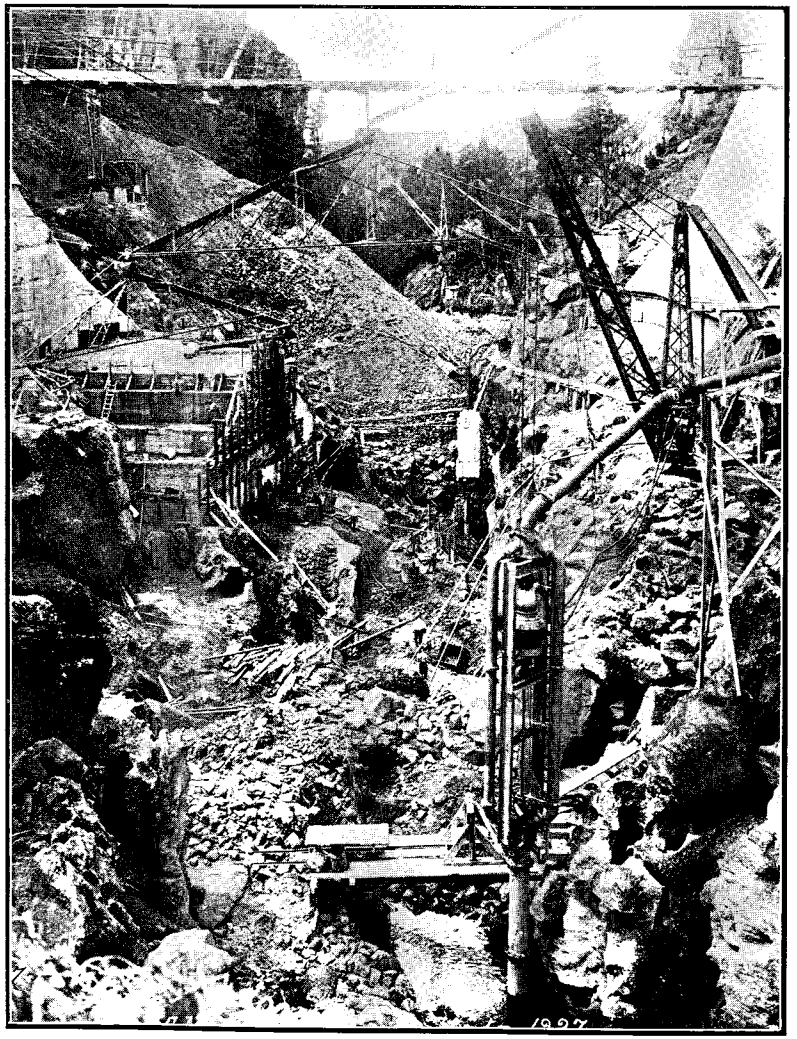


EXTENSION TO HEADWORKS.



FLOOD-CONTROL GATES.

HORAHORA POWER SCHEME.

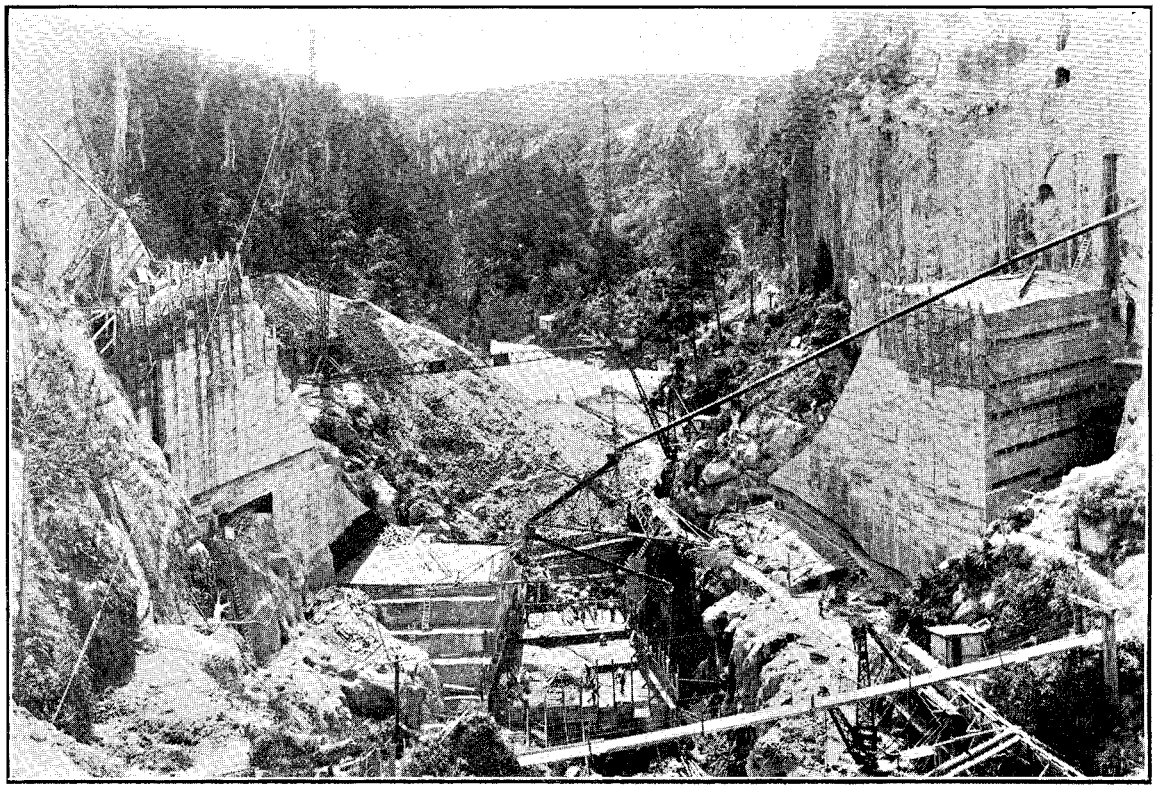


ARAPUNI DAM BEFORE EXCAVATING BOTTOM.

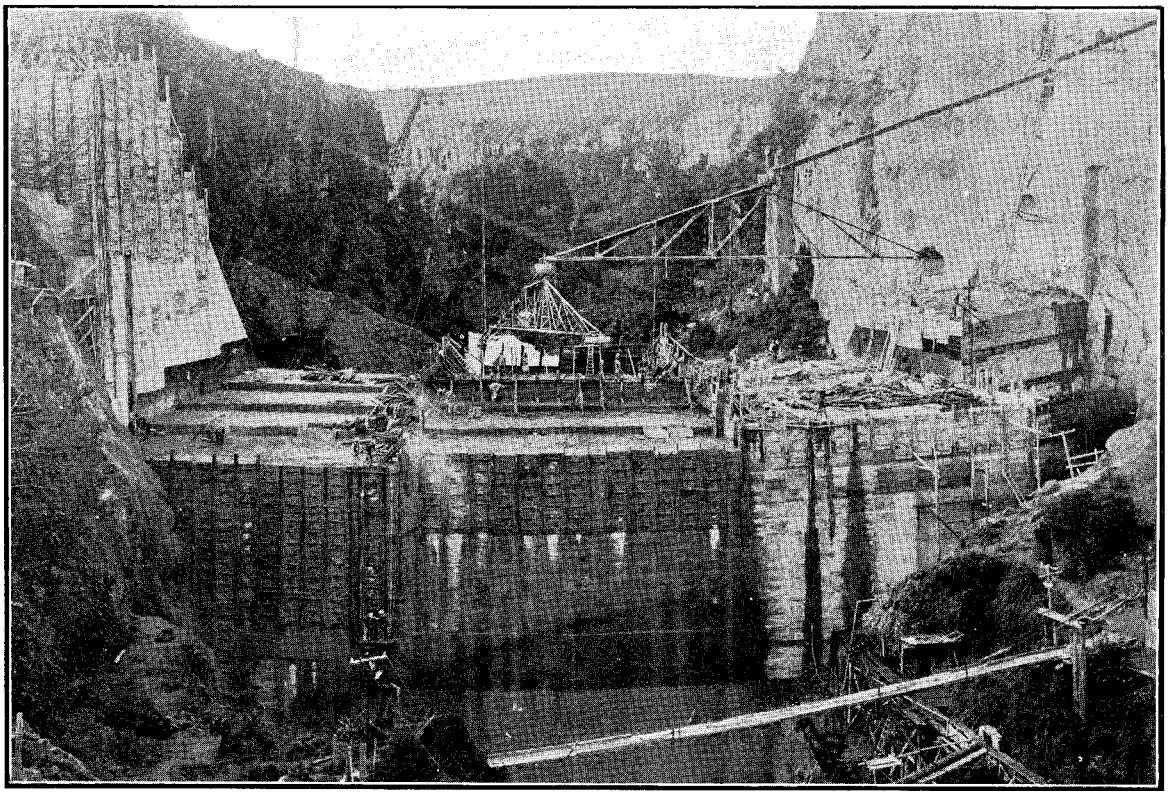


ARAPUNI DAM: ORIGINAL RIVER-BOTTOM BELOW UPPER DIVERSION DAM.

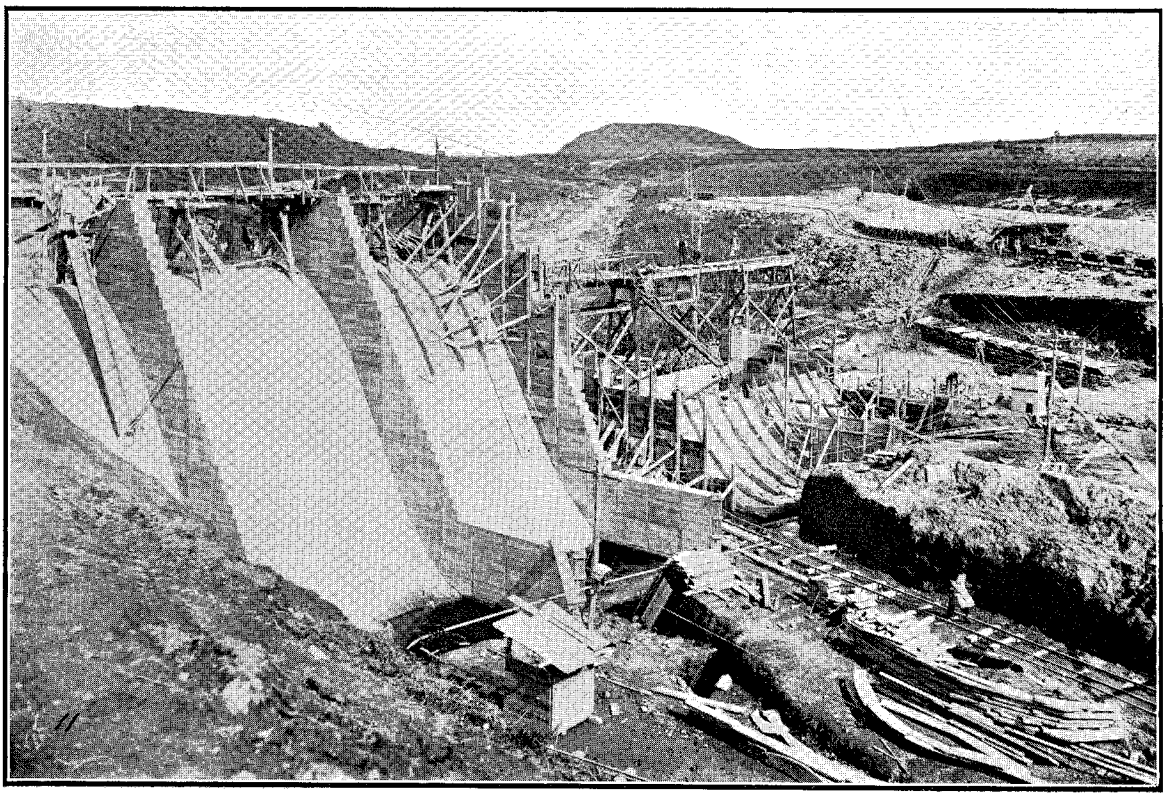
ARAPUNI HYDRO-ELECTRIC SCHEME.



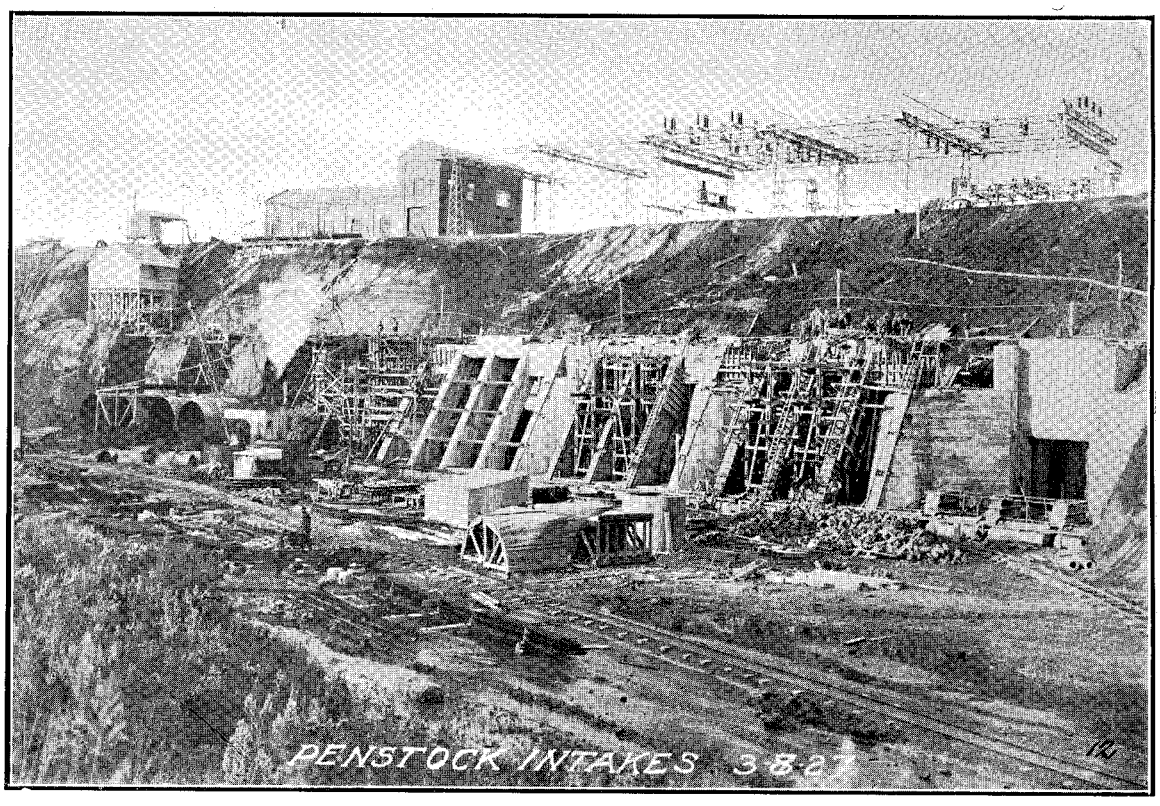
Arapuni Dam: Commencing Concrete in Bottom.



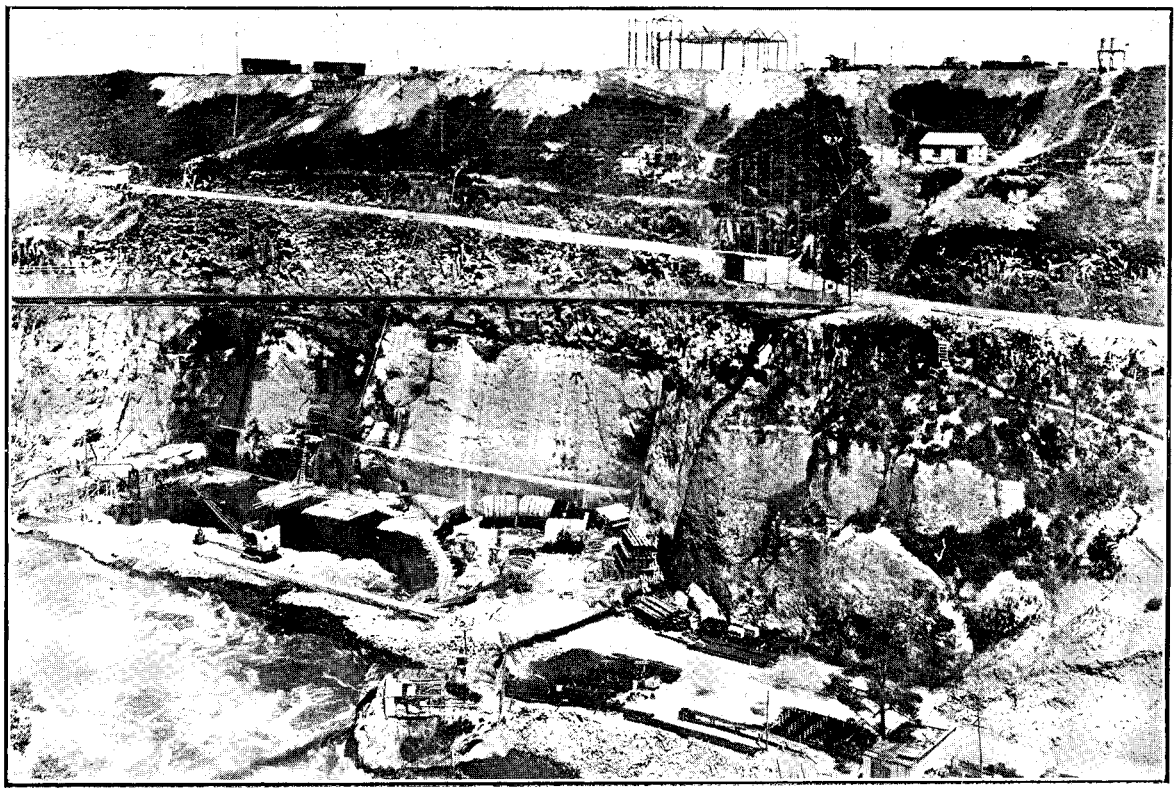
Arapuni Dam: Position of Work at 3rd August, 1927.



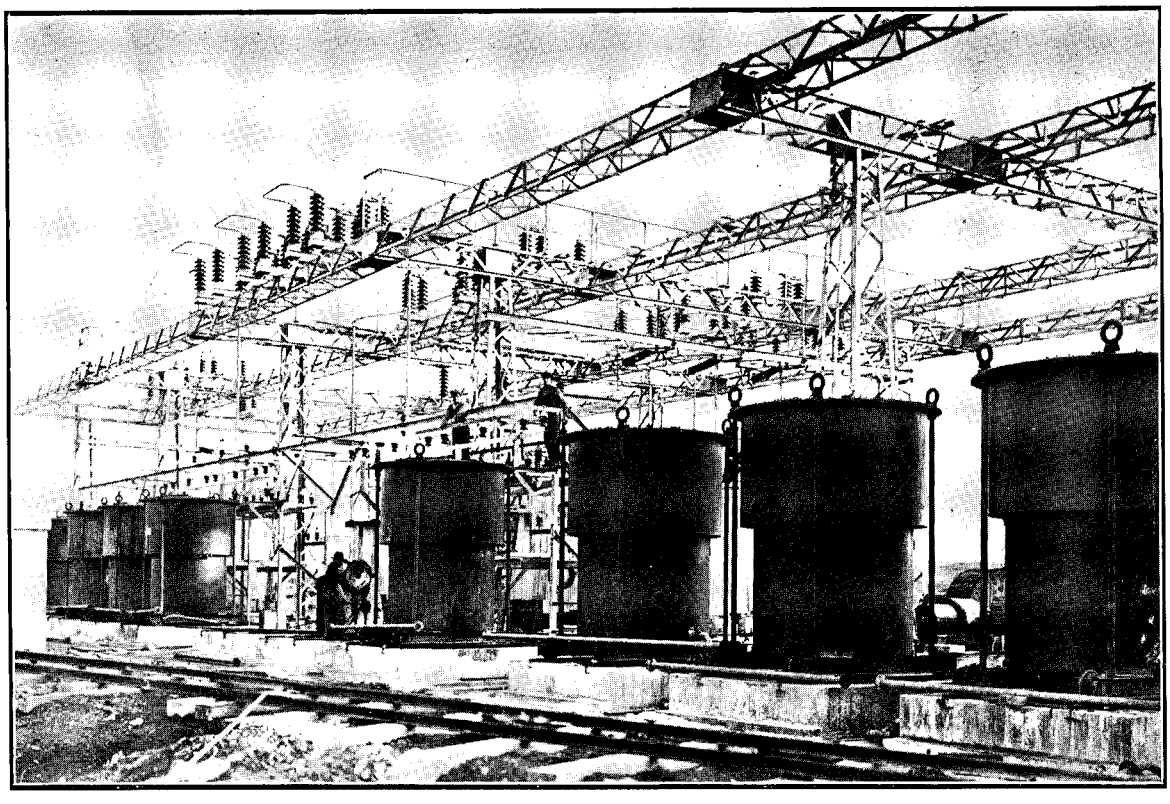
SPILLWAY UNDER CONSTRUCTION.



PENSTOCK INTAKES.

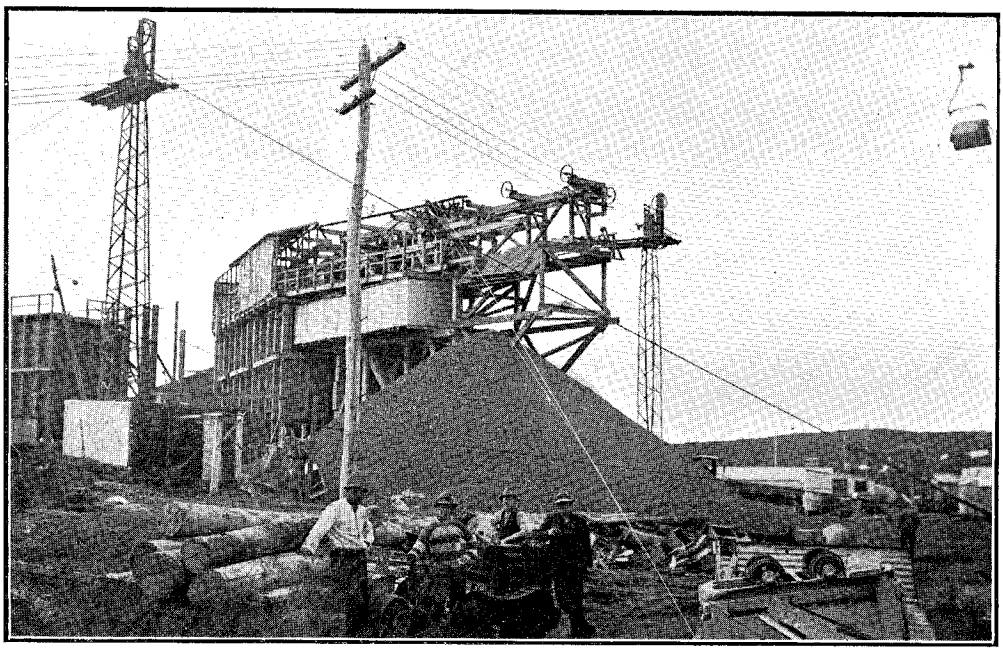


Power-house Site.



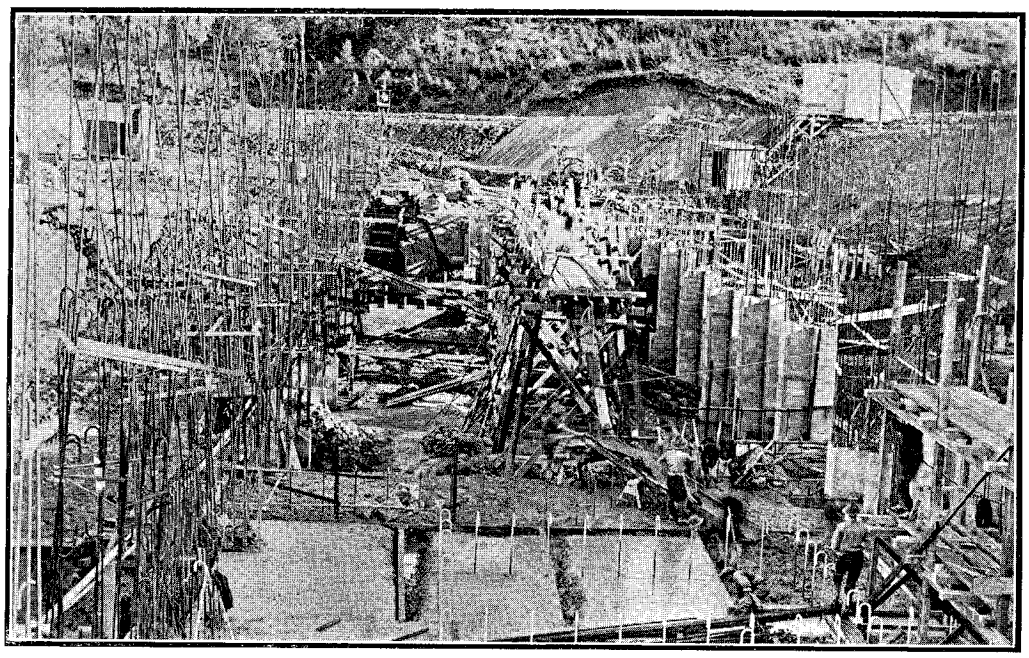
Outdoor Transformer and Switching-station.

ARAPUNI HYDRO-ELECTRIC SCHEME.

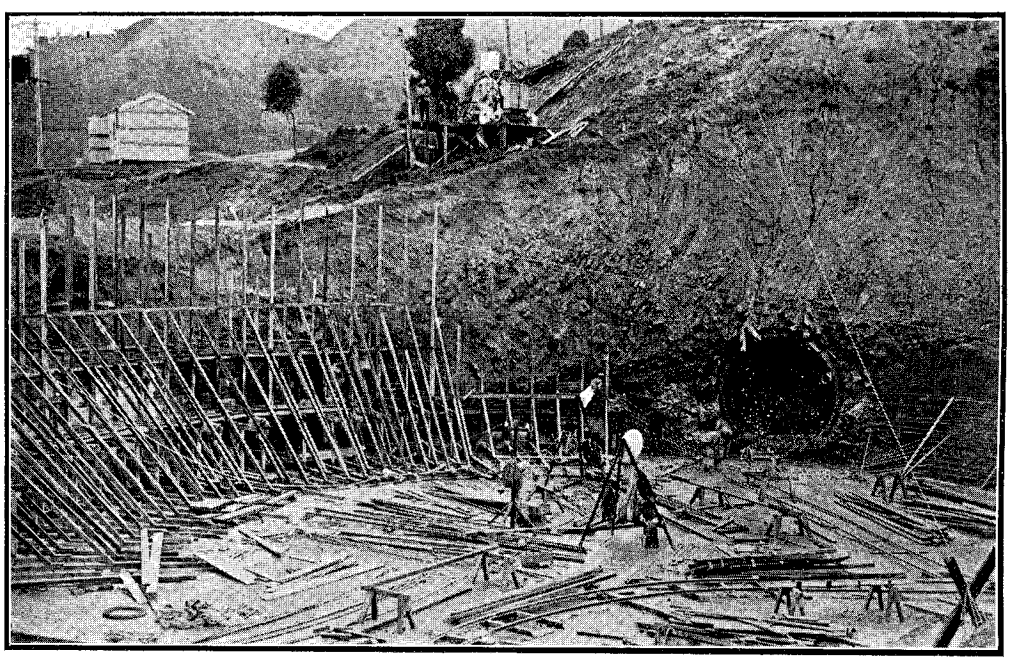


Ropeway Terminal, Shingle-bins, etc.

ARAPUNI HYDRO-ELECTRIC SCHEME.

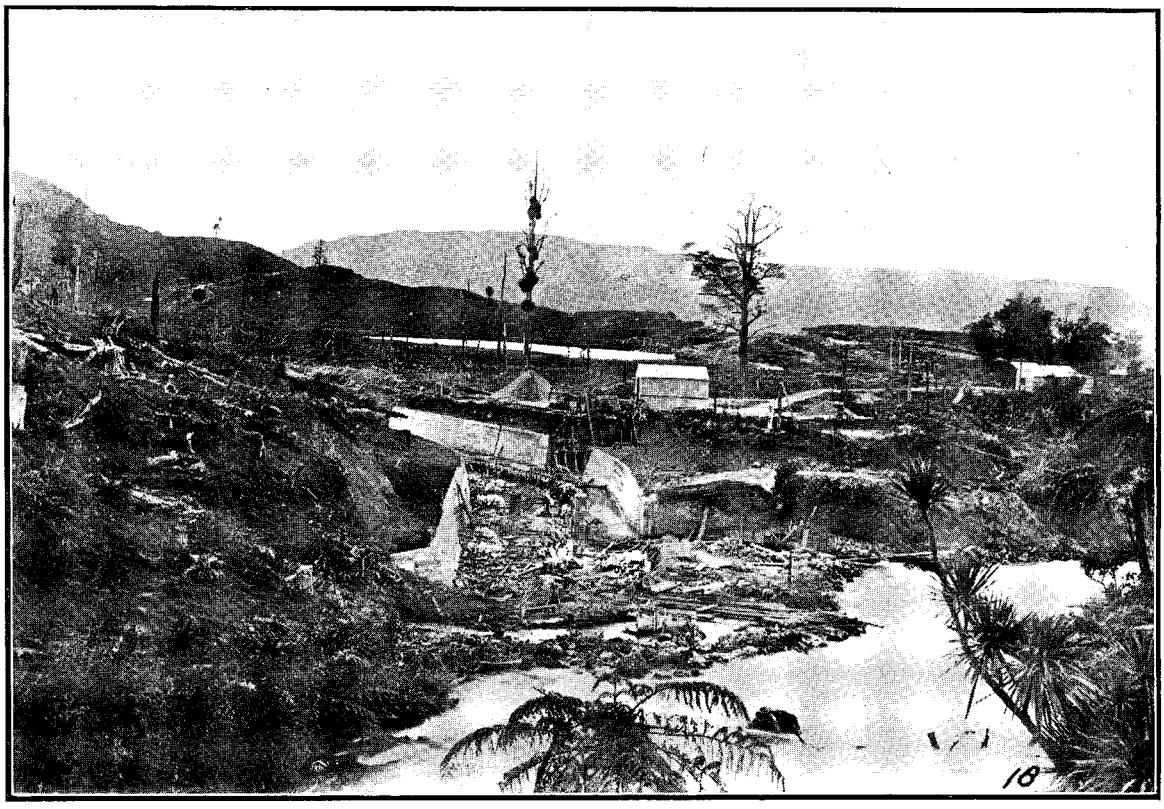


Power-house Foundations.



Part of Surge-chamber and Tunnel-outlet.

WAIKAREMOANA HYDRO-ELECTRIC SCHEME.

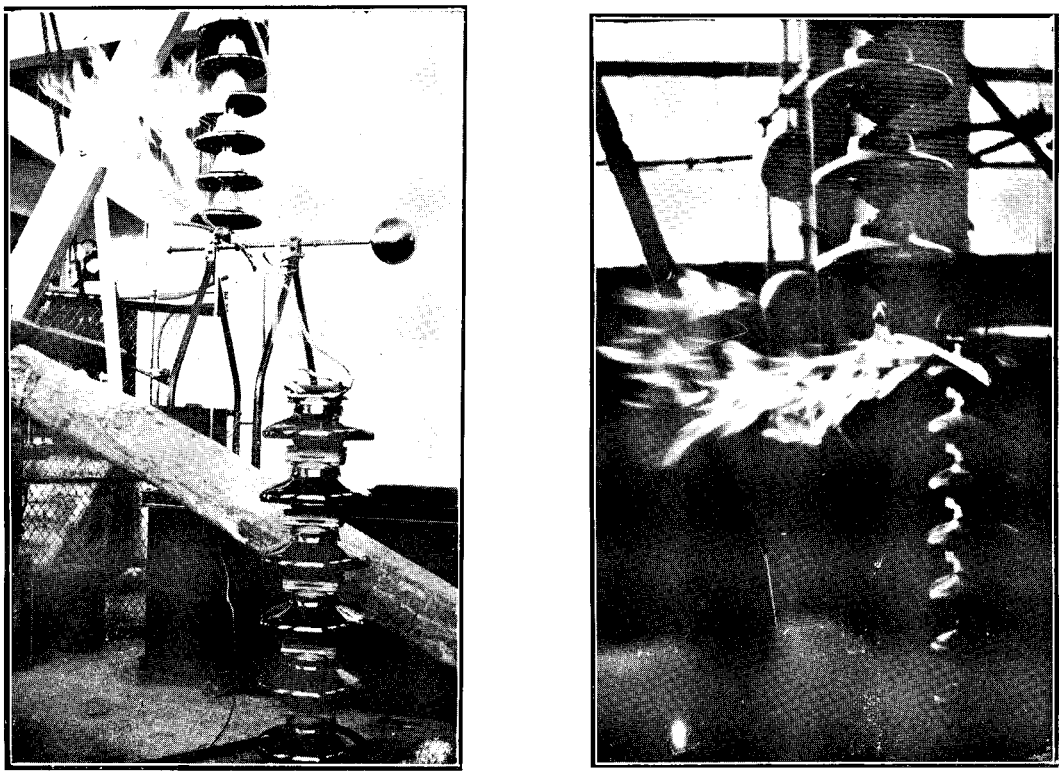


INTAKE RACE.



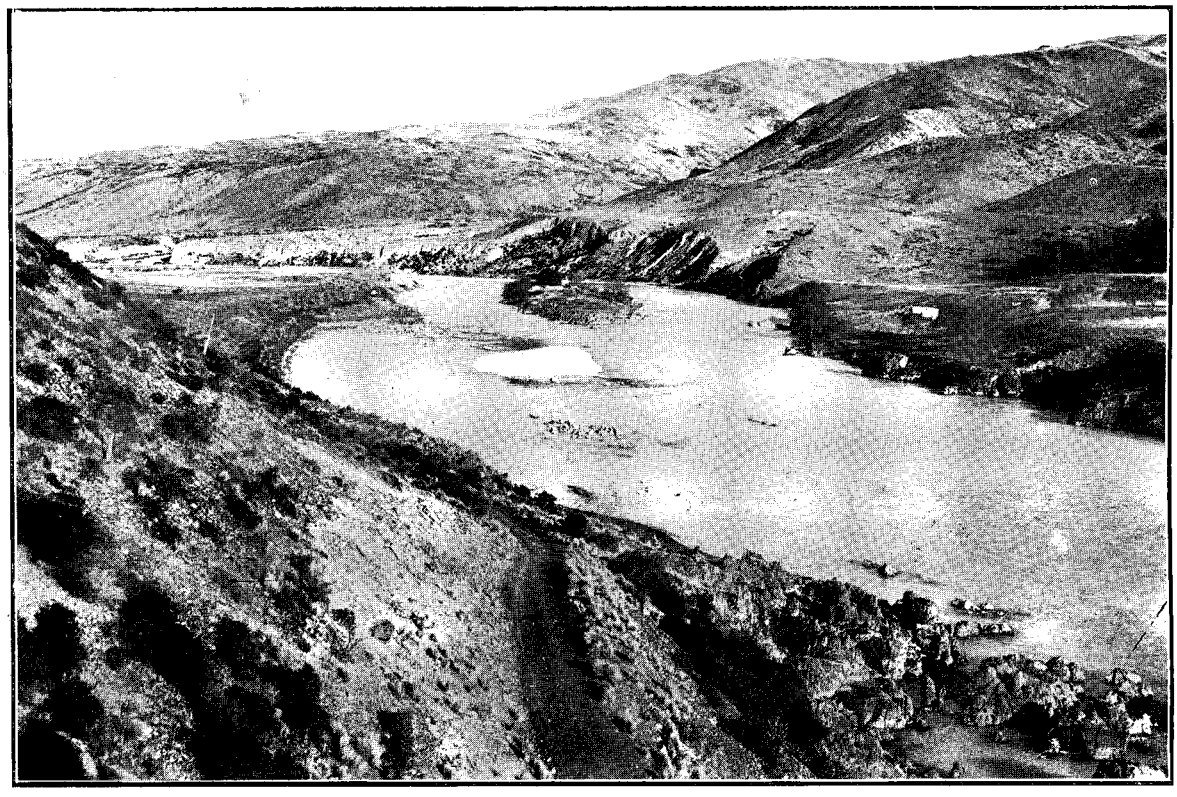
PIPE-LINE EXCAVATION FROM POWER-HOUSE.

WAIKAREMOANA HYDRO-ELECTRIC SCHEME.



TESTING FLASH-OVER CLEARANCES ON INSULATOR STRINGS.

KHANDALLAH SUBSTATION TEST-ROOM.



WAITAKI RIVER: ONE OF SUGGESTED DAM SITES.

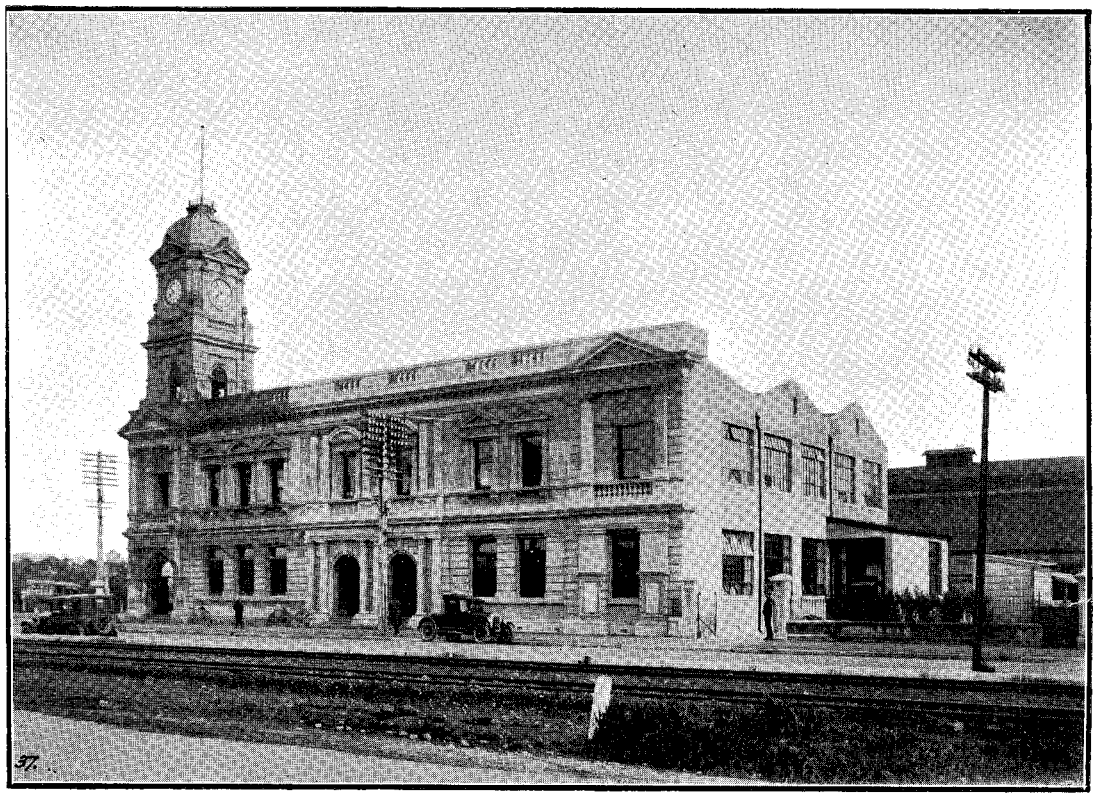
WAITAKI HYDRO-ELECTRIC SCHEME.



Bronze Entrance Gates, Parliament Buildings.



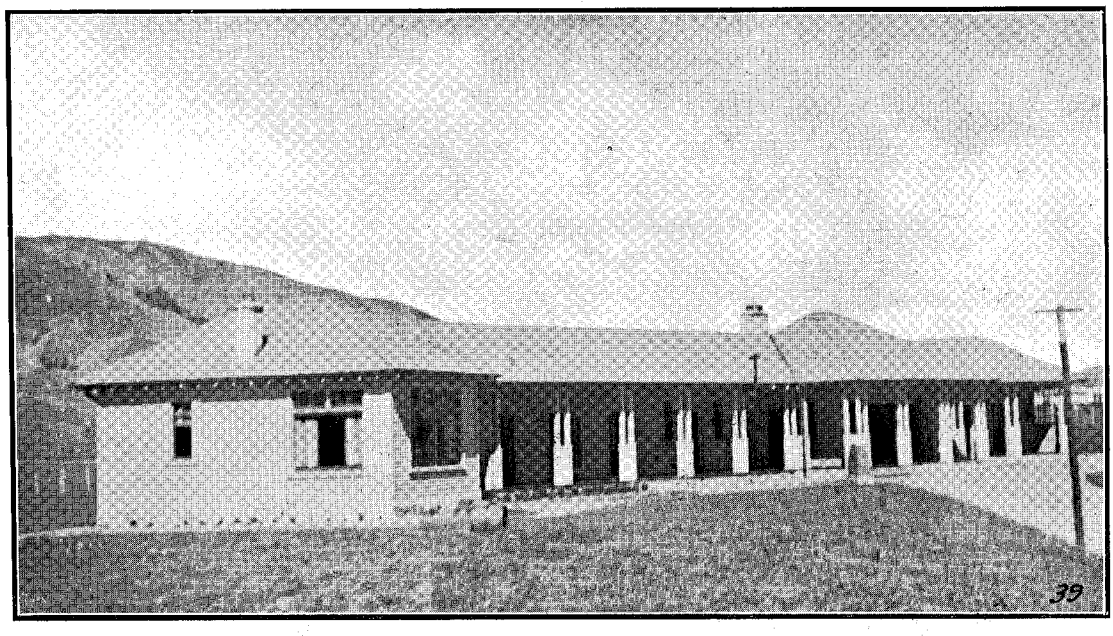
MARTON POST-OFFICE.



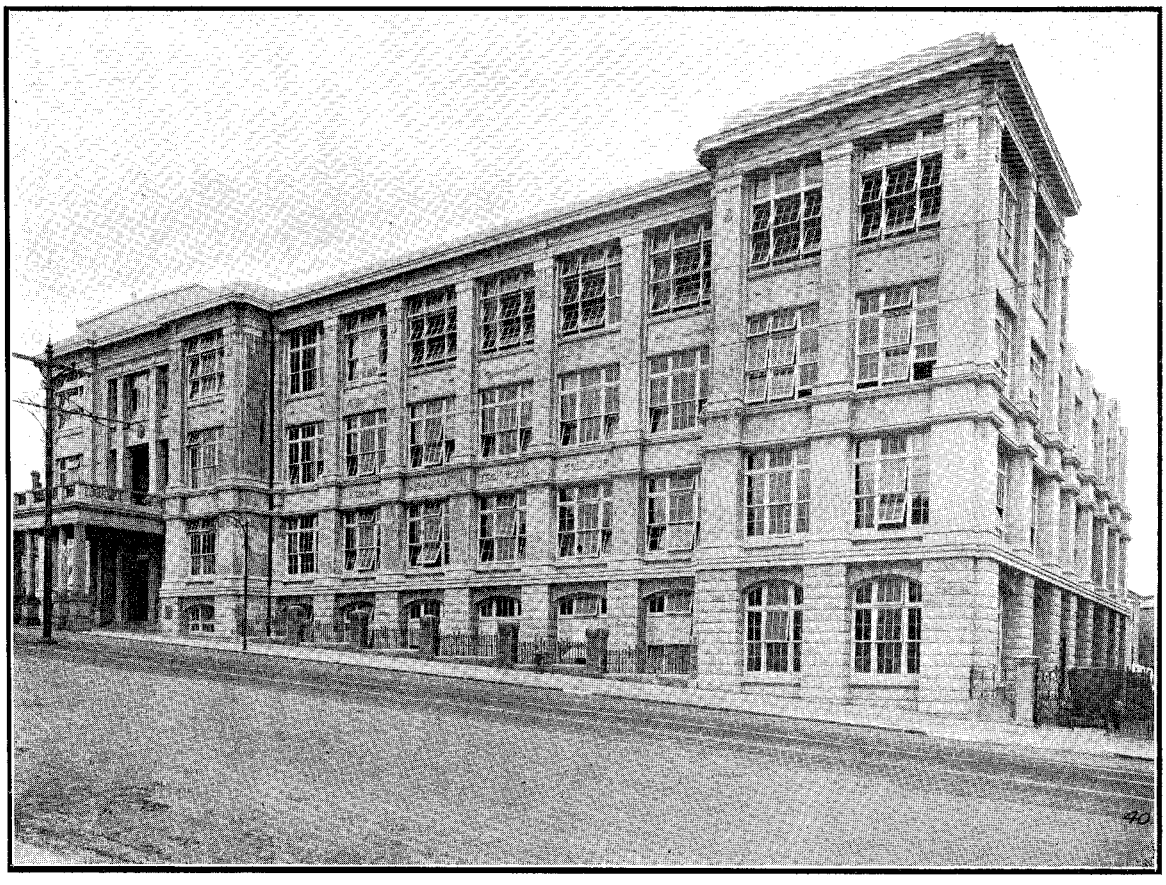
PALMERSTON NORTH POST-OFFICE ADDITIONS.



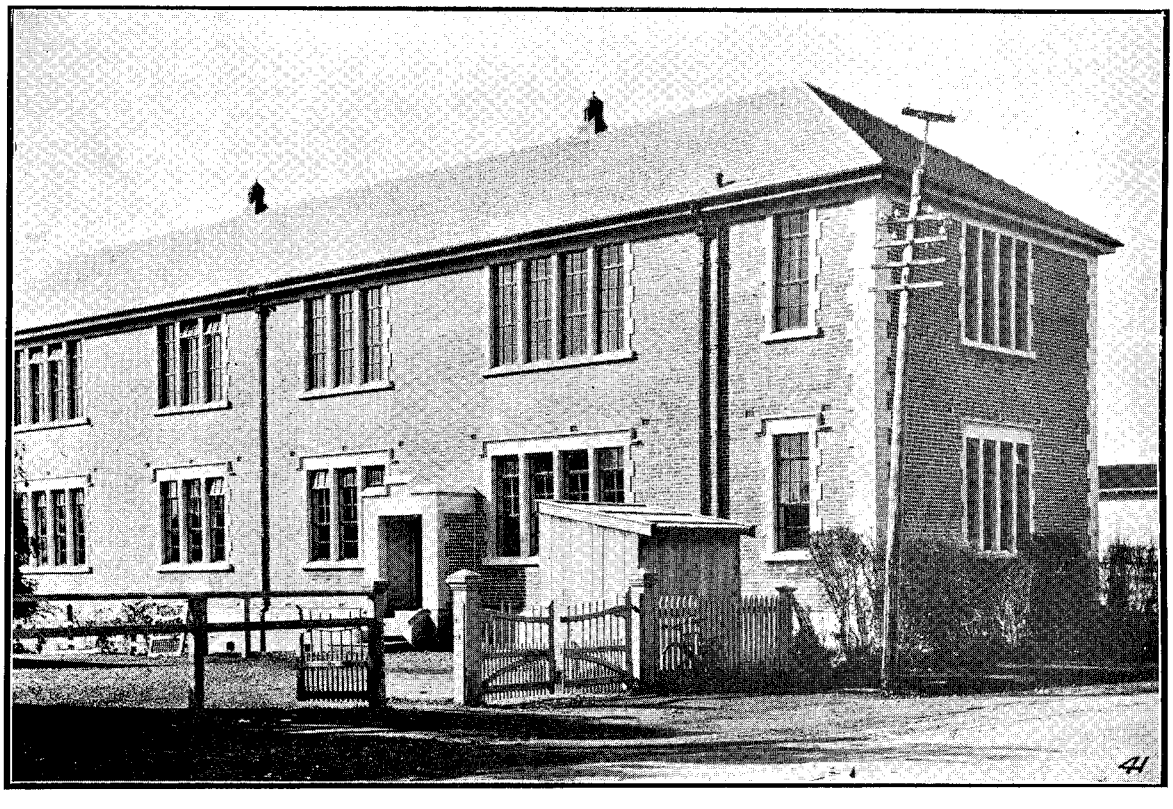
HAWKE'S BAY FALLEN SOLDIERS' MEMORIAL HOSPITAL, HASTINGS.



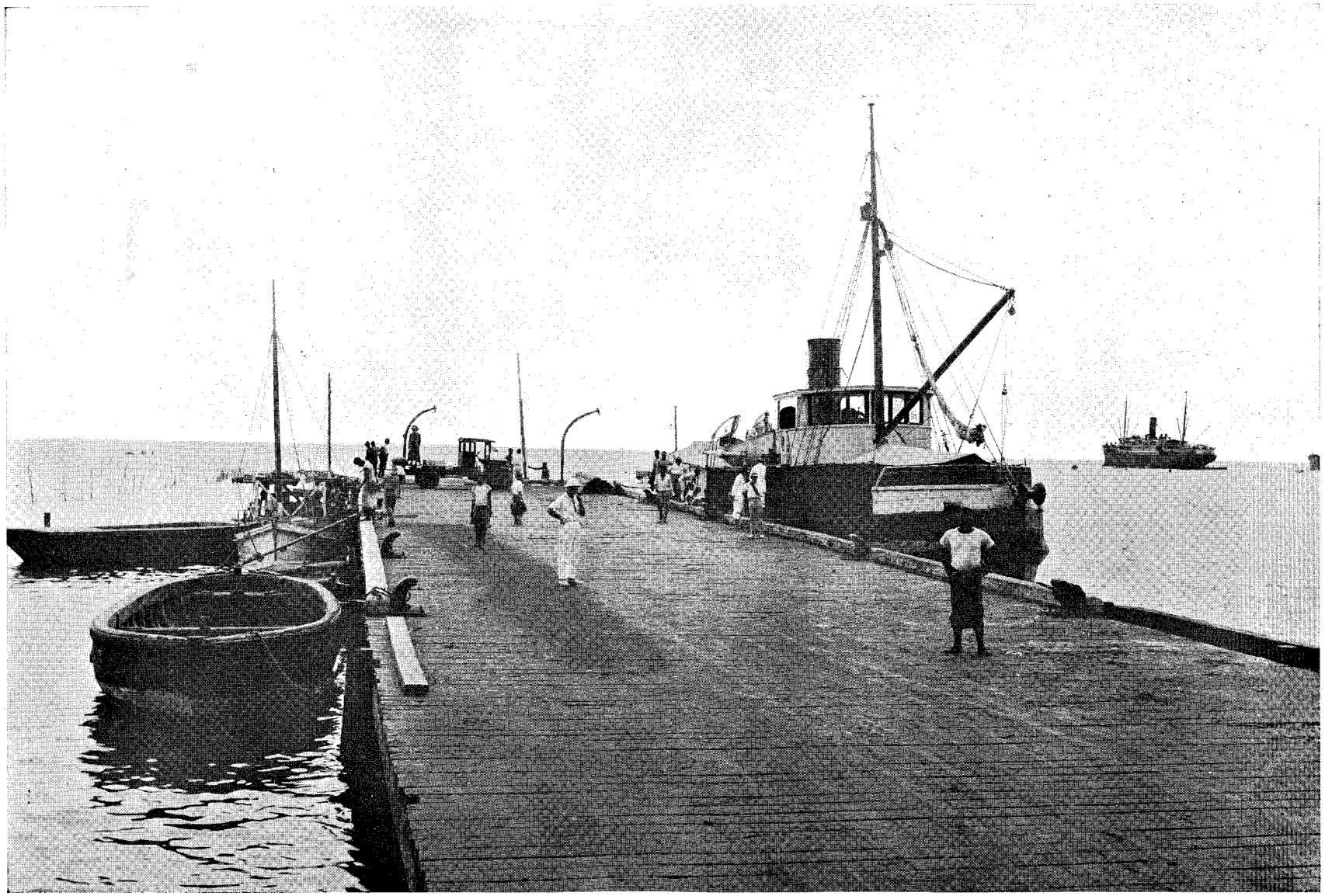
PORIRUA MENTAL HOSPITAL: NEW NEUROPATHIC UNIT.



SEDDON MEMORIAL TECHNICAL COLLEGE, AUCKLAND: ADDITIONAL STORY.



NEW MARLBOROUGH HIGH SCHOOL, BLENHEIM.



NEW WHARF AT APIA, SHOWING "LADY ROBERTS" ALONGSIDE FOR FIRST TIME.

PUBLIC WORKS STATEMENT, 1927.

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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, 1927, AND THE LIABILITIES ON THAT DATE.

Number of Table containing Details.	Works.	Total Net Expenditure to 31st March, 1926.	Expenditure during Twelve Months ended 31st March, 1927.	Recoveries on Account of Services of Previous Years.	Total Net Expenditure to 31st March, 1927.	Liabilities on 31st March, 1927.	Total Net Expenditure and Liabilities.	Works.
		£	£	£	£	£	£	
3	Railways*	48,431,119	1,480,807	95,647	49,816,279	122,980	50,017,008	Railways.*
..	Roads†	15,684,081	578,128	981	16,261,228	74,969	16,336,197	Roads.†
..	Development of mining	832,975	..	..	832,975	..	832,975	Development of mining.
..	Telegraphs	8,108,366	558,042	..	8,666,408	211,700	8,878,108	Telegraphs.
..	Public buildings	9,604,988	326,039	10,740	9,920,287	20,880	9,941,167	Public buildings.
..	Lighthouses, harbour-works, and harbour-defences	1,206,692	19,021	204	1,225,509	861	1,226,370	Lighthouses, harbour-works, and harbour-defences.
..	Departmental	2,293,023	115,866	35,948	2,372,941	2,198	2,375,135	Departmental.
18 of 1878	Coal-exploration and mine-development	10,835	..	..	10,835	..	10,835	Coal-exploration and mine-development.
11 of 1877	Aiding works on Thames goldfields ..	50,000	..	..	50,000	..	50,000	Aiding works on Thames goldfields.
..	Immigration	2,932,490	184,918	..	3,117,408	20,238	3,137,646	Immigration.
..	Purchase of Native lands	2,061,739	..	535	2,061,204	..	2,061,204	Purchase of Native lands.
..	Defence	1,208,132	34,014	751	1,241,395	..	1,241,395	Defence.
..	Charges and expenses of raising loans ..	2,340,952	155,373	..	2,496,325	..	2,496,325	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	392,628	31,981	..	424,609	992	425,601	Tourist and health resorts.
..	Lands improvement‡	300,151	56,267	135	356,283	1,585	357,868	Lands improvement.‡
..	Payment to Midland Railway bondholders	150,000	..	..	150,000	..	150,000	Payment to Midland Railway bondholders.
..	Irrigation and water-supply§ ..	677,408	56,937	..	734,345	3,478	737,823	Irrigation and water-supply.§
..	Plant, material, and stores	384,632	*Cr.* 24,148	1,992	358,492	2,610	361,102	Plant, material, and stores.
..	Quarries (acquisition and operation) ..	14,166	6,302	..	20,468	1,053	21,521	Quarries (acquisition and operation).
..	Timber-supply and sawmills for Public Works Department	4,174	8,512	..	12,686	1,367	14,053	Timber-supply and sawmills for Public Works Department.
..	Motor Transport Services	33,635	..	..	33,635	..	33,635	Motor Transport Services.
..	Transfer to Main Highways Account, Construction Fund	226,000	400,000	..	626,000	..	626,000	Transfer to Main Highways Account, Construction Fund.
	Totals	97,249,958	3,988,059	146,933	101,091,084	464,911	101,555,995	Totals.

* Exclusive of expenditure on Hutt Railway and Road Improvement and Railways Improvement Accounts. † Includes £4,500 expended under section 16 (1) Native Land Amendment and Native Land Claims Adjustment Act, 1923. ‡ £6,727 previously expended on irrigation under this item, now transferred to Irrigation and Water-supply. § Includes £115,000 previously expended under Irrigation and Water-supply Account, 1911–12 to 1915–16 and part 1917–18, now included in Public Works Fund; also £6,727 previously expended on irrigation under Lands Improvement, now transferred to Irrigation and Water-supply.

TABLE No. 2.

GENERAL SUMMARY.

Showing Net Yearly Expenditure out of Public Works Fund, 1905–1906 to 1926–27.

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

Description of Services.	Total Net Expenditure to 31st March, 1905.	Expenditure.										
		1905–6.	1906–7.	1907–8.	1908–9.	1909–10.	1910–11.	1911–12.	1912–13.	1913–14.	1914–15.	1915–16.
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	2,154,474	8,753	14,353	9,132	15,075	17,003	9,441	11,681	14,694	33,914	33,219	10,010 *Cr. 10*
Public Works, Departmental	519,938	13,517	16,710	18,219	24,512	41,176	42,733	49,864	57,426	66,650	100,719	111,489
Irrigation and Water-supply	..	..	..	..	..	..	1,562	2,794	14,689	40,329	32,090	29,874
Railways	20,870,313	1,021,265	1,227,880	1,093,535	1,116,183	1,128,400	1,104,071 *Cr. 652*	1,125,905 *Cr. 6,987*	1,148,832 *Cr. 29,528*	1,104,897 *Cr. 5,485*	2,146,753† *Cr. 6,022*	1,065,171 *Cr. 4,633*
Payment to Midland Railway Bondholders	150,000	..	..	..	..	..	..	..	..	..	..	..
Roads:—												
Miscellaneous Roads and Bridges	5,863,251	306,065	308,500	285,248	422,174	297,932	229,537	383,511	337,584	353,836 *Cr. 515*	484,365	400,062
Roads on Goldfields	658,848	45,139	38,970	38,494	47,375	40,830	25,626	41,067	36,761	24,143	30,065	24,432
Development of Thermal Springs and Natural Scenery ..	16,023	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account*	300,930	..	..	..	..	..	..	..	..	..	..	..
Total, Roads	6,839,052	351,204	347,470	323,742	469,549	338,762	255,163	424,578	374,345	377,464	514,430	424,494
Development of Mining	748,428	18,533	11,064	8,633	32,859	18,597 *Cr. 1,000*	10,845 *Cr. 1,000*	21,244 *Cr. 30*	10,644 *Cr. 1,015*	4,889	2,384 *Cr. 255*	6,602
Purchase of Native Lands	1,518,666	13,777	9,135	2,190	2,099	30,567	2,976 *Cr. 2,286*	*Cr. 2,466*	*Cr. 917*	*Cr. 857*	*Cr. 1,060*	*Cr. 972*
Native Lands Purchase Account	491,980	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	2,010,646	13,777	9,135	2,190	2,099	30,567	690	*Cr. 2,466*	*Cr. 917*	*Cr. 857*	*Cr. 1,060*	*Cr. 972*
Telegraph Extension	1,132,991	77,186	114,068	155,491	163,032	123,423	111,867	147,692	251,375	392,648	288,395	249,554
Public Buildings:—												
General (including Miscellaneous)	285,452	2,231	14,216	16,260	39,635	41,964	44,044	34,721	44,719	43,199	52,239	22,050
Parliamentary	62,252	71	1,047	4,119	5,172	3,157	237	2,004	18,806	23,612	31,478	17,133
Judicial { Courthouses	511,140	6,509	9,580	5,788	14,473	11,119	5,759	14,556	20,097	9,423	5,171	4,902
Judicial { Prisons		1,537	3,146	4,164	5,008	4,231	7,506	9,760	6,911	4,928	14,515	17,786
Judicial { Police-stations		7,853	22,466	18,986	17,730	16,256	9,030	19,817	18,423	14,094	19,122	25,484

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

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

[*Continued on page 4.*

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1905–1906 to 1926–27—*continued.*

Description of Services.	Total Net Expenditure to 31st March, 1905.	Expenditure.										
		1905-6.	1906-7.	1907-8.	1908-9.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.
Public Buildings—*continued.*	£	£	£	£	£	£	£	£	£	£	£	£
Post and Telegraph	402,298	38,419	43,918	43,724	62,262	68,574	117,815	130,815	122,999	78,815	60,838	35,258
Customs	38,335	7,903	414	47	2,507	233	..	..	..	..	..	..
Quarantine Stations	6,865	..	..	..	..	..	..	..	..	..	..	..
Mental Hospitals	517,523	16,235	8,049	7,987	15,296	19,839	12,707	8,809	46,181	26,001	53,996	54,898
												Cr. 15
Public Health	10,580	7,926	1,765	7,497	4,402	319	..	..	376	..	..	..
Health and Hospital Institutions	64,719	4,786	10,259	15,576	11,153	7,259	1,484	12,745	8,750	1,435	998	1,426
School Buildings	1,275,567	69,223	109,459	100,197	102,340	98,103	124,926	90,535	105,000	121,954	122,940	97,972
Agricultural	11,493	2,618	2,707	1,690	5,543	6,103	1,160	3,684	6,475	4,398	2,428	2,972
											Cr. 34	
Workers' Dwellings	..	..	..	..	..	..	..	22,644	46,455	41,741	68,275	55,893
Total, Public Buildings	3,186,224	165,311	227,026	226,035	285,521	277,157	324,668	350,090	445,192	369,600	431,966	335,759
Lighthouses, Harbour-works, and Harbour-defences :—												
Lighthouses..	161,893	962	..	1,417	7,481	6,762	1,470	5,428	9,031	5,174	3,887	1,415
Harbour-works	327,609	2,684	2,963	2,867	4,439	4,548	4,092	6,004	7,415	3,346	12,563	9,355
										Cr. 1,462		
Harbour-defences	518,705	1,300	1,541	2,579	7,297	5,372	2,865	1,144	339	539	681	2,903
										Cr. 300		
Total, Lighthouses, &c.	1,008,207	4,946	4,504	6,863	19,217	16,682	8,427	12,576	16,785	7,297	17,131	13,673
Rates on Native Lands	66,565	548	695	837	27	..	..	..	..	..	..	..
Contingent Defence	819,151	35,569	14,874	18,574	10,766	4,977	6,071	10,437	23,790	30,186	15,221	37,619
Tourist and Health Resorts	55,360	15,888	42,271	45,048	24,286	14,507	5,912	13,361	12,906	14,989	8,232	5,167
											Cr. 12	*Cr. 500*
Lands Improvement*	8,357	1,052	5,605	9,561	19,542	6,910	11,125	20,394	22,550	10,269	13,810	5,936
									Cr. 383	*Cr. 432*	*Cr. 522*	
Charges and Expenses of raising Loans	1,249,068	236	*Cr. 5,175*	*Cr. 8,487*	575	17,715	66,367	67,470	72,950	105,449	35,495	5,037
						Cr. 12,000	*Cr. 66,392*	*Cr. 66,954*	*Cr. 71,681*	*Cr. 96,741*	*Cr. 34,865*	*Cr. 5,030*
Interest and Sinking Funds	218,500	..	..	..	..	..	..	..	..	..	..	..
Coal-exploration and Mine-development	10,835	..	..	..	..	..	..	..	..	..	..	..
Thermal Springs	14,600	..	..	..	..	..	..	..	..	..	..	..
Plant, Material, and Stores	..	..	..	..	..	..	..	..	..	..	..	74,418
Total Ways and Means Credits	..	..	*5,175*	*8,487*	..	..	..	*10,530*	*103,524*	*105,792*	*43,400*	*11,160*
Grand Total—Net Expenditure	41,062,709	1,730,686	2,035,144	1,909,688	2,183,245	2,022,876	1,891,918	2,190,731	3,362,654	2,455,066	2,597,109	2,363,658

* 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, 1905–1906 to 1926–27—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1927.
	1916–17.	1917–18.	1918–19.	1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	6,533	3,856	*Cr. 12,018*	*Cr. 62,561*	*Cr. 7,806*	247,528	90,611 *Cr. 140*	92,600 *Cr. 1,267*	136,353 *Cr. 16*	107,521 *Cr. 443*	184,918	3,117,408
Public Works, Departmental	131,701	127,962 *Cr. 2,662*	115,419 *Cr. 4,119*	121,677	143,280 *Cr. 6,281*	128,002 *Cr. 525*	111,367 *Cr.* 131	110,445 *Cr. 69*	127,556 *Cr. 19*	126,596 *Cr. 129*	115,866 *Cr. 35,948*	2,372,941
Irrigation and Water-supply*	20,794	11,650	13,665	34,115	55,344	82,713	58,131	95,467	127,995	56,227 *Cr. 31*	56,937	734,345
Railways	620,947 *Cr. 4,845*	495,771 *Cr. 110*	387,923 *Cr. 4,924*	748,649 *Cr.105,196*	1,365,466 *Cr. 388*	3,133,200 *Cr. 751*	2,110,859 *Cr. 3,171*	1,776,413 *Cr. 1,167*	1,878,729 *Cr.37,924*	1,988,614 *Cr. 16,875*	1,480,807 *Cr. 95,647*	49,816,279
Payment to Midland Railway Bondholders	..	..	..	..	..	..	..	..	..	..	..	150,000
Roads :—												
Miscellaneous Roads and Bridges	203,746	128,730 *Cr. 600*	221,887 *Cr. 997*	376,097 *Cr. 603*	527,854 *Cr. 81*	552,895 *Cr. 197*	643,156 *Cr. 244*	751,370 *Cr. 188*	603,968 *Cr. 231*	564,694 *Cr. 4,810*	575,898 *Cr. 981*	..
Roads on Goldfields	17,099	6,912	4,186	12,465	11,050	11,264	4,850	2,867	2,755	3,934	2,230	..
Development of Thermal Springs and Natural Scenery	..	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account	..	..	..	..	..	..	..	..	..	..	..	..
Total, Roads	220,845	135,042	225,076	387,959	538,823	563,962	647,762	754,049	606,492	563,818	577,147	16,261,228
Development of Mining	4,592	27 *Cr. 6,545*	518 *Cr. 1,000*	1,173 *Cr. 7,008*	2,153 *Cr. 1,606*	2,130 *Cr. 51*	*Cr. 98* *Cr. 1,785*	1,363 *Cr. 2,310*	..	..	..	882,975
Purchase of Native Lands	*Cr. 868*	*Cr. 57*	..	*Cr. 57*	*Cr. 57*	*Cr. 52*	..	..	..	..	*Cr. 535*	..
Native Lands Purchase Account	..	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	*Cr. 868*	*Cr. 57*	..	*Cr. 57*	*Cr. 57*	*Cr. 52*	..	..	..	..	*Cr. 535*	2,061,204
Telegraph Extension	203,311	213,955	198,611	249,379	336,468	590,981	512,657 *Cr. 11,082*	717,409	957,294	931,661	558,042	8,666,408
Public Buildings :—												
General (including Miscellaneous)	12,648	11,646 *Cr. 15,067*	43,168	64,207	39,504	87,057	113,553	8,160	30,791 *Cr. 35*	29,369 *Cr. 345*	119,864 *Cr. 429*	..
Parliamentary	22,586	37,233	..	..	..	..	..	..	..	..	..	..
Judicial — Courthouses	299	21	..	868	1,400	4,358	2,018 *Cr. 13*	2,448	5,363 *Cr. 19*	7,209	1,261 *Cr. 13*	..
Judicial — Prisons	15,685	13,195	16,299	20,981	30,038 *Cr. 800*	41,740	23,313	26,484 *Cr. 2,568*	25,279 *Cr. 86*	24,196	22,812 *Cr. 908*	..
Judicial — Police-stations	21,147	18,814	6,157	24,944	36,843	22,544	6,298	12,838	18,553	16,594 *Cr. 102*	7,411 *Cr. 13*	..

* £6,727 previously included under Lands Improvement, now transferred to Irrigation and Water-supply.

[*Continued on page 6.*

TABLE No. 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing NET YEARLY EXPENDITURE out of PUBLIC WORKS FUND, 1904–1905 to 1926–27—*continued.*

Description of Services.	Expenditure. 1916–17.	1917–18.	1918–19.	1919–20.	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total Net Expenditure to 31st March, 1927.
	£	£	£	£	£	£	£	£	£	£	£	£
Public Buildings—*continued.*												
Post and Telegraph	22,744	33,525	26,072	66,543	93,364	112,906	77,211	108,395	65,917	89,865	86,052	..
					Cr. 560	*Cr. 675*	*Cr. 69*		*Cr. 210*	*Cr. 453*	*Cr. 1,114*	
Customs	..	..	..	..	..	..	..	..	..	..	..	
Quarantine Stations	..	..	..	35,490	15,529	4,581	154	171	284	..	..	..
Mental Hospitals	44,602	26,502	14,640	18,277	27,368	41,838	13,852	26,541	68,438	77,835	68,635	
										Cr. 283		
Public Health	..	..	..	..	..	..	..	..	..	..	..	..
Health and Hospital Institutions	7,570	4,080	2,332	8,484	4,099	26,131	20,981	7,420	27,951	31,177	15,840	..
							Cr. 1,399			*Cr. 300*		
School Buildings	70,367	63,082	115,656	195,500	244,722	2,469	..	..	..	..	..	..
						Cr. 9,255	*Cr. 367*	*Cr. 1,090*	*Cr. 905*	*Cr. 1,050*	*Cr. 7,953*	
Agricultural	3,046	5,685	4,229	7,227	9,345	1,115	514	282	3,242	7,932	4,164	..
							Cr. 27	*Cr. 171*	*Cr. 686*	*Cr. 865*	*Cr. 310*	
Workers' Dwellings	35,437	15,505	7,293	26,674	..	..	..	..	..	..	..	..
Total, Public Buildings	256,131	214,221	235,846	469,195	500,851	334,809	255,818	188,910	243,877	280,780	315,299	9,920,287
Lighthouses, Harbour-works, and Harbour-defences :—												
Lighthouses	449	561	1,663	253	758	16,350	3,260	4,473	2,850	5,690	5,758	..
										Cr. 750		
Harbour-works	2,280	2,359	3,729	3,245	4,080	2,424	6,524	6,334	423	3,717	13,263	..
										Cr. 131	*Cr. 204*	
Harbour-defences	1,038	56	..	..	..	..	..	..	..	..	..	..
							Cr. 1,235	*Cr. 16*				
Total, Lighthouses, &c.	3,767	2,976	5,392	3,498	4,838	18,774	8,549	10,791	3,273	8,526	18,817	1,225,509
Rates on Native Lands	..	..	..	..	..	..	..	..	..	..	..	68,672
Contingent Defence	9,742	6,714	8,809	10,187	8,701	15,586	1,702	4,931	27,133	89,670	34,014	1,241,395
			Cr. 922				*Cr. 463*	*Cr. 280*	*Cr. 580*	*Cr. 33*	*Cr. 751*	
Tourist and Health Resorts	1,094	931	1,620	6,194	19,041	17,996	5,435	27,264	12,343	43,486	31,981	424,609
						Cr. 110			*Cr. 81*			
Lands Improvement*	*Cr. 2,731*	1,838	*Cr. 4,268*	2,964	2,064	17,478	26,204	18,182	34,172	70,493	56,267	356,283
										Cr. 19	*Cr. 135*	
Charges and Expenses of raising Loans	35	1	..	..	184	174,280	62,399	311,905	241,930	297,180	155,373	2,496,325
Interest and Sinking Funds	..	..	..	..	..	..	..	..	..	..	..	218,500
Coal-exploration and Mine-development	..	..	..	..	..	..	..	..	..	..	..	10,835
Thermal Springs	..	..	..	..	..	..	..	..	..	..	..	14,600
Plant, Material, and Stores	9,778	6,811	20,638	47,682	169,910	106,432	*Cr. 19,708*	*Cr. 52,788*	..	34,471	*Cr. 24,148*	358,492
			Cr. 31						*Cr. 12,230*	*Cr. 751*	*Cr. 1,992*	
Quarries (acquisition and operation)	..	..	..	..	..	..	..	..	1,815	12,351	6,302	20,468
Timber-supply and Sawmills for Public Works Department	..	..	..	..	..	16,369	14,725	3,613	*Cr. 20,537*	*Cr. 9,892*	8,512	12,686
										Cr. 104		
Motor Transport Service	..	..	..	..	..	..	22,679	962	5,000	4,994	..	33,635
Transfer to Main Highways Account :—												
Construction Fund	..	..	..	..	..	..	..	..	226,000	..	400,000	626,000
Total Ways and Means Credits	*5,713*	*43,492*	*11,993*	*112,864*	*19,627*	*11,616*	*20,127*	*61,914*	*73,559*	*27,474*	*146,933*	..
Grand Total—Net Expenditure	1,502,588	1,237,422	1,207,482	2,020,714	3,121,131	3,449,351	3,892,320	4,056,423	4,632,134	4,615,585	3,988,059	101,091,084

* Expenditure on Irrigation and Water-supply—1905–6, £22; 1906–7, £750; 1907–8, £1,554; 1908–9, £1,966; 1909–10, £2,435, now transferred to Irrigation and Water-supply.

TABLE No 3.

Expenditure on Railways to 31st March, 1927.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1926.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1926-27: New Works.		Expenditure under Special Acts during Year 1926-27.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1927.	Valuation of Works constructed by Provinces and Midland Railway Company.
			Construction and Surveys.	Works on Open Lines.				
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Kaihu Valley	179,117 17 0	50 0 0	..	..	..	..	179,067 17 0	..
Opua Wharf to Whangarei and Onerahi	608,291 17 7	..	..	*Cr.* 750 0 0	16 10 8	..	607,558 8 3	..
Otiria to Ngapuhi	125,987 0 0	..	..	..	..	..	125,987 0 0	..
Whangarei Branch (Kioreroa to Waiotira)	417,356 12 7	1 0 0	1,400 6 5	..	..	..	418,755 19 0	..
North Auckland Main Trunk—								
Ngapuhi Northwards	296,209 16 5	..	93,153 9 11	..	..	..	389,363 6 4	..
Helensville Northwards	2,636,185 19 11	186 17 5	168,242 10 5	6,642 7 10	28,748 15 11	..	2,839,632 16 8	..
North Auckland Main Trunk to Dargaville	10,601 10 5	..	1,021 9 10	..	..	..	11,623 0 3	..
Helensville to Te Awamutu	3,591,698 1 3	5 0 0	..	30,048 15 9	417,878 2 6	..	4,039,619 19 6	..
Waiuku Branch (Paerata to Waiuku)	207,735 9 10	..	..	..	..	..	207,735 9 10	..
Huntly to Awaroa	182,708 7 11	..	..	42 15 9	..	..	182,751 3 8	..
Waikokowai Branch	3,442 0 0	..	..	..	..	..	3,442 0 0	..
Waipa Gravel Access Branch	114 0 0	..	..	..	..	..	114 0 0	..
Frankton to Thames	498,757 3 4	75 0 0	..	2,186 16 7	*Cr.* 13,372 13 7	..	487,496 6 4	..
Cambridge Branch (Ruakura Junction to Cambridge)	58,819 17 7	..	..	..	484 5 6	..	59,304 3 1	..
Morrinsville to Rotorua	421,747 10 4	..	..	..	237 12 1	..	421,985 2 5	..
Marton to Te Awamutu	2,969,971 3 3	..	..	34,121 16 4	8,917 9 8	..	3,013,010 9 3	..
Raetihi Branch	88,619 17 1	..	..	..	85 11 1	..	88,705 8 2	..
Paeroa to Pokeno	4,654 7 9	..	15,342 8 8	..	..	..	19,996 16 5	..
Paeroa to Waihi and Tauranga	838,171 3 10	104 9 10	208,268 10 11	..	*Cr.* 12 18 3	..	1,046,322 6 8	..
Tauranga to Taneatua, including Te Maunga to Maunganui Branch	1,336,420 19 6	..	70,660 6 6	..	..	..	1,407,081 6 0	..
Gisborne to Motu	623,357 14 9	..	..	..	21 12 5	..	623,379 7 2	..
Gisborne to Ormond Tramway	4,975 1 7	..	..	..	..	..	4,975 1 7	..
Napier to Gisborne—								
Gisborne Southwards	287,713 15 0	14 11 4	*Cr.* 2,064 18 10	..	..	..	285,634 4 10	..
Wairoa Northwards	20,896 12 0	..	4,032 13 7	..	..	..	24,929 5 7	..
Napier Northwards	756,102 13 11	..	217,179 0 5	..	..	..	973,281 14 4	..
Waikokopu Branch	557,023 16 4	..	16,291 19 1	..	..	..	573,315 15 5	..
Wellington to Napier—								
Napier to Woodville and Palmerston North	994,439 4 1	17 10 0	..	47,888 13 10	1,584 18 1	..	1,043,895 6 0	..
Wellington to Woodville, including Te Aro Extension	1,955,325 19 6	550 0 0	..	14,150 18 0	199,706 9 10	..	2,168,633 7 4	..
Featherston to Martinborough	399 0 0	..	..	..	..	..	399 0 0	..
Wellington to Waitara—								
Wellington to Longburn	1,259,482 11 10	..	..	18,670 0 6	110,698 6 9	..	1,388,850 19 1	..
Foxton to Waitara and Moturoa	1,723,600 17 11	..	..	54,949 19 6	15,200 14 3	..	1,793,751 11 8	..
Mount Egmont Branch	70,686 1 6	..	..	..	..	..	70,686 1 6	..
Moturoa to Opunake	759 0 0	..	..	..	..	..	759 0 0	..
Opunake Branch (Te Roti to Opunake)	418,762 16 7	144 15 5	29,002 3 8	..	..	..	447,620 4 10	..
Manaia Branch (Kapuni to Manaia)	19,648 6 0	..	*Cr.* 10,000 0 0	..	..	..	9,648 6 0	..
Rangitikei River Quarry Line	206 0 0	..	..	..	..	..	206 0 0	..

* Railways Improvement Authorization Act 1914 Account.

TABLE No. 3—*continued.*

Expenditure on Railways to 31st March, 1927—*continued.*

Lines of Railway.	Total Expenditure by General Government to 31st March, 1926.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1926-27: New Works.		Expenditure under Special Acts during Year 1926-27.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1927.	Valuation of Works constructed by Provinces and Midland Railway Company.
			Construction and Surveys.	Works on Open Lines.				
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Stratford to Okahukura (East End)	586,447 14 6	..	56,945 8 0	..	..	..	643,393 2 6	..
Stratford to Okahukura (West End)	852,723 14 10	11,914 0 4	99,203 16 1	..	..	..	940,013 10 7	..
Nelson to Greymouth—								
Nelson to Inangahua	487,821 12 6	1,960 0 0	23,918 4 6	..	985 5 2	..	510,765 2 2	78,307 0 0
Stillwater to Inangahua	226,997 11 3	..	..	351 14 8	148 14 5	..	227,498 0 4	279,685 0 0
Ngahere to Blackball	147,532 0 0	..	..	..	15 5 10	..	147,547 5 10	..
Westport to Ngakawau	193,883 5 9	..	..	..	..	..	193,883 5 9	..
Westport to Inangahua	198,048 6 6	..	10,690 17 9	2 15 6	8 17 8	..	208,750 17 5	..
Greymouth to Rewanui	255,646 0 0	..	..	..	87 4 8	..	255,733 4 8	..
Point Elizabeth Branch	74,096 18 11	40 0 0	108 4 2	..	..	..	74,165 3 1	..
Greymouth to Ross and Mikonui	355,853 5 3	..	..	446 9 11	206 3 9	..	356,505 18 11	..
Picton to Waipara—								
Picton Southwards	656,026 16 1	128 16 3	4 12 9	..	189 17 0	..	656,092 9 7	..
Waipara Northwards	378,740 6 5	..	1,792 14 2	..	..	..	380,533 0 7	..
Christchurch to Greymouth—								
Rolleston to Bealey	1,002,513 6 7	..	285 4 7	505 18 1	173 2 0	..	1,003,477 11 3	61,579 0 0
Whitecliffs Branch	25,021 0 0	..	..	..	..	..	25,021 0 0	..
Greymouth to Bealey	2,047,114 12 1	2,536 5 0	*Cr.* 906 18 0	2,724 5 7	4,364 18 4	..	2,050,760 13 0	263,889 0 0
Hurunui to Waitaki—								
Main Line (Waiau to Waitaki)	2,163,594 9 9	..	..	*Cr.* 646 18 3	111,398 16 10	..	2,274,346 8 4	316,135 0 0
Oxford Branch (Rangiora to Oxford West)	53,072 8 2	..	..	..	..	..	53,072 8 2	..
Eyreton Branch (Kaiapoi to Bennett's)	44,277 0 0	..	..	..	..	..	44,277 0 0	..
Lyttelton Branch	80,908 0 0	..	..	4,176 1 5	6,400 14 7	..	91,484 16 0	340,500 0 0
Southbridge Branch (Hornby to Southbridge)	91,441 0 0	..	..	..	..	..	91,441 0 0	..
Little River Branch (Lincoln to Little River)	110,846 11 9	..	..	132 17 6	*Cr.* 132 17 6	..	110,846 11 9	..
Rakaia to Methven	77,233 19 4	..	..	..	..	..	77,233 19 4	..
Ashburton to Springburn	64,025 11 3	..	..	..	..	..	64,025 11 3	..
Orari to Geraldine	321 0 0	..	..	..	..	..	321 0 0	..
Fairlie Branch (Washdyke Junction to Fairlie)	69,359 3 8	..	..	474 14 3	360 9 2	..	70,194 7 1	75,124 0 0
Waimate Branch	80,718 17 0	166 12 2	213 8 0	..	..	..	80,765 12 10	..
Canterbury Interior Main Line—								
Oxford to Malvern	54,248 0 0	..	..	..	..	..	54,248 0 0	..
Whitecliffs to Rakaia	542 0 0	..	..	..	..	..	542 0 0	..
Temuka to Rangitata	5,152 0 0	..	..	..	..	..	5,152 0 0	..
Waitaki to Bluff—								
Main Line, including Port Chalmers Branch	3,411,332 6 2	..	..	8,806 16 0	87,083 14 11	..	3,507,222 17 1	82,259 0 0
Duntroon Branch (Pukeuri to Kurow)	97,465 0 0	..	..	..	218 6 11	..	97,683 6 11	37,500 0 0
Ngapara Branch (Waiareka Junction to Ngapara)	26,090 0 0	..	..	..	..	..	26,090 0 0	58,009 0 0

* Railways Improvement Authorization Act 1914 Account.

TABLE No. 3—*continued.*

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1927—*continued.*

Lines of Railway.	Total Expenditure by General Government to 31st March, 1926.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1926-27: New Works.		Expenditure under Special Acts during Year 1926-27.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1927.	Valuation of Works constructed by Provinces and Midland Railway Company.
			Construction and Surveys.	Works on Open Lines.				
Waitaki to Bluff—*continued.*	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Livingstone Branch (Windsor to Tokarahi)	82,785 0 0	..	..	800 0 0	..	..	83,585 0 0	..
Waihemo Branch (Palmerston to Dunback)	33,191 0 0	..	..	324 18 3	..	..	33,515 18 3	..
Fernhill Railway	1,415 0 0	..	..	..	..	..	1,415 0 0	..
Brighton Road Branch	6,474 0 0	..	..	..	..	..	6,474 0 0	12,829 0 0
Outram Branch (Mosgiel to Outram)	11,951 0 0	..	..	..	100 0 7	..	12,051 0 7	29,691 0 0
Lawrence Branch	612,547 16 2	..	67,605 19 11	73 4 4	..	..	680,227 0 5	..
Balclutha to Tuapeka Mouth	2,489 0 0	..	..	..	..	..	2,489 0 0	..
Catlin's River Branch (Balclutha to Tahakopa)	463,158 13 6	..	4 0 0	..	..	..	463,162 13 6	..
Heriotbu.n Branch (Waipahi to Edievale)	124,808 4 5	..	..	..	..	..	124,808 4 5	..
Waikaka Branch (McNab to Waikaka)	68,423 0 0	..	..	..	..	..	68,423 0 0	..
Gore to Lumsden	112,143 0 0	..	..	..	..	..	112,143 0 0	..
Edendale to Glenham	53,328 0 0	..	..	..	..	..	53,328 0 0	..
Riversdale to Switzers	82,304 0 0	..	..	..	..	..	82,304 0 0	..
Seaward Bush to Catlin's (Appleby to Tokanui)	185,360 0 0	..	*Cr.* 4 0 0	..	..	..	185,356 0 0	..
Otago Central (Wingatui to Cromwell)	1,436,626 2 8	..	1,139 15 6	..	775 9 7	..	1,438,541 7 9	..
Invercargill to Kingston—								
Main Line	366,118 19 4	..	..	..	834 10 4	..	366,953 9 8	91,937 0 0
Mararoa Branch (Lumsden to Mossburn)	27,508 4 4	..	..	..	..	..	27,508 4 4	..
Winton to Heddon Bush	140 0 0	..	..	..	..	..	140 0 0	..
Makarewa to Orepuki and Waiau	356,947 3 11	3 10 0	615 12 2	..	364 8 1	..	357,923 14 2	37,097 0 0
Thornbury to Wairio	90,489 13 8	..	..	557 14 6	..	..	91,047 8 2	23,200 0 0
Forest Hill (Winton to Hedgehope)	23,337 0 0	..	..	..	..	..	23,337 0 0	..
Expenses of Railway Commissions and other Expenditure not chargeable to Individual Lines	10,337 0 0	..	..	..	..	..	10,337 0 0	..
Surveys of New Lines—								
North Island	39,688 9 3	..	648 13 2	..	..	..	40,337 2 5	..
Middle Island	5,763 0 0	..	..	..	..	..	5,763 0 0	..
Rolling-stock	10,124,091 2 2	..	..	92,960 16 10	*Cr.* 32,246 19 2	..	10,184,804 19 10	..
General	3,698 6 4	..	..	..	3,876 14 11	..	7,575 1 3	..
Suspense Account, being proportion of cost of raising loans for Railways Authorization Improvement Act 1914 Account	..	..	..	..	15,380 6 11	..	15,380 6 11	..
Stock of Permanent-way Materials, 31st March, 1926 £ 22,457 18 8	22,457 18 8	..	..	..	..	..	..	..
	51,436,664 18 9							
Stock of Permanent-way decreased by £ 11,728 4 2	11,728 4 2	..	..	..	..	..	..	..
Stock of Permanent-way Materials, 31st March, 1927 £10,729 14 6	..	..	..	..	..	..	10,729 14 6	..
Total	51,424,936 14 7	17,898 7 9	1,074,795 13 4	319,643 12 8	970,788 1 11	..	53,772,265 14 9	1,787,741 0 0†

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

TABLE No. 4.

EXPENDITURE OUT OF SEPARATE ACCOUNTS ON WORKS UNDER THE CONTROL OF THE PUBLIC WORKS DEPARTMENT.

Year.	Loans to Local Bodies Account. Roads to open up Crown Lands.	Opening up Crown Lands for Settlement Account. Roads to open up Crown Lands.	Land for Settlements Account. Opening up Crown Lands for Settlement Account. Roads to open up Crown Lands.	National Endowment Account. Roads to open up National-endowment Lands.	Land for Settlements Account. Roads to open up Land for Settlements.	Waihou and Ohinemuri Rivers Improvement Account. Waihou and Ohinemuri Rivers Improvement.
	£	£	£	£	£	£
1890-91	25,000					
1891-92	64,000					
1892-93	800					
	89,800*					
1891-92	8,000†					
1892-93	29,833†					
1893-94	30,000†					
1894-95	6,114†					
1894-95	42,971‡					
1895-96	30,057‡					
1896-97	31,017					
1897-98	18,770					
1898-99	16,972					
1899-1900	31,363					
1900-1	37,390					
1901-2	31,979					
1902-3	18,578					
1903-4	25,753					
1904-5	28,895					
1905-6	38,801					
1906-7	47,371					
1907-8	38,524					
1908-9	54,713					
1909-10	40,507	..	..	4,975	..	..
	607,608§					
1910-11	..	45,691	..	5,619	..	..
1911-12	..	49,739	..	6,554	..	3,769
1912-13	..	47,951	..	2,689	..	9,555
1913-14	..	63,245	..	4,282	..	9,633
1914-15	..	..	92,975	9,151	..	10,004
1915-16	..	..	47,974	13,344	..	9,225
1916-17	..	..	24,730	6,787	..	10,407
1917-18	..	..	..	..	43,996	12,025
1918-19	..	..	..	..	51,355	27,402
1919-20	..	..	..	..	61,692	34,806
1920-21	..	..	..	..	28,920	62,249
1921-22	..	..	..	..	51,471	54,379
1922-23	..	..	..	..	78,350	66,708
1923-24	..	..	..	..	49,186	70,533
1924-25	..	..	..	..	23,144	53,887
1925-26	..	..	..	..	17,181	47,908
1926-27	..	..	..	..	12,714	65,855
	697,408	206,626	165,679	53,401	418,009	548,345

* Payment to the Public Works Fund under section 31 of the Government Loans to Local Bodies Act, 1886, in reduction of expenditure under Class "Roads."
† Paid into the Public Works Fund, reducing the expenditure under Class "Roads."
‡ Paid into the Lands Improvement Account (now included in Public Works Fund under Class "Roads"), reducing the expenditure on roads.
§ Expenditure under the Government Loans to Local Bodies Act Amendment Act, 1891.

TABLE No. 5.

EXPENDITURE ON PUBLIC BUILDINGS OUT OF PUBLIC WORKS FUND TO THE 31ST MARCH, 1927, AND THE LIABILITIES ON THAT DATE.

—	Total Expenditure to 31st March, 1926.	Expenditure for Year ended 31st March, 1927.	Total Expenditure to 31st March, 1927.	Liabilities on Authorities, Contracts, &c., 31st March, 1927.	Tota Expenditure and Liabilities.
	£	£	£	£	£
Judicial*	1,329,409	30,549	1,359,958	3,790	1,363,748
Postal and telegraph	1,915,309	84,938	2,000,247	8,492	2,008,739
Customs	49,441	..	49,441	..	49,441
Offices for public Departments	643,624	119,235	762,859	1,400	764,259
Mental hospitals	1,147,114	68,635	1,215,749	3,669	1,219,418
Alexandra Depot, Wellington†	8,084	..	8,084	..	8,084
School buildings	3,097,346	*Cr.* 7,953	3,089,393	..	3,089,393
Hospitals‡	312,589	15,840	328,429	3,434	331,863
Quarantine-stations	62,464	..	62,464	..	62,464
Parliament Buildings (old buildings) ..	76,553	..	76,553	..	76,553
Parliament Buildings (new buildings) ..	393,389	201	393,590	..	393,590
Parliament Buildings (alterations to streets surrounding grounds, and purchase of land)	14,187	..	14,187	..	14,187
Government House, Wellington (land and new building)	72,645	..	72,645	..	72,645
Agricultural	92,105	3,854	95,959	97	96,056
Workers' dwellings	319,916	..	319,916	..	319,916
Miscellaneous	70,813	..	70,813	..	70,813
Totals	9,604,988	315,299	9,920,287	20,882	9,941,169

* Includes Courthouses, prisons, and police-stations. † Expenditure *re* Defence requirements only. Other expenditure included in "Judicial" class. ‡ Includes £32,754 previously shown under "Public Health."

TABLE No. 6.

ELECTRIC SUPPLY ACCOUNT.

STATEMENT OF ACCOUNTS AT THE 31st MARCH, 1927.

GENERAL BALANCE-SHEET AT 31ST MARCH, 1927, COMPARED WITH POSITION AT 31ST MARCH, 1926.

1925–26.	*Liabilities.*	1926–27.		1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
	Aid to Water-power Works and Electric Supply Accounts—			1,464,931 0 8	Lake Coleridge scheme—		
	Debentures issued—			..	Assets as per separate balance-sheet ..	1,608,880 17 10	
189,000 0 0	At 4 per cent. interest	274,000 0 0			Investments, Sinking Fund	9,192 14 2	
310,000 0 0	At 4½ per cent. interest	225,000 0 0					1,618,073 12 0
108,450 0 0	At 5½ per cent. interest	108,450 0 0			Lake Waikaremoana scheme—		
51,650 0 0	At 5 per cent. interest	50,550 0 0		81,702 13 2	Assets as per separate balance-sheet ..	191,664 15 7	
	N.Z. inscribed stock—			10,682 18 9	Profit and Loss Account—Loss to date ..	15,050 4 7	
804,460 0 0	At 5 per cent. interest (due 1930) ..	805,560 0 0					206,715 0 2
195,550 0 0	At 5½ per cent. (due 1936)	293,550 0 0		92,385 11 11			
	N.Z. Consolidated Stock—						
542,004 10 10	At 4½ per cent. (due 1945)	542,004 10 10			Waikato River schemes—		
510,991 13 4	At 5 per cent. (due 1935–46)	1,652,640 11 2			Horahora—		
1,884,642 6 3	At 6 per cent. interest (due 1936–51) ..	1,884,642 6 3		767,637 2 3	Assets as per separate balance-sheet ..	883,938 15 7	
			5,836,397 8 3	17,596 11 3	Investments, Sinking Fund	30,067 1 9	
4,596,748 10 5				785,233 13 6			914,005 17 4
	Waihi Gold-mining Company (Limited)—				Arapuni—		
	Purchase of Horahora works—Deed of			553,019 14 11	Assets as per separate balance-sheet ..	..	1,216,032 5 4
212,500 0 0	security at 5 per cent. interest ..	..	212,500 0 0				
	Consolidated Fund—			2,111,908 4 2	Mangahao scheme—		
	Interest accrued on loans to 31st March,			67,290 12 9	Assets as per separate balance-sheet ..	2,325,264 7 6	
45,978 3 0	1926	60,640 7 3			Profit and Loss Account—Loss to date ..	124,193 2 1	
100 18 0	Sundry creditors for interest unclaimed ..	324 11 3		2,179,198 16 11			2,449,457 9 7
			60,964 18 6				
46,079 1 0					Other schemes, surveys, &c.—		
				6,045 10 8	North Island	6,044 17 5	
				5,129 6 11	South Island	11,965 10 11	
	Amount set aside as reserve to cover difference between interest payable on loans raised and interest earned from their			4,613 9 1	General surveys and investigations ..	4,622 19 10	
						22,633 8 2	
31,250 0 5	temporary investment pending use ..	..	30,261 11 2	578 4 10	Material on hand .. £374 9 7		
				212 11 1	Sundry debtors 229 4 7		
						603 14 2	
				16,579 2 7			23,237 2 4
4,886,577 11 10	Carried forward	..	6,140,123 17 11	5,091,348 0 6	Carried forward	..	6,427,521 6 9

TABLE No. 6—*continued.*

GENERAL BALANCE-SHEET AT 31ST MARCH, 1927, AS COMPARED WITH POSITION AT 31ST MARCH, 1926—*continued.*

1925–26.	*Liabilities.*	1926–27.		1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
4,886,577 11 10	Brought forward	..	6,140,123 17 11	5,091,348 0 6	Brought forward	..	6,427,521 6 9
	Sundry Creditors—				Charges and expenses of raising loans not		
44,895 3 10	Arapuni scheme	106,206 11 10		43,148 0 2	distributed to schemes	..	875 15 0
4,614 9 9	Horahora scheme	7,048 16 9			Balance in Electric Supply Account at the		
34,915 18 2	Lake Coleridge scheme	13,258 9 7			end of the year—		
15,290 3 4	Mangahao scheme	28,023 17 3		2,350 6 8	Cash in Public Account	44,866 5 8	
291 8 8	Waikaremoana scheme	14,686 3 5			In hands of Government officers in New		
163 13 3	South Island surveys	577 2 9		2,145 7 0	Zealand	2 0 0	
	Amount due to Public Works Fund, Public				In hands of Government officers in		
	Works Departmental, for Head Office			43,616 0 9	London	79,322 4 9	
26,240 0 0	salaries, &c.	..					124,190 10 5
			169,801 1 7	48,111 14 5			
126,410 17 0							
	Depreciation Reserves—						
46,443 18 4	Horahora scheme	63,782 3 2			Investment Account (funds invested until		
111,526 8 0	Lake Coleridge scheme	142,594 2 0		90,000 0 0	actually required for use) ..	..	150,000 0 0
30,056 0 0	Mangahao scheme	64,255 5 0					
4,431 0 0	Waikaremoana scheme	6,326 1 0					
			276,957 11 2				
192,457 6 4							
	Sinking Funds—			1,196 7 5	Interest accrued on investments to 31st		
28,938 11 3	Horahora scheme	38,515 1 9			March, 1926	5,573 18 1	
8,906 15 11	Lake Coleridge scheme	35,442 19 5		40 17 10	Sundry debtors for interest due but unpaid	421 7 0	
			73,958 1 2	1,237 5 3			5,995 5 1
37,845 7 2							
	Reserve Fund—						
30,553 18 0	Horahora scheme	..	47,669 10 0				
	Writings-off in Suspense—						
..	Lake Coleridge scheme	..	72 15 5				
5,273,845 0 4	Total	..	£6,708,582 17 3	£5,273,845 0 4	Total	..	£6,708,582 17 3

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

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

TABLE No. 6—*continued.*

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY.

Profit and Loss Account for Year ended 31st March, 1927, compared with Year ended 31st March, 1926.

Gross Revenue Account.

1925–26.		1926–27.		1925–26.		1926–27.	
£ s. d.	To Generating expenses, headworks, and power-house—	£ s. d.	£ s. d.	£ s. d.	By Sale of energy—	£ s. d.	£ s. d.
2,894 4 5	Salaries	2,886 4 6		120,749 1 6	Wholesale	147,794 6 6	
725 12 5	Wages	1,116 9 3		263 9 7	Retail	269 4 8	
58 6 5	Supplies	104 5 3		121,012 11 1			148,063 11 2
580 1 0	Transport of stores, &c...	422 10 7					
	Maintenance and repairs—						
1,354 0 0	Harper diversion	2,488 16 5		0 3 10	Discounts forfeited	..	..
297 4 5	Headworks	267 6 10					
205 16 8	Power-house building..	582 8 11					
515 15 3	Power-house machinery	1,822 8 3			Rents—		
232 19 8	Roads and fences	641 15 6		1,054 19 11	Land and buildings	1,058 18 3	
447 18 3	Staff residences, &c.	640 6 5		221 4 8	Electric lines	210 3 0	
			10,972 11 11	471 12 11	Electric plant	465 13 7	
7,311 18 6							1,734 14 10
				1,747 17 6			
	Transmission-lines—						
555 0 0	Salaries	540 0 0					
	Transport, including upkeep of horses,						
560 16 1	traps, cars, and cycles	567 6 2			Fees for testing and repairing electrical ap-		
2,992 3 9	Repairs to power-lines	3,130 9 2		445 5 3	pliances	..	317 3 5
			4,237 15 4				
4,107 19 10							
	Substation, Addington—				Stand-by provision: Fees from wholesale		
1,258 6 8	Salaries	1,323 12 6		80 0 0	consumers	..	..
521 8 2	Wages	543 0 9					
58 16 11	Supplies	121 12 4					
	Maintenance and repairs—						
238 18 3	Buildings and yards	458 6 8			Interest from local bodies in respect of		
227 11 1	Machinery	311 17 7		7 9 4	reticulations sold on deferred payment ..	7 9 4	
			2,758 9 10	61 6 11	Earnings, motor-vehicles	116 15 1	
2,305 1 1							124 4 5
	Distribution—						
212 10 0	Salaries	212 10 0					
	Transport, including upkeep of motor-						
99 8 4	vehicles	91 9 5					
	Maintenance of feeder cables, transformer						
2,649 17 0	stations, and tools	3,138 11 9					
2,553 17 7	Maintenance of secondary distribution ..	2,017 19 1					
250 15 7	Maintenance of and testing meters ..	213 18 4					
109 12 7	Earth-testing	97 15 2					
			5,772 3 9				
5,876 1 1							
19,601 0 6	Carried forward	..	23,741 0 10	123,354 13 11	Carried forward	..	150,239 13 10

TABLE No. 6—*continued.*

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

Profit and Loss Account for Year ended 31st March, 1927, compared with Year ended 31st March, 1926—*continued.*

Gross Revenue Account—continued.

1925–26.		1926–27.		1925–26.		1926–27.
£ s. d.	——	£ s. d.	£ s. d.	£ s. d.	——	£ s. d.
19,601 0 6	Brought forward	..	23,741 0 10	123,354 13 11	Brought forward	150,239 13 10
	To Stand-by provision—					
1,350 0 0	Payment to Christchurch Tramway Board for rental	..				
226 12 11	Payment to Christchurch Tramway Board for energy supplied	1,483 9 5				
1,576 12 11			1,483 9 5			
	Management and general expenses—					
2,241 0 7	Salaries	2,522 11 2				
267 6 11	Sick and holiday pay to workmen ..	301 12 4				
103 11 10	Travelling-expenses	142 17 8				
379 0 0	Office-rent	379 0 0				
65 10 0	Rent of other buildings	65 10 0				
132 16 3	Postages and telegrams	95 13 3				
136 8 8	Telephone subscriptions	153 13 9				
95 14 1	Printing and stationery	65 3 10				
17 1 3	Advertising	14 2 6				
13 1 7	Accident pay	59 9 2				
107 6 3	Fire insurance	125 3 0				
139 13 4	Audit fees	163 2 6				
208 14 8	Meter-reading and line-inspection ..	218 3 1				
2 4 3	Commission on collection of accounts ..	..				
328 10 9	Electrical testing	212 4 3				
4 14 7	Miscellaneous trade expenses	9 13 6				
909 18 4	Misappropriation by clerk	..				
..	Duplication works opening ceremony ..	90 15 5				
..	Bad debts suspense account	72 15 5				
705 0 0	Proportion of salaries, rents, and expenses, Head Office and High Commissioner's Staff	812 0 0				
5,857 13 4			5,503 10 10			
			30,728 1 1			
27,035 6 9						
96,319 7 2	Balance to Net Revenue Account ..	..	119,511 12 9			
£123,354 13 11			£150,239 13 10	£123,354 13 11		£150,239 13 10

Net Revenue Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
19,350 0 0	To Depreciation at 2 per cent. per annum on completed work..	28,167 17 2	96,319 7 2	By Balance from Gross Revenue Account	119,511 12 9
50,323 12 5	Interest for year ended 31st March	65,093 10 4			
26,645 14 9	Balance to Profit and Loss Appropriation Account ..	26,250 5 3			
£96,319 7 2		£119,511 12 9	£96,319 7 2		£119,511 12 9

TABLE No. 6—*continued.*

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

Profit and Loss Appropriation Account.

1925–26.	——	1926–27.	1925–26.	——	1926–27.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
17,738 18 10	To Balance from previous year's statement	..	26,645 14 9	By Balance from Net Revenue Account	26,250 5 3
8,906 15 11	Sinking Fund Account	26,250 5 3			
£26,645 14 9		£26,250 5 3	£26,645 14 9		£26,250 5 3

Depreciation Reserve Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
..	To Amounts written off—				
	Motor-vehicles and tools	1,561 3 2	88,631 3 0	By Balance from previous year's statement..	111,526 8 0
111,526 8 0	Balance	142,594 2 0	3,545 5 0	Interest at 4 per cent. per annum	4,461 0 0
			19,350 0 0	Amount set aside as per Net Revenue Account	28,167 17 2
£111,526 8 0		£144,155 5 2	£111,526 8 0		£144,155 5 2

Sinking Fund Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
8,906 15 11	To Balance	35,442 19 5	8,906 15 11	By Balance at close of previous year	8,906 15 11
			..	Amount set aside as per Profit and Loss Appropriation Account	26,250 5 3
			..	Interest	285 18 3
£8,906 15 11		£35,442 19 5	£8,906 15 11		£35,442 19 5

TABLE No 6—*continued.*

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

BALANCE-SHEET AT 31ST MARCH, 1927.

1925–26.	*Liabilities.*	1926–27.		1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
111,526 8 0	Depreciation Reserve Account	..	142,594 2 0	4,601 19 2	Works at Lake Coleridge—		
				10,064 17 5	Land, including fencing and planting ..	4,661 7 8	
				7,566 3 8	Coalgate Gorge Road	10,946 6 4	
				310 8 5	Service roads	7,566 3 8	
8,906 15 11	Sinking Fund	..	35,442 19 5		Service telephones	310 8 5	23,484 6 1
				22,543 8 8			
	Sundry creditors—						
5,471 18 6	On open accounts	10,224 13 9			Headworks—		
29,133 8 2	On contracts	2,717 0 7			First tunnel, including inlet and outlet		
310 11 6	For current paid in advance	316 15 3		80,586 0 8	works	80,728 2 10	
			13,258 9 7		Second tunnel, including inlet and outlet		
34,915 18 2				202,987 17 5	works	237,698 8 2	
				121,582 14 1	Pipe-lines	121,514 8 9	
				4,186 14 5	Tram-lines	3,970 7 10	
..	Writings off in suspense	..	72 15 5	3,473 19 5	Weir at lake out-let, gauges, and fencing ..	3,473 19 5	
				23,007 6 9	Harper River diversion works	23,007 6 9	
	Balance carried to general balance-sheet—						470,392 13 9
1,464,931 0 8	Total assets as *per contra*	1,618,073 12 0		435,824 12 9			
155,349 2 1	*Less* total liabilities as above	191,368 6 5			Power-house—		
			1,426,705 5 7	52,680 9 4	Buildings, &c.	53,522 12 5	
1,309,581 18 7				129,451 9 9	Machinery, &c.	151,073 9 0	
				231 2 1	Office furniture, fittings, &c.	231 2 1	
							204,827 3 6
				182,363 1 2			
					Accommodation for staff and workmen—		
				24,400 16 0	Buildings, fencing, &c.	..	24,062 18 5
					Transmission-lines—		
				4,983 14 4	Land	4,982 19 4	
				180,609 19 9	Power-lines to Christchurch	178,968 15 5	
				97,196 11 8	Power-lines to South Canterbury	116,253 10 11	
				10,970 14 1	Power-lines, Timaru–Oamaru	42,617 11 0	
				2,480 7 8	Telephone-system	2,480 7 8	
					Linemen's cottages, depots, tools, and		
				3,244 17 3	equipment	3,244 17 3	
				6,588 12 4	Alterations to public telegraph-lines ..	6,588 12 4	
				11,386 19 4	Point Switching Station	11,439 7 10	
							366,576 1 9
				317,461 16 5			
					Addington Substation—		
				3,483 0 5	Land, including cottages	3,643 0 5	
				8,654 19 0	Substation buildings	8,835 6 10	
				61,399 14 3	Machinery, &c.	55,732 11 10	
				5,865 14 3	Store buildings and workshops	5,865 14 3	
							74,076 13 4
				79,403 7 11			
1,464,931 0 8	Carried forward	..	1,618,073 12 0	1,061,997 2 11	Carried forward	..	1,163,419 16 10

TABLE No. 6—*continued.*

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

BALANCE-SHEET AT 31ST MARCH, 1927—*continued.*

1925–26.	*Liabilities.*	1926–27.		1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
1,464,931 0 8	Brought forward	..	1,618,073 12 0	1,061,997 2 11	Brought forward	..	1,163,419 16 10
					Primary distribution—		
				7,021 16 1	Supply cables—Christchurch City ..	7,258 16 6	
				4,889 19 10	Christchurch Tramways ..	5,171 13 2	
				7,210 15 11	Lyttelton	7,624 4 2	
				20,720 19 11	Northern	26,161 4 9	
				13,096 2 0	Southern	14,016 14 0	
				4,064 7 7	Motukarara	4,064 7 7	
				6,190 13 0	Substations—Hororata	10,101 12 6	
				12,838 1 11	Ashburton	17,930 4 0	
				14,974 13 2	Timaru	25,599 17 5	
				..	Oamaru	2,623 8 9	
				622 9 9	Lightning-arresters	622 9 9	
				300 4 5	Tools and equipment	300 4 5	
				1,516 12 8	Alterations to public telegraph-lines ..	1,516 12 8	
				93,446 16 3			122,991 9 8
					Secondary distribution—		
				15,490 5 2	Supply cables and reticulation	15,502 10 6	
				26,675 3 2	Local substations	30,253 17 3	
				42,165 8 4			45,756 7 9
				7,003 9 6	Service transformers and meters	..	6,000 11 5
				9,460 18 4	Motor-cars, lorries, and cycles, &c.	..	8,475 1 2
				108 5 4	Test room equipment	..	109 2 7
				17,846 3 11	Loose tools, plant, and equipment	..	15,147 17 9
				1,729 3 9	Public telephones to the lake	..	1,729 3 9
				173 19 1	Telephones to Christchurch City Council and Tramway Board and local offices.. ..	..	173 19 1
				255 1 0	Christchurch office—Furniture and fittings ..	..	255 1 0
				47,030 10 9	Engineering, office, and general expenses on preliminary surveys and during construction	..	53,637 12 2
				35,152 17 11	Salaries of Engineers and others on preliminary surveys and during construction	..	38,437 8 4
				..	Cost of raising loans	..	21,396 0 0
				50,580 14 4	Interest during construction	..	61,039 0 4
				1,366,950 11 5			1,538,568 11 10
				69,504 16 11	Stocks of material, &c., on hand at date ..	..	33,222 16 9
				162 13 6	Telephone subscriptions, fire insurance, &c., paid in advance	..	88 18 7
				28,312 18 10	Sundry debtors— For current, rent, work carried out, &c. ..	..	37,000 10 8
				..	Sinking Fund— Investment and cash in hands of Treasury	9,055 7 5	
				..	Interest accrued	20 13 3	
				..	Interest due and unpaid	116 13 6	
							9,192 14 2
£1,464,931 0 8			£1,618,073 12 0	£1,464,931 0 8			£1,618,073 12 0

I hereby certify that the Balance-sheet and accompanying accounts have been duly examined and compared with the relative books and documents submitted for audit, and correctly state the position as disclosed thereby.—G. F. C. CAMPBELL, Controller and Auditor-General.

TABLE No. 6—*continued.*

MANGAHAO ELECTRIC-POWER SUPPLY.

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1927, COMPARED WITH YEAR ENDED 31ST MARCH, 1926.

Gross Revenue Account.

1925–26.	——	1926–27.		1925–26.	——	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
	To Generating-expenses, headworks, and power-house—			74,783 18 2	By Sale of energy— Wholesale	118,665 15 5	
3,535 19 2	Salaries, wages, and allowances ..	3,867 16 8		1,137 8 1	Retail (staff cottages and construction works)	4,505 7 8	
190 1 2	Maintenance headworks, dams, and pipe-lines	610 13 10				123,171 3 1	
	Maintenance power-house building and			75,921 6 3	Less stand-by, &c.	22,553 12 11	
909 0 1	machinery	816 7 4					100,617 10 2
	Maintenance staff-village and roads,				Rents—		
1,136 8 7	transport and general	742 1 3		918 17 10	Cottages, &c.	1,266 4 6	
			6,036 19 1	6 9 9	Poles	8 13 0	
5,771 9 0				925 7 7			1,274 17 6
	Transmission-lines, patrol maintenance, &c.—						
2,142 5 9	Mangaore–Khandallah	3,368 19 10		9 18 0	Tests and inspections	..	4 13 8
1,025 14 1	Mangaore–Wanganui	2,700 9 4					
1,204 4 1	Bunnythorpe–Dannevirke	1,605 6 4					
1,580 11 9	Woodville–Masterton	1,700 3 3					
333 4 3	Dannevirke–Napier	1,080 6 6					
58 16 7	Miscellaneous 11,000-volt lines ..	42 0 1					
			10,497 5 4				
6,344 16 6							
	Substations — Operating, maintenance, &c.—						
2,001 6 0	Khandallah	1,941 2 0					
28 0 2	Otaki	9 1 4					
672 3 1	Bunnythorpe	431 16 4					
431 7 3	Dannevirke	240 0 6					
492 1 4	Waipukurau	248 10 2					
424 1 9	Woodville	188 12 7					
355 2 9	Mangamaire	187 6 1					
463 16 8	Masterton	195 7 2					
..	Wanganui	250 3 0					
			3,691 19 2				
4,867 19 0							
	Management and general expenses—						
2,397 1 0	Management and office salaries, &c. ..	2,744 4 2					
	Distribution salaries and expenses and						
1,654 8 8	transport	1,970 14 10					
195 12 6	Postages, telephones, &c.	275 0 1					
4,247 2 2	Carried forward	4,989 19 1	20,226 3 7	76,856 11 10	Carried forward	..	101,897 1 4

TABLE No. 6—*continued.*

MANGAHAO ELECTRIC-POWER SUPPLY—*continued.*

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1927, COMPARED WITH YEAR ENDED 31ST MARCH, 1926—*continued.*

Gross Revenue Account—continued.

1925–1926.	——	1926–27.		1925–26.	——	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
4,247 2 2	Brought forward	4,989 19 1	20,226 3 7	76,856 11 10	Brought forward	..	101,897 1 4
	To Management and general—*continued.*						
107 8 9	Printing, stationery, and advertising ..	116 7 6					
279 8 11	Motor-cars and general travelling-expenses	487 13 7					
205 13 11	Accident, sick, and holiday pay ..	453 18 9					
..	Fire insurance	12 4 2					
..	Audit fees	133 16 1					
..	Legal expenses	20 4 2					
41 8 4	Miscellaneous expenses	480 11 9					
4,881 2 1			6,694 15 1				
			26,920 18 8				
21,865 6 7							
54,991 5 3	Balance to Net Revenue Account ..	..	74,976 2 8				
£76,856 11 10			£101,897 1 4	£76,856 11 10			£101,897 1 4

Net Revenue Account.

£ s. d.		£ s. d.	£ s. d.			£ s. d.
	To Depreciation at 2 per cent. per annum on completed works		54,991 5 3	By Balance from Gross Revenue Account		74,976 2 8
30,056 0 0	at 31st March, 1927	32,997 0 0	67,290 12 9	Loss for year		56,902 9 4
92,225 18 0	Interest for year ended 31st March, 1927	98,881 12 0				
£122,281 18 0		£131,878 12 0	£122,281 18 0			£131,878 12 0

Profit and Loss Appropriation Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
..	To Balance from previous year	67,290 12 9	..	By Balance	124,193 2 1
..	Balance from Net Revenue Account	56,902 9 4			
..		£124,193 2 1	..		£124,193 2 1

TABLE No. 6—*continued.*

MANGAHAO ELECTRIC-POWER SUPPLY—*continued.*

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1927, COMPARED WITH YEAR ENDED 31ST MARCH, 1926—*continued.*

Depreciation Reserve Account.

1925–26.		1926–27.	1925–26.		1926–27.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
30,056 0 0	To Balance	64,255 5 0	30,056 0 0	By Balance at close of previous year	30,056 0 0
			..	Interest at 4 per cent. per annum	1,202 5 0
			..	Amount set aside as per Net Revenue Account	32,997 0 0
£30,056 0 0		£64,255 5 0	£30,056 0 0		£64,255 5 0

BALANCE-SHEET AS AT 31ST MARCH, 1927.

1925–26.	*Liabilities.*		1926–27.	1925–26.	*Assets.*		1926–27.
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
30,056 0 0	Depreciation Reserve	..	64,255 5 0	9,961 15 2	Headworks—		
15,208 1 1	Sundry creditors	..	28,023 17 3	69,077 1 9	Land, headworks, &c.	9,993 18 11	
	Charges paid in advance by consumers and			10,344 14 2	Roads, tram-lines, &c.	70,017 19 6	
82 2 3	others	..	..	277,509 19 1	Local electric line	11,230 16 3	
	Balance carried to General Balance-sheet—			149,071 11 7	Dams 1, 2, and 3	379,512 16 6	
2,179,198 16 11	Total assets as *per contra*	2,449,457 9 7		108,339 5 11	Tunnels 1 and 2	150,058 1 4	
45,346 3 4	Less total liabilities as above ..	92,279 2 3		14,611 16 7	Pipe-line, &c.	108,469 13 2	
			2,357,178 7 4		Surge-chamber	14,882 5 2	
2,133,852 13 7				638,916 4 3			744,165 10 10
					Power-house—		
				64,510 16 2	Buildings, &c.	63,347 4 6	
				207,213 19 0	Machinery, &c.	204,496 12 2	
				5,591 6 5	Tail-race	8,690 17 9	
				2,441 5 6	Village water-supply	2,440 0 6	
				279,757 7 1			278,974 14 11
					Accommodation for staff—Buildings, fences,		
				15,913 6 1	&c.	..	15,936 6 0
					Transmission-lines (110,000-volt)—		
				8,159 4 1	Lands, lines, and substations	8,523 17 8	
				145,466 2 3	Shannon–Khandallah	142,423 17 5	
				95,054 19 0	Shannon–Wanganui	96,724 16 1	
				45,772 16 7	Bunnythorpe–Dannevirke	45,161 6 10	
				67,819 15 7	Woodville–Masterton	68,086 10 0	
				72,315 11 2	Dannevirke–Napier	76,577 12 6	
				434,588 8 8			437,498 0 6
2,179,198 16 11	Carried forward		2,449,457 9 7	1,369,175 6 1	Carried forward	..	1,476,574 12 3

TABLE No. 6—*continued.*

MANGAHAO ELECTRIC-POWER SUPPLY—*continued.*

BALANCE-SHEET AS AT 31ST MARCH, 1927—*continued.*

1925–26.	*Liabilities.*	1926–27.		1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
2,179,198 16 11	Brought forward	..	2,449,457 9 7	1,369,175 6 1	Brought forward	..	1,476,574 12 3
					Transmission-lines (11,000-volt)—		
				3,004 5 2	Mangaore–Shannon	3,004 10 11	
				8,811 18 2	Khandallah–Petone	7,344 12 11	
				11,816 3 4			10,349 3 10
					Substations—		
				71,303 17 3	Khandallah	73,473 11 4	
				1,661 14 11	Otaki	1,666 12 8	
				26,327 14 9	Bunnythorpe	31,082 11 7	
				16,922 18 5	Wanganui	20,762 16 2	
				9,991 2 9	Dannevirke	13,520 12 2	
				18,075 14 8	Waipukurau	21,445 8 0	
				15,006 6 6	Napier	25,052 7 4	
				7,567 16 2	Woodville	12,159 17 10	
				14,055 13 5	Mangamaire	17,745 15 5	
				12,157 12 11	Masterton	12,790 7 4	
				193,070 11 9			229,699 19 10
				3,982 13 10	Motor-cars, lorries, &c...	..	4,602 13 3
				810 19 6	Office furniture	..	961 10 10
				13,366 10 10	Service buildings	..	14,641 4 7
					Salaries and expenses, &c., of engineers and others on preliminary surveys and during		
				100,611 7 4	construction	..	117,515 11 9
				75,668 0 0	Construction-tools, plant, and equipment, &c.	..	75,806 18 6
				57,392 11 2	Housing workmen, &c...	..	60,059 3 7
				196,420 13 2	Interest during construction	..	217,068 13 2
				..	Cost of raising loans	..	35,591 0 0
				2,022,314 17 0			2,242,870 11 7
					Stocks on hand, 31st March, 1926 (including		
				53,973 15 1	10 per cent. to cover administration, &c.)	45,597 3 7	
				6,937 5 5	Stocks issued but not used	15,714 4 2	
				60,911 0 6			61,311 7 9
				28,602 18 5	Sundry debtors for current rents, &c. ..	..	21,029 5 0
				79 8 3	Telephone subscriptions, &c., paid in advance	..	53 3 2
				67,290 12 9	Net loss	..	124,193 2 1
£2,179,198 16 11			£2,449,457 9 7	£2,179,198 16 11			£2,449,457 9 7

I hereby certify that the Profit and Loss Account and Balance-sheet of the above-named electric-power scheme has been duly examined and compared with the relative books and documents submitted for audit, and correctly state the position as disclosed thereby.—G. F. C. CAMPBELL, Controller and Auditor-General.

TABLE No. 6—*continued.*

WAIKATO ELECTRIC-POWER SUPPLY—HORAHORA SCHEME.

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1927, COMPARED WITH YEAR ENDED 31ST MARCH, 1926.

Gross Revenue Account.

1925–26.		1926–27.		1925–26.		1926–27.	
£ s. d.	To Generating expenses, headworks, and power-house—	£ s. d.	£ s. d.	£ s. d.	By Sales of electrical energy to wholesale consumers	£ s. d.	£ s. d.
3,448 10 1	Salaries and wages	3,222 0 4		84,070 2 4		106,421 8 10	
125 0 10	Supplies	84 5 8		101 3 0	Less discounts and rebates	205 8 11	
130 9 10	Transport	50 1 1		83,968 19 4			106,215 19 11
	Maintenance and repairs—						
610 4 6	Headworks and buildings	547 12 5					
1,047 0 4	Power-house machinery	1,280 4 7					
149 5 8	Staff village	128 16 9		43 10 8	Hire of plant	6 7 6	
			5,313 0 10	790 12 4	Rent of lines	783 0 9	
5,510 11 3				869 11 8	Miscellaneous rents	1,402 14 0	
							2,192 2 3
2,561 14 6	Power purchased in bulk	..	8,787 5 9	1,703 14 8			
	Operation and maintenance of main transmission-lines (50,000-volt)—			154 5 11	Testing, oil-drying, and repairs for consumers	264 1 0	
1,222 2 1	Horahora–Waikino	1,541 14 7					
368 7 5	Horahora–Hamilton	571 18 11		3 3 0	Fees for inspection of lines and testing of instruments, &c.	75 11 0	
116 12 3	Mystery Creek–Te Awamutu	167 2 4					
..	Te Awamutu–Hangatiki	60 2 11		157 8 11			339 12 0
26 15 3	Wairongomai–Waihou	10 16 8					
47 5 4	Horahora–Arapuni	107 15 8					
31 11 6	Arapuni–Ngongotaha	131 17 11					
..	Arapuni–Hamilton	48 5 2					
971 7 6	Hamilton–Penrose	1,144 8 5					
..	Penrose–Waitemata	21 9 7					
70 8 0	Katikati–Waikino	328 3 0					
			4,133 15 2				
2,854 9 4							
	Operation and maintenance of main sub-stations (50,000-volt)—						
693 9 0	Waikino	632 7 4					
451 10 10	Hamilton	470 13 0					
293 11 6	Te Awamutu	361 2 0					
..	Hangatiki	87 2 4					
312 7 1	Waihou	309 9 3					
19 9 11	Arapuni	27 9 1					
38 17 0	Ngongotaha	272 12 6					
28 0 3	Bombay	20 3 5					
534 7 4	Penrose	943 2 3					
..	Henderson	30 7 1					
..	Takapuna	11 13 7					
			3,166 1 10				
2,371 12 11							
13,298 8 0	Carried forward	..	21,400 3 7	85,830 2 11	Carried forward	..	108,747 14 2

TABLE No. 6—*continued.*

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

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1927, COMPARED WITH YEAR ENDED 31ST MARCH, 1926—*continued.*

Gross Revenue Account—continued.

1925-26.		1926-27.		1925-26.		1926-27.	
£ s. d.	——	£ s. d.	£ s. d.	£ s. d.	——	£ s. d.	£ s. d.
13,298 8 0	Brought forward	..	21,400 3 7	85,830 2 11	Brought forward	..	108,747 14 2
16 19 5	Operation and maintenance of distribution substations (11,000 volt)	..	31 5 1				
	Operation and maintenance of distribution lines (11,000 volt)—						
199 1 7	Horahora–Hamilton–Frankton	468 11 10					
4 5 7	Waikino–Waihi	4 17 3					
203 7 2			473 9 1				
1,598 18 5	General supervision and management of transmission distribution systems	..	1,855 4 1				
	Management and general—						
2,162 9 1	Salaries, wages, and audit fees	2,918 15 8					
177 5 8	Accident insurance, sick and holiday pay ..	216 18 3					
274 7 8	Travelling-expenses and motor-cars ..	330 5 8					
193 16 2	Postages, telegrams, and telephones ..	291 3 4					
28 3 3	Fire insurance	55 16 8					
219 5 6	Printing, stationery, and advertising ..	259 17 7					
228 8 11	Office rent, cleaning, and lighting	278 2 0					
86 0 2	Experimental testing and miscellaneous expenses	360 2 0					
38 6 3	Fire damage, Hamilton office	..					
3,408 2 8		4,711 1 2					
..	Carried forward	..	23,760 1 10	85,830 2 11	Carried forward	..	108,747 14 2

TABLE No 6—*continued.*

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

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1927, COMPARED WITH YEAR ENDED 31ST MARCH, 1926—*continued.*

Gross Revenue Account—continued.

1925–26.		1926–27.		1925–26.		1926–27.
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.
3,408 2 8	Brought forward	4,711 1 2	23,760 1 10	85,830 2 11	Brought forward	108,747 14 2
	To Management and general—*continued.*					
142 6 7	Testing, oil-drying, repairs, &c., for consumers	242 4 8				
3 12 2	Bad debts	..				
939 19 10	Losses on sales of old and surplus stocks ..	..				
4,494 1 3			4,953 5 10			
			28,713 7 8			
19,611 14 3						
66,218 8 8	Balance to Net Revenue Account ..	..	80,034 6 6			
£85,830 2 11			£108,747 14 2	£85,830 2 11		£108,747 14 2

Net Revenue Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
	To Interest on purchase-money for plant purchased from Waihi		66,218 8 8	By Balance from Gross Revenue Account	80,034 6 6
31,269 6 0	Gold-mining Company, and on advances from Treasury ..	37,989 7 6			
13,600 16 9	Depreciation on completed works (2 per cent.) and on stocks	16,481 7 0			
44,870 2 9		54,470 14 6			
21,348 5 11	Balance to Profit and Loss Appropriation Account ..	25,563 12 0			
£66,218 8 8		£80,034 6 6	£66,218 8 8		£80,034 6 6

PROFIT AND LOSS APPROPRIATION ACCOUNT FOR YEAR ENDED 31ST MARCH, 1927, COMPARED WITH YEAR ENDED 31ST MARCH, 1926.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
	Sinking Fund contributions to date, as required by section 12		21,348 5 11	By Balance from Net Revenue Account	25,563 12 0
11,342 0 0	of the State Supply of Electrical Energy Act, 1917.. ..	8,448 0 0			
10,006 5 11	Reserve Fund	17,115 12 0			
£21,348 5 11		£25,563 12 0	£21,348 5 11		£25,563 12 0

TABLE No. 6—*continued.*

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

Depreciation Reserve Account.

1925–26.		1926–27.	1925–26.		1926–27.
£ s. d.	——	£ s. d.	£ s. d.	——	£ s. d.
	To Cost of replacing—		31,680 16 7	By Balance at close of previous year	46,443 18 4
..	Horahora–Waikino Line—six towers and telephone line ..	1,059 0 2	1,267 5 0	Interest for year	1,857 15 0
..	Horahora Station Oil-store floor	46 17 0		Adjustment of amount incorrectly written off in 1925–26	
105 0 0	Amount written off for plant sold and replaced	..	..	accounts	105 0 0
46,443 18 4	Balance	63,782 3 2	13,600 16 9	Amount set aside as per Net Revenue Account	16,481 7 0
£46,548 18 4		£64,888 0 4	£46,548 18 4		£64,888 0 4

Sinking Fund Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
28,938 11 3	To Balance	38,515 1 9	16,983 5 1	By Balance at close of previous year	28,938 11 3
			11,342 0 0	Amount set aside as per Profit and Loss Appropriation Account	8,448 0 0
			613 6 2	Interest	1,128 10 6
£28,938 11 3		£38,515 1 9	£28,938 11 3		£38,515 1 9

Reserve Fund Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
30,553 18 0	To Balance	47,669 10 0	20,547 12 1	By Balance at close of previous year	30,553 18 0
			10,006 5 11	Amount set aside as per Profit and Loss Appropriation Account	17,115 12 0
£30,553 18 0		£47,669 10 0	£30,553 18 0		£47,669 10 0

TABLE No. 6—*continued.*

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

BALANCE-SHEET AT 31ST MARCH, 1927.

1925–26.	*Liabilities.*	1926–27.		1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
	Electric Supply Account—				Works, &c., at Horahora—		
674,682 16 2	Balance carried to general balance-sheet ..	756,990 5 8		2,168 5 9	Roads and bridges	2,168 5 9	
4,614 9 9	Sundry creditors	7,048 16 9		1,039 15 3	Land and fencing	1,039 15 3	
46,443 18 4	Depreciation reserve	63,782 3 2		11,461 1 0	Accommodation for staff and workmen ..	11,491 11 6	
28,938 11 3	Sinking Fund	38,515 1 9		174,518 18 8	Headworks	175,751 9 7	
30,553 18 0	Reserve Fund	47,669 10 0		74,105 13 9	Generating-station	74,123 18 0	
				40,168 4 2	Transformer building and machinery ..	40,203 2 0	
			914,005 17 4	1,632 10 2	Tools and equipment	1,632 8 11	
785,233 13 6				305,094 8 9			306,410 11 0
					Transmission-lines (50,000 volt)—		
				38,460 1 3	Horahora – Waikino	38,460 1 3	
				10,657 15 7	Waikino – Katikati	11,001 19 2	
				4,561 6 6	Wairongomai – Waihou	4,561 6 6	
				138 19 2	Waihou – Hamilton	138 19 2	
				22,332 6 7	Horahora – Hamilton	22,332 6 7	
				7,803 2 6	Mystery Creek – Te Awamutu	7,803 2 6	
				11,962 9 9	Te Awamutu – Hangatiki	12,079 4 4	
				4,865 12 4	Horahora – Arapuni	4,875 8 7	
				18,931 6 1	Arapuni – Ngongotaha	18,895 19 3	
				148 15 9	Arapuni – Te Kuiti	148 15 9	
				..	Arapuni – Hamilton	34,765 7 2	
				99,354 7 1	Hamilton – Penrose	99,591 11 8	
				..	Penrose – Takapuna	44,979 11 0	
				1,479 3 1	Linemen's cottages	1,495 6 7	
				220,695 5 8			301,128 19 6
					Main substations (50,000 volt)—		
				20,736 17 0	Waikino	21,094 10 3	
				7,893 18 11	Hamilton	8,495 12 11	
				6,362 6 4	Te Awamutu	6,691 0 4	
				8,448 15 10	Waihou	9,351 12 6	
				480 9 4	Hangatiki	5,317 19 11	
				2,289 10 2	Arapuni	2,318 3 3	
				3,684 8 1	Ngongotaha	3,627 13 7	
				2,656 5 6	Bombay	2,474 18 3	
				27,686 7 8	Penrose	29,903 3 2	
				..	Waitemata	6,156 14 5	
				..	Takapuna	5,368 11 10	
				80,238 18 10			100,800 0 5
785,233 13 6	Carried forward	..	914,005 17 4	606,028 13 3	Carried forward	..	708,339 10 11

TABLE No. 6—*continued.*

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

BALANCE-SHEET AT 31ST MARCH, 1927—*continued.*

1925–26.	*Liabilities.*	1926–27.	1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
785,233 13 6	Brought forward	914,005 17 4	606,028 13 3	Brought forward	..	708,339 10 11
				Distribution-lines (11,000 volt)—		
			33,162 10 5	Horahora–Frankton	33,162 10 5	
			704 11 11	Waihi Grand Junction Company line ..	704 11 11	
			6,000 0 0	Waikino–Waihi	6,000 0 0	
			3,076 14 9	Bombay–Pukekohe	3,323 19 7	
			42,943 17 1			43,191 1 11
			7,353 8 5	Distribution substations (11,000 volt) ..	..	7,408 3 10
				Hamilton Area—		
			3,976 3 9	Land at Ruakura	3,997 14 6	
			7,648 15 1	Stores buildings and fittings and railway-siding, Ruakura	7,679 15 1	
			4,270 5 11	Staff residences, Ruakura	4,270 5 11	
			3,217 5 7	Loose tools and equipment	3,230 17 7	
			4,434 15 0	Motor lorries, cars, and cycles	4,434 15 0	
			739 17 1	Office furniture, Hamilton	892 1 9	
			227 9 6	Office accommodation	227 9 6	
			7,524 17 2	Engineering, office, and general expenses on surveys and on construction	7,524 17 2	
			14,036 18 2	Salaries of officers on surveys and on construction	14,513 18 2	
			32,013 11 5	Interest during construction	32,013 11 5	
			..	Cost of raising loans	6,548 0 0	
			78,089 18 8			85,333 6 1
				Arapuni Area —		
			675 10 9	Electric lines and distribution	..	675 10 9
			735,091 8 2			844,947 13 6
			10,697 17 0	General stocks of material on hand	..	11,596 2 3
				Debtors—		
			21,838 8 7	For electricity and sales of material ..	27,394 19 10	
			9 8 6	For payments in advance	..	
			21,847 17 1			27,394 19 10
				Sinking Fund—		
			17,391 5 1	Investment and cash in hands of Treasury ..	29,607 5 7	
			205 6 2	Interest accrued	69 3 11	
			..	Interest due and unpaid	390 12 3	
			17,596 11 3			30,067 1 9
£785,233 13 6		£914,005 17 4	£785,233 13 6			£914,005 17 4

NOTE.—The sum of £268,107 7s. 5d., representing various assets which form part of the permanent works of the Arapuni scheme but which are in the meantime operated in production of Horahora revenue, is included in the above figures. In connection therewith, maintenance (£3,235 15s. 6d.), interest (£11,399 13s. 9d.), depreciation (£5,362), and sinking fund (£2,681) are charged against the Horahora scheme.

I hereby certify that the balance-sheet and accompanying accounts have been duly examined and compared with the relative books submitted for audit, aud correctly state the position as disclosed thereby.—G. F. C. CAMPBELL, Controller and Auditor-General.

TABLE No. 6—*continued.*

WAIKATO ELECTRIC-POWER SUPPLY.—ARAPUNI SCHEME.

BALANCE-SHEET AT 31ST MARCH, 1927.

1925–26.	*Liabilities.*	1926–27.	1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
568,124 11 1	Electric Supply Account—Balance carried to general balance-sheet	1,109,825 13 6	151 5 2	Works, &c., at Arapuni— Land and fencing	4,832 5 9	
			27,029 16 0	Roads and bridges	26,549 4 8	
44,895 3 10	Sundry creditors	106,206 11 10	5,453 2 7	Houses	5,579 13 2	
			6,180 6 9	Offices and temporary buildings ..	6,168 10 10	
			38,814 10 6			43,129 14 5
				Headworks—		
			16,678 13 3	Engineering and preliminary works ..	16,614 7 0	
			322,072 7 7	Dam and other headworks under Armstrong-Whitworth's contract ..	710,930 8 3	
			338,751 0 10			727,544 15 3
				50,000-volt lines—		
			1,268 2 4	Waikino–Bombay	29,515 9 5	
			..	Ngongotaha–Opotiki	783 19 8	
			1,594 6 0	Penrose–Takapuna	..	
			2,862 8 4			30,299 9 1
				110,000-volt lines—		
			4,999 10 11	Arapuni–Penrose (tower)	132,028 1 0	
			..	Tamaki deviation	521 16 5	
			27,531 13 6	Arapuni–Hamilton	..	
			32,531 4 5			132,549 17 5
				50,000-volt substations—		
			1,196 4 9	Bombay	8,956 18 0	
			12 15 10	Takapuna	6,254 4 4	
			13 18 3	Henderson	3,821 12 10	
			1 0 3	Huntly	30 5 10	
			..	Kerepeehi	70 11 5	
			..	Mamaku	929 19 0	
			..	Te Teko	2 13 0	
			..	Opotiki	1 8 3	
			1,223 19 1			20,067 12 8
				110,000-volt substations—		
			9 13 6	Penrose	39,524 14 11	
			5 16 9	Hamilton	438 5 11	
			15 10 3			39,963 0 10
553,019 14 11	Carried forward	1,216,032 5 4	414,198 13 5	Carried forward	..	993,554 9 8

TABLE No. 6—*continued.*

WAIKATO ELECTRIC-POWER SUPPLY.—ARAPUNI SCHEME—*continued.*

BALANCE-SHEET AT 31ST MARCH, 1927—*continued.*

1925–26.	*Liabilities.*	1926–27.	1925–26.	*Assets.*	1926–27.	
£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
553,019 14 11	Brought forward	1,216,032 5 4	414,198 13 5	Brought forward	..	993,554 9 8
				Works, &c., at Arapuni—*continued.*		
			3,949 0 5	Motor-vehicles	4,088 3 11	
			7,470 2 2	Loose tools, plant, and equipment ..	6,758 3 11	
				Engineering, office, and general expenses on preliminary survey and during construction	45,375 13 10	
			15,696 7 5			
				Supervision and office expenses on transmission-lines and substations during construction	10,503 14 5	
			8,404 2 2			
			41,159 17 7	Interest during construction	87,985 19 1	
			..	Cost of raising loans	18,420 0 0	
						173,131 15 2
			76,679 9 9			
						1,166,686 4 10
			61,263 18 6	Stocks of material on hand	..	48,364 10 2
			877 13 3	Sundry debtors	..	981 10 4
£553,019 14 11		£1,216,032 5 4	£553,019 14 11			£1,216,032 5 4

NOTE.—The sum of £268,107 7s. 5d. representing various assets which form part of the permanent works of the Arapuni Scheme but which are in the meantime operated in production of revenue by the Horahora Scheme has been transferred to the accounts of the latter scheme. In connection therewith maintenance (£3,235 15s. 6d.), interest (£1,399 13s. 9d.), depreciation (£5,362), and sinking fund (£2,681) are charged against the Horahora Scheme.

I hereby certify that the Balance-sheet and accompanying accounts have been duly examined and compared with the relative books and documents submitted for audit, and correctly state the position as disclosed thereby.—G. F. C. CAMPBELL, Controller and Auditor-General.

TABLE No. 6—*continued.*

WAIKAREMOANA ELECTRIC-POWER SUPPLY.

Profit and Loss Account for the Year ended 31st March, 1927, compared with Year ended 31st March, 1926.

1925–26.	*Dr.*	1926–27.	1925–26.	*Cr.*	1926–27.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
4,388 4 0	To Interest on capital	4,861 7 0	2,425 13 7	By Rental of plant and land leased to Wairoa Power Board	2,404 2 2
13 0 0	Departmental expenses	15 0 0	3,523 2 5	Loss for year	4,367 5 10
1,432 6 0	Depreciation on plant (2 per cent. on value of assets in operation at close of year)	1,717 16 0			
115 6 0	Interest on Depreciation Reserve (4 per cent. on £4,431)	177 5 0			
£5,948 16 0		£6,771 8 0	£5,948 16 0		£6,771 8 0
3,523 2 5	To Loss for year as above	4,367 5 10	10,682 18 9	By Accumulated loss to date, carried to balance-sheet	15,050 4 7
7,159 16 4	Loss carried forward at 1st April, 1926	10,682 18 9			
£10,682 18 9		£15,050 4 7	£10,682 18 9		£15,050 4 7

Depreciation Reserve.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
4,431 0 0	To Balance carried to balance-sheet	6,326 1 0	2,883 8 0	By Balance at close of previous year	4,431 0 0
			115 6 0	Interest	177 5 0
			1,432 6 0	Amount reserved for year	1,717 16 0
£4,431 0 0		£6,326 1 0	£4,431 0 0		£6,326 1 0

TABLE No. 6—*continued.*

WAIKAREMOANA ELECTRIC-POWER SUPPLY—*continued.*

BALANCE-SHEET AS AT 31ST MARCH, 1927.

Liabilities.	£	s.	d.
Electric Supply Account—Balance carried to general balance-sheet	185,702	15	9
Sundry creditors	14,686	3	5
Depreciation Reserve	6,326	1	0
	£206,715	0	2

Assets.	£	s.	d.	£	s.	d.
Temporary development—						
Headworks and pipe-lines	26,827	18	10			
Building and machinery	30,831	11	4			
Workshop, equipment, &c.	477	9	3			
				58,136	19	5
Main development—						
Headworks	19,860	2	3			
Main power-house	10,450	4	2			
Outdoor station	534	17	7			
Staff village	11,460	0	10			
Transmission-lines	4,167	5	1			
Substations (survey)	36	7	5			
				46,508	17	4
Management and general expenses				12,861	7	10
Workers' accommodation				13,030	3	1
Medical and first-aid appliances				54	6	0
Temporary service buildings				4,783	5	10
Main roads and bridges				17,109	13	4
Land for headworks, &c.				6,627	6	7
Telephone-line to Wairoa				1,064	10	4
Works telephone-lines				174	3	6
Temporary electric-power lines				3,326	2	1
Temporary water-supply				621	18	2
Installation of major plant				1,484	1	3
Construction plant and equipment				5,354	17	5
Office furniture and equipment				55	4	0
Holiday and accident pay				252	14	7
Interest during construction				7,782	18	5
Charges and expenses of raising loans				2,842	0	0
				182,070	9	2
Sundry debtors				1,660	7	10
Stocks of material, tools, &c.				7,933	18	7
Profit and Loss Account—Accumulated loss to date				15,050	4	7
				£206,715	0	2

I hereby certify that the Balance-sheet and accompanying accounts have been duly examined and compared with the relative books and documents submitted for audit, and correctly state the position as disclosed thereby. The following comment is appended: In the opinion of the Audit Office the purchase-price of the land exchanged for the watershed and paid for out of the Lands Improvement Vote is a proper charge against the scheme.—G. F. C. CAMPBELL, Controller and Auditor-General.

TABLE No. 7.

IRRIGATION AND WATER-SUPPLY.

SCHEDULE OF SCHEMES COMPLETED OR UNDER CONSTRUCTION.

Scheme.	Source of Supply.	River Discharge (Minimum).	Main Canal Discharge (Maximum).		Average Rainfall from Records Available.	Rainfall, 1926.	Area commanded (Gross).	Area irrigated at Present.	Works authorized.		Works completed.		Expenditure to 31st March, 1927.	Estimate to complete.	Remarks.
			As per Design.	During 1926–27.					Main Canals.	Distributaries.	Main Canals.	Distributaries.			
		Cusecs.	Cusecs.	Cusecs.	Inches.	Inches.	Acres.	Acres.	M. ch.	M. ch.	M. ch.	M. ch.	£	£	
Steward Settlement	Waitaki River ..	..	110	..	20·57 (Steward Settlement)	24·79	18,000	..	14 60	50 31	14 60	50 31	12,115	..	Completed.
Otekaike ..	Otekaike River ..	9	15	..	22·47 (Duntroon)	27·75	1,500	800	14 37	3 47	14 37	3 47	3,631	..	Completed. Used only on west side of river.
Ida Valley ..	Manorburn, Poolburn, and Moa Creek. (Storage Manorburn Dam)	..	110	110	16·08 (Moa Ck.)	19·77	28,918	10,498	73 0	54 0	73 0	29 50	170,375	433	Completed and in working condition. Supplying all the land that requires water.
Galloway ..	Manorburn Dam ..	..	30	23·5	14·37 (Galloway)	15·58	3,450	2,066	10 50	7 47	10 50	10 7	23,218	651	Completed and in working condition. An extension of area of 600 acres has been completed during the year.
Manuherikia – Alexandra-Clyde No. 1	Manuherikia River	77	100	76	15·77 (Alexandra, Ophir, and Clyde)	17·87	11,000	5,178	23 0	45 20	23 0	45 20	222,395	3,547	Completed and serving all land requiring water.
Ardgour	Lindis River ..	40	20	19	19·32 (Tarras)	21·64	2,000	1,494	13 0	2 40	13 0	2 40	33,424	957	Completed and serving whole area, with a few improvements requiring to be done.
Arrow River ..	Arrow River ..	55	50	..	26·50 (Frankton)	28·20	6,536	..	17 0	24 0	7 42	8 49	38,348	85,044	Construction is half-completed.
Hawkdun (formerly Mount Ida)	Tributaries of Manuherikia River and Eweburn Reservoir	..	60	..	24·61 (Naseby, Naseby Plantation).	25·50	10,000	..	65 0	70 0	30 17	..	18,144	42,820	Survey is nearly completed, and construction is well in hand.
Earnscleugh (Fraser River)	Fraser River ..	10	40 (all races)	44	14·50 (Earnscleugh)	16·56	2,743	1,851	11 30	17 40	11 30	17 40	12,298	468	Extension has been completed, and whole scheme is in working order and supplying all land requiring water.
Last Chance (Fruitlands and Earnscleugh Tops)	Shingle, Coal Gorge, and Butcher's Creek	14	20	13	14·46 (Earnscleugh and Roxburgh East)	16·68	4,300	2,960	22 0	5 70	20 78	5 70	28,147	762	The extension is complete, and the scheme is serving all occupied land.
Tarras	Lindis River ..	40	70	35	19·32 (Tarras)	21·64 (Tarras)	7,000	4,171	21 70	17 55	21 70	17 55	129,677	3,059	Completed, and has had two years of operation.
Bengerburn ..	Bengerburn ..	1	4	4	..	..	1,000	144	2 06	..	2 06	..	764	92	Completed. Supplying domestic and irrigation requirements.
Teviot River ..	Teviot River and Lake Onslow dam	40	80	42	14·43 (Roxburgh East)	16·81	3,300	2,742	16 51	10 55	16 51	10 55	39,241	3,281	Completed and serving all land requiring water.

TABLE No. 7—*continued.*

IRRIGATION AND WATER-SUPPLY—*continued.*

SCHEDULE OF SCHEMES UNDER INVESTIGATION.

Scheme.	Source of Supply.	River Discharge (Minimum).	Main Canals Discharge (Maximum), as per Design.	Average Rainfall from Records available.	Rainfall, 1926.	Area commanded (Gross).	Length of Main Canal.	Length of Distributaries.	Expenditure to 31st March, 1927.	Estimate to complete.	Remarks.
		Cusecs.	Cusecs.	Inches.	Inches.	Acres.	Miles.	Miles.	£	£	
Maniototo (Upper Taieri)	Taieri River and storage dam	25	500	17·67 (Waipiata)	19·47	100,000	60	..	257	..	Modified scheme for complete irrigation of 5,000 acres is possible without storage, or for reasonable partial irrigation of 15,000 acres.
Cromwell Flat and Lowburn (Roaring Meg)	Roaring Meg Stream (gravity), Kawarau River (pumping)	29 3,000	40	21·52 (Luggate)	23·28	15,000	10	30	3,074	Various	This scheme is a costly development, and alternative scheme of combined power development and irrigation are being investigated.
Upper Manuherikia ..	Manuherikia and Dunstan Rivers, and storage dam in Manuherikia River at Falls	77	500	20·07 (Clyde, Ophir, and Blackstone Hill)	27·74	96,000	130	..	5,256	866,360	Surveys and investigations in connection with dam and storage have been continued.
Hawea Flats (first alternative)	Timaru Creek (gravity)	20	30	26·42 (Hawea Flat)	20·05 (8 months only)	4,000	11	20	49	41,470	To irrigate lower flat only.
Hawea Flats (later alternative)	Hawea River (pumping)	..	..	26·42 (Hawea Flat)	20·05 (8 months only)	17,600	..	..	..	71,720	Latest tentative proposal. Electric power not necessary, but water to be pumped by direct application of power generated by low-pressure turbines at outlet of Lake Hawea. This appears preferable to alternative No. 1, and appears to be a promising scheme. Further closer survey and estimates are necessary.
Chapman's Gully ..	Butcher's Creek, Conroy's Creek, and storage dam	..	..	15·02 (Alexandra)	17·65	100	..	..	16	1,165	May yet be amalgamated with Last Chance scheme or possible scheme from Conroy's Gully.
Bendigo Flat	Lindis River and storage dam	40	30	19·32 (Tarras)	21·64	3,000	7	..	..	..	Survey will be commenced shortly.

TABLE No. 7—*continued.*

IRRIGATION AND WATER-SUPPLY—*continued.*

SCHEDULE OF SCHEMES UNDER INVESTIGATION—*continued.*

Scheme.	Source of Supply.	River Discharge (Minimum).	Main Canals Discharge (Maximum), as per Design.	Average Rainfall from Records available.	Rainfall, 1926.	Area commanded (Gross).	Length of Main Canal.	Length of Distributaries.	Expenditure to 31st March, 1927.	Estimate to complete.	Remarks.
		Cusecs.	Cusecs.	Inches.	Inches.	Acres.	Miles.	Miles.	£	£	
* Teviot River Extension	Teviot River and Lake Onslow dam	40	80	14·43 (Roxburgh East)	16·81	13,400	..	..	207	11,440	To irrigate Teviot and Ettrick. Involves enlargement of Lake Onslow dam. Survey completed and construction will be commenced shortly.
Miller's Flat	Minzionburn	6	..	..	..	2,000	..	..	136	10,000	Proposed to utilize abandoned race of Island Block Extended Gold-mining Company. A new and promising proposal. Survey completed.
Luggate Burn	Luggate Burn ..	6 (after existing rights)	12	21·52 (Luggate)	23·28	1,200	..	..	273	5,000	To supply water to part of Mount Pisa settlement lands. Detail proposals in hand.
Scandinavian	Tributaries of Manuherikia River	..	20	29·69 (St. Bathan's)	38·64	4,000	..	..	..	50,000	For lands about St. Bathan's. Includes £12,000 towards cost of Falls dam, Upper Manuherikia scheme.
Soil Survey (Central Otago)	..	..	..	..	..	..	..	..	1,593	1,680	Approximately 255,000 acres surveyed this year in Upper Manuherikia and Ida Valleys and on Maniototo Plain.
Investigation of proposed schemes	..	..	..	..	..	..	..	..	120	500	Includes the reading of river and rain gauges.

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

APPENDICES TO THE PUBLIC WORKS STATEMENT, 1927.

APPENDIX A.

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS OUT OF THE PUBLIC WORKS FUND FOR THE YEAR 1926–27.

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

SIR,— Public Works Department, Wellington, 19th July, 1927.

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.,
K. S. WILLIAMS,
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 1926–27.

Vote.	Summary.	Appropriation.	Gross Expenditure.	Credits-in-Aid.	Net Expenditure.
	General Purposes Account—	£	£ s. d.	£ s. d.	£ s. d.
42	Public Works, Departmental	138,301	223,536 3 5	108,092 11 11	115,443 11 6
43, 44	Railways	1,827,470	1,568,860 0 11	88,052 12 4	1,480,807 8 7
45–52	Public Buildings..	519,600	342,131 14 3	16,093 4 0	326,038 10 3
53	Timber-supply and Sawmills for Public Works Department	15,000	20,961 8 4	12,449 16 0	8,511 12 4
54	Acquisition and operation of Quarries ..	25,000	48,442 15 11	42,140 18 8	6,301 17 3
55, 56	Lighthouses and Harbour-works	24,650	19,243 3 6	222 7 2	19,020 16 4
57	Development of Tourist Resorts	35,000	32,629 11 0	648 16 3	31,980 14 9
58	Department of Immigration	275,000	401,274 8 2	216,356 2 4	184,918 5 10
59, 60	Roads, Bridges, and other Public Works ..	661,950	614,925 18 9	37,565 0 2	577,360 18 7
61	Telegraph Extension	765,000	662,642 13 1	104,601 7 5	558,041 5 8
62	Contingent Defence	50,000	34,220 8 7	206 2 1	34,014 6 6
63	Lands, Miscellaneous	105,000	57,244 17 10	977 10 4	56,267 7 6
64	Irrigation, Water-supply, and Drainage ..	75,000	59,451 18 4	2,515 2 5	56,936 15 11
65	Plant, Material, and Stores	40,000	54,407 2 5	78,555 3 6	*Cr.* 24,148 1 1
66	Transfer to Main Highways Account, Construction Fund	400,000	400,000 0 0	..	400,000 0 0
..	Unauthorized—Services not provided for ..	..	2,601 14 6	1,412 4 1	1,189 10 5
	Totals, General Purposes Account ..	4,956,971	4,542,573 19 0	709,888 18 8	3,832,685 0 4
67	*Electric Supply Account*	1,371,000	1,158,329 0 8	28,316 2 0	1,130,012 18 8
..	*Unauthorized—Services not provided for* ..	..	45 11 10	45 11 10	..
..	*Waihou and Ohinemuri Rivers Improvement Account*	..	68,674 7 9	2,818 14 1	65,855 13 8
	Totals, Public Works Fund	6,327,971	5,769,622 19 3	741,069 6 7	5,028,553 12 8

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

J. J. GIBSON,
Accountant.

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

Examined and found correct.

J. H. FOWLER,
Deputy Controller and Auditor-General.

APPENDIX A—*continued.*

	Name of Vote.	Appropriation.	Gross Expenditure.	Credits-in-Aid.	Net Expenditure.
	PUBLIC WORKS FUND.	£	£ s. d.	£ s. d.	£ s d.
	General Purposes Account—				
42	Public Works, Departmental	138,301	223,536 3 5	108,092 11 11	115,443 11 6
	Railways—				
43	Railway-construction	1,265,470	1,181,919 1 6	85,550 14 7	1,096,368 6 11
44	Additions to Open Lines	562,000	386,940 19 5	2,501 17 9	384,439 1 8
	Public Buildings—				
45	General	173,000	120,419 14 10	555 17 4	119,863 17 6
46	Courthouses	8,000	1,260 15 4	..	1,260 15 4
47	Prison Buildings and Works	31,600	23,974 0 1	1,162 3 4	22,811 16 9
48	Police-stations	14,000	7,410 12 4	..	7,410 12 4
49	Postal and Telegraph	137,000	87,148 3 10	1,095 14 8	86,052 9 2
50	Agricultural	9,000	4,165 12 7	2 0 0	4,163 12 7
51	Mental Hospital Buildings	110,000	68,661 8 0	26 6 8	68,635 1 4
52	Health and Hospital Institutions	37,000	29,091 7 3	13,251 2 0	15,840 5 3
53	Timber-supply and Sawmills for Public Works Department	15,000	20,961 8 4	12,449 16 0	8,511 12 4
54	Acquisition and Operation of Quarries	25,000	48,442 15 11	42,140 18 8	6,301 17 3
	Lighthouses and Harbour-works—				
55	Lighthouses	13,000	5,759 3 8	0 15 8	5,758 8 0
56	Harbour-works	11,650	13,483 19 10	221 11 6	13,262 8 4
57	Development of Tourist Resorts	35,000	32,629 11 0	648 16 3	31,980 14 9
58	Department of Immigration	275,000	401,274 8 2	216,356 2 4	184,918 5 10
	Construction and Maintenance of Roads, Bridges, and other Public Works—				
59	Roads, &c.	657,350	612,695 16 9	37,565 0 2	575,130 16 7
60	Roads on Goldfields	4,600	2,230 2 0	..	2,230 2 0
61	Telegraph Extension	765,000	662,642 13 1	104,601 7 5	558,041 5 8
62	Contingent Defence	50,000	34,220 8 7	206 2 1	34,014 6 6
63	Lands, Miscellaneous	105,000	57,244 17 10	977 10 4	56,267 7 6
64	Irrigation, Water-supply, and Drainage	75,000	59,451 18 4	2,515 2 5	56,936 15 11
65	Plant, Material, and Stores	40,000	54,407 2 5	78,555 3 6	*Cr.* 24,148 1 1
66	Transfer to Main Highways Account, Construction Fund	400,000	400,000 0 0	..	400,000 0 0
..	Unauthorized—Services not provided for ..	..	2,601 14 6	1,412 4 1	1,189 10 5
	Totals, General Purposes Account ..	4,956,971	4,542,573 19 0	709,888 18 8	3,832,685 0 4
67	*Electric Supply Account*	1,371,000	1,158,329 0 8	28,316 2 0	1,130,012 18 8
..	*Unauthorized—Services not provided for* ..	..	45 11 10	45 11 10	..
..	*Waihou and Ohinemuri Rivers Improvement Account* ..	..	68,674 7 9	2,818 14 1	65,855 13 8
	Totals, Public Works Fund	6,327,971	5,769,622 19 3	741,069 6 7	5,028,553 12 8

APPENDIX B.

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

The Engineer-in-Chief to the Hon. Minister of Public Works.

Sir,—

I have the honour to submit the following report upon the various works under my control completed and in progress throughout the Dominion during the period from the 1st July, 1926, to the 30th June, 1927.

RAILWAYS.

Abstract.

The following table shows the expenditure on Government railways in New Zealand up to the 31st March, 1927:—

Name of Railway.	Total Length of Railway or Section.	Open for Traffic.	Expenditure to 31st March, 1927.
	M. ch.	M. ch.	£
Kaihu Valley	24 32	24 32	179,068
Otiria–Ngapuhi	13 45	13 45	125,987
Opua Wharf – Onerahi	58 6	58 6	607,558
Kioreroa–Waiotira	19 79	19 79	418,756
North Auckland Main Trunk Railway (from Helensville)	172 35	80 63	3,240,619
Helensville – Te Awamutu, with Branches (including Auckland–Westfield Deviation)	215 35	160 63	4,433,549
Frankton Junction – Thames, with Branches	127 35	87 20	1,613,119
Thames Valley – Rotorua	69 33	69 33	421,985
Tauranga–Opotiki, with Branches	145 32	..	1,407,081
Gisborne–Opotiki	93 44	49 32	623,379
Napier–Gisborne (including Waikokopu Branch)	231 44	23 44	1,857,161
Wellington – Napier and Palmerston North (including Te Aro Extension, Greytown and Martinborough Branches, and Hutt Valley Railway)	258 62	233 12	3,212,928
Wellington–Waitara, with Branches	350 11	308 42	3,711,522
Stratford–Okahukura	112 47	47 40	1,583,407
North Island Main Trunk (Marton – Te Awamutu), including Raetihi Branch and Waipa Gravel-access Branch	225 79	218 39	3,101,830
Picton–Waipara (South Island Main Trunk Railway)—			
Picton southwards	92 38	56 6	656,093
Waipara northwards	90 45	44 14	380,533
Nelson–Greymouth	177 51	129 50	738,263
Stillwater – Arthur's Pass	51 41	50 41	2,048,842
Rolleston – Arthur's Pass (including Whitecliffs Branch)	92 59	84 45	1,030,417
Westport–Ngakawau	19 56	19 56	193,883
Westport – Ngakawau Extension to Mokihinui*	7 12	7 12	..
Mokihinui Colliery Line†	3 69	3 69	..
Westport–Inangahua	26 0	5 74	208,751
Ngahere–Blackball	3 40	3 40	147,547
Greymouth–Rewanui and Branches	11 34	11 34	329,898
Greymouth–Waitaha	50 32	38 68	356,506
Waipara–Waitaki, with Branches	459 34	413 70	2,958,009
Canterbury Interior Main Line—Oxford–Temuka	83 0	11 44	59,942
Waitaki–Bluff, with Branches	600 21	561 2	5,540,279
Otago Central	182 51	147 27	1,438,542
Invercargill–Kingston, with Mararoa Branch	117 4	97 44	394,602
Forest Hill Railway—Winton–Hedgehope‡	12 40	12 40	23,337
Western Railways	94 8	78 49	448,971
Preliminary surveys	..	..	46,100
General charges not yet apportioned	..	..	7,575
Miscellaneous	..	..	10,337
Stock of permanent-way on hand	..	..	10,730
Rolling-stock	..	..	10,184,805
Suspense Account, being proportion of cost of raising loan for Railways Improvement Authorization Act 1914 Account	..	..	15,380
Total	4,275 49	3,172 55	§53,767,291
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	4,275 49	3,172 55	55,560,007

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

NORTH AUCKLAND MAIN TRUNK RAILWAY.

Rangiahua Section (24 m. 45 ch. to 38 m. 34 ch.; length, 13 m. 69 ch.).—This section extends from Okaihau Station to Rangiahua Station, and includes the whole of what was previously called the Okoro Section, the use of which name is now discontinued. In my last report the work on this section had practically just started anew, but it is to be noted that this section was under construction some years before and owing to financial restrictions work had to be stopped till last year. The result of this was that much of the formation done was rendered useless by cuttings filling in and banks slipping away in bad country.

The whole of the country for a distance of 8 m. from Okaihau has proved to be of a very treacherous and unstable character. Practically every cutting excavated has slipped and many banks have subsided. The railway here traverses the slopes of a wide valley and crosses several old slips of considerable extent, which circumstance adds to the already unstable nature of the country. However, it is anticipated that by use of stone drains and dry-stone retaining-walls, the difficulties in regard to slips and subsidences will be overcome.

Fencing has been erected on both sides of the railway reserve from 28 m. 75 ch. to 32 m. 30 ch., a total length of 6¾ m. for the year. Sixty-five culverts have been constructed, consisting of one 8 ft., one 6 ft., five 4 ft., and four 3 ft. arched culverts, thirty-six concrete pipe, and eighteen earthenware-pipe culverts.

Earthworks have been completed from 26 m. 50 ch. to 28 m. 30 ch., making a distance of 3 m. 60 ch. of completed formation beyond Okaihau. Further earthworks are in hand to 32 m. 50 ch. One mile of this, from 28 m. to 29 m., is very heavy, and three steam-shovels are still at work between 28 m. 30 ch. and 29 m. What with an exceedingly wet season and treacherous ground, work has been seriously delayed on this section. Nothing but thorough drainage by means of culverts, drainage-drives, stone drains, and stone walls has enabled work to be carried out at all over some miles of this length.

The laying of a temporary tramway to the heavy work above mentioned at the head of the valley has obviated the necessity of providing and maintaining metalled service roads. The driving of a short tunnel at 25 m. 11 ch. under the Okaihau Horeke Road, mentioned in my last report, is completed. This tunnel is 160 ft. long, and takes the place of an overbridge originally designed for this place.

During the year 1 m. 47 ch. of track, from 24 m. 77 ch. to 26 m. 44 ch., was laid. A service tram-line was continued on to 28 m. 65 ch., a further distance of 2¼ m. It is worth noting that locally grown puriri sleepers are being used on this line instead of Australian hardwood.

Several sites were surveyed and test bores put down for a quarry for ballast and road-metal. The originally proposed sites did not prove economical to work, and a new site is now proposed almost 1 m. from the railway-line.

A fourth workmen's camp was built at 32 m., and the three existing camps were enlarged. During the year 108 single huts, 87 married men's houses, 2 cookhouses, 3 bathhouses, and 2 staff cottages were erected. Accommodation is now provided for the 260 men employed on this line.

An engine-shed, truck-repair shop, carpenter's shop, and a school were built at Okaihau. A cinema outfit was installed by the Y.M.C.A. in the Public Works recreation-hall at Okaihau, and is well patronized by the workmen and settlers in the vicinity. An average of 226 men were employed on this section during the year.

Kirikopuni Section (107 m. 28 ch. to 121 m.; length, 13 m. 52 ch.).—As reported last year, the line was laid and ballasted sufficiently to carry passenger traffic from Waiotira (107 m. 28 ch.) to Pukehuia (118 m. 20 ch.). Under ordinary circumstances future work on this length would entail only the completion of the ballasting and the running of traffic, but, as usual on North Auckland railways, clearance of slips and proper drainage of cuttings and banks has been much the greater portion of the work. During the very wet winter experienced last year much more trouble on this account was encountered than was anticipated. Practically every cutting between Waiotira and Pukehuia has slipped, and dry-stone retaining-walls and stone drains had to be constructed in them in order to keep the line open for traffic. Five steam-shovels have proved invaluable in removing the wet, heavy, slipped material, the cost of the removal of which would have been excessive by any other means.

With the exception of some half-dozen workmen's cottages, all workmen's camps have been removed and the sites cleaned up between Waiotira and Pukehuia.

The Pikiwahine and Omana station-yards on this length have been finished and ballasted, and access roads to the stations completed. Pukehuia station-yard is also completed, together with access roads and a ¾ m. road-deviation at 118 m. 60 ch. As mentioned in my last report, repair work due to subsidence was necessary in the Tokatoka Tunnel. This work has been satisfactorily completed.

North of Pukehuia, formation was completed last year, with the exception of the big bank at Kirikopuni station-yard (120 m. 72 ch.). This bank is still giving trouble, and two steam-shovels have been working in borrow-pits continuously for the last six months to fill up the subsidence that has occurred.

All banks north of the Wairoa River and near the river have given an extraordinary amount of trouble. The river-silt forming the flats here is so fine in texture that banks have to be made two or three times the standard width in order to reduce the pressure to a sufficient amount to enable this weak foundation to support them. Even then there is an unusual amount of subsidence before stability is reached. Work of this nature has had the effect of enormously increasing the anticipated cost of the railway.

During the year 3¼ m. of access road were formed to Kirikopuni Station from Paradise Road, and 1½ m. of this road were metalled. On the road connecting the same station with the main highway from Kirikopuni to Parakaoa 4½ m. were metalled.

The principal work now unfinished on the Kirikopuni Section of this railway is the Wairoa River Bridge. This bridge is 756 ft. long, and consists of two 106 ft., two 45 ft., and fifteen 30 ft. steel spans on three cylinder concrete piers and seventeen timber piers. In my last report I mentioned that the cylinder-pier construction was well under way. Good progress has now been made. All the timber piers on the south side of the river are now finished; the three concrete cylinder piers in the river are completed, having been sunk to an average depth of 25 ft. on to the sandstone rock of the river-bed. On the north bank eleven piers are in place, and pile-driving on the remaining six piers is in progress. Three 30 ft. and one 45 ft. plate girders are erected, as well as one of the main 106 ft. spans. The erection of the other 106 ft. span is well forward. It is hoped to complete the bridge by the end of October next.

There are twelve other bridges on this section, seven of which were practically completed last year and the balance during this year. One bridge at 120 m. had to be abandoned owing to the falling-in of river-banks and consequent shearing-off of the piles. The bridge has to be lengthened, and cannot be completed till the ground dries and becomes stable during the summer. A temporary bridge has been erected to carry the traffic in the meantime.

In addition to the above bridges, nine road-bridges, including five overbridges, were completed during the year. All culverts have been completed, and some have been extended where slipping of banks has made this necessary.

Platelaying was done during the year from the northern end of Wairoa Bridge (119 m. 5 ch.) to the terminus at 120 m. 75 ch. Ballasting was completed between Waiotira and the Wairoa Bridge. On the northern side of the Wairoa River the first lift of ballast is finished. The line has been well maintained for the running of traffic to Pukehuia.

There has been an increase of traffic during the year; 8,477 passengers, 1,200 tons of general goods, 1,500 head of cattle, and 12,400 head of sheep and pigs were carried. It is expected that when trains cross the Wairoa River Bridge at the end of October the amount of traffic will be much increased. The roads radiating from the terminal station at Kirikopuni are now being improved, and after next summer they will probably be open for all-the-year-round traffic. An average of 390 men were employed on this section during the year.

Crushed stone for ballast was obtained from Tauraroa quarry. The plant in the quarry was altered during the year to supply a greater quantity of smaller metal and chips for roadworks in the vicinity. The output for the year was 63,200 cub. yd. of spalls. There are now fifty-two men employed in the quarry.

Auckland-Westfield Deviation.

This deviation is 9 m. 70 ch. in length, of which 8 m. 70 ch. is being done by the Public Works Department. The long embankments across Judge's and Hobson Bays which were in progress when I wrote my last annual report are now practically completed. The embankment across Orakei basin is now also joined up, so that the formation is now nearly completed from the new Auckland station-yard to the Purewa Tunnel at 4 m. 60 ch. A service track has been laid over the whole of the distance, and also extends through the bottom drive of the tunnel and on to the rock cutting at 6 m. 60 ch. The widening and completing of the long embankments is dependent on the progress of the sea-wall, which will protect both the railway and the Auckland–Orakei Waterfront Road. These two works are now organized and worked in conjunction. The sea-wall has now advanced for a distance of 70 ch., and good progress is being made both with the wall and the road. Beyond Purewa Tunnel formation work to Mount Wellington (6 m. 64 ch.) is well advanced, and a service train is running from the tunnel to this point. From 6 m. 60 ch. to the end of the deviation (9 m. 70 ch.) the formation is in varying stages of completion, but has been delayed by some alterations to grade and alignment, which were rendered desirable to avoid rock exposed in floor of cutting. It is anticipated that by March next the whole formation will be sufficiently advanced to permit of the laying of the permanent track from Auckland to Westfield.

Selected rock from a cutting through a lava-flow at 6 m. 60 ch. is being crushed for road-metal and for concrete. A considerable saving has been made by utilizing the rock from the cutting for the construction of the tunnel, bridges, culverts, roads, &c. The rock not suitable for these purposes is being used for the banks. The plant consists of two gyratory crushers, one chip-crusher, and the necessary elevating and screening machinery, all being electrically driven.

The Purewa Tunnel is the principal work that governs the progress of this railway-deviation. When I made my last report, practically only the bottom heading had been driven. During the year 612 ft. at the north and 400 ft. at the south end have been completed, leaving 900 ft. still to complete. The country through which the tunnel is being driven has proved more difficult than was expected, and considerable pressures have been met with, necessitating a tunnel with a strong concrete invert, as well as a thick lining for the walls and arch. It is expected, however, that the tunnel will be finished by the end of March next.

Five steam-shovels and eight locomotives have been employed continuously on the formation and tunnel work, and have given every satisfaction. There are six railway bridges and seven road overbridges on the deviation. These are in varying stages of completion, and will be some of the last works to be completed. A considerable number of culverts were completed during the year, and only a few near Westfield now remain unfinished.

Considerable use has been made of electric power on the works, obtainable from the local Power Board. The average number of men employed during the year was five hundred. Nearly all of these have been accommodated in cottages and huts in three main villages, supplied with drainage, water-supply, electric lighting, and metalled roads.

EAST COAST MAIN TRUNK RAILWAY—WAIHI EASTWARDS.

During the year substantial progress has been made towards the completion of the East Coast Main Trunk Railway between Waihi and Taneatua. The main features of the work have been the completion and handing-over to the Railway Department of the first 14 m. eastward from Waihi, the steady progress on the section 19 m. 11 ch. long being constructed under contract by Sir W. G. Armstrong, Whitworth, and Co., and of the progress towards completion of all works on the length of 66 m. between Te Puna and Taneatua station-yards, over which the running of traffic has been continued by the Public Works Department. A description of the work that has been done on the various sections of the line is as follows:—

Athenree Section (0 m. 0 ch. to 8 m. 68 ch.; length, 8 m. 68 ch.).—This section was completed and put in order for handing over to the Railway Department. The Athenree quarry continued in operation till the end of March, 1927, and from July, 1926, to that date had supplied 16,000 cub. yd. of crushed metal for ballast and other purposes.

Katikati Section (8 m. 68 ch. to 16 m. 28 ch.; length, 7 m. 40 ch.).—This length as far as the 14 m. peg was completed by the Department. At 12 m. 61 ch. a reinforced-concrete slab bridge 40 ft. long, in three spans, was built. For a short period a passenger and goods service was run to the 14 m. peg as a continuation of a similar service that had been maintained on the Athenree Section. On the 2nd May, 1927, the Railways Department took over the length from 0 m. 0 ch. to 14 m. 0 ch., and commenced running a service thereon.

Sir W. G. Armstrong, Whitworth, and Co.'s contract commences at the 14 m. peg. The formation is almost complete, with the exception of the Tahawai embankment, trouble being experienced here through the sinking of the heavy bank through the soft mud-flat foundation. This is not an uncommon feature of this East Coast Main Trunk Railway construction. The subsidences, as they occur, are made good by fresh filling, and the embankment gradually becomes stable. The fencing is now almost complete. The 6 ft. arched concrete culvert at 14 m. 38 ch. was built during the year. Road-overbridges at 14 m. 46 ch., 15 m. 38 ch. (both with deck 9 ft. wide), and at 15 m. 74 ch. and 16 m. 6 ch. (deck 12 ft. wide), were also built, and the railway-bridge across road at 14 m. 71 ch., started the previous year, was completed. A start was made with the platelaying and ballasting, and also with the Katikati Station buildings—the latrines, and 6,000 gal. water-vat being completed.

Aongatete Section (16 m. 28 ch. to 21 m. 5 ch.; length, 4 m. 57 ch.).—With the exception of some trimming of batters and of some widening of banks, all formation on this section is now complete. The principal work has been the erection of bridges. My last year's report indicated that piers of the Uretawa Bridge at 16 m. 46 ch., Te Rereatukahia Bridge at 18 m. 12 ch., and Te Mania Bridge at 18 m. 50 ch. were in hand, and these bridges are now complete. In addition, the Waitakohe Bridge at 19 m. 4 ch. and Aongatete Bridge at 20 m. 45 ch. have been completed, except for one pair of girders still to be placed on Waitakohe Bridge. The total length of these five bridges is 675 ft. On the section seven road-overbridges were completed during year, six with roadway 12 ft. wide, and one with roadway 9 ft. wide. Of these bridges three had been started in the previous year. Platelaying was done from 20 m. 51 ch. back to 16 m. 28 ch., and a start was made with ballasting. In the Aongatete station-yard the buildings, well advanced the previous year, were completed, except for stock-yards, which are now in hand.

Apata Section (21 m. 5 ch. to 27 m. 70 ch.; length, 4 m. 12 ch.).—(Note: Short length is due to deviations from original line.) Fencing is practically complete, and the culverting on the section has also been completed. The reconstruction of the Wainui bank at 23 m. with greater width and flatter batters, involving greatly increased earthwork, is finished. At the Wainui Bridge site at 23 m. 2 ch. the piles had been driven and piers completed. Ground-subsidences and other movements that took place as railway-bank was first run out so seriously damaged the piers that they had to be abandoned, and new piers will be built as the reconstructed bank stabilizes. In order that platelaying would not be unduly delayed, the contractors deemed it advisable to construct a temporary deviation over the Wainui Valley, crossing the stream about 20 ch. above the permanent-bridge site. Road-overbridges at 27 m. 35 ch. and 23 m. 19 ch. are now completed.

Three miles of platelaying were completed on the section during the year, and the first and second lifts of ballast were placed throughout the section, except on Wainui bank and bridge, where track is not yet laid. Four platelayers' cottages, in hand last year, and goods-shed and passenger-shelter for Apata Station were completed.

Te Puna Section (27 m. 70 ch. to 34 m. 78 ch.; length, 7 m. 72 ch.).—The clearing, fencing, culverting, and formation are now substantially complete. The bridge at 28 m. 29 ch. (three 20 ft. spans), and Waipapa Bridge at 29 m. 29 ch. (six 35 ft. spans, one 45 ft. span), and bridge at 31 m. 63 ch. (three 20 ft. spans) are now complete, except the placing of the first span in the Waipapa Bridge. The second lift of ballast is complete throughout the section, except on the larger banks, which are still settling. Station buildings at Omokoroa and Te Puna Stations were completed during the year.

This section completes the length of 19 m. that is in the hands of the contracting firm of Sir W. G. Armstrong, Whitworth, and Co. Summarizing the position of the works on the contract, practically all the earthwork is complete, a yardage of 600,000 cub. yd. being handled during the year; all bridge-work is practically complete, except the new structure required at Wainui Stream; rail connection exists from the company's rail-head at 16 m. 3 ch. to the junction at 34 m. 78 ch. with the line built by the Department, though a detour at Wainui is necessary, as already pointed out. Ballasting and road-metalling is, however, proceeding very slowly. Out of a total of 83,000 cub. yd. called for by the contract, only one-third had been delivered by the 30th June last. As the completion of this contract is already overdue, the backwardness of the ballasting programme is very serious and calls for special concentration by the Contractor, with a view to pushing this portion of the work.

Tauranga Section (34 m. 78 ch. to 41 m. 5 ch.; length, 6 m. 7 ch.).—This section was open for traffic throughout the year, and the usual maintenance carried out. Incompleted portions of fencing, earthwork, and platelaying were finished during the year, the latter work including rail connection to the new Tauranga Railway Wharf and the laying-down of the associated exchange siding. The earthwork included placing 47,000 cub. yd. as reclamation behind the new wharf on behalf of the Tauranga Harbour Board. At the Tauranga Station five more platelayers' cottages and a 70 ft. engine-turntable were erected.

Te Maunga, Te Puke, Paengaroa, Pongakawa, Otamarakau, and Matata Sections (41 m. 5 ch. to 79 m. 16 ch.; total length, 38 m.).—This length has again carried regular goods and passenger traffic throughout the year, and adequate maintenance has been carried out. New bridging totalling 124 lin. ft. was erected. The Te Puke quarry output included 16,600 cub. yd. crushed metal, 6,900 cub. yd. spalls, and 20,000 cub. yd. stripping for Tauranga Harbour reclamation. The Matata pit output included 32,000 cub. yd. metal, mostly used for ballasting purposes, and 75,000 cub. yd. of stripping, mostly used for widening embankments.

Rangitaiki Section (79 m. 16 ch. to 87 m. 45 ch.; length, 8 m. 29 ch.).—Considerable construction work was done during the year on this section, including widening banks with 18,260 cub. yd. spoil from Matata pit, the spreading of 9,827 cub. yd. of ballast, the building or completing of 195 lin. ft. of bridging (four bridges).

Awakeri Section (87 m. 45 ch. to 91 m. 40 ch.; length, 3 m. 75 ch.).—Here again the chief work done was the strengthening of embankments with 53,000 cub. yd. spoil from Matata pit, and the spreading of 14,580 cub. yd. of ballast; 215 lin. ft. of bridging has been completed except for the placing of two 20 ft. spans, for which steel is not yet to hand.

Taneatua Section (91 m. 40 ch. to 100 m. 5 ch.; length, 9 m. 35 ch.).—Three sets of cattle-stops, three sets of private-crossing gates, and two 2 ft. circular and one 3 ft. arched concrete culverts were put into position during the year. The formation was strengthened with 33,000 cub. yd. spoil distributed by work-trains, and 7,000 cub. yd. distributed by dray teams. A creek-deviation 24 ch. long to left of 100 m. was made, and 1,800 cub. yd. of rock spalls were quarried for protection work at Whakatane River. Ballasting-work is represented by the placing of 26,000 cub. yd. of ballast from the Whakatane River ballast-pit, this completing the main line, and the approach roads to Kiwinui, Pekatahi, and Taneatua station-yards.

Station buildings: At Taneatua Station the six platelayers' cottages and one Stationmaster's house, begun the previous year, were completed, and, in addition, two sets of 16 ft. station-gates, engine-shed pit, one buffer-stop, and cart-dock at platform were placed. At Kiwinui two buffer-stops, one 6,000 gal. water-vat, and double cart-docks were erected, and water-supply was laid on to the yard.

Mount Workshops.—The programme on new construction was much hampered by non-arrival of steel from England, due to the coal strike. Four hundred tons of steel were fabricated into girder spans during the year, mostly for bridge-work outside the Tauranga district. Maintenance-work, some of it of a heavy character, has been done to the Department's construction plant in the district, and to the railway rolling-stock. This latter includes work done on ten locomotives, five passenger-cars, and 171 wagons.

Traffic.—A regular passenger and goods service was maintained throughout the year between Tauranga and the terminus at Taneatua, and a full maintenance programme has also been continued. The total revenues for the year from this traffic service was £21,816.

Gisborne-Napier Railway.

Putorino Section (10 m. 56 ch. to 37 m. 35 ch.; length, 26 m. 59 ch.).—During the previous period the formation on this section had been vigorously pushed on in order to enable work to be commenced on the Waikoau and Matahoura Viaducts. This programme has been adhered to during this year, and with the exception of two small blocks of cutting at 30 m. 25 ch. and 30 m. 65 ch., totalling 8,000 cub. yd., the formation has now been completed to the Matahoura Viaduct site at 33 m. 42 ch. The formation from this latter point to the end of the section is well in hand, so that by the time this viaduct has been completed the formation and platelaying should be finished to Putorino station-yard.

The formation of the Waipunga, Waikoau, Tutira, and Matahoura station-yards, including access roads, has been completed, and the sidings have been laid in the first two. 12 ch. of access road to the Putorino station-yard have been completed, and also the metalling of the access road to the Tutira yard. Three steam-shovels, in addition to manual labour and scoop teams, have been employed on the earthwork of this section, a total of 159,634 cub. yd. having been excavated for the twelve months. 8 m. of fencing have been completed during the period, and this part of the work is generally well in hand. Nine pipe culverts and one water-drive have been completed and the big water-drive at Maori Creek at 36 m. 58 ch. is in hand.

Good progress has been made with the large steel viaduct across the Waikoau Creek at 26 m. 60 ch., all piers and abutments being completed. This viaduct consists of four 60 ft. and one 250 ft. spans, with an over-all height of 236 ft. The temporary trestle which is being erected to carry the main span is also practically completed, and the transporter cableway erected for the placing of the steel is now in operation. 292 tons of steel which have been fabricated in England have been landed and transported to the site. The assembly and riveting of the legs for piers B, D, and E, and the approach 60 ft. spans are in hand, and it is anticipated that the steelwork will be completed very shortly after the end of 1927.

The preliminary work in connection with the bridge over Sandy Creek at 29 m. 12 ch., consisting of three 60 ft. spans, has been completed, and the materials for the construction of the temporary trestle, concrete abutments, and pier-foundations are being conveyed to the site. At 30 m. 19 ch. the

piers and abutments of the bridge, consisting of one 30 ft. and two 20 ft. spans are complete. At 33 m 42 ch. the construction of the piers for the Matahoura Viaduct is now in hand. The excavation for the foundations of piers C and D is completed, and the concreting of pier D is in hand. The viaduct itself consists of two 40 ft., two 60 ft., and one 250 ft. spans, with a total height of 215 ft.

Platelaying is now complete to the Waikoau Viaduct at 26 m. 60 ch., and preparations are being made for the laying of the rails from the north side of this viaduct to the Matahoura Viaduct at 33 m. 42 ch. The rails for this work will be taken over the Waikoau Gorge on the bridge transporter cableway, and the sleepers will be carted ahead to Tutira from the 26 m. peg.

Ballasting is being vigorously pushed ahead. The first lift has been completed to 26 m. 60 ch., the second lift to 18 m. 40 ch., and the third life to 13 m., and also between 16 m. and 18 m., the ballast being loaded by a steam-shovel from pit at 13 m. 65 ch.

Cattle-stops have been put in at 16 m. 72 ch. and at the north end of the Waipunga station-yard. Overbridge at 18 m. 69 ch. has been completed, those at 23 m. 31 ch. and at 28 m. being under construction. The road-deviation at 30 m. 19 ch. is completed, and that at 35 m. 10 ch. is being metalled. The reconstruction of the telephone line to the new railway standard is well in hand. Two concrete cottages for platelayers have been erected at Matahoura and the provision of a permanent water-supply is on the way.

The original sawmill at Makomako has been replaced by a new outfit, which is turning out approximately 100,000 super. ft. of timber per month. The bush itself is of good quality and consequently timber for general purposes on the works as well as for the housing of employees is being procured at considerably less cost than it can be purchased. In addition, there is the added convenience of being able to obtain delivery of timber as it is required.

The general housing conditions for workmen are good and whenever necessary new provision has been made and houses moved forward as the work progressed.

The line from Eskdale onwards to Waikoau has been well maintained and a regular train service has been run to connect with the Napier-Eskdale service at Eskdale, and a fair amount of goods has been handled, particularly over the last four months.

Wairoa Section (37 m. 35 ch. to 70 m. 67 ch.; length, 33 m. 32 ch.).—This section now comprises all that part of the above railway previously dealt with as the Mohaka, Waihua, and Wairoa Sections, including the Wairoa station-yard. The construction of this section involves a considerable amount of very heavy work, including, as it does, five tunnels aggregating 120 ch. in length. It also includes three viaducts over the Waihua, Mohaka, and Maungaturanga Rivers respectively. The principal objective during the period has been as far as possible to get the tunnels under way, as they comprise the greatest portion of the work from a time-to-complete point of view.

At the Chimney Creek Tunnel No. 1 (46 m. 15 ch. to 46 m. 31 ch.) the northern approach has been taken out and 3 ch. of tunnel driven; a steam-shovel is engaged on the southern approach to this tunnel. At Chimney Creek Tunnel No. 2 (47 m. 1 ch. to 47 m. 17 ch.) the northern approach has been completed and 7 ch. of tunnel driven, also bottom heading holed right through. The Mohaka Tunnel (52 m. 74 ch. to 53 m. 27 ch.) has been driven for a distance of about 6 ch. from the southern end. The Waihua Tunnel (60 m. 63 ch. to 60 m. 77 ch.) is being pierced from the northern end and about 7 ch. have been completed. The Kotemaori Tunnel, which is 41 ch. long, and the longest tunnel on the section, has unfortunately very long heavy approaches. These are being vigorously pushed on, two steam-shovels being engaged on the southern end and one on the northern end; it will, however, be some considerable time before work can be commenced on the tunnel proper. A steam-shovel is at present engaged in shifting slip country from the southern end of the Waihua Tunnel; two shovels are at work, and another is being installed to deal with the heavy work between 53 m. 30 ch. and 55 m. 40 ch.

Between the beginning of the Wairoa Section and the Mohaka Tunnel no continuous length of railway is being worked, attention being mainly given to those works which will require the longest period for construction. The formation of the Wairoa station-yard has been completed and all sidings laid, while the formation and platelaying has been extended a distance of 2 m. in readiness for the erection of the Wairoa Bridge there. In the meantime all formation work as far as Te Kumi is in hand, so that on the completion of the bridge the rails may be laid for 18 m. and thus facilitate the transport of construction material for the Mohaka Tunnel and works farther south. A number of road-deviations have been constructed in connection with the railway, one at Kiwi Creek approximately a mile long being in hand, while two at Waihua are completed and metalled. These are principally to avoid level crossings. Four concrete block cottages were erected at Kotemaori, where the headquarters for part of the section is now established. At the Wairoa station-yard the passenger-station buildings, goods-shed, platform, and loading-bank have been built. As the main construction headquarters for the Wairoa Section is also located here, various other buildings for carpenters' shop, fitters' shop, stores, and other buildings have been erected or shifted from other sites to this yard. The general housing facilities for workmen throughout the section are good. A large Y.M.C.A. building was transferred from Waipunga to Kotemaori and is well patronized. Twenty-nine huts, sixteen married men's cottages, and four bath-houses have been erected.

Waikokopu Branch Railway.

Wairoa Station-yard to Waikokopu Wharf (0 m. 41 ch. to 23 m. 23 ch.; length, 24 m. 35 ch.).—During the year work has been mainly confined to completing the bridges and maintaining the line for traffic. The Awatiri Bridge and the Wai Bridge have had permanent caps placed. The goods-shed at Waikokopu station-yard has been completed, and the Harbour Board's shed has been extended to allow of a loop line being run under cover through the shed, thus allowing of goods being handled

in wet weather. The Waikokopu Wharf is completed except for the replacement of wooden fenders by iron fenders on iron bark spring piles. Goods traffic has been run during the year, the total revenue for the year derived therefrom totalling £7,300, which more than paid working-expenses.

STRATFORD MAIN TRUNK RAILWAY (EAST END).

Matiere Section (0 m. to 10 m. 23 ch.; length, 10 m. 23 ch.).—The only new work on this section is the building of the road-overbridge at 10 m. 21 ch., and the building of a water-supply reservoir for Matiere Station. Adequate maintenance has been carried out.

Ohura Section (10 m. 23 ch. to 19 m. 10 ch.; length, 8 m. 67 ch.).—Railway-formation on the section is now complete 33,000 cub. yd. of earthwork being excavated and placed during the year. Road-deviation work, which has been very heavy, is mainly in connection with access roads to Ohura Station, and alteration to the roading-system in Ohura Township where interfered with by the railway-works. The earthwork done in this connection during the period under review was 30,000 cub. yd. One 10 ft. by 6 ft. flat-topped culvert at 19 m. 6 ch. and an 18 in. circular concrete culvert at 16 m. 72 ch. have been built, and a culvert at 18 m. 67 ch. is in hand. The railway-bridges on the section are now complete, five being completed during the year, total length 495 ft., comprising sixteen steel-plate girder spans, on concrete and timber pile piers. Three road-overbridges are in hand. 460 lin. ft. of concrete-pipe culverts varying from 9 in. to 3 ft. in diameter have been placed in road and level crossing construction. Considerable work was done on provision of private crossings, and 6¼ m. of fencing have been erected. The formation of the Nihoniho and Kopuka station-yards, which had been proceeding the previous year, was duly completed, and formation of Ohura station-yard is finished, with the exception of the formation for the dead-end sidings. On the main line, 3¼ m. of rails have been laid, making rail-head at 19 m. 10 ch. and sidings at Nihoniho and also those at Ohura, with the exception of the dead-end sidings are laid. Ballasting has closely followed platelaying operations, the main line being fully ballasted to 19 m. 10 ch. The main line, sidings, and road-deviations absorbed 20,000 cub. yd. ballast during the period. This ballast is obtained from the shingle-beds of the Taringamotu Stream, the average haul over opened and unopened line being 23 m.

Traffic.—A goods and passenger service has been maintained from Okahukura to the terminus, which was moved from Toitoi (16 m.) to Ohura in December, 1926. The passenger and freight receipts totalled £6,589.

Section beyond Ohura.—In October of last year preliminary work was started on this section and so far a total quantity of 16,000 cub. yd. of earthwork has been shifted, two steam-shovels being now in operation. The driving of the bottom heading of the Mangatawa Tunnel at 19 m. 52 ch. has been commenced.

STRATFORD MAIN TRUNK RAILWAY (WEST END).

Work on this railway has been mainly concentrated on the Heao Section, so that the tunnels which are the governing feature in the through connection could be manned as early as possible.

Raekohua Section (47 m. 40 ch. to 50 m. 60 ch.; length, 3 m. 20 ch.).—Very little regular formation work has been carried out on this section, the most important work being the service tram and its maintenance. This tram, which was constructed to a 3 ft. 6 in. gauge is generally paralleling the railway-line, but is on steep grades and sharp curves to reduce formation costs. It connects the station-yard at the Raekohua Flat with the opened section at Tahora, and enables all construction materials to be transported in the railway-trucks direct to the main camp and depot at the Flat, thus saving considerable cartage and handling costs.

On the main line the overhead bridges at 47 m. 75 ch. and at 48 m. 38 ch. were completed, the latter consisting of two 60 ft. trusses with one landing-span, all on concrete piers. The bridges at 48 m. 15 ch. and 49 m. 16 ch. are in hand. Two large 8 ft. arched culverts at 48 m. 30 ch. and at 50 m. 25·50 ch. and a 4 ft. one at 48 m. 32 ch. were completed. Where necessary to form the bridge approaches, formation has been put in hand, but otherwise, as already mentioned, the policy has been to leave it in favour of more urgent work.

The construction of a road partly for settlement use and partly to serve the railway-work has been proceeded with between 47 m. 40 ch. and 50 m. 40 ch.; this work, which involves considerable formation in addition to two bridges, is well in hand. The large permanent camp at the Raekohua Flat, which I mentioned in my last report as being under construction, was completed; it involves a total of eighty-seven married quarters, seventy single quarters, post-office, social hall, nurses home, school, staff quarters, &c. A number of private business premises have been erected on land leased by the Department, and an electric-lighting supply and drainage-system installed throughout the camp generally. A regular passenger service has been run from the main camp to connect with the railway services on the opened line at Tahora.

Heao Section (50 m. 60 ch. to 57 m. 0 ch.; length, 6 m. 20 ch.).—The principal work on this section has been the opening-up and working of the tunnels, of which there are four on the section. The country is exceedingly rough, and, as mentioned in my last report, a great deal of preliminary work in connection with the transport and erection of plant has been necessary before work on the actual piercing of tunnels could be commenced. A particular feature on this section is the electrification of practically all the construction plant. A large power-house equipped with two Babcock boilers and the necessary generating equipment has been established, and transmission-lines run throughout.

Tunnels Nos. 1, 2, and 3 are now in hand. At No. 1 tunnel (51 m. 15 ch.) good progress was made at the west end, a total of 14 ch. being excavated and lined complete. Electric locomotives are utilized for hauling spoil from the face, and the drills are driven by compressed-air delivered from the electrically driven compressors at the power-house.

Immediately beyond the No. 1 tunnel there is a large ravine, which is to be filled by the spoil from the tunnels and from a large cutting at 51 m. 58 ch. This ravine was bridged by a trestle 6 ch. long and 80 ft. high, built of bush timber throughout. In order to facilitate the excavation of cutting at 51 m. 58 ch. a double heading was driven and a crater opened up, so that the spoil trucks could be filled by gravity. After tipping, the trucks are hauled back to the crater by means of an air-operated winch.

At No. 2 tunnel (52 m. 10·50 ch.) the western approach has been completed, the portal excavated, and approximately a chain of tunnel driven and lined. In order to start work on this tunnel it was necessary, in the first place, to construct the electrically operated jig-line (mentioned in my last report) over the top of the No. 1 tunnel, build the trestle previously referred to, and construct a tram-line round the cutting at 51 m. 58 ch. At the east end of this tunnel the approach cutting was just completed at the end of the year.

To start the approaches to No. 3 tunnel, the western portion of which is in hand, it was necessary to construct a service road over the No. 2 tunnel ridge to connect with the Mangaone Valley. This road, which commences at 51 m. 70 ch., was graded to the top of the ridge at a 1-in-7 grade for a distance of 50 ch. From there it was graded level for 40 ch., and then down at 1 in 7 for 50 ch. to the Mangaone Valley and opposite 53 m. 5 ch. on the railway chainage. It was necessary to fascine this road in order to allow tractor haulage in the wet weather. The formation was then continued from the end of the service road, crossing the Mangaone Stream by a temporary bridge, and on to the No. 3 tunnel approach, a distance of 45 ch.

In addition to the above work, the general formation was completed up to the No. 1 tunnel, creek-diversions were cut at 51 m. 65 ch. and 51 m. 68 ch. in the Mangatatoke and at 52 m. 79 ch. in a side stream of the Mangaone. Water-drives of the dimensions shown were put in at the following places: 51 m. 50 ch., 10 ft. by 8 ft.; 52 m. 9 ch., 3 ft. diameter; 53 m. 0 ch., 8 ft. by 6 ft.; and at 53 m. 25 ch., 12 ft. by 10 ft.

The platelaying and ballasting of the jig-line was completed, and a service tram laid from the end of the jig-line to the western end of No. 2 tunnel; this tram was operated by one of the electric locomotives. A service tramway was also put in hand in the Mangaone Valley, and the line laid from 53 m. 23 ch. to 53 m 40 ch. At the main camp a depot comprising a carpenter's shop, stores building, loco.-shed, &c., and well-equipped repair and fitting shops was erected to deal with the upkeep of plant incidental to works, and involved the extended use of power and labour-saving machinery. Housing-conditions were well maintained, and a cookhouse and workers' accommodation-house were established at Mangatatoke and Mangaone.

Palmerston North Railway Deviation.

This work had just started before the beginning of this year. It was commenced primarily to give work to the unemployed in the Palmerston district, and up to last April only an average of thirty men were employed. This number has now been increased to fifty, and a bigger programme of work has been put in hand. The deviation-works include the construction of 6¾ m. of double-track railway, as well as large up-to-date goods-yard and passenger-station. These works necessitate a large amount of excavation and banking, which so far has been confined mainly to the opening-up of cuttings for the goods-yard. This has been done so far by manual labour, but two steam-shovels are now to be employed, one of which is at present being assembled, together with a petrol-locomotive for transporting the spoil. The main line is completed from 88 m. 32 ch. to 88 m. 57 ch., and the main goods-siding from 88 m. 36 ch. to 88 m 64 ch. About 28,000 cub. yd. have so far been excavated. A diversion of the Kawau Stream at 88 m. 36 ch., of 19 ch. in length, has been completed; also 19 ch. of a creek-diversion running through the goods-yard from 89 m. 20 ch. to 88 m. 37 ch. The permanent fencing has been done on one side of the goods-yard, necessitating 68½ ch. of standard fence. A store has been built, also a blacksmith's shop, cement-shed, and explosives-magazine. Only two workmen's huts have so far been found necessary for the workmen's accommodation, as most of the employees live in Palmerston North.

Hutt Valley Railway Duplication.

The formation of this line was completed to the 10 m. during the year. A steam-shovel and a drag-line were engaged and did excellent work, particularly towards supplying material for the high ramps required for the overbridges at Cuba Street, Randwick Road, and White's Line. These three overbridges were completed during the year. The remaining eight piers for the Hutt River Bridge were built and the steel girders erected. Platelaying on both tracks was completed between 8 m. and 10 m. The sidings were also laid in the station-yards at Ava, Woburn, and Waterloo Road. Ballasting was completed over the whole section. An industrial line 70 ch. in length branching off this line was constructed during the year. This railway was handed over to the Railway Department for operation on the 25th May of this year.

Midland Railway.

Kawatiri Section (59 m. 17 ch. to 63 m. 10 ch.; length, 3 m. 73 ch.).—This section was practically completed at the end of last period, but owing to heavy slips taking place the opening was delayed somewhat; but the section, with the exception of 2 ch., was handed over to the Railway Department early in the current year. During the year various slips both on the railway and the main-road deviations have been removed, and protective works at the creek-diversion at 62 m. 60 ch. have been completed.

Murchison Section (63 m. 10 ch. to 86 m.; length, 22 m. 70 ch.).—The formation, culverting, and road-deviations generally have been completed to 64 m. 58 ch. and from there on to the Gowan station-yard, the formation and culverting is in hand, the principal work on the formation to the Gowan station-yard yet to be done, comprising two large rock cuttings at 65 m. and 66 m. Loop tramways have been constructed at both places to enable additional faces to be opened up and facilitate completion. 20 ch. of road-deviations have been formed and metalled; 55 ch. of line have been felled and cleared, and a substantial retaining-wall has been erected at 65 m. 75 ch. The formation of the Gowan station-yard is in hand, and the approach road has been formed and metalled. A concrete reservoir and the necessary main to serve the station have been constructed. Workmen's dwellings have been shifted forward as the work progressed, and a platelayers' cottage and large store erected at the Gowan station-yard.

Westport–Inangahua Railway.

Cascade Section (5 m. 70 ch. to 9 m.; length, 3 m. 10 ch.).—The position regarding this line is that some years ago the heavy rock formation between Te Kuha Station and Cascade Creek was practically completed. The work was abandoned for some years, but with the opening-up of the coal-measures, particularly the Cascade Creek Mine, it was decided to proceed with the work. The work still remaining on the Cascade Section was a considerable amount of bridging and culverting, the general completion of formation and platelaying, and ballasting throughout. In my last report I indicated that this work was well in hand, and since then all work on this section is almost completed, and in addition a loop siding has been put in up the Cascade Creek to tap the coal company's bins and provide shunting facilities. The principal work carried out during the past twelve months is as under: Formation between 8 m. 65 ch. and 8 m. 75 ch. has been widened to enable a loop siding to be put in. Stringers were placed on the open culverts at 7 m. 2 ch., 7 m. 34 ch., and 7 m. 50 ch., thus completing the culverting of the section. A retaining-wall 67 ft. long was erected at 8 m. 67 ch. The bridge at 7 m. 65 ch., consisting of two 20 ft. and two 30 ft. plate-girder spans on concrete piers, is complete; that at 8 m. 7 ch., consisting of two 20 ft., two 30 ft., and two 40 ft. spans similarly arranged, being well in hand. The Little Cascade Creek Bridge at 8 m. 40 ch., consisting of one 20 ft., two 30 ft., and four 50 ft. plate-girder spans on concrete piers, has been erected. Platelaying and ballasting are complete to 9 m. on the main line, as well as on the loop siding of 33 ch. and dead-end to the Coal Company's bins. The Coal Company are fluming their coal 7 m. from the mine to the railway, and a trial run has demonstrated the flume to be successful. It is anticipated, therefore, that a considerable coal traffic is likely to develop over this section.

Cascade Creek–Hawk's Crag Section (9 m. to 14 m.; length, 5 m.).—Twenty men have been employed on this section clearing up the formation, shifting slips, and generally preparing for the further prosecution of the work on the section.

Lawrence–Roxburgh Railway.

Roxburgh Section (49 m. 59 ch. to 58 m. 69 ch.; length, 9 m. 10 ch.).—The construction of this section has now been in hand for two years. During the last year the formation has been completed, including the heavy schist-rock cutting at Dumbarton. The three bridges on the section will total 270 ft. in length, with eleven steel-plate girder spans. Concrete piers for bridges at 49 m. 67 ch. and 53 m. 59 ch. are complete, and those for bridge at 50 m. 36 ch. are in hand. The plate-girders are being fabricated by the Department at Tauranga Workshops. Platelaying is complete except for a portion of the loops in the sidings. Ballasting of the main line is almost complete; most of the ballasting in the Roxburgh Station yard has yet to be done.

Station buildings: A contract has been let for the erection of shelter-shed, goods-shed, and stock-yards at Teviot Station yard. At Roxburgh Station a contract is in hand for the erection of four cottages, stock-yards, and 6,000 gal. water-vat. Certain other buildings are to be moved up from Beaumont and Miller's Flat.

It is anticipated that the line will be ready to hand over to the Railway Department early in the new year.

SURVEYS OF LINES UNDER CONSTRUCTION, NEW RAILWAYS, ETC.

Dargaville Branch Railway.

The permanent-line survey for this railway has been pegged from Kirikopuni Station, on the North Auckland Main Trunk Railway, to Tangowahine, a distance of 9 m. An additional mile of pegging is almost completed, and the remaining 8 m. to Dargaville is now being surveyed. The whole survey should be completed before the summer.

Rotorua–Taupo Railway.

Nothing further has been done on this survey during the year, with the exception of completing plans of surveys already done.

Gisborne–Wairoa Railway.

Trial lines for the coastal route between Waikokopu and Gisborne were completed last year. This year the permanent-line survey along the coastal route was started, and has been completed from 24 m. 28 ch. to 28 m. Drainage areas have been surveyed as far as 32 m. Another trial line was run between 28 m. 57 ch. and 31 m. 5 ch., and the location of the permanent line over this length has now also been fixed. Survey for a service tram for a distance of 2 m. beyond 29 m. 40 ch. was made. A service road 60 ch. in length was made to the new camp at 29 m. 40 ch.

Stratford Main Trunk (East End).

Trial-line plans of alternative routes from Ohura (20 m.) to the Heao Valley (32 m. 40 ch.) were completed and comparative estimates made out. Additional surveys are still required to make the comparative estimates complete, as some alterations to grades were found necessary after the trial lines were finished. Permanent-line pegging has been done from 19 m. 74 ch. to 22 m., and plans and estimates are completed for this distance. About 2 m. of road-survey, to avoid road-crossings or enable better ones to be obtained, were made.

Midland Railway (Nelson End).

Trial-line surveys between 88 m. and 93 m. were made on the right bank of the Buller River, and between 88 m. and 94 m. 7 ch. on the left bank. (Note: 93 m. on right bank traverse is the same point as 94 m. 7 ch. on the left bank.) The paper location for both routes is in hand.

Westport–Inangahua Railway.

The permanent survey was carried as far as the 18 m. during the previous period. Several small deviations are, however, being finalized at present.

South Island Main Trunk.

During the year exhaustive surveys were carried out to determine the best route between Parnassus and Wharanui, particularly over the portion between Parnassus and Kaikoura. These surveys, which have now been completed, indicate that a route closely following the coast will prove the most satisfactory from the point of view of both grading and cost.

Otago Central Railway—Cromwell Northwards.

When my last report was written the trial survey of this proposed railway-extension from Cromwell via Loburn and Bendigo to Luggate had been completed for a distance of 15 m. During the year under review this trial survey has been completed to the proposed terminus at the Luggate, a total distance of approximately 27½ m. Plans and a paper location have been completed, and these, with the estimate of cost, will shortly be available for consideration.

Te Wera Quarry.

This quarry was originally opened to provide ballast-supplies for the Stratford Main Trunk Railway and road-metal for local bodies' and departmental use in the surrounding district. Owing to the alteration in the railway tariff, the cost of supplying local bodies was considerably increased, and consequently outside orders were not large. This necessitated a reduction in the number of men employed during the period. During the year a total of 15,186 cub. yd. was crushed, of which 10,054 cub. yd. were sent to the railway-works, the balance being used on roadworks.

CONSTRUCTION AND MAINTENANCE OF ROADS AND BRIDGES.

Huehue–Waimatenui Road (Bay of Islands County).—This road has been widened to 16 ft. over a length of 190 ch.

Waikare–Kawakawa Road (Bay of Islands County).—This road-line was felled and burnt 1 ch. wide for a distance of 128 ch. and the road formed 14 ft. wide for 48 ch. In addition 110 cub. yd. of slips were cleared.

Awakino Valley (Upper) Road (Hobson County).—174 ch. of formation were completed to a width of 14 ft., 356 lin. ft. of concrete-pipe culverts placed, and one 20 ft. bridge erected.

Kirikopuni–Parakao Road (Hobson and Whangarei Counties).—A further 360 ch. of this important road were metalled 14 ft. wide, nine bridges totalling 490 lin. ft. were erected, and 660 cub. yd. of slips cleared. Bush was felled and cleared over a length of 4 ch. and 900 cub. yd. of rock excavated.

Waimamaku–Donnelly's Crossing Road (Hobson and Hokianga Counties).—Road was formed 18 ft. wide for 7 m. 35 ch., and formation is well in hand over a further 271 ch. In addition sixty culverts were placed and covered, and the road-line was double-fenced for 78 ch.

Broadwood–Runa Runa Road (Hokianga County).—The following work has been completed: re-formation 16 ft. wide, 256 ch.; formation 24 ft. wide, 81 ch.; formation 22 ft. wide, 84 ch.; formation 16 ft. wide, 23 ch.; formation 14 ft. wide, 28 ch.; cutting off corners, 4,613 cub. yd.; removing slips 1,100 cub. yd.; four 28 ft. and nine 18 ft. timber culverts; 22 ch. of drains; metalling 367 ch., and one 60 ft. bridge with approaches.

Iwitaua Road (Hokianga County).—186 ch. were widened to 16 ft., 8 ch. to 14 ft., and 29 ch. of new formation completed.

Mohuiti Road (Hokianga County).—227 ch. of formation 20 ft. wide completed, metalled, and rolled, and 225 lin. ft. of concrete culverts placed.

Kaingaroa–Fairburn Road (Mangonui County).—The following work was completed: Widening from 6 ft. to 12 ft., 237 ch., and from 12 ft. to 14 ft., 210 ch.

Mangonui–Stoney Creek Road (Mangonui County).—Re-formed 240 ch. and metalled 120 ch.

Waipapakauri–Tangoake Road (Mangonui County).—This road was reconstructed over a length of 684 ch., and widened to 16 ft. for 20½ m. 26 ch. of drains were completed.

Mareretu–Waikiekie (Keay's Deviation) (Otamatea County).—59½ ch. of formation 18 ft. wide completed, 54 ch. of drains cleared, 310 lin. ft. of pipe culverts placed, and one stock-bridge erected.

Allison's North Road (Whangarei County).—180 ch. re-formed and metalled, and 144 lin. ft. of culverts placed.

Ody's Road (Whangarei County).—233½ ch. of 14 ft. formation completed.

One Tree Point – Ruakaka Road (Whangarei County).—100 ch. of this road were formed and metalled, 2½ m. of drains cleared and widened, and one 30 ft. pipe culvert placed.

Ruakaka Bridge (One Tree Point – Ruakaka Road) (Whangarei County).—The girders for this bridge were delivered on the site, and timber, &c., has been ordered.

Kaeo River Bridge (Kaeo Village Road) (Whangaroa County).—The rolled-steel joists and all timber have been delivered on site.

Oakleigh–Waipu Road (Whangarei County).—Substitution of road for railway: A small amount of metalling which was left over the previous year was completed during the first two weeks of this year. During the winter, gangs were engaged on maintenance, rollers being used to consolidate the road. The surface was maintained with metal chips from the quarries at Tauraroa and Allison's, and the rollers were kept in constant use up till the end of October. Immediately the fine weather set in, the risk of fast traffic disintegrating the dry surface became apparent, and it was decided to maintain a loose surface over the whole length of 17 m. For this purpose the surface was spread with approximately 1½ cub. yd. of loose chips per chain, and this loose surface was maintained by the regular use of graders dragging in the fine metal as thrown to the side by the fast motor traffic, and the road was maintained in good condition from end to end.

Coromandel–Colville Coast Road (Coromandel County).—1 m. 36 ch. of engineering surveys were carried out, and plans completed. The balance of the formation was completed and maintained, four bridges were erected, and 765 lin. ft. of culverts placed. The whole road was opened for vehicular traffic.

Oteao Bridge (Gumtown–Whenuakite Road) (Coromandel County).—This second-class bridge of three 25 ft. spans in New Zealand timber, with approaches, was completed during the year.

Titi–Puni Road (Franklin County).—This road was metalled 10 ft. wide for a distance of 2 m. 3 ch.

Haratonga–Kaitoke–Whangaparapara Road (Great Barrier County).—One bridge, 65 ft. in length, was erected, and approaches completed.

Maukoro Canal Road (Hauraki Plains County).—215 ch. of metalling were completed.

Kawaroa Road (Kawhia County).—A further 2 m. 76 ch. of track was widened to 14 ft., leaving only 1 m. 43 ch. of widening to complete the whole road, which is 9 m. 12 ch. in length.

Clevedon–Takanini Road (Manukau County).—260 ch. of formation and culverting were completed.

Mangere Road (Manukau County).—139 ch. of bitumen surfacing 16 ft. wide completed during the year.

Putaruru–Waotu Road (Matamata County).—87 ch. metalled 13 ft. wide, 239 ch. metalled 12 ft. wide, and 342 ft. pipe culverts laid.

Mangawhero Road (Otorohanga County).—2 m. 12½ ch. of 16 ft. formation done, 144 lin. ft. of pipe culverts laid, and timber for the Mangawhero Steam Bridge delivered. A contract for the erection of this bridge has been arranged.

Te Kawa – Ngaroma Road (Otorohanga County).—229 ch. of road were metalled.

Hangawera Road (Piako County).—3 m. of road were metalled.

Waihou River Bridge, Te Aroha (Piako County).—This bridge, consisting of ten 40 ft. reinforced-concrete beam spans on mass concrete and pile piers and abutments, is in hand by the Te Aroha Borough Council.

Huntly–Rotowaro Road (Raglan County).—4 m. 52 ch. road formed 18 ft. wide and metalled.

Port Waikato – Tuakau (Raglan County).—117 ch. formed and metalled, and proposals have been approved for a further 111 ch. of metalling.

Hoteo River Bridge (Helensville to Port Albert Road) (Rodney County).—This bridge, consisting of three 40 ft. and five 30 ft. spans, with rolled steel joists and reinforced concrete piers, was completed at a cost of £5,670.

Tapu–Coroglen Road (Thames and Coromandel Counties).—This road was opened for vehicular traffic at Easter. One 40 ft. and one 15 ft. bridges were erected, and three box culverts and 438 ft. of concrete-pipe culverts were placed. The whole road over a total length of 15¼ m. was maintained throughout the year.

Tamahere–Tauwhare Road (Waikato County).—211 ch. of reconstruction were carried out, and the foundation course completed in readiness for sealing next year.

Te Awamutu – Arapuni Road (Waipa County).—183 ch. of formation 18 ft. wide completed, and 530 lin. ft. of culverts laid.

Waimauku – West Coast Road (Waitemata County).—Contracts covering 160 ch. of metalling were completed.

Orakei–Waterfront Road (Eden County).—This roadway is being constructed at the joint expense of the Tamaki West Road Board, Auckland City Council, and the Government, to give improved access to the new suburbs, including the new garden suburb at Orakei. Commencing at Campbell Point, which is 1 m. from the Auckland Chief Post Office, it parallels the Auckland–Westfield Railway deviation for 50 ch., thence diverging eastward in a long sweep across Hobson Bay to the cliffs at Hobson Point; after following the cliff fronting the Orakei Suburb for a distance of ½ m., the roadway continues across the flat on the foreshore of Okahu Bay to join up with a 20 ch. length of road previously constructed on the top of the sewerage storage tanks. The engineering survey was completed in October and formation work was commenced immediately afterwards. A feature of the work is the construction of a heavy sea-wall of dumped rubble rock which protects both road and railway, its cost

being divided between both works. During the year 60 ch. of this wall were completed. The formation is being carried out with four steam-shovels, supplemented by manual labour parties. Spoil is being placed at the rate of from 20,000 cub. yd. to 25,000 cub. yd. per month. Borings were taken at the bridge-sites, and sufficient data was obtained to enable a design to be prepared.

Orakei Garden Suburb (Eden County).—This work was commenced in May, and the following works were completed: Street-formation—3 m. 52 ch.; kerbing and channelling, 3,746 lin. ft.; kerbing only, 10,600 lin. ft. Storm-water drainage—5,500 lin. ft. of field tiles and 4,952 lin. ft. of pipes were laid. Cess-pits—Forty-eight completed, and a considerable amount of open ditching and stone drain. Foundation course—90 ch. full width and 38 ch. half width, consisting of some 6,000 cub. yd. of rough scoria and bluestone rubble, were completed.

Ongaroto Road (Taupo County).—5¼ m. of new road formed.

Opotiki–East Cape Road (Opotiki County).—A further 2 m. of formation were completed. Hawai Stream Bridge, consisting of two spans of 60 ft. and one of 25 ft., and Torere Stream Bridge, of one span of 32 ft. and two of 18 ft. were erected. Piles for testing the foundations for the Motu River Bridge have been driven, and 5 m. of engineering surveys completed.

Opotiki–Matawai via Waioeka Road (Opotiki County).—A further 5 m. of formation, mostly in heavy rock cuttings, were completed to a width of 16 ft., and 60 ch. widened to the same width; 265 ft. of timber box-culverts and 1,272 lin. ft. of concrete-pipe culverts were placed, and two concrete fords and four concrete retaining-walls were completed. A bridge consisting of one 30 ft. and one 25 ft. steel-joist spans on concrete piers across Sulphur Creek, and the Maukoro Bridge, of one 35 ft. steel-joist span and one 24 ft. and one 19 ft. stringer spans on concrete piers were erected. An engineering survey of a further 2 m. 70 ch. was made. The contract for this remaining section was recently let.

Rotorua–Tauranga Direct Road (Rotorua County).—The Mangapouri Bridge of one 40 ft., two 30 ft., and one 16 ft. spans was erected, and deviation of 1 m. over the gorge was formed and partly metalled. A further 60 ch. on various sections were metalled.

Rotorua–Atiamuri Road (Rotorua County).—3 m. of road were resurfaced with pumice and shingle, 6,030 cub. yd. of material being used; 950 cub. yd. of clay strippings were used to widen the road; 94 lin. ft. of pipe culverts were placed; one 25 ft. bridge was erected; and an 8 ch. deviation was completed.

Tauranga–Rotorua Direct Road (Tauranga County).—On the Pye's Pa section of this road a length of 35 ch. was metalled, and the section through the Akeake was widened to 18 ft. Between the Akeake junction and the county boundary minor deviations are in hand, and approximately 35 ch. have been re-formed on the new location.

Rotoma Soldiers' Settlement (Whakatane County).—1 m. 44 ch. of formation, with necessary culverting, completed, and one 25 ft. span bridge erected over the Karaponga Stream.

Ruatahuna–Waikaremoana Road (Whakatane County).—This road was widened from 6ft. to 12 ft. over a length of 4 m., and formation now extends for 7 m. beyond Ruatahuna. 458 ft. of pipe culverts and 40 ft. of box culverts were placed.

Urewera Block Roads (Whakatane County).—6 ft. track was completed from 21 m. to 35 m. on the main road line and the Maungapohatu Track was formed for a distance of 3 m. 23 ch., 48 ch. of formation on branch track were also completed. The bridges at 3 m. 70 ch. (consisting of one 80 ft., one 25 ft., and one 15 ft. spans), at 8 m. 24 ch. (one 25 ft. span), at 10 m. 35 ch. (one 80 ft. span), and at 17 m. 67 ch. (three 25 ft. spans) were erected. The road from Waimana to Tawhana Flats and the track on to Maungapohatu were maintained, several heavy slips having been removed.

Hangaroa–Tahora (Cook County).—1 m. 60 ch. of metalling and 104 lin. ft. of culverts completed.

Ormond Road via Waiohika (Cook County).—2 m. 12 ch. of metalling completed.

Main East Coast Road, Hicks Bay to Waikura Section (Matakaoa County).—2 m. 31 ch. formed and 1,294 lin. ft. of culverts placed.

Tolaga Bay–Arakihi Road (Uawa County).—77 ch. of formation, 1 m. 79 ch. of metalling, and 246 lin. ft. of culverting completed.

Moanui Road (Waikohu County).—60 ch. of engineering survey, 48 ch. formation, and 401 lin. ft. of culverts completed.

Te Maire Bridge, Wanganui River (Kaitieke County).—A commencement has been made on this composite truss bridge consisting of one 110 ft., two 60 ft., and two 25 ft. spans on mass concrete piers.

Wanganui River Road, Te Maire to Kokakonui (Kaitieke County).—2 m. of formation completed, one 22 ft. and one 28 ft. bridges erected, and 301 lin. ft. of culverts placed.

Tongaporutu–Mangatoa Road (Ohura County).—1 m. 53 ch. of formation, 2 m. 72 ch. of metalling, and 700 lin. ft. of culverting completed.

Otunui North Road (Taumarunui County).—4 m. 16 ch. formed, and 324 lin. ft. of culverts placed.

Papakauri Road (Waitomo County).—Two bridges, one 28 ft. and one 52 ft., were erected, and 1 m. 2 ch. formation completed.

Rangitoto Road (Waitomo County).—1 m. 14 ch. formed, 1 m. 36 ch. metalled, and 124 lin. ft. of culverts placed.

Rerekino Road (Clifton County).—Extended as a dray-road for a further 1 m. 73 ch.; one 59 ft. bridge erected, and 209 lin. ft. of culverts placed.

Okahu Road (Newall Road–Kahui Road) (Egmont County).—69 ch. formation, 30 ch. metalling, and 215 lin. ft. culverts completed.

Rawhitiroa Road (Eltham County).—1 m. 10 ch. of metalling completed.

Mabin Road (Lower) (Patea County).—2 m. 75 ch. of formation done, and 90 lin. ft. of culverts laid.

Waitotara River Bridge (Waitotara Valley Road) (Patea County).—This bridge, consisting of one 100 ft. truss, two 40 ft. trusses, and three 25 ft. platform spans, was erected. By the completion of this bridge dray-road access is now available to the Upper Waitotara Valley Settlement.

Mangaohane–Napier (Rangitikei County).—1 m. 40 ch. of this road was metalled.

Pipiriki–Raetihi Road (Waimarino County).—1 m. 6 ch. metalled, and 186 lin. ft. culverts placed.

Waimarino–Raetihi Road (Waimarino County).—2 m. 26 ch. formed, and 64 lin. ft. culverts placed.

Mokau Valley Road (Waitomo County).—2 m. 22 ch. formed, 328 lin. ft. culverts placed, and 64 ch. engineering surveys completed.

Wanganui River Road (Right Bank) (Waitotara County).—This road was metalled over a length of 2 m. 29 ch.

Wangaehu Valley (Upper) (Wanganui County).—The formation on this important road was extended a further 1 m. 7 ch.

Whangamomoma Valley Road (Whangamomona County).—5 m. 40 ch. of metalling completed during the year.

Crownthorpe Settlement Roads (Hawke's Bay County).—This road was metalled for a distance of 3 m. 40 ch.

Tutira–Pohokura Road (Hawke's Bay County).—This road, which provides access to both Crown and private property, was formed for a distance of 4 m. 8 ch., and 878 lin. ft. of culverts were placed.

Mangataura Stream Bridge (Waipawa County).—This bridge, 70 ft. in length, was erected.

Erepeti Road (Waipaoa Block (Wairoa County).—63 ch. engineering surveys, 40 ch. formation, and one 53 ft. bridge completed, and 208 lin. ft. culverts placed.

Willow Flat Road (Wairoa County).—The following work was completed: Engineering surveys, 20 ch.; formation, 1 m. 40 ch.; one 18 ft. bridge; and 357 lin. ft. of culverts.

Pongaroa–Akitio Road (Akitio County).—18 ch. formation and 2 m. 10 ch. metalling completed.

Tinui–Pakowai Road (Castlepoint County).—79 ch. of formation completed, and 468 lin. ft. of culverts laid.

Awhea Road, Tuturumuri Settlement (Featherston County).—1 m. formed and metalled.

Hutt–Waikanae Road (Hutt County).—2 m. formed.

Leen's Line Road (Manawatu County).—Formed and metalled over a length of 1 m. 31 ch.

Benton's Road (Mauriceville County).—1 m. 70 ch. formed and metalled.

Awatere River Bridge, Limestone Ford (Awatere County).—This suspension bridge of one 120 ft. span, one 25 ft. end span, 10 ft. 6 in. roadway, together with 1¼ ch. of approaches, was completed.

Awatere River Bridge (access to Medway) (Awatere County).—A bridge consisting of three 110 ft. truss spans, three 25 ft. stringer spans, with 10 ft. 6 in. roadway, carried on mass concrete piers and abutments, was erected, and 4½ ch. of approaches completed.

Blenheim – Hope Junction via Tophouse (Marlborough County).—The formation and metalling of 8 m. 2 ch. on the Wash–Tophouse section is in hand. 7 m. 50 ch. has been formed to a width of 16 ft. and metalled 10 ft. wide. This is an important work, as, when completed, it will provide a through metalled road from Blenheim to Tophouse, and will eventually join up with the Nelson–Westport Main Highway at Hope Junction, thus providing a metalled road between Blenheim and the West Coast.

Wairau River Bridge (Upper), Blenheim – Hope Junction Road (Marlborough County).—This bridge, which will consist of one 140 ft. and three 80 ft. spans, with 12 ft. roadway, carried on mass concrete and cylinder piers and abutments, is in hand. Pier D and abutment E have been completed and spanned by the 140 ft. truss, and both cylinders for abutment A and the up-stream cylinder of pier C have been sunk.

Roding River Bridge (Johnson's) (Waimea County).—A contract for the erection of this bridge has been let. The concreting of piers and abutments has been completed, and approaches are being formed.

Brunner Bridge (Greymouth–Reefton Main Road) (Brunner Borough).—This bridge, consisting of a new suspended truss span 300 ft. long, with new cables and anchorages and strengthened towers, was completed.

Little Wanganui – Wangapeka (Buller County).—20 ch. of dray-road re-formed and gravelled, 100 ch. regraded, and 46 lin. ft. culverts laid.

Westport–Greymouth Coast Road (Buller County).—This road, when completed, will be a through tourist road between Westport and Greymouth, and will shorten the present route by 40 m. During the year 60 ch. of formation on the Church to Fox's River section were completed. From Fox's River to Bullock Creek 9½ ch. of formation were completed and 34 ch. of metalling done. A contract has been let for the formation of the Gentle Annie – Bluff section, which is 33 ch. in length, and engineering surveys of the three main bridge-sites were completed.

Grey Valley – Taramakau Road, Lady Lake to Bell Hill (Grey County).—87 ch. of 17-ft.-wide formation and 72 ch. of metalling were completed during the period.

Matakitaki–Springlands Junction (Inangahua County).—An additional 2 m. of engineering surveys were completed; 2 ch. were formed; 1 m. 60 ch. metalled; two platform bridges, 17 ft. and 27 ft. respectively, erected; and 144 lin. ft. of culverts placed.

Waiho River Bridge, Main South Road (Westland County).—This bridge, 300 ft. long, of the suspension type, with two 150 ft. steel trusses, hinged at centre and supported on hinged towers at the abutments, was completed. It gives access to South Westland below Waiho.

Menzies Bay – Little Akaloa (Akaroa County).—162 ch. of road on heavy side cutting, mostly rock formation, were completed. The necessary culverts were put in, and one first-class bridge 25 ft. in length was erected.

Hind's River Bridge (Poplar Road) (Ashburton County).—This bridge to first-class standard, 160 ft. long, consisting of eight 20 ft. beam spans on ironbark pile piers, with approach banks and metalling, was completed.

Puhipuhi East Road (Kaikoura County).—80 ch. of road formed 14 ft. wide and metalled.

Evans Pass–Godley Head Road (Lyttelton County).—4 m. 12 ch. widened from 4 ft. to 12 ft. in side cutting, mostly rock.

Cairn Road (Bruce County).—1 m. 40 ch. of metalling completed.

Switzer's Road (Tuapeka County).—1 m. 31 ch. formed, and 1 m. 10 ch. metalled.

Omarama–Lindis Pass (Waitaki County).—1 m. formed and 5 m. 16 ch. metalled.

Lawson Road North (Southland County).—1 m. 68 ch. formed, and 148 lin. ft. culverts laid.

Tokanui–Haldane (Southland County).—5 m. 1 ch. metalled.

Key – Te Anau (Wallace County).—5 m. 38 ch. formed and metalled, and 1,342 lin. ft. culverts laid.

HYDRO-ELECTRIC WORKS.

Horahora.

At the end of the period covered by my last report the construction work in connection with the erection of a permanent weir across the Waikato River to provide water at low-river stage for the enlarged power-station had almost been completed. Items such as the erection of the light footbridge along the crest of the weir, the concreting of the balance box of the Ransome-Rapier gate, the final adjustments of the gates, and some concrete-work raising the level of the head-race spillway, were completed. The work was finally completed in October, 1926.

Arapuni.

Although the contractors, Messrs. Sir W. G. Armstrong, Whitworth, and Co., have lately made substantial progress on No. 1 section of the contract, yet, having regard to the fact that the contract time expired on the 12th July, 1927, a review of the whole situation cannot but disclose disappointing and unsatisfactory progress. In particular, at the power-house and its foundations progress has been so small as to be practically negligible. The steps taken by contractors to overcome the inroad of water from the river into the excavation for the power-house foundations have been quite inadequate, and after months of time spent on insufficient effort that portion of the work is now at a complete standstill. The effect of this delay on the completion of the works is most serious, especially in view of the Department's commitments for power in the area to be supplied from this power-station. The obligation on the contractors to spare no effort to get on with this portion of the work is most urgent, and is being pressed on them to the utmost by the Department.

A summary of the progress made on the various portions of the contract is as follows :—

No. 1 Section of Contract.—The metalling of the access road, Putaruru to Arapuni, is complete, $1\frac{3}{4}$ m. being metalled during the year. The Waikato River diversion tunnel was completed on the 16th July, 1926. The method proposed for removing the barriers of rock and talus between the inlet and outlet ends of the tunnel was by the firing of charges of explosives placed in a series of galleries and a series of drilled holes respectively. A total of 1,421 lb. of explosives was used at the outlet end, and 6,475 lb. at the inlet end. This method proved effective. The next or associated step was the building of auxiliary dams in the bed of the river to enable the permanent-dam site to be unwatered. The upper one of these, located immediately below inlet to diversion tunnel, was built of gabions of rock spalls in wire-net crates. The lower auxiliary dam was built in the dead-water just above the outlet of the diversion tunnel, and consisted of two barriers of rock spoil with fine pumiceous material filled in between. These works were successful, and after some delay, due to floods, the dam-site was unwatered at the end of October, 1926.

The diversion-tunnel gates have been erected and riveted up and painted. The gate shaft has been concreted to ground-surface level, and a commencement made with the erection of the permanent operation gear.

At the dam-site the excavation for the dam-foundations proceeded vigorously, three shifts being employed, concreting of the side sections of the dam going on simultaneously. At the centre section and western side of the dam good foundations were obtained at approximately the level shown on the contract drawings. On the eastern side one section of the excavation had to be carried 32 ft. lower than level shown on drawings to remove a soft pocket of material unsuitable as a foundation. To the end of June last a total of 54,650 cub. yd. of excavation had been removed, and a total of 50,704 cub. yd. of concrete had been placed. In this latter work good outputs, up to 475 cub. yd. of concrete, have at times been placed per eight-hour shift.

For the penstock intakes all the material for the gates and screens is now on the works. Concreting of the intake structure was begun in November, and intakes 5, 6, 7, and 8 are well in hand. The spillway-weir and spillway-weir extension are practically completed except for a 20 ft. length left for construction purposes. An additional cut-off wall containing 100 cub. yd. is needed to secure a section of the foundations where pumiceous material underlies the rhyolite foundation. A further additional work is the putting-down of a concrete floor over a considerable area of the excavation below the spillway-weir, necessitated by the occurrence of softer beds of material in the floor disclosed by excavation. This work is in hand. The total quantities of excavation and concrete to the end of June are 42,957 cub. yd. and 8,118 cub. yd. respectively.

No. 2 Section of Contract.—In April last a start was made placing the steel lining of the penstock-tunnels, and No. 1 penstock is now almost completely lined and concreted, and similar work has been begun at No. 2 penstock. At the outdoor step-up transformer station the main outdoor building is practically complete. The concrete foundations for the 50,000-volt and 110,000-volt outdoor

equipment and steel structures are complete, and the erection of the steel structures themselves is almost complete. The pipe and cable trenches and the floor slab have been concreted. The cable-tunnel has been excavated and concreted, and the cable-house at the top of the tunnel has been built.

Electrical Equipment.—The following plant has arrived at the site: 3 generators, 2 turbines, 3 Larner-Johnson valves, 10 5,900 kv.a. transformers, 4 4,700 kv.a. transformers, 4 150 kv.a. service transformers, 6 110,000-volt oil-switches (less tanks), 7 110,000-volt isolating-switches, all 50,000-volt switch-gear, all 11,000-volt switch-gear, and all switchboards. The 50,000-volt oil and isolating switches are erected, and also 7 110,000-volt isolating-switches. The oil purifying and testing plant has been erected and tested. Oil-pipes to the transformers are now being installed. 925 drums of transformer and switch oil have arrived.

Waikaremoana.

The first stage of the above power development involves the diverting of the Waikaretaheke River, which is itself formed by the overflow from Lake Waikaremoana into Lake Kaitawa, whence it will be conveyed by tunnel and pipe-lines to the generating-station at Whakamarino. The principal features of the work are the intake race which will convey the water from the Waikaretaheke to Lake Kaitawa, the approach canal from Lake Kaitawa to the tunnel, the tunnel itself, the dam at the southern end of Lake Kaitawa, the surge-chamber, pipe-line, and power-house.

Before work could be started in earnest on the above items it was necessary to metal and extend access roads to the main generating-station site at Whakamarino and the headworks at Kaitawa. The capacity of the original generating-station had to be increased to cover the additional demand due to the construction plant as well as to the increasing requirements of the Power Board. This was accomplished by installing a 1,000 kv.a. unit with an additional pipe-line 4,446 ft. in length and with a head of 650 ft.

Accommodation for workmen and service buildings have been erected at Whakamarino and Kaitawa. At each camp a social hall has been built and placed under the direction of a Church Army officer. In addition to the regular service buildings, sheds, workshops, &c., the main office, temporary staff quarters, and married workman's quarters have been built.

The intake race which will convey the water of the Waikaretaheke to Lake Kaitawa was commenced in July last, but progress was necessarily slow owing to the swampy nature of the country. The excavation, trimming of batters, and concreting have now been completed. Considerable difficulty was caused by the presence of springs on the upper side of the race, but this was dealt with by means of drains laid with open joints in crushed metal. Where not concreted, the walls have been protected by stone pitching and a toe of heavy spalls.

As the design provides for the raising of the level of Lake Kaitawa 10 ft. above the original level, it is necessary to construct an earth dam at the south end of the lake. To achieve this a strata of porous pumice at the dam-site has been removed and a pug-core wall carried down to reach as nearly as possible an impervious layer. The completion of the dam and the final raising of the lake-level will be carried out later.

The excavation of the approach canal leading from Lake Kaitawa to the tunnel was commenced in February last by hand-labour, but later a mechanical excavator has been operating satisfactorily at this point, and work is well in hand. During the period, 205 ft. of completed tunnel and 74 ft. of bottom heading from the Kaitawa basin to the head of the pipe-line have been driven. In order to enable the tunnelling to be carried out independently of the surge-chamber, an adit 110 ft. in length was driven to intersect the tunnel clear of the surge-chamber workings, and later a start was made from the intake end of the tunnel.

Excavation of the surge-chamber was commenced in January and completed in May, 10,894 cub. yd. having been taken out. Concreting was then put in hand and has continued steadily since, except for a short period when work was held up on account of slips.

The excavation of the pipe-line bench has been completed, the work being carried out by means of ploughs and scoops, 51,830 cub. yd. of material being shifted. The pipe-line is being built under contract, and the contractor is now carrying out his preparatory work, erecting workshops and plant for fabricating the pipe on the site. The pipe-line tramway has been laid; No. 3 anchor block has been concreted to invert level, and work is now proceeding on No. 2 anchor block and pedestals above it.

The foundations for the main generating-station at Whakamarino Flat are in hand. Considerable difficulty has been experienced in this work, due largely to the level of the column-foundations being below the water-level of the Kahutangaroa Stream, this involving continuous pumping in order to keep the workings sufficiently free from water. To date 2,690 cub. yd. of concrete and 26½ tons of steel have been placed in the power-house building.

The provision of accommodation for the permanent operating staff has been put in hand. A contract has been let for six five-roomed cottages and is nearing completion. A septic tank, drainage, and water system have been installed for this permanent village.

The fine aggregate for concrete is obtained from the Waikaretaheke River at Mitchell's turn-off, 7 m. from the power-house, by means of a drag-line scoop which was installed for the purpose; the coarse aggregate for concrete and for road-metal is quarried and crushed at Kaitawa and Tuai. Another crushing plant is being installed at the Mangaone Creek to supply road-metal for the portion of road between Terapatiki and Kaitawa.

In order to provide timber for its many operations, the Department purchased a sawmill formerly owned by the Wairoa Timber Co. Approximately 1½ million feet of timber have been turned out by the Department since taking over.

An unloading-store equipped with a 30-ton crane is now in course of erection at the Wairoa station-yard. Material and plant will be unloaded at the Port of Waikokopu, where another 30-ton crane is being provided, and then railed to Wairoa, where it will be stored until required at the works.

MANGAHAO.

Mangaore Section.—The Mangaore Stream now carries all the tail-water from the power-house of this scheme, and as a consequence a certain amount of erosion has taken place, due to the additional quantity of water added to the normal flow. At the same time, it must be pointed out that the normal flow under present conditions is very much less than the previous flood flows, which were responsible for considerable erosion long before the power-station was erected. It is considered that a reasonable balance will shortly be obtained, and that after that no excessive erosion should occur, except that due to flood flow. In the meantime the Department has agreed to construct protection works where needed, and in accordance with that policy a considerable number of gabion and stone groynes have been constructed. Three additional bridges have been erected to give internal access to various settlers, and a weir 150 ft. long has been built to improve a ford in the lower part of the river. In the lower portion of the tail-race, the additional water tended to interfere with the drainage of several properties, and to overcome this the Department has hired a floating dredge from the Makerua Drainage Board to improve the outlet for a distance of 60 ch. from its junction with the Manawatu River.

Arapeti Section.—The balance of construction material was removed, and the permanent electrical installation, with outdoor transformer for the gate-shaft control at No. 2 tunnel, was completed. The sawmill was kept steadily in operation throughout the period, the output being mainly used for housing and construction purposes at the No. 3 dam; but portion of the timber is being supplied to the Palmerston North Railway deviation.

Mangahao Section.—No. 1 dam: The automatic spillway gates have been kept under close supervision, and where necessary adjustments have been made.

No. 3 dam: This work, of course, represented the main development work on the scheme for the period under review. A very great deal of preliminary work had to be carried out before a start could be made with the construction work proper. The site of the dam itself is in a comparatively narrow gorge, with a very limited area of suitable ground surrounding it on which to provide housing and construction facilities. Where possible, hutments, &c., were shifted from the lower dam, but in addition to this it was necessary to considerably increase the present accommodation.

The main crushing and screening plant, which stands on the side of the gorge, was completed early in the period; it is 173 ft. above the river-level, and is equipped with bins of 600 cub. yd. capacity, and duplicate crushing, screening, and sandmaking machines, all driven by electric motors. The aggregate itself is obtained from deposits in the stream, both at the head of the existing No. 1 dam and by the construction of shingle-traps above the new dam. These deposits were connected with the screening plant and metal-dumps by tramway, 6,800 ft. of track being laid and ballasted during the year, independently of that laid in the river to the various shingle deposits. The rolling-stock using the tramway consisted of light metal-wagons hauled by small oil-locomotives. A large reserve dump was established to enable work to be carried on continuously during periods when the river was unworkable. These dumps are connected with the screening and mixing plant by means of an inclined tramway 1,070 ft. long, operated by motor-driven hauling-winches. An auxiliary aggregate supply was obtained by opening up a quarry near the crusher. A supplementary screening and crushing plant was also erected at the head of the No. 1 dam, and additional bins, with a capacity of 220 cub. yd. were erected adjacent to the dam core-wall section. Two mixers were established adjacent to the main screening plant, and duplicate chute-lines were carried to the limits of the main dam section. A second mixing plant, with associated hauler and feeder lines, was established on the opposite side of the gorge.

By-pass tunnel: This was completed and the river diverted in August last, the following work having been carried out since the end of last period: Concrete invert, 39 ft.; enlarged inlet portal, 34 ft.; outlet, 23 ft.; 8-ft.-diameter tunnel barrel-lining, 200 ft.

Main diversion dam: This temporary dam, 95 ft. long, 32 ft. wide, and 13 ft. high, was constructed across the gorge near the entrance to the by-pass tunnel. It was constructed with heavy transverse and longitudinal logs, with a consolidating filling of 1,500 cub. yd. of boulders from the core-wall excavation, all placed from the upper terrace by a motor-operated flying-fox line.

Coffer-dam: In order to enable the foundation for the dam and core-wall to be constructed in the bed of the river, a coffer-dam was built across the gorge below the diversion dam. This consisted of two parallel rows of interlocking steel-sheet piling above the coffer dam and a similar double row below the toe of the dam, with concrete filling poured between the rows to tighten and consolidate the work. Two 10 in. centrifugal pumps mounted on skids were used for pumping out this coffer-dam. After unwatering, it was necessary to excavate 2,000 cub. yd. of material, the bottom of the dam as finally exposed consisting of hard waterworn rock. During the period that work was being carried out on these foundations severe and constant flooding was experienced throughout, and it was only by constant work night and day whenever conditions were at all possible that the difficulties were eventually overcome.

No. 3 dam excavation: This involved the completion of the core-wall trench, the base of the main gravity section adjoining the foundation of the main dam in the gorge, the extension of the cut-off trenches, additional rock-excavation on the sides of the gorge, the lateral and longitudinal extension of the toe of the dam, and the excavation of the lower sections of the spillways. The core-wall trench was everywhere carried at least 5 ft. into solid rock. During the period 25,583 cub. yd. of concrete were placed in the core wall and main dam. Concreting operations in the core wall were much retarded by an exceptionally wet season, also the presence of springs and excessive water made concrete progress very slow until the drier summer months. Three shift operation was maintained throughout the year, and this enabled good progress to be made in spite of floods and excessive rain, the latter being indicated by the fact that the rainfall for the year was 145 in. Maintenance and improvements in connection with

the housing of workmen and staff were kept up-to-date, sanitation, drainage, electric lighting, roading, &c., all being provided. The cookhouse erected and equipped by the Department has been run throughout the year by a contract caterer, who has maintained a fine service and organization, resulting in an entire absence of complaints from the workmen. The activities of the Y.M.C.A., which is subsidized by the Department, have made a wonderful difference to the life of this isolated camp, and given both the men and their families a marked social interest, which has tended to retain a better class of workman.

Lake Coleridge.

The year covered by my last report marked the completion of construction work in connection with the enlargement of the Lake Coleridge Station, with the exception of pressure grouting, which had been commenced in No. 2 tunnel. This work had to be discontinued at the beginning of the year now under review, as the tunnel had to be put into commission. On the 6th October, 1926, No. 2 tunnel was again drained, and three shifts were employed on grouting-work for a period of three months, during which time a distance of 63 ch. of tunnel was grouted, two cement-guns being in use. Cement mortar was forced under pressure into any open ground that existed behind the concrete lining of the tunnel, and during the course of the work a quantity of approximately 1,000 cub. yd. of grout was used.

RIVER IMPROVEMENT AND PROTECTIVE WORKS.

Wairoa River.

Tokatoka Stop-banks.—During the year the reconstruction or enlargement of the original inadequate stop-banks built for protection of the Rauwai Flats, on the Wairoa River, against tidal action has progressed steadily. Work is being done with a Bucyrus drag-line excavator, which excavated during the year 70,000 cub. yd., completing 4½ m. of stop-bank.

The foreshore is subject to erosion from waves and current-action, and protection by laying a covering of rock spalls is necessary. During the year a contract was let for the supply and delivery of 10,000 cub. yd. of spalls as the first instalment of this work, and at the end of the year the contract was three-fourths complete.

Waihou and Ohinemuri Rivers.

This major work of rivers improvement and protection of adjoining lands from flooding has again made substantial progress this year.

Ohinemuri River.—The clearing of both banks and the bed of the river from the heavy growth of willows, stumps, and snags that obstructed it is completed. The reconstruction of the Ohinemuri River Traffic-bridge at Paeroa in reinforced concrete and steel is in hand. The bulk of the difficult foundation work is finished, good progress being made.

Lower Waihou River.—The main activity has been centred on the Lower Waihou River. The construction of the main stop-bank has proceeded steadily; two suction dredges, one electrically and one steam operated, being employed, together with one Ruston drag-line excavator, which follows behind the suction dredges, cleaning up the river-bank and soiling the stop-bank. For the year a total of 3½ m. of stop-bank of heavy cross-section has been built, requiring 450,000 cub. yd. of earthwork. Major improvement work has been done on the Hikutaia, Omaku, and Onetai Streams, tributaries of the Waihou River, the work consisting of willow-clearing, enlarging and straightening the channels, and building stop-banks, a second Ruston drag-line excavator being in use for this work. Willow clearing operations are now in hand on the Lower Waihou River, two steam-driven log-hauling plants being in use. Two large reinforced-concrete culverts with flood-gates have been built on this section.

Taieri River.

This work, designed to protect the Taieri Plains from flooding by the Taieri and Waipori Rivers, has made substantial progress during the last year. The essential feature is stop-bank construction, and two drag-line excavators and a suction dredge have been regularly in commission, the latter for portion of the year only. The total length of stop-bank made in the year covered by this report is 8 m., entailing the placing of 262,000 cub. yd. of earthwork, the total figures since the works commenced being 17 m. of embankment and 605,000 cub. yd. of earthwork. A commencement has been made cutting an extension of the contour channel from its present outlet to the new outlet on the reconstructed stop-bank system.

The earthwork on the Taieri Plains has now reached the stage where a substantial measure of additional protection is available from the stop-banks system on the right bank of the Taieri River between Outram and Lake Waipori.

A contract has been let for the supply from England of three low-head pumping units to be installed in a pumping-station to be erected alongside Lake Waipori for dewatering the plain. The nominal capacity of this pumping-station will be 90,000 gal. per minute, or 240 cub. ft. per second.

MARINE.

Lighthouses.

Piako River Leading-lights.—The original oil-burning leading-lights have been replaced by a small automatic flashing acetylene-burner mounted on a reinforced-concrete pile dolphin.

Kahurangi Point.—This light has now been converted from an oil-burning watched light to an automatic flashing light on the Dalen principle. The installation was completed during the year, but an additional burner is being provided, and will be installed on arrival.

Dog Island.—The existing accommodation for the keepers, which dates back to 1868, has become somewhat out-of-date and weather-worn. A contract has been let for the erection of two new and up-to-date dwellings, and material is now being landed on the island for that purpose.

French Pass Beacon.—This beacon, which was originally an oil-burner, has been converted to automatic operation. Previously it had to be attended to daily from the main-land, and was a source of considerable inconvenience. The new installation is a decided improvement.

Pencarrow Lighthouse.—The fog-signal at this lighthouse, which was of the old explosive type, has been dismantled, and a compressed-air diaphone signal has been erected in a suitable building, and is now in operation. This signal, which gives a distinctive blast of three seconds every minute, is one of the latest developments in this branch of engineering.

North Cape Light.—It is now proposed to erect a light on this point, and an order has been placed for an automatic flashing light with a range of approximately fifteen miles. The apparatus is expected to arrive shortly, when the work of erection will be put in hand.

Kaikoura Point.—An order has been placed for an automatic flashing light with open flame burner for this locality, and the apparatus has been landed. In order to proceed with the erection of the light, and to enable it to be attended to after erection, it is necessary to form about 20 chains of road, and this work is now being put in hand.

Kahu Rocks.—Provision was made on last year's appropriations for a sum to cover the erection of a light on these rocks. After a careful investigation it was found to be a very expensive matter to build a tower on the rock itself, on account of the difficulty in finding shelter for the workmen on the rock itself, or a suitable base of operations on the mainland from which the work could be carried out. It was then decided to place the light on the mainland, and after careful examination of the coast it was found that what is locally known as the Honeycomb Rock would provide a very suitable location, giving a clear view up and down the coast, and being comparatively close to the Kahu Rocks, which can be covered by a red sector. It is also of sufficient elevation to give a range of from twelve to fifteen miles.

Godley Head.—A modern diaphone fog-signal, operated by compressed air, has been landed for this station, the excavation of the site has been completed, and the foundations of the shed to house it have been put in. It is anticipated that the signal will be in operation shortly.

Cape Brett.—Various renewals and repairs were carried out to the keeper's residence.

Manakau South Head.—Arrangements are being made to convert this light from a watched light to automatic operation. Specifications have been prepared and orders placed for the apparatus.

Harbours.

Westport Harbour.—The main activities at this port during the past year have been in regard to dredging. The "Eileen Ward" was employed part time on the bar, but a great deal of dredging was also carried out in the berthage area and in deepening the full width of the river opposite the Crane Wharf in order to enable larger vessels to swing when fully loaded. This latter dredging was carried out by the Greymouth Harbour Board's bucket dredge "Mawhero," which was chartered for the work. A good depth of water has been maintained on the bar throughout, but the very high flood of the 4th and 5th November brought down very large quantities of shingle and debris generally, and, to a certain extent, undid a lot of the work done in the swinging-basin. The eastern breakwater and training-wall is in good order, but the western wall requires additional stone, and arrangements will be made to truck stone to this work from the Cape Foulwind quarry, which is at present in operation. In November last the most severe flood on record occurred in the river, owing to very heavy rains over the whole watershed; severe erosion took place above the Railway Bridge and at the island adjacent to the old relief channel. The banks, where eroding, are being protected with stone to prevent any further damage where it would be injurious to the harbour. The Cape Foulwind quarry has been reopened, and plant assembled for the quarrying of stone. Tram-lines are being built for the transport of stone, and the necessary transport arrangements made. Prior to the flood a certain amount of willow-planting had been put in hand, and this work will be continued during the ensuring period. Some snagging was also carried out on the section of river immediately above the Buller Bridge, but there is still a fair amount to do. The installation of electric lights on the eastern side of the harbour has been completed. All buildings, plant, dredges, &c., have been well maintained.

Karamea Harbour.—During the previous period a substantial addition to the original wharf has been added to cope with the timber traffic, and to this has been added tram and road accommodation to give access to the timber skidways. A new wharf-shed is in process of erection. A tramway is being built from the limestone and granite deposits at the Oparara to the training-wall. This tramway has been put in to tap the stone deposits in the Oparara Gorge for the purpose of gradually replacing the existing wooden structure by a permanent stone wall.

Little Wanganui.—A new wharf has been erected here, and it is proposed to carry out further improvements by means of a groyne when the traffic warrants it.

Russell.—A new reinforced-concrete wharf is being erected by the Bay of Islands Harbour Board, assisted by a substantial subsidy from the Government, and the work is now almost completed.

Waikokopu Harbour.—A considerable amount of work has been carried out here. The s.s. "Talune," which was sunk on the seaward side of the wharf to act as a breakwater, has been very effective in improving the conditions at the wharf. Recent heavy weather has, however, damaged her somewhat considerably, and she will probably require strengthening with stonework at an early date. The existing goods-shed has been enlarged and additional traffic facilities provided to deal with the business of the port, which has increased considerably during the past year.

Gisborne.—Owing to representations made to the Hon. Minister of Marine by the Board I visited Gisborne, and, after having inspected the works in company with the Board's Engineer, conferred

with the Board. The Board's request, it was found, was not for a comprehensive report, but for a reply to certain questions, to which answers were furnished as far as was practicable. The answering of a questionnaire prepared by a Harbour Board does not necessarily afford a Marine Engineer an opportunity of fully advising. The Board's position is unfortunate in that so much money has been expended in directions which would show full proportionate result only in a completed comprehensive scheme, and it has been particularly unfortunate in the quarrying operations which were to produce the stone for breakwater purposes. The scheme of works is one which can produce the full benefit only as a completed whole, and the Board's undertakings to the ratepayers apparently preclude their raising further moneys, at any rate until the position is better understood and the benefits of an overseas-ship harbourage appreciated.

Napier.—Matters in Napier have been very unsettled, and as a result of petitions it was decided to set up a Royal Commission to go into the whole matter, and it is hoped that the findings of this Commission (which has a most comprehensive order of reference) will settle a number of matters which have been in doubt and the cause of dissention on the Board and in the district, and will bring about a better state of things.

Waikawa Harbour.—A small wharf has been erected here for the convenience of the fishermen.

Waikouaiti River Entrance.—A small training-wall has been built and wind-breaks erected across the sandspit at the entrance of this harbour. The work has been partly financed by the Government and partly by the local residents.

Wharf and Shed, Hui House, Whangape.—This work has been completed and handed over to the trustees.

Havelock Wharf.—Fairly extensive repairs have been carried out to this wharf, the moneys being provided and the work carried out by the Department.

Paihia Wharf.—The construction of this wharf on a new site near the Post-office was finished during the year.

Horeke Launch-landing.—This launch-landing was undertaken and carried out during the year.

Mangawai Wharf.—Alterations to this wharf, consisting of the dismantling of the old shed and the erection of a new shed, were completed during the year by the Otamatea County Council.

General.

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

Wharves.—Western Wharf, Freeman's Bay, Auckland; Russell, Bay of Islands; New Plymouth; Tauranga Harbour; Tihitai Bay, Manukau Harbour; Weymouth Bay, Manukau Harbour; Mangawhare, Northern Wairoa River; Horeke; West Quay, Napier; Opunake; Wade River, Auckland; Matakaha.

Miscellaneous Works.—Storage culvert and promenade, Takapuna.

Wharf-sheds.—Hui House, Whangape Harbour.

Boat Sheds and Landings.—Anikiwa, Queen Charlotte Sound; Rawene, Hokianga River; Jock's Point, Wairoa River; Helensville, Kaipara Harbour; Karehana Bay, Picton; Wanganui River; St. Mary's Bay, Auckland.

Foreshore Licenses.—Little Passage, Coromandel; Koteonepoto Spit, Parengarenga Harbour; Rawene, Hokianga River; Whangaparapara; Narrows, Hokianga Harbour; Great Barrier Island; Rawene, Hokianga River; Whangape Harbour, Hauraki Gulf; Kaiarara Stream, Great Barrier Island; Anikiwa, Queen Charlotte Sound; Terakohe, Golden Bay; Kaihu Creek, Northern Wairoa; Elaine Bay, Pelorus Sound; Kaipipi Bay, Stewart Island; Waipu; Whangaruru; Helena Bay; Stony and Shag Bays, Coromandel; Kaipipi Bay, Paterson Inlet, Stewart Island; Ruakaka River, Whangarei; Rawene, Hokianga, Wairoa River; Branda Bay, Chaffer's Passage; Waiheke Island; Cowes Bay.

Harbour-works.—Wellington Harbour, dredging; Auckland Harbour; Tokamatua, Akaroa Harbour; Napier.

Boatslips and Sheds.—Bluff Harbour; Kaihu Creek; Northern Wairoa River, Kaipara Harbour; Tekipuri, Kaipara; Kaipipi Bay, Paterson Inlet; Helensville, Kaipara Harbour; Russell, Bay of Islands.

Timber Booms.—Ruakaka River, Whangarei.

Reclamations.—Bayswater, Auckland; Mussel Bay, Otago; Auckland Harbour; Whakatane.

Bridges.—Avon River, Bridge (street), New Brighton; Avon River, Seaview Road, New Brighton; Wairau Bridge, Takapuna; Kaitoke Stream, Great Barrier Island; Tamaki River, Kawakawa Bay, Manakau.

Dock.—Calliope Dock, Auckland.

DEFENCE WORKS.

Admiralty Naval Base and Fuel-oil Depot, Devonport.

At the end of last year the two 5,000-ton fuel-oil tanks had been erected, and the necessary pumping plant was awaited from England. This plant, consisting of a three-throw pump and 40 h.p. motor, arrived during the period covered by this report, and was duly installed and put into service. The fire-fighting plant, consisting of two 15-ft.-diameter chemical storage tanks, a 30 h.p. electrically driven pump, and a steam boiler, has been installed and is ready for use. A 100 h.p. Diesel engine and 52 kw. generating set has been installed, with switchboard complete, as a stand-by set.

Waikato Camp, Ngaruawahia.

During the past year steady progress has been made with the erection of the various buildings and other structures required for the training and mobilization camp, Ngaruawahia. The Ordnance Depot in reinforced concrete, 320 ft. by 100 ft., commenced at the end of the previous year, is now complete save for some plastering and painting. The internal fittings are being made on the ground. The Ordnance Offices and the Quartermaster's Store were erected during the year. Cottage No. 4 was finished, and cottages Nos. 1, 2, and 3 are in hand. Electric light, water-supply, and sewerage is being completed as the several buildings are ready.

IRRIGATION—CENTRAL OTAGO.

Operation of Completed Schemes.

General.—During the past year the several completed schemes have been maintained in good condition, and all lands requiring water have been supplied. Certain minor extensions to races have been made to supply new areas. Of those in operation, the Ida Valley, Galloway, Teviot River, and Bengerburn schemes are being operated on a trading basis, and, with full working-expenses being incurred, show results as follows: Revenue, £7,388; working-expenses, £3,806: profit on working, £3,582, this being an increase for the year of £450.

The number of irrigators and the total area irrigated on all Government schemes for the past year is as follows:—

Scheme.	Number of Irrigators.	Area under Irrigation.	Additional Works carried out during Year.
		Acres.	
Ida Valley ..	49	10,498	35 ch. distributary race.
Galloway ..	21	2,064	See below.
Manuherikia ..	65	5,178	Small extension to serve Borough of Alexandra.
Earnscleugh ..	54	1,851	..
Ardgour ..	14	1,494	16 ch. race lined in concrete.
Tarras	15	4,171	..
Last Chance ..	25	2,960	..
Teviot River ..	35	2,742	..
Bengerburn ..	10	144	..
Totals ..	288	31,102	

The corresponding total figures for the previous year were 279 irrigators and 27,314 acres irrigated.

On the Galloway scheme the new work comprised 900 ft. of pipe siphons, 2½ m. of new race, and the renovation of 1 m. of old race. These works enable a supply to be given to an additional area of 700 acres.

The three demonstration plots on the border-dyke method that were laid down and sown in the autumn and spring of 1926 in Galloway, Manuherikia, and Earnscleugh give indications of affording useful results. Another demonstration plot has been laid down in Tarras, and will be sown in the coming spring.

New Schemes under Construction.

Hawkdun Scheme.—Steady progress has been made during the year, and works completed include the renovation and enlargement of 37 m. 50 ch. of the Mount Ida Race, the renovation and re-laying of 51 ch. of pipe siphon, and the lining with concrete of the old Eweburn tunnel (length, 7⅓ ch.).

Arrow River Scheme.—The benching for the pipe-line in the gorge (length, 3¼ m.) is complete. Almost the whole of the main and distributary races are now complete, the length constructed during the year being 19½ m. Owing to shortage of funds, the building of the various siphons and pipe-lines could not be gone on with.

Surveys and Investigations.

Teviot River Scheme Extension.—A survey for an extension to serve an additional area of 1,800 acres on the east bank of the Clutha River has been completed, and construction will be put in hand shortly. A survey for an extension to an area on the west bank of the Clutha River has also been completed, and plans are in course of preparation.

Upper Manuherikia Scheme.—Investigations are still in hand to determine the irrigable area, the duty of water, and the financial possibilities of this big scheme.

Surveys are also being made in connection with the Miller's Flat and Roaring Meg schemes.

Soil surveys are in progress over the irrigable area of Central Otago as a result of arrangements made with the Geological Survey Branch of the Department of Scientific and Industrial Research. During the summer season 1926–27 this survey covered the Ida Valley, Upper Manuherikia, Scandinavian, Hawkdun, and Maniototo irrigation areas, representing an area of about 554 square miles. The result of these soil surveys will be of great value in assisting in the determination of the economic possibilities of the various proposed irrigation schemes, and in examinations into the question of the duty of water on irrigation areas.

TRAMWAYS.

Auckland.—The Eden Park loop, which was well in hand at the date of my last report, has been finally completed and passed. Three new cars were inspected and certificates issued.

New Plymouth.—8¼ ch. of single track were laid from the terminus at the Breakwater to facilitate passenger traffic from the wharves. This work was inspected and passed for traffic.

Wellington.—37 ch. of new track in Wakefield Street, 7 ch. in Hunter Street, and 15 ch. in Brooklyn Road, as well as a loop in Hobart Street, were inspected and passed for traffic. Various plans for new developments were considered and dealt with, but construction had not proceeded far enough to be included in this report. Eight new cars were examined, and certificates for these were issued.

Christchurch.—The Bealey Avenue portion of the St. Albans line was duplicated for 41 ch., and the existing portion of the line was relaid for a similar distance; the Barbadoes Street portion of this line was also relaid for a distance of 70 ch. Both duplication and relaying were placed on a base of reinforced concrete, and the street surface finished in bituminous concrete. Loops were constructed on the Riccarton, Burwood, and Spreydon lines, and a cross-over laid on the Sumner line. The trailer-siding at the terminus of the Fendalton line was extended a distance of 90 ft. Six new cars were constructed and passed for traffic during the year.

Dunedin.—During the year three converted trailer cars (Nos. 75, 76, and 77) were inspected and were put into commission.

Invercargill.—One of the original two men cars has been converted to, and fitted with, the necessary adjustments for one-man operation.

GENERAL.

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

F. W. Furkert, C.M.G., M.Inst.C.E., A.M.I.Mech.E.
Engineer-in-Chief.

ANNEXURE I TO APPENDIX B.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927.

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, 1904–22.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
Kawakawa-Grahamtown (Onerahi)	Kawakawa ..	7 16	Opua Wharf - Kawakawa	7 16	0 57	7 73	..	..	..	..	..	..	..	..	..	7 16
	Kawakawa-Kamo ..	41 48	Kawakawa-Towai ..	21 18	0 61	21 79	..	..	..	12 April,1911	..	..	..	..	..	21 18
			Towai-Hukerenui ..	4 30	0 33	4 63	..	..	..	2 May, 1910	..	..	..	..	..	27 2
			Hukerenui-Kamo ..	16 0	3 29	19 29	..	..	..	..	..	..	..	..	..	
	Kamo-Grahamtown	9 22	Kamo-Kioreroa ..	6 52	2 27	8 79	..	..	..	..	..	..	..	..	..	
			Kioreroa-Onerahi ..	2 50	1 16	3 66	..	..	..	2 Oct., 1911	..	..	..	..	..	2 50
	Kawakawa-Hokianga	48 38	Otiria-Kaikohe ..	16 25	1 45	17 70	..	..	..	1 May, 1914	..	..	..	..	..	16 25
			Kaikohe-Okaihau ..	8 20	0 34	8 54	..	..	..	29 Oct., 1923	..	8 20	..	..	..	8 20
			Okaihau-Hokianga ..	23 73	2 06	25 79	20 73	6 00	3 00	..	..	..	..	..	..	..
Kaihu Valley	Kaihu Valley ..	24 32	Dargaville-Booms ..	17 21	0 75	18 16	..	..	..	..	..	..	..	..	..	19 58
			Booms-Tarawhati ..	2 37	0 25	2 62	..	..	..	1 June, 1914	..	..	..	..	..	
			Tarawhati-Donnelly's Crossing	4 54	0 38	5 12	..	..	..	5 Feb., 1923	4 54	..	..	..	..	4 54
North Auckland Main Trunk Railway	Dargaville–N.A.M.T. Railway	18 40	Kirikopuni–Dargaville	18 40	..	18 40	18 40	Trial	..	..	..	..	..	..	..	..
	Kaipara Northwards	83 39	Kirikopuni–Waiotira	13 56	1 44	15 20	.	2 35	11 21	..	..	..	..	..	..	..
			Waiotira–Mareretu ..	9 44	1 20	10 64	..	..	..	29 Nov., 1925	..	..	..	9 44	..	9 44
			Mareretu–Paparoa ..	4 16	0 25	4 41	..	..	..	29 Nov., 1925	..	..	..	4 16	..	4 16
			Paparoa-Huarau ..	1 56	0 36	2 12	..	..	..	29 Nov., 1925	..	..	..	1 56	..	1 56
			Huarau-Maungaturoto	2 5	0 38	2 43	..	..	..	1 April, 1920	..	..	..	..	..	2 5
			Maungaturoto-Ranganui	4 25	0 61	5 6	..	..	..	1 April, 1920	..	..	..	..	..	4 25
			Ranganui-Kaiwaka ..	2 35	0 62	3 17	..	..	..	1 Aug., 1914	..	..	..	..	..	2 35
			Kaiwaka - Te Hana ..	8 65	1 3	9 68	..	..	..	18 Mar. 1913	..	..	..	..	..	
			Te Hana-Wellsford ..	3 27	0 58	4 5	..	..	..	16 May, 1910	..	..	..	..	..	
			Wellsford-Wayby ..	3 18	0 28	3 46	..	..	..	1 April, 1909	..	..	..	..	..	
			Wayby-Hoteo ..	3 40	0 13	3 53	..	..	..	13 May, 1908	..	..	..	..	..	
			Hoteo-Kaipara Flats	2 45	0 13	2 58	..	..	..	11 June, 1907	..	..	..	..	..	45 42
			Kaipara Flats-Woodcock's	3 5	0 16	3 21	..	..	..	17 Nov., 1905	..	..	..	..	..	
			Woodcock's-Ahuroa	2 41	0 16	2 57	..	..	..	18 May, 1905	..	..	..	..	..	
			Ahuroa-Helensville ..	18 41	1 75	20 36	..	..	..	..	..	..	..	..	..	

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*continued*.

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
Whangarei Branch Railway	Whangarei Branch..	19 79	Kioreroa-Portland ..	5 23	0 37	5 60	..	..	..	3 April, 1920	..	..	..	..	..	5 23
			Portland-Waiotira ..	14 56	1 39	16 15	..	..	..	29 Nov., 1925	..	..	..	14 56	..	14 56
Kaipara-Waikato	Kaipara-Newmarket	35 73	Helensville-Newm'rk't	35 73	6 66	42 59	..	..	..	..	..	..	..	..	..	35 73
	Onehunga Branch ..	2 73	Penrose - Onehunga Wharf	2 73	1 70	4 63	..	..	..	..	..	..	..	..	..	2 73
	Auckland-Waikato ..	100 13	Auckland-Te Awamutu	100 13	16 66	116 79	..	..	..	..	..	..	..	..	..	100 13
	Auckland-Westfield	9 68	Deviation via Orakei	9 68*	1 10	10 78	9 68	9 68	..	..	..	..	..	..	..	..
	Auckland City Branch—Kingsland Station to Auckland Station via Western Park and Freeman's Bay	2 60	Auckland City Branch	2 60	..	2 60	2 60	Prelim.	..	..	..	..	..	..	..	..
Waiuku Branch	Waiuku Branch Railway	12 69	Paerata-Patumahoe	5 4	0 78	6 2	..	..	..	10 Dec., 1917	..	..	..	..	..	5 4
			Patumahoe-Waiuku	7 65	1 3	8 68	..	..	..	10 May, 1922	7 65	..	..	..	..	7 65
Huntly-Awaroa	Huntly-Awaroa ..	8 75	Huntly-Awaroa ..	8 75	1 18	10 13	..	..	..	16 June, 1924	..	..	1 55	..	..	8 75
Survey, new lines	Waikokowai Branch Railway	8 25	Waikokowai ..	8 25	..	8 25	8 25	..	..	..	..	..	..	..	..	..
Surveys, new lines	Paeroa-Pokeno ..	42 15	Paeroa-Pokeno ..	42 15	..	42 15	42 15	..	..	..	..	..	..	..	..	..
Waikato-Thames	Waikato-Thames ..	62 58	Frankton Junction-Thames	62 58	10 17	72 75	..	..	..	..	..	..	..	..	..	62 58
Hamilton-Cambridge	Hamilton-Cambridge	12 2	Ruakura Junction-Cambridge	12 2	3 14	15 16	..	..	..	..	..	..	..	..	..	12 2
Paeroa-Waihi	Paeroa-Waihi ..	12 40	Paeroa-Waihi ..	12 40	1 30	13 70	..	..	..	9 Nov., 1905	..	..	..	..	..	12 40
East Coast Railway	Waihi-Opotiki, or East Coast Railway	139 53	Waihi-Tauranga ..	38 33	3 35	41 68	..	6 02	32 31	..	..	..	..	..	..	..
			Tauranga-Te Maunga Junction	3 75	0 17	4 12	..	..	3 75	..	..	..	..	..	..	..
			Te Maunga Junction-Te Puke	9 0	1 38	10 38	..	..	9 0	..	..	..	..	..	..	..
			Te Puke-Paengaroa..	5 67	1 16	7 3	..	..	5 67	..	..	..	..	..	..	..
			Paengaroa - Pongakawa	4 28	0 56	5 4	..	..	4 28	..	..	..	..	..	..	..
			Pongakawa-Otamarakau	6 70	0 52	7 42	..	..	6 70	..	..	..	..	..	..	..
			Otamarakau-Matata	8 11	0 46	8 57	..	..	8 11	..	..	..	..	..	..	..

* Double track.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927 *continued*.

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch	M. ch.	M. ch.	M. ch.		M. ch	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
East Coast Railway—*contd.*	Waihi-Opotiki—*ctd.* ..	..	Matata-Rangitaiki ..	8 29	2 04	10 33	..	..	8 29	..	..	..	..	..	..	..
			Rangitaiki-Awakeri	4 2	0 65	4 67	..	..	4 2	..	..	..	..	..	..	..
			Awakeri-Taneatua ..	8 47	1 67	10 34	..	..	8 47	..	..	..	..	..	..	..
			Taneatua-Opotiki ..	26 26	..	26 26	26 26	..	..	..	..	..	..	..	..	..
	Branch Lines ..	..	Mount Maunganui-Te Maunga Junction	4 27	0 67	5 14	..	..	4 27	..	..	..	..	..	..	..
			Te Puke Quarry ..	3 0	0 20	3 20	..	..	3 0	..	..	..	..	..	..	..
			Moturiki Quarry § ..	1 0	0 10	1 10	..	..	..	..	..	..	..	..	..	..
			Whakatane Branch	7 5	..	7 5	7 5†	..	..	..	..	..	..	..	..	..
			Whakatane Ballast Siding	0 33	..	0 33	..	..	0 33	..	..	..	..	..	..	..
Thames Valley-Rotorua	Thames Valley-Rotorua	69 33	Morrinsville-Rotorua	69 33	5 27	74 60	..	..	..	..	..	..	..	..	..	69 3
New survey	Rotorua-Taupo ..	53 30	Rotorua-Taupo ..	53 30	..	53 30	53 30*	..	..	..	..	..	..	..	..	..
Gisborne-Rotorua	Gisborne-Opotiki ..	92 44	Gisborne Wharf-Kaiteratahi	13 10	2 45	15 55	..	..	..	..	..	..	..	..	..	
			Kaiteratahi-Karaka	5 5	0 71	5 76	..	..	..	13 April, 1905	..	..	..	..	..	
			Karaka-Puha ..	1 75	0 24	2 19	..	..	..	20 May, 1907	..	..	..	..	..	
			Puha-Waikohu Bridge	3 29	..	3 29	..	..	..	28 May, 1908	..	..	..	..	..	
			Waikohu Bridge-Waikohu	0 35	0 32	0 67	..	..	..	1 April, 1909	..	..	..	..	..	49 3 ‡
			Waikohu-Otoko ..	7 75	0 32	8 27	..	..	..	6 April, 1912	..	..	..	..	..	
			Otoko-Rakauroa ..	6 60	0 32	7 12	..	..	..	2 Nov., 1914	..	..	..	..	..	
			Rakauroa-Matawai ..	5 65	0 50	6 35	..	..	..	2 Nov., 1914	..	..	..	..	..	
			Matawai-Motuhora	4 78	0 61	5 59	..	..	..	26 Nov., 1917	..	..	..	..	..	
			Motuhora-Motu ..	2 10	..	2 10	2 10	..	..	..	..	..	..	..	..	..
			Motu-Opotiki ..	41 2	..	41 2	41 2	Estim.	..	..	..	..	..	..	..	..
Gisborne-Napier	Napier-Wairoa ..	72 14	Napier-Eskdale ..	11 73	1 31	13 24	..	..	..	23 July, 1923	..	11 73	..	..	..	11 73
			Eskdale-Putorino ..	26 69	1 38	28 27	..	10 67	16 02	..	..	..	..	..	..	..
			Putorino-Wairoa ..	33 32	2 50	36 02	..	31 60	1 52	..	..	..	..	..	..	..
	Gisborne-Wairoa .. (Inland Route)	72 42	Gisborne Station-Makaraka	3 5	..	3 5	..	..	..	..	..	..	..	..	..	..
			Makaraka-Ngatapa ..	11 51	1 29	13 0	..	..	11 51	15 Dec., 1924	..	..	11 51	..	..	11 51
			Ngatapa-Wharekopae	4 69	..	4 69	0 19	3 0	1 50§	..	..	..	..	..	..	..
			Wharekopae-Waikura	5 40	..	5 40	5 40	..	..	..	..	..	..	..	..	..

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

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*continued*.

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
Gisborne-Napier	Gisborne - Wairoa — *continued*.		Waikura-Waterfall ..	6 66	..	6 66	5 6	Perm.	..	..	..	..	..	..	..	..
							1 60	Prelim.	..	..	..	..	..	..	..	..
			Waterfall-Hangaroa	4 0	..	4 0	4 0	"	..	..	..	..	..	..	..	..
			Hangaroa-Te Reinga	17 11	..	17 11	17 11	"	..	..	..	..	..	..	..	..
			Te Reinga-Marumaru	9 40	..	9 40	9 40	"	..	..	..	..	..	..	..	..
			Marumaru-Wairoa ..	10 0	..	10 0	4 0	Perm.	..	..	..	..	..	..	..	..
							6 0	Prelim.	..	..	..	..	..	..	..	..
	Wairoa - Gisborne (Waikokopu Route)	63 59	Wairoa-Nuhaka ..	18 24	1 18	19 42	..	..	18 24	..	..	..	..	..	..	..
			Nuhaka-Waikokopu	6 11	0 49	6 60	..	..	6 11	..	..	..	..	..	..	..
			Waikokopu-Patutahi	32 47	..	32 47	16 01	Perm.	..	..	..	..	..	..	..	..
							16 46	Trial	..	..	..	..	..	..	..	..
			Patutahi-Gisborne ..	6 57	..	6 57	..	..	..	..	..	..	..	..	..	..
			Wairoa - Freezing-works Siding	..	0 34	0 34	..	..	0 34	..	..	..	..	..	..	..
Napier-Woodville and Palmerston North	Napier-Woodville ..	96 65	Napier Spit-Woodville	96 65	15 5	111 70	..	..	..	..	..	..	..	..	..	96 65
	Woodville-Palmerston North	17 21	Woodville-Palmerston North	17 21	0 51	17 72	..	..	..	..	..	..	..	..	..	17 21
Wellington-Woodville	Woodville-Wellington	115 79	Woodville-Wellington [Te Aro]	115 79	21 73	137 72	..	..	..	..	..	..	..	..	..	115 7
	Greytown Branch ..	3 7	Woodside-Greytown	3 7	0 64	3 71	..	..	..	..	..	..	..	..	..	7
	Featherston - Martinborough	11 50	Featherston - Martinborough	11 50	..	11 50	11 50	..	..	..	..	..	..	..	..	..
	Greytown - Martinborough	4 62	Greytown - Martinborough	4 62	..	4 62	4 62	Trial	..	..	..	..	..	..	..	..
Rimutaka Incline Deviation Surveys	Coach-road Route ..	9 0	Kaitoke-Featherston	9 0	..	9 0	9 0	Prelim.	..	..	..	..	..	..	..	..
	Tauherenikau Route	21 30	Upper Hutt-Woodside	21 30	..	21 30	21 30	..	..	..	..	..	..	..	..	..
	Wainui-o-mata Route	31 40	Petone-Pigeon Bush	31 40	..	31 40	31 40	..	..	..	..	..	..	..	..	..
	Coast Route ..	52 0	Petone - Pigeon Bush	52 0	..	52 0	52 0	..	..	..	..	..	..	..	..	..
	Coast Route ..	70 0	Petone-Carterton, via Martinborough	70 0	..	70 0	70 0	..	..	..	..	..	..	..	..	..
	Wellington-Manawatu	83 37	Wellington-Longburn	83 37	15 76	99 33	..	..	..	7 Dec., 1908*	..	..	..	..	..	83 37
Foxton-New Plymouth	Foxton-Patea ..	120 44	Foxton-Patea ..	120 44	14 75	135 39	..	..	..	..	..	..	..	..	..	120 44
	Route Improvement Surveys	26 7	Turakina-Matarawa	11 67	..	11 67	11 67	..	..	..	..	..	..	..	..	..
			Aramoho - Goat Valley Tunnel	7 40	..	7 40	7 40	..	..	..	..	..	..	..	..	..
			Kai Iwi - Okehu ..	3 60	..	3 60	3 60	..	..	..	..	..	..	..	..	..
			Nukumaru-Waitotara	3 0	..	3 0	3 0	Prelim.	..	..	..	..	..	..	..	..

* Date of purchase.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927 *continued*

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
Foxton-New Plymouth —*contd.*	Patea Waitara and New Plymouth	72 29	Patea-New Plymouth Breakwater	72 29	11 52	84 1	..	..	..	..	..	..	..	..	..	72 29
	Bull's Branch ..	3 79	Bull's Branch ..	3 79	..	3 79	3 79	Prelim.	..	..	..	..	..	..	..	..
	Wanganui Branch ..	3 29	Aramoho-Wanganui	3 29	2 23	5 52	..	..	..	..	..	..	..	..	..	3 29
Stratford-Main Trunk	Stratford-Main Trunk	90 10	Stratford-Toko ..	6 26	0 40	6 66	..	..	..	..	..	..	..	..	..	
			Toko-Oruru ..	4 72	0 36	5 28	..	..	..	1 Mar., 1905	..	..	..	..	..	
			Oruru-Huiroa ..	4 50	0 35	5 5	..	..	..	1 April, 1908	..	..	..	..	..	
			Huiroa-Te Wera ..	6 77	1 16	8 13	..	..	..	20 June, 1910	..	..	..	..	..	
			Te Wera-Pohokura	8 55	0 65	9 40	..	..	..	1 Aug., 1912	..	..	..	..	..	
			Pohokura-Whangamomona	6 13	0 45	6 58	..	..	..	1 July, 1914	..	..	..	..	..	47 40
			Whangamomona-Kohuratahi	4 53	0 29	5 2	..	..	..	7 Jan., 1918	..	..	..	..	..	
			Kohuratahi-Tahora	5 14	0 37	5 51	..	..	..	21 Nov., 1924	..	..	5 14	..	..	
			Tahora-Raekohua ..	3 20	..	3 20	..	3 20	..	..	..	..	..	..	..	..
			Raekohua-Heao ..	6 20	..	6 20	3 0‡	3 20	..	..	..	..	..	..	..	..
			Heao-Ohura ..	14 0	..	14 0	1 70†	0 25	..	..	..	..	..	..	..	..
							12 10	Preim.		..	..	..	..	..	..	..
			Ohura-Matiere ..	8 67	1 21	10 8	..	..	8 67	..	..	..	..	..	..	..
			Matiere-Okahukura ..	10 23	1 10	11 33	..	..	10 23	..	..	..	..	..	..	..
	Stratford-Ongarue—Deviations	33 40	Mangaroa-Puketutu	33 40	..	33 40	33 40	Prelim.	..	..	..	..	..	..	..	..
		14 0	Aramatai-Hangatiki	14 0	..	14 0	14 0	Prelim.	..	..	..	..	..	..	..	..
	Puketutu-Mangaroa Deviation	30 0	..	30 0	..	30 0	30 0	Prelim.	..	..	..	..	..	..	..	..
	Opunake-Mountain Rd.	23 10	Opunake-Eltham ..	23 10	..	23 10	23 10	..	..	..	..	..	..	..	..	..
	Te Roti-Moturoa ..	56 18	Te Roti-Opunake ..	22 63	3 02	25 65	..	..	..	12 July, 1926	..	..	..	..	22 63	22 63
			Opunake-Stony River	18 70	..	18 70	18 70	..	..	..	..	..	..	..	..	..
			Stony River-Moturoa	14 45	..	14 45	14 45	..	..	..	..	..	..	..	..	..
	Te Roti-Moturoa .. Deviation	..	Oakura-Breakwater ..	..	..	..	2 30	..	..	..	..	..	..	..	..	..
	Manaia Branch ..	5 50	Manaia-Kapuni ..	5 50	0 78	6 48	..	4 25	1 25	..	..	..	..	..	..	..
	Mount Egmont Branch	8 77	Manganui Section ..	5 74	2 3	7 77	..	..	..	1 April, 1908	..	..	..	..	..	6 0
			Quarry Section ..	3 3	0 60	3 63	..	1 58	1 25	..	..	..	..	..	..	..

† Permanent survey. ‡ Preliminary survey.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*continued*.

NORTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
North Island Main Trunk Railway	Marton-Te Awamutu	209 69	Marton Junction-Mangaweka	31 67	4 61	36 48	..	..	..	..	..	..	..	..	..	
			Mangaweka-Taihape	13 1	1 61	14 62	..	..	..	10 Sep., 1904	..	..	..	..	..	50 58
			Taihape-Mataroa ..	5 70	0 61	6 51	..	..	..	1 June, 1907	..	..	..	..	..	
			Mataroa-Waiouru ..	18 10	12 50	97 28	..	..	..	30 June, 1908	..	..	..	..	..	
			Waiouru-Erua ..	30 63			..	..	..	13 Feb., 1909	..	..	..	..	..	84 58
			Erua-Taumarunui ..	35 65			..	..	..	9 Nov., 1908	..	..	..	..	..	
			Taumarunui-Te Awamutu	74 33	6 20	80 53	..	..	..	..	..	..	..	..	..	74 33
	Waipa Gravel Access Branch	7 40	Otorohanga ..	7 40	..	7 40	..	..	..	..	..	..	..	..	..	..
	Raetihi Branch ..	8 50	Raetihi Section ..	8 50	1 7	9 57	..	..	..	18 Dec., 1917	..	..	..	..	..	8 50
	Central Route Deviation Surveys	30 0	Ohakune to Mokau-Retaruke Divide	30 0	..	30 0	30 0	Prelim.	..	..	..	..	..	..	..	..
		34 0	Makatote Gorge-Marae-Kowhai	34 0	..	34 0	34 0	Prelim.	..	..	..	..	..	..	..	..
		20 0	Marae-Kowhai-Ohura Valley	20 0	..	20 0	20 0	Explor.	..	..	..	..	..	..	..	..
	Ngaire-Ongarue ..	103 58	Ngaire Section ..	38 73	..	38 73	38 73	..	..	..	..	..	..	..	..	..
			Tangarakau Section	26 0	..	26 0	26 0	..	..	..	..	..	..	..	..	..
			Heao Section ..	10 70	..	10 70	10 70	..	..	..	..	..	..	..	..	..
			Ohura Section ..	27 75	..	27 75	27 75	..	..	..	..	..	..	..	..	..
	Waitara-Tangarakau	46 75	Waitara Section ..	46 75	..	46 75	46 75	..	..	..	..	..	..	..	..	..
	Urenui Route ..	12 0	Urenui to Tangitu River	12 0	..	12 0	12 0	Prelim.	..	..	..	..	..	..	..	..
	Hastings-Te Awamutu	170 0	Hastings-Te Awamutu	170 0	..	170 0	170 0	Prelim.	..	..	..	..	..	..	..	..
	Totals ..	2774 76	..	2774 76	233 04	3008 00	1119 07	82 60	191 05	..	12 39	20 13	18 40	30 12	22 63	1394 70

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

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*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, 1904-22.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.										
							Surveyed.	Under Formation.	Under Platelaying.	Opened.							
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
Nelson-Roundell	Nelson-Belgrove ..	22 73	Nelson-Belgrove ..	22 73	2 52	25 45	..	..	..	..	..	..	..	..	..	22 73
Midland Railway	Stillwater - Belgrove (via Tadmor)	146 75	Stillwater-Reefton S.	37 30	4 79	42 29	..	..	..	..	..	..	..	..	..	
			Reefton S.-Reefton N.	1 30	1 0	2 30	..	..	..	31 Mar., 1907	..	..	..	..	..	
			Reefton N.-Cronadun	5 38	0 56	6 14	..	..	..	7 Aug., 1908	..	..	..	..	..	57 32
			Cronadun-Landing ..	8 40	0 45	9 5	..	..	..	June, 1914	..	..	..	..	..	
			Landing-Inangahua	6 0	0 10	6 10	1 26	..	..		..	..	..	..	..	
			Inangahua-Murchison	23 53	..	23 53	7 00	Trial	..	..	..	..	..	..	..	..
							16 53	Prelim.	..	..	..	..	..	..	..	..
			Murchison-Kawatiri	22 70	..	22 70	13 70	..	..	..	..	..	..	..	..	..
							5 10*	3 70	..	..	..	..	..	..	..	..
			Kawatiri-Glenhope ..	3 73	0 15	4 8	..	..	..	21 June, 1926	..	..	..	..	3 73	..
			Glenhope-Tui ..	9 42	0 55	10 17	..	..	..	2 Sep., 1912	..	..	..	..	..	
			Tui-Kiwi	3 17	0 34	3 51	..	..	..		..	..	..	..	..	
			Kiwi-Tadmor ..	5 9	0 29	5 38	..	..	..	18 Dec., 1908	..	..	..	..	..	41 54
			Tadmor-Kohatu ..	10 29	0 69	11 18	..	..	..	7 Aug., 1906	..	..	..	..	..	
			Kohatu-Belgrove ..	9 44	0 62	10 26	..	..	..	..	..	..	..	..	..	
	Brunner-Springfield	92 68	Brunner-Otira ..	42 27	2 68	45 15	..	..	..	..	..	..	..	..	..	
			Otira-Arthur's Pass	8 14	5 38	13 52	..	..	..	26 May, 1924	..	..	8 14	..	..	
			Arthur's Pass - Cass	14 67	0 20	15 7	..	..	..	1 July, 1914	..	..	..	..	..	
			Cass - Broken River ..	15 22	1 29	16 51	..	..	..	10 Dec., 1910	..	..	..	..	..	92 68
			Broken River - Otarama	7 40	0 30	7 70	..	..	..	29 Oct., 1906	..	..	..	..	..	
			Otarama-Springfield	4 58	0 16	4 74	..	..	..	29 Oct., 1906	..	..	..	..	..	
Blackball Railway	Ngahere-Blackball ..	3 40	Ngahere-Blackball ..	3 40	1 20	4 60	..	..	..	16 July, 1910	..	..	..	..	..	3 40
Greymouth-Nelson Creek	Greymouth - Nelson Creek	7 51	Greymouth-Brunnerton-Stillwater	7 51	6 18	13 69	..	..	..	..	..	..	..	..	..	7 51
Westport-Ngakawau	Westport-Ngakawau	19 56	Westport-Ngakawau	19 56	8 12	27 68	..	..	..	..	..	..	..	..	..	19 56
Westport-Ngakawau Extension	Ngakawau - Mokihinui	7 12	Ngakawau-Mokihinui	7 12	1 18	8 30	..	..	..	..	..	..	..	..	..	7 12
	Mokihinui Colliery Line	3 69	Mokihinui-Seddonville	3 69	0 25	4 14	..	..	..	..	..	..	..	..	..	3 69
Westport-Inangahua	Westport-Inangahua Junction	26 0	Westport-Te Kuha ..	5 74	0 10	6 4	..	..	..	1 April, 1912	..	..	..	..	..	5 74
			Te Kuha - Inangahua Junction	20 6	0 39	20 45	16 06*	1 00	3 0	..	..	..	..	..	..	..

* Permanent.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*continued*.

SOUTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
State Colliery, or Coal Creek Railway	Greymouth - Point Elizabeth Collieries	5 1	Greymouth-Runanga Colliery	5 1	2 10	7 11	..	..	..	1 Dec., 1904	..	..	..	..	..	5 1
	Extension ..	3 69	Runanga Colliery-Point Elizabeth Collieries	3 69	2 20	6 9	..	..	..	21 Jan., 1914	..	..	..	..	..	3 69
	" ..	2 44	Runanga to Seven-mile	2 44	1 40	4 4	..	..	2 44	3 Sept., 1923	..	2 44	..	..	..	2 44
Greymouth-Hokitika	Greymouth-Hokitika	24 37	Greymouth-Hokitika	24 37	2 10	26 47	..	..	..	..	..	..	..	..	..	24 37
Kumara Branch	Kumara Branch ..	4 10	Kumara Branch ..	4 10	..	4 10	4 10	..	..	..	..	..	..	..	..	..
Hokitika-Ross	Hokitika-Ross ..	15 75	Hokitika-Ruatapu ..	7 10	0 61	7 71	..	..	..	9 Nov., 1906	..	..	..	..	..	7 10
			Ruatapu-Ross ..	7 21	0 69	8 10	..	..	..	1 April, 1909	..	..	..	..	..	7 21
			Survey to Ross Township	1 44	..	1 44	1 44	..	..	..	..	..	..	..	..	..
New survey	Ross-Waitaha ..	10 0	Ross-Waitaha ..	10 0	..	10 0	2 54	..	..	..	..	..	..	..	..	..
Picton-Waipara	Picton - Kaikoura ..	92 38	Picton-Seddon ..	33 45	3 26	36 71	..	..	..	..	..	..	..	..	..	..
			Seddon-Kaparu ..	6 30	0 76	7 26	..	..	..	13 April, 1911	..	..	..	..	..	56 6
			Kaparu-Ward ..	8 15	1 20	9 35	..	..	..		..	..	..	..	..	
			Ward-Mirza ..	3 38	0 30	3 68	..	..	..	4 Dec., 1915	..	..	..	..	..	
			Mirza-Wharanui ..	4 38	0 34	4 72	..	..	..		..	..	..	..	..	
			Wharanui-Kekerangu	7 0	..	7 0	2 42	1 18	3 20	..	..	..	..	..	..	..
			Kekerangu - Hapuka River	29 32	..	29 32	29 32	..	..	..	..	..	..	..	..	..
	Hapuka River-Mendip Hills	40 50	Hapuka River-Limestone Creek	23 0	..	23 0	23 0	Prelim.	..	..	..	..	..	..	..	..
			Limestone Creek-Conway River	7 0	..	7 0	7 0	Prelim.	..	..	..	..	..	..	..	..
			Conway River - Mendip Hills	10 50	..	10 50	10 50	Prelim.	..	..	..	..	..	..	..	..
	Mendip Hills - Parnassus	5 61	Mendip Hills ..	5 61	..	5 61	2 0	3 61	..	..	..	..	..	..	..	..
	Parnassus-Waipara	44 14	Parnassus-Mina ..	8 43	1 14	9 57	..	..	..	1 Sept., 1912	..	..	..	..	..	
			Mina-Domett ..	3 63	0 70	4 53	..	..	..	1 Aug., 1910	..	..	..	..	..	
			Domett-Tormore ..	3 10	0 66	9 24	..	..	..	14 Nov., 1906	..	..	..	..	..	44 14
			Tormore-Ethelton ..	5 28			..	..	..	21 Mar., 1907	..	..	..	..	..	
			Ethelton-Scargill ..	8 51	0 51	9 22	..	..	..	3 Nov., 1905	..	..	..	..	..	
			Scargill-Waipara ..	14 59	1 2	15 61	..	..	..	..	..	..	..	..	..	
Hurunui-Waitaki	Main Line.. ..	206 7	Culverden-South Waitaki	206 7	64 68	270 75	..	..	..	..	..	..	..	..	..	206 7
		13 0	Culverden-Achray ..	5 23	0 10	5 33	..	..	..	15 Dec., 1919	..	..	..	..	..	13 0
			Achray-Rotherham ..	1 75	0 43	2 38	..	..	..							
			Rotherham-Waiau ..	5 62	1 3	6 65	..	..	..							

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*continued*.

SOUTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
Hurunui-Waitaki —*contd.*	*Branches,—*															
	Rangiora - Oxford	21 76	Rangiora-Oxford West	21 76	2 36	24 32	..	..	..	..	..	..	..	..	..	21 76
	Eyreton (from Main Line)	20 7	Main Line - West Eyreton-Bennett's	20 7	1 61	21 68	..	..	..	..	..	..	..	..	..	20 7
	Lyttelton ..	6 26	Lyttelton - Christchurch	6 26	..	6 26	..	..	..	..	..	..	..	..	..	6 26
	Southbridge ..	25 31	Hornby-Southbridge	25 31	3 17	28 48	..	..	..	..	..	..	..	..	..	25 31
	Little River-Akaroa	42 10	Lincoln - Little River	22 46	2 5	24 51	..	..	..	..	..	..	..	..	..	22 46
			Reconnaissance ..	19 44	..	19 44	19 44	Prelim.	..	..	..	..	..	..	..	..
	Springfield ..	30 60	Rolleston-Springfield	29 63	3 7	32 67	..	..	..	..	..	..	..	..	..	30 60
			Springfield-Coal-mine	0 77												
	Whitecliffs ..	11 38	Darfield-Whitecliffs	11 33	1 53	13 11	..	..	..	..	..	..	..	..	..	11 38
			Whitecliffs to Bridge	0 5												
	Rakaia - Ashburton Forks	22 20	Rakaia-Methven ..	22 20	2 65	25 5	..	..	..	..	..	..	..	..	..	22 20
	Ashburton ..	29 46	Tinwald-Springburn	27 29	1 52	29 1	..	..	..	..	..	..	..	..	..	27 29
			Extension ..	2 17	..	2 17	2 17	..	..	..	..	..	..	..	..	..
	Opawa and Albury to Fairlie Creek and Burke's Pass	55 8	Washdyke-Eversley	36 5	2 45	38 50	..	..	..	..	..	..	..	..	..	36 5
			Preliminary survey ..	19 3	..	19 3	19 3	Prelim.	..	..	..	..	..	..	..	..
	Waimate ..	17 43	Studholme-Waimate	4 42	1 3	5 45	..	..	..	..	..	..	..	..	..	12 63
			Waimate-Waihao Downs	8 21	0 54	8 75	..	..	..	..	..	..	..	..	..	
			Waihao Downs-Serpentine	2 65	..	2 65	..	2 65	..	..	..	..	..	..	..	..
			Serpentine-Kelcher's	1 75	..	1 75	..	1 75	..	..	..	..	..	..	..	..
Canterbury Interior Main Line	Oxford-Temuka ..	83 0	Oxford-Sheffield ..	11 44	0 27	11 71	..	..	..	..	..	..	..	..	..	11 44
			Surveyed ..	21 7	..	21 7	21 7	..	..	..	..	..	..	..	..	..
			Reconnaissance ..	50 29	..	50 29	50 29	Prelim.	..	..	..	..	..	..	..	..
	Orari–Rangitata, via Geraldine	10 25	Orari-Geraldine ..	4 17	..	4 17	4 17	..	..	..	..	..	..	..	..	..
			Geraldine-Rangitata	6 08	..	6 08	6 08	..	..	..	..	..	..	..	..	..
Waitaki-Bluff and Branches	Main Line ..	246 69	South Waitaki-Bluff	246 69	59 13	306 2	..	..	..	..	..	..	..	..	..	246 69
	Branches,—															
	Duntroon - Hakataramea	37 33	Pukeuri-Duntroon ..	21 75	1 35	23 30	..	..	..	..	..	..	..	..	..	21 75
			Duntroon-Hakataramea	15 38	1 5	16 43	..	..	..	..	..	..	..	..	..	15 38
	Ngapara ..	14 76	Waiareka-Ngapara ..	14 76	1 31	16 27	..	..	..	..	..	..	..	..	..	14 76
	Livingstone ..	16 40	Windsor-Tokorahi ..	12 0	0 50	12 50	..	0 5	..	..	..	..	..	..	..	11 75
			Survey (trial) ..	4 40	..	4 40	4 40	Prelim.	..	..	..	..	..	..	..	..
	Palmerston - Waihemo	8 55	Palmerston-Dunback	8 55	0 54	9 29	..	..	..	..	..	..	..	..	..	8 55
		0 65	Surveyed ..	0 65	..	0 65	0 65	..	..	..	..	..	..	..	..	..

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*continued*.

SOUTH ISLAND—*continued*.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch
Waitaki-Bluff and Branches —*contd.*	*Branches*—contd.															
	Inch Valley Railway	2 29	Inch Valley-Lime Kiln	2 29	0 23	2 52	..	..	..	..	..	..	..	..	..	2 29
	Port Chalmers ..	1 9	Glendermid - Port Chalmers	1 9	3 40	4 49	..	..	..	..	..	..	..	..	..	1 9
	Green Island ..	2 44	Burnside-Saddle Hill	2 44	0 52	3 16	..	..	..	..	..	..	..	..	..	2 44
	Green Island to Brighton	4 65	Surveyed	4 65	..	4 65	4 65	..	..	..	..	..	..	..	..	..
	Fernhill Colliery Line	1 60	Abbotsford to Fernhill Colliery	1 60	0 24	2 4	..	..	..	..	..	..	..	..	..	1 60
	Kaikorai Valley Railway	2 60	Surveyed	2 60	..	2 60	2 60	..	..	..	..	..	..	..	..	..
	Outram ..	8 78	Mosgiel-Outram ..	8 78	0 68	9 66	..	..	..	..	..	..	..	..	..	8 78
	Lawrence ..	21 76	Clarksville-Lawrence	21 76	2 2	23 78	..	..	..	..	..	..	..	..	..	
	Lawrence-Roxburgh	36 71	Lawrence-Big Hill	7 33	0 44	7 77	..	..	..	1 Aug., 1910	..	..	..	..	..	49 55
			Big Hill-Beaumont	5 36	0 45	6 1	..	..	..	15 Dec., 1914	..	..	..	..	..	
			Beaumont-Miller's Flat	14 70	0 38	15 28	..	..	..	16 Dec., 1925	..	..	..	14 70	..	
			Miller's Flat-Roxburgh	9 12	0 68	10 00	..	2 60	6 32	..	..	..	..	..	..	..
	Lovell's Flat-Tuapeka Mouth	23 20	Surveyed	23 20	..	23 20	23 20	..	..	..	..	..	..	..	..	..
	Balclutha-Tuapeka Mouth	22 0	Surveyed	7 0	..	7 0	..	..	..	..	..	..	..	..	..	..
			Trial Survey ..	15 0	..	15 0	..	..	..	..	..	..	..	..	..	..
	Crichton-Tuapeka Mouth	11 60	Surveyed	11 60	..	11 60	11 60	..	..	..	..	..	..	..	..	
	Stirling-Hill End (via Stoney Creek)	11 43	Trial Survey ..	11 43	..	11 43	11 43	..	..	..	..	..	..	..	..	..
	Balclutha-Appleby Junction or Catlin's-Seaward Bush	105 49	Balclutha-Owaka ..	19 20	1 63	21 3	..		..	..	..	..	..	..	..	
			Owaka-Catlin's ..	3 38	0 30	3 68	..	..	..	1 Aug., 1904	..	..	..	..	..	
			Catlin's-Houipapa ..	2 30	0 9	2 39	..	..	..	17 Dec., 1909	..	..	..	..	..	
			Houipapa-Puketiro ..	7 11	0 43	7 54	..	..	..	1 Feb., 1915	..	..	..	..	..	42 67
			Puketiro-McLennan	5 29	0 59	6 8	..	..	..	1 Feb., 1915	..	..	..	..	..	
			McLennan-Tahakopa	5 19	0 38	5 57	..	..	..	1 Feb., 1915	..	..	..	..	..	
			Tahakopa-Marinui ..	23 63	..	23 63	23 63	Prelim.	..	..	..	..	..	..	..	..
			Marinui-Tokanui ..	6 0	..	6 0	6 0	..	..	..	..	..	..	..	..	..
			Tokanui-Waimahaka	8 27	0 64	9 11	..	..	..	20 Sept., 1911	..	..	..	..	..	32 79
			Waimahaka-Appleby	24 52	1 50	26 22	..	..	..	..	..	..	..	..	..	
	Waipahi-Heriot Burn	26 23	Waipahi-Heriot ..	20 3	2 3	22 6	..	..	..	..	..	..	..	..	..	26 23
			Heriot-Edievale ..	6 20	0 45	6 65	..	..	..	15 Feb., 1905	..	..	..	..	..	
	Extension to Roxburgh, via Rae's Junction and Ettrick	28 10	Surveyed ..	28 10	..	28 10	28 10	Prelim.	..	..	..	..	..	..	..	..
	Via Spylaw ..	25 70	Surveyed ..	25 70	..	25 70	25 70	Prelim.	..	..	..	..	..	..	..	

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1927—*continued.*

SOUTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.									
							Surveyed.	Under Formation.	Under Platelaying.	Opened.						
										Date.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.
Waitaki-Bluff and Branches—*contd.*	*Branches*—contd.															
	Waimea Plains District Ry.	36 39	Gore-Lumsden ..	36 39	1 34	37 73	..	..	..	..	..	..	..	.	..	36 39
	Kelso-Gore ..	24 0	Surveyed ..	9 58	..	9 58	9 58	..	..	..	..	..	..	..	..	..
			Preliminary survey ..	14 22	..	14 22	14 22	Prelim.	..	..	..	..	..	..	..	..
	Gore-Waikaka ..	12 65	Waikaka Section ..	12 65	1 51	14 36	..	..	..	26 Nov., 1908	..	..	..	..	..	12 65
	Riversdale-Switzers	13 70	Riversdale-Waikaia	13 70	1 40	15 30	..	..	..	1 Oct., 1909	..	..	..	..	..	13 70
	Edendale-Toitois ..	19 30	Edendale-Glenham	9 36	0 72	10 28	..	..	..	..	..	..	..	..	..	9 36
			Surveyed ..	9 74	..	9 74	9 74	..	..	..	..	..	..	..	..	..
Otago Central	Waitaki Bluff Main Line to Lake Hawea	182 45	Wingatui-Ida Valley	98 18	5 62	104 0	..	..	..	..	..	..	..	..	..	
			Ida Valley-Omakau	13 20	1 16	14 36	..	..	..	1 Sept., 1904	..	..	..	..	..	
			Omakau-Chatto Creek	7 36	0 34	7 70	..	..	..	14 July, 1906	..	..	..	..	..	147 27
			Chatto Ck.-Alexandra	10 39	1 6	11 45	..	..	..	15 Dec., 1906	..	..	..	..	..	
			Alexandra-Clyde ..	5 45	0 77	6 42	..	..	..	27 Mar., 1907	..	..	..	..	..	
			Clyde-Cromwell ..	12 29	0 69	13 18	..	..	..	10 July, 1921	12 29	..	..	..	..	
			Surveyed ..	35 18	..	35 18	..	..	..	..	..	..	..	..	..	..
Invercargill-Kingston and Branch, Lumsden-Mararoa	Invercargill-Kingston	87 4	Invercargill-Kingston Wharf	87 4	5 15	92 19	..	..	..	..	..	..	..	..	..	87 4
	Lumsden-Mararoa ..	30 0	Lumsden-Mossburn	10 40	1 0	11 40	..	..	..	..	..	..	..	..	..	10 40
			Surveyed	8 20	..	8 20	8 20	..	..	..	..	..	..	..	..	..
			Reconnaissance ..	11 20	..	11 20	11 20	Prelim.	..	..	..	..	..	..	..	..
	Winton-Heddon Bush	11 0	Surveyed	11 0	..	11 0	11 0	..	..	..	..	..	..	..	..	..
Forest Hill Railway	Winton to Hedgehope	12 40	Winton-Hedgehope	12 40	0 65	13 25	..	..	..	..	..	..	..	..	..	12 40
Western Railways, Orepuki-Waiau River	Orepuki-Waiau ..	60 74	Makarewa-Orepuki ..	35 41	6 37	41 78	..	..	..	..	..	..	..	..	..	
			Orepuki-Waihoaka ..	4 48	0 58	5 26	..	..	..	..	..	..	..	..	..	56 34
			Waihoaka-Tuatapere	8 7	1 10	9 17	..	..	..	1 Oct., 1909	..	..	..	..	..	
			Tuatapere-Orawia ..	8 18	..	8 18	..	..	8 18	20 Oct., 1925	..	..	..	8 18	..	
			Orawia-Clifden ..	4 40	..	4 40	4 40	..	..	..	..	..	..	..	..	
	Otautau Branch ..	22 15	Thornbury-Wairio ..	22 15	..	22 15	..	..	..	..	..	..	..	..	..	22 15
	Orawia Branch ..	11 0	Surveyed	11 0	..	11 0	11 0	..	..	..	..	..	..	..	..	..
	Totals ..	2361 07	..	2361 07	266 39	2627 46	488 52	17 34	23 34	..	12 29	2 44	8 14	23 08	37 3	1777 65

NORTH ISLAND

NEW ZEALAND

SHOWING

POWER BOARD DISTRICTS.

Scale: 35 miles to an inch.

Reference

Cities	thus	AUCKLAND
Provincial Centres	..	O NAPIER
Boroughs	..	O FEILDING
Town Districts	..	O MANAIA
Small Centres	..	o Tokomaru
Railways	..	
Coach Routes	..	
Boundaries of Land Districts	..	

TASMAN SEA

SOUTH ISLAND

POWER BOARDS FORMED.

No.	Name.	Population.	Value of Rateable Property unimproved.
3	Hobson ..	7,180	1,424,942
5	Waitemata ..	21,425	5,901,473
6	Auckland ..	175,000	43,469,650
7	Franklin	14,444	6,800,000
9	Wairere ..	2,500	872,434
10	Waitomo	8,500	3,566,152
12	Taranaki ..	22,000	5,974,732
13	Opunake ..	7,000	916,111
14	South Taranaki	17,612	7,914,269
15	Wanganui-Rangitikei	60,000	7,976,750
16	Manawatu-Oroua	40,000	13,355,493
17	Horowhenua	12,095	3,403,255
18	Hutt Valley	27,275	3,119,920
19	Wairarapa ..	19,000	9,370,503
20	Tararua ..	10,255	3,983,107
21	Dannevirke ..	12,081	4,666,713
22	Central Hawke's Bay	10,056	6,839,951
23	Hawke's Bay ..	40,104	11,611,022
26	Wairoa ..	7,712	2,639,968
27	Poverty Bay ..	23,986	9,591,676
28	Bay of Plenty ..	10,900	2,562,042
29	Tauranga ..	8,425	1,232,100
30	Thames Valley ..	30,000	7,550,000
31	Te Awamutu ..	8,500	1,668,509
32	Cambridge ..	6,000	1,841,209
33	Central ..	17,512	4,630,943
	Totals ..	619,562	173,482,924

POWER BOARDS PROPOSED

1	Whangaroa.	24	Waimarino.
2	Whangarei.	25	East Taupo.
4	Rodney.	27	Poverty Bay (outer areas).
8	Waikato.	30	Thames Valley.
11	Taumarunui.	34	Rotorua.

Districts shown red.

ELECTRIC SUPPLY STATIONS.

Steam	▼
Gas	▲
Oil	●
Hydro	■
P.W.D. transmission lines over 30,000 v.	———
P.W.D. proposed transmission lines over 30,000 v.	– – – –
Other supply authorities	. . . .

172° 173° 174° 175° 176° 177° 178° East Longitude

SOUTH ISLAND

NEW ZEALAND

SHOWING

POWER BOARD DISTRICTS.

Scale: 35 miles to an inch.

Reference

Cities	thus	NELSON
Provincial Centres	..	HOKITIKA
Boroughs	..	TEMUKA
Town Districts	..	CLINTON
Small Centres	..	Lyell
Railways	..	
Coach Routes	..	
Boundaries of Land Districts	..	

TASMAN SEA

South Latitude

Stewart Island

Canterbury Bight

Pegasus Bay

Lake Coleridge

Banks Peninsula

Otago Peninsula

ELECTRIC SUPPLY STATIONS.

Steam	▼
Gas	▲
Oil	●
Hydro.	■

P.W.D. transmission lines over 30.000 v. ——————

P.W.D. proposed transmission lines over 30.000 v. — — — — —

Other supply authorities - · - · - · -

POWER BOARDS FORMED.

No.	Name.	Population.	Value of Rateable Property unimproved.
1	Buller	9,197	696,374
2	Reefton	1,850	64,476
3	Grey	12,000	614,694
4	Westland	2,272	196,268
6	Southland	66,009	15,493,548
7	Otago	24,082	4,696,448
8	Teviot	2,466	183,022
9	Otago Central	5,179	1,067,518
10	Waitaki	17,580	4,646,292
11	South Canterbury	41,618	15,483,654
12	Ashburton	18,001	10,047,044
13	Malvern	5,050	3,891,668
14	Springs-Ellesmere	11,270	6,480,598
15	Banks Peninsula	4,000	4,218,326
16	North Canterbury	12,868	4,941,302
19	Marlborough	20,780	6,728,793
21	Golden Bay	1,200	240,717
	Totals	273,927	78,710,742

POWER BOARDS PROPOSED

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

Districts shown red.

168° 169° 170° 171° 172° 173° 174° East Longitude

PUBLIC WORKS
Engineer's Department
NEW ZEALAND.

F. W. FURKERT, M.INST.C.E
ENGINEER-IN-CHIEF.

PUBLIC WORKS MAP
SHOWING THE RAILWAYS
SOUTH ISLAND
OF
NEW ZEALAND
1927

— Scale of Miles —

10 0 10 20 30 40 50 60 70 80

— REFERENCE —

GOVERNMENT RAILWAYS.

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

PRIVATE RAILWAYS.

Opened - - ———

DISTANCES BY RAILWAY BETWEEN PRINCIPAL PLACES.

	Miles.	Miles.
Bluff to Invercargill	17	
Invercargill to Lumsden	50	
Lumsden to Kingston	37	
Bluff to Kingston		**104**
Invercargill to Gore	39	
Gore to Balclutha	47	
Balclutha to Milton	17	
Milton to Dunedin	36	
Invercargill to Dunedin		**139**
Invercargill to Orawia		**64**
Invercargill to Tokanui		**34**
Balclutha to Tahakopa		**43**
Dunedin to Cromwell		**155**
Dunedin to Port Chalmers		**8**
Gore to Lumsden		**37**
Gore to Waikaka		**16**
Waipahi to Edievale		**26**
Milton to Miller's Flat		**52**
Dunedin to Oamaru	78	
Oamaru to Timaru	53	
Timaru to Ashburton	47	
Ashburton to Rolleston	38	
Rolleston to Christchurch	14	
Dunedin to Christchurch		**230**
Christchurch to Lyttelton		**7**
Oamaru to Hakataramea		**43**
Timaru to Fairlie Creek		**39**
Christchurch to Greymouth		**147**
Christchurch to Little River		**36**
Christchurch to Waiau		**82**
Christchurch to Parnassus		**85**
Picton to Wharanui		**56**
Nelson to Glenhope		**59**
Greymouth to Reefton		**47**
Reefton to Inangahua		**19**
Greymouth to Ross		**39**
Westport to Mokihinui Colliery		**31**

By Authority W. A. G. Skinner, Government Printer, Wellington.

PUBLIC WORKS
Engineer's Department
NEW ZEALAND.

F. W. FURKERT, M.INST.C.E
ENGINEER-IN-CHIEF.

PUBLIC WORKS MAP
SHOWING THE RAILWAYS
OF NORTH ISLAND
NEW ZEALAND
1927

— Scale of Miles —

10 0 10 20 30 40 50 60 70 80

— REFERENCE —

GOVERNMENT RAILWAYS.

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

PRIVATE RAILWAYS.

Opened - - ———

DISTANCES BY RAILWAY BETWEEN PRINCIPAL PLACES.

	Miles.	Miles.
Wellington to Palmerston North	87	
Palmerston North to Wanganui (Aramoho Junction)	60	
Aramoho to New Plymouth	104	
Wellington to New Plymouth		**251**
Wellington to Palmerston North	87	
Palmerston North to Woodville	18	
Woodville to Napier (Spit)	97	
Wellington to Napier via Manawatu ..		**202**
Wellington to Woodville	115	
Woodville to Napier (Spit)	97	
Wellington to Napier via Wairarapa ..		**212**
Auckland to Onehunga		**8**
Auckland to Hamilton (Frankton Junction) ..	85	
Hamilton to Ongarue	75	
Ongarue to Taumarunui	15	
Taumarunui to Ohakune	50	
Ohakune to Waiouru	17	
Waiouru to Marton	68	
Marton to Wellington	116	
Auckland to Wellington		**426**
Auckland to Hamilton (Frankton Junction) ..	85	
Hamilton to Te Aroha	30	
Te Aroha to Thames	33	
Auckland to Thames		**148**
Auckland to Rotorua		**171**
Auckland to Whangarei		**133**
Dargaville to Donnelly's Crossing ..		**24**
Whangarei to Opua		**53**
Kawakawa to Okaihau		**29**
Gisborne to Motuhora		**49**
Thames to Waihi		**33**
Stratford to Tahora		**48**

By Authority W. A. G. Skinner Government Printer Wellington.

APPENDIX C.

ANNUAL REPORT ON BUILDINGS BY THE GOVERNMENT ARCHITECT.

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

Sir,—

I have the honour to submit the following report on the activities of the Architectural Branch of the Department for the year ended 30th June, 1927 :—

During the period plans were prepared for eighty-six new works, of a total estimated value of £756,155, of which thirty-three contracts, to the amount of £68,122, have been let. In addition, forty-one contracts, to the amount of £245,420, for buildings designed prior to the 30th June, 1926, have also been let, making the total of works completed or under construction £313,542.

The latter total includes £56,199 for secondary-school buildings, and £65,132 for hospitals, &c., designed for Hospital Boards.

In addition to the above totals for buildings designed in Head Office, a large amount of minor additions, alterations and repairs, and general maintenance of public buildings has been carried out by District Engineers, and a considerable quantity of furniture and fittings has been manufactured in the Public Works workshops for various Government Departments.

New Zealand materials and manufactures have been used, except where the use of imported material was unavoidable, with generally satisfactory results. Competition for Government contracts has been keen, with prices generally showing a slight downward tendency, and the standard of workmanship has been satisfactory.

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

Post-offices.

Whangarei District.—A new post-office has been erected at Paihia. Repairs and renovations have been carried out to twenty-two post-offices.

Auckland District.—Extensive additions in brick and concrete have been carried out to the automatic-telephone exchanges at Hamilton, Remuera, and Mount Eden. New post-offices have been erected at Wellsford, Te Mata, and Kaukapakapa, and a Postmaster's residence built at Waiuku. Contracts have been let for the erection of offices and store and motor-garage and workshops in reinforced concrete at Frankton. Additions and general repairs have been carried out to the Hamilton, Frankton, and Pukekohe Post-offices. A motor-garage, linesman's store, and benzine-store have been erected at Te Aroha, a motor-garage and benzine-store at Helensville, and a motor-garage at Huntly. A contract has been let for additions to the Wellesley Street Post-office, Auckland.

Taumarunui District.—General repairs and renovations have been carried out to seventeen post-offices, and a motor-garage has been erected at Taumarunui.

Tauranga District.—General repairs and renovations have been carried out to ten post-offices in this district.

Gisborne District.—Extensive alterations and additions were completed at a cost of £20,019 to the Gisborne Post-office, and a new residence for the Postmaster was completed at Te Karaka. Repairs and renovations have been carried out to six post-offices.

Stratford District.—A new post-office has been erected at Marton, and a contract has been let for the erection of a new post-office at Castlecliff. General repairs and alterations have been carried out to nine other post-offices, &c.

Napier District.—A new Postmaster's residence at Porangahau has been completed, and a new store and garage erected at Wairoa. General repairs and renovations have been carried out to twenty-two post-offices. A contract has been entered into and the work of making large additions to the Hastings Post-office is in hand and proceeding satisfactorily.

Wellington District.—Contracts for the erection of additions to Courtenay Place Automatic Exchange and Palmerston North Post-office are nearing completion, whilst a new building for the automatic-telephone exchange at Miramar is completed. A new Public Service garage was erected by contract at Pipitea. General repairs and renovations were carried out to five other post-offices, &c.

Nelson District.—New exchange buildings in brick at Seddon completed. Additions to the post-offices at Richmond and Murchison completed. A new linesman's store and garage was erected at Motueka. Alterations and renovations were carried out to post-office at Brightwater.

Christchurch District.—A concrete motor-garage and workshops has been added to the Timaru Post-office. General repairs and renovations have been carried out to twenty-four post-offices.

Greymouth District.—New post-offices in wood on concrete foundations have been erected at Wallsend and Waiuta. Repairs and renovations have been carried out to fifteen post-offices, &c.

Dunedin District.—New post-offices have been erected at Omakau, Oturehua, Outram, Poolburn, Portobello, and Ohai. General repairs and renovations have been carried out to thirty other post-offices.

Courthouses.

Whangarei District.—Repairs and renovations have been carried out to two Courthouses.

Auckland District.—Renovations have been carried out to the Courthouses at Matamata, Raglan, and Te Awamutu.

Tauranga District.—Repairs and renovations have been carried out to Te Puke Courthouse and the Rotorua Magistrate's Court.

Gisborne District.—General repairs and renovations were carried out to the Courthouses at Gisborne and Waipiro Bay.

Napier District.—Repairs and renovations have been carried out to four Courthouses.

Wellington District.—Repairs and renovations have been carried out to the Courthouse, Otaki.

Nelson District.—Alterations and renovations have been carried out to the Courthouse at Takaka.

Greymouth District.—Repairs and renovations have been carried out to six Courthouses.

Christchurch District.—Repairs and renovations have been carried out to four Courthouses in the district.

Dunedin District.—Repairs and renovations have been carried out to seven Courthouses.

Police-stations and Gaols.

Whangarei District.—Repairs and renovations have been carried out to six police-stations.

Auckland District.—A new police-station has been erected at Putaruru. General repairs and renovations have been carried out to three police-stations in the district. A new blacksmith repair shop and new bathing-accommodation have been provided at Mount Eden Prison. General repairs, &c., have been carried out.

Taumarunui District.—Repairs and renovations have been carried out to five police-stations.

Tauranga District.—General repairs and renovations have been carried out to four police-stations.

Gisborne District.—Repairs and renovations have been carried out to seven police-stations, &c.

Napier District.—Repairs and renovations have been carried out to sixteen police-stations.

Stratford District.—General repairs and renovations have been carried out to three police-stations.

Wellington District.—A new police-station has been erected at Eketahuna. Repairs and renovations have been carried out to four other stations.

Nelson District.—General repairs and renovations have been carried out to eight stations and gaols in this district.

Christchurch District.—A new police-station in brick has been erected at Phillipstown. Repairs and renovations have been carried out to ten other police-stations. Paparua Prison: Administrative block has been taken into occupation; central hot-water heating-system installed throughout. Work on the provision of exercise-yards is in progress, and some of the walls have been completed. Further accommodation to the piggeries has been provided by the erection in wood and concrete of twelve farrowing-pens.

Dunedin District.—Repairs and renovations have been carried out to twelve police-stations.

Mental Hospitals.

Avondale.—The contract for the neuropathic unit has been completed, and a new Nurses' Home and residence for the Assistant Medical Officer have been erected. A new washing-machine and hydro-extractor, with motors, &c., complete, has been installed in the laundry, and considerable improvements have been carried out to the drying-room. Extensive painting and renovations have also been carried out.

Tokanui.—A veranda and visitors' room have been erected in front of female admission block; also outside fire-escape in iron. Alterations and additions have been made to day-room in unit No. 3 to provide for a cinema operating-box. A contract has been let for the mortuary in concrete blocks, and the work is in hand. General repairs and renovations have also been carried out.

Porirua.—Male neuropathic unit completed and furnished, also admission unit and three villa units for males erected during the year. General repairs and renovations have also been carried out. Heating-system installed by contract in Sick-ward A.

Nelson.—General repairs and renovations carried out.

Stoke.—Improved lavatory accommodation installed. General repairs and renovations were also carried out.

Hokitika.—General repairs, additions, and renovations have been carried out.

Sunnyside.—A residence in wood for the Assistant Medical Officer was erected under contract.

Hornby.—A villa for nervous patients was erected under contract.

Templeton.—A contract was let for the erection of a villa hospital, and the work is in progress.

Seacliff.—A new neuropathic unit has been erected at Puketeraki; a new admission cottage, new coal-bunkers, and alterations and additions to several buildings at the main institution.

Education Department.

Whangarei District.—Whangarei High School boys' hostel and class-room additions have been completed. Alterations and renovations were carried out to six Native schools. A new teacher's residence was erected at Mangamuka, and a new Native school at Waikeri.

Auckland District.—The contract for a new Probation Home for boys was completed early in the year, and furniture and fittings were supplied. The contract for providing an additional story to the Seddon Memorial Technical College has been completed. The exterior of the old portion of the building was cement washed and all woodwork painted.

Tauranga District.—Two new Native schools and teachers' residences have been erected at Taheke and Ranana. Contracts have been let for a new Native school and teacher's residence at Maraenui, and additions to Native school and residence at Te Paroa, Totara. Repairs and renovations have been carried out to three other Native schools.

Gisborne District.—Two additional class-rooms in brick are in course of erection to the Gisborne High School. Alterations and renovations have also been carried out to this school. A new Native school and teacher's residence have been erected at Tokata, and a new school and outbuildings at Hiruharama. A tender has been accepted for additions and alterations to the Manutahi Native School. General repairs and renovations have been carried out to four other Native schools.

Napier District.—A new fence has been erected to the Hastings Technical School. A contract has been let for the erection of new workshops to the Napier Technical School; also for the erection of a new cookery-room to the Dannevirke Technical School. Additions to the Nuhaka Native School are in hand. General maintenance-work has been carried out to the Greenmeadows Receiving-home.

Stratford District.—New Plymouth Boys' High School: A new cavity brick and concrete building, finished in rough-cast, with Marseilles-tile roof, comprising four class-rooms and appurtenances, also separate lavatory block of similar construction, was erected complete. New Plymouth Girls' High School: A new cavity brick and concrete building, having exterior finished in pressed brick with joints pointed in cream mortar, and concrete tile roof, comprising four class-rooms, lavatories, &c., was erected complete. Alterations and repairs have been carried out to the Wanganui Technical College.

Wellington District.—Two additional class-rooms to the Feilding Technical High School have been completed. The erection of two additional class-rooms to the Palmerston North Technical School is in hand. A contract has been let for alterations and additions to the Wairarapa High School. A caretaker's cottage and bicycle-shed have been erected at the Hutt Valley High School. Repairs and renovations have been carried out to three other schools.

Nelson District.—The erection of the Marlborough High School is in hand. Repairs and renovations to the Richmond Special School for Girls have been carried out.

Greymouth District.—Repairs and renovations have been carried out to the Technical School and School of Mines at Westport.

Christchurch District.—Timaru Girls' High School: Two new class-rooms, &c., erected in brick and concrete, and other improvements effected. Additions to hostel in brick, and detached dormitory, with necessary conveniences, being erected. Timaru Boys' High School: Two new class-rooms, &c., erected in brick and concrete, and improvements effected in old school. Repairs and improvements have also been carried out to the Ashburton High School.

Dunedin District.—A contract has been let for the erection in brick of a new home-science wing to the Invercargill Technical College. A new brick outbuilding has been erected at the Anderson's Bay Probation Home, and a cottage to the Otekaike Special School. General repairs and renovations have also been carried out at Otekaike.

Health Department.

Auckland District.—Extensive repairs and renovations have been carried out to the nurses' quarters of St. Helens Hospital.

Gisborne District.—General repairs and renovations have been carried out to St. Helens Hospital, Gisborne.

Napier District.—Farm buildings (piggeries and stables) have been erected at the Pukeora Sanatorium.

Wellington District.—Otaki Sanatorium: Ten shelters and ten cubicles, with lavatories and store accommodation, were completed. Additions were made to the Medical Superintendent's residence. Repairs were carried out to the St. Helens Hospital.

Christchurch District.—Hanmer: A new women's hospital has been erected, also a new power-house in concrete.

Dunedin District.—Renovations and repairs have been carried out to St. Helens Hospitals, Dunedin and Invercargill.

Hospital Boards.

Whangarei District.—A contract has been let for the erection of a maternity hospital at Kaitaia. Good progress is being made.

Taumarunui District.—General renovations and repairs have been carried out to the Maternity Home at Taumarunui.

Napier District.—Waipawa Hospital, Waipukurau: A new Nurses' Home, under construction last year, has been completed; a new kitchen block has been erected; additions to the women's ward and a new administration block is in course of erection. Napier Hospital (Midgley Ward): This ward, under erection last year, has been completed; roading-work and the erection of retaining-walls have been put in hand for the Board by this Department. Dannevirke Hospital: The erection of a new ward and additions to the Nurses' Home have been completed. Hawke's Bay Fallen Soldiers' Memorial Hospital: The erection of this hospital is well advanced.

Wellington District.—A contract for new kitchen, laundry, and boiler-house for the Wellington Hospital has been let, and good progress is being made.

Greymouth District.—An extension in brick to the male ward at the Westport Hospital has been completed. A new Nurses' Home in brick and concrete for the Grey River Hospital Board has been completed.

Dunedin District.—A tender has been accepted for the erection of a Nurses' Home in brick at the Gore Hospital.

Defence Department.

Whangarei District.—Repairs have been carried out to the Dargaville rifle range.

Auckland District.—A new drill-hall has been erected on concrete base and foundations at Hamilton. A new store and offices have been erected at the Narrow Neck Field Artillery Barracks, Waikato Camp, Ngaruawahia. Ordnance Depot: This work was started at the end of last year, and is now complete, with exception of painting and plastering. Ordnance Offices: These have been erected, and are complete, with exception of external plastering. Quartermaster's Store has been erected, and is now complete. Cottage No. 4 has been completed, and cottages Nos. 1, 2, and 3 are now under construction. Magazines Nos. 6 and 7 are under construction. A fair amount of general maintenance-work has been carried out.

Gisborne District.—A contract has been let for re-covering roof and repairs.

Napier District.—General repairs and renovations have been carried out to the drill-halls at Dannevirke and Napier, and the Artillery Barracks, Napier.

Stratford District.—Repairs and renovations have been carried out to the New Plymouth Drill-hall.

Wellington District.—A five-roomed cottage was erected in concrete, winch-shed erected, and hauling plant installed at Fort Ballance. Extra storage accommodation provided at Carterton; offices, officers' mess, sergeants' mess, gun-park, and recreation-room were erected from buildings transferred from Featherston Camp, and hot- and cold-water shower-baths installed at Fort Dorset.

Nelson District.—General maintenance-work carried out to Defence buildings, Nelson.

Greymouth District.—Repairs and renovations have been carried out at Westport, Hokitika, and Greymouth Drill-halls.

Christchurch District.—Burnham Camp: Large corrugated galvanized building erected to serve as camp-equipment store. New deep-well pumping plant installed for general water-supply.

Dunedin District.—Repairs and renovations have been carried out to Kensington Drill-hall and Central Battery, St. Kilda. A target-shed was erected at the Invercargill rifle range, and general repairs effected to Defence buildings in district.

Tourist Department.

Auckland District.—Helensville Hot Springs: New conveniences in concrete have been erected, and electric light installed in the Domain Grounds.

Taumarunui District.—Waitomo Caves: A contract has been let for extensive additions to the hostel and the erection of garage. Piggeries and poultry-house carried out. New men's quarters have been erected. General repairs and renovations have been carried out.

Nelson District.—Fittings and furniture have been supplied to the Tourist Department's office, Nelson.

Christchurch District. — Mount Cook Hermitage: Alternative fuel-burning plant installed to supply hot water to kitchen and bathroom services. Large reinforced-concrete water-tank erected to supplement the water-supply.

Dunedin District.—Queenstown Park: The erection of conveniences and septic tank completed. Sandfly Huts: Temporary accommodation has been erected. Glade House: Power plant for cutting of firewood supplied and installed. Te Anau Hostel: Additional drainage installed. Te Anau Slipway: Arrangements are in hand for the erection of a new slipway to accommodate the steamer at Lake Te Anau; preliminary work has been commenced.

General.

A large quantity of furniture and fittings was made and supplied to various offices.

In concluding, I desire to place on record my appreciation of the co-operation of the district offices, and the efficient and loyal manner in which the members of the architectural staff carried out their duties.

John T. Mair, A.R.I.B.A.,
Government Architect.

APPENDIX D.

ANNUAL REPORT OF THE CHIEF ELECTRICAL ENGINEER.

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

Sir,—

I beg to report on the position of the development of electric power in the Dominion for the past year as follows:—

GOVERNMENT SCHEMES IN OPERATION.

LAKE COLERIDGE ELECTRIC-POWER SUPPLY.

The year ending 31st March, 1927, completes the twelfth year of operation of the Lake Coleridge scheme, and the results of the year's working have been very satisfactory. The attached tables (A, C, and E) show the analysis of results obtained for the year's operation, and connected load details are scheduled in Table D.

Financial Results.

The capital outlay at the end of the year was £1,538,569, as against £1,366,950 for the preceding year, an increase of £171,619. The total revenue for the year was £150,240, and after payment of all charges, including interest and depreciation, an excess of £26,250 was shown. This amount of £26,250 has been placed to the credit of Sinking Fund Account, bringing the sinking fund to a total amount of £35,157. To this, however, should be added the interest earned by investments on this account—viz., £286—making a total to sinking fund credit of £35,443. Table A shows particulars of financial results and load records.

The total cost per unit generated was 0·3798d., being an increase of 0·0427d., due mainly to increased capital charges. Operating-costs have increased by £3,693, mainly due to increased staff, generating-costs, and maintenance of Harper River diversion works. Particulars of operating-costs are given in Table C.

Connected Load.

The total connected load at the end of the year was 112,424 kw., being an increase of approximately 24 per cent. on that of the previous year. Details of connected load are given under Table D.

Power-house Load and Operation.

The maximum demand on the power-house for the year was 16,880 kw., representing an increase of 17 per cent. over the previous year's maximum demand. Units output from the power-house totalled 78,342,797, as against 68,860,614 for the previous year, being an increase of 13·7 per cent. The annual load-factor was 53·4 per cent. or 1·4 per cent. lower than that of the previous year.

There was a heavy overload on the plant prior to July, 1926, when the first 7,500 kw. generator was brought into service, and the Tramway Board was called upon to supply their own load with the 1,500 kw. steam standby plant when required. Subsequent to the completion of the first 7,500 kw. generating-unit at the power-house (July, 1926) there has been no call made on the Tramway Board for standby supply.

During the period 31st March to 30th June, 1927, the maximum demand made on the power-house reached 21,020 kw. The installation of the second 7,500 kw. unit was completed in December, 1926, thus bringing the total installed capacity of plant at the power-house to 27,000 kw.

Transmission-lines.

The new transmission-line from Hororata to Timaru was completed on the 21st August, 1926, and power was supplied to Ashburton and Timaru over this line on the 29th idem. Steel towers with piled foundations are used for the Rakaia, Ashburton, Rangitata, Opihi, and Temuka River crossings, and carry two circuits, thus avoiding troubles which have occurred in the past by washing-out of poles during floods.

The Timaru–Oamaru line was not completed until November, 1926, and supply was given to the Waitaki Power Board from the Department's substation at Weston, on the 24th December, 1926.

The total length of new line erected from Hororata to Oamaru is 140 miles, and the type of construction is such that by the addition of extra suspension insulator units the voltage of this line can be raised to 110,000 volts.

With the object of better control and sectionalizing of the main lines from Lake Coleridge to Addington it was decided to bring the north line from Lake Coleridge into Hororata substation and thence to Addington. This involved the construction of five and a quarter miles of new line between

Glentunnel and Hororata, and the dismantling of about four miles of the original line between Glentunnel and Homebush. All three lines from Lake Coleridge now pass through Hororata switching-station, which will ultimately become the Department's main-load-despatching station on this system. In order to automatically cut out and sectionalize faulty sections of line without interrupting supply, oil circuit-breakers have been erected on all outgoing lines at Hororata and at Addington. The completion of this work will materially assist in maintaining uninterrupted supply to Christchurch and the south.

The results of the course of instruction in live-line testing in 1926 were very successful, and the Department is systematically treating all transmission-lines by testing insulators under live-line conditions. To date quite a number of defective insulators shown faulty by this method of testing have been removed, thus reducing the risks of interruptions.

Transmission-lines and Substations.

The construction of additional lines and the alterations outlined above have necessitated considerable alterations and additions to the various substations. At Ashburton Substation the growth of load of the Ashburton Electric-power Board necessitated the removal of the 750 kv.a. bank of transformers and the replacement of same by a 5,000 kv.a. bank. This bank was recently in use in Addington Substation, and was reconstructed for outdoor conditions. The 750 kv.a. bank was transferred to Weston (Oamaru) Substation for supply to the Waitaki Power Board.

Considerable extensions were made to the outdoor equipment at Timaru Substation to make provision for the new Hororata–Timaru line and the extension from Timaru to Oamaru. This latter line is protected by an oil circuit-breaker, and provision is made whereby Oamaru can be supplied from either of the two lines from Ashburton. Provision has also been made for a second line to Oamaru. In order to regulate the voltage at Timaru the 1,500 kv.a. synchronous condenser was transferred from Addington and installed in the substation, and put into operation on the 8th March, 1927.

Weston (Oamaru) Substation.

A contract was let in November for the erection of substation building, cottage, and garage. Owing to delay in construction these were not completed before supply was available, and temporary housing was provided for the necessary switch-gear. The outdoor equipment consists of air-break switch, arresters, and 750 kv.a. bank of transformers. These were completed and supply given to Waitaki Power Board on the 24th December, 1926. In order to regulate the voltage of supply an induction regulator was installed, and put into operation at the end of February, 1927.

Interruptions to Supply.

Christchurch Line.

Apart from one pre-arranged shut-down, the interruptions on these lines during the year totalled 41½ minutes. Of these interruptions the longest, of 20 minutes, was due to bark and trees fouling both lines. Two interruptions were due to defective insulators (total time 14½ minutes) and two were due to operating faults (3 minutes) and to lightning (4 minutes). The period of involuntary interruptions has been considerably reduced, and it is hoped that with the installation of sectionalizing oil switches and live-line insulator testing these will be reduced to a minimum.

Timaru and Oamaru Lines.

Neglecting such pre-arranged shut-downs as were found necessary for construction work and alterations, the interruptions on these lines totalled 11 hours 56 minutes. Most of these were of short duration. The longest period of interruption was 3 hours 20 minutes, and was due to a broken phase wire causing delay in repairing. The next longest period occurred in September, when an earth-wire came into contact with the transmission-line. Difficulty was experienced in locating this trouble, and service was not restored for 3 hours 11 minutes. In both of these cases only one line was available for use.

Lake Coleridge Duplication.

The construction of the necessary new intake works, tunnel, surge-chamber, and pipe-lines was completed by the end of June, and the first of the two 7,500 kw. generating-units was completed and run on load on the 9th July, 1926. Up to that date the existing plant had been heavily overloaded, and assistance was obtained from the Christchurch Tramway Board. The necessity for this assistance was then removed, and the addition of the 7,500 kw. unit enabled all demands to be easily met. Erection of the second generating-unit was commenced on the 1st August, 1926, and completed at the end of November, 1926. Some trouble was experienced with both generator and turbine bearings and the lubricating system. The latter was modified, the bearings of each unit being supplied from one oil-pump, the latter being coupled to a motor for emergency drive. Both sets have been run on overload with good results.

The erection of the new ironclad switch-gear was completed on the 8th January, and has since been in operation. The dismantling of the original open-type switch-gear was then carried out, and completed at the end of March, 1927.

A system of forced ventilation was installed in the original section of the power-house to conduct the hot air from the generator basement where the generator reactors are installed. During the hot north-west winds the temperature of the basement has been somewhat high, and the installation of this system will have the effect of reducing this.

General.

Addington Substation.

The work of erecting the new ironclad switch-gear was carried out, and one of the three sections was put into service in October, 1926. Erection of frames and chambers was completed in April, 1927, and it is hoped that the whole equipment will be put into service by September, 1927. The new switchboard to control the above switch-gear was completed and the original board moved back into line by March, 1927.

The north bank of 5,000 kv.a. transformers was completed and put into service on the 9th June, 1926, bringing the capacity of the substation up to 15,000 kv.a. In anticipation of the arrival of the new 12,000 kv.a. bank, the middle bank of transformers was removed and changed to outdoor type. These were then installed at Ashburton in December, 1926. Owing to late delivery on the part of the contractors for supply of the 12,000 kv.a. bank of transformers these did not arrive until the 28th March, 1927. They were dried out in the substation, and put into service in June. Until these were put into service the existing banks, totalling 10,000 kv.a., were subjected to heavy overloads, but carried them successfully.

In order to cope with the heavy lifts at the Addington Substation the electrically operated 20-ton crane was transferred from the power-house. Certain structural alterations were necessary to adapt the crane for its new location, and it was nearly completed by the close of the year. The erection was actually completed in April, and facilitated the erection of the 12,000 kv.a. bank of transformers.

The 6,000 kv.a. synchronous condenser was put into service in April, 1926, and has been running on full load during the day load throughout the year.

The North Canterbury Electric-power Board was formed and duly gazetted on the 3rd March, 1927. This Board will control supply of electricity over an area extending from the Waimakariri River to the Waipara River, and will be supplied by the Department by a new 33 kv. line from Addington to Southbrook. This line will be built during the present summer. Extensions to the area of the South Canterbury Power Board comprised the counties of MacKenzie and Levels.

Rainfall.

The rainfall at the power-house for the year was 34·83 in., or over 9 in. less than for the preceding year. The highest monthly rainfall occurred in November, when 3·09 in. were recorded.

WAIKATO ELECTRIC-POWER SUPPLY.

Capital Outlay.

The capital outlay at Horahora at the end of the year was £576,841, as compared with £561,065 at the end of last year, an increase of £15,776, all of which was in operation at the end of the year.

In addition to the capital outlay provided under the Horahora scheme, the following works of total capital value of £268,107, provided under the Arapuni scheme, are in operation, and supplied with power from Horahora: Transmission-lines—Horahora–Hamilton and Penrose, Horahora–Arapuni–Ngongotaha, Waikino–Aongatete, Penrose–Takapuna, Bombay–Pukekohe; also substations at—Arapuni, Penrose, Bombay, Ngongotaha, Takapuna, Henderson.

The combined capital outlay on assets in operation on which capital charges are paid out of revenue, is thus as follows: Horahora, £576,841; Arapuni, £268,107: total, £844,948: as compared with £701,357 last year.

The capital outlay is analyzed in Table G herewith, which shows that the increase is principally in the item "Transmission-lines under the Arapuni scheme"—*i.e.*, the Penrose–Takapuna 50,000 v. line, and the Arapuni–Hamilton 110,000 v. line.

Financial results of Operation, and future Prospects.

The year ended with a profit, after paying all working costs, interest, depreciation, and sinking fund, of £16,653, as compared with £10,006 last year. The annual revenue increased from £85,830 last year to £108,748 this year, an increase of £22,918, or 26·7 per cent. (Table F). The table below shows the sources of this revenue:—

Revenue from—	1924. £	1925. £	1926. £	1927. £
Large mining companies	24,635	18,086	16,476	16,150
Four original Power Boards (Cambridge, Central, Te Awamutu, and Thames Valley)	26,007	35,302	42,226	50,616
Additional power Boards (other than Auckland)	..	..	504	6,173
Auckland Power Board	..	..	10,850	15,139
Hamilton Borough	4,621	5,461	6,205	6,888
Tourist Department, Rotorua ..	..	..	276	2,262
Other wholesale consumers ..	3,281	4,264	7,432	8,988
Miscellaneous	1,380	2,071	1,861	2,532
	£59,924	£65,184	£85,830	£108,748

It is satisfactory to note that the largest item of increase is in the revenue from the four original Power Boards. New Power Boards other than Auckland—*i.e.*, Franklin, Waitomo, and Waitemata—also the Auckland Power Board, show large increases, while the revenue from mining companies shows a slight decrease (Table N).

The sum of the maximum loads of the four original Boards has increased from 4,532 kw. in 1925 to 5,521 kw. in 1926, and to 6,714 kw. in 1927.

EXTENSIONS DURING THE YEAR, AND FUTURE EXTENSIONS.

General: Additional Consumers and Connected Load.

During the year supply has been given at the following additional points:—

Consumer.	Point of Supply.	Date.
Waitemata Power Board	Takapuna	20th December, 1926.
,, ...	Henderson	20th ,, ,,
Waitomo Power Board (from 50 kw. substation) ..	Hangatiki	24th February, 1927.

With the completion of the Penrose–Takapuna double circuit 50 kv. line, and of the 110 kv. pole line from Horahora to Hamilton, the system of lines supplied from Horahora consists of the following:—

Lines belonging to Public Works Department: 94 miles of 110 kv. line operated at 50 kv.: 193 miles of 50 kv. line, including 28 miles two-circuit line; 44 miles of 11 kv. line: also 16 miles of 50 kv. line belonging to Tauranga Borough Council.

Lines belonging to Power Boards and other local authorities (not including Auckland Power Board and Tourist Department, Rotorua): 801 miles of 11 kv. line; 488 miles of 3,300 v. line; 528 miles of 400 v. line.

The above are route-miles of lines, and are only approximate figures, owing to incomplete returns supplied by one of the local bodies (Tables K and L).

The connected load, not including Auckland, has increased from 41,448 kw. to 52,205 kw., or 26 per cent. (Table J).

The number of milking-machines supplied increased from 2,731 to 3,308, or 21·2 per cent. (Table M).

An alteration was made in the agreement for supply from Tauranga Borough whereby the amount of power they guarantee to supply was increased from 1,800 kw. to 2,200 kw. an hour for eight hours, and from 16,000 units daily to 20,000 units.

Towards the end of the year, the load increased considerably, and it became necessary to call on the Grand Junction steam plant to run from 1 p.m. to 9 p.m. on week-days, supplying a maximum of about 1,000 kw. Arrangements to purchase the Grand Junction plant were practically completed during the year.

The increase in maximum load has been as follows: Horahora Power-station, 11,400 kw. to 12,400 kw.; system, 11,860 kw. to 14,160 kw.

The diversity factor (exclusive of power supplied to Auckland and connected load in Auckland) is 4·1 this year, compared with 4·15 and 3·8 for the two previous years.

Extensions to Horahora.

During the year the new weir at Horahora was completed, with the three gates in it—Glenfield-Kennedy hand-operated Stoney sluice-gate, Boving automatic lifting-gate, and Ransome and Rapier automatic lowering-gate.

Additional switch-gear was installed at Horahora to connect to the Horahora–Hamilton–Penrose line, which supplies power to the Franklin, Auckland, and Waitemata Power Boards.

An additional transformer, 625 kv.a., 5000/11,000 v., was installed in parallel with the existing 938 kv.a. transformer to give increased supply to the Thames Valley Board, and was put in service on the 20th February, 1927.

The oil-store floor was concreted, and concrete stands made for oil-tanks.

Additional Transmission-lines.

The following lines were completed during the year: Horahora–Hamilton, 110 kv., put in service on the 18th July, 1926; Penrose–Takapuna, 50 kv., put in service on the 20th December, 1926 (one circuit only is in service). The first of these is a 110 kv. wood-pole line, and the second a double-circuit 50 kv. line, partly on narrow base two-circuit steel towers and partly on wood poles. The total number of towers is 300, including two special towers at the Greenhithe–Hobsonville crossing; and the number of poles 243.

Arapuni-Penrose Line (110 kv.).—Work has been in progress throughout the year on the Arapuni–Penrose double-circuit steel-tower 110 kv. line, with the following results: Special foundations, including concreted stubs, piled foundations, and floating foundations, 63 completed out of a total of 77; other stubs set, 424 out of 450; towers erected, 337 out of 527; towers wired, 41.

It is expected that this line will be completed in September, 1927. This line has been carried out as far as possible by co-operative contract. Under this system the average "man-hours" work for erecting a 70 ft. tower was reduced from 140 man-hours at the commencement to about 80 man-hours at present, while the best time on any one 70 ft. tower was 57 man-hours. A similar reduction

applies to other sizes of towers. Considerable difficulty and expense was incurred in building special foundations in the swamps on parts of the route.

Bombay–Waikino 50 kv. Wood-pole Line.—This line has been under construction by contract throughout the year, the position at the end of the year being as follows: 597 poles erected out of a total of 607; 584 poles wired out of a total of 607; two towers out of five erected. The five towers are at crossings of the Waitakaruru Canal one, Piako River two, and Waihou River two. These were necessary to provide clearance for navigation, and in the case of the Waihou River special foundations (piles and concrete) were necessary owing to the soft ground.

Arapuni–Horahora Section of Arapuni–Penrose 110 kv. Pole Line.—This line has been constructed and put into service in stages as required: (1) Hamilton–Penrose, completed 1925; (2) Hamilton–Horahora, including two miles of temporary wood-pole line to complete the connection from Horahora; (3) the Arapuni–Horahora section has been completed during the year except for erecting and wiring of two 40 ft. strain towers.

Survey Ngongotaha–Opotiki Line (50 kv.).—The survey of this line was commenced during the year, the general route decided on, and the pole positions pegged on thirty-four miles out of a total length of about sixty miles. The line is due for completion in June, 1928.

Substations.

Penrose (110 kv. to 22 kv. and 22 kv. to 50 kv.).—Construction work has been in progress throughout the year, comprising excavating for synchronous condensers, construction of blacksmith's shop, construction of new oil-store and conversion of old oil-store into a machine-shop, fitting up tanks and piping of oil-store, construction of garage, construction of foundations for 50 kv. transformers, erection of switch-gear for temporary supply to Waitemata line, construction of drying-oven for large transformers, and drying-out of 22/50 kv. transformers, and assembly and erection of the 110 kv. switch-gear and structure. A garage building was erected during the year.

Bombay (110 kv. to 50 kv. and 50 kv. to 11 kv.).—Transformers (110 kv. to 50 kv.) arrived for this substation during the year, and are at present stored in the Auckland Harbour Board sheds and at Penrose. The temporary 50 kv./11 kv. substation has continued in operation throughout the year, supplying the Franklin Power Board.

Hamilton No. 2 (110 kv. to 50 kv.).—The site for this substation has been selected, and the incoming and outgoing 110 kv. lines arranged to fit in with it.

Hamilton No. 1 (50 kv.).—A new bank of transformers (three 500 kv.a.) was ordered to provide for growth of load. Additional switch-gear was installed to provide for supplying Hamilton Borough over their new underground feeders. These two feeders take the place of one overhead circuit on the Department's poles. This circuit was taken over from the borough by the Department, and is now used by the Central Power Board, giving them three outgoing circuits. The Central Power Board metering was rearranged to provide for these three circuits. The new Hamilton feeders were put in service on the 20th and 28th January, 1927. A new 50 kv.a. transformer for local service was installed.

Hangatiki (50 kv. to 11 kv.).—This substation was completed and put in service during the year, supplying the Waitomo Power Board. It consists of three 250 kv.a. single-phase transformers with a spare, together with the necessary 50 kv. switch-gear (outdoor) and 11 kv. switch-gear (indoor, ironclad type), with one house for the operator-lineman.

Takapuna (50 kv. to 11 kv.).—This substation was put in service during the year, supplying the Waitemata Power Board. It consists of two 1,000 kv.a. three-phase transformers, with provision for extension, with outdoor 50 kv. switch-gear, and indoor 11 kv. switch-gear in concrete cells, and with one house for the operator, and oil-store. Owing to delay in arrival of the 50,000 v. steelwork and switch-gear, temporary connections had to be put in to give supply to Henderson (Waitemata) 50 kv. to 11 kv.

Henderson (50 kv. to 11 kv.).—This substation was put in service during the year, supplying the Waitemata Power Board at a point about three miles north of Henderson. It is similar to Takapuna, except that there is one 1,000 kv.a. transformer instead of two, and the 50 kv. switch-gear is arranged to provide for supply to a line to North Auckland. Owing to delay in arrival of the 50,000 v. steelwork and switch-gear, temporary connections had to be put in to give supply.

Mamaku (50 kv. to 11 kv.).—Provision had been made for erection of a small substation at Mamaku during the year, of 150 kv.a. capacity. Owing to delay in arrival of the transformer, the substation only was completed by 31st March, 1927.

Waihou (50 kv. to 11 kv.).—An additional transformer-bank was installed, increasing the capacity to 1,500 kv.a. This was put in service on the 19th May, 1926. A new total-supply metering-panel was installed. A small store building was erected. Check metering-panels were installed by the Power Board.

Te Awamutu (50 kv. to 11 kv.).—The temporary connections to supply the Waitomo Power Board at 11,000 v. were removed, and the necessary connections made and air-break switches installed to supply the line through to Hangatiki at 50 kv. This was put in service on the 24th February, 1927.

Ngongotaha (50 kv. to 6·6 kv.).—A new 50 kv.a. local-service transformer was installed, and has since been re-erected by the Tourist Department, Rotorua, nearer the centre of the load in Ngongotaha. A small store building was erected.

General.—Small battery-charging rectifiers were provided at all important substations, principally for the transmission-line breakdown equipment; also, frequency meters were installed at Horahora, Penrose, Waikino, and Claudelands.

Future Substation Work.—Arrangements are well advanced for completion of Penrose, Bombay, and Hamilton 110 kv. substations; for the erection of new 50 kv. substations near Rangataiki and

Waiotahi for the Bay of Plenty Power Board, at Kerepeehi and Matamata for the Thames Valley Power Board, and an additional substation at Huntly is being provided to supply the growing load of the Central Power Board at that point. Considerable alterations to provide for the increase of load are to be made at Waihou, and also at Waikino for the control of the Bombay–Waikino line, and the two existing lines to that point. A 1,500 kv.a. synchronous condenser is to be installed at Waikino.

Operation and Maintenance.

Headworks and Power-house.

During the year the system peak load increased from 11,860 kw. to 14,160 kw., and the maximum load on the Horahora plant increased from 11,400 kw. to 12,400 kw. The Horahora plant has been running under almost daily overload throughout the year, and credit is due to the Station Superintendent and staff for the satisfactory maintenance of the plant under these conditions. The ventilation has been improved by cutting openings in each generator-pit to allow access of air from underneath, and the performance of No. 1 turbine has been improved by putting a deflector in the head-race, which has overcome the tendency for debris to settle on the racks in front of this machine.

The following troubles have been experienced with the plant: A flashover damaged one of the line entrance bushings and necessitated replacement of it; a condenser bushing in No. 3 transformer-bank 50 kv. oil circuit-breaker failed, and was replaced; No. 7 generator cable broke down, probably because of overload, and was replaced by an overhead connection from power-house to transformer-house. In addition to the above, partial blockage of transformer-cooling coils, overheating of some of the connections and switches due to overload, and the usual wear on the turbine gate-operating gear have been the chief matters requiring attention. As in previous years, the screens have required continual attention to keep them clean. All turbines were overhauled during the year.

The McLaren's Falls plant (Tauranga Borough Council) has supplied power regularly throughout the year. The amount taken was increased as the demand grew, and in addition it became necessary towards the end of the year to run the Grand Junction plant during the peak periods.

Transmission-lines.

The system of lines supplied from Horahora consists of the following:—

(1) Horahora–Arapuni–Ngongotaha line, supplying power at Arapuni and Rotorua.

(2) Horahora–Waiorongomai–Waikino, supplying power at Waihou over a five-mile branch line from Waiorongomai, and at Waikino. It connects at Waikino with a thirty-two-mile line to Aongatete and McLaren's Falls Power-station.

(3) Horahora–Claudelands–Bombay–Penrose–Henderson–Takapuna line, supplying power at Bombay, Penrose, Waitemata, and Takapuna, and connected at Penrose to the Auckland Power Board's steam plant at King's Wharf. This line can also be connected at Hamilton to line No. 4.

(4) Horahora–Mystery Creek line, branching north to Hamilton and south to Te Awamutu and Hangatiki, and supplying power at Hamilton, Te Awamutu, and Hangatiki.

Interruptions.—For purposes of recording interruptions to service on lines, these four main branches are divided into the different sections between points of supply. One such section may in most cases be out of service while emergency supply is being given from one of the other sources of supply, so that the record of interruptions applies only to lines, and not to service to consumers. Apart from prearranged shut-downs, the interruptions are scheduled for the various lines hereunder:—

Horahora–Waiorongomai: Five interruptions, totalling 53 hours 46 minutes, due principally to insulator failures.

Waiorongomai–Waikino: Six interruptions, totalling 70 hours 11 minutes, of which five were directly attributable to the faults originating on the Horahora–Waiorongomai Section. The other interruption was due to insulator failure.

Waiorongomai–Waihou: The eight interruptions on the section, totalling 22 hours 49 minutes, were entirely due to faults originating on the other sections of the system.

Horahora–Arapuni: One interruption, of two minutes' duration, due to fault on Waikino section of the system.

Arapuni–Ngongotaha: No interruptions due to line faults.

Horahora – Mystery Creek: Two interruptions, totalling ten minutes, one of which was due to insulator failure and the other to fault on Waikino section previously mentioned.

Mystery Creek – Hamilton: Two interruptions, totalling 1 hour 32 minutes, one of which was due to insulator failure and the other to fault on Waikino section previously mentioned.

Mystery Creek – Te Awamutu – Hangatiki: No interruptions due to line failures.

Horahora–Penrose: No interruptions due to line failures.

In addition to the above sectionalized line failures, there were twenty-nine interruptions, totalling 16 hours 51½ minutes, the principal ones being: 4 hours 47 minutes whilst connecting in loop line of 110,000 v. line; 3 hours 10 minutes due to a faulty bushing on oil circuit-breakers at Waikino; 2 hours 1 minute due to a broken terminal on switch at Hamilton; and 53 minutes due to a faulty high-tension bushing on transformer at Arapuni. Others of short duration were due to a variety of causes—*i.e.*, cable faults at Penrose and Arapuni, faulty bushings on transformers, also surges on the system tripping the oil circuit-breakers.

A considerable amount of tree-cutting has been carried out during the year, with good results. Live-line insulator testing and replacement has been carried out during the year, following on instruction given to the linemen in May, 1926.

On the Horahora–Waikino line (Mountain section) new towers were packed out and got ready to replace some of the original towers, which were badly rusted. Also, on this line, the No. 14 phosphor-bronze telephone wire was removed and replaced by No. 8 galvanized iron, on the Hinuera–Halfway and Waiorongomai–Waikino portions. This change had been made previously on the other portions of this line with good results in preventing breakage and contact of phone and power wires.

Substations.

Penrose.—The temporary installation of transformers from 50,000 v. to 6,600 v. has been in operation throughout the year, supplying a maximum of 3,200 kw. to the Auckland Power Board.

With the exception of a breakdown in the cable from the transformers, and its replacement by cable of higher capacity, there have been no special operating troubles.

The Auckland Power Board's plant at King's Wharf has been running in parallel through Penrose Substation with the Horahora and the McLaren's plants during most of the year. On one or two occasions there have been indications of hunting, apparently due to some accidental and temporary causes.

Te Awamutu.—An 11,000 v. current-transformer broke down, and oxide-film 11,000 v. arresters were substituted for compression chamber type. Trouble was experienced on the 50 k.v. arresters, due to a bird earthing it with nesting-material.

Arapuni.—One of the 50 kv. transformer bushings broke down and was replaced, and there was a failure on the 11,000 v. cable during a thunderstorm.

Generally speaking, apparatus at all substations has been satisfactory. There have been no troubles with main transformers or other more important apparatus.

11,000 v. Lines and Substations.

Little trouble has been experienced on these during the year. Six defective poles were replaced on the Horahora–Leamington–Hamilton line. The duplicate cable under the railway at Pukekohe on the Bombay–Pukekohe line was installed.

Power purchased.

Power purchased during the year amounted to 7,398,942 units, at a cost of £8,787 5s. 9d., including 7,217,830 units from McLaren's Falls for £7,489, and 162,700 from the Grand Junction plant for £1,250, as shown in Tables F and H. This compares with totals for the previous year of 1,590,511 total units purchased for £2,562.

General.

The McLaren's Falls plant has been supplying practically daily on week days throughout the year, and the Junction plant was called on regularly in March, 1927. Supply from the other sources was given only in emergency, during overhaul work on lines.

The Auckland steam plant has on several occasions supplied power as far as Bombay, Hamilton, and Te Awamutu Substations, and to Henderson and Takapuna.

The Tourist Department's plant at Okere (200 kv.a.) has been run at peak-load hours since October, 1926, supplying as much of the Rotorua load as it can.

MANGAHAO ELECTRIC-POWER SUPPLY.

Financial Results.

The capital outlay at the close of the year was £2,242,871, as against £2,022,315 for the previous year, an increase of £220,555, and is analysed in Table P. The total revenue for the year was £101,897 1s. 4d., as against £76,856 11s. 10d. for the previous year, an increase of £25,040 9s. 6d., or 32·6 per cent. Working-expenses were £26,921, an increase of £5,055 12s. 1d., mainly due to maintenance work on transmission-lines and the coming into operation of Wanganui Substation (Table Q).

The table below shows the main sources of revenue for the year:—

	1926. £ s. d.	1927. £ s. d.
Wellington City Council	.. 41,289 17 9	* 29,740 8 1
Horowhenua Power Board	.. 9,299 13 6	14,020 14 6
Wanganui–Rangitikei Power Board	.. ..	9,049 7 10
Manawatu–Oroua Power Board ..	.. 7,747 16 9	12,752 0 0
Hutt Valley Power Board	.. 7,953 5 2	11,877 2 0
Other Power Boards	.. 8,493 5 0	18,672 10 1
Other sources	.. 2,072 13 8	5,784 18 10
	£76,856 11 10	£101,897 1 4

* Reduction due to amount of power purchased from Wellington City Council.

After allowing for interest, £98,881, and depreciation £32,997, there is a net loss of £56,901, being £10,387 less than in 1925–26. The system earned 4·0 per cent. on the capital in operation during the year. The financial results are analysed in Tables O and S herewith.

Operation and Maintenance.

Headworks and Power-house.

During the year the plant has operated very satisfactorily. Minor repairs were carried out on the automatic crest gate at Mangahao dam, and these reduced the leakage very considerably. The pipe line and the steelwork on the roof required painting where the rust was showing through. On the turbines the new stainless steel nozzles are not showing any signs of wear, but the buckets and deflectors have had to be welded where wear has taken place. The underspeed device was also altered to give more stability under overload conditions. The oil in the bearings and governors was filtered and reconditioned during the year. Minor repairs and adjustments were carried out on the 11,000 v. regulators, the "Olmsted" regulators, and the 110,000 v. oil-switches. The power-house roof required repairing where blisters had formed. The louvres over the Horowhenua regulators had to be blocked, as driving rain through these caused a flashover of the 11 kv. pot-heads.

The growth of load of the Horowhenua Power Board early in the year put a heavy overload on the induction regulators, and fans had to be installed to cool these. Larger regulators have since been installed. During the periods when the fuel plants were running in parallel no difficulties were encountered, and the various plants kept in parallel very well.

Transmission-lines—110,000 v. Lines.

Powerhouse–Khandallah Section.—During the year there have been four interruptions on this line, totalling 11½ minutes in duration. One interruption was due to the West line tripping on the leakage relay when the East line was put in, and the other three were due to transient troubles, of which no trace could be found.

A considerable amount of work has been done clearing patrol tracks and erecting small bridges, repairing broken members and tightening bolts on towers, and a start has been made on altering weights. All underground cables have been removed from the telephone-line, and an additional hut placed at Brandon's Rock. A groyne has been built to protect poles near Waitohou Stream from erosion during floods. At Tower 59 it was found that clearance was not up to standard of 22 ft., so a 50 ft. tower has been built in place of a 30 ft. tower at this point.

Power-house – Bunnythorpe Section.—West line: Apart from pre-arranged shut-downs there have been nine interruptions to service, totalling 1 hour 5 minutes duration. Of these, seven were probably due to flashovers on Wanganui switch-gear or discharge of the lightning-arresters at Wanganui; two were due to the leakage relay at the power-house opening the oil circuit-breakers when switching was being done at Bunnythorpe.

East line: This line, which is normally connected to the Hawke's Bay and Wairarapa system, has given a considerable amount of trouble, particularly in the earlier part of the year. These interruptions in the main have been due to flashovers between the phase-wire and the earth-wire, consequent on unequal swinging of these two wires during heavy gales, and the earth-wire was therefore removed from all long spans on Bunnythorpe–Dannevirke section. The number of interruptions before this work was completed was forty-nine, of which ten were arranged, and it can be assumed from the service obtained since that a very large part of the interruptions had been due to the above cause.

The known causes of interruptions are as follows: Three due to lightning; two due to flashovers on pillar insulator at Woodville; one due to gale lifting a piece of timber on to an air-break switch at Bunnythorpe; one due to switch being opened by hand at the power-house to reduce the excitation of the station when No. 2 generator dropped out.

Willow-planting has been carried out at the Manawatu River crossing on this line to protect the tower foundations from erosion during heavy floods.

A start has been made to replace jumpers where the steel core had been removed from the aluminium-steel-core cable, and to alter weights where necessary.

A start has been made with the telephone deviation at the Manawatu River, which will do away with the lead-covered cable across the Longburn Railway-bridge, and which will bring the telephone-line close to the transmission-line.

Bunnythorpe–Wanganui Section.—Apart from the arranged shut-downs, interruptions to this section totalled 5 hours 24 minutes. Five of these interruptions were due to disturbances on the east line previously mentioned, and of the others seven were probably due to either flashovers on the Wanganui switch-gear or discharges on the lightning-arresters; one was due to a lightning surge, three due to trouble on Power Board feeders bringing out the oil circuit-breakers at Bunnythorpe, and five due to some unknown transient troubles.

During the year a good deal of attention has had to be paid to protection of the Rangitikei River crossing from erosion in flood-times, the protective willow mat having been broken by floods. This has been repaired, but owing to the constant danger at this point it has been decided to alter the construction across the river. Two special towers have been ordered to carry stranded copperweld conductors right across the river-bed, without a support in the middle. The material is now to hand, and this source of danger will be permanently removed. A large number of small bridges have also been erected on the patrol tracks to facilitate patrol during floods.

Bunnythorpe–Woodville Section.—The interruptions on this line were practically the same as on the Power-house–Bunnythorpe east line, mentioned above. On this section the earth-wire has been removed from all long spans, and jumpers have been stiffened by suspension from a string of insulators to keep them from blowing about in the wind.

Two towers on this section have been threatened by slips. In one case another tower was built about 50 ft. to one side of the present tower and the lines transferred to it, removing the present tower. In the other case it has been decided that measures can be taken to prevent further slipping. A small area of land round the tower will be taken, and will be planted with willows, &c., to hold the ground together.

Woodville–Mangamaire Section.—This section being in series with the Bunnythorpe Woodville section, interruptions on this line were practically the same as on that section. One additional interruption—only momentary—was the result of the linesman at Woodville opening the Woodville–Mangamaire oil-switch by mistake for the Woodville–Dannevirke switch when testing relays.

On this section a groyne was built in a creek near the Ballance Dairy Factory to obviate danger to a pole through erosion of the bank.

Mangamaire–Masterton Section.—Interruptions on this section, which is in series with the preceding one, were the same as for the Woodville–Mangamaire section.

On this section the earth-wire has been removed from the Mount Bruce tower section, and also from the towers at the Waingawa River crossing. A test of the earths on these towers after removal of the earth-wire showed very high resistances in some instances, so special earths were constructed to reduce them.

Woodville Dannevirke Section.—As this line is in series with the Bunnythorpe–Woodville line, interruptions were practically the same as on that line. Two additional interruptions on this line were due to broken jumpers, these being jumpers from which the steel core had been removed where this core and the aluminium were clamped separately. The jumpers on this section are now being replaced by others containing a steel core clamped to the cable outside the strain clamps. Weights according to the revised schedule are being put on as opportunity offers, and the line generally being put into good order by clearances of cables from cross-arms, cross-arm stays, &c., under conditions of extreme wind-pressure, being lengthened by shortening insulator strings, &c.

This section is, without doubt, the worst section for wind in the whole Mangahao system. Construction must therefore be of the most solid description, and clearances must be greater than would be necessary in most parts of the country. The service that has been obtained during the last half-year, in which many severe gales have been experienced, would show that most of the troubles have been overcome, and that very few interruptions due to the lines themselves should be experienced in the future.

Dannevirke–Waipukurau Section.—This section has for the greater part of the year been operating at 11,000 volts, but has now been changed over to operation at 110,000 volts. As this line is in series with the Woodville–Dannevirke line, all interruptions to that section were experienced here also. In addition interruptions were caused by swinging earth-wire on this particular section, and by damage done to a temporary switch due to faults on the Power Board system. Two further interruptions were due to fault on new work at Napier bringing out the Dannevirke line switch.

The earth-wire has been removed from all long spans, and a considerable amount of maintenance work carried out. A groyne was built on the Makaretu River, and extensive willow-planting done on this river and on the Tukituki River.

Waipukurau–Napier Section.—This section was livened up at 11,000 volts in January last, power being supplied to dry out transformers, &c., and on the 20th March it was livened up at 110,000 volts, but no power was supplied to Hawke's Bay Power Board till the 8th April, 1927, so that the line cannot be considered to have been in service during the year under review.

Before this line was put in service the whole line was gone over, weights hung, earth-wire removed, and poles straightened and re-rammed where necessary. Telephone huts were also wired up and put in service.

Transmission-lines: 11,000 v. Lines.

Power-house–Shannon Section.—Apart from prearranged shut-downs, the interruptions totalled eighteen minutes. One of two minutes, was caused by water dripping through a louvre in the power-house, causing a flashover on the trifurcating-box on this feeder, but no damage was caused thereby. The louvre has been protected from similar occurrences in future. One interruption, of two minutes, was caused by an operator at the power-house accidentally opening the switch. The remaining ten, of fourteen minutes duration, were due to the overload relay opening the switch at the power-house, probably owing to faults on the Horowhenua Power Board lines.

This section is maintained by the Horowhenua Power Board, so that no maintenance work has been done by the Department.

Khandallah–Hutt Valley Power Board Section.—Supply is taken by the Hutt Valley Power Board over two feeders, Nos. 1 and 2. On this section sap-testing on poles has been done, and poles re-rammed and straightened where necessary.

No. 1 feeder: Apart from prearranged shut-downs there were seventeen interruptions on this line, totalling 3 hours 3 minutes. Four were due to troubles on main power-house–Khandallah transmission-line, and totalled 13 minutes; three, totalling 7 minutes, were due to the Khandallah operators opening switches during service to prevent voltage reaching too high values on Power Board feeders; one, of 4 minutes, was due to a surge caused by Wellington City Council's substation tripping out; the cause of one, of 1 minute duration, was not ascertained; and the remaining eight were due to troubles on Hutt Valley Power Board's own feeders.

No. 2 feeder: Apart from prearranged shut-downs there were twenty-four interruptions on this line, totalling 2 hours 56 minutes. Of these, seventeen were due to causes as outlined above for No. 1 feeder. Of the other five, one, of 5 minutes, was due to the power being cut off by Wellington City Council, who were feeding back to Khandallah in order to synchronize again with Mangahao

after a surge had put them out of parallel. The remaining four were due to No. 2 feeder switch opening on overload when the Hutt Valley Power Board were taking all load on No. 2 feeder, without first notifying Khandallah operators and getting them to set up the overload relays to a heavier current value.

Khandallah–Petone Railway Section.—Apart from prearranged shut-downs there were eight interruptions on this line, totalling 13 hours 57 minutes. Of these, one, of 12 hours 22 minutes, was due to a wire falling on the cross-arm of a pole, setting the arm and pole on fire, necessitating considerable work before supply could be resumed; one, of 1 hour 14 minutes, was caused by the Railway Workshops Fire Brigade, during a small fire in the workshops, switching the live feeder on to an earthed one: five were due to trouble on the main power-house–Khandallah line; one was due to surge caused by trouble on Wellington City Council system.

Sap-testing carried out on poles, also a good deal of work in straightening and re-ramming poles.

A three-mile extension of the 11,000 v. Hutt Valley line has been built for the Railway Department.

Transmission-lines: General.

On all 110,000 v lines in service the usual maintenance work has been carried out, such as repairs to tracks and small bridges, tree-cutting, &c. In addition, all insulators, except on the Waipukurau–Napier line, have been tested by the buzz-stick method.

On the power-house–Khandallah, power-house–Bunnythorpe, Bunnythorpe–Wanganui, and Bunnythorpe–Woodville sections all units reported defective by the buzz-stick method have been removed and sent to Khandallah to be tested on the oscillator set there. On the other sections the work of testing the remaining insulators and defective units is being carried out as opportunity offers.

On most of the lines, also, a good start has been made in testing for the amount of sap or rot on transmission-line poles, and calculating their factors of safety. The sap is now in most instances getting fairly soft, and in some cases has entirely rotted at the ground-line. A few poles have been found that will shortly require replacement owing to the proportion of sap being found to be greater than allowed for in designing and laying out the various lines, but generally the allowance made when designing has proved ample, especially for poles of large diameter.

It may be noted from the above report that a large number of interruptions have been arranged during the present year. In all cases these have been arranged after consultation with the Power Boards concerned, and have taken place in most instances just after midnight on week-days and from 1 to 3.30 p.m. on Sundays, as it is found that these times are the most convenient for the Power Boards. It is also estimated that after the end of June of the present year there will be little necessity for prearranged shut-downs for some time to come.

The work at present being carried out during these shut-downs is to bring the lines up to the highest point of efficiency for future service, experience having pointed that our exceedingly windy conditions need more attention paid to clearances, &c., than seemed justified when the lines were erected.

Substations.

The apparatus at the various substations operated satisfactorily throughout the year. At Waipukurau Substation a pot-head broke down and had to be repaired. At all substations it was necessary to change the current-transformers and to test relays and instruments. This work required prearranged shut-downs of short duration. Napier Substation was livened up at 110,000 volts on the 20th March, 1927.

CONSTRUCTION.

Headworks.—The road between Shannon and headworks has been kept in constant repair. The tail-race has also been protected from erosion by the placing of groynes and other protective works along the banks of the stream. Several bridges have been built across the tail-race for giving access to property across the stream.

Fair progress has been made on Mangahao No. 3 dam. During the year over 33,900 cubic yards of metal were passed through the crushers. Concreting did not commence until August, 1926, and to date 25,583 cubic yeards of concrete have been poured. Work on No. 3 dam has been carried out in three shifts of eight hours. The average number of workmen employed is about 250, while the labour turnover is practically nil.

This section of the work is described in detail in the Engineer-in-Chief's Report.

Power-station.—During the year a considerable amount of work at the power-station has been carried out, this work including the installation of water-level indicators and wiring of same to power-station. The electric motor operating the gate at Arapeti has been wired ready for operation. The generator rheostats have been fitted with illuminating signal device so that the position of the regulator could be seen at any moment.

So that constant time and frequency control could be maintained a Warren clock was installed on the operating-gallery, and to ensure correct time each day a wireless time-receiving set was installed, so that the time signals broadcasted from the Observatory are received and the station synchronous clock checked each day. Definite time relays have been installed on the 110 kv. outgoing lines. The new induction regulators for the Horowhenua Power Board 11,000 v. feeders were received and have been installed. Fire-protection equipment has been installed. To facilitate the handling of the petrol for the line cars a bowser was installed near the power-house. General clearing up and dismantling of temporary buildings was also carried out.

Khandallah Substation.—During the year the high-tension testing equipment, including a 250 kv. transformer and 250 kv. high-frequency oscillator, was installed for the testing of insulator and other allied material.

Reverse power relays have been ordered for the two incoming 110 kv. lines, and should be installed this year. So that proper regulation of voltage and power-factor can be obtained, a 10,000 kv.a. synchronous condenser has been ordered, and a start made on the foundations.

Permanent water-supply from the city mains is being installed at this station.

Tests have been carried out with the high-frequency oscillator set on all insulator units received from the transmission-lines, as well as several insulators sent in for test by local agents.

Bunnythorpe Substation.—Electrically operated oil circuit-breakers were installed on the two 110 kv. outgoing lines to Wanganui and Woodville. The installation of these switches has considerably reduced the interruptions at the power-station and cut out the faulty sections only. As the power required for operating the above switches is 110 volts D.C., a suitable motor generator set, complete with battery and control panel, was installed in the station, the 110 v. battery being housed in a small room especially built for this purpose. The station oil-store was also enlarged, and a new tank installed in place of the one originally placed in the ground.

Wanganui Substation.—Construction work was completed on this station early in April, and on the 23rd April, 1926, power was supplied at 110 kv. to the station, and operated in parallel with the Wanganui–Rangitikei Power Board's steam plant.

Woodville Substation.—Semi-automatically operated oil circuit-breakers were installed on the 110 kv. lines to Mangamaire and Dannevirke Substations. With the installation of these switches it was necessary to erect an oil-store and control-room, which was erected close to the steel structure. The operators' cottages were fitted up with septic tank and water-supply, the well being sunk in the station-yard, and a pump and water-storage tank installed.

Mangamaire Substation.—A semi-automatically operated oil circuit-breaker and by-pass air-break switches were installed on the outgoing 110 kv. line to Masterton Substation, the control panel being installed in the substation. A 1,500 kv.a. synchronous condenser has been ordered for installation in this station, and the present substation building is being extended and foundations built for this machine. The station and cottages are now connected up to a permanent supply of water, a well having been sunk in the station-yard, and pump and storage tanks installed. The cottages have had septic tanks installed.

Dannevirke Substation.—A semi-automatically operated oil circuit-breaker and by-pass air-break switches were installed on the outgoing 110 kv. line to Waipukurau, the control panel for the oil circuit-breaker being installed in the station building. A 1,500 kv.a. synchronous condenser has been ordered for this station, and a contract let for the extension of the building to accommodate this machine. This station has also had a small well sunk for obtaining a permanent water-supply, the necessary tanks and pumps supplied for maintaining water storage, and a septic tank installed.

Waipukurau Substation.—A semi-automatically operated oil circuit-breaker, complete with by-pass air-break switch, has been installed on the 110 kv. outgoing feeder to Napier. The control panel for the oil circuit-breaker has been installed in the station building.

Masterton Substation.—The station oil-store was extended and a new oil-tank installed to replace the one placed in the ground. A septic tank and a permanent water-supply, with pump and storage tanks, have also been provided for the station cottages.

Napier Substation.—The construction and installation of equipment at this substation was completed and the station was put into service at 110 kv. on the 20th March, 1927, and it has since operated satisfactorily.

Load.

During the year supply has been given to the Wanganui–Rangitikei Power Board at Wanganui Substation, and to the Railway Department Workshops at Petone. Supply to the Hawke's Bay Power Board was given on the 8th April, 1927.

During the year all the Power Boards have greatly exceeded their guarantees, as the following table shows:—

	Guaranteed		Actual			
	Load.	Revenue.	Mean Quarterly Maximum Load.	Revenue.		
	Kv.a.	£	Kv.a.	£	s.	d.
Wellington City Council	..	45,000	..	49,920	0	0
Hutt Valley Power Board	720	6,160	1,434·64	11,877	2	0
Horowhenua Power Board	600	5,200	1,707·15	14,057	4	0
Wanganui–Rangitikei Power Board ..	700	6,000	1,366·65	11,306	16	3
Wairarapa Power Board	235	2,280	470·465	4,178	13	1
Tararua Power Board	300	2,800	353·67	3,229	7	2
Dannevirke Power Board	225	2,200	376·84	3,414	14	0
Central Hawke's Bay Power Board ..	160	1,600	301·35	2,810	16	5
Manawatu–Oroua Power Board ..	1,100	9,200	1,544·00	12,752	0	0

During the year, on account of the third dam not being completed and on account of the power-station being overloaded, it was necessary to call on Wellington City Corporation steam plant, the Wanganui–Rangitikei Power Board's steam plant, and the Palmerston North Borough Council gas plant during periods of low river-flow. These plants were in operation for supplying power to the Mangahao system on account of low river-flow on the following dates: Wellington steam plant—

7th to 11th and 24th to 25th June, 1926; 25th November, 1926; 7th to 13th January, 30th January to 1st February, 4th to 7th and 8th to 21st February, 5th to 13th March, 1927. Wanganui steam plant.—10th to 13th January, 31st January to 1st February, 4th February, 7th to 8th and 12th to 21st February, and 7th to 12th March, 1927. Palmerston North gas plant—7th to 11th June, 1926; 10th to 13th January, 31st January to 1st February, 8th to 12th, 14th to 16th, and 19th to 20th February, and 7th to 12th March, 1927.

During the periods when the above plants were running the power-station plant was, of course, running in parallel and supplementing the above plants when required. In the early hours of the morning the whole of the load was supplied from the Wellington steam plant, the department's machines charging the lines. During these hours power from the Wellington plant was therefore being transmitted as far as Wanganui and Napier.

When it was necessary to run the steam plants, the loads between the fuel plants and the hydro-station were so adjusted that there was always sufficient water in the dams to supply the whole load for a day or two, in case of repairs being required for any plants, or other emergencies.

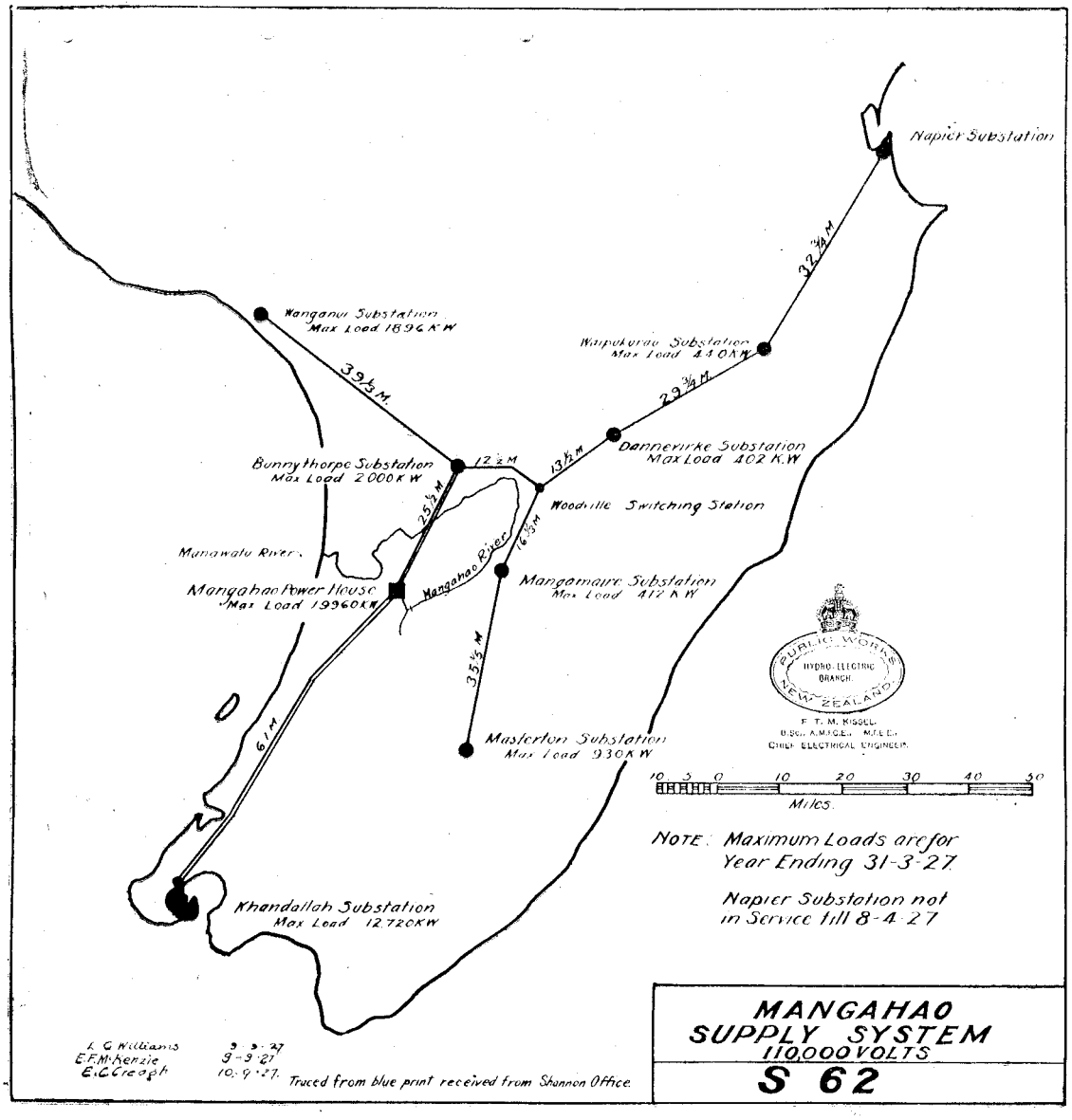
It was necessary to ask the Power Boards to reduce their peak loads for one day only during a period of low flow. With this exception no restrictions have been placed on the Power Boards with regard to load, even in those cases where the Boards have exceeded the amount allocated to them.

The maximum load to date is 20,040 kw., and the maximum number of units generated per week 2,007,180. The plant is therefore fully loaded on plant capacity, and overloaded by 25 per cent. on units generated.

The connected load on the system is analysed in Table R herewith.

General.

The whole system of transmission-lines and substations is now in operation, and all the oil circuit-breakers have been installed at the various substations. The map S. 62 shows the transmission-lines, substations, and the maximum load to date at each substation. The total length of 110,000 v. lines is 351 circuit miles, and there are eight substations and one switching-station on the system. The installation of the oil circuit-breakers and the replacing of the air-break switches has greatly improved the working of the system.



The live-line (or buzz-stick) method of testing insulators has been used during the year to determine the condition of practically the whole of the line-insulation of the scheme.

Another seven linesmen were trained in the testing-work early in the year, and, but for the Waipukurau–Napier section, which was only livened at 110,000 volts on the 20th March, 1927, all sections on 110,000 v. lines have been gone over. After each batch of insulators which had tested faulty by the buzz-stick was removed from the line they were shipped to Khandallah and tested on the 250,000 v. oscillator set. Those units standing up to the flashover tests were then subjected to an immersion test and then retested, which often brought to light hidden flaws.

At the beginning of the year it was noticed that some insulators which showed faulty by the buzz-stick method proved sound by the flashover and immersion tests, and eventually it was found that weather conditions materially affected the buzz-stick tests. However, this was overcome by the linesmen gradually gaining experience in the work and being able to pick days suitable for testing.

A few of the power-station and substation operators were trained in the testing, particularly as applied to post and bushing insulators.

The year's experience of live testing of insulators has shown that, generally speaking, the insulation of the lines is in very good condition, and by periodical retesting there is no doubt that the insulation of the lines can be maintained at a very high standard, and the chances of line-insulators failing whilst in service practically eliminated.

During the year the surveys of the transmission-lines in connection with Waikaremoana scheme have been completed. These were the surveys of the line from the substation at Taradale to the power-house site at Waikaremoana. This line is to be a double-circuit steel-tower line, and the towers and wire have been ordered. The surveys of the 50,000 v. wood-pole line from the power-house site at Waikaremoana to Gisborne were also completed, and surveys made and substation site acquired at Gisborne.

Waikaremoana Power Development.

The plant originally erected in 1922, partly to provide power for the construction of the major development and partly to supply power to the Wairoa Power Board, continues to be operated under lease by the above-mentioned Board. The total connected load is now 2,571 kw., and the maximum demand on the station reached 1,010 kw. during the year. The installed capacity is now 1,750 kw.

The financial results for the year ending 31st March, 1927, are as follows:—

	£
Capital (including initial losses)	185,703
Annual capital charges (interest and depreciation)	6,771
Revenue	2,404

leaving a loss of £4,367 on the year's operations.

Major Scheme.—Work on the major scheme has progressed rapidly during the year under review, and is dealt with more fully in the Engineer-in-Chief's report. The headworks and power-house are well under way, and contracts have been let for the supply of the first two 20,000 kv.a. hydro-electric sets together with the necessary switch-gear and transformers for 110,000-volt operation.

Contracts have also been let for the supply of steel towers and copper for the transmission-line from the power-house to Taradale Substation, at which point connection with be made with the existing 110,000-volt lines from Mangahao. Similarly, a contract has been let for the supply of poles and conductors for the 50,000-volt line to Gisborne. The plant is expected to be ready for operation in the early part of 1929.

Investigations, Surveys, etc.

Investigations have now proceeded sufficiently far to enable a fairly definite pronouncement to be made on the future policy to be adopted in providing additional power for the Canterbury District. In considering this matter an endeavour has been made to look at the position with as broad a view as possible. Any works that have to be provided for this purpose will involve very heavy capital expenditure, and must be designed to meet the needs of the districts to be served for a considerable period ahead. They must also be designed so that the requirements of any one district are not catered for at the expense of other less fortunate districts.

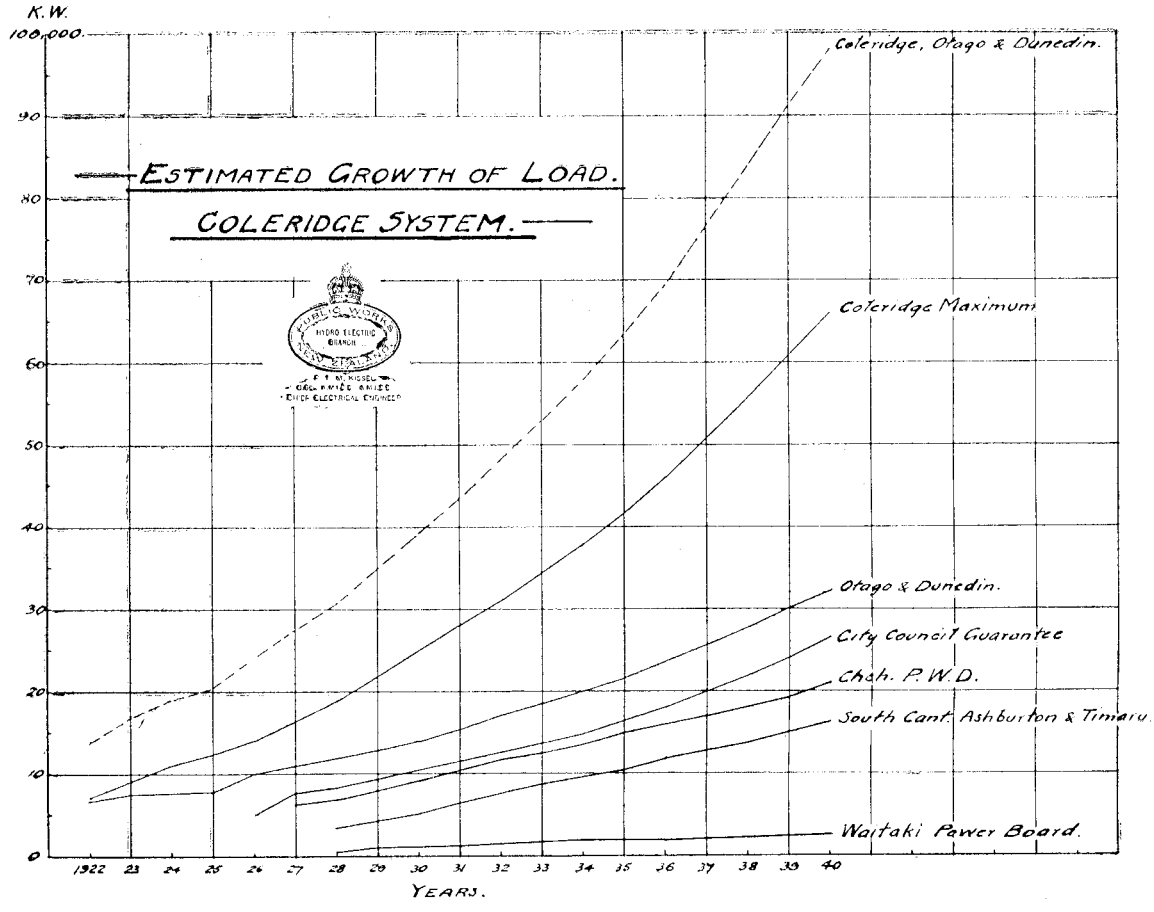
The first point for consideration is therefore the prospective load for a considerable period ahead, and the capabilities of the existing plants to supply the demand. The value of comparatively large generating plants interconnected by transmission-lines is now generally accepted. The obvious adoption of this policy on the eastern side of the South Island (Canterbury and Otago) is that we should have an extra-high-tension main transmission-line running from north to south through Canterbury and Otago, and that this transmission-line should be tapped at various points by main substations to supply the various load-centres, and supplied with power at various points where such power can be most economically supplied.

The nucleus of such a system already exists in the main transmission-line recently completed between Oamaru and Hororata and Addington, which will undoubtedly at a later date be extended to link up with the existing transmission systems in Otago and Southland. This line is now tapped to supply load at Addington, Hororata, Ashburton, Timaru, and Oamaru, but at present is supplied with power at only one point—viz., Hororata—where the main lines from Lake Coleridge feed in power. In selecting the point at which more power has to be fed into this main transmission-line several main factors have to be taken into consideration:—

(1) The cost at which power can be generated at the generating-station and supplied to the main line:
(2) The location of the feed-point in respect to the centre of gravity of the load and prospective load to be supplied:

(3) The location of the feed-point on the main line as affecting the security from interruption of all substations supplied off the main transmission systems :
(4) The possibility of the generating source selected being developed at reasonable cost for the capacity immediately required, and of economical progressive extension to meet future growth.

Load Possibilities.—A forecast of the probable growth of load is shown on the following graph.



In this is shown the probable demand in the various sections of the country which have to be considered. The total load has been divided up into the following sections : Christchurch City Council guaranteed load ; Christchurch and surrounding districts supplied by Public Works Department ; South Canterbury and Ashburton ; North Otago ; Dunedin (including area now supplied from Waipori).

From this graph it is fairly evident that the present Lake Coleridge power-station of 27,000 kw. capacity will be fully loaded about 1931, and that Waipori (Dunedin) will have reached its capacity (assumed at 20,000 kw.) about three years later. It would appear that, neglecting Otago for the time being, by 1940 there should be a load available of about 65,000 kw. or 38,000 kw. in excess of the present Lake Coleridge capacity. Similarly it would appear that there should be a load of 12,000 kw. over and above the estimated capacity of Waipori available in the portion of Otago supplied from that source. There is also undoubtedly a very considerable prospective load in Otago Central, which could be quite economically supplied by the generating-station where located, as suggested later, on the Waitaki River.

The history of the growth of load at Coleridge also gives an indication of the size of development we should now consider. The Coleridge plant went into operation in 1915 with a capacity of 4,500 kw. ; it was increased in March, 1917, to 6,000 kw., an increase of 33 per cent. This extension was overloaded by April, 1919, but extension was not possible on account of war conditions. An extension to 9,000 kw.—that is, 50 per cent.—was made in March, 1922. This was almost immediately overloaded and increased to 12,000 kw., or 33 per cent., in January, 1923. This development was again overloaded by May, 1924, and increased towards the end of last year (1926) to 27,000 kw., an increase of 125 per cent. The indications are that this stage will be fully loaded within three to four years. It would appear, both from the percentage-growths that have taken place at Coleridge, and from the prospective loads in excess of Coleridge and Waipori capacity discussed earlier, that nothing less than about 25,000 or 30,000 kw. must be considered as a first development, and that even such a development should be possible of extensions as required.

To supply the requisite amount of power three main drainage areas need to be considered : (1) The Waimakariri area, which was recently examined and reported on by the Christchurch City Council ; (2) the Rakaia area, including Lake Coleridge, with the Harper and Wilberforce Rivers ; (3) the Waitaki area, including the Lakes Tekapo, Pukaki, and Ohau and various gorges and dam-sites on the Waitaki River itself. These three areas need consideration in respect to each of the four main influencing factors mentioned earlier.

The Waimakariri possibilities have been investigated by the Christchurch City Council, and, comparing these results with the results of investigations made by the Department on other sources, it would appear that the capital cost to deliver power on to the main trunk transmission-line would be greater than in the case of the Waitaki sources. The point of supply on to the main transmission-line would be somewhat nearer the centre of gravity of the prospective load in from six to ten years hence, but it is extremely likely that, as further loads in excess of Waipori develop in Otago, and as South Canterbury and Otago Central go ahead, the load-centre will progressively move south. It does not appear that any advantages that Waimakariri may possess in this particular outweigh the disadvantages it has from the point of view of capital cost or location on the general main trunk transmission system.

Security from interruption is now reasonably secured to the Christchurch load by means of the favourable location of Lake Coleridge, and it would appear that to secure additional security to the whole system the next source of supply should feed in at some very different point than does Coleridge. This station now feeds in at the northern end of the existing main trunk line, and it would appear that the maximum security to the whole system would be secured by another station feeding in at the present southern end or from some source in the Waitaki basin.

As regards the possibility of extension to meet future growth, there is no doubt that the sources on the Waitaki are much the more favourably situated. The regulation of additional water to increase the capacity of any initial development in the lower gorges can be much more effectively carried out by damming the outlets of the existing lakes than by building large dams in the upper portions of the Waimakariri or Rakaia. The ultimate capacity is also much greater in the Waitaki basin than in either of the other two.

Taking all points into consideration, there is no difficulty in recommending that the next main hydro-electric development for the South Island should be on the Waitaki. To enable the best source to be selected, surveys have been going on for the past two years, and have included alternative sources at the outlets of Lake Tekapo, Lake Pukaki, Lake Ohau, the gorge at the Ohau Bridge, on the Ahuriri, and at various sites on the lower gorges of the Waitaki between the Ahuriri junction and Kurow.

Reports on various schemes at Lake Tekapo were prepared by Mr. J. O. Boving for the Tekapo League, but all of these proposals, whilst no doubt suitable enough for purely local consideration, are too small for consideration as part of a general system of supply. Plans of a larger scheme at Tekapo have been prepared, but it does not compare favourably as an initial development with other alternatives on the lower gorge of the Waitaki above Kurow. A station at a dam on the river above Kurow would be possible of progressive extension to much larger size than would one at Tekapo. The cost per horse-power developed and delivered on to the main transmission-line would also be considerably lower on the Waitaki, and the transmission-lines, though slightly farther from Timaru, would be over much easier country and freer from snow than would one from Tekapo. It would also be much nearer to connect with our southern feed-point at Oamaru and for extension into Otago.

The question of further development on the Rakaia has been considered, but as any station developed here would feed into the main line at Hororata, as from Coleridge, they would have much the same objection as has the Waimakariri. As further power may be required at a still later date, the potential value of development of the Wilberforce diversion to Lake Coleridge, and of possible dam-sites near the Gorge Bridge, should be carefully examined as alternatives to the Waimakariri.

The scheme of development which at present appears the most favourable is to build a dam raising the level about 70 ft. at a point on the Waitaki about four miles above Kurow Railway-station. The works would consist almost entirely in the dam across the river. The power-house would be built into one end of this structure, and the balance, about 1,360 ft. long, used as overflow to discharge surplus and flood waters. Of the total length of about 1,700 ft. of dam, only about 500 ft. would be in the actual river-channel; the balance would be about 40 ft. in height and built in the dry on the banks.

The Waitaki River has decided advantages over the Waimakariri when the question of dams has to be considered. In the first place, on account of the large amount of lake area in the drainage basin, the flood flow as compared with ordinary mean flow is very considerably reduced. For the same reason the amount of shingle travelling in the stream and tending gradually to reduce storage values is very much less in the case of the Waimakariri or the Rakaia. As the minimum flow in the river is about three times the minimum flow in the Waimakariri, the same height of dam affords at least three times the amount of power. The long crest of dam available for overflow reduces very considerably the depth of water flowing over the dam in times of flood, and so reduces the possibility of erosion and damage behind the dam.

It is estimated that a complete development at this point to a capacity of 30,000 kw. and including transmission-lines to link up with the main line, one at Oamaru and one at Timaru, would cost about £1,200,000. In the initial development this might be reduced to £1,000,000 by omission of one unit and one transmission-line. By building subsequent low control dams at the outlet of each of the lakes the capacity of this one station could be brought up to 75,000 kw. on a 50-per-cent.-load-factor basis. Further power both above and below this station can be developed on the Waitaki River, and at the different lakes if necessary at a later date, without in any way interfering with the output from this station.

To develop the station indicated above to the 30,000 kw. stage would take about three years from the date construction is commenced.

It will be remembered that when the Coleridge duplication works (completed last year) were designed, provision was made for the installation of a third unit of 7,500 kw. in the station. This

can be installed at a cost of about £65,000, and if the scheme proposed above is adopted this unit should be installed at Coleridge somewhat in advance of the major development at Waitaki. The per kilowatt cost is low, and, as it can be installed more quickly than can the main development, its installation would obviate any risk of short supply, and allow the main construction and expenditure to be delayed by about a year.

The amount of water available at Coleridge would want careful watching if a dry year were struck, and we would probably have to draw considerably on the storage until the Waitaki was ready. Once that scheme was in operation the supply of water in Lake Coleridge could be stored up again and the augmented Coleridge station run to full plant capacity, but on somewhat lower load-factor, to meet peak demands, whilst the bulk load was carried on the Waitaki station.

The Waitaki site outlined above appears the most suitable available, and is certainly preferable to the Waimakariri or Lake Tekapo proposals. Surveys and borings are still being carried on at different sites on the Waitaki, and it is just possible that one of two other sites a few miles farther up the river might prove slightly more advantageous than the one which has so far been most completely investigated.

Surveys commenced at the end of 1925 to determine the power resources of Lakes Te Anau and Manapouri were continued during the past season (1926–27), and will be resumed early in the coming summer, when it is hoped to complete the field-work. At the present time field-work for the scheme whereby power from Lake Manapouri will be developed at Deep Cove is complete, and huts have been established along the route from Te Anau to George Sound. Owing to delay in the delivery of the equipment ordered for making the aerial photographic survey, the Defence Department has not yet been able to make a start with this work in this district.

Electric-power Boards.

Amendments to the original Act, based on the results of experience, were passed in 1919, 1920, 1921, 1922, and 1923. The legislation was consolidated and amended in the Electric-power Boards Act, 1925.

The development of the reticulated areas of Electric-power Boards has made substantial progress during the year. One additional district was formed—viz., North Canterbury—and there are now forty-three districts constituted, and thirty-five actually carrying out the distribution and sale of electrical energy (August, 1927). The total area covered is 64,457 square miles, or 62·5 per cent. of the total area of the Dominion; the total population concerned is 886,924, or 64 per cent. of the total population of the Dominion; and the unimproved value of the land included in the electric-power districts and outer area is £263,638,004, or 79 per cent. of the total unimproved value of the Dominion.

The attached coloured map shows the location of the various Boards already constituted and the proposed Boards. The areas in which Electric-power Boards have not been set up are on the whole comparatively sparsely populated, but there are two localities where it would appear that such Boards could with advantage be formed—viz., the suggested Nelson Electric-power District, including Nelson City, Richmond, Motueka, Brightwater, Wakefield, and surrounding district, and the suggested Waimarino Electric-power District, which includes Ohakune, Raetihi, and surrounding districts.

So far only one of the four main cities—viz., Auckland—has been included in the inner area of a power district, but of the secondary centres the boroughs of Wanganui, Palmerston North, Invercargill, Timaru, Napier, Hastings, Blenheim, Greymouth, Gisborne, and Oamaru are included. The advantage of Power Board organization is more obvious to rural than to urban ratepayers, and yet the above position indicates that some of the more important centres are realizing that it is to their advantage generally to be associated with the country in undertaking the work of reticulation of electric power on a comprehensive scale.

The Boards already formed are working energetically in carrying out their functions. Twenty-two Boards—viz., Waitemata, Thames Valley, Cambridge, Central, Franklin, Waitomo, Te Awamutu, Hutt Valley, Horowhenua, Manawatu-Oroua, Wanganui-Rangitikei, Central Hawke's Bay, Hawke's Bay, Dannevirke, Tararua, Wairarapa, Malvern, Bank's Peninsula, Springs-Ellesmere, Ashburton, South Canterbury, and Waitaki—have carried out fairly complete reticulation of their areas, and are distributing power taken in bulk from the plants at Horahora, Mangahao, and Lake Coleridge. The Auckland Board has taken over the city electric-power station, and is providing for large extensions of both plant and mains. It has also entered into a contract to take the whole of its power, with a minimum of 15,000 kw., from the Government when the Arapuni Station is completed, which is estimated to be in 1929. Taranaki is now giving a supply from its own generating-station at Tariki. Wairoa is taking power in bulk from the Department's station at Lake Waikaremoana, and supplies the borough of Wairoa and a few consumers in the neighbourhood. Six—viz., Opunake, Taranaki, Southland, Wairere, Marlborough, and Teviot—have local water-power stations in operation. Three others—viz., Poverty Bay, Bay of Plenty, and South Taranaki—are arranging to take power in bulk from the Government hydro-electric sources, and are preparing their systems of reticulation with this end in view. The Grey Power Board has erected a steam station of its own. The Tauranga, Otago, and Otago Central Boards have arranged to purchase power in bulk from other authorities. The other five—viz., Hobson, Buller, Reefton, Golden Bay, and Westland—are making arrangements which have not yet been finalized.

Table T gives details of the date of constitution, the area, population, and rateable value of each of forty-two power districts already formed, also the amounts of the loans already authorized, and the voting on each poll taken. The total amount of the loans authorized by the thirty-six districts which

have taken their polls is £11,067,115. The population of the districts concerned is 847,936, so that the loans authorized amount to £13·1 per head of population, as compared with £12·5 last year. The unimproved valuation of the districts is £257,341,532, the loans authorized amounting to 4·3 per cent. of the unimproved rateable value of the lands pledged as security for the loans. The voting at the polls totalled 46,036 to 7,146—*i.e.*, a majority of 87 per cent.

Table U shows the capital expenditure incurred by each Board up to the end of the financial year 1926–27, the revenue and expenditure, and the amount of rates struck and collected.

The total capital outlay by the thirty-five Boards which have started construction is £9,394,136, and a small proportion of this is on works not yet in service. The gross revenue from the sale of electricity by the thirty-four Boards which had commenced supply was £1,312,212, of which 39·2 per cent. was received by the Auckland Board. The general result is a loss over the whole business of the Power Boards of £10,216. Such losses in the early stages do not indicate any want of security in the business as a whole, but are inherent in the commencement of any concern depending to such an extent on a large initial capital outlay to earn a revenue which takes time to develop.

During last year six of the Boards struck a general rate, which was collected in five cases, and seven of the Boards struck special rates for the security for loans, which were collected in only one case.

Several of the Boards have been passing through a critical stage owing to the high cost and high interest rates ruling in 1921 when they started construction work, and to the fact that they have undertaken the construction of many lines without requiring the guarantees from consumers authorized by clause 7 (*d*) of the 1922 regulations, and since amplified in the 1927 regulations. But costs and rates of interest are now substantially lower, and other Boards are profiting by such experiences, and much better results will be attained by the Power Boards generally in future as the result of the experience of these earlier districts.

Local Electric-supply Systems.

Including the Government plants, there are now (31st March, 1927) forty-eight public electric-power stations in the Dominion, as compared with fifty-one last year. One new hydro station (Tariki) came into operation, and three gas stations (Devonport, Waiuku, and Pukekohe) were shut down when bulk supply from hydro became available.

The total installed capacity has increased during the year by 11,898 kw., or 9·4 per cent. (from 127,017 kw. to 138,915 kw.), while the sum of the maximum loads has increased by 18,421 kw., or 21 per cent. (from 87,861 kw. to 106,282 kw.).

The proportion of installed plant is now as follows:—

	Stations.	Kilowatts.	Proportion per Cent.
Water-power	35	103,288	74·53
Steam-power (excluding hydro stand-by plants at Wellington (10,000), Invercargill (2,450), Waihi (2,500)	5	32,324	23·20
Gas-power	5	1,978	1·42
Oil-power	3	1,325	0·88
	48	138,915	100·00

The number of consumers supplied has increased from 192,392 to 228,345, an increase of 35,953, or 18·6 per cent., for the year.

The total population included in the various areas of electric-power supply is 1,239,535, or 90 per cent. of the total population of the Dominion, so that the ideal of a supply being available to every home in the Dominion is well on the way to realization.

The maximum demand per head of population in the areas supplied is 0·085 kw., slightly over one-half of the allocation of 0·15 kw., or 0·2 h.p. per head of population, which is the basis of the design of the Government schemes. The units sold per head of population supplied were 310, as compared with 241 last year.

The total length of distributing-line is 14,975 route-miles, as compared with 12,454 last year, an increase of 2,521 miles, or 20·3 per cent. The number of consumers per route-mile is 15·2, as compared with 15·4 last year, the reduction being due to the extra mileage of new lines erected during the year to which the full number of services is not yet connected, and to the increased proportion of country lines.

The maximum power-demand per route-mile of line is now 7·1 kw., the sales 25,700 units, and the revenue £193. The units and revenue are substantially better than last year, which were 21,600 units and £184 respectively, while there was no increase in the corresponding maximum demand.

The revenue per kilowatt of maximum load of all stations was £27·3, as compared with £26·1 last year. The water-power stations show a revenue of £28·3 per kilowatt, steam stations of £24 per kilowatt, oil stations of £33 per kilowatt, and gas stations of £36·8 per kilowatt. These are valuable figures for use in forecasting the revenue from systems of various descriptions. The water-power systems include the greatest proportion of large consumers, and the gas-engine stations the greatest proportion of small consumers.

Out of the 101 distributing authorities, sixty-nine showed a profit for the year amounting to £297,542, and thirty-two showed a loss amounting to £173,407. The general result is a net profit for the whole Dominion of £124,135 after paying working-costs (£1,353,591) and capital charges (£1,426,319) at the rate of 7·55 per cent. on the total capital outlay of £18,936,136. This shows a net profit of 0·66 per cent., as compared with 1·0 per cent. last year. The business on the whole is thus a thoroughly sound and remunerative one, as well as supplying a public necessity to 90 per cent. of the population of the Dominion.

The following table summarizes the results of the year's operations in connection with electric supply throughout the Dominion :—

Results for Electric-power Supply of New Zealand for the Year ended 31st March, 1927.

——	Water.	Steam.*	Gas.	Oil.	Totals.
Number of stations	35	5	5	3	48
Average capacity (kilowatts)	3,570	7,545	396	469	2,900
Number of consumers	169,096	49,691	6,301	3,257	228,345
Installed capacity (kilowatts), (main plant only)	103,288	32,324	1,978	1,325	138,915
Maximum load (kilowatts)	76,915	26,904	1,653	809	106,281
Units generated	351,654,279	93,697,052	4,552,548	2,091,231	451,995,110
Annual load-factor (per cent.)	52·5	39·7	31·3	29·5	48·6
Units sold	302,227,684	78,204,575	3,545,649	1,718,423	385,696,331
Total capital outlay (including distribution system)	£15,674,274	£2,808,160	£338,849	£114,853	£18,936,136
Total capital per kilowatt installed (including distribution system)	£152	£87	£170	£86·5	£136
Total annual working-costs	£988,994	£306,455	£42,323	£15,819	£1,353,591
Total annual working-costs per unit sold	0·79d.	0·942d.	2·87d.	2·2d.	0·84d.
Total annual working-costs per kilowatt (maximum)	£12·8	£11·8	£25·6	£19·55	£12·62
Total annual capital charges	£1,123,154	£279,904	£17,762	£5,499	£1,426,319
Total annual capital charges per unit sold	0·89d.	0·86d.	1·2d.	0·77d.	0·89d.
Total annual capital charges per kilowatt (maximum)	£14·6	£10·40	£10·7	£6·79	£13·4
Total annual capital charges as percentage of capital outlay	7·2	10·0	5·25	4·82	7·52
Total annual costs	£2,112,147	£586,359	£60,085	£21,318	£2,779,910
Total annual costs per unit sold	1·68d.	1·8d.	4·07d.	2·97d.	1·73d.
Total annual costs per kilowatt (maximum)	£27·4	£21·79	£36·3	£26·34	£26·02
Total annual revenue (not including rates)	£2,169,181	£647,222	£60,882	£26,760	£29,040,045
Total annual revenue per unit sold	1·72d.	1·98d.	0·41d.	3·72d.	1·8d.
Total annual revenue per kilowatt (maximum)	£28·3	£24·05	£36·7	£33·07	£27·1
Net profit	£57,033	£60,863	£797	£5,442	£124,135
Ratio of working-costs to revenue (per cent.)	45·2	47·5	69·5	59·0	46·8

* Does not include Wellington (10,000 kw.), Invercargill (2,450 kw.), Waihi (2,500 kw.) as stand-by plants for hydro stations.

Growth of Load.

In the early days of electric supply electricity was used almost exclusively for lighting purposes. With the advent of electric motors and the application of electricity for heating purposes the power and heating load increased, until at the present time the energy used for lighting is small compared with that used for other purposes. The benefits of electric drive in factories and workshops have to a large extent been taken advantage of, and the use of electricity for commercial heating and domestic heating and cooking is rapidly increasing. The use of electric ranges and water-heaters during the past few years tends to confirm the opinion that the use of electricity for domestic purposes will soon exceed the demand for industrial and commercial uses.

Returns have again been obtained of electric ranges and water-heaters in use throughout the Dominion, and the figures obtained continue to show satisfactory increases over those of the previous twelve months, and the statistics obtained for the year ending 31st March, 1927, have been scheduled in Table Y. Of the ninety-eight electric-supply authorities engaged in retail distribution of electrical energy, seventy-nine of them have an aggregate total of 9,511 electric ranges connected to their systems, and the number now installed represents an increase of 103 per cent. for the year. The return shows the percentage of consumers using electric cooking to the total number of consumers being supplied in each area respectively, and an examination of this column shows where the field for electric cooking still remains to be developed.

The number of consumers using electric water-heaters has increased from 6,654 to 14,160 during the year, an increase of 113 per cent.

When electric-supply authorities actively canvass their areas for the above class of load the response is generally favourable, and it is only reasonable to anticipate that in the near future the demand on the available stations will be such as to warrant further extensions to keep up with the requirements. This development of load is particularly noticeable in rural and country areas, where the facilities for more congenial living-conditions are being brought into line with those already existing in the metropolitan areas.

As regards the conversion of fuel-driven to electrically-driven milking-machines, the figures this year show a steady advance over those of previous years—viz., 1925, 3,581 ; 1926, 4,856 ; 1927, 6,738. The collection of these statistics was inaugurated in 1923, when the total number of electrically-driven machines was only 1,310. The increase in four years is thus 410 per cent. ; and as there are still about nine thousand machines which are fuel-driven, the work of conversion is not yet half completed, and the electric-supply authorities have still this additional load of approximately 12,000 horse-power in prospect and ready for canvassing.

Registration of Electrical Wiremen.

During the year the administration of the Electrical Wiremen's Registration Act, 1925, has occasioned a large amount of work, and up to the end of July, 1927, there have been registered 192 Inspectors of Electrical Wiring and 2,260 electrical wiremen. In addition to these registrations, 400 provisional licenses have been issued.

Examinations were held in October, 1926, and April, 1927. At the October examination there were 167 candidates for the written part and 171 for the practical part, those passing being 110 (66 per cent.) and 133 (77 per cent.) respectively. At the April examination there were 239 candidates for the written part and 231 for the practical part, those passing being 136 (57 per cent.) and 164 (71 per cent.) respectively. The highest marks obtainable for each part of the examination is 100, and at the October examination the highest marks obtained were 91 for the written part and 94 for the practical part; the highest marks at the April examination being 86 for the written part and 91 for the practical part.

The following table gives a summary of the results for the various centres :—

	Written Part.						Practical Part.					
	October, 1926.			April, 1927.			October, 1926.			April, 1927.		
	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.
Auckland ..	29	20	69	41	22	54	23	19	83	37	31	84
Christchurch ..	22	10	45	35	21	60	21	15	71	32	23	72
Dunedin ..	8	6	75	22	17	78	9	8	89	23	17	74
Gisborne ..	..	..	..	7	2	29	..	..	..	6	4	67
Greymouth ..	6	4	67	5	3	60	6	4	67	6	3	50
Hamilton ..	18	13	72	28	13	46	20	18	90	28	14	50
Invercargill ..	4	4	100	1	Nil	..	6	6	100	1	Nil	..
Kaikoura ..	2	Nil	..	2	2	100	2	2	100	..	..	..
Masterton ..	5	4	80	8	5	63	5	5	100	8	8	100
Napier ..	8	7	87	7	2	29	8	7	87	8	7	88
Nelson ..	5	2	40	6	3	50	6	5	83	5	4	80
Palmerston North	13	10	77	20	13	65	14	12	86	19	17	90
Stratford ..	7	4	57	13	4	31	7	4	57	15	9	60
Timaru ..	..	..	..	5	4	80	..	..	..	5	5	100
Wanganui ..	6	5	83	..	..	..	6	4	67	..	..	..
Wellington ..	29	16	55	34	22	65	33	23	70	31	18	58
Westport ..	..	..	..	2	1	50	..	..	..	2	1	50
Whangarei ..	5	4	80	3	2	67	5	2	40	5	3	60

The tendency of the Board will be to consistently raise the standard of future examinations to ensure that candidates passing have a good technical knowledge as well as being competent of maintaining a high grade of workmanship.

There have been three appeals against the decision of the Board under section 23 of the Act, the Board's decision being upheld in two of the appeals. The third case was lost solely on account of the appellant not having furnished information with his original application for registration, which he subsequently produced in the Appeal Court, and was then accepted by the Board as sufficient evidence for the purposes of registration.

An amendment to the Act was passed in 1926 to provide, in the case of those wiremen who have not previously had an opportunity to apply, a temporary permit to work pending the Board's decision with reference to their application; to provide for the removal from the Register of Inspectors of Electrical Wiring of the name of any Inspector when he ceases to be so employed by the supply authority who appointed him; and to provide against any person acting as an Inspector of Electrical Wiring when not employed as such.

Eight prosecutions for working contrary to the Act have been taken, and others are pending. Fines and costs totalling £52 8s. 6d. were imposed in the above cases.

Although the Act came into operation on the 1st April, 1926, applications for registration are still being received from wiremen who have been working, since that date, contrary to the Act, and there is no doubt that the Act is being evaded by persons who are not registered or licensed, and by the employment of apprentices without supervision. To remedy this the active co-operation of all electrical-supply authorities is required, and periodical inspection of all certificates is necessary to ascertain not only that the person carrying out the work is in possession of a certificate, but that the certificate is actually made out in his name. Breaches of the Act and bad work are at any time difficult for the Board to detect and prove, and it is unlikely that any great improvement will be forthcoming unless supply authorities come forward willingly with evidence to support any action proposed against offenders. It is to be regretted that this assistance has not always been forthcoming when sought by the Board.

Twelve reports of bad workmanship were received up to the end of July, and the action taken was as follows: One name was removed from the register; one provisional license was withdrawn; the certificate was endorsed for bad workmanship in one case; six wiremen were censured; and in three of the cases the offence occurred before the Act came into force, and no action could be taken.

Electrical Supply and Wiring Regulations.

The Advisory Committee set up in 1925 to assist with the revision of the regulations issued under section 2 of the Public Works Amendment Act, 1911, have completed their deliberations, and the two sets of regulations—viz., the Electrical Supply Regulations, 1927, and the Electrical Wiring Regulations, 1927—were gazetted on the 12th July, 1927.

The Advisory Committee held their first meeting on the 12th November, 1925, and had forty-three meetings, the majority of which were held on Monday evenings from 7 p.m. till 10 p.m. The thanks of the Department are due to the members of the committee for their hard work in connection with drafting the regulations and for devoting so much of their spare time and expert knowledge in the interests of the electrical industry.

Suggestions have been drawn from all sources, and regulations in use in other countries have been studied and the information obtained adapted to local conditions, the result being the most complete and comprehensive electrical regulations the Department have ever had. It is hoped by their adoption to further increase the present high factor of safety and immunity from danger to life and property without increasing the cost as a whole to the public. Modern developments in the industry and increasing knowledge have resulted in the relaxation of certain requirements of the existing regulations, while experience had dictated a tightening-up in certain directions.

The Wiring Rules which have heretofore been incorporated in the Department's regulations were those issued by the Council of Fire and Accident Underwriters' Associations of New Zealand. It has been patent for some time that these required revision and that more consideration should be given to interests other than those of the insurance companies. It is anticipated that the new Wiring Regulations will prove acceptable to all parties concerned, and will reduce the present high cost of installations without in any way increasing the risk to the insurance companies. It is hoped that the cost of wiring will be further reduced when the Wiremen's Registration Act has been in operation long enough to raise the standard of the work carried out, and thus permit the use of less costly methods of installing conductors.

Both sets of the regulations were well perused by the interested parties—viz., the Electrical Supply Authority Engineers' Association, the Electrical Traders' Federation, and the Fire Underwriters' Association. Valuable suggestions were received from each body, and they are in agreement with practically the whole of the regulations as now issued.

Briefly, the main alterations from the existing regulations are:—

(a) Electrical Supply Regulations.

Frequency: The permissible variation infrequency has been reduced from 2½ per cent to 1½ per cent.; this will mean better regulation of the speed of motors, resulting in more satisfactory service to those industries where an invariable speed is an important factor.

Extension of lines on demand: The regulation governing the condition under which a consumer or group of consumers can demand an extension of a licensee's lines has been completely redrafted to further protect the interests of the licensee and the ratepayers against the erection of lines which may otherwise prove unprofitable.

Erection of lines: Complete sag and tension tables for the stringing of lines, calculated and prepared by this office, have been included, to guard against lines being erected under too great a stress, and consequent danger to the public by breakage.

Feeder protection: Provision has been made for the installation of earth leakage relays for overhead lines. Such relays are designed to operate in the event of a leakage to earth, thus protecting the public from the danger of fallen live wires.

Employees safeguards: Additional safeguards have been specified to protect the employees of the licensee while engaged in their duties.

Post and Telegraph requirements: The requirements of the Post and Telegraph Department and Railway Department where power-wires cross or are adjacent to the wires of these Departments, have been clarified and made more definite. In view of higher standards of construction now required, some of the requirements at telephone crossings have been somewhat relaxed. Lithographs of the standard drawings of both the Post and Telegraph Department and the Railway Department, showing types of construction to be adopted where overhead crossings occur, have been included in the appendix.

Clearances: The clearances above ground-level have in certain cases been reduced, thus slightly reducing the cost of construction without in any way lessening their safety, and safe clearances between lines have been specified.

Strength of supports: Figures have been included for the working-strengths of timber supports of overhead lines, thus ensuring uniformity of practice and eliminating the possibility of poles being overstressed in some cases.

Bare wires: Provision has been made for the use of bare wires in certain areas where covered wires were previously required, thus decreasing the cost of construction.

Responsibility clause: The regulation defining the responsibility of the licensee for the safety of lines and apparatus has been clarified, removing an ambiguity which has hitherto caused discussion and dissatisfaction among licensees.

Existing installations: Provision has been made whereby a licensee can supply an installation which previously had its own plant, without requiring the complete rewiring of the installation in some cases, provided the installation is safe.

Consumers' installations: The consumer is required to maintain his installation in a safe condition, and the licensee is empowered to discontinue supply if the installation is dangerous.

General safety: A regulation has been made requiring the licensee to bring under the consumer's notice annually certain requirements designed to ensure greater safety to the users of electrical energy. This should have the effect of reducing still further the small number of accidents from electrical causes.

(b) Electrical Wiring Regulations.

(These were previously issued by the Council of the New Zealand Fire Underwriters).

Temporary wiring: The condition under which temporary wiring may be installed have been specified, and this should tend towards uniformity of practice and greater safety.

Switchboards: All switchboards which are mounted on a wall must now be provided with an enclosing case, thus meeting the objection of the Painters and Paperhangers' Union, who have on several occasions stated that some of their members had received shocks when papering behind a switchboard. Thickness for switchboards of composition material has been specified, to secure adequate mechanical strength.

Switch-gear: In the case of underground supply, provision is made for a master switch to be fitted near an entrance or exit door, to enable firemen to cut off the supply, if necessary, in case of fire.

Service-mains: The minimum size of service-mains has been specified, so as to ensure that the mains are of sufficient size for the new installation, and a lithograph of curves showing the minimum size of conductor required for motor installations as a function of the permissible voltage-drop has been included as an appendix.

Wireless aerials: Provision has been made to prevent contact between overhead lines and wireless aerials or stay-wires.

Flexible cords: The weight which a flexible cord may carry is specified, in order to prevent undue stress in the conductors.

Wiring systems with special control: A regulation governing the use of wiring systems having a special method of remote control has been included, to cover a new system of wiring invented by a resident of Christchurch.

Wiring in special situations: Special requirements have been included for wiring in special situations, in order to obtain additional safety.

Bell-ringing transformers: Provision has been made for the use of bell-ringing transformers.

Electric signs: The methods of wiring and control of electric signs have been specified.

Electric lifts: A regulation has been included to provide safe conditions for electrically-operated lifts.

Electric water-heaters: The requirements for electric water-heaters are specified.

Medical and dental appliances: A regulation governing the use of medical and dental appliances has been included, to prevent danger to patients.

Places of public amusement: Special requirements for installations in theatres, &c., have been specified, to secure additional safety.

High and extra-high pressures: Regulations governing the installation and use of high- and extra-high pressure apparatus have been included.

Earthing: The requirements for the earthing of apparatus when used in places where the user is otherwise likely to receive an electrical shock have been very fully covered to prevent accidents.

General: The new Wiring Regulations cover the installation of wiring on premises in a much more complete manner than wiring rules previously in operation.

Approval Board.

The setting-up of an Approval Board is closely allied with the administration of the regulations, and steps have now been taken to draft the necessary legislative enactment. The proposed Act will contain provisions for controlling the sale and use of electrical material and apparatus in the Dominion by approval of same being first obtained from the proposed Board, and it is hoped thereby to afford protection to the public by prohibiting any apparatus which does not conform to the requirements of the Board.

Work for other Departments.

This Department during the year has been called upon to co-operate with other Government Departments, amongst which may be quoted the work done on the advisory committee set up to investigate and report on the Christchurch–Lyttelton electrification proposals of the Railway Department, also the acceptance of tenders for plant in connection with same. Tenders for the electrical equipment of railway workshops were also dealt with by this committee.

Special oscillograph investigations were made into the question of telephone interference arising from the Otira Tunnel railway electrification, for which a solution was obtained and applied with satisfactory results. Other oscillograph investigations extending over several days were undertaken in the Taranaki district at the request of the Post and Telegraph Department to locate the disturbing factor from the local electric-supply stations which was causing telephone interference in that district. The results obtained pointed to a solution which it is anticipated will prove satisfactory as soon as the electric-supply authority concerned has installed the corrective apparatus recommended.

The assistance of this Department was also sought by the Mental Hospitals Department in connection with their proposals to equip the hospitals at Porirua and Seacliff for electric service.

The complete wiring and illumination of the Waitomo Caves was successfully carried out on behalf of the Tourist Department, and has effected a pronounced improvement over the methods previously in use, besides showing the caves to better advantage.

For the Department of External Affairs complete sets of specifications and drawings were prepared for a hydro-electric installation in Samoa, and tenders called for the supply of the necessary pipe-line, power-house plant, overhead and underground cables, transformers, street-lighting, and watt hour meters for electric supply in Apia.

Inspection of Electric Lines.

During the year the staff was strengthened by the appointment of two Electric-lines Inspectors, who have been kept fully occupied in making up arrears in the inspection of the electric lines throughout the Dominion, and also in carrying out inspections associated with the additional 2,500 miles of new lines erected during the current year. The work represented a large amount of travelling-time, and the lines and equipment of ninety-six electric-supply authorities scheduled below were inspected, and breaches of the regulations and defects in construction, &c., brought under the notice of the licensees concerned.

Power Boards (34).

Ashburton	Hawke's Bay (part)	Poverty Bay (part)	Wairarapa
Auckland (part)	Horowhenua	South Canterbury	Wairere
Banks Peninsula	Hutt Valley	Southland	Wairoa
Cambridge	Malvern	Springs-Ellesmere	Waitaki
Central	Manawatu-Oroua	Taranaki	Waitemata (part)
Central Hawke's Bay	Marlborough (part)	Tararua	Waitomo
Dannevirke	Opunake	Te Awamutu	Wanganui-Rangitikei.
Franklin	Otago	Teviot	
Grey	Otago Central	Thames Valley (part)	

Cities (4).

Christchurch	Dunedin	Nelson	Wellington (part).

Boroughs (35).

Bluff	Motueka	Queenstown	Tauranga
Gore	Mataura	Raetihi	Te Aroha
Hastings	Napier	Rangiora	Thames
Hamilton	New Plymouth	Riccarton	Wairoa
Inglewood	Ohakune	Stratford	Waitara
Invercargill	Opotiki	Sumner	Westport
Kaitangata	Picton	Timaru	Whakatane
Kaiapoi	Palmerston North	Taihape	Whangarei.
Lyttelton	Patea	Taumarunui	

Town Districts (7).

Havelock North	Kaponga	Taradale	Waverley.
Kamo	Mangaweka	Te Puke	

County Councils (10).

Eyre	Kowai	Murchison	Waimairi.
Halswell	Kaikoura	Rangiora	
Heathcote	MacKenzie	Uawa	

Companies (6).

Hawera	Reefton	Waimea
Kanieri	Tai Tapu	Wilsons (Wairua).

As a result of the inauguration of these regular and systematic inspections it is hoped that the standard of construction hitherto erected by some electric-supply authorities will be progressively improved. It is also satisfactory to notice that some licensees have already set a high standard, and it is hoped that ultimately the standard of work throughout the Dominion will bear very favourable comparison with that of any other country.

The electric-supply authorities are apparently anxious to co-operate with the Department in endeavouring to carry out the regulations, but it is recognized that some of them are not financially able to effect immediate improvements; and the Department, in administering the regulations, and where necessary to fix a time-limit, has no desire to be other than tolerant where such is definitely known to be the cause of slow response in remedying any existing defects.

The inspection work has been confined principally to overhead lines and equipment, but it may be necessary to undertake further inspection work in connection with the Electrical Wiring Regulations, 1927, if electric-supply authorities fail to carry out the obligations imposed by their licenses. Electric-supply authorities must recognize the responsibility resting on them through their Inspectors, who are registered under the Wiremen's Registration Act, and take active steps to detect bad workmanship and unregistered wiremen. The Electrical Supply Regulations and Electrical Wiring

Regulations, 1927, are very specific on this question of consumers' installations and the licensee's duty in connection therewith, and in some cases the inspection organization of some electric-supply authorities is not fulfilling these requirements.

The question of voltage of supply to consumers has also been the subject of investigation during the year, and as opportunity offers further tests will be undertaken to ascertain if licensees are discharging their obligations by maintaining properly designed distribution systems. Inspection of protective relays and automatic apparatus will be given more attention in future to ensure that same are in full working-order and functioning properly. These additional activities of the Department must follow the rapid expansion of electric-supply systems which is taking place, and should be viewed in a co-operative spirit, but the onus still remains on a licensee to maintain his system in a safe condition and to give satisfactory supply to all consumers.

Licenses issued (Electric-line and Water-power).

Licenses from April, 1926, to September, 1927, were issued to the following: New Zealand Sounds Hydro-electric Concessions, Ltd.; Poverty Bay Power Board; V. A. Abraham, Hokianga; Nelson City Council (amendment); Tauranga Borough Council (extensions); Auckland Farmers' Freezing Co., Moerewa; Waimea Electric Supply Co. (two amendments); Raetihi Borough Council (two amendments); Tauranga Power Board (amendment); Marlborough Power Board; Waitomo Power Board; Central Hawke's Bay Power Board (purchase of Waipukurau plant); Waitemata Power Board (purchase of Devonport plant); Poverty Bay Power Board (purchase of Gisborne plant); Otago Electric-power Board (purchase of Kaitangata plant); Southland Power Board (purchase of Gore plant); Westland Power Board (for delegation to Westland Power, Ltd.); Bay of Plenty Power Board; Hastings Borough Council (new license); Opunake Power Board (amendment).

Electrical Accidents.

The following is a list of the various electrical accidents reported to the Department from June, 1926, to August, 1927:—

20/6/26	Two men received burns on face and arms whilst working on switchboard (Portland).
2/7/26	Firemen received severe shocks due to burnt overhead line falling on them (Masterton).
9/7/26	Workman received severe shock due to steel cable to scaffolding accidentally fouling 11,000-volt lines (Wanganui).
10/7/26	Lineman electrocuted due to accidental contact being made between 11,000-volt lines and low-pressure lines (Southland Power Board).
15/7/26	Painter received burns due to accidental contact between binder-wire and neutral (Nelson).
5/8/26	Lineman received severe burns and shock through ladder which he was carrying accidentally contacting with 33,000-volt lines (Otago Power Board).
6/8/26	Lineman electrocuted whilst working on 230-volt lines (Hutt Valley Power Board).
16/8/26	Lineman severely burnt by 11,000-volt lines due to slipping on pole (Dannevirke Substation).
19/8/26	Lineman severely burnt due to accidental contact with extra high-pressure lines (Timaru Substation).
24/9/26	Lineman severely injured by fall from pole due to 230-volt electric shock (Auckland).
2/10/26	Three horses electrocuted due to corrugated-iron shed being shifted and fouling overhead lines (Tuai).
26/10/26	Post and Telegraph lineman killed as result of fall from pole after receiving accidental electric shock from 230-volt lines (Christchurch).
4/11/26	Man severely burnt on hands due to fence being livened up by fallen high-tension wire (Taranaki Power Board).
28/11/26	Twelve cows electrocuted due to fallen 230-volt line (Thames Valley Power Board).
24/12/26	Lineman electrocuted while working on 230-volt lines (Dunedin).
20/1/27	Lineman severely burnt due to careless handling of 400-volt cables whilst removing switch (Thames Valley Power Board).
30/1/27	Boy severely burnt due to climbing up steelwork of 11,000-volt transformer enclosure (Port Chalmers).
2/2/27	Post and Telegraph lineman killed by fall from pole due to shock received from electric lines (Auckland).
11/2/27	Lineman received burns on hand due to neglect in not using rubber gloves provided (Waitemata Power Board).
27/2/27	Lineman injured by fall from transformer-platform due to shock received (Thames Valley Power Board).
1/3/27	Telephone-exchange operator received severe shock due to telephone-lines contacting with electric lines (New Plymouth).
6/3/27	Engineer received severe shock due to accidental contact with 6,600-volt bus-bars (Ashburton Power Board).
15/3/27	Man, cow, and dog electrocuted at Ratapiko due to contact with fence on which 6,600-volt line had fallen (Taranaki Power Board).
29/4/27	Workman electrocuted at Alexandra whilst working in 11,000-volt transformer enclosure (Otago Central Power Board).
17/5/27	Boy electrocuted in garage at Gore due to shock from defective wiring in portable lamp-holder.

17/5/27 Wireman received burns whilst setting conduit for new mains (Taranaki Power Board).
9/6/27 Lineman killed due to shock and fall from pole (Wellington).
17/6/27 Operator received shock and burns due to handling 6,600-volt fuse through failure to use protective apparatus provided (Taranaki Power Board).
25/6/27 Boy playing on roof of cow-shed received burns due to contact with overhead lines (Thames Valley Power Board).
1/7/27 Horse electrocuted in Hamilton by accidental contact with 3,000-volt line.
13/7/27 Lineman severely injured by fall from pole (Hastings).
14/7/27 Operator severely burnt while operating 3,300-volt air-break switch, due to defective insulator (Manawatu–Oroua).
20/8/27 Child at Tikorea received shock from live fence-wire.
23/9/27 Engineer injured by fall from pole due to electric shock (Havelock North).

TABLE A.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—RESULTS OF OPERATION.

Results of Operation.	Ninth Year, 1924.	Tenth Year, 1925.	Eleventh Year, 1926.	Twelfth Year, 1927.
	£	£	£	£
Capital outlay..	892,801	1,008,491	1,366,951	1,538,569
Costs—				
Working-costs	20,777	23,270	27,035	30,728
Interest	44,444	47,780	50,324	65,094
Depreciation, 2 per cent.	12,584	15,679	19,350	28,168
Total costs	77,805	86,729	96,709	123,990
Accumulated Depreciation Fund	72,594	88,631	111,526	142,594
Accumulated deficiency	23,172	17,738	..	..
Sinking Fund Account	..	..	8,907	35,443
Revenue—				
City Council (excludes Woolston)	26,055	28,925	50,377	64,322
Tramways	9,189	9,477	10,122	16,094
Wholesale consumers	39,280	49,822	60,250	67,378
Retail consumers	2,289	1,880	264	269
Miscellaneous	1,695	2,059	2,342	2,177
Total revenue	78,508	92,163	123,355	150,240
Maximum load (kilowatts)—				
Power-house	10,800	13,180	14,430	16,880
Substations	9,490	11,190	13,583	15,512
City Council	5,344	6,216	7,244	7,978
Tramways	2,740	2,760	2,880	2,860
Average load (kilowatts)—				
Power-house	5,722	6,820	7,916	9,000
Substations	5,158	5,680	6,303	8,200
City Council	2,438	2,930	3,357	3,760
Tramways	870	897	972	980
Units output—				
Power-house	50,614,955	59,528,216	68,860,614	78,342,797*
Fed to village, tunnel, and intake	1,837,069	1,865,344	1,664,917	741,462
Fed to transmission-lines	48,777,886	56,935,840	65,491,130	76,941,870
Substations (various)	45,778,007	53,261,142	61,167,881	71,791,696
Units distributed—				
City Council	21,664,830	25,616,445	29,126,211	32,935,247
Tramways	7,623,900	7,851,060	8,511,530	8,583,270
Wholesale consumers and local bodies ..	14,198,034	17,420,138	22,988,931	27,829,050
Retail consumers	305,608	399,390	41,453	23,699
Substation local consumption	..	..	284,764	1,516,395
Total units distributed	43,792,372	51,287,033	60,952,889	70,887,661
„ „ sold	..	..	..	69,371,266
Losses—				
Transmission-line losses	2,999,879	3,676,518	4,323,249	5,150,174
Percentage	6·15	6·43	6·270	6·7
Distribution losses..	1,985,635	1,973,199	1,342,454	1,645,497
Percentage	4·3	3·71	2·202	2·2
Average load-factor (per cent.)—				
Power-house	53·0	51·8	54·8	53·4
Substation	54·3	50·8	54·0	52·9
City	45·6	47·1	46·3	47 2
Working-costs—				
Per kilowatt (power-house maximum) ..	£1·92	£1·76	£1·874	£1·8204
Per kilowatt (substation maximum)	£2·188	£2·08	£1·99	£1·9809
Per unit generated..	0·102d.	0·0938d.	0·0942d.	0·09413d.
Per unit sold	0·113d.	0·1088d.	0·1064d.	0·1060d.
Capital charges—				
Per kilowatt (power-house maximum) ..	£5·28	£4·82	£4·828	£5·525
Per kilowatt (substation maximum)	£6·00	£5·67	£5·129	£6·012
Per unit generated	0·280d.	0·255d.	0·2428d.	0·2856d.
Per unit sold	0·313d.	0·297d.	0·2743d.	0·3225d.
Total cost—				
Per kilowatt (power-house maximum) ..	£7·20	£6·58	£6·702	£7·3454
Per kilowatt (substation maximum)	£8·198	£7·75	£7·119	£7·9929
Per unit generated..	0·3821d.	0·349d.	0·3371d.	0·3798d.
Per unit sold	0·4264d.	0·4059d.	0·3807d.	0·4285d.
Revenue (total revenue)—				
Per kilowatt (power-house maximum) ..	£7·27	£6·992	£8·548	£8·9005
Per kilowatt (substation maximum)	£8·27	£8·23	£9·081	£9·6854
Per unit generated	0·386d.	0·3715d.	0·43d.	0·4603d.
Per unit sold	0·4302d.	0·4312d.	0·4857d.	0·52d.
Per unit sold (city)	0·288d.	0·271d.	0·4150d.	0·4687d.
Per unit sold (trams)	0·289d.	0·2897d.	0·2854d.	0·4500d.
Per unit sold (wholesale consumers)	0·664d.	0·6864d.	0·629d.	0·5810d.
Per unit sold (retail consumers)	1·80d.	1·13d.	1·528d.	2·724d.

* Plus 446,300 units purchased.

Substations maximum: Addington, 12,872 kw.; Timaru, 1,133 kw.; Ashburton, 1,040 kw.; Oamaru, 269 kw.; Hororata, 177 kw.; Point, 21 kw.: total, 15,512 kw.

TABLE B.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—ANALYSIS OF CAPITAL OUTLAY.

Item.	At 31st March, 1926.	At 31st March, 1927.	Expenditure during Year.
	£	£	£
Land, roading, and fencing	22,543	23,484	941
Harper diversion	23,007	23,007	..
Headworks No. 1	209,830	209,687	*Cr.* 143
Headworks No. 2	202,988	237,699	34,711
Power-house machinery	182,363	204,827	22,464
Staff village	24,401	24,063	*Cr.* 338
Transmission-lines	317,462	366,576	49,114
Addington Substation	79,404	74,077	*Cr.* 5,327
Primary distribution	59,444	66,737	7,293
Secondary distribution	76,168	102,011	25,843
Service transformers and motors	7,003	6,001	*Cr.* 1,002
Vehicles and loose tools	27,415	23,732	*Cr.* 3,683
Telephone-lines	1,903	1,903	..
Office furniture	255	255	..
Surveys, preliminary expenses, &c.	82,183	92,075	9,892
Cost of raising Loans	..	21,396	21,396
Interest during construction	50,581	61,039	10,458
	1,366,950	1,538,569	171,619

TABLE C.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—OPERATING OR WORKING COSTS.

Item.	1926.		1927.	
	Cost.	Cost per Unit.	Cost.	Cost per Unit.
	£	d.	£	d.
Harper diversion	1,354	0·005	2,488	0·008
Generating	5,958	0·024	8,484	0·029
Transmission-line	4,108	0·016	4,237	0·015
Main distribution	2,305	0·009	2,758	0·009
H.T. distribution	2,986	0·018	3,448	0·012
L.T. distribution	2,890	0·011	2,326	0·009
Standby	1,577	0·006	1,483	0·005
Management	5,857	0·023	5,504	0·019
	27,035	0·106	30,728	0·106

TABLE D.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—CONNECTED LOAD IN KILOWATTS AT 31ST MARCH, 1927.

Consumer.	Light.	Heat.	Power.	Total.
Local bodies, &c.—				
Ashburton Electric-power Board ..	1,262	4,655	1,454	7,371
Banks Peninsula Electric-power Board	346	1,059	325	1,730
Christchurch City Council	..	..	..	59,406*
Christchurch Tramways Board ..	85	..	7,544	7,629
Eyre County Council	41	66	81	188
Halswell County Council	66	136	45	247
Heathcote County Council ..	374	1,415	102	1,891
Kowai County Council	107	201	55	363
Kaiapoi Borough Council	129	204	81	414
Lyttelton Borough Council.. ..	288	360	522	1,170
Lyttelton Pumping-station ..	..	3	114	117
Malvern Electric-power Board ..	204	793	164	1,161
Rangiora County Council	372	517	484	1,373
Riccarton Borough Council ..	556	1,693	400	2,649
Sumner Borough Council	287	547	125	959
South Canterbury Electric-power Board	2,304	3,697	2,128	8,129
Springs – Ellesmere Electric - power Board	743	1,305	629	2,677
Tai Tapu Dairy Co.	100	225	70	395
Waimairi County Council (Hillmorton)	85	86	18	189
Waitaki Electric-power Board ..	..	3,488†	516	4,004
Freezing-works (4) ..	165	45	2,278	2,488
Flour-mills (2) ..	10	8	281	299
Dairy factory (1) ..	3	1	57	61
Quarry (1) ..	2	3	110	115
Tanneries and wool-scourers (6) ..	33	9	774	816
Seed-cleaning (4) ..	7	5	173	185
Brickyard (1) ..	2	1	111	114
Railway workshops (1) ..	49	..	1,140	1,189
Harbour Board (1) ..	59	2	1,445	1,506
Institutions (4) ..	159	413	157	729
Soapworks (1) ..	..	..	15	15
Steelworks (1) ..	3	1,200	26	1,229
Glue-works (1) ..	4	1	99	104
Woollen-mills (1) ..	9	2	120	131
Chemical-works (1) ..	15	11	323	349
Railway-stations (3) ..	74	10	128	212
Railway signalling (1) ..	13	..	36	49
Twine-mill (1) ..	2	1	119	122
Retail	6	14	4	24
Substations—				
Addington	24	45	39	108
Ashburton	1	10	..	11
Hororata	1	4	..	5
Point	3	28	..	31
Timaru	2	17	1	20
Lake Coleridge	..	..	..	450
	7,995	22,280	22,293	112,424

* Includes Woolston. † Light and heat combined.

Power-house maximum, 16,880 kw.

TABLE E.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY: GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR YEAR ENDED 31ST MARCH, 1927.

Distributing Authority.	Number of Consumers.	Capital Outlay.	Revenue.					Expenditure.							Balance.	
			From Sale of Electrical Energy.	Rates.	Trading Account.	Other Sources.	Total.	Paid for Electrical Energy.	Maintenance.	Interest.	Depreciation.	Sinking Fund, Reserve Fund, &c.	Other Expenditure.	Total.	Profit.	Loss.
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Public Works Department	72	1,538,569	46,158*	..	..	2,176	150,240	..	30,728	65,094	28,168	26,250	..	150,240	..	..
Ashburton Power Board	2,804	283,797	31,012	..	..	412	31,424	7,280	6,344	12,877	..	3,139	385	30,025	1,399	..
Banks Peninsula Power Board	891	95,295	9,401	4,154	451	229	14,235	1,734	4,497	5,935	..	932	..	13,098	1,137	..
Christchurch City Council	23,932	614,780	178,453*	..	2,620	3,600	187,978	61,204†	40,825	23,428	29,421	14,000	1,297	173,480	14,498	..
Eyre County Council	141	6,285	1,379	..	..	..	1,379	622	100	273	..	50	..	1,045	334	..
Halswell County Council	219	6,568	1,540	..	..	12	1,552	657	440	263	..	50	..	1,410	142	..
Heathcote County Council	1,000	22,153	6,496	..	453	..	6,949	2,607	2,240	626	..	436	..	5,909	1,040	..
Kaiapoi Borough Council..	450	9,765	2,533	..	419	..	2,952	1,015	945	371	61	135	210	2,737	215	..
Kowai County Council	285	21,856	2,260	..	..	23	2,281	587	343	1,210	..	..	12	2,152	129	..
Lyttelton Borough Council	512	5,000	4,092	..	..	18	4,110	1,423	1,586	235	..	100	288	3,632	478	..
Malvern Power Board	495	49,903	2,966	..	78	1	3,045	828	343	1,008	..	500	136	2,815	230	..
Rangiora Borough Council‡																
Rangiora County Council..	425	24,419	5,481	..	..	546	6,027	2,271	1,007	1,488	..	270	676	5,712	315	..
Riccarton Borough Council	1,090	15,544	7,661	..	..	..	7,661	2,351	3,369	622	670	201	2	7,215	446	..
South Canterbury Power Board	3,961	184,087	21,395	..	..	253	21,649	9,220	861	5,651	..	1,450	1,168	18,349	3,300	..
Springs-Ellesmere Power Board	1,645	96,995	13,629	..	219	116	13,964	2,994	1,901	5,548	2,643	890	1,744	15,720	..	1,756
Sumner Borough Council	860	11,627	4,630	..	..	26	4,656	1,236	1,182	459	232	81	..	3,189	1,467	..
Tai Tapu Dairy Company	247	9,045	3,674	..	197	547	3,398	1,677	1,561	415	347	..	390	3,385	13	..
Timaru Borough Council§																
Waimairi County Council	2,687	56,730	15,746	..	..	..	15,746	3,498	4,192	1,977	..	497	..	10,164	5,582	..
Waitaki Electric Power Board	2,020	108,129	16,186	..	1,248	111	17,545	702	3,401	3,780	3,000	700	3,497	15,080	2,465	..
Totals	43,736	3,160,547	374,692	4,154	5,685	8,070	496,791	101,906	105,865	131,260	64,542	49,681	9,805	465,357	33,190	1,756

* After deducting sales to other distributing bodies, totalling—Public Works Department, £101,906; Christchurch City Council, £3,305. † After deducting amount paid by Waimairi County Council, £3,305. ‡ Included under Rangiora County Council. § Included under South Canterbury Power Board.

	£
Gross profit	31,434
Raised by rates	4,154
Net profit	£27,280

TABLE F.—WAIKATO ELECTRIC-POWER SUPPLY.—RESULTS OF OPERATIONS.

	Fourth Year, March, 1924.	Fifth Year, March, 1925.	Sixth Year, March, 1926.	Seventh Year, March, 1927.
Capital outlay—	£	£	£	£
Horahora—Total expenditure	474,817	522,973	561,065	576,841
Less assets not in operation	..	..	33,734	..
Horahora—Assets in operation	..	..	527,331	576,841
Arapuni—Assets in operation	..	..	174,026	268,107
Total assets in operation	..	..	701,357	844,948
Costs—				
Working-costs	12,474	14,106	19,612	28,713*
Capital costs—Interest	21,231	20,129	31,269	37,989
Capital costs—Depreciation	10,393	9,757	13,601	16,481
Sinking fund	..	4,139	11,342	8,448
Total costs	44,098	48,131	75,824	91,631
Total revenue	59,924	65,184	85,830	108,748
Profit	15,826	17,053†	10,006†	17,116†
Accumulated Reserve Fund	3,494	20,547	30,554	47,670
Accumulated Depreciation Fund	24,832	31,681	46,444	63,782
Accumulated Sinking Fund	12,718	16,983	28,939	38,515
Maximum load (kilowatts)—				
System for year (includes Grand Junction and McLaren's Falls)	..	8,300	11,860	14,160
Power-house for year	7,400	7,600	11,400	12,400
Power-house, average weekly	6,852	6,963	9,665	11,090
Units output—				
System total (generated and purchased)	..	45,643,664	67,026,141	86,652,102
Power-house units generated	45,077,150	45,070,650	65,435,630	79,253,160
Units available for outgoing lines	..	..	65,815,911	84,802,102
Units sold	39,914,854	41,281,159	60,261,326	75,844,229
Losses in transmission and distribution	5,162,296	4,362,505	5,554,585	8,957,873
Losses—Per cent. of units available	11·3	9·6	8·44	10·55
Load-factor, annual (per cent.)—				
System	..	62·7	64·5	69·9
Power-house	69·6	67·6	65·5	72·9
Power-house, average weekly	75·3	71·9	77·5	81·6
Working-costs (less power purchased)—				
Per kilowatt (power-house annual maximum)	£1·69	£1·69	£1·49	£1·645
Per kilowatt (power-house average weekly maximum)	£1·82	£1·85	£1·76	£1·84
Per unit generated at Horahora	0·067d.	0·068d.	0·063d.	0·062d.
Per unit sold (less units purchased)	0·075d.	0·076d.	0·070d.	0·0645d.
Capital costs—				
Per kilowatt (power-house annual maximum)	£4·28	£4·47	£4·93	£5·07
Per kilowatt (power-house average weekly maximum)	£4·62	£4·88	£5·81	£5·69
Per unit generated (at Horahora)	0·168d.	0·181d.	0·206d.	0·1905d.
Per unit sold	0·194d.	0·200d.	0·230d.	0·199d.
Total costs (less power purchased)—				
Per kilowatt (power-house annual maximum)	£5·96	£6·17	£6·42	£6·715
Per kilowatt (power-house average weekly maximum)	£6·44	£6·73	£7·58	£7·51
Per unit generated (at Horahora)	0·235d.	0·250d.	0·269d.	0·252d.
Per unit sold (less units purchased)	0·277d.	0·277d.	0·299d.	0·264d.
Total costs on system—				
Per kilowatt (system annual maximum)	..	£5·80	£6·39	£6·51
Per unit generated and purchased	..	0·253d.	0·271d.	0·255d.
Per unit sold	..	0·279d.	0·302d.	0·291d.
Revenue—				
Per kilowatt (system annual maximum)	..	£7·85	£7·24	£7·72
Per kilowatt (power-house annual maximum)	£8·10	£8·58	£7·52	£8·75
Per kilowatt (power-house average weekly maximum)	£8·73	£9·34	£8·88	£9·79
Per unit generated and purchased	0·319d.	0·343d.	0·307d.	0·301d.
Per unit sold	0·360d.	0·379d.	0·342d.	0·343d.

* Includes £8,787 for power purchased. † After deducting sinking fund.

TABLE G.—WAIKATO ELECTRIC-POWER SUPPLY (HORAHORA SCHEME).—ANALYSIS OF CAPITAL OUTLAY.

—	At 31st March, 1924.	At 31st March, 1925.	At 31st March, 1926.	At 31st March, 1927.	Expenditure during Year.
	£	£	£	£	£
Land roading and fencing at Horahora	3,208	3,208	3,208	3,208	..
Headworks	134,842	158,113	174,519	175,741	1,222
Generating-station transformers and machinery	79,588	113,559	115,906	115,969	63
Staff village, Horahora	11,054	11,354	11,461	11,492	31
Transmission-lines	113,245	114,817	125,900	126,032	132
Distribution-lines	705	705	705	705	..
Main substations	41,123	41,266	43,923	50,952	7,029
Distribution substations	7,414	7,406	7,353	7,408	55
Vehicles and loose construction equipment	8,418	7,291	7,652	7,666	14
Land, stores, and railway-siding, Claudelands	11,342	11,342	11,625	11,677	52
Staff residences	3,521	3,521	4,270	4,270	..
Office furniture, Hamilton	494	867	967	1,120	153
Supervision, preliminary expenses on surveys and on construction	17,639	19,667	21,562	28,587	7,025
Interest during contruction	24,224	29,866	32,014	32,014	..
	474,817	522,973	561,065	576,841	15,776
Works constructed out of Arapuni moneys brought into operation in conjunction with the Horahora scheme—					
Electric lines at Arapuni	..	..	675	675	..
Transmission-lines	..	..	137,035	217,582	80,547
Main substations	..	..	36,316	49,850	13,534
Totals	..	..	174,026	268,107	94,081
Grand totals	474,817	522,973	735,091	844,948	109,857

TABLE H.—OPERATING OR WORKING COSTS.

—	1925.		1926.		1927.	
	Cost.	Per Unit sold.	Cost.	Per Unit sold.	Cost.	Per Unit sold.
	£	d.	£	d.	£	d.
Generating	5,239	0·031	5,511	0·022	5,313	0·017
Transmission	2,068	0·012	3,403	0·014	5,226	0·016
Main substations	2,339	0·014	3,621	0·014	4,434	0·014
H.T. distribution	346	0·002	21	..	..	..
Management and general	2,858	0·017	4,494	0·018	4,953	0·017
Purchase of power	1,256	0·007	2,562	0·010	8,787	0·028
Totals	14,106	0·083	19,612	0·078	28,713	0·092

TABLE J.—WAIKATO ELECTRIC-POWER SUPPLY.—CONNECTED LOAD IN KILOWATTS AT 31ST MARCH 1927.

(Does not include Auckland Power Board.)

—	Light.	Heat.	Power.	Total.
Waihi Gold-mining Co.	150	100	5,770	6,020
Waihi Grand Junction Gold-mining Co.	38	38	2,452	2,528
Cambridge Co-operative Dairy Co.	5	2	231	238
New Zealand Co-operative Dairy Co., Frankton	11	15	520	546
State Farm, Ruakura	10	1	5	16
New Zealand Railways, Frankton	69	45	775	889
Hamilton Borough Council	1,984	1,885	1,273	5,142
Armstrong-Whitworth Co., Arapuni	60	214	1,220	1,494
Tourist Department, Rotorua	1,680		508	2,188
Cambridge Electric-power Board	300	1,162	570	2,032
Central Electric-power Board	1,030	2,556	1,547	5,133
Te Awamutu Electric-power Board	446	1,577	1,058	3,081
Thames Valley Electric-power Board	2,147	5,371	7,676	15,194
Waitomo Electric-power Board	812		320	1,132
Franklin Electric-power Board	547	1,490	579	2,616
Waitemata Electric-power Board	788	2,426	341	3,555
Public Works Department, Horahora	12	100	32	144
Public Works Department, Arapuni	5	105	..	110
Public Works Department, Hamilton	5	47	4	56
Public Works Department, Penrose	6	60	25	91
Totals	7,613	2,492 17,194	24,906	52,205

TABLE K.—WAIKATO ELECTRIC-POWER SUPPLY.—ROUTE MILEAGE OF LINES AT 31ST MARCH, 1927.

	Size of Wire (S.W.G.).	Miles.
110,000 v. Lines (Single Circuit)—		
Horahora—Tap on Arapuni–Penrose line, Penrose (Arapuni scheme—in operation at 50,000 v.)	19/13	94
50,000 v. (Double Circuit)—		
Penrose–Takapuna	7/14	28·6
50,000 v. (Single Circuit)—		
Horahora—Tap on Arapuni–Penrose line (temporary)	7/14	2·0
Horahora–Waikino	7/12	44·42
Waiorongomai–Waihou	7/12	5·22
Waikino–Aongatete (Department's part of McLaren's Falls line) ..	7/14	17·27
Horahora–Claudelands	7/12	27·5
Mystery Creek–Te Awamutu	7/14	9·5
Te Awamutu–Hangatiki	7/14	19·5
Horahora–Arapuni	7/12	6·8
Arapuni–Ngongotaha	7/14	32·25
		287·06

	Number of Circuits.	Size of Wire (S.W.G.).	Miles.
11,000 v. Lines—			
Waikino–Waihi	1	37/13	5·77
Waihi Grand Junction	1	7/12	0·75
Horahora–Leamington	2	7/14	12·54
Leamington–Hamilton	2	7/16	15·86
Hamilton–Frankton	4–3–2	7/16	3·8
Bombay–Pukekohe	2	7/14	5·0
			43·72

TABLE L.—WAIKATO ELECTRIC-POWER SUPPLY.—ROUTE MILEAGE, POWER BOARD LINES, AT 31ST MARCH, 1927.

	11,000 V.		3,000 V.		400 V.	Total Route-miles.
Number of circuits	2	1	2	1	1	
Cambridge Electric-power Board	..	..	..	98½	26	124½ (*a*)
Central Electric-power Board	6	113	..	87	147	353 (*b*)
Te Awamutu Electric-power Board ..	12	37	4	168	69	290 (*c*)
Thames Valley Electric-power Board ..	82	302½	..	125½	127	637 (*d*)
Waitomo Electric-power Board	..	..	..	..	..	60*
Franklin Electric-power Board	1	113	..	..	49	163 (*e*)
Waitemata Electric-power Board	5	68	..	..	65	138 (*f*)
Hamilton Borough Council	2	..	½	5	45	52½ (*g*)
Totals	108	633½	4½	484	528	1,818

(*a*) Also 42 miles of 400 v. on 3,000 v. lines.
(*b*) Also 2½ miles of 3,000 v. on 11,000 v. poles, 59 miles of 400 v. on 11,000 v. poles, and 47 miles of 400 v. on 3,000 v. poles.
(*c*) Also 30 miles of 3,000 v. on 11,000 v. lines, 17 miles of 400 v. on 11,000 v. lines, and 115 miles of 400 v. on 3,000 v. lines.
(*d*) Also 3 miles of 3,000 v. on 11,000 v. lines, 266 miles of 400 v. on 11,000 v. lines, and 88 miles of 400 v. on 3,000 v. lines.
(*e*) Also 82 miles of 400 v. on 11,000 v. lines.
(*f*) Also 45 miles of 400 v. on 11,000 v. lines.
(*g*) Also 4 miles of 400 v. on 3,000 v. lines.
* **Incomplete return.**

TABLE M.—WAIKATO ELECTRIC-POWER SUPPLY.—MILKING-MACHINES CONNECTED AT 31ST MARCH, 1927.

Electric-power Board.	½ Horse-power.		1 Horse-power.		1½ Horse-power.		2 Horse-power.		3 Horse-power.		5 Horse-power.		Total Number.	Total Horse-power.
	No.	H.P.	No.	H.P.	No.	H.P.	No.	H.P.	No.	H.P.	No.	H.P.		
Cambridge	1	0·5	9	9	109	163·5	123	246	8	24	..	..	750	443·0
Central	..	..	28	28	..	..	661	1,322	5	15	..	..	694	1,365·0
Te Awamutu	7	3·5	24	24	116	174·0	257	514	..	..	..	..	404	715·5
Thames Valley	..	..	..	..	..	..	1,583	3,166	30	90	1	5	1,614	3,261·0
Waitomo	..	..	3	3	..	..	68	136	..	..	..	..	71	139·0
Franklin	49	24·5	14	14	100	150·0	95	190	..	..	..	..	258	378·5
Waitemata	..	..	..	..	..	..	17	34	..	..	..	..	17	34·0
Totals ..	57	28·5	78	78	325	487·5	2,804	5,608	43	129	1	5	3,308	6,336·0

TABLE N.—WAIKATO ELECTRIC-POWER SUPPLY.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR THE YEAR ENDED 31ST MARCH, 1927.

Distributing Authority.	Number of Consumers.	Capital Outlay.	Revenue.					Expenditure.							Balance.	
			From Sales of Electrical Energy.	Rates.	Trading Account.	Other Sources.	Total.	Paid for Electrical Energy.	Maintenance.	Interest.	Depreciation.	Sinking Funds Reserve Fund, &c.	Other Expenditure.	Total.	Profit.	Loss.
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Public Works Department ..	19	844,948	41,558*	..	..	2,532	44,090*	8,787	19,107	37,989	16,481	8,448	819	91,631	17,116	..
Cambridge Electric-power Board	1,069	102,526	15,455	..	249	992	16,696	4,177	3,701	6,414	..	1,234	185	15,711	985	..
Central Electric-power Board ..	2,680	227,747	33,606	..	..	3,398	37,004	9,022	6,993	14,282	576	2,923	1,736	35,532	1,472	..
Te Awamutu Electric-power Board	1,275	147,968	20,829	2,150	2	766	23,747	6,113	4,607	9,477	..	1,440	1,011	22,648	1,099	..
Thames Valley Electric-power Board	4,696	659,486	89,288*	..	3,165	3,235	95,688*	31,303	19,030	36,071	..	7,791	6,960	101,155	..	1,708
Franklin Electric-power Board	1,724	139,716	13,858	..	2,699	1,477	18,034	3,687	939	3,807	5,335	3,750	516	18,034	..	..
Waitomo Electric-power Board	1,015	69,597	8,428	..	3,967	..	12,395	1,205	8,549†	1,220	..	..	70	11,044	1,351	..
Tourist Department	1,278	58,981	11,914	..	..	466	12,380	2,262	3,792	2,949	1,180	1,180	155	11,518	862	..
Hamilton Borough Council ..	3,167	58,808	30,083	..	..	273	30,356	6,888	6,788	3,254	4,260	3,644	3,306	28,140	2,216	..
Te Aroha Borough Council ..	616	17,470	5,923	..	..	244	6,167	1,310	1,366	655	..	55	39	3,425	2,742	..
Thames Borough Council ..	1,034	30,594	10,412	..	..	74	10,486	2,449	2,565	1,059	..	459	..	6,532	3,954	..
Totals	18,573	2,357,841	281,354	2,150	10,082	13,457	307,043	77,203	77,437	117,177	27,832	30,924	14,797	345,370	31,797	1,708

* After deducting amount of sales to other distributing authorities totalling—Public Works Department, £60,207; Thames Valley, £3,759. † Including operation of Te Kuiti Power-station.

	£
Gross profit	30,089
Raised by rates	2,150
Net profit	£27,939

TABLE O.—MANGAHAO ELECTRIC-POWER SUPPLY.—RESULTS OF OPERATIONS.

	First Year, 1926.	Second Year, 1927.
	£	£
Capital outlay	2,022,358	2,242,871
Costs—		
Working-costs*	21,865	26,921
Interest	92,226	98,881
Depreciation	30,056	32,997
Total costs	144,147	158,799
Revenue†	76,859	101,897
Loss	67,288	56,902
Depreciation Fund	30,056	32,997
Maximum load (kilowatts)—		
Power-house	13,960	18,100
Khandallah Substation	9,820	12,720
Wellington City	8,416	11,078
Hutt Valley Electric-power Board	1,280	1,700
Wellington Meat Export Co.	346	397·6
Railway Department	..	360
Horowhenua Electric-power Board	1,384	1,688
Manawatu-Oroua Electric-power Board	1,305	1,632
Dannevirke Electric-power Board	294	381
Tararua Electric-power Board	260	382
Wairarapa Electric-power Board	300	820
Wanganui-Rangitikei Electric-power Board	..	1,848
Central Hawke's Bay Electric-power Board	180	300
Units output—		
Generated—		
Power-house total	49,482,425	72,133,890
Purchased—		
Wellington City Council	..	5,720,463
Wanganui-Rangitikei Electric-power Board	..	549,620
Palmerston North Borough Council	..	143,911
Total units generated and purchased	49,482,425	78,547,884
Units sold—		
Wellington City	28,897,960	36,140,668
Wellington Meat Export Co.	816,095	1,292,500
Horowhenua Electric-power Board	3,864,275	5,986,110
Hutt Valley Electric-power Board	4,305,630	6,334,156
Wairarapa Electric-power Board	234,335	1,676,550
Tararua Electric-power Board	719,765	1,556,650
Dannevirke Electric-power Board	687,359	1,337,202
Central Hawke's Bay Electric-power Board	353,315	1,188,238
Manawatu-Oroua Electric-power Board	4,560,631	9,068,259
Wanganui-Rangitikei Electric-power Board	..	6,959,957
Railway Department	..	704,456
Headworks and village	..	1,346,880
Testing, &c. (includes supply to substations)	691,552	250,391
Total units sold	45,131,120	73,842,017
Losses—		
Total losses (units)	4,349,305	4,705,867
Percentage	8·8	6·0
Load-factor (per cent.)—		
Power-house (annual)	40·0	45·3‡
Power-house (average weekly)	60·0	55·3
Working-costs (less power purchased)—		
Per kilowatt (power-house annual maximum)	£1·56	£1·49
Per unit generated	0·106d.	0·0895d.
Per unit sold	0·115d.	0·087d.
Capital charges—		
Per kilowatt (power-house annual maximum)	£8·76	£7·28
Per unit generated	0·595d.	0·44d.
Per unit sold	0·659d.	0·43d.
Total costs—		
Per kilowatt (power-house annual maximum)	£10·32	£8·62
Per unit generated	0·701d.	0·53d.
Per unit sold	0·774d.	0·517d.
Revenue—		
Per kilowatt (power-house annual maximum)	£5·50	£5·64
Per unit generated	0·372d.	0·339d.
Per unit sold	0·412d.	0·331d.

* Does not include £22,554 for power purchased. † Gross revenue, £124,450. ‡ On units generated; 49·6 per cent. on total units.

TABLE P.—MANGAHAO ELECTRIC-POWER SUPPLY.—ANALYSIS OF CAPITAL OUTLAY.

	Expenditure to 31st March,	
	1926.	1927.
	£	£
Land, roading, tram-lines, and fencing	79,039	80,012
Headworks	559,877	664,154
Generating-station and machinery	279,757	278,975
Transmission-lines	446,405	447,847
Main substations	193,071	229,700
Service buildings and workmen's accommodation	70,759	74,700
Staff village	15,913	15,936
Vehicles and loose construction tools	7,326	7,946
Office furniture	811	961
Surveys, expenses, and salaries	100,611	117,516
Construction plant and equipment	72,325	72,464
Interest during construction	196,421	217,069
Cost and expenses of raising loans	..	35,591
Totals	2,022,315	2,242,871

TABLE Q.—MANGAHAO ELECTRIC-POWER SUPPLY.—OPERATING OR WORKING COSTS.

	1926.		1927.	
	Cost.	Per Unit sold.	Cost.	Per Unit sold.
	£	d.	£	d
Generating	5,771	0·031	6,037	0·019
Transmission	7,999	0·043	12,468	0·041
Substations	4,868	0·026	3,692	0·012
Management and general	3,227	0·017	4,724	0·015
	21,865	0·117	26,921	0·087

TABLE R.—MANGAHAO ELECTRIC-POWER SUPPLY.—CONNECTED LOAD IN KILOWATTS AT 31ST MARCH, 1927.

	Street-lighting.	General Lighting, Heating, and Cooking.	Power.	Total.
Public Works Department	1·1	393·4	170·4	564·9
Construction No. 3 dam	17·1	46·4	404·5	468·0
Wellington City Council	250·0	29,930·0	18,091·0	48,271·0
Wellington Meat Export Co.	..	63·8	959·0	1,022·8
Railway Department	..	91·0	982·5	1,073·5
Hutt Valley Electric-power Board	87·0	12,459·0	2,636·0	15,182·0
Horowhenua Electric-power Board	28·0	4,458·0	2,136·9	6,622·9
Manawatu-Oroua Electric-power Board	22·6	4,883·4	2,910·0	7,815·6
Dannevirke Electric-power Board	17·6	2,764·8	693·7	3,476·1
Tararua Electric-power Board	11·6	2,070·0	653·0	2,734·6
Wairarapa Electric-power Board	29·0	5,916·0	1,260·0	7,205·0
Wanganui-Rangitikei Electric-power Board	86·0	10,908·0	3,352·0	14,346·0
Central Hawke's Bay Electric-power Board	20·0	2,028·0	252·0	2,300·0
Totals	570·0	76,011·8	34,501·0	111,082·4

TABLE S.—MANGAHAO ELECTRIC-POWER SUPPLY.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR THE YEAR ENDING 31ST MARCH, 1927.

Distributing Authority.	Number of Consumers.	Capital Outlay.	Revenue.					Expenditure.							Balance.	
			From Sale of Electrical Energy.	Rates.	Trading Account.	Other Sources.	Total.	Paid for Electrical Energy.	Maintenance.	Interest.	Depreciation.	Sinking Fund Reserve Fund, &c.	Other Expenditure.	Total.	Profit.	Loss.
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Public Works Department ..	57	2,242,871	7,451*	..	..	1,279	124,450*	22,554	22,195	98,881	32,997	..	4,724	181,351	..	56,901
Horowhenua Electric-power Board	2,584	172,729	33,889	..	..	3,693	37,582	14,020	4,272	8,070	2,000	3,534	4,105	36,001	1,581	..
Dannevirke Electric-power Board	1,658	151,104	15,864	..	90	1,302	17,256	3,415	520	6,918	..	1,208	2,509	14,570	2,686	..
Central Hawke's Bay Electric-power Board	1,185	106,165	9,769	..	..	1,011	10,780	2,564	1,076	5,100	..	675	1,304	10,719	61	..
Hutt Valley Electric-power Board	5,670	248,880	41,651	..	100	801	42,552	11,877	4,116	14,806	..	2,423	6,269	39,491	3,061	..
Manawatu-Oroua Electric-power Board	3,551	378,062	41,201	..	859	2,693	44,753	12,751	3,176	24,317	..	4,417	3,675	48,336	..	3,583
Tararua Electric-power Board	1,237	121,931	14,438	..	145	843	15,426	3,229	1,067	6,374	..	1,420	4,109	16,199	..	773
Wairarapa Electric-power Board	2,904	302,868	31,818	..	211	1,765	33,794	6,571	3,652	19,668	995	2,303	6,960	40,149	..	6,355
Wellington City Council ..	21,500	934,148	261,926*	..	..	5,308	286,819*	36,204	70,819	29,580	..	38,921	87,356	262,880	23,939	..
Wanganui-Rangitikei Electric-power Board	5,880	372,162	68,265*	..	..	4,128	74,683*	11,425	15,994	27,459	8,676	8,317	6,258	78,129	..	3,446
Totals	46,226	5,030,920	526,272	..	1,405	22,823	688,095	124,610	126,887	241,173	44,668	63,218	127,269	727,825	31,328	71,058

* After deducting amount of sales to otherdistributing bodies totalling—Public Works Department, £115,720; Wellington City Council, £19,585; Wanganui-Rangitikei Electric-power Board, £2,290.

Net loss, £39,730.

Table T.—Electric-power Boards of New Zealand as constituted on 31st March, 1927.

Name of Electric-power Board.	Proclamation constituting Power Board Area gazetted.	Number of Members on Board.	Approximate Area (Square Miles).		Population.		Value of Rateable Property.			Valuation Basis.	Amount of Loan authorized.	Voting for Loan Poll.	
							Used as Rating Basis.	Unimproved.					
			District.	Outer Area.	District.	Outer Area.	District.	District.	Outer Area.			For.	Against.
							£	£	£		£		
1. Ashburton	17/11/21	12	1,193	1,349	17,468	533	11,500,000	9,346,863	700,181	Capital	326,150	1,590	96
2. Auckland	1/4/22	12	300	..	175,000	..	50,491,865	50,491,865	..	Capital	1,603,000	7,096	476
3. Banks Peninsula	8/1/20	7	387	..	4,500	..	5,061,923	4,178,776	..	Capital	109,000	331	23
4. Bay of Plenty	20/8/25	8	460	2,615	8,400	2,500	2,096,042	2,096,042	466,000	Unimproved ..	170,000	436	137
5. Buller*	11/5/22	5	1,987	..	9,197	..	696,374	696,374	..	Unimproved ..	Poll not yet taken.		
6. Cambridge	8/1/20	8	137	..	6,000	..	2,559,567	1,550,262	..	Capital	88,235	474	71
7. Central	8/7/20	8	752	..	17,512	..	6,583,253	4,630,943	..	Capital	287,000	947	73
8. Central Hawke's Bay ..	19/10/22	9	1,300	..	10,250	..	6,839,951	6,839,951	..	Unimproved ..	150,000	543	41
9. Dannevirke	11/8/21	10	578	118	12,188	426	4,275,674	4,275,674	487,019	Unimproved ..	175,000	651	93
10. Franklin	25/9/24	8	628	194	14,891	1,468	6,763,874	4,387,352	696,732	Capital	200,000	1,030	145
11. Golden Bay	18/6/25	5	51	..	1,200	..	455,593	240,717	..	Capital	Poll not yet taken.		
12. Grey	26/10/22	9	640	810	10,120	2,080	1,545,502	515,700	107,000	Capital	138,000	1,368	298
13. Hawke's Bay	19/6/24	8	1,039	1	27,389	11,219	15,271,565	10,027,805	16,576,668	Capital	304,000	681	68
14. Hobson	29/3/23	8	778	..	7,180	..	1,424,942	1,424,942	..	Unimproved ..	Poll not yet taken.		
15. Horowhenua	1/12/21	9	630	..	15,701	..	3,403,255	3,403,255	..	Capital	260,000	973	26
16. Hutt Valley	6/7/22 11/12/24	11	530	..	32,169	..	3,119,920	3,119,920	..	Unimproved ..	390,000	1,748	146
17. Malvern	28/6/23	6	308	1,833	3,550	1,500	3,037,533	2,433,080	1,458,588	Capital	69,000	508	33
18. Manawatu-Oroua	1/12/21	12	1,301	..	39,011	..	13,955,493	13,955,493	..	Unimproved ..	500,000	1,144	96
19. Marlborough	11/9/24	8	3,218	..	4,850	15,930	9,442,042	541,095	6,187,695	Capital	300,000	1,334	300
20. Opunake	9/8/21 11/3/22	7	197	5	7,000	300	1,728,168	916,111	..	Capital	99,000	231	26
21. Otago	18/10/23 23/12/26	7	781	1,500	12,901	11,281	1,635,933	2,085,382	2,611,066	Capital	240,000	1,217	179
22. Otago Central	26/10/22	9	232	2,452	3,085	2,085	538,838	160,008	927,510	Capital	50,000	252	11
23. Poverty Bay	12/6/24	11	1,738	..	23,220	..	16,502,852	9,599,999	..	Capital	280,000	1,203	244
24. Reefton	30/6/21	5	24	..	1,639	..	178,055	38,504	..	Capital	Poll not yet taken.		
25. South Canterbury	3/7/24	12	1,673	3,429	35,618	6,000	12,946,839	12,946,839	2,536,815	Unimproved ..	329,000	1,861	584

* 1925 figures.

TABLE T.—ELECTRIC-POWER BOARDS OF NEW ZEALAND AS CONSTITUTED ON 31ST MARCH, 1927—*continued.*

Name of Electric-power Board.	Proclamation constituting Power Board Area gazetted.	Number of Members on Board.	Approximate Area (Square Miles).		Population.		Value of Rateable Property.			Valuation Basis.	Amount of Loan authorized.	Voting for Loan Poll.	
							Used as Rating Basis.	Unimproved.					
			District.	Outer Area.	District.	Outer Area.	District.	District.	Outer Area.			For.	Against.
							£	£	£		£		
26. Southland	19/11/19	12	7,798	3,059	67,090	22	15,258,868	15,258,868	137,513	Unimproved ..	1,650,000	6,516	415
27. South Taranaki	24/4/25	8	162	..	12,000	4,500	6,271,271	3,699,667	..	Capital	Poll not yet taken.		
28. Springs-Ellesmere	1/7/20	5	412	..	11,270	..	6,480,598	6,480,598	..	Capital	120,000	795	41
29. Taranaki	18/5/22	8	286	1,402	12,000	10,000	6,141,672	2,865,396*	3,109,336*	Capital	425,000	1,026	252
30. Tararua	23/3/22	10	701	565	8,484	1,770	2,833,994	2,833,994	1,149,113	Unimproved ..	159,480	714	83
31. Tauranga	14/6/23	7	636	3	8,300	3,445	978,782	978,782	455,731	Unimproved ..	110,000	421	277
32. Te Awamutu	8/1/20	9	270	..	8,500	..	3,698,805	2,266,431	..	Capital	178,000	757	146
33. Teviot	22/7/22	7	320	..	2,400	..	200,008	255,661	..	Unimproved ..	50,500	191	27
34. Thames Valley	8/1/19	11	2,300	30	39,270	3,850	13,000,000	7,550,000	..	Capital	850,000	1,236	806
35. Wairarapa	25/3/20	9	516	1,480†	19,500	500	9,183,537	5,161,438	4,209,065†	Capital	324,750	2,274	302
36. Wairere	18/1/23	7	265	142	2,000	500	380,000	623,459	236,541	Unimproved ..	38,500	82	8
37. Wairoa	29/7/20	10	1,354	..	7,678	..	4,344,028	2,639,969	..	Capital	100,000	504	31
38. Waitaki	9/8/23	9	520	1,813	17,029	551	6,735,789	4,406,970	239,322	Capital	135,000	1,286	124
39. Waitemata	15/10/23 25/11/24 29/11/24	12	623	2	24,096	2,536	8,581,819	4,433,250	249,295	Capital	200,000	2,940	1,196
40. Waitomo	6/3/24	7	160	1,100	5,000	3,000	1,066,361	1,066,361	2,500,000‡	Unimproved	97,000	361	58
41. Wanganui-Rangitikei ..	1/12/21	12	1,648	972	52,000	1,000	22,099,617	6,568,540	1,408,210	Capital	582,000	1,315	214
42. Westland§	28/10/20	9	750	..	3,272	..	196,268	196,268	..	Unimproved ..	Poll not yet taken.		
Totals	..	366	39,583	24,874	799,928	86,996	289,506,470	217,188,604	46,449,400	..	11,067,115	46,036	7,146

* 1924 figures. † Assessed. ‡ 1926 figures. § 1925 figures.

Table U.—Electric-power Boards.—Return for Year ended 31st March, 1927.

Board.	Main Supply commenced.	Capital Outlay.	Revenue.				Expenditure.				Profit.	Loss.	General Rate.		Availability Rate.		Special Rates.	
			Sale of Electricity (Gross).	Sale of Materials (Profit).	General.	Total (not including Rates).	Capital Charges, &c.	Power.	General.	Total Annual Costs.			Levied.	Collected.	Levied.	Collected.	Levied.	Collected.
		£	£	£	£	£	£	£	£	£	£	£	d.	£	d	£	d.	£
Ashburton ..	17/11/25	283,797	31,012	34	378	31,424	16,016	11,363	2,646	30,025	1,399	..	Nil	Nil	..	..	$\frac{1}{20}$	Nil
Auckland ..	1908	2,186,347	508,995	..	7,764	516,759	218,224	196,599	39,297	454,120	62,639	..	..	..	..	..	..	..
Banks Peninsula ..	1921	95,295	9,401	451	229	10,081	6,867	4,006	2,225	13,098	..	3,017	$\frac{1}{11}$	4,503	..	..	$\frac{1}{7}$	Incl. Gen.
Bay of Plenty* ..	..	16,991	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cambridge ..	1922	102,526	15,455	249	992	16,696	7,648	6,572	1,491	15,711	985	..	..	..	..	..	..	..
Central	1921	227,747	33,606	..	3,398	37,004	17,781	13,097	4,654	35,532	1,472	..	..	..	..	..	..	..
Central Hawke's Bay	1925	106,165	9,769	..	1,011	10,780	5,775	3,640	1,304	10,719	61	..	..	..	..	..	..	..
Dannevirke ..	1925	151,104	15,864	90	1,302	17,256	8,126	3,935	2,509	14,570	2,686	..	..	..	..	..	..	..
Franklin	1925	139,716	13,858	2,699	1,477	18,034	12,892	4,090	1,052	18,034	..	..	..	..	..	..	..	..
Golden Bay* ..	..	465	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Grey	1926	96,978	8,935	..	93	9,028	4,565	5,988	2,985	13,538	..	4,510	..	..	..	..	1½d., ½d., ⅜d., and 1⅝d.	Nil
Hawke's Bay ..	1927	165,225	445	..	587	1,032	215	173	140	528	504	..	..	..	..	..	..	..
Horowhenua ..	1924	172,729	33,889	649	3,044	37,582	13,604	18,292	4,105	36,001	1,581	..	..	..	..	..	..	..
Hutt Valley ..	1924	248,880	41,651	100	801	42,552	17,229	15,993	6,269	39,491	3,061	..	..	..	..	..	..	..
Malvern	1925	49,903	2,966	78	1	3,045	1,508	846	461	2,815	230	..	$\frac{1}{4}$	..	..	..	$\frac{1}{6}$	..
Manawatu-Oroua ..	1924	378,062	41,201	859	2,694	44,754	28,734	15,927	3,675	48,336	..	3,582	..	..	..	..	..	..
Marlborough* ..	1927	189,072	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Opunake	1924	94,362	9,088	57	261	9,406	6,126	1,143	1,665	8,934	472	..	..	..	..	..	..	..
Otago	1926	175,616	13,254	..	334	13,588	7,245	6,411	3,291	16,947	..	3,359	..	..	..	..	½ and 2	..
Otago Central ..	1925	55,896	4,072	100	200	4,372	2,060	689	1,136	3,885	487	..	..	..	..	..	..	..
Poverty Bay ..	1912	83,253	26,663	..	1,200	27,863	7,440	13,549	3,554	24,543	3,320	..	..	..	..	..	..	..
South Canterbury ..	1925	184,087	21,395	..	254	21,649	7,101	10,081	1,167	18,349	3,300	..	..	..	..	..	..	..
Southland	1925	1,558,087	79,502	1,247	11,368	92,117	115,500	23,691	23,213	162,404	..	70,287	$\frac{5}{8}$	67,451‡	..	..	..	..
Springs-Ellesmere ..	1922	96,995	13,629	219	116	13,964	9,081	4,895	1,744	15,720	..	1,756	..	..	..	..	..	..
Taranaki	1927	430,170	17,654	..	676	18,330	848	8,798	2,425	12,071	6,259	..	..	..	..	..	..	..
Tararua	1925	121,931	14,438	145	843	15,426	7,794	4,296	4,109	16,199	..	773	..	..	2	315	1⅓	..
Tauranga	1926	87,923	14,494	61	1,867	16,422	5,608	5,200	4,294	15,102	1,320	..	..	..	..	..	..	..
Te Awamutu ..	1920	147,968	20,829	2	766	21,597	10,917	9,069	2,662	22,648	..	1,051	$\frac{1}{4}$	1,690†	..	..	..	..
Teviot	1924	45,023	3,241	90	60	3,391	2,265	645	605	3,515	..	124	$\frac{1}{2}$	532§	..	..	..	..
Thames Valley ..	1920	659,486	93,047	3,165	3,235	99,447	43,862	41,064	16,229	101,155	..	1,708	..	..	..	148	..	..
Wairarapa	1924	204,868	31,818	211	1,765	33,794	22,966	10,223	6,960	40,149	..	6,355	..	..	..	..	..	..
Wairere	1925	32,005	1,812	..	..	1,812	1,158	45	562	1,765	47	..	..	..	..	..	..	..
Wairoa	1923	68,486	9,492	398	140	10,030	5,487	4,786	1,548	11,821	..	1,791	$\frac{1}{8}$ and $\frac{1}{4}$	3,167‖	..	..	..	..
Waitaki	1926	108,129	16,186	1,248	111	17,545	7,480	5,782	1,818	15,080	2,465	..	..	..	..	..	..	..
Waitemata	1927	164,546	6,884	..	1,470	8,354	5,369	2,988	3,548	11,905	..	3,551	..	..	..	..	..	..
Waitomo	1926	69,597	8,428	3,967	..	12,395	1,220	7,301	2,523	11,044	1,351	..	..	..	..	..	1¼d., ⅛d., and ⅜d.	..
Wanganui-Rangitikei	1924	372,162	70,555	..	4,128	74,683	44,452	27,419	6,258	78,129	..	3,446	..	..	..	..	..	..
Totals ..	..	9,411,592	1,243,528	16,119	52,565	1,312,212	673,163	488,596	162,124	1,323,883	93,639	105,310	..	77,343	..	463	..	..

* Not yet operating. † Includes arrears, £253. ‡ Includes £10,318 arrears. § Includes £205 arrears. ‖ Includes £4 arrears.

Buller, Hobson, Reefton, South Taranaki, and Westland not yet operating.

Table V.—Summary of Returns of Operating Results for the Year ended 31st March, 1927.

Title.	Capital Outlay at 31st March, 1927.	Total Revenue (not including Rates).	Working-expenses.		Capital Charges, &c.		Total Annual Costs.	Net Results.		Average Revenue from Sale of Energy.		Working-costs.		Capital Charges, &c.		Total Costs.		Retail Selling-rates.		
			Total.	Per Cent. of Revenue.	Total.	Per Cent. of Capital Outlay.		Profit.	Loss.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Lighting.	Heating.	Power.
Steam Stations.	£	£	£		£		£	£	£	d.	£	d.	£	d.	£	d.	£	d.	d.	d.
1. Auckland Power Board ..	2,186,347	516,760	235,896	45·69	218,224	9·98	454,120	62,640	..	1·85	22·59	0·855	10·43	0·791	9·65	1·646	20·08	$6\frac{1}{2}$ & $2\frac{7}{16}$	$4\frac{1}{2}$	Less 5% and $2\frac{1}{2}$ to $1\frac{3}{16}$
2. Grey Power Board ..	96,978	9,028	8,973	99·3	4,565	4·71	13,538	..	4,510	1·91	10·9	1·9	10·95	0·97	5·55	2·91	16·5	6	2	2 & $1\frac{1}{2}$
3. Poverty Bay Power Board	83,252	27,863	17,103	61·3	7,440	8·93	24,543	3,320	..	5·08	45·0	3·05	27·65	1·32	12·0	4·47	39·65	7	4	$2\frac{3}{4}$ to $2\frac{1}{2}$
4. Nelson City Council ..	64,637	18,000	9,782	54·3	4,900	7·58	14,682	3,318	..	5·03	47·45	2·7	25·75	1·3	12·9	4·0	38·65	9	4, 3, 2	4, 3, 2
5. Wanganui-Rangitikei Power Board	372,162	74,683	33,677	45·09	44,452	11·9	78,129	..	3,446	2·06	30·6	0·9	13·8	1·2	18·2	2·1	32·0	7	$3\frac{1}{2}$	..
Mangaweka Town Board	4,784	888	1,024	115·0	323	6·75	1,347	..	459	5·95	26·1	6·7	30·0	2·15	9·5	9·05	39·5	12	$3\frac{1}{2}$	$4\frac{1}{2}$
Totals	2,808,160	647,222	306,455	47·4	279,904	9·97	586,359	69,278	8,415	1·98	24·05	0·942	11·8	0·86	10·40	1·8	21·79	..	..	..
Gas Stations.																				
1. Devonport Borough Council	60,139	16,898	13,809	81·71	4,270	7·1	18,079	..	1,181	4·52	36·6	3·7	29·9	1·14	9·24	4·84	39·14	6	4 to 2	3 to 2
2. Kaikoura County Council	9,608	1,529	1,565	102·35	699	7·27	2,264	..	735	12·8	54·6	13·14	55·8	5·87	24·96	19·01	80·76	12	12	6
3. Letts Bros., Opotiki ..	9,770	3,387	3,078	90·87	210	2·14	3,288	99	..	8·14	48·4	7·4	44·0	0·5	3·0	7·9	47·0	10	5	5
4. Motueka Borough Council	13,513	1,958	1,929	98·26	962	7·11	2,891	..	933	10·0	43·6	10·0	43·0	5·4	21·0	15·4	64·0	12	4	4
5. Napier Borough Council..	128,975	34,526	20,580	59·6	10,685	8·28	31,265	3,261	..	3·3	32·8	1·99	19·63	1·03	10·19	3·02	29·82	6 to 3	6 to 3	3 to $1\frac{1}{2}$
Taradale Town Board..	11,619	1,552	1,049	67·59	721	6·2	1,770	..	218	5·56	39·77	3·75	26·9	2·57	18·45	6·32	45·35	10	4	4
Hawke's Bay Power Board	105,225	1,032	313	30·35	215	0·02	528	504	..	16·7	..	5·0	..	3·49	..	8·49	..	10	4	4
Totals	338,849	60,882	42,323	69·50	17,762	5·24	60,085	3,864	3,067	0·41	36·7	2·87	25·6	1·2	10·7	4·07	36·3	..	..	..
Oil Stations.																				
1. Hastings Borough Council	91,643	22,936	13,167	57·4	3,821	4·16	16,988	5,948	..	3·38	31·1	1·95	18·0	0·56	5·2	2·51	23·2	8 to 3	4 and 3	3, $1\frac{1}{2}$, $1\frac{1}{4}$
2. Picton Borough Council ..	16,992	2,749	2,142	77·91	1,040	6·12	3,182	..	433	8·08	46·2	6·29	36·0	3·05	17·4	9·34	53·4	10	4	4
3. Uawa County Council ..	6,218	1,075	510	47·44	638	10·26	1,148	..	73	18·4	72·0	8·7	34·0	10·9	42·5	19·6	76·5	17	11	11
Totals	114,853	26,760	15,819	59·11	5,499	4·78	21,318	5,948	506	3·72	33·07	2·2	19·55	0·77	6·79	2·97	26·34	..	..	..
Hydro Stations.																				
1. Coleridge (Public Works)	1,538,569	150,240	30,728	20·38	93,262	6·06	123,990	26,250	..	0·52	8·9	0·106	1·820	0·322	5·525	0·428	7·345	..	..	..
Ashburton Power Board	283,797	31,424	14,009	44·58	16,016	5·64	30,025	1,399	..	2·42	27·1	1·093	12·23	1·251	14·0	2·344	26·23	8 and 3	3, 2, 1	3 to 9
Banks Peninsula Power Board	95,295	10,081	6,231	61·8	6,867	7·20	13,098	..	3,017	4·9	39·4	3·05	24·45	3·36	26·95	6·41	51·4	10 to 3	2 to $1\frac{1}{2}$	3 to $1\frac{1}{2}$
Christchurch City Council	614,780	187,978	106,631	56·72	66,849	10·87	173,480	14,498	..	1·56	23·3	0·87	13·2	0·55	8·3	1·42	21·5	5 and 3	$1\frac{1}{2}$ and 1	$1\frac{1}{2}$ and $\frac{3}{4}$
Eyre County Council ..	6,285	1,379	722	52·35	323	5·13	1,045	334	..	1·91	12·3	1·0	6·4	0·44	2·88	1·44	9·28	..	..	..
Halswell County Council	6,568	1,552	1,097	70·69	313	4·76	1,410	142	..	..	15·5	..	10·97	..	3·15	..	14·12	6	..	$1\frac{1}{2}$
Heathcote County Council	22,153	6,949	4,847	69·75	1,062	4·79	5,909	1,040	..	..	22·8	..	16·0	..	3·48	..	19·48	5	$1\frac{1}{2}$	3, 2, 1
Kaiapoi Borough Council	9,765	2,952	2,170	73·5	567	5·8	2,737	215	..	1·45	18·57	1·73	22·15	0·32	0·41	2·05	22·56	P.W.D. Flat Rates.		
Kowai County Council	21,856	2,281	942	41·29	1,210	5·53	2,152	129	..	4·8	32·57	1·98	13·4	2·55	17·2	4·53	30·6	9 to 8	3 to 1	3 to 1
Lyttelton Borough Council	5,000	4,110	3,297	80·21	335	6·7	3,632	478	..	1·93	24·2	1·5	19·5	0·16	2·0	1·66	21·5	5	1	3 to 1

TABLE V.—SUMMARY OF RETURNS OF OPERATING RESULTS FOR THE YEAR ENDED 31ST MARCH, 1927—*continued.*

Title.	Capital Outlay at 31st March, 1927.	Total Revenue (not including Rates).	Working-expenses.		Capital Charges, &c.		Total Annual Costs.	Net Results.		Average Revenue from Sale of Energy.		Working-costs.		Capital Charges.		Total Costs.		Retail Selling-rates.		
			Total.	Per cent. of Revenue.	Total.	Per Cent. of Capital Outlay.		Profit.	Loss.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Lighting.	Heating.	Power.
Hydro Stations—continued.	£	£	£		£		£	£	£	d.	£	d.	£	d.	£	d.	£	d.	d.	d.
Malvern Power Board ..	49,903	3,045	1,307	43·00	1,508	3·02	2,815	230	..	4·24	22·25	1·83	9·6	2·1	11·1	3·93	20·7	9	3	3
Rangiora County Council ..	24,419	6,027	3,954	65·72	1,758	7·19	5,712	315	..	2·35	23·4	1·5	15·3	0·68	6·8	2·18	22·1	8	3 to 1½	3 to ½
Rangiora Borough Council	9,309	3,088	1,664	53·78	1,240	13·32	2,904	184	..	3·52	30·55	1·89	16·5	1·41	12·4	3·3	28·9	6 and 3	3 to 1	3 to ½
Riccarton Borough Council	15,544	7,661	5,722	74·68	1,493	9·60	7,215	446	..	1·86	29·0	1·4	21·6	0·36	5·66	1·76	27·26	5	1½	1½
S. Canterbury Power Board	184,087	21,649	11,248	51·95	7,101	3·85	18,349	3,300	..	1·23	14·5	0·647	7·6	0·40	4·8	1·047	12·4	8 to 3	3 to 2	3 to 1
Springs-Ellesmere Power Bd.	96,995	13,964	6,639	47·54	9,081	9·36	15,720	..	1,756	4·8	41·5	2·26	19·65	3·11	26·85	5·37	46·5	8 to 2	3 to ½	3 to 1½
Sumner Borough Council ..	11,627	4,656	2,418	51·93	771	6·63	3,189	1,467	..	2·05	29·43	1·06	15·3	0·34	4·88	1·40	20·18	5	1½ to ½	1½
Timaru Borough Council ..	100,939	24,952	13,481	54·02	8,223	8·14	21,704	3,248	..	2·95	29·6	1·59	16·0	0·96	9·79	2·55	25·79	7	3 to 1½	3 to 2
Tai Tapu Dairy Company	9,045	3,398	2,715	79·89	670	7·4	3,385	13	..	..	20·4	..	16·3	..	4·0	..	20·3	P.W. flat rate.		
Waimairi County Council ..	56,730	15,746	7,690	48·83	2,474	4·36	10,164	5,582	..	2·17	32·6	1·06	15·9	0·34	5·1	1·4	21·0	6 and 5	3, 2, 1	3, 2, 1
Waitaki Power Board ..	108,129	17,545	7,600	43·31	7,480	6·91	15,080	2,465	..	4·5	38·8	1·94	16·8	1·91	16·5	3·85	33·3	9 to 3	3 to ⅓	3 to ½
2. Dunedin (Waipori) City Council	990,607	161,676	61,338	37·93	76,150	7·68	137,488	24,188	..	1·2	15·9	0·4637	6·1	0·575	7·55	1·04	13·65	6 to 1	2, 1, ½	2 to ⅙
Otago Power Board ..	175,616	13,588	9,702	71·4	7,245	4·12	16,947	..	3,359	2·04	15·6	1·459	11·113	1·09	8·299	2·549	19·4	4	4	1
Kaitangata Borough Council	..	347	219	63·1	..	..	219	128	..	Three months only		..	..	..	..	..	..	7	..	..
3. Havelock North Town Board	24,062	3,743	956	25·54	1,736	7·21	2,692	1,051	..	3·46	28·8	0·88	7·4	1·6	13·4	2·48	20·8	7	4	2
4. Havelock South Town Board	2,200	422	271	64·21	270	12·27	541	..	119	..	30·0	..	19·3	..	19·3	..	38·6	9	£3 per annum	..
5. Hawera Electric Company ..	94,309	25,309	9,477	37·44	7,590	8·04	17,067	8,242	..	5·55	42·0	2·06	15·6	1·6	12·5	3·66	28·1	8	4	2 less 10 per cent.
6. Kanieri Electric Company ..	39,390	6,239	4,970	79·66	1,316	3·34	6,286	..	47	0·6	9·9	0·445	7·9	0·13	2·1	0·575	10·0	6	1½	4 to 2
7. Kaponga Town Board ..	20,178	3,513	3,262	93·0	968	4·8	4,230	..	717	3·14	29·2	2·9	27·1	0·86	8·0	3·76	35·1	9	4	4
8. Mackenzie (Fairlie) County Cl.	10,941	1,460	289	19·8	617	5·63	906	554	..	5·6	50·5	1·18	9·9	2·5	21·0	3·68	30·9	9 to 4½	4½ to 2	4½
9. Mangahao (Public Works) ..	2,242,871	124,450	49,473†	39·5	131,878	5·9	181,351	..	56,901	0·4	6·87	0·157	2·73	0·43	7·26	0·587	9·99	..	..	..
Central Hawke's Bay Power Board	106,165	10,780	4,944	45·86	5,775	5·43	10,719	61	..	2·88	36·0	1·31	16·48	1·54	19·2	2·85	35·68	10 to 3	3 to 1½	3 to 1½
Dannevirke Power Board..	151,104	17,256	6,444	37·34	8,126	5·37	14,570	2,686	..	4·3	45·3	1·6	17·0	2·03	21·3	3·63	38·3	8 to 7	3 to 1½	3 to 1
Horowhenua Power Board	172,729	37,582	22,397	59·59	13,604	7·87	36,001	1,581	..	1·87	22·0	1·115	13·25	0·68	8·15	1·795	21·4	8	4 to 1½	4 to 3
Hutt Valley Power Board	248,880	42,552	22,262	52·31	17,229	6·92	39,491	3,061	..	1·84	25·0	0·98	13·1	0·75	10·0	1·73	23·1	6 to 5	3 to 1	3 to 1
Manawatu-Oroua Power Bd.	378,062	44,754	19,602	43·8	28,734	7·6	48,336	..	3,582	1·37	27·5	0·59	12·0	0·87	17·6	1·46	29·6	8	3½ to 1½	4 to 1¾
Palmerston N. Borough Cl.	192,684	38,931	15,018	38·6	12,723	6·6	27,741	11,190	..	2·66	29·8	1·02	11·5	0·87	9·8	1·89	21·3	7	4 to 1½	3 to ½
Tararua Power Board ..	121,931	15,426	8,405	54·48	7,794	6·39	16,199	..	773	2·9	40·4	1·58	21·97	1·46	20·3	3·04	42·27	8	4 to 2	4½ to 1
Wairarapa Power Board ..	302,868	33,794	17,183	50·84	22,966	7·53	40,149	..	6,355	3·03	34·4	1·53	17·4	2·06	23·3	3·59	40·7	7	3½ to 1¾	4½ to 1
Wellington City Council ..	934,148	286,821	126,500	44·11	67,879* / 68,501	14·59	262,880	23,941	..	2·35	24·8	1·04	11·1	0·57	6·0	1·61	17·1	6 to 3	2 to 1	3 to ¾
10. Mataura Borough Council ..	4,348	1,205	1,906	158·17	155	3·56	2,061	..	856	5·5	20·1	8·6	31·7	0·71	2·58	9·31	34·28	6	2½	2½
11. Murchison County Council ..	15,200	2,012	806	40·05	974	6·4	1,780	232	..	3·26	20·12	1·3	8·06	1·57	9·75	2·87	17·81	3½	3	2½ to 1½
12. New Plymouth Borough Cl...	360,574	64,090	23,992	37·43	31,151	8·65	55,143	8,947	..	1·87	30·0	0·7	11·29	0·91	14·66	1·61	25·95	7 to 6	2 to 1	2 to 1
Inglewood Borough Council	11,500	3,397	2,433	71·62	750	6·52	3,183	214	..	3·0	30·9	2·13	22·0	0·66	6·8	2·79	28·8	7 to 6	2	2
Waitara Borough Council..	10,479	2,901	1,937	66·77	900	8·58	2,837	64	..	6·55	38·7	4·37	26·0	2·05	12·0	6·42	38·0	9	2	2 to 1
13. Ohakune Borough Council ..	16,365	3,804	1,567	41·19	1,116	6·81	2,683	1,121	..	5·74	40·1	2·36	16·5	1·67	11·7	4·03	28·2	9	3 to 1½	4 to 2
14. Opunake Power Board ..	94,362	9,406	2,808	29·85	6,126	6·49	8,934	472	..	2·44	26·8	0·73	8·0	1·6	17·5	2·33	25·5	4 to 2	..	..
15. Patea Borough Council ..	12,370	2,547	1,405	55·16	801	6·47	2,206	341	..	3·8	24·7	2·1	13·7	1·2	7·8	3·3	21·5	8½ to 7½	4–3	1½ to 1

* Special expenditure out of revenue on "change over." † Includes £22,554 for power purchased.

Table V.—Summary of Returns of Operating Results for the Year ended 31st March, 1927—*continued.*

Title.	Capital Outlay at 31st March, 1927.	Total Revenue (not including Rates).	Working-expenses.		Capital Charges, &c.		Total Annual Costs.	Net Results.		Average Revenue from Sale of Energy.		Working-costs.		Capital Charges.		Total Costs.		Retail Selling-rates.		
			Total.	Per Cent. of Revenue.	Total.	Per Cent. of Capital Outlay.		Profit.	Loss.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Per Unit sold.	Per Kw. of Max.	Lighting.	Heating.	Power.
Hydro Stations—continued.	£	£	£		£		£	£	£	d.	£	d.	£	d.	£	d.	£	d.	d.	d.
16. Queenstown Borough Council	12,200	1,247	550	44·1	833	6·82	1,383	..	136	3·38	19·25	1·5	8·46	2·2	12·8	3·7	21·26	6 to 1	..	3 to 1
17. Raetihi Borough Council ..	34,750	4,552	1,988	43·67	1,918	5·51	3,906	646	..	3·35	28·5	1·46	12·42	1·41	11·98	2·87	24·4	10	1½	2
18. Reefton Electric Company ..	6,088	3,748	5,359	142·99	..	..	5,359	..	1,611	..	..	..	..	..	..	..	..	Flat rate.		
19. Southland Power Board ..	1,588,087	92,117	46,904	50·91	115,500	7·27	162,404	..	70,287	1·84	21·3	0·937	10·858	2·31	26·76	3·247	37·618	7 to ½	Domestic, heating, and	water-power.
Bluff Borough Council ..	10,014	4,358	2,350	53·92	1,726	17·23	4,076	282	..	4·1	25·6	2·2	13·8	1·62	10·15	3·82	23·95	6 to 5	2	..
Gore Borough Council ..	27,492	9,120	5,876	64·4	1,656	6·02	7,532	1,588	..	4·06	38·0	2·61	24·5	0·74	6·9	3·35	31·4	7 to 6	3 to 2	3 to 2
Invercargill Borough Council	161,488	43,451	23,586	54·28	18,012	11·15	41,598	1,853	..	2·49	31·4	1·35	17·0	1·033	13·0	2·383	30·0	6·3 to 2·7	..	2·7 to 1
20. Taranaki Power Board ..	430,170	18,330	11,223	61·22	848	0·19	12,071	6,259	..	..	..	..	..	..	..	..	..	6	3	3 to 1
Stratford Borough Council	25,996	10,542	6,699	63·54	4,769	18·34	11,468	..	926	3·24	35·0	2·06	22·3	1·47	16·0	3·53	38·3	8	4 to 1½	4 to 1
21. Taihape Borough Council ..	17,772	5,298	3,135	59·17	1,010	5·68	4,145	1,153	..	4·5	25·9	2·66	15·3	0·85	4·9	3·51	20·2	8	1½	2
22. Taumarunui Borough Council	66,434	8,560	2,428	28·36	4,462	6·71	6,890	1,670	..	3·03	19·4	0·865	5·5	1·59	10·14	2·45	15·64	9 to 7	3 to 1½	3 to ·9
23. Tauranga Borough Council ..	159,949	21,134	4,044	19·13	9,716	6·05	13,760	7,374	..	0·49	6·2	0·094	1·18	0·226	2·85	0·32	4·03	7	1½	2 to 1
Tauranga Power Board ..	87,923	16,422	9,494	57·81	5,608	6·37	15,102	1,320	..	2·37	29·6	1·37	17·1	0·81	10·1	2·18	27·2	5 to 1¼	5 to 1¼	5 to 1¼
Te Puke Town Board ..	10,205	2,656	1,226	46·15	992	9·72	2,218	438	..	3·22	35·8	1·46	16·6	1·19	13·33	2·65	29·93	9	3	2
24. Teviot Power Board ..	45,023	3,391	1,250	37·0	2,265	5·05	3,515	..	124	..	11·3	..	4·16	..	2·7	..	6·86		Flat rate.	
Otago Central Power Board	55,896	4,372	1,825	41·72	2,060	3·68	3,885	487	..	2·93	27·3	1·23	11·4	1·39	12·9	2·62	24·3	3 to ½	*	
25. Tourist Department (Rotorua)	58,981	12,380	6,209	50·15	5,309	9·0	11,518	862	..	3·6	38·8	1·80	19·4	1·55	16·6	3·35	36·0	7	3 to 1	3 to 1
26. Waikato (Horahora) ..	844,948	108,748	28,713†	26·25	62,919	7·45	91,631	17,116	..	0·343	7·72	0·092‡	2·06 ‡	0·199	4·45	0·291	6·51	..	..	..
Cambridge Power Board ..	102,526	16,696	8,063	48·29	7,648	7·45	15,711	985	..	1·93	35·4	0·93	17·09	0·89	16·21	1·82	33·3	9	3 to 1½	3 to 1½
Central Power Board ..	277,747	37,004	17,751	47·94	17,781	6·40	35,532	1,472	..	2·08	37·0	0·99	17·75	0·99	17·78	1·98	35·53	9	1½	3 to ½
																		All less 5 per cent.		
Franklin Power Board ..	139,716	18,034	5,142	28·51	12,892	9·22	18,034	..	..	3·26	40·7	0·93	11·6	2·35	29·15	3·28	40·75	8	1½	3 to 2½
Hamilton Borough Council	58,808	30,356	16,982	55·94	11,158	18·97	28,140	2,216	..	3·43	37·2	1·935	20·81	1·27	13·68	3·20	34·49	6 to 4½	2 to 1	2 to 1
Te Awamutu Power Board	147,968	21,597	11,731	54·1	10,917	7·3	22,648	..	1,051	1·88	29·0	1·02	15·77	0·95	14·67	1·97	30·44	8 to 7	2 to 1½	3 to 1½
Thames Valley Power Board	659,486	99,447	57,293	57·61	43,862	6·65	101,155	..	1,708	1·51	25·2	0·87	14·54	0·666	11·13	1·536	25·67	8	3 to 1½	3 to ·7
Thames Borough Council ..	30,594	10,486	5,014	47·81	1,518	4·97	6,532	3,954	..	3·23	43·6	1·55	21·0	0·47	6·34	2·02	27·34	8	3 to 1½	3 to ·5
Te Aroha Borough Council	17,470	6,167	2,715	44·02	710	4·06	3,425	2,742	..	3·8	43·0	1·688	19·0	0·441	5·0	2·129	24·0	7 to 5	3 to 1	3 to ½
Waitemata Power Board ..	164,546	8,354	6,536	78·4	5,369	3·27	11,905	..	3,551	3·0	18·5	2·35	14·5	1·93	11·9	4·28	26·4	7	3 to 1½	..
Waitomo Power Board ..	69,597	12,395	9,824	79·25	1,220	1·75	11,044	1,351	..	6·5	77·5	5·2	61·5	0·636	7·6	5·836	69·1	10	3	2
27. Wairoa (Waikaremoana) Power Board	68,486	10,030	6,334	63·15	5,487	8·01	11,821	..	1,791	1·05	9·8	0·7	6·25	0·6	5·45	1·3	11·7	9 to 1	9 to 1	3 to 1½
Wairoa Borough Council ..	12,646	5,908	3,541	59·93	1,411	11·15	4,952	956	..	1·81	27·6	1 098	16·65	0·437	6·6	1·535	23·25	6	3 to 1	3 to 1½
28. Waimea Electric Company ..	19,261	4,669	2,371	50·78	1,281	6·65	3,652	1,017	..	9·9	46·69	5·0	23·7	2·7	12·8	7·7	36·5	11	4	4 to 2½
29. Waverley Town Board ..	5,492	963	541	56·23	291	5·29	832	131	..	7·4	53·5	4·16	30·0	2·23	16·0	6·39	46·0	10	6	..
30. Wairua (Wilson's Cement Co.)	87,757	13,568	5,227	38·52	..	..	5,227	8,341	..	0·353	6·17	0·136	2·37	..	..	..	..	4·95	2·7 to 1·5	..
Kamo Town Board ..	2,961	607	408	67·21	232	7·83	640	..	33	8·58	20·2	5.75	13·6	3·28	7·7	9·03	21·3	9	4	4
Whangarei Borough Council	48,583	13,963	7,371	52·78	2,209	4·54	9,580	4,383	..	3·05	34·6	1·6	18·2	0·48	5·45	2·08	23·65	5½ to 5	1½	3 to 2
31. Wairere Power Board ..	32,005	1,812	607	33·49	1,158	3·61	1,765	47	..	1·73	10·06	0·57	3·37	1·1	6·43	1·67	9·8	9	4½	1
32. Westport Borough Council ..	27,961	3,120	1,668	53·46	3,206	11·46	4,874	..	1,754	5·3	28·0	2·84	15·2	5·46	29·0	8·3	44·2	9	3	3
33. Whakatane Borough Council	52,510	4,897	2,338	47·74	3,524	6·71	5,862	..	965	3·048	21·2	1·45	10·15	2·19	15·32	3·64	25·47	9	9	3 to 1
Totals	15,674,274	2,169,181	988,994	45·5	1,123,154	7·6	2,112,147	218,452	161,419	1·72	28·3	0·79	12·8	0·89	14·6	1·68	27·4			

* Plus capacity charge. † Includes £8,787 for power purchased. ‡ Includes cost of power purchased.

TABLE W.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1927.

(G = gas; O = oil; S = steam; W = water.)

Title.	Ownership.	Supply commenced.	Population included in Area of Supply.	Number of Consumers.	Capacity in Kilowatts.			Connected Load (Kilowatts).	Demand Factor.	Units.				Annual Load-factor Percentage.	System of Supply.	Supply Voltage.	Route-miles of Lines.	Static Head, in Feet.
					Main Plant.	Standby Plant.	Maximum Load.			Generated or purchased.	Sold.	Non-productive.	Percentage Non-productive.					
Steam Stations.																		
1. Auckland	Power Board ..	1908	175,000	38,498	29,800	3,750	22,610	..	..	79,621,226	66,207,786	13,413,440	16·8	40·2	A.C./D.C.	400/230/460 (D.C.)	1,072	..
2. Grey	Power Board ..	1926	12,200	739	1,250	..	820	1,573	52·1	1,643,233	1,118,749	524,484	31·9	22·8	A.C.	400/230	71	..
3. Poverty Bay	Power Board ..	1912	23,220	2,868	650	..	620	4,356	14·3	1,675,435	1,315,109	360,326	21·5	30·5	D.C.	440/220	39	..
4. Nelson	City Council ..	1923	11,000	1,601	624	..	380	2,767	13·7	1,044,880	859,253	185,627	17·7	31·3	A.C.	415/230	46·5	..
5. Wanganui-Rangitikei ..	Power Board ..	1924	52,000	5,880	Bulk	1,650	2,440	14,402	16·9	9,667,900	8,667,900	1,000,000	10·3	45·2	A.C.	400/230	589	..
Mangaweka ..	Town Board ..	1913	370	105	Bulk	40 (W)	34	151	22·5	44,378	35,778	8,600	19·5	14·8	A.C.	400/230	6·5	..
Totals	..	..	273,790	49,691	32,324	5,440	26,904	23,249	18·4	93,697,052	78,204,575	15,492,477	16·5	39·7	..	..	1,824	..
Gas Stations.																		
1. Devonport*	Borough Council	1915	9,831	1,841	Bulk	440 (G)	462	2,647	17·4	1,380,754	894,778	485,976	35·2	34·1	A.C./D.C.	400/460/230	19·5	..
2. Kaikoura	County Council ..	1922	630	135	47	..	28	89	31·4	40,850	28,563	12,287	30	16·65	A.C.	400/230	5·7	..
3. Opotiki	Private ..	1914	1,300	360	99	..	70	163·9	42·9	118,000	100,622	17,378	14·7	19·2	D.C.	460/230	12	..
4. Motueka	Borough Council	1922	1,490	270	62	..	45	145·8	30·8	51,570	42,771	8,799	17	13·1	A.C.	400/200	11·4	
5. Napier	Borough Council	1913	14,980	3,349	1,330	..	1,048	5,715	18·3	2,961,374	2,478,915	482,459	16	32·3	A.C./D.C.	460/230	33	..
Taradale	Town Board ..	1924	1,084	256	Bulk	..	(39)	227	17·2	(78,349)	(67,048)	(11,301)	14·5	23	A.C.	400/230	14	..
Hawke's Bay ..	Power Board ..	1925	12,325	90	Bulk	..	..	101	..	(15,525)	(14,786)	(739)	5	..	A.C.	400/230	68	..
Totals	..	..	41,640	6,301	1,538	440	1,653	9,088·7	18·2	4,552,548	3,545,649	1,006,899	22·0	31·3	..	..	163·6	..
Oil Stations.																		
1. Hastings	Borough Council	1912	10,150	2,831	1,175	..	735	4,361	17·7	1,955,100	1,622,733	332,367	15·4	30·36	A.C./D.C.	400/230/460	38	..
2. Picton	Borough Council	1917	1,300	333	24 (W) 60 (G) 120 (O)	..	59·5	429	14	116,220	81,648	34,572	27·4	22·3	D.C.	460/230	10	..
3. Uawa (Tolaga Bay) ..	County Council ..	1925	400	93	30	..	15	59·8	25·4	19,911	14,042	5,869	29·4	15·15	D.C.	230	6	..
Totals	..	..	11,850	3,257	1,409	..	809·5	4,849·8	16·7	2,091,231	1,718,423	372,808	17·8	29·5	..	..	54	..

* Joined Waitemata Power Board, September, 1926.

TABLE W.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1927—*continued*.

(G = gas; O = oil; S = steam; W = water.)

Title.	Ownership.	Supply commenced.	Population included in Area of Supply.	Number of Consumers.	Capacity in Kilowatts.			Connected Load (Kilowatts).	Demand Factor.	Units.				Annual Load-factor Percentage.	System of Supply.	Supply Voltage.	Route-miles of Lines.	Static Head, in Feet.
					Main Plant.	Standby Plant.	Maximum Load.			Generated or purchased.	Sold.	Non-productive.	Percentage Non-productive.					
Hydro Stations.																		
1. Coleridge	Public Works Dept.	1915	237,580	72	27,000	..	16,880	112,424	15·00	78,789,097	69,371,266	9,417,831	11·9	53·4	A.C.	11,000	530	480
Ashburton ..	Power Board ..	1912	(18,001)	2,804	Bulk	200 (O)	(1,143)	(7,371)	15·52	(3,839,633)	(3,071,706)	(767,927)	20	38·3	A.C.	400/230	774	..
Banks Peninsula ..	Power Board ..	1921	(4,050)	891	Bulk	90 (W)	(255)	(1,735·6)	14·69	(782,138)	(489,908)	(292,230)	37·3	35	A.C.	400/230	194	..
Christchurch ..	City Council ..	1904	(91,000)	26,438	Bulk	400 (S)	(8,070)	(59,406)	13·6	(33,103,053)	(29,119,422)	(3,983,631)	12	46·8	A.C.	400/230	260	..
Eyre	County Council ..	1920	(1,060)	141	Bulk	..	(111·6)	(188)	59·4	(172,568)	..	..	..	17·6	A.C.	400/230	21·25	..
Halswell	County Council ..	1919	(1,850)	219	Bulk	..	(99·4)	(246·5)	40·2	(258,168)	..	..	..	29·6	A.C.	400/230	22	..
Heathcote ..	County Council ..	1914	(5,000)	1,000	Bulk	..	(304)	(1,891·75)	16·06	(961,376)	..	..	..	36.2	A.C.	400/230	29	..
Kaiapoi	Borough Council	1917	(1,800)	450	Bulk	..	(136)	(421)	32·3	(418,000)	(330,500)	(87,500)	20·9	35	A.C.	400/230	..	..
Kowai	County Council ..	1922	(1,950)	285	Bulk	..	(70)	(362·46)	19·31	(168,600)	(113,788)	(54,812)	32·46	27·49	A.C.	400/230	62	..
Lyttelton ..	Borough Council	1917	(3,762)	512	Bulk	..	(169)	(1,169·76)	14·4	(543,033)	(512,131)	(30,902)	5·6	36·7	A.C.	400/230	9	..
Malvern	Power Board ..	1925	(5,050)	495	Bulk	..	(136)	(1,161)	11·8	(334,920)	(171,997)	(162,923)	48·7	28·1	A.C.	400/230	135·5	..
Rangiora	County Council ..	1919	(3,155)	425	Bulk	..	(257·7)	(1,373·46)	18·7	(741,845)	(614,772)	(127,073)	17·1	32·8	A.C.	400/230	56·5	..
Rangiora	Borough Conncil	1919	(2,100)	460	Bulk	..	(101)	(685·44)	14·7	(246,000)	(210,316)	(35,684)	14·5	27·8	A.C.	400/230	12	..
Riccarton ..	Borough Council	1916	(5,500)	1,090	Bulk	..	(265)	(2,649·44)	10	(1,070,210)	(984,474)	(85,736)	8·01	46·1	A.C.	400/230	18·25	..
South Canterbury ..	Power Board ..	1925	(41,618)	3,961	Bulk	..	(1,477)	(8,128·6)	18	(5,159,550)	(4,168,520)	(991,030)	19·2	40·0	A.C.	400/230	491·25	..
Springs-Ellesmere ..	Power Board ..	1922	(11,370)	1,645	Bulk	..	(338)	(2,687)	12·63	(1,292,703)	(709,421)	(592,282)	45·8	43·6	A.C.	400/230	232·65	..
Sumner	Borough Council	1913	(3,200)	860	Bulk	..	(158)	(922·45)	17·1	(546,030)	..	..	..	39·5	A.C.	400/230	19.5	..
Timaru	Borough Council	1908	(17,000)	2,396	Bulk	435	(840)	(4,627·84)	18·146	(2,533,408)	(2,042,781)	(490,627)	19·36	34·4	A.C.	400/230	46·22	..
Tai Tapu Dairy Co.	Company ..	1915	(5,700)	228	Bulk	..	(166)	..	..	(538,425)	..	..	..	37·0	A.C.	400/230	37	..
Waimairi ..	County Council ..	1916	(12,000)	2,687	Bulk	..	(483)	(4,726)	10·2	(2,174,285)	(1,739,428)	(434,857)	20·0	51·3	A.C.	400/230	138	..
Waitaki	Power Board ..	1918	(17,580)	2,020	Bulk	390 (W) (O)	(452)	(4,004)	11·3	(1,213,089)	(938,930)	(274,159)	22·6	30·6	A.C.	400/230	143	250
2. Dunedin (Waipori) ..	City Council ..	1907	80,000	18,449	13,750	860 (O)	10,040	43,928	23	41,343,180	31,744,232	9,598,948	23	47·07	A.C.	400/230	461	700
Otago	Power Board ..	1926	(12,801)	2,428	Bulk	..	(873)	(5,631)	15·5	(1,696,217)	(1,596,724)	(99,493)	5·8	22·2	A.C.	400/230	376·5	..
Kaitangata* ..	Borough Council	1917	1,768	248	Bulk	..	..	..	..	14,883	11,907	2,976	19·98	..	A.C.	400/230	9	..
3. Havelock North ..	Town Board ..	1916	1,500	284	200	..	130	..	..	388,100	261,447	126,653	32.6	34·1	A.C.	400/230	16·5	50
4. Havelock South ..	Town Board ..	1918	300	50	15	..	14	..	..	..	..	..	..	..	D.C.	460/230	2	270
5. Hawera County Electric Co. (Limited)	Company ..	1902	6,700	2,285	615 (W) (O)	135 (O)	605	3,716	16·28	1,275,810	1,095,111	180,699	14·1	24·07	A.C.	400/230	74	57
6. Kanieri Electric Limited (Hokitika)	Company ..	1908	2,500	430	700	150 (O)	630	856·2	73·6	2,903,080	2,433,210	469,870	16·2	52·6	A.C.	400/230	18	250
7. Kaponga	Town Board ..	1916	1,200	321	136	..	120	..	..	287,260	269,453	17,807	6·2	27·3	A.C.	400/230	36	58, 31
8. Mackenzie County (Fairlie)	County Council ..	1922	1,942	183	40	..	29	142	20·5	66,386	59,170	7,216	10·8	26·1	A.C.	400/230	5·5	66
9. Mangahao	Public Works Dept.	1925	240,357	57	24,000	..	18,100	111,083	16·3	78,547,884	73,842,017	4,705,867	6	49·6	A.C.	11,000	358	850
Central Hawke's Bay	Power Board ..	1925	(10,250)	1,185	Bulk	..	(300)	(2,400)	12·5	(1,188,238)	(901,292)	(286,946)	24	45·1	A.C.	400/230	90	..

* Absorbed by Otago Power Board, July, 1926.

TABLE W.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1927—*continued*.

(G = gas; O = oil; S = steam; W = water.)

Title.	Ownership.	Supply commenced.	Population included in Area of Supply.	Number of Consumers.	Capacity in Kilowatts.			Connected Load (Kilowatts).	Demand Factor.	Units.				Annual Load-factor Percentage.	System of Supply.	Supply Voltage.	Route-miles of Lines.	Static Head, in Feet.
					Main Plant.	Standby Plant.	Maximum Load.			Generated or purchased.	Sold.	Non-productive.	Percentage Non-productive.					
Hydro Stations—continued.																		
Dannevirke ..	Power Board ..	1925	(12,614)	1,658	Bulk	..	(381)	(3,476)	10·9	(1,337,202)	(962,175)	(375,027)	28	40	A.C.	400/230	270	..
Horowhenua ..	Power Board ..	1924	(15,701)	2,584	Bulk	..	(1,688)	(6,623)	25·5	(5,986,110)	(4,820,819)	(1,165,291)	19·4	40·7	A.C.	400/230	262	..
Hutt Valley ..	Power Board ..	1924	(32,169)	5,670	Bulk	500 (S)	(1,700)	(15,210)	11·2	(6,398,339)	(5,438,828)	(959,511)	15	42·9	A.C.	400/230	230	..
Manawatu-Oroua ..	Power Board ..	1924	(20,868)	3,551	Bulk	..	(1,632)	(7,816)	20·8	(9,068,259)	(7,850,402)	(1,217,857)	13·4	63·4	A.C.	400/230	440	..
Palmerston North ..	Borough Council	1924	(19,000)	3,611	Bulk	1,020 (G)	(1,305)	(7,267)	17·9	(4,203,251)	(3,521,708)	(681,543)	16·2	36·7	A.C.	400/230	71	..
Tararua	Power Board ..	1925	(10,255)	1,237	Bulk	..	(382·5)	(2,723)	14·05	(1,556,650)	(1,275,783)	(280,867)	18	46·45	A.C.	400/230	160	..
Wairarapa ..	Power Board ..	1924	(19,500)	2,904	Bulk	837 (W)	(985)	(7,744·75)	12·7	(3,503,814)	(2,668,496)	(835,318)	23·8	40·6	A.C.	400/230	420	..
Wellington ..	City Council ..	1888	(100,000)	21,500	Bulk	10,000 (S)	(11,400)	..	..	(38,963,924)	(29,293,694)	(9,670,230)	24·8	39	A.C.	400/230	250	..
10. Mataura	Borough Council	1913	1,300	289	75	100 (S)	60	..	..	82,069	52,730	29,339	35·8	15·4	A.C.	440/220	25	22
11. Murchison	County Council ..	1922	450	120	100	..	100	150	66·6	253,700	148,182	105,518	41·6	28·96	A.C.	400/230	14	105
12. New Plymouth ..	Borough Council	1905	20,000	4,710	3,500	..	2,125	10,750	19·77	10,425,946	8,214,438	2,211,508	21·2	56	A.C.	400/230	312	240
Inglewood ..	Borough Council	1905	(1,300)	420	Bulk	120 (W)	(110)	(1,008)	10·9	(359,862)	(273,598)	(86,264)	23·9	37·3	A.C.	400/230	10	38
Waitara	Borough Council	1907	(1,715)	380	Bulk	..	(75)	(432)	17·37	(182,360)	(105,507)	(76,853)	42·14	27·75	A.C.	400/230	11·25	..
13. Ohakune	Borough Council	1914	2,400	440	120	141 (O)	95	350	27·1	189,630	159,352	30,278	15·9	22·7	A.C.	400/230	18	42
14. Opunake	Power Board ..	1920	7,000	900	320	..	350	596	59	1,086,400	924,357	162,043	15	35·4	A.C.	400/230	135	38
15. Patea	Borough Council	1901	1,800	302	82	80 (O)	102·3	216·75	47·2	180,630	160,226	20,404	11·3	20·1	A.C.	110/230	12·5	78
16. Queenstown	Borough Council	1924	879	187	100	..	65	208	31·2	147,140	88,576	58,564	39·8	25·8	A.C.	400/230	4	510
17. Raetihi	Borough Council	1917	4,500	466	470	..	160	650	24·6	408,000	326,400	81,600	20	29·09	A.C.	400/230	28	350
18. Reefton Electric Light and Power Co. (Ltd.)	Company ..	1887	1,300	274	80	..	..	..	..	108,000	..	..	..	..	D.C.	220	10	27
19. Southland (Monowai)	Power Board ..	1925	67,090	6,666	4,000	..	4,320	28,547	15·13	16,979,662	12,013,412	4,966,250	29·3	44·8	A.C.	400/230	2,339	154
Bluff	Borough Council	1903	(1,672)	371	Bulk	..	(170)	(629)	27	(318,625)	(255,196)	(63,429)	19·9	21·4	A.C.	400/230	10	..
Gore	Borough Council	1905	(3,915)	1,016	Bulk	..	(240)	..	..	(706,470)	(537,162)	(169,308)	24	33·5	A.C.	400/230	24	..
Invercargill ..	Borough Council	1913	(21,000)	3,730	Bulk	2,450 (S)	(1,380)	(9,448)	14·6	(4,880,370)	(4,176,230)	(704,140)	14·4	40·3	A.C.	400/230	74	..
20. Taranaki	Power Board ..	1925	22,000	1,217	3,600	..	..	2,326	..	*(1,492,600)	..	..	..	..	..	400/230	..	300
Stratford	Borough Council	1898	3,336	912	Bulk	280 (W&O)	300	1,892	15·9	942,018	779,675	162,343	17·2	35·8	A.C.	400/230	24	27
21. Taihape	Borough Council	1913	2,450	620	150	75 (G)	204	848	24	440,370	281,340	159,030	36·1	24·5	D.C.	460/230	10	30
22. Taumarunui ..	Borough Council	1924	4,000	693	500	..	440	1,308	33·6	927,126	679,147	247,979	26·8	24	A.C.	415/230	15	25

* From New Plymouth Borough.

TABLE W.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1927—*continued.*

(G = gas; O = oil; S = steam; W = water.)

Title.	Ownership.	Supply commenced.	Population included in Area of Supply.	Number of Consumers.	Capacity in Kilowatts.			Connected Load (Kilowatts).	Demand Factor.	Units.				Annual Load-factor Percentage.	System of Supply.	Supply Voltage.	Route-miles of Lines.	Static Head, in Feet.
					Main Plant.	Standby Plant.	Maximum Load.			Generated or purchased.	Sold.	Non-productive.	Percentage Non-productive.					
Hydro Stations—contd.																		
23. Tauranga	Borough Council	1915	2,500	803	4,300	..	3,418‡	1,520	..	12,412,672	10,310,637	2,102,035	16·8	41·5	A.C.	415/230	69·5	110 & 86
Tauranga ..	Power Board ..	1925	8,300	738	Bulk	..	(555)	2,042	..	*(1,993,590)	(1,661,261)	(332,329)	16·6	..	A.C.	400/230	264	..
Te Puke	Town Board ..	1921	925	234	Bulk	..	(74·4)	477	15·5	(224,118)	(198,908)	(25,210)	11·2	34·38	A.C.	400/230	9	..
24. Teviot	Power Board ..	1924	2,400	300	750	..	300	900	33	1,028,745	..	..	..	16·3	A.C.	400/230	64	380
Otago Central ..	Power Board ..	1925	2,037	560	Bulk	..	(160)	765	20·95	(400,600)	(355,550)	(44,450)	11·1	28·5	A.C.	400/230	70	..
25. Tourist Dept. (Rotorua)†	Government ..	1901	5,000	1,278	200	187 (O)	320	2,188	14·62	1,119,917	824,510	295,407	26·37	39·6	A.C.	400/230	37	14
26. Waikato (Horahora) ..	Public Works Dept.	1913	151,847	18	12,875	2,500 (S)	14,160	52,205	29·4	86,652,102	75,844,229	10,807,873	12·5	69·9	A.C.	11,000	373	27
Cambridge ..	Power Board ..	1922	(6,000)	1,069	Bulk	..	(472)	(2,032)	23·3	(2,699,500)	(2,067,817)	(631,683)	23·4	65·3	A.C.	400/230	124·5	..
Central	Power Board ..	1921	(17,512)	2,680	Bulk	..	(1,002)	(5,153)	19·4	(5,130,283)	(4,272,597)	(857,686)	16·7	58·44	A.C.	400/230	352	..
Franklin	Power Board ..	1925	(16,359)	1,724	Bulk	150 (G)	(442)	(2,636)	16·76	(1,522,163)	(1,318,315)	(203,848)	13·4	39·31	A.C.	400/230	163	..
Hamilton	Borough Council	1913	(15,000)	3,167	Bulk	..	(816)	(5,142)	15·87	(2,578,734)	(2,106,425)	(472,309)	18·3	36	A.C.	400/230	48	..
Te Awamutu ..	Power Board ..	1920	(8,500)	1,275	Bulk	..	(744)	(3,081)	24·15	(3,464,117)	(2,751,284)	(712,833)	20·58	53	A.C.	400/230	290	..
Thames Valley ..	Power Board ..	1920	(43,120)	4,696	Bulk	..	(3,937)	(15,193)	25·9	(19,876,401)	(15,801,739)	(4,074,662)	20·6	57·5	A.C.	400/230	637	..
Thames	Borough Council	1914	(5,000)	1,034	Bulk	200	(240)	(1,463)	16·4	(915,847)	(772,964)	(142,883)	15·6	43·6	A.C.	400/230	20	130
Te Aroha ..	Borough Council	1906	(2,324)	616	Bulk	150 (W)	(143)	(1,018)	14·04	(480,290)	(385,747)	(94,543)	19·6	38·3	A.C.	400/230	15·5	560
Waitemata ..	Power Board ..	1926	(26,632)	2,112	Bulk	..	(451)	(3,555)	12·7	(862,566)	(668,759)	(193,807)	22·4	21·8	A.C.	400/230	133	..
Waitomo	Power Board ..	1925	(8,000)	1,015	Bulk	170 (G)	(160)	(1,132)	14·1	(637,760)	(460,304)	(177,456)	27·82	45·5	A.C.	400/230	60	..
27. Wairoa (Waikaremoana)	Power Board ..	1923	5,341	233	2,000	..	1,010	2,571	39·4	2,569,270	2,177,380	391,890	15·2	29	A.C.	415/230	103	680
Wairoa	Borough Council	1913	2,337	575	Bulk	..	(213)	1,400	15·2	(858,193)	(773,722)	(84,471)	9·8	46	A.C.	400/230	13	..
28. Waimea	Company ..	1910	4,000	572	100	40 (G)	100	647	15·6	139,500	113,600	25,900	18·6	16	A.C.	400/230	33	12
29. Waverley	Town Board ..	1916	650	183	40	..	18	160	11·25	35,000	31,195	3,805	10·8	22	A.C.	400/230	6	60
30. Wairua (Wilson's Cement Company)	Company ..	1916	..	38	2,500	..	2,200	..	..	10,772,415	9,232,491	1,539,924	14·2	56	A.C.	400/230	37	130
Kamo	Town Board ..	1923	516	72	Bulk	..	(30)	85	35·29	(21,227)	(16,981)	(4,246)	20	8	A.C.	400/230	5·5	..
Whangarei ..	Borough Council	1915	7,000	1,740	Bulk	..	(405)	3,173	12·75	(1,441,230)	(1,100,282)	(340,948)	23·65	40·62	A.C.	400/230	23	..
31. Wairere	Power Board ..	1925	2,000	212	480	..	180	570	31·6	269,707	251,500	18,207	6·7	17·11	A.C.	400/230	72·5	65
32. Westport	Borough Council	1925	4,000	351	250	..	110	344	32	206,620	140,979	65,641	31·76	21·4	A.C.	400/230	21·5	430
33. Whakatane	Borough Council	1922	1,450	374	240	..	230	529	43·5	661,960	385,515	276,445	42	33	A.C.	400/230	32	276
Totals	..	..	912,655	169,096	103,288	21,660	76,915	392,664	20·2	351,654,279	302,227,684	48,289,850	13·7	52·5	..	..	12,896·37	..

* Assessed. † Now on bulk supply from Horahora. ‡ Includes Horahora maximum demand.

TABLE X.—ROUTE-MILES OF PUBLIC WORKS DEPARTMENT TRANSMISSION-LINES, 31ST MARCH, 1927.

Transmission-line.	Waikato System.	Mangahao System.	Coleridge System.	Totals.
110,000-volt steel-supported, single circuit ..	..	6·70	..	6·70
,, ,, double circuit ..	99·00	21·04	..	120·04
,, wood pole, single circuit	99·00	302·19	..	401·19
66,000-volt steel-supported, single circuit ..	..	..	1·94	1·94
,, ,, double circuit ..	..	..	2·93	2·93
,, wood pole, single circuit	..	..	410·00	410·00
50,000-volt steel-supported, single circuit ..	44·42	..	..	44·42
,, ,, double circuit ..	19·50	..	..	19·50
,, wood pole, single circuit	138·20	..	..	138·20
33,000-volt steel-supported, single circuit ..	..	..	..	Nil
,, ,, double circuit ..	..	..	..	Nil
,, wood pole, single circuit	..	..	8·50	8·50
11,000-volt steel-supported, single circuit ..	5·77	..	..	5·77
,, wood pole	37·95	6·59	88·00	132·54
Totals	443·84	336·52	511·37	1,291·73

TABLE Y.—RETURN OF ELECTRIC RANGES, WATER-HEATERS, AND MILKING-MACHINES.

Licensee.	Ranges, 31/3/27.		Percentage of Number of Consumers	Water-heaters, 31/3/27.	Percentage of Number of Consumers	Milking-machines, 31/3/27.
	2–5 kw.	5 kw. and over.				
Ashburton Power Board	..	299	10·7	203	7·23	28
Auckland Power Board	54	2,078	5·54	4,026	10·46	Not known
Banks Peninsula Power Board	..	51	5·73	45	5·05	114
Cambridge Power Board	..	83	7·76	273	25·53	250
Central Hawke's Bay Power Board	3	39	3·54	69	5·83	46
Central Power Board	15	74	3·32	559	20·85	694
Christchurch City	157	1,024	4·47	1,473	5·57	..
Dannevirke Power Board	..	50	3·02	89	5·36	183
Dunedin City	370		2·00	428	2·32	106
Eyre County	..	..	..	2	1·41	16
Franklin Power Board	73	..	4.23	218	12·63	236
Grey Power Board	1	2	0·4	7	0·95	..
Halswell County	7	..	3·2	3	1·37	15
Hamilton Borough	10	23	1·04	35	1·10	..
Hastings Borough	11	39	1·76	..	..	..
Havelock North Town Board	9	..	3·16	1	0·35	..
Hawera Company	2	4	0·26	8	0·35	126
Heathcote County	17	96	11·3	102	10·2	..
Horowhenua Power Board	2	245	9·6	460	17·8	332
Hutt Valley Power Board	37	378	7·3	161	2·84	40
Inglewood Borough	3	13	3·8	8	1·90	1
Invercargill Borough	10	63	1·95	2	0·05	3
Kaiapoi Borough	..	2	0·45	..	..	5
Kanieri Electric Limited	1	..	0·23	2	0·46	..
Kaponga Town Board	..	..	..	..	..	..
Kowai County	..	2	0·7	1	0·35	2
Lyttelton Borough	..	2	0·39	3	0·58	1
Mackenzie County (Fairlie)	..	1	0·55	1	0·55	1
Malvern Power Board	..	43	8·7	19	3·83	5
Manawatu-Oroua Power Board	..	252	7·1	496	13·96	484
Mangaweka Town Board	..	4	3·8	4	3·8	2
Mataura Borough	1	..	0·35	..	..	4
Murchison County	..	3	2·5	11	9·2	16
Napier Borough	5	..	0·15	..	..	..
Nelson City	..	..	..	1	0·06	..
New Plymouth Borough	45	300	7·3	285	6·05	160
Ohakune Borough	2	1	0·68	5	1·13	1
Opotiki Borough	..	..	..	..	..	8
Opunake Power Board	22	..	2·44	77	8·55	181
Otago Central Power Board	33	..	5·9	25	4·46	3
Otago Power Board	3	66	2·84	54	2·22	32
Palmerston North Borough	6	182	5·21	293	8·13	1
Picton Borough	..	1	0·3	..	..	..
Poverty Bay Power Board	2	..	0·07	2	0·07	..
Raetihi Borough	..	2	0·43	1	0·21	10
Rangiora Borough	..	7	1·52	4	0·87	..
Rangiora County	..	4	0·94	5	1·17	26
Riccarton Borough	4	90	8·6	96	8·80	..
Rotorua Tourist Department	8	13	1·64	36	2·82	11
South Canterbury Power Board	6	106	2·83	61	1·54	43
Southland Power Board	..	845	12·7	511	7·66	..
Springs-Ellesmere Power Board	..	39	2·37	17	1·03	53
Stratford Borough	4	64	7·45	58	6·35	..
Sumner Borough	26	10	4·2	60	6·97	..
Taihape Borough	..	6	0·97	7	1·13	..
Tai Tapu Dairy Co.	..	8	3·5	..	..	39
Taradale Town Board	2	..	0·78	1	0·39	..
Taranaki Power Board	1	45	3·78	129	10·60	216
Tararua Power Board	25	83	8·75	154	12·44	165
Taumarunui Borough	4	11	2·16	18	2·60	..
Tauranga Borough	37	68	13·1	82	10·21	..
Tauranga Power Board	23	41	8·7	173	23·44	269
Te Aroha Borough	..	8	1·3	12	1·94	6
Te Awamutu Power Board	2	61	4·95	326	25·56	404
Te Puke Town Board	..	5	2·14	12	5·14	3
Teviot Power Board	4	38	14·0	40	13·33	..
Thames Borough	8	4	1·16	18	1·74	..
Thames Valley Power Board	57	112	3·6	1,020	21·72	1,614
Timaru Borough	4	90	3·9	58	2·42	..
Waimairi County	51	120	6·36	247	9·20	13
Waimea Electrical Supply Company	..	..	..	1	0·17	..
Wairarapa Power Board	4	154	5·45	225	7·75	225
Wairere Power Board	2	30	15·1	43	20·28	47
Wairoa Borough	5	53	10·1	69	12·0	..
Wairoa Power Board	16	54	30·0	48	20·6	21
Wairua (Wilson's)	1	..	2·63	..	..	22
Waitaki Power Board	5	93	4·85	68	3·37	10
Waitara Borough	7	1	2·1	4	1·05	..
Waitemata Power Board	6	207	10·1	274	12·96	94
Waitomo Power Board	1	25	2·56	87	8·57	71
Wanganui-Rangitikei Power Board	230	255	8·25	547	9·32	274
Wellington City	11	197	0·97	118	0·55	Nil
Westport Borough	..	..	..	2	0·57	2
Whakatane Borough	8	..	2·14	4	1·07	4
Whangarei Borough	17	32	2·82	73	4·19	..
Totals	1,110	8,401	..	14,160	..	6,738

TABLE Z.—AVAILABLE WATER-POWER IN NEW ZEALAND: SCHEMES OF 1,000 HORSE-POWER AND OVER.

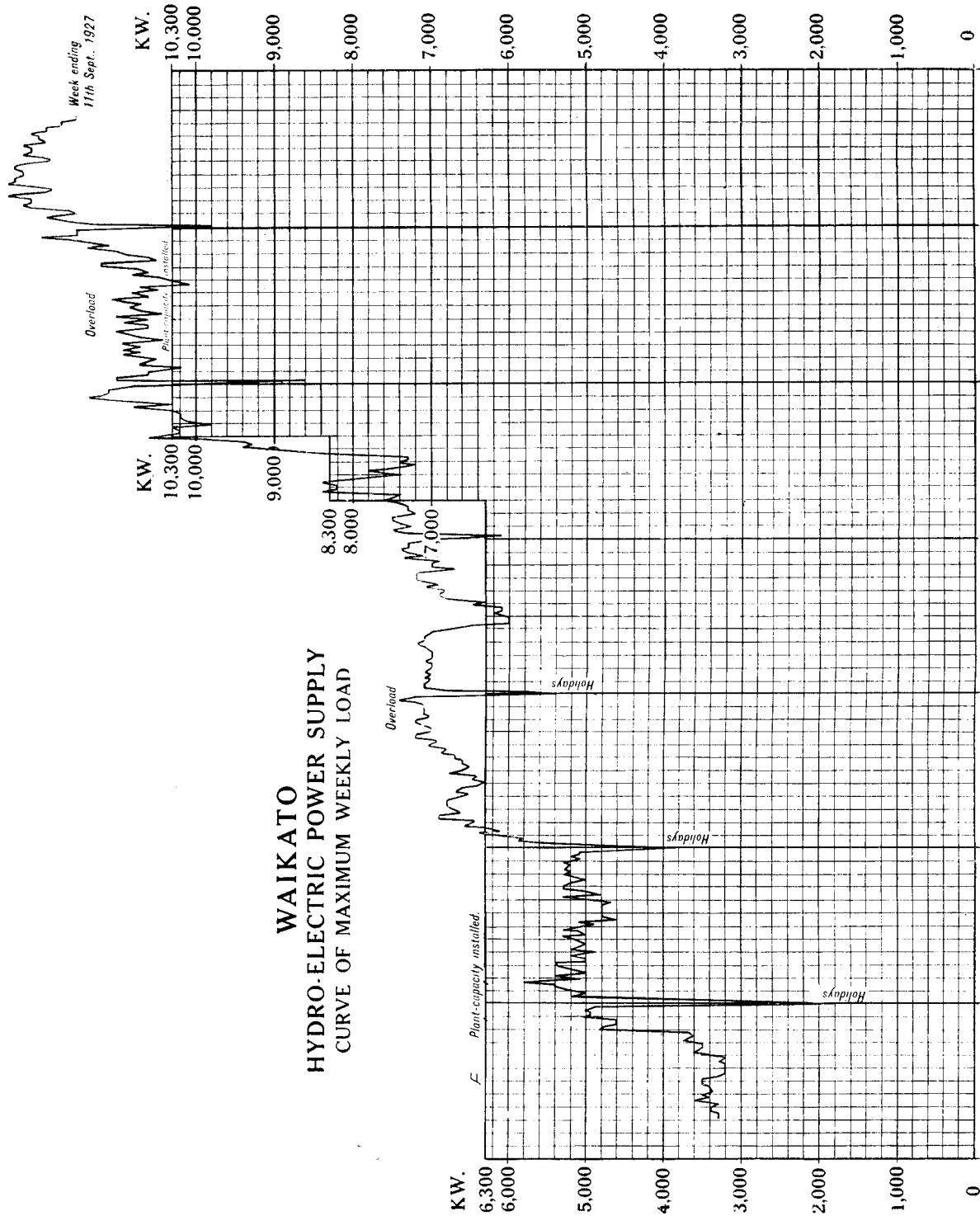
Source of Power.	Position of Power-house.	Available Flow: Cubic Feet per Second.	Available Head.	Average Power on 50-per-cent. Load Factor.		Nearest City, Port, or Deep Water.	Distance.
	NORTH ISLAND.						
North Auckland District—			Ft.	H.p.	Kw.		Miles.
Wairua Falls	Wairua Falls ..	150*	130	3,200	2,400	Whangarei ..	18
Omapere	Utakura Stream ..	11*	550	1,000	750	..	..
South Auckland District—							
Kaituna	Kaituna River ..	500†	784	65,000	50,000	Tauranga ..	25
						Auckland ..	125
Wairoa River	Wairoa	420*	80	5,600	4,200	Tauranga ..	20
Waikato River	Aratiatia Rapids ..	4,400†	170	136,000	100,000	Auckland ..	154
Waikato River	Orakeikorako Rapids	4,400†	35	14,000	10,000	Auckland ..	148
Waikato River	Aniwhaniwha Falls	4,400†	80	32,000	24,000	Auckland ..	142
Waikato River	Atiamuri Rapids ..	4,400†	25	10,000	7,500	Auckland ..	139
Waikato River	Arapuni Gorge ..	5,300†	165	163,000	120,000	Auckland ..	105
Waikato River	Horahora Rapids ..	5,300†	27	13,000	10,000	Auckland ..	97
Pokaiwhenua River ..	Horahora Rapids ..	165*	170	4,600	3,400	Auckland ..	97
Marakopa Falls	Marakopa	90	420	3,100	2,300	Te Kuiti ..	27
Wairere Falls	Wairere Falls ..	160*	60	1,600	1,200	Te Kuiti ..	22
Hawke's Bay District—							
Waikaremoana	Upper Waikaretaheke	530†	1,100	97,000	75,000	Gisborne ..	50
Waikaremoana	Lower Waikaretaheke	530†	360	32,000	24,000	Napier ..	60
Te Reinga Falls	Te Reinga Falls ..	124	125	1,300	1,000	Gisborne ..	35
Waikohu River	Waikohu	45†	847	6,000	4,500	Gisborne ..	28
Wanganui District—							
Mangawhero River ..	Raukawa Falls ..	125	90	1,000	750	Wanganui ..	45
Mangawhero River ..	Wanganui River ..	125	680	7,100	6,950	Wanganui ..	24
Rangitikei River	Makohine	1,500†	300	75,000	56,000	Wanganui ..	48
Wangaehu River	Wangaehu River ..	260	70	1,500	1,100	Wanganui ..	25
Karioi	Karioi	300*	180	8,800	6,600	Wanganui ..	60
Taranaki District—							
Waitara River	Waitara River ..	400	140	4,600	3,600	New Plymouth	12
Waiwakaiho	Waiwakaiho ..	150†	250	6,200	4,800	New Plymouth	4
Manganui River	Waitara River ..	415†	340	26,000	19,400	New Plymouth	25
Wellington District—							
Mangahao River	Shannon	160†	895	24,000	18,000	Wellington ..	65
Makuri River	Makuri Gorge ..	100*	384	6,400	4,800	Pahiatua ..	20
Waiohine	Woodside	120*	120	2,400	1,800	Masterton ..	15
Hutt River	Mangaroa	200†	330	11,000	8,300	Wellington ..	24
Tauherenikau	Featherston ..	150*	440	11,000	8,300	Wairarapa ..	..
Kourarau	Kourarau	20	755	2,680	2,000	Masterton ..	12
Totals—North Island	..	..	..	776,080	582,650		

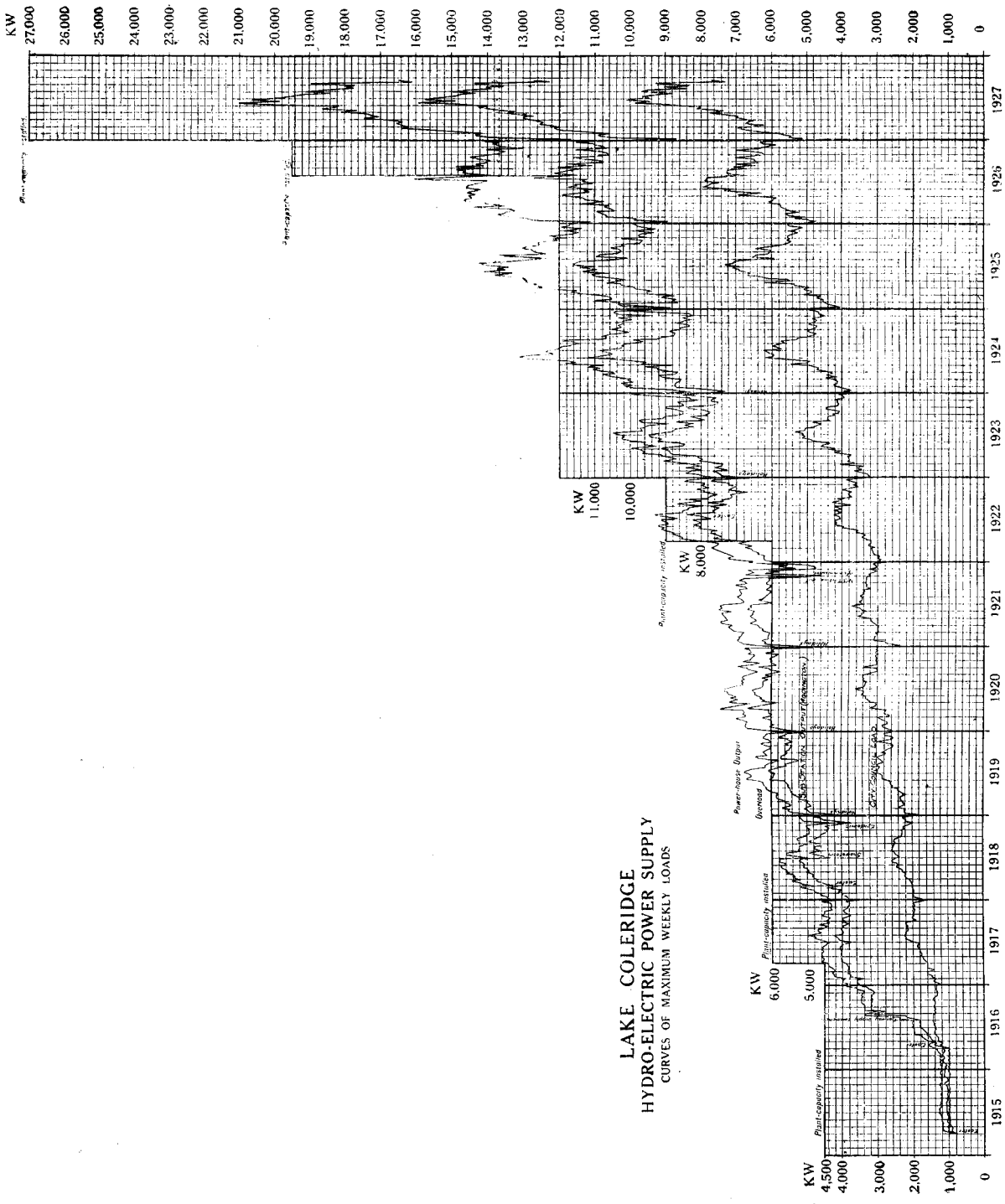
* Signifies daily storage available to utilize 50-per-cent. load factor. † Signifies seasonal storage made available.

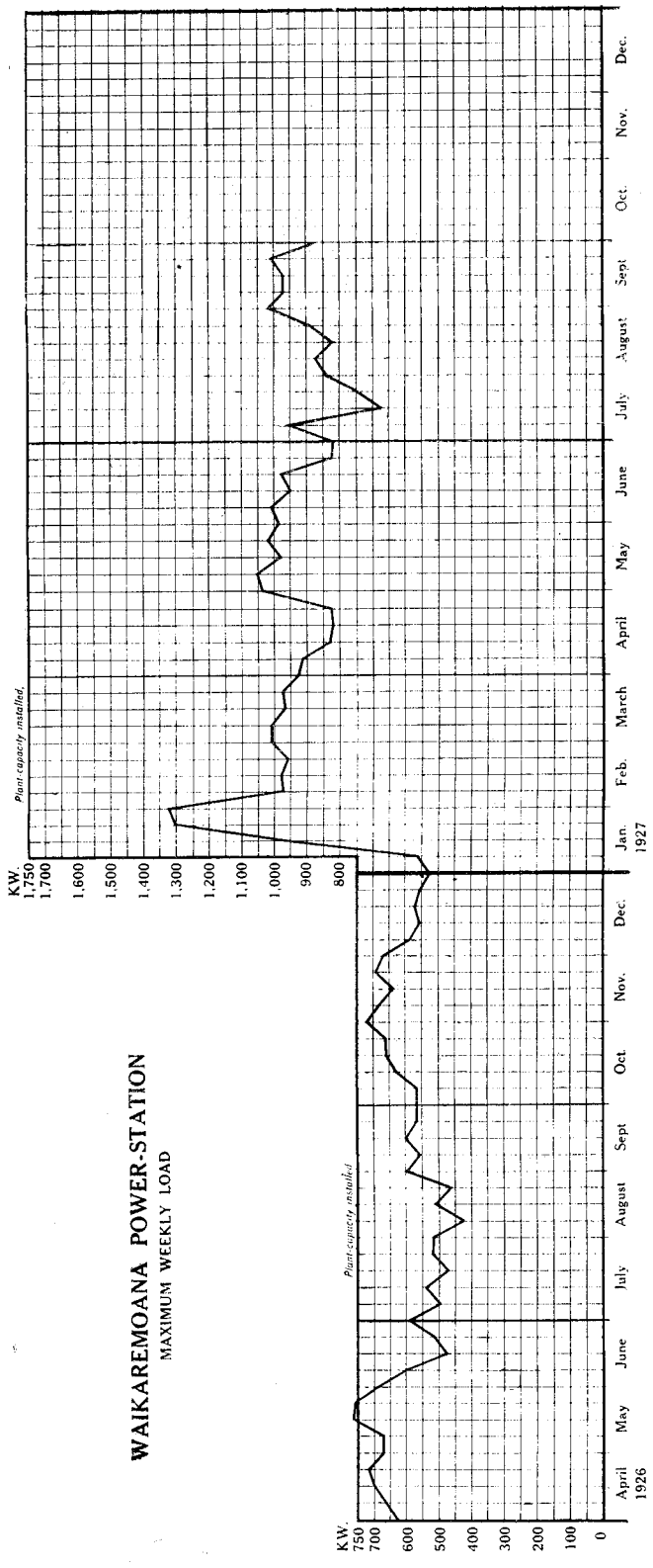
TABLE Z.—AVAILABLE WATER-POWER IN NEW ZEALAND—*continued.*

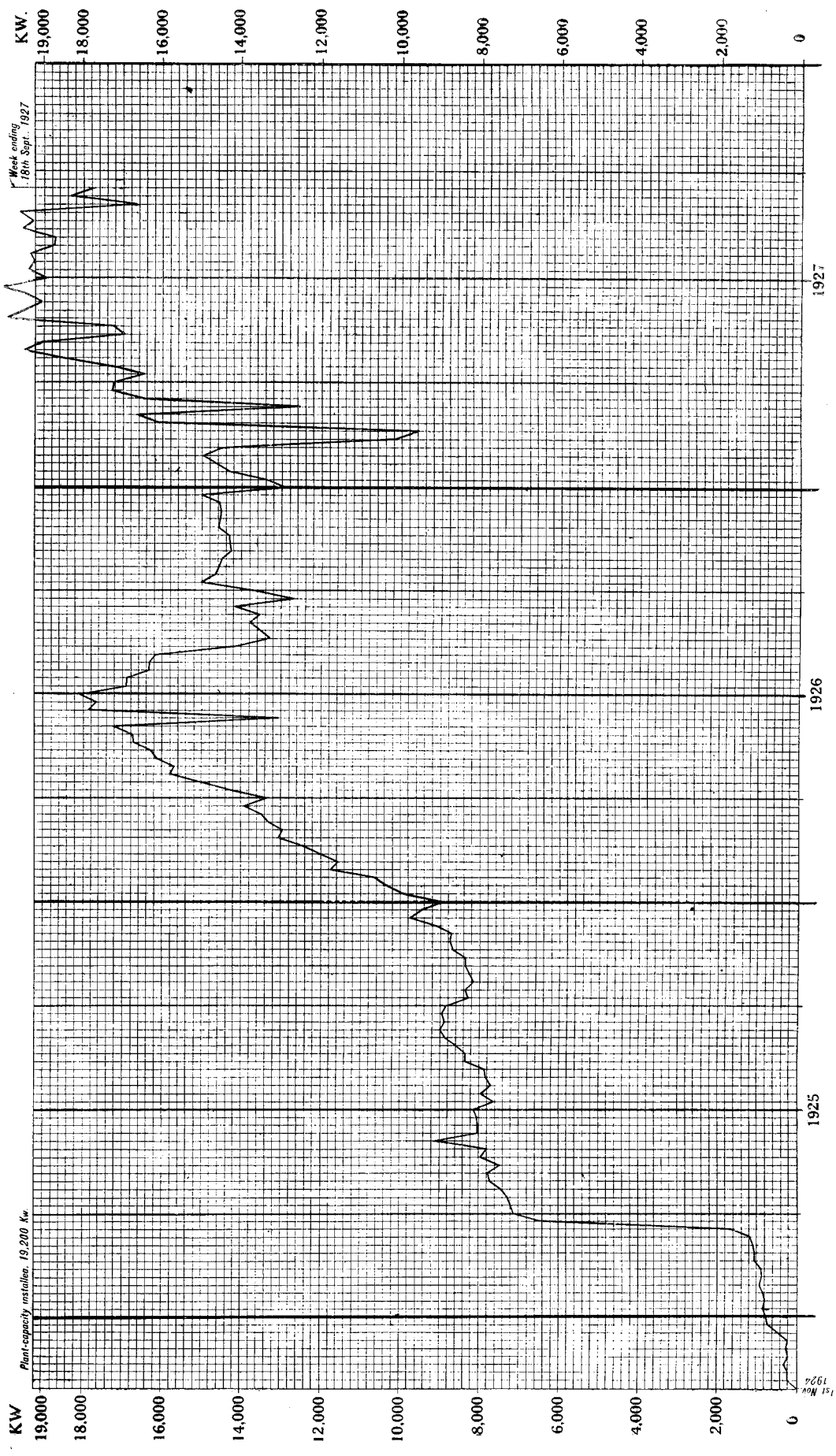
Source of Power.	Position of Power-house.	Available Flow: Cubic Feet per Second.	Available Head.	Average Power on 50-per-cent. Load Factor.		Nearest City, Port, or Deep Water.	Distance.
				H.p.	Kw.		
SOUTH ISLAND.							
Marlborough District—			Ft.				Miles.
Clarence	Ericaburn ..	640	158	8,300	6,300	Blenheim ..	45
Waihopai River	Waihopai Gorge ..	130*	96	2,000	1,500	Blenheim ..	28
Nelson and Buller District—							
Boulder Lake	Aorere River ..	50*	2,600	22,000	16,000	Golden Bay ..	10
Rotoiti Lake	Buller River ..	200†	600	20,000	15,000	Nelson ..	50
Rotoroa Lake	Gowan River ..	900†	400	60,000	45,000	Nelson ..	60
Inangahua River ..	Blackwater River ..	78	125	8,000	6,000	Westport ..	20
Four-mile Creek	Four-mile Creek ..	24*	450	2,000	1,500	Westport ..	4
Westland District—							
Lake Brunner	Stillwater	1,750	200	29,000	22,000	Greymouth ..	10
Kumara Water-race ..	Kumara	87	330	2,400	1,800	Greymouth ..	12
Otira River	Otira	40	700	2,300	1,700	Greymouth ..	52
Rolleston River	Otira	36	700	2,000	1,500	Greymouth ..	52
Kanieri Lake	Kanieri River ..	100	330	2,800	2,100	Hokitika ..	12
Toaroha River	Toaroha River ..	150	760	10,000	7,500	Hokitika ..	17
Whitcombe River ..	Hokitika River ..	250	800	16,000	12,000	Hokitika ..	20
Kakapotahi River ..	Kakapotahi River ..	100	580	4,800	3,600	Hokitika ..	26
Wanganui River	Hende's Ferry ..	830	580	40,000	30,000	Hokitika ..	36
Wataroa River	Wataroa	1,360	700	80,000	60,000	Hokitika ..	48
Canterbury District—							
Clarence River	Jollie's Pass ..	200	1,160	20,000	15,000	Christchurch ..	90
Clarence River	Conway River ..	1,150	1,050	100,000	75,000	Christchurch ..	90
Waiau-ua River	Culverden ..	1,600	200	27,000	20,000	Christchurch ..	75
Waimakariri River ..	Gorge Bridge ..	1,000*	90	15,000	11,000	Christchurch ..	30
Waimakariri River ..	Otarama	1,000*	150	30,150	22,500	Christchurch ..	42
Lake Coleridge	Rakaia River ..	100†	480	8,000	6,000	Christchurch ..	65
Acheron River	Rakaia River ..	50†	480	4,000	3,000	Christchurch ..	65
Harper River	Rakaia River ..	320†	480	25,000	18,000	Christchurch ..	65
Wilberforce River ..	Rakaia River ..	1,100	480	44,000	33,000	Christchurch ..	65
Rakaia River	Gorge Bridge ..	2,600	30	6,500	4,800	Christchurch ..	50
Lake Heron	Rakaia River ..	300	200	5,000	3,750	Christchurch ..	88
Opihi River	Opihi Gorge ..	200	400	6,700	5,000	Timaru ..	30
Pukaki Lake	Pukaki	5,000†	460	50,000	37,000	Timaru ..	85
Tekapo Lake	Fairlie	5,100†	900	400,000	300,000	Timaru ..	40
Ohau Lake	Waitaki River	5,000†	300	125,000	90,000	Timaru ..	85
Otago and Southland District—							
Ahuriri River	Waitaki River ..	600	200	10,000	7,500	Oamaru ..	62
Waitaki River	Waitaki River ..	15,000	30	37,000	28,000	Oamaru ..	60
Waipori Falls	Waipori River ..	230†	700	26,800	20,000	Dunedin ..	30
Lee Stream	Outram	15*	750	1,800	1,300	Dunedin ..	18
Deep Stream	Taieri River ..	110	900	8,400	6,300	Dunedin ..	20
Taieri River	Deep Stream ..	700	220	12,000	9,000	Dunedin ..	44
Talla Burn	Clutha River ..	30	890	2,200	1,600	Dunedin ..	60
Teviot River	Roxburgh ..	100†	1,900	30,000	21,000	Dunedin ..	90
Manuherikia River ..	Chatto Creek ..	200	350	5,800	4,400	Dunedin ..	127
Hawea Lake	Wanaka Lake ..	2,500†	205	80,000	60,000	Dunedin ..	170
Shotover	Wakatipu Lake ..	500	250	10,000	7,500	Invercargill ..	112
Lake Hall	Doubtful Sound ..	220	2,625	48,000	36,000	On seaboard ..	..
Lake Cecil	Lake Te Anau ..	200	900	15,000	11,200	On seaboard ..	..
Lake Hilda	Lake Te Anau ..	550	1,190	55,000	41,080	On seaboard ..	..
Lake Te Anau	George Sound ..	12,630	694	1,600,000	1,200,000	On seaboard ..	..
Lake Manapouri	Smith Sound ..	8,400†	600	840,000	630,000	On seaboard ..	..
Bowen Falls	Milford Sound ..	700	600	35,000	25,000	On seaboard ..	..
Lake Monowai	Waiau River ..	500†	160	16,000	12,000	Invercargill ..	60
Lake Hauroto	Tewaewae Bay ..	2,300	514	100,000	75,000	Invercargill ..	51
Totals—South Island	..	..	..	4,110,950	3,074,430		

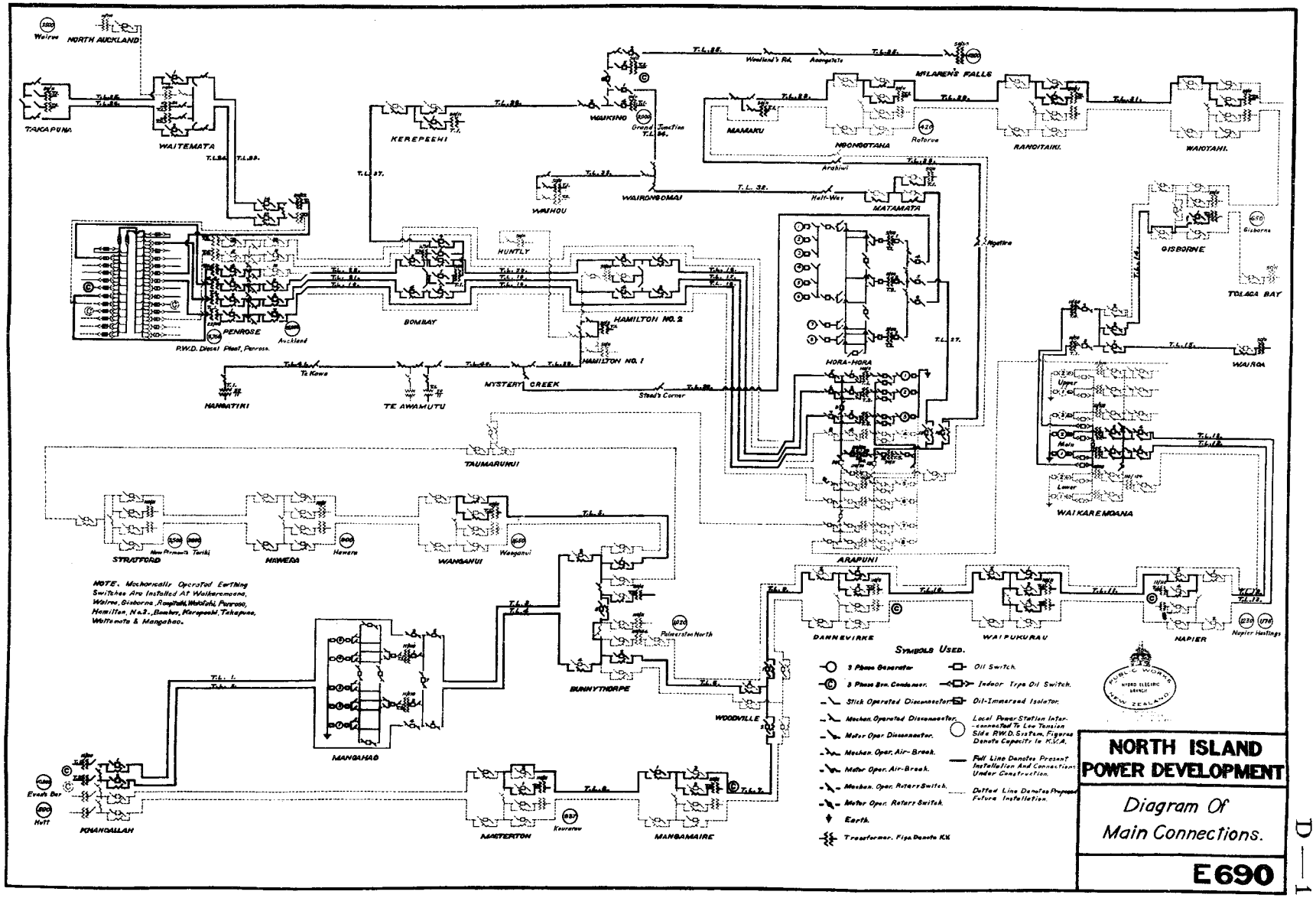
* Signifies daily storage available to utilize 50-per-cent. load factor. † Signifies seasonal storage made available.


WAIKATO
HYDRO-ELECTRIC POWER SUPPLY
CURVE OF MAXIMUM WEEKLY LOAD
KW.
10,300
10,000
9,000
8,300
8,000
7,000
6,300
6,000
5,000
4,000
3,000
2,000
1,000
0
Overload
Plant-capacity installed.
Holidays
1921
1922
1923
1924
1925
1926
1927
Week ending 11th Sept. 1927

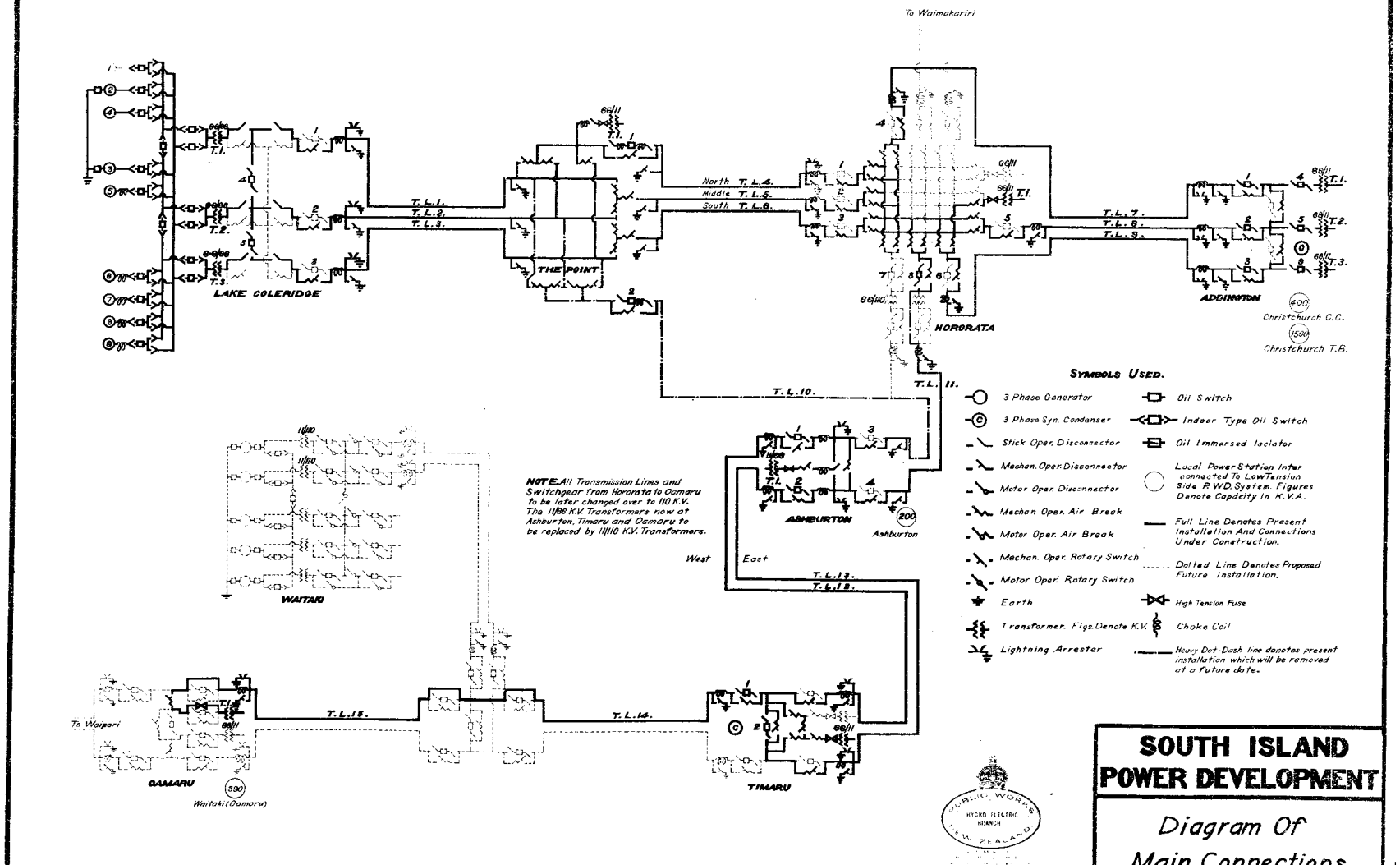

LAKE COLERIDGE
HYDRO-ELECTRIC POWER SUPPLY
CURVES OF MAXIMUM WEEKLY LOADS
KW
27,000
26,000
25,000
24,000
23,000
22,000
21,000
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19,000
18,000
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16,000
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1915
1916
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1921
1922
1923
1924
1925
1926
1927
Plant-capacity installed
Power-house Output
Overload


WAIKAREMOANA POWER-STATION
MAXIMUM WEEKLY LOAD
KW.
1,750
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
Plant capacity installed
April May June July August Sept Oct. Nov. Dec. Jan. Feb. March April May June July August Sept Oct. Nov. Dec.
1926 1927
KW.
750
700
600
500
400
300
200
100
0
Plant capacity installed


MANGAHAO
HYDRO-ELECTRIC POWER SUPPLY
CURVE OF MAXIMUM WEEKLY LOAD
KW.
19,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Week ending 18th Sept., 1927
1927
1926
1925
Plant-capacity installed, 19,200 Kw
1st Nov. 1924


Wairau
NORTH AUCKLAND
TAKAPUNA
WAITEMATA
T.L.84.
T.L.85.
T.L.86.
T.L.89.
KEREPEEHI
T.L.88.
WAIKINO
Grand Junction
T.L.94.
T.L.87.
WAIHOU
T.L.33.
WAIRONGOMAI
T.L. 35.
Half-Way
MATAMATA
Arahiwi
T.L.81.
MAMAKU
MROMOTTAHA
Rotorua
T.L.82.
T.L.83.
T.L.84.
McLAREN'S FALLS
Woodland's Rd.
Aongatete
T.L.80.
RANGITAIKI.
T.L.91.
WAIOTAHI.
Ngatira
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PENROSE
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HAMILTON NO. 2
HAMILTON NO. 1
MYSTERY CREEK
Te Kowa
Stead's Corner
HAMPATIKI
TE AWAMUTU
TAUMARUNUI
HORA-HORA
ARAPUNI
GISBORNE
Gisborne
TOLAGA BAY
WAIROA
Upper
Main
Lower
WAIKAREMOANA
STRATFORD
New Plymouth Tariki
MAKERA
Hawera
WANGANUI
Wanganui
NOTE. Mechanically Operated Earthing Switches Are Installed At Waikaremoana, Wairau, Gisborne, Rangitaiki, Waiotahi, Poroaa, Hamilton, N.A.S., Bombay, Maraposki, Takapuna, Whitemata & Mangahao.
SUNNYTHORPE
Palmerston North
WOODVILLE
MANGAHAO
MASTERTON
Kaiwaiwai
MANGAMAIRE
KOHANGALLAH
Evans Bay
Hutt
DANNEVIRKE
WAIPUKURAU
NAPIER
Napier
Hastings
SYMBOLS USED.
3 Phase Generator
3 Phase Syn. Condenser.
Stick Operated Disconnector
Mechan. Operated Disconnector.
Motor Oper. Disconnector.
Mechan. Oper. Air-Break.
Motor Oper. Air-Break.
Mechan. Oper. Rotary Switch.
Motor Oper. Rotary Switch.
Earth.
Transformer. Figs. Denote K.V.
Oil Switch.
Indoor Type Oil Switch.
Oil-Immersed Isolator.
Local Power Station Interconnected To Low Tension Side P.W.D. System. Figures Denote Capacity in K.V.A.
Full Line Denotes Present Installation And Connections Under Construction.
Dotted Line Denotes Proposed Future Installation.
PUBLIC WORKS
HYDRO ELECTRIC BRANCH
NEW ZEALAND
NORTH ISLAND
POWER DEVELOPMENT
Diagram Of
Main Connections.
E690

D—1



SOUTH ISLAND POWER DEVELOPMENT

Diagram Of Main Connections.

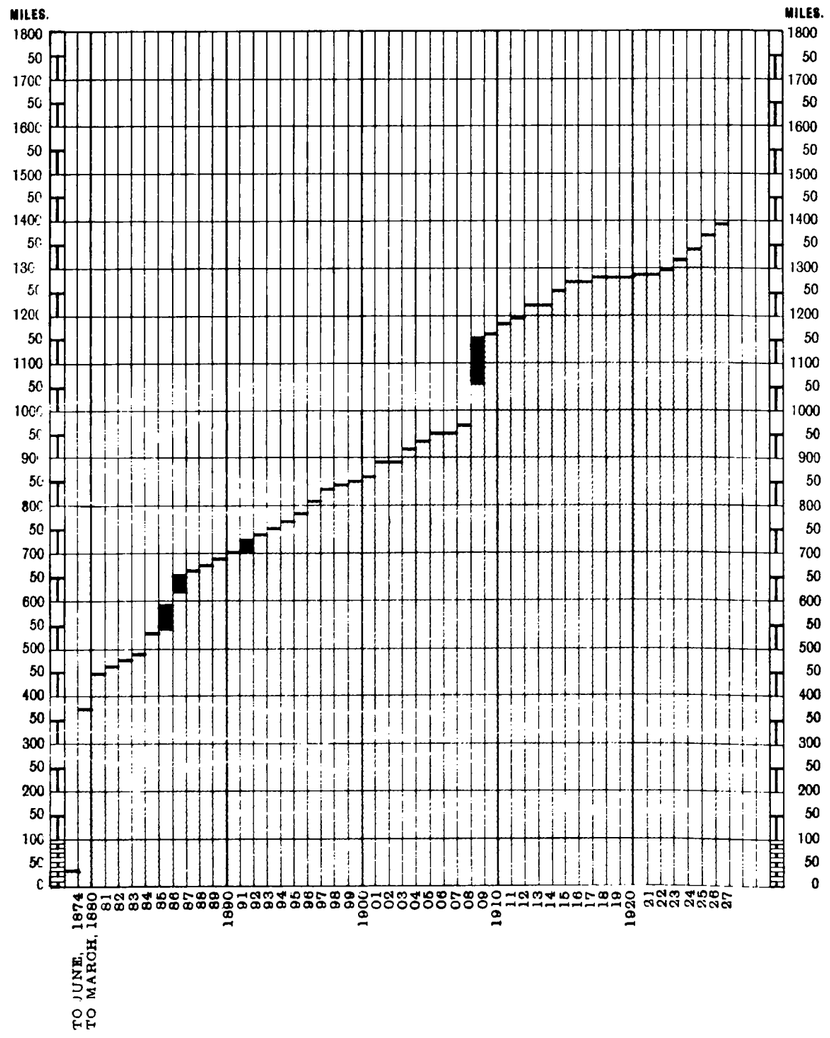
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FIG 4
Main Distribution
Do
POWER
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CHAIRS

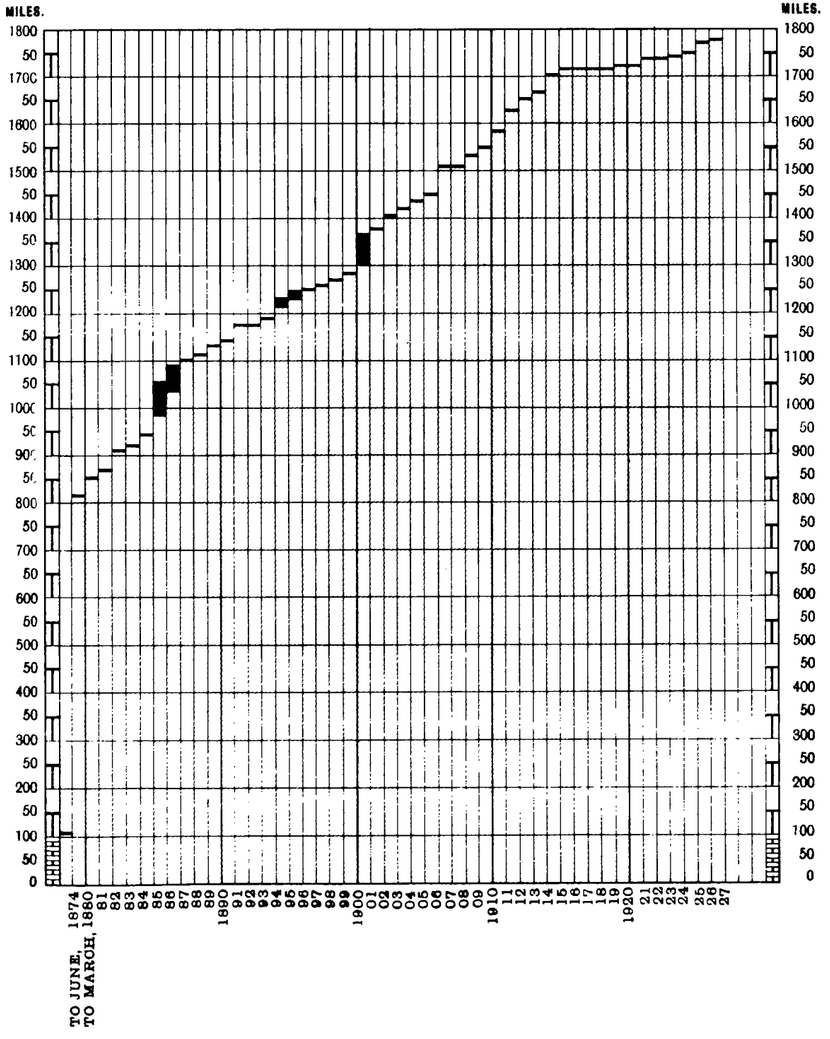
NUMBER OF MILES OPEN OF GOVERNMENT LINES.

NORTH ISLAND.



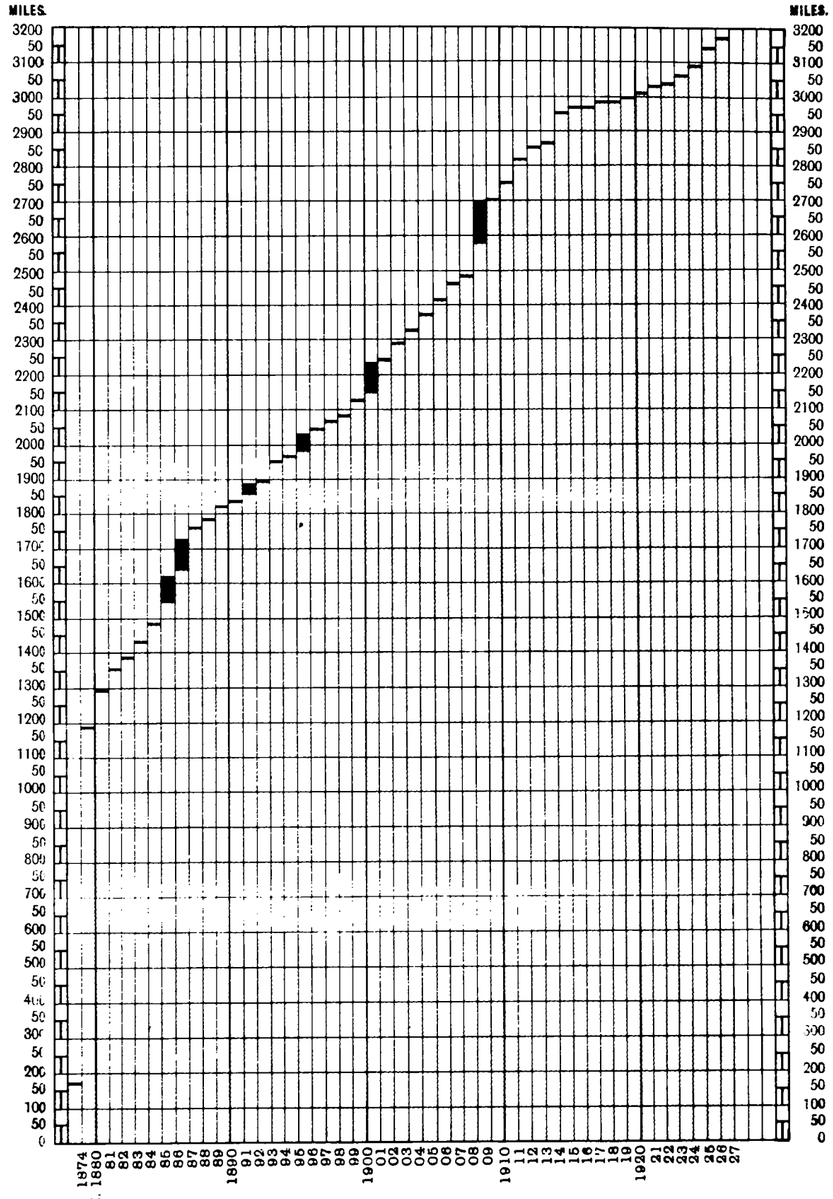
NUMBER OF MILES OPEN OF GOVERNMENT LINES.

SOUTH ISLAND.



NUMBER OF MILES OPEN OF GOVERNMENT LINES.

NORTH AND SOUTH ISLANDS COMBINED.



Private railways acquired by the Government shown thus: ▬

APPENDIX E.

THIRD ANNUAL REPORT OF THE MAIN HIGHWAYS BOARD.

The MAIN HIGHWAYS BOARD to the MINISTER OF PUBLIC WORKS, Wellington.

SIR,—

In accordance with the provisions of section 24 of the Main Highways Act, 1922, the Main Highways Board has the honour to submit its third annual report for presentation to Parliament through the Hon. the Minister.

INTRODUCTORY.

The total expenditure by the Board for the year under review has been £1,120,952. Of this amount £547,090 was expended from the Revenue Fund and £573,862 from the Construction Fund. The operations under the Revenue Fund involved the payment of subsidies on the maintenance of 6,391 miles of main highways, as well as providing assistance towards the cost of the maintenance of over 200 miles of continuations of main highways passing through boroughs of under six thousand inhabitants.

The following summary shows roughly the achievements in the way of construction: Length of highway surfaced, 252 miles, made up as follows: Portland cement concrete, 16 miles; bituminous concrete, 12 miles; bituminous macadam (penetration), 38 miles; tar and bituminous surface treatment (sealing), 35 miles; gravelling and metalling, 151 miles. Length of highway formed and widened, 174 miles; length of bridges completed, 6,408 lineal feet.

The outstanding feature of the Board's financial position is that the expenditure from the Revenue Fund for the year roughly approximated the actual receipts. As explained later in this report, however, the receipts for the year show an unduly inflated figure, due to the late issue of the number-plates for motor-vehicles in the year 1926. For the purpose of gauging the true position it may be pointed out that the Board's average revenue for the past two years from all sources has been £458,748. The anticipated revenue for the year ending 31st March, 1928, is £530,000, but it is expected that the expenditure from the Revenue Fund will reach £750,000, an estimated excess of expenditure over income of £220,000. This position has been brought about through the Board framing its policy of increased maintenance subsidies with the object of reducing its credit balance in the Revenue Fund, which was appreciably augmented by the accumulations in the first two years of its operations. It is a fact also that the great increase in motor-vehicles has demanded a corresponding increase in expenditure on maintenance, and had the Board not increased its rate of subsidy, as explained later in this report, the position would have been most unsatisfactory not only from the point of view of the travelling public, but also from the point of view of the local authorities of the Dominion, who would have been called upon to shoulder an unbearable burden. Indeed, even with the increased subsidies, the local authorities of the Dominion during the past year found a sum of £91,334 in excess of their contribution for the previous year. There also has been an insistent demand from several parts of the Dominion that the Board should spend its accumulated funds at an even greater rate than the above figures disclose. It is obvious that the surplus in the Revenue Fund will be very quickly absorbed, and if the present standard of maintenance is to be retained under the ever-increasing motor traffic it will be necessary for the Government to furnish the Board with additional revenue.

As has been the case since the commencement of the Board's operations, the bulk of the construction work during the year under review has been carried out in the North Island, but it is gratifying to record that the local authorities of the South Island have applied for their full share of the Construction Fund for the year 1927–28.

The direction contained in section 21 of the Main Highways Act, 1922, providing that the Customs duty on tires and the annual revenue from motor registrations and licenses shall be apportioned between the North and South Islands in accordance with the number of motor-vehicles in each Island at the 31st March of each year has been rigidly adhered to.

The annual review of main highways, as provided under the Act, resulted in the receipt by the Board of applications for a considerable length of additional highways, but in view of the financial position of the Revenue Fund as outlined above only a very small percentage of the applications were recommended to you for declaration.

Appended to this report is a map of each island showing the main-highway system at the 31st March, 1927. The maps also indicate those sections of main highway which are not yet in such condition as to be available for motor traffic in wet weather.

During the last session of Parliament the Main Highways Amendment Act, 1926, was passed, embodying several recommendations made by the Board as the result of its previous year's experience.

In last year's report the Board commented on the desirability, in some parts of the Dominion, of amalgamation of counties. The progress in this direction, however, has been disappointing.

During the past year the Dominion has experienced a slight depression, with corresponding difficulties in regard to unemployment. The Board has regarded it as its duty to co-operate with the Government in relieving the position.

The Board records its appreciation of the work which has been done during the year by District Highway Councils. It can be realized that it is not always possible to accept recommendations made by District Highway Councils, as the members of these bodies have not the same opportunity of keeping in touch with the financial situation as Board members, nor are they always in a position to view matters from a national standpoint. Nevertheless, all recommendations made by District Highway Councils receive the most careful consideration. The Board, moreover, fully realizes that the work of District Councils cannot be measured merely by recommendations passed on to it. Their work involves a great deal of local negotiation and discussion which do not come directly under the Board's notice.

The Board also wishes to place on record its appreciation of the enthusiastic co-operation which has been accorded its policy by its representatives in the various districts, together with the whole of their staffs.

With the object of gaining first-hand knowledge of local problems and at the same time keeping in touch with those responsible for local-authority administration throughout the Dominion, the Board during the year made two comprehensive tours of the North Island, traversing the greater portion of the primary highway system. Opportunity was taken on the occasion of the visit to the North Auckland District to inspect three different routes which had been investigated for the purpose of deciding on the future main artery north of the City of Auckland. It is proposed that the Board undertake a tour of the South Island during the year 1927–28.

Personal.

Mr. J. D. Bruce, one of the members representing the New Zealand Counties Association, and a foundation member of the Board, by reason of ill health retired on the 27th July, 1926, and on the same date Mr. C. J. Talbot, Fairlie, was appointed to fill the consequential vacancy. On Mr. Bruce's retirement the Board placed on record, by resolution, its very great appreciation of the valuable services rendered by him during his term of office. It is with deep regret that the Board has to record the subsequent death of Mr. Bruce, which took place on the 28th August, 1927.

Early in April, 1926, Mr. F. W. Furkert, Chairman of the Board, proceeded abroad on a twelve-months world tour. Whilst in Italy in September, 1926, he attended, as the official representative of New Zealand, the Fifth International Road Congress at Milan. During Mr. Furkert's absence from New Zealand Mr. C. J. McKenzie, Assistant Engineer-in-Chief of the Public Works Department, held the position of Chairman.

As this report is going to press the sad news has been received of the untimely death, on the 8th September, 1927, of Mr. P. S. Waldie, Chief Clerk of the Public Works Department, who has been an active member of the Board since April, 1924, and it is desired here to record our appreciation of the loyal and efficient service rendered by Mr. Waldie during the three years he was associated with us.

Main Highways Amendment Act, 1926.

Several amendments to the Main Highways Act, 1922, were brought into operation by the passing of the Main Highways Amendment Act, 1926. The most important amendment authorized the Board to increase its subsidy towards the cost of maintenance from £1 for £1 to £1 10s. for £1. The effect of this amendment is that the Board is now paying 60 per cent. of the cost of maintenance of ordinary main highways, whereas the original Act provided for a contribution of 33 per cent. only. The Board was also authorized, in special cases, to increase its maintenance subsidy to local authorities without the necessity for declaring the sections of main highways involved to be Government roads. Another clause in the Amendment Act aims at giving further assistance towards the cost of maintenance in boroughs where large bridges are situated on continuations of main highways. The Board was also given power in the amending Act to advance on loan to local authorities sums not exceeding in the aggregage £50,000, the maximum period of any such loan being limited to ten years. Although several inquiries were made concerning this, only one application, of £3,400, was finalized in terms of this provision.

Declaration of New Main Highways.

In pursuance of section 11 of the Main Highways Act, 1922, the usual annual review of main highways was made and District Highway Councils submitted recommendations for new highways totalling 693 miles in length. The following roads, of a total length of 187 miles 75 chains were declared, bringing the total length of main highways in the Dominion, less the mileage revoked, up to 6,390 miles 77 chains :—

	M.	ch.
No. 2 Highway District—		
Papakura–Clevedon	7	73
No. 5 Highway District—		
Napier–Wellington, via Wairarapa (extension)	0	31
Omahu–Tukituki River Bridge via Hastings and Havelock	12	0
Farndon–Hastings	5	0
No. 11 Highway District—		
Takaka–Terakohe	7	10
Nelson–Westport (Jenkins Hill)	1	32
No. 12 Highway District—		
Loopline Road	9	0
No. 13 Highway District—		
Hanmer–Jollie's Pass	2	0

	M.	ch.
No. 14 Highway District—		
Darfield–Rakaia (via Glentunnel)	26	0
No. 16 Highway District—		
Alexandra–Clyde	7	50
No. 17 Highway District—		
Balclutha–Owaka	23	0
Balclutha – Tuapeka Mouth	20	40
Dunedin–Invercargill (extension)	2	31
Tapanui Railway-station Road	1	8
No. 18 Highway District—		
Invercargill–Fortrose	25	14
Gore–Winton	37	26
Total	187	75

The declaration of the Omahu – Tukituki River Bridge via Hastings and Havelock Main Highway, and the Farndon–Hastings Main Highway, in the No. 5 Highway District, involved a change of routes only, the declarations as originally made being simultaneously revoked. This was also the case with the Gore–Winton Main Highway, in the No. 18 Highway District, which was gazetted in lieu of the previously declared route, Mataura–Winton.

Declaration of New Government Roads.

During the year a number of new Government roads were declared, involving a length of 73 miles 72 chains. The total length of highways declared to be Government roads at the 31st March, 1927, less the mileage revoked, was 1,562 miles 65 chains. The following are the Government road declarations for the year :—

	M.	ch.
No. 1 Highway District—		
Wayby–Maungaturoto	5	20
No. 2 Highway District—		
Great South Road	9	58
No. 6 Highway District—		
Kawhia to Auckland–Wellington via Kawa	2	40
Stratford–Taumarunui	7	60
No. 8 Highway District—		
Auckland–Wellington via Taranaki	9	0
No. 9 Highway District—		
Auckland–Wellington via Taranaki	2	24
No. 10 Highway District—		
Wellington–Napier via Wairarapa	1	40
No. 11 Highway District—		
Richmond–Collingwood	0	20
No. 12 Highway District—		
Loopline Road	9	0
No. 16 Highway District—		
Palmerston–Queenstown via Beck's	6	10
No. 17 Highway District—		
Balclutha – Tuapeka Mouth	20	40
Total	73	72

The declaration of the following section of Government road was revoked: No. 16 Highway District—Palmerston–Queenstown, via Beck's, 6 miles 10 chains.

Finance.

The actual contributions to the Board's Revenue Fund from external sources for the year 1926–27 amounted to £507,413. The following tabulation shows how this total is made up, together with the comparative figures for the year 1925–26 :—

	1926–27. £	1925–26. £
Transfer from Consolidated Fund	35,000	35,000
Proceeds of tax on tires and tubes, collected through the Customs Department	188,450	223,699
Registration and license fees of motor-vehicles	283,963	78,038
	£507,413	£336,737

The extraordinary difference between the figures showing the revenue from registration and license fees of motor-vehicles in each year is explained by the fact that there was considerable delay in 1926 in the issue of number-plates for motor-vehicles, with a corresponding lag in the payment of the fees by motor-vehicle owners. The total revenue for the two years from the sources referred to amounted to £844,150, or an average of £422,075.

The estimated revenue for the current year from the same sources is £510,000, made up as follows:—

	£
Transfer from Consolidated Fund	35,000
Proceeds of tax on tires and tubes, collected through the Customs Department	175,000
Registration and license fees payable by motor-vehicle owners	300,000
	£510,000

In addition, subsidiary sources of income are estimated to yield £20,000, making a total of £530,000.

At the time of writing this report the total applications for funds submitted in connection with the current year's maintenance appropriations amount to £700,000, to which must be added overhead expenses, interest charges on capital borrowed, as well as expenditure on plant, &c. The indications are that the total cash required from the Revenue Fund will approximate £750,000.

For the year ending 31st March, 1927, the appropriations and expenditure under the Revenue Fund were as follows:—

——	Available for Authorization.	Appropriated.	Expenditure.	Percentage of Expenditure to Appropriations.
	£	£	£	
North Island	364,087	364,087	284,594	78·17
South Island	167,220	167,220	154,168	92·19
Administration charges	30,000	30,000	27,118	90·39
Commission paid to Postal Department for collection of motor registration and license fees	21,500	21,500	8,885	41·33
Miscellaneous payments, including recoupment of interest on loans to Consolidated Fund	65,500	65,500	72,325	110·42
Totals	648,307	648,307	547,090	84·38

It will be seen that the total expenditure for the past year from the Board's Revenue Fund has been £547,090. The corresponding figure for the year ending 31st March, 1926, was £321,016. There are three main reasons for this substantial increase in expenditure—(1) The increase in the Board's maintenance subsidy from £1 for £1 to £1 10s. for £1 from the 9th September, 1926; (2) the willingness of local authorities to find a greater amount towards the cost of maintenance of the main-highways system, partly brought about by the Board's improved subsidy; and (3) the alteration by the Board on the 2nd December, 1926, of its definition of "maintenance" to include tar and bituminous sealing or surface treatment.

An analysis of the Board's expenditure and the expenditure by local authorities on actual maintenance, as distinct from interest on loans and other overhead charges, shows the following position:—

——	Board's Contribution.	Local Authorities' Contribution.	Total.	Percentage Board's Contribution to Total.	Percentage Local Authorities' Contribution to Total.
	£	£	£		
North Island	284,594	197,691	482,285	59·01	40·99
South Island	154,168	78,658	232,826	66·22	33·78
Totals	438,762	276,349	715,111	61·36	38·64

It will be seen that the local authorities have contributed towards the maintenance of main highways during the past year a total sum of £276,349. The corresponding figure for the year ending 31st March, 1926, was £185,015, so that there has been an increase in twelve months of almost exactly 50 per cent.

When announcing improved maintenance subsidies in the past, the Board has always pointed out that any additional funds thereby becoming available to the local authorities were for the purpose of meeting the additional cost of maintenance brought about by the increased motor traffic, and not for the purpose of reducing the amounts which the local authorities had already been finding towards the cost of maintenance of main highways. The above figures show conclusively that not only have the local authorities met the Board in this direction, but they have increased their annual burden by a very substantial amount. Moreover, the Board is quite satisfied in the cases of certain local authorities that the limit in this direction has been reached. The above figures also disclose that the Board is finding a greater percentage of the cost of maintenance of the main highways of the South Island than it is finding in the case of the North Island, the respective proportions being 1·96 to 1 and 1·44 to 1.

An analysis of the actual expenditure on maintenance in each Island as compared with the number of motor-vehicles in each Island at the 31st March, 1927, gives the following result, expressed in percentages of the Dominion totals :—

	Per Cent.
North Island—	
Maintenance expenditure	64·86
Motor-vehicles	61·86
South Island—	
Maintenance expenditure	35·14
Motor-vehicles	38·14

These figures show that, although the Board is treating the South Island more favourably as regards its average rate of subsidy over the whole, there is a balance of expenditure in favour of the North Island to the extent of 3 per cent. The corresponding figure for the year ending 31st March, 1926, was 4·4 per cent. in favour of the North Island.

In accordance with the direction contained in section 21 of the original Act, and following on the Board's resolution passed in May, 1925, an apportionment of the tire duty and license fees collected for the year ending 31st March, 1927, was made between the two Islands in proportion to the number of motor-vehicles registered in each Island on that date. In making this apportionment the interest and sinking fund on moneys borrowed for construction work in each Island have been charged against the allocation to each Island. The balances to the credit of the North and South Islands respectively were £317,823 and £324,920.

Shortly before the expiration of the year under review the Hon. the Minister of Finance informed the Board that he did not propose to borrow any funds for construction purposes for the financial year 1927–28 under section 12 of the Main Highways Act, 1922, and at the same time suggested that the Board should exercise the powers contained in subsection (2) of section 15 of the parent Act. The latter section provides that there may be at any time transferred from the Revenue Fund to the Construction Fund any moneys which in the opinion of the Board are not required for the purposes of the Revenue Fund The policy of the Board of gradually absorbing the surplus in the Revenue Fund by increased maintenance subsidies and a review of the position of the Revenue Fund, however, especially in the light of the increasing demands on this fund, made it apparent that such a transfer could not be permanently made without seriously depleting the surplus in hand, on the strength of which surplus the Board had framed its recent policy and had recommended payment of the increased maintenance subsidy of £1 10s. for £1. It was therefore agreed that the transfer should be of a temporary nature only, and that provision should be made for the reimbursement of any amounts so transferred to the Revenue Fund. In order to retain the allocation of the revenue between the two Islands in terms of section 21 of the original Act, the following resolution was passed by the Board : " That the moneys temporarily transferred from the Revenue Fund to the Construction Fund shall be allocated according to their use between the North and South Islands on the basis now in force in regard to the distribution of revenue funds received from motor-taxation."

For the year ending 31st March, 1927, the appropriations and expenditure under the Construction Fund were as follows :—

——	Available for Authorization.	Appropriated.	Expenditure.	Percentage of Expenditure to Appropriation.
	£	£	£	
North Island	600,595	409,810	424,353	103·55
South Island	181,273	123,690	116,009	93·79
Administration charges and compensation for accidents to workmen	21,500	21,500	33,500	155·81
Totals	803,368	555,000	573,862	103·40

An analysis of the Board's expenditure and the expenditure by local authorities under the Construction Fund shows the following position :—

——	Board's Contribution.	Local Authorities Contribution.	Total.	Percentage of Board's Contribution to Total.	Percentage of Local Authorities Contribution to Total.
	£	£	£		
North Island	424,353	225,042	649,395	65·35	34·65
South Island	116,009	30,818	146,827	79·01	20·99
Totals	540,362	255,860	796,222	67·87	32·13

During the year the Government was faced with the problem of unemployment. It was recognized by the Board that the inauguration of road-improvement schemes would assist largely in relieving the position, and it was accordingly resolved to co-operate to the fullest extent, consistent with the finances available. As a result a number of new road-improvement works have been put in hand, some of which, however, are a few years in advance of requirements.

Maintenance.

The Board has continued its efforts to secure better maintenance of the main highways, and it is gratifying to be able to report further progress in this direction in spite of the ever-increasing demands of traffic. During the past year many more local authorities have obtained up-to-date plant, and the attention now given to gravel and pumice roads in the way of regular grading is much more intense than heretofore, with corresponding benefits to the travelling public. In particular, power graders of various types are being used in ever-increasing numbers.

It is interesting to compare the average cost of maintenance per mile per annum during the three years since the Board commenced its operations. The figures are—1924–25, £51·7 per mile; 1925–26, £73·2 per mile; 1926–27, £111·9 per mile. The very substantial increase during the past year has been due to several causes, the principal ones being the more favourable subsidy granted by the Board, and the increased funds provided by the local authorities. The increase in cost of maintenance during the past three years is almost an exact reflection of the increase in the number of motor-vehicles, the figures in both cases having slightly more than doubled. In the same period the Board's statutory contribution to maintenance has increased from 33 per cent. to 60 per cent.

In order to assist and educate those responsible for the maintenance of highways, the Board issued early in 1927 its first bulletin, entitled "Highway Maintenance." The publication comprises fifty-one pages, and is very amply illustrated. Copies of the bulletin were supplied free of charge to all members of County Councils and all County and Borough Engineers in the Dominion. To meet the public demand copies are available for sale at a nominal charge.

Construction.

Considerable progress has been made with construction work during the past year, particularly in the North Island. The Board has continued its policy of closing up unmetalled gaps in the main-highway system, although one or two schemes involving work of this nature have been temporarily retarded by the unwillingness of the local authorities to find the relatively small proportion of the cost which has been required by the Board before authorizing the commencement of operations.

Work was continued on the Waitakaruru section of the Pokeno–Waihi Main Highway, but the connection was not quite completed by the end of last construction season. A considerable amount of surfacing-work was carried out on the Mamaku Bush section of the Hamilton–Rotorua Main Highway, resulting in greatly improved conditions for the travelling public. A portion of the highway in this locality is being deviated, and when the surfacing of this deviation is complete and a topping of shingle placed on the soft rhyolite foundation all-the-year-round access will be available to the thermal district.

In the vicinity of Auckland a considerable length of concrete pavement has been laid down, and although a large number of local authorities have been concerned in the work, wonderful co-operation has been displayed in achieving the construction of a continuous length of high-class road. The result is that the motorist can now travel on practically an unbroken ribbon of concrete from the Township of Henderson, north of the City of Auckland, to the Township of Papakura, in the south, a distance of nearly 30 miles.

In the vicinity of the City of Wellington the Board has subsidized the cost of a considerable leng t of bituminous concrete pavement constructed by the Wellington City and Suburban Highways Board under the special local legislation passed in 1924.

In the Hawke's Bay County, adjacent to the Town of Napier, 1 mile of concrete pavement and 4 miles of bituminous concrete pavement were completed.

Several counties have proceeded with very comprehensive surfacing schemes involving the use of the cheaper forms of bituminous construction. In particular, the Counties of Horowhenua, Egmont, and Matamata have made great progress.

In the South Island bituminous construction has been limited to a few miles in the vicinity of Christchurch, Timaru, and Invercargill.

The erection of a number of important bridges has been undertaken during the year, the principal of which are the following: Waihou River Bridge at Kirikiri, 1,520 ft. in length; Selwyn River Bridge, 1,050 ft.; Waioeka River Bridge, 1,000 ft.; Manawatu River Bridge near Shannon, 720 ft.; Mokau River Bridge, 660 ft. Two of these bridges provide passages for navigation purposes—the Waihou Bridge by means of a swing span, and the Mokau Bridge by means of a lift span. The completion of the Mokau Bridge will eliminate the last ferry on the primary highway system of the Dominion.

To expedite the approval of small construction projects, power was given to the Board's representatives in the various districts to approve proposals submitted by local authorities in the case of formation, gravelling, and metalling up to an estimated cost not exceeding £1,000, and in the case of structures up to an estimated cost not exceeding £500. This step was found possible by reason of the better knowledge and appreciation of the Board's requirements displayed by local authorities.

In regard to standards of construction, the Board has continually endeavoured to improve alignment and sight distance consistent with the funds available, the improvement of grades being regarded as of secondary importance. While an endeavour is made to obtain grades not steeper than 1 in 15 on the primary highway system, nevertheless proposals have been approved for retaining grades as steep as 1 in 11 where the alignment has been good.

Relief Works.

As previously mentioned in this report under finance, the Board has endeavoured to assist the Government and local authorities as far as possible in relieving the unfortunate unemployment which has been evident during the past two years. Works of appreciable magnitude have been commenced in a number of districts, the most important being the Bombay Hills deviation on the Auckland–Wellington Main Highway, the Kaimai section of the Matamata–Tauranga Main Highway, the Johnsonville–Porirua section of the Wellington–Auckland Main Highway, the Rimutaka Hill section of the Wellington–Napier Main Highway, the Gisborne–Wairoa via Hangaroa Main Highway, the Te Kuiti – Bull's via Taumarunui Main Highway, the Waitati–Merton section of the Dunedin–Christchurch Main Highway, the Dunedin–Portobello Main Highway, and the Balclutha–Tuapeka Mouth Main Highway. On these works an average number of six hundred relief workers have been employed.

Purchase of Plant.

The policy of purchasing and hiring plant on the hire-purchase system to local authorities has been continued, and considerable further advantage has been taken of the scheme—in fact, the Board regards it as one of the most useful and helpful phases of its operations. The total value of plant now on hire-purchase to local authorities is £59,922.

The following statement shows the plant ordered and hired to local authorities from the 31st March, 1926, to the 31st March, 1927, the amount involved being £29,151 : Road-rollers, 4 ; one-man-power graders, 12 ; ordinary road-graders, 3 ; crushers, 3 ; motor-lorries, 14 ; tractors, 3 ; bitumen-heater, 1 ; bitumen-sprayer, 1 ; water-cart, 1 ; conveyors, 3 ; elevator, 1 ; electric motors, 2 ; and a number of minor items.

In addition to the above, the Board has purchased the following plant for its own use at a total cost of £12,792 : Road-roller, 1 ; one-man-power graders, 4 ; ordinary road-grader, 1 ; crusher, 1 ; motor-lorries, 7 ; traction-engine, 1 ; tractors, 4 ; bitumen-heaters, 2 ; bitumen-sprayers, 2 ; air-compressors, 3 ; concrete-mixers, 2 ; road-sweeper, 1 ; oil-driven excavator, 1 ; and a number of minor items.

Elimination of Railway-crossings.

In last year's report it was intimated that a mutually satisfactory programme of railway-crossing eliminations had been arranged between this Board and the Railway Department. It was left to the Main Highways Board to obtain from the local authorities concerned such contributions as were considered to be commensurate with the local interest. Negotiations have proceeded in connection with a number of crossings which were selected as being the most urgent cases for elimination, and contributions ranging from 5 per cent. to 30 per cent. of the total cost have been obtained from the local authorities. Where satisfactory arrangements have been completed work has been proceeded with. The elimination of the following crossings is in hand :—

Auckland–Wellington via Taranaki Main Highway : Crossing at Turakina.
Wellington–Napier via Wairarapa Main Highway : Crossings at Piripiri and Matahiwi Hill.
Blenheim–Christchurch via Parnassus : Crossing at Weka Pass.

Schemes and detailed plans have been prepared for the elimination of the following crossings :—

Auckland–Wellington via Taranaki Main Highway : Crossings at Porirua, Hawera, and Paraparaumu.
Dunedin–Christchurch Main Highway : Crossing at Tumai.

Road-signs.

In last year's report the Board intimated that it had decided to subsidize the cost of erection of road-signs by local authorities and automobile associations to the extent of £1 for £1. It is gratifying to note that automobile associations are taking advantage of the Board's subsidy, with appreciable benefits to the travelling public.

County boundary signs have been erected by the local authorities concerned in many parts of the Dominion in accordance with a design prepared by the Board and with the assistance of the Board's subsidy.

Testing of Highway Materials.

The Petrological Laboratory has continued to carry out the standard tests on roadmaking materials. Table 6 shows the results of the year's operations. In addition, the usual granulometric analyses of gravels and sands were undertaken. The testing of samples of tar, bitumen, and bituminous concrete was carried out as usual by the Dominion Analyst, Wellington.

Examination of Foremen and Overseers employed on Road-construction.

A second examination of foremen and overseers for the purpose of issuing certificates of competency was held on the 14th January, 1927. Forty-eight candidates sat for the examination, out of which six obtained a complete pass, and eight a partial pass. Certificates have now been issued to the following successful candidates : P. S. Finlayson, W. J. Hawkes, O. G. Hewison, J. H. Kendall, B. L. Larson, R. M. Lankshear, J. G. Mahood, O. R. Marshall, F. F. Maynard, J. G. McIvor, F. Muggeridge, H. J. L. Wotten.

Progress Report.

The following statement shows the more important construction work carried out under the control of the Main Highways Board during the year ended 31st March, 1927 :—

Broadwood–Kaitaia.—The unmetalled section between Herekino and Kaitaia has been metalled during the year.

Victoria Valley – Mangonui.—1¾ miles of this section has been reconstructed and metalled.

Te Karae – Mangamuka.—During the year this highway has been reconstructed from Tutekehua through the Mangamuka Gorge for a length of 3 miles.

Kohukohu – Te Karae.—A length of 2 miles 30 chains within the Hokianga County has been formed, and a total length of 3 miles of lower-course metalling completed.

Kawakawa–Mangamuka.—Rangiahua – Mangamuka Section: 5¼ miles of this section has been reconstructed.

Waimamaku–Ohaeawai.—Bay of Islands County Section: A length of 45½ chains of this highway has been formed and metalled between Kaikohe and Ohaeawai. The Taheke deviation, extending over a distance of 91 chains, has also been formed.

Mangatoa Bridge: The erection of this bridge is in hand.

Hokianga County Section: The bridge over the second crossing of the Pakanae River has been completed, and that over the third crossing is in hand.

Waimamaku–Pakanae Section: 2 miles 4 chains of this section had been re-formed and metalled.

Maungatapere–Kaikohe.—Whangarei County Section: A number of bad corners have been improved, and the surfacing has been strengthened between Parakao and Titoki. Beyond Pakotai the metalling has been extended 1 mile 17 chains. In the Mangakahia Gorge over 1½ miles of highway has been widened. Work has also been undertaken in the Awarua Gorge.

Bay of Islands County Section: A further 4 miles of formation and 3¼ miles of metalling south of Kaikohe have been carried out.

Ruakokopu Bridge: This bridge, consisting of two 30 ft. spans, of rolled-steel-joist construction on ironbark piles, has been completed.

Whangarei–Kawakawa.—Whakapara Bridge: A new bridge, consisting of three 40 ft. spans of rolled-steel-joist construction with hardwood superstructure, is in hand.

Hukerenui–Kawakawa Section: 78 chains of this section has been metalled.

Wayby–Maungaturoto.—Mainene Bridge: The concrete pier and abutments have been completed.

Breakneck Valley Bridge: The concrete piers for this bridge have been completed, and the rolled-steel joists placed in position.

Topuni Bridge Approaches: These approaches have been metalled.

Kaiwaka–Maungaturoto: 21 chains of re-forming and metalling have been completed north of Kaiwaka.

Kaiwaka–Mangawai.—44 chains of formation and metalling of this highway are in hand.

Dargaville – Maungaturoto.—Hardie's Bridge – Junction at Paparoa: 2 miles of this section has been re-formed and metalled.

Hardie's Bridge: This bridge, consisting of five 40 ft. spans, is being built.

Donovan's Deviation: A foundation course of sandstone has been placed on 60 chains of this deviation.

Waiwera–Mangawai.—Hoteo River Bridge: This reinforced-concrete bridge and approaches were completed during the year.

Falls Creek Bridge: This bridge, consisting of one 30 ft. span, rolled-steel joists, and hardwood superstructure on concrete abutments, has been completed.

Tomorata–Mangawai Section: 64½ chains of formation on this section has been completed, and the metalling is in hand. This work will provide a completely metalled surface between Mangawai and Tomorata.

Warkworth-Kaipara Flats.—60 chains of wearing-course metal has been laid during the year.

Helensville-Waiwera.—Wainui–Waiwera Section: A length of 1 mile 11 chains has been formed and surfaced with gravel.

Auckland – Wainui, via Birkenhead.—Birkenhead – Albany: A contract has been underway on this section for two years, but the progress has not been satisfactory. Half of the formation work has been completed, and metalling is in hand.

Albany – Dairy Flat Section: A lower course of limestone has been laid for a distance of 64 chains beyond the Pukeatua Trig.

Kumeu–Albany.—North of Riverhead 105 chains of this section has been formed and metalled.

Auckland–Helensville.—An 18 ft. concrete pavement has been completed between Auckland City and the northern boundary of Henderson Town District.

Waitakere Section: 73 chains of lower-course metalling has been carried out on this section.

Great South Road.—The construction of the concrete pavement through the Ellerslie Town District, Manukau County, Papatoetoe Town District, Manurewa Town District, and Papakura Town District is well in hand. 7 miles 29 chains has been completed and the remainder is well under way.

Bombay Hills Deviation: 4 miles of this deviation has been formed and all necessary culverts installed.

Mercer–Ngaruawahia: 66 chains of first-coat bituminous sealing has been carried out near Whangamarino Station.

Pokeno–Waihi.—At Waitakaruru a length of 3 miles 48 chains of widening and metalling has been completed. An additional span of 15 ft. has been added to the Waitakaruru Stream Bridge.

Pokeno–Waihi Junction to Coromandel.—A ferry has been installed at Pipiroa.

Waihou River Bridge: Twelve piers of this bridge have been completed and steel girders have been placed in position over eight spans. The piles for the central swing span are being driven. Material for the approaches to this bridge is being obtained from the river by means of a dredge.

Thames County Section: A deviation 51 chains in length has been completed near Waikawau.

Kopu – Raglan.—Kopu – Wharehoe Stream: 2 miles of this section has been reconstructed in preparation for sealing.

Hamilton–Rotorua.—Mamaku Bush Section: 8 miles 56 chains of this section has been surfaced with rhyolite during the year, thus completing a total length of 10 miles. A 4-mile deviation is in hand.

Steel's Mill–Tarukenga: A deviation 1 mile 66 chains long has been put in hand, and a length of 63 chains has already been formed.

Tarukenga–Ngongotaha: The lower course of metalling on this section has been completed for a distance of 95 chains.

Ngongotaha–Rotorua: A 4-mile length of this section has been metalled with rhyolite and given a top course of shingle.

The whole of the section between Steel's Mill and Rotorua is now surfaced.

Waitoa–Taupo.—Matamata County Section: South of Putaruru 4 miles 64 chains of lower-course metalling has been completed, and 4 miles 10 chains has received a wearing-course of bituminous macadam. Between Hinuera and the northern county boundary 6 miles 33 chains of first-coat sealing-work has been carried out, and the second coat of bitumen has been applied over a length of 1 mile 64 chains.

Atiamuri–Wairakei: 8½ miles of this section has been widened and reformed. Damp sections of the highway have been surfaced with pumice.

Tauranga–Matamata.—Matamata County Section: 1 mile 18 chains of this section has received a first sealing-coat.

Tauranga County Section: The remaining 15 chains of metalling at Kaimai has been completed, and work is in hand on the linking-up of the metalling between Nganuawahine and Ruahihi Bridge. A deviation 37 chains long has been completed. The Tauranga side of the range is now passable to motor-vehicles in practically all weathers.

Whakatane–Rotorua.—West Bank Section: A further 140 chains of metalling has been completed on this section, and a deviation 48 chains long at Onepu has also been completed.

Te Ngae–Rotorua: The formation and the lower course of metalling have been completed for a distance of 4 miles 22 chains, and the wearing-course has been placed for a length of 1 mile 50 chains.

Te Ngae–Paengaroa.—Four small deviations, totalling 1 mile 22 chains, have been completed.

Tauranga–Waihi.—40 chains of metalling has been completed between Tauranga and Te Puna. Two miles of the section between Tuapiro Bridge and Athenree has been metalled, thereby completing the surfacing between Waihi and Aongatete.

Whakatane–Tauranga.—The Rangitaiki Bridge, consisting of six 20 ft. spans and one 62 ft. span, has been completed.

Gisborne–Whakatane, via Motu.—Waiawa Bridge, consisting of one 80 ft. and one 20 ft. span, has been completed.

Waioeka River Bridge: This reinforced-concrete bridge, consisting of twenty-five 40 ft. spans, is well in hand. Twenty-two piers have already been built. The beams and decking have been completed for ten spans.

Waikohu County Section: 1¾ miles of this section has been re-formed and metalled during the year.

Rotorua–Taupo.—10,163 cubic yards of pumice has been used for surfacing on this section during the year. The metalling of Hickey's Flat over a length of 1 mile 11 chains has been completed.

Gisborne–Opotiki, via the Coast.—Between 19 m. and 33 m. the lower course of metalling has been completed. The top course of metal has also been placed over a length of 9 miles.

Waiapu County Section: 3½ miles of this section has been re-formed and metalled, and three bridges over the Kopuaroa Stream have been erected.

Kai Inanga Section: 2 miles of this section has been surfaced with metal.

Rotokautuku Bridge–Tikitiki: Formation of this section has been completed, together with all bridges and culverts except the Whakatu and Mangaoporo Bridges.

Matakaoa County Section: 2¼ miles of this section has been re-formed and metalled.

Gisborne–Wairoa, via Hangaroa.—Cook County Section: 1 mile 50 chains of this section has been formed, and further formation and metalling is in hand. Work is in hand on a deviation between 31 m. and 38 m.

Wairoa County Section: The remaining 74¼ chains of unsurfaced highway on this section has been metalled.

Ring's Bridge Deviation: This work has been completed.

Marumaru Bridge Deviation: This bridge has been replaced by a waterdrive and filling.

Sunken Bridge: This bridge has been replaced by a culvert.

Opoiti Bridge: Repairs to the piers and superstructure of this bridge have been carried out.

McRae's Bridge: The renewal of this bridge and the formation of the approaches are in hand.

Napier–Gisborne, via Morere.—Cook County Section: 1¾ miles of bituminous macadam (penetration) has been carried out between 4·8 m. and 6·7 m., and a further length of 3 miles has been completed between 32·3 m. and 35·3 m.

Roadman's Bridge Deviation: This deviation, near Morere, has been formed and metalled. A further deviation past Morere Hotel has been carried out to eliminate two bad corners and improve the grade.

Waikare Gorge: Widening and improvements to the alignment in the southern end of the Gorge have been completed.

West Shore Embankment: A start has been made with the first sealing-coat of this embankment.

Napier–Wellington, via Wairarapa.—Hawke's Bay County Section: 1 mile of concrete pavement south of the Napier Borough has been completed. The bituminous concrete pavement extending from the southern end of the above concrete pavement to the junction with the Farndon–Hastings Main Highway has been completed, except for a small section near the Waitangi Washout.

Pakipaki Deviation: Work on this deviation is in hand.

Kaikoura Stream Bridge: This bridge, consisting of a 40 ft. rolled-steel-joist span on concrete abutments, has been completed.

Corkscrew Gully Deviation: The formation of this deviation has been completed and the lower course of metal laid.

Waipawa–Waipukurau: Widening of this section has been completed, and the 2 miles south of the Waipawa River Bridge has been sealed.

Deviation at Takapau: The metalling of this deviation has been completed.

Dannevirke County Section: First-coat sealing-work has been carried out from Mangatera to the Whakaruatapu deviation, a length of 3 miles. Similar work has been undertaken for a length of 1 mile from the Dannevirke Borough boundary southwards.

Piripiri Widening: This widening has been completed.

Piripiri Deviation: The formation of this deviation has been completed, together with the first course of metal.

Whakaruatapu Deviation: The formation work of this deviation is complete except for the cutting between pegs 30 and 41. The foundations of the bridge have been commenced.

Woodville County Section: The second coat of bituminous sealing has been completed for a distance of 2 miles, from Oringi railway-crossing to the northern county boundary. The widening between Woodville and northern county boundary has been completed.

Matahiwi Hill Deviation: This deviation, which will eliminate two railway-crossings, is well in hand. Culverting and formation work have been completed from peg 38 to the southern end of the deviation. A steam-shovel is at work in the big cutting between peg 17 and peg 26.

Petane–Taupo.—A small deviation at Waipahihi to improve the alignment and grade has been completed.

Mohaka River Bridge: Extensive repairs to this bridge have been carried out.

Deviation at 25 m.: This deviation has been completed.

Farndon–Hastings.—A bituminous-concrete pavement has been laid on 75 chains of this highway through Clive Township.

Havelock–Tukituki.—Waimarama Deviation: A start has been made with this deviation.

Napier–Omahu.—Taradale Town District: A further mile of first-coat sealing-work has been carried out.

Otane–Elsethorpe.—Old Waipawa River-bed Culvert: This culvert, consisting of four 11 ft. openings, has been completed.

Dannevirke–Waipukurau, via Porangahau.—Mangaongaonga Stream Bridge: This bridge, consisting of two 15 ft. spans and one 24 ft. span, has been completed.

Greatford–Woodville, via Feilding and Ashhurst.—Woodville Borough to Manawatu Gorge: Two small rubble walls have been built between the highway and the railway. The whole of this section has now been sealed.

Bridge at 0 m. 32 ch.: This bridge consists of one 60 ft. and one 40 ft. span alongside each other. The half-width of this bridge (60 ft. span) has been completed and opened to traffic.

Kawhia–Junction Auckland–Wellington Road, via Kawa.—Oparau River–County Boundary: 2 miles 15 chains of this section has been widened and metalled.

County Boundary to Waipa River: A 4 ft. by 3 ft. culvert, 20 ft. long, has been built near Te Rauamoa.

Auckland–Wellington, via Taranaki.—Puniu River–Hangatiki: A culvert 20 ft. long has been constructed to replace a small bridge.

Hangatiki–Te Kuiti: 1 mile 76 chains of formation and 22 chains of metalling have been completed.

Clifton County Section: A further 70 chains of bituminous macadam (penetration) has been carried out 5 miles south of the Mokau River, and $2\frac{1}{2}$ miles of surface sealing has been completed near Uruti.

Mokau River Bridge: The erection of this bridge, 660 ft. in length, had progressed favourably. The structure is nearing completion, and the approaches are well in hand.

Taranaki County Section: The Lepperton Junction railway-overbridge has been widened to 18 ft.

Inglewood County Section: An additional mile of bituminous macadam (penetration) has been completed north of Inglewood, and 1 mile 51 chains of similar work has been completed between Rugby Road and Tariki.

Patea County Section: 1 mile 68 chains of this section has been re-formed. A total length of 4 miles 16 chains has been remetalled, and 1 mile 53 chains has been surfaced with bituminous macadam.

Waverley Racecourse Deviation: This deviation, which eliminates two dangerous railway-crossings, has been completed.

Turakina Railway-crossing: The elimination of this crossing is well in hand.

Hangatiki–Lemon Point.—1 mile 40 chains of this highway has been widened and metalled.

Lepperton Junction–Hawera, via Opunake.—A total length of $6\frac{1}{4}$ miles of bituminous macadam (penetration) has been completed during the year. Between Nopera Road and Ouri River a length of 60 chains has been sealed with bitumen.

New Plymouth–Kaimata, via Inglewood.—Waiwakaiho River to Inglewood: Several short gaps of this section, totalling $\frac{1}{2}$ mile, have been surfaced with bituminous macadam.

Ngatoro Stream Bridge: This reinforced-concrete bridge, 120 ft. long, has been completed.

Maketawa Stream Bridge: This reinforced-concrete bridge, 164 ft. long, has been completed.

Eltham–Opunake.—Egmont County Section: $4\frac{3}{4}$ miles of this section has been sealed with bitumen, and a further $3\frac{1}{2}$ miles has been surfaced with bituminous macadam (penetration).

Mangahume Stream Bridge: This reinforced-concrete bridge, 60 ft. long, has been completed.

Opunake Town District: 91 chains of this section has been surfaced with bituminous macadam.

Te Kuiti–Bull's, via Taumarunui.—Kurakura Road Deviation: 1 mile 11 chains of the formation has been completed.

Ohura Road Section: 3 miles 25 chains of this section has been formed, and a further 20 chains of formation has been completed on the Hiwi Road.

Taumarunui–Raurimu: 1 mile 20 chains of formation has been completed near Raurimu, and one rolled-steel joist bridge, 53 ft. long, has been erected.

Raurimu – Kaitieke County Boundary: 1 mile 60 chains of formation has been completed.

Waimarino County Section: 45 chains of metalling has been carried out between Rangataua and Karioi.

Hunterville Town District: 44 chains of this section has been reformed and metalled, and one culvert 10 ft. by 9 ft. has been lengthened.

Piopio–Tatu.—Waitomo County Boundary to Harvey Road Junction: 3 chains of formation and 40 chains of metalling have been completed on this section.

Stratford–Taumarunui.—Paparata Saddle to Ohura County Boundary: 1 mile 2 chains of formation and 54 chains of metalling have been completed.

Ongarue River Bridge: The erection of the piers of this bridge is in hand.

Stratford County Section: 1½ miles of metalling has been carried out near Toko.

Whangamomona County Section: 2½ miles of metalling has been completed on the south side of the Whangamomona Saddle, thus completing the metalling of the saddle. The unmetalled gap between Te Wera and Whangamomona has been reduced to 8 miles.

Waingarara Stream Bridge: This reinforced-concrete bridge, 30 ft. long, has been completed.

Stratford – Junction Manaia – Mount Egmont.—Stratford County Section: A deviation 12½ chains long has been completed to ease the grades and curves near Cardiff.

Rangitatau East and Watershed.—67 chains of new metalling has been carried out on this highway during the year, thus completing the metalling up to Bruce Road—approximately 17 miles from the Kai Iwi Railway-station.

Wanganui–Horopito.—Upokongaro Stream Bridge, which consists of one 61 ft. truss span and two 10 ft. spans, has been erected in hardwood. 2 miles 37 chains of widening and metalling has been carried out during the year. The unmetalled section has been reduced to 12 miles 7 chains.

Ore Ore Stream Bridge: The erection of this 40 ft. rolled-steel-joist bridge on concrete abutments is in hand.

1 mile 29 chains of new metalling has been carried out from Mangawhero southwards, and a further 29 chains of metalling has been carried out on the southern end of the section.

Wellington–Auckland, via Taranaki.—Ngahauranga Gorge Section: Good progress is being made with the widening of this section. 60 chains has already been widened and 40 chains metalled. Seven old wooden bridges have been replaced by concrete culverts.

Johnsonville – Tawa Flat Section: 2 miles of this section has been widened and 1 mile metalled.

Porirua–Paremata Section: A second seal-coat of bitumen has been applied over a length of 60 chains.

Paremata–Waikanae: 8½ miles of this section has been widened to 24 ft., and 8 miles metalled. A portion of the metalled section has received the first seal-coat.

Waikanae–Levin: 9 miles 55 chains of this section has been widened, and a length of 4 miles 70 chains has been surfaced with bituminous macadam (penetration).

Sanson–Bulls Section: 66 chains of this section has been widened and metalled.

Palmerston North – Levin, via Shannon.—6 miles of this section has been widened, and a length of 3 miles has been surfaced with bituminous macadam (penetration).

Wellington–Napier, via Wairarapa.—Lower Hutt – Taita Section: 1 mile 60 chains of this section has been paved with bituminous concrete.

Silverstream Section: 53 chains of this section has been paved with bituminous concrete.

Upper Hutt Borough Section: 2 miles of this section has been paved with bituminous concrete.

Summit Mangaroa Hill to Foot Rimutaka Hill: 1 mile 15 chains of this section has been widened and metalled.

Greytown–Waiohine Bridge: A further 17 chains of bituminous macadam has been carried out, thus completing the surfacing of this section.

Waiohine–Waingawa Bridge: 2 miles 40 chains of this section has been metalled, and 1 mile 32 chains of bituminous macadam completed. A small concrete bridge, 11 ft. span, has been erected.

Waingawa Bridge – Masterton: A further 16 chains of this section has been surfaced with bituminous macadam.

Eketahuna Deviation: 38 chains of new formation, 24 ft. wide, has been completed.

Konini Bridge: This reinforced-concrete bridge, consisting of four 40 ft. spans, has been completed.

Warren's Bridge: This reinforced-concrete bridge, consisting of one 40 ft. span, has been completed.

Masterton–Martinborough, via Gladstone.—Waipopo Creek Bridge: This reinforced-concrete bridge consisting of one 20 ft. span, has been completed.

Carterton – Longbush Junction to Gladstone.—Booth's Creek Bridge: This bridge, consisting of one 40 ft. span, has been completed.

Featherston–Martinborough.—74 chains of this section has been widened and metalled. 1 mile 21 chains of bituminous-macadam work has been carried out. 2 miles 66 chains of surface-sealing has also been completed.

Weber–Masterton, via Alfredton.—Barton's Line – Mauriceville County Boundary: A further 84 chains of clay road has been metalled.

Eketahuna County Section: A reinforced-concrete bridge, consisting of one 58 ft. span and two 22 ft. spans, situated in the Alfredton Township, has been erected.

Greatford–Woodville, via Feilding and Ashhurst.—Lower Gorge Bridge to Manawatu Gorge: 55 chains of widening and metalling has been carried out.

Nelson–Blenheim.—Pike's Stream Bridge: This bridge has been completed and opened to traffic. A deviation, 8 chains long, has been carried out at McDowell's corner.

Ruapeka Stream Bridge: A reinforced-concrete bridge, 18 ft. span, is being erected.

Rai Hill Section: The widening of several dangerous corners on this section is in hand.

Nelson–Westport.—Annesbrook Overhead Bridge: The erection of this overbridge and approaches has been completed.

Doctor's Creek Bridge: The erection of this reinforced-concrete bridge, consisting of one 20 ft. span, has been completed, and the approaches are in hand.

Dellow's Bluff Widening: The widening and metalling of a dangerous section of this highway, 16½ chains long, has been completed.

Four River Plain Deviation: This deviation, 90 chains long, has been completed.

Richmond–Pakawau.—Motueka River Bridge: The construction of a further section of this bridge is in hand.

Washaway Creek Bridge: This bridge has been completed and opened to traffic.

Small's Creek Bridge: The erection of this 40 ft. concrete bridge is in hand.

Stoney Creek Bridge: The erection of this 48 ft. concrete bridge has been completed, and the approaches are in hand.

Parapara Bridge Protection: The gabions for the protection of this bridge have been completed.

Westport–Karamea.—Lake Creek Bridge: This bridge, 80 ft. in length, has been completed.

Renewal of bridges: Bridges Nos. 25, 27, 29, 31, 32, and 35 have been replaced by concrete pipes.

Bridge No. 9: This bridge has been completed.

McMaster's Creek Bridge: This bridge, consisting of two 25 ft. hardwood spans has been completed.

Nelson–Westport.—Ohikanui River Bridge: This bridge, 272 ft. long, consisting of hardwood trusses on cylinders and concrete piers with hardwood pile abutments, has been erected.

Frenchman's Creek Culvert: This work has been completed.

Inangahua Junction Combined Bridge: This bridge, consisting of nine 60 ft. steel-plate girder spans on reinforced-concrete cylinder piers has been completed. The northern approach is complete and the southern approach is in hand.

Bens Creek Bridge: This bridge, consisting of one 80 ft. hardwood truss on concrete abutments, has been completed.

Inangahua Junction – Waiho.—Little Grey River Bridge at Mai Mai: This bridge, consisting of three 61 ft. truss spans, has been completed.

Little Grey River Erosion at Marsden's: 17 chains of protective work has been erected.

Bridge near Kokatahi Track: This bridge, consisting of one 30 ft. rolled-steel-joist span on concrete abutments, has been completed.

Totara River Bridge: This bridge, consisting of two 60 ft. hardwood truss spans, has been completed.

Cowhide Creek Bridge: This bridge and protective work have been completed.

Dry Creek Bridge: The protective works for this bridge are almost completed.

Wataroa Deviation: This deviation, 63·55 chains long, has been formed.

Parker's Creek Bridge: This bridge, consisting of three 25 ft. spans, has been completed.

Christchurch-Blenheim, via Parnassus.—Clarence River Protective Works: 30 chains of wing groynes have been completed on the left bank of the Clarence River.

Clarence to Dashwood Section: 2 miles 47 chains of this section has been widened and a number of sharp bends improved.

Elterwater Bridges: These two hardwood bridges on concrete abutments have been completed.

Parikawa Stream Bridge: This bridge, consisting of four 25 ft. spans, has been completed, together with approach banks and protective work.

Hapuka River Bridge: The approach bank and the protective groynes for this bridge have been completed.

Hurunui Cutting: 13 chains of this section has been widened to 20 ft.

Boundary Gully Bridge: The erection of this 28 ft. span hardwood bridge, together with the approach banks and metalling, has been completed.

Double Ford Bridge: The erection of this 25 ft. span hardwood bridge has been completed.

Northcote Road – Styx River Bridge: A bituminous-concrete pavement 18 ft. wide has been laid on 95 chains of this section.

Waipara–Kaikoura, via Culverden.—Charwell River Bridge: The erection of this hardwood bridge, 138 ft. long, consisting of one 51 ft. truss, three 25 ft. and one 12 ft. spans, together with the approach banks, has been completed.

Dry Creek Bridge: The erection of this hardwood bridge, 60 ft. long, together with the approach banks, has been completed.

Hurunui Overflow Protection: The erection of four protective groynes and breastwork of gabions has been completed.

Approaches, School Creek Bridge: The approach banks and metalling have been completed.

Peaches' Cutting Deviation: This deviation, 10 chains in length, has been completed.

Whalesback Section: Metalling of this section has been completed.

Weka Creek Deviation: The road-deviation for this bridge, 15 chains in length, has been completed.

Weka Creek Bridge: The erection of this hardwood bridge has been completed.

Christchurch–Dunedin.—Riccarton – Church Corner: A bituminous-concrete pavement, 18 ft. wide, has been laid on 43 chains of this section.

Church Corner – Sockburn: A bituminous-concrete pavement, 18 ft. wide, has been laid on 1 mile 45 chains of this section.

Selwyn River Bridge: The erection of this bridge, 1,050 ft. in length, is progressing favourably. Fifty-six piles have been driven and fourteen caps are in place.

Kingsdown Church to Brooklands' Hill: 47 chains of first-coat sealing-work has been carried out on this section.

Hinds to Tinwald: 70 chains of this section has been re-formed and metalled.

Waimate County Section: Three bridges on this section have been widened.

Dunedin–Waitati Section: 3 miles of this section has been surface treated with bitumen.

Kaiapoi – Waddington to Bennett's, via Swannanoa.—Cherry's Ford Bridge: The erection of this bridge has been completed.

Christchurch–Motukarara.—Widening Shag Rock Corner: This work is in hand.

Upper Riccarton – Arthur's Pass.—Kowai River Bridge Restoration: Two 25 ft. spans have been added to this bridge.

Kowai River Deviation: This deviation, 80 chains in length, has been completed.

Darfield–Arundel, via Rakaia Gorge.—Mayfield to Rangitata: Formation and metalling work on this section have been completed.

Taylor's Stream Bridge Approaches: This work has been completed.

Culvert at Buccleigh: A start has been made with the erection of this reinforced concrete culvert.

Mount Hutt – McLeod's Corner: The formation and metalling of 3 miles 30 chains of this section have been completed.

Rakaia–Methven.—Ashburton County Section: 3 miles 55 chains of this section has been reformed and metalled.

Geraldine–Orari.—Dobbie's Creek Bridge: This bridge and approaches have been completed.

Timaru Hermitage, via Washdyke.—Kimbell Protective Works: The erection of the stop-banks and fences, and the planting of willows has been completed.

Pukeuri–Kurow.—Otiake Creek Bridge: This bridge, consisting of thirty-two 20 ft. spans, has been completed.

Balclutha – Tuapeka Mouth.—Improvements to the alignment and regrading have been completed from 0 m. to 7 m. 65 ch. Metalling has been completed between 1 m. 15 ch. and 2 m. 65 ch. and between 3 m. and 5 m. 40 ch.

Palmerston–Queenstown, via Beck's.—Swinburn Bridge: This bridge, consisting of four 20 ft. spans, has been erected.

East Eweburn Bridge: This bridge, consisting of three 20 ft. spans, has been completed.

Cromwell – Roaring Meg Section: 30 chains of metalling has been carried out on this section.

Arrowtown to Junction Palmerston – Queenstown Main Highway.—49 chains of re-formation and metalling has been carried out near Lake Hayes.

Dunedin–Invercargill.—A 48 ft. culvert has been installed near Mosgiel Junction.

Lovell's Creek Bridge: This bridge, 41 ft. in length, has been completed.

Waiwera Stream Bridge: This reinforced-concrete bridge, 70 ft. in length, has been completed.

Southland County Section: A further 60 chains of this section has been tar sealed.

Clarksville–Springvale.—Manuka Gorge Bridges: The reconstruction in concrete of several bridges has been completed.

McNab–Edievale.—Pomahaka River Bridge: The erection of this bridge, 138 ft. long, is in hand.

Valley Creek Bridge: The erection of this bridge is in hand.

Invercargill–Riverton.—2¼ miles of bituminous macadam (penetration) has been carried out on this section.

Signed on behalf of the Main Highways Board.

F. W. Furkert,
Chairman.

TABLE 1.—MAIN HIGHWAYS ACCOUNT.

CONSTRUCTION FUND.

INCOME AND EXPENDITURE ON CAPITAL ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1927.

EXPENDITURE.	Government Roads.	Ordinary Main Highways.	Total for Year 1926–27.	Total since Declaration of Main Highways (9/6/24).
To Net expenditure on construction and improvement of main highways, including cost of administration by Public Works Department and accident compensation :—				
Highway District—	£ s. d.	£ s. d.	£ s. d.	£ s. d.
No. 1	28,148 1 6	20,322 18 8	48,471 0 2	142,484 2 9
No. 2	32,219 0 11	60,799 15 4	93,018 16 3	178,023 14 3
No. 3	30,010 9 0	6,008 15 3	36,019 4 3	54,252 16 10
No. 4	25,767 4 1	7,281 16 2	33,049 0 3	130,706 3 7
No. 5	2,280 17 6	24,547 9 2	26,828 6 8	62,111 15 11
No. 6	25,723 8 11	2,862 4 5	28,585 13 4	75,449 5 10
No. 7	30,506 17 3	26,539 5 10	57,046 3 1	150,771 7 1
No. 8	7,439 1 7	11,168 0 9	18,607 2 4	40,385 8 6
No. 9	30,559 19 9	55,780 7 1	86,340 6 10	130,962 1 11
No. 10	2,605 8 1	19,213 8 3	21,818 16 4	31,881 9 5
No. 11	2,432 13 11	2,602 10 7	5,035 4 6	9,317 11 11
No. 12	21,059 13 10	630 14 8	21,690 8 6	70,194 11 4
No. 13	36 15 0	12,983 4 5	13,019 19 5	56,820 8 10
No. 14	1,996 9 10	17,338 14 9	19,335 4 7	20,331 17 8
No. 15	..	3,745 3 8	3,745 3 8	6,715 5 1
No. 16	5,489 3 8	1,471 6 7	6,960 10 3	30,051 19 8
No. 17	30,267 10 1	3,551 12 10	33,819 2 11	34,965 1 6
No. 18	6,040 15 0	14,431 17 6	20,472 12 6	23,233 15 11
	282,583 9 11	291,279 5 11	573,862 15 10	1,248,658 18 0
Balance, being excess of income over expenditure, carried to general balance-sheet			..	19,460 3 8
			573,862 15 10	1,268,119 1 8

INCOME.	Government Roads.	Ordinary Main Highways.	Total for Year 1926–27.	Total since Declaration of Main Highways (9/6/24).
By Recoveries on account of expenditure of previous years :—				
Highway District—	£ s. d.	£ s. d.	£ s. d.	£ s. d.
No. 2	..	..	..	6 0 0
No. 4	1 9 4	..	1 9 4	2 8 8
No. 12	0 19 0	..	0 19 0	0 19 0
No. 13	..	102 0 0	102 0 0	102 0 0
	2 8 4	102 0 0	104 8 4	111 7 8
Receipts under section 15, Finance Act, 1923, from Public Works Fund, General Purposes Account*	..	..	200,000 0 0	626,000 0 0
Loans raised under Main Highways Act, 1922—				
Consolidated stock	..	..	..	542,007 14 0
Debentures	..	..	100,000 0 0	100,000 0 0
Balance, excess of expenditure over income, carried to general balance-sheet			273,758 7 6	..
			573,862 15 10	1,268,119 1 8

* Interest on these amounts is paid from Consolidated Fund.

TABLE 1.—MAIN HIGHWAYS ACCOUNT—*continued.*

REVENUE FUND.

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1927.

EXPENDITURE.	Government Roads.	Ordinary Main Highways.	Total for Year 1926–27.	Total since Inception of Main Highways Act, 1922, to 31/3/27.
To Net expenditure on maintenance of main highways :—				
Highway District—	£ s. d.	£ s. d.	£ s. d.	£ s. d.
No. 1	3,994 6 3	16,968 6 9	20,962 13 0	48,865 2 6
No. 2	4,647 18 3	42,051 16 4	46,699 14 7	75,138 18 6
No. 3	16,316 7 7	4,199 7 1	20,515 14 8	42,211 7 6
No. 4	15,112 10 0	6,580 18 10	21,693 8 10	38,403 11 1
No. 5	5,707 19 8	36,197 19 7	41,905 19 3	83,678 6 2
No. 6	8,281 8 9	5,107 1 0	13,388 9 9	36,098 16 5
No. 7	11,833 0 0	24,405 8 11	36,238 8 11	64,188 11 10
No. 8	5,899 9 10	21,758 5 1	27,657 14 11	47,967 17 7
No. 9	7,298 17 5	23,905 18 10	31,204 16 3	61,221 5 1
No. 10	1,542 1 3	22,784 16 2	24,326 17 5	48,955 9 10
No. 11	18,269 9 9	8,736 4 6	27,005 14 3	45,699 1 5
No. 12	35,671 17 8	..	35,671 17 8	82,010 13 11
No. 13	1,491 4 3	12,731 3 1	14,222 7 4	28,447 1 2
No. 14	1,708 5 8	16,112 17 10	17,821 3 6	31,355 1 3
No. 15	..	17,410 6 4	17,410 6 4	38,435 3 6
No. 16	3,345 4 9	5,075 15 1	8,420 19 10	12,558 0 5
No. 17	63 3 0	12,819 8 3	12,882 11 3	20,687 1 1
No. 18	507 13 7	20,224 19 5	20,732 13 0	35,919 19 0
	141,690 17 8	297,070 13 1	438,761 10 9	841,841 8 3
Abolition of toll-gates (section 20, Finance Act, 1925)			1,807 0 0	8,537 14 7
Accident compensation			16 19 5	178 16 7
Administration and supervision expenses, including salaries and travelling-expenses of Public Works officers, printing, stationery, postages, and miscellaneous expenses			25,597 9 4	46,684 8 4
Charges and expenses of raising loans { for the year 1926–27			210 0 6	42,217 14 6
Charges and expenses of raising loans { for the year 1925–26			42,007 14 0	
Commission on collection of motor-registration fees by Postal Department			8,884 14 0	19,075 0 6
Depreciation of furniture, fittings, &c.			38 2 3	89 3 1
Erection of signposts (subsidies to) on County boundaries			234 1 8	234 1 8
Expenses of District Councillors, attending District Council meetings and annual conference			92 5 6	92 5 6
Fees and travelling-expenses of members of the Main Highways Board, other than Government members			1,428 18 6	4,637 19 6
Interest on loans, recoupment to Consolidated Fund (section 4, Finance Act, 1919)			27,524 9 3	44,029 2 9
Management charges of consolidated stock on account of Construction Fund			28 11 7	28 11 7
Miscellaneous expenses (advertising, maps, rent of halls, traffic tallies, transport of metal, samples, &c.)			458 1 11	874 8 1
			547,089 18 8	1,008,520 14 11
Balance, being excess of income over expenditure, carried to general balance-sheet			..	642,743 3 6
			£547,089 18 8	£1,651,263 18 5

INCOME.		Total for Year 1926–27.	Total since Inception of Main Highways Act, 1922, to 31/3/27.
By Income from—			
Interest from investments of—	£ s. d.		
Construction Fund	2,581 14 8		
Revenue Fund	32,037 0 8	£ s. d.	£ s. d.
		34,618 15 4	88,336 6 2
Interest from local bodies on plant purchased on their behalf ..		1,774 2 7	1,895 0 9
Motor-registration licenses fees and fines (section 24, Motor-vehicles Act, 1924)..		283,963 9 1	630,180 0 11
Recoveries on account of expenditure of previous years—Ordinary main highways		28 12 0	28 12 0
Rent of and tolls from ferries		712 2 8	1,781 10 6
Tire-tax (sections 13 and 14, Main Highways Act, 1922)		188,450 6 1	824,042 8 1
Transfer from Consolidated Fund (section 14, Main Highways Act, 1922)		35,000 0 0	105,000 0 0
Balance, being excess of expenditure over income, carried to general balance-sheet		2,542 10 11	..
		£547,089 18 8	£1,651,263 18 5

TABLE 1.—MAIN HIGHWAYS ACCOUNT—*continued.*

General Balance-sheet as at 31st March, 1927.

LIABILITIES.			Revenue Fund.	Construction Fund.	Total.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Accumulated Construction Fund—					
Balance at 31/3/26	251,210 17 2				
Excess of expenditure, 1926–27 .. .. £273,758 7 6					
Less "Cost of raising loans," 1925–26, chargeable to revenue 42,007 14 0					
	231,750 13 6				
..		19,460 3 8	19,460 3 8		
Accumulated Revenue Fund—					
Balance at 31/3/26		645,285 14 5	..	..	
Less excess of expenditure over income for 1926–27		2,542 10 11	..	..	
		642,743 3 6	..	642,743 3 6	
Sundry creditors		109,384 4 7	124,746 8 5	234,130 13 0	
Interest accrued on loans		3,319 14 11	..	3,319 14 11	
1927–28 motor-registration fees—					
Received during 1926–27		188,500 0 0	..	188,500 0 0	
Writings-off in Suspense		30 0 0	54 16 11	84 16 11	
		943,977 3 0	144,261 9 0	1,088,238 12 0	

ASSETS.			Revenue Fund.	Construction Fund.	Total.
			£ s. d.	£ s. d.	£ s. d.
Cash in Public Account—					
At call			100,039 7 5	65,559 10 6	165,598 17 11
Invested temporarily until required ..			652,900 0 0	5,000 0 0	657,900 0 0
Sundry debtors			12,161 16 4	47,435 16 7	59,597 12 11
Motor-registration fees in hands of Postal Department			78,693 10 0	..	78,693 10 0
Tire-tax in hands of Customs Department ..			7,792 15 1	..	7,792 15 1
Interest due and accrued			11,370 16 6	..	11,370 16 6
Stocks of material, tools, &c.			5,612 12 8	22,471 2 6	28,083 15 2
Stocks, &c., deficits, Suspense Account ..			30 0 0	54 16 11	84 16 11
Roadmen's cottages, huts, and road buildings generally			2,487 5 0	3,740 2 6	6,227 7 6
Furniture, fittings, &c.—	£ s. d.				
Expenditure to 31/3/27 ..	600 5 8				
Depreciation, sales, &c., to 31/3/27	88 6 3				
			511 19 5	..	511 19 5
Plant and equipment—					
For Main Highways Board—					
Expenditure to 31/3/27..	29,576 3 2				
Less depreciation charged to works, and transfers	2,188 12 6				
			27,387 10 8	..	27,387 10 8
Purchased for local bodies—					
Expenditure to 31/3/27..	54,713 1 0				
Less repayments of principal—					
Paid .. £9,434 14 10					
Due .. 288 16 3					
	9,723 11 1				
			44,989 9 11	..	44,989 9 11
			943,977 3 0	144,261 9 0	1,088,238 12 0

J. J. Gibson, Accountant, Public Works Department.

F. W. Furkert, Chairman, Main Highways Board.

TABLE 2.—LENGTHS OF MAIN HIGHWAYS AT 31ST MARCH, 1927.

Number and Name of Highway District.	Ordinary Main Highways.	Main Highways declared Government Roads.	Total all Main Highways.
	M. ch.	M. ch.	M. ch.
1. Auckland North	428 0	146 37	574 37
2. Auckland South	373 62	44 71	418 53
3. Tauranga	166 40	266 40	433 0
4. Gisborne	110 41	138 40	249 1
5. Napier	392 20	36 50	428 70
6. King-country	176 32	157 78	334 30
7. Taranaki	234 10	60 25	294 35
8. Wanganui	260 55	55 0	315 55
9. Wellington West	269 18	25 32	294 50
10. Wellington East	305 62	15 40	321 22
Totals, North Island ..	2,717 20	947 13	3,664 33
11. Nelson	168 18	128 4	296 22
12. West Coast	..	340 5	340 5
13. Canterbury North	269 20	38 20	307 40
14. Canterbury Central	335 60	54 0	389 60
15. Canterbury South	430 40	..	430 40
16. Otago Central	240 70	8 0	248 70
17. Otago South	251 24	21 23	272 47
18. Southland	415 0	26 0	441 0
Totals, South Island ..	2,110 72	615 52	2,726 44
Totals, Dominion ..	4,828 12	1,562 65	6,390 77

TABLE 3.—CONSTRUCTION WORK COMPLETED DURING YEAR 1926–1927.

Number and Name of Highway District.	Formation and Widening.	Gravelling and Metalling.	Tar and Bituminous Sealing.	Bituminous Macadam (Penetration).	Bituminous Concrete.	Portland Cement Concrete.	Bridges.	Engineering Surveys.	
								Surveys completed.	Plans completed.
	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	Ft.	M. ch.	M. ch.
1. Auckland North	40 42	20 65½	..	..	..	3 41	280	53 32	49 64
2. Auckland South	8 73½	16 54	8 37	4 10	..	11 29	..	13 68	29 78
3. Tauranga	11 50	15 45	..	..	..	..	682	4 13	4 13
4. Gisborne	12 74½	19 66½	..	4 60	..	..	922½	10 42½	10 42½
5. Napier	5 60½	5 31¼	2 0	..	4 7	1 0	198	2 50	5 32
6. King-country	20 40	12 20	..	..	..	..	90	6 69½	5 72
7. Taranaki	0 36½	2 60	8 36	14 50	..	..	..	23 52½	23 52½
8. Wanganui	4 25	10 3	0 50	1 53	..	..	81	1 33	1 33
9. Wellington West	35 31	14 23	8 57	7 70	4 33	..	..	16 50	16 50
10. Wellington East	1 68	4 74	2 66	3 6	..	..	389	9 11	9 11
11. Nelson	1 66	1 65	..	..	..	..	287	26 20½	26 20½
12. West Coast	0 48½	0 48½	..	..	..	..	1,542	..	..
13. Canterbury North ..	0 60½	0 60½	..	..	..	..	415	0 30	0 30
14. Canterbury Central ..	..	..	..	..	3 23	..	69	1 0	1 0
15. Canterbury South ..	9 15	9 15	..	..	..	..	690	0 31	0 31
16. Otago Central	..	0 79	3 22	..	..	..	60	0 40	0 40
17. Otago South	7 0	3 15	..	..	..	..	247½	9 0	8 0
18. Southland	12 8	11 60	0 60	2 21	..	..	455	..	..
Total	173 59	150 65¼	35 8	38 30	11 63	15 70	6,408	179 63	193 9½

TABLE 4.—APPROPRIATIONS AND EXPENDITURE FOR THE YEAR ENDING 31ST MARCH, 1927.

Number and Name of Highway District.	Construction.		Maintenance.	
	Available for Authorization.	Expenditure.	Available for Authorization.	Expenditure.
	£	£	£	£
1. Auckland North ..	89,633	45,186	55,558	20,963
2. Auckland South	98,179	87,842	43,200	46,700
3. Tauranga	60,181	34,434	24,326	20,516
4. Gisborne	54,234	30,255	30,512	21,693
5. Hawke's Bay	40,402	25,290	39,706	41,906
6. King-country	49,105	26,921	22,515	13,388
7. Taranaki	61,871	53,985	32,451	36,238
8. Wanganui	25,582	16,847	36,957	27,658
9. Wellington West	92,164	82,546	37,516	31,205
10. Wellington East	29,244	21,047	31,346	24,327
11. Nelson	20,975	4,850	23,778	27,006
12. West Coast	25,217	19,684	33,873	35,672
13. Canterbury North ..	16,838	12,176	17,171	14,222
14. Canterbury Central ..	33,429	18,440	23,334	17,821
15. Canterbury South ..	19,951	3,553	25,356	17,410
16. Otago Central	10,360	5,388	8,893	8,421
17. Otago South	34,241	31,927	13,575	12,883
18. Southland	20,262	19,991	21,240	20,733
Totals for Dominion ..	781,868	540,362	531,307	438,762
Totals, North Island ..	600,595	424,353	364,087	284,594
Totals, South Island ..	181,273	116,009	167,220	154,168

TABLE NO. 5.—MAINTENANCE OF MAIN HIGHWAYS (INCLUDING BRIDGES).

Number and Name of Highway District.	Length maintained.	Expenditure.			Average Cost per Mile per Annum.		
		By Board.	By Local Authority.	Total.	1926–27.	1925–26.	1924–25.
	M. ch.	£	£	£	£	£	£
1. Auckland North ..	574 37	20,963	16,755	37,718	65·6	56·1	77·0
2. Auckland South ..	418 53	46,700	29,095	75,795	181·0	85·1	53·5
3. Tauranga	433 0	20,516	9,424	29,940	69·1	48·6	28·1
4. Gisborne	249 1	21,693	16,345	38,038	152·7	93·9	59·5
5. Napier	428 70	41,906	30,745	72,651	169·4	104·5	73·4
6. King-country	334 30	13,388	9,949	23,337	69·8	55·4	58·5
7. Taranaki	294 35	36,238	22,300	58,538	198·8	105·0	67·1
8. Wanganui	315 55	27,658	25,270	52,928	167·6	88·9	54·4
9. Wellington East ..	294 50	31,205	17,785	48,990	166·3	120·2	91·7
10. Wellington West ..	321 22	24,327	20,023	44,350	138·0	104·7	77·7
Totals, North Island ..	3,664 33	284,594	197,691	482,285	131·6	82·9	62·9
11. Nelson	296 22	27,006	8,516	35,522	119·9	63·9	48·1
12. West Coast	340 5	35,672	3,160	38,832	114·2	94·6	61·6
13. Canterbury North ..	307 40	14,222	10,228	24,450	79·5	47·7	37·7
14. Canterbury Central ..	389 60	17,821	13,921	31,742	81·4	46·1	52·2
15. Canterbury South ..	430 40	17,410	16,809	34,219	79·5	73·9	39·7
16. Otago Central	248 70	8,421	3,848	12,269	49·3	26·1	12·6
17. Otago South	272 47	12,883	9,392	22,275	81·7	54·2	22·5
18. Southland	441 0	20,733	12,784	33,517	76·0	56·6	24·6
Totals, South Island ..	2,726 44	154,168	78,658	232,826	85·4	59·6	38·5
Totals for Dominion ..	6,390 77	438,762	276,349	715,111	111·9	73·2	51·7

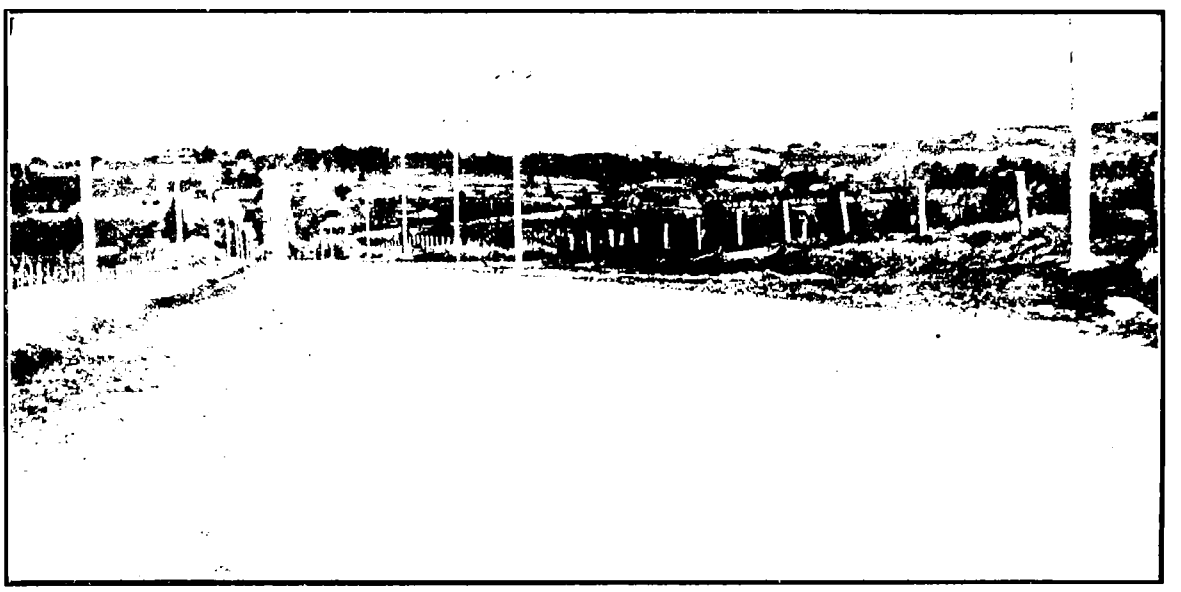
TABLE 6.—TESTS OF STONE COMPLETED DURING THE YEAR ENDING 31ST MARCH, 1927.

Locality.	Weight in Pounds per Cubic Foot.	Absorption of Water in Pounds per Cubic Foot.	Abrasion.		Hardness.	Toughness.	Geological Classification.
			Percentage of Wear.	French Coefficient.			
55. Drury	183	0·68	3·8	10·5	17·96	18·5	Basalt.
56. Waitotara quarry	151	1·75	34·0	1·2	..	..	Pebbly shell limestone.
57. Boulderbank, Nelson ..	171	0·06	3·0	13·1	19·24	27·5	Hornblende granite.
Halswell, Christchurch City Council—							
58. No. 1	173	1·54	..	..	17·76	36·0	Coarse basalt.
59. No. 2	178	1·06	3·6	10·1	17·76	41·5	Coarse basalt.
60. No. 3	176	1·37	4·8	8·4	18·29	23·0	Coarse basalt.
61. No. 4	183	0·90	4·0	10·0	18·00	18·0	Coarse basalt.
62. No. 5	177	1·36	6·6	6·0	18·31	31·5	Fine-grained basalt.
63. No. 6	180	1·80	..	..	18·63	9·0	Fine-grained basalt.
64. No. 7	168	0·90	..	..	18·98	38·0	Trachyte.
65. No. 8	166	3·04	..	..	17·50	11·0	Trachyte.
66. No. 9	161	3·30	..	..	18·17	14·0	Trachyte.
67. No. 10	176	1·49	..	..	17·27	21·0	Coarse basalt.
68. No. 11	182	0 86	..	..	18·51	34·5	Coarse basalt.
69. Athenree, Tauranga	163	0·12	4·0	9·9	18·41	14·0	Hypersthene andesite.
70. Knox quarry, Tolaga ..	157	3·49	8·3	4·8	18·32	6·0	Glauconitic limestone.
71. Whangara, near Gisborne ..	163	1·31	9·3	4·3	16·30	8·5	Glauconitic limestone.
72. Maungatuna, Tolaga	157	3·23	9·7	4·1	15·75	6·0	Shell limestone (glauconitic).
73. Mangawai	163	0·02	11·3	3·6	..	..	Greywacke.
74. Whangarei No. 1	165	0·91	5·5	7·3	17·06	7·0	Greywacke.
75. Whangarei No. 2	164	1·82	17·0	2·3	15·84	..	Altered gabbro (calcareous).
76. Whangarei No. 3	176	0·17	6·4	6·2	14·69	10·5	Diabase.
77. Whangarei No. 4	171	0·84	9·3	4·3	14·53	4·0	Greywacke.
78. Whareongaonga, near Gisborne	160	1·64	8·1	4·9	13·39	11·0	Sandstone calcareous, argillaceous.
79. Thames No. 1	175	0·04	3·6	11·1	19·00	22·0	Hypersthene-augite andesite (slightly altered).
80. Thames No. 2	162	1·10	9·7	4·1	6·83	11·0	Altered andesite (chloritic).
81. Thames No. 3	168	0·71	7·4	5·4	15·50	14·5	Propytitized andesite.
82. Maungatipu Mt. Quarry No. 1..	162	0·43	6·2	6·4	9·60	7·0	Hornblende-augite lamprophyre (camptonitic).
83. Maungatipu Mt. Quarry No. 2 ..	164	0·77	6·2	6·4	18·17	12·0	Augite lamprophyre affected by movement.
84. ..	168	0·50	2·5	16·0	18·98	37·0	Greywacke.
85. Mile 13, Whakatane–Rotorua Main Highway	156	1·26	18·1	2·2	..	..	Rhyolite.
86. Motutara Island	174	0·08	2·9	13·8	18·07	45·0	Greywacke (partly silicified).
87. Kawau Island	165	1·43	16·3	2·4	..	..	Argillite.
88. Rodney County's quarry, Leigh	161	0·13	13·9	2·9	15·92	4·0	Argillite.
89. Waihi Borough Council ..	127	7·00	8·0	5 0	5·20	5·0	Rhyolite.
90. Mt. Cargill (Otago), No. 1 quarry	164	0·23	4·5	9·0	19·30	22·0	Nephelinitoid phonolite.
91. Woodhaugh quarry, Dunedin City Corporation	171	0·37	4·0	10·0	17·60	15·0	Trachydolerite.
92. Mt. Cargill (Otago), No. 2 quarry	164	0·23	6·0	6·6	18·87	41·0	Nephelinitoid phonolite.
93. Logan's Point, Dunedin ..	163	0·17	3·4	11·8	18·71	16·0	Nephelinitoid phonolite.
94. Tainui quarry, Dunedin ..	168	0·16	3·7	10·8	18·37	23·0	Trachytoid phonolite.
95. Mt. Cargill (Otago), No. 3 quarry	165	0·19	5·0	8·0	18·93	15·0	Nephelinitoid phonolite.
96. Calder's quarry, Dunedin ..	161	0·17	4·1	9·8	19·17	34·0	Nephelinitoid phonolite.
97. Second Beach, St. Clare, Dunedin	165	0·62	4·8	8·8	18·50	15·0	Porphyritic basalt.
98. Roslyn quarry, Dunedin ..	192	0·23	5·5	7·4	18·90	8·5	Basalt.
99. Matawai, 46 m. peg, Gisborne–Motu Railway	164	0·29	5·6	7·1	16·50	12·5	Sandstone.
100. Huntly Town Board's quarry ..	165	0·47	6·6	6·0	17·60	9·0	Fine grained Greywacke.
101. Little Island, Hauraki Gulf ..	163	0·12	10·2	3·9	..	..	Red cherty shale.
102. Rodger's quarry, Warkworth ..	168	0·65	11·1	3·6	18·60	6·0	Metamorphic argillite.
103. Oruawharo Point, Warkworth ..	152	1·21	8·6	4·6	15·10	7·0	Weathered andesite.
104. Waikaremoana	163	0·26	8·1	4·9	14·60	7·0	Sandstone.
105. Ngongotaha, Rotorua ..	..	..	32·1	1·2	..	..	Glassy spherulitic rhyolite.
107. Mangapai	149	3·74	..	..	13·60	9·0	Sandstone.
108. Alison's quarry, Whangarei ..	168	0·37	6·9	5·8	19·20	26·0	Greywacke.
109. Paparoa	183	0·22	3·0	13·3	18·60	27·0	Diabase.
110. Haughton's quarry, Waimauku	149	4·67	7·4	5·4	17·40	15·5	Altered basalt.

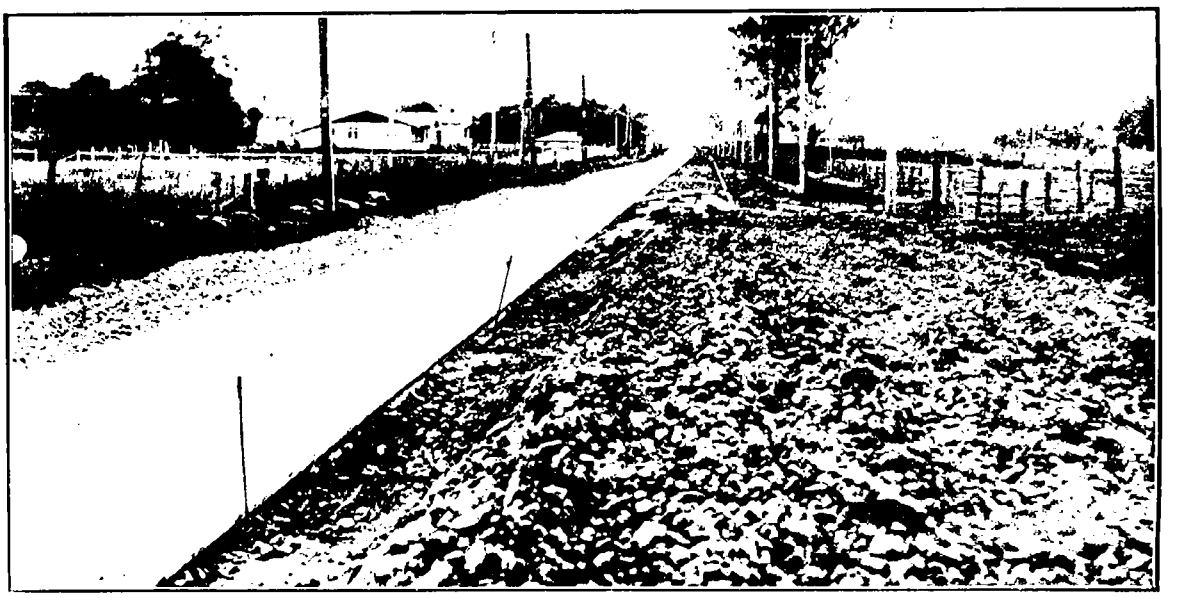
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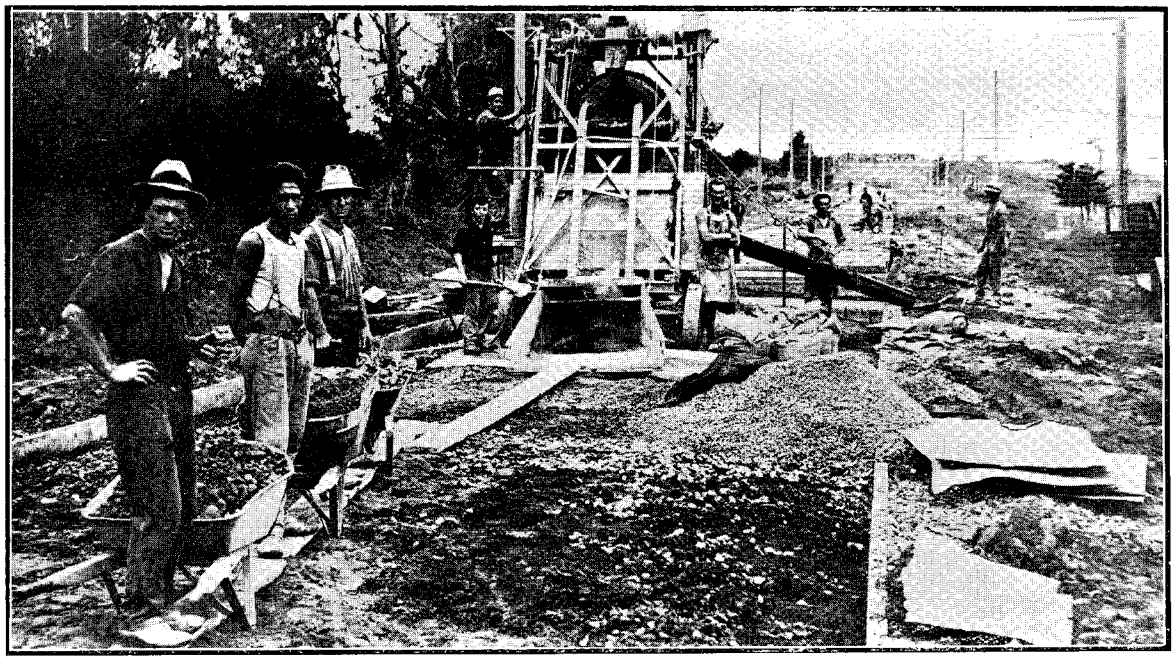
Maungatapere Kaikohe Main Highway.
Breast cutting in rock.



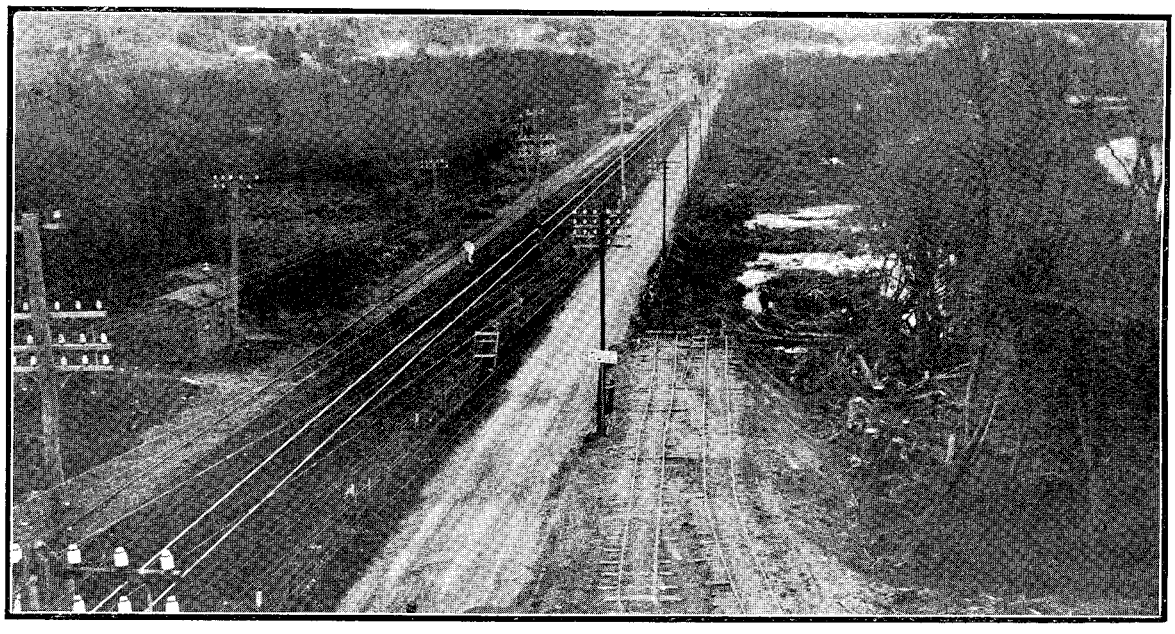
Auckland Helensville Main Highway.
Concrete pavement.



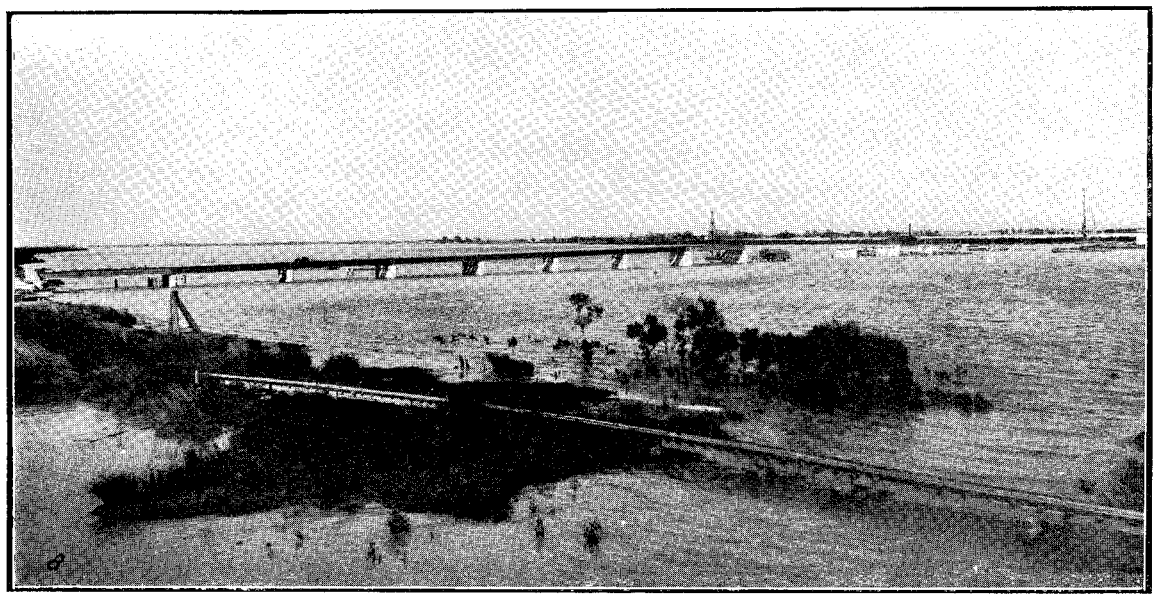
Great South Road, Papakura Town District.
Showing half slab of concrete paving completed.



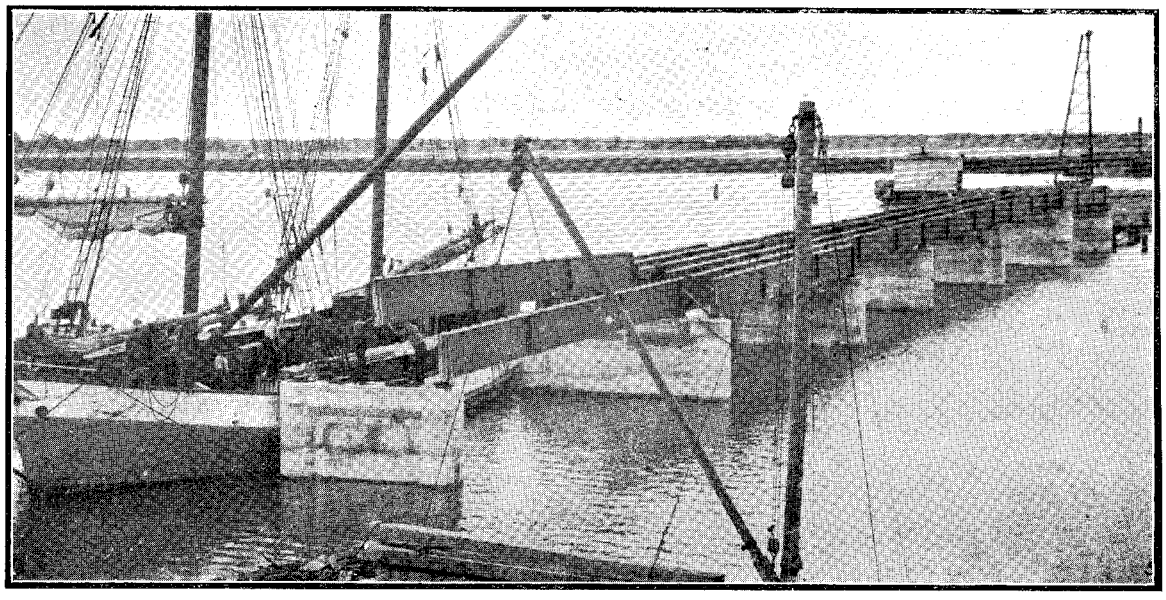
Great South Road, Manurewa Town District.
Concrete paving in progress.



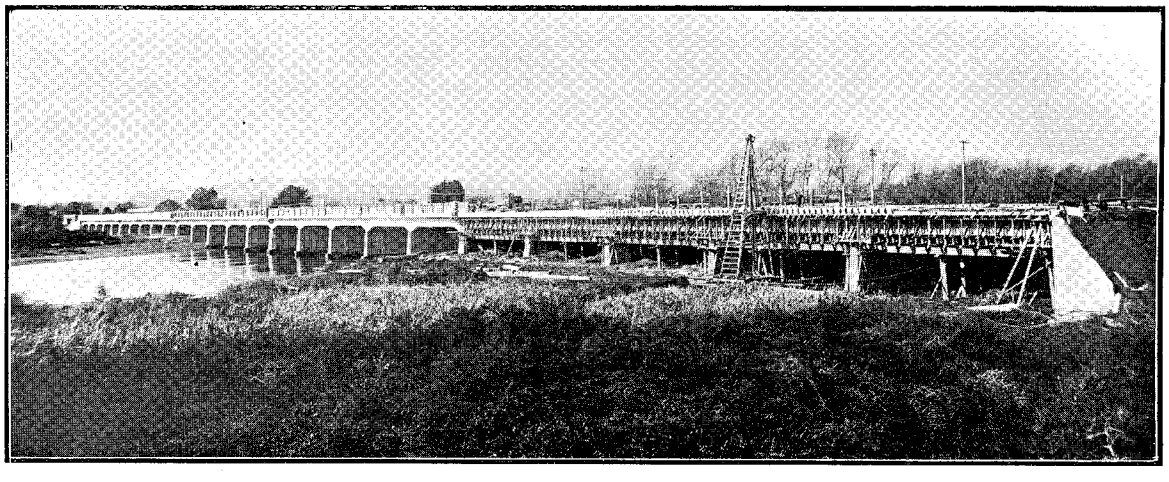
Great South Road.
Widening in progress at Mercer.



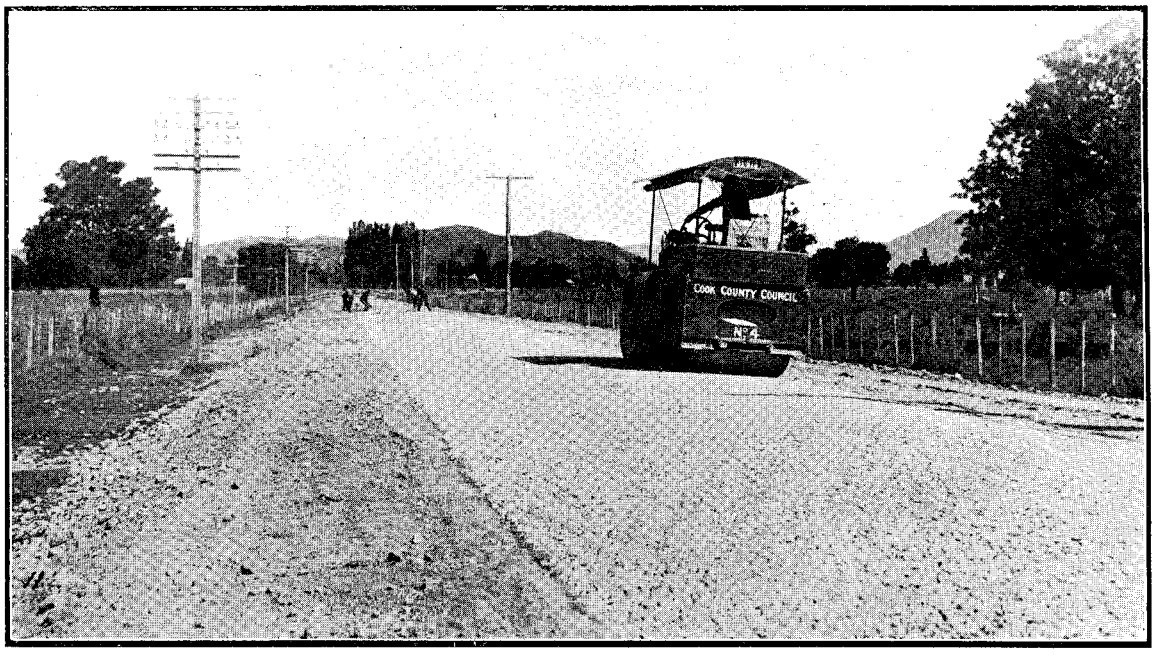
Pokeno–Waihi Junction to Coromandel Main Highway.
Waihou River Bridge at Kopu, under construction.



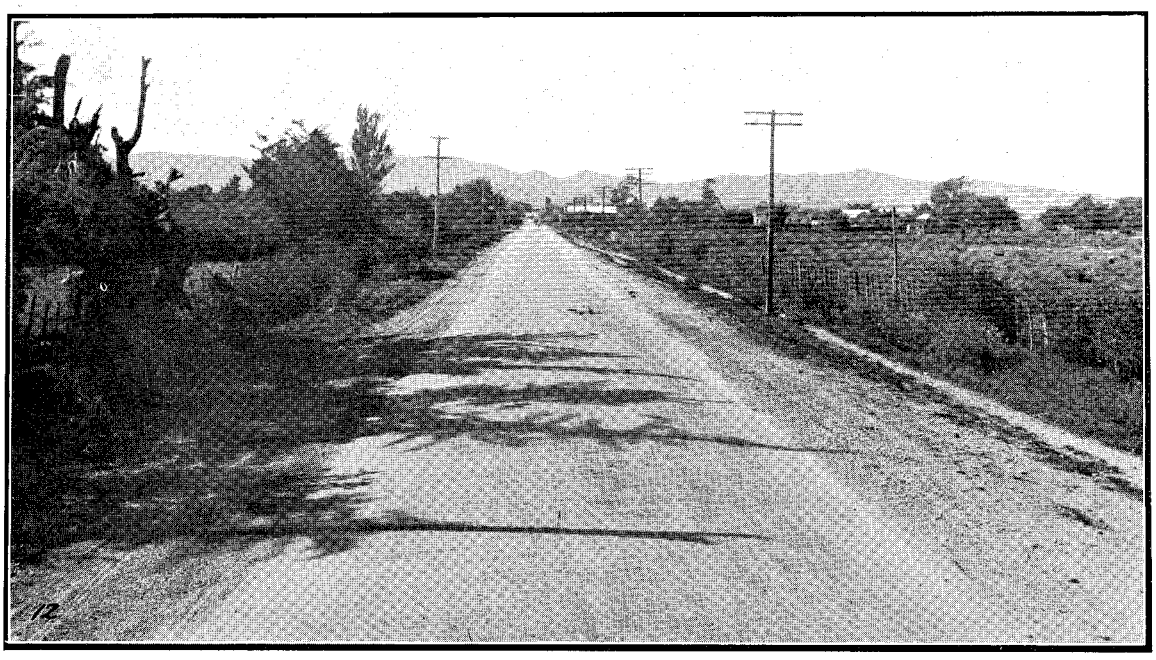
Pokeno–Waihi Junction to Coromandel Main Highway.
Waihou River Bridge at Kopu: Unloading girders from scow "Rangi," and placing in position.



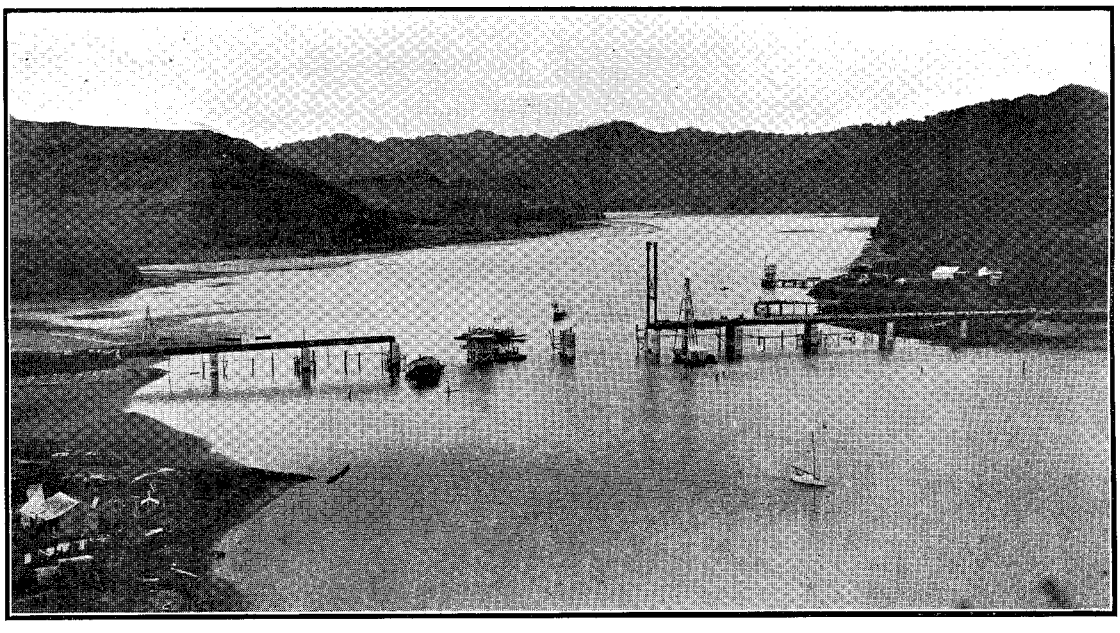
Gisborne–Whakatane (via Motu) Main Highway.
Waioeka River Bridge, under construction.



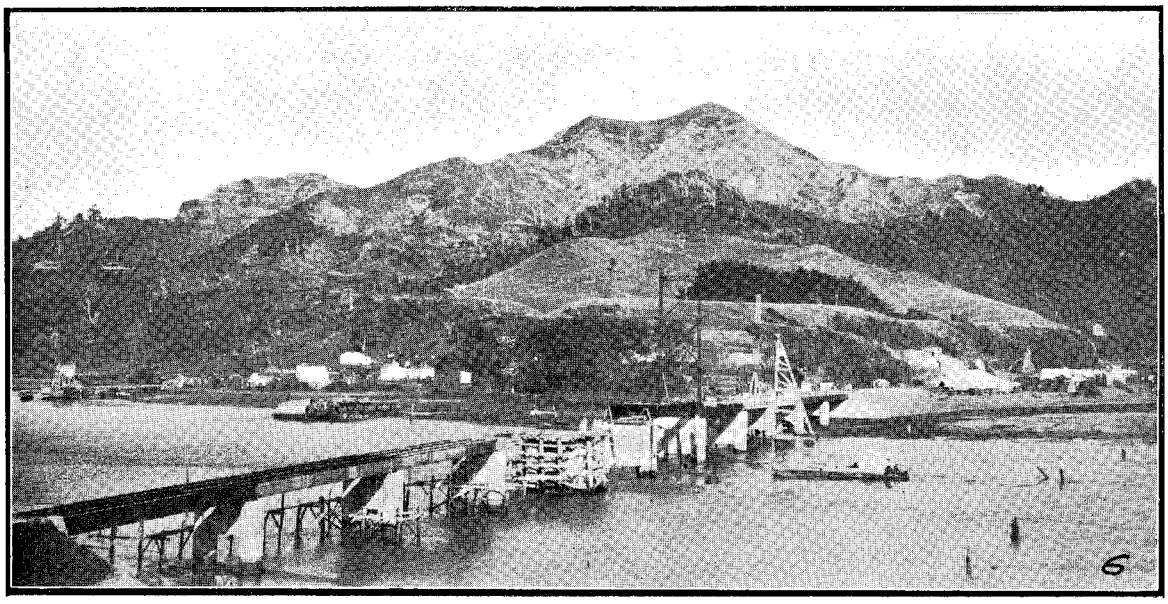
Gisborne–Napier (via Wairoa) Main Highway, Cook County Section.
Bituminous penetration surfacing; rolling before spraying.



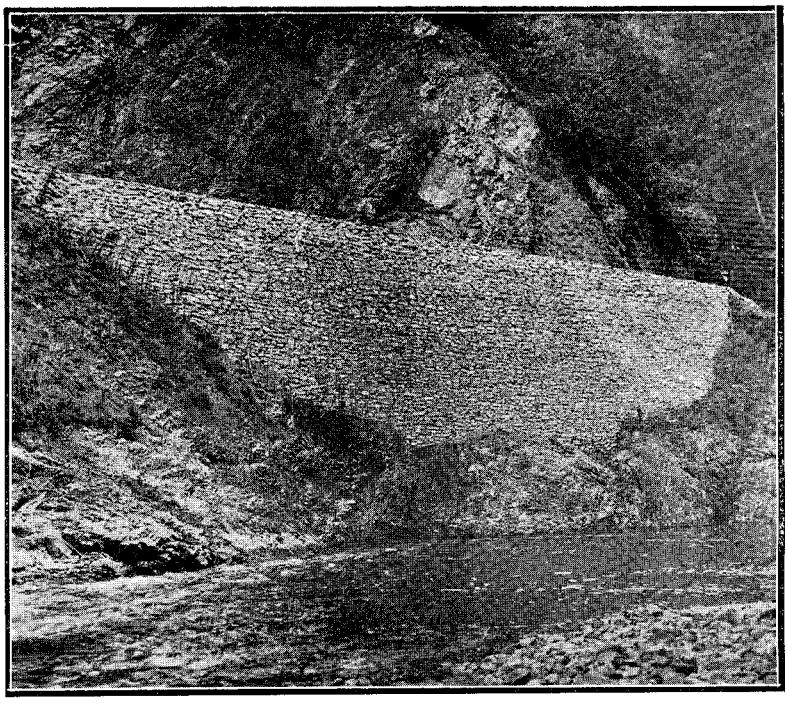
GISBORNE–NAPIER (VIA WAIROA) MAIN HIGHWAY, COOK COUNTY SECTION.
Bituminous penetration surfacing; finished work.



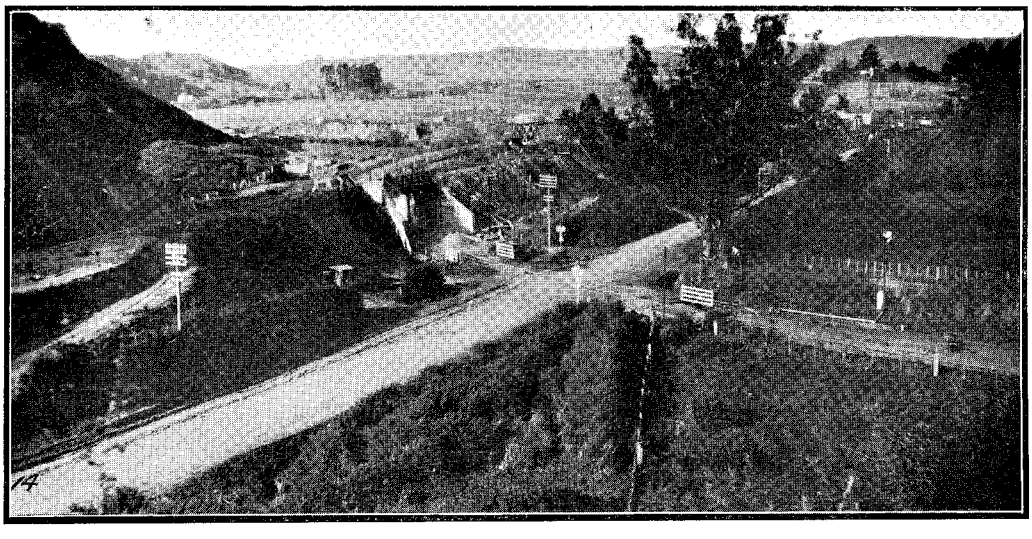
AUCKLAND–WELLINGTON (VIA TARANAKI) MAIN HIGHWAY.
Mokau Bridge, under construction.



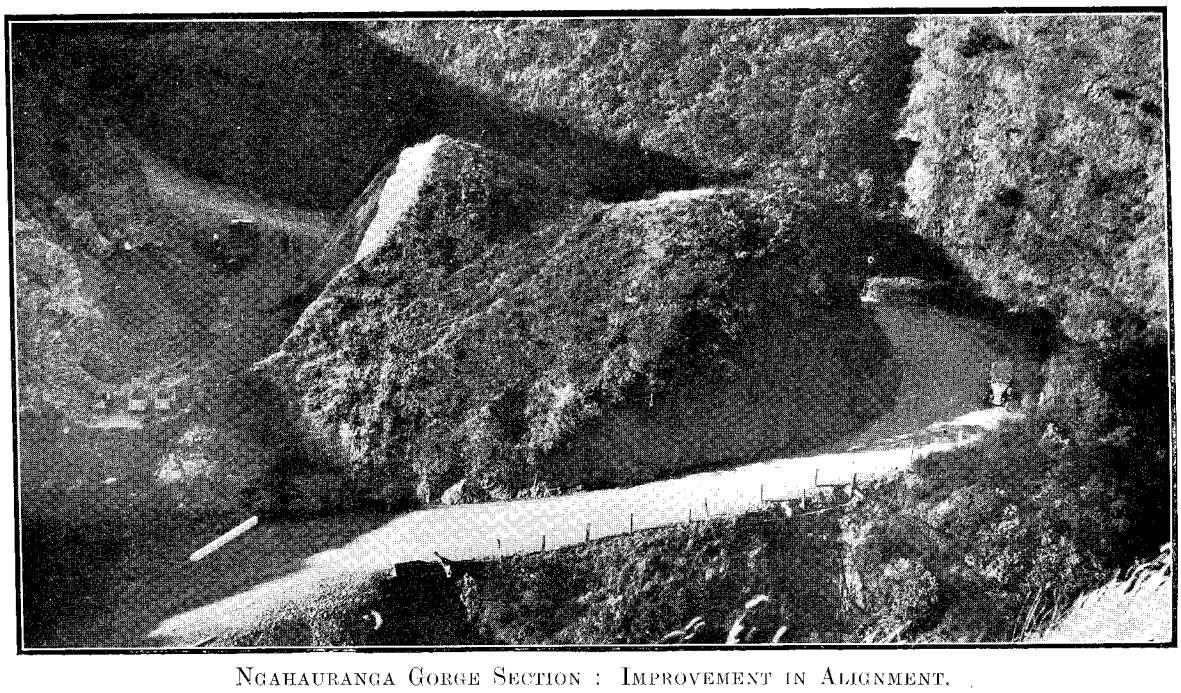
AUCKLAND–WELLINGTON (VIA TARANAKI) MAIN HIGHWAY.
Mokau Bridge, under construction.



Dry-stone Retaining-wall, Awakino Valley Section.

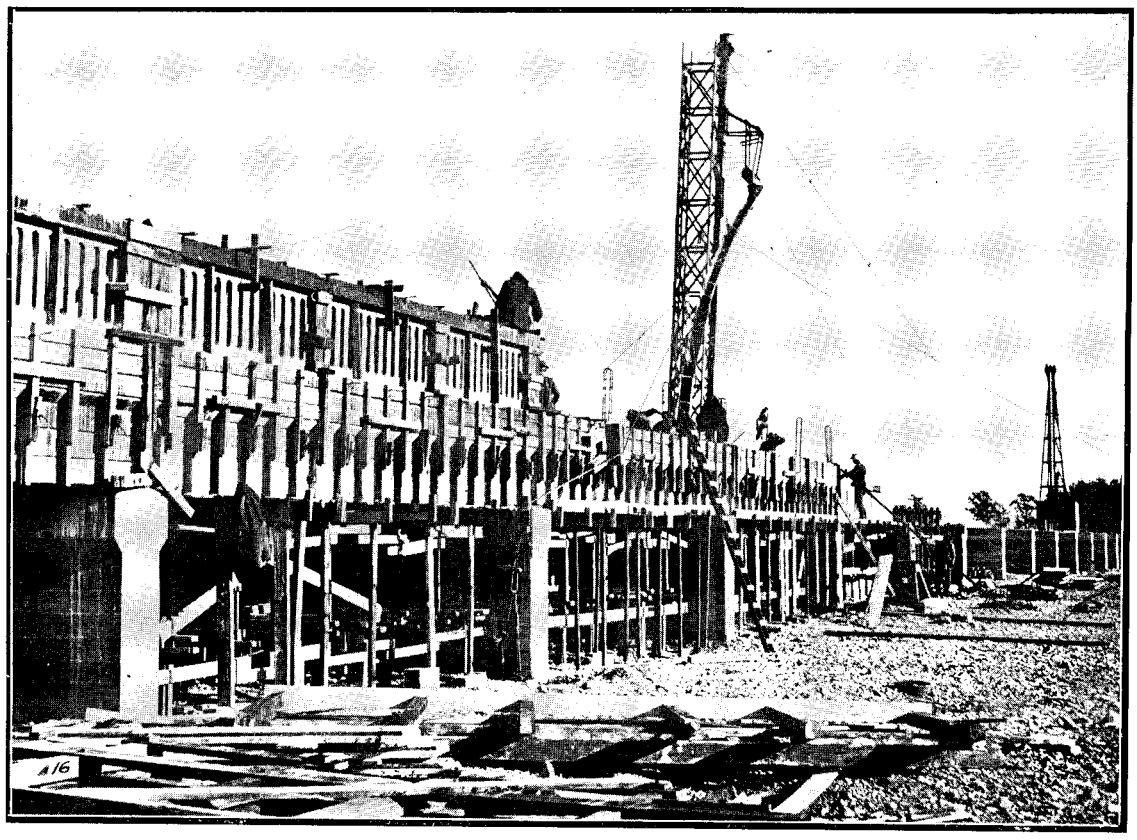


Elimination of Turakina Railway Level Crossing.

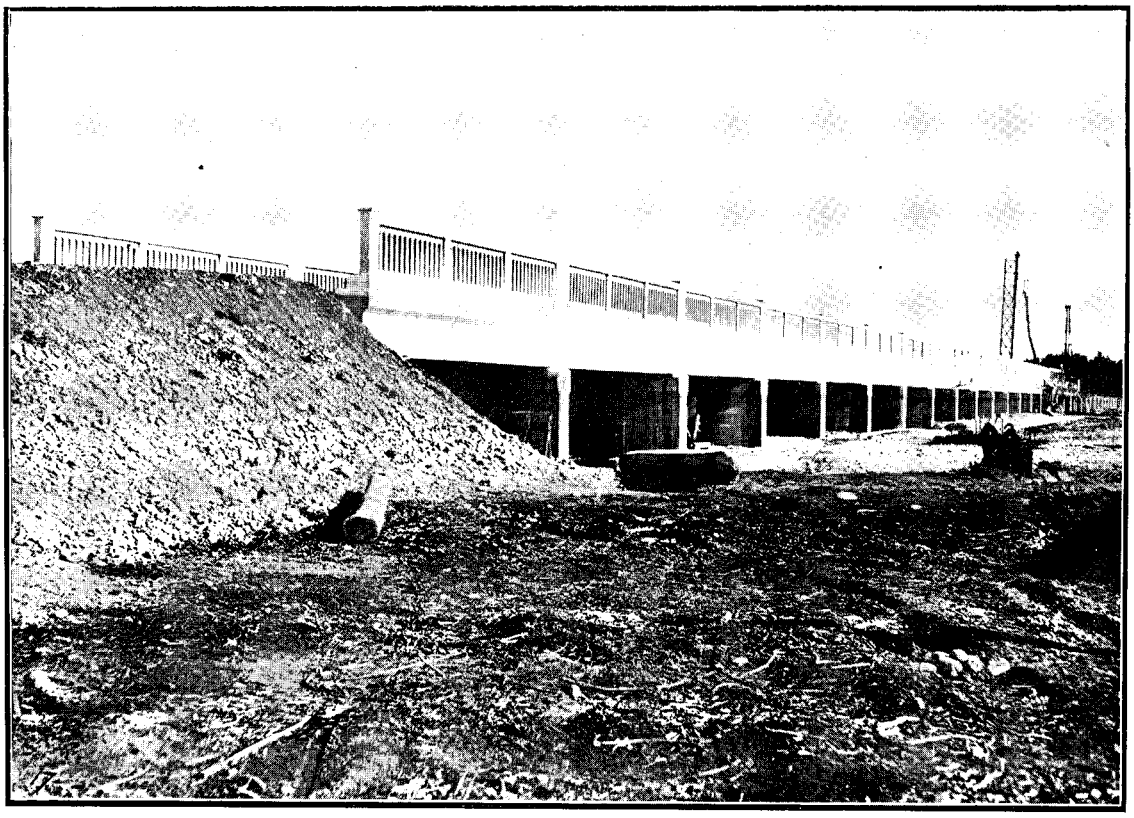


Ngahauranga Gorge Section : Improvement in Alignment.

WELLINGTON–AUCKLAND (VIA TARANAKI) MAIN HIGHWAY.

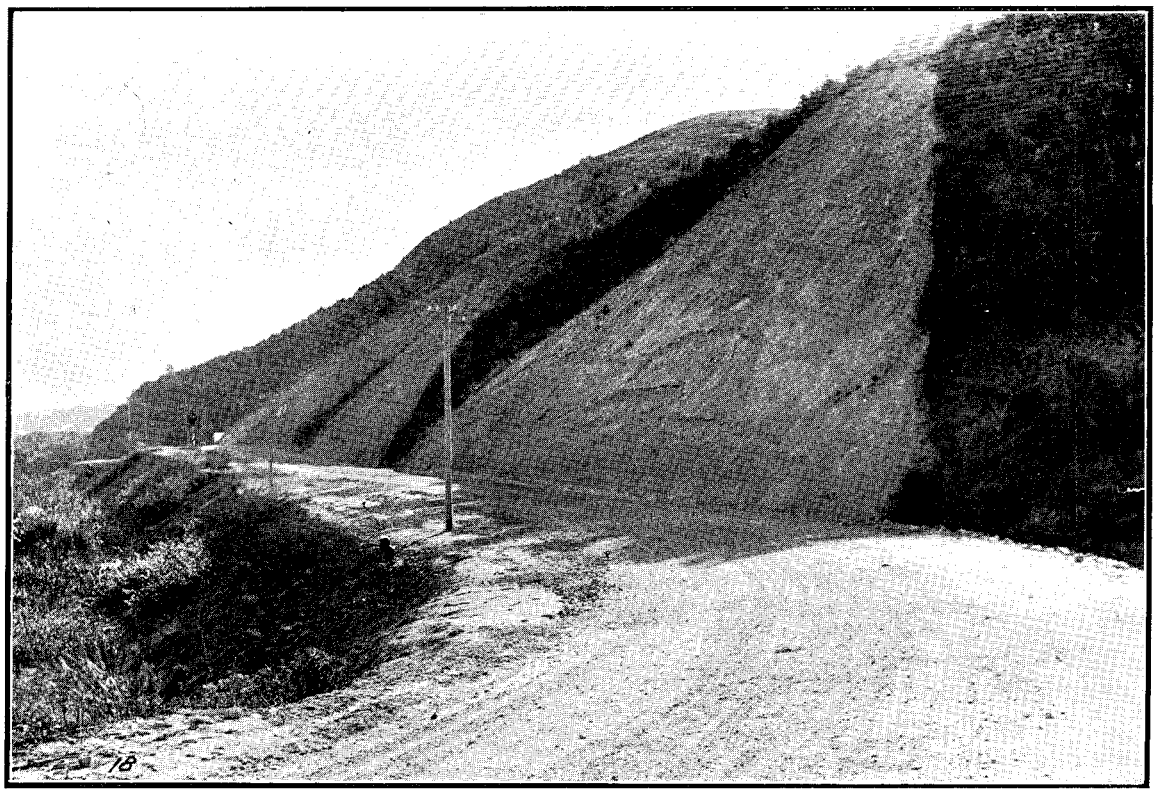


SELWYN RIVER BRIDGE, UNDER CONSTRUCTION.

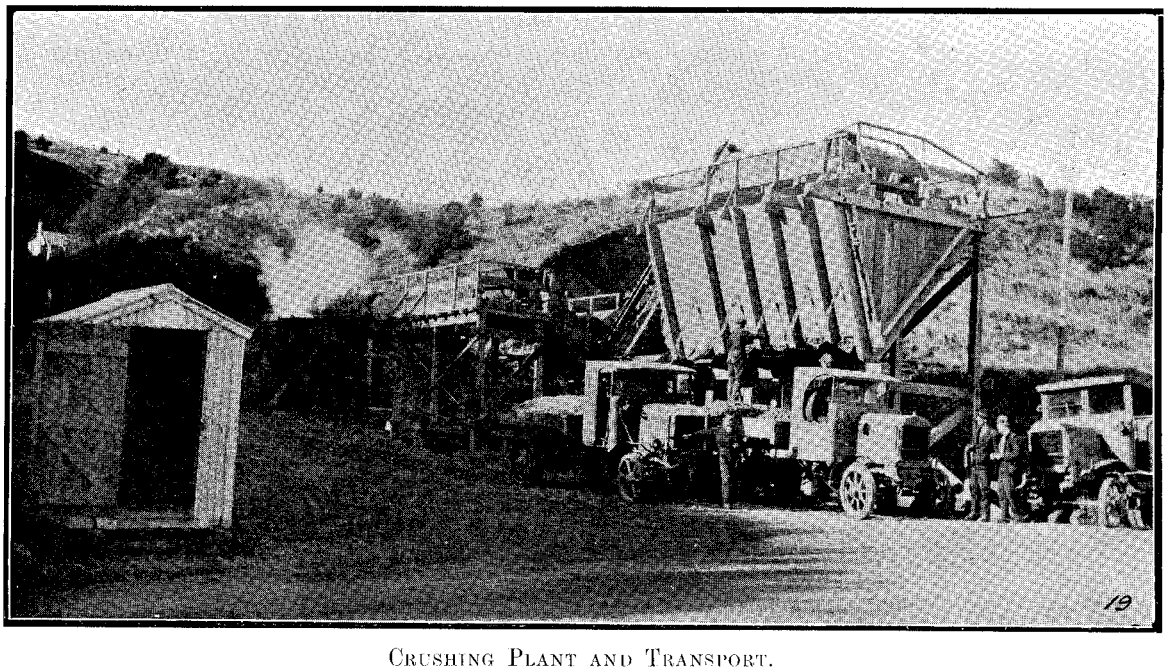


SELWYN RIVER BRIDGE, PARTIALLY COMPLETED.

CHRISTCHURCH–DUNEDIN MAIN HIGHWAY.



IMPROVED BATTERS ON SANDY CLAY FACES.



CRUSHING PLANT AND TRANSPORT.

BALCLUTHA - TUAPEKA MOUTH MAIN HIGHWAY.



MAP OF THE
NORTH ISLAND
(NEW ZEALAND)
SHOWING
MAIN HIGHWAYS
AS DECLARED
(See Main Highways Act N.Z. 1922)

Scale of Miles

10 5 0 10 20 30 40 50 60 70 80 90

Reference

- Main Highways ..... thus
- Main Highways ... *Impassable in wet weather* ,,
- Main Highways numbered ..... ,, (13)
- * Distances Junction to Junction ..... ,, 17½
- Boundaries of Highway Dists ,,
- Numbers of Highway Dists ,, (2)
- County Boundaries ..... ,,

** These distances include short sections of highway routes through cities and boroughs even though these sections may not in all cases be Declared Main Highways.*

AUCKLAND NORTH (1)

AUCKLAND SOUTH (2)

TAURANGA (3)

GISBORNE (4)

HAWKES BAY (5)

KING COUNTRY (6)

TARANAKI (7)

WANGANUI (8)

WELLINGTON WEST (9)

WELLINGTON EAST (10)

Waipapakauri, Kaitaia, Mangonui, Whangaroa, Bay of Islands, Russell, Mangamuka, Broadwood, Kohukohu, Rawene, Omapere, Opononi, Ohaeawai, Kawakawa, Waimamaku, Dargaville, Te Kopuru, Maungaturoto, Whangarei, Maungatapere, Hikurangi, Mangapai, Waipu, Kaiwaka, Mangawai, Wellsford, Wayby, Pt Albert, Tauhoa, Warkworth, Waiwera, Waiuku, Helensville, Pukeatua, Takapuna, Kumeu, Birkenhead, Auckland, Clevedon, Papakura, Pokeno, Coromandel, Thames, Kopu, Waihi, Paeroa, Te Aroha, Waitoa, Tauranga, Paengaroa, Whakatane, Opotiki, Hicks Bay, Tokomaru Bay, Tolaga Bay, Gisborne, Patutahi, Makarake, Wairoa, Hamilton, Raglan, Matamata, Cambridge, Pirongia, Te Awamutu, Tirau, Kawhia, Lemon Point, Waitomo, Hangatiki, Te Kuiti, Piopio, Rotorua, Te Ngae, Wairakei, Taupo, Tokaanu, Waipukurau, Elsthorpe, Dannevirke, Whetukura, Norsewood, Pohangina, Kimbolton, Ashhurst, Feilding, Palmerston N., Himatangi, Foxton, Shannon, Levin, Woodville, Pahiatua, Weber, Eketahuna, Pongaroa, Alfredton, Tinui, Masterton, Carterton, Greytown, Featherston, Martinborough, Otaria, Awhea, Gladstone, Westmere, Longbush, Pigeon Bush, Ngahauranga, Wellington, Taihape, Mangaweka, Mangamahu, Fordell, Kai-iwi, Waitara, New Plymouth, Lepperton, Kaimata, Inglewood, Egmont Vill., Stratford, Tahora, Normanby, Opunake, Manaia, Hawera, Patea, Waverley, Eltham, Rawhitiroa, Kaponga, Wade's Landing, Raurimu, Tatu, Taumarunui, Ohakune, Raetihi, Horopito, Moawhango, Wanganui, Awahuri, Sanson, Bulls, Greatford, Apiti, Ongaonga, Tikokino, Waipawa, Utane, Rissington, Petane, Napier, Farndon, Omahu, Maraekakaho, Hastings, Clive, Havelock North, Te Hapara, Waipukurau, Kaikora Flats, Wakarara, Porangahau, Waimarama, Tahoraiti, Omakere, Ormondville, Mauriceville, Norsewood, Dannevirke, Weber, Pongaroa, Alfredton, Tinui, Masterton, Carterton, Greytown, Featherston, Martinborough, Otaria, Awhea, Gladstone, Westmere, Longbush, Pigeon Bush, Ngahauranga, Wellington, Elsthorpe, Waipawa, Waipukurau, Wairoa, Patutahi, Gisborne, Tolaga Bay, Tokomaru Bay, Hicks Bay, Opotiki, Whakatane, Paengaroa, Tauranga, Waihi, Paeroa, Thames, Kopu, Coromandel, Te Aroha, Waitoa, Hamilton, Raglan, Kawhia, Lemon Point, Te Kuiti, Piopio, Rotorua, Te Ngae, Wairakei, Taupo, Tokaanu, Waipukurau, Elsthorpe, Dannevirke, Whetukura, Norsewood, Pohangina, Kimbolton, Ashhurst, Feilding, Palmerston N., Himatangi, Foxton, Shannon, Levin, Woodville, Pahiatua, Weber, Eketahuna, Pongaroa, Alfredton, Tinui, Masterton, Carterton, Greytown, Featherston, Martinborough, Otaria, Awhea, Gladstone, Westmere, Longbush, Pigeon Bush, Ngahauranga, Wellington, Taihape, Mangaweka, Mangamahu, Fordell, Kai-iwi, Waitara, New Plymouth, Lepperton, Kaimata, Inglewood, Egmont Vill., Stratford, Tahora, Normanby, Opunake, Manaia, Hawera, Patea, Waverley, Eltham, Rawhitiroa, Kaponga, Wade's Landing, Raurimu, Tatu, Taumarunui, Ohakune, Raetihi, Horopito, Moawhango, Wanganui, Awahuri, Sanson, Bulls, Greatford, Apiti, Ongaonga, Tikokino, Waipawa, Utane, Rissington, Petane, Napier, Farndon, Omahu, Maraekakaho, Hastings, Clive, Havelock North, Te Hapara, Waipukurau, Kaikora Flats, Wakarara, Porangahau, Waimarama, Tahoraiti, Omakere, Ormondville, Mauriceville, Norsewood, Dannevirke, Weber, Pongaroa, Alfredton, Tinui, Masterton, Carterton, Greytown, Featherston, Martinborough, Otaria, Awhea, Gladstone, Westmere, Longbush, Pigeon Bush, Ngahauranga, Wellington

DIAGRAMS

Scale 0 1 2 3 4 8 12 M.

MASTERTON, CARTERTON, GREYTOWN, FEATHERSTON, MARTINBOROUGH

MILEAGES MAIN HIGHWAYS.

NORTH ISLAND.

	Miles
1. Waipapakauri to Wellington, via Taranaki. (Mileage includes connecting links not declared main highways and shown dotted on plan	680½
2. Victoria Valley Mangonui	20
3. Broadwood Kaitaia	39
4. Mangamuka One Junction	11½
5. Waimamaku Ohaeawai	48½
6. Whangarei Okaihau	18½
7. Omapere Maungaturoto. (Mileage includes connecting link not declared main highway and shown dotted on plan)	99
8. Whangarei Te Kopuru, via Dargaville	47
9. Dargaville Maungaturoto	42½
10. Takapuna to Junction Birkenhead Wairau	4½
11. Wellsford Port Albert	7
12. Warkworth Tauhoa, via Kaipara Flats	14
13. Wairau Auckland, via Helensville	48½
14. Kumeu Pukeatua	3½
15. Pokeno Wellington, via Gisborne and Wairarapa	651½
16. Pokeno Waihi Junction to Coromandel	46½
17. Kopu Raglan, via Te Aroha	94
18. Hamilton Rotorua, Petane	211½
19. Waitoa Waiuku	87½
20. Matamata Tauranga	35½
21. Kawhia to Junction Auckland Wellington, via Kawa	40½
22. Hangatiki Lemon Point	11½
23. Auckland Wellington Junction to Bull's, via Taumarunui	191
24. Rotorua Whakatane	53
25. Te Ngae Paengaroa	24
26. Hicks Bay Gisborne	123½
26A. Rotokautuku Bridge Tikitiki	9
27. Patutahi Waerenga via Hangaroa	58
28. Napier Tutaekuri River Bridge, via Omahu and Havelock	25½
29. Taradale Rissington	3½
30. Farndon Hastings	6½
31. Otane Elsthorpe	13
32. Waipawa Tikokino	11
33. Waipawa Ongaonga	9½
34. Dannevirke Waipukurau, via Porangahau	79
35. Norsewood Weber	7
36. Lepperton Junction Hawera, via Opunake	53
37. New Plymouth Kaimata, via Inglewood	15
38. Egmont Village Mt. Egmont (cabin line)	5½
39. Opunake Pririti, via Eltham	29
40. Stratford Tahoraiti	92½
41. Manaia Mt. Egmont (cabin line)	13
42. Normanby Mt. Egmont (cabin line)	6½
43. Hawera Waverley	9
44. Kaponga Eltham	5½
45. Rail Roads	3
46. Kaharoa Road	3
47. Kaitoi Road	25
48. Normanby Hawera Road	7
49. Ranginui East and Watershed Roads	25
50. Wanganui Hunterville	67
51. Raetihi Ohakune	23
52. Fordell Mangamahu	20
53. Taihape Moawhango	8
54. Mangaweka Awahuri via Kimbolton	52
55. Kimbolton Apiti	36
56. Feilding Sanson	9
57. Awahuri Bulls	9
58. Palmerston N. Himatangi	3
59. Foxton Himatangi	6
60. Foxton Shannon	12
61. Pahiatua Eketahuna	33
62. Eketahuna Alfredton	16
63. Weber Masterton, via Alfredton	41
64. Masterton Weber Junction to Tinui	24½
65. Junction Tinui Road to Wertiti	10
66. Masterton Martinborough, via Gladstone	31
67. Turipuapua Westmere	6
68. Carterton Longbush Junction to Gladstone	6
69. Carterton Longbush	15
70. Greytown Bidwell's Cutting	7½
71. Martinborough Otaria Junction to Awhea	6½
72. Martinborough Otaria	9½
73. Kaimatara Loop	14
74. Featherston Pier on Beach	5½
75. Raurimu Wades Landing	28
76. Hastings Maraekakaho	9
77. Featherston Martinborough	13
78. Ashhurst Pohangina	9
79. Stratford to Junction Mangaoa Mt. Egmont	5
80. Kaiwaka Mangawai Wharfe	26
81. Te Awamutu Pirongia	9
82. Pio Pio Tatu via Otira	44
83. Papakura Clevedon	8
84. Pahiatua Pongaroa	16
85. Tokomaru Bay Wharf Road	2½
86. Tolaga Bay Harbour Road	1

Corrected to 31st March 1927

MAP OF THE SOUTH ISLAND (NEW ZEALAND) SHOWING MAIN HIGHWAYS

AS DECLARED

(See Main Highways Act N.Z. 1922)

Scale of Miles

10 5 0 10 20 30 40 50 60 70 80 90

Reference

Main Highways ..... thus : ——

Main Highways ..... *Impassable in wet weather* ..... : ·····

Main Highways numbered ..... : (116)

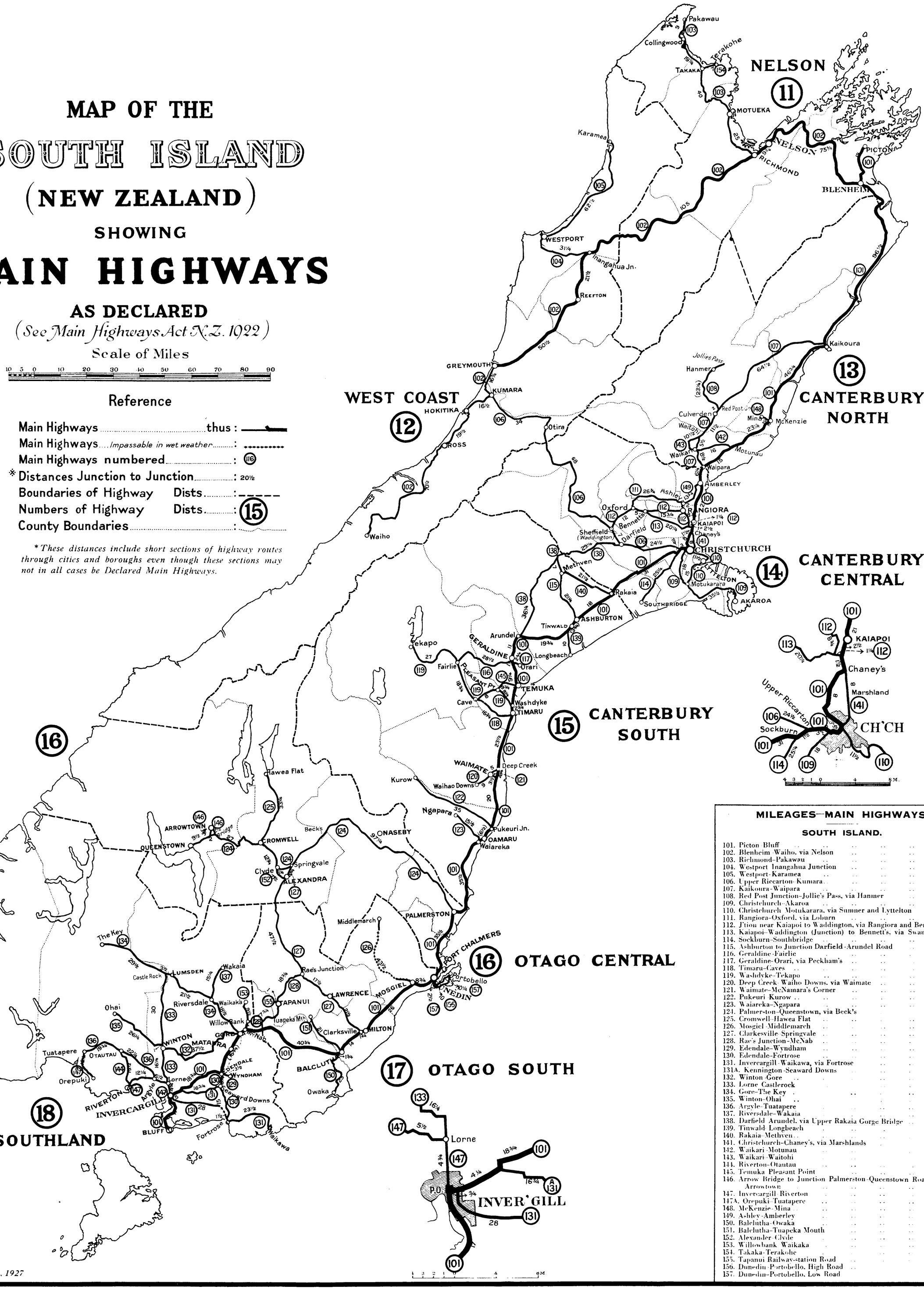
* Distances Junction to Junction ..... : 20½

Boundaries of Highway Dists ..... : – – – –

Numbers of Highway Dists ..... : (15)

County Boundaries ..... : ·····

** These distances include short sections of highway routes through cities and boroughs even though these sections may not in all cases be Declared Main Highways.*



MILEAGES—MAIN HIGHWAYS.

SOUTH ISLAND.

	Miles.
101. Picton–Bluff	627
102. Blenheim–Waiho, via Nelson	385¾
103. Richmond–Pakawau	93
104. Westport–Inangahua Junction	31¼
105. Westport–Karamea	62½
106. Upper Riccarton–Kumara	133¾
107. Kaikoura–Waipara	92
108. Red Post Junction–Jollie's Pass, via Hanmer	23¼
109. Christchurch–Akaroa	53¼
110. Christchurch–Motukarara, via Sumner and Lyttelton	26
111. Rangiora–Oxford, via Loburn	28¾
112. Junction near Kaiapoi to Waddington, via Rangiora and Bennett's	42¾
113. Kaiapoi–Waddington (Junction) to Bennett's, via Swannanoa	20¼
114. Sockburn–Southbridge	25¼
115. Ashburton to Junction Darfield–Arundel Road	28¼
116. Geraldine–Fairlie	28½
117. Geraldine–Orari, via Peckham's	2
118. Timaru–Caves	16¾
119. Washdyke–Tekapo	62
120. Deep Creek–Waihao Downs, via Waimate	14
121. Waimate–McNamara's Corner	3
122. Pukeuri–Kurow	35
123. Waiareka–Ngapara	15½
124. Palmerston–Queenstown, via Beck's	154¾
125. Cromwell–Hawea Flat	33¾
126. Mosgiel–Middlemarch	43½
127. Clarksville–Springvale	91¼
128. Rae's Junction–McNab	40¾
129. Edendale–Wyndham	3
130. Edendale–Fortrose	20¼
131. Invercargill–Waikawa, via Fortrose	53
131A. Kennington–Seaward Downs	16¾
132. Winton–Gore	37½
133. Lorne–Castlerock	47¼
134. Gore–The Key	73
135. Winton–Ohai	26¼
136. Argyle–Tuatapere	42
137. Riversdale–Wakaia	15¾
138. Darfield–Arundel, via Upper Rakaia Gorge Bridge	65¾
139. Tinwald–Longbeach	10
140. Rakaia–Methven	21¼
141. Christchurch–Chaney's, via Marshlands	8
142. Waikari–Motunau	16
143. Waikari–Waitohi	10½
144. Riverton–Otautau	15½
145. Temuka–Pleasant Point	9¼
146. Arrow Bridge to Junction Palmerston–Queenstown Road, via Arrowtown	6¼
147. Invercargill–Riverton	23¾
147A. Orepuki–Tuatapere	12¼
148. McKenzie–Mina	2¼
149. Ashley–Amberley	13¾
150. Balclutha–Owaka	23
151. Balclutha–Tuapeka Mouth	21
152. Alexander–Clyde	7¼
153. Willowbank–Waikaka	9¼
154. Takaka–Terakohe	7
155. Tapanui Railway-station Road	1
156. Dunedin–Portobello, High Road	10
157. Dunedin–Portobello, Low Road	12¾

Corrected to 31st March, 1927