1931.

NEW ZEALAND.

PUBLIC WORKS STATEMENT

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

MR. SPEAKER,—

The Coalition of the two main parties of the House and the consequent changes in the personnel of the Cabinet have caused me to resume the office of Minister of Public Works at a time when my predecessor had already prepared his Statement and estimates for presentation to honourable members.

Although the details of the Statement and estimates show the result of the year's work carried out under his direction, I propose to preface them with a few general remarks on the intentions of the Government in respect to public works.

For a number of years I have felt that an unbalanced industrial condition existed in New Zealand, due to an unduly large proportion of the population deriving a livelihood from works the expenditure upon which was from Government loan funds. The country has been pursuing a policy of development from borrowed moneys for a period so long that men have looked upon public works as a permanent avenue of employment. Many of them engaged in these works in early manhood and have reared their families while in the employ of the State. They have regarded their positions as being permanent, and failed to recognize that the tenure of their work depended upon the continuance of a policy to construct works from capital-moneys.

So long as the progress of the country justified the carrying-on of developmental works, and our industries, particularly the great primary industry, increased at a rate faster than that at which borrowed money was spent, the position was sound; but when uncontrollable causes, especially the fall of world prices of primary products, caused a suspension in the expansion of industry, the justification for developmental works became less apparent. I do not mean to say that developmental works should then cease altogether. There should be a gradual tapering-off to enable those men displaced from one calling to have the opportunity of establishing themselves in other industries.

The financial position in the country to-day calls upon the Government to provide as much work as it can to tide the country over the difficult period until industries are established on a new basis. For this reason it is still necessary that certain public works should be carried out.

Honourable members have my assurance that it will be my endeavour while looking to the ultimate reduction in the expenditure of capital-moneys to see that such borrowed money as is available is spent to the best advantage on undertakings that promise to return the greatest value to the State. More particularly is it desirable that the public works undertaken in the future are of a character to enable more people than at present to earn their living at rural

occupations and in other spheres which will result in increased production. With the price per unit of our products greatly reduced, our efforts must be to increase the number of units for sale.

One of the works which can be carried out and which fulfils the condition I have mentioned is the metalling of rural roads, and it is the Government's desire to change over as quickly as possible from formation work to metalling settlers' roads. Not only will this plan enable the farmer to make better use of the land of the Dominion, but it will, by improving the amenities in country districts, tend to check the movement of workers from the country to the cities. It is also hoped that work of the kind will encourage some people to take up again rural occupations.

In addition to borrowed money being used to tide the country over the present difficult phase, there are the funds raised by special taxation under the Unemployment Act. Unfortunately, owing to the endeavour to keep men employed near their homes, and the fact that there is more unemployed labour in the towns than in the country, the works carried out through the medium of the unemployment funds have been mainly of an urban character. Although the works have been the best that local authorities have been able to arrange, they have not resulted in the production of wealth or in an increase in the volume of products for export.

My endeavour in the future will be to divert labour available, and such funds as can be justifiably raised, together with a portion of the Unemployment Board's funds, to carrying out rural developments. Some of these rural works must continue to be what has commonly been understood in the past as public works. I have more particularly in mind the improvement of lands. Men now being displaced in work on railway construction will be given work as far as practicable in metalling roads in outlying districts, on new blocks of land, in forming and making new roads necessary, and in fencing and in preparing those blocks for settlement; also on undeveloped lands, construction of irrigation schemes, reclamation of low-lying country and sand-covered country. In all probability greater national returns can be obtained by intensive work on successful farms than on any possible development of the poorer lands. I do not mean from this that there should be any slackening-off in the endeavour to bring in virgin land or to restore deteriorated land, but unemployment and the country's financial position demand immediate consideration, and the quickest response will come from the application of labour intelligently directed on our best farming-land.

As Parliament has adopted the report of the Railways Board and has discontinued work on all the railways which the Board recommended be suspended, the estimates so far as they affect those railways have been recast and make provision only for liabilities to date and the estimated cost of clearing up and securing the works and plant.

Touching the subject of hydro-electric development, which is really a commercial undertaking, it will be necessary so long as the policy of the Government to control the bulk sources of supply is continued, to spend money on new developments as fast as the growth of load continues. In the past the growth has been remarkable, but with financial tightness a slackening in the rate must be looked for. Whatever the financial condition of the country, there must come a time when there are no new areas to reticulate, and the growth of load thereafter will depend upon the increase of population, together with the utilization of electrical energy in channels in which it is now not used.

There is still a healthy increase in most districts in the demand for electrical energy. It will shortly be necessary, if this additional demand is to be met, to give consideration to developments or extensions of existing stations. Development in this direction as in all others, must, of course, depend on available finance.

Even though it be found impossible for a time to borrow money abroad it will be necessary, to employ our labouring population and to prevent complete stagnation, to carry out a certain amount of work with the financial resources obtainable within New Zealand. I am satisfied when the issues are put to the test it will be found that the resources of New Zealand are greater than we have imagined.

In conclusion, the country is to-day, so to speak, in "reverse gear." Public-works activities may be said to be running in "top gear." A "change of gear" must now be made.

The statement of the year's operations and comments on same by my predecessor now follow.

STATEMENT BY THE HON. W. B. TAVERNER.

The fact that public-works expenditure is steadily increasing notwithstanding the fact that our national income has of recent years been decreasing, has caused me to carefully investigate all branches of the Department's activity, and the ability of suggested works to eventually bear at least a substantial portion of interest and sinking fund on the capital involved has been my first consideration. The developmental value of public works is a factor not readily assessable in terms of money, and it is necessary to take a longer view than that of the present or the immediate future. Public works are, in the main, purely construction works of a developmental nature, and so they should be regarded in endeavouring to arrive at a correct assessment of their economic value.

In view of the uncertainty of the position, I have used every endeavour to keep the amount being expended on railway construction within limits, and have refrained from placing on order large quantities of structural steel and other material which would be required should Parliament, after consideration of the report of the Railways Board which they are required to render to the House under the provisions of section 18 of the Government Railways Amendment Act, 1931, decide to complete the various lines.

This report, having now been submitted to Parliament, indicates the opinion of the Board in regard to railway-line construction. I do not propose to offer any comment thereon at this stage. For the information of the House, however, I desire to say that a cessation of expenditure on railway-lines construction would not mean that loan-money would not continue to be spent on the railway system. I would point out that the estimates now before the House provide for the sum of £1,020,000 under the Railways Improvement and Addition to Open Lines vote being made available direct to the Working Railways Department. It should also be borne in mind that, should Parliament decide to endorse the recommendations of the Railway Board and entirely cease construction, considerable expenditure would yet be involved in stopping the works, and this, at a rough estimate, I am advised would be £100,000.

It cannot be gainsaid that with the low prices for our primary products, resulting in decreased revenue, it is quite impossible to continue developmental works, providing no direct return, with borrowed money at the rate which has obtained during past years, and the provision of work for the relief of those unfortunately unable to obtain employment except from the State relief works must in the future be financed to a much larger degree, if not entirely, from revenue funds and not from borrowed money. In the Public Works estimates now before the House it will be seen that reductions are proposed under most heads.

It has been pointed out elsewhere that the provision of loan-money for this year's public-works operations has been very considerably reduced. The expenditure of a sum of over eight millions on public-works activities in times like the present cannot be justified, unless the works are essential works of a reproductive nature; but the position has been that, on account of the imperative necessity of affording employment to large numbers of men, the suitability of certain works from the employment point of view has possibly outweighed their justification from a developmental or economic point of view. To expend large sums of borrowed money upon relief of unemployment, other than as a temporary expedient, is unsound and should not be continued, and assists in no small degree to increase the burden of our annual loan indebtedness. It is intended, therefore, to gradually diminish the relief works hitherto carried on by my Department.

The time has arrived when the Unemployment Board should have complete control of the relief of unemployment, and it is the duty of Parliament to render available to that Board a sum adequate to the needs of the situation, always having in mind the relation of the expenditure of revenue in this direction to other forms of expenditure.

The amount spent by the Department under this head during the last four years are as follows: 1928, £284,427; 1929, £665,715; 1930, £625,391; 1931, £1,032,102; 1932 (proposed), £700,000; and the weekly average numbers of men to whom employment has been given during the same period are 1,908, 3,016, 3,713, and 4,898.

It is essential that the Department should render the fullest possible assistance to the Board to carry out schemes that may be decided upon, and every effort will be made in this direction. All facilities available to my Department are at the disposal of the Board.

Up to the present the local bodies in the centres of population have been largely depended upon to provide relief works. Such works are becoming increasingly difficult to find, and indications are that whatever relief will in the future be provided will have to be somewhat further afield. The Public Works Department has the necessary organization and staff in the country districts to efficiently undertake and supervise such works, which would certainly be of a more useful character than many of the relief works which up to the present have been undertaken adjacent to the towns.

The unemployment-relief works carried on by my Department were, in the early stages of the unemployment problem, the sole avenue of Government relief work; but with the increase of unemployment and the creation of special machinery in the form of the Unemployment Board to deal with the question, the relief works of my Department are now only supplementary to the operations of the Board. In this connection it has lately become apparent that there now exists a position which gives to the small number of relief workers under my Department the monopoly of full-time employment, while the less fortunate majority are restricted to the intermittent relief available from the limited resources of the Unemployment Board.

The construction of roads, particularly the widening and improving of existing roads, provides the simplest channel for the employment of unskilled labour, particularly with reference to the fact that it involves the purchase of very little material, thereby allowing the money to be utilized for wages as far as possible.

Even although the metalling of roads may not fulfil the above requirements quite so completely as improvements of alignment and grade, nevertheless the decided advantages to settlement of metalled roads has prompted a decision to utilize relief funds in the providing of metalled surfaces to roads giving access to rural properties, and during the past few months quite a lot of work of this nature has been in hand.

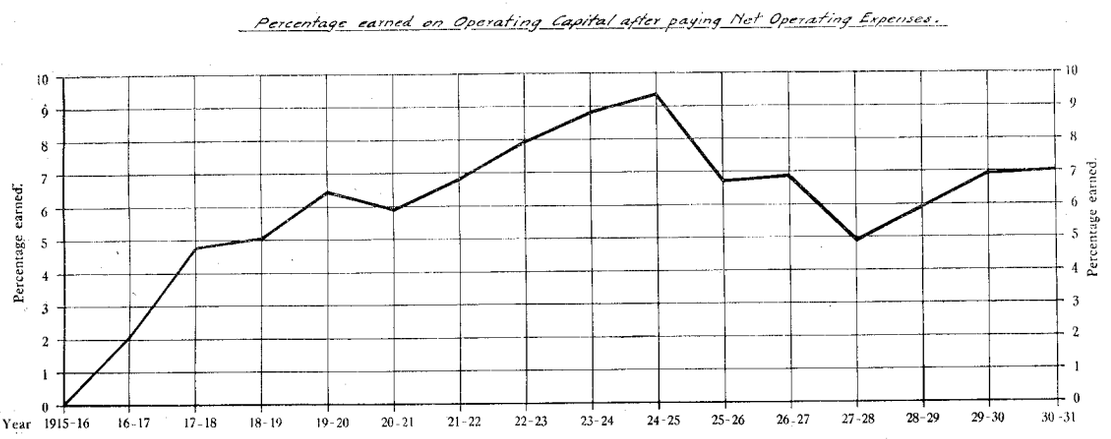
A continuation of the policy of the past, it may be pointed out, is contrary to the principles embodied in the Unemployment Act, where it is definitely laid down that relief is to be financed from taxation. To the extent that the Public Works Department expends loan-money on relief works that principle has been violated. From every angle, therefore, from which the position can be viewed it is deemed desirable to diminish loan-expenditure under this head and to so arrange that any works carried out by my Department for the relief of unemployment should be at the request and on behalf of the Unemployment Board.

HYDRO-ELECTRIC OPERATIONS.

Hydro-electric development and operation has again been one of the most important functions of the Department. The year under review has been a most critical one, owing to special circumstances which developed during the preceding year, and which were discussed in my previous Statement. Following on the report received from the expert engineer brought from abroad by the Government to investigate the failure at Arapuni, remedial measures to recondition these headworks were commenced on the lines of his suggestions. The severe drought at Lake Coleridge continued well into the summer and a fuel generating plant was installed on that system as an emergency measure to safeguard the position for the immediate future. Despite the adverse effect these events have had on the operating results of the hydro-electric system, the account generally still shows quite a reasonable return on the capital operation. In the following table, giving a summary of the year's operation, the average capital cost includes the whole of the capital expenditure on any part of the system which is in operation or capable of earning money. At Arapuni, for example, the capital represented by the dam and headworks which, for the time being, are out of operation is included for the first quarter of the year during which the plant was in operation, but the capital represented by transmission-lines, substations, &c., is included, even though these assets are operating only to a partial extent owing to the limited amount of power available on the system.

PERCENTAGE EARNED ON OPERATING CAPITAL AFTER PAYING OPERATING EXPENSES.

	Average Operating Capital.	Gross Revenue.	Working Expenses.	Net Profit.	Percentage Net Profit to Operating Capital.
	£	£	£	£	£
Horahora–Arapuni	1,672,621	184,593	101,889	82,704	5·99
Mangahao–Waikaremoana ..	3,388,726	283,017	59,476	223,541	6·60
Lake Coleridge	1,609,604	217,632	57,033	160,599	9·86
Total	6,670,951	685,242	218,398	466,844	7·00



The graph above indicates that despite the adverse year the general average has been well up to that of previous years.

There are indications that the general period of depression is having some effect on the rates of increase in power-demand for bulk supply. On account of the totally different conditions under which we are operating in the Auckland-Waikato area as compared with last year, it is not possible to make any very definite comparisons, but in the Mangahao–Waikaremoana system for the quarter ending June, 1931, there has been an increase of only 5 per cent. as compared with the same quarter of last year, whilst in the Lake Coleridge system there has been a decrease of 3 per cent. as compared with the same quarter of the previous year. Both these figures show very considerable reductions on the large increases which have been usual during the previous two or three years.

ARAPUNI HYDRO-ELECTRIC WORKS.

The report on this scheme submitted by Professor Hornell, which was laid before honourable members last year, was fully considered by the Government and a decision arrived at that work on the re-establishment of the development should proceed, so as to get the plant into operation at the earliest possible date. The Department was accordingly in December last authorized to proceed with the work as outlined in that report, and also to do some further work on stabilizing the section known as the "waterfall" which, in the opinion of the Government, was one of the most important parts. Work on all sections is now well in hand, and it is hoped to again have the plant in operation for the winter of 1932. As this work is of considerable public importance, the attention of honourable members is directed to the detailed report of the Engineer-in-Chief, which will be found in another part of this Statement. I desire to say, however, at this stage, that I am very satisfied with the progress of the work and that the indications are that it will be completed well within the estimate made last year.

By utilizing all existing auxiliary plants in the area, the Department has been able to supply practically the whole demand that has been made for power. The Auckland Power Board, immediately following the breakdown at Arapuni, placed an order for an additional 15,000 kw. set for its King's Wharf Station, and now this is in operation the Board is in a position to supply power back to the Department for use by its other consumers should occasion demand.

Waikaremoana Power Scheme.

No new developmental work was carried out at Waikaremoana during the past year, but the station was operated continuously in conjunction with the Mangahao Station. Surveys and investigations are still in progress, and it will be necessary at no distant date to consider putting in hand work for the development of further power from Waikaremoana.

Lake Coleridge System.

As mentioned above, the severe drought in this area which commenced in the summer of 1930 continued right through until the end of that year. The result was that the level of the lake was drawn down to such an extent that supply authorities had to be asked to restrict their loading, so as to limit the drop in lake-level to such a point as would still enable the Department to take some advantage of the storage left to cover daily fluctuations in load. The Department was assisted to a very material extent by the co-operation of the authorities concerned, and it was possible to reduce the load over a period of about three months by approximately 2,000 kw. In addition, the Government made urgent inquiries for additional plant which could be installed to meet any prospective shortage this year, and which might also act as a general standby. As a result a Diesel generating-station was decided upon, and this has been established at Lyttelton. Four engines, each of 1,500 kw. capacity, were purchased in England, and the first of these went into operation at the end of June, and at the moment all four of them can be operated if necessary. The station has also been designed so that the three similar engines at present at Penrose (Auckland) can be removed and located in an extension to the station, and this will provide a total of 9,100 kw. available as standby. Fortunately the latter part of the past summer and the early winter has been unusually wet in this area, and the lake has so far recovered its level that it is now over 9 ft. higher than it was at the same time last year. This should ensure that it will be completely filled by the end of the year, and the position next summer, even without the operation of the standby plant, should be much more satisfactory.

Waitaki Hydro-development.

Work on this development has progressed at full speed throughout the year, approximately one thousand men having been continuously employed. Damage done to the temporary works during a heavy flood in February last, rendered necessary some modification to the original programme. It is not now proposed to close off the Otago half of the river this winter, as originally intended, but to leave this work for the following winter and to carry on meanwhile with the power-station and the work on the Otago shore.

After lengthy negotiations an agreement has been reached with the Dunedin City Corporation for the supply of power from the Waitaki - Lake Coleridge system. This will obviate the necessity for the City of Dunedin to further develop their own installation at Waipori, and will give the Waitaki system a valued customer. There is no question but that the interconnection of the two systems will add to the security and reliability of each of them, and be advantageous both to the Department and to Dunedin.

Electric Supply Operating Accounts.

Horahora-Arapuni.—As mentioned earlier, the Arapuni Station has been out of operation for the greater part of the year, and during this time, for the purpose of accounting, the headworks have been considered as being under construction.

The financial position may be summarized as under

	£
Capital investment (total) at end of year	3,943,837
Revenue	184,593
Operating-expenses	101,889
Balance	£82,704

The balance has been used in paying interest and depreciation charges. This does not provide the full statutory provision, but leaves a deficit of £35,694 on the year's operations.

The reserve accounts established in connection with the scheme now show that £186,405 has been paid to Depreciation and £56,740 to Sinking Fund.

The fourth generating unit, of 15,000 kw., the delivery of which was held back pending decision on the question of remedial measures, has since been delivered, and erection work is in hand, so that the machine should be available as soon as the headworks are again in commission.

Waikaremoana-Mangahao.—These two stations have been delivering power into a common system of transmission and distribution throughout the year, and, despite a certain amount of dislocation following the Hawke's Bay earthquake, the financial position continues to show some improvement.

	£
Capital investment at end of year	3,498,840
Revenue	283,017
Operating-expenses	59,476
Balance	£223,541

The balance has been used in paying interest, and has, in addition, allowed a payment of £63,850 to the Depreciation Account, which now stands at £284,966.

The Hawke's Bay earthquake was felt very severely over a good deal of the territory served by the system. No damage was done at either of the two power-stations, though a considerable amount of damage was done to chimneys and all loose material in the staff cottages at Waikaremoana. The Department's substation at Taradale (Napier) was, however, severely damaged, the main transformers being overturned, and portions of the building will also require fairly extensive repairs. An extensive slip between Napier and the power-station also carried away two of the main transmission-line towers and necessitated a deviation being built over a length of one mile and a half to clear the broken country.

Despite the severity of this calamity, however, the Department was able to make power available again at Taradale within thirty-six hours of the occurrence of the earthquake. Though the load taken by the Hawke's Bay Power Board necessarily showed considerable reduction for some time, it has already risen again to figures in excess of what was taken before the disaster occurred.

Lake Coleridge.—I have already mentioned the unfortunate restrictions that had to be imposed on account of the unprecedented drought in this area. This, of course, also had considerable influence in increasing operating-costs and decreasing revenue returns. Nevertheless, the year has been a successful one.

	£
Capital investment at end of year	1,712,555
Revenue	217,632
Operating-expenses	57,033
Balance	£160,599

The balance has been used in payment of interest: £13,290 has been paid to the Depreciation Account, £17,126 to Sinking Fund, and £52,957 to General Reserve.

Electric Supply Authorities Activities.

The regulations governing electric supply and installations of all authorities are at present being revised by the officers of my Department, assisted by an Advisory Committee on which other interested parties are represented, and it is hoped that a new issue may be made available during the coming year.

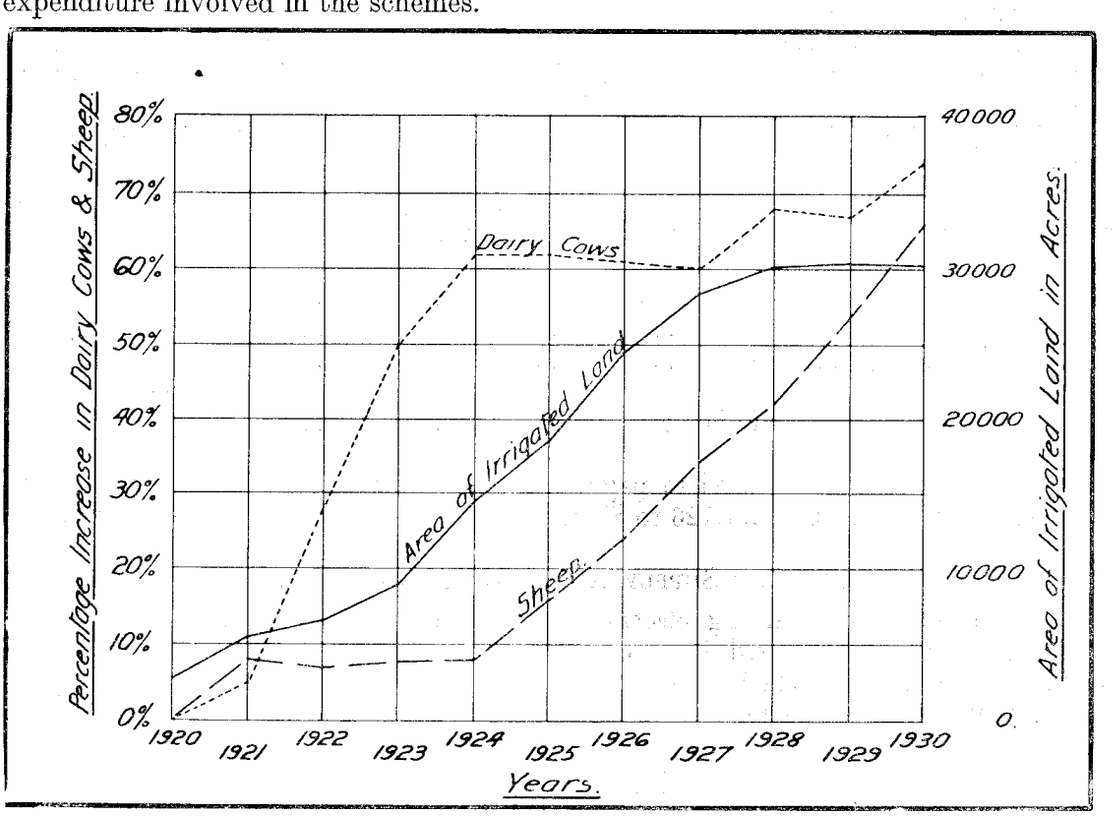
IRRIGATION.

During the year a considerable amount of investigation and survey work has been carried out in connection with irrigation schemes in Central Otago. The data thus obtained is now being compiled, and early consideration will be given to the question of the desirability or otherwise of further extensions of the irrigable areas in that district. The total expenditure which the Public Works Department has incurred on irrigation in Otago up to the end of March, 1931, amounts to

£981,688. The total area at present irrigated under the eleven completed schemes is 42,672 acres, and the irrigators under these schemes number 408. It is interesting to note that the total land owned by farmers who irrigate the 42,672 acres under the Government schemes is approximately 250,000 acres, or six times the area irrigated. The rates charged for water range from 5s. to 14s. per acre, the average being approximately 10s. per acre. The present average is 7s. per acre, due to the fact that the system of rating is based on a graduated scale varying from 1s. per acre in the first year to the full rate in the fifth or sixth year.

On account of the difficulties through which the farming community is at present passing as a result of the period of depression, difficulty is being experienced by my Department in collecting payment for water-supply. The amount of rates for last financial year, including the rates unpaid during former years, amounted to £18,787, and of this amount a sum of no less than £12,933 yet remains unpaid. From a departmental point of view the position regarding unpaid rates is unsatisfactory. It is evident, of course, that the low price-level is largely contributing towards this difficulty; but, even so, it is considered that in many cases there is no justifiable excuse for non-payment, and it seems apparent that greater pressure must be brought to bear to obtain payments of arrears, some of which have been outstanding for a considerable period. While every effort has been made to collect these outstanding rates, it became apparent to me that, as other Government Departments were in a somewhat similar position regarding outstanding amounts due to existing conditions, whatever action was taken by my Department in regard to unpaid irrigation charges should be in conformity with the action taken by those other Departments, and that the Government's policy should be of a uniform nature. Arrangements have therefore been made for the Otago Land Board, which has been handling the question of rent unpaid by Crown tenants, to investigate each case of unpaid irrigation charges and report to me, after consideration of the irrigator's ability to pay, its recommendation as to whether payment should be enforced, rebated, or postponed.

The following graphs indicate conclusively that the benefits resulting to this district from irrigation are considerable, and the indirect return to the Consolidated Fund as a result of increased production would appear to fully justify the capital expenditure involved in the schemes.

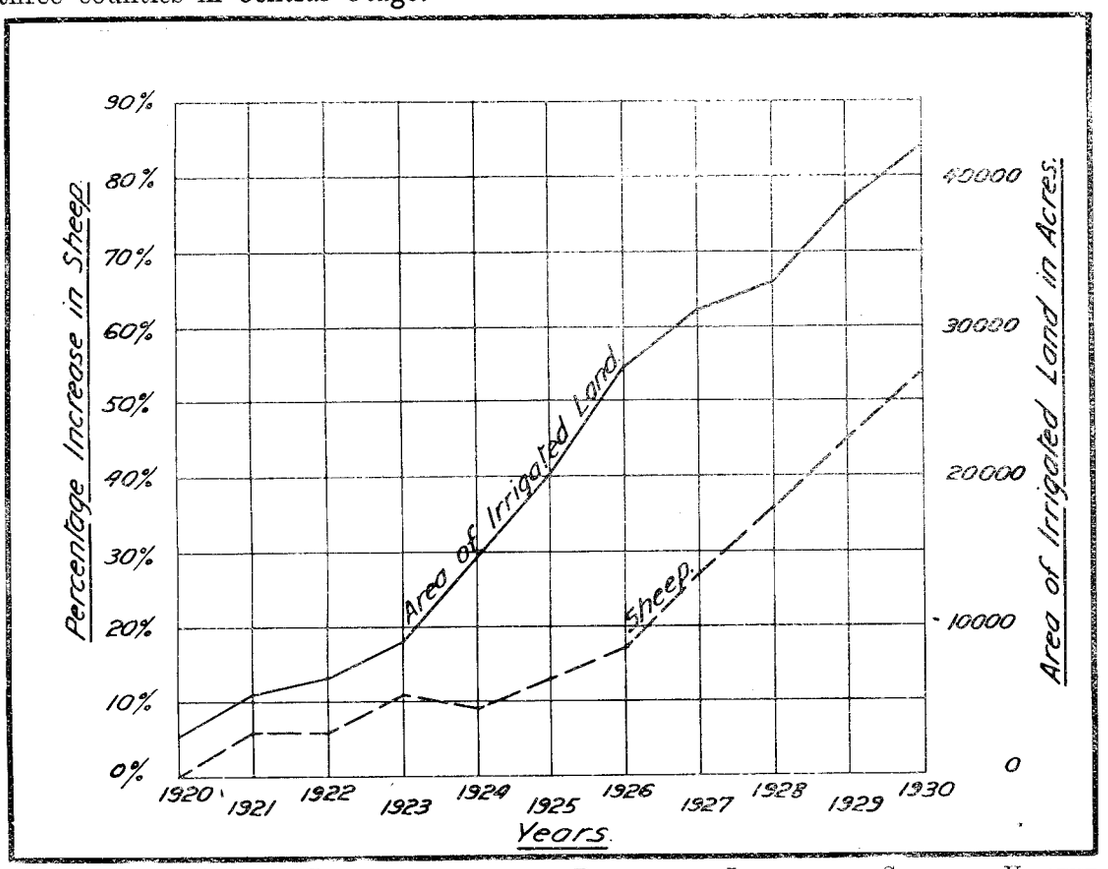


Graph showing Area of Land irrigated and Increase in Dairy Cows and Sheep in Vincent County.

No. 1.—Otago Central Irrigation.

The above graph indicates that from 1920 to 1930 there was an increase of 74 per cent. in the number of dairy cows, and an increase of 66 per cent. in the number of sheep in Vincent County.

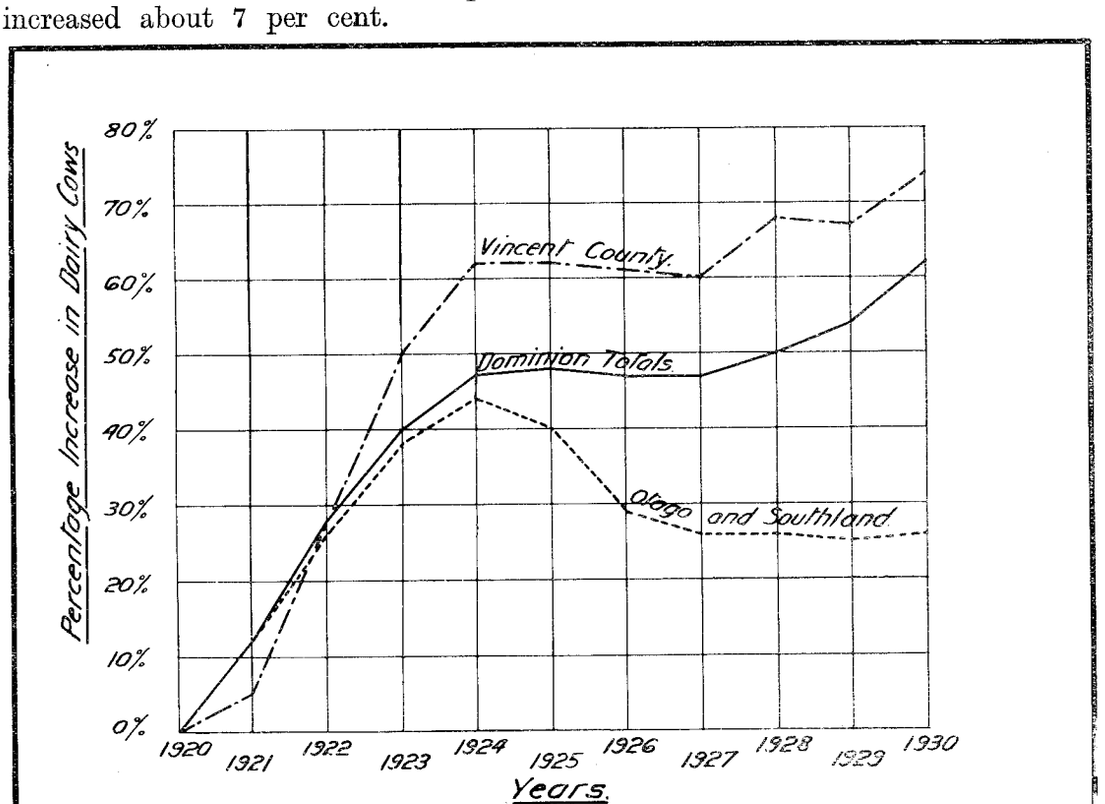
Graph No. 2 shows an increase of 54 per cent. in the number of sheep in the three counties in Central Otago.



Graph showing Area of Land irrigated, and Percentage Increase in Sheep in Vincent, Tuapeka, and Maniototo Counties.

No. 2.—Otago Central Irrigation.

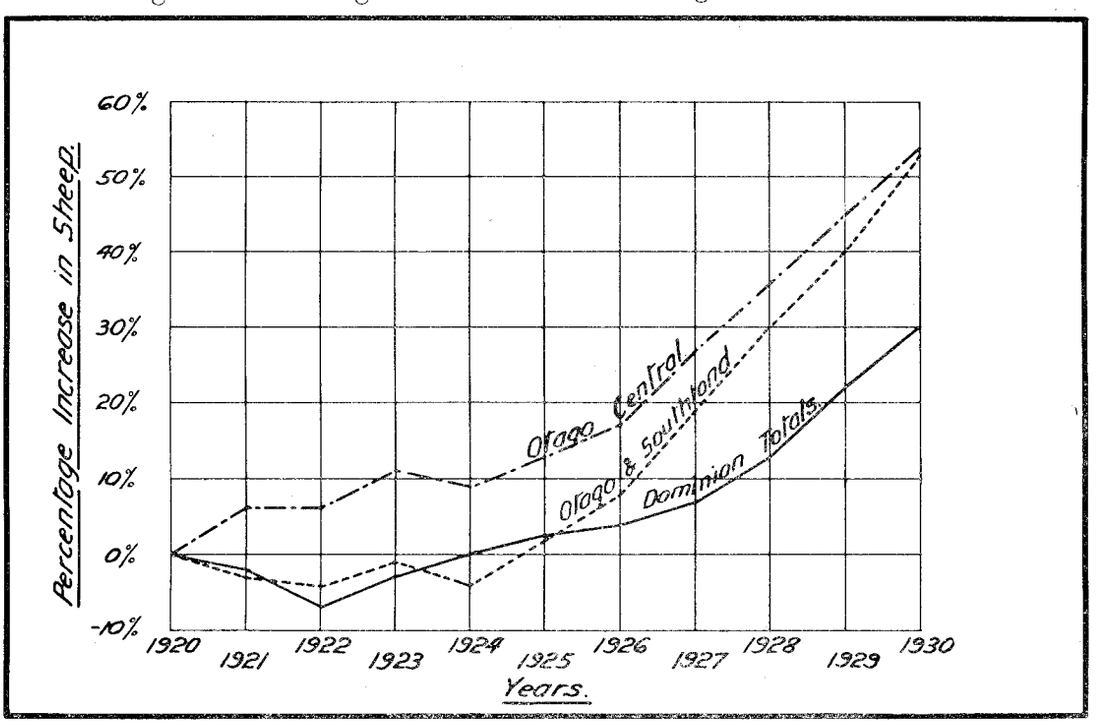
In order to show that the increases indicated in the above graphs are not entirely due to the general increase that has taken place in live-stock throughout the Dominion, the following graphs, Nos. 3 and 4, have been prepared. No. 3 shows that the percentage of increase in dairy cows in the Vincent County exceeds the Dominion total and very greatly exceeds the increase in Otago and Southland. In fact, while the number of dairy cows for these two provinces has shown a decrease since 1924 of about 13 per cent., the number in Vincent County has increased about 7 per cent.



Graph showing Percentage Increase in Dairy Cows in Dominion, Otago and Southland, and Vincent County.

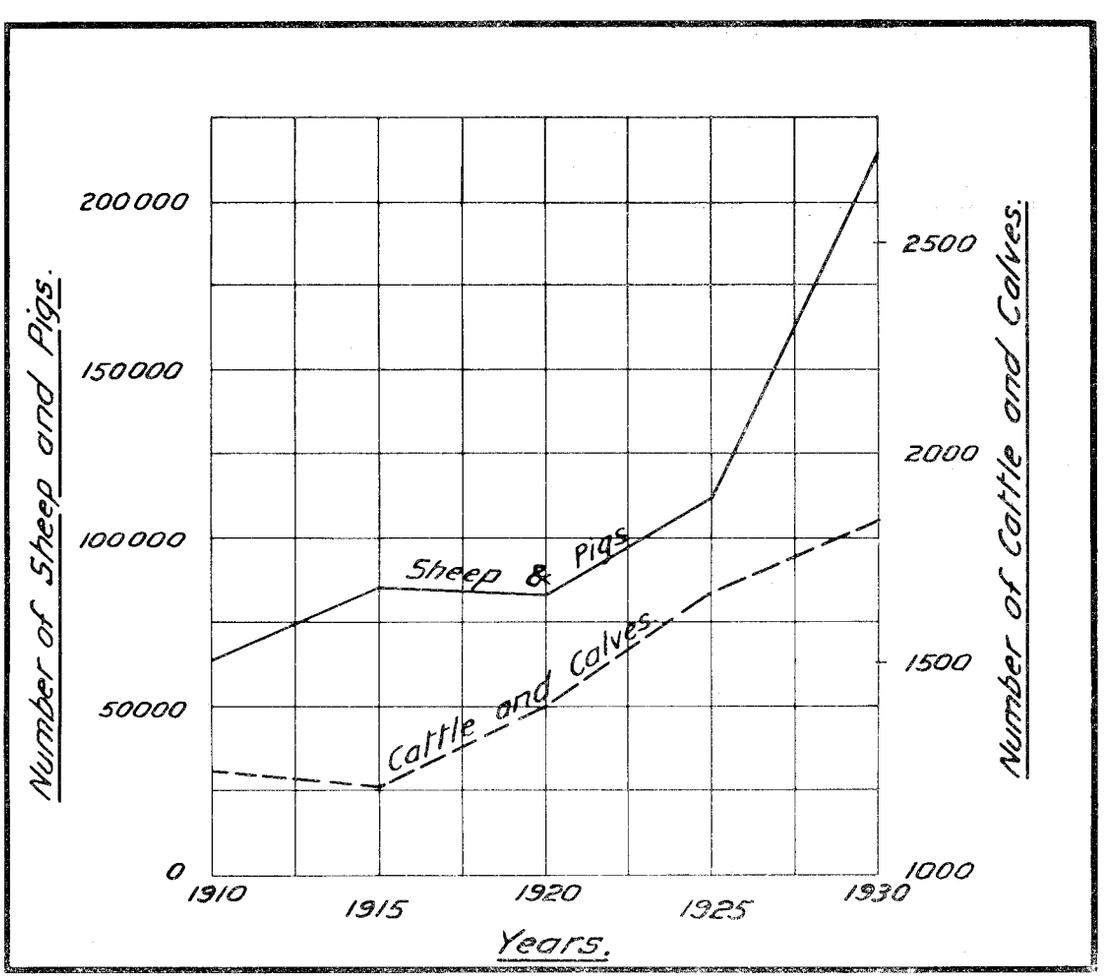
No. 3.—Otago Central Irrigation.

Graph No. 4 shows that, whilst Otago and Southland have shown a greater percentage increase on the number of sheep than the whole of the Dominion, Central Otago has even a greater increase than Otago and Southland.



GRAPH SHOWING PERCENTAGE INCREASE IN SHEEP IN DOMINION, OTAGO AND SOUTHLAND, AND CENTRAL OTAGO.

No. 4.—OTAGO CENTRAL IRRIGATION.



RAILWAY RETURNS.—GRAPH SHOWING AMOUNT OF STOCK TRAFFIC FROM THE FOLLOWING STATIONS: OTUREHUA, OMAKAU, ALEXANDRA, CLYDE, AND CROMWELL. FOR SHEEP AND PIGS, RANFURLY IS INCLUDED.

No. 5.—OTAGO CENTRAL IRRIGATION.

Although graphs 3 and 4 are instructive in the way of showing that the counties affected by irrigation have more than kept pace with the general growth of dairy and sheep farming in the Dominion, they do not fairly show the progress that has really taken place in these counties. It has to be remembered that over the lands which are suitable for irrigation in Otago Central the rainfall is extremely small, and that without some artificial means of watering these lands very little increase at all could have taken place in farm-produce. Therefore graphs 3 and 4 as well as graphs 1 and 2 are really indicative of the progress that has been made due entirely to the irrigation of the land.

The above graph shows the increase in traffic from 1915 to 1930 for sheep, pigs, and cattle from the various railway-stations in the irrigated area.

Taking the figure of 16s. per head as a fair value to allow for the production for a sheep per year, the increase in production due to irrigation for sheep only can be calculated at £104,000. Similarly, taking the annual value of the production from a dairy cow as £13 10s. and the increase in numbers of dairy cows due to irrigation as 1,200, the increase in the value of the products from this source can be calculated at £16,000. The total increase in production primarily due to irrigation from these two sources alone can therefore be set down at £120,000 per annum.

Future Proposals.

The amount proposed to be made available this year for the development of irrigation in Central Otago is £75,000. The possible future schemes that have been under review are the Omakau–Lauder–Matakanui, taking supply from the Upper Manuherikia River, which would irrigate between 14,000 and 15,000 acres at present owned by fifty-two individuals. In the absence of complete detailed surveys and plans, the estimated cost of this work is £267,000, and the annual charges would amount to £12,550. The next scheme under consideration is known as Becks–Clyde, also taking supply from the Upper Manuherikia. In this case there would be available for irrigation purposes 28,000 acres of land at a total estimated capital outlay of approximately £680,000. The third scheme in regard to which a certain amount of information is available is known as the Lake Hawea electric pumping scheme, which would irrigate about 14,000 acres of land. In regard to this area a tentative proposal was recently made to the Government that private enterprise would be prepared to undertake this work, and a reply has been given to the effect that the Government would give its answer to the request for a license when a definite proposition is submitted.

The remaining schemes which have at one time or another been investigated are the Roaring Meg electrical pumping and the Ettrick or Teviot extension. In the first case about 8,000 acres could be irrigated, and under the Ettrick scheme a much smaller area.

With regard to the Maniototo Plain, the irrigable area is very large, probably amounting to 120,000 acres. No tentative estimates have yet been made in regard to this very large undertaking, but it is obvious that if its development were undertaken it would have to be of a progressive nature. The supply in this case would be drawn from the upper reaches of the Taieri River. The Maniototo Plain is held in large areas, and the number of present settlers who would be irrigators has not yet been established. Various surveys and the collection of data of an engineering nature have been in hand by my Department for some time past in connection with the possibilities of this area. The prospects of increased production from Otago Central are too well known to need any further elaboration in this Statement, and, as pointed out above, it is necessary that those engaged in promoting extensions of irrigation schemes should bear in mind that, judging from the experience of schemes at present operating, the indirect or national benefit accruing as the result of making water available to land hitherto unproductive entirely outweighs the direct return provided by a water rate.

EXPENDITURE.

The total net expenditure under all votes and accounts appearing on the public-works estimates for the financial year ended 31st March, 1931, was £8,388,529. Of this sum £4,810,659 was expended out of General Purposes Account, and the balance, £3,577,870, 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, 1931.	Total Expenditure to 31st March, 1931.
Railways—	£	£
New construction	1,478,689	39,095,904
Additions to open lines	508,507	16,871,808
Payment to Midland Railway bondholders	..	150,000
Roads	1,475,522	20,334,817*
Public buildings	423,021	11,099,895
Immigration	33,544	3,309,850
Purchase of Native lands	..	2,061,147
Lighthouses, harbour-works, and harbour defences	10,845	1,291,817
Tourist and health resorts	60,288	576,708
Telegraph extension	419,756	10,930,501
Development of mining	..	881,065
Defence works (general)	13,812	1,406,587
Departmental	131,816	2,740,866
Irrigation and water-supply	62,614	968,743
Lands-improvement	70,534	661,216
Minor works and services	..	312,607
Plant, material, and stores	*Cr.* 44,772	274,633
Quarries (acquisition and operating)	4,219	9,636
Timber-supply and sawmills for Public Works Department	*Cr.* 2,271	*Cr.* 5,489
Motor-transport services	..	33,635
Cost and discount, raising loans, &c.	164,535	3,713,744
Total General Purposes Account	4,810,659†	116,719,690†
Aid to Water-power Works and Electric Supply Account	1,187,797‡	10,270,384‖
Waihou and Ohinemuri Rivers Improvement Account	22,080‡	709,740‡
Total Public Works Fund	6,020,536	127,699,814
Wellington–Hutt Railway, &c.—		
Railway	..	228,374
Road	..	101,658
Railways Improvement Account	..	641,275
Railways Improvement Authorization Act 1914 Account	1,018,615§	8,727,918§
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	..	590,025
National Endowment Account	..	53,401
Education Loans Account	503,174§	4,678,965§
Main Highways Account–Construction Fund	757,906	4,536,977
Hauraki Plains Settlement Account	33,468	942,095
Rangitaiki Land Drainage Account	6,767	499,935
Swamp Land Drainage Account	48,063	538,626
	8,388,529	150,143,097

* Includes £4,500 expended under section 16, subsection (1), Native Land Amendment and Native Land Claims Adjustment Act, 1923. † Does not include expenditure under the Ellesmere Land Drainage Act, 1905. ‡ Excludes interest during construction and loan charges. § Includes proportionate cost of loan raised under these accounts. ‖ Includes total expenditure under votes only for construction and maintenance—for commercial accounts see Table 6 *infra*.

WAYS AND MEANS.

	£
On the 1st April, 1930, the available ways and means for public-works purposes were	348,125
Additional funds were received as follows :—	
(*a*) Under Finance Act, 1927, section 2 (public works)	196,730
(*b*) Under Finance Act, 1928, section 2 (public works)	1,185,133
(*c*) Under Finance Act, 1929, section 2 (public works)	4,017,119
(*d*) Stock issued for expenses of conversion	360,836
(*e*) Recoveries on account of expenditure of previous years ..	41,583
(*f*) Ellesmere and Forsyth Reclamation and Akaroa Railway Trust Account receipts	1,693
	£6,151,219

The net expenditure on works and services against the General Purposes Account for the year was—	£
(*a*) Under appropriations	4,646,124
(*b*) Under Lake Ellesmere Land Drainage Act, 1905	439
(*c*) Under Lake Ellesmere and Akaroa Railway Trust Account ..	85
(*d*) Charges and expenses of raising loans	164,535
Making a total of	£4,811,183
This left a credit balance in the account for general purposes at 31st March, 1931, of	£1,340,036

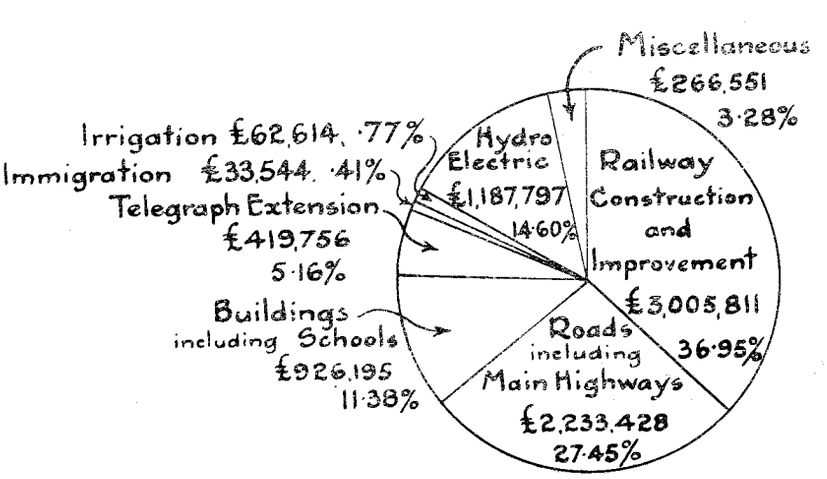
The estimated expenditure under the account for the current financial year is £4,158,000, and arrangements are being made with the Minister of Finance to provide the necessary funds.

The gross cash expenditure on works and services under the direct supervision or control of the Public Works Department itself was £8,098,301. This includes expenditure from the Public Works Fund, Consolidated Fund, Main Highways Account, Electric Supply Account, Railways Improvement Account, and various other accounts.

The Department also collected in cash a total of £707,820 as revenue from electric-supply and irrigation undertakings. The total, therefore, of gross cash expenditure and revenue for the year was £8,806,121. This figure is exclusive of interest and loan charges, credits-in-aid for works of various kinds, and sundry relatively minor items of revenue, and gives some indication of the volume of work handled by the Department's staff.

Ratio of Expenditure, 1930–31.

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



RAILWAY-CONSTRUCTION.

The net expenditure as shown on graph was £3,005,811, being £33,729 less than that of the previous year. The total length of all lines under construction over which goods and passenger traffic has been run during the year was 48 miles, and these services have been well maintained.

The work for the year on the several lines in course of construction is fully set out in the Engineer-in-Chief's report, and may be summarized as follows:—

North Auckland Main Trunk Railway.—The Rangiahua Section was closed down in January last. During the early part of the year three large slips were shifted and the line consolidated where the country was very unstable. Two bridges were erected, and the platelaying was proceeded with for a further distance of 1 mile 5 chains. Ballasting has practically been completed to the rail-head at 35 mile 45 chain peg.

The ballast was obtained from the Okaihau Quarry, which delivered 26,274 cubic yards of crushed metal and 2,474 cubic yards of spalls for the period.

Dargaville Branch Railway.—During the period three steam-shovels had been operating on this line, and the construction was proceeding rapidly when works were closed in December last. The railway has practically been completed to 16 miles 23 chains peg with the exception of two small sections where subsidences have occurred, making it necessary to construct temporary deviations in the meantime. Three permanent bridges were erected, totalling 395 ft. in length.

Goods traffic was commenced in December, 1929, and a passenger service was inaugurated between Kirikopuni and Tangowahine, a distance of 10 miles 10 chains, in September, 1930.

On the works closing down some of the men were transferred to Arapuni hydro-electric works and others were absorbed in various road works in the vicinity.

There are still 1 mile 50 chains of light formation, 3 miles 70 chains of platelaying, 7 miles of ballasting, three bridges, and the necessary station buildings to complete this line.

Gisborne–Napier Railway.—The construction of this railway between Waikokopu and Gisborne was discontinued in January last. Up to this date formation was in hand on the Gisborne Section (14½ miles), Wharerata Section (10 miles), and Kopuawhara Section (11 miles). Co-operative contracts were in hand over the greater portion of these sections.

On closing down, some of the workmen were transferred to Galatea road-works and others to Arapuni.

The Putorino Section, 26 miles 59 chains in length, was completed and handed over to the Railway Department on the 6th October, 1930, and from that date maintenance and control was carried out by that Department.

Work on the Wairoa Section has progressed steadily, and it is expected that the line will be completed to Wairoa about September, 1932.

The following bridges were completed during the year: Waihua River Bridge; Ohinepaka Stream Bridge at 64 miles 7 chains; Ohinepaka Stream Bridge at 64 miles 47 chains; Hurumua Stream Bridge.

The following major works are in hand:—

Kotemaori Tunnel: This work has suffered by various stoppages due to labour disputes, but it is confidently expected that it will be completed in six months' time. The bottom heading was pierced in September last, and 11½ chains on the south side and 14½ chains on the north side have been enlarged and concrete-lined. There is still 7½ chains of enlarging and lining to complete the tunnel.

Mohaka Viaduct: Very good progress has been made with the foundations, and they will be completed in about three months' time.

Maungaturanga Viaduct: The steelwork is nearing completion, and this viaduct will soon be ready for traffic.

Station buildings have yet to be erected; 10 miles of platelaying and 15 miles of ballasting have yet to be completed.

Stratford Main Trunk Railway.—On the eastern end the passenger and goods service has been well maintained between Okahukura and Ohura, and early this year a goods service was started to Tokirima, thus extending the means of transport a further distance of 8 miles. The total distance over which this service is now run is 27 miles from the North Island Main Trunk Railway, and settlers are thus receiving most of the benefits of a completed railway in the transport of stock and manures, &c., particularly as through rates are given to and from any stations on the opened railways.

On the western end the tri-weekly goods and passenger service has been maintained between Tahora and Tangarakau, a distance of 3½ miles. This has enabled the coal from the Egmont Collieries mine at Tangarakau to be marketed.

The formation has steadily progressed during the year. On the Tokirima Section the earthwork formation is practically complete. The six tunnels, aggregating 1¼ miles in length, have been finished.

The bulk of the work is now being concentrated on the Heao Section (3 miles 50 chains in length). Three bridges over the Heao Stream are being erected, and the remaining two tunnels are in hand. No. 1 Tunnel (8 chains long) has been pierced, and is now being enlarged and concrete-lined.

The Mangatete Tunnel (55 chains long) is manned at both ends, 20 chains of bottom heading being driven on the east end and 22 chains on the west end. Approximately 8 chains of enlargement and concrete-lining has been completed at the west end.

The Tangarakau River Bridge, consisting of 25 ft., 30 ft., 60 ft., 80 ft., and 60 ft. girder spans, has been completed.

The work on this railway is nearing completion, and the line should be ready for handing over to the Railway Department about July, 1932.

Wellington – Tawa Flat Deviation.—During the year work has been continued on the sea-wall, which has been extended a further 22 chains, and at Kaiwarra the embankment has been extended a distance of 16 chains.

The No. 1 Tunnel has been enlarged to full size and concreted throughout its entire length, a distance of 61·58 chains.

The No. 2 Tunnel has progressed satisfactorily. The heading from the north end has been extended 54 chains and from the south end 54¼ chains. There is still approximately 21½ chains of heading to complete. The tunnel has been enlarged and concreted for a further 38 chains during the period.

Tunnel-work was interrupted for a period of nine weeks on account of the disinclination of the tunnel-workers to accept the modified prices fixed by the Government. This has now been overcome.

The formation has been completed from 6 miles 14 chains to 8 miles 26 chains, except for a small gap at 6 mile 72 chain peg. Concrete culverts have been placed totalling 488 lineal feet, and five girder bridges have been erected.

Midland Railway.—The construction of this railway was closed down in January last, and up to this date formation had practically been completed to 82-mile peg. Everything was in readiness for platelaying and ballasting to commence, and this work could have been proceeded with without interruption up to 82-mile peg, a distance of 14 miles.

Westport–Inangahua Railway.—The formation is progressing satisfactorily. The Cascade Section, 3 miles 8 chains in length, is practically complete, and coal traffic from Cascade Mines has been carried over it.

On the Hawk's Crag Section, 9 miles long, formation has been completed for a distance of 7½ miles. A start has been made with driving the bottom heading for the tunnel at 13 miles 41 chains. Owing to an unfortunate disaster, involving the death of three men, and owing to disputes regarding tunnel prices, operations were suspended. The parties have now been reorganized and a fresh start is being made.

The erection of the Cascade Creek Bridge at 9-mile peg, consisting of five 80 ft. and one 40 ft. spans, is in hand. This bridge is on a 7½-chain curve, and massive concrete piers have been placed. It is anticipated that this bridge will be completed in about twelve months' time. A suspension bridge 530 ft. long over the Buller River has been erected to enable workmen to reach their work on the opposite side of the river from the camps.

On the Orikaka Section formation has proceeded satisfactorily, and the whole section, 9½ miles in length, is now fully manned, 4½ miles being completed. Some of the cuttings on this section are exceptionally heavy, as the country is precipitous. A suspension bridge across the Buller River, 540 ft. long, is being erected at the 19-mile peg to facilitate access to the men camped there.

South Island Main Trunk Railway.—At the north end of this railway formation work has progressed satisfactorily on the Clarence Section, 20 miles in length. Foundations have been completed for bridges over Kekerangu, Deadman's, Woodbank, and Washdyke Streams, and the permanent bridges will be completed as soon as the girders and steel come to hand.

At the south end formation is in hand on the Conway and Oaro Sections. The Conway Section is being worked by heavy machinery, six steam-shovels, two drag-lines, and eight locomotives being utilized. A very heavy cutting, 46 chains long, is in hand. This is to take the place of a tunnel which was originally proposed.

At Parnassus an up-to-date workshop and plant-depot has been established; sixty-one married men's quarters and 134 single men's huts and two staff cottages have been built. At Wharanui an office, store, smithy, carpenters' shop, garage, fitting-shop, recreation-hall have been erected, and at Camp No. 8 twenty-nine single men's huts and twelve married men's cottages.

RAILWAYS.

Additions to Open Lines.

The net expenditure out of the Public Works Fund for the year ended 31st March, 1931, amounted to £526,514 11s. 3d., and was charged to capital. This sum represents the provision of new rolling-stock, grade-easements between Crichton and Lovell's Flat, additional dwellings, improvements and extensions to operating buildings and plant, workshop equipment, rearrangement of station-yards, and other facilities.

Railways Improvement Authorization Act, 1914.

The expenditure under the Railways Improvement Authorization Act 1914 Account amounted to £1,018,615, including £45,928 proportion of cost of raising loan. The works carried out during the year included the completion of new station and yard at Auckland, new goods-shed at Wellington and reclamation for station-yard, Papatoetoe–Papakura duplication, reconstruction and strengthening of bridges, completion of Ravensbourne–Burke's Deviation, telegraph and telephone lines, safety appliances, and train-control; and in addition to these works, which were executed under the control of the staff of the Railway Department, the Public Works Department has proceeded with the Wellington – Tawa Flat Deviation described above.

RIVER-IMPROVEMENTS AND LAND-PROTECTION WORKS.

Waihou and Ohinemuri Rivers.—The work carried out during the year comprised the raising of the stop-bank on both banks of the Upper Waihou River for a distance of 4 miles. Some of the drains leading into the Ohinemuri River have been deepened. The Tirohia–Rotokohu drain has been cleaned out for a total length of 3¼ miles, and Te Tawa drain for 1 mile.

Taieri River.—The contour channel has been improved over a distance of 4 miles, and the whole work to be carried out by my Department on the Taieri Plain is complete and has been handed over to the Taieri River Trust for future maintenance.

HARBOURS.

In order to improve the entrance at Westport, an extension of the training-wall was put in hand during the year, and dredging was steadily proceeded with. The funds for this work are provided out of the general revenue for the harbour, which in itself is largely dependent on the output of coal. Unfortunately, towards the end of the period this coal-output dropped very considerably, and in the interests

of harbour finance it has been necessary to temporarily stop work on the extension. Dredging has, however, been proceeded with whenever possible, and the regular services have been well maintained.

The position of Karamea is, I regret to say, very unsatisfactory. The aftermath of the severe earthquake experienced in 1929 is still apparent, and is, I am afraid, likely to be so for many years. Large quantities of shattered material from the back country have been deposited in the river, which is rising and generally making navigation difficult, and increasing the flood menace over a considerable area of the district.

The construction of the main training-wall has been proceeded with, a temporary wharf in a more suitable position is being erected, and endeavours are being made to so train the river as to improve the channel and make the best of the position as it exists.

The contract for the construction of a breakwater at Waikokopu has been proceeded with, and although work was held up for some little time it is anticipated that it should be finally completed within the next few months. The improvement in loading-conditions at the wharf is becoming increasingly apparent as the work goes on.

In addition to these main harbour-works, a considerable number of wharves and small harbour-improvements have been carried out in various parts of the Dominion with funds provided either in whole or part by the Government.

LIGHTHOUSES.

The policy of gradually improving and extending the various aids to navigation around the coast of New Zealand has been steadily proceeded with.

Arrangements have been made to provide a new flashing light at East Head, near Le Bon's Bay, on Akaroa Peninsula, and it is anticipated that this work will be completed by Christmas-time.

At Baring Head the necessary land has been acquired and provision made for the transfer of the existing lighthouse at Pencarrow to this locality. When the transfer has been effected an up-to-date flashing light will be provided in place of the old fixed light now in operation, and the necessary housing for fog-signal keepers, and possibly a radio direction-finder, will be provided. A contract has been let for the construction of the access road and bridge.

A new automatic flashing apparatus has been ordered for Godley Head Lighthouse, which will supplant the fixed light at present in use. Whenever possible, these old fixed lights are being converted to flashing operation, since the growth of population adjacent to many of these lights and the more general use of electric lights renders it sometimes difficult for a shipmaster to distinguish between a lighthouse and what may be purely a domestic installation or even a motor-car.

A new crane is being provided for the Brothers Lighthouse, and the station generally overhauled.

At Kahurangi a new lens has been installed to take the place of the old lens, which was seriously damaged by the earthquake of the 17th June, 1929, and the tower itself has been repaired.

A new and powerful diaphone fog-signal has been installed at Taiaroa Heads. It has been housed in a reinforced-concrete building, and is a thoroughly up-to-date and efficient installation.

A radio telephone has been established at Portland Island, and general maintenance and repair work has been carried out at the various stations.

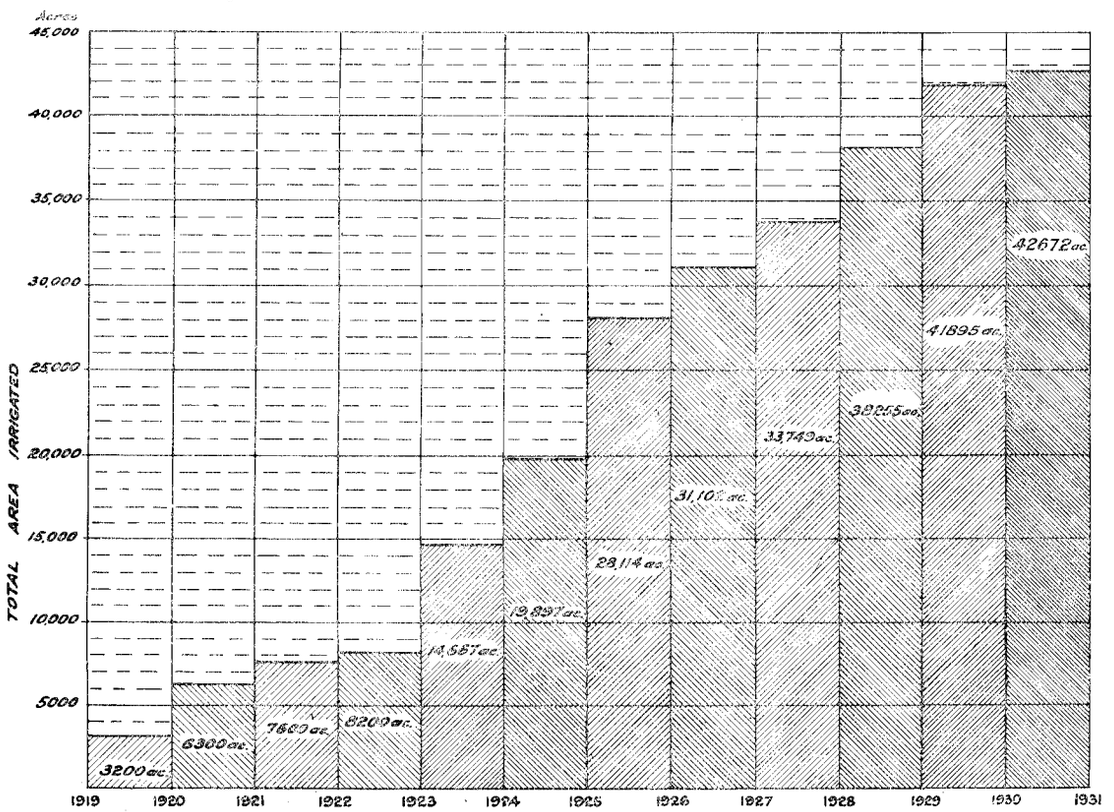
IRRIGATION AND WATER-SUPPLY.

During the year the existing schemes were maintained in good order. All lands requiring water have been served, and the season has been fairly successful, as the water-supply has been good, and the distribution of water has been subject to very little interruption. The schemes in operation on a trading basis are Ardgour, Bengerburn, Earnscleugh, Galloway, Hawkdun, Ida Valley, Last Chance, Manuherikia, Tarras, and Teviot.

The total area irrigated under all Government schemes was 42,672 acres, as against 41,895 acres last year, the number of irrigators being 408.

The Poolburn Dam has been completed and has commenced storing water for next season's supply, and thus will supplement the Manorburn Dam supply for the Ida Valley Scheme and obviate the necessity for pumping from the Manuherikia River.

The following graph shows the growth of irrigation under Government schemes for the last ten years.



ROAD-CONSTRUCTION.

During the past financial year construction and improvement of roads throughout the Dominion were actively prosecuted, and many settlers who previously had little or no access to their properties have had their position in this respect considerably improved.

The opening-up of new lands for settlement has also been responsible for increased roading activity, and several large areas are now being opened up.

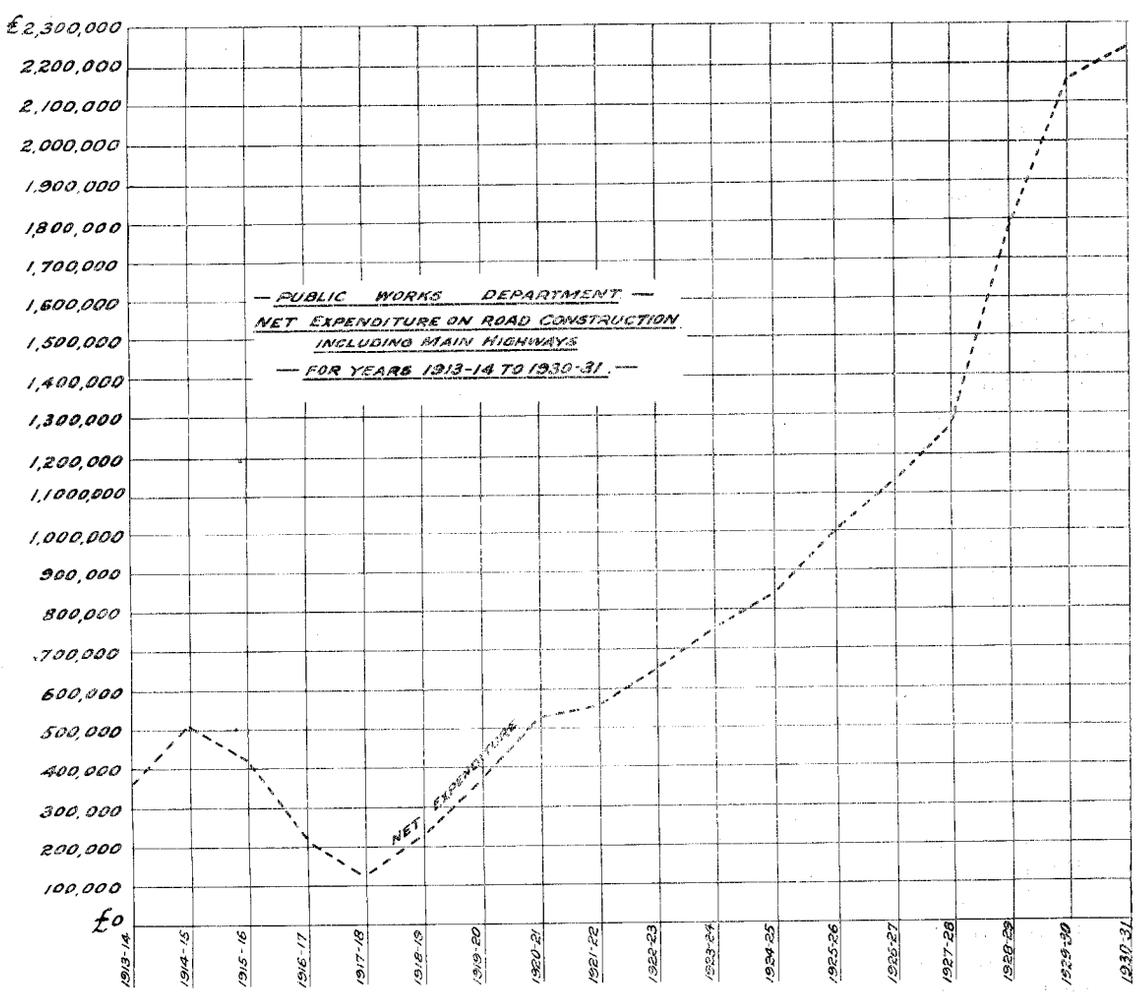
A total sum of £2,233,428 has been expended on the construction of roads and main highways, as against £2,158,056 for the preceding year. Roads other than main highways accounted for £1,475,522 of this sum, and main highways £757,906, compared with £1,060,908 and £1,097,148 for 1929–30.

The actual increase in expenditure on roads other than main highways during the year is, therefore, £414,614, the increase being principally due to the necessity of providing work for the unemployed.

As a result of the duration of the present depression and the need for providing relief for unemployed, roads throughout the Dominion which under normal conditions would be looked upon as of sufficiently high standard to meet present-day requirements have been further improved in width, grade, and alignment. Many roads have been trimmed up in preparation for metalling, and in some instances in isolated districts, owing to special circumstances, metalling has actually been done by the Government. It is essential, however, that the hitherto-followed principle, in accordance with which local bodies finance a portion of the cost of metalling, should continue to be followed, and only those localities which warrant exceptional treatment will receive special Government assistance.

On the 3rd February, 1931, the Dominion was again visited by a disastrous earthquake, which played havoc with many roads and bridges in the Hawke's Bay, Wairoa, Dannevirke, and surrounding districts. Such widespread destruction as resulted is almost unprecedented in the history of New Zealand roads, and the reconstruction in the damaged area has placed, and is placing, a heavy burden upon the areas affected in particular, and upon the Dominion in general. Government assistance towards the cost of reconstruction of roads other than main highways has received consideration in connection with the estimates submitted to the House. The restoration of the main highways has been vigorously carried out. What has already been done in the matter of reconstruction has been done well, and the gratitude of the public has been expressed through the press on many occasions.

With regard to maintenance, it has not been possible to assist local bodies to the same extent as in the past. It must be recognized that the present financial position has had a distinct bearing upon this work, the general policy being to expend the funds available on major works suitable for unemployment-relief, thus assisting local bodies in their construction programmes and allowing local-body funds to be utilized in the maintenance of completed works.



PUBLIC BUILDINGS.

General Departmental Buildings.

The balance of purchase-money for the new offices of the High Commissioner for New Zealand in London (£77,500) was paid during the year.

At Auckland the lift in the Departmental Buildings was completed.

In Christchurch new offices were erected on the top of the Government Buildings for accommodating the officers of the Scientific and Industrial Research Department.

At Dunedin a shed and store for housing plant and equipment was erected.

At Greymouth the explosives magazine was extended.

At Nelson additions were made to the office of the Public Works Department.

New offices were erected for the Land and Deeds Department at New Plymouth; and at Wellington additional lavatory accommodation was erected for the Government Printing Office, and a new central heating system is being installed.

New offices for the Meteorological Department were erected in Kelburn.

The total net expenditure under this vote was £100,927.

Courthouses.

The new Courthouses at Upper Hutt, Papakura, Maungaturoto, and Patea, which were practically finished at the end of the previous financial year, were completed and officially opened early in the year.

A Courthouse at Hamilton was erected during the year and is now in use. The grounds have still to be laid out.

Additions were also made to the Courthouse at Rotorua, and will provide for requirements for many years to come.

The net expenditure under the vote was £19,572.

Prison Buildings and Works.

The expenditure on prison buildings and works was further reduced during the year, the total net expenditure being £2,504.

Extensions of buildings at Invercargill were not proceeded with on account of the need for economy, and the proposed purchase of additional farming-lands at Invercargill was deferred.

Accommodation has been taxed at almost all institutions, but apart from the establishment of a new camp at Hautu, it has not been considered necessary, up to the present, to undertake further permanent extensions on a major scale to prison accommodation.

A summary is given hereunder of the classes of work on which last year's capital expenditure was made; the previous year's figures also being quoted:—

	1930–31.	1929–30.
	£	£
Erection and extension of buildings	535	1,791
Water-supply and sanitary drainage	217	612
Officers' cottages and quarters	389	2,460
Completion of access road (Wellington)	390	747
Farm buildings	315	894
Estuary-reclamation (Invercargill)	534	1,399
Quarry and laundry plant	124	302
	£2,504	£8,205

Police-stations.

The expenditure on police-stations for the year amounted to £8,360 out of an allocation of £10,000.

New police-stations to replace buildings which had become beyond repair were erected at Cromwell, Culverden, Milton, and Palmerston South.

A contract was let for the building of a police-station at Te Araroa, and the work is now in hand.

Post and Telegraph Buildings.

Satisfactory progress continues to be made in the execution of the Post and Telegraph Department's buildings programme.

New buildings were erected at Kurow, Mount Albert (Auckland), Napier, and Te Anga.

Garages were built at Albany, Blenheim (also store, &c.), Ohura, Rawene, Tikitiki, and Walton.

Residences for Postmasters were erected at Hinds and Kurow.

A building was erected at Mount Crawford (Wellington) for the accommodation of the New Zealand receiving-station of the trans-Tasman radio-telephone service.

Increased or improved accommodation for departmental purposes has been provided at the following places: Christchurch, Gore, Greymouth, Hokitika, Huntly (garage), Kaikohe, Kaitaia, Nelson, Newton (Auckland), Papatoetoe, Wairoa (garage), Wellington (workshops), Whangarei.

The following works are in progress: Courtenay Place (Wellington East)—new post-office building; High Street, Christchurch—new post-office building; Lower Hutt—automatic telephone exchange; Masterton—additions and alterations; Palmerston (Otago)—new post-office building; Ruatoria—new post-office and residence; Upper Symond Street (Auckland)—new post-office building; Urenui—new post-office building; Waitara—new post-office building; Westport—new chief post-office building.

The foundations for the new chief post-office building at Dunedin have been completed. Plans and specifications for the erection of the building have been prepared, and tenders have been called, closing in January next.

Plans and specifications have also been prepared for the new post-office building at Taumarunui, and tenders will be called shortly.

The earthquake of the 3rd February, 1931, caused extensive damage to post-office buildings in the Hawke's Bay District. The new chief post-office at Napier, which was completed and opened for business on the 28th July, 1930, withstood the shock, but was subsequently gutted by the fire which followed.

The post-office at Port Ahuriri was badly damaged by the shake, and afterwards burned.

At Hastings the clock-tower collapsed, and the old portion of the post-office building, which carried the tower, had to be demolished.

The Wairoa Post-office was badly damaged, and the clock-tower collapsed.

There was quite a number of other smaller post-offices which were damaged and which are being repaired.

The net capital expenditure for the year amounted to £138,670.

Mental Hospitals.

The net capital expenditure for the year on mental hospitals amounted to £134,140. The following is a summary showing the position of the various institutions at the end of the year:—

Avondale: A new two-story residence in wood has been erected for the Medical Superintendent; an additional lavatory block built for Ward M 9; and a new hot-water service has been installed at the Wolfe Home.

Puhitahi: Villas Nos. 1 and 2 were erected in brick and concrete at a cost of £25,000. These buildings will accommodate 100 male patients.

Tokanui: The Nurses' Home has been completed and handed over to the Mental Hospitals Department. A water-supply and fire service have been installed and the roads formed and metalled. A new transformer substation has been built and a standby generating plant has been installed.

Porirua: A surgery has been provided for "A" Ward, female division, the electrical change-over to the 230 voltage was completed in several buildings and residences; the reservoir was completed, the dam-face being concreted to full height. Several alterations were made to various buildings and renovations carried out as required during the year.

Nelson and Stoke: Three villas commenced the previous year were completed, furnished, and occupied. The equipment for the new bakery was installed; the Imhoffe septic tank was completed, and all drainage connected thereto. The new reservoir for water-supply for Stoke is nearing completion. Contour plans of York property have been prepared.

Sunnyside: A new villa, in wood, was erected, and will accommodate fifty-four male patients.

Templeton: A fire service was installed for Villas Nos. 2 and 3 and extensive drainage-work carried out at Villas Nos. 1 and 2.

Hokitika: A large villa, in wood, to accommodate forty-eight female patients, was completed and furnished during the year. A pumping plant was fitted up and laundry machinery installed. New farm buildings in wood and iron on concrete foundations were erected.

Seacliff: All necessary machinery and appliances were installed in the new laundry and kitchen block. The old kitchen block was altered and rearranged; new service roads and paths were formed, and additional lavatories provided.

Waitati: A new villa for female patients was completed and furnished, and a new access road was formed.

Health and Hospital Institutions.

The chief works under this heading were the completion of additions to the Nurses' Home, erection of the porters' lodge, and a new laundry and fuel-shed at Otaki Sanatorium. Additions have also been made to St. Helens Hospitals at Gisborne and Wellington, and a new Nurses' Home has been completed at Invercargill.

An additional grant was made to the Nelson Hospital Board for repairs to Nelson Hospital, damaged by the earthquake of 1929.

Provision is being made this year for the erection of a building for the Raukawa Children's Health Camp, the site for which has been generously donated to the Government by Mr. Byron Brown. When completed it will provide a health camp for selected children.

The net capital expenditure under this vote amounted to £17,338 for the year.

Agricultural Buildings.

The amount expended last year on capital works was £1,509. Additions to the Wallaceville Laboratory were completed, and an observation shed in brick has been erected.

Education.

The sum of £500,000 was estimated to cover the cost of the erection of school buildings, additions, sites, and teachers' residences during the year under review, the actual expenditure being £501,344. Of this amount £203,292 was spent on primary schools, the larger works being additional accommodation at Brooklyn, Wellington; Southbridge, Canterbury; and new schools at Russell Street, Palmerston North; Picton; Eketahuna; and Miramar Central, Wellington. Additions have been made to the Technical Schools at Auckland, Hamilton, Hawera, Wellington, and Invercargill; also to the Hastings High School, Rongotai Boys' College, and Wellington East Girls' College. Several large works are in progress at primary and secondary schools, and hostel accommodation is being provided at the Wanganui Technical School, Nelson Boys' College, and New Plymouth Boys' High School. The main building for the Massey Agricultural College is nearing completion.

The recent earthquake in Hawke's Bay damaged a large number of the schools in the district, some of which have had to be demolished and are being replaced as rapidly as possible.

The Education Purposes Loans Act, 1919, has been repealed by the 1931 Finance Act (No. 2), which also abolished the Education Loans Account. Amounts required for the erection of school buildings will now be paid out of the Public Works Fund as appropriated by Parliament for the purpose.

The following table shows for the year ended 31st March, 1931, the amount expended on new buildings, additions, sites, and teachers' residences:—

	£
Public schools	203,292
Training colleges	9,080
Technical schools	78,318
Secondary schools	128,594
Universities	241
Native schools	8,922
Schools for feeble-minded	5,110
Child-welfare institutions	1,660
School for the deaf	..
Kindergartens	1,747
Canterbury Agricultural College	109
Massey Agricultural College	68,825
	505,898
Less credits-in-aid	4,554
Net total	£501,344

TOURIST AND HEALTH RESORTS.

The net capital expenditure for the year was £60,288, as against £20,547 for the previous year.

The principal works undertaken were in Rotorua.

The Ward (formerly Pavilion) Bath building was reconstructed, and extensive additions were made to the electrical plant, the transmission-lines were extended, and reconstruction of the Blue Baths is now in hand.

Improvements have been made to the reserves and the formation of a nine-hole golf-course has been completed.

Additions to Glade House, Te Anau, have been erected, and hot-water service and drying-rooms are in course of erection at Quintin Huts, in the same locality.

TELEGRAPH EXTENSION.

The expenditure for the financial year in extending and improving the telephone, telegraph, and wireless facilities throughout the Dominion amounted to £419,756, as against £594,383 for the year ended the 31st March, 1930. Owing to the limitation of funds, it has not been possible to carry out such a large amount of work in extending telegraph and telephone systems as has been the case in previous years. Although the greatest possible use has been made of the amount available, the reduced extent of developmental work will, no doubt, be felt when the Dominion returns to normal and the demand for communication service is restored.

A summary of the more important works upon which capital expenditure was incurred during the year is as follows:—

The installation of a considerable amount of carrier-current equipment, the erection of new metallic circuits between Katikati and Waihi, Ngatea and Waitakaruru, Tauranga and Matamata (main toll route to east coast), Whakatane and Te Teko, and Te Kuiti and Te Anga; the laying of submarine telephone-cable across Auckland Harbour and in the Marlborough Sounds; the opening of new exchanges at Colville, Te Anga, and Waiotira; the conversion to automatic working of the Birkenhead Exchange area; the installation in ten automatic exchanges and nineteen magneto exchanges of additional switching equipment; the establishing of sixty-six new public call offices (coin-in-the-slot telephones); the laying of 25 miles of underground cable-ducts; the laying or erecting of 102 miles of lead-covered cable containing 1,896 miles of wire for subscribers' circuits; the erection of 837 miles of pole-line and 6,781 miles of open aerial wire for telephone-exchange subscribers' circuits; and the connection of 12,779 new subscribers' stations.

The development of long-distance telephone communication within the Dominion, which has been a feature of the Government's policy in recent years, was advanced a further stage during the year by the opening for commercial traffic of the undermentioned additional carrier-current telephone toll systems: Auckland–Whangarei—One single-channel system; Auckland–Tauranga—One single-channel system; Auckland–Napier—One single-channel system; Napier–Gisborne—Two single-channel systems; Napier–Palmerston North—One additional single-channel system; New Plymouth–Wanganui—One single channel system; Wellington–Napier—One single-channel system; Wellington–Palmerston North—One additional single-channel system; Wellington–New Plymouth—One single-channel system; Wellington–Blenheim—One single-channel system; Nelson–Blenheim—One single-channel system; Seddon–Christchurch—One additional single-channel system; Christchurch–Greymouth—One single-channel system; Dunedin–Invercargill—One single-channel system.

The installation of the additional carrier-current systems, besides effecting a substantial improvement in the speech efficiency, stability, and reliability of the network of long-distance telephone-lines throughout the Dominion, has improved the service generally by relieving the congestion of traffic between certain of the larger centres, thus appreciably reducing the delays on long-distance toll communications. The facilities now provided enable practically all the important centres

to obtain reliable telephonic communication at all hours. The efficiency of the network of long-distance telephone communication in the South Island was further enhanced by the installation at Timaru of voice-frequency amplifiers. By means of this additional equipment, two high-grade telephone circuits have been made available between Christchurch and Wellington, which, together with the additional carrier equipment, has resulted in a marked improvement in the volume, clarity, and reliability of the long-distance conversations over the various circuits with which the equipment is connected.

A progressive improvement of the toll and telegraph wire systems has been aimed at throughout the year, and in those cases in which existing facilities could not be sufficiently augmented or improved capital works were undertaken with a view to erecting new circuits.

The development of the local telephone-exchange systems throughout the Dominion has not been so great as in some other years. The number of new connections installed was 12,779, which is nearly as many as were installed during the previous year, but, as the number of relinquishments of service was greater, the net increase in subscribers has fallen off to some extent. In view of the prejudical effects likely to be felt from the general depression now existing, the developmental work in connection with local exchange systems has been curtailed to some extent.

At Wellington Radio a 165-ft. steel lattice mast has been erected. The higher mast and aerials have considerably improved the range of the medium-wave transmitters. A directional transmitting array of the horizontal doublet type, with reflector of similar design, has been erected for the New Zealand-Australian radio-telephone service, which was obtained by the addition of a 5 kw. modulating-unit to the existing 3 kw. short-wave continuous-wave transmitter. A second array has been provided for the Pacific islands radio-telegraph service, with a considerable improvement in reliability. The change of voltage in the Wellington City power-supply system necessitated the complete replacement of the electrical wiring and the substitution of all direct-current motors by alternating-current type. To minimize the risk of an entire interruption to the power-supply, provision has been made for the supply to be obtained over alternative routes and for emergency service to be given from a storage-battery source.

The earthquake and fire in Hawke's Bay on the 3rd February, 1931, were responsible for a considerable amount of damage to telephone and telegraph plant that was originally provided out of Telegraph Extension vote. Temporary arrangements were made to carry on the communication services, but the whole of the equipment destroyed will ultimately require to be replaced.

WORKS FOR DEFENCE DEPARTMENT.

The net capital expenditure for the year under "Contingent Defence" was £13,812, as against £46,766 for the previous year.

The restricted vote has meant that the expenditure and work carried out has been reduced to a minimum, and absolute immediate essentials only gone on with.

The mobilization bases and training-camps at Waikato, Trentham, and Burnham have been maintained in good order.

Various improvements to fortifications, drill-halls, and miscellaneous buildings throughout New Zealand have been carried out, and the buildings maintained.

Owing to the Mount Cook site being required for the War Museum and Art Gallery, the Ordnance Workshops have been removed to Trentham.

Central Command Headquarter buildings were burnt down, but in the interests of economy it was determined not to rebuild, but to transfer these Headquarters to Wellington.

The Gisborne Drill-hall was totally destroyed by fire, but, owing to the Defence Department's programme of training being in abeyance and the necessity to economize, no action is being taken to rebuild until such time as the requirements of the district have been determined.

The development of the New Zealand Air Force Base at Hobsonville has proceeded satisfactorily, and the following works have been completed: Seaplane hangar block, comprising plumbers' and blacksmith shop, engineers' repair shop, aircraft-repair shop, marine store-room, Dope-room (less heating); also the married quarters, oil-store, fire-alarm system, No. 3 hangar, general store (ground floor only), fuelling-station, garage, and the sealing of the roads. Though the workshops have been completed, there has been no money available for machinery and fittings and tools.

The Wigram Aerodrome has been maintained in fair order.

PLANT AND MECHANICAL APPARATUS.

The stoppage of four major railway-construction works in December last released a quantity of construction plant, at least half of which has now been transferred for use on other railway and hydro-electric construction jobs, which were previously short-supplied, and the remainder, which comprises the older and more worn items, is being, wherever expedient, put in good repair for transfer later to wherever required.

Arapuni Hydro-electric construction works absorbed some of the available plant, as also did Waitaki hydro-electric works and the South Island Main Trunk Railway, but a certain amount of new plant also was required to carry out special work at Arapuni.

Bridge-construction jobs in hand throughout New Zealand during the year necessitated the supply of a considerable quantity of plant.

Machinery for the purpose of crushing stone in large quantities for road works in the North was installed at Motutara Island Quarry, and this necessitated several transfers of existing plant and a few new purchases.

A good deal of old plant that has become too expensive to maintain, as compared with new plant, and certain obsolete plant has been disposed of by sale after calling for public tenders, this being the policy of the Department in all such cases. New plant items were purchased by public tender, to, in some cases, serve as replacements for discarded machinery

The major items purchased during the year include one complete set of airlock equipment, two electric hoists, three steam boilers, nine motor-cars, twenty-five motor-lorries, four compressors, two conveyers, one overhead electric crane, six oil-engines, one mechanical excavator, five fans, two oil-burning rivet-forges, three motor graders, one mechanical loader, five electric-battery locomotives, four motor generator sets, two petrol-locomotives, one steam-locomotive, one petrol lighting-set; thirty-one machine tools, two drill-sharpeners, six concrete-mixers, four electric motors, twenty-three pumping units, five air-receivers, two road-drags, one sand-blast plant, five tractors, one motor-velocipede, four welding plants, two oil winches, one electric winch, four steam winches and boilers.

Inspecting of motor-omnibuses is carried out for the Transport Department, and work of a mechanical nature is carried out for other Government Departments and for the Cook Islands and Samoan Administration, as well as for local bodies throughout New Zealand.

HAWKE'S BAY EARTHQUAKE.—OPERATIONS IN CONNECTION WITH RESTORATION OF DAMAGE.

Early on the morning following the Hawke's Bay earthquake of the 3rd February last the Department's officers commenced emergency operations in connection with the erection of cookhouses and other emergency accommodation for the use of the various organizations set up to deal with the earthquake situation.

Cookhouses were erected at Nelson Park and six other suitable locations. The buildings housing the Napier Borough pumping-station and power-station were shored up and made safe for operation. The Hawke's Bay steam laundry was made safe for the handling of the hospital and other laundry-work. Parties of workmen were organized to temporarily cover the roofs of houses where chimneys had crashed through in the Napier Borough and adjoining districts, extending as far as Taradale and Clive.

At Nelson Park three large mess-rooms, staff mess-rooms, hot-water service, and sanitary accommodation were provided, and sanitary accommodation was also provided at Clive Square.

On the 3rd March instructions were received regarding the effecting of minimum repairs necessary to make private dwellings habitable, to the extent of reconditioning eno chimney, permanently repairing the roof, and putting drains and sanitary fittings in good order. Owing to the absence of householders, the greatest difficulty was found in properly organizing this service. However, under the circumstances, good progress was made. It soon became apparent the work involved in reconstructing the drains at private houses was so extensive that operations were discontinued, and this work was left to be dealt with under the £100-loan scheme.

The work done in the way of restoration of private dwellings is summarized as follows :—

In the Napier Borough chimneys have been erected in 954 houses where roofs have also been permanently repaired and sanitary fittings put in order.

In the Hawke's Bay County chimneys have been repaired, water-supply restored, and minor repairs effected in 367 houses, the operations extending to Taradale, Puketapu, Greenmeadows, Meeanee, Clive, Haumoana, Tukituki, Pakowhai, and Mangateretere districts.

The greatest number of men employed at any one time in the work of chimney re-erection was 200. A good deal of difficulty was experienced in obtaining suitable labour, as the local reputable bricklaying contractors were employed on private work.

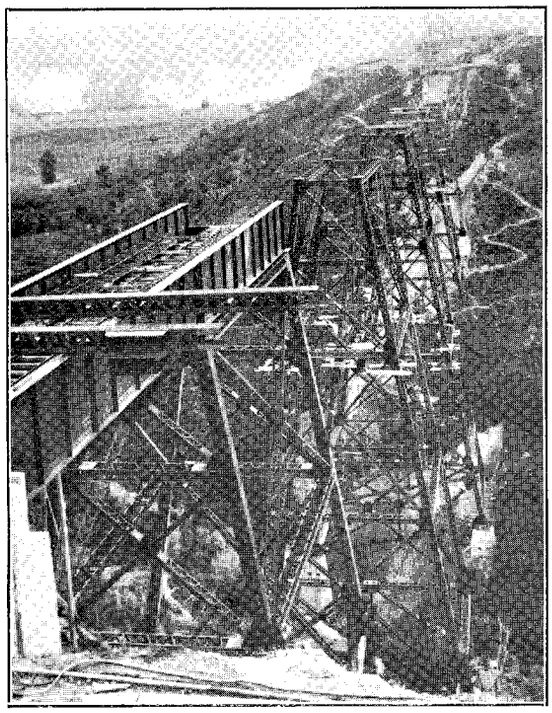
It was found possible to let the plumbing-work, to a considerable extent, in batches of houses, as petty contracts.

Cost of repairs to houses in the Napier Borough has averaged about £15 per house, and corresponding work in the county districts has averaged £22.

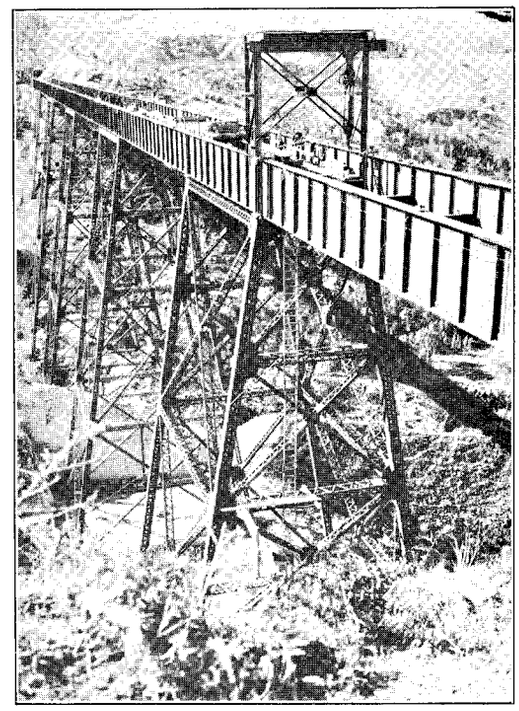
STAFF.

The staff of the Public Works Department is now almost as large as at any time in its history, although relatively to the expenditure and the number of employees it is less in proportion than it was ten years ago. It is apparent that a substantial reduction in the amount of loan-money which will be available for expenditure will necessitate a reduction of the staff. Already a very substantial decrease in numbers has been effected. I desire to say that the various officers have carried out their duties in a commendable manner, often under conditions which were calculated to test their capacity.

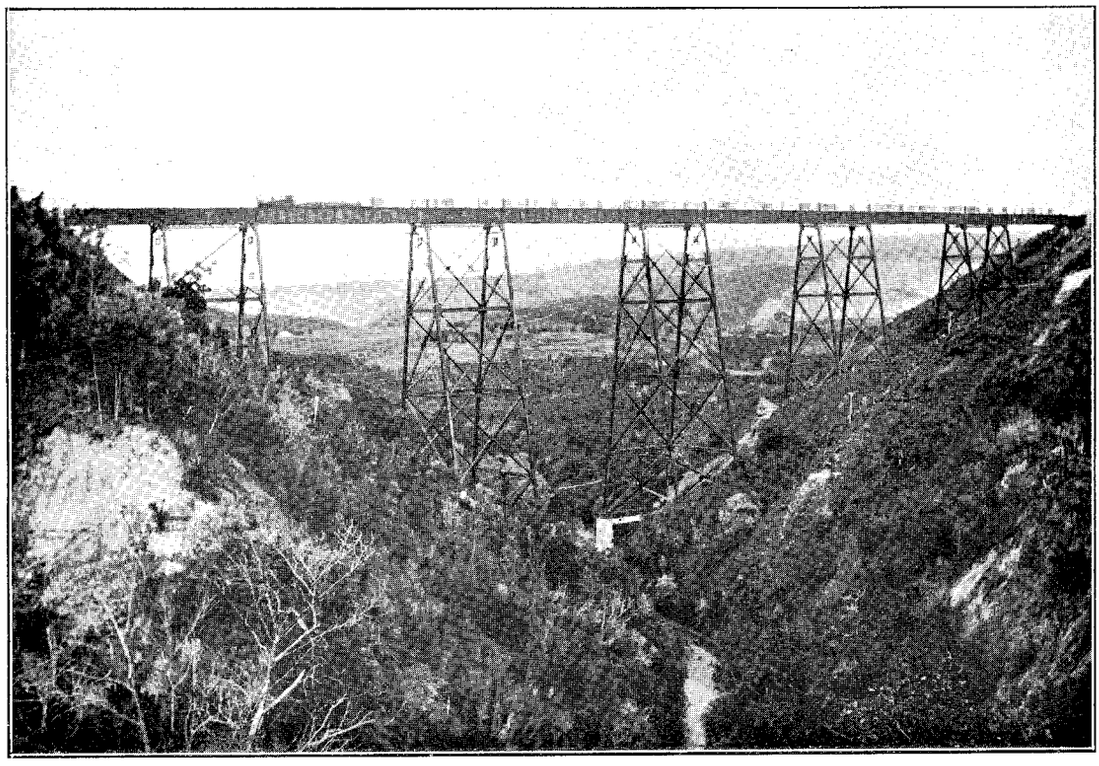
As appendices to this Statement honourable members will find full details of the principal works carried out by the Department, together with reports of the Engineer-in-Chief, the Chief Electrical Engineer, the Government Architect, and the Main Highways Board.



TOWERS ERECTED.



GIRDERS IN PLACE.

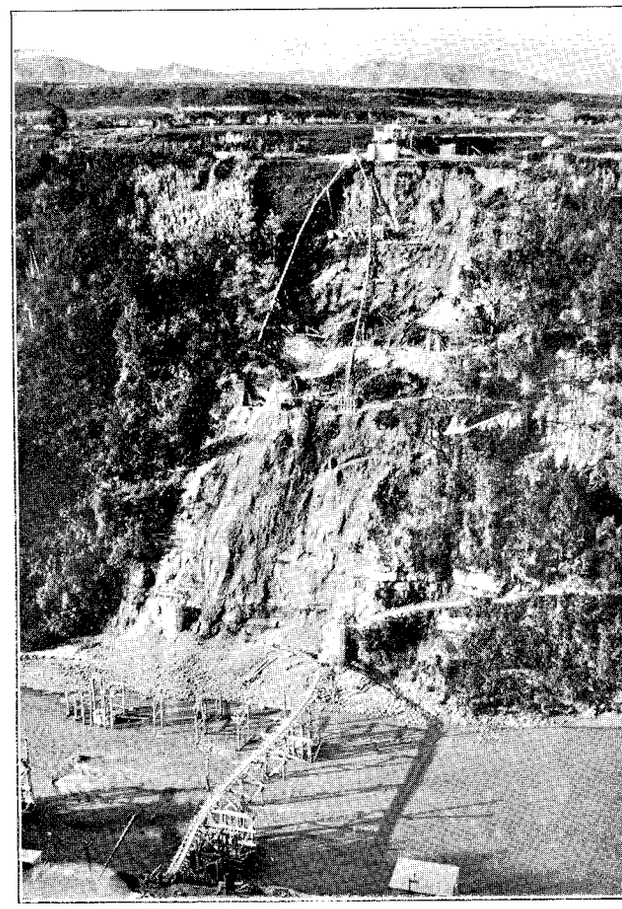


VIADUCT COMPLETED, EXCEPT FOR SMALL PORTION OF WIND-SCREEN.

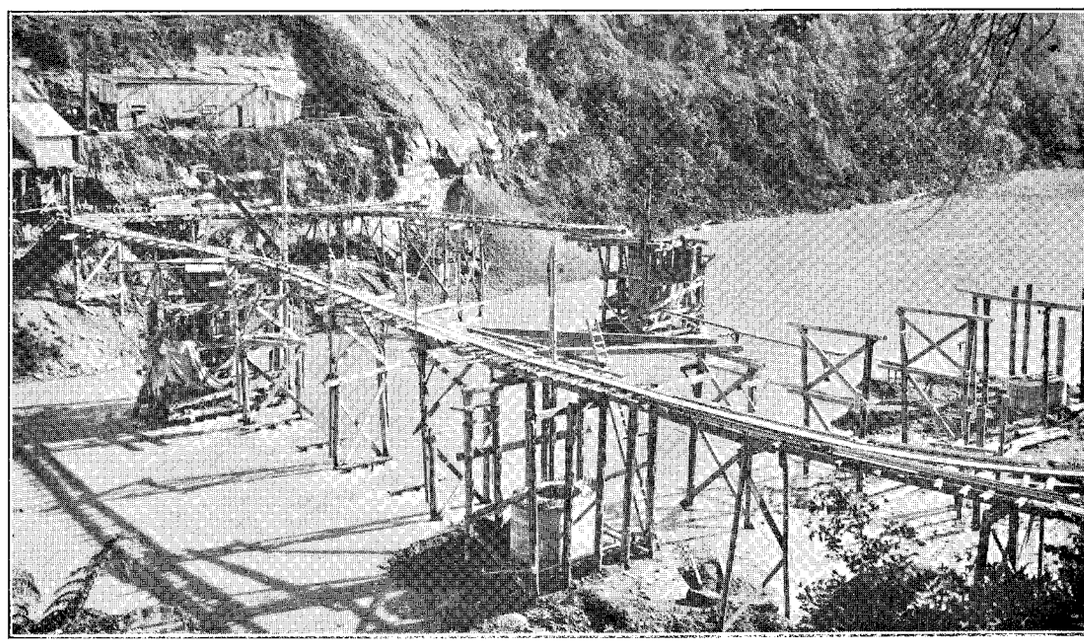
MAUNGATURANGA VIADUCT.

Five 100 ft. spans, six 50 ft. spans: Total length, 800 ft.; height above stream-bed, 215 ft.

NAPIER-GISBORNE RAILWAY.—WAIROA SECTION.



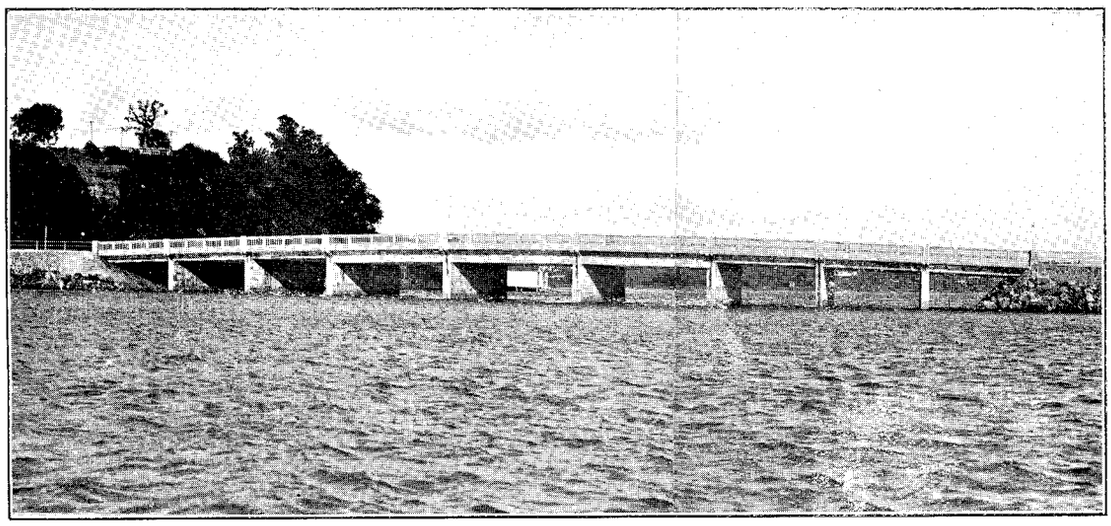
FOUNDATIONS ON NORTH BANK OF RIVER.



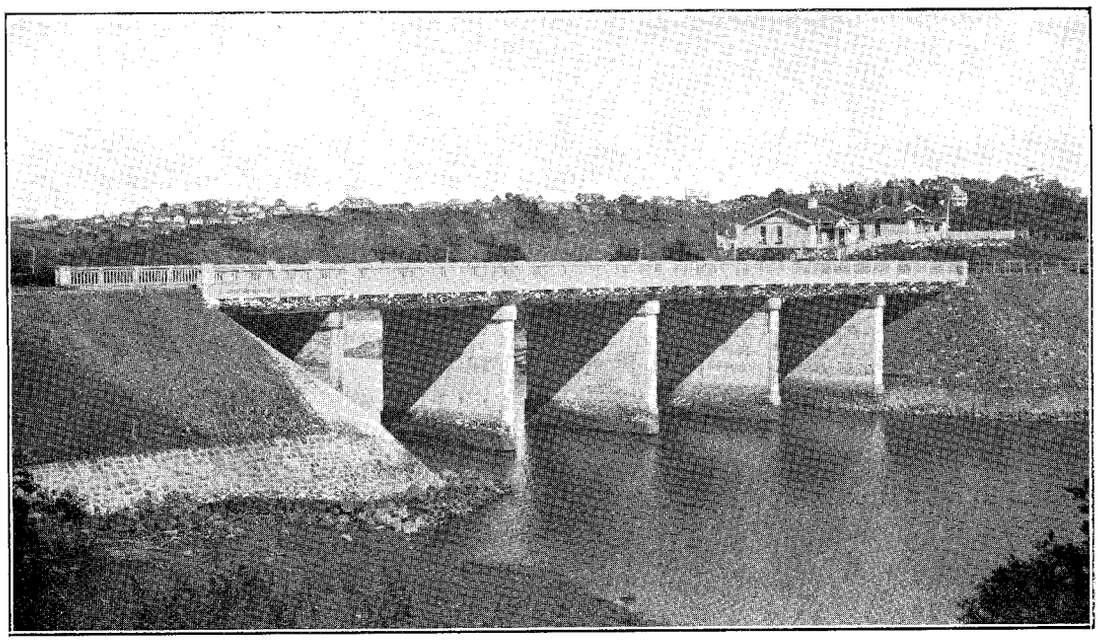
CYLINDER PIERS IN RIVER.

MOHAKA VIADUCT.
Viaduct will be 905 ft. long and 315 ft. high.

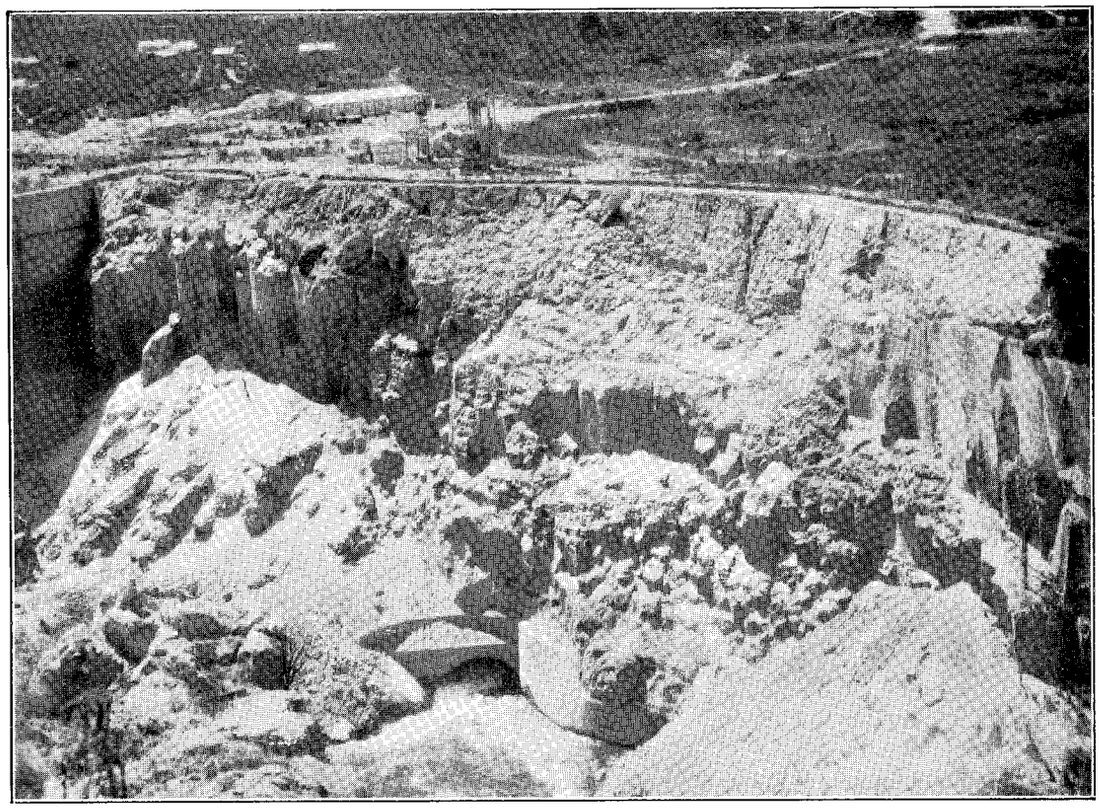
NAPIER-GISBORNE RAILWAY.—WAIROA SECTION.



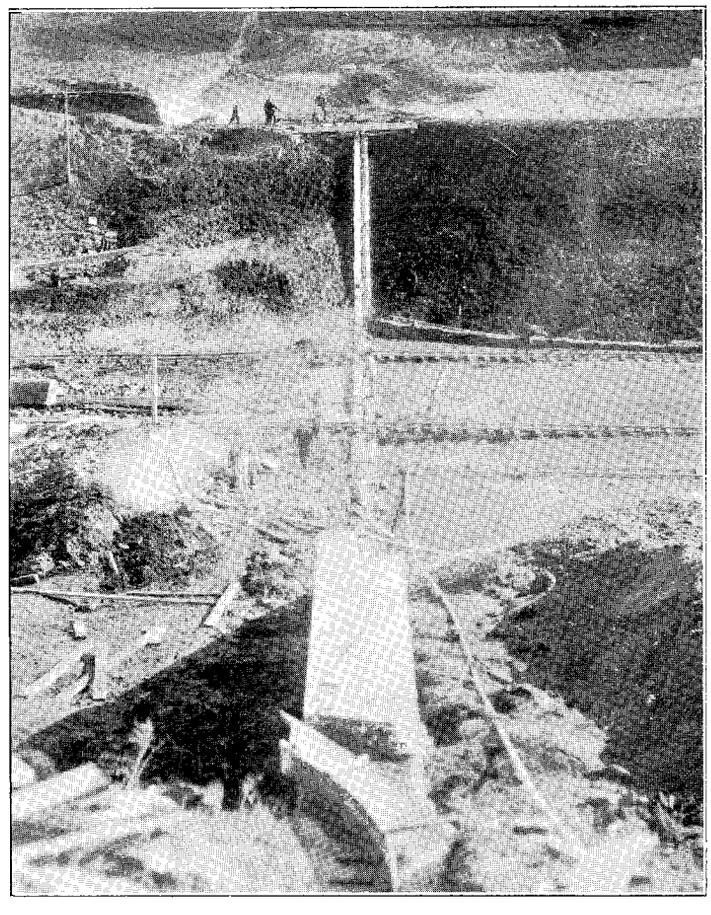
Orakei Waterfront Road.—Orakei Bridge No. 2.
Three 40 ft. spans and six 30 ft. spans, reinforced concrete; 40 ft. roadway and two 10 ft. footways.



Orakei Settlement Road.—Purewa Stream Bridge.
Four 40 ft. spans and two 30 ft. spans, reinforced concrete; 30 ft. roadway and two 6 ft. footways.

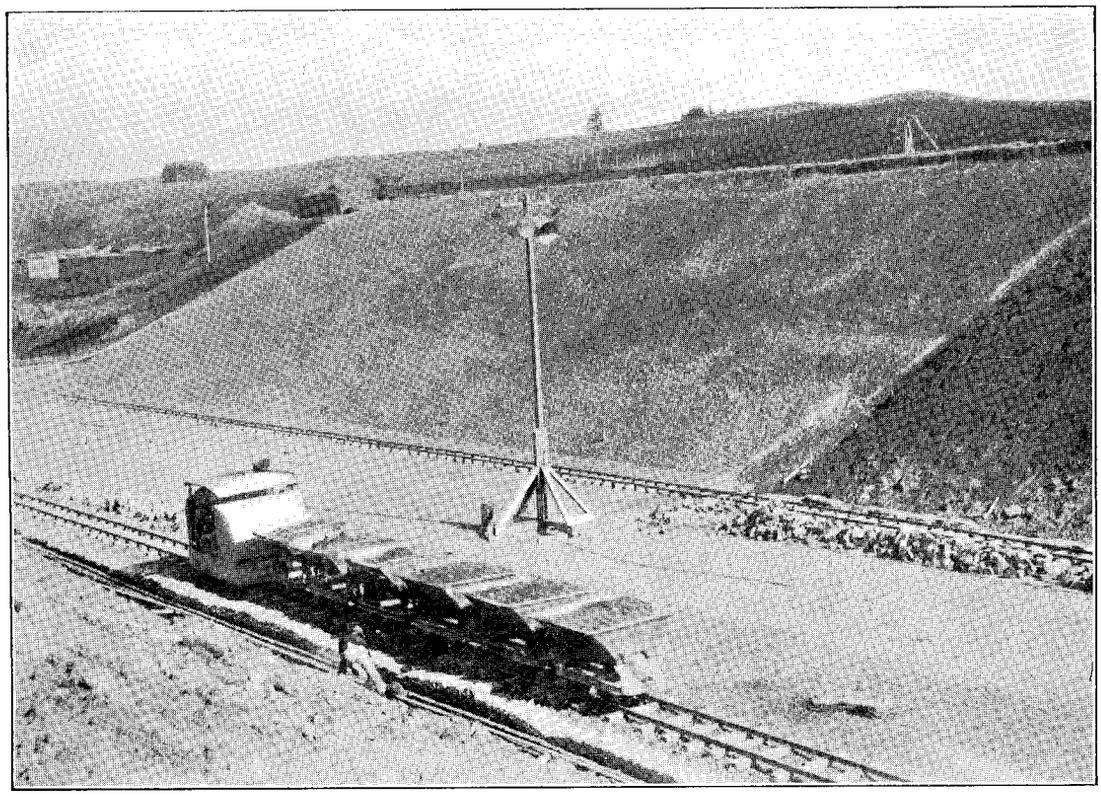


Cliff above Intake of Diversion Tunnel, with Loose Rock removed.

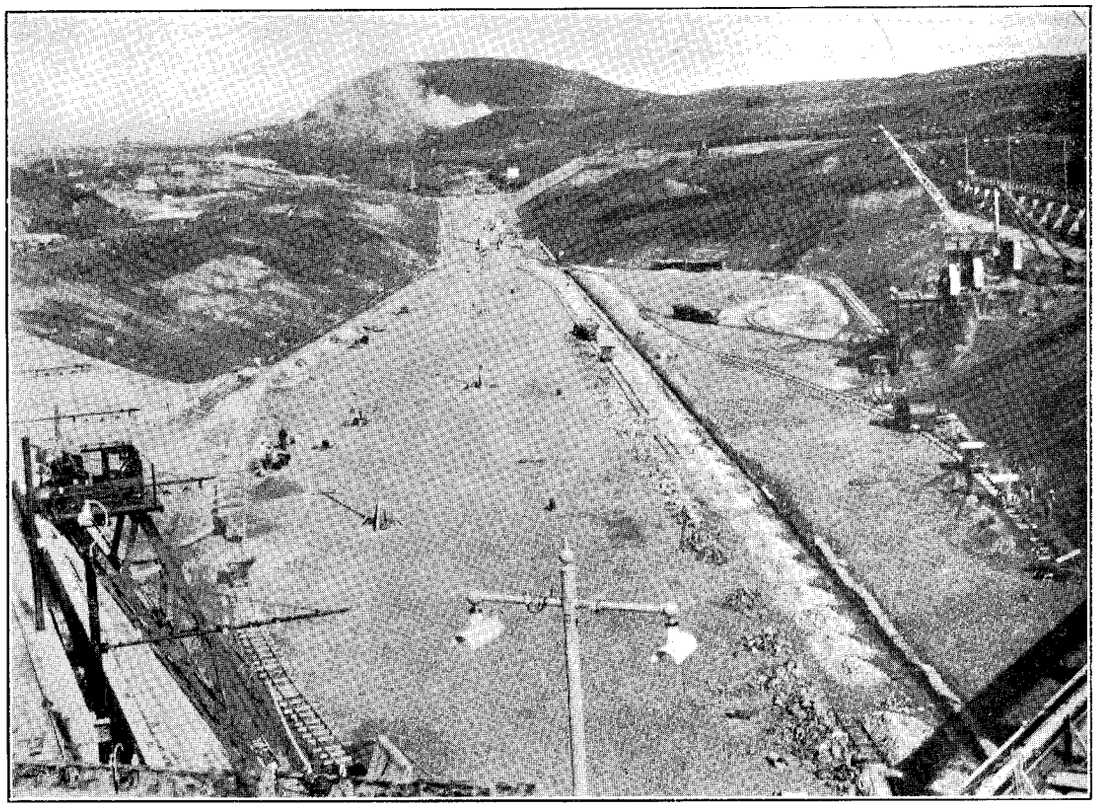


Concrete Cut-off Wall at Up-stream End of Headrace Lining.

ARAPUNI POWER DEVELOPMENT.

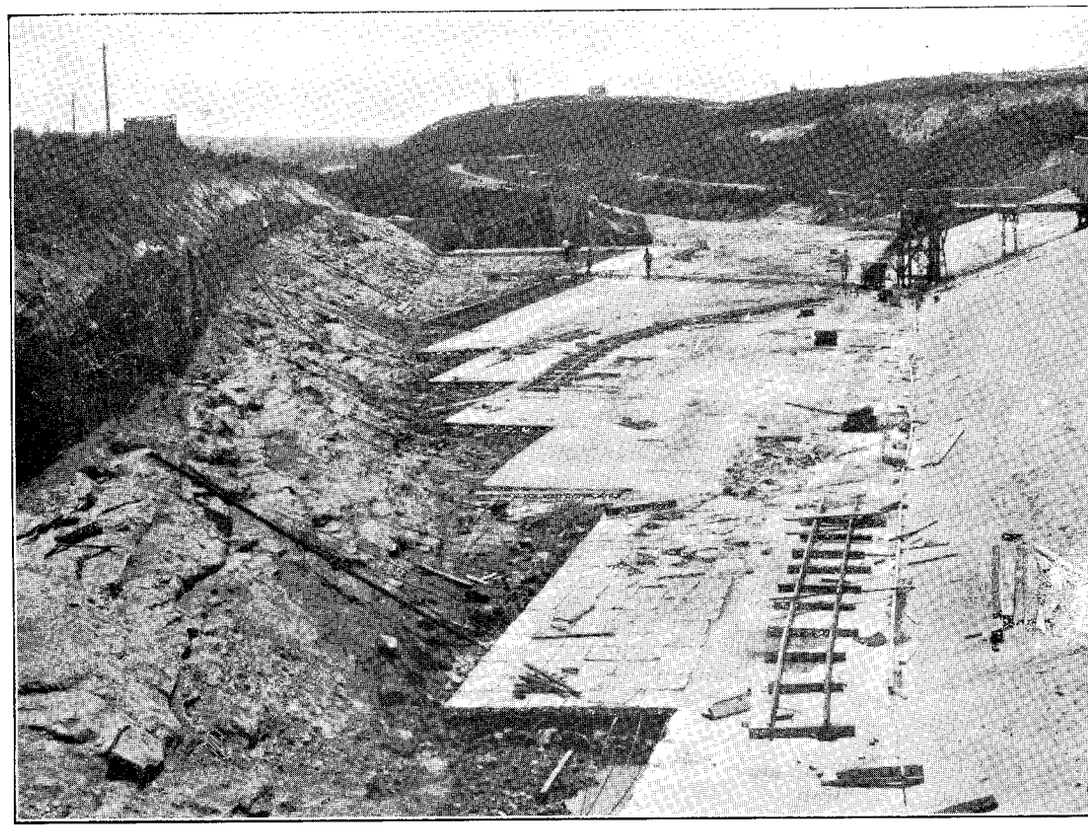


HEADRACE, SOUTH END WESTERN EMBANKMENT, SHOWING POROUS LAYER OF SHINGLE.

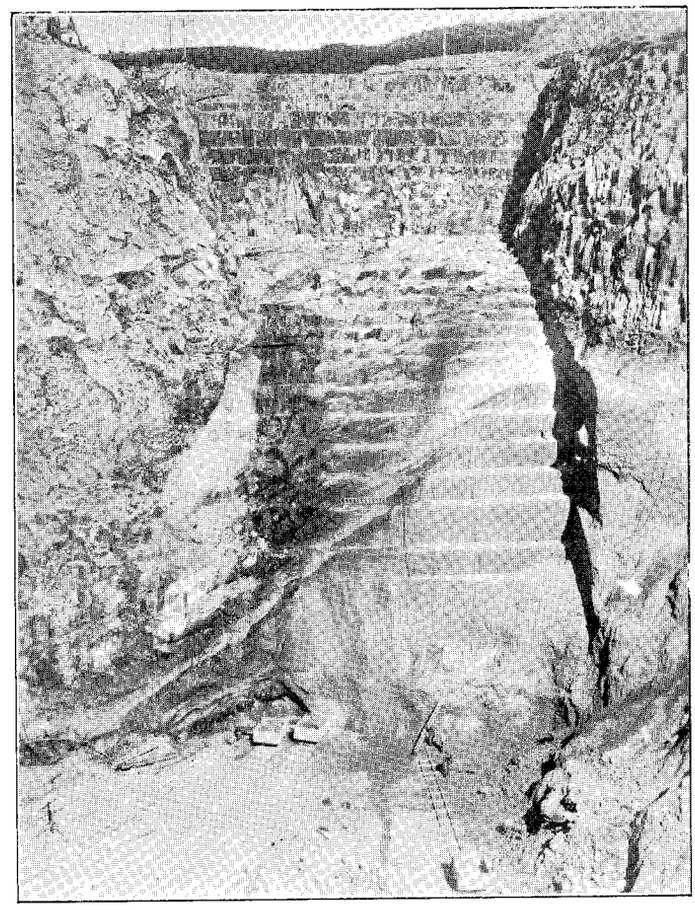


HEADRACE AND FOREBAY, LOOKING SOUTH.
5th July, 1931.

ARAPUNI POWER DEVELOPMENT.

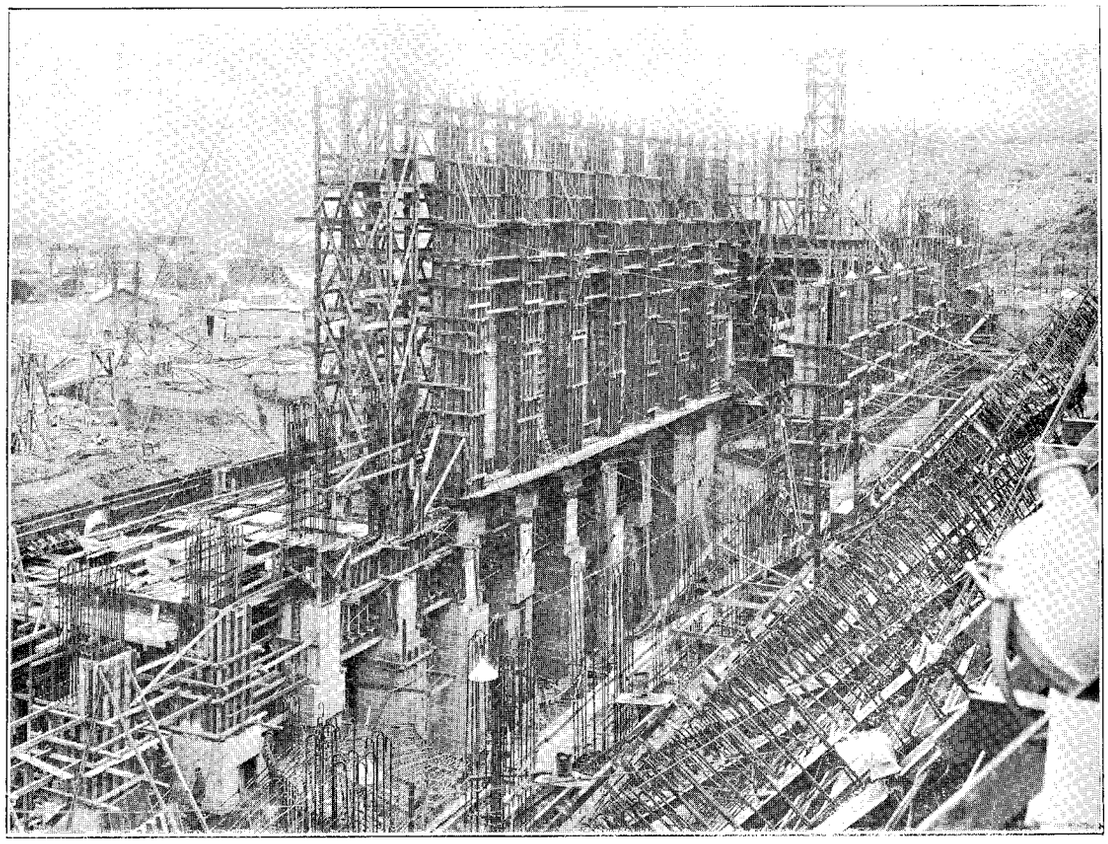


Overflow-channel Lining between Spillway Extension and Drop Weir.

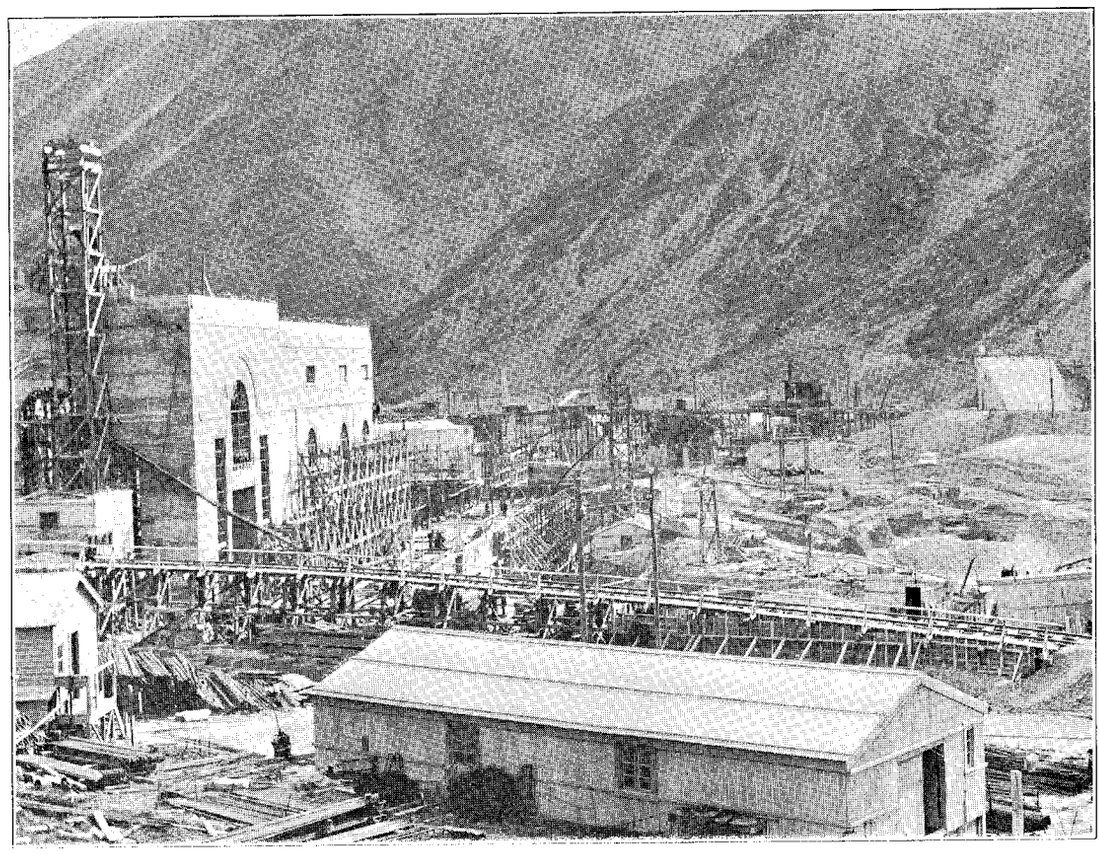


Falls, stepped ready for concreting.

ARAPUNI POWER DEVELOPMENT.

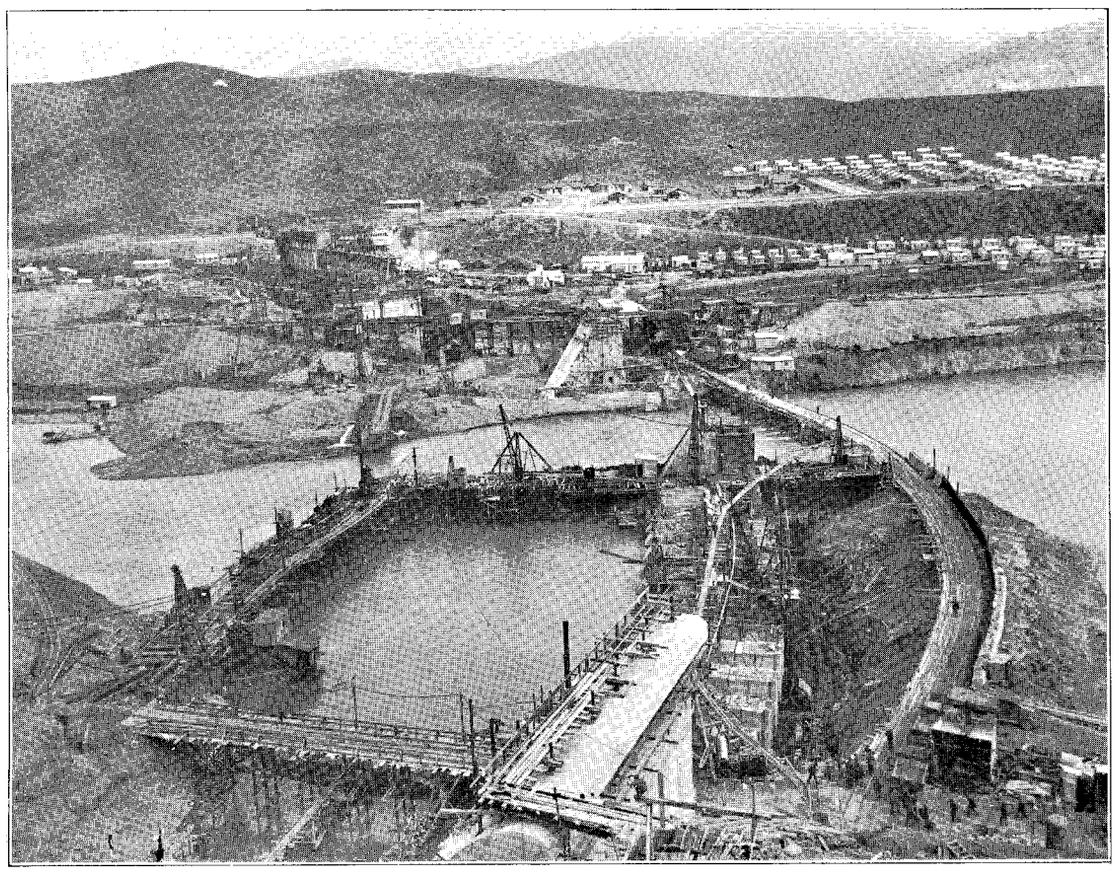


View showing Details of Power-house Construction.

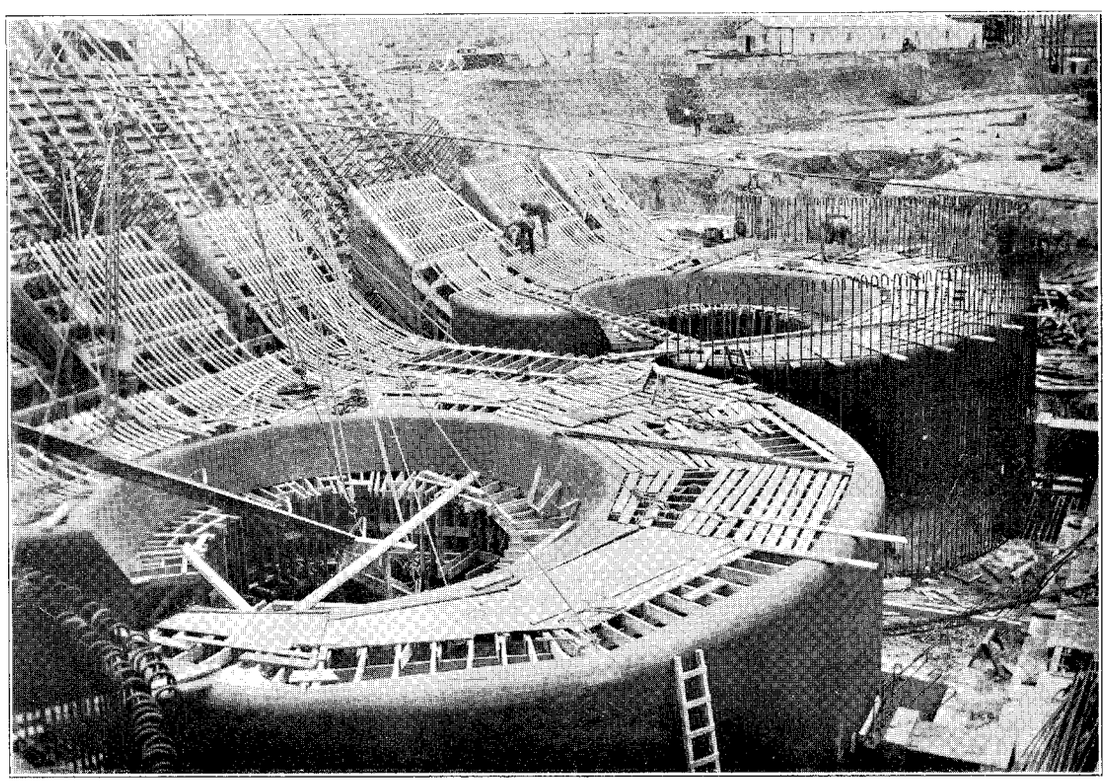


General View from Otago Side, showing Power-house on Left.

WAITAKI POWER DEVELOPMENT.

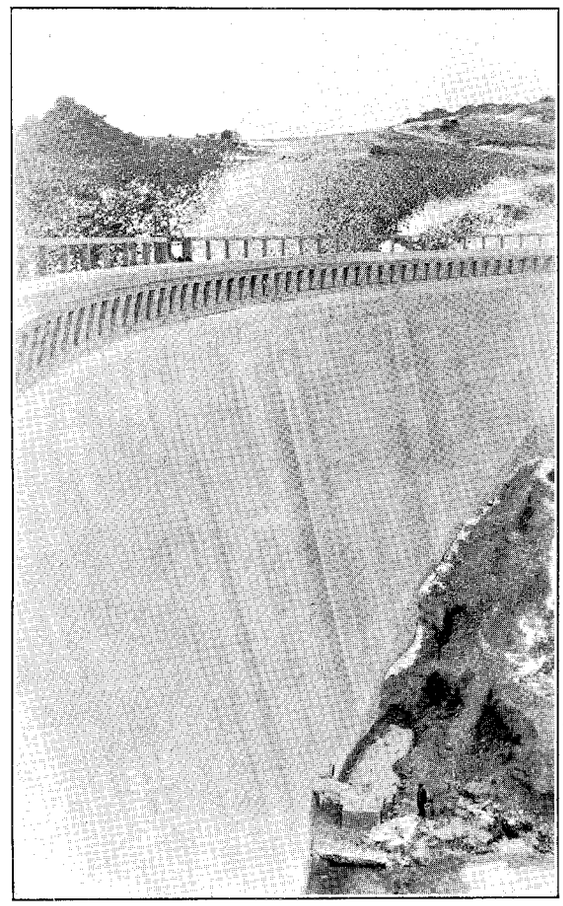


General View from Canterbury Side of River.

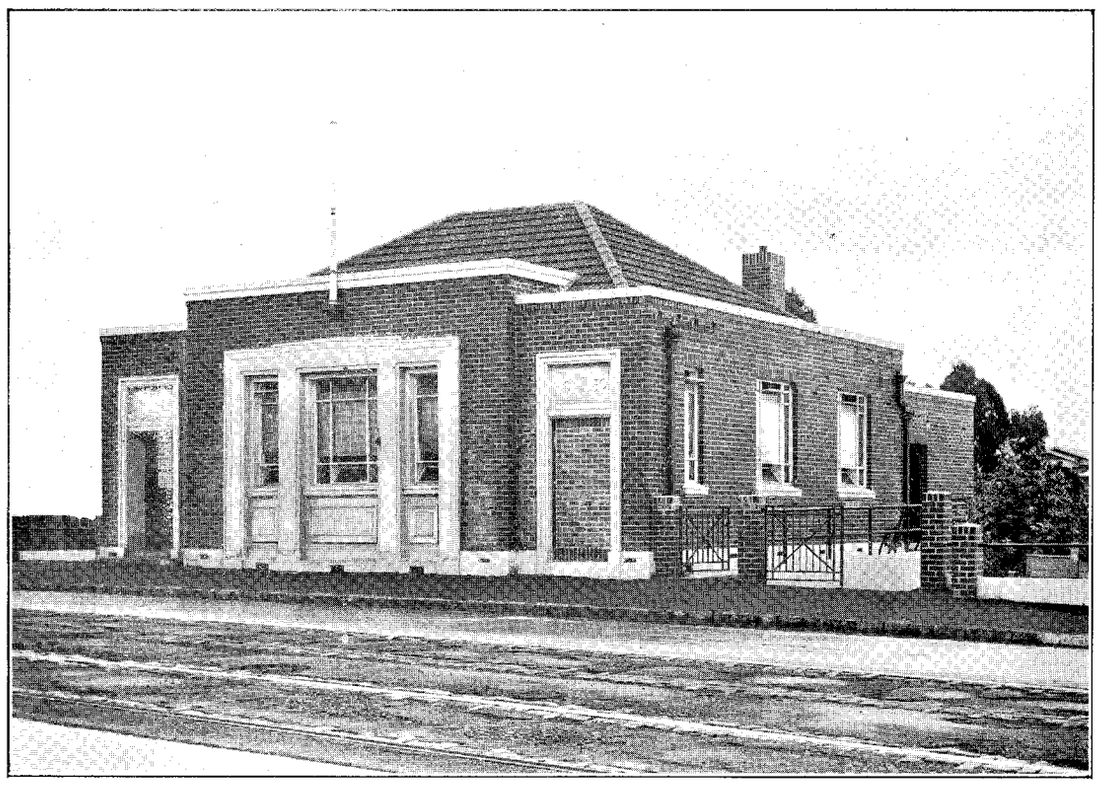


Formwork for Penstocks and Scroll Cases for 20,000 h.p. Turbines.

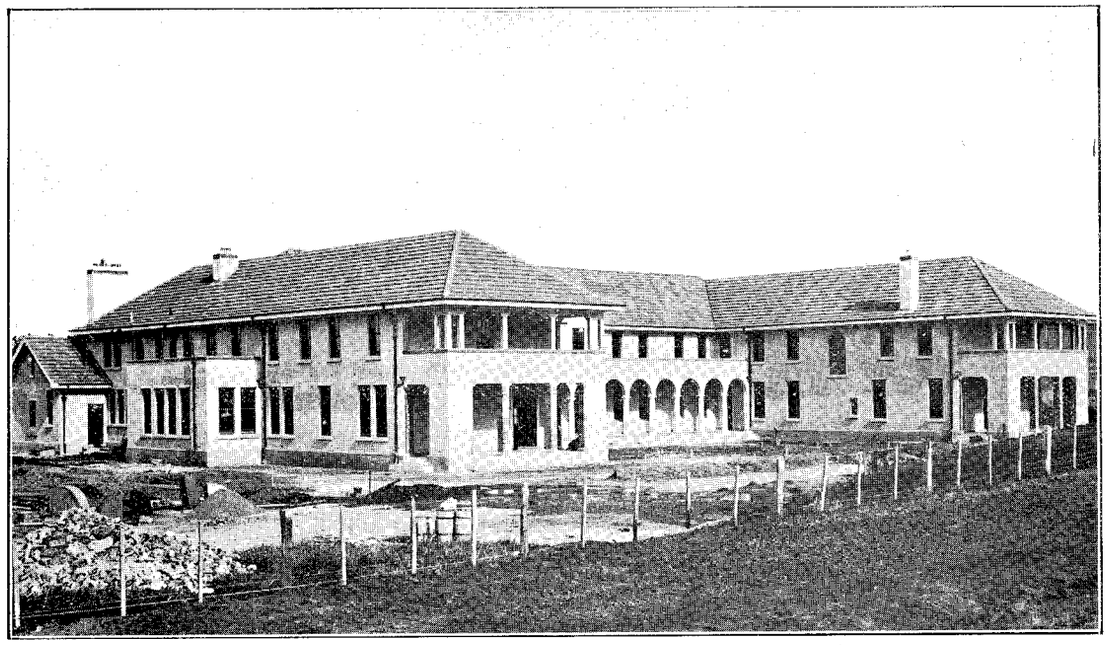
WAITAKI POWER DEVELOPMENT.



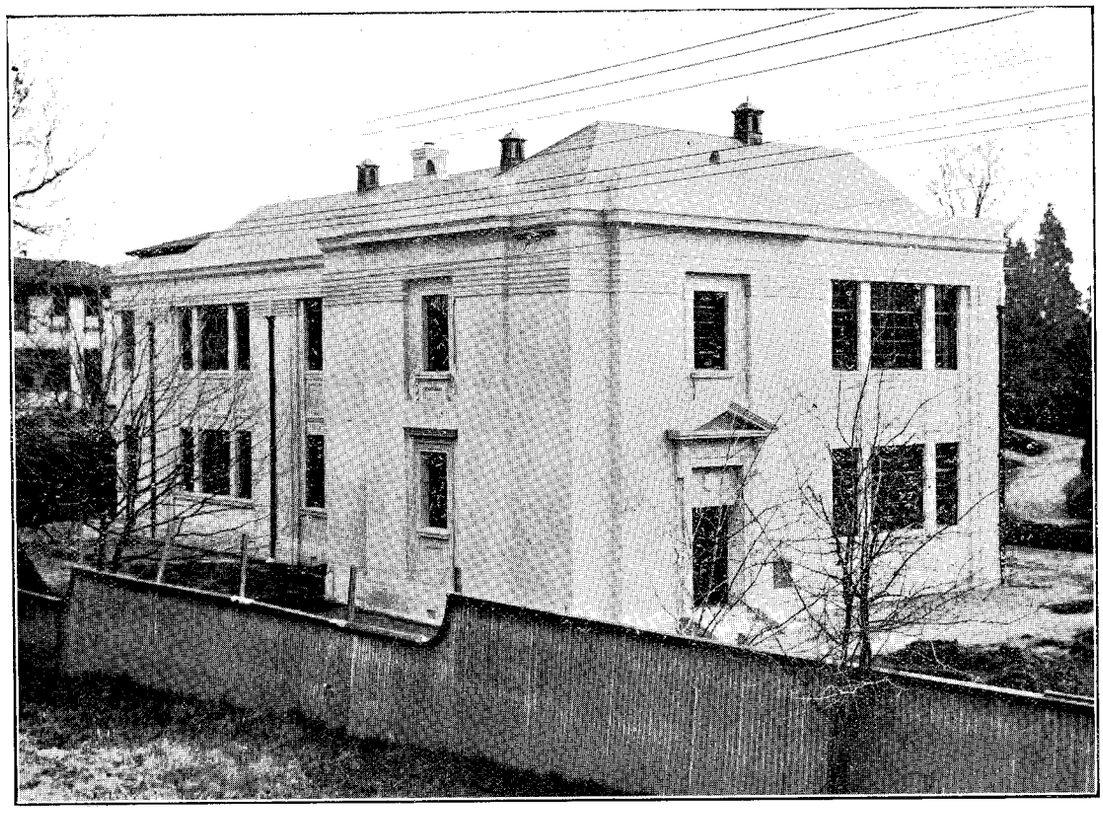
Otago Central Irrigation.—Poolburn Dam.
100 ft. high.



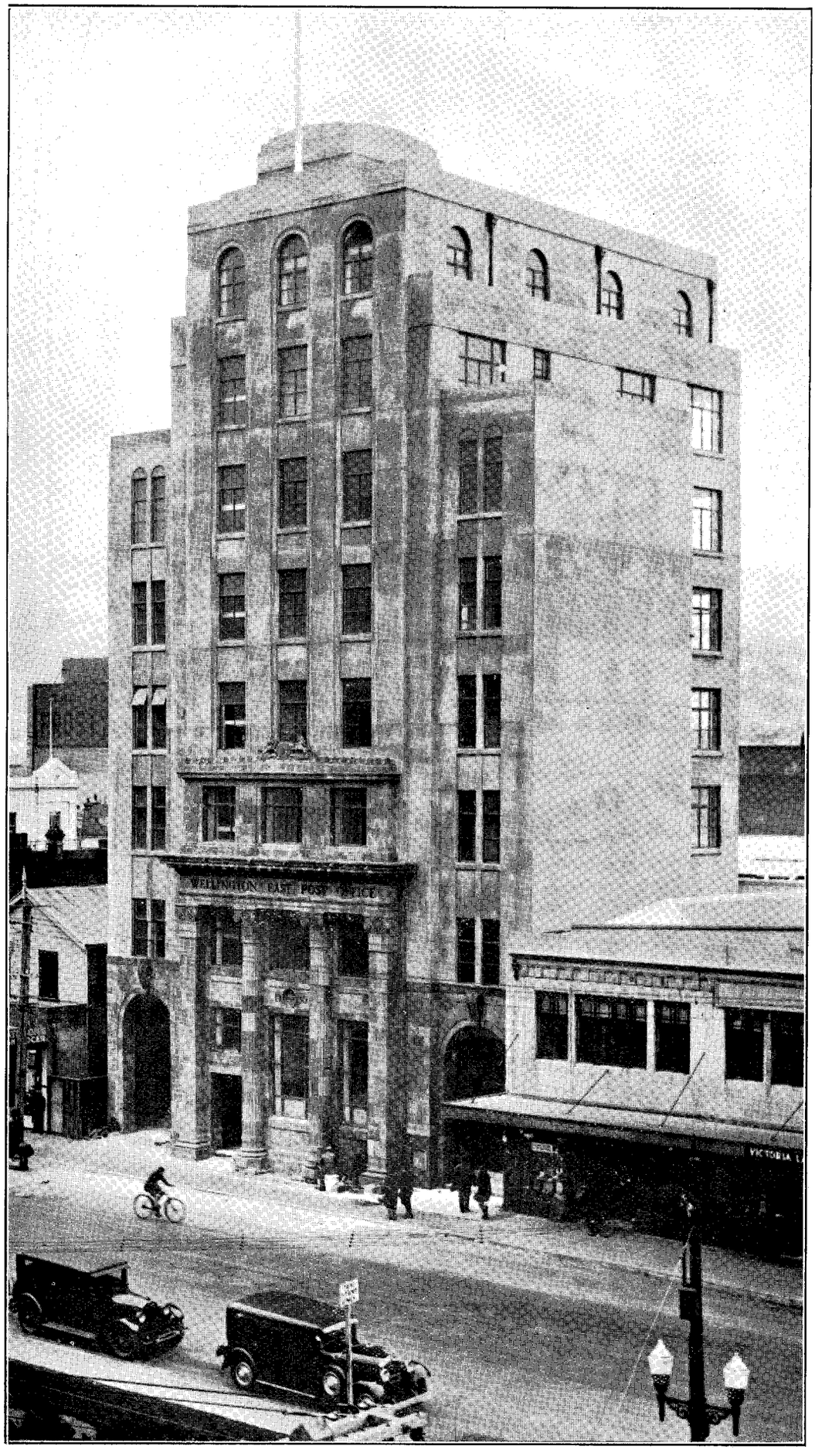
Mount Albert Post-office.



Tokanui Mental Hospital.—Nurses' Home.



Nelson Girls' College (First Portion).



WELLINGTON EAST POST-OFFICE.

PUBLIC WORKS STATEMENT, 1931.

INDEX.

TABLE No. 1.

SUMMARY SHOWING THE TOTAL EXPENDITURE ON PUBLIC WORKS AND OTHER SERVICES OUT OF PUBLIC WORKS FUND (GENERAL PURPOSES ACCOUNT) TO 31ST MARCH, 1931, AND THE LIABILITIES ON THAT DATE.

Number of Table containing Details.	Works.	Total Net Expenditure to 31st March, 1930.	Expenditure during Twelve Months ended 31st March, 1931.	Recoveries on Account of Services of Previous Years.	Total Net Expenditure to 31st March, 1931.	Liabilities on 31st March, 1931.	Total Net Expenditure and Liabilities.	Works.
		£	£	£	£	£	£	
3	Railways*..	53,981,310	1,987,196	792	55,967,712	140,179	56,107,891	Railways.*
..	Payment to Midland Railway bond-holders	150,000	..	..	150,000	..	150,000	Payment to Midland Railway bond-holders.
..	Roads†	18,859,767	1,475,522	472	20,334,817	126,952	20,461,769	Roads.†
..	Development of mining	831,325	..	260	831,065	..	831,065	Development of mining.
..	Telegraphs	10,510,744	419,756	..	10,930,501	121,709	11,052,210	Telegraphs.
..	Public buildings‡	10,696,215	423,021	19,341	11,099,895	29,071	11,128,966	Public buildings.‡
..	Lighthouses, harbour-works, and harbour-defences	1,280,972	10,845	..	1,291,817	175	1,291,992	Lighthouses, harbour-works, and harbour-defences.
..	Departmental	2,625,431	131,816	16,381	2,740,866	3,375	2,744,241	Departmental.
10 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	3,276,305	33,544	..	3,309,850	3,861	3,313,711	Immigration.
..	Purchase of Native lands	2,061,147	..	..	2,061,147	..	2,061,147	Purchase of Native lands.
..	Defence	1,393,361	13,812	586	1,406,587	..	1,406,587	Defence.
..	Charges and expenses of raising loans ..	3,549,209	164,535	..	3,713,744	..	3,713,744	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	518,914	60,288	2,494	576,708	4,036	580,744	Tourist and health resorts.
..	Lands improvement§	591,722	70,534	1,041	661,216	2,960	664,176	Lands improvement.§
..	Irrigation and water-supply‖.. ..	906,129	62,614	..	968,743	1,370	970,113	Irrigation and water-supply.‖
..	Plant, material, and stores	319,621	*Cr.* 44,772	216	274,633	2,072	276,705	Plant, material, and stores.
..	Quarries (acquisition and operation) ..	5,418	4,219	..	9,636	155	9,791	Quarries (acquisition and operation).
..	Timber-supply and sawmills for Public Works Department	*Cr.* 3,218	*Cr.* 2,271	..	*Cr.* 5,489	..	*Cr.* 5,489	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	1,226,000	..	..	1,226,000	..	1,226,000	Transfer to Main Highways Account, Construction Fund.
	Totals	113,176,614	4,810,659	41,583	117,945,690	435,915	118,381,605	Totals.

* Exclusive of expenditure on Hutt Railway and Road Improvement and Railways Improvement Accounts. † Includes £4,500 expended under section 16 (1) Native Land Amendment and Native Land Claims Adjustment Act, 1923. ‡ Includes £12,500 expended under Finance Act, 1929, section 32. § £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 (GENERAL PURPOSES ACCOUNT), 1909–1910 to 1930–31.

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, 1909.	Expenditure.										
		1909–10.	1910–11.	1911–12.	1912–13.	1913–14.	1914–15.	1915–16.	1916–17.	1917–18.	1918–19.	1919–20.
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	2,201,788	17,003	9,441	11,681	14,694	33,914	33,219	10,010 *Cr. 10*	6,533	3,856	*Cr. 12,018*	*Cr. 62,561*
Public Works, Departmental	592,898	41,176	42,733	49,864	57,426	66,650	100,719	111,489	131,701	127,962 *Cr. 2,662*	115,419 *Cr. 4,119*	121,677
Irrigation and Water-supply	..	..	1,562	2,794	14,689	40,329	32,090	29,874	20,794	11,650	13,665	34,115
Railways	25,329,178	1,128,400	1,104,071 *Cr. 652*	1,125,905 *Cr. 6,987*	1,148,832 *Cr.29,528*	1,104,897 *Cr. 5,485*	2,146,753† *Cr 6,022*	1,065,171 *Cr. 4,633*	620,947 *Cr. 4,845*	495,771 *Cr. 110*	387,923 *Cr. 4,924*	748,649 *Cr.105,196*
Payment to Midland Railway Bondholders	150,000	..	..	..	..	..	..	..	..	..	..	..
Roads:—												
Miscellaneous Roads and Bridges	7,185,241	297,932	229,537	383,511	337,584	353,836 *Cr. 515*	484,365	400,062	203,746	128,730 *Cr. 600*	221,887 *Cr. 997*	376,097 *Cr. 603*
Roads on Goldfields..	828,826	40,830	25,626	41,067	36,761	24,143	30,065	24,432	17,099	6,912	4,186	12,465
Development of Thermal Springs and Natural Scenery ..	16,023	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account*	300,930	..	..	..	..	..	..	..	..	..	..	..
Total, Roads	8,331,020	338,762	255,163	424,578	374,345	377,464	514,430	424,494	220,845	135,042	225,076	387,959
Development of Mining	819,517	18,597 *Cr. 1,000*	10,845 *Cr. 1,000*	21,244 *Cr. 30*	10,644 *Cr. 1,015*	4,889	2,384 *Cr. 255*	6,602	4,592	27 *Cr. 6,545*	518 *Cr. 1,000*	1,173 *Cr. 7,008*
Purchase of Native Lands	1,545,867	30,567	2,976 *Cr. 2,286*	*Cr. 2,466*	*Cr. 917*	*Cr. 857*	*Cr. 1,060*	*Cr. 972*	*Cr. 868*	*Cr. 57*	..	*Cr. 57*
Native Lands Purchase Account	491,980	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	2,037,847	30,567	690	*Cr. 2,466*	*Cr. 917*	*Cr. 857*	*Cr. 1,060*	*Cr. 972*	*Cr. 868*	*Cr. 57*	..	*Cr. 57*
Telegraph Extension	1,642,767	123,423	111,867	147,692	251,375	392,648	288,395	249,554	203,311	213,955	198,611	249,379
Public Buildings:—												
General (including Miscellaneous)	357,693	41,964	44,044	34,721	44,719	43,199	52,239	22,050	12,648	11,646 *Cr. 15,067*	43,168	64,207
Parliamentary	72,661	3,157	237	2,004	18,806	23,612	31,478	17,133	22,586	37,233	..	..
Judicial { Courthouses	628,380	11,119	5,759	14,556	20,097	9,423	5,171	4,902	299	21	..	868
Judicial { Prisons		4,231	7,506	9,760	6,911	4,928	14,515	17,786	15,685	13,195	16,299	20,981
Judicial { Police-stations		16,256	9,030	19,817	18,423	14,094	19,122	25,484	21,147	18,814	6,157	24,944

* 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 (General Purposes Account), 1909–1910 to 1930–31—*continued.*

Description of Services.	Total Net Expenditure to 31st March, 1909.	Expenditure.										
		1909–10.	1910–11.	1911–12.	1912–13.	1913–14.	1914–15.	1915–16.	1916–17.	1917–18.	1918–19.	1919–20.
Public Buildings—*continued.*	£	£	£	£	£	£	£	£	£	£	£	£
Post and Telegraph	590,621	68,574	117,815	130,815	122,999	78,815	60,838	35,258	22,744	33,525	26,072	66,543
Customs	49,206	233	..	..	..	..	..	..	..	..	..	..
Quarantine Stations	6,865	..	..	..	..	..	..	..	..	..	..	35,490
Mental Hospitals	565,090	19,839	12,707	8,809	46,181	26,001	53,996	54,898 *Cr. 15*	44,602	26,502	14,640	18,277
Public Health	32,170	319	..	..	376	..	..	..	..	..	..	..
Health and Hospital Institutions	106,493	7,259	1,484	12,745	8,750	1,435	998	1,426	7,570	4,080	2,332	8,484
School Buildings	1,656,786	98,103	124,926	90,535	105,000	121,954	122,940	97,972	70,367	63,082	115,656	195,500
Agricultural	24,051	6,103	1,160	3,684	6,475	4,398	2,428 *Cr. 34*	2,972	3,046	5,685	4,229	7,227
Workers' Dwellings	..	..	..	22,644	46,455	41,741	68,275	55,893	35,437	15,505	7,293	26,674
Total, Public Buildings	4,090,016	277,157	324,668	350,090	445,192	369,600	431,966	335,759	256,131	214,221	235,846	469,195
Lighthouses, Harbour-works, and Harbour-defences:—												
Lighthouses	171,753	6,762	1,470	5,428	9,031	5,174	3,887	1,415	449	561	1,663	253
Harbour-works	340,562	4,548	4,092	6,004	7,415	3,346 *Cr. 1,462*	12,563	9,355	2,280	2,359	3,729	3,245
Harbour-defences	531,422	5,372	2,865	1,144	339	539 *Cr. 300*	681	2,903	1,038	56	..	..
Total, Lighthouses, &c.	1,043,737	16,682	8,427	12,576	16,785	7,297	17,131	13,673	3,767	2,976	5,392	3,498
Rates on Native Lands	68,672	..	..	..	..	..	..	..	..	..	..	..
Contingent Defence	898,934	4,977	6,071	10,437	23,790	30,186	15,221	37,619	9,742	6,714	8,809 *Cr. 922*	10,187
Tourist and Health Resorts	182,853	14,507	5,912	13,361	12,906	14,989	8,232 *Cr. 12*	5,167 *Cr. 500*	1,094	931	1,620	6,194
Lands Improvement*	44,117	6,910	11,125	20,394	22,550 *Cr. 383*	10,269 *Cr. 432*	13,810 *Cr. 522*	5,936	*Cr. 2,731*	1,838	*Cr. 4,268*	2,964
Charges and Expenses of raising Loans	1,236,217	17,715 *Cr. 12,000*	66,367 *Cr. 66,392*	67,470 *Cr. 66,954*	72,950 *Cr. 71,681*	105,449 *Cr. 96,741*	35,495 *Cr. 34,865*	5,037 *Cr. 5,030*	35	1	..	..
Interest and Sinking Funds	218,500	..	..	..	..	..	..	..	..	..	..	..
Coal-exploration and Mine-development	10,835	..	..	..	..	..	..	..	..	..	..	..
Thermal Springs	14,600	..	..	..	..	..	..	..	..	..	..	..
Plant, Material, and Stores	..	..	..	..	..	..	..	74,418	9,778	6,811	20,638 *Cr. 31*	47,682
Total Ways and Means Credits	..	..	..	*10,530*	*103,524*	*105,792*	*43,400*	*11,160*	*5,713*	*43,492*	*11,993*	*112,864*
Grand Total—Net Expenditure	48,913,496	2,202,876	1,891,918	2,190,731	2,347,965	2,455,066	2,597,109	2,363,658	1,502,588	1,237,422	1,207,482	2,020,714

* 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 (GENERAL PURPOSES ACCOUNT), 1909–1910 to 1930–31—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1931.
	1920-21.	1921-22.	1922-23.	1923-24.	1924-25.	1925-26.	1926-27.	1927-28.	1928-29.	1929-30.	1930-31.	
	£	£	£	£	£	£	£	£	£	£	£	£
Immigration	*Cr. 7,806*	247,528	90,611 *Cr. 140*	92,600 *Cr. 1,267*	136,353 *Cr. 16*	107,521 *Cr. 443*	184,918	67,157	50,266 *Cr. 283*	41,756	33,544	3,309,850
Public Works, Departmental	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*	130,951 *Cr. 13,328*	142,252 *Cr. 88,499*	132,783 *Cr. 51,671*	131,816 *Cr. 16,381*	2,740,866
Irrigation and Water-supply*	55,344	82,713	58,131	95,467	127,995	56,227 *Cr. 31*	56,937	49,735 *Cr. 2,798*	55,198 *Cr. 8*	69,657	62,614	968,743
Railways	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*	1,141,822 *Cr. 1,699*	1,216,277 *Cr. 2,595*	1,812,521 *Cr. 1,296*	1,987,196 *Cr. 792*	55,967,712
Payment to Midland Railway Bondholders	..	..	..	..	..	..	..	..	..	..	..	150,000
Roads :—												
Miscellaneous Roads and Bridges	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*	669,833 *Cr. 540*	780,990 *Cr. 330*	1,005,330 *Cr. 415*	1,379,810 *Cr. 472*	..
Roads to give access to Outlying Districts	..	..	..	..	..	..	..	33,642	51,582	53,693	91,126	..
Roads on Goldfields	11,050	11,264	4,850	2,867	2,755	3,934	2,230	2,330 *Cr. 467*	1,005	1,885	4,586	..
Development of Thermal Springs and Natural Scenery	..	..	..	..	..	..	..	..	..	..	..	..
Lands Improvement Account	..	..	..	..	..	..	..	..	..	..	..	..
Total, Roads	538,823	563,962	647,762	754,049	606,492	563,818	577,147	704,798	833,247	1,060,493	1,475,050	20,334,817
Development of Mining	2,153 *Cr. 1,606*	2,130 *Cr. 51*	*Cr. 98* *Cr. 1,785*	1,363 *Cr. 2,310*	..	..	..	..	..	..	..	831,065
								Cr. 1,130	*Cr. 260*	*Cr. 260*	*Cr. 260*	
Purchase of Native Lands	*Cr. 57*	*Cr. 52*	..	..	..	..	*Cr. 535*	*Cr. 56*	..	..	..	..
Native Lands Purchase Account	..	..	..	..	..	..	..	..	..	..	..	..
Total, Land Purchases	*Cr. 57*	*Cr. 52*	..	..	..	..	*Cr. 535*	*Cr. 56*	..	..	..	2,061,147
Telegraph Extension	336,468	590,981	512,657 *Cr. 11,082*	717,409	957,294	931,661	558,042	625,540	624,414	594,383	419,756	10,930,501
Public Buildings :—												
General (including Miscellaneous)	39,504	87,057	113,553	8,160	30,791 *Cr. 35*	29,369 *Cr. 345*	119,864 *Cr. 429*	42,553 *Cr. 1,065*	4,272 *Cr. 420*	14,106† *Cr. 3,156*	85,204 *Cr. 55*	..
Parliamentary	..	..	..	..	..	..	..	..	35	27,142	15,723	..
Judicial — Courthouses	1,400	4,358	2,018 *Cr. 13*	2,448	5,363 *Cr. 19*	7,209	1,261 *Cr. 13*	7,531 ..	8,387 *Cr. 95*	15,765 *Cr. 29*	19,572 *Cr. 16,403*	..
Judicial — Prisons	30,038 *Cr. 800*	41,740	23,313	26,484 *Cr. 2,568*	25,279 *Cr. 86*	24,196	22,812 *Cr. 908*	22,359 *Cr. 524*	12,573 *Cr. 321*	18,814 *Cr. 285*	2,504 *Cr. 134*	..
Judicial — Police-stations	36,843	22,544	6,298	12,838	18,553	16,594 *Cr. 102*	7,411 *Cr. 13*	5,561 *Cr. 970*	6,925 *Cr. 605*	8,442 *Cr. 319*	8,360 *Cr. 54*	..

* £6,727 previously included under Lands Improvement now transferred to Irrigation and Water-supply. † Includes £12,500 expended under Finance Act, 1929, section 32. [*Cntd. on page 6*

TABLE No 2—*continued.*

GENERAL SUMMARY—*continued.*

Showing Net Yearly Expenditure out of Public Works Fund (General Purposes Account), 1909–1910 to 1930–31—*continued.*

Description of Services.	Expenditure.											Total Net Expenditure to 31st March, 1931.
	1920–21.	1921–22.	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.	
Public Buildings—*continued.*	£	£	£	£	£	£	£	£	£	£	£	£
Post and Telegraph	93,364	112,906	77,211	108,395	65,917	89,865	86,052	77,194	62,087	104,157	138,671	..
	Cr. 560	*Cr. 675*	*Cr. 69*		*Cr. 210*	*Cr. 453*	*Cr. 1,114*	*Cr. 834*	*Cr. 1,980*	*Cr. 197*	*Cr. 1,391*	
Customs	..	..	..	..	..	..	..	..	..	..	..	..
Quarantine Stations	15,529	4,581	154	171	284	..	..	..	..	..	..	..
Mental Hospitals	27,368	41,838	13,852	26,541	68,438	77,835	68,635	51,119	96,782	152,096	134,140	.
						Cr. 283		*Cr. 3,600*				
Public Health	..	..	..	..	..	..	..	..	..	..	..	..
Health and Hospital Institutions	4,099	26,131	20,981	7,420	27,951	31,177	15,840	14,361	19,637	16,651	17,338	..
			Cr. 1,399			*Cr. 300*		*Cr. 310*				
School Buildings	244,722	2,469	..	..	..	..	..	..	..	..	..	..
		Cr. 9,255	*Cr. 367*	*Cr. 1,090*	*Cr. 905*	*Cr. 1,050*	*Cr. 7,953*	..	*Cr. 2,428*	..	*Cr. 1,110*	
Agricultural	9,345	1,115	514	282	3,242	7,932	4,164	2,863	2,808	2,963	1,509	..
			Cr. 27	*Cr. 171*	*Cr. 686*	*Cr. 865*	*Cr. 310*		*Cr. 2,395*	*Cr. 1,721*	*Cr. 194*	
Workers' Dwellings	..	..	..	..	..	..	..	..	..	..	..	..
Total, Public Buildings	500,851	334,809	255,818	188,910	243,877	280,780	315,299	216,237	205,262	354,429	403,680	11,099,895
Lighthouses, Harbour-works, and Harbour-defences:—												
Lighthouses	758	16,350	3,260	4,473	2,850	5,690	5,758	7,979	2,637	4,460	4,103	..
						Cr. 750				*Cr. 500*		
Harbour-works	4,080	2,424	6,524	6,334	423	3,717	13,263	15,891	14,425	10,736	6,742	..
						Cr. 131	*Cr. 204*	*Cr. 165*				
Harbour-defences	..	..	..	..	..	..	..	..	..	..	..	..
			Cr. 1,235	*Cr. 16*								
Total, Lighthouses, &c.	4,838	18,774	8,549	10,791	3,273	8,526	18,817	23,705	17,062	14,696	10,845	1,291,817
Rates on Native Lands	..	..	..	..	..	..	..		..	..	..	68,672
Contingent Defence	8,701	15,586	1,702	4,931	27,133	89,670	34,014	39,986	67,652	46,766	13,812	1,406,587
			Cr. 463	*Cr. 280*	*Cr. 580*	*Cr. 33*	*Cr. 751*	*Cr. 465*	*Cr. 648*	*Cr. 1,325*	*Cr. 586*	
Tourist and Health Resorts	19,041	17,996	5,435	27,264	12,343	43,486	31,981	36,673	39,254	20,547	60,288	576,708
		Cr. 110			*Cr. 81*			*Cr. 516*	*Cr. 440*	*Cr. 1,213*	*Cr. 2,494*	
Lands Improvement*	2,064	17,478	26,204	18,182	34,172	70,493	56,267	72,898	85,861	79,454	70,534	661,216
						Cr. 19	*Cr. 135*	*Cr. 2,574*	*Cr. 87*	*Cr. 112*	*Cr. 1,041*	
Charges and Expenses of raising Loans	184	174,280	62,399	311,905	241,930	297,180	155,373	100,297	438,238	518,158	164,535	3,713,744
									Cr. 3,811			
Interest and Sinking Funds	..	..	..	..	..	..	..	..	..	..	..	218,500
Coal-exploration and Mine-development	..	..	..	..	..	..	..	..	..	..	..	10,835
Thermal Springs	..	..	..	..	..	..	..	..	..	..	..	14,000
Plant, Material, and Stores	169,910	106,432	*Cr. 19,708*	*Cr. 52,788*	..	34,471	*Cr. 24,148*	*Cr. 1,288*	4,595	*Cr. 31,813*	*Cr. 44,772*	274,633
					Cr. 12,230	*Cr. 751*	*Cr. 1,992*	*Cr. 8,985*	*Cr. 1,042*	*Cr. 335*	*Cr. 216*	
Quarries (acquisition and operation)	..	..	..	..	1,815	12,351	6,302	*Cr. 9,325*	*Cr. 6,030*	329	4,219	9,636
										Cr. 25		
Timber-supply and Sawmills for Public Works Department	..	16,369	14,725	3,613	*Cr. 20,537*	*Cr. 9,892*	8,512	*Cr. 6,997*	*Cr. 5,116*	*Cr. 3,608*	*Cr. 2,271*	*Cr. 5,489*
						Cr. 104			*Cr. 182*			
Motor Transport Service	..	..	22,679	962	5,000	4,994	..	..	..	..	..	33,635
Transfer to Main Highways Account:—												
Construction Fund	..	..	..	..	226,000	..	400,000	200,000	200,000	200,000	..	1,226,000
Total Ways and Means Credits	*19,627*	*11,616*	*20,127*	*61,914*	*73,559*	*27,474*	*146,933*	*40,026*	*106,429*	*62,859*	41,583	..
Grand Total—Net Expenditure	3,121,131	5,449,351	3,892,320	4,056,423	4,632,134	4,615,585	3,988,059	3,400,664	3,977,006	4,917,173†	4,810,659	117,945,690

* 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. † Includes £12,500 expended under Finance Act, 1929, section 32.

TABLE No. 3.

Expenditure on Railways to 31st March, 1931.

Lines of Railway.	Total Expenditure by General Government to 31st March, 1930.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1930–31: New Works.		Expenditure under Special Acts during Year 1930–31.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1931.	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	180,096 15 6	..	..	36 5 1	..	..	180,133 0 7	..
Opua Wharf to Whangarei and Onerahi	609,652 12 9	8 0 0	..	*Cr.* 1,684 7 4	327 18 7	..	608,288 4 0	..
Otiria to Ngapuhi	127,370 15 6	..	..	..	..	..	127,370 15 6	..
Whangarei Branch (Kioreroa to Waiotira)	420,533 1 0	..	..	..	..	..	420,533 1 0	..
North Auckland Main Trunk—								
Ngapuhi Northwards	773,415 16 2	..	106,415 10 10	..	..	..	879,831 7 0	..
Helensville Northwards	2,982,992 5 5	..	..	..	..	..	2,982,992 5 5	..
North Auckland Main Trunk to Dargaville	347,251 0 1	..	97,188 4 4	..	..	..	444,439 4 5	..
Helensville to Te Awamutu	5,661,923 14 7	..	..	*Cr.* 17,572 17 3	342,380 2 10	..	5,986,731 0 2	..
Waiuku Branch (Paerata to Waiuku)	208,909 9 6	..	..	..	..	..	208,909 9 6	..
Huntly to Awaroa	184,379 5 0	..	..	..	..	..	184,379 5 0	..
Waikokowai Branch	3,442 0 0	..	..	..	..	..	3,442 0 0	..
Frankton to Thames	501,758 15 6	..	..	*Cr.* 65 8 6	164 0 9	..	501,857 7 9	..
Cambridge Branch (Ruakura Junction to Cambridge)	61,419 0 10	..	..	412 16 5	..	..	61,831 17 3	..
Morrinsville to Rotorua	429,623 11 0	..	..	784 2 8	632 3 9	..	431,039 17 5	..
Marton to Te Awamutu	3,046,505 12 8	..	..	4,004 11 10	27,336 13 9	..	3,077,846 18 3	..
Waipa Gravel Access Branch	114 0 0	..	..	..	..	..	114 0 0	..
Raetihi Branch	89,452 2 1	..	..	..	..	..	89,452 2 1	..
Rotorua to Taupo	38,516 5 2	..	*Cr.* 305 9 1	..	..	..	38,210 16 1	..
Paeroa to Pokeno	22,450 18 2	..	439 3 6	..	..	..	22,890 1 8	..
Paeroa to Tauranga	1,244,648 15 10	..	1,428 1 4	599 14 5	216 12 0	..	1,246,893 3 7	..
Tauranga to Taneatua, including Te Maunga to Maunganui Branch	1,494,939 6 0	..	*Cr.* 1,436 18 10	..	82 14 9	..	1,493,585 1 11	..
Gisborne to Motu	624,907 7 3	..	..	45 0 0	134 1 7	..	625,086 8 10	..
Gisborne to Ormond Tramway	4,975 1 7	..	..	..	..	..	4,975 1 7	..
Napier to Gisborne—								
Gisborne Southwards	286,487 15 9	118 8 11	*Cr.* 1,088 14 5	..	..	..	285,280 12 5	..
Waikokopu Northwards	281,628 8 9	..	289,809 1 7	..	..	..	571,437 10 4	..
Wairoa Northwards	20,684 10 0	..	..	..	..	..	20,684 10 0	..
Napier Northwards	1,923,325 9 6	..	297,192 12 3	..	..	..	2,220,518 1 9	..
Waikokopu Branch	599,811 7 10	..	15,447 19 9	..	..	..	615,259 7 7	..
Wellington to Napier—								
Napier to Woodville and Palmerston North	1,123,926 9 5	..	..	*Cr.* 442 4 1	30,605 13 10	..	1,154,089 19 2	..
Wellington to Woodville, including Te Aro Extension	3,131,283 8 10	316 0 0	..	*Cr.* 1,813 17 8	118,212 14 10	..	3,247,366 6 0	..
Featherston to Martinborough	399 0 0	..	..	..	..	..	399 0 0	..
Wellington to Waitara—								
Wellington to Longburn	2,222,047 14 0	..	..	*Cr.* 17,646 12 6	360,893 14 1	..	2,565,294 15 7	..
Foxton to Waitara and Moturoa	2,044,006 8 9	..	..	*Cr.* 11,217 15 10	37,106 14 1	..	2,069,895 7 0	..
Mount Egmont Branch	70,686 1 6	..	..	*Cr.* 150 0 0	..	..	70,536 1 6	..
Moturoa to Opunake	3,105 0 0	..	..	..	..	..	3,105 0 0	..
Opunake Branch (Te Roti to Opunake)	442,862 15 3	..	23 0 0	*Cr.* 443 0 0	..	..	442,442 15 3	..
Manaia Branch (Kapuni to Manaia)	9,648 6 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, 1931—*continued.*

Lines of Railway.	Total Expenditure by General Government to 31st March, 1930.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1930–31: New Works.		Expenditure under Special Acts during Year 1930–31.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1931.	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)	1,063,576 2 5	130 0 0	137,281 0 7	..	..	..	1,200,727 3 0	..
Stratford to Okahukura (West End)	1,379,702 10 10	..	202,399 6 4	*Cr.* 102 18 10	..	..	1,581,998 18 4	..
Nelson to Greymouth—								
Nelson to Inangahua	639,282 19 2	..	94,852 6 10	*Cr.* 270 0 0	228 14 2	..	734,094 0 2	78,307 0 0
Stillwater to Inangahua	223,435 4 11	..	..	97 12 4	..	..	223,532 17 3	279,685 0 0
Ngahere to Blackball	147,694 15 0	..	...	..	186 17 11	..	147,881 12 11	..
Westport to Ngakawau	208,410 3 0	..	..	103 3 4	509 8 5	..	209,022 14 9	..
Westport to Inangahua	393,866 7 7	..	161,073 1 4	..	..	..	554,939 8 11	..
Greymouth to Rewanui	260,233 8 9	..	..	*Cr.* 245 18 7	..	..	259,987 10 2	..
Point Elizabeth Branch	74,139 3 1	..	..	224 7 10	..	..	74,363 10 11	..
Greymouth to Ross and Mikonui	422,752 4 9	..	..	377 11 2	28 6 3	..	423,158 2 2	..
Picton to Waipara—								
Picton Southwards	729,523 3 4	..	155,047 11 3	..	*Cr.* 66 14 11	..	884,503 19 8	..
Waipara Northwards	385,411 13 5	..	140,293 16 1	6 10 5	..	..	525,711 19 11	..
Christchurch to Greymouth—								
Rolleston to Bealey	1,011,616 13 11	..	..	..	358 3 10	..	1,011,974 17 9	61,579 0 0
Whitecliffs Branch	25,021 0 0	..	..	..	..	..	25,021 0 0	..
Greymouth to Bealey	1,964,599 17 6	3 2 6	378 0 0	438 16 8	13,712 1 2	..	1,979,125 12 10	263,889 0 0
Hurunui to Waitaki—								
Main Line (Waiau to Waitaki)	2,708,773 8 4	41 19 3	..	*Cr.* 5,134 17 3	20,793 15 1	..	2,724,390 6 11	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	229,493 9 2	..	..	542 16 1	457 13 1	..	230,493 18 4	340,500 0 0
Southbridge Branch (Hornby to Southbridge) ..	92,336 14 7	..	..	66 1 9	0 3 7	..	92,402 19 11	..
Little River Branch (Lincoln to Little River) ..	110,852 18 10	..	..	..	..	..	110,852 18 10	..
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) ..	70,344 1 4	..	..	..	79 12 9	..	70,423 14 1	75,124 0 0
Waimate Branch	80,862 4 6	..	..	..	..	..	80,862 4 6	..
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 ..	4,033,610 5 2	175 0 0	..	24,870 10 3	98,284 2 9	..	4,156,589 18 2	82,259 0 0
Duntroon Branch (Pukeuri to Kurow)	99,039 19 8	..	..	..	24 14 10	..	99,064 14 6	37,500 0 0
Ngapara Branch (Waiareka Junction to Ngapara) ..	25,238 2 0	..	..	..	..	..	25,238 2 0	58,009 0 0

* Railways Improvement Authorization Act 1914 Account.

TABLE No. 3—*continued.*

EXPENDITURE ON RAILWAYS TO 31ST MARCH, 1931—*continued.*

Lines of Railway.	Total Expenditure by General Government to 31st March, 1930.	Recoveries on Account of Expenditure of Previous Years.	Expenditure out of Public Works Fund during Year 1930–31: New Works.		Expenditure under Special Acts during Year 1930–31.*	Amounts previously charged to "Surveys of New Lines" now charged to Individual Lines.	Total Expenditure by General Government to 31st March, 1931.	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) ..	83,623 4 11	..	..	..	..	..	83,623 4 11	..
Waihemo Branch (Palmerston to Dunback) ..	33,531 8 11	..	..	..	..	..	33,531 8 11	..
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)	12,051 0 7	..	..	..	..	..	12,051 0 7	29,691 0 0
Lawrence Branch	717,629 18 5	..	480 15 0	*Cr.* 101 14 0	..	..	718,008 19 5	..
Balclutha to Tuapeka Mouth	2,489 0 0	..	..	..	..	..	2,489 0 0	..
Catlin's River Branch (Balclutha to Tahakopa) ..	463,909 6 3	..	..	..	..	..	463,909 6 3	..
Heriotburn Branch (Waipahi to Edievale) ..	124,808 4 5	..	..	..	..	..	124,808 4 5	..
Waikaka Branch (McNab to Waikaka)	68,423 0 0	..	..	..	..	..	68,423 0 0	..
Gore to Lumsden	112,344 3 2	..	..	..	..	..	112,344 3 2	..
Edendale to Glenham	53,613 3 7	..	..	..	..	..	53,613 3 7	..
Riversdale to Switzers	82,285 4 0	..	..	..	..	..	82,285 4 0	..
Seaward Bush to Catlin's (Appleby to Tokanui) ..	185,202 3 0	..	..	..	27 2 5	..	185,229 5 5	..
Otago Central (Wingatui to Cromwell)	1,443,337 18 9	..	..	1,616 0 3	2,758 17 10	..	1,447,712 16 10	..
Invercargill to Kingston—								
Main Line	368,542 17 5	..	..	290 2 3	308 16 8	..	369,141 16 4	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	359,762 8 6	..	292 12 3	..	169 13 10	..	360,224 14 7	37,097 0 0
Thornbury to Wairio	96,107 15 6	..	..	8,280 3 4	303 3 5	..	104,691 2 3	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	29,983 19 10	..	516 13 6	..	..	..	30,500 13 4	..
Middle Island	5,763 0 0	..	..	..	..	..	5,763 0 0	..
Rolling-stock	10,847,960 14 4	..	..	565,079 4 5	..	..	11,413,039 18 9	..
Motor-omnibus Service, Wellington	45,112 10 0	..	..	10,483 12 4	..	..	55,596 2 4	..
General	16,515 4 10	..	..	*Cr.* 2,455 7 7	16 15 6	..	14,076 12 9	..
Miscellaneous works, R.I.A.	673 2 5	..	..	..	*Cr.* 11,840 19 0	..	*Cr.* 11,167 16 7	..
Suspense Account, being proportion of cost of raising loans for Railways Authorization Improvement Act, 1914 Account	25,819 2 2	..	..	..	*Cr.* 25,819 2 2	..	..	..
Stock of Permanent-way Materials	123,103 15 6	..	*Cr.* 121,626 3 4	..	..	..	1,477 12 2	..
Total	63,269,878 8 0	792 10 8	1,576,101 11 1	559,012 3 5	1,018,614 12 3	..	66,422,814 4 1	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
1927-28	..	..	..	..	6,337	59,644
1928-29	..	..	..	..	..	52,310
1929-30	..	..	..	..	..	27,361
1930-31	..	..	..	..	..	22,080
	697,408	206,626	165,679	53,401	424,346	709,740

* 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, 1931, AND THE LIABILITIES ON THAT DATE.

—	Total Expenditure to 31st March, 1930.	Expenditure for Year ended 31st March, 1931.	Total Expenditure to 31st March, 1931.	Liabilities on Authorities, Contracts, &c., 31st March, 1931.	Total Expenditure and Liabilities.
	£	£	£	£	£
Judicial*	1,463,167	13,847	1,477,014	4,404	1,481,418
Postal and telegraph	2,240,673	137,279	2,377,952	10,710	2,388,662
Customs	49,441	..	49,441	..	49,441
Offices for public Departments†	819,149	85,149	904,298	1,610	905,908
Mental hospitals	1,512,146	134,140	1,646,286	11,396	1,657,682
Alexandra Depot, Wellington‡	8,084	..	8,084	..	8,084
School buildings	3,086,965	*Cr.* 1,110	3,085,855	..	3,085,855
Health and Hospital Institutions§	378,768	17,338	396,106	951	397,057
Quarantine-stations	62,464	..	62,464	..	62,464
Parliament Buildings (old buildings) ..	76,553	..	76,553	..	76,553
Parliament Buildings (new buildings) ..	393,625	..	393,625	..	393,625
Parliament Buildings (alterations to streets surrounding grounds, and purchase of land)	41,329	15,723	57,052	..	57,052
Government House, Wellington (land and new building)	72,645	..	72,645	..	72,645
Agricultural	100,477	1,314	101,791	..	101,791
Workers' dwellings	319,916	..	319,916	..	319,916
Miscellaneous	70,813	..	70,813	..	70,813
Totals	10,696,215	403,680	11,099,895	29,071	11,128,966

* Includes Courthouses, prisons, and police-stations. † Includes £12,500 expended under Finance Act, 1929, section 32.
‡ 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, 1931.

GENERAL BALANCE-SHEET AT 31ST MARCH, 1931, COMPARED WITH POSITION AT 31ST MARCH, 1930.

1929-30.	*Liabilities.*	1930-31.		1929-30.	*Assets.*	1930-31.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
	Aid to Water-power Works and Electric Supply Accounts—				Lake Coleridge scheme—		
	Debentures Stock issued—			1,692,794 3 8	Assets as per separate balance-sheet ..	1,784,315 4 11	
2,651,413 18 0	At 4½ per cent. interest	2,651,413 18 0		120,774 1 5	Investments, Sinking Fund	41,195 12 5	
3,504,782 19 6	At 5 per cent. interest	3,937,539 6 10		1,813,568 5 1			1,825,510 17 4
739,480 0 0	At 5¼ per cent. interest	739,480 0 0					
398,000 0 0	At 5½ per cent. interest	608,000 0 0					
1,884,642 6 3	At 6 per cent. interest	1,884,642 6 3					
				3,758,405 19 9	Horahora–Arapuni scheme—		
9,178,319 3 9			9,821,075 11 1	54,445 6 5	Assets as per separate balance-sheet ..	4,027,610 12 7	
				2,617 15 9	Investments, Sinking Fund	7,072 2 7	
				3,815,469 1 11	Profit and Loss Account—Loss to date ..	38,312 8 8	
							4,072,995 3 10
				3,553,715 16 6	Mangahao–Waikaremoana scheme—		
	Waihi Gold-mining Company, Limited—			430,774 11 3	Assets as per separate balance-sheet ..	3,640,166 0 3	
212,500 0 0	Purchase of Horahora works—Deed of security at 5 per cent. interest. (Due 1/11/1931) ..		212,500 0 0	3,984,490 7 9	Profit and Loss Account—Loss to date ..	467,289 13 4	4,107,455 13 7
				78,451 9 7	Waitaki River scheme—		
				100,549 9 1	Headworks	236,599 4 10	
				48,015 15 8	Power-house, machinery, &c.	303,619 5 9	
	Consolidated Fund—			148,861 11 5	Accommodation of workmen	66,655 14 0	
94,230 2 5	Interest accrued on loans to 31st March, 1931	102,581 17 5			Transmission line, service line, roads, land, &c.	336,959 11 9	
				65,003 7 6	Interest and loan charges	120,651 6 4	
179 8 9	Sundry creditors for interest unclaimed ..	182 9 8		40,542 5 3	Stocks	63,389 0 3	
94,409 11 2			102,764 7 1	268 15 11	Sundry debtors	1,562 8 10	
				481,692 14 5			1,129,436 11 9
					Other schemes, surveys, &c.—		
	Electric Supply Sinking Fund Account—			4,256 14 0	North Island	4,269 7 0	
..	Amount due under section 23, Finance Act, 1928 ..		5,094 6 6	10,835 2 2	South Island	11,364 4 3	
				15,091 16 2		15,633 11 3	
					£ s. d.		
				160 0 0	Material on hand .. 140 0 0		
				7 10 0	Sundry debtors		
31,704 12 10	Amount set aside as reserve to cover difference between interest payable on loans raised and interest earned from their temporary investment pending use ..		30,995 4 4	167 10 0		140 0 0	
							15,773 11 3
				15,259 6 2			
9,516,933 7 9	Carried forward	..	10,172,429 9 0	10,110,479 15 4	Carried forward	..	11,151,171 17 9

TABLE No. 6—*continued.*

ELECTRIC SUPPLY ACCOUNT—*continued.*

STATEMENT OF ACCOUNTS AT THE 31ST MARCH, 1931—*continued.*

GENERAL BALANCE-SHEET AT 31ST MARCH, 1931, AS COMPARED WITH POSITION AT 31ST MARCH, 1930—*continued.*

1929–30.	*Liabilities.*	1930–31.		1929–30.	*Assets.*	1930–31.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
9,516,933 7 9	Brought forward	..	10,172,429 9 0	10,110,479 15 4	Brought forward	..	11,151,171 17 9
	Sundry Creditors—				Balance in Electric Supply Account at the end of year—		
23,098 14 4	Horahora–Arapuni scheme	69,215 3 6					
8,264 4 7	Lake Coleridge scheme	14,535 11 5		121,092 4 7	Cash in Public Account	89,808 7 1	
14,322 7 1	Mangahao–Waikaremoana scheme ..	15,699 18 10		783 14 7	In hands of Government officers in New Zealand	1,149 6 3	
72,624 13 3	Waitaki scheme	37,837 14 11		43,505 9 3	In hands of Government officers in London	50,731 0 0	
55 15 11	South Island surveys	12 0 0					
			137,300 8 8				141,688 13 4
118,365 15 2				165,381 8 5			
	Depreciation Reserve—						
165,757 15 4	Horahora–Arapuni scheme	187,573 16 5					
188,293 18 9	Lake Coleridge scheme	197,627 3 10					
223,257 6 8	Mangahao–Waikaremoana scheme ..	284,965 15 2					
			670,166 15 5				
577,309 0 9				176,500 0 0	Investment Account (funds invested until actually required for use)	..	8,320 0 0
	Sinking Fund—						
..	Amount utilized for redemption of loans	159,810 0 0					
199,002 7 10	Available for further redemptions ..	65,393 15 0					
			225,203 15 0				
199,002 7 10							
				4,042 16 6	Interest accrued on investments to 31st March, 1931	1,056 19 3	
44,387 16 2	Reserve Fund— Lake Coleridge scheme		97,344 15 4	2,966 7 5	Sundry debtors for interest due but unpaid..	207 13 1	
	Writings-off in Suspense—						1,264 12 4
3,372 0 0	Lake Coleridge scheme		..	7,009 3 11			
£10,459,370 7 8	Total		£11,302,445 3 5	£10,459,370 7 8	Total	..	£11,302,445 3 5

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.

The following comment is appended: A charge of £2,295 4s. 10d. has been made in the accounts for costs of remittances to London, whereas the account had no need for any remittance to London (see page xii of my Annual Report, parliamentary paper B.–1 [Part II], 1931.—G. F. C. CAMPBELL, Controller and Auditor-General.

TABLE No. 6—*continued.*

LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY.

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1931, COMPARED WITH YEAR ENDED 31ST MARCH, 1930.

Gross Revenue Account.

1929–30.	——	1930–31.		1929–30.	——	1930–31.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
9,831 17 6	To Generating expenses, headworks, and power-house ..	..	11,170 4 2	197,593 7 5	By Sale of energy—		
6,971 18 8	Transmission-lines, maintenance, &c. ..	..	5,848 6 9	110 2 2	Wholesale	215,311 15 7	
3,183 6 4	Substation, Addington, operation and maintenance	..	3,399 4 2	197,703 9 7	Retail	41 13 0	
8,159 13 3	Distribution	..	8,166 13 2	3,372 0 0		215,353 8 7	
..	Power purchased in bulk	..	21,169 16 4		*Less* amount written off	..	
8,661 4 4	Management and general expenses ..	..	7,278 14 2	194,331 9 7			215,353 8 7
36,808 0 1			57,032 18 9	6 6 6	Discounts forfeited, &c.	..	..
159,840 3 7	Balance, to Net Revenue Account ..	..	160,599 4 4		Rents—		
				1,253 0 3	Land and buildings	1,266 7 10	
				327 13 2	Electric lines	284 12 6	
				353 3 8	Electric plant	395 4 1	
				1,933 17 1			1,946 4 5
				376 10 6	Fees for testing and repairing electrical appliances and earnings of motor-vehicles	..	332 10 1
£196,648 3 8			£217,632 3 1	£196,648 3 8		..	£217,632 3 1

Net Revenue Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
15,315 4 10	To Depreciation on completed work	13,289 16 5	159,840 3 7	By Balance from Gross Revenue Account ..	..	160,599 4 4
76,354 2 7	Interest for year ended 31st March	77,226 8 9				
68,170 16 2	Balance, to Profit and Loss Appropriation Account ..	70,082 19 2				
£159,840 3 7		£160,599 4 4	£159,840 3 7			£160,599 4 4

TABLE No. 6—*continued.*

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

Profit and Loss Appropriation Account.

1929-30.	—	1930-31.	1929-30.	—	1930-31.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
23,793 0 0	To Sinking Fund Reserve Account	17,126 0 0	68,170 16 2	By Balance from Net Revenue Account	70,082 19 2
44,387 16 2	General Reserve Account	52,956 19 2			
68,170 16 2		£70,082 19 2	£68,170 16 2		£70,082 19 2

Depreciation Reserve Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
	To Amounts written off—		192,410 19 9	By Balance from previous year's statement	188,293 18 9
27,128 14 7	Motor-vehicles, tools, plant, &c.	11,488 6 6	7,694 7 2	Interest at 4 per cent. per annum	7,531 15 2
188,293 18 9	Balance	197,627 3 10	15,317 6 5	Amount set aside as per Net Revenue Account	13,289 16 5
£215,422 13 4		£209,115 10 4	£215,422 13 4		£209,115 10 4

Sinking Fund Reserve Account.

		£ s. d.	£ s. d.		£ s. d.
..	To Cost of exchange on cash remitted to London for investment	11 11 7	115,769 17 9	By Balance at close of previous year	144,557 1 5
144,557 1 5	Balance	168,463 12 5	23,783 0 0	Amount set aside as per Profit and Loss Appropriation Account	17,126 0 0
			5,004 3 8	Interest	6,792 2 7
£144,557 1 5		£168,475 4 0	£144,557 1 5		£168,475 4 0

General Reserve Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
44,387 16 2	To Balance	97,344 15 4	..	By Balance at close of previous year	44,387 16 2
			44,387 16 2	Amount set aside as per Profit and Loss Appropriation Account	52,956 19 2
44,387 16 2		£97,344 15 4	£44,387 16 2		£97,344 15 4

TABLE No. 6—*continued.*

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

BALANCE-SHEET AT 31ST MARCH, 1931.

1929-30.	*Liabilities.*	1930-31.		1929-30.	*Assets.*	1930-31.	
£ s. d.		£ s. d.	£ s. d.				£ s. d.
188,293 18 9	Depreciation Reserve	..	197,627 3 10	760,119 3 8	Works at Lake Coleridge— Headworks, power-house machinery, buildings, &c.	..	780,488 19 6
44,387 16 2	Reserve Fund	..	97,344 15 4				
144,557 1 5	Sinking Fund—			394,883 18 11	Transmission-lines	..	390,144 12 5
	Amount utilized for redemption of loans ..	110,142 0 0					
	Available for further redemptions ..	58,321 12 5		83,958 16 9	Substation, Addington	..	96,356 9 2
			168,463 12 5	..	Diesel station, Lyttelton	..	48,164 4 2
	Sundry creditors—			151,557 18 2	Distribution	..	161,586 18 4
3,193 14 8	Public Works Department	2,978 10 3		7,083 17 3	Service transformers and meters	..	8,629 12 10
1,225 13 2	Other Government Departments ..	1,206 9 0		30,697 11 8	Plant, equipment, &c.	..	26,787 7 2
3,844 16 9	Non-departmental	10,350 12 2		99,791 10 9	Salaries, and engineering, office, and general expenses on preliminary surveys and construction	..	102,944 7 6
8,264 4 7			14,535 11 5				
				28,866 0 0	Cost of raising loans	..	30,632 0 0
3,372 0 0	Writings-off in suspense	..	..	65,240 6 9	Interest during construction	..	66,820 0 2
				1,622,199 3 11			1,712,554 11 3
	Balance carried to general balance-sheet—						
1,813,568 5 1	Total assets as *per contra*	1,825,510 17 4		22,865 1 7	Stocks of material	..	19,183 17 3
388,875 0 11	*Less* total liabilities as above ..	477,971 3 0					
1,424,693 4 2			1,347,539 14 4				
				47,671 17 6	Sundry debtors	..	52,534 18 11
				58 0 8	Payments in advance	..	41 17 6
				120,774 1 5	Sinking-fund investments	..	41,195 12 5
1,813,568 5 1		..	1,825,510 17 4	1,813,568 5 1			1,825,510 17 4

I hereby certify that the Balance-sheet and accompaning 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–WAIKAREMOANA ELECTRIC-POWER SUPPLY.

ELECTRIC SUPPLY ACCOUNT.

Profit and Loss Account for the Year ended 31st March, 1931, compared with Year ended 31st March, 1930.

Gross Revenue Account.

1929-30.	——	1930-31.		1929-30.	——	1930-31.	
£ s. d.	To Generating-expenses, headworks, and power-house—	£ s. d.	£ s. d.	£ s. d.	By Sales of energy—	£ s. d.	£ s. d.
7,807 19 3	Mangahao	7,843 11 4		255,618 5 7	Wholesale consumers	277,872 6 9	
8,124 14 1	Waikaremoana	8,182 9 4		724 8 2	Retail consumers	746 16 3	
			16,026 0 8	256,342 13 9			278,619 3 0
15,932 13 4							
20,200 6 2	Transmission-lines, patrol maintenance, &c.	..	16,907 14 9		Rents—		
7,764 4 3	Substations — Operating maintenance, &c.	..	5,996 18 0	2,918 2 4	Cottages, &c.	3,898 19 8	
233 9 6	Power purchased in bulk	..	4,441 8 8	327 2 10	Poles, land, and plant	265 0 1	
	Management and general—			3,245 5 2			4,163 19 9
15,336 13 1	Salaries, office expenses, accident, sick and holiday pay, postages, &c.	..	16,103 12 8				
				26 11 10	Tests and inspections	..	50 2 10
				34 0 0	Penalties	..	163 17 11
59,467 6 4			59,475 14 9	45 11 6	Refunds from local bodies	..	19 9 8
200,226 15 11	Balance, to Net Revenue Account ..	..	223,540 18 5				
£259,694 2 3			£283,016 13 2	£259,694 2 3			£283,016 13 2

Net Revenue Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
62,205 3 10	To Depreciation on completed works	63,850 6 9	200,226 15 11	By Balance from Gross Revenue Account	223,540 18 5
191,288 9 11	Interest for year ended 31st March, 1931	196,205 13 9	53,266 17 10	Loss for year	36,515 2 1
£253,493 13 9		£260,056 0 6	£253,493 13 9		£260,056 0 6

Profit and Loss Appropriation Account.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
377,507 13 5	To Balance from previous year	430,774 11 3	430,774 11 3	By Balance	467,289 13 4
53,266 17 10	Balance from Net Revenue Account	36,515 2 1			
£430,774 11 3		£467,289 13 4	£430,774 11 3		£467,289 13 4

TABLE No. 6—*continued.*

MANGAHAO-WAIKAREMOANA ELECTRIC-POWER SUPPLY—*continued.*

ELECTRIC SUPPLY ACCOUNT—*continued.*

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1931, COMPARED WITH YEAR ENDED 31ST MARCH, 1930—*continued.*

Depreciation Reserve Account.

1929–30.	——	1930–31.	1929–30.	——	1930–31.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
5,233 11 3	To Replacements, renewals, &c.	11,066 19 0	159,896 2 1	By Balance at close of previous year	223,257 6 8
223,257 6 8	Balance	284,965 15 2	6,389 12 0	Interest at 4 per cent. per annum	8,925 0 9
			62,205 3 10	Amount set aside as per Net Revenue Account ..	63,850 6 9
£228,490 17 11		£296,032 14 2	£228,490 17 11		£296,032 14 2

BALANCE-SHEET AS AT 31ST MARCH, 1931.

1929–30.	*Liabilities.*	1930–31.		1929–30.	*Assets.*	1930–31.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
223,257 6 8	Depreciation Reserve	..	284,965 15 2	1,196,933 12 5	Works at Mangahao—Headworks, power-house, machinery, &c.	1,197,189 4 8	
14,322 7 1	Sundry creditors	..	15,699 18 10	515,527 11 7	Works at Waikaremoana — Headworks, power-house machinery, &c.	516,520 6 8	
	Balance carried to General Balance-sheet—						1,713,709 11 4
3,984,490 7 9	Total assets as *per contra*	4,107,455 13 7		675,584 18 2	Transmission-lines	..	703,910 18 10
237,579 13 9	*Less* total liabilities as above ..	300,665 14 0		305,226 3 1	Substations	..	333,746 0 10
			3,806,789 19 7	25,814 15 6	Plant, motor-vehicles, construction tools, &c.	..	28,695 9 2
3,746,910 14 0				104,454 10 6	Service buildings, workmen's accommodation, &c.	..	105,550 7 10
				39,746 19 1	Temporary development, Waikaremoana ..	..	39,682 9 10
				3,768 4 7	Harbour facilities, Waikokopu	..	3,768 4 7
				198,437 16 0	Salaries and expenses of Engineers and others on surveys and during construction	..	202,683 6 4
				71,480 19 6	Cost of raising loans	..	73,214 19 6
				289,925 12 10	Interest during construction	..	293,878 14 3
				3,426,901 3 3			3,498,840 2 6
				58,177 1 4	Stocks on hand	..	76,657 19 5
				68,637 11 11	Sundry debtors, payments in advance, &c.	..	64,667 18 4
				430,774 11 3	Accumulated loss to date	..	467,289 13 4
£3,984,490 7 9			£4,107,455 13 7	£3,984,490 7 9			£4,107,455 13 7

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.*

ELECTRIC SUPPLY ACCOUNT—*continued.*

WAIKATO ELECTRIC-POWER SUPPLY.—HORAHORA–ARAPUNI SCHEME.

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1931, COMPARED WITH YEAR ENDED 31ST MARCH, 1930.

Gross Revenue Account.

1929–30.		1930–31.		1929–30.		1930–31.	
£ 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.
7,017 16 5	Horahora	7,429 11 0		222,243 15 1		180,940 1 11	
4,410 2 7	Arapuni	3,737 5 9		42 4 4	*Less* discounts and rebates	11 1 5	
11,427 19 0			11,166 16 9	222,201 10 9			180,929 0 6
	Operation and maintenance of—			19 0 8	Hire of plant	17 16 6	
				778 11 0	Rent of lines	778 11 0	
10,972 7 11	Waihi Grand Junction steam-plant ..	20,650 15 3		2,225 3 8	Miscellaneous rents	2,474 5 11	
4,791 4 11	Diesel Station, Penrose	12,861 5 8					3,270 13 5
7,947 16 11	Power purchased in bulk	30,008 8 3		3,022 15 4			
23,711 9 9			63,520 9 2				
10,388 9 5	Operation and maintenance of main transmission-lines	..	9,188 14 3	416 13 9	Testing, oil-drying, and repairs for consumers	..	341 14 4
7,681 15 6	Operation and maintenance of main substations	..	7,600 9 3				
29 18 6	Operation and maintenance of distribution substations	..	33 11 6	42 0 0	Fees for inspection of lines and testing of instruments	..	46 14 6
290 5 2	Operation and maintenance of distribution-lines (11,000-volt)	..	510 9 2				
380 18 5	Live-line testing and changing of insulators	..	393 12 8	..	Penalties	.. ..	5 0 0
2,575 0 7	General supervision and management of transmission and distributing systems	..	3,375 2 3				
	Management and general—						
6,084 16 8	Salaries, rent, postages, insurances, &c.	..	6,100 1 11				
62,570 13 0			101,889 6 11				
163,112 6 10	Balance to Net Revenue Account ..	..	82,703 15 10				
£225,682 19 10			£184,593 2 9	£225,682 19 10			£184,593 2 9

TABLE No. 6—*continued.*

ELECTRIC SUPPLY ACCOUNT—*continued.*

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

PROFIT AND LOSS ACCOUNT FOR YEAR ENDED 31ST MARCH, 1931, COMPARED WITH YEAR ENDED 31ST MARCH, 1930—*continued.*

Net Revenue Account.

1929–30.		1930–31.	1929–30.		1930–31.
£ s. d.	——	£ s. d.	£ s. d.	——	£ s. d.
135,622 3 8	To Interest on purchase-money for plant purchased from Waihi Gold-mining Co., Ltd., and on advances from Treasury	85,388 19 6	163,112 6 10	By Balance from Gross Revenue Account	82,703 15 10
			32,768 7 7	Balance to Profit and Loss Appropriation Account ..	35,694 12 11
60,258 10 9	Depreciation on completed works (2 per cent.) and on stocks	33,009 9 3			
£195,880 14 5		£118,398 8 9	£195,880 14 5		£118,398 8 9

PROFIT AND LOSS APPROPRIATION ACCOUNT FOR YEAR ENDED 31ST MARCH, 1931, COMPARED WITH YEAR ENDED 31ST MARCH, 1930.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
..	To Balance at close of previous year	2,617 15 9	30,150 11 10	By Amount transferred from Reserve Account	..
32,768 7 7	Balance from Net Revenue Account	35,694 12 11	2,617 15 9	Balance to general balance-sheet	38,312 8 8
£32,768 7 7		£38,312 8 8	£32,768 7 7		£38,312 8 8

DEPRECIATION RESERVE ACCOUNT.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
1,814 17 4	To Replacements, renewals, &c.	17,823 14 5	103,186 12 8	By Balance at close of previous year	165,757 15 4
165,757 15 4	Balance to general balance-sheet	187,573 16 5	4,127 9 3	Interest for year	6,630 6 3
			60,258 10 9	Amount set aside as per Net Revenue Account	33,009 9 3
£167,572 12 8		£205,397 10 10	£167,572 12 8		£205,397 10 10

TABLE No. 6—*continued.*

ELECTRIC SUPPLY ACCOUNT—*continued.*

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

SINKING FUND ACCOUNT.

1929-30.	——	1930-31.	1929-30.	——	1930-31.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
54,445 6 5	To Balance	56,740 0 0	52,163 18 3	By Balance at close of previous year	54,445 6 5
			2,281 8 2	Interest	2,294 16 2
£54,445 6 5		£56,740 2 7	£54,445 6 5		£56,740 2 7

BALANCE-SHEET AT 31ST MARCH, 1931.

1929-30.	*Liabilities.*	1930-31.		1929-30.	*Assets.*	1930-31.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
165,757 15 4	Depreciation reserve	..	187,573 16 5	305,184 4 4	Works at Horahora— Headworks, generating station, transformer buildings, and machinery, &c.	..	305,665 3 1
54,445 6 5	Sinking Fund—						
	Utilized for redemption of loans ..	49,668 0 0					
	Amount available for further redemptions	7,072 2 7					
			56,740 2 7				
	Sundry creditors—						
7,064 19 7	Public Works Department	6,606 1 11					
194 11 6	Other Government Departments ..	1,591 11 10					
15,839 3 3	Non-departmental	61,017 9 9					
			69,215 3 6				
23,098 14 4							
	Balance carried to general balance-sheet—						
3,815,469 1 11	Total assets as *per contra*	4,071,825 19 8					
243,301 16 1	*Less* liabilities as above	312,359 18 4					
			3,759,466 1 4	1,559,890 4 4	Works at Arapuni— Headworks and tail-race, machinery, transformers and switch-gear, buildings, &c.	..	1,696,040 14 5
3,572,167 5 10					Auxiliary plants—		
				9,139 9 4	Waihi Grand Junction steam-plant ..	9,139 9 4	
				63,329 5 10	Diesel station, Penrose	61,770 10 7	
				..	Huntly steam-plant	11,169 15 6	
				72,468 15 2			82,079 15 5
3,815,469 1 11	Carried forward	..	4,072,995 3 10	1,937,543 3 10	Carried forward	..	2,083,785 12 11

TABLE No. 6—*continued*

ELECTRIC SUPPLY ACCOUNT—*continued.*

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

BALANCE-SHEET AT 31ST MARCH, 1931—*continued.*

1929-30.	*Liabilities.*	1930-31.		1929-30.	*Assets.*	1930-31.	
£ s. d.		£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
3,815,469 1 11	Brought forward	..	4,072,995 3 10	1,937,543 3 10	Brought forward	..	2,083,785 12 11
				605,416 14 3	Transmission-lines	..	606,605 1 9
				369,974 8 11	Substations	..	386,555 19 7
				44,261 9 0	Distribution-lines	..	40,867 19 9
					Distribution substations, 11,000 kv.—		
				8,642 18 6	Waihi Grand Junction	8,642 18 6	
				2,269 12 6	Taps for consumers	2,187 12 3	
				10,912 11 0			10,830 10 9
				19,104 7 0	Hamilton Area—Land at Ruakura, stores, buildings, staff residences, &c.	..	19,020 11 1
				15,850 15 1	Loose tools and equipment, motor-lorries, cars, &c.	..	16,718 6 6
				152,479 10 0	Salaries of officers, engineering office, and general expenses on surveys and on construction	..	158,784 6 6
				353,198 4 11	Interest during construction	..	459,952 10 4
				132,054 12 4	Cost of raising loans	..	135,790 12 4
				19,631 4 9	Stocks of spares, &c., on hand	..	20,210 14 6
				3,660,427 1 1			3,939,122 5 6
				31,704 7 4	Stocks of material on hand	..	53,918 12 11
					Debtors—		
				66,274 11 4	For electricity and sales of materials ..	..	34,569 14 2
				54,445 6 5	Sinking-fund Investments	..	7,072 2 7
				2,617 15 9	Net loss	..	38,312 8 8
£3,815,469 1 11			£4,072,995 3 10	£3,815,469 1 11			£4,072,995 3 10

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

TABLE No. 7.

IRRIGATION AND WATER-SUPPLY.

SCHEDULE OF SCHEMES COMPLETED OR UNDER CONSTRUCTION.

Scheme.	Source of Supply.	River Discharge (Minimum).	Main Canal Discharge (Maximum).		Average Rainfall from Records available.	Rainfall, 1930.	Area commanded (Gross).	Area irrigated at Present.	Works authorized.		Works completed.		Expenditure to 31st March, 1931.	Remarks.
			As per Design.	During 1930–31.					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	..	20·69 (Steward Settlement)	17·39	18,000	..	14 60	50 31	14 60	50 31	12,115	Completed.
Otekaike ..	Otekaike River ..	9	15	..	21·92 (Duntroon)	15·40	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	86·5	15·80 (Moa Creek)	12·18	14,000	11,441	73 0	54 0	73 0	29 50	238,338	Completed. Additional storage now furnished by Poolburn Dam.
Galloway ..	Manorburn Dam ..	..	30	20	13·82 (Galloway)	11·53	3,450	2,453	10 50	10 7	10 50	10 7	24,383	Completed.
Manuherikia – Alexandra-Clyde No. 1	Manuherikia River	77	100	80	15·09 (Alexandra, Ophir, and Clyde)	10·56	7,000	5,830	23 0	46 20	23 0	46 20	232,092	Completed.
Ardgour	Lindis River ..	35	20	20	19·06 (Tarras)	15·72	2,000	1,462	13 0	2 40	13 0	2 40	33,463	Completed.
Arrow River ..	Arrow River	40	50	25	26·39 (Arrowtown and Frankton)	21·26	6,536	2,000	..	..	9 18	23 2	137,378	Completed.
Hawkdun (formerly Mount Ida)	Tributaries of Manuherikia River and Eweburn Reservoir	..	60	29	24·44 (Naseby and Naseby Plantation)	20·66	10,000	8,017	66 0	101 0	66 0	90 12	67,387	Completed.
Earnscleugh (Fraser River)	Fraser River ..	10	47 (all races)	60	14·32 (Earnscleugh)	11·59	2,743	2,048	11 30	17 60	11 30	17 60	10,480	Completed.
Last Chance (Fruitlands and Earnscleugh Tops)	Shingle, Coal, Gorge, and Butcher's Creek	8	20	13	15·00 (Earnscleugh and Roxburgh East)	14·39	4,300	2,915	22 0	5 70	20 78	5 70	28,758	Completed.
Tarras	Lindis River ..	35	70	38	19·06 (Tarras)	15·72	6,000	2,495	21 70	17 55	21 70	17 55	135,854	Completed.
Bengerburn ..	Bengerburn ..	1	4	4	..	..	1,000	144	2 6	..	2 6	..	690	Completed.
Teviot River ..	Teviot River and Lake Onslow Dam	40	80	63	15·69 (Roxburgh East)	17·20	3,300	3,867	16 51	10 55	16 51	10 55	54,357	Completed and serving all land requiring water.
Teviot River Extension	Ditto	40	80	63	15·69 (Roxburgh East)		2,000		3 77	4 2	3 77	4 2		Completed.

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, 1930.	Area commanded (Gross).	Length of Main Canal.	Length of Distributaries.	Expenditure to 31st March, 1931.	Remarks.
		Cusecs.	Cusecs.	Inches.	Inches.	Acres.	Miles.	Miles.	£	
Maniototo (Upper Taieri)	Taieri River and storage dam	25	500	17·24 (Waipiata)	14·50	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. Surveys in hand.
Cromwell Flat and Lowburn (Roaring Meg)	Roaring Meg Stream (gravity), Kawarau River (pumping)	29 3,000	40	19·99 (Luggate)	14·78	15,000	10	30	3,774	Development of gravity scheme would be costly. Hydro-electric scheme under investigation. Power would be available for pumping irrigation supplies in Upper Clutha Valley.
Upper Manuherikia ..	Manuherikia and Dunstan Rivers, and storage dam in Manuherikia River at Falls	77	500	20·49 (Clyde, Ophir, and Blackstone Hill)	16·30	96,000	130	..	6,467	Further investigations into water requirements and areas available, and revised estimates have been made. Fresh surveys and investigations were made during past year for scheme to supply portion of original area.
Hawea Flats (first alternative)	Timaru Creek (gravity)	20	30	25·06 (Hawea Flat)	18·13	4,000	11	20	53	To irrigate lower flat only.
Hawea Flats (later alternative)	Hawea River (pumping)	..	..	26·01 (Hawea Flat)	20·58	17,600	..	..	..	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	..	..	14·05 (Alexandra)	10·05	100	..	..	16	..
Bendigo Flat	Lindis River and storage dam	35	30	19·06 (Tarras)	15·72	3,000	7	..	..	The greater portion of this area is now served.
Teviot River Extension *	Teviot River and Lake Onslow Dam	40	80	15·69 (Roxburgh East)	17·20	2,300	..	..	207	To irrigate a limited area in the vicinity of Ettrick, on west side of Clutha River.
Miller's Flat	Minzionburn	6	..	..	..	2,000	..	..	192	Survey and proposals completed.
Luggate Burn	Luggate Burn ..	..	12	19·99 (Luggate)	14·78	1,200	..	..	273	To supply water to part of Mount Pisa settlement lands.
Scandinavian	Tributaries of Manuherikia River	..	20	31·22 (St. Bathan's)	30·43	4,000	..	..	..	For lands about St. Bathan's. Include £12,000 towards cost of Falls dam, Upper Manuherikia scheme.
Soil Survey (Central Otago)	..	..	..	..	..	..	..	..	2,804	This soil survey in the irrigation districts is now complete, and plans are being prepared.
Investigation of proposed schemes	..	..	..	..	..	..	..	..	454	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, 1931.

APPENDIX A.

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS OUT OF THE PUBLIC WORKS FUND FOR THE YEAR 1930–31.

Prepared in compliance with Section 8 of the Public Works Act, 1928.

SIR,— Public Works Department, Wellington, 9th July, 1931.

In compliance with the 8th section of the Public Works Act, 1928, I enclose a statement of the expenditure during the preceding financial year on all works and services chargeable to the Public Works Fund.

I have, &c.,
W. B. TAVERNER,
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 1930–31.

Vote.	Summary.	Appropriation.	Gross Expenditure.	Credits in Aid.	Net Expenditure.
	General Purposes Account—	£	£ s. d.	£ s. d.	£ s. d.
41	Public Works, Departmental	165,000	311,447 15 3	179,631 11 0	131,816 4 3
42, 43	Railways	2,239,524	2,288,695 1 2	301,499 18 0	1,987,195 3 2
44–51	Public Buildings	467,220	424,864 17 9	1,844 1 0	423,020 16 9
52	Timber-supply and Sawmills, &c., for Public Works Department	5,000	4,101 18 1	6,372 17 1	*Cr.* 2,270 19 0
53	Acquisition and Operation of Quarries for Public Works Department	10,000	23,323 2 4	19,104 9 4	4,218 13 0
54, 55	Lighthouses and Harbour-works	25,000	10,913 7 7	68 11 11	10,844 15 8
56	Development of Tourist Resorts	70,000	60,657 14 4	369 9 5	60,288 4 11
57	Department of Immigration	50,000	76,253 6 9	42,708 17 0	33,544 9 9
58–60	Roads, Bridges, and other Public Works ..	1,486,500	1,561,244 15 0	85,722 4 11	1,475,522 10 1
61	Telegraph Extension	420,000	479,998 14 0	60,242 7 7	419,756 6 5
62	Contingent Defence	15,000	15,883 18 8	2,072 0 3	13,811 18 5
63	Lands, Miscellaneous	94,500	71,716 5 2	1,182 8 5	70,533 16 9
64	Irrigation, Water-supply, and Drainage ..	95,500	65,240 8 5	2,626 6 2	62,614 2 3
65	Plant, Material, and Stores	30,000	99,735 7 5	144,507 4 5	*Cr.* 44,771 17 0
..	Unauthorized—Services not provided for ..	..	104 17 4	104 17 4	..
	Totals, General Purposes Account ..	5,173,244	5,494,181 9 3	848,057 3 10	4,646,124 5 5
66	*Electric Supply Account*	1,334,000	1,224,276 2 1	36,479 3 8	1,187,796 18 5
..	*Waihou and Ohinemuri Rivers Improvement Account*	..	25,056 10 7	2,976 19 6	22,079 11 1
	Totals, Public Works Fund.. ..	6,507,244	6,743,514 1 11	887,513 7 0	5,856,000 14 11

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—				
41	Public Works, Departmental	165,000	311,447 15 3	179,631 11 0	131,816 4 3
	Railways—				
42	Railway-construction	1,570,429	1,529,577 9 2	50,888 18 1	1,478,688 11 1
43	Additions to Open Lines	669,095	759,117 12 0	250,610 19 11	508,506 12 1
	Public Buildings—				
44	General	105,500	101,391 13 3	464 13 10	100,926 19 5
45	Courthouses	21,000	19,578 16 0	6 7 3	19,572 8 9
46	Prison Buildings and Works	13,220	2,807 18 9	303 18 1	2,504 0 8
47	Police-stations	10,000	8,370 13 0	10 17 6	8,359 15 6
48	Postal and Telegraph	156,000	139,325 9 10	655 0 7	138,670 9 3
49	Agricultural	2,500	1,508 11 9	..	1,508 11 9
50	Mental Hospital Buildings	139,000	134,523 6 3	382 17 6	134,140 8 9
51	Health and Hospital Institutions	20,000	17,358 8 11	20 6 3	17,338 2 8
52	Timber-supply and Sawmills, &c., for Public Works Department	5,000	4,101 18 1	6,372 17 1	*Cr.* 2,270 19 0
53	Acquisition and Operation of Quarries for Public Works Department	10,000	23,323 2 4	19,104 9 4	4,218 13 0
	Lighthouses and Harbour-works—				
54	Lighthouses	8,000	4,110 0 7	6 16 2	4,103 4 5
55	Harbour-works	17,000	6,803 7 0	61 15 9	6,741 11 3
56	Development of Tourist Resorts	70,000	60,657 14 4	369 9 5	60,288 4 11
57	Department of Immigration	50,000	76,253 6 9	42,708 17 0	33,544 9 9
	Construction and Maintenance of Roads, Bridges, and other Public Works—				
58	Roads, &c.	1,383,500	1,463,713 9 6	83,903 17 9	1,379,809 11 9
59	Roads to give access to Outlying Districts	100,000	92,944 11 7	1,818 7 2	91,126 4 5
60	Roads, &c., on Goldfields	3,000	4,586 13 11	..	4,586 13 11
61	Telegraph Extension	420,000	479,998 14 0	60,242 7 7	419,756 6 5
62	Contingent Defence	15,000	15,883 18 8	2,072 0 3	13,811 18 5
63	Lands, Miscellaneous	94,500	71,716 5 2	1,182 8 5	70,533 16 9
64	Irrigation, Water-supply, and Drainage	95,500	65,240 8 5	2,626 6 2	62,614 2 3
65	Plant, Material, and Stores	30,000	99,735 7 5	144,507 4 5	*Cr.* 44,771 17 0
..	Unauthorized—Services not provided for	..	104 17 4	104 17 4	..
	Totals, General Purposes Account	5,173,244	5,494,181 9 3	848,057 3 10	4,646,124 5 5
	Electric Supply Account—				
66	Development of Water-power	1,334,000	1,224,276 2 1	36,479 3 8	1,187,796 18 5
..	*Waihou and Ohinemuri Rivers Improvement Account*	..	25,056 10 7	2,976 19 6	22,079 11 1
	Totals, Public Works Fund	6,507,244	6,743,514 1 11	887,513 7 0	5,856,000 14 11

NOTE.—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, subject to the foregoing departmental note.—G. F. C. CAMPBELL, Controller and Auditor-General.

APPENDIX B.

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

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

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, 1930, to the 30th June, 1931.

As in previous years, the principal operations consist of the construction of railways, roads, and hydro-electric undertakings, in that order, followed by buildings, irrigation, lighthouses, river-control, and other miscellaneous works. Although in the graph showing the ratios of the various subdivisions to the whole, telegraph-extension is shown as absorbing 5·16 per cent. of the total funds expended, this work, although paid for out of the Public Works Fund, is supervised and carried out, in the main, by the Telegraph Department itself, and is consequently not reported on here.

A considerable amount of the building-work totalling 11·38 per cent. of our operations includes schools, which until recently have been directly controlled by the Education Department, but in future will come under your more direct control.

Although a very considerable reduction was made part-way through the year in the scope of the railway-construction, this branch of the Department's work, in volume, is still far ahead of any other branch of the Department's operations.

RAILWAYS.

ABSTRACT.

The following table shows the expenditure on Government railways in New Zealand up to the 31st March, 1931:—

Name of Railway.	Total Length of Railway or Section.	Open for Traffic.	Expenditure to 31st March, 1931.
	M. ch.	M. ch.	£
Kaihu Valley	24 32	24 32	180,133
Otiria–Ngapuhi	13 45	13 45	127,371
Opua Wharf – Onerahi	58 6	58 6	608,288
Kioreroa–Waiotira	19 79	19 79	420,533
North Auckland Main Trunk Railway (from Helensville)	189 75	94 39	4,307,263
Helensville – Te Awamutu, with Branches (including Auckland–Westfield Deviation)	215 35	170 51	6,383,462
Frankton Junction – Thames, with Branches	127 35	125 53	1,833,472
Thames Valley – Rotorua	69 33	69 33	431,040
Rotorua–Taupo	54 40	..	38,211
Tauranga–Opotiki, with Branches	145 32	59 09	1,493,585
Gisborne–Opotiki	93 44	49 32	625,086
Napier–Gisborne (including Waikokopu Branch)	231 44	50 33	3,713,180
Wellington – Napier and Palmerston North (including Te Aro Extension, Greytown and Martinborough Branches, and Hutt Valley Railway)	258 62	235 76	4,401,855
Wellington–Waitara, with Branches	350 11	308 42	5,161,128
Stratford–Okahukura	112 47	47 40	2,782,726
North Island Main Trunk (Marton – Te Awamutu), including Raetihi Branch and Waipa Gravel-access Branch	225 79	218 39	3,167,413
Picton–Waipara (South Island Main Trunk Railway)—			
Picton southwards	92 38	56 6	884,504
Waipara northwards	90 45	44 14	525,712
Nelson–Greymouth	177 51	129 50	957,627
Stillwater – Arthur's Pass	51 41	50 41	1,979,126
Rolleston – Arthur's Pass (including Whitecliffs Branch)	92 59	84 45	1,036,996
Westport–Ngakawau	19 56	19 56	209,023
Westport – Ngakawau Extension to Mokihinui*	7 12	7 12	..
Mokihinui Colliery Line†	3 69	3 69	..
Westport–Cape Foulwind‡	7 0	7 0	..
Westport–Inangahua	26 0	5 74	554,939
Ngahere–Blackball	3 40	3 40	147,882
Greymouth–Rewanui and Branches	11 34	11 34	334,351
Greymouth–Waitaha	50 32	38 68	423,158
Waipara–Waitaki, with Branches	459 34	413 70	3,548,356
Canterbury Interior Main Line—Oxford–Temuka	83 0	11 44	59,942
Waitaki–Bluff, with Branches	600 21	570 14	6,229,098
Otago Central	182 51	147 27	1,447,713
Invercargill–Kingston, with Mararoa Branch	117 4	97 44	396,790
Forest Hill Railway—Winton–Hedgehope§	12 40	12 40	23,337
Western Railways	94 8	78 49	464,916
Preliminary surveys	..	..	36,264
General charges not yet apportioned	..	..	2,908
Miscellaneous	..	..	10,337
Stock of permanent-way on hand	..	..	1,478
Rolling-stock and omnibuses	..	..	11,468,636
Total	4,373 54	3,339 46	‖66,417,839
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	4,373 54	3,339 46	68,210,555

* 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 funds for this line—namely, £93,450—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. 65 ch.).—My report for last year detailed the extensive and costly work that had to be carried out to get stable railway formation along a considerable length of the unstable hillside. During the earlier portion of this year this section of the work drew to a conclusion—the last three large slips were removed, and the formation consolidated—and all other earthwork was completed. During the period that work was in hand 60,000 cubic yards of earthwork were handled, 40,000 being slip material, and the balance being excavation to make the Rangiahua Station-yard.

All culverts are now complete. During the year 57 lineal chains of stone walls and 94 lineal chains of stone drains were made as part of the work to consolidate cuttings and fillings. Two miles of fencing were erected.

One mile of platelaying was done, and substantial progress was made with the ballasting, the work done being equal to 6 miles of track completely ballasted. All bridge-work has now been completed, the work for the period being the building of a railway-bridge of total length of 130 ft. in plate-girder spans, and a heavy reinforced-concrete road-overbridge.

A feature of the work has been the extensive reconstruction of the main highway, the need for which arose through the way in which the railway location fouled the main highway. With the exception of 2½ miles of metalling, this highway-reconstruction work is about complete. Ballast and road-metal is obtained from a basaltic-rock quarry at Okaihau operated by the Department. While operations were in hand this year the quarry delivered 26,274 cubic yards of crushed metal and 2,474 cubic yards of spalls.

Construction work was suspended at the New Year, and during the six months of the year that works were in hand an average of 235 men had been employed. A few men were retained after the New Year, cleaning up and reconditioning plant and finishing essential road-deviations.

The work that requires to be done to complete this railway is briefly stated as follows: 3 miles of platelaying and ballasting, including Rangiahua Station yard; erection of Rangiahua Station buildings; 10 chains of main-highway formation and 2½ miles of metalling.

Tauraroa Quarry.

The installation of permanent plant to replace that destroyed by fire in the preceding year was undertaken, the installation being completed early in November last.

A much smaller programme of work was undertaken this year than in previous years, practically the whole of the metal going to the Dargaville Branch Railway or to the Auckland–Maungaturoto Main Highway. With the closing-down of the railway-work at the New Year the quarry likewise had to be closed down.

During the months that the plant was operating 11,800 cubic yards of metal of all kinds were crushed.

Dargaville Branch Railway.

This railway continued to make rapid progress during the year under review till construction was stopped at the New Year. By that time the formation had been completed, except for a subsidence at 2 m. 15 ch., the approaches to the Tangowahine Bridge at 10 m. 20 ch., and the continued subsidence at the big bank at 13 m. 63 ch. At 2 m. 15 ch. a single-span bridge is required, and at 13 m. 63 ch. it is anticipated that the filling is approaching a stable condition, probably requiring not a great deal of extra work to complete. Three steam-shovels were in continuous service.

Culverting is complete to 15 m. 66 ch. Three railway-bridges of plate-girder spans, totalling 395 ft., were complete. Overbridge at 12 m. 37 ch. was built of hardwood timber.

Platelaying was continued to 11 m. 70 ch., 1 m. 45 ch. being laid, and 2 miles of ballasting, first lift only, were done. The Te Wharau Station yard was completed, with the exception of metalling, stock-yards, and gates.

The goods service between Tangowahine and Kirikopuni, started the previous year, was continued, and from the 22nd September, 1930, a regular passenger service connecting with the Railway Department's services has been run. These services have been of great benefit to the Dargaville district. The passenger, mail, and goods service is still being continued.

General construction works ceased at the New Year, but a force of fifty men has been retained during the rest of the year now reported upon. These men have been employed on cleaning up, reconditioning of plant, running of train services, and maintenance of works.

During the first six months of the year dealt with in this report the number of men employed averaged 210.

The work required to be done to complete this railway, and thus link Dargaville and the Kaihu Valley with the railway system, is as follows: 1 m. 50 ch. of formation of very light nature, 3 m. 70 ch. of platelaying, 7 miles of ballasting, and erection of Whapu Bridge at 17 m. 20 ch.

Napier–Gisborne Railway.—Waikokopu–Gisborne.

Owing to the closing-down of construction work on the Waikokopu–Gisborne Railway at the end of 1930 active operations covered by this report represented six months' work only. During that period construction was pushed on vigorously, the average number of men employed being 792.

My report of last year described the heavy nature of the work, particularly in respect to tunnelling, the three longer tunnels having a total length of 241 chains. These tunnels would thus control the time required for the completion of the railway, so the construction of the necessary service roads,

the ordering of air-compressing plant, and the erection of power transmission-line from Nuhaka up the Kopuawhara Valley to the points from which these tunnels would be attacked were energetically pushed forward. Everything was in readiness to start the tunnels when the decision was made to stop the work.

Very substantial progress had been made with general construction operations, apart from the tunnels, and particulars of the work done are as follows :—

Kopuawhara Section (12 m. 0 ch. to 33 m. 72 ch., Wairoa chainage; length, 10 m. 72 ch.).—Clearing has been completed to 31 m. 71 ch., and 308 chains of permanent fencing have been erected.

Earthwork was proceeding very vigorously over the whole of this section until the closing-down of the work on the 14th January, 1931, a total of 104,857 cubic yards having been excavated during the period.

The culverting of the section was pushed on vigorously; 468 ft. of concrete culverts varying from 6 ft. to 18 in. in width, and 789 ft. of water-drives from 9 ft. by 9 ft. to 4 ft. 6 in. by 3 ft. were completed.

No permanent bridging has been carried out on the section, but borings for foundations at 23 m. 22 ch., 30 m. 15 ch., and 33 m. 68 ch. were made, and a service trestle was completed at 23 m. 22 ch.

Two miles of service road were formed, and 2 m. 20 ch. of metalling, and one road-bridge were completed.

There were 9 m. 60 ch. of telephone-line built, and 5 miles of 11,000-volt transmission-line were erected.

Wharerata Section (34 m. 60 ch., Wairoa chainage, to 14 m. 0 ch., Gisborne chainage; length, 9 m. 75 ch.).—Co-operative contracts for the formation have been in hand over the whole section, a total of 129,382 cubic yards having been excavated up to the time of closing down and 947 ft. of culverts and 917 ft. of water-drives completed.

The formation of the Wharerata Station yard at 14 m. 35 ch. was in hand, and several miles of service road in the Tikiwhata Valley and to the Coast Road tunnel were formed and partially metalled and culverted.

A start was made with the construction of the tunnel at 18 m. 70 ch., 114 ft. of bottom heading and 44 ft. of top heading being completed, 16½ ft. of tunnel being enlarged and lined.

Gisborne Section (14 m. 0 ch. to Gisborne; length, 14 m. 7·35 ch.).—The earthwork, which is of a light character, has been in hand over the whole section, and during the year 39,302 cubic yards have been excavated, and marram-grass has been planted where the formation passes through sandy country.

There were 120 ft. of culverts built, 65 ch. of permanent fencing completed, and the widening of the Pakowhai Stream finished.

A start had been made with the erection of the Waipaoa Bridge at 5 m. 0 ch. The protection of one bank has been completed, three test piles cast and pile-driver, derrick, &c., assembled.

General: The policy of providing good accommodation for the workers was carried on, and to date a total of 221 married quarters, 560 single huts, and a Y.M.C.A. hall have been built.

Since the works closed down clearing-up work has been in progress, all rails have been tarred or oiled, and plant overhauled, a great deal of the latter being transferred to other works.

Gisborne–Napier Railway.—Napier–Wairoa Section.

Putorino Section (10 m. 56 ch. to 37 m. 35 ch.; length, 26 m. 59 ch.).—This section was handed over to the Railway Department on the 6th October, 1930, and from that date maintenance and control of traffic was carried out by that Department, the whole of the Public Works organization having been moved forward to the Wairoa Section.

The work carried out for the period before handing over was in the nature of cleaning up, small jobs in station-yards, fettling, fencing, repairs, and telephone-line renewals, and the evacuation of workers' accommodation to the section farther north.

Traffic was dealt with throughout the period, and the volume was quite satisfactory.

Since the earthquake on the 3rd February, 1931, a certain amount of work has been done on behalf of the Railway Department on a portion of this section, restoring damage to the track between Waikoau and Putorino.

Wairoa Section (37 m. 35 ch. to 70 m. 67 ch.; length, 33 m. 32 ch.).—The formation work on this section is practically completed, there being only the Kotemaori Tunnel and a few cuttings and banks to complete.

Four steam-shovels have been employed during the period, and these, together with scoop teams and hand labour, accounted for the excavation of 99,500 cubic yards, the principal works being cuttings at 44 m. 23 ch., 44 m. 63 ch., 51 m. 0 ch., 51 m. 10 ch., and 52 m. 13 ch. At 51 m. 10 ch. work is being carried on in three shifts.

The southern approach to the Kotemaori Tunnel has been completed, and the side drive running parallel to this cutting has been cleaned out and made sound by judicious trimming where required.

The bottom heading through the Kotemaori Tunnel at 42 m. 15 ch. was pierced in September last, and from that date three shifts have been working from both ends enlarging and lining the tunnel. Progress at the south end since September, 1930, is 11·73 chains, and the work is completed back to 42 m. 26·31 ch. At the north end three shifts have been working on the breakdown and have completed 14½ ch. of tunnel during the year. There is 7½ ch. left to complete this tunnel, and now that the dispute in connection with tunnels generally has been finalized the work should be completed in about six months' time.

The Mohaka Tunnel was completed just after Christmas, a total of 11 ch. being driven and lined during the year.

The principal work on the section has been the construction of the viaducts and bridges, all other works being co-ordinated as far as possible to enable these to be carried out progressively, the erection plant and cableways being shifted forward as required.

The wind-screen at the Waikare Viaduct, the only work remaining here, has been completed; but a certain amount of earthquake damage was sustained and will have to be repaired, as the piers and abutment at the south end were badly damaged, though, generally speaking, the structure stood up to the earthquake very well and can still take traffic.

The Mohaka Viaduct, at 49 m. 40 ch., which towers 315 ft. above the river-bed, and consists of four 100 ft., three 80 ft., four 50 ft., and one 65 ft. spans, is now in hand, the foundations for the piers being well forward. The river piers, which consist of large concrete caissons sunk under compressed air, presented peculiar difficulties owing to their large size and the depth to which they had to be sunk, but fortunately there were comparatively few floods while the sinking was in progress. Good progress has been made with the land piers, and all foundations should be completed in three months. The steelwork for this viaduct is being fabricated in the Department's workshop at Tauranga, and is well in hand.

The Maungaturanga Viaduct, at 51 m. 44 ch., consists of five 100 ft. and six 50 ft. spans, with a height of 220 ft. above river-level. All foundations and piers have been completed and the steel towers erected, leaving only the 100 ft. steel spans to complete. A feature of this work has been the construction and operation of the two overhead cableways for the steel erection. These cableways have given great satisfaction, and the method has resulted in quick and efficient work. They will shortly be shifted forward for a similar use at the Mohaka Viaduct.

The formation, bridges, &c., on the section between Mohaka Tunnel and Wairoa were pushed on and completed in time to lay the permanent-way and allow the steel for the Maungaturanga Viaduct to be transported by rail.

Waihua River Bridge, at 59 m. 31 ch., consisting of one 100 ft., three 50 ft., and two 40 ft. steel spans on concrete piers, is practically completed, all steel being erected during the year. Owing to a large slip blocking the Waihua Tunnel all steel had to be carted to the site by lorries. The only work yet to be done consists of guard-rails, sleepering, refuges, painting, and the general dismantling and clearing-up of staging.

Ohinepaka Bridge, at 64 m. 7 ch., consisting of one 40 ft., four 30 ft., and one 25 ft. steel-plate girder spans on pile piers, was completed during the year.

Ohinepaka Bridge, at 64 m. 47 ch., consisting of five 30 ft. plate-girder spans on pile piers, was also completed.

Hurumua Bridge (65 m. 46 ch.), consisting of three 30 ft. and two 25 ft. plate-girder spans on pile piers was completed, except for full sleepering and spacing bars.

Wairoa River Bridge, at 68 m. 59 ch., consisting of four 105 ft. steel truss spans and two 15 ft. plate girders on concrete piers with deep cylinder foundations, is now complete except for the placing of guard-rails at end spans. It is at present in use as a road-bridge pending the construction of the new bridge at Wairoa Township.

Fourteen culverts have been completed over the section, and fencing has been practically completed throughout.

On the southern end platelaying has been carried forward to 41 m. 63 ch., near the southern end of the Kotemaori Tunnel, and southwards to 51 m. 60 ch. near the Maungaturanga Viaduct, and a lift or more of ballast has been given to all track.

The ballast for the section south of Kotemaori Tunnel is being obtained from Waikoau Pit, and it has been necessary to operate ballast-trains over the open railway to obtain this.

Ballast for section north of Maungaturanga Viaduct has been obtained by dredging out of the Wairoa River near the railway-bridge. For the interventing portions ballast may be obtained for probably first and second lifts from shingle deposits handy, and it can be topped off with Wairoa River shingle after completion of the viaducts.

A number of platelayers' cottages constructed of concrete blocks were very severely damaged by the earthquake, demonstrating that this class of construction is not suitable for an earthquake area.

The Makomako Sawmill was in operation till the 7th November, when it closed down on account of the bush being cut out.

The average number of men on the line during the period was 473.

Waikokopu Branch Railway.

The line from Wairoa to Waikokopu (24 m. 30 ch. long) has been maintained for traffic, and maintenance gangs have been employed fettling, &c., and attending to the repair of permanent structures.

The only construction work has been the erection of cattle-stops at 10 m. 19 ch., two private crossings with four gates and one small bridge.

Ploughing and grassing in Ohuia Swamp, 0 m. 40 ch. to 2 m. 70 ch., left and right, has been completed for fire-break purposes.

A daily service has been in operation, and all of the steel for the Maungaturanga Viaduct was landed at Waikokopu and railed through to Wairoa.

Stratford Main Trunk Railway.—East End.

Matiere Section (0 m. to 10 m.; length, 10 m.)—This section has been complete for some time, except for a few minor details. General maintenance has been carried out.

Ohura Section (10 m. to 19 m.; length 9 m. 10 ch.).—This section is also complete. Certain minor works were completed, and general maintenance was carried out.

Tokirima Section (19 m. 10 ch. to 29 m. 70 ch.; length, 10 m. 20 ch.).—During the year the formation and culverting have been completed, except for additions needed to four fillings. The tunnels on the section, six in number, are complete, the year's work comprising 28 chains of breakdown and lining. Two railway-bridges, comprising 195 ft. of plate-girder spans on ironbark pile piers, were built, and material is on the site for Tokirima Stream Bridge and for two road overbridges.

Platelaying in 70 lb. material was done for 4½ miles to just beyond Tokirima Station yard, and first and second lifts of ballasting have been spread for 5 miles and 4 miles respectively.

Heao Section (29 m. 70 ch. to 55 m. 40 ch., on chainage from western end; length, 3 m. 50 ch.).—The work on this section is heavy, and most of the construction work now being done is concentrated thereon. To facilitate transport of construction material from the Heao Depot to the heavy work on this section, including the eastern end of the Mangatete Tunnel, a service tramway was built, transport being handled by small construction locomotives. Most of the culverting and stream-diversion work is complete, this latter ranging in size from 18 in. culverts to 10 ft. by 8 ft. water-drive.

There are three crossings of the Heao Stream on this section of the railway, at all of which the concreting of foundations and piers is in hand.

Tunnels.—Heao No. 1 and Heao No. 2 are both 8 chains long. The Heao No. 1 tunnel has bottom heading pierced and 2½ chains of lining completed. The Heao No. 2 tunnel is complete. At the Mangatete Tunnel (length, 55 chains) a commencement has just been made with the breakdown and the lining at the eastern end. The western end of this tunnel is being worked under the Stratford District office. It is anticipated that this tunnel will be complete by May of next year, and the linking-up of the rails and the completion of railway, preparatory to handing over to the Working Railways, will follow quickly thereafter.

The stoppage of work for two months between April and June last occasioned a serious setback to construction operations. Had it not been for this the rails would have been into Heao Station yard by June, and all service transport would thus have been off the road before the winter conditions became adverse.

Traffic.—The Department is now maintaining a goods service from Tokirima Station, and a passenger and goods service from Ohura, linking up with the Main Trunk line at Okahukura. Goods are carried at through-booking rates, and the service is of much benefit to the district.

The average number of men employed on these works during the year was 350.

Stratford Main Trunk Railway.—West End.

Raekohua Section (47 m. 40 ch. to 50 m. 60 ch.; length, 3 m. 20 ch.).—My last report indicated that this section had been completed as far as 50 m. 35 ch. During the year covered by this report some formation was done on Tangarakau Station yard; 70 lb. rails were laid on the main line, and first loop of this yard, from 50 m. 37 ch. to 50 m. 50 ch.; and rails have been boxed in with ballast and a good running-top maintained from 47 m. 40 ch. to 50 m. 37 ch. Ballasting is now being done in the Tangarakau Station yard with ballast supplied by the Railway Department from Mount Egmont. All completed bridges on the section were painted during the year. Piers A, B, and C of the Tangarakau Bridge were built, the construction being reinforced-concrete piles surmounted with a concrete pier. The steel-plate girders have been delivered, and preparations are in hand for placing them in position.

The tri-weekly passenger and goods services were maintained between Tangarakau and Tahora, connecting with the railway system at Tahora. During the year a total of 15,000 tons of coal was hauled to Tahora from the Egmont Collieries siding at Tangarakau.

Heao Section (50 m. 60 ch. to 55 m. 40 ch.; length, 4 m. 60 ch.).—Good progress has been made on this section. The earthwork has been practically completed, though several cuttings are slipping badly. The bank between 50 m. 65 ch. and 70 ch. is narrow, and in the cutting at 50 m. 73 ch. 1,500 cubic yards is still to be removed out of an original total of 20,000 cubic yards. From here up to No. 1 tunnel, at 51 m. 15 ch., the service tram-line has prevented completion of the permanent formation, but the tram-line has been deviated to facilitate this work, which will be put in hand almost immediately. Earthwork in the Mangatotoko Valley, 51 m. 45 ch. to 52 m. 10 ch., is finished, and also in the Mangaone Valley, from 52 m. 65 ch. to 53 m. 47 ch., except for trimming of batters. In the Mangatete Valley, 54 m. 30 ch. to 55 m. 17 ch., all cuttings have been taken out, but several have given trouble with slips, two of which are still being worked.

Tunnels.—No. 3 tunnel, 63½ ch. long, was finished in March, 1931. The bottom heading of No. 4 tunnel (Mangatete Tunnel), which is now the only tunnel not finished, reached 55 m. 38·77 ch. in October, 1930, and was then stopped in order to make a start on concreting. Heavy ground at the portal necessitated 2 ch. of B section with lining 2 ft. thick. Lining is completed from the portal at 55 m. 16·60 ch. to 55 m. 24·45 ch. At 55 m. 20·50 ch. the tunnel comes to the surface of the ground and crosses a creek, which is being taken over the top of the tunnel. To give the necessary strength, for a length of 59 ft., the concrete lining was increased to a thickness of 30 in., a concrete invert also being built, and construction of a spillway over the tunnel is in hand. An electric locomotive is now in use in the tunnel in place of horses.

All fence-lines have been cleared, and all fencing, except 150 ch., erected. The country being rough has made the work very difficult in many places.

The 6 ft. by 4 ft. water-drives at 54 m. 51 ch. (length, 121 ft.) and 55 m. 16 ch. (length, 313 ft.) have been lined complete with face-walls. Twelve concrete culverts, of total length of 278 ft., were placed and completed.

The piers for the Mangatete Stream Bridge at 54 m. 40 ch. have all been finished, and the plate girders have been delivered at Tahora.

Seventy-pound rails have been laid from 51 m. 21 ch. to 52 m. 65 ch., and from 53 m. 47 ch. to 54 m. 30 ch.—a total of 2 m. 27 ch. The greater part of this work was done on night shift, so as not to interfere with transport.

The Mangaone Quarry was closed down in September, 1930, and all metal and sand for concrete have since been supplied from Te Wera Quarry.

The main air-line was extended from 54 m. 30 ch. to 55 m. 15 ch., thus eliminating the compressor at No. 4 tunnel. The compressor in the Mangaone Valley which had been used to boost the supply during the day was shut down on completion of No. 3 tunnel in March, 1931, and all air is now supplied by the compressor in the power-house at Tangarakau.

The power-house has run during the year without any trouble. With the completion of No. 3 tunnel the load was reduced and economies effected.

The Raekohua Road has been maintained during the year.

General.—The number of men employed on this work was 294 at the beginning of the year and 190 at the end, the average number being 261. The reduction is due to the completion of No. 3 tunnel. The programme of work suffered considerably as a result of the recent stoppage of work for a period of two months, following on the men's refusal to accept the reduced contract rates fixed in accordance with the new basic rate of pay. However, in spite of this delay, the railway should be completed by about the end of June, 1932, if all goes well.

Te Wera Quarry.—This quarry was worked continuously, except for one month when work had to cease, due to stoppage of work on the Heao Section. The total output of crushed rock was 19,904 cubic yards, the railway-works absorbing 60 per cent. of this quantity, the remainder going out on to roadworks. The average number of men employed in the quarry for the year was 20.

Wellington - Tawa Flat Railway Deviation.

During the past year construction work on this deviation, which has a total length of 7 m. 14 ch., has been actively prosecuted. My report for the preceding year explained the method of construction of the sea-wall required to protect from wave-action the embankment which is now being built in the harbour waters as the approach to No. 1 tunnel. This sea-wall is made of 5-ton concrete blocks and of heavy stone from quarry at Horokiwi. During the year this wall was built for a distance of 22 ch. to a height of 5 ft. above high-water level; the embankment itself was made to a height of 3 ft. above high-water level for a distance of 16 ch. (2 m. 9 ch. to 1 m. 73 ch.), and brought up to formation level for half-width from 2 m. 25 ch. to 2 m. 5 ch. (Note.—The chainage used in this report has its zero at site of proposed Bunny Street Station.)

No. 1 tunnel of total length of 61·58 ch. is now complete. During the year the full enlargement of tunnel section and concreting of the lining respresented a progress of 20½ ch.

No. 2 tunnel is 2 m. 53 ch. in length. The main heading was extended during the year 29 ch. from the south end and 26 ch. from the north end, leaving 14 ch. of heading to be completed. The pioneer heading which is being driven, as my last year's report indicated, to facilitate progress, advanced 28¼ ch. from the south end and 25 ch. from the north end, the distance between headings at the end of the year being 21½ ch. The necessary connections were made between pioneer heading and main heading as progress required. Full enlargement and lining were completed for 22 ch. at the south end and 16 ch. at the north end, the total length of tunnel now completed being 68 ch. In addition, an equivalent of 8 ch. of enlargement has been completed at the south end, and has been timbered preparatory to concreting.

Progress has been made with cuttings and banks beyond No. 2 tunnel, and, except for a gap at 6 m. 72 ch., formation is now complete from 6 m. 14 ch. to 8 m. 26 ch. The road-diversion at 7 m. 30 ch. and creek-diversions at 6 m. 70 ch. and 8 m. 10 ch. were completed. Four hundred and eighty-eight lineal feet of concrete culverts were built.

Regarding bridges, the launching of steel-plate girders for bridges at 7 m. 25 ch., 7 m. 37 ch., 7 m. 51 ch., and 7 m. 63 ch. was completed, girders were bedded down and cleaned, painting is in hand, being completed at first two bridges named.

During the year the average number of men employed was 435.

Midland Railway.

Murchison Section (63 m. 8 ch. to 85 m.; length, 21 m. 72 ch.).—All work on the section between 63 m. 10 ch. and 67 m. 3 ch. at Gowan Station yard was completed during the previous year, but it has been maintained and departmental traffic run over it during the period.

Up till the closing-down of this railway in January of this year formation work was proceeding very vigorously, and, with the exception of several cuttings, was practically complete to 82 m.

The most important work on the section was the completion of the cutting at 67 m. 50 ch. This cutting, which governed the progress of platelaying and ballasting, was being excavated by means of a steam-shovel working two shifts, the spoil being deposited from a long trestle, and it was anticipated that it would have been completed inside six months.

At 69 m. 20 ch. and 72 m. 40 ch. there was also approximately six months' work remaining, and all the other gaps up to the 82 m. mentioned above would have been completed within the same time.

The cutting at 72 m. 40 ch., which was being excavated by hand, with the assistance of pneumatic drills, was also being worked on shifts, the material going to form the approach to the Owen River Bridge.

Had operations been continued as anticipated a start would have been made with platelaying and ballasting within the next few months, and this would then have proceeded without interruption, at least, as far as Mangles River, at 82 m., and probably to Murchison itself, at 84 m. 50 ch.

Overbridges at 66 m. 60 ch. and 67 m. 59 ch. were completed, and approaches metalled, while the necessary foundation tests for bridges over Owen River and Doctors Creek were completed.

The road-deviation from 69 m. 10 ch. to 69 m. 50 ch. along a steep precipitous rock bluff was completed and metalled.

Nine concrete culverts, varying from 12 in. wide to 8 ft. wide, were built.

One hundred and sixteen single men's huts were erected during the period, and the machine-shop installed and fitted at Grassy.

Since the work has stopped all plant has been collected, overhauled, and stored or transferred where necessary, fencing restored, and works cleaned up generally.

The average number of men employed over the period was 298.

Westport–Inangahua Railway.

Cascade Section (5 m. 70 ch. to 8 m. 78 ch.; length, 3 m. 8 ch.).—This section, although practically complete, is still under the control of the Public Works Department, and has been maintained by it for the coal traffic from the Cascade Mine.

Hawk's Crag Section (8 m. 78 ch. to 18 m.; length, 9 m. 2 ch.).—All bushfelling and clearing has now been completed on this section, and the earthwork has been finished for a total distance of 7 m. 43 ch.

The portions unfinished involve in most cases long leads, where the progress is slower. At such places the actual excavation is carried out by manual labour, but the haulage of spoil is effected by means of small petrol-locomotives, five of these of a special type being employed on this section, each hauling a rake of from four to six steel side-tipping trucks. The nature and location of the cuttings exclude the use of any mechanical loading-devices.

From 11 m. 10 ch. to 11 m. 26 ch., where the first petrol-locomotive is stationed, there are several cuttings which block the advance of platelaying, as all the material from these cuttings is required to fill a large bank of 50,000 cubic yards between 11 m. 43 ch. and 11 m. 54 ch., and none of it can be spoiled. To expedite the completion of this portion of the line, shift-work was started early in the year in the advance cutting. This involved the installation of an electric-light plant to illuminate the rugged cuttings and the long leads, and to enable tipping to be carried out from the trestles with safety at night.

A start was made with the driving of bottom heading for the tunnel at 13 m. 41 ch., but unfortunately a disastrous accident occurred, involving the death of three men. Following this, work was held up for some time on account of the negotiations regarding tunnel prices. The parties have now been reorganized and a fresh start is being made.

In order to facilitate the supply of shingle and cement for tunnel-lining and for adjacent culverts and bridges, a cableway transporter has been erected at the tunnel-mouth, by means of which the shingle and cement will be conveyed across the river.

Four culverts and a concrete retaining-wall have been constructed and several are in hand, but the transport of shingle across the river is expensive, and a great deal of the culvert-work has to wait until the rail-head advances.

The concrete-metal supply for this section of the railway is one of the difficult problems, on account of the inaccessibility of the structures to be built. As far as possible the aggregate will be brought by rail from a shingle-pit 3 m. out of Westport, where a stock of good metal has been accumulated throughout the year. Bridges and culverts will be taken in a face as the railroad advances, but, as this cannot proceed very quickly, other means of obtaining metal in the isolated sections ahead of the rails have had to be resorted to. In several places shingle from a convenient river-beach has been carted by lorry to a point on the Main Gorge Road where a cableway transporter has been erected, the shingle being taken over by this means and then redistributed over the completed formation to the sites of such bridges and culverts as were accessible.

The most important work on this section, however, has been the construction of the Cascade Creek Bridge at 9 m. 0 ch. This bridge is 446 ft. in length, and consists of five 80 ft. and one 40 ft. spans, all on a 7½ ch. curve. The piers are of concrete, each founded on three concrete cylinders arranged in the form of a triangle. This work has proceeded steadily, and the gorge has been spanned by a temporary bridge, which also serves as a staging for the sinking of the cylinders, the construction of the piers, and erection of the steel superstructure. Cylinder-sinking at one pier has been completed, and the others are well in hand.

The erection of the temporary bridge, although primarily designed to facilitate the construction of the permanent bridge, enables the construction train to deliver plate-laying material to the rail-head at 10 m. 20 ch., as well as to convey concrete, metal, and material to structures ahead of Cascade Creek. It is expected that the permanent bridge will be completed in about twelve months.

At 10 m. 24 ch. the construction of a three 30 ft. spans steel-girder bridge on concrete piers is in hand. The excavation for the piers is almost completed, while the combined temporary bridge and staging is in hand.

A feature of all the bridge work on this railway is the necessity, owing to the impracticability of constructing service roads, for the erection of temporary bridges at each gulch to enable the rail-head to be carried forward and construction material delivered ahead while the actual construction of the permanent bridge is in hand.

Another suspension bridge, 530 ft. long, was constructed across the Buller River at 15 m. 24 ch., to assist the men in reaching their work on the opposite side of the river from the camps. These suspension bridges, of which there are now three on this section, have proved of great value in floods, which occur frequently in this river, as shown by the fact that the rainfall for this locality for the past twelve months was 169·90 in.

The workshop at Tiroroa has had a very busy year, effecting repairs to vehicles and items of plant, as well as the making-up of ironwork for bridge and general construction use.

Orikaka Section (18 m. to 27 m. 34 ch.; length, 9 m. 34 ch.).—Good progress has been made with the formation work on this section during the year, a large number of parties having been transferred from completed contracts on the Hawk's Crag Section, much of the earthwork on that section having been completed early in the year. The whole section has been fully manned throughout, and a total of 4 m. 40 ch. has been completed. There are several very large earthwork undertakings on this section, there being fillings of 60,000 and 50,000 cubic yards at 20 m. 0 ch. and 20 m. 62 ch. respectively. At the first of these places the material required has to be borrowed by widening along the line, and arrangements have been made using petrol-locomotives and steel tipping-trucks to build the bank in two lifts. At the second bank a drag-line scraper is being used with good results to borrow material and deposit it in the bank.

Another bank, containing 70,000 cubic yards, between 26 m. 42 ch. and 27 m. 12 ch., in the vicinity of the Inangahua Station yard, is being expedited as much as possible, as it forms the approach to the combined road and railway bridge across the Inangahua River, a number of co-operative parties, with petrol-locomotives and trucks, as well as wheeled scoops and drays, being employed.

Some of the cuttings on this section, which are in heavy precipitous country, have given trouble, owing to the large quantities of debris which have been loosened by the earthquake of June, 1929, slipping down on to the formation. Portion of the section from 19 m. to 23 m. is very inaccessible, and special camps have had to be established and the transport of supplies provided by the Department. A suspension bridge across the Buller River, 540 ft. long, is being erected at the 19 m., and will greatly facilitate access to the men camped there.

The average number of men on both sections for the period was 414.

South Island Main Trunk Railway.—North End.

Clarence Section (56 m. to 76 m.; length, 20 m.).—Good progress has been made with the formation on this section, all work, with the exception of that at the Blue Slip, being practically completed. This slip, which extends from 60 m. 61 ch. to 61 m. 8 ch., has been vigorously attacked by means of two steam-shovels, and, although it is anticipated that a considerable amount of work will have to be carried out before it is stabilized, still good results are being obtained.

The formation of this section has been comparatively light, a considerable length being through the sand areas, which have been stabilized by extensive marram-grass planting both on the batters of cuttings and banks, and on the adjacent reserves. It is intended to follow up this planting by the establishment of a belt of trees to check any further wind-action.

A feature of the year's work has been the large number of concrete culverts constructed, sixteen large concrete-pipe culverts, with a total length of 483 ft., and twenty-four flat-topped and arched culverts, with a total length of 394 ft., varying from 3 ft. to 10 ft. by 10 ft.

At 62 m. 26 ch. concrete abutments on piled foundations for a 30 ft. steel-plate girder have been built, and a temporary superstructure erected to enable platelaying to proceed pending the supply of the steelwork.

Kekerangu Stream Bridge: At 63 m. 15 ch. concrete piers have been erected. The superstructure will consist of five 50 ft. and one 25 ft. plate girders, but in view of the delay in the supply of steel it has been necessary to erect a temporary wooden superstructure here also.

Deadman Stream: At 67 m. 37 ch. the concrete piers which are built on piled foundations have been partly completed, all pile-driving being finished and four caps cast, the bridge consisting of five 30 ft. spans.

Woodbank Stream Bridge, at 68 m. 66 ch., consisting of three 25 ft. steel-plate-girder spans, is in hand, the piles for the foundations having been cast and raker piles driven at abutment A.

At the Washdyke Stream Bridge, at 69 m. 71 ch., consisting of four 30 ft. steel-girder spans on concrete abutments with piled foundation, the pile-casting is in hand.

Owing to the close proximity of the road and railway, a number of road-deviations have had to be constructed on this section. During the period 1 m. 60 ch. were formed and metalled.

Three mile of fencing have been erected.

Platelaying was carried on from 60 m. 37 ch. to 64 m. 3 ch., and ballasting is well in hand over this distance, and at the present rate of progress it is hoped to have the rails to the Clarence by Christmas time.

Kaikoura Section.—Construction work on this section has been put in hand in earnest only during the last six months of the period, but it was then strongly manned by parties finishing up on the Clarence Section. The first 5 miles pass through sand areas, which have been planted with marram-grass similarly to those dealt with on the previous section.

Although the first 6 m. of this section is comparatively light, the following 8 m. are the heaviest on the section, comprising as it does the well-known Ohau Bluff portion. Owing to the bluffs coming

very close to the sea, heavy cuttings and road-deviations are necessary to provide for both railway and road.

A total of 4 m. 11 ch. of formation and 35 ch. of road-deviations have been completed, while 1 m. 19 ch. of the latter are in hand.

Twenty-four culverts, varying from 18 in. to 10 ft. by 5 ft., have been constructed, with a total length of 924 ft.

A series of borings at all the bridge-foundations on the section has been carried out by a Keystone boring plant, but no work has yet been started on the actual bridge-construction.

The following buildings were erected on this section during the year :—Office, store, smithy, and carpenter's shop, garage, fitting-shop, recreation-hall at Wharanui and at Camp No. 8, twenty-nine single huts, and twelve married men's cottages.

The average number of men employed on both sections during the period has been 368.

South Island Main Trunk Railway.—South End.

Conway Section (44 m. 20 ch. to 56 m. ; length, 12 m.).—The main activity during the year has been the prosecution of the large cuttings on this section. During the period approximately 9½ miles of heavy grading has been completed, a feature of the work being the comparatively large amount of mechanical plant which has been successfully employed, six steam shovels, two drag-lines, and eight locomotives having been utilized. Although a portion of the plant has only recently arrived on the work and been put into operation immediately prior to the close of the year under review, a total of 187,851 cub. yd. has been shifted by mechanical means. The total yardage of spoil excavated by all means during the year was 345,378 cub. yd.

Of the formation work on this section the most important unfinished portion is between 48 m. 4 ch. and 48 m. 50 ch. On the original plans this was shown as a tunnel, and a special contract was advertised and tenders invited for its construction by special contract. On going into the matter further it was found that it was more satisfactory to make an open cut in place of a tunnel. This has now been done, the present arrangement being to treat it as an open cutting and excavate it by means of a drag-line. By this means it is anticipated that a considerable saving can be made over the tunnel proposed.

A very extensive programme of culverting has been carried out during the year, 1,700 lineal feet of pipe culverts varying in diameter from 12 in. to 30 in., and 1,151 ft. of arch and flat-topped culverts varying from 3 in. to 9 in. in width having been completed.

The nature of the country lends itself particularly to the use of water-drives in place of culverts at many of the heavy fillings, 1,200 lineal feet of drives, varying from 6 ft. by 4 ft. to 9 ft. by 6 ft., being completed and 630 ft. being in hand.

No bridge-work has been put in hand, but test piles have been driven at the Leader River Bridge at 44 m. 63 ch., and for the Conway River Bridge at 50 m. 56 ch. Plans have been prepared and material has been assembled on the site in readiness to commence construction.

The road-overbridge at 47 m. 45 ch., consisting of a single-span concrete skew-arch, is well in hand.

Nine miles of permanent fencing on both sides of the Railway Reserve have been completed.

Oaro Section (56 m. onward).—The formation along 4 m. of this section has been opened up, and approximately 1½ m. have been completed. There are on this section 2 m. or 3 m. of very light formation, but, practically speaking, this comprises the only really easy portion of this southern section. About 1½ m. of grading has been completed, and the culverting is in hand.

General.—A thoroughly up-to-date workshop and plant-depot has been established at Parnassus, and all repair work for the extensive mechanical equipment is now being carried out locally.

Sixty-one married quarters for workmen and 134 single men's huts, as well as two staff cottages, have been built.

The necessary temporary buildings for the prosecution of the work, consisting of fitting-shop, carpentering, plumbing, and blacksmithing shops, store, benzine-store, cement-shed, and office, together with the various miscellaneous small sheds incidental to a large construction work, have been built.

A total of 300 men have been employed on an average during the year.

SURVEYS OF LINES UNDER CONSTRUCTION.

South Island Main Trunk Railway.—South End.

During the period trial lines were run from 53 m. to 73 m. 30 ch., and permanent pegging was completed from 53 m. to 63 m. 15 ch.

South Island Main Trunk Railway.—North End.

The permanent survey has been completed and plans prepared from 76 m. 0 ch. to 88 m. 0 ch. Trial survey is completed to 97 m. 0 ch., and work is in hand for a further 8 m. 48 ch.

Midland Railway.

The survey of the permanent line on the Murchison Section has been completed, and continued to 88 m. 0 ch. on the Maruia Section. Survey work was closed down simultaneously with the ceasing of railway-construction.

CONSTRUCTION AND MAINTENANCE OF ROADS AND BRIDGES.

Huehue–Waimatenui (Bay of Islands County).—Widening to 18 ft. has been carried out on this road, covering a total distance of 3 m. 30 ch. Rock from excavations has been used as a base course for metalling 12 ft. 6 in. Two rolled-steel joists and mixed Australian hardwood bridges, one comprising six 40 ft. spans and the other four 40 ft. spans, have been erected. Relief work has been carried out on this road.

Kawakawa – Opua Road: Whangae Deviation (Bay of Islands County).—Engineering survey of 2 m. 68 ch., and formation 3 m. 56 ch. 16 ft. wide, including culverting, have been done.

Russell–Manawara (Bay of Islands County).—Widening from 12 ft. to 18 ft. over a distance of 8 m., and metalling 12 ft. by 6 in over the same distance, has been completed by relief work. Two bridges were renewed in New Zealand timbers.

Waikare – Kawakawa Road (Bay of Islands County).—Road has been widened over a distance of 10 ch. from 10 ft. to 15 ft. by relief workers. Four bridges—namely, Karetu, Waikare, Waihaha, and Burling's—totalling 250 ft., have been erected in mixed Australian hardwood on hardwood piles and rolled-steel joists.

Te Kuri Block Road (Hobson County).—An engineering survey has been completed over 9 m. 32 ch. of road, and 7 m. 40 ch. 14 ft. formation has also been completed. Relief work has been carried out on this road.

Giles Road (Hokianga County).—Engineering survey of 4 m., 3 m. 26 ch. 16 ft. formation, including culverting, have been completed by relief work.

Iwitaua Road (Hokianga County). — Through connection made between Mangamuka and Otongaroa. 2,300 cub. yd. of limestone has been knapped along formation as a base course, 2 m 50 ch. being treated in this manner.

Jensen's Road (Hokianga County).—1 m. of road 16 ft. wide has been formed and culverted. Metalling 9 ft. by 6 in. over a length of 2 m. 40 ch. has been completed. Relief work has been carried out on this road.

Mangamuka – Victoria Valley (Hokianga and Mangonui Counties).—Work on this road includes widening of corners, removal of slips, and the placing of 3,080 cub. yd. of shingle to bring the road up to standard in readiness for handing over to the Main Highways. Relief work was carried out on this road.

Mohuiti–Broadwood (Hokianga County).—Widening to 18 ft. and culverting for a distance of 2 m. 24 ch. have been completed. Borings have been taken in connection with three proposed bridge-sites.

Omahuta Block Road (Hokianga County).—Formation 16 ft. wide and culverting over a length of 5 m. have been completed, and 2 m. 10 c. of metalling has been laid by relief workers. The erection of two bridges—one 40 ft. span and one 20 ft. span motor design in rolled-steeled joists, mixed Australian hardwood and hardwood piles—is in hand.

West Coast Road: Tapuwae–Whakarapa (Hokianga County).—Formation 18 ft. wide and culverting over a distance of 1 m. 21 ch. have been completed by relief work. The erection of the Tupawae Bridge, which consists of five 40 ft. spans in rolled-steel joists, mixed Australian hardwood and hardwood piles, is well in hand.

Herekino–Whangape (Mangonui County.)—During the year an engineering survey of 4 m. 40 ch. was completed, and formation 18 ft. wide over this length has also been done by relief workers. Metalling operations are now in hand.

Kaingaroa–Fairburn's (Mangonui County).—20 ch. of formation 18 ft. wide, and four bridges, totalling 290 ft., in rolled-steel joists, mixed Australian hardwood and hardwood piles, together with necessary approaches, completed.

Kohumaru Road (Mangonui County).—Work on this road during the year consists of an engineering survey over 8 m. 3 m. 42 ch. formation 18 ft. wide and 2 m. 41 ch. rock base course in preparation for metalling have been done by relief work.

Oruru – Fern Flat – Mangamuka (Mangonui County).—This road has been culverted throughout, and numerous points cut back. Rock base course in preparation for metalling has been laid over a length of 2 m.

Waipapakauri–Tangoake (Mangonui County).—Reconditioning has been effected over a total length of 18 m., and low-lying swampy patches improved by relief labour. One new bridge 12 ft. long has been constructed in New Zealand timbers, and five bridges reconditioned.

Kirikapa–Ngunguru (Whangarei County).—Slips have been cleared over the whole length of road by relief workers, and the erection of the Waitohi Bridge, four 40 ft. spans in rolled-steel joists, reinforced-concrete piles, and mixed Australian hardwood, has been completed.

Matapouri–Marua (Whangarei County).—An engineering survey over a distance of 8 m. 56 ch. completed, and road has been widened to 18 ft. over this distance. A good deal of rock has been spread over the road as a base course for metalling. Erection of three bridges, totalling 110 ft., in rolled-steel joists, and reinforced-concrete piles, mixed Australian hardwood, is in hand. Relief workers have been employed on this road.

Ngunguru–Tutukaka (Whangarei County).—3 m. 2 ch. engineering survey, 3 m. 2 ch. widening to 18 ft., and culverting completed by relief workers. Erection of two bridges, each of one 40 ft. span, rolled-steel joists, and reinforced concrete, completed; approaches in hand.

Russell–Whangaruru (Whangarei County).—13 m. of 9 ft. by 3 in. top-course metalling completed by relief workers.

Tokatoka–Mangapai (Whangarei County).—Engineering survey for 12 m. 16 ch. Widening to 18 ft., including culverting over 9 m. 60 ch., have been completed by relief workers. Erection of bridge over Mangonui River, comprising six 40 ft. spans in rolled-steel joists and reinforced concrete, in hand.

Tutukaka–Matapouri (Whangarei County).—Engineering survey over 4 m. 19 ch. Widening to 18 ft., including the necessary culverting over a distance of 3 m. 60 ch., have been completed by relief labour.

Waipu Gorge Road (Whangarei County).—Top-course metal laid throughout gorge, and one bridge, 80 ft. long and 20 ft. wide, in rolled-steel joists and reinforced concrete, erected.

Whatoro–Opouteke (Whangarei County).—7 m. 64 ch. of engineering survey has been carried out. Widening to 18 ft., culverting for 2 m. 40 ch., and metalling 9 ft. by 6 in. for 52 ch. completed by relief workers.

Waiare–Okaihau (Whangaroa County).—8 m. of 18 ft. formation, 2 m. of engineering survey completed, and 5 m. 10 ch. base-course metal laid. Erection of Kaeo and Inumia Bridges in hand. Relief work has been carried out on this road.

Mangonui Bridge (Mangonui County).—Erection of bridge comprising six 40 ft. spans in rolled-steel joists, concrete piles, and mixed Australian hardwood superstructure, completed.

Okaihau–Kerikeri (Bay of Islands County).—Formation 30 ft. wide for 6 m. 41 ch. and metalling with ironstone for 7 m. 8 ch. have been completed by relief workers.

Coromandel–Colville (Coromandel County).—3½ m. of formation, including 1½ m. widening, completed.

Coromandel–Whangapoua (Coromandel County).—2½ m. of formation completed and one 15 ft. span, mixed Australian hardwood, bridge erected.

Hikuai–Tairua–Whenuakite Road (Coromandel County).—3½ m. of reconstruction completed.

Kaimarama to Coroglen (Coromandel County).—Relief workers completed 5¼ m. of 18 ft. formation during the year.

Mercury Bay Ferry to Hahei (Coromandel County).—6 m. of 10 ft. formation completed.

Awhitu Central to Orua Bay and Orua Bay–Awhitu Gully (Franklin County).—1 m. 18 ch. of 16 ft. formation completed during the year.

Awhitu – Waiuku Main Road (Franklin County).—Relief workers completed 68 ch. new formation and widened 24 ch. old formation to 18 ft. during the year.

Given's and Cemetery Roads (Franklin County).—Widening 1 m. 43 ch. to 16 ft. minimum width and necessary culverting carried out by relief workers during the year.

Hunua – Happy Valley and Bombay–Paparata (Franklin County).—Widening, regrading, and deviating 2 m. 29 ch. to 18 ft., including culverting, completed by relief labour during the year.

Paparimu–Mangatawhiri and Paparimu–Otau Roads (Franklin County).—Widening 2 m. 75 ch. to 18 ft. minimum completed during the year.

Kerepeehi Block Roads (Hauraki Plains County).—3 m. 55 ch. formed and metalled.

Mangatarata Road (Hauraki Plains County).—4 m. of metalling and 33½ ch. of 20 ft. formation completed.

Waiharakeke to Kinohaku (Kawhia County).—106 ch. of 16 ft. formation completed by relief workers.

Kawaroa Road (Kawhia County).—4 m. 70·5 ch. widened to 16 ft. and 3 ch. metalled.

Kawakawa–Matingarahi (Manukau County).—5 m. 61 ch. of formation widened to 18 ft. and 79 ch. of 18 ft. new formation completed during year.

Maraetai Coast Road (Manukau County).—1 m. 22 ch. of road 18 ft. wide formed and necessary culverts placed.

Hunua–Clevedon Road (Manukau County).—1 m. 8 ch. of old formation widened to 20 ft. and necessary culverts laid.

Puketurua to Uraura (Matamata County).—Relief workers formed 4 m. 30 ch. of road, averaging 16 ft. and 18 ft. wide, and metalled 5 m. 5 ch., 10 ft by 8 in.

Te Raumauku Road (Otorohanga County).—5 m. 47 ch. of widening to 16 ft. completed.

Adams Road (Otorohanga County).—20 ch. of road widened to 16 ft. and 3 m. of new road formed to 16 ft. by relief workers.

Hetherington's Road (Raglan County).—5 m. 60 ch. of road widened to 16 ft. by relief workers.

Klondyke Road (Raglan County).—9 m. 4 ch. of road widened to 14 ft. and 16 ft. by relief workers.

Ruapuke Mountain Road (Raglan County).—Formation of 5 m. 68 ch. of 14 ft. road completed by relief workers.

Te Mata to Ruapuke (Raglan County).—5 m. 60 ch. of 18 ft. formation completed and metalled 10 ft. by 10 in. throughout.

Waikaretu to Port Waikato (Raglan County).—3 m. 50 ch. of 16 ft. new formation and 2 m. 35 ch. of widening to 16 ft. completed. Metalling 10 ft. by 8 in. for length of 1 m. 18 ch. completed.

Otorohaeo Road (Raglan County).—Relief workers widened 4 m. of this road to 18 ft.

Te Maari Road (Raglan County).—4 m. 47 ch. widened to 16 ft., and 1 m. 28 ch. of same length metalled 10 ft. by 9 in.

Waingaro Springs – Te Uku (Raglan County).—6 m. 58 ch. widened to 16 ft., and 14 ch. metalled. This work was done by relief workers.

Puhoi to Ahuroa (Rodney County).—241½ ch. of metalling completed by relief workers.

Waiteitei Settlement Road (Rodney County).—2 m. of metalling completed.

Kahe Block Access: Bridge (Thames County).—This 200-ft.-span suspension bridge was erected during the year.

Tararu Creek Bridge (Thames County).—This one 45-ft.-span rolled-steel-joist bridge with mixed Australian hardwood timber, together with approaches, was completed during the year.

Kopuku to Whangamarino Falls (Waikato County).—2 m. 28 ch. of 18 ft. formation, together with necessary culverts, completed during the year.

Matahura Stream Bridge (Waikato County).—This three-span rolled-steel-joist bridge on piles was completed during the year.

Pokeno – Miranda Road to Maramarua (Waikato County).—A considerable amount of culverting-work, together with widening of 1 m. 73 ch. of old formation to 18 ft., has been carried out by relief workers.

Rutherford Road (Waikato County).—107½ ch. of 9 ft. by 8 in. metalling completed.

Brooklyn to Huia (Waitemata County).—8 m. 35 ch. of widening and improvements to alignment completed during the year.

Makarau to West Coast (Waitemata County).—2 m. 26 ch. of widening completed.

Kanohi – Makarau Road (Waitemata County).—2 m. 45 ch. of heavy formation completed.

Makarau – Tahekeroa Road (Waitemata County).—Widening operations in hand. 3 m. 12 ch. completed during the year.

South Head Road (Waitemata County).—7 m. 35 ch. of widening completed.

Waikumete West Coast Road (Waitemata County).—Widening and improvement to alignment for a distance of 3 m. 20 ch. completed to date.

Orakei Waterfront Road (Eden County).—The work completed on this road includes the formation of approaches to No. 2 bridge, the laying of some 2,700 cub. yd. of stone protective works, the placing of 10,600 cub. yd. of surface metal, and the surfacing of the whole length of the carriageway with a 2 in. bituminous penetration wearing-course. Footpaths have been completed between Campbell's Point and No. 2 bridge.

Haparapara Bridge (Opotiki County).—Bridge consisting of two 25 ft. hardwood spans on hardwood pile piers, and two 81 ft. hardwood-truss spans on concrete-cylinder pier and concrete abutment, was completed during the year.

Motu River to Te Kaha (Opotiki County).—The construction of this 16 ft. road was completed during the year by relief labour. Necessary culverts have been laid, and metalling over a length of 3 m. 64·5 ch. is in hand.

Te Kaha – Orete (Opotiki County). — 5 m. of engineering survey completed, and 3 m. 38 ch. of road 16 ft. wide has been formed. Necessary culverts over this length have been laid. The construction of four bridges is in hand.

Opotiki–Matawai via Waioeka (Opotiki County).—Work during the year comprised 8 m. of engineering survey, 10 m. 11 ch. widening from 10 ft. to 18 ft., metalling 65 ch. 12 ft by 6 in. deep. Relief workers have been employed on this road.

Opotiki–Matawai via Waioeka: Bridge at 32 ch., and Bridge at 60 ch., No. 2 Deviation (Opotiki County).—The former bridge, comprising three 35 ft. rolled-steel-joist spans, one end on concrete abutment and the other end on hardwood-pile piers and pile abutments, is well in hand. The second bridge, comprising two 25 ft. hardwood spans and one 35 ft. rolled-steel-joist span, one end on concrete abutment and the other on hardwood-pile piers and pile abutments, is also showing considerable progress.

Waitukuaruhi Stream Bridge (Opotiki County).—Bridge, 100 ft. long, consisting of two rolled-steel-joist spans, and one hardwood span on two concrete piers, and two concrete abutments has been erected, and the necessary approaches completed.

Okataina Road (Rotorua County).—An engineering survey for 4 m. 34 ch. completed. Widening from 10 ft. to 16 ft. on straights and to 19 ft. on curves has been done over this distance. 2 m. 40 ch. of metalling, 12 ft. by 9 in., has been laid, and culverts placed throughout. Relief workers have been engaged on this road.

Rotorua–Atiamuri (Rotorua County).—Engineering survey of 2 m. 20 ch., 8 m. 78 ch. of widening 12 ft. to 20 ft., and 11 m. 42 ch. of metalling (10 ft. by 9 in.) have been completed. Culverts have been laid throughout the length of the road. Relief workers have been employed during the year.

Rotorua–Taupo (Rotorua and Taupo Counties).—During the year engineering surveys have been advanced a further 13½ m., and necessary plan-work completed for 18 m. of road. Extensive drainage has been done throughout the route, and formation 26 ft. wide has been completed for a distance of 15 m. 56 ch. Pumice 18 ft. wide, averaging 6 in. to 8 in. deep, has been spread on the road for a total of 13 m. 56 ch. 4,740 lin. ft. of culverts have been laid. The erection of a bridge over the Puarenga Stream, consisting of a one 40 ft. rolled-steel-joist span with reinforced-concrete decking and piles, and timber handrails, is in hand. Relief workers have been engaged during the year.

Wairoa Road (Rotorua County).—4 m. 23 ch. have been widened to 20 ft., and 2 m. 40 ch. pumice 12 ft. by 9 in., and 1,409 lin. ft. of culverts, have been placed.

Whirinaki – Waikite Road (Rotorua County).—Engineering surveys 4 m. 40 ch. completed, 5 m. 50 ch. have been formed 16 ft. wide, and 1,700 ft. culverts have been laid. The construction of one 40 ft. span rolled-steel-joist bridge with timber superstructure on ironbark piles is in progress. Relief work has been carried out.

No. 2 Road, Te Puke (Tauranga County).—86 ch. of metalling, 10 ft. by 9 in., completed during the year.

Omanawa Falls Road (Tauranga County).—1 m. 21 ch. metalling, 9 ft. by 6 in., completed during the year.

Tauranga to Oropi (Tauranga County).—58 ch. of 10 ft. by 9 in. metalling completed.

Whakamarama Road (Tauranga County).—3 m. 49 ch. of metalling, 10 ft. by 9 in., completed, and 375 lin. ft. of culverts installed.

Maungaroa to Taneatua (Whakatane County).—Metalling, 12 ft. by 9 in., has been completed for a length of 3 m.

Railway Road (Whakatane County).—2 m. 65 ch. of 12 ft. by 9 in. metalling completed during the year.

Ruatahuna–Waikaremoana (Whakatane County).—Relief workers commenced operations on this road recently. 34 ch. of undergrowth have been cut, and 15 ch. of road have been formed.

Te Teko – Waiohau (Whakatane County).—This road provides access to the Galatea Estate. 15 m. 20 ch. of engineering survey completed; 5 m. road-line cleared; 9 m. 34 ch. formed 16 ft. wide, including 1,700 lin. ft. of culverting. Relief workers have been engaged during the year.

Waikirikiri to Cheese-factory (Whakatane County).—Approximately 2½ m. re-formed and re-metalled during the year.

Daulton's Road (Whakatane County).—116 ch. metal, 10 ft. by 6 in., has been laid.

Murupara to Te Whaiti (Taupo County).—This road is part of the scheme of access to Galatea Block. 11 m. of engineering surveys are completed, 6 m. 53 ch. of road widened to 18 ft., and 900 lin. ft. culverts placed. Relief workers have been employed during the year.

Rotowhero–Murupara (Rotorua and Taupo Counties).—Another road being formed for development of Galatea Estate. 7 m. 78 ch. widening to 18 ft. has been done: 3 m. 24 ch. pumice, 12 ft. by 8 in., and 600 lin. ft. of culverts laid by relief workers.

Ngakuru Block No. 2 (Rotorua County).—45 ch. of road-line have been cleared of vegetation, and 1 m. 64 ch. of road formed by relief work to a width of 16 ft.

Galatea Estate: Internal Roading (Whakatane County).—6 m. 63 ch. of road-formation, width 26 ft., has been completed, and further formation work is being actively proceeded with by relief workers.

Kaimai Soldiers Settlement Road (Tauranga County).—2 m. 30 ch. has been re-formed 18 ft. wide.

Hangaroa to Tahora (Cook County).—3 m. 14 ch. of metalling completed during the year. There is now a metalled surface to Tahunga Station, 40 m. from Gisborne.

Hangaroa to Waikaremoana (Cook County).—Further formation of 69 ch. completed during the year, and 7 ch. of the worst portions metalled.

Mangapoike Valley Section (Cook County).—2½ m. of top-course metal has been put down.

Stafford's Road (Cook County).—1 m. of metalling completed.

Kokomoko Road (Matakaoa County).—1 m. 27 ch. of formation constructed during the year.

Te Araroa to East Cape (Matakaoa County).—157 ch. of formation completed during the year, and reasonable access has been provided over the whole road.

Mangaheia Road (Uawa County).—120 ch. of formation has been completed, giving access to two settlers at the back of Mangaheia Station.

Tauwhareparae Road (Uawa County).—This road, which provides access to a large area of grazing-country, was re-formed for a length of 2 m. 10 ch., relief workers being employed on a considerable section.

Tutamoe Road (Uawa County).—With the completion of 1 m. 38 ch. of formation the last settler in the block has been provided with access.

Waiapu Island: Tirohanga (Uawa County).—Mr. Spencer's homestead has now been provided with access, 1 m. 14 ch. of formation having been completed during the year.

Jerusalem–Wharepunga (Waiapu County).—2 m. 72 ch. of formation completed during the year as a relief work for unemployed Natives.

Makarika–Horehore (Waiapu County).—1 m. 17 ch. of dray-road has been formed.

Makarika to Matahiia (Waiapu County).—2 m. 2 ch. of formation completed.

Mata River Bridge (Waiapu County).—Foundations have been completed and the bulk of timber prepared for re-erection. Steel towers, cables, and all material are on the job ready for the completion of this 495 ft. suspension bridge.

Poroporo Road (Waiapu County).—This road will give access to the northern side of Poroporo Block. 5 m. 52 ch. of new formation were completed during the year.

Armstrong Road (Waikohu County).—1 m. 78 ch. of metalling completed during the year.

Matawai to Hangaroa (Waikohu County).—Formation has been continued for a further 2 m. 27 ch., and 50 ch. of bottom-course metal has been laid. The completion of this work is expected at an early date.

Motu River Bridge (Waikohu County).—One 120 ft. plate-girder bridge with concrete deck has been erected across the Motu River, on the Waioeka Road, near its junction with the Matawai–Koranga Main Highway.

Oliver Road (Waikohu County).—1 m. 20 ch. of formation completed.

Rere–Wharekopae (Waikohu County).—1 m. 25 ch. of metalling on two of the worst sections of this road completed during the year.

Rutledge's Bridge (Waikohu County).—One 111 ft. suspension stock-bridge erected over the Koranga Stream at the end of the Moanui Road.

Taumata Road (Waikohu County).—Further formation of 1 m. 16 ch. of road has been completed during the year.

Erua Road (Kaitieke County).—5 m. of formation under 16 ft. completed.

Kawautahi Valley Road (Kaitieke County).—6 m. 67 ch. of engineering survey, 7 m. 17 ch. of formation over 16 ft., 1 m. 40 ch. of gravelling, together with necessary culverting (388 lin. ft.) and bridging (96 lin. ft.), completed during the year.

Oio No. 2 Road (Kaitieke County).—11 m. 49 ch. of engineering survey, 7 m. 60 ch. of formation over 16 ft., 45 ch. of gravelling, and 657 ft. of culverting completed.

Kopuha North Road (Ohura County).—3 m. 21 ch. of engineering survey, 2 m. 49 ch. of formation over 16 ft., culverting 555 ft., and one bridge 180 ft. long completed.

Mangakakatea Road (Ohura County).—1 m. 32 ch. of formation under 16 ft., 2 m. 14 ch. gravelling, and 597 ft. of culverting completed.

Mangapapa and Akatarewa Roads (Ohura County).—4 m. 30 ch. formation over 16 ft., culverting 797 ft., and engineering survey over a further 4 m. 36 ch. completed.

Ohura to Mokau (Ohura County).—11 m. 25 ch. formation over 16 ft., 3 m. 14 ch. surfacing with gravel, and 2,601 ft. culverting completed.

Tongaporutu to Mangaroa (Ohura County).—9 m. formation over 16 ft., 1 m. 50 ch. gravelling, and 401 ft. culverting completed.

Waikaka Road (Ohura County).—6 m. 50 ch. formation under 16 ft. and 354 ft. culverting completed.

Kakiamutu Road (Taumarunui County).—2 m. 39 ch. engineering survey, 2 m. 34 ch. formation under 16 ft., and 588 ft. culverting completed.

Koiro Block: Otuiti Road (Taumarunui County).—3 m. 70 ch. formation over 16 ft., 276 ft. of culverting, and one bridge 50 ft. long completed.

Kururau Road (Taumarunui County).—10 m. 54 ch. formation, 3 m. 62 chains metalling, and 2,784 ft. culverting completed.

Lairdvale Road (Taumarunui County).—2 m. 5 ch. formation over 16 ft., 52 ch. formation under 16 ft., 46 ch. metalling, and 272 ft. culverting completed.

Mangaohutu Road (Taumarunui County).—4 m. 15 ch. formation over 16 ft. and 548 ft. culverting completed.

Taringamotu Valley Road (Upper) (Taumarunui County).—6 m. 68 ch. formation over 16 ft. and 32 ch. under 16 ft. completed.

Taumarunui to Taupo: Taringamotu-Mangakahu (Taumarunui County).—6 m. 58 ch. formation over 16 ft. and 2,156 ft. culverting completed.

Te Maire Road (Taumarunui County).—2 m. 13 ch. formation over 16 ft. and 1 m. 5 ch. metalling completed; 359 ft. culverting also carried out.

Mahoenui – Kawhia Road (Waitomo County).—4 m. 60 ch. of road formed and culverted to an average width of 15 ft.

Mangatoa Road (Waitomo County).—5 m. 20 ch. formation over 16 ft., together with 1,087 ft. of culverting, completed.

Mapara Road (Waitomo County).—6 m. formation over 16 ft. has been carried out and 1,189 ft. of culverts installed.

Nohonoa – Tuhua Road (Waitomo County).—3 m. 60 ch. of metalling and 852 ft. of culverting completed.

Waimiha–Porootarao (Waitomo County).—3 m. formation over 16 ft. completed and 763 ft. of culverts installed.

Waitomo Valley Road (Waitomo County).—1 m. 65 ch. of road has been formed to a width averaging over 16 ft.

Tapuwae Block Road (Waitomo County).—2 m. 54 ch. engineering survey and 2 m. 54 ch. formation averaging under 16 ft. completed.

Okau Road (Clifton County).—Relief workers have been engaged on widening this road, 3 m. of which was completed during the year.

Rerekino Road (Clifton County).—Relief workers widened 1 m. 45 ch. from 6 ft. track to 12 ft. road.

Waikaramarama Stream Bridge, No. 1 (Clifton County).—This bridge, consisting of a 40 ft. rolled-steel-joist span, was completed.

Kaweora Road (Egmont County).—75 ch. of 14 ft. road formed by relief workers.

Wiremu Road Bridges (Egmont County).—The eight bridges necessary on this road have now been erected and are available for traffic.

Bedford Road (Inglewood County).—3 m. of 12 ft. road has been formed by relief workers.

Junction Road (Stratford and Whangamomona Counties).—Relief workers have been employed on widening this road. 5 m. 55 ch. were completed during the year.

Stratford Mountain House Road (Stratford County).—1 m. 47 ch. of 22 ft. road formed and 1 m. 42 ch. of metal laid under the relief scheme.

Mangaoapa Road (Stratford County).—Widening operations by relief workers resulted in a length of 1 m. 54 ch. being completed during the year.

Carrington Road (Taranaki County).—Formation of a further 1 m. 29 ch. was completed by relief workers during the year.

Mangaetoroa Road (Waimarino County).—This road, passing through heavy bush country, was formed 12 ft. wide for a further 2 m. 17 ch.

Mangapurua Valley Road (Waimarino County).—A further 1 m. 7 ch. of heavy formation 14 ft. wide completed during the year.

Murumuru–Mangatiti Road (Waimarino County).—A further length of 1½ m. of this road was widened in preparation for metalling by relief workers.

Raetihi–Ohura Road: Solly's Hill (Waimarino County).—2 m. 26 ch. of widening completed during the year.

Waipapa Valley Road (Waimarino County).—A further 2 m. 7 ch. of this road, which passes through bush country, was formed during the year.

Wanganui River Road (Left Bank), Pipiriki–Jerusalem (Waimarino County).—10 ch. of heavy formation 14 ft. wide and 1¾ miles metalling were completed by relief workers.

Field's Track to Rangiwaea (Wanganui County).—75 ch. of this road were metalled during the year.

Landguard Bluff Access Road (Wanganui County).—This road, which gives access to the Wanganui Airport, is now completed. 1 m. 45 ch. of formation and metalling being done by relief workers during the year.

Mangawhero Road (Wanganui County).—4 m. 8 ch. of this road has been formed 12 ft. wide during the year.

Wanganui River Road (Left Bank), Jerusalem–Ranana (Wanganui County).—29 ch. of heavy 14 ft. formation completed during the year.

Wanganui River Road (Left Bank), Ranana–Pitangi (Wanganui County).—60 ch. of 14 ft. formation and 12 m. of metalling were completed during the year by relief workers.

Wanganui River Road (Left Bank), Taupiri Stream Bridge (Wanganui County).—This bridge, consisting of one 40 ft. and two 30 ft. rolled-steel-joist spans on hardwood piles, has been completed.

Whangamomona Valley Road; Miro Stream Bridge (Whangamomona County).—This bridge, consisting of one 60 ft. railway truss and two 12 ft. hardwood-timber spans, was completed during the year.

Mangahe Road (Dannevirke County).—1,798 cub. yd. of metal were delivered for spreading on a length of 1 m. 51 ch. of this road. Several small deviations have been surveyed for legalization purposes. 46 ch. were formed under the relief scheme.

Hamilton Block, Okarae Block (Dannevirke County).—A contract was let for the formation of 2 m. 22 ch. of this road. The balance of 45 ch. was formed to a width of 14 ft. by the Department.

Raukawa – Te Onepu Road (Hawke's Bay County).—4 m. of engineering survey, and 4 m. of formation and metalling work were carried out. These improvements have resulted in two dead-ends of road being connected up, and provide a through access to the Waipawa–Tikokino and Hastings–Maraekakaho Roads.

Te Pohue to Tutira (Hawke's Bay County).—The formation and metalling of 70 ch. were carried out.

Waikare Inland Road (Hawke's Bay County).—35 ch. of formation, and 5 m. of metalling were completed. Five 100 ft. culverts were also placed.

Waimarama Settlement Road (Hawke's Bay County).—3 m. of this road were metalled with broken limestone.

Wallingford Bush Road (Patangata County).—Metalling over a length of 2 m. 10 ch. was carried out.

Waipawa River Suspension Bridge (Pendle Hill), Access to Section 5 (Waipawa County).—The erection of the above-mentioned bridge to give access to Section 5 is in hand, and will shortly be completed. It consists of a light suspension bridge suitable for motor-car traffic.

Tourere–Whetakura Road (Waipukurau County).—A length of 1 m. 23 ch. was surveyed, and the formation of this section was commenced under the co-operative system. 36 ch. were formed to a width of 20 ft., while improvements to 16 ft. were effected over a length of 67 ch.

Mohaka River Bridge (Mohaka Township) (Wairoa County).—The necessary repairs to the old township bridge were effected.

Ruakituri to Waimana Road (Wairoa County).—The formation of this road has been carried out by relief workers, a length of 3 m. 14 ch. being completed. A bridge 65 ft. long with two rolled-steel-joist spans on one concrete pier and two pile piers was erected. The formed length and the bridge mentioned have been handed over to the local authority for future maintenance.

Waikaremoana Lake House to Hopuruahine Road (Wairoa County).—This road has been maintained by the Department, and was well patronized by traffic during the summer months. 9,900 cub. yd. of metal, consisting of crushed sandstone and river-shingle, were placed on the road, and as the result of attention by a roller a good surface has been obtained.

Waikaremoana–Hangaroa (Graham's) (Wairoa County).—Relief workers have been employed on the construction of this road, the formation of which has been limited to a minimum width of 12 ft. 4 m. 20 ch. have been completed, and access is now provided to S.G.R. 114. The road has been handed over to the County Council for maintenance purposes.

Waikaremoana–Hangaroa (Oldham's) (Wairoa County).—The improvements required on the length of 2 m. 60 ch. of this road were undertaken by relief labour. Culverts of red-birch have been placed, while attention has also been paid to roadside drains and outlet drains in the swampy portions. This road, apart from providing access to S.G.R. 105, opens up a route to the Papakorito Falls on the Aniwaniwa Stream.

Willow Flat Road (Wairoa County).—Formation and culverting over a length of 4 m. 61 ch. have been completed to a minimum width of 12 ft. Slips caused by the earthquake, totalling approximately 6,000 cub. yd., were also removed.

Awamate Settlement Roads (Wairoa County).—Two short access roads from the main Awamate Road have been formed and metalled.

Akitio River Road (Akitio County).—4 m. 49 ch. of metalling completed and 24 ch. of widening carried out on Toxford's Bluff and Weed's Hill.

Glenora Road (Akitio County).—21 ch. of widening completed.

Akitio Soldiers' Settlement Access (Akitio County).—7 m. of metalling completed during the year.

Otahome Road (Castlepoint County).—48 ch. of metalling completed.

Pack Spur Road (Castlepoint County).—2 m. 20 ch. formed, culverted, and metalled.

Bush Gulley Bridge (Featherston County).—This bridge, comprising five 50 ft. rolled-steel spans on hardwood piers, was erected over the Pahaoa River.

Pahaoa–Glendhu Road (Featherston County).—The formation, culverting, and metalling of this road are now complete, the total length of work being 8 m. 29 ch.

Stoney Creek – White Rock Road (Featherston County).—5 m. 40 ch. formation completed during the period.

Whatarangi Road: Lake Ferry to Cape Palliser (Featherston County).—Formation, culverting, and metalling, and the construction of three bridges of one 30 ft. span each, were completed during the year.

Cross Creek Access (Featherston County).—Two light traffic-bridges of two 30 ft. spans each were erected. Protection groynes and reconstruction of half a mile of road completed.

Mangaparuparu Road (Masterton County).—1 m. 40 ch. of metalling has been completed.

Motukai Road (Masterton County).—2 m. 25 ch. metalling completed.

Ngaumu Road (Masterton County).—2 m. 77 ch. metalling completed.

Tunipo Road (Pohangina County).—The clearing of slips and general repairs to this road over a length of 1 m. 20 ch. completed.

Craigie Lea Road (Wairarapa South County).—1 m. 20 ch. metalling completed.

East Coast and Flat Point Road (Wairarapa South County).—Widening of corners over a length of 11 m. 40 ch. was carried out.

Hayward's to Pahautanui, Pahautanui to Judgeford (Hutt County).—70 ch. of this road was widened, surfaced with rotten rock, and rolled.

Western Hutt Road (Hutt County).—4 m. 56 ch. widened, surfaced with rock, and rolled.

Takapu Road (Makara County).—3 m. 26 ch. widening completed.

Connor's Creek Bridge (Marlborough County).—This bridge, consisting of a 40 ft. rolled-steel-joist span on reinforced concrete abutments, with a 12 ft. roadway, completed during the year.

Upper Opouri, No. 2 (Marlborough County).—This road has been widened to 14 ft. throughout, and has received coating of metal 8 ft. wide. Necessary culverting has also been laid.

Ronga Valley to Croixelles (Marlborough and Sounds Counties).—6 m. of 12 ft. formation, with necessary culverts, has been completed as relief work.

Blenheim to Hope Junction via Tophouse. Tophouse to Hope Junction Section (Murchison County).—This section is now completed, and has been handed over to the county to maintain.

Earthquake Damage (Murchison County).—Extensive restoration work has been carried out under this item, the main roads benefited being :—

Fern Flat Road.—1 m. 20 ch. of 8 ft. track opened, and a birch bridge 74 ft. long constructed.

Mangles Valley.—General repairs.

Maruia (East Bank Road).—Widening and removal of slips.

Maruia Valley (West Bank Road).—4 ft. track formed across Peacock's Flat to Glengarry Stream.

Maruia River Bridge.—This bridge, consisting of a one 100 ft. truss, and one 18 ft., one 20 ft., one 22 ft. spans, with 10 ft. 6 in. roadway on timber piers with concrete foundations, is in hand.

Matiri River Bridge.—Single suspension span of 198 ft. in hand.

Glenroy Road.—General restoration work.

Tiraumea Bridge.—80-ft.-truss span bridge under construction.

Shenandoah Road.—Survey work completed.

Rappahannock Road.—30-ft.-span bridge in birch timber completed.

Gowan River Bridge.—Bridge consisting of three 30 ft., one 25 ft., and one 20 ft. spans constructed in birch timber over Gowan River at Lake Rotoroa.

Toi Flat.—4 ft. stock-track constructed across Toi Flat.

Sandstone Creek Track.—Slips cleared.

Howard Road.—A deviation 26·6 ch., 12 ft. formation, has been completed.

Takaka Hill to Canaan (Takaka County).—1 m. 26 ch., 6 ft. track, completed by relief workers.

Longford Road Bridge (Takaka County).—This bridge, consisting of a one 30 ft. rolled-steel-joist span with a 10 ft. 6 in. roadway, together with 5 ch. of approach road, was completed during the year.

Tarakohe Wharf Approaches (Takaka County).—Approach track completed during the year consisted of 10 ch. of 16 ft. formation, and metalling 12 ft. wide over this length with clinker. A 19 ft. overbridge is in hand.

Blenheim to Hope Junction via Tophouse (Waimea County).—Work on this section has now been completed, and the road has been handed over to the county to maintain.

Korere–Tophouse Road (Waimea County).—Widening and general improvements have been carried out as a relief work over a length of 9 m. 32 ch.

Riwaka–Sandy Bay Road (Waimea County).—This road has been widened to a width of 12 ft. for a distance of 7 m. 52 ch.

Lyon's Bridge – Kelling Road (Waimea County).—This bridge, which consists of a one 40 ft. rolled-steel-joist span on mass-concrete abutments, is now in course of erection.

Blackwater Bridge (Buller County).—This bridge, comprising six hard-wood spans, total length 150 ft., was erected on the Te Namu-Kongahu Road.

Quinlan's Bridge (Buller County).—This rolled-steel-joist bridge, 480 ft. long, with pile piers and abutments, was erected on the Karamea–Collingwood Road, and 9 ch. of approach bank completed.

Westport–Greymouth Coast Road (Buller County).—Improvements, comprising concrete retaining-walls, culverting, metalling, and fencing dangerous portions of road, were carried out during the year. A bridge consisting of three truss spans, total length 278 ft., was erected over Fox's River.

Backwater Creek Bridge (Grey County).—This rolled-steel-joist bridge on the Brunner–Blackball Road, 40 ft. long, was completed.

Grey Valley to Maruia (Grey County).—5 m. of 7 ft. track, together with 4 m. of metalling, was completed by relief workers during the year.

Grey Valley to Taramakau Road (Grey County).—Improvement to the access to the Rotomanu and Inchbonnie Settlements was effected by the completion of the bridges over Camp Creek, Deep Creek, Dry Creek, and Rough-and-Tumble Creek.

Lake Brunner to Inchbonnie Road (Grey County).—2 m. 65 ch. of new formation and 2 m. 9 ch. of metalling were completed during the year by relief workers. 136 ft. of culverts were laid and two 20 ft. bridges erected.

Haupiri Junction to Haupiri (Grey County).—3 m. 50 ch. of formation and 1 m. 62 ch. of metalling were carried out during the year by relief workers. 1,386 ft. of culverts were laid and a 22 ft. span bridge was erected.

Brown Creek Bridge (Inangahua County).—This rolled-steel-joist bridge, 90 ft. in length, is nearing completion, and the approach work is in hand.

Springlands Junction to Hot Springs (Inangahua County).—Relief workers completed 1 m. 65 ch. of widening and 9 ch. of metalling during the year. Two small bridges were erected on this road, and three culverts placed.

Waiau to Maruia Road (Inangahua County).—1 m. 10 ch. of formation and 1 m. 6 ch. of surfacing were completed by relief workers during the year.

Little Wanganui Flood-protection Works (Westland County).—Strengthening of protective works, including 9¾ ch. of additional bank, 34 ch. of raising bank, and additional driving of piles, carried out during the year.

Dorothy Falls Road (Westland County).—2 m. 13 ch. of formation and 2 m. of metalling, together with 400 ft. of culverts, were completed by relief workers during the year.

Great South Road (Westland County).—2 m. of bushfelling, 4 m. of formation, 2 m. of metalling, and 947 ft. of culverts were completed. One 40-ft.-span bridge was erected on the section between Weheka and Ohinetamatea. Dangerous corners were cut back.

Fisherman's and Paua Bay Road (Akaroa County).—Metalling of 3 m. 44 ch. of road completed.

Pigeon Bay Road (Akaroa County).—Relief workers widened 5 m. of this road during the year.

Lewis Saddle Road (Amuri County).—5 m. 35 ch. of road formed by relief workers during the year.

Kowai River Protective Works (Kaikoura County).—8 ch. of gabion net breastwork with spur groynes has been completed on the left bank of the Kowai River.

Rampaddock Road (Kowai County).—A deviation of 36½ ch. on above road has been completed by relief workers.

Ball Hut Road (Mackenzie County).—2 m. 42 ch. of road has been formed on the moraine during the year. This completes the road, and all traffic can now get through to the Ball Hut.

Hawkins River Bridge (Halliday's Crossing) (Malvern County).—This bridge, consisting of three 20 ft. beam spans on ironbark-pile piers, has been erected.

Purau-Charteris Bay Road (Mount Herbert County).—3 m. of road has been formed.

Summit Road (Kennedy's Bush-Gebbies Pass) (Mount Herbert County).—3 m. 12 ch. of new road formed during the period.

Waipara River Bridge (Edward's Ford) (Waipara County).—The erection of this bridge, which is 373 ft. long, consisting of nine 34 ft. 1 in. and two 33 ft. 2½ in. rolled-steel-joists spans on ironbark-pile piers, together with the necessary approaches, is complete.

Okain's Bay to Little Akaloa (Akaroa County).—Widening on this road as a relief work is in hand, and a length of 2 m. 50 ch. has been completed.

Catlin's River Bridge (Houipapa) (Clutha County).—Suspension bridge, 7 ft. roadway, 120 ft. long, completed.

Kaka Point to Nuggets (Clutha County).—1 m. 75 ch. formation over 16 ft. wide, and 18 ch. metalling completed.

Papatowai to Long Beach Creek (Clutha County).—3 m. 35 ch. formation over 16 ft. and 3 m. 4 ch. metalling completed.

Aurora Creek Road (Clutha County).—2 m. 68 ch. formation under 16 ft. completed.

Milford to Lake Wakatipu via Hollyford (Gertrude Saddle) (Lake County).—3½ m. of 6 ft. track completed. One footbridge, 50 ft. long, installed.

Access to Scheelite Mines, Glenorchy (Lake County).—1 m. 68 ch. of road under 16 ft. wide has been formed.

Kyeburn Bridge (Scott Lane) (Maniototo County).—One bridge 275 ft. long, comprising eleven 25 ft. Australian hardwood spans, on two pile piers, completed.

Portobello to Harrington Point (Peninsula County).—7 m. engineering surveys, 7 m. formation under 16 ft., and 2 m. gravelling carried out during the year.

Whare Flat (Hill) Road (Taieri County).—5 m. 20 ch. of engineering surveys, 4 m. 20 ch. formation, 2 m. 60 ch. gravelling, and culverting throughout completed to date.

Hawea to West Coast via Haast Pass (Vincent County).—5 m. 26 ch. second-class formation completed during the year. A length of 3 m. 51 ch. has received a first coat of metal, and a length of 5 m. 72 ch. received second coat. Camp Creek Bridge, of 30 ft. span, with rolled-steel joists and timber deck, completed during the period. Construction of Waterfall Creek Bridge, of similar type and 25 ft. span, still in hand.

Fleming Road (Titiroa) (Southland County).—1 m. 25 ch. formation over 16 ft. and gravelling over the same length completed.

Ivy Lane Road (Southland County).—Relief workers formed a further 1 m. 47 ch. of this road during the period.

Domain Road (Wallace County).—1 m. 29 ch. formation over 16 ft. completed during the year by relief workers.

Merrivale – Te Tua Road (Wallace County).—This work was carried out with unemployed labour. 2 m. 13 ch. first-class formation completed, one 20-ft.-span bridge erected, and 1,188 ft. culverts placed.

Waimeamea Stream Bridge (Wallace County).—This 70 ft. bridge was erected and the necessary approaches formed during the year.

Te Anau – Milford Sound Road (Wallace County).—During the period 20 m. 39 ch. of formation, 26 m. of gravelling, 6,425 lin. ft. of culverting, and 487 lin. ft. of bridging were completed. A furthe section of 4 m., including bushfelling, formation, and gravelling, is in hand.

HYDRO-ELECTRIC WORKS.

Arapuni Power Development.

The position at Arapuni on the 1st July, 1930, the beginning of the year covered by this report, was that all construction operations had ceased as a result of the earth-movement that took place on the 7th June. The position of the works at that time was that the power-house structure had been completed, with the exception of a few details; and three turbines and generators, together with all the necessary switch-gear, cables, and transformers, had been erected and were in service. Measures to divert the surplus water from the forebay into the gorge by the construction of Nos. 7 and 8 penstock tunnels were well advanced, and preparatory work in connection with proposals to protect the rock at the falls in the overflow-channel was almost completed. No. 4 penstock tunnel was in hand, the excavation having been finished. Owing, however, to the serious position due to the damage resulting from the above-mentioned earth-movement, the Arapuni Lake had been emptied, and the station went out of service from the 11th June. Construction operations at once ceased, and were not resumed until December last.

Investigations.—Investigations were immediately commenced as to the cause of the earth-movement. This work consisted of the clearing of a deposit of sand from the forebay, and the excavation of a series of small tunnels and shafts situated in the vicinity of the power-house and spillway structures: 4,334 ft. of drive and 208 ft. of shaft were completed for this particular purpose. Well-boring equipment was utilized to sink a number of investigation bores at the sides of the power-house, at the forebay, headrace, and main dam, a total of 2,404 ft. of deep hole being drilled.

A technical committee, consisting of officers of the Scientific and Industrial Research Department, the Director of the Geological Survey, and one outside geologist, visited the site, made a thorough investigation, and reported on the geological aspect of the movement. The whole of the information collected was then made available for Professor Hornell and Mr. Werner, two Swedish experts, who arrived at the invitation of the Government on the site at the end of the month of August, 1930. A thorough examination was made of the locality, of the conditions, and the nature of the rock; and a report was subsequently made to the Government outlining their opinion of the cause of the movement and the nature of the remedial measures necessary to effectively repair the damage to the works.

Restoration Measures.—Professor Hornell's recommendations were accepted by the Government, and authority was issued during the month of December to proceed with the reconditioning of the station, when arrangements for the necessary staff and equipment were immediately put in hand. The major items of work were commenced on three shifts during January, and continued on that basis.

By the end of the year—that is, the 30th June—the various works for the reconditioning of the headrace and forebay were well in hand. The lining of the overflow-channel with concrete has been commenced and the excavation preparatory to concreting the falls is almost completed. At the dam, grouting operations have been carried out on a large scale, and a commencement made with the excavation of a shaft for the emergency gates of the diversion tunnel. The reconditioning of the existing tunnel-gates is well forward.

At the power-house the lower section of the foundation for No. 4 unit has been concreted and a start made with the erection of the turbine. No. 4 penstock tunnel is being lined, and the excavation required for the power-house extension had been recommenced.

Details of the work carried out are as follows:—

Penstock Intake Structure.—Repairs are at present in hand, and as yet have been confined chiefly to the grouting of the rock comprising the foundation of the structure, and to the reconditioning of the damaged concrete by grouting and reinforcing with steel rods. This work is well forward.

Drainage-tunnels.—The investigation tunnels driven from the water-level in the Gorge have been utilized as portion of a system of drainage-tunnels. A total of six tunnels, running at right angles to the line of the gorge and the headrace, have been provided for, and are situated at approximately 8-chain intervals between the up-stream end of the headrace-lining and the falls structure. These tunnels are provided for the purpose of draining the rock underneath the headrace, the forebay, and overflow-channel, and the block of country situated between those works and the gorge. The tunnels are nearing completion, a total of 6,960 lineal feet having been excavated.

Reinforcement of Country at Junction of Penstock Intakes and Spillway.—This work is almost completed, and is being effected by the drilling, with special equipment, of a series of long horizontal holes up to 100 ft. in length, the inserting of steel rods into the holes, and subsequent pressure-grouting. Preparatory work in connection with the provision of a reinforcing concrete block at junction of spillway-weir and penstock intake structure has been finished.

Crack in Headrace.—Strengthening and sealing the country along the line of the crack in the rock under the headrace and forebay has been in hand for some time and is almost completed. The work consists chiefly of drilling a series of 70-ft.-long inclined holes into the rock intersecting the crack below the surface, placing steel rods in the holes, and pressure-grouting.

Headrace and Forebay Lining.—The preparation of the headrace and the placing of the special lining comprises one of the major works of the remedial measures, and consists of the clearing for, and construction of, side banks, the placing of porous layers, the laying of 35,000 square yards of bituminous mastic into which sheet iron is to be embedded, and the construction and laying of protecting concrete slabs. The preparation of the foundations for the new work was commenced with three shifts early during the month of January, and has been completed. Subsequently the construction of side banks was commenced, plough and scoop teams, supplemented by mechanical equipment, being used for the purpose. The construction of the banks is 85 per cent. completed.

The trimming of the side slopes preparatory to the placing of the porous layers has been commenced. 90,500 cubic yards of excavated material has been handled and 2,567 ft. of drainage-pipes have been placed in connection with this section of the work.

Subsequent to the clearing of the floor of the headrace and forebay all depressions were filled with concrete or with spalls and adequately drained, followed by the placing of the porous layers, which have been 60 per cent. completed. The concrete cut-off wall to cut off seepage, situated at the up-stream end of the headrace-lining, has been completed, as is also a short curved wall situated at the junction of the eastern embankment of the penstock intake structure. 829 cubic yards of concrete have been placed in these two structures. It is proposed to carry out the bituminous lining of the headrace and the making of the concrete paving-slabs by contract, and at the end of the year plans and specifications had been prepared and tenders invited.

Headrace-drainage.—A drainage-gallery, consisting of two shafts and a series of drives at various levels situated adjacent to the up-stream end of the headrace-lining, was commenced towards the end of the year. This gallery will ultimately be connected to an up-stream drainage-tunnel, which will serve as an outlet for it. A drainage-trench along the centre-line of and situated inmediately beneath the headrace-lining has been completed, and consists of a 6 ft. by 3 ft. trench, in which 1,630 lineal feet of 2 ft. concrete pipes were laid and covered with spalls. The outlet of this drain, consisting of 625 lineal feet of concrete-lined shaft and tunnel, will discharge into the gorge near the power-house.

Main Dam.—Drilling and grouting of the country, comprising the abutments of the main dam have been in hand for some months, and satisfactory results have been obtained. Well-boring plants are being utilized to drill vertical holes, and special percussion-drilling equipment, operated by compressed air, for the inclined and horizontal holes. Drilling and grouting of vertical holes in the abutments are well advanced, but several months' work of horizontal drilling remains to be done. Clearing of the clay from the surface of the rock and guniting the western abutment of the dam was commenced towards the end of the year, but owing to the action of the severe frosts experienced, the work has been postponed until the spring and summer seasons. Preparatory work in the nature of excavation in connection with the provision of bitumen seals between the dam and the rock abutments is well advanced.

Diversion-tunnel.—The diversion-tunnel which was opened during June, 1930, for the purpose of emptying the Arapuni Lake has been continually in service since then for the discharge of the Waikato River, with the exception that on a few brief occasions the gate-valves have been closed for testing and observation purposes. During the year several inspections of the condition of the concrete lining of the tunnel have been made, and it is found to be in a very satisfactory condition.

Large pieces of rock that had accumulated at the entrance of the tunnel during the emptying of the lake were cleared, and considerable trimming of the unstable portions of the cliff above the tunnel intake was carried out. Work has been commenced on the shaft required in connection with the emergency gates that are to be installed. A pilot shaft from the surface into the crown of the tunnel has been completed, and the enlargement to full size of the shaft has been commenced.

One single gate of massive construction is proposed, which will be fabricated overseas. The installation involves the construction of a shaft of liberal dimensions, lined with reinforced concrete, extending from the ground surface for a depth of 162 ft. to the invert of the existing tunnel. The construction of the shaft and a small section of the concrete foundations for the gate-frame may be done while the tunnel is in service, but the completion of the gate-anchorages and the erection and installation of the gate-frame and lifting equipment must be left over until the lake has been filled and the tunnel dewatered. The whole work of the construction of the shaft and gate-chamber, fabrication, erection, and installation of gates will be of considerable magnitude. Repairs to the bases of both the existing gates have been undertaken and are well forward. This involved the raising of both gates, and the dismantling and replacing of the lower section of each.

Overflow-channel.—Reconditioning of the upper section of the overflow-channel situated between the spillway extension and the drop weir has been completed. This particular section of the work was limited to the trimming of the rock and covering the whole surface with a 12 in. layer of reinforced concrete. 1,355 cubic yards of concrete were used for the purpose. The major or lower section of the work extends from the drop weir to the upper section of the falls structure, and is 960 ft. in length. The channel on this section is being widened to 150 ft. and the alignment improved. Both the floor and the sides are to be protected with a 12 in. layer of reinforced concrete, and excavation and concreting operations are at present in hand, the former being well advanced. 1,036 cubic yards of concrete, 22 tons of steel, and 5,550 cubic yards of excavation have been handled to date.

Protection of Waterfall.—Operations were recommenced on preparations for concreting the falls immediately after authority was obtained for proceeding with the general works of restoration. The protective works are extensive, and generally consist of the trimming of the excavation of the foundation rock to such a shape and to such limits as will permit of the construction of a stream-line reinforced-concrete structure of such dimensions as will accommodate the discharge of 30,000 cusecs. A drainage-gallery, together with a comprehensive system of porous drains, is included in the work; also the strengthening of the foundation rock by steel rods and pressure-grouting.

Excavation work was commenced on three shifts during January, and has proceeded along these lines for the remainder of the year. On the upper section of the structure excavation has been completed and concreting work commenced. The lower section is more extensive than the upper; larger quantities of excavation and reinforced concrete, and the dewatering of a large pool, being involved. Subsequent to the trimming of the batters, some of which were 180 ft. in height, pumping equipment was installed and the pool dewatered. Pumping was greatly facilitated by connecting the discharge from the pumps to a drainage-tunnel, by which means the water was carried directly to the Arapuni Gorge. The pool was effectively dewatered during the month of April, and by continual

pumping the water has been kept well below excavation-level. Excavation of the surplus material from the bed of the pool was then proceeded with, and by the end of the year was nearly completed. 39,000 cubic yards of excavated material have been handled since the work commenced. Strengthening of the foundation rock is being effected by drilling and grouting a series of 20-ft. holes, into which steel rods are being inserted. This work is well forward. Concreting operations which comprise the chief work remaining have commenced. A drainage-gallery, consisting of a shaft and a series of tunnels at various levels situated beneath and a little up-stream of the upper crest, is now in hand, and is being connected to a portion of the porous-drain system by two vertical steel-cased boreholes. The whole of the work of protecting the falls is timed to be completed simultaneously with the remaining remedial measures.

Grouting.—Grouting of the country at the sites of the dam, headrace, penstock intake, spillway, and the falls is recognized to be one of the important sections of the operations at Arapuni, and during the last six months a total of 56,000 ft. of holes has been drilled by well-boring and percussion-drilling equipment for this purpose.

Power-house Extensions.—The draught-tube and concrete foundations for No. 4 unit have been completed to the level of the under-side of the turbine scroll casing, and the erection of the turbine has actually been commenced. The remainder of the equipment, consisting of the main valve, generator, governor, and transformers, has been delivered. The work of steel-lining No. 4 penstock tunnel and the auxiliary pipe, contracts for which were cancelled when the station went out of service, has been resumed by the Dunedin Engineering Co. Concreting between the steel lining and the country is being carried out by the Department's own forces, and is following close behind the steel erection. Work on the power-house extension excavation has been resumed as a preliminary to clearing a space for foundations required for two 450 kw. independently driven auxiliary units, which are at present being manufactured overseas.

General.—Two small permanent cottages have been erected in the permanent village, and have been occupied by staff. Six hundred men, exclusive of staff, were employed at the end of the year being reported upon, most of whom are engaged on shift-work. The average number employed since work resumed on the 13th December last was four hundred.

The constructional programme provides, subject to finance being available, for the station, with the additional unit, to be in service by the winter of 1932.

Waitaki River Power Development.

Dam.—When the last annual report was written the chief work in hand on this scheme was the dewatering and excavation of the second, or North, coffer-dam, which extends from the first, or central, coffer-dam to the Canterbury River bank. This coffer-dam encloses the deepest section of the dam within the river-channel, but by the end of November the entire excavation within the coffer-dam was completed, and the concrete in the dam was placed to the height of ordinary summer river-level, at which level it will remain for some time.

While this concreting work was in progress Professor Hornell visited the works, and after consultation with him it was decided to extend the dam by an apron some 25 ft. down-stream, and also to deepen the cut-off wall on the up-stream side. Fortunately, the coffer-dam was still intact, so that this work could be done without much extra expense. When the work on the down-stream extension was, however, about half completed in February last, a big flood occurred and caused a considerable amount of damage to the coffer-dam and other temporary works. This occasioned a good deal of delay and disorganization of the work, even though it gave an opportunity to overhaul and redispose the pumping and other plant in readiness for the next stage of the work. When repairs and overhaul had been effected and the river had subsided to normal the concreting of the apron was completed.

Eleven openings or sluices were left in the concrete of the dam to divert and control the river during the third stage of dam-construction in the river-channel on the Otago side. These openings for the passage of water will later on be closed, first by dropping temporary steel gates in front of them, and then by filling them up with concrete.

While the concreting of the dam in the coffer-dam was in progress up to river level, a section of the dam at the Canterbury end, 80 ft. in length, was completed almost to full height.

A considerable number of model tests has been carried out to determine the most suitable shape to divert the water overflowing near the Canterbury end back to the river-channel, and the results have been most valuable.

On the south, or Otago, river-bank excavations are in progress over the length of the dam between the river and the power-house. In addition to this work, a 36 ft. length of dam in this section is being constructed as close to the river-bank as it is practicable to excavate without danger. Unfortunately, the foundations for portion of the dam between the river and the power-house are at a greater depth than it was expected they would be, and increased quantities of excavation and concrete will be necessary.

On account of the delays caused by the extra concrete-work within the north coffer-dam, and the serious floods in February, as well as restrictions due to the present financial position, it was decided that the original proposal to construct the third coffer-dam and complete the dam within it during this winter would have to be abandoned, and that work be concentrated on the section of dam on the Otago bank. While this will delay the time of completion, it is not so serious as it might have been, as the additional work caused by the greater depth of foundation on the Otago side would have caused some delay in the original programme in any case. It also allows of the cut-off wall on the up-stream face of the dam, which has been increased in depth, being partially excavated by tunnelling methods, thereby shortening the time during which the third coffer-dam will be exposed to flood risks.

This may prove to be a very important consideration indeed if heavy floods are experienced, and one that might easily result in a good deal of economy.

The quantity of concrete that has been placed in the dam to date is 27,277 cubic yards.

The quantity of excavation for the dam, apart from that involved in the coffer-dam, that has now been done is 104,000 cubic yards.

Power-house.—The excavations for the power-house, which involved the removal of 60,000 cubic yards of rock and surface stripping, were completed during the year. In June, 1930, the excavation had progressed far enough to commence concreting, and from that date to the present time over 29,000 cubic yards of concrete have been placed in position.

The work here has been planned in order to give precedence to the foundations that enclose and support the two turbines which comprise the first installation, whilst the remaining foundation work is being completed to such a stage as will allow the three additional power units which complete the station to be installed, when required, with very little structural work.

In April last a commencement was made with the installation of the turbines, and this work has now progressed far enough to permit of the surrounding concrete being completed to the level of the generator floor. Simultaneously the main columns at the other end of the building have been concreted almost to full height, and forms have been placed and concreting is in progress in each of the fifteen penstock-ducts. In the power-house to date 29,346 cubic yards of concrete have been placed, 898 tons of reinforcing-steel have been bent and 967 tons fixed in position, while 1,363,000 superficial feet of timber has been used on the work.

Tail-race.—To the 30th June 70,000 cubic yards had been excavated from the tail-race. By the aid of pumping, the work, although mostly below river-level, has so far been done under dry conditions, and, in order to give employment to as many men, with as little machinery as possible. This method will be continued until it becomes uneconomical, when mechanical plant will be employed. The gravel excavated from the tail-race now constitutes the main source from which the aggregates for concrete are derived.

General.—The service railway from Kurow to the works has been adequately maintained, and since this railway came into operation in December, 1928, 25,531 tons of materials and 3,500,000 superficial feet of timber have been carried. Charges based on tariff rates are debited to the particular section of the work to which transported materials belong, by which means the capital cost of the railway should be extinguished when the works are completed. To date about half the cost has been written off in this way. All centres of activity at the works have been connected with this railway and interconnected with one another, and this provides a rapid, safe, and economical solution to the problems of transport. Six locomotives are in service day and night, and they have almost entirely obviated the employment of motor-vehicles.

To retain access to sheep-stations which will be cut off by the reservoir behind the dam on the Canterbury side of the river, a large steel bridge is in course of erection. This is a cheaper and better proposal than the formation and maintenance of an extensive deviation of the present road, which was considered as an alternative. During a period of exceedingly low water in the river last August the foundations to the concrete piers of the bridge were, by a week's concentrated effort, placed in position, thereby greatly simplifying what would in normal years have been a difficult task. A contract for the fabrication of steelwork has been let, and it is anticipated that the substructure will be completed and a start made on the erection of the steel-girder spans next December.

Permanent buildings are being erected in concrete blocks, and during the year ten residences, a large hostel, and a garage have been completed, as well as the necessary road access to these, and fencing, water-supply, and drainage. During the year the permanent steel-tower transmission-line from Glenavy to the works was pushed on, one of the circuits was completed, and the new line came into service at the end of June. This obtaining of power direct from Lake Coleridge terminated the contract for supply from the Waitaki Power Board. The whole of the extensive plant on the works is now well supplied with power and is working with greater efficiency. To assist towards the relief of unemployment, however, work, where possible, is being carried out by manual labour rather than by mechanical means, whenever such a course can be economically justified.

The number of employees during the year has varied between 1,000 and 1,240, including transmission-line workmen. Provision has been made for separate accommodation for 233 married men and their families, while huts and hutments to the number of 434 were provided for single men or those without their families.

RIVER IMPROVEMENT AND PROTECTIVE WORKS.

Waihou and Ohinemuri Rivers Improvement.

As was the case the previous year, the chief work carried out during the year just ended has been the raising and strengthening of the upper Waihou stop-bank system. The stop-banks are being raised and strengthened by adding a banquette on the side remote from the river-channel. In addition, the berm between the stop-bank and the river-edge is being graded, borrow pits filled in, and the growths of blackberry removed. Two 1½-cubic-yard dragline excavators have been continuously employed on this work, and have made good progress. There is not much of this work now to do, save the cleaning-up of the berm. The reconditioned stop-bank and berm are being harrowed and grassed as work is completed. The completed work represents that portion between Ngahina and Tirohia stop-banks, and has resulted in an immense improvement to the flood-carrying capacity of the river.

On the lower Waihou maintenance has been carried out; all the flood-gates have been overhauled, cleaned, and painted. Five small culverts complete with flood-gates were installed under stopbank between Netherton and Turua. The whole of the construction work on the lower Waihou—*i.e.*, from Ngahina down-stream to Huirau Road and Wharepoa Ferry—is finished.

On the Ohinemuri River general maintenance has been carried out, and deepening and enlargement of major drains has been done by drag-line machine.

The plant has been efficiently maintained.

The average number of men employed on these works was fifty-five.

Taieri River.

My report for the previous year indicated that, with the exception of some improvement work required to the contour channel, the scheme of protection works was completed.

During the year covered by this report the improvement work on the contour channel has been completed. This extended over a length of four miles, the work consisting of deepening and enlarging the channel, the work being done by drag-line excavator. Provision has been made for spillways, so that the peak of flood-discharges will be released from the contour channel without damage to the channel. The water so escaping will reach the pumping-station by other canals or drains and be there pumped to Lake Waipori.

The whole of the work to be carried out by the Department on the Taieri Plain is complete, and the Taieri River Trust is carrying out maintenance.

MARINE.

Lighthouses.

North Cape Lighthouse.—A new flashing-apparatus has been installed in the original lens to take the place of the original flasher, which had not been wholly satisfactory.

Matakaoa.—This light has been equipped with a new automatic acetylene flashing-apparatus.

Cape Maria Van Diemen.—Surveys were made and investigations carried out in regard to the transport arrangements between the landing-stage and the tower, keepers' houses, &c. Owing to the financial stringency the new proposals have not yet been put in hand, but it is hoped to proceed with them early. Measures are also in hand to deal with the drifting sand, which causes considerable inconvenience at this station.

East Head.—A site has been selected for this light on East Head, Akaroa Peninsula, and the necessary flashing-apparatus, lens, and lantern have been ordered. This light, being located on the main salient point of the Peninsula, should be of great assistance to coastal traffic both from north and south. It is proposed to call this "Le Bon Light," after the bay of the same name, which is adjacent. This will avoid any confusion with the existing East Cape Lighthouse in the North Island.

Portland Island.—A radio telephone set has been established at this station, which should considerably relieve the isolation and enable the keepers to be in constant communication with the mainland in case of emergencies.

Baring Head.—An area of land has been acquired for the new light in this locality, which will take the place of the existing high-level light at Pencarrow. A contract is being let for the construction of the access road, and it is expected that contracts for the erection of cottages, fog-signal house, tower, &c., will be proceeded with almost immediately. The apparatus will be of a powerful flashing type, and, being erected on this salient point, should be of great assistance to shipmasters. The new light erected by the Harbour Board at the entrance will then take the place of the old Pencarrow Head Lighthouse, which has been in operation for over seventy years.

Godley Head.—The necessary apparatus for converting this light from a fixed oil-burner to a flashing type has been ordered, and the conversion should be completed early in the coming summer. Although this light is still thoroughly efficient, the universal use of powerful public and domestic electric lights render the fixed character unsuitable, and it is for this reason that the change is being made.

Taiaroa Heads.—A new powerful fog-signal, constructed on the diaphone principle and similar to those already installed at Pencarrow and Godley Head, was installed. It is housed in a reinforced-concrete building, and is a great improvement on the old explosive signal.

Okuri Point.—Repairs have been carried out to the landing-gantry.

French Pass.—Some dangerous overhanging rocks which were shattered in the earthquake have been removed, as they were threatening the safety of the station.

Brothers.—A contract has been let for a new crane for the north landing, and some of the rocks which were dangerously overhanging the south landing and crane have been removed. The buildings generally on this station are getting old, and a general overhaul will have to be undertaken during this coming year.

Kahurangi.—A new 800 mm. lens has been installed in this lighthouse to take the place of the old lens, which was irretrievably damaged by the earthquake, and new cast-iron segments have been erected, some of the original segments having been badly cracked. The light itself is operated automatically, the illuminating-apparatus consisting of a Dalen burner using acetylene gas. Provision is being made this year for the erection of a new keeper's house, the old houses being practically destroyed by the earthquake, and the single keeper there is at present occupying only temporary accommodation.

HARBOURS.

Westport Harbour.—Entrance and bar: Conditions generally at the entrance have not been altogether satisfactory, and in spite of continual dredging difficulty has been experienced in maintaining at all times an adequate depth of water for the class of vessels now trading here. As mentioned in my previous report, the only satisfactory method of dealing with these conditions is to extend the training-walls. Work on these lines was proceeded with during the year, but unfortunately the financial conditions of the harbour, due to the reduction in the export of coal, has been such as to necessitate a temporary cessation of the breakwater-construction. The suction dredger "Eileen Ward" has been kept constantly employed on the bar, and has removed a total of 571,885 yards during the period.

Lower River: The average working-depth of the river over the period was 24 ft. 3 in., which is a slight reduction over last year's average. The dredger "Maui" was occupied part of her time in this portion of the harbour, principally in the floating-basin and in the vicinity of the Cattle Wharf, and in this area she removed 14,475 cubic yards.

Berthage area: With the exception of the work at the Cattle Wharf, the bucket dredger "Maui" has been engaged solely in deepening the berths and improving the river fairway opposite the wharves, and depths generally have been maintained, total yardage shifted by the bucket dredger for the year being 97,570 cubic yards.

Eastern Breakwater extension: Prior to the commencement of the work on the Western Breakwater, 604 tons of first-class stone was tipped with a view to consolidating the postion there.

Western Breakwater: A definite start was made with the extension of this breakwater, the timber staging being driven and the depositing of stone commenced in July. Considerable difficulty was experienced with heavy weather the first few days while the staging was being erected, and two bays were carried away. 130 ft. of staging has been erected and 22,397 tons of stone have been tipped. This work has, however, now been discontinued, owing to decreased output of coal and consequent shortage of funds.

Quarry: The quarry has been worked regularly throughout the year; the quality of the stone is good, and it is estimated that there is ample good stone in the vicinity of the present workings to complete the proposed breakwater extensions of 300 ft. A considerable amount of waste material has to be shifted in order to procure the suitable large stone, and this has considerably hampered the output generally. Prior to the suspension of work it had been proposed to procure a small steam-shovel to facilitate the loading and disposal of this waste material, and to clean up the quarry-floor generally. This should be one of the first matters to be attended to when work is recommenced, and a new 10-ton crane will have to be purchased or the existing 10-ton machine very thoroughly overhauled. The total output for the year has been 38,980 tons, but this included approximately 16,000 tons of third-class stone, which has been used on the extension of the wall at Organ's Island and the groyne at McPadden's.

River-protective works: The training-wall at Organ's Island which was built last year has been extended for about 3 chains, and, although there have been comparatively few floods, the present effect indicates that the river should considerably straighten its course through the shingle-bank between it and Roselli's. The willow plantations near Hannah's are now becoming well established, and where any damage has been caused it has been reinstated. The river-banks where protected with willows resisted the January flood well. Surplus stone from the quarry which was not suitable for breakwater-construction has been tipped at McPadden's in continuation of the protective groyne there.

Plant: The plant generally has been fully maintained. The suction dredger "Eileen Ward" and the bucket dredger "Maui" have been constantly in use, and wherever possible all necessary repairs and renewals have been carried out when dredging-conditions were unsuitable, in order to keep them thoroughly efficient. The suction dredger "Rubi Seddon" has not worked during the period, but the necessary attention has been given to this vessel in the nature of chipping, tarring, and painting, and the engines are periodically turned over. The tug "Mana" and the launch "Kaiuruanga" have both been slipped, and are in first-class order. The workshops have been kept busy repairing and maintaining the dredgers, locomotives, trains, &c.; and signal-station buildings, beacons, lights, &c., are in good order.

Karamea Harbour.—Fairway and entrance: During the year the shoaling in the fairway has been accentuated. An enormous quantity of sand, silt, and general detritus has been brought down to the lower reaches by successive floods in the Karamea River, and a very considerable deposition has occurred in the slacker waters through the coastal plain. The last investigation of the upper reaches of the river, in January, confirmed the extensive rending and disturbance of the hills and mountains by the earthquake in nearly all parts of the watershed, and revealed the fact that only a comparatively small quantity of the disintegrated rock-material had reached the tidal area. The transportation of detritus, associated with deposition in the lower reaches and harbour area, can therefore be confidently assumed for many years to come, and under these circumstances any marked immediate improvement in the harbour entrance and fairway with works in hand or proposed can hardly be anticipated, though the influence of such works in relation to the river-flow is an important factor. At the beginning of the period under review it was possible to work the port only at spring tides and with favourable sea conditions. A slight improvement to the channel at the wharf occurred in October, but further floods practically closed the port to shipping as from November, 1930. The last serious floods, which occurred at Easter (3rd April, 1931), caused further extensive deposition and the formation of shoals between the Otumahana and the training-wall, and resulted in a considerably increased flow (approximately 70 per cent. of the river) down the Otumahana Channel. Steps were immediately taken with regard to a proposal for improving the flow over the Karamea bar by

blocking the entrance to the Otumahana with a half-tide pile and netting wall. This work to influence and regulate the Karamea River flow is now in hand. Work carried out during the year to reduce the Otumahana overflow with a blockage of logs and cable was effective up to the time of the Easter flood.

Training-wall: During the year the work of replacing the old timber-pile wall by quarried stone has been expeditiously carried out, 11,803 tons of stone having been placed during the year. Further temporary strengthening and retopping of the old wall was necessary for stone-tipping purposes. The whole length of the wall (17½ chains) has been completed to half-tide level, while at the extreme outer end a length of 5 chains has been built as a full-tide wall. At a point near the approach bank of the training-wall 300 tons of ballast was tipped for use in extending the stop-bank round the adjacent length of Simpson's Island to prevent flooding of the tram-line during spring tides.

Oparara Quarry: At the beginning of the year a new quarry was being opened up. This has developed very satisfactorily and produced excellent stone. Various tunnels for quarrying the rock have been driven and fired with good results. During Christmas and New Year holidays the quarry plant and rolling-stock were thoroughly overhauled. At Rhind's erosion protective works, adjacent to and associated with the quarry, 833 tons of box stone and spoil have been placed.

Survey: A comprehensive survey has been made to definitely establish relative information concerning the harbour and adjacent areas for future reference and for the consideration of various proposals at present under review.

Little Wanganui Harbour.—Since the closing of the Karamea Harbour the Little Wanganui Harbour has been worked on an average of once a week. The "Kotiti" can reach the wharf at high tide at all times, while the "Fairburn" arranges her itinerary so as to call at spring tides. Towards the end of the year, a sandspit commenced to encroach on the up-stream end of the wharf and threatened to interfere with the berthage. This was partly due to the influence of a huge earthquake slip a short distance up the river. Proposals have been approved for the erection of a piled permeable groyne to regulate the channel-flow so as to give the desired berthage-improvement.

Waikokopu.—During the year work has been continued on the breakwater, except during the period when the contract was under revision. About 9,000 tons of stone were deposited in place, and, even though the wall is yet unfinished, the benefit to the wharf is very apparent, the shelter being very much improved. This locality is subject to very sudden storms, and as an indication of this it may be mentioned that the breakwater staging was wrecked by storms twice during the year. It is anticipated that this work will be completed in about six months' time. A transmission-line has been put in and the wharf-lighting connected up with the Power Board's electric mains. The wharf and wharf facilities have been well maintained, and the trade has been very constant throughout the year.

Tairua Wharf.—A new wharf was erected at the end of the existing jetty in place of the old wharf, which had collapsed. The new wharf has a kauri superstructure on turpentine piles.

Matiotitawa Wharf.—The approaches to this wharf were completed during the year.

Naumai Wharf.—The approach to this wharf was also completed during the year.

Tikinui Wharf.—Plans were prepared for the construction of a new wharf, 118 ft. long, with approaches, and the work has been put in hand.

Tinopai Wharf.—This wharf has been completed, together with approaches.

General.

A large number of applications have been received from local bodies and private individuals for the approval of works involving Marine interests. Among the various applications were the following:—

Foreshore Licenses.—Shelly Bay, Kaipara Harbour; Dargaville; Paritu Bay, Coromandel; Whangapoua; Whangaroa; Motukaraka, Wairupe Creek, Hokianga Harbour; Horeke, Hokianga; Awawa Bay, Waiheke Island; Beachlands, Maraetai, Auckland; Ohariu Bay; Awakino Creek, Wairoa River, Kaipara; Waitangi, Chatham Islands; Tamaki River, Mangatete Stream, Awanui; Onekaka, Hokianga; Gumstore Creek, Kaipara Harbour; Tairua, Thames Harbour; Pegasus Harbour, Stewart Island; Rawene, Hokianga Harbour; Tatarika, Kaipara Harbour; Pupuke River, Whangaroa; Rangauna Bay; Church Bay, Waiheke Island; Te Akau, Raglan Harbour; Awaroa and Opuatia Streams, Glen Murray.

Wharves and Jetties.—Queenstown, Lake Wakatipu; Te Karaka Point, Hokianga; Lyttelton; Puriri, Waihou River; Lake Taupo; Thorndon, Wellington Harbour; Big Bay, Manukau Harbour; Tairua, Thames; Nelson Harbour Board; Western Wharf extension, Auckland Harbour; Eastern Breastwork, Auckland Harbour; Naumai Wharf, Wairoa River, Kaipara Harbour; Tinopai Wharf, Wairoa River, Kaipara Harbour; Matakohe, Wairoa River; Kaipara Harbour.

Boat Sheds and Skids.—Evans Bay, Wellington; Whangaroa; Te Rawa, Pelorus Sound; Heathcote River, Sumner Estuary; Hobson Bay, Auckland, Whakatakataka Bay, Auckland Harbour; Gold Hole Beach, Northcote, Auckland Harbour; Ferry Wharf extension, Wellington Harbour.

Bridges.—Whangape Stream, Waikato River; Waikato River, Tuakau; Whau Creek, Auckland; Meola and Motion's Creek, Auckland Harbour.

Retaining-walls and Outfalls, Reservoirs, &c.—Ponsonby, Auckland Harbour; Sumner; Haughton Bay, Cook Strait; Otahu, Manukau Harbour.

Transmission-lines.—Uretara River, Kati Kati.

Harbour-works.—Whangarei Harbour Board; Otago Harbour Board; Wanganui Harbour Board; Wellington Harbour Board.

IRRIGATION—CENTRAL OTAGO.

Operation of Completed Irrigation Schemes.

During the past year the several completed schemes have been maintained in good condition, and all lands requiring water have been supplied. The irrigation season was a fairly successful one, the water-supplies have been good, and the distribution of water has been subject to very little interruption.

Of the schemes in operation, the following are on a trading basis: Ardgour, Bengerburn, Earnscleugh, Galloway, Hawkdun, Ida Valley, Last Chance, Manuherikia, Tarras, and Teviot. Accounts have been rendered for £14,120, and working-expenses amount to £14,152, or very nearly the same as the amount of the accounts as rendered. This does not show a return as well as last year, the reason being that the Hawkdun scheme has now been included on a trading basis where irrigators are paying on the earlier (lower) stages of the deferred scale; and on two other schemes substantial areas have been withdrawn for the time being from irrigation.

The number of irrigators in the total area irrigated on all Government schemes for the past year is as set out in the following table:—

Scheme.	Number of Irrigators.	Acres under Irrigation.	Scheme.	Number of Irrigators.	Acres under Irrigation.
Ardgour	12	1,462	Last Chance ..	23	2,915
Arrow	23	2,000	Manuherikia ..	77	5,830
Bengerburn ..	14	144	Tarras ..	17	2,495
Earnscleugh ..	52	2,048	Teviot ..	58	3,867
Galloway	22	2,453			
Hawkdun	61	8,017		408	42,672
Ida Valley ..	49	11,441			

For the previous year the totals were 395 irrigators, with 41,895 acres under irrigation.

Of these schemes, the Arrow scheme, which is now complete, has come into partial service. Some settlers have used little or no water, this being largely due to the wet summer experienced. At Galloway the temporary pumping-plant continued in use during the season to ease the draw-off from Manorburn reservoir, but the need for its further use no longer exists, and it has been dismantled. At Ida Valley, a diminished supply was again given this year, on the same scale as indicated in my last year's report. Storage is now accumulating in the new Poolburn reservoir, and as Manorburn reservoir is now accumulating a much better storage than in the preceding two years the full supply will be given next season.

The position in respect to the payment of last season's irrigation accounts is very serious, the greater amount being outstanding, although the time up to which rebate is allowed has lapsed. The matter requires the serious consideration of the Government.

New Schemes and Additions to Schemes in operation.

Poolburn Dam, Ida Valley Scheme.—This work, designed to supplement the storage necessary for the Ida Valley scheme, is now complete. Concreting recommenced, after the winter shut-down, on the 3rd November, 1930, and finished on the 22nd May last. The whole construction operations ran very satisfactorily, the plant layout was very suitable, and an excellent job has resulted. Quantity of concrete in this work is 13,980 cubic yards.

Idaburn Scheme.—This small scheme, located at Oturehua, will supply water to 600 acres, distributed among eight settlers who have signed agreements. Work is proceeding on the excavations of the foundations for the dam, and some race-work has been put in hand.

Surveys and Investigations.

Lauder-Omakau Scheme (Upper Manuherikia).—Under this scheme 14,000 acres of irrigable land are included. Surveys and plans of the various works necessary are complete. The land under this scheme is favourably situated as an irrigation project. No steps have yet been taken to have irrigation agreements signed.

Maniototo Scheme.—A survey party has now been in the field for two months, running contours, taking levels and cross-sections to enable a preliminary decision to be made regarding major works, and the most suitable area or areas for irrigation development. This scheme covers a very large area—over 100,000 acres—very favourably situated, both as to aspect and easy slopes, for irrigation purposes, and as to roads and railways for the transport of the produce which will be grown when the land is irrigated.

TRAMWAYS.

Auckland.—During the year the Auckland Transport Board has carried on a progressive policy in regard to new construction, the following works being carried out and approved: Mount Eden Road, 173·26 ch. double track; Sandringham Road, 64·50 ch. double track; Richmond Road, 105 ch. double track; Station Loop, 25·50 ch. single track; Garnet Road, 58 ch. single track. Inspections and brake-tests were made for seventeen new tram-cars.

New Plymouth.—Three cars were converted to one-man control, and fitted with compressed-air emergency, service, and rheostatic brakes, and automatically air-operated folding doors. These were inspected and passed.

Wanganui.—Four cars have been reconditioned and arranged for one-man control, being fitted with compressed-air emergency, service, and rheostatic brakes, and have been tested and approved.

Wellington.—The following new works were carried out and approved: Aro Street extension, 3·4 ch.; Whitmore Street extension, 10·5 ch. double track; Customhouse Quay realignment, 26·36 ch.; Grosvenor Terrace, 41·1 ch. duplication; Hobart Street, Miramar, 28·9 ch. duplication. Five new cars were tested and passed for service.

Christchurch.—No new lines were laid during the year, but re-laying of existing lines was carried out between Carlyle and Brougham Streets on the Cashmere Hills route, between Leinster Road and Papanui on the Papanui route, and between Fitzgerald Avenue and Bamford Street on the Sumner line. An alteration to the lines in the vicinity of the Avon River Bridge, on the New Brighton line, was effected, this being necessitated by the construction of the new bridge. Authority was granted the Tramway Board to discontinue the tram service between Papanui and the old terminus at Northcote Road. The tram-line has been taken up and the tram service has been replaced by a petrol-bus service. The institution of a trolly-bus service to serve North Beach was well forward; this service actually commenced to run on the 4th July. No new tram-cars were put into operation during the year, but seven forty-passenger trolly-buses have been constructed and were ready to be placed in operation by the 30th June.

STAFF.

I would like to place on record the exceptionally good work which has been done by the staff during the past year. The numbers of men employed rose to a figure unprecedented in the history of the Department. Officers were called upon at short notice to commence works for the relief of unemployment, and responded splendidly. Had the numbers not fallen considerably later on, it would have been quite impossible to continue without very considerable increase in the staff, as many of the officers were really strained to the breaking-point, but nevertheless carried on.

I would particularly like to mention the staff in the Hawke's Bay District, who stood up to the shock and immediately commenced remedial measures and the organizing of relief in a way which invoked the admiration of all with whom they came in contact.

PUBLIC BUILDINGS.—MAINTENANCE.

The maintenance of public buildings has been carried out by the District Engineers and their staffs in accordance with proposals and reports prepared in District Offices. Maintenance work is, for more ready reference, included with public-building work reported on by the Government Architect.

PUBLIC-BUILDING WORKS AND ELECTRICAL OPERATIONS.

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

F. W. FURKERT, C.M.G.,
M.Inst.C.E., 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, 1931.

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, 1904–30.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.					
							Surveyed.	Under Formation.	Under Platelaying.	Opened for Traffic.		
										Date.	Length.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13
		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-Kamo	41 48	4 43	46 11	..	..	..	..	..	41 48
	Kamo-Grahamtown ..	9 22	Kamo-Onerahi	9 22	3 43	12 65	..	..	..	..	..	9 22
	Kawakawa-Hokianga ..	48 38	Otiria-Okaihau	24 45	1 79	26 44	..	..	..	..	..	24 45
			Okaihau-Hokianga ..	23 73	2 6	25 79	10 0	2 73	11 0	..	..	..
Kaihu Valley	Kaihu Valley	24 32	Dargaville-Donnelly's Crossing	24 32	1 58	26 10	..	..	..	..	..	24 32
North Auckland Main Trunk Railway	Dargaville-N.A.M.T. Railway	17 28	Dargaville-Kirikopuni ..	17 28	..	17 28	..	2 13	15 15	..	..	..
Whangarei Branch Railway	Kaipara Northwards ..	83 39	Helensville-Kirikopuni ..	83 39	10 28	93 67	..	..	..	..	..	83 39
Kaipara-Waikato ..	Whangarei Branch ..	19 79	Kioreroa-Waiotira	19 79	1 76	21 75	..	..	..	..	..	19 79
	Kaipara-Newmarket ..	35 73	Helensville-Newmarket ..	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 64	11 52	..	..	..	27 April, 1930	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	..	..	..	..	..	..
Waiuku Branch ..	Waiuku Branch Railway ..	12 69	Paerata-Waiuku	12 69	2 1	14 70	..	..	..	..	..	12 69
Huntly-Awaroa ..	Huntly-Awaroa	8 75	Huntly-Awaroa	8 75	1 18	10 13	..	..	..	..	..	8 75
Survey, new lines ..	Waikokowai Branch Railway	8 25	Waikokowai	8 25	..	8 25	8 25	..	..	..	..	..
Surveys, new lines ..	Paeroa-Pokeno	42 0	Paeroa-Pokeno	42 0	..	42 0	42 0	..	..	..	..	..
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	..	..	..	..	..	12 40
East Coast Railway ..	Waihi-Opotiki or East Coast Railway	139 53	Waihi-Taneatua	97 42	14 3	111 45	..	..	..	..	..	97 42
			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 33

* Double track. † Rails taken up. ‡ Preliminary survey.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1931—*continued.*

NORTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.					
							Surveyed.	Under Formation.	Under Platelaying.	Opened for Traffic.		
										Date.	Length.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.
New survey	Rotorua-Taupo	53 30	Rotorua-Taupo	53 30	..	53 30	53 30*	..	..	..	..	..
Gisborne-Rotorua ..	Gisborne-Opotiki	92 44	Gisborne Wharf - Motuhora	49 32	6 27	55 59	..	..	..	..	..	49 32
			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	..	..	..	..	..	11 73
			Eskdale-Putorino	26 69	1 49	28 38	..	..	..	6 Oct., 1930	26 69	26 69
			Putorino-Wairoa	33 32	3 4	36 36	..	10 45	22 67	..	..	..
	Gisborne - Wairoa (Inland Route)	72 42	Gisborne Station - Makaraka	3 5	..	3 5	..	..	..	..	..	..
			Makaraka-Ngatapa ..	11 51	1 29	13 0	..	..	..	..	..	11 51
			Ngatapa-Wairoa	57 66	..	57 66	..	3 0	1 50†	..	..	..
							14 65	Perm.				
							38 31	Prelim.				
	Wairoa-Gisborne (Waikokopu Route)	59 75	Wairoa-Nuhaka	18 24	1 18	19 42	..	..	18 24	..	..	..
			Nuhaka-Waikokopu ..	6 11	0 49	6 60	..	..	6 11	..	..	..
			Waikokopu-Kopuawhara ..	10 72	..	10 72	..	10 72	..	..	..	..
			Kopuawhara-Wharerata ..	9 18	0 34	9 52	5 18	8 0	..	..	..	..
			Wharerata-Gisborne ..	15 30	..	15 30	6 30	13 30	..	..	..	..
			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 79
	Greytown Branch	3 7	Woodside-Greytown ..	3 7	0 64	3 71	..	..	..	..	..	3 7
	Featherston-Martinborough	11 50	Featherston-Martinborough	11 50	..	11 50	11 50	..	..	..	..	..
	Greytown-Martinborough ..	4 62	Greytown-Martinborough ..	4 62	..	4 62	4 62	Trial ..	..	..	..	..
	Lower Hutt - Silverstream ..	9 34	Lower Hutt - Waterloo Road	9 34	1 62	11 16	6 50	..	..	..	..	‡2 64
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-New Plymouth	Wellington-Manawatu ..	83 37	Wellington-Longburn ..	83 37	15 76	99 33	..	..	..	7 Dec., 1908§	..	83 37
		7 7‡	Tawa Flat Deviation ..	7 7‡	0 45	7 52	7 7	7 7	..	..	..	..
		6 78‖	Palmerston North Deviation	6 78‖	16 11	23 9	..	6 78	..	..	..	..
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.	..	..	..	..
	Patea-Waitara and New Plymouth	72 29	Patea-New Plymouth Breakwater	72 29	11 52	84 1	..	..	..	..	..	72 29
	Bulls Branch	3 79	Bulls Branch	3 79	..	3 79	3 79	Prelim.	..	..	..	..
	Wanganui Branch ..	3 29	Aramoho-Wanganui ..	3 29	2 23	5 52	..	..	..	..	..	3 29

* Trial survey. † Rails taken up. ‡ Double track. § Date of purchase. ‖ Works closed down.

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1931—*continued.*

NORTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.					
							Surveyed.	Under Formation.	Under Platelaying.	Opened for Traffic.		
										Date.	Length.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.
Stratford - Main Trunk ..	Stratford - Main Trunk ..	89 0	Stratford-Tahora	47 40	4 63	52 23	..	..	..	..	..	47 40
			Tahora-Raekohua	3 20	..	3 20	..	..	3 20	..	..	..
			Raekohua-Heao	4 63	..	4 63	..	4 63	..	..	..	..
			Heao-Tokirima	3 47	0 15	3 62	..	3 47	..	..	..	..
			Tokirima-Ohura	10 60	0 25	11 5	..	3 20	7 40	..	..	..
			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	„	..	..	..	..
			Puketutu-Mangaroa Deviation	30 0	..	30 0	30 0	„	..	..	..	..
	Opunake - Mountain Road ..	23 10	Opunake-Eltham	23 10	..	23 10	23 10	..	..	..	..	..
	Te Roti - Moturoa ..	56 18	Te Roti - Opunake ..	22 63	3 2	25 65	..	..	..	..	..	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	..	..	..	..	..	6 0
			Quarry Section	3 3	0 60	3 63	..	1 58	1 25	..	..	..
North Island Main Trunk Railway	Marton - Te Awamutu ..	209 69	Marton Junction-Te Awamutu	209 69	26 13	236 2	..	..	..	..	..	209 69
	Waipa Gravel Access Branch	7 40	Otorohanga	7 40	..	7 40	..	..	..	..	..	..
	Raetihi Branch	8 50	Raetihi Section	8 50	1 7	9 57	..	..	..	..	..	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	„	..	..	..	..
		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	„	..	..	..	..
	Totals	2,792 14		2,792 14	252 52	3,044 66	1,052 15	82 51	115 61	..	36 57	1,545 49

* Rails taken up.

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, 1931—*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, 1904–1930.

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.					
							Surveyed.	Under Formation.	Under Platelaying.	Opened for Traffic.		
										Date.	Length.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13
		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)	145 75	Stillwater-Landing ..	52 58	7 20	59 78	..	..	..	..	..	52 58
			Landing-Inangahua ..	6 0	0 10	6 10	..	1 26	..	..	..	4 54
			Inangahua-Murchison ..	23 53	..	23 53	3 0	Perm.	..	..	..	..
							16 53	Prelim.	..	..	..	..
							7 0	Trial ..	..	..	..	..
			Murchison-Kawatiri ..	21 70	0 38	22 28	22 28	18 5	5 23	..	..	..
			Kawatiri-Belgrove ..	41 54	3 24	44 78	..	..	..	..	..	41 54
	Brunner-Springfield ..	92 68	Brunner-Springfield ..	92 68	10 41	103 29	..	..	..	..	..	92 68
Blackball Railway ..	Ngahere-Blackball ..	3 40	Ngahere-Blackball ..	3 40	1 20	4 60	..	..	..	..	..	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 - Cape Foulwind	Westport - Cape Foulwind ..	7 0	Westport - Cape Foulwind ..	7 0	0 60	7 60	..	..	..	..	..	7 0
Westport-Inangahua ..	Westport-Inangahua Junction	26 0	Westport - Te Kuha ..	5 74	0 10	6 4	..	..	..	..	..	5 74
			Te Kuha - Inangahua Junction	20 6	0 39	20 45	..	16 6	4 0	..	..	..
State Colliery, or Coal Creek Railway	Greymouth - Point Elizabeth Collieries	5 1	Greymouth - Runanga Colliery	5 1	2 10	7 11	..	..	..	..	..	5 1
	Extension	3 69	Runanga Colliery-Point Elizabeth Collieries	3 69	2 20	6 9	..	..	..	..	..	3 69
		2 44	Runanga to Seven-mile ..	2 44	1 40	4 4	..	..	..	..	..	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-Ross	14 31	1 50	16 1	..	..	..	..	..	14 31
			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 - Hapuka River ..	92 38	Picton-Wharanui	56 6	6 26	62 32	..	..	..	..	..	56 6
			Wharanui-Kekerangu ..	7 0	..	7 0	..	7 0	3 20	..	..	..
			Kekerangu - Hapuka River ..	29 32	..	29 32	27 0	18 0	..	..	..	..
							2 32	Trial ..	..	..	..	..
	Hapuka River - Conway River	18 0	Hapuka River - Kahautara River	11 0	..	11 0	11 0	Prelim.	..	..	..	..
							9 48	Trial ..	..	..	..	..
			Kahautara River - Oaro ..	7 0	..	7 0	7 0	Prelim.	..	..	..	..
			Oaro-Conway	9 0	..	9 0	3 0	Perm.	..	..	..	..
							6 0	Prelim.	..	..	..	..
	Conway River - Parnassus ..	22 0	Conway-Parnassus ..	13 0	..	13 0	13 0	13 0	..	..	..	..
	Parnassus-Waipara ..	44 14	Parnassus-Waipara ..	44 14	4 43	48 57	..	..	..	..	..	44 14

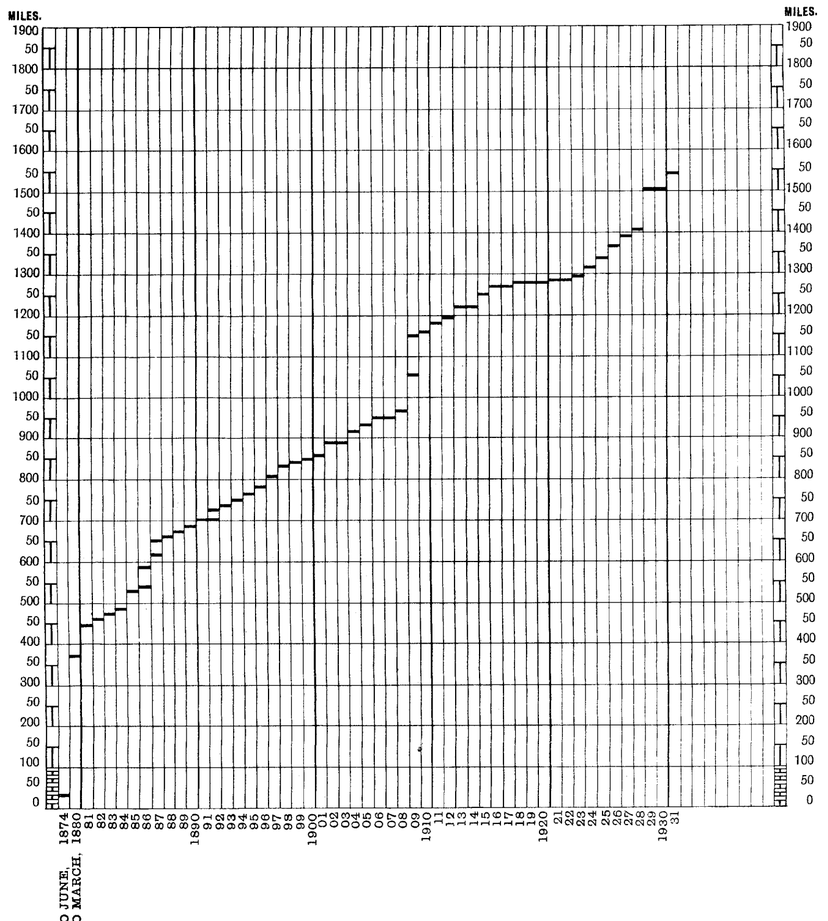
TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1931—*continued.*

SOUTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.					
							Surveyed.	Under Formation.	Under Platelaying.	Opened for Traffic.		
										Date.	Length.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13
		M. ch.		M. ch.	M. ch	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.
Hurunui-Waitaki ..	Main Line	206 7	Culverden - South Waitaki ..	206 7	64 68	270 75	..	..	..	..	..	206 7
	Branches—											
	Culverden-Waiau ..	13 0	Culverden-Waiau	13 0	1 56	14 56	..	..	..	..	..	13 0
	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	33 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	..	..	..	..	..
	Waimate	17 43	Studholme - Waihao Downs	12 63	1 57	14 40	..	..	..	..	..	12 63
			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 8	..	6 8	6 8	..	..	..	..	..
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-Hakataramea ..	37 33	2 40	39 73	..	..	..	..	..	37 33
	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	..	..	..	..	..
	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

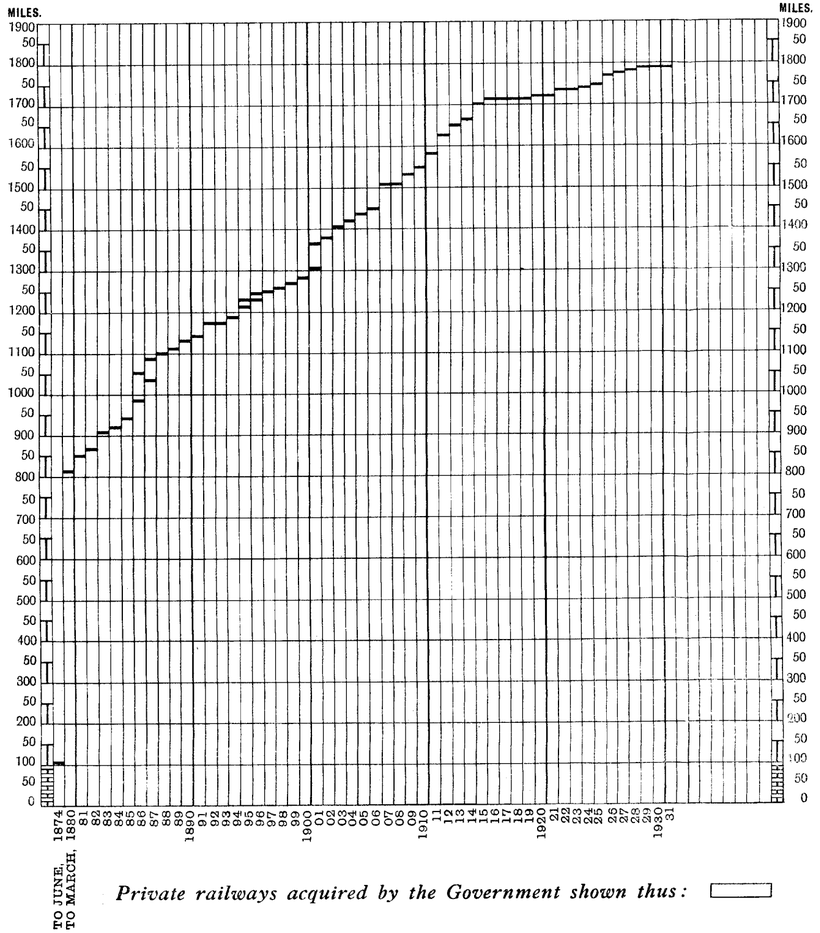
NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

NORTH ISLAND.



NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

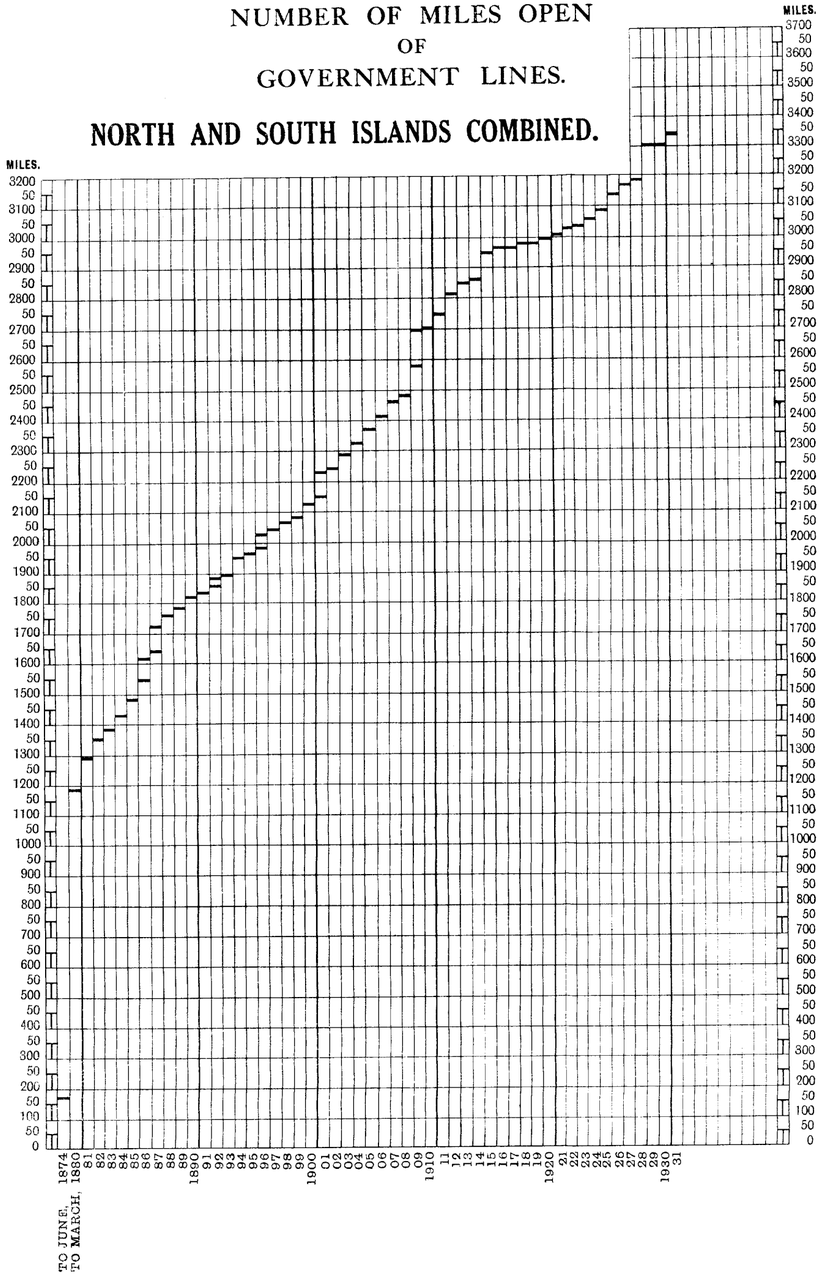
SOUTH ISLAND.



Private railways acquired by the Government shown thus: ▭

NUMBER OF MILES OPEN
OF
GOVERNMENT LINES.

NORTH AND SOUTH ISLANDS COMBINED.



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
1931

— Scale of Miles —

10 0 10 20 30 40 50 60 70 80

— REFERENCE —

GOVERNMENT RAILWAYS.

Opened - -
Under construction
Proposed - -
Explored - -

PRIVATE RAILWAYS.

Opened - -

TASMAN SEA

PACIFIC OCEAN

SOUTH

C. Farewell
GOLDEN BAY
D'Urville Id
French Pass
COOK STRAIT
TASMAN BAY
Karamea R.
KARAMEA BIGHT
Mokihinui R.
C. Foulwind
Arahura R.
HOKITIKA
Abut Hd
Pt Elizabeth
Kaikoura Peninsula
Conway R.
Waiau-ua R.
Hurunui R.
CLOUDY BAY
C. Campbell
Clarence R.
PEGASUS BAY
Ashley R.
Waimakariri R.
Banks Peninsula
Rakaia R.
Ashburton R.
Rangitata R.
CANTERBURY BIGHT
Waitaki R.
Taieri R.
C. Saunders
Shag Point
Milford Sound
L. Wakatipu
L. Te Anau
Manapori L.
Monowai L.
Hauroto L.
L. Wanaka
L. Hawea
L. Ohau
Pukaki L.
L. Tekapo
L. Heron
L. Coleridge
L. Ellesmere
L. Forsyth
L. Waihola
Chutha R.
Waiau R.
Mataura R.
The Bluff
SOLANDER Id
RUAPUKE Id
STEWART Id
MASON BAY
Port William
East Head
S.W. Cape
Port Pegasus
FOVEAUX STRAIT

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		53
Dunedin to Cromwell		155
Dunedin to Port Chalmers		8
Gore to Lumsden		37
Gore to Waikaka		13
Waipahi to Edievale		26
Milton to Roxburgh		61
Dunedin to Oamaru	78	
Oamaru to Timaru	52	
Timaru to Ashburton	47	
Ashburton to Rolleston	28	
Rolleston to Christchurch	13	
Dunedin to Christchurch		**230**
Christchurch to Lyttelton		7
Oamaru to Hakataramea		48
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		58
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
Engineers Department
NEW ZEALAND.
E. W. FURKERT, M.INST.C.E.
ENGINEER-IN-CHIEF.

PUBLIC WORKS MAP
SHOWING THE RAILWAYS
NORTH ISLAND
OF
NEW ZEALAND
1931

— Scale of Miles —

10 0 10 20 30 40 50 60 70 80

— REFERENCE —

GOVERNMENT RAILWAYS.

Opened - - ———
Under construction - - - - - -
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 Taneatua		**227**
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**

PRINTED BY W. A. G. SKINNER, GOVERNMENT PRINTER, WELLINGTON

TABLE OF LENGTHS OF GOVERNMENT LINES AUTHORIZED, CONSTRUCTED, AND SURVEYED UP TO 31ST MARCH, 1931—*continued.*

SOUTH ISLAND—*continued.*

Appropriation.	Division.	Mileage.	Section.	Main Line.	Sidings.	Total.	State of Line.					
							Surveyed.	Under Formation.	Under Platelaying.	Opened for Traffic.		
										Date.	Length.	Total.
1	2	3	4	5	6	7	8	9	10	11	12	13
		M. ch.		M. ch.	M. ch.	M. ch.	M. ch.	M. ch.	M. ch.		M. ch.	M. ch.
Waitaki-Bluff and Branches —*continued.*	*Branches*—continued.											
	Lawrence	21 76	Clarksville-Lawrence ..	21 76	2 2	23 78	..	..	..	..	..	58 67
	Lawrence-Roxburgh ..	36 71	Lawrence-Roxburgh ..	36 71	2 35	39 26	..	..	..	..	..	
	Lovell's Flat - Tuapeka Mouth	23 20	Surveyed	23 20	..	23 20	23 20	..	..	..	..	..
	Balclutha - Tuapeka Mouth	22 0	Surveyed	7 0	..	7 0	7 0	..	..	..	..	..
			Trail Survey	15 0	..	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-Tahakopa ..	42 67	4 2	46 69	..	..	..	..	..	42 67
			Tahakopa-Marinui ..	23 63	..	23 63	23 63	Prelim.	..	..	..	..
			Marinui-Tokanui	6 0	..	6 0	6 0	..	..	..	..	..
			Tokanui-Appleby	32 79	2 34	35 33	..	..	..	..	..	32 79
	Waipahi - Heriot Burn ..	26 23	Waipahi-Edievale	26 23	2 48	28 71	..	..	..	..	..	26 23
	Extension to Roxburgh via Rae's Junction and Ettrick	28 10	Surveyed	28 10	..	28 10	28 10	Prelim.	..	..	..	..
	Via Spylaw	25 70	Surveyed	25 70	..	25 70	25 70	Prelim.	..	..	..	..
	Waimea Plains District Rly.	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	..	..	..	..	..	12 65
	Riversdale-Switzers ..	13 70	Riversdale-Waikaia ..	13 70	1 40	15 30	..	..	..	..	..	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-Cromwell ..	147 27	10 24	157 51	..	..	..	..	..	147 27
			Surveyed	35 18	..	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-Orawia	56 34	8 25	64 59	..	..	..	..	..	56 34
			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	2,360 56		2,360 56	267 57	2,628 33	539 22	78 22	12 43	..	..	1,793 77

APPENDIX C.

ANNUAL REPORT OF 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 Department for the year ended 30th June, 1931.

During the period plans were prepared for forty-one new works, of a total estimated value of £329,460, of which sixteen contracts, to the amount of £56,250, have been let. In addition, thirty contracts, to the amount of £188,801, for buildings designed prior to the 30th June, 1930, have also been let, making the total works completed or under construction £245,455.

The latter total includes £73,126 for secondary-school buildings.

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 showing a downward tendency, and the standard of workmanship has been satisfactory.

Earthquake.—The Hawke's Bay earthquake of the 3rd February subjected buildings to an exceedingly severe test, which Government buildings, generally, on account of their more substantial construction, withstood remarkably well, there being no cases of collapse other than the clock-towers of Hastings and Wairoa Post-offices, and no reported injury to persons except those resulting from the falling of the Hastings tower. The Post and Telegraph Department, to obviate this danger, has for several years discontinued the practice of building clock-towers.

The departmental building at Napier and Port Ahuriri Post-office were totally destroyed by the combined effect of earthquake and fire.

The new post-office at Napier successfully withstood the shock without structural damage, but was completely gutted by fire.

All modern brick buildings and additions erected by the Government in the area embodied earthquake protection (uncalculable), and some came through the ordeal unscathed, others with minor damage only, while some show large cracks and extensive damage, which serve to prove that Government buildings were not, as has been repeatedly stated, unnecessarily strong, and that comparatively little more earthquake protection would have been sufficient.

In view of the lesson learned in Hawke's Bay, steps are being taken to provide additional stiffening in existing buildings where such is deemed necessary.

In recent years all State buildings of over three stories in height have been designed with steel frames definitely stiffened to withstand the horizontal forces of a very severe earthquake.

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

VICEREGAL RESIDENCES.

Auckland.—Improvements were carried out to the kitchen, including tiling-in of the large gas range. General maintenance was also carried out during the year.

Wellington.—General maintenance was carried out during the year. Four fireplaces were dismantled and modern grates with tiled surrounds were installed.

PARLIAMENT BUILDINGS.

Sundry renovations were carried out as required during the year.

POST-OFFICES.

Whangarei District.—Additions were made to post-offices at Kaitaia and Kaikohe. Extensive alterations and additions in brick and concrete were completed at Whangarei Post-office. Alterations, repairs, and renovations were carried out to four other offices.

Auckland District.—At Upper Symonds Street, Auckland, a new three-storied post-office, with steel frame and reinforced-concrete walls and floors, has been erected and is practically ready for occupation. At Mount Albert, Auckland, a one-story brick post-office has been erected. Extensive additions in brick have been carried out to Newton Post-office, and in wood to Papatoetoe Post-office. Extensive alterations have been made to Auckland Central Post-office. Additions, alterations, repairs, and maintenance have been carried out as required to twenty-seven post-offices and residences.

Taumarunui District.—A new post-office, in wood, was erected at Te Anga. Renovations and repairs were carried out to eight offices.

Tauranga District.—Extensive renovations, &c., have been carried out to Rotorua Post-office. A new roof was provided for Mokai Post-office. Repairs and renovations were carried out to four other offices.

Gisborne District.—A new post-office and residence combined, in wood, is nearing completion at Ruatoria. Extensive repairs and renovations were carried out to Gisborne Post-office, two telephone-boxes were erected, and general maintenance attended to. Repairs were carried out at Tikitiki Post-office, which was damaged by fire.

Stratford District.—At Waitara a new two-storied post-office in brick and concrete has been completed. At Urenui a new post-office in wood was erected. Repairs and renovations were carried out to twelve offices and five official quarters; general maintenance-works were attended to as required.

Napier District.—The new three-storied post-office at Napier was completed in July, 1930, and a large quantity of fittings and fixtures provided and installed. The building is a composite structure of steel-frame, reinforced concrete and brickwork—the street frontages being finished with Coromandel granite and Oamaru stone. Subsequent to the earthquake of the 3rd February, temporary accommodation was provided for the Postal Department in the Hawke's Bay Farmers' old building. Additional garage accommodation was provided at Wairoa and ordinary maintenance work effected. Renewals and repairs were carried out to Nuhaka Post-office, and walls damaged by fire in the main office were made good. Earthquake damage has been made good, partly or completely, at the following post-offices: Clive, Tarawera, Taradale, Tikokino, Waipawa, Norsewood, Porangahau, Woodville, Wairoa, Havelock North, Greenmeadows, Ongaonga, Waipukurau, Dannevirke, and Otane.

Wellington District.—The new eight-storied post-office at Wellington East (Courtenay Place) is progressing satisfactorily, and should be completed about the end of September next. Extensive alterations and additions have been made to Masterton Post-office, and the old portion of the building is being renovated. Alterations, repairs, and renovations were carried out as required to twenty-three post-offices in the district.

Nelson District.—The extensive additions and alterations to Nelson Central Post-office were completed, also the strengthening of the tower. The large store and garage at Blenheim was completed. Repairs and renovations were carried out to eight post-offices.

Christchurch District.—In September, 1930, a contract was let for the erection of a four-storied post-office at High Street, Christchurch. The building will be of steel frame and reinforced concrete construction, and the steel frame has been erected to first-floor level. An old wooden building was demolished and removed; ninety-nine concrete piles were driven and a concrete foundation raft constructed on same. Excavation for the basement and concrete walls and floor for same were completed. It is expected that the building will be ready for occupation early in 1932. A residence in wood was erected for the Postmaster at Hinds. Extensive alterations and renovations were carried out to the old manual exchange at Christchurch. Repairs and renovations were carried out to sixteen post-offices as required.

Dunedin District.—During the year the extensive foundation work in preparation for the new chief post-office was completed, the expenditure for the year being over £18,000. Tenders for the erection have been called and close in January, 1932. A new two-storied post-office and residence, in brick and concrete, was erected at Palmerston South. At Kurow a one-story post-office with separate residence was erected in Oamaru stone. Repairs, renovations, and maintenance-works were carried out to thirty-eight post-offices, residences, and telephone exchanges, and also to Awarua Radio-station.

Greymouth District.—A new post-office in reinforced concrete is in course of erection at Westport. This building replaces the post-office which was extensively damaged in the 1929 earthquake and was subsequently demolished. The nature of the site necessitated special reinforced-concrete foundations. The building will be ready for occupation about the end of the year. Repairs and renovations were carried out to eleven offices and residences.

Courthouses.

Whangarei District.—The Courthouse at Kaitaia was repaired and renovated.

Auckland District.—The new Courthouse at Hamilton was completed during the year and opened on the 22nd February. The building was completely furnished and the grounds are being laid out. Repairs, &c., were carried out at Cambridge, Thames, and Te Aroha Courthouses.

Taumarunui District.—Repairs and renovations were carried out to Courthouses at Te Kuiti and Taumarunui.

Tauranga District.—Alterations and additions were completed at Rotorua Courthouse, and furniture and fittings supplied. Minor works were carried out to two other Courthouses.

Gisborne District.—Repairs and renovations were carried out to Gisborne Courthouse and to the Native Land Court. At the latter building concrete pediments above the roof-level are being removed.

Stratford District.—Improved accommodation for Bench, counsel, and jury was provided at Wanganui Courthouse. Maintenance and repairs were carried out to six other courthouses.

Napier District.—The Napier Courthouse was renovated inside and out prior to the earthquake; and earthquake damage has been made good, partly or completely, at the following Courthouses: Napier, Waipukurau, Ormondville, Waipawa, and Hastings.

Nelson District.—Minor maintenance-works were carried out to Courthouses at Nelson and Blenheim.

Christchurch District.—Repairs and renovations were carried out to Leeston Courthouse.

Dunedin District.—Repairs and renovations were carried out to ten Courthouses.

Greymouth District.—Repairs and renovations were carried out to Greymouth, Westport, and Hokitika Courthouses.

Police-stations and Gaols.

Whangarei District.—Maintenance-work was carried out as required.

Auckland District.—A garage and office were erected at Papakura. Alterations, repairs, and maintenance were carried out as required to seventeen police-stations and residences. At Waikeria Borstal Institute a water-supply was installed, a wool-shed erected, and various repairs and renovations carried out. At Mount Eden Gaol the electric lighting and power services were rewired and overhauled generally and the supply changed from D.C. to A.C.

Taumarunui District.—Minor repairs and renovations have been carried out to police-stations at Taumarunui, Ongarue, and Raurimu.

Tauranga District.—Repairs and renovations were carried out to Rotorua and Whakatane Police-stations.

Gisborne District.—A new police residence, in wood, is in course of erection at Te Araroa. Maintenance-works were carried out to Gisborne and Tokomaru Bay police-stations.

Stratford District.—Repairs and renovations were carried out to ten police stations and one gaol.

Napier District.—General repairs and renovations were carried out to Wairoa police-station. Earthquake damage was made good, partly or completely, at the following police-stations: Napier, Mohaka, Port Ahuriri, Havelock North, Ormondville, Porangahau, Wairoa, Waipawa, Waipukurau, Hastings, Takapau, Dannevirke, and Clive.

Wellington District.—Repairs and renovations were carried out to eleven police-stations in the district.

Nelson District.—Repairs and renovations were carried out to seven police-stations, and to gaols at Nelson and Picton.

Christchurch District.—A residence and office, in wood, was erected at Culverden, and the lock-up and stable removed to new site. Repairs and renovations were carried out to eleven police-stations, and also to Paparua Prison.

Dunedin District. — New police-stations, comprising residences and offices, were erected at Palmerston South, Cromwell, and Milton. At Mornington buildings were removed and re-erected. Repairs, &c., were carried out to twelve other stations. At the Borstal Institution, Invercargill, reclamation and drainage works were carried out.

Greymouth District.—Repairs and renovations were carried out to eight police-stations and two residences.

Mental Hospitals.

Auckland.—At Avondale Mental Hospital a two-storied residence in wood has been erected for the Medical Superintendent. An additional lavatory block was erected for Ward M. 9. A new hot-water service was installed at the Wolfe Home. Sundry other additions and alterations were made to buildings, and the whole of the Nurses' Home was painted and renovated.

Puhitahi.—Villas Nos. 1 and 2, in brick and concrete, were practically completed at the cost of approximately £25,000. These buildings will accommodate one hundred male patients. Electric-lighting services have been installed by the Department, and the permanent mains for the institution are being installed.

Tokanui.—The Nurses' Home has been completed and handed over to the Mental Hospital Department. Water-supply and fire services have been installed, and roads formed and metalled. A new transformer sub-station and a standby generating plant have been completed, all road-lighting completed, the change-over to the 230-volt Power Board's supply for the main building completed, and all wiring overhauled. Fire-alarm system has been completed, and telephone system is nearing completion. Various maintenance-works have been carried out.

Porirua.—Several alterations and additions were made to various buildings during the year and renovations carried out as required. A surgery was added to "A" Ward, female division, main building. Electrical change-over to the 230 voltage was completed for several buildings and residences. Concrete-work on the reservoir was completed, the dam-face being raised to full height.

Nelson and Stoke.—Three villas, commenced the previous year, were completed, furnished, and occupied. The equipment for the new bakery was installed. The septic tank was completed and all drainage connected thereto. The new reservoir and water-supply is nearing completion. The boundary-fences were reconditioned and completed. At York's Cottage property alterations and renovations were carried out and contour plans of the property were prepared. A new high-tension line for electric supply was installed and the low-tension line reconditioned. Various other works were carried out as required.

Sunnyside.—A new villa, in wood, has been erected. The building has accommodation for fifty-four male patients. Repairs to the boiler-house chimney-stack were carried out.

Templeton.—Fire services were installed for Villas Nos. 2 and 3, and extensive drainage-work carried out to Villas Nos. 1 and 2.

Seacliff.—All necessary machinery and appliances were installed in the new laundry and kitchen block, and the old kitchen block was altered and rearranged. New service roads and paths were constructed, additional lavatories erected, new furnishings and fittings supplied, and extensive renovations, repairs, and alterations carried out to the various buildings as required.

Waitati.—A new villa for female patients was completed and extensive furniture and furnishings supplied. A new access road was formed and sundry other works attended to.

Hokitika.—A large villa, in wood, was completed during the year. A pumping-plant was fitted up and laundry machinery installed. New farm buildings, in wood and iron, on concrete foundations were erected and 20 chains of 4 in. water-service pipes laid. Furniture and fittings were supplied for the new villa.

EDUCATION DEPARTMENT.

Whangarei District.—New class-rooms, outbuildings, &c., were erected to ten Native schools. Repairs and renovations were carried out to fifteen Native schools.

Auckland District.—Alterations were completed to the Rakaumanga Native School, and repairs, &c., carried out to other schools. New office accommodation was provided for the Child Welfare Department in the Wellesley Street Post-office, and a Children's Court provided. These works involved extensive alterations.

Tauranga District.—A new Native school and residence is in course of erection at Ruatoki West. New class-rooms were erected at Te Whaiti and Te Kotukutuku Native Schools. Repairs and renovations were carried out to ten Native schools.

Gisborne District.—Extensive repairs, &c., were carried out to the Gisborne High School, Girls' Hostel, and to the Main School and baths. A new Native school and residence were erected at Whangaparaoa; a new residence at Tokata; a two-roomed bach at Mangawhariki; a new class-room and new concrete foundations to school at Hiruharama; new shelter-sheds, &c., at Waiomatatini. Repairs and renovations were carried out to six Native schools.

Stratford District.—A contract was accepted for the erection of a Technical College Hostel at Wanganui, and the building is in course of erection. It is being constructed of reinforced concrete and brickwork. Additional accommodation was provided at the Boarding-out Office, Wanganui, and repairs and maintenance carried out as required.

Napier District.—The new Napier Technical School, a two-storied building in brick and reinforced concrete, was almost completed prior to the earthquake. The new Napier Girls' High School, of similar construction to the above, was well advanced at the time of the earthquake. These buildings were damaged in the earthquake, and the contracts have been terminated, as future educational policy has been changed by the earthquake. A new class-room was added to Nuhaka Native School, and repairs and renovations were carried out to Native schools at Kokaho and Rangiahuia. Earthquake restoration work has been carried out to Native schools at Te Haroto, Waihua, Nuhaka, and Te Reinga; also to the Greenmeadows Receiving-home. Tenders have been received for the restoration of earthquake damage to the Hastings High School, and reports have been prepared on the condition of sundry schools. Dangerous parapets and gable-ends have been removed from Napier Boys' High School.

Wellington District.—New Technical College workshops are in course of erection at Petone. This building, which is of steel-frame construction with reinforced-concrete walls and floors, will be of two stories, with provision for an additional story. Minor alterations and additions were made to the Palmerston North Technical School.

Nelson District.—The contract for new class-rooms for Nelson Girls' College was completed at a cost of approximately £10,000. At Richmond a recreation and dining block was erected for the Special School for Girls, and the cottage homes were altered and repaired. Various maintenance-works were carried out, and reports furnished regarding the condition of seven brick schools.

Christchurch District.—Very extensive additions have been made to Rangiora High School and Timaru Boys' High School. A new social hall and a clinic were erected at Burwood Girls' Home. A new janitor's cottage, in brick, was erected at Timaru Boys' High School. Additions were made to Timaru Girls' High School and Timaru Girls' Home. Repairs were carried out to the School for the Deaf, Sumner.

Dunedin District.—The home-science wing of the Invercargill Technical College was completed in February last. This two-storied wing, in brick and reinforced concrete, adjoins the original wing erected in 1927. At Anderson's Bay Home extensive renovations were carried out.

Greymouth District.—Extensive additions, consisting of four class-rooms and a detached sanitary block, were erected at Greymouth Technical School. Repairs and renovations were carried out to the School of Mines, Reefton.

HEALTH DEPARTMENT.

Auckland District.—Extensive repairs and renovations were carried out to St. Helens Hospital, and sinks and sterilizers provided and fitted up.

Gisborne District.—At St. Helens Hospital, Gisborne, an ante-natal block and a maids' cottage were erected. Alterations and additions were made to the main building, and all chimneys which collapsed in the earthquake were rebuilt.

Napier District.—A brick storeroom at Napier Hospital and a cottage for the district nurse at Hastings Hospital (also in brick) were in course of erection at the time of the earthquake, the foundations having been laid and walls commenced. Since the earthquake the works have been suspended and contracts cancelled.

Wellington District.—The very extensive additions to Ewart Hospital, for the Wellington Hospital Board, were completed during the year. This hospital is for tubercular patients. The work consisted of an additional story to the hospital block, a new wing to the Nurses' Home, a new boiler-house, and complete new hot-water and cooking services, the total cost being approximately £27,000. At Otaki Sanatorium the following works were completed during the year: New porters' lodge, extension of the Nurses' Home, and a new laundry and fuel-shed.

Christchurch District.—A new building for the Government Laboratory was erected at Christchurch, and heating system and fittings installed.

Dunedin District.—A new Nurses' Home, in wood, was erected for the St. Helens Hospital, Invercargill, and furnished throughout. Sundry repairs were carried out to St Helens Hospital, Dunedin.

Greymouth District.—Plans were prepared for a new boiler-house for Buller Hospital, Westport.

DEFENCE DEPARTMENT.

Whangarei District.—Maintenance-work was carried out as required.

Auckland District.—At Hobsonville Aerodrome the installation of electric light and power service was completed during the year, and electric cookers and hot-water services were installed in all staff houses. At Waikato Camp a drainage system was installed at one staff cottage, and sundry repairs effected to magazines and laboratory. Renovations were carried out to drill-halls at Rutland Street (Auckland), Hamilton, and Cambridge.

Napier District.—Earthquake damage was made good at Napier, Woodville, and Hastings drill-halls and Napier Artillery Barracks.

Wellington District.—Extensive alterations, to accommodate Headquarters Staff, were completed at Buckle Street Stores building. Renovations and general repairs were carried out at Fort Dorset and Trentham Camp.

Nelson District.—Renovations and painting were carried out to the Nelson drill-hall.

Christchurch District.—Alteratious and renovations were carried out to King Edward Barracks, and painting and repairs to Waimate drill-hall.

Dunedin District.—Repairs and renovations were carried out to the drill-hall at Oamaru and to a cottage at Deborah Bay.

Greymouth District.—Repairs were carried out to drill-halls at Greymouth and Hokitika.

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. 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, 1931, represents the sixteenth year of operation of the Lake Coleridge undertaking, and the year's working again shows satisfactory results under exceptional conditions as outlined elsewhere in this report.

FINANCIAL.

The capital outlay at the end of the year was £1,712,555, as against £1,622,199 for the previous year, showing an increase of £90,356. The total revenue for the year was £217,632 as compared with £196,648 for the year ending 31st March, 1930, and after payment of all charges, including interest and depreciation, the net profit was £70,083, which has been allocated as follows: £17,126 to Sinking Fund, and £52,957 to General Reserve Fund.

Table I shows particulars of financial results and load records, while Table II gives an analysis of capital outlay for the years 1930 and 1931.

The total cost per unit generated and purchased was 0·29d., an increase of 0·04d. on that of the previous year, the increase being due to decreased unit output in conjunction with increased working-costs.

Operating-costs have increased by £20,225, due chiefly to a payment of £21,170 towards the purchase of power. The latter amount, however, does not include a total payment of £1,674 13s. 9d. by way of rebate to supply authorities. Details of operating-costs are shown in Table III.

CONNECTED LOAD.

The total connected load at the end of the year was 200,535 kw., being an increase of 10·2 per cent. over the previous year's figures of 181,310 kw.

RESTRICTED SUPPLY.

Owing to the shortage of water at Lake Coleridge, a general appeal was circulated on the 26th August, 1930, amongst the supply authorities to institute a campaign of economy in the use of electricity. The Tramway Board's stand-by plant was called in on the 26th August to render assistance. As the first appeal was apparently not taken seriously, a second circular was sent out on the 4th September, and immediate results were noticed in the power-house load and the level of the lake. I take this opportunity of placing on record the valuable assistance rendered by both private consumers and supply authorities, and desire to express my sincere thanks for and appreciation of their efforts to help the Department.

ACHERON DIVERSION.

Owing to lack of water in the lake, it was decided to divert the Acheron River, and this was successfully done in December, 1930.

POWER-HOUSE LOAD AND OPERATION.

The maximum half-hourly output from the power-house for the year was 30,800 kw. on 9th June, representing an increase of 11·8 per cent. over that of the previous year, the increase being of normal character.

The annual load-factor was 44·8 per cent., which is a decrease of 13·18 per cent. on that of the previous year.

The power-house plant was not overloaded as the installed capacity of the plant is 34,500 kw., and the maximum demand only 30,800 kw., the power-factor being 0·97.

During the period 1st April to 30th June, 1931, the maximum half-hourly load at the power-house was 30,340 kw. on Tuesday, 23rd June, between 4.30 p.m. and 5 p.m., the power-factor being 0·975. This load is 460 kw. less than the recorded load of 30,800 kw., which was observed on 9th June, 1930.

The maximum number of units generated in any one day was 453,710 on the 6th June, 1930, as against 419,420 units on 19th June, 1931.

Lyttelton Diesel Station.

After careful consideration was given to the suitability of several sites for the installation of a Diesel electric-power station, the location at Lyttelton was finally selected in the first week of November, 1930, and excavation was immediately started for the foundations of the units and the building. A high rate of progress has been maintained throughout construction by the General Branch of the Public Works Department. The first two of the four engines to be installed in the first stage of construction of this station were landed on the 3rd February, and erection of all equipment and accessories was pushed on with all speed in case of another shortage of water at the lake. A trial run of No. 2 unit was carried out on the 4th June.

Survey and Easements.

The following surveys were carried out during the year: Acheron River diversion, completion of Waitaki power-supply and Glenavy steel-tower line, second Timaru–Oamaru line, preliminary work in connection with the Oamaru–Dunedin line, location of site for Lyttelton Diesel station, and route of 11 kv. Lyttelton–Woolston line, steel tower crossing over the Waimakariri, location work at Timaru, Oamaru, and Glenavy substations.

Negotiations with reference to easements covering the above routes were undertaken satisfactorily.

Live-line Operation.

Further progress has been carried out in this section with consequent reduction in interruptions to consumers. All insulators on the 11 kv. feeders were tested. Twenty-six poles were replaced under live-line conditions. The 33 kv. transmission-line to Banks Peninsula Power Board was overhauled, and all the 66 kv. insulators were tested between Lake Coleridge, Addington, and Timaru.

Live-line methods were utilized in the installation of a 5,300 kv.a. transformer-bank at Oamaru Substation, thereby reducing the total period of interruption of supply to a few minutes.

During the year a live-line cleaning-appliance was developed and tried out with satisfactory results on 66 kv. and 110 kv. insulators while alive.

Transmission-lines.

Owing to the absence of gales and heavy snowfalls, in the systematic cleaning and testing the line-insulators under live-line conditions, and cutting of trees likely to prove dangerous, very little line trouble was experienced during the year.

Headworks and Power-house.

Full opportunity was taken of the extremely low level of the lake to remove accumulations of shingle. To prevent the tendency for the water to shoal in the vicinity of No. 1 intake cylinder the original groyne was shortened by about 12 ft. and encased in concrete throughout its length. The western groyne was also concreted over the greater part of its length.

No. 1 tunnel was inspected from end to end and found in very fair order. No. 2 tunnel was also partly drained for cleaning the screens at the intake, inspection of the cross-drive tunnel, and of the lake end of the tunnel. No. 3 and No. 6 lines have been painted.

The annual report for year ending 1930 stated that seven out of the ten E.H.T. 4,000 kv.a. transformers had their low-tension coils replaced. The remaining three were dealt with this year.

The reorganized lay-out of the whole of the 66 kv. equipment, which was commenced last year, has been completed, with the exception of the control wiring for the main oil circuit-breakers.

Professor Hornell paid an unofficial visit to the power-house, lake, and headworks in October, 1930.

Addington Substation.

A 12,000 kv.a. bank of 66/11 kv. transformers which arrived in February was erected in March. The capacity of this substation will accordingly be increased from 29,000 kv.a. to 36,000 kv.a. A new circulating water-pump has been installed.

A comprehensive lay-out of railway sidings was prepared and the first section to deal with equipment to and from the substation building itself was laid.

Tests of the bearing value of the ground on the sites of the proposed test laboratory and steel structure were taken.

No damage to any equipment was observed due to the severe earthquake of February last.

No. 2 synchronous condenser, with a capacity of 10,000 kv.a. has arrived, and will be erected as soon as the construction on the two-bay extension of the substation building has been sufficiently advanced.

Point Substation.

The stick-operated single-phase isolating-switches have been replaced with triple-pole isolators.

Hororata.

The whole system of earthing has been rearranged. Alterations involving increasing the number of O.C.B.s from four to eight, replacing the stick-operated isolating-switches with gang-operated type, and replacing the independent-operated earthing-devices with a simpler method of grounding the lines was commenced in February.

Ashburton.

No structural alterations were carried out at this substation during the year.

Timaru.

The contract for the removal of the two staff cottages was let in February, and one of the cottages was re-erected in its new location in March. The first portion of the new steel structure and switch-gear for the auto transformers has arrived, and the transformers were erected in October. The overhead reticulation likely to interfere with the erection of the steel structure was deviated.

Oamaru.

Owing to this station being overloaded, its capacity was increased from 1,050 kv.a. to 5,300 kv.a., by replacing two banks of transformers of 300 kv.a. and 750 kv.a. capacity respectively with a single bank which had been converted from an indoor water-cooled type to an outdoor air-cooled type. The above 5,300 kv.a. transformer-bank has been erected in its permanent position in relation to the steel structure, but a temporary line has been installed to connect it with the existing arrangement.

During the year alterations to the electrical layout in the switch-house were carried out.

Interruptions to Supply.

(a) Power-house Supply.

There was only one interruption of 5½ minutes, which involved an outage throughout the whole undertaking.

(b) Addington, Point, and Hororata Supply.

The total number of interruptions to supply exceeding one minute throughout the year was three, and the accumulative period was 11½ minutes, the longest interruption being 5½ minutes on the 24th July. None of the above interruptions was due to insulator-failure, the systematic testing, cleaning, and weeding-out of defective insulators under live-line methods probably being chiefly responsible for this satisfactory condition of transmission of supply.

(c) Ashburton Supply.

The total number of outages was four, excluding those that had been prearranged, and the total period was 16 minutes.

(d) Timaru Supply.

The total number of interruptions for the year was nine, and the total time 55½ minutes, as against twenty-one interruptions with a total time of 2 hours and 54 minutes for the previous year.

(e) Oamaru Supply.

Excluding all shutdowns that had been prearranged, the number of outages for the year was fifteen, and the total period 6 hours 53½ minutes.

Distribution.

Tenders for the tower-foundations for the Waimakariri River crossing were invited in December, and pile-driving was commenced in March. The telephone circuits on the north, south, and Lyttelton 11 kv. feeders were overhauled and the No. 8 galvanized-iron wire of which the circuits consisted were replaced with No. 10 cadmium copper. The 7/12 aluminium conductors on the 11 kv. Montreal 1 and 2 and tramway 1 and 2 feeders were replaced with 7/0·135″ aluminium cables which had been previously removed from the 66 kv. lines.

Hanmer Power-supply.

On behalf of the Health Department, alterations were made to the Hanmer Power-house. A new Diesel electric set was installed to replace the petrol electric set, thereby increasing the capacity of the station from 45 kw. to 55 kw.

Relay Protection.

Preparations have been made for the installation of new relay panels at Lake Coleridge Power-house, Addington, Woolston, and Lyttelton Diesel stations.

General.

A sectionalized type of drying-oven was designed and manufactured locally during the year. For some considerable period the Testing Department has been functioning at a great disadvantage. The small poilite outbuilding is quite inadequate for the staff, equipment for carrying out tests, and tests records. A design for a new building has been prepared to house the test laboratory, the distribution office and workshop, the E.H.T. testing equipment, transmission-line and distribution-line stores, and live-line-testing equipment. The present store at Addington is to be removed before the outdoor steel structures and switch-gear can be erected.

A design was prepared for a combined Public Works Department store to serve the requirements of the General and Hydro-electric Branches. A railway siding will be laid alongside this store, and will remove a serious handicap which has had to be contended with hitherto.

The railway sidings for the substation building, the test-room, the store, and the outdoor steel structure have been laid out as a single comprehensive scheme for efficient and economical transport of all equipment to and from the substation.

The line for the Hurunui Power Board will be surveyed and constructed in the near future, and the substation at Southbrook will be at the same time redesigned.

At present Stoddart's Corner Substation chiefly supplies Banks Peninsula Power Board through a step-up 11/33 kv. transformer-bank. A route for a 33 kv. transmission-line will be determined and its erection between Addington and Stoddart's Corner will be proceeded with in due course.

At various river-crossings anti-vibration jumpers were fitted to the A.C.S.R. conductors to prevent the breakage of the strands at the clamps due to crystalization caused by vibration of cables between line-supports.

Lake-level and Rainfall.

The year has proved exceptionally dry, and the lowering of the level of the lake has caused much anxiety to both this Department and supply authorities and their consumers. In 1929 the average rainfall over the lake area was 41·89 in., whereas in 1930 it was 25·18 in. The lowest level of the lake was recorded as being 1,658·5 ft., and in March the maximum height of 1,667·55 ft. above sea-level was registered after drought conditions. The level of 1,658·5 ft. represents a drop of 13·5 ft. below the normal lake level of 1,672 ft.

The rainfall at the power-house for the calendar year 1930 was only 22·05 in., the lowest on record, as against 36·28 in. for the previous year: 6·80 in., out of the total of 22·05 in., fell in January when the lake was at overflow level.

Tai Tapu Dairy Co.

I have to report that amicable arrangements have been arrived at whereby this company, one of the oldest consumers of power from the Lake Coleridge scheme, will on 1st July, 1931, hand over its functions as a supply authority to the Springs-Ellesmere Power Board.

HORAHORA-ARAPUNI ELECTRIC-POWER SUPPLY.

1. Capital Outlay.

The total capital outlay at the end of the year, as shown in Table X herewith, was £3,939,122, an increase during the year of £278,695. The main items of increase were £49,336 on headworks at Arapuni, £44,494 on the generating-station, transformers, and other machinery, which includes part of the cost of No. 4 unit, £47,544 on remedial works at Arapuni, and £106,754 in interest during construction—*i.e.*, approximately ten months' interest on works not in operation.

The value of assets in operation at the end of the year (Table IX) was £1,286,667, as compared with £3,330,011 and £1,142,346 for the two previous years, the drop in the one year of over £2,000,000 being due to the closing-down of Arapuni and those other parts of the system which are not at present required to deal with the smaller amount of power now being sold.

2. Financial Results of Operation, and Future Prospects.

The gross profit for the year—*i.e.*, total revenue, £184,593, less working-costs, £101,889—was £82,704. Working-costs includes an assessed amount of £20,737 to be paid to the Auckland Power Board as part compensation for the use of King's Wharf plant as a standby, so that the gross profit on actual supply of power by the Department was £103,441, or 5·99 per cent. on the average capital outlay.

Interest and depreciation charges for the year amount to £118,398, so that the loss on the year's working was £35,694, inclusive of the payment mentioned, and £14,957 without including that payment.

The corresponding loss the previous year was £32,768.

Operating or working-costs are analysed for the past four years in Table XI herewith, and show the following points: Increase in total operating-costs, principally due to increased use of the fuel-plants and increase in standby provision. Increase in operating-costs at Horohora, due largely to increase in amount of screen-cleaning necessary to get the full output from the plant. Increase in transmission-line and substation operating-costs in 1929–30, due to the increased mileage of lines and additional substations brought into operation at about the same time as Arapuni.

3. Extensions during the Year, and Future Extensions.

(a) General, Additional Consumers, and Connected Load.

There were no additional consumers during the year.

The connected load, not including Auckland electric-power district, has increased from 89,523 kw. to 99,341 kw.

The number of milking-machines supplied has increased from 4,988 to 5,493, electric ranges from 2,807 to 3,420, and water-heaters from 7,088 to 8,229. These are exclusive of Auckland Power Board figures.

The system maximum-load figures for the past three years are 15,900 kw., 41,520 kw., and for this year 49,520 kw., when Arapuni was supplying, and 17,600 kw. since that time.

The demand factor (not including Auckland) was 17·7 per cent.

(b) Power-stations.

Arapuni.—The erection of the three units comprising the initial installation had been completed the previous year, and the erection of cable-work and switch-gear for No. 4 unit was in progress at the end of this year. No. 4 turbine and generator arrived, and were stored at Putaruru Station-yard.

(c) Transmission-lines.

The Waihou–Paeroa 50 kv. line and switching-structure at Paeroa were completed early in the year.

Survey of New Lines.—New 110 kv. lines are being surveyed as follow:—

Arapuni–Edgecumbe–Murupara portion of the Arapuni–Waikaremoana Line: Survey practically complete, and pegging of pole positions to Edgecumbe commenced.

Arapuni–Penrose Second Steel-tower Line: Work of contouring angle positions was carried out.

Henderson – North Auckland: Detailed survey of both power and telephone line are now practically complete.

Arapuni–Stratford: The survey of the selected route was practically completed, and plans prepared for location of pole-positions. A good deal of work is still to be done in investigating foundations in papa country. Poles and wire have been ordered for construction of part of this line.

(d) Substations.

Penrose (110/22 kv.—60,000 kv.a. capacity; 22/50 kv.—5,000 kv.a. capacity).—The installation of capacitors and protective relays for the three incoming 110 kv. lines was completed.

Three additional switch-gear panels arrived, and erection of them was commenced. The Power Board's cable to No. 4 panel was connected up in November, 1930.

Takapuna (50/11 kv.—2,000 kv.a.).—New bank of transformers (four 750 kv.a. single phase) arrived, and transported to the substation.

Waihou (50/11 kv.—2,250 kv.a.).—The 50 kv. transformer O.C.B. was installed, also the turntable, completing the present installation. A house was built for the operator.

Hamilton (50/11 kv.—3,000 kv.a.).—The motor-generator set for battery-charging and the control panels for No. 2 Substation were erected. The control cables to No. 2 Substation were laid underground.

Bombay (110/50 kv. — 5,000 kv.a.; 50/11 kv. — 3,000 kv.a.). — Two new feeder cubicles were installed by the Franklin Power Board. A second bank of transformers (three 500 kv.a.) arrived, and were put in service on 23rd December, 1930.

(e) Huntly Power-station.

One 1,500 kw. steam turbine, 3,000 r.p.m., 550 volts; three 623 kv.a. transformers, 550/11,000 volts.

On the failure of Arapuni in June, 1930, it was decided to remove the above turbine-set from the Grand Junction plant at Waihi, and re-erect it at Huntly. The turbine was run up to speed on 27th March, 1931, and operated very satisfactorily.

4. Operation and Maintenance.

(a) Power-stations.

Horahora. — This station operated satisfactorily throughout the year and the usual routine maintenance repairs were effected as opportunity offered.

Arapuni.—The failure of the headrace at Arapuni, which resulted in the closing-down of the power-station on 11th June last, was dealt with in the last annual report. Since then the power-house machinery and apparatus has been maintained in good order by the use of electric heaters and calcium chloride where necessary to ensure dryness.

Penrose Diesel Plant.—The plant has operated successfully during the year.

The new spray pond in conjunction with the cooling-tower, enabled all three engines to be run for long periods without excessive cooling-water temperatures, supplying load up to 3,980 kw. maximum, with weekly output up to 320,000 units.

Grand Junction Steam Plant.—This plant ran satisfactorily during the year, and carried up to 3,000 kw. load in June, 1930, after the failure of Arapuni. After September, 1930, only the 1,640 kw. unit was available to supply power.

(b) Transmission-lines.

110 kv. Lines.—Further work was done during the early part of the year in improving tower-foundations in clay country. There were no outages due to line-faults during the year.

50 kv. Lines.—There were only four cases during the year of failure of insulators in service causing interruption, all of these being on the old Horahora–Waikino line, three being pin insulators and one a strain insulator string.

Bombay – Kerepeehi – Waikino Line: A big improvement in telephone operation on this line was effected by rearranging the transpositions to get better balance.

Horahora – Matamata – Waikino: The dismantling of the Half-way – No. 8 hut portion – of this line was completed early in the year.

Ngongotaha – Edgecumbe – Waiotahi: On $2\frac{7}{8}$ miles of this line near Tikitere, 7/14 S.W.G. copper wire, which was being affected by sulphur fumes, was replaced with 7/13 S.W.G. galvanized iron, painted with sulphur-resisting paint. Inspection of a length of one mile, which had been previously dealt with in this way, showed that the wire was in good condition.

(c) Substations (Sixteen).

Penrose, Matamata, Waihou, Waikino, Huntly, Bombay, Waiotahi, Henderson, Takapuna, Hamilton, Te Awamutu, Hangatiki, Kerepeehi, Mamaku, Ngongotaha, and Edgecumbe: Nothing of importance to report.

(d) 11,000-v. Lines and Substations.

A total of forty-one 35 ft. poles have been found defective on these lines, and have been replaced during the year. Service generally has been good.

(e) Power purchased and generated by Stand-by Plants, System Operation, and General.

Power purchased (£9,271) during the year totalled 8,226,397 units, or 5·7 per cent. of the total system output of 143,093,777 units. The greater part of the power purchased, 7,444,500 units, was obtained from McLaren's Falls.

MANGAHAO-WAIKAREMOANA ELECTRIC-POWER SUPPLY.

I. Financial Results.

At the close of the year 1930–31 the capital outlay amounted to £3,498,840. The net revenue for the year was £283,017, and working-expenses £59,476. After paying interest, totalling £196,206, a net surplus of £27,335 was shown. Depreciation charges amount to £63,850, which leaves a deficiency on the year's working of £36,515.

The financial results and load records are analysed in Table V, whilst Tables VI and VII give an analysis of the capital outlay and working-expenses. The gross financial results of the system are given in Table VIII.

The earthquake on the 3rd February, 1931, was responsible for a direct loss of revenue of £3,576, and, in addition, it was necessary to purchase power from Wellington City Council and other supply authorities, costing in all £4,441. The total effect of the earthquake on the revenue was, therefore, a loss of £8,017.

The general depression throughout the country also reduced the revenue during the year by about £8,000.

II. Operation and Maintenance.

Mangahao Power-house and Headworks.—The various items under this head operated very satis factorily during the year.

The generators and turbines have operated well, practically the only trouble met with being chipped, cracked, and spongy buckets on the turbines.

At no time during the year was a unit under repair when in demand.

Tail-race: Very little maintenance has been necessary during the year, the channel now appearing to have become stable.

Waikaremoana Power-house and Headworks.—All apparatus has functioned satisfactorily except for the burning-out of four coils of No. 2 generator, which caused this unit to be shut down for fourteen days for repairs.

All damage caused by the earthquake has been repaired.

Substations.

Khandallah.—From this substation power is supplied to Wellington City Council, Hutt Valley Electric-power Board, New Zealand Railways Department, and Wellington Meat Export Co., Ltd. During the year there were seven total interruptions, totalling 12½ minutes, to service at this station, none being prearranged.

Bunnythorpe.—From this substation power is supplied to the Manawatu-Oroua Power Board. Interruptions to supply during the year numbered ten, of a total duration of 1 hour 2 minutes, apart from four prearranged shutdowns.

Due to fire last year destroying all control-gear, &c., this substation has been merely a switching-station during the year. The metering has been done by the Manawatu-Oroua Power Board's instruments in their substation.

All H.T. switch-gear has operated well, as also have the transformers.

Marton.—This station, as well as Wanganui, supplies power to the Wanganui-Rangitikei Power Board, the two being normally paralleled on the 11 kv. side.

The only fault which developed during the year was the burning-out of a coil on the auto-reclosing gear of the 11 kv. feeder-switch.

Wanganui.—All apparatus operated satisfactorily during the year. Interruptions to service totalled nineteen, of a duration of 1 hour 24½ minutes.

Masterton.—This station supplied power during the year to the Wairarapa Power Board. All apparatus functioned well during the year. Interruptions to service (other than those prearranged) numbered twenty-two, of a total duration of 4 hours 45 minutes.

Mangamaire.—This substation supplied power throughout the year to the Tararua Power Board, and all apparatus functioned satisfactorily, except for the failure of a H.T. bushing on the 110 kv. O.C.B., which caused an interruption to service for 17 minutes.

Woodville.—As listed under construction, this switching-station has been extended during the year.

All apparatus has operated well throughout the year, except for the failure of a rotating insulator (hollow type) of an air-break switch.

Dannevirke.—At this substation, which feeds the Dannevirke Power Board, all apparatus functioned satisfactorily throughout the year, no interruptions being caused by faults in the equipment.

Service interruptions (other than those prearranged) numbered fifteen, and amounted to 2 hours 41½ minutes.

Waipukurau.—This substation has supplied power to the Central Hawke's Bay Power Board throughout the year, and all apparatus has functioned well, except during the earthquake on 3rd February, 1931, which caused slight damage, putting the station out of commission for 1 hour 39 minutes while repairs were effected. The damage sustained is mentioned more fully under the report on the earthquake.

There were thirteen accidental interruptions to service, totalling 2 hours 3½ minutes.

Napier.—Hawke's Bay Power Board has derived its supply of electrical energy from this substation throughout the year. This year has been a marked one, owing to the disastrous earthquake which visited the locality on the 3rd February, 1931, practically wrecking the station. Details of damage done are set out in the report on the earthquake, which caused an interruption to service for 31 hours 5 minutes, power then being resumed at 11 kv. from Waipukurau and Tuai until a temporary substation was erected at Waiohiki.

Apart from this, there were thirty-one other accidental interruptions to service, totalling 16 hours 45½ minutes.

Wairoa.—This substation during the year supplied power to Wairoa Power Board, and, in general, all apparatus functioned well.

The accidental outages numbered twenty-four, of 33 hours 29½ minutes duration.

The earthquake on the 3rd February was responsible for an interruption to service for 24 hours 32 minutes while repairs were effected.

Gisborne.—At this substation, which feeds the Poverty Bay Power Board, the equipment operated well during the year.

The earthquake of the 3rd February was responsible for an interruption to service lasting 9 hours 51 minutes. Other accidental interruptions numbered twenty-six, of a total duration of 23 hours 50 minutes. All earthquake damage has now been repaired.

Substations: General.

At all substations all insulators and bushings on bus-bars and switch-gear were cleaned during the year.

Periodical checks were made on all switch-gear, relays, and metering-equipment, and repairs and adjustment made where necessary.

The synchronous condensers at Khandallah, Mangamaire, Dannevirke, and Napier were run, when required, for voltage regulation.

Transmission-lines (110,000 Volt).

Mangaore–Khandallah Duplicate Line.—During the year there were five outages, totalling 11 minutes, on this line. Three of these, totalling 5 minutes, were due to bird deposits on insulators; one of 3 minutes to earth-wire, which was being removed from the line, coming in contact with the live line; and one of 3 minutes to a farmer's wire-ropeway for transporting timber coming in contact with the line.

Mangaore–Bunnythorpe Duplicate Line.—This line gave no trouble whatever during the year.

The strengthening and replacing of weak poles has been completed during the year from Mangaore to Manawatu River, this section being thoroughly overhauled.

The reconstruction of the telephone-line in cadmium copper is in hand, and about ten miles have been wired to the 31st March, 1931.

Vibration-dampers were fitted to the cables on the towers at Manawatu River crossing.

Bunnythorpe–Marton–Wanganui Line.—This line gave very good service during the year.

Sap-testing has been carried out on this line with a view to pole-strengthening being started in the near future.

Bunnythorpe–Woodville Line.—This line gave very good service during the year. In connection with the vibration troubles previously experienced on the aluminium cables, vibration-dampers have been installed at various points on the line.

All towers were carefully examined for any damage due to the earthquake, but none was recorded.

Woodville–Mangamaire–Masterton Line.—No interruptions during the year were attributable to this line, which gave good service.

Further excessive wear during the year on the U-bolts on the Mount Bruce towers, and these were replaced where necessary.

Woodville–Dannevirke Line.—This line has generally given good service during the year, but a further break on the aluminium jumper at a strain pole has occurred, due to vibration.

Vibration-dampers have also been installed on this line on the section where vibration has been responsible for broken cables in the past.

Dannevirke–Waipukurau Line.—One interruption to service was caused by this line, a strain-pole jumper breaking, due to vibration.

Waipukurau–Napier Line.—This line gave very good service during the year. Practically no serious damage was done by the earthquake on the 3rd February, but a fair amount of work was necessary straightening cross-arms and replacing weights which had shaken off.

The telephone-line also was damaged very little, but the wires were twisted together, making communication over the line entirely out of the question.

The damage done was quickly repaired, and the lines made ready for service, power being supplied at 11 kv. from Waipukurau to Napier until the Napier–Tuai lines were repaired.

Napier–Tuai Duplicate Line.—This line gave good service during the year, except for the damage sustained in the earthquake on the 3rd February, which is reported more fully elsewhere.

A further interruption was caused by an earthquake on the 13th February, which shook open the isolating-switches.

Transmission-lines (50,000 Volt).

Tuai–Gisborne Line.—Considerable trouble has been experienced on this line during the year in heavy gales, by failure of insulators and pins, and by the telephone-line blowing up into the transmission-line. Twelve outages, totalling 22 hours 46½ minutes, being attributable to these troubles.

Further telephone-poles have been put in to reduce the spans, and more work will be done in this connection during the coming year.

This line was not put out of action during the earthquake, but on the telephone-line the wires were twisted.

Tuai–Wairoa Line.—Some trouble has been experienced on this line during the year with broken binders, insulators, and pins. Four outages, lasting 3 hours 30½ minutes, were attributable to this cause.

The earthquake on the 3rd February did some minor damage to the line, which, however, was quickly remedied.

Stratford – New Plymouth Line.—This line has been maintained and operated at 33 kv. during the year by the New Plymouth Borough Council.

Transmission-lines (11,000 Volt).

Tuai – Lake House and Thomas's Mill.—The line to Thomas Bros.' Mill has been connected in to the Lake House line during the year, and has operated well.

Mangaore–Shannon.—This line has been operated and maintained by the Horowhenua Power Board throughout the year.

Khandallah – Hutt Valley Power Board: Duplicate Circuit.—This line delivers power to the Hutt Valley Power Board, and suffered forty-three outages, totalling 2 hours 31½ minutes.

Khandallah – New Zealand Railways: Duplicate Circuit.—This line, delivering power to the railway workshops, had thirty-two outages during the year, totalling 2 hours 59½ minutes.

These lines were operated for some part of the year in parallel with the Hutt Valley lines.

Khandallah – Wellington Meat-export Co.—This line has suffered eight outages during the year, totalling 13½ minutes.

Transmission-lines.—General.

During the year all the insulators have been cleaned, with the result that no interruptions have occurred due to salt-deposit on insulators.

The fifth year's series of tests on insulators has practically been completed, these generally bearing out the results of previous years' tests.

A live-line-testing class was again held at Tuai.

Pole-testing for depth of sap has been continued, and a fair amount of work done in strengthening and replacing weak poles where necessary.

Further earthwire has been removed from lines during the year, to enable use to be made of the insulation resistance of poles in preventing flash-overs.

Further vibration troubles have been experienced on A.C.S.R. lines, and vibration-dampers and special clamps have been installed to prevent failures from this cause.

Lightning storms recorded during the year numbered four. One of these was responsible for an outage on the Tuai–Napier line, and one was responsible for the failure of a trifurcating-box on No. 1 Hutt feeder at Khandallah.

Earth-resistance tests were taken over the whole transmission system and, where necessary, extra precautions taken to bring the resistance values down to standard.

III. Earthquake on the 3rd February, 1931.

The first sign of this earthquake was at 10.48 a.m., when the Bunnythorpe East line opened at Mangahao and both Tuai–Napier lines opened at Tuai.

Telephonic communication was cut off from Mangahao north of Waipukurau, and Tuai was entirely isolated.

Supply was restored within half an hour to all stations south of Waipukurau, to which station power was resumed at 12.27 p.m. from Mangahao after minor repairs were effected. To carry all load Wellington City steam plant was called on to render assistance.

Tuai resumed power to Gisborne at 8.30 p.m. on the 3rd February, and to Wairoa about noon on the 4th February.

Telephone communication from Mangahao to Napier was established on the night of the 3rd, and to Tuai on Thursday, the 5th. This, however, was intermittent owing to the frequent after-shakes tangling the wires together, but on the 6th good service was obtained.

On the 4th February power at 11 kv. was delivered to Napier from Waipukurau Substation.

After temporary repairs had been effected to the Tuai–Napier lines, supply from Tuai was given to Napier at 11 kv. on the east line, and to the general system at 110 kv. via the west line on the 12th February, Tuai paralleling with Mangahao at 4.10 p.m.

On the 13th February, about 1.40 p.m., a heavy earthquake put the Tuai–Napier line out again, owing to the isolating-switches at Waikoau shaking open. The shake also interrupted telephone communication between Napier and Tuai. Communication between Mangahao and Tuai was eventually established by means of the Palmerston North and Gisborne Radio stations and Tuai paralleled once more with Mangahao at 9.10 p.m.

Owing to the Napier transformers and 110 kv. switch-gear being in a very chaotic state, the spare 1,500 kv.a. transformer from Mangamaire was transported to Clive Railway-station. The roads to Napier Substation were so damaged that it was impossible to bring this transformer to the substation site, so it was decided to erect a temporary substation at Waiohiki, across the Tutaekuri River from Taradale. This station was put into commission with 1,500 kv.a. transformer solidly connected to the line and an outdoor type 11 kv. switch cubicle on the L.T. side controlling a three-quarter mile temporary line to the 11 kv. switch-gear at the substation. Supply at 11 kv. was then discontinued from Tuai, and both Napier–Tuai lines used to supply power at 110 kv. to the general system. This substation was in operation until 29th March, 1931, when the main transformers were put back into service at Napier after repairs had been carried out to switch-gear, and the transformers had been reconditioned and dried out.

The damage done to the system was as follows :—

Substations.

Waipukurau.—Two post-insulators supporting the 110 kv. leads to the transformers were broken and the battery was badly damaged.

Napier.—The low-tension switch-gear and cables, except for a single-core pothead which had punctured, were undamaged. Three transformers were shaken off their pads and crashed on their sides. The fourth was lifted out of the runway, but remained on the pedestal. Seven out of the eight high-tension bushings and all eight low-tension bushings were broken. Conservator-tanks were buckled, slight damage was done to fins, and all oil-piping extensively damaged. All oil was lost. These transformers have since been reconditioned and are now back in service, no apparent damage having been sustained by the windings.

Practically the whole of the isolating-switches and air-break switches were badly damaged, some being ruined. These have since been repaired or replaced by spares.

The oil circuit-breakers sustained no damage, except for three broken bushing-caps.

The battery inside the building was totally wrecked. The lightning-arresters were badly shaken, but were easily repaired.

Most of the bushings on the synchronous condenser switch-gear and auto transformer were broken. These are awaiting new bushings now on order, but owing to the state of the building the condenser cannot yet be run.

The capacitor had two of its supporting insulators and one bushing broken.

The building suffered very severely, particularly the workshop section. Several columns and beams were cracked. The temporary end-wall collapsed, and a good portion of the windows were cracked. Of the outbuildings, only the operator's cottage was damaged, the building being badly wrenched, and the chimneys collapsed. Arrangements are being made to repair the building-damage.

Gisborne.—At this substation the transformers moved and dragged three insulators off the air-break switch above, breaking three bushings on the 50 kv. O.C.B. These have been replaced.

The only other trouble experienced was the breaking of the earthenware pipes for returning transformer cooling-water to the well, necessitating water being carted from Gisborne till repairs were effected.

Wairoa.—The earthquake caused the transformers to run off their pads, with consequent damage to three 50 kv. bushings, which have been replaced.

An 11 kv. cable was also broken, but no other damage was done.

Transmission lines.

Waipukurau–Napier.—No major damage was sustained by the transmission or telephone lines, but cross-arms were thrown out of alignment and weights thrown off the insulator-clamps. The telephone-lines were also twisted together in two places. These faults were very quickly remedied, the telephone-line being in service again on the night of the earthquake, and the transmission-line was never rendered unfit for service.

Napier–Tuai Lines.—Tower 220 on this line collapsed owing to the foundations slipping away, putting this duplicate line completely out of action. A temporary H structure was erected on a piece of fairly solid country, and the line restored on 12th February.

Several towers had their foundations badly shaken, cracks having opened up round the footings. These were filled and rammed as soon as possible.

A deviation to cut out the broken country round Tower 220 was surveyed, eight spare towers and cable were shipped to site and erected, and the new piece of line connected in for service on 31st May.

The telephone-line was also badly shaken, but the damage was principally confined to twisted wires.

Reconstruction work was difficult owing to all roads being closed by landslides and slips.

On 13th February a severe earthquake shook open the isolating-switches at Waikoau and Kotemaori, cutting off power from Napier. This also dislocated the telephone service again. The isolating-switches at Kotemaori and Waikoau have had jumpers placed across them.

Tuai–Gisborne.—No great trouble was experienced on this line, which remained in service until cut out for repairs at Gisborne Substation. Cracks opened up round several poles. These cracks have been filled and rammed.

Tuai–Wairoa.—Damage to this line was confined to a few broken binders and insulator-pins, which were very quickly replaced.

Waikaremoana Power-station, Headworks, and Village.

Access Roads.—All roads were blocked by landslides and slips, Tuai being completely isolated, the worst being a huge landslide at the 20 m. peg from Wairoa.

Pipe-line.—No damage was done except for the tilting-back of a few cradles.

Earth Dam.—Small cracks up to 2 in. wide and 4 ft. deep have been filled and rammed.

Power-station.—Various small cracks appeared in the building, but no appreciable damage was done either to the building or the apparatus.

Staff Village.—Practically every chimney was demolished. The main water-supply pipe burst at the entrance to the village. Repairs have been effected and conditions are now normal.

Power Boards' Damage.

Hawke's Bay Power Board.—This Board suffered severely not only on account of the earthquake, but also the fire which afterwards swept through Napier, destroying their store.

A large number of transformers were shaken down off their platforms, and the distribution-lines were reduced to a mass of wreckage.

Great strides have been made with the rehabilitation of services, as evidenced by the fact that the load immediately after the shake was reduced to about 400 kw., principally the Napier Borough pumping-plant, while early in June the load has reached almost 4,000 kv.a., which is greater than the peak load for 1930–31.

Wairoa Power Board.—While not a great deal of damage was done during the earthquake, this Board suffered from the loss of their principal consumer, the freezing-works, whose buildings were destroyed by fire just subsequent to the shake. The load taken by the Board has therefore fallen considerably.

General.—Considering the severity of the earthquake, suprisingly little damage was done. The transmission-lines stood up in every case except Tower 220 on the Napier–Tuai line, where a huge landslide took place.

One lesson learned is the necessity of fixing transformers and other apparatus securely to their foundations. This is being done all over the system. Oil switches which were bolted down suffered no great damage.

The system was back to normal operation on 29th March, when the reconditioned bank of 110 kv. transformers was put back into service at Napier.

IV. Construction.

Mangahao Power-station.—The delivery of the relay-protection equipment was completed during the year, and the erection of same is in an advanced state.

An acoustic shock-absorber was fitted to the main telephone system to guard operators from excessive shock to the eardrums during switching operations, lightning-storms, &c.

A new transformer, protection system, and metering equipment were installed on the headworks line.

Waikaremoana Power-station.—Relay equipment was received and installed during the year, and is practically ready for operation, only the final testing being required.

An acoustic shock-absorber was fitted to the telephone, following satisfactory results from that installed at Mangahao. Adjustments were made to the turbine relief-valves, and these are now operating satisfactorily. Duplicate power-supply has been run to the governor-motors.

The earth-filling at Lake Kaitawa at the position of the old spillway weir was completed and the water-level indicators at Kaitawa weir installed.

Khandallah Substation.—The installation of the relay equipment is practically complete.

A temporary wood-pile structure was erected as a terminus for the Khandallah–Melling transmission-line. A 110 kv. O.C.B. has also been installed to control this line.

Bunnythorpe Substation.—The renovation of the old building damaged by fire last year, and extensions to same to house new apparatus, made necessary by growth of load and the extension of the system, was completed during the year, and a good start has been made with the installation of apparatus therein.

New 11 kv. switch-gear is being installed. The new storage-battery and charging-set has been installed. A telephone switch-board has also been installed.

The two O.C.B.s (for the control of the two Mangahao lines) which were damaged by fire in the substation building while awaiting installation are being reassembled, one being completed.

A new bank of transformers has arrived at site and will be dried out shortly. To control the 110 kv. side of the two transformer-banks, O.C.B.s have been delivered to site and will be installed shortly. A new lightning-arrester has been installed.

Wanganui Substation.—The permanent water-supply system has now been completed.

The stable has been converted into single men's quarters.

A new lightning-arrester has been installed.

Steelwork and switchgear have been delivered for the proposed extensions.

The O.C.B. to control the Stratford lines has been received, and erection will proceed shortly.

A new storage-battery and charging-set has arrived.

Woodville Switching-station.—The relay system has been completely installed, and was finally tested and put into service in early June. The O.C.B. controlling the Bunnythorpe line was installed, and is now in service. A new workshop and battery-house were built, and the battery installed.

This station is now complete until it is necessary to duplicate the lines from Napier.

Dannevirke Substation.—The new relay equipment has been received on site and a start has been made to install same. A new O.C.B. for controlling the Woodville line has been erected and put into service.

Waipukurau Substation.—The relay equipment has been received, and the erection is practically complete.

The O.C.B. for the Dannevirke line has been received and put into service.

Napier Substation.—The relay system has been installed and was ready for final testing before being put into service when the destruction of the battery by the earthquake prevented the system being put into operation. Further work at the station is referred to in the report on the earthquake experienced on 3rd February, 1931.

Gisborne Substation.—An additional pumping-set was installed for the cooling-water supply for the transformers.

Hawera Substation.—Preliminary design work and arrangements have been finalized.

Stratford Substation.—Preliminary design work and arrangements have been finalized.

New Plymouth Substation.—Preliminary design work and arrangements have been finalized.

Melling Substation.—The name of this substation was changed from "Belmont" to "Melling." The Hutt Valley Power Board will receive supply from this substation. Contract for erection of buildings has been completed. Contracts for permanent equipment have been let. A temporary substation, comprising a wood-pole structure carrying an air-break switch, transformer-bank on crib-work pedestal, and 11 kv. metering-cubicle, have been completed. Transformers have been dried-out and are ready for service.

Khandallah - Melling 110 kv. Transmission - line.—Survey has been finalized, and construction will be completed early in July.

Wanganui–Stratford 110 kv. Transmission-line.—(*a*) Wanganui–Hawera Section: A contract for the cartage, delivery, and erection of main-line structures and telephone-poles was let in November. Two steel towers have been erected for the Wanganui River crossing.

Wiring of this section commenced in May, and to date thirteen miles of transmission-line and fifteen miles of telephone-line have been completed.

(*b*) Hawera–Stratford Section: A contract has been let for the pole-erection, and a start made.

Stratford - New Plymouth 50 kv. Line.—Two extensions of this line have been surveyed, and an early start will be made with erection.

Upper Development, Waikaremoana.—Work of considerable interest is at present being carried out around the outlet as a preliminary step to the second scheme.

A comprehensive study of the country around the outlet of the lake has been in progress during the year. This includes surface-surveys, surveys of underground chambers, a more intensive geological study, and investigations to determine the location and character of the rocks and underground passages through which the water escapes from the lake.

V. Load.

During the year Mangahao and Waikaremoana generating-stations have run very well in parallel, Waikaremoana taking the base load and Mangahao supplying power during peaks.

The only occasions when standby stations came into operation were—

(1) On peaks when Mangahao was out of commission during the Christmas - New Year holidays for overhaul of valves:

(2) During an arranged shutdown on the Mangaore–Wellington lines for repairs to the lines:

(3) During the period subsequent to the earthquake on the 3rd February while the Tuai–Napier line was out of commission, and while the load was greater than the capacity of Mangahao Power-station.

(4) While a machine at Waikaremoana was under repair and test, Wellington City steam plant was brought in for a total running-time of approximately 307 hours.

Wanganui-Rangitikei Power Board steam plant was called on for 64½ hours' running.

Hastings Borough, whose plant was undamaged during the earthquake, carried their own load thereafter until the Hawke's Bay Power Board's system was sufficiently repaired to enable them to supply power to the borough.

Through having Wellington City and other plants available, it was possible to avoid restrictions on the use of power whilst the Napier–Tuai line was being repaired after the earthquake.

The maximum load on the system was 44,660 kw., and the total number of units generated during the year was 210,373,650. The total connected load was 279,053 kw.

WAITAKI ELECTRIC-POWER SYSTEM.

1. Power-house – Glenavy Transmission-line.

A start was made on tower erection in May, 1930, and good initial progress was made, but running shingle and water met with on river-terrace demonstrated the necessity for extra pumping equipment.

Towards the end of March, 1931, a start was made on transporting insulators and cable to tower-sites in readiness for stringing of conductor, which began about the middle of April.

At the end of March, 1931, nineteen towers remained to complete this section of the work, and in April a start was made on stringing conductor.

At the end of June one circuit was completed and livened up for power-supply from the Lake Coleridge system.

2. Power-house – Glenavy Telephone-line.

In conjunction with power-house – Glenavy transmission-line construction, forty miles of cadmium copper telephone-line and six sectionalizing huts have been completed during the current financial year.

Special pole structures and 7/16 copper conductor were used at Hakataramea Stream and Waitaki River crossings, the spans being approximately 9 and 8 chains respectively.

3. Waitaki River Crossing.

During the year a careful watch was kept of the H pole in the centre of the river, and boulder-net protection round this structure was built to take care of any conditions that would arise due to abnormal floods in the river.

The general branch put in hand the work of building the concrete-cylinder foundations on the island to support the central tower for the new crossing. Two 88 ft. towers, together with the special strain structures and concrete anchors for the same, were erected on the north and south banks respectively.

Early in February, 1931, exceptionally heavy floods hindered progress on this work considerably.

Immediately on completion of the central tower, wiring operations were resumed, and on the 11th March, 1931, all six-phase wires erected, thus providing two circuits across the river. A deviation of the existing 66 kv. line on the Canterbury and Otago sides of the river was pegged out to line in with the new crossing, and erected.

4. Timaru–Oamaru Transmission-line.

The work of duplicating this line has been held over till next financial year.

5. Timaru–Oamaru Telephone-line.

The necessary material for this work is available, but erection of same is postponed for the present.

In January, 1931, three additional transformer-pads were cast to suit the revised substation lay-out and four 1,767 kv.a. transformers were shifted from Addington.

7. Glenavy Substation.

The erection of two cottages, pump-house, and tank-stand has now been completed.

Roof-trusses for substation-building have been unloaded and stored at Glenavy. Two turntables for outdoor-station traverser track are also to hand.

Switch-gear and steelwork commenced to arrive in January last, and are now practically complete.

Everything is in readiness for construction work to commence immediately the tower-foundations have been pegged out.

Six huts ex Waitaki River crossing were transferred to the substation-site, and are being used for storing electrical equipment and also for a temporary workshop.

8. Power-house Plant and Equipment.

Auxiliary generators and turbine units complete with pipe-line and switch-gear were received. Girders and towers for " B structure " were assembled on ground and checked for drilling, &c.

Galvanized steel for the headgate-screens has been received. Main headgate-winches have arrived.

Seven 5,500 kv.a. single-phase transformers were received.

Electrical equipment, girders, &c., for 120-ton crane arrived, and have been stored on the site.

One 46 ft. cross-girder was received in a badly buckled condition. A new girder was ordered to replace the damaged member and this arrived in September last.

9. Turbines.

The component parts of the two 23,000 b.h.p. Francis turbines have been received on the site.

A start was made on turbine-erection towards the end of February, 1931, when sections of the suction-tube angle-irons were assembled and checked for pitch circle diameter, and pipe manifolds for water-supply to filter were made up for scroll cases Nos. 1, 2, and 3. No. 1 turbine-foundation angle was assembled round the top of the draught-tube and plate marked off for cutting out R.L. 688 ft. 7½ in. The same procedure was carried out on No. 2 unit. This constituted the work on turbine-erection up till the 31st March, 1931, but it is anticipated that the installation of both machines will be well in hand by September, 1931, after which a start will be made on generator-erection.

10. Generators.

Component parts for No. 1 and No. 2 generators have arrived on site.

All parts for turbines and generators have been carefully inspected at regular periods, and necessary action taken to keep all machinery in good order and in readiness for erection.

11. Outdoor Station.

The construction of steel structure was commenced in July, 1930.

A certain amount of difficulty was experienced on the construction of the steelwork due to naccurate drilling of footings and bad fitting of girder and tower members.

The steel structure has now been completed, including lightning-arrester and isolating-switches.

To date all necessary work has been completed on the north line from Lake Coleridge, and on 28th June, 1931, power was passed over the power-house–Glenavy transmission-line at 66 kv., giving supply to the works at Waitaki Hydro.

12. Motor Transport and General.

A four-stalled motor-garage for departmental vehicles was erected and a 40 ft. extension made to store.

Six hundred and eighty-two drums of transformer-oil were unloaded and leaking drums attended to. Five oil-storage tanks were received on site and inspected.

Earth tests have been carried out in likely localities for power-house and lightning-arresters and steel structure, but to date satisfactory results have been difficult to obtain on account of the nature of the country.

HYDRAULIC DESIGN.

Arapuni.

Plans have been prepared for the remedial measures as outlined in Professor Hornell's report. Extensive model tests were made to determine the best means of preventing further erosion in the overflow-channel, and plans have been prepared for lowering the water to the Waiteti Flat in two stages so that the energy of the falling water should be absorbed gradually.

Waitaki.

Further work has been done on the dam, including a deep cut-off wall, separate from the dam, to prevent the development of under-pressure; the installation of permanent sluices to by-pass the water through the dam; the protection of the rock downstream of the dam and the disposal of the energy of flood-water falling over it. In connection with these latter a number of model experiments have been carried out.

DESIGN OFFICE WORK.

During the year under review the following design-work was carried out in connection with new developments and extensions to existing developments:—

Lake Coleridge System.

The advent of an abnormally dry season necessitated a curtailment of the output of Lake Coleridge, resulting in the decision to install a standby Diesel generating-station of four units at Lyttelton, with provision for extension to seven units at a later date, by transfer of the Diesel sets from Penrose station.

The site chosen has the advantages of direct access by railway siding from railway or wharf, and an unlimited supply of cooling-water from the harbour, whilst the fuel-oil supply can be pumped direct from the Oil Co.'s storage-tank.

To provide for the interconnection of the Diesel station with the Lake Coleridge system the line-conductors, switching-arrangements, and protective relay equipment required on the Addington–Lyttelton lines were investigated.

Lyttelton Diesel Station.—With the exception of a few minor details the design and layout of the Diesel station building and equipment was carried out during the year.

The following are some of the subjects dealt with:—

(*a*) Design of Diesel station building.
(*b*) General layout of site.
(*c*) Design and specification for 200-ton fuel-oil storage-tank.
(*d*) Design of compound wall and railway siding.
(*e*) Layout of equipment in power-station.
(*f*) Design of cooling-water and fuel-oil piping systems.
(*g*) Design of machine-foundations.
(*h*) Design of silencer-pits for engines.
(*i*) Design of oil-sump tanks.
(*j*) Design of transporter for crane.
(*k*) Layout of cables and cable pits and ducts.

In preparation for the interconnection of the system with the Waitaki Power-station, and at a later date with the Waipori Power-station, the design work in connection with the additional switch-gear and protective equipment for the system was carried out as the details of the equipment ordered came to hand.

The provision of increased transformer-capacity at some of the substations to take care of a reasonable growth of load, and inter-connecting auto-transformers at Timaru to tie in the 66 kv. with the 110 kv. lines also occasioned a certain amount of design work.

The following design work was also carried out for this system:—

Addington.—Preliminary drawings were prepared for the proposed new workshop, test-room, and office building, and for the extensions to the substation building to house the new 10,000 kv.a. synchronous condenser.

Timaru.—Design and specifications for traverser-truck and turntables.

Oamaru.—Revised layout of site; foundations and traverser-truck for 5,300 kv.a. transformer-bank; design and specification for traverser-truck.

Mangahao–Waikaremoana System.

With the growth of load in the Hutt Valley area the 11,000-volt supply-lines from Khandallah were becoming inadequate for the supply to the district, so it was decided to put in a new 110 kv. substation at Melling with a 110 kv. supply-line from Khandallah, which will ultimately be extended to Masterton Substation to give an alternative 110 kv. supply-line to Khandallah.

During the year additional transformer-capacity was ordered for some of the larger substations to provide for the estimated growth of load. In connection wth the extension of the system from Wanganui to New Plymouth with substations at Hawera, Stratford, and New Plymouth, further design work was carried out.

Wiring and phasing diagrams for the main line protective relay equipment were prepared and transmission calculations for the system were carried out.

Bunnythorpe.—Drawings and specifications were prepared for the reconstruction and extension of the substation building. A foundation drawing was prepared for the capacitor.

Melling.—The layout drawing of the site and drawings of the 11 kv. and 110 kv. switch-gear for tendering purposes were prepared. The drawings and specifications for the substation-building contract were prepared. A traverser-truck for handling the transformers and a turntable were designed, and a foundation drawing was prepared for the turntable and transformer-banks.

The following design work was also carried out for this system :—

Khandallah.—Preliminary layout 110 kv. switch-gear extensions ; layout of temporary switch-gear for 110 kv. line to Melling ; layout of proposed 110 kv. city substation ; foundations for capacitors.

Napier.—Foundations for capacitor.

Hawera.—Drawings for substation-building contract ; preliminary layout of switch-room.

Hawera, Stratford, and New Plymouth.—Layout of sites for construction purposes.

Hawera and Stratford.—Design of traverser-trucks and turntables.

Arapuni–Horahora System.

The Grand Junction steam plant was re-erected at Huntly, and in this connection designs and specifications were prepared for a 50 ft. steel chimney and foundations for same.

Hamilton and Bombay.—Preliminary layout drawings were prepared for the extensions to the steelwork and switch-gear to provide for additional lines, transformer-capacity, and switching and relay equipment.

Arapuni.—A drawing was prepared for the temporary end-wall supports.

Waitaki Power Development.

The design of the power-house and main units was outlined a year ago, but much detail work remained to be dealt with during this year. The Napier earthquake led to investigation of resistance to earthquake stresses. The dimensions of the power-house are so great that conditions might be more severe than for a smaller building. Consequently, it was decided to provide against a horizontal acceleration of $\frac{1}{6}$ g, corresponding to an earthquake of intensity about $8\frac{1}{2}$ on the Rossi-Forel scale. These considerations have amounted almost to redesigning the power-house, retaining the general arrangement, but increasing the strength and stability to an extent that might not have appeared to be justified before the Napier earthquake. Architectural features have been reduced to a minimum overhang, diagonal bracing has been introduced in walls and some openings have been closed with reinforced concrete panels. The penstock and scroll cases of the turbines had already been rechecked on a conservative basis, and any possible sources of weakness dealt with. The stability of the building has been increased by eliminating stair-wells from the lower part of the annexe, and by constructing part of the scroll cases of the three future units, as well as by a wall on the intake side of the structure and buttress piers between the draught-tube outlets.

In addition to the design being checked over and revised as described above, much detail work has been shown on drawings, notably for turbine- and generator-floor foundations, cable-shelves, piping systems, and auxiliary units, and for testing-apparatus, the latter being of a recent design, which gives remarkably accurate results.

Foundation drawings were prepared for the outdoor switch-gear and steelwork for the power-station, which also showed the layout of traverser-trucks and turntables.

Transmission-lines.

Waitaki–Glenavy 110 kv. Steel-tower Line.—Drawings have been prepared showing location of towers on route also assembly drawings of insulators.

Timaru–Oamaru Line Duplication.—For a distance of two miles south of Timaru Substation it was decided to install double-circuit steel towers to carry both the existing and the new circuits, thereby causing less obstruction to the property on route than two separate wood-pole lines.

Wanganui–Stratford 110 kv. Line.—Route plans have been prepared showing location of wood-pole supports, also detail drawings of structures.

Arapuni–Edgecumbe 110 kv. Line.—Only part of this line was dealt with, supports being located on route-plans, also consideration was given to a special crossing over Lake Roto-iti which was deemed advisable in order to avoid sulphur springs in the Tikitere district. It has been found that copper conductors are badly affected by sulphur fumes.

Arapuni–Stratford 110 kv. Line.—Between Taumarunui and Stratford the projected line passes over difficult country with steep papa ridges, and preliminary tests of the holding-power of anchorage in papa have been made. A light type of steel tower has been decided upon for this part of the line.

Khandallah–Melling Line.—Various drawings and conductor sag and tension tables have been supplied for use on the erection of this line.

Waikaremoana–Napier Line.—At one point on this line damage was caused by the earthquake in February and occasioned a certain amount of work in connection with the temporary measures for repairing the line also for the deviation finally decided upon for the permanent repair.

Waitaki River Crossing.—This is part of the Timaru–Oamaru line, and reconstruction of the line across the river became necessary owing to one of the original towers being washed out in a flood. A new layout was prepared with only one tower in the river-bed instead of three on the old line.

Waimakariri River Crossing.—This is on the route of the Addington–Southbrook line and some reconstruction became necessary owing to the wide diversion cut being made there. A single-span crossing on steel towers has been adopted.

Lyttelton–Woolston Line.—A new line with heavier conductors was required to cope with the supply of power from the Lyttelton Diesel station. Quantities and a new design for the hill section of the line were made up and stringing data supplied for the conductors.

General.—A specification was drawn up for concrete telephone-poles, and tests on same were supervised. Drawing and chart also prepared in connection with this pole.

Investigation is being made into most suitable form of guy-insulators for wood-pole structures.

In connection with line-insulators, data was prepared giving method of calculating surface-leakage form-factor for use with insulator specifications.

ELECTRIC-POWER BOARDS.

The development of the reticulated area of Electric-power Boards has continued to make progess during the year. There are now forty-five districts constituted, and forty actually carrying out the distribution and sale of electrical energy (August, 1931). The total area covered is 69,294 square miles, or 64 per cent. of the total area of the Dominion; the total population concerned is 1,004,081, or 68 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 £257,184,874, or 73·5 per cent. of the total unimproved value of the Dominion.

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 cities of Wanganui, Palmerston North, and Invercargill, and the boroughs of 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 have realized 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 question of administration and operating costs in Power Board areas where more than one organization is engaged on the business of electric supply is being investigated with a view to arriving at an approximation of the resultant savings to be obtained if amalgamations or absorptions are effected. If such investigations show the expected savings, then it is in the interests of national economy generally and of the consumers in particular that effect be given to the above objective.

The following tabulation has been prepared to show the present position of each city, borough, and town district in relation to Power Boards actually in operation, and it reveals the fact that the benefits of electric supply have reached many places which might otherwise not yet be enjoying these benefits. Included counties have not been scheduled.

TABLE SHOWING GROUPING OF LOCAL AUTHORITIES FOR ELECTRIC-SUPPLY PURPOSES IN POWER BOARD AREAS.

Power Boards taking Government Supply.	In District.			In Outer Area.	
	Operated entirely by Power Board Organization.	Purchasing Bulk.	Generating.	Purchasing Bulk.	Generating.
Ashburton	Ashburton Borough. Tinwald T.D.				
Auckland	Auckland City. Onehunga Borough. One Tree Hill Borough. Otahuhu Borough. Mount Albert Borough. Mount Eden Borough. Newmarket Borough. All town districts in Manukau County.				
Banks Peninsula ..	Akaroa Borough.				
Bay of Plenty ..	Opotiki Borough ..	..	..	Whakatane Borough	Whakatane Borough.
Cambridge	Cambridge Borough. Leamington T.D.				
Central	Huntly Borough. Ngaruawahia Borough. Raglan T.D.				
Central Hawke's Bay	Waipukurau Borough. Waipawa Borough.				
Dannevirke ..	Ormondville T.D. Dannevirke Borough. Woodville Borough. Norsewood T.D.				
Franklin	Pukekohe Borough. Waiuku T.D. Tuakau T.D. Mercer T.D.				
Hawke's Bay ..	Taradale T.D. ..	Napier Borough. Hastings Borough	..	Havelock North T.D.	Havelock North T.D.
Horowhenua ..	Foxton Borough. Levin Borough. Otaki Borough.				
Hutt Valley ..	Upper Hutt Borough. Lower Hutt Borough. Petone Borough. Eastbourne Borough.				

TABLE SHOWING GROUPING OF LOCAL AUTHORITIES FOR ELECTRIC-SUPPLY PURPOSES IN POWER BOARD AREAS—*continued.*

Power Boards taking Government Supply.	In District.			In Outer Area.	
	Operated entirely by Power Board Organization.	Purchasing Bulk.	Generating.	Purchasing Bulk.	Generating.
Manawatu-Oroua ..	Feilding Borough. Rongotea T.D. ..	Palmerston N. City	Palmerston N. City.		
North Canterbury ..	..	..	..	Kaiapoi Borough. Rangiora Borough.	
Poverty Bay ..	Patutahi T.D. Te Karaka T.D. Gisborne Borough.				
South Canterbury ..	Geraldine Borough. Pleasant Point T.D. Temuka Borough. Waimate Borough.	Timaru Borough.			
Springs-Ellesmere ..	Leeston T.D. Southbridge T.D.				
Tararua	Eketahuna Borough. Pahiatua Borough.				
Te Awamutu ..	Ohaupo T.D. Kihikihi T.D. Te Awamutu Borough.				
Thames Valley ..	Morrinsville Borough Matamata T.D. .. Putaruru T.D. Paeroa Borough.	Thames Borough. Te Aroha Borough.			
Wairarapa	Turua T.D. .. Masterton Borough. Carterton Borough. Featherston Borough. Greytown Borough. Martinborough Boro.	..	..	Waihi Borough.*	
Wairoa	..	Wairoa Borough.			
Waitaki	Oamaru Borough. Hampden Borough.				
Waitemata ..	Helensville T.D. Devonport Borough. Takapuna Borough. Northcote Borough. Birkenhead Borough. New Lynn Borough. Henderson T.D.				
Waitomo	Te Kuiti Borough. Otorohanga T.D.				
Wanganui-Rangitikei	Wanganui City. Waverley T.D. Marton Borough .. Bulls T.D. .. Hunterville T.D.	Mangaweka T.D...	Mangaweka T.D. Taihape Borough.		

Power Boards not taking Government Supply.	In District.			In Outer Area.	
	Operated entirely by Power Board Organization.	Purchasing Bulk.	Generating.	Purchasing Bulk.	Generating.
Golden Bay ..	Takaka T.D.				
Grey	Brunner Borough. Greymouth Borough. Runanga Borough. Cobden T.D.				
Marlborough ..	Blenheim Borough .. Havelock T.D.	..	..	..	Picton Borough.
Opunake	Opunake T.D.				
Otago Central ..	Alexandra Borough. Cromwell Borough.				
Otago	Palmerston Borough Waikouaiti Borough. Lawrence Borough. Balclutha Borough. Kaitangata Borough. Naseby Borough.	..	..	Milton Borough.†	
South Taranaki ..	Hawera Borough. Manaia T.D. .. Normanby T.D.	..	..	..	Patea Borough.
Southland	Winton Borough .. Wyndham T.D. .. Edendale T.D. Riverton Borough. Gore Borough. Nightcaps T.D. Otautau T.D. Tapanui Borough. Lumsden T.D.	Invercargill City .. Bluff Borough.	Mataura Borough.		
Taranaki	Eltham Borough ..	..	..	Kaponga T.D. .. Stratford Borough. Waitara Borough.‡ Inglewood Borough‡	Kaponga T.D.
Tauranga	..	..	..	Te Puke T.D. ..	Tauranga Borough.
Teviot	Roxburgh Borough.				
Wairere	..	..	..	..	..

* Power Board distributes retail. † Milton Borough is in outer area, but Power Board supplies retail. ‡ Purchase from New Plymouth Borough Council.

Receiving Government Supply direct.

Hamilton Borough. Christchurch City. Riccarton Borough. Lyttelton Borough.
Wellington City. Sumner Borough. Heathcote County. Halswell County.

(New Plymouth Borough and Dunedin City have signed contracts for supply.)

POWER BOARDS NOT YET FUNCTIONING.

Name.	In District.	In Outer Area.	Excluded.
North Auckland.. ..	Dargaville Borough ..	..	Whangarei Borough.
	Hikurangi T.D.		Kamo T.D.
	Whangarei County.		
	Otamatea County.		
	Hobson County.		
Hurunui..	Waipara County.		
	Amuri County.		
	Cheviot County.		
Westland*	Westland County	..	Kumara Borough.
			Hokitika Borough.
			Ross Borough.
Waimea	Motueka Borough	Nelson City.	
	Richmond Borough.		
	Tahunanui T.D.		
	Waimea County.		
Buller	Westport Borough.		
	Buller County.		

* License delegated to Westland Power, Ltd.

Table XIII gives details of the date of constitution, the area, population, and rateable value of each of forty-five 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-nine districts which have taken their polls is £13,047,156. The population of the districts concerned is 949,094, so that the loans authorized amount to £13·75 per head of population, as compared with £13·8 last year. The unimproved valuation of the districts is £227,177,927, the loans authorized amounting to 5·75 per cent. of the unimproved rateable value of the lands pledged as security for the loans. The voting at the polls totalled 65,160 to 12,155—*i.e.*, a majority of 69·0 per cent.

Table XIV shows the capital outlay incurred by each Board up to the end of the financial year 1930–31, the revenue and annual expenditure, and the amount of rates struck and collected.

The total capital outlay by the thirty-nine Boards which have started construction is £13,637,177, a small proportion of which is on works not yet in service. The gross revenue from the sale of electricity by the thirty-nine Boards which have commenced supply was £2,223,879, of which 29·5 per cent. was received by the Auckland Power Board. The general result is a profit over the whole business of the Power Boards of £179,422 for appropriation to depreciation and reserve funds, &c.

During last year four of the Boards struck a general rate, which was collected in all cases, and five of the Boards struck special rates for the security for loans, which were collected in two cases.

LOCAL ELECTRIC-SUPPLY SYSTEMS.

Including the Government plants, there are now (31st March, 1931) forty-one public electric-power stations in the Dominion, as compared with thirty-nine last year. One new hydro station (Alderton Co., Kerikeri), and one new oil station (Rawene) came into operation during the year.

The total installed capacity (excluding standby plant) has decreased during the year by 30,075 kw., or 11·8 per cent. (from 254,038 kw. to 223,963 kw.), while the sum of the maximum loads has increased by 6,017 kw., or 3·45 per cent. (from 175,211 kw. to 181,228 kw.). The decrease in installed capacity is due to Arapuni Station being temporarily closed down.

The proportion of installed plant is now as follows :—

	Stations.	Kilowatts.	Proportion per Cent.
Water-power (including Diesel standby, Penrose)	33	179,878	80·4
Steam-power (excluding hydro standby plants at Wellington (10,000 kw.), Invercargill (2,450 kw.), Waihi (2,500 kw.))	3	43,787	19·6
Gas-power	2	112	..
Oil-power	3	186	..
	41	223,963	100·00

The number of consumers supplied has increased from 284,235 to 300,809, an increase of 16,574, or 5·8 per cent. for the year.

The total population included in the various areas of electric-power supply is 1,400,214, or 94 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 0·129 kw., which is nearing the allocation of 0·15 kw., or 0·2 h.p. per head of population, the basis of the design of the Government schemes. The units sold per head of population supplied were 489, as compared with 490 last year.

The total length of distribution-line is 20,658 route-miles, as compared with 19,128 last year, an increase of 1,530 miles, or 8 per cent. The number of consumers per route-mile is 14·5, as compared with 14·9 last year, the decrease being due to the extra mileage of new lines erected during the year to which the full number of services are not yet connected, and to the increased proportion of country lines.

The maximum power-demand per route-mile is now 8·76 kw., the sales 33,000 units, and the revenue £210. The units are less than last year (35,000), and there is a slight decrease in revenue, as against £220 last year, and there is a decrease over the corresponding maximum demand of 10·9 kw. last year. These decreases can be directly attributed to the general economic conditions which have been a feature of the past year, and in a smaller degree to restricted outputs from Lake Coleridge and Waikato systems.

The revenue per kilowatt of maximum load of all stations was £24, as compared with £24 last year. The water-power stations show a revenue of £24·1 per kilowatt, steam stations of £23·3 per kilowatt, oil stations of £51·2 per kilowatt, and gas stations of £44·9 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 ninety-nine distributing authorities, eighty-three showed a profit for the year amounting to £755,415, and sixteen showed a loss amounting to £65,539. The general result is a net profit for the whole Dominion of £689,876, after paying working-costs (£2,094,736) and capital (interest and sinking fund) charges (£1,582,497) at the rate of 5·45 per cent. on the total capital outlay of £29,185,268. This shows a net profit of 2·38 per cent., as compared with 2·76 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 94 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, and Table XX shows in condensed form the financial statistics for each supply authority.

—	Water.	Steam.	Gas.	Oil.	Total.
Number of stations	33	3	2	3	41
Installed capacity, main plant only (kilowatts)	179,878	43,787	112	186	223,963
Average capacity (kilowatts)	5,450	14,595	56	62	5,463
Number of consumers	248,501	51,305	497	506	300,809
Connected load (kilowatts)	960,137	194,040	311	623	1,155,111
Maximum load (kilowatts)	150,477	30,564	88	99	181,228
Units generated	639,938,641	119,602,430*	104,950	181,035	759,827,056
Annual load-factor (per cent.)	54·8	54·39	13·61	20·87	48·00
Units sold	563,006,359	120,605,790	76,210	137,958	683,826,317
Total capital outlay in operation, including distribution systems	£25,496,190	£3,634,743	£25,879	£28,456	£29,185,268
Total capital outlay per kilowatt installed, including distribution systems	£142	£83	£230	£152	£113
Total annual working-costs	£1,699,894	£387,825	£3,681	£3,336	£2,094,736
Total annual working-costs per unit sold	0·725d.	0·77d.	11·6d.	5·8d.	0·735d.
Total annual working-costs per kilowatt (maximum demand)	£11·25	£12·65	£42·0	£33·6	£11·55
Total annual capital charges	£1,361,750	£217,157	£1,708	£1,882	£1,582,497
Total annual capital charges, per unit sold	0·58d.	0·435d.	5·35d.	3·26d.	0·558d.
Total annual capital charges per kilowatt (maximum demand)	£9·1	£7·1	£19·4	£19·0	£8·7
Total annual capital charges as percentage of capital outlay (per cent.)	5·34	5·99	6·6	6·6	5·45
Total annual costs	£3,061,644	£604,982	£5,389	£5,218	£3,677,233
Total annual costs per unit sold	1·305d.	1·205d.	16·95d.	9·06d.	1·293d.
Total annual costs per kilowatt (maximum demand)	£20·35	£19·75	£61·4	£52·6	£20·25
Total annual revenue, not including rates	£3,642,358	£716,744	£3,938	£5,084	£4,368,124
Total annual revenue per unit sold	1·55d.	1·43d.	12·4d.	8·85d.	1·54d.
Total annual revenue per kilowatt (maximum demand)	£24·1	£23·3	£44·9	£51·2	£24·0
Net profit	£580,714	£111,762	−£1,451	−£134	£689,876
Ratio of working-costs to revenue (per cent.)	46·5	54·0	93·5	65·8	47·9

* Also purchased 26,457,701 units.

BROKEN WIRES AND POLES.

During the year ending 31st March, 1931, there were 760 instances (1,019 broken wires) reported by electric-supply authorities, with 93,121 miles of conductor erected. The corresponding figures for the previous year were 1,811 broken wires, and 90,710 miles of conductor in use.

Falling trees were the principal cause of the breaks, and accounted for 25·4 per cent. of the total, as against 40·6 per cent. for 1930.

As regards broken poles, 450 instances were reported for the year, of which 352 were New Zealand blue-gum. For 1930 the total number of broken poles reported was 561, and it is still evident that electric-supply authorities who experimented with New Zealand blue-gum and nondescript Australian "hardwoods" are now being called upon to make early replacements after approximately five to seven years of pole-life.

GROWTH OF LOAD.

The total connected load at end of the year under review was 1,155,111 kw., as against a total of 886,905 kw. for 1930, an increase of 268,206 kw., or 30·3 per cent.

Statistics pertaining to the increasing use of electric ranges, electric water-heaters, and milking-machines, have been collected and scheduled for some years past, and from the following table it will be seen that during the period 1925 to 1931 the growth has been phenomenal.

Year.	Consumers.	Electric Ranges.	Electric Water-heaters.	Electrified Milking-machines.
	Number.	Number.	Number.	Number.
1925	148,699	1,526	..	3,581
1926	192,392	4,671	6,654	4,856
1927	228,345	9,511	14,160	6,738
1928	243,795	15,766	21,513	8,514
1929	266,306	20,254	29,257	10,161
1930	284,235	25,997	37,564	11,922
1931	300,809	29,480	42,803	13,656
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Increase over six-year period ..	103	1,820	541*	281

* Five years only.

See Table XVIII for details for year ended 31st March, 1931.

ELECTRICAL SUPPLY AND WIRING REGULATIONS.

The Electrical Supply and Wiring Regulations, which were gazetted in 1927, with the intention of revising same after two years' trial, are now being revised. It is expected that the work of revision will be completed towards the end of 1931.

INSPECTION OF ELECTRIC LINES.

The periodic inspection of the electric lines throughout the Dominion has been maintained in conjunction with the inspections necessitated by the addition of new lines erected during the year. It is satisfactory to be able to say that the electric-supply authorities facilitate these inspections, and, almost without exception, give prompt attention to the rectifying of any defects discovered.

In 1929 it was intimated that more attention would be paid to the inspecting of consumers' installations, and periodical inspections of this nature will be continued in co-operation with the activities of the Electrical Wiremen's Registration Board.

LICENSES ISSUED.

The following water-power and electric-line licenses and permits have been issued during the period from July, 1930, to July, 1931: Licenses—Wilson's (N.Z.) Cement Co. (amendment); Wilson's (N.Z.) Cement Co. (Hikurangi); North Auckland Power Board; Heathcote County Council (consolidating); Raetihi Borough Council (amendment); New Zealand Sounds Hydro-electric Concessions (variation); D. J. Barry, Ruatoria; Christchurch Tramway Board (trackless trolly); M. N. Wallis, Okete; Maniototo Hospital Board (amendment); W. Morris, Tirau; Malvern Power Board (amendment). Permits—J. W. Fraser, Hawarden; E. D. Hodges, Waitekauri; A. Schreiber, Oparau; A. Doig, Mawheraiti; R. Bruce, Pukerua; E. Rogers, Riverside.

The license held by J. Barnett, Leeston, was revoked.

ELECTRIC APPLIANCES BOARD.

Pressure from the electric-supply authorities and supported by the Electrical Traders' Federation has again been brought to bear on the Department for the setting-up of some authority with constitutional powers to prohibit the sale and use of unsafe electrical appliances to the public, and in response thereto a draft Bill has been prepared.

ELECTRICAL FIRES.

During the year there were thirty-three fires reported to the Department by the electric-supply authorities and attributed to electrical causes. The corresponding figure reported for 1930 was twenty-four fires.

ELECTRICAL ACCIDENTS.

During the year ending 31st March, 1931, there were reported to the Department thirty-one electrical accidents, of which eight were fatal. The corresponding figures for 1930 were twenty-four and eight respectively.

REGISTRATION OF ELECTRICAL WIREMEN.

The year has been a busy one for the Registration Board, and a total of fifteen meetings have been held during the year ended the 30th June, 1931. There has been a slight increase in the total registrations during the above period, a large increase in the number of reports of defective work, and an increase in the number of reports of breaches of the Act. The number of candidates for examination has shown a marked decline over the previous year.

A certain amount of delay and additional work is occasioned by the lack, in some cases, of the details which should accompany reports of defective work and breaches of the Act, and a further endeavour was made during the year to bring under the notice of the local authorities the necessity for supplying full reports.

The reinspections of consumers' installations has shown that a large number of extensions have been made to existing installations without notice to the electrical-supply authority, and that they have been connected up without inspection or test. In some cases dangerous conditions have been found to exist through this practice, and drastic action is required to put a stop to it.

Forty-three prosecutions for breaches of the Act were taken by the Registration Board, and several prosecutions were taken by the local authorities.

Sixteen Inspectors of electrical wiring, 149 electrical wiremen with full registration, and eleven electrical wiremen with limited registration have been registered during the year ended the 30th

June, 1931, and twenty-one provisional licenses have been issued during the same period. Of the 149 electrical wiremen granted full registration 138 qualified by examination.

The number of candidates for the examinations held during the year has shown a decline from the previous year, being 543 for the written part and 447 for the practical part, compared with 597 and 542 respectively for the previous year. The results of the examinations are still very disappointing, only 21 per cent. passing in the written part and 25 per cent. in the practical part. The highest marks gained by any candidate also show a falling-off, being seventy-eight in the written part and eighty-two in the practical part, compared with eighty-nine and ninety-six respectively for all examinations.

For the year ended the 30th June, 1931, there have been eighty-eight reports of defective work, and these have been dealt with as follow: The certificates of sixteen wiremen were endorsed for defective work, seventeen wiremen were censured, and fifteen wiremen were cautioned. Thirteen reports are still under consideration. One Inspector was reported for unsatisfactory inspections, and was cautioned.

The very large increase in reports during the year ended the 31st March, 1931—namely, from forty to ninety-nine—indicates that the electrical-supply authorities are taking more advantage of the facilities for disciplinary action provided by the Act.

For the year ended the 30th June, 1931, there have been eighty-two reports of breaches of the Act. Forty-three prosecutions were taken by the Registration Board during the above period, and others are pending.

Fines and costs amounting to £220 were imposed during the year ended the 31st March, 1931.

Electrical Wiremen's Examination Results.

—	September, 1928.			March, 1929.			September, 1929.			March, 1930.			September, 1930.			March, 1931.		
	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.	Entered.	Passed.	Percentage.
Written Part.																		
Alexandra	..	..	..	..	..	..	..	..	..	..	..	..	3	Nil	..	..	..	..
Auckland	65	22	34	62	18	29	69	12	17	59	16	27	56	10	18	41	8	20
Christchurch	31	10	32	23	2	9	42	12	29	25	7	28	36	13	36	25	8	32
Dunedin	23	5	22	22	4	18	25	4	16	22	6	27	28	5	18	23	1	4
Gisborne	5	1	20	7	4	57	4	Nil	..	5	2	40	10	2	20	10	1	10
Greymouth	9	Nil	..	10	2	20	5	Nil	..	10	1	10	7	1	14	8	1	13
Hamilton	16	6	37	17	2	12	13	2	15	16	3	19	24	4	17	15	6	40
Hawera	..	..	..	5	Nil	..	7	Nil	..	4	3	75	..	..	..	..	..	..
Invercargill	4	2	50	8	2	25	9	Nil	..	9	5	56	12	3	25	3	1	33
Masterton	8	2	25	8	2	25	6	Nil	..	2	2	100	3	Nil	..	5	Nil	..
Napier	7	1	14	10	3	30	12	Nil	..	8	1	13	13	2	15	12	Nil	..
Nelson	3	Nil	..	4	1	25	4	1	25	1	Nil	..	7	2	29	3	1	33
New Plymouth	8	1	12	9	3	33	8	2	25	11	3	27	5	Nil	..	6	1	17
Oamaru	..	..	..	..	..	..	3	1	33	..	..	..	..	..	..	..	..	..
Opotiki	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	Nil	..
Paeroa	..	..	..	..	..	..	4	Nil	..	7	Nil	..	6	Nil	..	3	1	33
Palmerston North	11	1	9	13	2	15	17	Nil	..	17	6	35	13	5	38	9	Nil	..
Petone	..	..	..	..	..	..	..	..	..	..	..	..	5	1	20	3	2	67
Tauranga	2	1	50	4	1	25	8	1	13	8	2	25	7	Nil	..	3	1	33
Timaru	4	2	50	2	Nil	..	1	Nil	..	3	Nil	..	8	2	25	6	1	17
Wanganui	13	1	7	12	1	8	9	Nil	..	9	2	22	9	4	44	9	1	11
Wellington	63	22	35	59	7	12	72	15	21	61	13	21	55	10	18	42	15	36
Westport	4	Nil	..	4	2	50	..	..	..	2	Nil	..	2	Nil	..	2	Nil	..
Whangarei	..	..	..	4	3	75	..	..	..	..	..	..	1	Nil	..	3	Nil	..
Total	276	77	28	283	59	21	318	50	16	279	72	26	310	64	21	233	49	21
Highest marks obtained		79			84			87			83			77			78	
Practical Part.																		
Alexandra	..	..	..	..	..	..	..	..	..	..	..	..	2	1	50	..	..	..
Auckland	68	29	43	58	20	34	62	7	11	66	36	55	51	7	14	38	8	21
Christchurch	30	11	37	25	3	12	39	2	5	37	13	35	38	15	40	28	10	36
Dunedin	24	15	62	14	5	36	19	Nil	..	18	10	56	21	3	14	20	7	35
Gisborne	6	3	50	5	Nil	..	4	1	25	4	2	50	11	4	36	7	3	43
Greymouth	5	1	20	7	Nil	..	5	Nil	..	7	2	29	6	Nil	..	5	Nil	..
Hamilton	19	8	42	17	1	6	19	Nil	..	22	10	46	20	7	35	10	2	20
Hawera	..	..	..	2	Nil	..	4	Nil	..	3	3	100	..	..	..	..	..	..
Invercargill	4	4	100	6	3	50	8	Nil	..	7	1	14	14	1	7	7	1	14
Masterton	6	3	50	4	Nil	..	7	Nil	..	4	3	75	2	2	100	5	2	40
Napier	6	3	50	9	4	44	9	Nil	..	8	5	63	10	6	60	6	2	33
Nelson	2	Nil	..	2	1	50	2	Nil	..	1	1	100	6	2	33	4	1	25
New Plymouth	6	1	17	3	1	33	6	1	17	9	4	44	4	Nil	..	6	1	17
Oamaru	..	..	..	..	..	..	4	Nil	..	3	2	67	..	..	..	..	..	..
Opotiki	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	67
Paeroa	..	..	..	..	..	..	5	Nil	..	7	3	43	4	Nil	..	2	1	50
Palmerston North	11	7	66	7	2	28	13	Nil	..	13	9	69	8	3	38	5	2	40
Petone	..	..	..	..	..	..	..	..	..	..	..	..	3	1	33	2	1	50
Tauranga	2	1	50	4	Nil	..	12	2	17	9	4	44	6	2	33	2	Nil	..
Timaru	3	2	67	4	Nil	..	1	1	100	1	1	100	5	Nil	..	7	3	43
Wanganui	6	4	67	3	2	66	5	Nil	..	3	2	67	5	3	60	5	3	60
Wellington	68	36	53	51	20	39	54	25	46	31	12	39	35	15	43	25	10	40
Westport	4	3	75	2	Nil	..	..	..	..	2	2	100	1	Nil	..	1	1	100
Whangarei	..	..	..	5	Nil	..	4	Nil	..	5	2	40	3	Nil	..	4	2	50
Total	270	131	49	228	62	27	282	39	14	260	127	49	255	72	28	192	62	32
Highest marks obtained		93			86			85			84			82			79	

F. T. M. Kissel, B.Sc., M.I.E.E., A.M.I.C.E.
Chief Electrical Engineer.

TABLE I.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—RESULTS OF OPERATION.

Results of Operation.	Thirteenth Year, 1928.	Fourteenth Year, 1929.	Fifteenth Year, 1930.	Sixteenth Year, 1931.
	£	£	£	£
Capital outlay	1,561,081	1,581,262	1,622,199	1,712,555
Costs—				
Working-costs	40,054	30,130	36,808	57,033*
Interest	75,630	76,612	76,354	77,226
Depreciation, 2 per cent.	29,863	29,847	15,315	13,290
Total costs	145,547	136,589	128,477	147,549
Accumulated Depreciation Fund	173,231	192,359	188,294	197,627
Accumulated Reserve Fund	..	..	44,388	97,345
Sinking Fund Account	62,465	115,770	144,557	168,464
Revenue—				
City Council	68,000†	70,344†	70,169	88,814
Tramways	16,863	16,215	16,435	9,121
Wholesale consumers	83,722	97,817	107,677	117,376
Retail consumers	164	145	50	42
Miscellaneous	2,378	2,442	2,317	2,279
Total revenue	171,127	186,963	196,648	217,632
Maximum load (kilowatts)—				
Power-house	21,020	24,370	27,540	30,800
Substations—				
Addington	16,088	17,610	20,792	23,582
Timaru	1,616	2,247	2,395	2,685
Ashburton	1,306	1,402	1,370	1,450
Oamaru	581	869	1,061	1,392
Hororata	239	264	275	289
Point	19	21	37	32
Total substations (66 kv.)	19,313	21,772	25,574	29,275
City Council	10,102†	11,624†	12,944	15,145
Tramways	2,720	2,810	2,860	2,630
Average load (kilowatts)—				
Power-house	10,710	12,370	14,210	13,790
Substations (66 kv.)	9,780	11,120	13,120	13,150
City Council	4,480†	5,140†	6,060†	5,960
Tramways	1,020	986	1,000	555
Units output—				
Power-house	93,853,759	108,011,955	124,375,245	120,687,377
Fed to village, tunnel, and intake	757,678	1,422,898	1,514,776	1,321,822
Fed to transmission-lines	93,096,081	106,589,057	122,860,469	119,365,555
Substations (66 kv.)	85,969,069	97,765,686	114,971,933	113,393,072
Units purchased (Christchurch Tramway Board, &c.	..	..	..	1,729,441
Units distributed—				
City Council (sold)	39,390,350†	45,058,656†	54,124,965	52,325,987
Tramways (sold)	8,993,650	8,648,400	8,764,860	4,864,657
Wholesale consumers and local bodies (sold)	34,912,744	42,195,004	49,706,308	54,760,271
Retail consumers (sold)	20,844	24,147	4,817	2,965
Substation and power-house local consumption (unsold)	1,453,130	2,118,757	2,569,583	2,316,735
Total units distributed	84,770,718	98,044,964	115,170,533	114,270,615
Losses—				
Transmission-line losses	7,127,012	8,823,371	7,888,536	5,972,483
Percentage	7·650	8·280	6·420	5
Distribution losses	1,956,029	1,143,620	1,316,176	2,173,720
Percentage	2·300	1·150	1·140	1·865
Average load-factor (per cent.)—				
Power-house	51·0	50·7	51·6	44·8
Substations (66 kv.)	50·6	51·2	51·4	44·9
City	44·4†	44·3†	46·7†	39·3
Working-costs—				
Per kilowatt (power-house maximum)	£1·905	£1·236	£1·338	£1·85
Per kilowatt (substations maximum)	£2·074	£1·383	£1·441	£1·946
Per unit generated and purchased	0·102d.	0·067d.	0·07d.	0·112d.
Per unit distributed	0·113d.	0·074d.	0·077d.	0·120d.
Capital charges (interest plus depreciation)—				
Per kilowatt (power-house maximum)	£5·019	£4·368	£3·326	£2·94
Per kilowatt (substations maximum)	£5·462	£4·889	£3·582	£3·092
Per unit generated and purchased	0·027d.	0·236d.	0·18d.	0·178d.
Per unit distributed	0·299d.	0·261d.	0·19d.	0·190d.
Total cost—				
Per kilowatt (power-house maximum)	£6·924	£5·605	£4·664	£4·790
Per kilowatt (substations maximum)	£7·536	£6·273	£5·023	£5·049
Per unit generated and purchased	0·372d.	0·303d.	0·25d.	0·289d.
Per unit distributed	0·412d.	0·334d.	0·267d.	0·309d.
Revenue—				
Per kilowatt (power-house maximum)	£8·141	£7·672	£7·262	£7·060
Per kilowatt (substations maximum)	£8·860	£8·587	£7·821	£7·435
Per unit generated and purchased	0·437d.	0·416d.	0·39d.	0·427d.
Per unit distributed	0·484d.	0·457d.	0·42d.	0·457d.
Per unit sold (city)	0·414d.	0·375d.	0·33d.	0·408d.
Per unit sold (trams)	0·450d.	0·449d.	0·45d.	0·45d.
Per unit sold (wholesale consumers)	0·575d.	0·556d.	0·52d.	0·515d.
Per unit sold (retail consumers)	1·889d.	1·441d.	2·49d.	3·40d.

* Includes £21,170 for power purchased. † Excludes Woolston Borough Council.

TABLE II.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—ANALYSIS OF CAPITAL OUTLAY.

Item.	Total Expenditure to 31st March, 1930.	Total Expenditure to 31st March, 1931.	Difference in Expenditure during Year 1930–31.
	£	£	£
Land, roading, and fencing	24,437	24,583	146
Harper diversion	23,158	23,158	..
Acheron diversion	..	18,704	18,704
Headworks (second tunnel)	235,745	236,914	1,169
Headworks	230,479	230,565	86
Power-house machinery, &c.	221,608	221,771	163
Staff village	24,692	24,795	103
Transmission-lines	394,884	390,145	*Cr.* 4,739
Addington Substation	83,959	96,356	12,397
Lyttelton Diesel Station	..	48,164	48,164
Primary distribution	110,555	119,371	8,816
Secondary distribution	41,003	42,216	1,213
Service transformers and meters	7,084	8,630	1,546
Vehicles and loose tools	28,490	24,574	*Cr.* 3,916
Telephone-lines	1,891	1,891	..
Office furniture	316	322	6
Surveys, preliminary expenses, &c.	128,658	133,576	4,918
Interest during construction	65,240	66,820	1,580
Total	1,622,199	1,712,555	90,356

TABLE III.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—OPERATING OR WORKING COSTS.

Item.	1930.		1931.	
	Cost.	Cost per Unit distributed.	Cost.	Cost per Unit distributed.
	£	d.	£	d.
Harper diversion	837	0·0021	1,123	0·0024
Generating	8,995	0·0186	10,047	0·0211
Transmission-line	6,972	0·0146	5,848	0·0123
Main distribution	3,183	0·0066	3,399	0·0071
H.T. distribution	3,480	0·0073	3,724	0·0078
L.T. distribution	4,680	0·0098	4,443	0·0093
Standby	..	..	21,170	0·0444
Management	8,661	0·0180	7,279	0·0153
	36,808	0·0770	57,033	0·1197
Units distributed	115,170,533		114,270,615	

TABLE IV.—LAKE COLERIDGE ELECTRIC-POWER SUPPLY.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR YEAR ENDED 31ST MARCH, 1931.

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.	Working-costs and Management.	Interest.	Depreciation.	Sinking Fund, Reserve Fund, &c.	Other Expenditure.	Total.	Profit.	Loss.
			Retail.	Bulk (for Resale).													
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Public Works Department ..	55	1,712,555	45,643*	169,710	..	241	2,038	217,632	21,170	35,863	77,226	13,290	70,083	..	217,632	..	..
Ashburton Power Board ..	3,568	351,031	41,518*	767	..	..	477	42,762	11,181	9,362	19,565	1,938	3,612	102	45,760	..	2,998
Banks Peninsula Power Board ..	957	102,757	13,140*	28	3,603	199	297	17,267	3,240	4,804	6,531	1,678	1,146	782	18,181	..	914
Christchurch City Council ..	26,101	770,063	211,185*	8,248	..	191	9,938	229,562	83,103	57,064	19,416	34,664	11,478	..	205,725	23,837	..
Halswell County Council ..	263	6,940	2,008	..	..	..	9	2,017	842	565	263	..	50	..	1,720	297	..
Heathcote County Council ..	1,828	35,492	10,110	..	..	352	68	10,530	5,467	4,299	1,540	..	1,151	..	12,457	..	1,927
Kaiapoi Borough Council ..	450	10,519	3,171	..	..	63	..	3,234	1,054	729	643	492	253	..	3,171	63	..
Lyttelton Borough Council ..	706	7,415	5,680	..	..	116	..	5,796	2,473	1,946	310	200	175	37	5,141	655	..
Malvern Power Board	654	63,966	6,814	..	1,321	130	772	9,037	2,503	2,252	3,541	..	630	319	9,245	..	208
North Canterbury Power Board ..	1,574	141,562	19,944*	2,782	..	23	659	23,408	8,416	4,247	6,266	1,517	2,017	141	22,604	804	..
Riccarton Borough Council ..	1,328	23,292	10,632	..	..	345	35	11,012	4,077	2,444	728	495	245	..	7,989	3,023	..
Rangiora Borough Council ..	559	11,980	4,910	..	..	..	198	5,108	1,698	1,610	335	336	75	65	4,119	989	..
South Canterbury Power Board ..	3,486	320,241	42,600*	12,083	..	..	398	55,081	22,825	7,257	17,829	2,127	5,090	259	55,387	..	306
Springs-Ellesmere Power Board ..	2,095	138,470	25,904	..	..	94	52	26,050	9,495	3,811	8,057	827	1,605	1,725	25,520	530	..
Sumner Borough Council ..	973	16,424	6,192	..	..	..	59	6,251	2,470	1,834	430	422	81	..	5,237	1,014	..
Tai Tapu Dairy Co.	248	10,572	4,097	..	..	92	..	4,189	1,829	961	495	376	..	..	3,661	528	..
Timaru Borough Council ..	3,510	110,512	33,844	..	..	..	131	33,975	12,052	6,794	5,808	..	3,353	..	28,007	5,968	..
Waimairi County Council ..	3,145	83,516	22,629	..	98	..	..	22,727	8,580	5,188	2,385	..	1,053	189	17,395	5,332	..
Waitaki Power Board	3,216	175,284	34,925*	1,093	..	..	1,155	37,173	11,567	9,027	9,735	2,100	2,280	667	35,376	1,797	..
Totals	54,716	4,092,591	544,946	194,711	5,022	1,846	16,286	762,811	214,042	160,057	181,103	60,462	104,377	4,286	724,327	44,837	6,353

* After deducting sales to other distributing bodies.

	£
Gross profit	33,462
Raised by rates	5,022
Net profit	£38,484

TABLE V.—MANGAHAO-WAIKAREMOANA ELECTRIC-POWER SUPPLY.—RESULTS OF OPERATIONS.

—	First Year, 31st March, 1930.	Second Year, 31st March, 1931.
	£	£
Capital outlay	3,426,901	3,498,840
Costs—		
Working-costs	59,235*	59,476†
Interest	191,288	196,206
Depreciation	62,205	63,850
Total costs	312,728	319,532
Revenue	259,461‡	283,017
Loss	53,267	36,515
Accumulated Depreciation Fund	223,257	284,996
Maximum load (kilowatts)—		
Combined power-houses	37,880	44,660
Khandallah	20,000	24,600
Wellington City	15,424	18,528
Hutt Valley Electric-power Board	4,180	5,028
Wellington Meat Export Co., Ltd.	429	461
Railway Department	1,440	1,737
Horowhenua Electric-power Board	2,142	1,670
Manawatu-Oroua Electric-power Board	3,465	3,660
Dannevirke Electric-power Board	617	708
Tararua Electric-power Board	607	655
Wairarapa Electric-power Board	1,044	1,339
Wanganui-Rangitikei Electric-power Board	3,441	3,970
Central Hawke's Bay Electric-power Board	694	806
Hawke's Bay Electric-power Board	3,048	3,504
Wairoa Electric-power Board	804	816
Poverty Bay Electric-power Board	1,330	1,158
Units output—		
Generated—Power-house totals	182,148,043	210,373,650
Purchased—		
Wellington City Council	65,040	1,465,602
Wanganui-Rangitikei Electric-power Board	..	51,980
Hastings Borough Council	1,300	80,160
Total units generated and purchased	182,214,383	211,971,392
Units sold—		
Wellington City Council	50,192,540	56,672,369
Wellington Meat Export Co., Ltd.	1,673,450	1,664,900
Horowhenua Electric-power Board	8,468,472	8,591,177
Hutt Valley Electric-power Board	20,086,060	24,612,820
Wairarapa Electric-power Board	3,549,797	5,273,654
Tararua Electric-power Board	3,090,220	3,490,764
Dannevirke Electric-power Board	2,987,845	3,718,552
Central Hawke's Bay Electric-power Board	3,487,202	4,148,254
Hawke's Bay Electric-power Board	15,401,308	16,009,755
Manawatu-Oroua Electric-power Board	20,266,997	23,437,239
Wanganui-Rangitikei Electric-power Board	17,026,540	20,598,638
Railway Department	3,136,540	5,142,720
Wairoa Electric-power Board	3,209,344	3,436,891
Poverty Bay Electric-power Board	4,981,845	6,456,441
Retail consumers	1,454,571	916,700
Total units sold	159,012,731	184,170,874
Operating consumption	3,090,320	3,451,150
Losses—		
Total losses (units)	20,111,332	24,349,368
Percentage	11·04	11·5
Load-factor (per cent.)—		
System (annual)	54·9	54·2
System (average weekly)	65·2	65·7
Working-costs (less power purchased)—		
Per kilowatt (system maximum)	£1·56	£1·23
Per unit generated	0·078d.	0·062d.
Per unit sold	0·089d.	0·072d.
Capital charges—		
Per kilowatt (system annual maximum)	£6·71	£5·82
Per unit generated	0·333d.	0·294d.
Per unit sold	0·381d.	0·339d.
Total costs—		
Per kilowatt (system annual maximum)	£8·27	£7·15
Per unit generated	0·411d.	0·362d.
Per unit sold	0·470d.	0·416d.
Revenue—		
Per kilowatt (system maximum)	£6·78	£6·36
Per unit generated	0·342d.	0·322d.
Per unit sold	0·390d.	0·370d.

* Does not include £233 for power purchased. † Includes £4,441 for power purchased. ‡ Gross revenue, £259,668.

TABLE VI.—MANGAHAO - WAIKAREMOANA ELECTRIC-POWER SUPPLY.—ANALYSIS OF CAPITAL OUTLAY.

	Expenditure to 31st March, 1930.	Expenditure to 31st March, 1931.
	£	£
Land, roading, tram-lines, and fencing	150,643	150,775
Headworks	952,034	953,037
Generating-stations and machinery	609,784	609,897
Transmission-lines	675,585	703,911
Main substations	305,226	333,746
Service buildings and workmen's accommodation	104,455	105,550
Vehicles and loose construction tools	7,310	5,837
Surveys, expenses, and salaries	241,353	246,134
Construction plant and equipment	18,505	22,859
Interest during construction	289,926	293,879
Cost and expenses of raising loans	71,481	73,215
Office furniture	599	..
Totals	3,426,901	3,498,840

TABLE VII.—MANGAHAO-WAIKAREMOANA ELECTRIC-POWER SUPPLY.—OPERATING OR WORKING COSTS.

	1930.		1931.	
	Cost.	Per Unit sold.	Cost.	Per Unit sold.
	£	d.	£	d.
Generating	15,933	0·024	16,026	0·021
Transmission	20,201	0·030	16,908	0·022
Substations	7,764	0·012	5,997	0·008
Management and general	15,337	0·023	16,104	0·021
Totals	59,235	0·089	55,035	0·072

Units sold—1930, 159,012,731; 1931, 184,170,874.

TABLE VIII.—MANGAHAO-WAIKAREMOANA ELECTRIC-POWER SUPPLY.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR THE YEAR ENDING 31ST MARCH, 1931.

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.	Working-costs and Management.	Interest.	Depreciation.	Sinking Fund, Reserve Fund, &c.	Other Expenditure.	Total.	Profit.	Loss.
			Retail.	Bulk (for Resale).													
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Public Works Department ..	98	3,498,905	747*	277,873	..	..	4,397	283,017	4,441	55,035	196,206	63,850	..	..	319,532	..	36,515
Central Hawke's Bay Electric-power Board	1,543	136,470	23,101	..	..	..	602	23,703	7,297	2,720	7,938	2,210	1,827	1,208	23,200	503	..
Dannevirke Electric-power Board	2,349	209,680	28,484	..	..	238	592	29,314	6,496	5,821	11,918	2,054	2,650	167	29,106	208	..
Hawke's Bay Electric-power Board	2,317	213,908	27,898*	19,675	..	378	1,231	49,182	25,802	7,285	12,185	3,217	2,215	343	51,047	..	1,865
Hutt Valley Electric-power Board	10,464	380,733	105,832	..	..	..	3,407	109,239	39,675	24,034	21,740	7,527	8,414	6,577	107,967	1,272	..
Horowhenua Electric-power Board	3,643	210,092	41,593	..	..	123	1,176	42,892	14,409	8,738	11,569	2,837	2,322	817	40,692	2,200	..
Hastings Borough Council ..	3,383	114,130	24,591*	250	..	..	57	24,898	6,924	8,156	3,858	..	2,327	552	21,817	3,081	..
Havelock North Town Board ..	288	24,074	2,954	..	..	..	..	2,954	394	1,354	1,256	..	537	16	3,557	..	603
Manawatu-Oroua Electric-power Board	4,505	509,011	64,313*	14,523	..	360	387	79,583	29,847	13,122	26,974	4,286	4,864	439	79,532	51	..
Mangaweka Town Board ..	106	5,504	923	..	..	228	41	1,192	252	470	108	..	21	212	1,063	129	..
Napier Borough Council ..	4,118	162,282	35,341	..	..	..	982	36,323	12,357	8,355	7,775	..	899	269	29,655	6,668	..
Palmerston North City Council	5,437	235,170	62,199	..	..	5	13	62,217	14,523	10,562	10,743	4,964	1,850	420	43,062	19,155	..
Poverty Bay Electric-power Board	4,511	314,904	52,885	..	..	264	1,397	54,546	10,024	13,788	16,565	3,849	5,189	2,330	51,745	2,801	..
Tararua Electric-power Board	1,559	164,418	23,504	..	..	95	960	24,559	5,944	4,514	8,420	2,278	2,361	179	23,696	863	..
Wairarapa Electric-power Board	4,204	356,474	52,533	..	..	1,342	1,132	55,007	7,635	12,021	20,482	1,940	4,209	3,402	49,689	5,318	..
Wanganui - Rangitikei Electric-power Board	9,470	548,279	100,044*	469	..	108	3,511	104,132	30,971	17,545	30,150	16,923	5,805	2,083	103,477	655	..
Wairoa Electric-power Board ..	389	62,109	8,057	4,201	1,998	623	151	15,030	6,616	3,098	3,632	879	485	77	14,787	243	..
Wairoa Borough Council ..	660	19,799	8,442	..	..	21	301	8,764	4,201	1,467	1,132	372	336	66	7,574	1,190	..
Wellington City Corporation ..	28,700	1,153,407	350,202*	3,974	..	..	3,097	357,273	73,574	79,932	30,648	..	48,638	68,896	301,688	55,585	..
Totals	87,744	8,319,349	1,013,643	320,965	1,998	3,785	23,434	1,363,825	301,382	278,017	423,299	117,186	94,949	88,053	1,302,886	99,922	38,983

* After deducting sales to other distributing bodies.

Gross profit, £60,939; rates collected, £1,998; net profit, £58,941.

Table IX.—Waikato Electric-power Supply.

—	Eighth Year. March, 1928.	Ninth Year. March, 1929.	Tenth Year. March, 1930.	Eleventh Year. March, 1931.
Capital outlay—	£	£	£	£
Horahora—Assets in operation	609,228	617,725	624,117	..
Arapuni—Assets in operation	363,945	524,621	2,705,894	..
Total assets in operation	973,173	1,142,346	3,330,011	1,286,667
Assets not in operation	..	..	330,416	2,652,455
Costs—				
Working-costs	46,568	76,231	62,702	101,889
Interest	44,190	53,044	135,622	85,389
Depreciation	18,646	21,527	60,127	33,009
Sinking Fund	9,732	..	..	..
Total costs	119,136	150,802	258,451	220,287
Revenue	125,312	135,511	225,683	184,593
Profit	6,176	*Dr.* 15,291	*Dr.* 32,768	*Dr.* 35,694
Accumulated surplus	53,845	32,415	*Dr.* 2,618	*Dr.* 38,312
Accumulated Depreciation Fund	84,272	103,187	165,758	187,574
Accumulated Sinking Fund	49,847	52,164	54,445	..
Maximum load (kilowatts)—				
System for year	15,700	15,900	41,520	49,520
Arapuni Power-station for year	..	..	33,900	38,400
Horahora Power-station for year	12,400	10,300	10,200	11,300
Arapuni Power-station, average weekly	..	..	24,731	35,927
Horahora Power-station, average weekly	11,370	9,702	7,752	9,804
Units output—				
Arapuni Power-station, total generated	..	..	121,084,986	40,898,950
Horahora Power-station, total generated	88,703,370	79,298,740	56,648,365	80,075,210
Grand Junction, total generated	..	5,846,740	2,682,100	6,368,600
Diesel plant, total generated	..	7,070,912	2,608,248	7,524,620
Units purchased (McLaren's Falls, Auckland Power Board, and dairy factory)	11,372,298	12,776,370	7,706,548	8,226,397*
Total units generated and purchased	100,075,668	104,992,762	190,710,247	143,093,777
(1) Units used for station auxiliaries, &c.	2,145,290	1,348,175	2,478,395	2,070,723
(2) Units available for outgoing lines	97,930,378	103,644,587	188,231,852	141,023,054
(3) Units sold	87,852,067	92,707,271	173,003,373	131,013,550
(4) Total losses	10,078,311	10,937,316	15,228,479	10,009,504
(5) Percentage of units available	10·29	10·58	8·1	7·09
Units sold	87,852,067	92,707,271	173,003,373	131,013,550
Load-factor, annual (per cent.)—				
System	72·8	75·5	54·1	32·9
Power-house—				
Arapuni	..	..	40·8	60·9
Horahora	81·7	87·8	63·4	80·9
Load-factor, average weekly—				
Power-house—				
Arapuni	..	..	55·9	65·1
Horahora	88·2	93·2	83·5	93·1
Working-costs	(£46,568)	(£76,231)	(£62,702)	(£101,889)†
Per kilowatt (system annual maximum)	£2·96	£4·79	£1·51	£2·06
Per unit generated and purchased	0·112d.	0·174d.	0·079d.	0·171d.
Per unit sold	0·127d.	0·197d.	0·087d.	0·187d.
Capital costs	(£62,836)	(£74,571)	(£195,749)	(£118,398)
Per kilowatt (system annual maximum)	£4·00	£4·70	£4·71	£2·39
Per unit generated and purchased	0·151d.	0·171d.	0·246d.	0·199d.
Per unit sold	0·172d.	0·194d.	0·261d.	0·217d.
Total costs on system	(£109,404)	(£150,802)	(£258,451)	(£220,287)
Per kilowatt (system annual maximum)	£6·96	£9·49	£6·22	£4·45
Per unit generated and purchased	0·263d.	0·345d.	0·325d.	0·369d.
Per unit sold	0·299d.	0·391d.	0·348d.	0·403d.
Revenue	(£125,312)	(£135,511)	(£225,683)	(£184,593)
Per kilowatt (system annual maximum)	£7·98	£8·53	£5·42	£3·73
Per unit generated and purchased	0·305d.	0·31d.	0·284d.	0·310d.
Per unit sold	0·342d.	0·351d.	0·313d.	0·338d.

* Includes 61,960 units supplied by King's Wharf Station while No. 1 unit at Arapuni was out of service.
† Note.—Capital costs do not include Sinking Fund.

TABLE X.—WAIKATO ELECTRIC-POWER SUPPLY: HORAHORA-ARAPUNI SCHEME.—ANALYSIS OF CAPITAL OUTLAY.

—	At 31st March, 1930.	At 31st March, 1931.	Expenditure during Year.	
			Dr.	*Cr.*
Horahora—	£	£	£	£
Land, road, and fencing	3,208	3,208	..	..
Headworks	187,609	178,636	27	..
Generating-station, transformers, and machinery	110,928	111,143	215	..
Staff village	12,439	12,678	239	..
Arapuni—				
Land, roading, and fencing	37,002	37,026	24	..
Headworks	901,973	951,309	49,336	..
Generating-station, transformers, and machinery	573,049	617,543	44,494	..
Staff village	47,866	48,503	637	..
Remedial works	..	47,544	47,544	..
Auxiliary plants—				
Waihi Grand Junction steam plant	9,139	9,139	..	..
Diesel plant	63,330	61,771	..	1,559
Huntly steam plant	..	11,170	11,170	..
Transmission-lines	605,417	606,605	1,188	..
Main substations	369,974	386,556	16,582	..
Distribution-lines (11,000 volts)	44,261	40,868	..	3,393
Distribution substations (11,000 volts)	10,913	10,831	..	82
General—				
Land, stores, and railway-siding, Ruakura	13,809	13,809	..	..
Staff residences	4,372	4,372	..	..
Office furniture, Hamilton	924	839	..	85
Motor-vehicles, loose tools, and equipment	15,851	15,549	..	302
Engineering office and general expenses on surveys and on construction	152,479	158,784	6,305	..
Interest during construction	353,198	459,952	106,754	..
Cost of raising loans	132,055	135,791	3,736	..
Stocks of spares at substations, &c.	19,631	20,211	580	..
Totals	3,660,427	3,943,837	283,410	..

TABLE XI.—WAIKATO ELECTRIC-POWER SUPPLY: HORAHORA-ARAPUNI SCHEME.—OPERATING OR WORKING COSTS.

—	1927–28.		1928–29.		1929–30.		1930–31.	
	Cost.	Per Unit generated.	Cost.	Per Unit generated.	Cost.	Per Unit generated.	Cost.	Per Unit generated.
Generating—	£	d.	£	d.	£	d.	£	d.
Horahora	5,837	0·0158	6,453	0·0195	7,018	0·0319	7,430	0·0223
Arapuni	..	..	..	..	4,410	0·0087	3,737	0·0219
Grand Junction	10,609	0·7047	17,836	0·7321	10,972	0·9819	20,651	0·7780
Diesel plant	..	..	14,930	0·5067	4,791	0·4409	12,861	0·4102
Sum	16,446	..	39,219	..	27,191	..	44,679	..
		Per Unit sold.		Per Unit sold.		Per Unit sold.		Per Unit sold.
Transmission-lines (110, 50, and 11 kv.)	7,757	0·0212	7,995	0·0207	12,331	0·0171	11,850	0·0217
Main substations (110 and 50 kv.)	5,466	0·0149	6,165	0·0148	9,016	0·0125	9,252	0·0169
Management and general	5,631	0·0154	6,210	0·0161	6,216	0·0087	6,100	0·0112
Total	35,300	0·0965	59,589	0·1543	54,754	0·0759	71,881	0·1317
Power purchased	11,268	..	15,964	..	7,777	..	9,271*	..
Standby provision	..	..	240	..	171	..	20,737	..
Total	46,568	0·1272	75,793	0·1962	62,702	0·0871	101,889	0·1867

* Includes £44 for power purchased in 1928–29 and paid for in 1930–31.

Total units sold: 1927–28, 87,852,067; 1928–29, 92,707,271; 1929–30, 173,003,373; 1930–31, 131,013,550.

TABLE XII.—ARAPUNI-HORAHORA ELECTRIC-POWER SUPPLY.—GROSS FINANCIAL RESULTS OF DISTRIBUTION OF ENERGY FOR THE YEAR ENDED 31ST MARCH, 1931.

Distributing Authority.	Number of Consumers.	Capital Outlay.	Revenue.					Expenditure.							Balance.	
			From Sales of Electrical Energy.		Trading Account.	Other Sources.	Total.	Paid for Electrical Energy.	Working-costs and Management.	Interest.	Depreciation.	Sinking Fund and Reserve Funds.	Other Expenditure.	Total.	Profit.	Loss.
			Retail.	Bulk (for Resale).												
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Public Works Department ..	19	3,991,872	20,385*	160,544	..	3,664	184,593	30,008	70,593	85,389	33,009	..	1,288	220,287	..	35,694
Auckland Power Board ..	46,519	3,304,924	645,967*	1,497	..	7,720	655,184	33,415	327,863	139,078	60,090	84,020	..	644,466	10,718	..
Bay of Plenty Power Board ..	1,309	207,015	33,087	..	839	1,150	35,076	11,536	8,133	11,895	..	2,380	..	33,944	1,132	..
Cambridge Power Board ..	1,344	109,589	19,411	..	325	1,093	20,829	5,637	5,819	6,316	..	1,676	..	19,448	1,381	..
Central Power Board ..	3,923	320,600	53,877	..	74	1,169	55,120	14,790	11,394	18,076	2,432	3,599	2,708	52,999	2,121	..
Franklin Power Board ..	3,092	264,450	44,264	..	1,943	3,189	49,396	14,916	7,740	14,314	2,809	2,603	524	42,906	6,490	..
Te Awamutu Power Board ..	1,650	181,095	30,152	..	41	188	30,381	8,428	5,030	9,917	1,000	2,032	975	27,382	2,999	..
Waitemata Power Board ..	8,067	382,115	70,373	..	..	1,442	71,815	18,443	17,042	21,075	3,313	6,770	1,729	68,372	3,443	..
Waitomo Power Board ..	1,127	98,707	17,672	..	..	398	18,070	4,389	5,202	5,881	..	1,152	372	16,996	1,074	..
Thames Valley Power Board ..	5,952	806,284	117,698*	5,421	1,827	2,107	127,053	36,679	28,049	46,207	4,449	9,763	1,218	126,365	688	..
Thames Borough Council ..	1,115	33,606	11,463	..	13	94	11,570	3,424	3,164	1,059	274	209	2,039	10,169	1,401	..
Te Aroha Borough Council ..	710	24,231	7,602*	57	..	134	7,793	1,997	4,295	515	350	95	42	7,294	499	..
Hamilton Borough Council ..	4,003	56,907	33,969	..	..	250	34,219	9,219	9,590	3,254	..	3,645	89	25,797	8,422	..
Tourist Department ..	1,814	71,197	18,693	..	..	561	19,254	3,337	6,591	3,560	1,424	4,342	..	19,254	..	..
Totals	80,644	9,871,475	1,124,613	167,519	5,062	23,159	1,320,353	196,218	510,505	366,536	109,150	122,286	10,984	1,315,679	40,368	35,694

* After deducting amount of sales to other distributing authorities.

Net profit, £4,674.

TABLE XIII.—ELECTRIC-POWER BOARDS OF NEW ZEALAND AS CONSTITUTED AT 31ST MARCH, 1931.

Name of Board.	Proclamation constituting Power Board Area gazetted.	Members on Board.	Approximate Area.		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.
		Number.	Sq. Miles.	Sq. Miles.	Number.	Number.	£	£	£		£	Number.	Number.
Ashburton	17/11/21	12	1,193	1,271	17,925	550	11,500,000	9,264,661	700,181	Capital	411,150	2,999	706
Auckland	1/4/22	12	300	..	200,000	..	73,537,262	50,491,865	..	Capital	2,318,000	11,004	1,367
Banks Peninsula	8/1/20	7	387	..	4,050	..	4,457,806	3,545,448	..	Capital	114,680	658	113
Bay of Plenty	20/8/25	8	460	2,615	8,600	3,100	1,769,657	1,769,657	450,000	Unimproved ..	206,000	654	153
Buller	11/5/22	5	1,987	..	9,197	..	696,374	696,374	..	Unimproved ..	Poll not yet taken.		
Cambridge	8/1/20	8	137	..	6,000	..	2,559,567	1,550,262	..	Capital	122,836	749	123
Central	8/7/20	10	985	..	18,939	..	9,078,818	4,866,263	..	Capital	307,000	1,059	78
Central Hawke's Bay ..	19/10/22	9	1,300	..	11,350	..	6,839,951	6,839,951	..	Unimproved ..	150,000	543	41
Dannevirke	11/8/21	10	578	118	12,188	426	4,275,674	4,275,674	487,019	Unimproved ..	224,000	1,584	330
Franklin	29/6/25	9	628	58	16,359	406	7,761,397	4,926,883	..	Capital	329,820	2,471	478
Golden Bay	18/6/25	5	51	..	1,200	..	479,726	248,871	..	Capital	28,000	393	98
Grey	26/10/22	9	640	810	13,100	700	1,920,000	567,270	117,700	Capital	260,800	2,073	665
Hawke's Bay	19/6/24	11	1,682	2	44,620	1,115	18,536,793	11,496,811	127,961	Capital	304,000	681	68
Horowhenua	1/12/21	9	630	..	16,680	..	6,898,987	3,403,255	..	Capital	260,000	973	26
Hurunui	31/10/29	7	..	..	5,443	537	..	1,330,629	64,421	Unimproved ..	Poll not yet taken.		
Hutt Valley	6/7/22 11/12/24	11	530	..	41,500	..	3,119,920	3,119,920	..	Unimproved ..	390,000	2,333	343
Malvern	28/6/23	6	308	1,833	3,550	1,500	2,900,019	2,226,497	1,426,740	Capital	65,000	508	33
Manawatu-Oroua	1/12/21	12	1,301	..	40,000	..	13,846,231	13,846,231	..	Unimproved ..	550,000	1,144	96
Marlborough	25/10/23	8	3,218*	..	14,530*	..	8,642,190	5,809,209*	..	Capital	327,500	1,334	300
North Auckland	29/3/23	12	2,218	..	22,619	..	4,058,081	4,058,081	..	Unimproved ..	Poll not yet taken.		
North Canterbury	3/3/27	8	858	200	9,064	4,021	6,591,030	5,503,803	1,451,124	Capital	173,700	447	95
Opunake	9/3/21 11/3/22	7	197	5	4,250	50	1,728,168	916,111	..	Capital	95,000	504	107
Otago Central	26/10/22	9	306	2,378	3,585	1,585	742,782	296,380	727,447	Capital	87,000	430	31
Otago	18/10/23 31/12/26 1/11/28 26/4/30	9	1,391	890	17,931	6,251	4,797,711	3,061,588	1,634,860	Capital	256,500	1,358	196
Poverty Bay	12/6/24	11	1,747	1,344	24,030	8,485	15,198,003	6,588,500	3,313,384	Capital	379,750	2,319	530
Reefton	30/6/21	4	24	..	1,639	..	178,055	38,504	..	Capital	Poll not yet taken.		
South Canterbury	3/7/24	12	1,673	3,451	35,618	6,625	15,096,516	12,946,839	2,640,530	Capital	348,300	1,919	587
South Taranaki	30/4/25 5/2/31	8	434	46	16,280	1,220	9,059,095	5,296,444	79,442	Capital	187,500	1,063	208
Southland	13/11/19 19/11/19	12	7,918	3,035	68,000	30	14,942,117	14,942,117	13,7513	Unimproved ..	1,650,000	6,516	415
Springs-Ellesmere	1/7/20	5	505	..	11,780	..	5,688,061	5,688,061	..	Unimproved ..	141,520	959	56

TABLE XIII.—ELECTRIC-POWER BOARDS OF NEW ZEALAND AS CONSTITUTED AT 31ST MARCH, 1931—*continued.*

Name of Board.	Proclamation constituting Power Board Area gazetted.	Members on Board.	Approximate Area.		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.
		Number.	Sq. Miles.	Sq. Miles.	Number.	Number.	£	£	£		£	Number.	Number.
Taranaki	18/5/22, 6/5/26, 20/5/26	8	355	1,333	13,985	8,015	6,141,672	2,865,396	3,109,336	Capital	435,000	1,026	252
Tararua	23/3/22	9	700	565	8,458	1,770	2,833,994	2,833,994	1,149,113	Unimproved ..	200,000	714	83
Tauranga	14/6/23	7	636	3	8,450	3,640	943,371	943,371	489,164	Unimproved ..	144,500	1,192	417
Te Awamutu	8/1/20	8	270	..	7,620	..	3,699,132	2,353,948	..	Capital	178,000	757	146
Teviot	22/7/22	7	102*	..	1,800*	..	176,839	255,661*	..	Unimproved ..	55,500	280	32
Thames Valley	8/1/19	12	2,295	6	38,570	3,150	14,785,086	7,709,621	43,047	Capital	850,000	1,507	960
Waimea	1/5/29	7	..	..	12,280	..	..	1,624,185	..	..	Nil	282	409
Wairarapa	25/3/20	9	606	1,390	19,650	4,350	9,683,051	5,465,547	2,753,453	Capital	330,600	2,295	312
Wairere	9/10/24, 4/11/26, 21/3/29	7	382	25	2,500	200	696,621	696,621	163,379	Unimproved ..	45,850	94	8
Wairoa	29/7/20	10	1,354	..	7,678	..	4,058,839	1,788,829	..	Capital	100,000	504	31
Waitaki	9/8/23	9	520	1,853	17,000	2,500	6,735,789	4,406,970	239,332	Capital	145,650	1,286	124
Waitemata	18/10/23, 27/11/24, 26/8/26, 7/3/29	12	627	..	39,565	..	12,602,711	6,084,047	..	Capital	380,000	6,676	1,834
Waitomo	6/3/24	7	160	1,100	5,000	3,000	1,066,361	1,066,361	..	Unimproved ..	119,000	557	90
Wanganui-Rangitikei ..	1/12/21	12	1,648	972	52,000	3,000	22,099,617	6,568,540	1,408,210	Capital	375,000	1,315	214
Westland†	28/10/20	9	750	..	3,272	..	196,268	196,268	..	Unimproved ..	Poll not yet taken.		
Totals, 1930–31 ..	..	398	43,991	25,303	937,855	66,226	342,619,342	234,471,518	22,713,356	..	13,047,156	65,160	12,155
Totals, 1929–30 ..	..	396	42,887	24,975	927,462	66,275	334,316,124	235,993,718	22,283,608	..	12,821,666	63,215	11,225

* Includes outer area. † License delegated to Westland Power, Ltd.

Table XIV.—Electric-power Boards.—Financial Statistics for the Year ended 31st March, 1931.

Name of Board.	Main Supply commenced.	Capital Outlay.	Revenue.					Expenditure.				Profit.	Loss.	Rates.					
			Sale of Electricity.		Sale of Materials (Profit).	General.	Total (not including Rates).	Power.	General.	Capital Charges.*	Total Annual Costs.			General Rate.		Availability Rate.		Special Rates.	
			Bulk.	Retail.										Levied.	Collected.	Levied.	Collected.	Levied.	Collected.
		£	£	£	£	£	£	£	£	£	£	£	£	d.	£	d.	£	d.	£
Ashburton	1923	351,031	..	42,285	..	477	42,762	11,574	9,071	23,177	43,822	..	1,060	..	..	..	..	..	..
Auckland	1908	3,304,924	..	647,464	..	7,720	655,184	246,582	114,696	201,849	563,127	92,057	..	..	..	..	..	..	..
Banks Peninsula ..	1921	102,757	..	13,168	199	297	13,664	3,351	5,475	7,677	16,503	..	2,839	$\frac{1}{15}$, $\frac{1}{7}$	3,945[1]	..	..	..	..
Bay of Plenty ..	1928	207,015	..	33,087	839	1,150	35,076	11,536	8,133	14,275	33,944	1,132	..	..	..	..	..	..	..
Buller†	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cambridge	1921	109,589	..	19,411	325	1,093	20,829	5,637	5,819	7,542	18,998	1,831	..	..	..	..	..	..	..
Central	1921	320,600	56	53,821	74	1,169	55,120	14,790	14,102	21,275	50,167	4,953	..	..	..	..	..	..	..
Central Hawke's Bay ..	1925	136,470	..	23,102	..	601	23,703	7,350	3,794	9,495	20,639	3,064	..	..	..	..	..	..	..
Dannevirke	1925	209,680	..	28,484	238	592	29,314	6,496	5,988	14,568	27,052	2,262	..	..	..	..	..	..	..
Franklin	1925	264,450	..	44,264	1,943	3,189	49,396	15,046	8,134	16,917	40,097	9,299	..	..	..	..	..	..	..
Golden Bay	1929	25,005	..	3,185	..	46	3,231	350	1,306	1,454	3,110	121	..	..	..	..	..	..	301[2]
Grey	1926	222,240	..	31,849	56	1,627	33,532	8,449	4,377	10,408	23,234	10,298	..	..	..	..	..	..	..
Hawke's Bay.. ..	1927	213,908	19,746	27,827	378	1,231	49,182	25,895	7,535	14,400	47,830	1,352	..	..	..	..	..	..	..
Horowhenua	1924	210,092	..	41,593	123	1,176	42,892	14,409	9,555	13,691	37,655	5,237	..	..	..	..	..	..	..
Hurunui†	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hutt Valley	1925	380,733	..	105,832	..	3,407	109,239	39,675	28,611	25,556	93,842	15,397	..	..	..	..	..	..	..
Malvern	1925	63,966	..	6,814	130	772	7,716	2,503	2,571	4,171	9,245	..	1,529	$\frac{1}{7}$	1,320[3]	..	..	$\frac{1}{4}$, $\frac{1}{40}$, $\frac{1}{8}$	..
Manawatu-Oroua ..	1924	509,011	14,523	64,313	360	387	79,583	29,847	13,561	31,838	75,246	4,337	..	..	..	..	..	..	..
Marlborough	1927	324,315	..	28,415	..	417	28,832	2,234	6,642	21,928	30,804	..	1,972	..	..	$\frac{1}{2}$	5,585[4]	..	..
North Auckland† ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
North Canterbury ..	1928	141,562	2,782	19,944	23	659	23,408	8,495	4,309	7,714	20,518	2,890	..	..	..	..	..	..	..
Opunake	1924	112,255	..	13,263	50	154	13,467	1,516	3,412	8,115	13,043	424	..	..	..	..	..	..	..
Otago Central ..	1925	86,002	..	9,997	180	329	10,506	1,280	2,875	6,781	10,936	..	430	..	..	..	..	..	..
Otago	1926	281,016	..	36,602	..	86	36,688	12,176	12,363	20,004	44,543	..	7,855	$\frac{1}{20}$	132	..	..	$\frac{4}{5}$, $\frac{17}{20}$, $\frac{7}{10}$	9,733[5]
Poverty Bay ..	1912	314,904	..	52,885	264	1,397	54,546	13,041	12,601	19,754	45,396	9,150	..	..	..	..	..	..	..
Reefton†	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
South Canterbury ..	1925	320,241	12,052	42,631	..	398	55,081	22,856	7,485	21,190	51,531	3,550	..	..	..	..	..	..	..
South Taranaki ..	1929	168,614	..	30,039	1,339	579	31,957	2,893	7,459	12,031	22,383	9,574	..	..	..	..	..	$\frac{588}{1000}$	..
Southland	1925	1,654,891	19,056	95,050	251	12,043	126,400	6,150	37,766	122,924	166,840	..	40,440	1	44,707[6]	..	..	..	..
Springs-Ellesmere ..	1922	138,470	..	25,904	94	22	26,050	9,495	5,536	9,662	24,693	1,357	..	..	..	..	..	..	..
Taranaki	1927	457,328	11,851	36,025	..	585	48,461	2,077	9,901	32,284	44,262	4,199	..	..	..	1½	6,129[7]	..	..
Tararua	1925	164,418	..	23,504	95	960	24,559	5,944	4,693	9,927	20,564	3,995	..	..	..	..	..	..	..
Tauranga	1926	133,540	..	22,091	..	2,771	24,862	6,010	7,646	9,173	22,829	2,033	..	..	..	..	..	..	..
Te Awamutu	1921	181,095	..	30,152	41	188	30,381	8,428	6,166	11,660	26,254	4,127	..	..	27[2]	..	..	..	..
Teviot	1924	56,683	1,289	5,018	58	63	6,428	433	1,353	3,772	5,558	870	..	..	..	..	..	..	..

TABLE XIV.—ELECTRIC-POWER BOARDS.—FINANCIAL STATISTICS FOR THE YEAR ENDED 31ST MARCH, 1931—*continued.*

Name of Board.	Main Supply commenced.	Capital Outlay.	Revenue.					Expenditure.				Profit.	Loss.	Rates.					
			Sale of Electricity.		Sale of Materials (Profit).	General.	Total (not including Rates).	Power.	General.	Capital Charges.*	Total Annual Costs.			General Rate.		Availability Rate.		Special Rates.	
			Bulk.	Retail.										Levied.	Collected.	Levied.	Collected.	Levied.	Collected.
		£	£	£	£	£	£	£	£	£	£	£	£	d.	£	d.	£	d.	£
Thames Valley ..	1921	806,284	5,739	117,380	1,827	2,107	127,053	36,679	29,267	55,970	121,916	5,137	..	..	..	..	..	..	..
Waimea†	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wairarapa	1923	356,474	..	52,533	1,342	1,132	55,007	8,468	14,590	24,691	47,749	7,258	..	..	..	..	..	..	..
Wairere	1925	41,120	..	5,368	16	164	5,548	205	1,488	2,841	4,534	1,014	..	..	..	..	..	..	..
Wairoa	1923	62,109	4,201	8,057	623	151	13,032	6,616	3,175	4,117	13,908	..	876	..	..	..	[2]	$\frac{7}{64}$, $\frac{1}{64}$, $\frac{3}{16}$	1,220[8]
Waitaki	1926	175,284	4,235	31,783	..	1,155	37,173	13,704	7,557	11,815	33,076	4,097	..	..	..	..	..	..	..
Waitemata	1926	382,115	..	70,373	..	1,442	71,815	18,443	18,771	27,845	65,059	6,756	..	..	..	..	..	..	..
Waitomo	1926	98,707	..	17,672	..	398	18,070	4,389	5,574	7,033	16,996	1,074	..	..	..	..	..	$1\frac{1}{4}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{3}{8}$, $\frac{1}{22}$	..
Wanganui-Rangitikei ..	1924	548,279	548	99,965	108	3,511	104,132	32,505	18,094	35,955	86,554	17,578	..	..	..	..	..	..	..
Westland‡	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Totals, 1930–31 ..	..	13,637,177	96,078	2,061,150	10,976	55,675	2,223,879	667,527	471,451	905,479	2,044,457	236,423	57,001	..	50,131	..	11,716	..	11,254
Totals, 1929–30 ..	..	12,920,150	95,160	1,935,079	12,150	49,780	2,092,169	786,147	242,091	859,262	1,887,500	278,486	73,817	..	60,920	..	9,946	..	25,691

* Includes interest and sinking-fund payments only. † Not yet actively functioning. ‡ License delegated to Westland Power, Ltd. [1] Includes arrears, £342. [2] Arrears only. [3] Includes arrears, £288. [4] Includes arrears, £5,310. [5] Includes arrears, £681. [6] Includes arrears, £5,070. [7] Includes arrears, £537. [8] Includes arrears, £203.

TABLE XV.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1931.

Title.	Supply commenced.	Population included in Area of Supply.	Number of Consumers.	Capacity.			Connected Load.	Demand Factor.	Units.						Annual Load Factor.	Average Units sold (excluding Sales in Bulk) per Consumer.	Average Units sold (excluding Sales in Bulk) per Capita of Population.	System of Supply.	Supply Voltage.	Route-miles of Lines.		Static Head.
				Main Plant.	Standby Plant.	Maximum Load.			Generated.	Purchased.	Total.	Sold (including Sales in Bulk).	Non-productive.	Percentage Non-productive.								
STEAM STATIONS.																						
1. Auckland	1908	No. 200,000	No. 46,518	Kv.a. 41,600	Kv.a. ..	Kw. 28,724	Kw. 182,069	Per Cent. 15·78	No. 112,311,640	No. 26,393,208	No. 138,704,848	No. 114,506,620	No. 24,198,228	Per Cent. 17·45	Per Cent. 55·12	No. 2,462	No. 573	A.C./D.C.	400/230 A.C., 460/230 D.C.	Miles 1,066	Ch. 60	Ft. ..
2. Grey	1926	13,100	2,400	1,250	..	1,200	5,764	20·82	5,131,670	64,493	5,196,163	4,393,084	803,079	15·46	49·43	1,830	335	A.C.	400/230	100	4	..
3. Nelson	1923	11,500	2,387	937	624	730	6,207	11·76	2,159,120	..	2,159,120	1,706,086	453,034	20·98	33·76	684	142	A.C.	415/236	47	40	..
Totals, steam stations	..	224,600	51,305	43,787	624	30,654	194,040	15·80	119,602,430	26,457,701	146,060,131	120,605,790	25,454,341	17·43	54·39	2,349	537	..	..	1,214	24	..
GAS STATIONS.																						
1. Kaikoura	1922	630	148	47	..	30	106	28·30	42,550	..	42,550	30,774	11,776	27·64	16·19	208	49	A.C.	400/230	5	0	..
2. Motueka	1922	1,600	349	65	..	58	205	28·29	62,400	..	62,400	45,436	16,964	27·19	12·28	130	28	A.C.	400/230	11	56	..
Totals, gas stations	..	2,230	497	112	..	88	311	28·30	104,950	..	104,950	76,210	28,740	27·38	13·61	153	34	..	..	16	56	..
OIL STATIONS.																						
1. Picton	1917	1,350	358	131*	..	69	511	13·50	142,140	..	142,140	112,969	29,171	20·52	23·52	316	84	D.C.	460/230	10	10	279
2. Spender, Paul	1926	300	50	25*	20*	16	49	32·65	15,025	..	15,025	8,685	6,340	42·20	10·72	174	29	D.C.	230	0	70	..
3. Uawa	1925	400	98	30*	..	14	63	21·80	23,870	..	23,870	16,304	7,566	31·70	19·75	166	41	D.C.	230	3	0	..
Totals, oil stations	..	2,050	506	186	20	99	623	15·89	181,035	..	181,035	137,958	43,077	23·79	20·87	273	67	..	..	14	0	..
HYDRO STATIONS.																						
1. Alderton Utility Co.	1930	240	25	110	..	36	110	32·73	69,330	..	69,330	61,700	7,630	11·01	21·98	247	257	A.C.	230	6	70	123
2. Coleridge	1915	..	39	40,580	..	30,800	199,881	15·41	120,687,377	1,729,441	122,416,818	111,953,880	10,462,938	8·55	45·37	..	..	A.C.	400/230	512	48	480
Ashburton	1923	17,925	3,568	..	200	(1,550)	(12,937)	11·98	252,831	5,555,694	5,808,525	(4,720,972)	1,087,553	18·72	42·78	1,323	263	A.C.	400/230	865	67	..
Banks Peninsula	1921	4,050	957	..	90	(415)	(3,706)	11·20	83,775	1,727,000	1,810,775	(1,298,614)	512,161	28·28	49·81	1,352	321	A.C.	400/230	202	22	310
Christchurch	1904	94,000	26,100	..	400*	(15,145)	(104,858)	14·44	197,390	52,325,987	52,523,377	(46,285,245)	6,238,132	11·88	39·59	1,593	442	A.C./D.C.	460/400/230	303	62	..
Waimairi	1916	13,000	3,145	..	..	(1,224)	(11,961)	10·23	..	4,795,603	4,795,603	(4,316,043)	479,560	10·00	44·73	1,370	331	A.C.	415/230	141	40	..
Halswell	1919	1,850	263	..	..	(140)	(466)	30·04	..	480,480	480,480	(404,380)	76,100	15·84	39·18	1,538	219	A.C.	400/230	22	0	..
Heathcote	1914	6,000	1,828	..	..	(574)	(4,564)	12·58	..	2,212,748	2,212,748	(1,945,307)	267,441	12·09	44·01	1,064	324	A.C.	400/230	30	40	..
Hurunui†	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lyttelton	1918	3,710	706	..	..	(250)	(2,364)	10·57	..	808,695	808,695	(662,368)	146,327	18·09	36·93	938	179	A.C.	400/230	10	6	..
Malvern	1925	5,050	654	..	..	(259)	(2,408)	10·76	..	958,360	958,360	(639,097)	319,263	33·31	42·24	977	127	A.C.	400/230	178	32	..
North Canterbury	1928	9,064	1,574	..	..	(920)	(7,425)	12·39	..	3,997,596	3,997,596	(3,621,749)	375,847	9·40	49·60	1,835	318	A.C.	400/230	343	21	..
Kaiapoi	1917	1,809	450	..	..	(106)	(638)	16·61	..	281,620	281,620	(237,833)	43,787	15·55	30·33	529	132	A.C.	400/230	20	0	..
Rangiora	1919	2,100	559	..	..	(187)	(1,402)	13·34	..	455,210	455,210	(416,173)	39,037	8·58	27·92	744	198	A.C.	400/230	13	28	..
Riccarton	1916	5,500	1,328	..	..	(505)	(4,605)	10·97	..	2,311,300	2,311,300	(2,111,793)	199,507	8·63	52·25	1,590	384	A.C.	400/230	18	20	..
South Canterbury	1925	42,598	3,486	40	..	(2,828)	(20,146)	14·17	123,452	12,097,949	12,221,401	(11,032,806)	1,188,595	9·73	48·87	1,776	145	A.C.	400,230	719	0	..
Timaru	1908	17,500	3,510	..	..	(1,528)	(9,826)	15·55	..	4,842,670	4,842,670	(4,237,330)	605,340	12·50	36·18	1,207	242	A.C.	420/240	55	25	..
Springs-Ellesmere	1922	11,780	2,095	..	..	(1,219)	(7,259)	16·79	..	5,105,914	5,105,914	(4,323,928)	781,986	15·32	47·82	2,064	367	A.C.	400/230	299	56	..
Sumner	1918	3,500	973	..	..	(283)	(1,821)	16·14	..	1,072,746	1,072,746	(1,012,489)	60,257	5·62	43·27	1,041	289	A.C.	400/230	9	40	..
Tai Tapu Dairy Co.	1915	5,700	248	..	..	(228)	(565)	40·35	..	839,940	839,940	(671,952)‡	167,988	20·00	42·05	2,709	118	A.C.	400/230	29	60	..
Waitaki	1926	19,500	3,215	150	240*	(1,505)	(10,235)	14·70	692,024	7,223,211	7,915,235	(6,506,141)	1,409,094	17·80	60·04	1,909	314	A.C.	400/230	364	0	250

(For notes see page 98.)

TABLE XV.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1931—*continued.*

Title.	Supply commenced.	Population included in Area of Supply.	Number of Consumers.	Capacity.			Connected Load.	Demand Factor.	Units.						Annual Load Factor.	Average Units sold (excluding Sales in Bulk) per Consumer.	Average Units sold (excluding Sales in Bulk) per Capita of Population.	System of Supply.	Supply Voltage.	Route-miles of Lines.		Static Head.
				Main Plant.	Standby Plant.	Maximum Load.			Generated.	Purchased.	Total.	Sold (including Sales in Bulk).	Non-productive.	Percentage Non-productive.								
HYDRO STATIONS—*continued.*		No.	No.	Kv.a.	Kv.a.	Kw.	Kw.	Per Cent.	No.	No.	No.	No.	No.	Per Cent.	Per Cent.	No.	No.			Miles	Ch.	Ft.
3. Dunedin	1907	80,000	23,906	23,125	860* / 2,340	14,485	74,793	19·37	64,491,030	..	64,491,030	54,432,607	10,058,423	15·55	50·82	1,997	597	A.C.	400/230	535	51	700
Otago	1926	17,931	3,755	..	..	(1,636)	(10,254)	15·95	..	6,519,538	6,519,538	(4,663,870)	1,855,668	28·46	45·49	1,242	260	A.C.	400/230	583	40	..
4. Golden Bay	1929	1,200	300	250	..	228	807	28·25	621,090	1,955	623,045	517,491	105,554	16·94	31·19	1,725	431	A.C.	400/230	55	0	330
5. Havelock North	1916	1,150	288	180	..	110	667	16·49	355,809	57,004	412,813	372,584	40,229	9·74	42·84	1,295	324	A.C.	400/230	16	40	50
6. Horahora-Arapuni	1921	..	19	12,860	8,614	49,520	281,410	17·60	134,867,380	8,226,397	143,093,777	131,013,550	12,080,227	8·44	32·99	..	..	A.C.	..	574	73	27
Bay of Plenty	1928	8,600	1,304	..	..	(1,281)	(6,097)	21·01	..	7,650,825	7,650,825	(6,639,920)	1,010,905	13·21	68·18	5,092	772	A.C.	400/230	240	0	..
Cambridge	1921	6,000	1,344	..	..	(696)	(2,833)	24·57	..	4,405,130	4,405,130	(3,436,000)	969,130	22·00	72·25	2,557	573	A.C.	400/230	153	0	..
Central	1921	18,939	3,923	..	..	(1,710)	(10,966)	15·59	..	10,405,115	10,405,115	(8,417,464)	1,987,651	19·10	69·46	2,142	443	A.C.	415/230	481	33	..
Franklin	1925	16,765	3,092	..	220	(1,709)	(8,301)	20·59	..	9,431,176	9,431,176	(7,553,041)	1,878,135	19·91	63·00	2,443	451	A.C.	400/230	439	38	..
Hamilton	1913	15,500	4,003	..	..	(1,188)	(9,169)	12·96	..	4,430,420	4,430,420	(3,807,487)	622,933	14·06	42·57	951	246	A.C.	400/230	53	65	..
Te Awamutu	1921	7,620	1,650	..	..	(952)	(5,482)	17·36	..	6,001,872	6,001,872	(4,865,154)	1,136,718	18·94	71·97	2,949	638	A.C.	415/230	309	11	..
Thames Valley	1921	34,850	5,950	..	..	(4,273)	(22,081)	19·35	..	24,654,651	24,654,651	(20,556,186)	4,098,465	16·62	65·87	3,079	526	A.C.	415/240	744	16	..
Thames	1914	5,000	1,115	100	105	(417)	(1,642)	25·42	50,544	1,308,090	1,358,634	(1,062,952)	295,682	21·76	37·18	..	..	A.C./D.C.	460/400/230	21	40	130
Te Aroha	1906	2,500	710	150	..	(227)	(1,878)	12·09	131,000	859,850	990,850	(826,382)	164,468	16·60	49·83	1,164	331	A.C.	400/230	15	49	600
Tourist Department	1901	5,500	1,814	200	187	(666)	(4,229)	15·75	1,134,364	1,167,261	2,301,625	(1,731,288)	570,337	24·78	39·45	954	315	A.C.	400/230, 200/115	51	60	14
Waitemata	1926	39,565	8,067	..	..	(2,371)	(18,615)	12·74	..	12,451,668	12,451,668	(10,513,495)	1,938,173	15·57	59·95	1,303	266	A.C.	400/230	427	8	..
Waitomo	1926	8,000	1,127	..	..	(530)	(2,649)	20·31	..	2,669,288	2,669,288	(2,188,188)	481,100	18·02	56·64	1,942	274	A.C.	400/230	98	40	..
7. Kanieri Electric, Ltd.	1921	2,500	596	770	150	600	1,286	58·32	3,663,180	..	3,663,180	2,697,412	965,768	26·36	55·76	4,533	1,079	A.C.	400/230	17	62	250
8. Kaponga Town Board	1916	1,200	360	75* / 120	..	210	682	30·79	481,450	70,420	551,870	440,670	111,200	20·29	30·00	1,224	367	A.C./D.C.	400/230	51	0	58/31
9. Mangahao-Waikaremoana	1925	..	86	65,000	..	44,660	280,752	15·91	210,373,650	1,597,742	211,971,392	184,170,874	27,800,518	13·12	54·04	..	..	A.C.	400/230	425	30	896, 676
Central Hawke's Bay	1925	11,350	1,543	..	..	(806)	(4,354)	18·51	..	4,148,254	4,148,254	(3,739,926)	408,328	9·84	58·75	2,424	330	A.C.	400/230	224	5	..
Dannevirke	1925	12,614	2,349	..	..	(708)	(6,797)	10·42	..	3,718,552	3,718,552	(3,039,743)	678,809	18·26	59·96	1,294	241	A.C.	415/230	311	53	..
Hawke's Bay	1927	16,020	2,314	..	..	(3,504)	(22,059)	15·88	..	15,929,595	15,929,595	(13,749,334)	2,180,261	13·69	51·90	2,557	369	A.C.	400/230	270	40	..
Hastings	1912	11,000	3,383	..	1,175	(882)	(6,959)	12·67	292,000	2,663,000	2,955,000	(2,482,200)‡	472,800	16·00	38·25	734	226	A.C./D.C.	400/230 A.C., 460/230 D.C.	55	53	..
Napier	1913	18,680	4,118	..	1,330*	(1,632)	(6,390)	25·54	10,022	6,190,600	6,200,622	(5,348,717)	851,905	13·74	43·37	1,299	286	A.C./D.C.	400/230 A.C., 460/230 D.C.	32	71	..
Horowhenua	1924	16,680	3,643	..	..	(1,670)	(10,698)	15·61	..	8,591,177	8,591,177	(7,264,912)	1,326,265	15·44	58·73	1,994	436	A.C.	400/230	308	19	..
Hutt Valley	1925	41,500	10,467	..	500	(5,028)	(36,883)	13·63	..	24,612,820	24,612,820	(19,612,820)	5,000,000	20·31	55·88	1,874	473	A.C.	400/230	284	7	..
Manawatu-Oroua	1924	39,011	4,505	..	..	(3,660)	(32,575)	11·24	..	23,437,239	23,437,239	(20,384,573)	3,052,666	13·02	73·10	2,163	250	A.C.	400/230	592	0	..
Palmerston North	1924	20,100	5,437	..	1,350	(2,522)	(15,863)	15·90	684,843	10,719,181	11,404,024	(9,644,917)	1,759,107	15·43	51·71	1,774	480	A.C.	400/230	78	51	..
Poverty Bay	1912	23,670	4,511	..	1,500	(1,717)	(12,738)	13·48	135,180	6,456,441	6,591,621	(5,404,759)	1,186,862	18·01	43·82	1,198	228	A.C./D.C.	400/240 A.C., 440/220 D.C.	228	35	..
Tararua	1925	10,255	1,559	..	..	(655)	(5,078)	12·90	..	3,490,792	3,490,792	(3,029,888)	460,904	13·20	60·84	1,943	295	A.C.	400/230	212	27	..
Wairarapa	1923	19,500	4,204	..	837	(1,395)	(14,408)	9·68	2,771,150	5,273,654	8,044,804	(6,491,080)	1,553,724	19·31	65·83	1,544	333	A.C.	400/230	499	53	290,429
Wairoa	1923	5,580	386	..	..	(800)	(4,694)	17·04	..	3,433,104	3,433,104	(3,008,510)	424,594	12·37	48·99	3,816	264	A.C.	415/230	93	6	..
Wairoa	1913	2,410	660	..	..	(312)	(2,536)	12·30	..	1,535,580	1,535,580	(1,418,991)	116,589	7·59	56·18	2,150	589	A.C.	400/230	13	64	..
Wanganui-Rangitikei	1924	52,000	9,469	..	1,650	(3,970)	(27,346)	14·52	51,980	20,546,658	20,598,638	(16,478,910)‡	4,119,728	20·00	59·23	1,730	315	A.C.	400/230	703	0	..
Mangaweka	1913	400	106	40	..	(37)	(239)	15·49	15,691	99,666	115,357	(92,329)	23,028	19·96	35·59	871	231	A.C.	400/230	8	60	37
Wellington	1907	110,000	28,700	8,000	1,650	(18,528)	(118,961)	15·57	1,535,907	55,385,700	56,921,607	(47,761,586)	9,160,021	16·09	35·07	1,664	434	A.C./D.C.	400/230 A.C., 105 D.C	354	0	..
10. Marlborough	1927	14,530	2,501	1,250	570	1,130	8,055	14·03	4,951,300	..	4,951,300	4,027,035	924,265	18·67	50·02	1,610	277	A.C.	400/2	274	40	100

(For notes see page 98.)

TABLE XV.—ELECTRIC-SUPPLY STATIONS OF NEW ZEALAND AT 31ST MARCH, 1931—*continued.*

Title.	Supply commenced.	Population included in Area of Supply.	Number of Consumers.	Capacity.			Connected Load.	Demand Factor.	Units.					Percentage Non-productive.	Annual Load Factor.	Average Units sold (excluding Sales in Bulk) per Consumer.	Average Units sold (excluding Sales in Bulk) per Capita of Population.	System of Supply.	Supply Voltage.	Route-miles of Lines.		Static Head.
				Main Plant.	Standby Plant.	Maximum Load.			Generated.	Purchased.	Total.	Sold (including Sales in Bulk).	Non-productive.									
HYDRO STATIONS—*continued.*		No.	No.	Kv.a.	Kv.a.	Kw.	Kw.	Per Cent.	No.	No.	No.	No.	No.	Per Cent.	Per Cent.	No.	No.			Miles	Ch.	Ft.
11. Matauraa§	1913	1,300	351	75	..	74	345	21·45	118,345	..	118,345	95,206	23,139	19·55	18·26	271	73	A.C.	440/230	9	0	22
12. Murchison	1922	500	124	100	..	90	247	36·44	250,000	..	250,000	145,500	104,500	41·80	31·71	1,173	291	A.C.	400/230	15	40	105
13. New Plymouth	1905	21,000	6,419	4,125	..	3,375	19,472	17·33	13,901,105	1,476,820	15,377,925	12,934,502	2,443,423	15·89	51·81	1,840	562	A.C.	400/230	285	0	120,240
Inglewood	1905	1,300	417	..	..	(143)	(1,289)	11·09	..	503,419	503,419	(404,111)	99,308	19·73	40·19	969	311	A.C.	400/230	8	10	..
Waitara	1905	1,825	451	..	..	(110)	(689)	15·96	..	346,930	346,930	(289,940)	56,990	16·43	36·00	643	159	A.C.	400/230	12	50	..
14. Ohakune	1914	2,300	458	120	141	123	687	17·90	302,386	54,080	356,466	296,904	59,562	14·92	33·08	648	129	A.C.	400/230	14	69	42
15. Opunake	1924	6,000	1,472	375	160	490	2,016	24·31	1,503,950	355,040	1,858,990	1,517,939	341,051	18·35	43·31	1,031	253	A.C.	400/230	151	0	47
16. Patea	1901	1,800	354	82	80	110	410	26·83	389,024	..	389,024	353,024	36,000	9·25	40·01	997	196	A.C.	220/110	13	60	78
17. Queenstown	1924	845	260	60	..	75	348	31·55	200,500	..	200,500	131,892	68,608	34·22	30·52	507	156	A.C.	400/220	8	0	510
18. Raetihi	1917	4,500	399	350	120	190	826	23·00	584,330	..	584,330	534,022	50,308	8·61	35·11	1,203	107	A.C.	400/230	28	0	380
19. Reefton	1887	1,200	273	86*	80*	80	178	44·94	106,200	..	106,200	79,650	26,550	25·00	15·15	292	66	D.C.	230	7	20	27
20. Southland	1925	47,000	9,080	7,050	..	6,200	43,490	14·26	24,307,540	..	24,307,540	17,460,395	6,847,145	28·17	44·76	1,274	246	A.C.	415/240	2,390	10	154
Bluff	1903	1,695	425	..	..	(274)	(1,139)	24·06	..	361,650	361,650	(294,293)	67,357	18·62	15·07	694	174	A.C.	400/230	9	51	..
Invercargill	1914	21,000	4,670	..	2,450	(1,740)	(12,640)	13·77	25,100	5,528,100	5,553,200	(4,899,884)	653,316	11·76	36·43	1,049	233	A.C./D.C.	400/230 A.C., 600 D.C.	78	25	..
21. South Taranaki	1929	16,280	2,787	615	605	918	4,835	18·99	2,527,410	..	2,527,410	2,102,126	425,284	16·83	31·43	754	129	A.C.	400/230	114	20	57
22. Taranaki	1927	12,285	2,113	3,600	..	2,937	8,636	34·01	11,136,500	2,070	11,138,570	8,614,036	2,524,534	22·66	43·29	2,507	431	A.C.	400/230	307	42	300
Stratford	1898	3,500	1,020	..	..	(460)	(2,185)	21·05	..	2,097,900	2,097,900	(1,813,560)	284,340	13·55	52·06	1,778	518	A.C.	400/230	15	0	..
23. Taihape	1913	2,450	622	150*	75*	206	1,004	20·52	511,390	..	511,390	371,003	140,387	27·45	28·34	596	151	D.C.	460/230	10	20	30
24. Taumarunui	1924	4,000	796	500	..	380	1,722	22·07	1,125,778	..	1,125,778	824,824	300,954	26·73	33·82	1,001	199	A.C.	415,230	16	0	25
Manunui	1929	1,000	157	..	..	(25)	(118)	21·19	..	28,974	28,974	(24,810)	4,164	14·37	13·23	1,580	25	A.C.	415,230	4	65	..
25. Tauranga	1915	2,700	948	4,300	..	3,602	6,817	52·84	16,620,071	..	16,620,071	13,308,302	3,311,769	19·93	52·67	2,815	813	A.C.	400/230	64	20	110/80
Tauranga	1926	8,450	943	..	..	..	(3,646)	..	..	3,509,124	3,509,124	(3,509,124)‖	..	..	..	3,721	415	A.C.	400/230, 460/230	305	48	..
Te Puke	1921	980	286	..	..	(130)	(683)	19·03	..	541,173	541,173	(444,134)	97,039	17·93	47·52	1,553	453	A.C.	400/230	9	33	..
26. Teviot	1924	1,800	400	750	..	780	3,325	23·46	3,614,052	..	3,614,052	2,891,242‡	722,810	20·00	52·86	1,968	437	A.C.	400/240	72	0	380
Otago Central	1925	2,537	853	..	..	(442)	(2,082)	21·23	..	2,104,176	2,104,176	(1,820,026)	284,150	13·50	54·34	2,134	627	A.C.	415/240	161	5	..
27. Waimea Electric Co.	1912	4,000	714	100	40	105	1,115	9·38	129,371	69,445	198,816	159,053	39,763	20·00	21·62	223	398	A.C.	400/230	36	0	11/14
28. Wairua (Wilson's Cement Co.)	1916	16,500	48	2,500	..	2,260	11,151	20·27	9,746,270	..	9,746,270	8,234,058	1,512,212	15·52	49·23	12,086	339	A.C.	400/230	37	4	130
Whangarei	1915	7,000	2,033	..	..	(725)	(5,227)	13·87	..	2,674,370	2,674,370	(2,338,531)	335,839	12·56	42·11	1,134	329	A.C.	2200/400/230	33	23	..
Kamo	1923	600	113	..	..	(50)	(236)	21·18	..	34,799	34,799	(34,799)	..	..	7·94	308	580	A.C.	2200/400/230	4	60	..
29. Wairere	1925	2,000	301	480	..	393	1,535	25·60	1,378,940	..	1,378,940	1,172,901	206,039	14·99	40·05	3,897	586	A.C.	400/230	107	18	65
30. Westland Power, Ltd.	1928	4,200	126	820	300	240	894	26·85	634,650	..	634,650	520,413	114,237	18·01	30·19	4,130	124	A.C.	400	52	31	260,105
31. Westport	1925	4,000	658	250	..	235	1,292	18·19	700,720	..	700,720	561,377	139,343	19·89	34·04	853	140	A.C.	400/230	22	10	430
32. Whakatane	1922	1,800	443	390	..	320	1,349	23·73	1,401,260	..	1,401,260	1,010,187	391,073	27·90	49·98	1,206	297	A.C.	400/230	22	0	258
Totals, Hydro Stations	..	1,166,334	247,386	179,778	27,920	150,477 (98,038)	960,137 (668,252)	15·67	639,888,097	425,342,559	1,065,230,656	563,006,359 (354,469,102)	147,755,195	13·92	54·80	1,711	363	..	..	18,391	11	..

* Kw. † Hurunui Electric-power Board not yet operating. ‡ Assessed; units not fully metered. § Generators located on Southland Frozen Meat Co.'s premises, who supply motive power. ‖ Units metered on consumers' premises; loss borne by Tauranga Borough Council.

Table XVI.—Summary of Returns of Operating Results for the Year ended 31st March, 1931.

Title.	Capital Outlay as at 31st March, 1931. (Total Expenditure—Depreciation not deducted.)	Value of Assets at 31st March, 1931. (Total Expenditure, less Total Allowance for Depreciation.)	Total Revenue (not including Rates).	Working-expenses.		Capital Charges, &c.		Total Annual Costs.	Net Results.		Revenue and Expenditure Comparisons.								Retail Selling-rates.		
				Total.	Per Cent. of Revenue	Total.	Per Cent. of Capital Outlay.		Profit.	Loss.	Average Revenue from Sale of Energy.		Working-costs.		Capital Charges.		Total Costs.		Lighting.	Heating.	Power.
											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.			
Steam Stations.	£	£	£	£		£		£	£	£	d.	£	d.	£	d.	£	d.	£	d.	d.	d.
1. Auckland Power Board ..	3,304,924	2,881,652	655,184	361,278	55·14	201,849	6·11	563,127	92,057	..	1·56	22·54	0·76	12·58	0·42	7·03	1·18	19·61	5, 2		$2\frac{1}{2}$ to $\frac{5}{8}$
2. Grey Power Board	222,240	221,691	33,532	12,826	38·25	10,408	4·68	23,234	10,298	..	1·74	26·54	0·70	10·69	0·57	8·67	1·27	19·36	All less 10 per cent.		
3. Nelson City Council ..	107,579	90,663	28,028	13,721	48·95	4,900	4·55	18,621	9,407	..	3·87	37·70	1·93	18·80	0·69	6·71	2·62	25·51	7	3, $1\frac{1}{2}$	2, $1\frac{1}{2}$
Totals, steam stations ..	3,634,743	3,194,006	716,744	387,825	54·11	217,157	5·97	604,982	111,762	..	1·41	23·06	0·77	12·65	0·43	7·08	1·20	19·73	7	3, $1\frac{1}{2}$	2, $1\frac{1}{2}$
Gas Stations.																			..	..	..
1. Kaikoura County Council ..	9,839	8,911	1,584	1,705	107·64	746	7·58	2,451	..	867	12·00	51·30	13·29	56·83	5·81	24·86	19·10	81·69	12	12	6
2. Motueka Borough Council ..	16,040	12,395	2,354	1,976	83·94	962	6·00	2,938	..	584	11·90	38·84	10·44	34·07	5·08	16·59	15·52	50·66	12	4	4
Totals, gas stations ..	25,879	21,306	3,938	3,681	93·47	1,708	6·60	5,389	..	1,451	11·94	43·09	11·59	41·83	5·38	19·42	16·97	61·25	..	..	..
Oil Stations.																					
1. Picton Borough Council ..	19,220	15,949	3,286	2,247	68·38	1,244	6·47	3,491	..	205	6·98	47·62	4·76	32·56	2·64	18·03	7·40	50·59	10	4 to 2	4
2. Spender, Paul (Rawene) ..	2,961	2,961	552	512	92·75	..	..	512	40	..	14·51	32·81	14·15	32·00	..	..	14·15	32·00	15	15	12
3. Uawa County Council ..	6,275	4,299	1,246	577	46·31	638	10·17	1,215	31	..	17·21	84·71	8·49	41·81	9·39	46·23	17·88	88·04	17	11	11
Totals, oil stations ..	28,456	23,209	5,084	3,336	65·62	1,882	6·61	5,218	71	205	8·66	50·30	5·80	33·70	3·27	19·01	9·07	52·71	..	..	..
Hydro Stations.																					
1. Alderton Utility Co. ..	4,705	4,705	273	110	40·29	85	1·81	195	78	..	1·02	7·31	0·43	3·06	0·33	2·36	0·76	5·42	No meters installed. Fixed charges according to installed capacity.		
2. Coleridge (Public Works Dept.)	1,840,543	1,731,739	217,632	57,033	26·21	94,352	5·13	151,385	66,247	..	0·46	6·99	0·12	1·85	0·20	3·06	0·32	4·91	..	..	..
Ashburton Power Board ..	351,031	337,693	42,762	20,645	48·28	23,177	6·60	43,822	..	1,060	2·15	27·28	1·05	13·32	1·18	14·95	2·23	28·27	8 to 1	3 to 1	3 to $\frac{9}{16}$
Banks Peninsula Power Board	102,757	98,103	13,664	8,826	64·59	7,677	7·47	16,503	..	2,839	2·43	31·73	1·63	21·27	1·42	18·50	3·05	39·77	10 to $1\frac{1}{2}$	2 to $\frac{3}{8}$	3 to $1\frac{1}{2}$
Christchurch City Council ..	770,063	387,240	229,562	140,167	61·06	30,800	4·00	170,967	58,595	..	1·14	14·49	0·73	9·25	0·16	2·03	0·89	11·28	$5\frac{1}{2}$ to 1	2 to 1	$1\frac{1}{2}$ to $\frac{1}{2}$
Waimairi County Council	83,516	83,516	22,629	13,957	61·68	3,438	4·12	17,395	5,234	..	1·26	18·49	0·78	11·41	0·19	2·81	0·97	14·22	5 to $1\frac{1}{2}$	2 to 1	2 to $\frac{1}{2}$
Halswell County Council ..	6,940	4,430	2,017	1,407	69·76	313	4·51	1,720	297	..	1·19	14·34	0·84	10·05	0·19	2·24	1·03	12·29	Flat rate.	P.W.D. Schedule.	
Heathcote County Council ..	35,492	28,142	10,530	9,766	92·74	2,691	7·58	12,457	..	1,927	1·25	17·61	1·20	17·01	0·33	4·69	1·53	21·70	6 to 4	$1\frac{1}{2}$, 1	3 to 1
Hurunui Power Board* ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lyttelton Borough Council ..	7,415	7,215	5,796	4,456	76·88	485	6·54	4,941	855	..	2·06	22·72	1·61	17·82	0·17	1·94	1·78	19·76	$4\frac{1}{2}$	1	3 to 1
Malvern Power Board ..	63,966	58,774	7,716	5,074	65·76	4,171	6·52	9,245	..	1,529	2·56	26·31	1·91	19·59	1·57	16·10	3·48	35·69	9 to 1	..	3 to 1
North Canterbury Power Board	141,562	135,767	23,408	12,804	54·70	7,714	5·45	20,518	2,890	..	1·51	24·70	0·85	13·92	0·51	8·38	1·36	22·30	8 to 2	3 to $\frac{1}{2}$	3 to $\frac{3}{16}$
Kaiapoi Borough Council..	10,519	7,971	3,234	1,782	55·13	896	8·52	2,679	555	..	3·20	29·92	1·80	16·82	0·90	8·45	2·70	25·27	6	1	1
Rangiora Borough Council	11,980	8,138	5,108	3,373	66·03	410	3·42	3,783	1,325	..	2·94	26·27	1·95	18·04	0·24	2·19	2·19	20·23	6 to 2	$2\frac{1}{2}$, $1\frac{1}{2}$	3 to $\frac{1}{2}$
Riccarton Borough Council..	23,292	19,145	11,012	6,521	59·22	973	4·18	7,494	3,518	..	1·21	21·05	0·74	12·91	0·11	1·93	0·85	14·84	6 to 1	1	$1\frac{1}{2}$
South Canterbury Power Board	320,241	294,806	55,081	30,341	55·08	21,190	6·62	51,531	3,550	..	1·19	19·15	0·66	10·62	0·46	7·42	1·12	18·04	8 to 1	3 to 1	3 to $\frac{3}{4}$
Timaru Borough Council ..	110,512	90,024	33,975	18,846	55·47	9,161	8·29	28,007	5,968	..	1·92	22·15	1·07	12·33	0·52	6·00	1·59	18·33	7 to 4	3 to $1\frac{1}{2}$	$2\frac{1}{2}$ to 1
Springs-Ellesmere Power Bd.	138,470	133,395	26,050	15,031	57·70	9,662	6·98	24,693	1,357	..	1·44	21·25	0·83	12·33	0·54	7·93	1·37	20·26	8 to 2	3 to $\frac{1}{2}$	3 to $\frac{3}{4}$
Sumner Borough Council ..	16,424	13,415	6,251	4,304	68·85	511	3·11	4,815	1,436	..	1·47	21·06	1·02	14·64	0·12	1·74	1·14	16·38	$4\frac{1}{2}$	1 to $\frac{1}{2}$	1 to $\frac{3}{4}$
Tai Tapu Dairy Co. ..	10,572	6,429	4,189	2,790	66·60	495	4·68	3,285	904	..	1·46	17·97	1·00	12·24	0·18	21·71	1·18	33·95	Flat rate.	P.W.D. Schedule.	
Waitaki Power Board ..	175,284	149,437	37,173	21,261	57·19	11,815	6·74	33,076	4,097	..	1·33	23·93	0·78	14·13	0·44	7·85	1·22	21·98	6 to $1\frac{1}{2}$	2 to $\frac{1}{4}$	2 to $\frac{2}{3}$
3. Dunedin City Council ..	1,654,133	1,615,401	223,886	80,528	35·97	86,037	5·20	166,565	57,321	..	0·98	15·31	0·36	5·56	0·38	5·94	0·74	11·50	6 to 1	2 to 1	2 to $\frac{1}{6}$
Otago Power Board ..	281,016	268,606	36,688	24,539	66·89	20,004	7·12	44,543	..	7,855	1·88	22·37	1·26	15·00	1·03	12·23	2·29	27·23	9	4 to $1\frac{1}{2}$	4 to $1\frac{1}{4}$
4. Golden Bay Power Board ..	25,005	24,141	5,231	1,656	51·25	1,454	5·81	3,110	121	..	1·48	13·97	0·77	7·26	0·67	6·88	1·44	13·64	9	$4\frac{1}{2}$ to 1	$4\frac{1}{2}$ to $1\frac{1}{2}$
5. Havelock North Town Board	24,074	24,074	2,954	1,764	59·72	1,793	7·45	3,557	..	603	1·91	26·85	1·14	16·04	1·15	16·30	2·29	32·34	7	2	2
6. Horahora - Arapuni (Public Works Dept.)	3,992,832	3,805,467	184,593	101,889	55·20	85,389	2·14	187,278	..	2,685	0·33	3·65	0·19	2·06	0·16	1·72	0·35	3·78	..	..	..
Bay of Plenty Power Board..	207,015	202,140	35,076	19,669	56·08	14,275	6·90	33,944	1,132	..	1·20	25·83	0·71	15·35	0·52	11·14	1·23	26·49	10	4	3
Cambridge Power Board ..	109,589	108,202	20,829	11,456	55·00	7,542	6·88	18,998	1,831	..	1·36	27·89	0·80	16·46	0·52	10·84	1·32	27·30	8 to $7\frac{1}{2}$	3 to $\frac{3}{4}$	3 to $\frac{3}{4}$
Central Power Board ..	320,600	307,127	55,120	28,892	52·42	21,275	6·64	50,167	4,953	..	1·54	31·51	0·82	16·89	0·61	12·44	1·43	29·33	7	$1\frac{1}{2}$	3
Franklin Power Board ..	264,450	225,268	49,396	23,180	46·93	16,917	6·40	40,097	9,299	..	1·41	25·90	0·74	13·56	0·54	9·90	1·28	23·46	$6\frac{1}{2}$	$1\frac{1}{2}$	3 to 2
Hamilton Borough Council ..	56,907	56,848	34,219	18,898	55·23	4,899	8·61	23,797	10,422	..	2·14	28·59	1·19	15·91	0·31	4·12	1·50	20·03	$5\frac{1}{2}$, 4	2 to 1	2 to 1
Te Awamutu Power Board ..	181,095	178,334	30,381	14,594	48·04	11,660	6·44	26,254	4,127	..	1·49	31·67	0·72	15·33	0·58	12·25	1·30	27·58	8, 7	2 to $1\frac{1}{2}$	3 to $1\frac{1}{2}$
Thames Valley Power Board	806,284	791,702	127,053	65,946	51·90	55,970	6·94	121,916	5,137	..	1·44	28·81	0·77	15·43	0·65	13·10	1·42	28·53	8	3 to $1\frac{1}{2}$	3 to $\frac{3}{8}$
Thames Borough Council..	33,606	23,583	11,570	8,627	74·56	1,268	3·77	9,895	1,675	..	2·59	27·48	1 95	20·68	0·29	3·04	2·24	23·72	8	3 to $1\frac{1}{2}$	3 to $\frac{1}{2}$
Te Aroha Borough Council	24,231	13,734	7,793	6,334	81·28	610	2·52	6,944	849	..	2·22	33·74	1·84	27·90	0·17	2·69	2·01	30·59	7 to 5	3 to $\frac{1}{2}$	3 to $\frac{1}{2}$
Tourist Dept. (Rotorua) ..	71,197	59,298	19,254	9,928	51·56	4,984	7·00	14,912	4,342	..	2·59	28·07	1·38	14·91	0·69	7·48	2·07	22·39	7, 6	3 to $1\frac{1}{2}$	3 to 1
Waitemata Power Board ..	382,115	380,886	71,815	37,214	51·82	27,845	7·29	65,059	6,756	..	1·60	29·68	0·85	15·69	0·64	11·74	1·49	27·43	7	$3\frac{1}{2}$ to $1\frac{3}{4}$	$3\frac{1}{2}$ to $1\frac{3}{4}$
Waitomo Power Board ..	98,707	96,726	18,070	9,963	55·14	7,033	7·13	16,996	1,074	..	1·94	32·85	1.09	18·52	0·77	13·07	1·86	31·59	All less $12\frac{1}{2}$ per cent. 10	3 to $1\frac{1}{2}$	3 to $1\frac{1}{2}$

* Hurunui Electric-power Board not yet operating.

Table XVI.—Summary of Returns of Operating Results for the Year ended 31st March, 1931—*continued.*

Title.	Capital Outlay as at 31st March, 1931. (Total Expenditure—Depreciation not deducted).	Value of Assets at 31st March, 1931. (Total Expenditure, less Total Allowance for Depreciation.)	Total Revenue (not including Rates).	Working-expenses.		Capital Charges, &c.		Total Annual Costs.	Net Results.		Revenue and Expenditure Comparisons.								Retail Selling-rates.		
											Average Revenue from Sale of Energy.		Working-costs.		Capital Charges.		Total Costs.				
				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.
7. Kanieri Electric, Ltd. ..	49,774	37,954	8,819	6,048	68·58	89	0·18	6,137	2,682	..	0·76	14·30	0·54	10·08	..	0·12	0·54	10·20	6	1½	4 to 2
8. Kaponga Town Board ..	24,507	23,052	5,299	4,199	79·24	1,621	6·61	5,820	..	521	2·81	24·56	2·29	20·00	0·88	7·72	3·17	27·72	9	4 to 1	5 to 2
9. Mangahao-Waikaremoana (Public Works Dept.)	3,498,840	3,203,939	283,017	59,476	20·93	196,206	5·61	255,682	27,335	..	0·36	6·26	0·08	1·33	0·26	4·39	0·34	5·72	..	..	..
Central Hawke's Bay Power Board	136,470	123,176	23,703	11,144	47·02	9,495	6·96	20,639	3,064	..	1·48	28·66	0·72	13·83	0·61	11·78	1·33	25·61	9	3 to 1½	3 to 1½
Dannevirke Power Board ..	209,680	203,245	29,314	12,484	42·59	14,568	6·95	27,052	2,262	..	2·25	40·23	0·99	17·63	1·15	20·58	2·14	38·21	8 to 7	3 to 1½	3 to 1
Hawke's Bay Power Board	213,908	205,968	49,182	33,430	67·97	14,400	6·73	47,830	1,352	..	0·83	13·58	0·58	9·54	0·25	4·11	0·83	13·65	8 to 1½	8 to 1½	3 to 1½
Hastings Borough Council	114,130	110,032	24,898	15,463	62·11	6,185	5·42	21,648	3,250	..	2·40	28·16	1·50	17·53	0·60	7·01	2·10	24·54	8 to 1½	4 to 1½	3 to 1¼
Napier Borough Council ..	162,282	160,683	36,323	20,981	57·76	8,674	5·35	29,655	6,668	..	1·59	21·66	0·94	12·86	0·39	5·31	1·33	18·17	6 to 1½	3 to 1½	3 to 1½
Horowhenua Power Board ..	210,092	195,598	42,892	23,964	55·87	13,691	6·52	37,655	5,237	..	1·37	24·91	0·79	14·35	0·45	8·20	1·24	22·55	6	4 to 1½	4 to 1⅛
Hutt Valley Power Board ..	380,733	340,673	109,239	68,286	62·51	25,556	6·71	93,842	15,397	..	1·29	21·05	0·84	13·58	0·31	5·08	1·15	18·66	6 to 4	3 to 1	3 to 1
																			All less 8⅓ per cent.		
Manawatu-Oroua Power Bd.	509,011	489,148	79,583	43,408	54·54	31,838	6·25	75,246	4,237	..	0·93	21·54	0·51	11·88	0·37	8·70	0·88	20·58	8	3½, 1½	4½, 1¾
Palmerston N. City Council	235,170	221,019	62,217	25,505	40·99	12,593	5·35	38,098	24,119	..	1·55	24·66	0·63	10·11	0·31	4·99	0·94	15·10	6	1½	3 to 1¾
Poverty Bay Power Board ..	314,904	304,295	54,546	25,642	47·01	19,754	6·27	45,396	9,150	..	2·35	30·80	1·14	14·93	0·88	11·50	2·02	26·43	8 to 6	4 to 1½	4 to 2½
Tararua Power Board ..	164,418	155,484	24,559	10,637	43·31	9,927	6·04	20,564	3,995	..	1·86	35·88	0·84	16·24	0·79	15·16	1·63	31·40	8	4 to 1	4½ to 1½
Wairarapa Power Board ..	356,474	349,890	55,007	23,058	41·92	24,691	6·93	47,749	7,258	..	1·94	37·66	0·85	16·53	0·91	17·70	1·76	34·23	7	3½ to 1¾	4½ to 2
Wairoa Power Board ..	62,109	58,871	13,032	9,791	75·13	4,117	6·63	13,908	..	876	0·98	15·32	0·78	12·23	0·33	5·15	1·11	17·38	9 to 1	..	3 to 1½
Wairoa Borough Council ..	19,799	11,474	8,764	5,734	65·43	1,468	7·41	7,202	1,562	..	1·43	27·06	0·97	18·38	0·25	4·71	1·22	23·09	6	3 to 1	3 to 1½
Wanganui-Rangitikei Power Board	548,279	467,436	104,132	50,599	48·59	35,955	6·56	86,554	17,578	..	1·46	25·32	0·74	12·75	0·52	9·06	1·26	21·81	5 to 3	2½ to 1¾	3 to 1½
Mangaweka Town Board..	5,504	5,504	1,192	934	78·36	129	2·34	1,063	129	..	2·40	24·95	2·43	25·24	0·34	3·49	2·77	28·73	10	3 to 2	4½ to 3½
Wellington City Council ..	1,153,407	1,145,407	357,273	169,097	47·33	38,090	3·30	207,187	150,086	..	1·78	19·12	0·85	9·13	0·19	2·06	1·04	11·19	5, 1 domestic 6, 3 commercial	5, 1 domestic 2 commercial	2½ to 1
10. Marlborough Power Board ..	324,315	314,937	28,832	8,876	30·79	21,928	6·76	30,804	..	1,972	1·69	25·15	0·53	7·85	1·31	19·41	1·84	27·26	9 to 1½	3 to 1½	4½ to 1½
11. Mataura Borough Council ..	4,977	4,295	1,706	1,603	93·96	234	4·70	1,837	..	131	3·86	20·68	4·04	21·66	0·59	3·16	4·63	24·82	6	2½	2½ to 1½
12. Murchison County Council ..	13,925	13,925	2,744	1,591	57·98	974	6·99	2,565	179	..	3·51	23·63	2·60	17·68	1·61	10·82	4·21	28·50	6	3	3
13. New Plymouth Borough Council	413,510	363,463	75,390	31,913	42·33	26,443	6·39	58,356	17,034	..	1·35	21·63	0·59	9·46	0·49	7·83	1·08	17·29	7 to 5	2, 1	2 to ½
Inglewood Borough Council	12,644	8,163	3,769	2,496	66·22	750	5·93	3,246	523	..	2·23	26·21	1·48	17·45	0·46	5·24	1·94	22·69	6	1¾	2 to 1¾
Waitara Borough Council ..	9,267	6,500	4,166	2,602	62·46	900	9·71	3,502	664	..	3·35	36·87	2·15	23·65	0·74	8·18	2·89	31·83	9	3 to 1	3 to 1
14. Ohakune Borough Council ..	18,492	15,454	4,260	2,287	53·69	1,069	5·78	3,356	904	..	3·42	34·43	1·85	18·59	0·86	8·69	2·71	27·28	9	3 to 1	4 to 2
15. Opunake Power Board ..	112,255	112,255	13,467	4,928	36·59	8,115	7·23	13,043	424	..	2·10	37·07	0·78	10·06	1·28	16·56	2·06	26·62	4, 3	2	2
16. Patea Borough Council ..	13,160	13,107	4,378	2,748	62·77	619	4·70	3,367	1,011	..	2·95	39·49	1·87	24·98	0·42	5·63	2·29	30·61	8½, 6½	4 to 2	3⅜ to 1
17. Queenstown Borough Council	12,837	12,837	1,552	530	34·15	816	6·36	1,346	206	..	2·68	19·69	0·96	7·07	1·48	10·88	2·44	17·95	6	6	3
18. Raetihi Borough Council ..	31,572	19,209	4,986	2,058	41·30	1,912	6·06	3,970	1,016	..	2·16	25·28	0·92	10·83	0·86	10·06	1·78	20·89	10 to 3	1	3 to 1½
19. Reefton Electric Light Co., Ltd.	6,831	6,030	3,496	2,625	75·09	..	..	2,625	871	..	9·53	39·55	7·91	32·81	..	..	7·91	32·81	9	4	4
20. Southland Power Board ..	1,654,891	1,636,508	126,400	43,916	34·74	122,924	7·43	166,840	..	40,440	1·57	18·40	0·60	7·08	1·69	19·83	2·29	26·91	7 to 1½	4 to 1	2½ to ⅝
Bluff Borough Council ..	9,214	9,105	3,926	2,782	70·86	929	10·08	3,711	215	..	2·88	12·90	2·27	10·15	0·76	3·39	3·03	13·54	7 to 6	2	3 to 1½
Invercargill City Council ..	172,609	151,023	50,110	27,176	54·23	10,839	6·28	38,015	12,095	..	2·33	27·35	1·33	15·62	0·53	6·23	1·86	21·85	7 to 1½	..	3 to 1½
21. South Taranaki Power Board	168,614	163,190	31,957	10,352	32·39	12,031	7·14	22,383	9,574	..	3·43	32·72	1·18	11·28	1·37	13·11	2·55	24·39	7½	3⅜, 1½	3⅜ to 2
22. Taranaki Power Board ..	457,328	443,871	48,461	11,978	24·72	32,284	7·06	44,262	4,199	..	1·33	10·30	0·33	4·08	0·90	10·99	1·23	15·07	6	3 to 1½	4½ to 1
Stratford Borough Council ..	28,351	27,843	12,599	7,324	58·13	3,426	12·08	10,750	1,849	..	1·65	27·37	0·97	15·92	0·45	7·45	1·42	23·37	8 to 4	2 to 1	4 to 1
23. Taihape Borough Council ..	18,795	9,020	5,543	2,775	50·06	1,081	5·75	3,856	1,687	..	3·59	26·91	1·80	13·47	0·69	5·25	2·49	18·72	8	1½	2
24. Taumarunui Borough Council	60,716	57,896	9,911	2,721	27·45	4,423	7·28	7,144	2,767	..	2·76	24·98	0·79	7·16	1·28	11·64	2·07	18·80	8, 7	3 to 1½	3 to $\frac{9}{10}$
Manunui Town Board ..	3,277	3,277	870	523	60·11	250	7·63	773	97	..	8·42	34·80	5·06	20·92	2·42	10·00	7·48	30·92	9	4½	4½
25. Tauranga Borough Council ..	154,018	154,018	25,160	6,931	27·55	10,324	6·70	17,255	7,905	..	0·44	6·72	0·12	1·92	0·19	2·87	0·31	4·79	6	1½, 1	2 to 1
Tauranga Power Board ..	133,540	127,164	24,862	13,656	54·97	9,173	6·87	22,829	2,033	..	1·51	..	0·93	..	0·63	..	1·56	..	9 to 8	3½ to 1	4½ to 1
Te Puke Town Board ..	11,315	6,325	3,297	1,548	46·95	562	4·97	2,110	1,187	..	1·74	24·82	0·84	11·91	0·30	4·32	1·14	16·23	7	2½, 1½	2½, 1½
26. Teviot Power Board ..	56,683	56,157	6,428	1,786	27·78	3,772	6·65	5,558	870	..	0·52	8·10	0·15	2·29	0·31	4·84	0·46	7·13	3 to ½	3 to ½	3 to 1
Otago Central Power Board	86,002	84,270	10,506	4,155	39·55	6,781	7·88	10,936	..	430	1·32	22·62	0·55	9·40	0·89	15·34	1·44	24·74	8 to 1	8 to 2	or £2 per h.p. 6d. p. annum plus unit charge as per lighting
27. Waimea Electric Supply Co. ..	21,198	18,265	5,160	3,174	61·51	359	1·69	3,533	1,627	..	7·18	45·34	4·78	30·23	0·54	3·42	5·32	33·65	11	4	4
28. Wairua (Wilson's Cement Co.)	91,971	34,481	16,267	4,387	26·97	..	..	4,387	11,880	..	0·46	7·02	0·13	1·94	..	..	0·13	1·94	5½, 5	1½	3 to 2½
Whangarei Borough Council	64,738	64,196	25,308	16,836	66·52	2,143	3·31	18,979	6,329	..	2·53	34·05	1·73	23·22	0·22	2·96	1·95	26·18	5½, 5	1½	3 to 2
Kamo Town Board ..	3,439	2,600	916	578	63·10	235	6·83	813	103	..	6·05	17·54	3·99	11·56	1·62	4·70	5·61	16·26	8¼	3½ to 2½	3½ to 2½
29. Wairere Power Board ..	41,120	39,084	5,548	1,693	30·52	2,841	6·91	4,534	1,014	..	1·10	13·66	0·35	4·82	0·58	7·23	0·93	12·05	9	4½	1
30. Westland Power, Ltd. ..	66,755	66,755	3,589	3,455	96·27	..	..	3,455	134	..	1·61	14·55	1·59	14·40	..	..	1·59	14·40	9 to 6	2½ to 1½	2 to 1½
31. Westport Borough Council ..	29,655	26,845	7,410	2,548	34·39	2,304	7·77	4,852	2,558	..	3·16	31·40	1·09	10·84	0·98	9·80	2·07	20·64	9	3 to 1	3 to 2
32. Whakatane Borough Council..	60,480	60,480	6,403	1,925	30·06	3,343	5·53	5,268	1,135	..	2·55	19·87	0·77	6·02	1·34	10·45	2·11	16·47	9	1½	3 to 1
Totals, hydro stations ..	25,496,125	23,727,017	3,642,358	1,699,928	46·66	1,361,802	5·34	3,061,730	643,496	62,868	0·75	11·77	0·44	6·97	0·36	5·58	0·80	12·55	..	..	..

TABLE XVII.—ELECTRIC-SUPPLY STATIONS.—APPROPRIATIONS FOR THE YEAR ENDED 31ST MARCH, 1931.

Title.	Ownership.	Supply commenced.	Appropriations.									Accumulated Funds.					
												Depreciation.		Renewal.	Sinking.	Reserves.	
			To Depreciation.	Renewal Fund.	General Reserve Fund.	Accident Insurance Fund.	Relief of Rates (Local Authorities)	Payment of Dividends.	Capital Expenditure (out of Revenue).	Unappropriated Surplus.	Total.	Reserve.	Funded.			General.	Net Surplus Unappropriated.
			£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
STEAM STATIONS.																	
1. Auckland	Power Board ..	1908	60,090	4,500	16,749	3,208	..	..	..	7,510	92,057	382,744	249	10,027	490,593	421,927	7,510
2. Grey	Power Board ..	1926	1,509	..	2,000	300	..	..	..	6,489	10,298	3,733	..	..	15,274	2,000	2,057
3. Nelson	City Council ..	1923	3,273	..	..	..	1,500	..	5,221	..	9,994	16,915	..	..	11,073	..	..
Totals, steam stations..	..	..	64,872	4,500	18,749	3,508	1,500	..	5,221	13,999	112,349	403,392	249	10,027	516,940	423,927	9,567
GAS STATIONS.																	
1. Kaikoura	City Council ..	1922	..	..	..	..	..	..	..	..	..	928	..	..	1,030	..	..
2. Motueka	Borough Council ..	1922	..	..	..	..	..	..	109	..	109	3,645	..	..	1,994	..	..
Totals, gas stations ..	..	..	..	..	..	..	..	..	109	..	109	4,573	..	..	3,024	..	..
OIL STATIONS.																	
1. Picton	Borough Council ..	1917	..	..	..	..	..	..	..	..	..	400	400	..	1,831	..	..
2. Spender, Paul (Rawene) ..	Private individual..	1926	..	..	..	..	..	..	..	40	40	..	..	..	..	..	40
3. Uawa (Tolaga Bay) ..	County Council ..	1925	..	..	..	..	..	..	23	8	31	..	..	..	1,995	..	66
Totals, oil stations ..	..	..	..	..	..	..	..	..	23	48	71	400	400	..	3,826	..	106
HYDRO STATIONS.																	
1. Alderton Utility Co. (Kerikeri)	Company ..	1930	..	..	..	..	..	..	..	78	78	..	..	..	..	..	78
2. Coleridge	Public Works Dept.	1915	13,290	..	52,957	..	..	..	..	..	66,247	197,627	..	..	58,322	97,345	..
Ashburton	Power Board ..	1923	1,938	..	..	..	..	..	..	..	1,938	9,373	..	9,500	21,669	..	..
Banks Peninsula ..	Power Board ..	1921	1,678	..	..	..	..	..	..	..	1,678	4,654	4,654	..	10,132	..	..
Christchurch ..	City Council ..	1904	34,664	..	94*	..	10,600†	..	..	13,237	58,595	382,823	..	3,000	165,618	175,417	13,237
Waimairi	County Council ..	1916	..	..	..	..	..	..	5,234	..	5,234	968	..	..	2,397	43,268	..
Halswell	County Council ..	1919	..	..	..	..	..	..	17	280	297	..	..	..	743	..	280
Heathcote	County Council ..	1914	..	..	..	..	..	..	..	..	..	..	..	..	6,756	..	..
Hurunui	Power Board‡ ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lyttelton	Borough Council ..	1917	200	..	..	..	..	..	485	170	855	200	..	..	392	..	170
Malvern	Power Board ..	1925	..	..	..	..	..	..	..	..	..	..	..	..	3,949	..	..
North Canterbury ..	Power Board ..	1928	1,517	569	..	..	..	..	..	804	2,890	5,861	1,209	..	7,997	..	3,726
Kaiapoi	Borough Council ..	1916	492	..	..	..	..	..	..	63	555	2,548	..	..	1,318	..	63
Rangiora	Borough Council ..	1919	336	..	..	..	..	..	564	425	1,325	3,827	336	..	1,132	..	2,584
Riccarton	Borough Council ..	1916	495	..	..	..	950	..	436	1,637	3,518	4,147	306	..	890	..	3,536
South Canterbury ..	Power Board ..	1925	2,127	1,729	..	..	..	..	..	..	3,856	6,833	1,729	..	..	..	3,674
Timaru	Borough Council ..	1908	..	..	..	..	1,000	..	3,694	1,274	5,968	..	..	..	42,869	..	1,274
Springs-Ellesmere ..	Power Board ..	1922	827	..	..	..	..	..	..	530	1,357	5,075	4,910	..	8,772	..	2,302
Sumner	Borough Council ..	1918	422	..	..	..	150	..	..	864	1,436	813	391	..	1,431	..	864

* Special lighting reserve. † Transfer to municipal accounts. ‡ Not yet in operation.

TABLE XVII.—ELECTRIC-SUPPLY STATIONS.—APPROPRIATIONS FOR THE YEAR ENDED 31ST MARCH, 1931—*continued.*

Title.	Ownership.	Supply commenced.	Appropriations.									Accumulated Funds.					
			To Depreciation.	Renewal Fund.	General Reserve Fund.	Accident Insurance Fund.	Relief of Rates (Local Authorities)	Payment of Dividends.	Capital Expenditure (out of Revenue).	Unappropriated Surplus.	Total.	Depreciation.		Renewal.	Sinking.	Reserves.	
												Reserve.	Funded.			General.	Net Surplus Unappropriated.
HYDRO STATIONS—*continued.*			£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
2. Coleridge—*continued.*																	
Tai Tapu Dairy Co. ..	Company ..	1915	376	..	..	..	..	..	..	528	904	1,102	..	..	..	..	528
Waitaki	Power Board ..	1926	2,100	..	200	..	..	..	..	1,797	4,097	8,716	8,716	..	15,499	10,564	9,596
3. Dunedin	City Council ..	1907	23,401	36,036	..	..	16,384	..	..	..	75,821	152,152	..	175,869	142,288	..	132,280
Otago	Power Board ..	1926	4,524	..	..	..	..	..	..	..	4,524	10,807	..	..	16,467	..	..
4. Golden Bay	Power Board ..	1929	..	..	..	..	..	..	121	..	121	865	..	..	453	..	..
5. Havelock North ..	Town Board ..	1916	..	..	..	..	..	..	..	..	..	..	..	..	7,303	..	..
6. Horahora-Arapuni ..	Public Works Dept.	1921	33,009	..	..	..	..	..	..	..	33,009	187,574	..	..	54,445	..	..
Bay of Plenty ..	Power Board ..	1928	..	..	..	..	..	..	..	1,132	1,132	..	..	..	5,903	..	1,132
Cambridge	Power Board ..	1921	..	..	450	..	..	..	411	970	1,831	1,387	..	..	11,295	..	1,939
Central	Power Board ..	1921	2,432	..	400	..	..	..	..	2,121	4,953	10,273	7,841	5,000	26,489	7,426	9,373
Franklin	Power Board ..	1925	8,809	..	..	..	..	..	..	490	9,299	38,802	16,582	..	11,230	8,054	2,149
Hamilton	Borough Council ..	1913	..	..	2,000	..	4,362	..	1,811	2,249	10,422	..	..	12,645	19,640	9,042	2,249
Te Awamutu ..	Power Board ..	1921	2,039	..	..	..	..	..	906	1,182	4,127	2,761	1,761	..	11,093	906	6,382
Thames Valley ..	Power Board ..	1921	4,449	..	..	..	..	..	..	688	5,137	14,582	10,333	..	92,915	13,913	1,777
Thames	Borough Council ..	1914	318	..	..	..	..	..	..	1,357	1,675	1,530	..	..	5,540	..	..
Te Aroha	Borough Council ..	1906	350	..	..	..	..	..	634	..	984	6,842	717	..	1,766	..	6,400
Tourist Dept. ..	Public Works Dept.	1901	1,424	..	2,918	..	..	..	..	..	4,342	11,899	..	..	13,262	..	..
Waitemata	Power Board ..	1926	3,313	..	..	..	..	..	192	3,251	6,756	10,139	..	..	37,645	18,207	4,934
Waitomo	Power Board ..	1926	..	..	..	..	..	..	..	1,074	1,074	1,805	..	..	4,855	..	1,074
7. Kanieri Electric, Ltd. ..	Company ..	1921	1,618	..	10	..	..	..	..	1,054	2,682	..	..	..	..	..	1,054
8. Kaponga	Town Board ..	1916	..	..	..	..	..	..	..	..	..	..	..	..	2,409	..	..
9. Mangahao-Waikaremoana	Public Works Dept.	1925	63,850	..	..	..	..	..	..	..	63,850	284,966	..	..	..	..	..
Central Hawke's Bay ..	Power Board ..	1925	2,210	..	270	..	..	..	..	584	3,064	12,857	7,166	1,832	1,051	1,653	584
Dannevirke	Power Board ..	1925	2,054	..	..	..	..	..	..	208	2,262	6,628	4,573	..	12,836	100	3,146
Hawke's Bay ..	Power Board ..	1927	3,217	..	..	..	..	..	..	..	3,217	8,055	4,990	..	11,155	..	3,111
Hastings	Borough Council ..	1912	169	..	..	..	..	..	6,812	..	6,981	3,500	3,500	..	11,935	..	7,462
Napier	Borough Council ..	1913	..	..	..	..	..	..	1,586	5,082	6,668	10,683	15,205	..	11,487	10,727	5,082
Horowhenua ..	Power Board ..	1924	2,837	..	..	200	..	..	..	2,200	5,237	14,494	11,657	..	13,491	13,300*	7,784
Hutt Valley	Power Board ..	1925	7,527	2,000	2,598	..	..	..	2,000	1,272	15,397	38,060	30,533	4,014	22,057	2,598	10,561
Manawatu-Oroua ..	Power Board ..	1924	4,286	..	..	..	..	..	..	51	4,337	10,941	8,531	..	48,937	..	51
Palmerston North ..	City Council ..	1924	4,964	..	..	..	6,800	..	..	12,355	24,119	14,510	..	..	18,194	..	12,355
Poverty Bay ..	Power Board ..	1912	3,849	..	2,500	..	11	..	..	2,790	9,150	10,609	1,798	..	12,976	2,650	16,917
Tararua	Power Board ..	1925	2,278	754	100	..	19	..	516	328	3,995	7,740	895	..	13,381	1,268	328
Wairarapa	Power Board ..	1923	1,940	..	..	..	..	..	..	5,318	7,258	6,906	..	..	18,205	..	9,328
Wairoa	Power Board ..	1923	879	..	..	..	..	..	..	..	879	3,069	168	..	4,982	..	..
Wairoa	Borough Council ..	1913	372	..	..	..	..	..	56	1,134	1,562	744	372	..	3,696	..	1,142
Wanganui-Rangitikei	Power Board ..	1924	16,923	..	..	..	..	..	..	655	17,578	12,221	..	4,000	31,163	..	11,336
Mangaweka ..	Town Board ..	1913	..	..	..	..	..	..	..	129	129	..	..	..	1,085	..	129
Wellington	City Council ..	1907	..	20,598	20,598	..	10,000	..	98,890	..	150,086	..	..	100,000	183,000	61,000	..
10. Marlborough	Power Board ..	1927	2,795	..	..	..	..	..	..	..	2,795	9,378	..	..	18,264	2,567	..

* Includes £300 Accident Reserve.

TABLE XVII.—ELECTRIC-SUPPLY STATIONS.—APPROPRIATIONS FOR THE YEAR ENDED 31ST MARCH, 1931—*continued.*

Title.	Ownership.	Supply commenced.	Appropriations.									Accumulated Funds.					
			To Depreciation.	Renewal Fund.	General Reserve Fund.	Accident Insurance Fund.	Relief of Rates (Local Authorities)	Payment of Dividends.	Capital Expenditure (out of Revenue).	Unappropriated Surplus.	Total.	Depreciation.		Renewal.	Sinking.	Reserves.	
												Reserve.	Funded.			General.	Net Surplus Unappropriated.
HYDRO STATIONS—*continued.*			£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
11. Mataura	Borough Council ..	1913	..	..	..	..	..	..	..	..	..	133	..	..	261	..	..
12. Murchison	County Council ..	1922	..	..	..	..	..	..	..	179	179	..	..	..	1,807	..	179
13. New Plymouth ..	Borough Council ..	1905	..	..	..	..	..	..	16,006	1,028	17,034	12,333	12,333	..	65,641	..	1,028
Inglewood	Borough Council ..	1905	235	..	..	..	..	..	..	288	523	256	256	..	3,069	..	288
Waitara	Borough Council ..	1907	125	..	..	..	..	..	..	539	664	128	..	..	2,452	..	539
14. Ohakune	Borough Council ..	1914	78	..	..	..	800	..	396	..	1,274	78	..	..	2,986	..	..
15. Opunake	Power Board ..	1924	150	..	..	..	..	..	..	274	424	520	..	..	12,322	..	2,048
16. Patea	Borough Council ..	1901	..	..	..	..	900	..	73	38	1,011	54	54	..	308	..	3,231
17. Queenstown	Borough Council ..	1924	110	96	..	..	..	..	..	..	206	110	110	201	678	..	..
18. Raetihi	Borough Council ..	1917	585	..	..	..	..	..	394	37	1,016	592	..	..	4,406	..	37
19. Reefton Electric Co. ..	Company ..	1887	..	..	112	..	..	750	..	9	871	..	..	..	..	557	1,453
20. Southland	Power Board ..	1925	..	..	..	..	..	..	1,321	..	1,321	13,845	..	..	239,397	..	..
Bluff	Borough Council ..	1903	..	..	..	..	..	..	..	215	215	1,537	..	..	1,144	..	215
Invercargill	City Council ..	1914	628	..	..	..	6,038	..	5,156	273	12,095	34,234	34,234	..	20,849	..	273
21. South Taranaki ..	Power Board ..	1929	1,350	..	4,487	..	..	..	2,677	1,060	9,574	1,508	1,508	..	4,789	4,800	2,149
22. Taranaki	Power Board ..	1927	3,012	..	..	..	..	..	..	1,187	4,199	8,918	..	..	21,375	..	15,779
Stratford	Borough Council ..	1898	250	..	..	..	..	..	..	1,599	1,849	508	508	..	6,168	..	3,859
23. Taihape	Borough Council ..	1913	508	..	..	..	..	..	205	974	1,687	1,365	857	..	4,565	..	1,812
24. Taumarunui	Borough Council ..	1924	600	..	..	..	1,300	..	110	757	2,767	2,820	2,820	..	2,610	..	757
Manunui	Town Board ..	1929	..	..	..	..	..	..	..	97	97	..	..	..	..	..	97
25. Tauranga	Borough Council ..	1915	500	..	..	..	12,681	..	3,793	..	16,974	2,183	..	..	19,000	9,021	..
Tauranga	Power Board ..	1926	1,727	..	300	..	..	..	..	6	2,033	4,876	1,567	..	7,601	300	208
Te Puke	Town Board ..	1921	250	..	..	..	..	..	..	937	1,187	2,609	2,068	..	1,184	648	2,724
26. Teviot	Power Board ..	1924	273	..	..	..	..	..	..	597	870	526	..	..	4,938	..	597
Otago Central ..	Power Board ..	1925	..	..	..	..	..	..	..	..	..	1,581	..	..	3,895	..	..
27. Waimea Electric Co. ..	Company ..	1912	983	..	..	..	..	..	..	644	1,627	933	933	..	..	..	644
28. Wairua (Wilson's Cement Co.)	Company ..	1916	..	..	..	..	..	11,880*	..	..	11,880	..	..	..	..	..	..
Whangarei	Borough Council ..	1915	1,540	..	1,971	..	..	..	2,818	..	6,329	4,540	..	..	4,283	..	3,801
Kamo	Town Board ..	1923	..	..	..	..	..	..	128	..	128	..	..	..	560	..	..
29. Wairere	Power Board ..	1925	559	..	..	..	..	..	89	366	1,014	1,444	885	..	635	..	366
30. Westland Power, Ltd. ..	Company ..	1928	..	..	..	..	..	..	..	134	134	..	..	..	..	..	134
31. Westport	Borough Council ..	1925	935	..	..	..	..	..	934	689	2,558	1,895	915	..	4,041	..	2,227
32. Whakatane	Borough Council ..	1922	..	..	..	..	..	..	..	1,135	1,135	..	..	..	7,377	..	3,860
Totals, hydro stations..	..	..	280,696	61,782	91,965	200	71,995	12,630	158,465	82,433	760,156	1,638,770	195,588	316,061	1,701,120	495,331	348,623

* Transfer to General Profit and Loss Account.

TABLE XVIII.—RETURN OF ELECTRIC RANGES, WATER-HEATERS, AND MILKING-MACHINES.

Table showing the Number of Electric Ranges, Water-heaters, and Milking-machines connected to Electric-supply Systems as at 31st March, 1931.

Licensee.	Number of Consumers.	Ranges.				Water-heaters.			Milking-machines.		
		2 to 5 Kilowatts.	5 Kilowatts and over.	Total.	Percentage of Number of Consumers.	Number.	Total Kilowatts.	Percentage of Number of Consumers.	Number.	Horse-power	Not yet electrified.
Alderton Utility Co.	25	2	6	8	32·0	13	8·4	52·0	1	2	1
Ashburton Power Board	3,568	42	719	761	21·3	429	863·0	12·0	58	92·5	46
Auckland Power Board	46,518	..	4,213	4,213	9·0	9,831	6,000·0	21·1	163	..	..
Banks Peninsula Power Board	957	47	150	197	20·5	181	265·0	18·9	182	213	..
Bluff Borough Council	425	1	..	1	..	..	..	..	..	..	..
Bay of Plenty Power Board	1,304	29	432	461	35·2	915	664·0	70·0	501	880	26
Cambridge Power Board	1,344	10	136	146	10·8	440	321·0	32·7	305	505	12
Central Hawke's Bay Power Board	1,543	6	163	169	10·9	251	251·0	16·2	66	80	..
Central Power Board	3,923	30	240	270	6·8	1,122	702·0	28·6	994	1,866·7	..
Christchurch City Council	26,100	..	3,776	3,776	14·5	4,199	4,337·0	16·1	..	..	..
Coleridge (Public Works Department)	39	21	16	37	95·0	38	35·0	97·0	..	..	..
Dannevirke Power Board	2,349	..	172	172	7·3	414	277·0	17·6	357	494	83
Dunedin City Council	23,906	..	1,020	1,020	4·2	1,647	1,640·0	6·8	160	320	..
Franklin Power Board	3,092	88	403	491	15·9	1,103	652·0	35·7	948	1,084	..
Golden Bay Power Board	300	9	19	28	9·3	31	25·0	10·3	45	55	10
Grey Power Board	2,400	24	111	135	5·6	110	112·0	4·6	4	9·5	..
Halswell County Council	263	18	12	30	11·4	14	10·4	5·32	17	40	..
Hamilton Borough Council	4,003	7	86	93	2·3	143	108·0	3·6	..	..	..
Hastings Borough Council	3,383	9	123	132	3·9	40	27·0	1·2	..	..	..
Havelock North Town Board	288	33	3	36	12·5	16	14·5	5·5	..	..	..
Hawke's Bay Power Board	2,314	..	377	377	16·0	470	288·0	20·0	156	191	..
Heathcote County Council	1,828	65	270	335	18·3	275	250·0	15·0	3	7	..
Horowhenua Power Board	3,643	..	513	513	14·1	880	554·0	24·0	653	855	..
Hutt Valley Power Board	10,467	94	1,263	1,357	12·9	1,169	1,317·0	11·1	67	129	..
Inglewood Borough Council	417	3	25	28	6·7	21	20·0	4·8	1	2·5	..
Invercargill City Council	4,670	10	109	119	2·5	2	4·0	..	..	..	..
Kaiapoi Borough Council	450	24	8	32	7·0	6	6·0	1·3	..	..	..
Kaikoura County Council	47	..	..	..	..	..	..	..	..	..	..
Kamo Town Board	113	1	..	1	1·0	..	..	..	..	..	..
Kanieri Electric Light, Ltd.	596	4	9	13	2·2	8	7·6	1·3	..	..	..
Kaponga Town Board	360	7	14	21	5·8	47	28·2	13·0	104	209	34
Lyttelton Borough Council	706	5	39	44	6·2	24	27·9	3·4	1	3	..
Malvern Power Board	654	19	119	138	21·0	67	114·0	10·1	5	10	..
Manawatu-Oroua Power Board	4,505	..	718	718	15·9	1,342	829·7	29·8	912	1,675	..
Mangahao (Public Works Department)	86	..	56	56	67·5	58	58·0	69·9	..	..	..
Mangaweka Town Board	106	1	9	10	10·6	7	3·5	6·6	3	5·7	..
Manunui Town Board	157	..	..	..	..	..	..	..	1	1·5	..
Marlborough Power Board	2,501	97	339	436	17·4	371	260·0	14·8	80	137	4
Mataura Borough Council	351	1	13	14	4·0	1	1·0	0·4	4	12	..
Motueka Borough Council	349	..	..	..	..	..	..	..	..	..	..

TABLE XVIII.—RETURN OF ELECTRIC RANGES, WATER-HEATERS, AND MILKING-MACHINES—*continued.*

Table showing the Number of Electric Ranges, Water-heaters, and Milking-machines connected to Electric-supply Systems as at 31st March, 1931—continued.

Licensee.	Number of Consumers.	Ranges.				Water-heaters.			Milking-machines.		
		2 to 5 Kilowatts.	5 Kilowatts and over.	Total.	Percentage of Number of Consumers.	Number.	Total Kilowatts.	Percentage of Number of Consumers.	Number.	Horse-power.	Not yet electrified.
Murchison County Council	124	..	2	2	1·6	11	8·7	8·8	15	27	2
Napier Borough Council	4,118	7	71	78	1·9	395	252·0	9·6	..	..	..
Nelson City Council	2,387	..	..	..	..	3	4·0	..	..	..	..
New Plymouth Borough Council	6,419	170	672	842	13·1	826	502·0	12·8	346	632	..
North Canterbury Power Board	1,574	29	169	198	12·6	147	246·0	9·3	67	136	..
Ohakune Borough Council	458	9	13	22	4·7	17	13·3	3·7	4	8·5	..
Opunake Power Board	1,472	..	75	75	5·9	141	81·0	9·6	242	420	..
Otago Central Power Board	853	11	112	123	14·4	142	150·0	16·7	20	35	..
Otago Power Board	3,755	9	333	342	9·1	318	314·8	8·4	54	91·5	..
Palmerston North Borough Council	5,437	31	487	518	9·5	1,010	650·0	18·5	4	8	..
Patea Borough Council	354	13	3	16	4·5	13	8·0	3·4	3	5·5	5
Picton Borough Council	358	2	..	2	0·5	..	..	..	..	..	..
Poverty Bay Power Board	4,511	69	439	508	11·3	362	380·0	8·0	88	114	..
Queenstown Borough Council	260	4	2	6	2·6	..	..	..	..	..	..
Raetihi Borough Council	399	1	9	10	2·5	25	18·6	6·2	11	29	..
Rangiora Borough Council	559	3	40	43	7·7	38	38·0	6·8	..	..	..
Reefton Electric Light and Power Co., Ltd.	273	..	..	..	..	2	6·0	0·7	..	..	..
Riccarton Borough Council	1,328	16	217	233	17·5	271	260·0	20·4	..	..	..
Rotorua (Tourist Department)	1,814	56	98	154	8·4	204	175·0	11·2	39	80	..
South Canterbury Power Board	3,486	24	537	561	16·1	409	547·0	11·7	122	194	..
South Taranaki Power Board	2,787	..	56	56	2·0	114	76·5	4·0	236	560	394
Southland Power Board	9,080	..	1,423	1,423	15·7	704	950·0	7·7	1,023	2,422	..
Springs-Ellesmere Power Board	2,095	5	190	195	9·0	100	115·3	4·8	74	145	..
Stratford Borough Council	1,020	6	126	132	13·0	135	108·0	13·2	..	..	..
Sumner Borough Council	973	40	67	107	11·0	96	88·0	9·8	1	3	..
Taihape Borough Council	622	..	9	9	1·4	13	12·2	2·0	..	..	..
Tai Tapu Dairy Co., Ltd.	248	10	19	29	11·7	22	45·0	9·0	41	92·5	..
Taranaki Power Board	2,113	5	234	239	11·3	765	684·0	36·2	767	1,493	..
Tararua Power Board	1,559	48	205	253	16·2	364	235·0	23·3	294	456	..
Taumarunui Borough Council	796	3	18	21	2·8	26	20·0	2·6	..	..	..
Tauranga Borough Council	948	73	167	240	25·3	323	125·6	34·07	..	..	..
Tauranga Power Board	943	29	156	185	19·6	470	281·0	49·8	414	753	47
Te Aroha Borough Council	710	3	32	35	4·9	45	30·0	6·3	7	15	..
Te Awamutu Power Board	1,650	22	176	198	12·0	572	389·0	35·0	615	935	..
Te Puke Town Board	286	11	18	29	10·0	44	25·8	15·0	4	8	1
Teviot Power Board	400	8	118	126	31·5	113	86·0	28·2	..	..	..
Thames Borough Council	1,115	1	16	17	1·92	34	21·5	3·05	..	..	..
Thames Valley Power Board	5,950	65	381	446	7·5	2,094	1,397·0	35·2	2,001	3,941	50
Timaru Borough Council	3,510	..	285	285	8·1	197	193·0	5·5	..	..	..
Uawa County Council	98	..	..	..	..	..	..	..	..	..	..

TABLE XVIII.—RETURN OF ELECTRIC RANGES, WATER-HEATERS, AND MILKING-MACHINES—*continued.*

Table showing the Number of Electric Ranges, Water-heaters, and Milking-machines connected to Electric-supply Systems as at 31st March, 1931—continued.

Licensee.	Number of Consumers.	Ranges.				Water-heaters.			Milking-machines.		
		2 to 5 Kilowatts.	5 Kilowatts and over.	Total.	Percentage of Number of Consumers.	Number.	Total Kilowatts.	Percentage of Number of Consumers.	Number.	Horse-power.	Not yet electrified.
Waikato (Horahora–Arapuni)	19	..	56	56	..	68	71·0	..	..	..	..
Waimairi County Council	3,145	27	555	582	18·5	597	614·7	19·0	14	30·5	..
Waimea Electric Supply Co.	714	..	..	..	..	2	2·0	0·2	1	0·25	..
Wairarapa Power Board	4,204	29	361	390	9·2	566	476·0	13·5	376	698	105
Wairere Power Board	301	3	90	93	31·0	138	77·0	45·8	71	100	..
Wairoa Borough Council	660	10	124	134	20·3	141	76·0	21·3	1	0·75	..
Wairoa Power Board	386	30	87	117	30·3	121	60·5	30·3	38	121	..
Wairua (Wilson's)	48	..	..	..	..	1	0·6	2·0	22	66	..
Waitaki Power Board	3,215	24	379	403	12·5	399	629·0	12·4	26	41·5	..
Waitara Borough Council	451	4	24	28	6·3	18	13·6	4·0	1	2	..
Waitemata Power Board	8,067	50	934	984	12·2	1,346	875·0	16·7	178	273	..
Waitomo Power Board	1,127	27	94	121	10·7	222	140·0	19·7	129	231	20
Wanganui-Rangitikei Power Board	9,469	..	979	979	10·3	1,271	944·0	13·4	484	1,090	..
Wellington City Council	28,700	103	1,082	1,185	4·0	1,392	1,973·0	4·8	..	..	..
Westland Power, Ltd.	126	..	16	16	13·0	34	80·0	27·0	20	40	..
Westport Borough Council	658	..	7	7	1·0	19	17·0	3·0	1	2	..
Whakatane Borough Council	443	10	57	67	15·1	71	..	47·1	3	5·5	..
Whangarei Borough Council	2,033	31	141	172	8·4	147	89·0	7·2	8	20	..
Totals, 1931	300,809	1,838	27,642	29,480	9·81	42,803	34,757·0	14·3	13,656	24,205	840
Totals, 1930	284,327	1,307	24,690	25,997	9·14	37,564	29,887·0	13·12	11,922	22,087·0	923

TABLE XIX.—RETURN SHOWING AVERAGE REVENUE PER CONSUMER AND PER CAPITA FOR THE YEAR ENDING 31ST MARCH, 1931.

Licensee.	Ratio of Consumers to Population.	Average Revenue per Consumer.	Average Revenue per Capita.	Capital Outlay per Capita.
	Per Cent.	£	£	£
Alderton Utility Co.	10·42	10·52	1·10	19·60
Ashburton Power Board	19·91	11·85	2·36	19·58
Auckland Power Board	23·21	13·92	3·24	16·52
Banks Peninsula Power Board	23·63	13·76	3·25	25·37
Bay of Plenty Power Board	15·16	25·37	3·85	24·07
Bluff Borough Council	25·01	8·34	2·09	5·44
Cambridge Power Board	22·40	14·44	3·24	18·26
Central Power Board	20·71	13·74	2·84	16·93
Central Hawke's Bay Power Board	13·59	14·97	2·04	12·02
Christchurch City Council	27·77	8·41	2·33	8·19
Dannevirke Power Board	18·62	12·13	2·26	16·62
Dunedin City Council	29·78	9·28	2·77	20·65
Franklin Power Board	18·44	14·32	2·64	15·77
Golden Bay Power Board	25·00	10·62	2·65	20·84
Grey Power Board	18·32	13·27	2·43	16·96
Halswell County Council	14·22	7·63	1·09	3·75
Hamilton Borough Council	25·83	8·49	2·19	3·67
Hastings Borough Council	30·75	7·34	2·26	10·38
Havelock North Town Board	25·04	10·26	2·57	20·93
Hawke's Bay Power Board	14·44	20·56	2·97	13·35
Heathcote County Council	30·47	5·53	1·69	5·91
Horowhenua Power Board	21·84	11·42	2·49	12·60
Hutt Valley Power Board	25·22	10·11	2·55	9·17
Inglewood Borough Council	32·08	8·99	2·88	9·72
Invercargill City Council	22·24	10·19	2·27	8·22
Kaiapoi Borough Council	25·00	7·05	1·76	5·84
Kaikoura County Council	23·49	10·40	2·44	15·62
Kamo Town Board	18·83	7·76	1·46	5·73
Kanieri Electric Light, Ltd.	23·80	14·42	3·43	19·91
Kaponga Town Board	30·00	14·33	4·30	2·04
Lyttelton Borough Council	19·03	8·05	1·53	1·20
Malvern Power Board	12·95	10·42	1·35	12·67
Manawatu-Oroua Electric-power Board	11·55	17·50	2·02	13·05
Mangaweka Town Board	26·25	8·71	2·31	13·76
Manunui Town Board	15·70	5·54	0·87	3·28
Marlborough Power Board	17·21	11·36	1·96	22·32
Mataura Borough Council	25·92	4·36	1·18	3·83
Motueka Borough Council	21·81	6·46	1·41	10·03
Murchison County Council	24·80	17·15	4·25	2·79
Napier Borough Council	22·04	8·58	1·89	8·69
Nelson City Council	20·75	11·53	2·39	9·35
New Plymouth Borough Council	30·55	11·38	3·48	19·69
North Canterbury Power Board	17·33	14·47	2·51	15·62
Ohakune Borough Council	19·91	9·25	1·84	8·04
Opunake Power Board	24·53	9·01	2·21	18·71
Otago Central Power Board	33·62	11·72	3·94	33·90
Otago Power Board	20·94	9·75	2·04	15·67
Palmerston North City Council	27·05	11·44	3·09	11·70
Patea Borough Council	19·67	12·27	2·41	7·31
Picton Borough Council	26·52	9·18	2·43	14·24
Poverty Bay Power Board	19·06	11·72	2·23	13·30
Queenstown Borough Council	30·77	5·68	1·75	15·19
Raetihi Borough Council	8·87	12·04	1·07	7·02
Rangiora Borough Council	26·62	8·78	2·34	5·70
Reefton Light and Power Co., Ltd.	22·75	11·59	2·64	5·69
Riccarton Borough Council	24·15	8·01	1·93	4·23
South Canterbury Power Board	8·18	15·69	1·28	7·52
South Taranaki Power Board	17·12	10·78	1·85	10·36
Southland Power Board	19·32	12·57	2·43	35·21
Spender, Paul	16·66	10·50	1·75	9·87
Springs-Ellesmere Power Board	17·78	12·36	2·10	11·75
Stratford Borough Council	29·14	12·34	3·60	8·10
Sumner Borough Council	27·80	6·36	1·77	4·69
Taihape Borough Council	25·39	8·91	2·26	7·67
Tai Tapu Dairy Co., Ltd.	4·35	16·52	0·72	1·85
Taranaki Power Board	17·18	22·69	3·90	37·23
Tararua Power Board	15·20	15·08	2·29	16·03
Taumarunui Borough Council	19·88	11·94	2·37	15·18
Tauranga Borough Council	35·11	25·55	8·97	57·04
Tauranga Power Board	11·16	23·43	2·61	15·80
Te Aroha Borough Council	28·40	10·79	3·06	9·69
Te Awamutu Power Board	21·65	18·27	3·96	23·77
Te Puke Town Board	29·18	11·28	3·29	11·55
Teviot Power Board	22·22	15·74	35·04	31·49
Thames Borough Council	22·3	10·3	2·29	6·72
Thames Valley Power Board	17·07	20·69	3·53	23·14
Timaru Borough Council	20·06	9·64	1·93	6·31
Tourist Department (Rotorua)	32·98	10·30	3·40	12·94
Uawa County Council	24·25	11·93	2·92	15·69

TABLE XIX.—RETURN SHOWING AVERAGE REVENUE PER CONSUMER AND PER CAPITA FOR THE YEAR ENDING 31ST MARCH, 1931—*continued.*

Licensee.	Ratio of Consumers to Population.	Average Revenue per Consumer.	Average Revenue per Capita.	Capital Outlay per Capita.
	Per Cent.	£	£	£
Waimairi County Council	24·19	7·20	1·74	6·42
Waimea Electric Supply Co., Ltd.	17·85	6·81	1·19	5·30
Wairarapa Power Board	21·56	12·50	2·69	18·28
Wairere Power Board	15·05	17·83	2·68	20·56
Wairoa Borough Council	27·39	12·79	3·50	8·22
Wairoa Power Board	6·92	31·75	2·20	11·13
Wairua (Wilson's Cement Co.)	2·79	34·50	9·62	5·57
Waitaki Power Board	16·49	11·20	1·85	8·99
Waitara Borough Council	24·71	8·99	2·22	5·08
Waitemata Power Board	20·39	8·72	1·78	9·66
Waitomo Power Board	14·09	15·68	2·21	12·38
Wanganui-Rangitikei Power Board	18·41	10·61	1·93	10·54
Wellington City Council	26·09	12·34	3·22	10·49
Westland Power, Ltd.	3·00	27·71	0·83	15·89
Westport Borough Council	16·45	11·22	1·85	7·41
Whakatane Borough Council	24·61	14·35	3·53	33·60
Whangarei Borough Council	2·90	12·15	3·53	9·25
Average for reticulation areas in New Zealand, 1931	21·47	11·93	2·56	20·84
Average for 1930	20·74	14·83	3·08	17·68
„ 1929	19·33	14·10	2·73	17·27

Table XX.—Condensed Financial Statistics for Year ending 31st March, 1931.

Supply Authority.	Capital Investment.		Total Revenue, excluding Rates.	Total Working-expenses.	Interest and Sinking Fund Payments.	Other Capital Charges.	Amount Credited to Depreciation Reserve.	Result of Year's Working.		Accumulated Sinking Funds.	Depreciation Account.		Accumulated Funds other than Sinking and Depreciation.	Amount Collected by Rates to make up Deficiencies.	Actual Accumulated Losses to 31st March, 1931.
	Total Outlay to Date.	Present Book Value.						Debit.	Credit.		Amount at Credit not Invested Separately.	Amount Invested Separately as Fund.			
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Ashburton	351,031	337,693	42,762	20,645	23,177	..	1,938	2,998	..	21,669	9,373	..	9,500	..	10,656
Auckland	3,304,924	2,881,652	655,184	361,278	201,849	7,709	60,090	..	24,258	490,593	382,744	249	439,464	..	..
Banks Peninsula	102,757	98,103	13,664	8,826	7,677	..	1,678	4,517	..	10,132	..	4,654	..	3,945	..
Bluff	9,214	9,105	3,926	2,782	929	..	299	84	..	1,144	1,537	..	..	..	..
Bay of Plenty	207,015	202,140	35,076	19,669	14,275	..	..	..	1,132	5,903	..	..	1,132	..	979
Cambridge	109,589	108,202	20,829	11,456	7,542	..	43	..	1,788	11,295	1,387	..	1,939	..	..
Central Hawke's Bay	136,470	123,176	23,703	11,144	9,495	..	2,210	..	854	1,832	6,128	7,166	2,705	..	..
Central	320,600	307,127	55,120	28,892	21,275	..	2,432	..	2,521	26,489	2,432	7,841	22,199	..	..
Christchurch	770,063	387,240	229,562	140,167	30,800	..	34,664	..	23,931	165,618	382,823	..	191,654	..	..
Coleridge	1,840,543*	1,731,739	217,632	57,033	94,352	..	13,290	..	52,957	58,322	197,627	..	97,345	..	..
Dannevirke	209,680	203,245	29,314	12,484	14,568	..	2,054	..	208	12,836	2,054	4,573	3,246	..	..
Dunedin (Waipori)	1,654,133	1,615,401	223,886	80,528	86,037	..	23,401	..	33,920	142,288	152,152	..	308,145	..	..
Franklin	264,450	225,268	49,396	23,180	16,917	..	8,809	..	490	11,230	22,220	16,582	10,203	..	..
Grey	222,240	221,691	33,532	12,826	10,408	..	1,509	..	8,789	15,274	3,733	..	4,057	..	..
Golden Bay	25,005	24,141	3,231	1,656	1,454	..	636	515	..	453	865	..	..	301	..
Halswell	6,940	4,430	2,017	1,407	313	..	..	..	297	743	..	..	..	..	..
Hamilton	56,907	56,848	34,219	18,898	4,899	..	2,000	..	8,422	19,640	19,012	12,645	9,042	..	..
Hastings	114,130	110,032	24,898	15,463	6,185	..	169	..	3,081	11,935	..	3,500	7,462	..	..
Havelock North	24,074	24,074	2,954	1,764	1,793	..	..	603	..	7,303	..	..	..	300	..
Hawke's Bay	213,908	205,968	49,182	33,430	14,400	..	3,217	1,865	..	11,155	8,055	4,990	3,111	..	..
Heathcote	35,492	28,142	10,530	9,766	2,691	..	..	1,927	..	6,756	..	..	..	..	1,927
Horahora-Arapuni	3,992,832	3,805,467	184,593	101,889	85,389	..	33,009	35,694	..	54,445	187,574	..	..	..	..
Horowhenua	210,092	195,598	42,892	23,964	13,691	..	2,837	..	2,400	13,491	14,494	11,657	21,084	..	..
Hutt Valley	380,733	340,673	109,239	68,286	25,556	..	7,527	..	7,870	22,057	7,527	30,533	17,173	..	..
Inglewood	12,644	8,163	3,769	2,496	750	..	235	..	288	3,069	..	256	..	..	..
Invercargill	172,609	151,023	50,110	27,176	10,839	..	628	..	11,467	20,849	..	34,234	..	..	..
Kaikoura	9,839	8,911	1,584	1,705	746	..	..	867	..	1,030	928	..	..	688	2,491
Kaiapoi	10,519	7,971	3,234	1,783	896	..	492	..	63	1,318	2,548	..	694	..	..
Kamo	3,439	2,600	916	578	235	..	..	..	103	560	..	..	..	124	..
Kanieri Electric, Ltd., Hokitika	49,774	37,954	8,819	6,048	89	..	1,618	..	1,064	..	..	..	..	..	..
Kaponga	24,507	23,052	5,299	4,199	1,621	..	..	521	..	2,409	..	..	..	..	3,450
Kerikeri (Alderton Utility Co.)	4,705	4,705	273	110	85	..	..	..	78	..	..	..	78	..	..
Lyttelton	7,415	7,215	5,796	4,456	485	..	200	..	655	392	200	..	..	..	..
Malvern	63,966	58,774	7,716	5,074	4,171	..	780	2,309	..	3,949	..	..	..	1,320	3,577
Manawatu-Oroua	509,011	489,148	79,583	43,408	31,838	..	4,286	..	51	48,707	10,941	8,531	..	..	5,108
Mangahao	3,498,840	3,203,939	283,017	59,476	196,206	..	63,850	36,515	..	..	284,966	..	..	..	467,205
Mangaweka	5,504	5,000	1,192	934	129	..	..	..	129	1,085	..	..	129	150	..
Manunui	3,277	3,277	870	523	250	..	..	..	97	177	..	..	..	..	9
Marlborough	324,315	314,937	28,832	8,876	21,928	..	2,795	4,767	..	18,264	9,378	..	2,567	5,585	9,700
Mataura	4,977	4,295	1,706	1,603	23	..	..	131	..	261	133	..	..	171	131
Motueka	16,040	12,395	2,354	1,976	962	..	812	1,396	..	1,994	3,645	..	..	786	1,890
Murchison	13,925	13,925	2,744	1,591	974	..	..	..	179	1,807	..	..	..	..	2,495
Napier	162,282	160,683	36,323	20,981	8,674	..	..	..	6,668	11,487	10,683	15,205	15,809	..	..
Nelson	107,579	90,663	28,029	13,721	4,900	..	3,273	..	6,135	11,073	16,915	..	..	153	..
New Plymouth	413,510	363,463	75,390	31,913	26,443	..	6,675	..	10,359	65,644	..	12,333	..	..	..
North Canterbury	141,562	135,767	23,408	12,804	7,714	..	1,517	..	1,373	7,997	5,861	1,209	3,726	..	..
Ohakune	18,492	15,454	4,260	2,287	1,069	..	78	..	826	2,986	78	..	..	389	..
Opunake	112,255	112,255	13,467	4,928	8,115	..	150	..	274	12,322	520	..	2,048	..	..
Otago Central	86,002	84,270	10,506	4,155	6,781	..	372	802	..	3,895	1,581	..	..	..	2,277

* Includes stocks valued at £127,988.

TABLE XX.—CONDENSED FINANCIAL STATISTICS FOR YEAR ENDING 31ST MARCH, 1931—*continued.*

Supply Authority.	Capital Investment.		Total Revenue, excluding Rates.	Total Working-expenses.	Interest and Sinking Fund Payments.	Other Capital Charges.	Amount Credited to Depreciation Reserve.	Result of Year's Working.		Accumulated Sinking Funds.	Depreciation Account.		Accumulated Funds other than Sinking and Depreciation.	Amount Collected by Rates to make up Deficiencies.	Actual Accumulated Losses to 31st March, 1931
	Total Outlay to Date.	Present Book Value.						Debit.	Credit.		Amount at Credit not Invested Separately.	Amount Invested Separately as Fund.			
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Otago	281,016	268,606	36,688	24,539	20,002	..	4,524	12,379	..	16,467	10,871	..	..	9,865	26,312
Palmerston North	235,170	221,019	62,217	25,505	12,593	..	4,964	..	19,155	18,194	14,510	..	12,355	..	..
Patea	13,160	13,107	4,378	2,748	619	..	..	..	1,011	308	54	..	3,231	..	..
Picton	19,220	15,949	3,286	2,247	1,244	..	..	205	..	1,831	..	400	..	1,219	..
Poverty Bay	314,904	304,493	54,546	25,642	19,754	..	3,849	..	5,501	12,978	10,609	1,798	19,567	..	..
Queenstown	12,837	12,640	1,552	530	816	..	110	..	96	678	110	..	201	3	..
Raetihi	31,572	19,209	4,986	2,058	1,912	..	585	..	431	4,406	592	..	..	209	..
Rangiora	11,980	8,138	5,108	3,373	410	..	336	..	989	1,132	3,827	336	2,584	..	..
Reefton Electric Light and Power Co., Ltd.	6,831	6,030	3,496	2,625	..	..	..	..	871	..	..	..	2,010	..	..
Riccarton	23,292	19,145	11,012	6,521	973	..	495	..	3,023	890	4,147	306	3,536	..	..
South Canterbury	320,241	294,806	55,081	30,341	21,190	..	2,127	..	1,423	17,530	6,833	1,729	3,674	..	..
South Taranaki	168,614	163,190	31,957	10,352	12,031	..	1,350	..	8,224	4,789	..	1,508	6,949	..	..
Southland (Monowai)	1,654,891	1,636,508	126,400	43,916	122,924	..	..	40,440	..	239,397	13,845	..	..	44,707	43,711
Spender, P. (Rawene)	2,961	2,961	552	512	..	..	..	..	40	..	..	..	..	..	..
Springs-Ellesmere	138,470	133,395	26,050	15,031	9,662	..	827	..	530	8,772	165	4,910	2,302	..	..
Stratford	28,351	27,843	12,599	7,324	3,426	..	250	..	1,599	6,168	..	508	3,859	..	..
Sumner	16,424	13,415	6,251	4,304	511	..	422	..	1,014	1,431	813	391	2,279	..	..
Taihape	18,795	9,020	5,543	2,775	1,081	..	508	..	1,179	4,565	1,365	857	1,812	..	..
Taranaki	457,328	443,871	48,461	11,978	32,284	..	3,012	..	1,187	21,375	8,918	..	15,779	6,129	..
Tararua	164,418	155,484	24,559	10,637	9,927	..	2,278	..	1,717	13,381	7,740	895	1,268	..	1,164
Taumarunui	60,716	57,896	9,911	2,721	4,423	..	600	..	2,167	6,370	..	2,820	..	..	..
Tauranga Power Board	133,540	127,164	24,862	13,656	9,173	..	1,727	..	306	7,601	4,876	1,567	508	..	..
Tauranga Borough Council	154,018	154,018	25,160	6,931	10,324	..	500	..	7,405	19,000	2,183	..	9,021	..	..
Te Aroha	24,231	13,734	7,793	6,334	610	..	350	..	499	1,766	6,842	717	6,400	..	..
Te Awamutu	181,095	178,334	30,381	14,594	11,660	..	2,039	..	2,088	11,093	2,761	1,761	7,289	2	..
Teviot	56,683	56,157	6,428	1,786	3,772	..	273	..	597	4,938	526	..	..	8	..
Te Puke	11,315	6,325	3,297	1,548	562	..	250	..	937	1,184	541	2,068	3,372	..	..
Thames Borough Council	33,606	23,583	11,570	8,627	1,268	..	318	..	1,357	5,540	1,530	..	..	..	..
Thames Valley	806,284	791,702	127,053	65,946	55,970	..	4,449	..	688	92,915	4,449	10,333	15,690	..	..
Timaru	110,512	90,024	33,975	18,846	9,161	..	..	..	5,968	42,869	..	..	..	..	10,875
Tourist Department (Rotorua)	71,197	59,298	19,254	9,928	4,984	..	1,424	..	2,918	13,262	11,899	..	..	..	..
Tai Tapu Dairy Co.	10,572	6,429	4,189	2,790	495	..	376	..	528	..	1,102	..	528	..	..
Uawa (Tolaga Bay)	6,275	4,299	1,246	577	638	..	..	..	31	1,995	..	..	66	..	..
Waimairi	83,516	83,516	22,629	13,957	3,438	..	..	..	5,234	2,397	968	..	43,268	98	..
Waimea Electric Co.	21,198	18,265	5,160	3,174	359	..	983	..	644	..	..	933	..	..	..
Wairarapa	356,474	349,890	55,007	23,058	24,691	..	1,940	..	5,318	18,205	6,906	..	9,328	..	..
Wairere	41,120	39,084	5,548	1,693	2,841	..	559	..	455	635	1,444	885	..	..	..
Wairua	91,971	34,481	16,267	4,387	..	..	..	..	11,880	..	..	..	..	..	..
Wairoa Borough Council	19,799	11,474	8,764	5,734	1,468	..	372	..	1,190	3,696	..	372	..	8	..
Wairoa Power Board	62,109	58,871	13,032	9,791	4,117	..	879	1,755	..	4,982	3,069	168	..	1,425	4,963
Waitaki	175,284	149,437	37,173	21,261	11,815	..	2,100	..	1,997	15,499	..	8,716	20,160	..	..
Waitara	9,267	6,500	4,166	2,602	900	..	125	..	539	2,452	128	..	539	329	2,720
Waitemata	382,115	380,886	71,815	37,214	27,845	..	3,313	..	3,443	37,645	10,139	..	23,141	..	..
Waitomo	98,707	96,726	18,070	9,963	7,033	..	..	..	1,074	4,855	1,805	..	..	..	2,287
Wanganui-Rangitikei	548,279	467,436	104,132	50,599	35,955	..	16,923	..	655	31,163	12,221	4,000	15,336	..	..
Wellington	1,153,407	1,145,401	357,273	169,097	38,090	..	..	..	150,086	183,000	..	..	161,000	..	..
Westport	29,655	26,845	7,410	2,548	2,304	..	935	..	1,623	4,041	1,895	915	2,227	28	..
Westland	66,755	66,755	3,589	3,455	..	..	..	..	134	..	..	..	..	..	..
Whakatane	60,480	60,480	6,403	1,925	3,343	..	..	..	1,135	7,377	..	..	3,860	84	..
Whangarei	64,738	64,196	25,308	16,836	2,143	..	1,540	..	4,789	4,283	4,540	..	3,801	..	..

APPENDIX E.

SEVENTH 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 seventh annual report for presentation to Parliament through the Hon. the Minister.

The report covers the period from the 1st April, 1930, to the 31st March, 1931, though a number of matters referred to are carried beyond the latter date for convenience and completeness of record.

GENERAL.

The total expenditure from both funds for the year amounted to £2,097,390, compared with £2,317,444 for the previous year. The expenditure from the Revenue Fund was £1,386,140. This amount is an appreciable increase on the figure for the previous year, which was £1,246,027. The increase, however, was not due to any expansion of the Board's normal activities, but was brought about by the operation of the Finance Act, 1930, which transferred certain charges from the Consolidated Fund to the Main Highways Revenue Fund. The most important of these charges is that in respect of the Government subsidies on rates to local authorities, amounting for the year to £219,316. The expenditure from the Revenue Fund on highway maintenance actually showed a substantial reduction on the previous year, but this matter will be dealt with in detail later in this report. Operations under the Revenue Fund included the payment of subsidies on the maintenance of 10,419 miles of main highway, of which 6,641 miles are regarded as primary highways and 3,778 miles secondary highways.

The expenditure from the Construction Fund for the year was £711,250, the figure for the previous year being £1,071,417. These figures indicate a severe curtailment of construction operations. The expenditure from the Construction Fund resulted in 130 miles 19 chains of highway being formed and widened, 128 miles 21 chains gravelled and metalled, and 159 miles 24 chains surfaced with bituminous materials or concrete. The year has been a notable one in regard to bridge construction, the total length erected being 11,175 lineal feet, a record for any year since the Board commenced operations in 1924. Engineering surveys were carried out over a length of 145 miles 30 chains of the highway system.

In each of the past two annual reports the Board was able to record large increases in the expenditure on construction in the South Island. These increases were gratifying on account of the fact that during the first few years of the Board's operations construction work in the South Island lagged far behind similar work in the North Island. The operations during the year under review again show a satisfactory position in the South Island, the total amount spent on construction being £303,466, or 42·66 per cent. of the total construction expenditure. Last year the ratio of construction-money spent in the South Island was 33·96 per cent.

It has always been the Board's policy to require as far as possible that all work shall be carried out under the contract system. In last year's report it was mentioned that there had been a tendency towards a reduction in prices, some very favourable tenders having been received for all classes of work, including formation, surfacing, and bridges. For the year under review it is necessary to record still further reductions in prices, but unfortunately in some cases tenders have been lowered to such an extent that acceptance of same would have meant almost certain insolvency for the contractors concerned.

During the year the sum of £108,320 was expended in the Nelson and West Coast districts on the restoration of damage caused by the earthquake of the 17th June, 1929. The total expenditure on the restoration of main highways in these districts up till the 31st March, 1931, is £195,198. The severe earthquake which occurred in the Hawke's Bay District on 3rd February, 1931, involved the Board in further large liabilities. Up till the end of the financial year under consideration, the expenditure on restoration work in the Hawke's Bay area was £7,473. Further details concerning earthquake damage appear later in this report. It is noteworthy that the whole cost of these disasters to the Main Highways Board has so far been met from revenue, and not from borrowed money. The Board's consistent policy during the past seven years of having a fairly substantial reserve in its Revenue Fund has been completely justified.

PERSONAL.

Mr. A. E. Jull, one of the members representing the New Zealand Counties' Association and a foundation member of the Board, resigned his seat on the Board in September, 1930, to contest the Waipawa by-election, as a result of which he was returned as member of the House of Representatives for that district. Mr. Jull took a most active part in the proceedings leading up to the formation of the Main Highways Board, and was originally appointed a member on the 12th June, 1923. His long experience of local-authority law and administration enabled him to render very valuable services, and the successful functioning of the Board during its first seven years of office was due in no small measure to his efforts.

The vacancy caused by Mr. Jull's resignation was filled by the appointment on the 7th November, 1930, of Mr. W. Morrison, Chairman of the Waitotara County Council.

Mr. W. A. Sutherland, who has acted as Secretary to the Board since 1924, resigned on the 30th June, 1931, and in his place Mr. G. W. Knapp was appointed. Upon Mr. Sutherland's retirement the Board recorded in its minutes its great appreciation of the valuable services rendered by him during his seven years of office.

Legislation.

The Finance Act, 1930, contains the following clauses dealing with main-highway matters :—

"34. This Part of this Act shall be read together with and deemed part of the Main Highways Act, 1922 (in this Part referred to as the principal Act).

"35. (1) Section fourteen of the principal Act is hereby amended by repealing paragraph (*a*) thereof.

"(2) Section sixteen of the principal Act is hereby amended by repealing paragraph (*b*) thereof.

"36. (1) As from the first day of April, nineteen hundred and thirty, interest at the rate of five per centum per annum shall, without further appropriation than this section, be paid out of the Main Highways Revenue Fund into the Consolidated Fund on the sum of one million two hundred and twenty-six thousand pounds, being the total amount heretofore appropriated out of the Public Works Fund and paid into the Main Highways Construction Fund, in terms of paragraph (*b*) of section sixteen of the principal Act.

"(2) The interest payable under this section shall be paid at such times as the Minister of Finance from time to time directs.

"37. (1) All subsidies payable to local authorities after the first day of April, nineteen hundred and thirty, in respect of general rates, pursuant to section nine of the Appropriation Act, 1916, or section seventy-two of the Municipal Corporations Act, 1920, shall, without further appropriation than this section, be paid out of the Main Highways Revenue Fund, and not out of the Consolidated Fund.

"(2) Section nine of the Appropriation Act, 1916, and section seventy-two of the Municipal Corporations Act, 1920, are hereby accordingly respectively amended by omitting therefrom all references to the Consolidated Fund and substituting in every case a reference to the Main Highways Revenue Fund.

"(3) All payments made to local authorities out of the Consolidated Fund on or after the first day of April, nineteen hundred and thirty, and before the passing of this Act, pursuant to the aforesaid sections or either of those sections, shall forthwith after the passing of this Act be recouped to the Consolidated Fund, without further appropriation than this section, out of the Main Highways Revenue Fund.

"38. (1) Of the net revenues which, pursuant to the Motor-spirits Taxation Act, 1927, are paid into the Consolidated Fund after the first day of August, nineteen hundred and thirty, and before the first day of April, nineteen hundred and thirty-one, in respect of Customs duty on motor-spirits, ninety-four and a half per centum shall be paid into the Main Highways Revenue Fund and the balance shall be applied in accordance with the provisions of paragraph (*b*) of subsection one of section nine of that Act. Of the net revenues received as aforesaid on or after the said first day of April, nineteen hundred and thirty-one, ninety-two per centum thereof shall be paid into the Main Highways Revenue Fund, and the balance shall be paid to the several Borough Councils entitled thereto in accordance with the aforesaid paragraph (*b*).

"(2) Section nine of the Motor-spirits Taxation Act, 1927, shall be read subject to the foregoing provisions of this section.

"39. (1) Notwithstanding anything to the contrary in the principal Act, there shall be payable out of the Main Highways Revenue Fund such sums as may from time to time be appropriated by Parliament for the maintenance or construction of roads, not being main highways, that afford or are intended to afford access to outlying areas, or to areas which, by reason of their physical nature or condition, or by reason of the financial position of the local authorities in whose districts they are situated, are subject to special disabilities.

"(2) The total amount to be appropriated in any financial year under this section shall not, unless in such appropriation the operation of this subsection is expressly excluded, exceed an amount equal to one-third of the net revenues estimated to be derived in that year from Customs duties on motor-spirits, reduced by the amount estimated to be payable out of the Main Highways Revenue Fund for that year as subsidies on general rates collected by local authorities, and further reduced by the sum of ninety-six thousand pounds.

"40. (1) The foregoing provisions of this Part of this Act shall continue in force until the thirty-first day of August, nineteen hundred and thirty-one, and shall then expire.

"(2) In consequence of the expiry of the said provisions, the following provisions shall apply :—

"(*a*) Paragraph (*a*) of section fourteen of the principal Act and paragraph (*b*) of section sixteen of that Act shall be deemed to be revived on the first day of September, nineteen hundred and thirty-one, and thereafter shall continue in force as if they had never been repealed :

"(*b*) No interest shall be payable to the Consolidated Fund out of the Main Highways Revenue Fund, on the sum mentioned in section thirty-six hereof, in respect of any period after the said thirty-first day of August, nineteen hundred and thirty-one :

"(*c*) All subsidies payable under the authorities mentioned in section thirty-seven hereof in respect of general rates collected before the thirtieth day of June, nineteen hundred and thirty-one, shall be paid out of the Main Highways Revenue Fund, and subsidies payable in respect of general rates collected after that date shall be paid out of the Consolidated Fund :

"(*d*) No appropriation shall be made out of the Main Highways Revenue Fund for the purposes mentioned in section thirty-nine hereof for any financial year after the financial year ending on the thirty-first day of March, nineteen hundred and thirty-one."

Section 14, paragraph (*a*), of the principal Act provided for the transfer of not less than £35,000 per annum from the Consolidated Fund to the Main Highways Revenue Fund. Section 16, paragraph (*b*), of the principal Act provided for the transfer annually from the Public Works Fund to the Main Highways Construction Fund of a sum of not less than £200,000. It will be seen that both these provisions were repealed by section 35 of the Finance Act and are to be revived under section 40 on the 1st September, 1931. Section 36 of the Finance Act provides for the payment of interest from the Main Highways Revenue Fund in respect of the accumulated amounts which have been transferred from the Public Works Fund to the Main Highways Construction Fund since 1924, the annual amount involved being £61,300. Section 37 provides for the payment of subsidies on rates to local authorities from the Main Highways Revenue Fund instead of from the Consolidated Fund, the amount involved being approximately £220,000 per annum.

To enable the Board to meet the additional charges above mentioned without disorganizing its operations, the Government imposed a further Customs tax of 2d. per Imperial gallon on motor-spirits, the greater part of which under section 38 of the Finance Act was allocated to the Main Highways Revenue Fund.

No payments have yet been made under the powers given in section 39 of the Finance Act, on account of the fact that, while the additional charges upon the Board's funds date from the 1st April, 1930, nevertheless, the additional Customs revenue commenced only on the 22nd July, 1930.

As a result of discussion in Parliament arising out of the above legislation, the Right Hon. the Prime Minister announced that during the main session of 1931 a special parliamentary Committee would be set up to consider highway finance. That Committee has since been appointed, and is hearing evidence at the present time.

Annual Review of Main Highways.

The provisions of section 11 of the Main Highways Act, 1922, require that an annual review of highways shall be made by District Highways Councils, and, in turn, by the Board. Applications were received from local authorities for additional main highways, totalling approximately 1,200 miles, but as in the case of the previous year, the Board felt that it was unable to make any substantial increase in the declared mileage until it was able to gauge more accurately its financial liability in respect of the large mileage of secondary highways declared in 1928.

The Board's attitude in this matter was more than justified by the enormous increase in the cost of maintenance of secondary highways which was recorded for the financial year ended the 31st March, 1930. The expenditure on the maintenance of secondary highways during the year under review shows a substantial reduction on the previous year, but how much of this reduction is due to a process of stabilization and how much to the prevailing depression, the Board is unable to gauge.

The following adjustments and additions were made to the highway system during the year:—

No. 1 Highway District.—Oakleigh–Waipu Main Highway: A length of 16 miles 60 chains was declared. This section of road forms an indispensable link between Whangarei and Auckland. The Public Works Department constructed the road to a modern standard in lieu of a railway, and upon completion of the work it was only natural that the section should be declared a portion of the main highway system.

Whangarei–Dargaville Main Highway: An adjustment to the declared route was made on account of a deviation.

No. 2 Highway District.—Great South Road: That portion of the Great South Road passing through the One Tree Hill Road District was revoked when the district was gazetted a borough. The length of highway involved was 2 miles 75 chains.

No. 3 Highway District.—Rotorua–Napier Main Highway: A length of 29 miles of this highway was revoked in order to permit of construction work being carried out by the Public Works Department, following upon the cessation of construction work on the Rotorua–Taupo Railway.

No 6 Highway District.—Te Kuiti – Bulls (via Taumarunui) Main Highway: A newly constructed route between Okahukura Bridge and Taumarunui, a distance of 6 miles 65 chains, was declared as portion of the Te Kuiti – Bulls (via Taumarunui) Main Highway, and a length of 5 miles of the old route was revoked. The remaining section of 2 miles of the old route between Okahukura Bridge and Taumarunui was incorporated with the Taringamotu Valley Road as a secondary highway.

No. 9 Highway District.—Porirua – Titahi Bay Main Highway: A length of 3 miles of this road was declared.

No. 10 Highway District.—Martinborough–Masterton (via Gladstone) Main Highway: An additional 24 chains of road was declared as a result of an alteration in the boundary of the Masterton Borough.

No. 15 Highway District.—Beach Road – Hakatere Main Highway: A length of 7 miles 60 chains was declared.

Lauriston–Barrhill Main Highway: A length of 5 miles 19 chains was declared.

Arowhenua–Fairlie, via Pleasant Point and Middle Valley Main Highway: A connecting-link of 2 miles 64 chains in the Pleasant Point Town District and the Levels County was declared.

No. 16 Highway District.—Junction near Wedderburn – Moa Creek School Main Highway: A length of 7 miles 70 chains was declared as an extension.

Alterations to Highway Districts.

To assist in administration, and with the concurrence of the Highways Councils concerned, the Waitemata County was transferred from the No. 1 Highway District to the No. 2 Highway District on the 31st March, 1931. Similarly, on the 2nd June, 1930, the Waitaki County was transferred from the No. 15 Highway District to the No. 16 Highway District.

Finance.

The actual contributions to the Board's Revenue Fund from external sources for the year 1930–31 amounted to £1,745,536. The tabulation below shows how this amount is made up. The income from similar sources during the previous five years is also shown :—

——	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
	£	£	£	£	£	£	£
Transfer from Consolidated Fund ..	35,000	35,000	35,000	35,000	35,000	35,000	..
Proceeds of tax on tires and tubes collected through the Customs Department	161,986	223,699	188,450	219,658	196,747	155,722	129,188
Registration and license fees of motor-vehicles	268,178	78,038	283,963	303,861	341,017	378,135	397,139
Motor-spirits tax	..	..	..	130,461	730,414	873,369	1,219,209
Totals	465,164	336,737	507,413	688,980	1,303,178	1,442,226	1,745,536

The elimination of the first item in the table for the year 1930–31 has already been explained, the effect of the relevant amending legislation being that the whole of the Board's revenue is now derived from special motor-taxation. With regard to the proceeds of the Customs tax on tires and tubes, the figures again reveal a substantial reduction, the receipts being £94,000 less than in 1925–26, when the number of vehicles registered was about 43 per cent. of the present number. To indicate the enormous reduction in another way, the tire-tax in 1924–25 amounted to £1 12s. 5d. per motor-vehicle as compared with 11s. 3d. per motor-vehicle in 1930–31. These figures indicate how unreliable the tire-tax is as a form of revenue for a road-controlling authority.

In the above table the proceeds from the motor-spirits tax for 1930–31 show a large increase on the previous year. The chief reason for this increase—namely, the imposition of an additional customs duty of 2d. per Imperial gallon of motor-spirits—has already been mentioned. The total amount of petrol-tax collected by the Customs Department for the year was £1,417,294, and of this amount £102,844 was refunded to persons entitled to exemption under the Motor-spirits Taxation Act. After charges for collection and for making refunds were deducted, the balance available for distribution amounted to £1,300,050, of which £1,219,209 was credited to the Main Highways Revenue Account, and £80,841 was paid to cities and boroughs of a population of more than six thousand, the allocation being made on a population basis.

For the year ending 31st March, 1931, the expenditure under the Revenue Fund was as follows :—

	Expenditure.
	£
North Island	516,840
South Island	355,737
Administration charges	38,449
Commission paid to Post and Telegraph Department for collection of motor-registration and license fees and registration of change of ownership	20,901
Subsidies on rates of local authorities (Finance Act, 1930)	219,316
Miscellaneous payments, including recoupment of interest on loans to Consolidated Fund and reserve for redemption of main-highway securities	234,897
Total	£1,386,140

An analysis of the expenditure by the Board and by local authorities on actual maintenance, as distinct from interest on loans and other overhead charges, is shown in the tabulation below. This tabulation has been subdivided to show—firstly, the expenditure on the original system of main highways; secondly, the expenditure on the additional main highways declared in 1928; and, thirdly, the expenditure on the whole system.

——	Board's Contribution.	Local Authorities' Contribution.	Total.	Percentage Board's Contribution to Total.	Percentage Local Authorities' Contribution to Total.
	£	£	£		
(1) Original highway system—					
North Island	402,022	163,454	565,476	71·09	28·91
South Island	276,273	72,234	348,507	79·27	20·73
	678,295	235,688	913,983	74·21	25·79
(2) Additional highways declared 1928—					
North Island	114,818	53,278	168,096	68·30	31·70
South Island	79,464	28,873	108,337	73·35	26·65
	194,282	82,151	276,433	70·28	29·72
(3) Complete system—					
North Island	516,840	216,732	733,572	70·45	29·55
South Island	355,737	101,107	456,844	77·87	22·13
	872,577	317,839	1,190,416	73·30	26·70

A comparison of the contributions of local authorities towards the cost of maintenance of main highways shows considerable reductions this year compared with the figures for last year. Towards the cost of maintenance of primary highways last year the local authorities found the sum of £273,063, whereas for the year under review the corresponding amount was only £235,688, or a reduction of over £37,000.

On secondary highways it will be seen from the above table that the local authorities found £82,151, whereas for the previous year the amount was £102,786, a reduction of over £20,000. The total reduction in the local authorities contribution on the whole highways system was therefore about £58,000.

The following tabulation shows the amount which has been provided by the Board and the local authorities for expenditure on both construction and maintenance of main highways during the seven years the Board has been in operation :—

——	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
	£	£	£	£	£	£	£
Maintenance by Board	123,675	279,404	438,762	523,581	756,399	1,049,249	872,577
Maintenance by local authorities	110,001	185,015	276,349	269,065	284,526	375,849	317,839
Construction by Board	222,422	421,880	540,362	449,904	936,148	1,007,957	667,902
Construction by local authorities	80,000	142,761	255,860	262,538	214,155	203,148	150,984
Totals ..	536,098	1,029,060	1,511,333	1,505,088	2,191,228	2,636,203	2,009,302

The figures in the above tabulation do not include indirect charges such as supervision, interest, and other overhead charges.

An analysis of the actual expenditure on maintenance by the Board in each Island, as compared with the number of motor-vehicles in each Island, at the 31st March of each year since the inception of the main-highways scheme gives the following results, expressed in percentages of the Dominion totals :—

——	1924–25.	1925–26.	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
North Island—							
Maintenance expenditure ..	64·49	65·27	64·86	67·51	66·13	62·30	59·23
Motor-vehicles	60·91	61·41	61·86	62·19	63·08	63·63	63·84
South Island—							
Maintenance expenditure ..	35·51	34·73	35·14	32·49	33·87	37·70	40·77
Motor-vehicles	39·10	38·59	38·14	37·81	36·92	36·37	36·16

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, registration and license fees for the year ending 31st March, 1931, has been made between the two Islands in proportion to the number of motor-vehicles registered in each Island on that date.

As explained in the last two annual reports, no statutory provision exists requiring an apportionment of the proceeds from the petrol-tax between the two Islands. The Board is of the opinion that the most equitable method of distribution of this tax is on the basis of the consumption of motor-spirits in each Island. As in previous years, the Board obtained figures from oil companies, and these figures show that during the calendar year 1930 approximately 67 per cent. of the motor-spirit imported was consumed in the North Island, and approximately 33 per cent. in the South Island, as compared with 69 per cent. and 31 per cent. respectively for the previous calendar year. No adjustment has been made on these percentages to take account of rebates, because definite information is not available, and in any case it appears probable that the rebates in each Island will bear the same relative proportions as the petrol consumed. Moreover, the proportion of rebates is so small that a very considerable error in their proportions would not materially affect the proportion of the totals. In making the apportionment the interest and redemption reserve charges on moneys borrowed for construction work in each Island have been charged against the revenue allocation to each Island, and other adjustments in connection with interest on accumulated balances have been made. The subsidies on rates to local authorities paid from the Main Highways Revenue Fund under the authority of the Finance Act, 1930, have also been taken into account in the apportionment.

On the assumptions given above, the balances to the credit of the North Island and South Island respectively on the 31st March, 1931, were £193,409 4s. 3d. and £190,307 19s. 10d.

The following statement shows the manner in which these balances have been obtained :—

NORTH ISLAND.

Expenditure.	£	s.	d.	*Income.*	£	s.	d.
Expenditure (general)	516,839	12	8	Balance at 1st April, 1930	30,610	0	3
Abolition of toll-gates	1,807	0	0	Interest from investments	5,615	7	7
Interest and expenses of raising loans, &c., and reserve for redemption of securities	102,734	14	0	Motor registration—Annual license fees and tire-tax	336,007	11	9
Interest on past Public Works grants ..	46,365	8	0	Motor-spirits tax	816,869	15	0
Commission on collection of motor fees, &c.	13,343	10	3	Part repayment of temporary transfer to Construction Fund	52,857	5	9
Miscellaneous expenditure	27,796	18	6				
Finance Act, 1927 (No. 2), section 33 (Wellington City Council)	22,339	10	0				
Finance Act, 1930 (subsidy on rates to local authorities)	143,511	16	4				
Refund of duty on motor-spirit ..	1,812	6	4				
Transfer to Construction Fund and spent in North Island	172,000	0	0				
Balance	193,409	4	3				
	£1,241,960	0	4		£1,241,960	0	4

SOUTH ISLAND.

Expenditure.	£	s.	d.	*Income.*	£	s.	d.
Expenditure (general)	355,737	9	5	Balance at 1st April, 1930	209,873	6	5
Interest and expenses of raising loans, &c., and reserve for redemption of securities	36,423	8	0	Interest from investments	16,606	13	7
Interest on past Public Works grants ..	14,934	12	0	Motor registration—Annual license fees and tire-tax	190,320	1	8
Commission on collection of motor fees, &c.	7,557	19	7	Motor-spirits tax	402,338	16	8
Miscellaneous expenditure	19,132	8	3	Part repayment of temporary transfer to Construction Fund	8,758	14	3
Finance Act, 1930 (subsidy on rates to local authorities)	75,803	15	6				
Transfer to Construction Fund and spent in South Island	128,000	0	0				
Balance	190,307	19	10				
	£827,897	12	7		£827,897	12	7

It will be seen from the above statement that the amounts to the credit of the two Islands are practically equal. Last year by far the greater proportion of the balance in the Revenue Fund stood to the credit of the South Island. The position has changed on account of three factors :—

(1) The reduction in maintenance expenditure during the past year has been proportionately much greater in the North Island than in the South Island.

(2) The expenditure on construction in the South Island during the past year has been greater proportionately than in any other year since the Board commenced operations ; this means that a greater proportion than usual of the money transferred from the Revenue Fund to the Construction Fund was spent in the South Island.

(3) Much greater expenditure for the year on earthquake damage in the South Island than in the North Island.

A permanent transfer of the sum of £300,000 was made from the Revenue Fund to the Construction Fund during the past financial year, this transfer being in accord with the policy announced at the time of the passing of the Motor-spirits Taxation Act.

For the year ended 31st March, 1931, the expenditure, including administration charges, &c., under the Construction Fund was as follows :—

	Expenditure. £
North Island	407,784
South Island	303,466
Total	711,250

An analysis of the Board's expenditure, excluding overhead charges, 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.
(1) *Original Highway System.*					
	£	£	£		
North Island	362,069	83,400	445,469	81·28	18·72
South Island	261,795	49,276	311,071	84·16	15·84
Totals	623,864	132,676	756,540	82·46	17·54

—	Board's Contribution.	Local Authorities' Contribution.	Total.	Percentage of Board's Contribution to Total.	Percentage of Local Authorities' Contribution to Total.
		(2) *Additional Highways declared, 1928.*			
	£	£	£		
North Island	21,244	11,678	32,922	64·53	35·47
South Island	22,793	6,630	29,423	77·47	22·53
Totals	44,037	18,308	62,345	70·63	29·37
		(3) *Complete System.*			
North Island	383,313	95,078	478,391	80·13	19·87
South Island	284,588	55,906	340,494	83·58	16·42
Totals	667,901	150,984	818,885	81·56	18·44

The amount provided by local authorities towards the cost of construction works on the original highway system shows a reduction of £39,000, as against a reduction of £19,000 in the previous year. On construction work on secondary highways the local authorities found £13,000 less than in the previous year, so that on the whole highway system the amount provided by local authorities for construction has dropped £52,000, as compared with the previous year. The percentage of construction-cost provided by the Board has increased from 70 per cent. in 1924–25 to 83 per cent. for 1929–30 and 81 per cent. for 1930–31.

MAINTENANCE.

During the first half of the year the main highways generally were kept up to standard as regards maintenance. During the latter half of the year, however, there has been evidence that the local authorities have curtailed maintenance work to some extent, principally, of course, on account of the depression and the difficulty in collecting rates. When the final figures for the year were obtained, it was found that the curtailment in expenditure had been most marked.

The amount of benzine imported into the country is probably a very fair indication of the volume of the Dominion's motor traffic. The gross importations of benzine since 1926 are as follows :—

	Gallons.		Gallons.
1926	44,800,000	1929	62,400,000
1927	48,000,000	1930	68,300,000
1928	54,500,000		

In the same period the total expenditure on maintenance of primary highways, including local authority contributions, but excluding special earthquake damage, has been as follows :—

	£		£
1926–27	715,111	1929–30	990,953
1927–28	792,646	1930–31	806,366
1928–29	832,618		

From the above figures it will be seen that the total expenditure on maintenance of primary highways in 1927–28 was practically the same as the expenditure in 1930–31, yet in the latter year the traffic was 40 per cent. greater than in 1927–28. It will also be seen that in the year under review the primary highways received £184,000 less than they did in the previous year, in spite of the fact that the traffic appreciably increased. It is manifest therefore that the highways were not adequately maintained during the past year. The fact that the local authorities curtailed their own expenditure resulted in lower claims upon the Board's funds, with the effect that the Board found itself with approximately £130,000 more in its Revenue Fund at the end of the year than it anticipated. The anomalous position has therefore arisen that the roads have had less money than they needed and the Board has a somewhat larger surplus than it deems necessary. Since the figures have become available the position has been carefully considered and, with a view to bringing up the maintenance expenditure to the amount which is obviously necessary taking the volume of traffic into consideration, and at the same time relieving the local authorities during a period of economic stress, the Board on the 19th August, 1931, decided to increase the subsidy for ordinary maintenance from £2 for £1 to £3 for £1.

The average cost of maintenance per mile per annum since 1924 on the primary system is as follows :—

	£		£
1924–25	51·7	1928–29	125·2
1925–26	73·2	1929–30	151·2
1926–27	111·9	1930–31	121·4
1927–28	119·9		

Again, it will be seen that for the first time on record the maintenance cost of the primary highways has been substantially reduced.

With regard to secondary highways, a total length of 3,778 miles was maintained at an average cost of £71 per mile, the figures for the two previous years being : 1928–29, £55·5 per mile, and 1929–30, £88·5 per mile.

Construction.

During the past seven years the Board has been responsible for the closing-up of a large number of unmetalled gaps in the arterial road system. One of the most important links remaining in the Dominion has been that between Auckland and the North Auckland Peninsula. During the past three years special attention has been devoted to this work and considerable progress achieved.

In last year's statement it was possible to report that surfacing-work had reached the Township of Warkworth. This year it is gratifying to record that a temporary connection to the Far North was established before the present winter. This connection, being by a devious route via Wharehine is regarded as a temporary one only, but, nevertheless, is sufficient to allow light motor traffic to proceed to Whangarei and other northern centres under all-weather conditions.

Surfacing-work on the more heavily trafficked sections of main highway, principally adjacent to the main centres of population, has proceeded satisfactorily. In the South Island, in particular, excellent progress has been made.

As mentioned previously, the year has been a most notable one as regards bridge-construction. Although the total expenditure on all construction was substantially less than in the previous year, nevertheless, the length of bridges completed is a record since the Board commenced operations. In the fifth annual report, to give an idea of the bridge programme immediately ahead of the Board, a list of important structures commenced or requiring to be put in hand in the next year or two was shown. The list included thirty-two important structures, all of an estimated cost of over £4,000. The present position is that nineteen of these structures have been completed, five are in hand, and the remaining eight have not yet been commenced. Some of the largest structures which have been completed in the year under review are as follow: Mangaoporo Bridge, consisting of four 80 ft. truss spans; the Awatere Bridge, consisting of plate girders and concrete deck, and having three 60 ft. spans and one 35 ft. span; the Mangatewai-nui Bridge, a reinforced-concrete structure, comprising two 40 ft. and three 50 ft. spans; the Manawatu Gorge Bridge, a handsome concrete structure, comprising four 80 ft. arch spans and six short spans; the Aorangi Bridge, a reinforced-concrete structure, 576 ft. in length; the Ruamahanga Bridge, consisting of eleven 40 ft. spans of reinforced concrete; Kokotau Bridge, also a reinforced-concrete structure, consisting of eight 45 ft. spans; the Newton River Bridge, a steel-truss structure, 180 ft. in length; the Little Wanganui Bridge, consisting of six 40 ft. spans; the Ahaura Bridge, 720 ft. in length; McDonald's Creek Bridge, 200 ft. in length; the Waimakariri River Bridge, consisting of plate girders with a concrete deck, and comprising twenty-nine spans of 40 ft.; the Selwyn River Bridge on the Darfield–Arundel Main Highway, a reinforced-concrete structure, 300 ft. in length; the Ashburton River Bridge, a reinforced-concrete structure, 1,120 ft. in length, furnished with a roadway 22 ft. in width and a footpath 6 ft. in width; the Clutha River Bridge, at Albert Town, consisting of six 50 ft. spans in reinforced concrete; and the Aparima River Bridge, at Riverton, a reinforced-concrete structure 440 ft. in length.

Railway-crossing Elimination and Protection.

Principally on account of the financial situation of the Railways Department, only one railway-crossing elimination was proceeded with on the main highway system during the year. This elimination is situated on the Auckland–Wellington Main Highway in the vicinity of the Borough of Waitara. The bridge structure has been completed and the approaches are now in the process of construction. The Railways Department during the year erected flashing lights and other protective signals at a number of crossings on the main highways, the Main Highways Board undertaking to find half the cost of both the installation and the future maintenance.

Advances to Local Authorities.

Under section 2 of the Main Highways Amendment Act, 1926, which authorizes the Board to advance moneys by way of loan to local authorities for highway purposes, a sum of £18,190 was advanced, making a total to the 31st March, 1931, of £57,377. All loans are made on the instalment-repayment system, the local authorities being required to make equal annual payments, which include interest on the amount for the time being outstanding and part repayment of principal. The principal repaid to the 31st March, 1931, amounted to £7,213, leaving a balance outstanding of £50,164. The powers vested in the Board under the above-mentioned clause have been most beneficial, and are primarily responsible for the excellent progress made in the past three years in the South Island.

Traffic-control.

As mentioned in last year's report, the Board suggested to local authorities that certain groups should combine for the purpose of efficiently administering the traffic regulations. In cases of approved joint schemes the Board indicated that it would subsidize the wages and expenses of a Traffic Inspector on a pound-for-pound basis. A number of local authorities have taken action in this direction, and schemes have already been approved and are in operation in the following areas:—

Hamilton Group, including Waikato County, Waipa County, Otorohanga County, Raglan County, Ngaruawahia Borough, and Huntly Town District.
Thames Group, including Thames County and Ohinemuri County.
Rotorua Group, including Rotorua County and Rotorua Borough.
Gisborne Group, including Cook County, Waikohu County, Uawa County, and Waiapu County.
Napier Group, including Hawke's Bay County, Woodville County, Weber County, Dannevirke County, Waipukurau County, Patangata County, and Waipawa County.
Taumarunui Group, including Ohura County, Taumarunui County, Kaitieke County, Taumarunui Borough, and Manunui Town District.

Wanganui Group, including Wanganui County, Patea County, and Waitotara County.
Wairarapa Group, including Masterton County, Wairarapa South County, Featherston County, Eketahuna County, Pahiatua County, Akitio County, Mauriceville County, and Castlepoint County.
Marlborough Group, including Marlborough County, Awatere County, and Blenheim Borough.
Nelson Group, including Waimea County, Richmond Borough, and Motueka Borough.
South Canterbury Group, including Mackenzie County, Geraldine County, Levels County, Waimate County, Geraldine Borough, Temuka Borough, Waimate Borough, and Pleasant Point Town District.

The Board has also recently agreed to subsidize the cost of painting and maintaining white centre-lines on black road-surfaces, the rate of subsidy for such work to be the same rate as for the time being prevails for ordinary maintenance. This work will no doubt be highly appreciated by the travelling public, and should have a beneficial effect in reducing accident risk.

Earthquake Damage.

A great deal of work was carried out in the Nelson and West Coast districts on the restoration of damage caused by the earthquake of the 17th June, 1929. The total expenditure for the year was £108,320. The expenditure on restoration work in the same districts for the year ending 31st March, 1930, was £86,878, making a total expenditure to the 31st March, 1931, of £195,198. It is anticipated that a further sum of £30,000 will be required during the current financial year. The expenditure for the past two years was made up as follows :—

	1929–30.	1930–31.	Total.
	£	£	£
Nelson–Westport	51,907	44,539	96,446
Murchison–Reefton	11,652	5,685	17,337
Westport–Karamea	15,936	55,937	71,873
Various small items on other main highways ..	7,383	2,159	9,542
	86,878	108,320	195,198

The Nelson–Westport Main Highway through the Buller Gorge was re-opened to traffic on the 1st November, 1930. The highway between Westport and Karamea was reopened on the 1st April, 1931, but severe floods and slips on the 3rd April blocked the road again for some weeks.

On the 3rd February, 1931, the disastrous earthquake in the Hawke's Bay District involved the Board in heavy liabilities. The principal damage was in respect of several large bridges, most of which, however, would have required to have been renewed within a comparatively few years. Most of the highways in the vicinity of Napier were only blocked for a comparatively short time. The worst slips occurred on the Napier–Wairoa Main Highway, but even on this road traffic was restored within a few days. The total estimated cost of rebuilding the damaged bridges and of restoring the highways to their previous condition is approximately £100,000. Up to the 31st March, 1931, a sum of £7,473 was spent by the Board.

Purchase of Plant.

The purchasing, and hiring of plant to local authorities on the hire-purchase system has been continued. The total value of plant purchased during the year under this system was £15,878, making a grand total value since the scheme was inaugurated of £155,694. Of this sum, £99,818 has been recovered from local authorities, leaving a balance outstanding of £55,876.

The following list shows the plant hired to local authorities from the 31st March, 1930, to the 31st March, 1931: Power graders, 5; road-rollers, 3; motor-lorries, 11; tractors, 4; tractor-scoop, 1; tar-boilers, 2.

In addition to the above, the Board purchased the following plant for its own use at a total cost of £7,514: Power graders, 4; motor-lorries, 6; road-planers, 2; tractors, 2; portable conveyer, 1; oil-engines, 2, &c.

As mentioned in last year's report, the periodical payments being made to the Board by local authorities for plant purchased on their behalf are now sufficient to finance all new purchases under the scheme, so that it is unnecessary to utilize ordinary revenue for this purpose.

Testing of Highway Materials.

The Petrological Laboratory has continued to carry out the standard tests on roadmaking-materials. The testing of samples of tar, road-oil, bitumen, bituminous emulsions, and bituminous concrete was efficiently undertaken as usual by the Dominion Analyst, Wellington. A core drilling machine for concrete pavements was purchased, and has been operated for some considerable time. The results of compression tests carried out on the samples bored from the various pavements laid have been most satisfactory.

Examination of Foremen and Overseers employed on Road-construction.

The sixth examination of foremen and overseers for the purpose of issuing certificates of competency was held on the 11th August, 1931. Ninety-one candidates sat for the examination as compared with twenty-six, fifty, fifty-two, forty-eight, and eighty-four respectively in previous years. The marking of the papers has not yet been completed, and consequently the results are not available.

For the information of local authorities the following is a complete list of successful candidates since the examinations were originated: S. Annabell, G. Avery, V. L. Bagnall, D. Baldwin, F. H. Bastin, J. W. Bean, H. V. Bond, D. E. Brown, H. Chappell, W. E. Cottrell, A. H. Davis, J. G. Dennison, E. J. Ferguson, P. S. Finlayson, J. Forbes, W. I. Gardiner, G. E. Gibbs, E. Grant, W. J. Hawkes, F. Hermans, O. G. Hewison, T. J. Hickey, M. H. Houlihan, R. G. Howell, T. R. Hutton, W. J. Jenkins, W. J. E. Jenkins, J. H. Kendall, B. L. Larson, R. M. Lankshear, R. G. Lysnar, J. G. Mahood, O. R. Marshall, G. Mascull, F. F. Maynard, J. E. Mays, H. N. McDonald, J. G. McIvor, C. D. Molesworth, J. I. Monfries, F. Muggeridge, J. V. Neill, R. H. Newman, R. F. Newton, L. Oldham, W. Page, R. B. Price, E. M. B. Revill, S. G. H. Robinson, J. I. Shields, H. B. Smart, T. G. Smith, T. R. Sneddon, S. G. Stockley, J. Stringer, C. B. Thomson, R. H. Westbrook, J. A. Williams, H. J. L. Wotten.

Bulletin No. 2.

In order to assist those reponsible for the submission of schemes for highway improvement, the Board issued early in 1930 its second bulletin entitled "Typical Specifications with Introductory Notes on Main Highway Standards and Design." The publication comprises seventy-eight pages, and is furnished with a comprehensive index. Copies of the bulletin were supplied free of charge to all local authorities in the Dominion, while to meet the public demand, copies were made available for sale at a nominal charge. The skeleton specifications issued by the Board in 1925 were withdrawn.

Sixth International Road Congress.

The New Zealand Government was invited by the United States Government to send an official delegate to the Sixth International Road Congress held at Washington, D.C., from the 6th October to the 11th October, 1930. Mr. A. Tyndall, Highways Engineer, was appointed, and left New Zealand on the 26th August, 1930, returning on the 12th January, 1931. While in North America many great courtesies were extended to the representative from New Zealand by the Chief of the Bureau of Public Roads, Mr. T. H. MacDonald, the officers of the Federal Government associated with him in Washington, and also by the State highway officials with whom he came in contact both in the U.S.A. and Canada. Without a single exception these officials did everything in their power to supply any information at their disposal, as well as to make special arrangements to enable the delegates to view numerous works under construction. Special tours lasting for some seventeen days, held under the auspices of the Highway Education Board, proved most interesting and beneficial. Upon his return, Mr. Tyndall furnished a comprehensive report to the Government and to the Board.

Roughometers.

One of the features of a highway always closely observed by road-users is the smoothness or riding-quality of the road-surface. A rough surface gives rise to effects unpleasant to the passenger and detrimental to the vehicle. Smooth surfaces mean greater mileage with less fatigue, with less damage to the contents of the vehicle, and with lower operating-costs for the vehicle. Thus, as far as the user is concerned, the question assumes a very considerable economic aspect. On the other hand, the highway engineer is vitally interested in building and maintaining smooth roads on account of the direct effect of surface-roughness on the life of the pavement. The research of the past few years has clearly indicated that road-roughness produces impact, and impact contributes to the early deterioration of any type of road-surface. So convincing has been the evidence of this fact, that many highway engineers have expressed the belief that smoothness is the most important quality to be sought in road-surfaces. The appreciation of the importance of surface-smoothness has resulted in the development of a number of mechanical appliances for the measurement of same. A comparatively simple and efficient instrument for determining relative roughness was devised some five years ago by the Bureau of Public Roads in the United States of America, and is known as the roughometer. It has been adopted by a number of Highway Departments in different parts of the world, and its use in many places has resulted in considerably improved standards in the riding qualities of new pavements. The instrument is fitted to an ordinary motor-car, and actually measures the total average accumulated compression of the two front springs of the vehicle in inches per mile of distance travelled. The Main Highways Board has purchased two of the instruments, and during the forthcoming season they will be fitted to motor-cars and used in determining relative roughness of a number of recently constructed pavements.

Magnetic Truck.

Investigations have shown that there is considerable economic loss annually to the road-user in the way of damage to tires by punctures and cuts caused by iron and steel nails and other metal fragments. To deal with the problem there have been developed in other countries, notably the United States of America, motor-trucks fitted with special electro-magnets. The trucks patrol the highways at a comparatively slow speed, the magnets being suspended within a few inches of the road-surface. Surprisingly large quantities of iron and steel scrap are usually gathered, and the beneficial results which have followed the use of the devices have been most noticeable. The Board proposes to try out the scheme in this country, and with this in view a special magnetic truck is at present being assembled.

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, 1931:—

Waimate–Kaeo–Mangonui.—Kaihoe Bridge: The northern approach has been constructed with stone facings, and a contract let for the erection of this bridge.

Fairburn Road.—Povey's Bridge: A 25-ft.-span bridge with rolled steel joists and concrete deck has been completed.

Victoria Valley – Mangonui.—Garton's Corner Bridge: Concrete piles have been driven and the erection is in progress.

Puriri Bridge: Piles have been fabricated and the erection is in hand.

Broadwood-Kaitaia.—Awaroa Bridge to Herekino Section: Contracts have been let for the formation work on the 4½ m. of clay gap.

Herekino–Wainui Junction Section: Lee's Bridge, a 20-ft.-span in timber, has been erected.

Waimamaku–Ohaeawai.—Kaikohe to County Boundary Section: 74 ch. was metalled and a top course of shingle laid, thus closing the unmetalled gap on this highway.

Whangarei–Kawakawa.—Otonga to County Boundary Section: Three bridges on the Waiariki Flat and two bridges at Waiotu, totalling 460 ft., have been completed. These consist of rolled-steel-joist spans on concrete piers, with reinforced-concrete decks. Approach work is in hand.

Maungatapere–Kaikohe.—Awarua Gorge Section: 20 ch. of base-course metal has been laid. Contracts were let for the erection of three timber bridges, which are well in hand.

Kaikohe to Mangakahia Section: 2 m. 16 ch. of base-course was laid.

Whangarei–Dargaville.—40 ch. was formed in preparation for bituminous surfacing between Whangarei and Maungatapere.

Dargaville–Maungaturoto.—Anderson's Bridge: This bridge has been completed, with the exception of approaches.

Bascombe's Bridge: The erection of this bridge is in progress.

Wellsford–Whangaripo.—Top-course metal was laid on the base-course put down last year, completing 2 m. 73 ch.

Wayby–Mangawai.—34½ ch. was metalled north of Te Arai.

Te Hana – Tomarata.—25 ch. of metalling was completed.

Kaukapakapa – Port Albert.—36 ch. was metalled on the Hoteo Bridge approaches, and a total length of 1¼ m. on the Tauhoa to Mangakura, Boler's Hill, Mount Bonnie, and Putahi Flat Sections.

Tauhoa to Wharehine Section: 4¼ m. of sandstone and conglomerate base-course was laid throughout the length, and improvements to alignment and widening of formation carried out.

Tauhoa – Kaipara Flats.—A wearing-course was placed on the sandstone base laid last year.

Auckland–Maungaturoto.—Silverdale–Maungaturoto Section—Waiwera Southwards: The southern approach to the Waiwera Bridge was completed, and a sandstone base-course laid.

Waiwera Bridge: A commencement was made with the construction of this bridge at the beginning of the year. The work has been delayed by difficulty with the pile-driving, but at the close of the year the six continuous spans to the centre expansion joint had been constructed and the pile-driving was two piers in advance of the completed work.

Puhoi–Warkworth Section: Langridge's Bridge, consisting of two 30-ft. spans in steel and concrete, has been completed.

Culverts: One reinforced-concrete culvert, 3½ ch. of pipe culverts, 2 ch. of concrete channelling, and 13 ch. of spall drains were constructed.

Formation: The earthwork of the formation and creek-diversion between 4 m. 66 ch. and 5 m. was completed. Between 12 m. 24 ch. and 13 m. 7 ch. formation has been practically completed, and the length between 9 m. 35 ch. and 10 m. on the Pohuehue deviation was prepared for metalling.

Sandstone base-course: In completion of the previous year's programme of an all-weather route to Warkworth a further 1 m. 40 ch. of metalling was carried out, together with 56 ch. of temporary track.

Metalling: The formation recently constructed between 12 m. 23 ch. and 12 m. 63 ch. was metalled to full width. Top-course metalling on sandstone was carried out over a total length of 3 m. 79 ch., involving 6,427 cubic yards of Motutara metal.

Dome–Wayby Section—Culverts: Three large reinforced-concrete culverts were constructed and 9 ch. of pipe-culverts laid.

Formation: Formation contracts were let for work between 20 m. 33 ch. and 21 m. 34 ch.

Sandstone base-course: 122 ch. of half-width base-course was laid, also 42 ch. of temporary track in the vicinity of the Hoteo Bridge.

Metalling: 54 ch. of metalling was laid and consolidated.

Wayby–Wellsford Section—Metalling: 25 ch. of top-course work was carried out.

Wellsford – Te Hana Section: Formation was carried out in the Wellsford Township for a distance of 15 ch., 6 ch. of which was metalled, and a further 50 ch. length of metalling was completed.

Te Hana – Topuni Section: The metalling of this section was completed.

Topuni–Kaiwaka Section: Formation. The filling at the north approach to the Topuni Bridge was partially carried out.

Birkenhead–Albany Section: 81½ ch. of cement-penetration pavement has been constructed. A further length of 211 ch. is being constructed in bituminous penetration, which will complete the paving of this section.

Motutara Island.—Further developmental work and plant extension have been undertaken at the quarry on this island.

Auckland–Helensville–Waiwera.—Contracts have been let for the reconstruction of Whau and Brigham's Creek Bridges, and the work is in progress.

Northcote Road.—The Northcote Borough has completed the sealing of the shoulders to the concrete pavement.

Titirangi Road.—Concrete paving over the full length of this highway was undertaken during the year, and has been completed full width in the Waitemata County, and half-width in the New Lynn Section.

Waikumete – West Coast.—Considerable improvements have been made by widening the formation and cutting back corners.

Massey Road.—The metalling of the portion between White Hills and No. 1 Main Highway was put in hand during the year and good progress has been made.

Great South Road.—Manukau County Section: Reconstruction and widening at the Tamaki Bridge is in hand, straightening the alignment of the highway.

Franklin County Section: Considerable improvements in alignment, involving heavy earthwork, were carried out on the Bombay Hills deviation.

Waikato County Section: Reinforced-concrete bridges, totalling 378 ft. in length, have been completed at the Whangamarino, Rangiriri, Te Onetea, and Kimihia Streams, and 20 ch. of approaches formed and metalled.

Between Mercer and Taupiri a total length of 8 m. 57 ch. of bituminous-penetration pavement has been laid, and from Taupiri to Ngaruawahia a contract has been let for similar work, with necessary widening and strengthening.

Pokeno–Waihi.—Hauraki Plains County Section: 3 m. 38 ch. of three-coat bituminous sealing has been completed.

Paeroa Borough: A seal coat was applied on various lengths in the borough.

Waihi Borough: A contract was let for sealing 1 m. 26 ch., and the work put in hand.

Pipiroa–Coromandel.—Coromandel County Section: The work of widening to 18 ft. was completed, 210 ch. being finished this year.

Kopu–Raglan.—Paeroa Borough: Bituminous sealing on the Station Road was completed, and a seal coat applied between Criterion Bridge and the borough boundary.

Piako County Section: A contract was let for the reconstruction and sealing of 8¼ m. between Waiharakeke Stream and the Western County boundary, of which 6 m. 61 ch. has been reconstructed and 3 m. 45 ch. sealed. Four bridges have been widened to 20 ft., and one 40 ft. span bridge erected. A further contract has been let for the reconstruction of 1½ m. of this highway near Waitoa.

Morrinsville Borough: The construction of 3 ft. bitumen shoulders to the existing work has been carried out.

Waikato County Section: Leask's Bridge, of one 20 ft. span in reinforced concrete, with approaches, has been completed.

Raglan County Section: The widening between Whatawhata and Raglan, the greater part of which was done last year, has been completed.

Hamilton–Rotorua.—Matamata County Section.—Cambridge–Tirau: An additional 146 ch. has been formed to 24 ft. width, and a further 20 ch. is in hand; 187 ch. of rhyolite and gravelled surfacing was also completed.

Waitoa–Taupo.—Putaruru Town District: The whole of the proposals for sealing this area are now completed, 78 ch. being undertaken during the present year.

Ellerslie–Howick.—Manukau County Section: A total length of 3 m. 58 ch. was paved in Portland cement concrete.

Howick Town District: 88 ch. was paved in concrete.

Te Aroha – Waharoa.—Piako County Section: Bituminous shoulders to the concrete pavement have been constructed over a length of 1¼ m.

Kihikihi–Arapuni–Putaruru.—Waipa County Section: A further length of 39 ch. of reconstruction and gravelling was carried out.

Putaruru Town District: Reconstruction and sealing work was completed.

Mount Albert – Royal Oak.—2 m. 44 ch. was surfaced with tar by the Mount Roskill Road Board.

Te Awamutu – Cambridge.—Waipa County Section: A deviation 38 ch. in length was formed.

Ngaruawahia–Waingaro.—53 ch. in the Mile Bush Section has been widened to 20 ft. in steep rock country, and a further 11½ ch. is in hand.

Pukekohe – Glen Murray, via Tuakau.—Pukekohe Borough: Widening to 18 ft. was completed and a concrete culvert constructed.

Cambridge–Morrinsville, via Eureka.—The whole of the highway in Cambridge Borough, 60 ch. in length, was sealed with one coat of tar.

Pukekohe–Bombay.—Pukekohe Borough: A length of 60 ch. has been reconstructed and sealed with bitumen, completing a bituminous surface throughout the borough.

Station Road, Matamata.—Bituminous sealing was completed during the year.

Gisborne–Whakatane, via Motu (No. 3 Highway District).—Motu – Willow Tree Crossing – Nukuhou: Between Motu and Willow Tree Crossing, a number of sharp bends were cut back, and extra culverts of a total length of 935 ft. installed.

Opotiki County Section: Two points were removed between Waiotahi and Nukuhou, a total of 9 ch. being formed 22 ft. wide and gravelled. Tenders have been called for a reinforced-concrete bridge across the Kukumoa Stream.

Opotiki Borough: 52 ch. was sealed with two coats of bitumen and 7 ch. with one coat.

Whakatane County Section.—Nukuhou–Whakatane: 5 ch. of filling was deposited in the approaches to Ryan's Bridge, and guard-fences erected.

Whakatane–Tauranga.—Whakatane County Section.—Matata–Otamarakau: Approach roads, 23 ch. in length, were constructed to the new concrete bridges at the Hereperu and Mimihau Streams.

Tauranga County Section.—Te Puke – Tauranga: Contracts have been let for re-forming and metalling 9 m. 30 ch. of this road, of which 1½ m. of reformation and 1 m. of metalling are completed.

Tauranga–Waihi.—Tauranga County: Several bad corners have been cut back, and 209 lin. ft. of pipe-culverts installed; 23 ch. of deviation at Dodds's has been formed and metalled.

Rotorua–Napier (No. 3 Highway District).—Rotorua–Waiotapu.—Rotorua Borough: Whaka Road was treated with a seal coat of bitumen.

Cambridge–Taupo.—Two small bridges at 33 m. 60 ch. and 34 m. 20 ch. were replaced by large concrete-pipe culverts.

Tauranga–Matamata.—Tauranga County Section.—Tauranga–Ruahihi: 18 ch. between the borough boundary and the hospital has been sealed with two coats of bitumen.

Ruahihi – County Boundary: Two new bridges have been erected: Ruahihi Bridge of two 55 ft. one 65 ft., and one 22 ft. spans, a steel and hardwood superstructure, on existing concrete piers, with new abutments; Ngamuawahine Bridge, a reinforced-concrete bridge of one 43 ft. and two 35 ft. 6 in. spans on new alignment.

Whakatane–Rotorua.—Whakatane County Section.—Whakatane – Te Teko: A steel-pipe culvert was installed in the eastern drain, and Reid's drain-bridge was extended to 42 ft.

Whakatane Borough: The Strand received a bituminous-sealing coat and 31 ch. of Domain Street was sealed with two coats.

Rotoma–Rotorua: Between 25 m. and 26 m., where the lake had washed away the outside of the road, 72 ch. was widened to 20 ft.; 5 ch. of rock protection-wall built, and culverts consisting of 479 ft. of concrete pipes placed. Tenders were invited for four reinforced-concrete culverts and for the Waiohewa Bridge at Te Ngae.

Waioeka Road.—57 ch. has been surfaced with two coats of bituminous material.

Rotorua – Tauranga Direct Road.—Rotorua County Section: 24½ ch. has been metalled with a base course of local rhyolite and a top course of spherulitic rhyolite.

Rotoma–Matata.—Whakatane County Section: Eight new culverts have been installed and three extended.

Gisborne–Opotiki, via Coast.—Cook County Section (0 m.–25 m.): On this highway a reinforced-concrete culvert 95 ft. in length was constructed at the Makarori Deviation. A contract was let for the regrading, widening, and bituminous-penetration surfacing of lengths totalling 7 m. 53 ch. between 14 m. and 25 m. The work is in progress, 5 m. of formation and 3½ m. of foundation work being completed.

Waiapu County Section: Between 82·8 m. and 99·7 m. 12 m. of top course, 1 m. 22 ch. of bottom course, and 1 m. of top and bottom course metalling have been laid. The regrading, culverting, and metalling of the length 97·7 m. to 98·7 m., north of Tikitiki, have been commenced. This will complete the metalling on this highway to Hick's Bay.

Mangaoporo Bridge: This bridge, of four 80 ft. spans has been completed and opened for traffic.

102 m.–119·1 m.: 40·20 ch. of metalling was completed on the Letter-box Hill.

Awatere Bridge: The contract for the erection of this bridge of three 60 ft. and one 35 ft. spans is nearing completion. The completion of this bridge will provide practically all-weather access from Gisborne to Te Araroa.

Gisborne–Wairoa, via Morere (No. 4 Highway District).—Cook County Section: Work has been commenced on the laying of 98 ch. of bottom-course metal on the formation completed last year.

Te Arai Bridge: A bituminous surface was laid on the deck of this bridge and the approaches metalled.

Gisborne–Wairoa, via Hangaroa (No. 4 Highway District).—One mile of bituminous surfacing has been completed. Between 32 m. and 39 m., 3½ m. of top-course metal and 2 m. of top and bottom course were laid, thus completing the metalling to Tiniroto.

Gisborne–Opotiki, via Motu (No. 4 Highway District).—Cook County Section: The extension of the bituminous-penetration surfacing from 7½ m. to 9 m. was put in hand, and, except for 1 m. of seal coat, has been completed.

Waikohu County Section: A deviation of 32 ch. eliminating an overbridge at 20½ m. was formed and metalled; 1½ m. of top-course metal was laid between 39 m. and 44 m., completing the metalling on this road, except for 40 ch. of top course at 47·7 m.

Patutahi–Rere.—234 ch. of top course and 9 ch. of bottom course metal was laid on this highway.

Gisborne–Ormond, via Waiohika.—Cook County Section: 118 ch. of bituminous surfacing was completed to the Waimata turn-off.

Napier–Gisborne, via Wairoa (No. 5 Highway District).—This highway, in common with others in the vicinity of Napier, suffered severe damage in the earthquake of 3rd February. The damage consisted principally of dislocation of bridge-structures, blockage by slips, and the partial destruction of the road-surface by fissures. Restoration works were immediately put in hand and are in active progress.

Hawke's Bay County Section.—Te Ngaru Crossing to Tutira Homestead Gate—Te Ngaru Stream Bridge: This reinforced-concrete bridge of one 30 ft. span with 3 ch. of approach bank has been completed, replacing an awkward ford and shortening the road by 10 ch.

This section is being widened to 24 ft.

Wairoa County Section.—Mohaka Bridge to Morere: The Tahaenui Bridge, 110 ft. long, in reinforced concrete, has been completed. An old bridge at Kirk's (Nuhaka) has been replaced with a large pipe culvert.

Petane–Taupo.—Esk-Titiokura Saddle: A contract was let for the erection of a reinforced-concrete bridge over the Mangakopikopiko Stream at Marshall's Crossing, and the work has been commenced.

The widening of the section between Eskdale and Dillon's Hill to 24 ft. is in progress.

Mohaka Bridge to Taupo: The bridge at Double Crossing, of three 25 ft. spans in steel and concrete, with approaches, was completed.

Napier–Wellington, via Wairarapa (No. 5 Highway District).—Waipawa County Section: No. 1 Section of the Takapau Road has received a final sealing-coat over a length of 2¼ m., and No. 2 Section of 5 m. was metalled and sealed with two coats.

Waipukurau Borough: 18 ch. of two-coat sealing from the bridge to the post-office was carried out.

Dannevirke County Section: Two lengths, totalling 4 m., between the Waipawa Boundary and Norsewood, 40 ch. on the Whakaruatapu Deviation, and the Piripiri overhead-bridge approaches were given a second sealing-coat.

Mangatewai-nui Bridge and Deviation—Bridge: This reinforced-concrete structure of two 40 ft. and three 50 ft. spans was completed.

Deviation: The widening, straightening, and regrading of 1 m. 14 ch., involving 11,000 cub. yd. of earthwork, and 2,545 cub. yd. of metalling were also completed.

Woodville County Section: A dangerous corner at the junction of the Bluff Road with the highway near the Ngawapurua rail and traffic bridge was cut back, and the approach to the bridge widened.

Dannevirke–Waipukurau, via Porangahau.—Dannevirke County Section: Corners were cut back between 3 m. and 9 m., and a concrete culvert installed at 15½ m.

Mangatera Stream Bridge: This reinforced-concrete bridge consisting of two spans of 43 ft. 6 in. and a centre span of 48 ft. was completed, together with approaches.

Patangata County Section: Several corners on this road have been widened and two deviations near Wanstead, of a total length of 27 ch., completed.

Waipukurau Borough: This length received two coats of tar sealing.

Woodville–Greatford, via Ashhurst (No. 5 Highway District).—Woodville County Section—Manawatu Gorge Bridge: The construction of this reinforced-concrete bridge of four 80 ft. circular arches and six short spans has been in progress during the year, and the structure with its approaches carried well towards completion.

Napier–Tukituki, via Omahu.—Hawke's Bay County Section: Tenders were called for the construction of a new concrete and steel bridge over the old Ngaruroro Stream at Havelock to replace the structure totally destroyed by the earthquake.

Farndon–Hastings.—Hawke's Bay County Section: A new steel and concrete bridge of two 40 ft. spans 24 ft. wide, with a footway, was erected over the Karamu dip.

Otane–Tukituki.—Patangata County Section: A new bridge at McAuley's comprising one 24 ft. span with a long approach filling was erected, to replace an old totara structure.

Frasertown – Lake House.—A temporary road 2¼ m. in length was formed, and is being metalled, to divert the traffic and provide an outlet made necessary by the blocking of the Ohuka Gorge by the earthquake.

Waipawa–Pourere.—Waipawa Borough: 20 ch. of new highway received a second coat of tar sealing.

Patangata County Section: A large reinforced-concrete-pipe culvert replacing an old timber bridge was installed on the Puropuro Hill. A reinforced-concrete culvert replacing a narrow motor-bridge has been put in at the old river-bed crossing at the Waipawa boundary.

Waipukurau–Matamau, via Hatuma, Takapau, and Ormondville.—Waipukurau County Section: A bridge and wooden culvert on this road have been replaced with concrete-pipe culverts.

Dannevirke County Section: A bad hairpin bend on Holden's Hill was cut back and the approaches to the corner widened.

Hastings–Pakipaki.—Hawke's Bay County Section: A concrete and steel bridge of one span was erected over the old Ngaruroro Stream near Longlands.

Mangateretere – Te Awhanga.—A large concrete-pipe culvert was put in to replace an old wooden bridge on the Clifton Road.

Te Kuiti – Bulls, via Taumarunui (No. 6 Highway District).—Aramatai Deviation – Kurakura: 1 m. 27 ch. of formation was completed.

Kurakura – Mangaiti: 1 m. 63 ch. of formation and 2 m. 45 ch. of metalling were completed.

Hiwi Road Bridge: The construction of this bridge, comprising an 81 ft. truss span with approaches, is in hand.

Overbridge Bush Crossing Erua: This bridge, 66 ft. long, and its approaches were completed.

Hangatiki–Caves.—4 m. of reconstruction and bituminous-penetration surfacing was completed from the Waitomo Caves Hostel to the limeworks.

Raurimu – Wade's Landing.—Kaitieke to Wade's Landing: 1 m. 43 ch. of formation and 1 m. 11 ch. of metalling were completed.

Stratford–Taumarunui.—Paparata Saddle to County Boundary: 4 ch. of heavy formation was widened near Tokirima.

County Boundary to Taumarunui: A contract has been let for the metalling of 6 m., to Aukopae.

Te Maire – Mangaohutu.—Kokakonui – Mangaohutu Section: 3 m. 34 ch. of formation was completed.

Kawa Junction – Wharepuhunga.—The Mangatutu Stream Bridge, 120 ft. in length, of steel joists on concrete piles was completed.

Pirongia – Kawhia Junction.—8 ch. of metalling was completed, providing a through metalled road from Pirongia to Kawhia.

Kawhia to Auckland–Wellington, via Kawa.—A portion of the road has been widened and the small bridge on the Kawa Swamp Section reconstructed.

Okahukura–Ohura.—8 ch. near Matiere was metalled.

Auckland–Wellington, via Taranaki (No. 7 Highway District).—Mahoenui–Mokau: The formation has been widened to 22 ft. over a length of 76 ch., and 29 ch. sealed with bitumen.

Mokau – Pukearuhe Junction: A further 65 ch. of bituminous-penetration pavement has been laid near Uruti.

Clifton County Section: 42 ch. of bituminous-penetration pavement was laid and the Urenui Stream Bridge completed.

Taranaki County Section: The construction of the overbridge for the elimination of the railway level-crossing near Waitara is in hand. 47 ch. of bituminous-penetration pavement was laid south of Lepperton, and a deviation 24 ch. in length formed and metalled, shortening the road by several chains, and eliminating four bends.

Lepperton Junction – Hawera, via Opunake.—Taranaki County Section: The deviation at Katikara Stream, of 37 ch., has been metalled, and the approaches to the new Stoney River Bridge, 17 ch. in length, have been formed, metalled, and bitumen-surfaced.

Egmont County Section: A reinforced-concrete bridge of 25 ft. span has been built at the Oaoiti Stream and a similar bridge of 50 ft. span at the Oeo Stream. A deviation 17 ch. in length is in hand at the Oeo Stream, the formation being practically completed.

New Plymouth – Kaimata.—Taranaki County Section: The programme of improvements to grades, curvature, and width of the bituminous pavement south of New Plymouth has progressed a further distance of 75 ch., thus completing the first 2 m. The earthwork is well advanced over the second 2 m.

Skeet Road.—Eltham County Section: 18 ch. of approaches to the new bridge at Mangatoki Stream have been formed, metalled, and bitumen-surfaced.

Waimate West County Section: 2 m. 20 ch. of the bituminous pavement has been widened.

Egmont County Section: 40 ch. has been sealed with bitumen.

Stratford–Taumarunui (No. 7 Highway District).—Stratford County Section: Eastward from the Mangoatuku Road Junction a length of 100 ch. has been sealed with bitumen.

Normanby – Manaia – Mount Egmont.—100 ch. of the bituminous pavement has been widened and a second coat of bitumen has been applied on 140 ch.

Ihaia Road.—A second coat of bitumen has been applied over a length of 50 ch.

Ngatimaru Road.—Waitara Borough: 30 ch. has been remetalled and sealed with two coats of bitumen.

Auckland–Wellington, via Taranaki (No. 8 Highway District).—Patea County Section: 3¼ m. of the bituminous pavement has been widened from 12 ft. to 15 ft., making a total of 9 m. of this work completed.

Waitotara County Section: 33 ch. of heavy reconstruction and 8½ ch. of metalling on Kai Iwi Hill, and the bituminous surfacing of 2 m. 77 ch. between Goat Valley and Kai Iwi have been carried out.

Wanganui County Section: The Wangaehu Hill, a distance of 76 ch., was reconstructed and metalled.

Rangitikei County Section: 1 m. 8 ch. of metalling between Wangaehu and Turakina, which was reconstructed the previous year, and the bituminous surfacing of 3 ch. in Turakina Township were completed. Protective work was carried out at the northern approach to the Rangitikei River Bridge at Bulls.

Ball Road.—1 m. 20 ch. has been reconstructed and sealed with bitumen.

Te Kuiti – Bulls, via Taumarunui (No. 8 Highway District).—Rangitikei County Section: A contract was let for the construction of the Hautapu River Bridge, Taihape, a concrete-arch structure, and the work is in hand. The formation of the Tohanga Road deviation has been completed and temporary bridges erected over the Makotuku and Heremaiea Streams.

Kaharoa Road.—24¼ ch. of metalling was completed.

Kohi Road.—46 ch. has been reconstructed and metalled.

Momohaki State Farm Road.—A length of 9 ch. was reconstructed and metalled, completing the unmetalled gap in the highway. A further length of 40 ch. was remetalled and bitumen surfaced.

Raetihi–Ohakune.—Raetihi Borough: The Makotuku Stream Bridge has been completed.

Waimarino County Section: 30 ch. near the Ohakune Borough boundary was surfaced with bitumen, and a timber bridge replaced by a concrete-arch culvert.

Rangitatau East and Watershed Road.—60 ch. of base-course metal was laid and several corners widened.

Turakina Cliff Road, via Marton.—Gowers Hill, 23 ch. in length, is being reconstructed on improved alignment and grade.

Wanganui–Horopito.—Between Horopito and Tohanga Road Junction 3 m. 33 ch. was reconstructed and metalled.

Waverley Beach Road.—Waverley Town District: 19 ch. was reconstructed and surfaced with bitumen.

Patea County Section: 37 ch. was re-formed and 32 ch. metalled.

Wellington–Auckland, via Taranaki (No. 9 Highway District).—Makara County Section—Johnsonville – Tawa Flat – Piebald Corner Bridge: An old wooden bridge was replaced with a large twin-box concrete culvert. The road-alignment at the site was also improved.

Porirua–Paremata Section: A commencement has been made with the realignment of the tortuous piece of road round the bends of the Porirua Harbour. During the year 40 ch. of new road was constructed and metalled.

Hutt County Section—Paremata–Waikanae: Duck Creek Bridge was replaced with an 8 ft. by 10 ft. concrete culvert. Considerable improvement was made at the Paraparaumu Railway crossing by the removal of trees, hedges, &c. A concrete culvert at Horokiwi 15 ft. by 10 ft. was completed.

Horokiwi–Paekakariki: The widening of the Paekakariki Hill has been completed. During the year 71 ch. was widened. The surface-sealing of the hill has also been completed, with the exception of a portion of the second coat. The sealing carried out during the year comprised 166 ch. of first-coat and 81 ch. of second-coat work.

Horowhenua County Section: The Manakau Bridge, consisting of one 40 ft. span, was completed in concrete. The approaches, 10 ch., have been formed and metalled. The approaches to the Waikawa River Bridge have been surfaced with bituminous macadam. Between Levin and the Wirokino Bridge 2 m. 45 ch. was widened and prepared for paving, and 15 ch. of deviations at corners formed and metalled; 3 m. was surfaced with bituminous macadam.

Manawatu County Section: A contract has been let for the bituminous-concrete paving of 5 m. between Foxton and Himatangi, of which 2 m. 60 ch. has been completed. Between Himatangi and Sanson, widening and shoulder work have been carried out for a length of 3¼ m.

Levin – Palmerston North, via Shannon.—Horowhenua County Section: Between the Waoku Stream and Shannon Borough 83 ch. of heavy widening was carried out, and 27 ch. metalled.

Kairanga County Section: On the southern portion 1½ m. of road was widened, nearly all in heavy cut and fill.

Shannon Borough: 52 ch. was sealed with two coats of bituminous material and 10 ch. widened.

Himatangi–Ashhurst, via Palmerston North.—Kairanga County Section: The bituminous concrete paving of this section has been completed, 2 m. 47 ch. having been laid during the year.

Sanson – Palmerston North.—Manawatu County Section: Between Awahuri and Mount Stewart 60 ch. has been sealed with one coat.

Awahuri–Mangaweka, via Kimbolton.—Manawatu County Section: A deviation 8 ch. long has been formed in heavy block cutting near the intersection of Mount Stewart Highway.

Oroua County Section: Between Feilding and Cheltenham 2 m. was widened and surfaced with three-coat sealing.

Ashhurst–Pohangina.—Oroua County Section: Preparation for bituminous sealing of 26 ch. through Ashhurst Township has been completed, and a contract let for the sealing.

Greatford–Woodville, via Ashhurst (No. 9 Highway District).—Aorangi Bridge: The construction of this bridge by contract has been in progress throughout the year, and the whole of the structural work was completed with the exception of four spans of handrails. The approaches are being formed.

Kairanga County Section: Between Aorangi Bridge and Taonui 136 ch. has been prepared for sealing. Three-coat sealing has been completed over a length of 90 ch., and the remaining 46 ch. has received one coat.

Oroua County Section: The three-coat sealing-work between Taonui and Bunnythorpe has been completed, 1 m. 60 ch. of one coat and 2 m. 20 ch. of second coat having been applied during the year.

Wellington-Napier, via Wairarapa (No. 9 Highway District).—Akatarawa – Rimutaka Summit: 66 ch. of heavy widening was completed, the work being mostly in rock. Preparation for sealing was completed over a length of 4 m. 44 ch. and one-coat sealing was carried out over a length of 4 m. 10 ch. Second-coat work was completed over a length of 54 ch.

Feilding–Hunterville.—Kiwitea County Section—Haycock's Bridge: The contract for this concrete bridge, which comprises three 35 ft. spans, was commenced at the end of the year.

Upper Hutt – Waikanae.—Rangiora Bridge: This concrete bridge, comprising one 20 ft. span, was completed.

Wellington–Napier, via Wairarapa (No. 10 Highway District).—Featherston County Section—Rimutaka Summit – Featherston: 56 ch. of heavy widening was completed.

Featherston Borough: At the foot of the Rimutaka Hill 8 ch. was widened, re-formed, and sealed in two coats of bitumen.

Masterton County Section: 30 ch. of two-coat sealing was applied on this section, commencing at the north boundary of the Masterton Borough.

Mauriceville County Section – Mount Bruce: Between the Ruamahanga Bridge and Faulkner's Bridge widening and remetalling have been completed, the length carried out during the year being 2 m.

Eketahuna Borough: A contract has been let for three-coat sealing of 25 ch. through the business area, and the work put in hand.

Eketahuna County Section: A reinforced-concrete bridge (Waiwaka No. 2) of one 40 ft. span was completed.

Pahiatua County Section: A concrete bridge (Galvin's) of one 20 ft. span was completed.

Featherson–Martinborough.—Martinborough Borough: On this section 50 ch. of road was re-formed and sealed in two coats.

Martinborough–Otaraia.—Martinborough Borough: 65 ch. of re-formation and two-coat sealing was completed.

Featherson County Section: Wall's and Kennedy's Culverts, each 9 ft. by 6 ft., in concrete, have been constructed.

Carterton–Longbush.—Kokotau Bridge: This concrete bridge, comprising eight 45 ft. spans, was completed.

Martinborough–Masterton, via Gladstone.—Martinborough Borough: 60 ch. of preparation work for bituminous sealing was completed.

Featherston County Section: Two concrete bridges (Ruahara and Ruffen Glen), each of one 21 ft. span, were completed.

Kahautara Highway.—Featherston County Section: 3½ m. received one coat of bituminous sealing.

Masterton–Weber, via Alfredton.—Masterton County Section—Ruamahanga Bridge: This bridge, of eleven 40 ft. concrete spans, was completed.

Eketahuna County Section: Between Heckler's Loan Block and Alfredton, 1 m. 74 ch. of widening to 16 ft. was completed, and metalling carried out over a length of 3 m. 56 ch. Concrete culverts, totalling 418 lin. ft., were installed. On the Summit Hill Section near the county boundary widening to 16 ft. and metalling over a length of 3 m. 4 ch. were completed. The completion of these two metalling contracts makes the whole of this highway an all-weather road.

Pahiatua–Pongaroa.—Pahiatua County Section—Deviation at O'Grady's Bridge: A deviation 20 ch. long was formed and metalled.

Akitio County Section—Stone's Bridge: This bridge, of one 27 ft. span in steel and concrete, is in progress.

Tinui–Castlepoint.—Whakataki River Bridge: This bridge, which consists of three 25 ft. spans in steel and concrete, was completed.

Weraiti–Stronvar.—Whakatahine Bridge: This concrete bridge, which consists of two 40 ft. and one 50 ft. spans, was completed, and improvement made to the road-alignment at the site.

Picton–Bluff (No. 11 Highway District).—Marlborough County: Widening and improvements of 36 ch. at Picton Swamp have been completed.

Dashwood Deviation: Formation work has been continued throughout the year, the length completed with culverts being 3 m. 53 ch. The total length completed to date is 6 m. 28 ch. The formation of a further 1 m. 20 ch. is in hand. 51 ch. of base-course metalling has been laid.

Blenheim Borough: 132 chains was sealed with one coat of bitumen.

Blenheim-Nelson.—Marlborough County Section: The erection of Sneiders Creek Bridge, comprising one 20 ft. span, was completed.

Waimea County Section: The reconstruction of the Whangamoa Bridge has been completed.

Nelson–Westport (No. 11 Highway District).—Tahunanui Town District: 2 m. 10 ch. was re-formed, and bituminous-penetration and sealing coats laid over a length of 1 m. 72 ch. 189 ft. of concrete retaining-wall was erected. The widening of the Abattoir Creek Bridge is in hand.

Wairoa River Bridge: The construction of this bridge of ten 42 ft. spans in reinforced concrete has been completed.

Godbaz Creek Bridge of one 20 ft. span in reinforced concrete was completed.

Norris' Gully: A concrete box culvert 8 ft. by 6 ft. has been completed, and approaches formed and metalled.

Newton River Bridge: The construction of this steel and concrete bridge 180 ft. in length was completed.

Spooner's Range to Hope Saddle: The improvements to curves, widening, and metalling have been completed, the total length being 9 m. 20 ch.

Murchison County Section: The reconstruction work necessitated on this section by the earthquake of June, 1929, was continued. Slips were cleared, deviations constructed, culverts placed, the road metalled, and repairs to bridges, including the Matakitaki Bridge, carried out.

Richmond–Pakawau.—Moutere Deviation: The formation, 42 ch. in length, was completed and the bottom course of metal laid. The deviation is being fenced.

Murchison–Reefton.—The Six-mile Creek Bridge, a 40 ft. span in steel and concrete, was completed and approaches filled. A creek-diversion to the bridge was also effected.

Appleby–Motueka, via Tasman.—Waimea County: Watts' Creek Bridge, of one 20 ft. span in reinforced concrete, was constructed.

Westport–Karamea.—Westport Borough: 13½ ch. has been sealed with tar.

Westport–Mokihinui—Bridge at 19 m. 62 ch.: This bridge has been replaced by a 15 ft. steel span, on concrete abutments.

Bridge at 19 m., Granity Township: The old bridge has been replaced by a 25 ft. timber span on concrete abutments.

Mokihinui–Karamea Section.—Little Wanganui River Bridge: The erection of this bridge, which consists of six 40 ft. steel spans on ironbark pile piers, has been completed.

Inangahua Junction–Waiho.—Inangahua–Reefton Section—Milligan's Creek Bridge: The construction of this bridge, one 40 ft. steel span with concrete abutments, has been completed.

Big Grey–Taramakau Section—Ahaura River Bridge: The construction of the Ahaura River Bridge, 720 ft. in length, has been completed, and the formation of approaches is nearing completion.

Taramakau–Ross Section—Selby's Hill: The widening of 5 ch. has been completed.

Ross–Waiho Section—Mitchell's Hill: A deviation 7 ch. in length has been completed.

McDonald's Creek Bridge: This bridge, consisting of five 40 ft. steel spans, has been completed. The work included 9 ch. of approach road and a considerable amount of wired stone-crate protection work. Bridges have also been constructed over the Mapourika, Donovan's, Stony, and Paganini's Creeks. The works included the formation of 18 ch. of approaches.

Flood Damage: Heavy floods in the latter part of the year caused severe damage to bridges and protective works throughout this highway, and restoration work is in hand.

Westport-Greymouth Coast Road.—Four Mile–Charleston Section: 19 ch. of new formation has been completed.

Charleston–Brighton Section: Further work in connection with the widening of corners and improvement to gradients has been carried out, and 202 ft. of culverts placed.

Bromilow Creek Bridge: An arched concrete culvert has been completed and the road-alignment improved.

Canoe Creek Bridge: The erection of this bridge of three 40 ft. steel spans on ironbark pile piers has been completed.

Waiwhio Creek Bridge: This bridge, 80 ft. long, has been completed.

Bridges have also been constructed over White Horse, Little Granite, and Fourteen Mile Creeks. These works included the formation of some 12 ch. of approaches.

Greymouth–Punakaiki Section: The Pillar Rock at Batty's Hill has been removed by blasting. Widening has been carried out over a length of 12 ch. where the road was seriously damaged by sea-action.

Westport–Nelson (No. 12 Highway District).—Westport–Eight Mile Section—Stone Walls at Cascade Point and at 12 m. 0 ch.: Stone retaining-walls have been built at these points.

Bridges at Horse-shoe Bend and at 15 m. 48 ch.: Single-span steel bridges, 35 ft. and 30 ft. in length, have been constructed.

Widening, 13 m. to 14 m.: A length of 14 ch. has been completed.

Protective Work at Inangahua: A timber-pile-and-gabion groyne has been constructed in the Inangahua River at 29 m.

Flood-protective works have also been constructed at Waimea Creek, Back Creek, Island Creek, and Ten-mile Creek, and fourteen passing-places have been formed.

Arthur's Pass – Kumara.—Washout at Aickens: Exceptionally heavy rains during the latter part of the period caused the Taramakau River to change its course, and necessitated the reconstruction of 11 ch. of road and the building of a diversion groyne near Kelly's Creek, and protective work at the Wainihinihi River.

Reefton–Maruia.—Improvements have been effected at Menzie's Bluff and Palmer's Corner. Three small bridges have been constructed at the Springs end, as well as a temporary bridge over the Inangahua River.

Earthquake Damage Reconstruction.—The section of the Westport–Karamea Main Highway which suffered the greatest damage was the 21 m. length between Mokihinui and Te Namu. Reconstruction work was pushed ahead from both ends. The pack-track first formed was widened to 10 ft. and later to 16 ft., and the work of placing culverts and improvement of curves put in hand.

Damaged bridges have been replaced by temporary structures, four having been built, while at other streams fords have been provided. Thirty-four culverts, of an aggregate length of 754 ft., have been installed.

A length of 58 chains of road at Kongahu which subsided has been raised 3 ft. throughout.

The formation of the south approach to Tidal Creek Bridge has been completed, and materials for the bridge ordered.

Although traffic was allowed to use the road on certain days for some time previously, it was not fully opened until the 1st April, 1931. On the 3rd April heavy floods occurred and slips entirely blocked the road for some weeks.

On the Westport–Nelson Main Highway the works carried out included the relocation of 60 ch. of roadway at the Four Mile slip and the elimination of a bad curve at Lyell. The road was opened for traffic on the 1st November, 1930, but has since been blocked by slips on several occasions for one or two days. Structural work carried out consisted of the building of stone retaining-walls, the construction of two arched concrete culverts, a temporary bridge, and the installation of 1,021 ft. of concrete-pipe culverts.

Picton–Bluff (No. 13 Highway District).—Waipara County Section—Waipara–Omihi: 6 m. 24 ch. of bituminous sealing has been completed.

Omihi–Motunau: A contract has been let for the reconstruction and sealing of 6 m., and the work is in progress; 3 m. of the reconstruction has been carried out.

Hurunui-Waipara: The widening and improving of sharp bends has been completed on 46 ch. of road.

Kaikoura County Section: 2 m. has been widened at Hundalee.

Lambrook Bridge: This bridge, a timber structure on concrete abutments, has been completed.

Waipara – Kaikoura, via Culverden.—Waipara County Section.—Weka Creek – Waikari: A deviation 36 ch. in length has been formed 24 ft. wide at Weka Creek, and 1 m. 5 ch. of road has been improved by widening

Waipara River – Waikari: 4 m. of bituminous sealing on this section at the Waipara River end has been put in hand, and 40 ch. of the first coat has been applied.

Amuri County Section: 30½ ch. of two-coat sealing 40 ft. wide has been applied through the Culverden Township.

Kaikoura County Section—Goat Hills Creek Bridge: A 20 ft. span bridge has been constructed on concrete abutments

Waikari–Waitohi.—Bituminous Sealing: 4 m. 50 ch. of sealing has been carried out, making a total of 6 m. to date. The road is now sealed from Waikari through the Hawarden Township to the railway crossing.

Dashwood–Upcott.—Awatere River Protective Works: Protective works at Woodman's Bend were carried out. This work consisted of erection and repair of groynes, placing of concrete blocks, and construction of stone facing to groyne.

Picton–Bluff (No. 14 Highway District).—Waimairi County Section: A Portland-cement-concrete pavement 18 ft. wide has been constructed between Christchurch City boundary and Northcote Road, the distance being 58·65 ch.

Waimakariri River Bridge: The construction of this bridge, consisting of twenty-nine 40 ft. spans on reinforced concrete piles, with 20 ft. concrete deck, has been completed.

Kaiapoi Borough: A Portland-cement-concrete pavement 18 ft. wide has been constructed through the borough, a distance of 1 m. 21·7 ch.

Rangiora County Section—Woodend – Ashley River: 1 m. 7 ch. of bituminous-concrete pavement has been constructed, completing the contract of 3 m. 47 ch.

Paparua County Section—Junction at Sockburn: A bituminous pavement, 8½ ch. in length, has been constructed, 5 ch. on the Christchurch–Dunedin and 3½ ch. on the Sockburn–Southbridge Highway.

Riccarton Borough—Bituminous Surfacing: The surfacing of two strips of road 12 ft. 6 in. and 13 ft. 3 in. wide, for a distance of 1 m. 20 ch., has been carried out in three-coat sealing.

Selwyn County Section—Culvert at Dunsandel: A reinforced-concrete 6 ft. culvert, 40 ft. in length, has been constructed.

Christchurch–Chaneys, via Marshlands.—Bituminous Surfacing: 3 m. 56 ch. from McSaveneys Road to Chaneys has been sealed in three coats.

Woodend–Rangiora.—A bituminous-concrete pavement, 3 m. 56 ch. in length and 18 ft. wide, has been completed.

Christchurch–Akaroa.—Wairewa County Section—Prices Valley Bridge: A 22 ft. bridge, 18 ft. wide, in steel and concrete, has been completed.

Upper Riccarton – Arthur's Pass.—Tawera County Section—Broken River Bridge: A light-traffic bridge, 100 ft. long with 7-ft.-wide deck, in hardwood, has been completed, and a contract let for the approach banks, protective works, and metalling.

Darfield–Arundel, via Upper Rakaia Gorge Bridge (No. 14 Highway District).—Selwyn County Section—Selwyn River Bridge: This bridge, 300 ft. long and 12 ft. wide, consisting of ten 30 ft. spans on reinforced-concrete piles, has been completed, and a contract let for the formation of the approaches and metalling.

Rakaia Gorge: 2 m. 24 ch. has been improved by widening on the left bank of the river leading to the bridge.

Christchurch – Governors Bay, via Dyers Pass.—Victoria Park to Sign of Kiwi: 1 m. 42 ch. of road has been improved by widening, lengthening culverts, and building stone walls.

Junction near Kaiapoi to Waddington, via Rangiora and Bennetts.—Skew Bridge: The construction of this bridge, consisting of four 30 ft. spans on reinforced-concrete piles, has been completed.

Clarkville Deviation: The formation of a deviation 1 m. 10 ch. in length and 35 ft. in width has been completed, and the metalling is in hand.

Christchurch – Russley Road Junction, via Burnside Road.—107 ch. of bituminous sealing in three-coat work has been completed between Clyde Road and Rossall Street, and two further ½ m. sections have been surfaced with one coat.

Picton–Bluff (No. 15 Highway District).—Ashburton County Section—Dromore–Ashburton: The reconstruction and metalling of 7 m. 60 ch. of road has been completed in preparation for bituminous sealing.

Ashburton River Bridge: The erection of this reinforced-concrete bridge, 1,120 ft. long, with 22 ft. deck and 6 ft. footway, has been completed, and a contract let for the approach banks.

Geraldine County Section—Cooper's Creek Bridge: A 40 ft. bridge, 20 ft. wide, in steel and concrete, has been completed, and a contract let for the approach banks.

Waihi River Bridge: A contract has been let for the erection of this bridge, consisting of six 40 ft. spans in steel and concrete, and work is in progress.

Waihi Creek Bridge: This 40 ft. span bridge, 20 ft. wide, in steel and concrete, has been completed.

Levels County Section: The reconstruction of 7 m. 65 ch. between Arowhenua and Timaru Borough boundary has been completed in preparation for bituminous surfacing, which work is in progress on a length of 4 m. at the south end.

Waimate County Section—Junction Pareora – Cave Highway to Junction Deep Creek – Waihao Downs: 4 m. 58 ch. of bituminous paving, 18 ft. wide, has been carried out, making a total of 13 m. 50 ch. on this section.

Horseshoe Bend Bridge and Deviation: A reinforced-concrete bridge 32 ft. long has been completed.

Darfield–Arundel, via Upper Rakaia Gorge Bridge (No. 15 Highway District).—Cavendish Culvert: A reinforced-concrete 8 ft. culvert, 32 ft. in length, has been completed.

Timaru–Queenstown, via Tekapo and Lindis Pass (No. 15 Highway District).—Levels County Section: Light-traffic bridges, 30 ft. long and 10 ft. wide, of hardwood on concrete piers, have been constructed over Day's and Sutherland's Creeks.

Mackenzie County Section: A concrete culvert, 19 ft. by 14 ft., has been constructed near Fairlie.

Lake Pukaki–Hermitage.—20 miles of road has been improved by widening at the Pukaki end.

Waihao Downs – Wright's Bridge, via Hakataramea.—1 m. 50 ch. at the Waitaki River has been widened.

Geraldine–Fairlie, via Cattle Valley—Concrete culvert at White's Corner: A concrete culvert, 19 ft. by 14 ft., has been constructed near Fairlie.

Picton–Bluff (No. 16 Highway District).—Kartigi Beach: The widening and improvement to curvature and visibility of the section between Bushey and 43 m. 20 ch. have been completed.

Waitaki River – Shag Point—Oamaru to Pukeuri: The bituminous sealing of the remaining portion of this section, 3 m. in length, has been completed.

Muddy Creek Bridge and Small Bridge near Bushey: These bridges, comprising three 40 ft. and one 20 ft. spans in steel and concrete, have been completed.

Deviation at Bushey: This work, which includes the improvement to curvature and visibility and gravelling between 38 m. 65 ch. and the Kartigi Beach Section, and also the approaches to the Bushey bridges, has been completed.

Waitati–Waikouaiti: This section between 13 m. 42 ch. and 21 m. 10 ch. was reconstructed in waterbound macadam and brought up to a high standard of curvature and visibility.

Goodwood Deviation: This deviation, which eliminates the old Goodwood Hill, has been completed.

Pukeuri–Kurow.—Little Awakino Creek Bridge: This bridge, comprising two 12 ft. and one 15 ft. spans in steel and timber, has been constructed.

Dunedin – Port Chalmers.—Port Chalmers Borough: Improvements to curvature and the reconstruction and bituminous surfacing between the existing sealing and the approach to the railway overhead bridge have been carried out.

Ida Valley Railway-station – Moa Creek School.—Poolburn Bridge: This reinforced-concrete beam and slab bridge of 37 ft. span has been completed.

Palmerston–Queenstown, via Becks.—Pigroot Bridge: This structure, a 37 ft. span in steel and concrete, was completed.

Arrow River Bridge: This structure, consisting of one 63 ft. and two 34 ft. steel spans with concrete deck, has been completed.

Timaru–Queenstown, via Tekapo and Lindis Pass (No. 16 Highway District).—Deviation near Ahuriri: The gravelling of this deviation was completed.

Clutha River Bridge (Albertown): This structure, consisting of six 50 ft. reinforced-concrete spans, has been completed, together with the approaches.

Hawea (Maungawhero Road) Bridge and Approaches: A reinforced-concrete bridge of three 50 ft. spans has been completed.

Black Bridge: This bridge, which consists of a reinforced-concrete arch of 55 ft. span, has been completed.

Waipiata – Styx Highway.—Rocky Creek Bridge (near Patearoa): This reinforced-concrete structure, of one 20 ft. span, has been constructed.

Balclutha–Papatowai.—Omaru Stream Bridge: This concrete bridge, a 40 ft. span 18 ft. in width, has been completed.

McLennan – Tahakopa Bridge: The metalling of this section of 68 ch. has been completed.

Picton–Bluff (No. 17 Highway District).—Green Island Borough: The borough section of the highway has been sealed with bitumen. The bituminous-concrete surfacing on Brown's Hill and Lookout Point has been completed.

Lovell's Flat – Stony Creek Deviation: The work of widening and improving curvature and visibility was completed.

Mosgiel–Henley Section: A contract was let for a bituminous-concrete pavement on this section from 10 m. 23 ch. to 16 m. 23 ch., and the work carried to completion.

Metalling: Reconstruction and metalling were continued and completed to 22 m. (Taieri Ferry Bridge).

Otokia Bridge: A reinforced-concrete culvert, of 12 ft. span, 24 ft. wide, has been constructed.

Taieri Ferry Bridge: Widening work at the south end was completed.

Green Island – Taieri Mouth.—Kaikorai Stream Bridge: This concrete bridge, of one 28 ft. span, has been completed.

McNab–Edievale.—Edgar's culvert: The construction of this concrete culvert, 12 ft. by 5 ft. with 18 ft. deck, and approaches, has been completed.

Flodden Corner: The improvement to visibility at this corner has been completed.

Clarkesville–Springvale.—Devil's Elbow at Lawrence: A deviation to eliminate a sharp turn has been completed.

Coal Creek – Fruitlands: Various sharp turns and corners of bad visibility were improved between these points.

Waipahi–Pomahaka.—Conical Hills: The gravelling of the clay section of this highway, 3 m. 78 ch. in length, has been completed.

Mosgiel–Middlemarch.—Lee Stream – Clark's: The gravelling of the clay portions has been completed.

Picton–Bluff (No. 18 Highway District).—Southland County Section—Gore–Mataura: 4 m. 50 ch. has been widened to 34 ft. and remetalled.

Greenhills – Ocean Beach: 2 m. 36 ch. has been widened to 32 ft.

Gore Borough: 2¼ m. was sealed in bitumen.

Bluff Borough: 16 ch. was sealed in bitumen.

Invercargill–Fortrose.—Tisbury to Waimatua: 2 m. 53 ch. has been widened to 30 ft. and the metal strengthened and widened to 18 ft.

Makarewa–Brown's.—Leggett Road Section: 2 m. 60 ch. has been metalled, completing the unmetalled gap in this highway.

Te Anau – Manapouri.—5 m. has been metalled, completing the surfacing of this highway.

Invercargill–Riverton.—Riverton Borough – Aparima River Bridge: This two-way concrete structure, 440 ft. long, has been completed.

Wyndham–Mokoreta.—Mokoreta River Bridge: This bridge, 84 ft. in length, was rebuilt with rolled-steel joists.

Wrey's Bush – Mossburn.—Two small bridges were erected.

Argyle–Tuatapere.—22 ch. at Beer's Cutting was straightened.

Gore – Te Anau.—Wallace County Section: Three concrete culverts were constructed.

Gore Borough: 60 ch. has been surfaced with bitumen.

Ohai–Orawia.—A small bridge was erected over Bull Creek.

Riverton–Otautau.—Otautau Town District: 68 ch. was sealed in bitumen.

Signed on behalf of the Main Highways Board,

F. W. FURKERT,
Chairman.

TABLE 1.—MAIN HIGHWAYS ACCOUNT.

REVENUE FUND.

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1931, AND TOTAL TO DATE.

EXPENDITURE.	Total for Year 1930–31.	Total since Inception of Main Highways Act, 1922, to 31/3/31.
	£ s. d.	£ s. d.
To Net expenditure on maintenance of main highways: —		
Highway District—		
No. 1	47,566 19 3	265,173 1 10
No. 2	99,987 5 5	463,378 13 9
No. 3	38,253 14 8	194,800 15 3
No. 4	39,609 19 2	166,919 11 10
No. 5	65,585 12 8	324,189 19 7
No. 6	42,568 10 1	178,573 8 11
No. 7	45,303 11 6	261,223 8 8
No. 8	37,808 11 7	200,310 14 4
No. 9	55,655 3 1	296,050 9 0
No. 10	44,500 5 3	213,900 9 1
Totals for North Island	516,839 12 8	2,564,520 12 3
No. 11	51,173 12 1	227,078 2 4
No. 12	137,303 7 10	441,938 13 4
No. 13	20,695 19 2	115,955 4 10
No. 14	32,239 3 6	148,029 7 11
No. 15	39,766 15 1	195,741 15 1
No. 16	15,826 6 8	85,676 4 11
No. 17	26,781 3 2	120,903 11 3
No. 18	31,951 1 11	143,774 9 10
Totals for Dominion	872,577 2 1	4,043,618 1 9
Abolition of toll-gates (section 20, Finance Act, 1925)	1,807 0 0	15,765 14 7
Accident compensation	2,367 17 11	4,020 13 5
Administration and supervision expenses, including salaries and expenses of Public Works officers, printing, stationery, postages, and miscellaneous expenses	38,448 13 0	185,711 9 6
Charges and expenses of raising loans, management charges of Consolidated Stock on account of Construction Fund, &c.	2,532 3 3	46,539 13 5
Commission on collection of motor-registration fees by Postal Department	15,564 3 10	72,917 5 10
Commission on registration of change of ownership	5,337 6 0	21,872 3 6
Depreciation of furniture, fittings, &c.	64 11 1	307 15 10
Depreciation of plant not in service	54 0 0	88 0 0
Expenses of District Councillors attending District Council meetings and annual conference	41 15 1	573 7 11
Expenses of delegate to International Roads Congress at Washington	450 0 0	450 0 0
Fees and travelling-expenses of members of the Main Highways Board, other than Government members	1,500 13 6	9,948 0 0
Carried forward	940,745 5 9	4,401,812 5 9

INCOME.	£ s. d.	Total for Year 1930–31.	Total since Inception of Main Highways Act, 1922, to 31/3/31.
		£ s. d.	£ s. d.
By Income from—			
Interest from investments of—			
Construction Fund	6,248 0 6		
Revenue Fund	9,654 8 0		
		15,902 8 6	187,270 3 8
Interest from local authorities on plant purchased on their behalf		3,552 8 1	14,841 5 2
Interest on advances to local authorities		2,647 17 6	3,778 19 6
Miscellaneous receipts		119 7 1	359 13 6
Motor-registration licenses, fees, and fines (section 24, Motor-vehicles Act, 1924)		397,139 7 0	2,050,332 1 5
Motor-spirits tax (section 9, Motor-spirits Taxation Act, 1927)		1,219,208 11 8	2,953,453 3 8
Rent of and tolls from ferries		..	2,081 10 6
Tire-tax (sections 13 and 14, Main Highways Act, 1922)		129,188 6 5	1,525,358 15 9
Transfer from Consolidated Fund (section 14, Main Highways Act, 1922)		..	210,000 0 0
Carried forward		1,767,758 6 3	6,947,475 13 2

TABLE 1.—MAIN HIGHWAYS ACCOUNT—*continued.*

REVENUE FUND—*continued.*

EXPENDITURE.	Total for Year 1930–31.	Total since Inception of Main Highways Act, 1922, to 31/3/31.	INCOME.	Total for Year 1930–31.	Total since Inception of Main Highways Act, 1922, to 31/3/31.
	£ s. d.	£ s. d.		£ s. d.	£ s. d.
Brought forward	940,745 5 9	4,401,812 5 9	Brought forward	1,767,758 6 3	6,947,475 13 2
To Net expenditure on maintenance of main highways—*continued.*					
Finance Act, 1930,—					
Subsidies to municipalities	29,948 17 5	29,948 17 5			
Subsidies to County Councils and other local authorities	189,366 14 5	189,366 14 5			
Hutt Road annual charges—Finance Act, 1927 (No. 2), section 33 ..	22,339 10 0	61,536 11 6			
Interest on amount appropriated out of Public Works Fund and paid into Main Highways Account Construction Fund	61,300 0 0	61,300 0 0			
Interest on loans, recoupment to Consolidated Fund (section 4, Finance Act, 1919)	92,445 18 9	263,863 15 6			
Level crossings, alarm-signals at	..	598 6 10			
Miscellaneous expenses—					
Advertising, maps, rent of halls, traffic tallies, transport of samples, &c.	64 9 3	1,589 1 4			
Compensation under section 3, Public Works Amendment Act, 1925..	..	815 1 6			
Petrological Laboratory, Expenses of	730 0 0	730 0 0			
Refund of duty on motor-spirit destroyed by fire	1,812 6 4	1,812 6 4			
Reserve for redemption of main highways securities	44,180 0 0	144,636 0 0			
Signposts, erection of	1,453 17 6	3,456 18 3			
Traffic inspection	1,753 9 5	2,292 10 3			
	1,386,140 8 10	5,163,758 9 1			
Transfers to Construction Fund	300,000 0 0	1,400,000 0 0			
	1,686,140 8 10	6,563,758 9 1			
Balance, being excess of income over expenditure, carried to general balance-sheet	81,617 17 5	383,717 4 1			
	1,767,758 6 3	6,947,475 13 2		1,767,758 6 3	6,947,475 13 2

TABLE 1.—MAIN HIGHWAYS ACCOUNT—*continued.*

CONSTRUCTION FUND.

INCOME AND EXPENDITURE ON CAPITAL ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1931, AND TOTAL TO DATE.

EXPENDITURE.	Total for Year 1930–31.	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.
No. 1	62,956 18 3	527,178 13 6
No. 2	108,802 15 5	629,645 4 3
No. 3	8,355 0 0	154,776 10 9
No. 4	19,743 1 4	282,025 16 11
No. 5	39,798 11 10	204,766 15 3
No. 6	33,328 2 6	291,430 5 0
No. 7	21,575 8 2	316,722 18 5
No. 8	6,939 2 0	156,666 8 11
No. 9	67,856 16 6	482,340 3 11
No. 10	38,428 9 6	175,299 16 5
Totals for North Island	407,784 5 6	3,220,852 13 4
No. 11	52,705 10 11	117,472 5 4
No. 12	25,525 3 11	131,300 8 2
No. 13	18,486 1 7	149,130 9 1
No. 14	52,317 10 2	241,308 4 8
No. 15	52,465 16 5	117,182 13 6
No. 16	55,820 0 8	132,078 16 11
No. 17	29,646 18 5	296,381 7 3
No. 18	16,498 18 4	92,407 5 5
Totals for Dominion	711,250 5 11	4,498,114 3 8
Balance, being excess of income over expenditure, carried to general balance-sheet	138,724 14 1	99,493 10 4
	849,975 0 0	4,597,607 14 0

INCOME.	Total for Year 1930–31.	Total since Declaration of Main Highways (9/6/24).
	£ s. d.	£ s. d.
By Receipts under section 15, Finance Act, 1923, from Public Works Fund, General Purposes Account	..	1,226,000 0 0
Loans raised under Main Highways Act, 1922—		
Stock and Debentures issued—		
At 4 per cent. interest	..	100,000 0 0
At 4½ per cent. interest	..	596,254 10 10
At 5 per cent. interest	..	21,500 0 0
At 5⅛ per cent. interest	..	207,150 0 0
At 5¼ per cent. interest	..	251,550 0 0
At 5½ per cent. interest	549,975 0 0	795,150 0 0
Transfer from Revenue Fund	300,000 0 0	1,400,000 0 0
Charges and expenses of raising loans (adjustment)	..	3 3 2
	849,975 0 0	4,597,607 14 0

TABLE 1.—MAIN HIGHWAYS ACCOUNT—*continued.*

General Balance-sheet as at 31st March, 1931.

LIABILITIES.	Revenue Fund.	Construction Fund.	Total.
	£ s. d.	£ s. d.	£ s. d.
Accumulated Revenue Fund—			
Balance at 31/3/30	302,099 6 8		
Excess of income over expenditure for 1930–31	81,617 17 5		
	383,717 4 1	..	383,717 4 1
Construction Fund—			
Excess of income over expenditure for 1930–31	..	138,724 14 1	
Less balance at 31/3/30	..	39,231 3 9	
	..	99,493 10 4	99,493 10 4
Sundry creditors—			
Public Works Department	11,610 18 7	8,213 1 3	19,823 19 10
Other Government Departments	655 2 3	462 16 1	1,117 18 4
Non-departmental	66,857 13 10	48,342 9 10	115,200 3 8
Interest accrued on loans	12,908 16 1	..	12,908 16 1
Motor-registration fees paid in advance	66,249 0 0	..	66,249 0 0
Writings-off in Suspense	347 8 11	211 5 11	558 14 10
Reserve for redemption of securities	150,738 14 4	..	150,738 14 4
	693,084 18 1	156,723 3 5	849,808 1 6

ASSETS.		Revenue Fund.	Construction Fund.	Total.
		£ s. d.	£ s. d.	£ s. d.
Cash in Public Account—				
At call		224,885 19 0	102,636 17 11	327,522 16 11
Invested temporarily until required		115,000 0 0	..	115,000 0 0
		339,885 19 0	102,636 17 11	442,522 16 11
Sundry debtors—				
Public Works Department		1,496 6 1	1,354 2 8	2,850 8 9
Other Government Departments		2,807 6 6	200 2 0	3,007 8 6
Non-departmental		4,258 6 1	24,279 4 3	28,537 10 4
Motor-registration fees in hands of Postal Department		2,683 12 9	..	2,683 12 9
Interest due and accrued		3,888 8 9	..	3,888 8 9
Stocks of material, tools, &c.		13,283 19 0	21,293 9 2	34,577 8 2
Stocks, deficits account		347 8 11	211 5 11	558 14 10
Roadmen's cottages, huts, and road buildings generally		8,123 7 0	6,748 1 6	14,871 8 6
Furniture, fittings, &c.—	£ s. d.			
Expenditure to 31/3/31	1,003 7 11			
Less depreciation to 31/3/31	311 13 3			
		691 14 8	..	691 14 8
Plant and equipment—				
For Main Highways Board—				
Expenditure to 31/3/31	89,728 3 11			
Less depreciation charged to works	30,889 10 1			
		58,838 13 10	..	58,838 13 10
Purchased for local authorities—				
Expenditure to 31/3/31	155,694 8 9			
Less repayments of principal	99,817 16 9			
		55,876 12 0	..	55,876 12 0
Amount in Loans Redemption Account		150,738 14 4	..	150,738 14 4
Advances to local authorities (Main Highways Amendment Act, 1926, section 2)		50,164 9 2	..	50,164 9 2
		693,084 18 1	156,723 3 5	849,808 1 6

J. J. Gibson, Accountant, Public Works Department.

C. J. McKenzie, for Chairman, Main Highways Board.

I hereby certify that the Income and Expenditure Accounts and Balance-sheet 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: A reserve of £150,738 14s. 4d. for redemption of securities has been set up and paid over to Loans Redemption Account, but the amount has not yet been applied to the redemption of securities.—G. F. C. Campbell, Controller and Auditor-General.

TABLE 2.—LENGTHS OF MAIN HIGHWAYS AT 31ST MARCH, 1931.

Number and Name of Highway District.	Original Main Highways.		Additional Main Highways.		Total.	
	M.	ch.	M.	ch.	M.	ch.
1. Auckland North	595	1	331	30	926	31
2. Auckland South	483	73	335	22	819	15
3. Tauranga	409	9	175	30	584	39
4. Gisborne	249	56	91	0	340	56
5. Napier	456	8	232	7	688	15
6. King-country	350	20	306	60	657	0
7. Taranaki	313	72	123	6	436	78
8. Wanganui	326	48	147	15	473	63
9. Wellington West	314	54	125	40	440	14
10. Wellington East	338	72	114	2	452	74
Totals, North Island ..	3,838	13	1,981	52	5,819	65
11. Nelson	305	3	193	10	498	13
12. West Coast	348	69	145	13	494	2
13. Canterbury North	312	20	89	20	401	40
14. Canterbury Central	406	9	243	7	649	16
15. Canterbury South	347	63	319	58	667	41
16. Otago Central	324	16	326	51	650	67
17. Otago South	295	21	144	36	439	57
18. Southland	463	52	335	12	798	64
Totals, South Island ..	2,803	13	1,796	47	4,599	60
Totals for Dominion ..	6,641	26	3,778	19	10,419	45

TABLE 3.—CONSTRUCTION WORK COMPLETED DURING YEAR 1930-31.

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	3 10	22 42	0 10	1 75	..	2 52	680	15 67	15 42
2. Auckland South	14 36	11 4	27 36	10 67	..	4 66	441	0 73	0 73
3. Tauranga	2 72	1 57	2 39	..	..	..	314	7 70	..
4. Gisborne	6 14	11 5	1 38	..	..	..	80	13 48	13 48
5. Napier	4 30	9 15	10 18	10 18	..	..	682	14 17	14 17
6. King-country	11 44	8 44	..	4 0	..	..	186	1 27	1 27
7. Taranaki	0 76	1 16	2 9	2 29	..	..	215	0 79	0 79
8. Wanganui	6 6	1 11	5 26	..	..	..	82	11 79	15 47
9. Wellington West ..	12 63	0 60	13 4	3 8	5 27	..	681	33 18	33 18
10. Wellington East	8 2	7 0	5 33	..	..	..	889	8 50	8 50
11. Nelson	12 71	10 27	..	1 72	..	..	700	..	..
12. West Coast	0 77	0 72	..	..	..	..	1,567	..	..
13. Canterbury North ..	7 7	..	11 34	..	..	..	30	4 7	..
14. Canterbury Central ..	6 15	1 10	6 23	..	3 63	2 0	1,702	2 0	..
15. Canterbury South ..	17 15	15 45	..	..	4 58	..	1,312	17 37	..
16. Otago Central	12 16	10 37	5 40	..	..	..	889	11 78	11 78
17. Otago South	3 25	7 76	..	6 61	..	..	93	1 20	1 20
18. Southland	..	7 60	3 78	..	..	..	632	..	..
Totals	130 19	128 21	94 68	41 10	13 68	9 38	11,175	145 30	117 19

TABLE 4.—APPROPRIATIONS AND EXPENDITURE FOR THE YEAR ENDING 31ST MARCH, 1931.

Number and Name of Highway District.	Construction.		Maintenance.	
	Available for Authorization.	Expenditure.	Available for Authorization.	Expenditure.
	£	£	£	£
1. Auckland North	76,545	62,957	65,643	47,567
2. Auckland South	133,862	108,803	132,052	99,987
3. Tauranga	23,128	8,355	48,173	38,254
4. Gisborne	63,523	19,743	59,708	39,610
5. Napier	47,877	39,799	50,042	65,586
6. King-country	41,050	33,328	54,243	42,568
7. Taranaki	30,721	21,575	52,427	45,304
8. Wanganui	40,841	6,939	50,714	37,809
9. Wellington West ..	72,410	67,857	63,340	55,655
10. Wellington East ..	45,468	38,428	49,692	44,500
11. Nelson	62,859	52,705	54,139	51,174
12. West Coast	30,317	25,525	152,451	137,303
13. Canterbury North ..	25,586	18,486	26,663	20,696
14. Canterbury Central ..	68,302	52,318	45,583	32,239
15. Canterbury South ..	61,268	52,466	42,206	39,767
16. Otago Central	55,131	55,820	35,525	15,826
17. Otago South	37,628	29,647	35,692	26,781
18. Southland	28,702	16,499	35,617	31,951
Totals for Dominion ..	945,218	711,250	1,053,910	872,577
Totals for North Island	575,425	407,784	626,034	516,840
Totals for South Island	369,793	303,466	427,876	355,737

TABLE 5.—MAINTENANCE OF MAIN HIGHWAYS (INCLUDING BRIDGES).

Number and Name of Highway District.	Length Maintained.	Expenditure.									
		Board.	Local Authorities.	Total.	Average per Mile per Annum.						
					1930–31.	1929–30.	1928–29.	1927–28.	1926–27.	1925–26.	1924–25.
Primary System.											
	M. ch.	£	£	£	£	£	£	£	£	£	£
1. Auckland North ..	595 1	34,259	21,248	55,507	93·29	125·34	102·28	103·6	65·6	56·1	77·0
2. Auckland South ..	483 73	71,623	30,049	101,672	210·10	218·87	233·82	203·3	181·0	85·1	53·5
3. Tauranga	409 9	31,210	7,126	38,336	93·70	110·47	90·59	80·3	69·1	48·6	28·1
4. Gisborne	249 56	32,761	13,027	45,788	183·37	218·70	146·40	104·3	152·7	93·9	59·5
5. Napier	456 8	46,361	20,947	67,308	147·57	187·03	158·72	170·0	169·4	104·5	73·4
6. King-country ..	350 20	30,920	8,949	39,869	113·83	170·63	90·18	56·2	69·8	55·4	58·5
7. Taranaki	313 72	33,542	8,379	41,921	133·55	189·83	182·93	195·7	198·8	105·0	67·1
8. Wanganui	326 48	28,535	17,723	46,258	141·63	193·86	96·12	145·3	167·6	88·9	54·4
9. Wellington West ..	314 54	48,233	19,643	67,876	215·70	270·58	228·91	228·9	166·3	120·2	91·7
10. Wellington East ..	338 72	37,437	16,363	53,800	158·75	177·48	158·02	138·8	138·0	104·7	77·7
Totals, North Island	3,838 13	394,881	163,454	558,335	145·47	180·38	147·29	141·2	131·6	82·9	62·9
11. Nelson	305 3	22,250	10,138	32,388	106·17	153·18	121·31	102·1	119·9	63·9	48·1
12. West Coast	348 69	34,316	3,954	38,270	109·70	154·06	158·56	118·3	114·2	94·6	61·6
13. Canterbury North ..	312 20	17,244	7,579	24,823	79·49	111·63	94·06	90·1	79·5	47·7	37·7
14. Canterbury Central ..	406 9	24,336	12,207	36,543	89·98	77·74	77·85	87·3	81·4	46·1	52·2
15. Canterbury South ..	347 63	24,397	12,989	37,386	107·50	128·43	95·69	105·0	79·5	73·9	39·7
16. Otago Central ..	324 16	8,563	4,055	12,618	38·92	84·86	61·25	77·2	49·3	26·1	12·6
17. Otago South ..	295 21	21,152	10,321	31,473	106·59	124·24	88·96	90·5	81·7	54·2	22·5
18. Southland	463 52	23,540	10,991	34,531	74·46	70·62	67·13	63·4	76·0	56·6	24·6
Totals, South Island	2,803 13	175,798	72,234	248,032	88·48	111·19	94·96	91·4	85·4	59·6	38·5
Totals, Dominion ..	6,641 26	570,679	235,688	806,367	121·42	151·20	125·19	119·9	111·9	73·2	51·7

TABLE 5.—MAINTENANCE OF MAIN HIGHWAYS (INCLUDING BRIDGES)—*continued.*

Number and Name of Highway District.	Length Maintained.	Expenditure.					
		Board.	Local Authorities.	Total.	Average per Mile.		
					1930–31.	1929–30.	1928–29.
		Secondary System.					
	M. ch.	£	£	£	£	£	£
1. Auckland North ..	331 30	13,308	8,420	21,728	65·57	98·84	68·85
2. Auckland South	335 22	28,364	14,002	42,366	126·36	207·63	109·12
3. Tauranga	175 30	7,044	1,600	8,644	49·27	38·87	32·23
4. Gisborne	91 0	6,849	3,056	9,905	108·85	109·45	67·79
5. Napier	232 7	11,762	4,325	16,087	69·31	68·65	45·97
6. King-country	306 60	11,649	4,867	16,516	53·84	54·09	29·17
7. Taranaki	123 6	11,762	5,762	17,524	142·38	129·53	87·91
8. Wanganui	147 15	9,273	4,497	13,770	93·55	136·68	71·64
9. Wellington West.. ..	125 40	7,422	3,493	10,915	86·97	105·12	74·18
10. Wellington East ..	114 2	7,063	3,256	10,319	90·50	104·00	80·04
Totals, North Island ..	1,981 52	114,496	53,278	167,774	84·66	107·70	66·20
11. Nelson	193 10	5,687	2,802	8,489	43·96	49·08	37·14
12. West Coast	145 13	17,905	4,277	22,182	152·81	196·99	111·98
13. Canterbury North ..	89 20	3,452	894	4,346	48·69	58·54	36·31
14. Canterbury Central ..	243 7	7,903	4,349	12,252	50·40	76·58	54·05
15. Canterbury South ..	319 58	15,370	5,960	21,330	66·71	49·78	36·23
16. Otago Central	326 51	7,263	3,840	11,103	33·99	61·19	31·95
17. Otago South	144 36	5,629	2,833	8,462	58·58	75·09	52·62
18. Southland	335 12	8,411	3,918	12,329	36·78	40·30	26·07
Totals, South Island ..	1,796 47	71,620	28,873	100,493	55·93	67·42	43·79
Totals, Dominion ..	3,778 19	186,116	82,151	268,267	71·00	88·51	55·51
		Complete Highway System.					
1. Auckland North ..	926 31	47,567	29,668	77,235	83·37	115·66	90·26
2. Auckland South	819 15	99,987	44,051	144,038	175·83	214·30	182·99
3. Tauranga	584 39	38,254	8,726	46,980	80·38	90·73	74·50
4. Gisborne	340 56	39,610	16,083	55,693	163·47	189·52	124·91
5. Napier	688 15	58,123	25,272	83,395	121·18	146·72	120·35
6. King-country	657 0	42,568	13,816	56,384	85·82	115·75	61·44
7. Taranaki	436 78	45,304	14,141	59,445	136·04	172·85	155·92
8. Wanganui	473 63	37,808	22,220	60,028	126·70	176·13	88·53
9. Wellington West.. ..	440 14	55,655	23,136	78,791	179·00	224·31	185·63
10. Wellington East ..	451 74	44,500	19,619	64,119	141·56	158·96	138·38
Totals, North Island ..	5,819 65	509,376	216,732	726,108	124·76	155·78	119·87
11. Nelson	498 13	27,937	12,940	40,877	82·05	112·83	88·69
12. West Coast	494 2	52,221	8,231	60,452	122·37	166·76	144·87
13. Canterbury North ..	401 40	20,696	8,473	29,169	72·65	99·69	81·07
14. Canterbury Central ..	649 16	32,239	16,556	48,795	75·16	77·29	68·85
15. Canterbury South ..	667 41	39,767	18,949	58,716	87·96	89·58	66·32
16. Otago Central	650 67	15,826	7,895	23,721	36·45	73·89	47·67
17. Otago South	439 57	26,781	13,154	39,935	90·82	108·15	77·06
18. Southland	798 64	31,951	14,909	46,860	58·66	57·90	49·90
Totals, South Island ..	4,599 60	247,418	101,107	348,525	75·77	94·12	75·04
Totals, Dominion ..	10,419 45	756,794	317,839	1,074,633	103·14	128·57	100·06

For the purpose of computing the average costs per mile in the above tables the expenditure on the restoration of earthquake damage in the Nos. 5, 11, and 12 Highway Districts has been excluded.

TABLE 6.—TESTS OF STONE COMPLETED DURING THE YEAR ENDING 31ST MARCH, 1931.

No.	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.			
170	Mount Tumunui, Rotorua ..	134	8·50	..	..	17·48	7·0	Spherulitic rhyolite.
171	Mount Tumunui, Rotorua ..	147	4·89	..	..	17·68	7·5	Banded spherulitic rhyolite.
172	Mount Tumunui, Rotorua ..	143	5·39	..	..	17·77	7·5	Banded spherulitic rhyolite.
173	Mount Tumunui, Rotorua ..	132	9·32	..	..	17·02	6·0	Rhyolite.
174	Mount Tumunui, Rotorua ..	140	5·49	..	..	16·85	6·0	Rhyolite.
175	Mount Tumunui, Rotorua ..	141	7·76	..	..	13·07	3·5	Rhyolite
176	Mount Tumunui, Rotorua ..	140	6·16	..	..	14·66	4·5	Rhyolite.
177	Mount Tumunui, Rotorua ..	148	3·38	..	..	17·28	4·5	Spherulitic rhyolite.
178	Turitea Stream, Otorohanga ..	188	0·87	1·92	20·8	19·04	33·5	Basalt.
179	Trig K, East Taupo	150	5·55	6·28	6·37	16·41	11·5	Scoriaceous basalt.
180	Trig K, East Taupo	140	11·50	23·76	1·67	13·42	7·0	Scoriaceous basalt.
181	Waikari, Waipara County ..	164	0·77	7·08	5·65	..	..	Brecciated greywacke.
181A	Waikari, Waipara County ..	..	..	31·96	1·25	..	..	Broken greywacke.
182	Te Puna Quarry, Tauranga ..	149	1·37	15·68	2·55	18·01	6·5	Spherulitic rhyolite.
183	Public Works Department Quarry, Okaihau	167	0·71	3·30	12·12	17·55	10·5	Basalt.
184	Hutt River shingle	165	0·69	2·68	14·92	18·60	26·0	Greywacke.
185	Section 11, Block XV, Rangiriri Survey District	165	0·62	3·16	12·66	..	..	Fine-grained greywacke.
186	Wharekawa shingle, Auckland..	171	0·21	2·02	19·80	18·83	45·5	Greywacke.
187	Ferguson and Kew's Quarry Penrose	185	1·00	2·64	15·15	18·25	30·0	Basalt.
188	Ohakune Railway Quarry ..	153	1·24	12·90	3·00	16·97	11·0	Augite andesite.
189	Ohakune Railway Quarry ..	154	6·24	9·50	4·20	16·97	11·0	Augite andesite.
190	Luke's Quarry, Ngaruawahia ..	170	0·60	3·33	18·89	18·94	31·0	Greywacke.
191	Te Kawa Quarry, Te Awamutu	197	0·50	5·25	14·75	18·68	11·0	Basalt.
192	Section 25, Quarry Reserve, North Road, Hauraki Plains County	156	0·40	4·53	18·59	17·35	21·0	Hornblende andesite.
193	Mangahoe Stream, Arapuni ..	169	0·40	2·29	17·90	19·17	35·0	Greywacke.
194	Motutara Island	169	0·20	2·60	15·4	19·21	44·0	Greywacke.
195	Waipara County	165	0·16	5·20	7·9	16·59	21·0	Greywacke.

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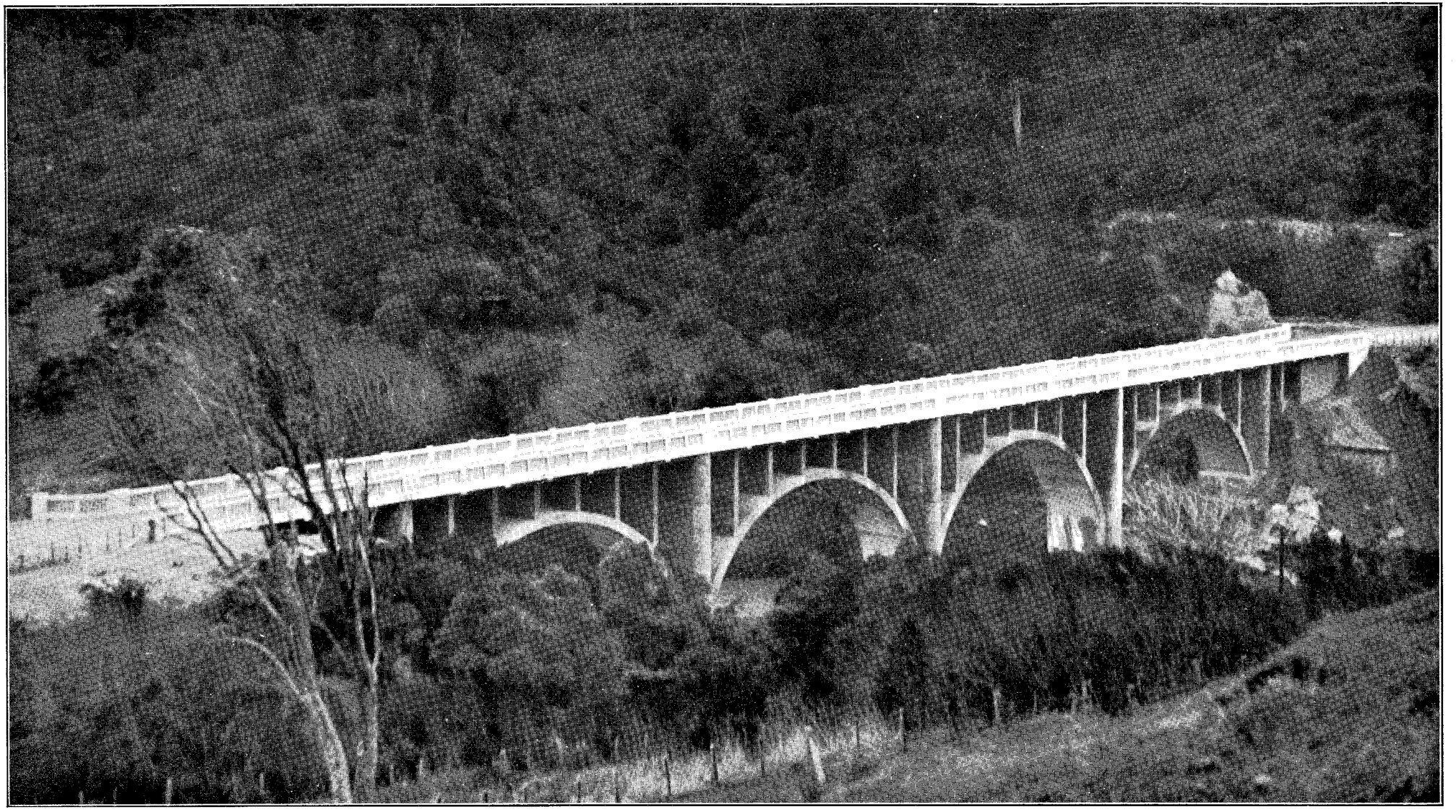
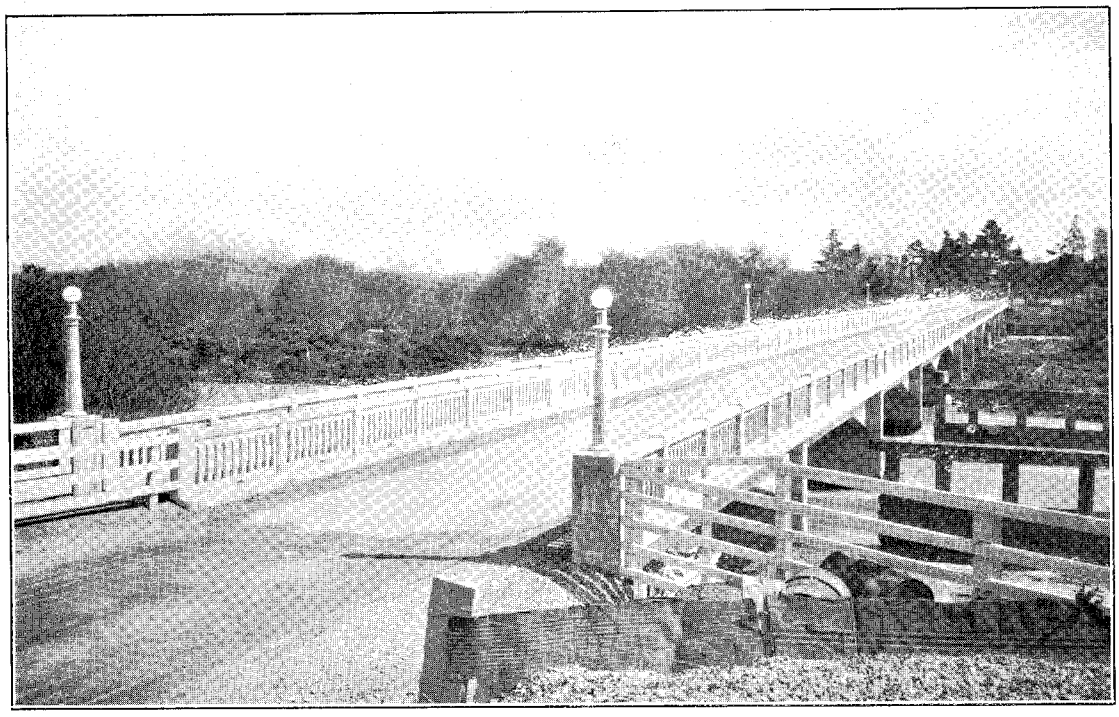
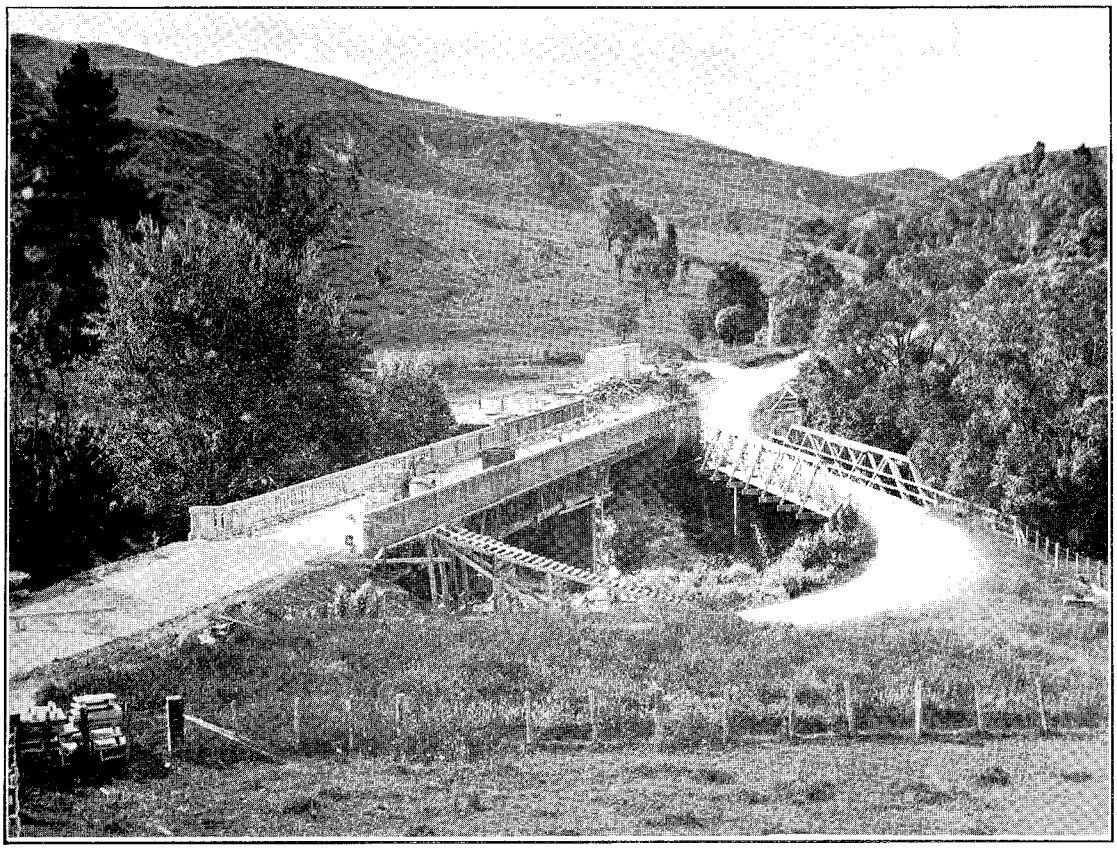


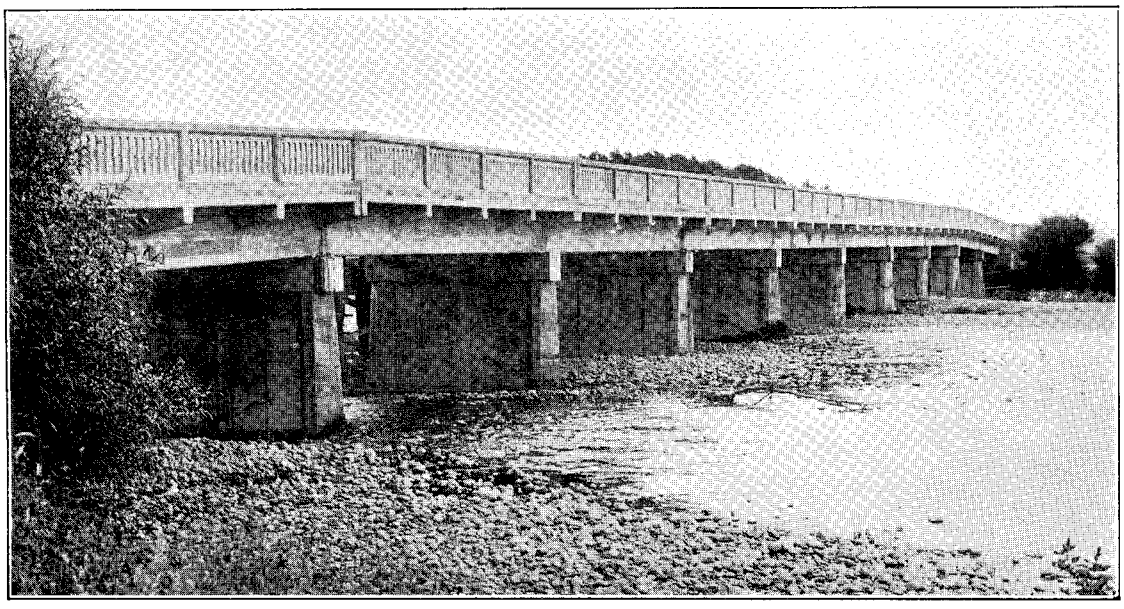
WOODVILLE – PALMERSTON NORTH MAIN HIGHWAY.—UPPER MANAWATU GORGE BRIDGE.
Four 80 ft. reinforced-concrete arch spans, and short approach spans. Total length, 410 ft.; 20 ft. roadway.



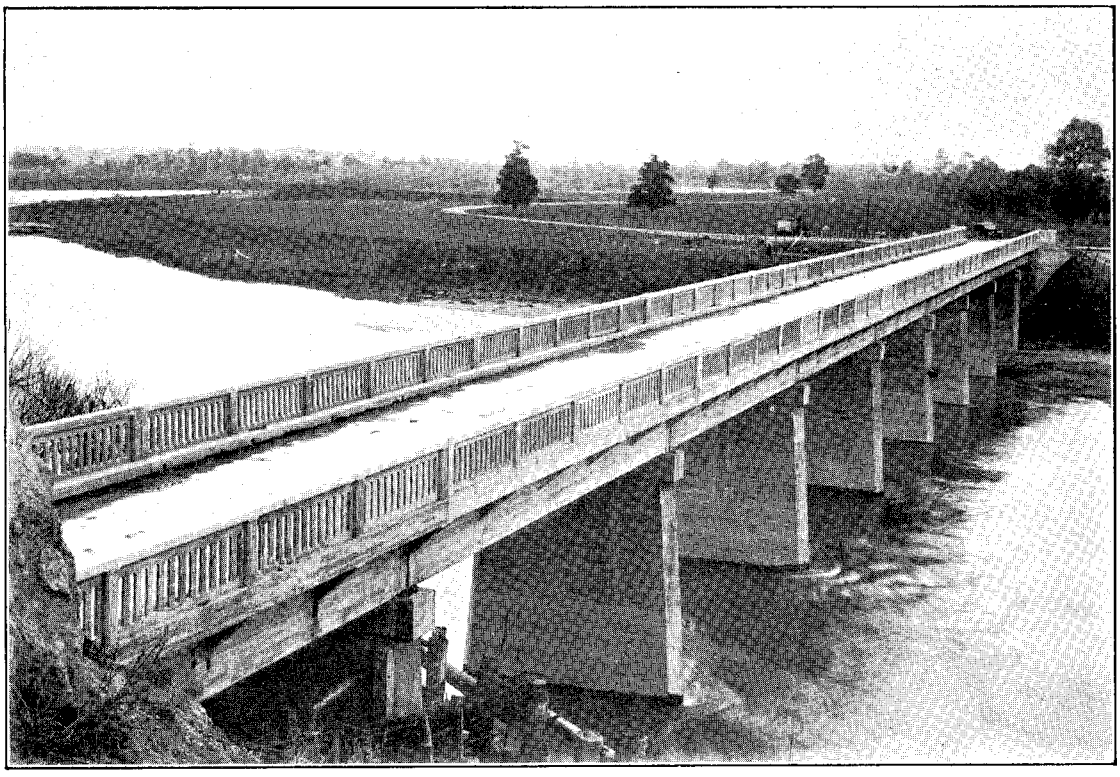
Greatford–Woodville Main Highway.—Aorangi Road Bridge.
Twelve 48 ft. spans, reinforced concrete; 20 ft. roadway and 4 ft. footway.



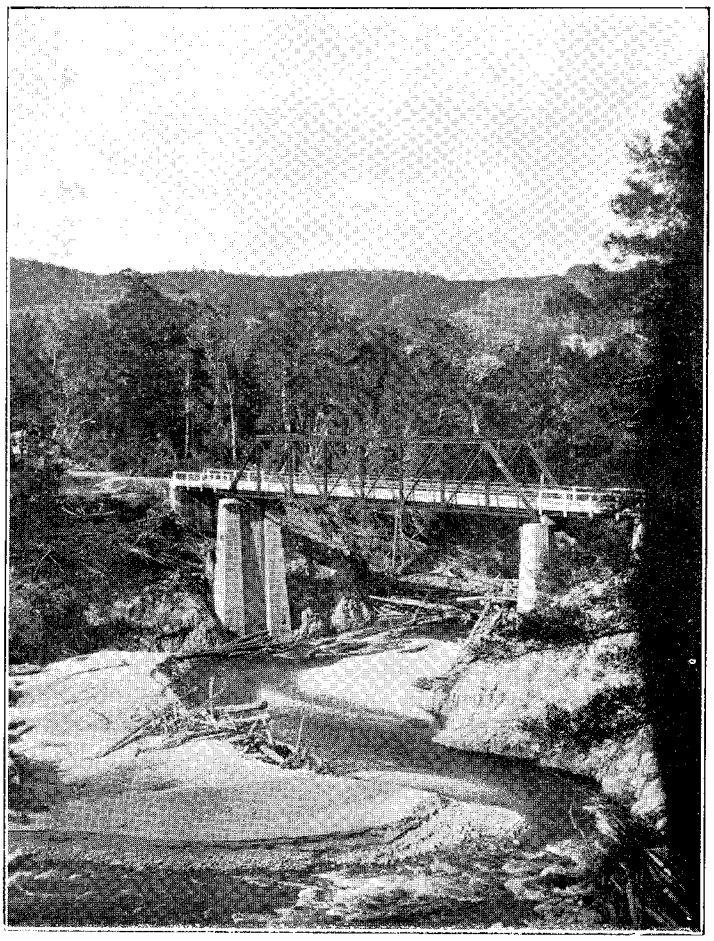
Tinui Junction to Stronvar Main Highway.—Whakatahine Stream Bridge.
One 50 ft. and two 40 ft. spans, reinforced concrete; 18 ft. roadway.



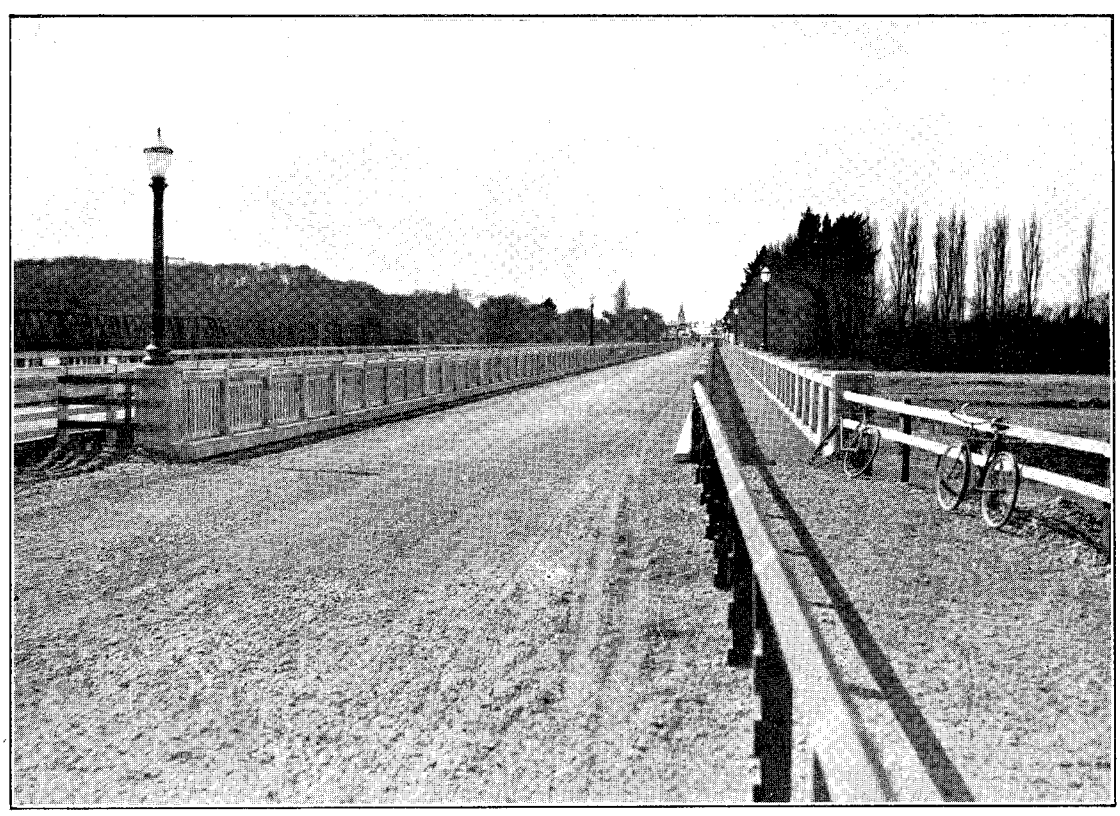
Masterton-Tinui Main Highway.—Ruamahanga River Road-bridge.
Eleven 40 ft. spans, reinforced concrete; 18 ft. roadway.



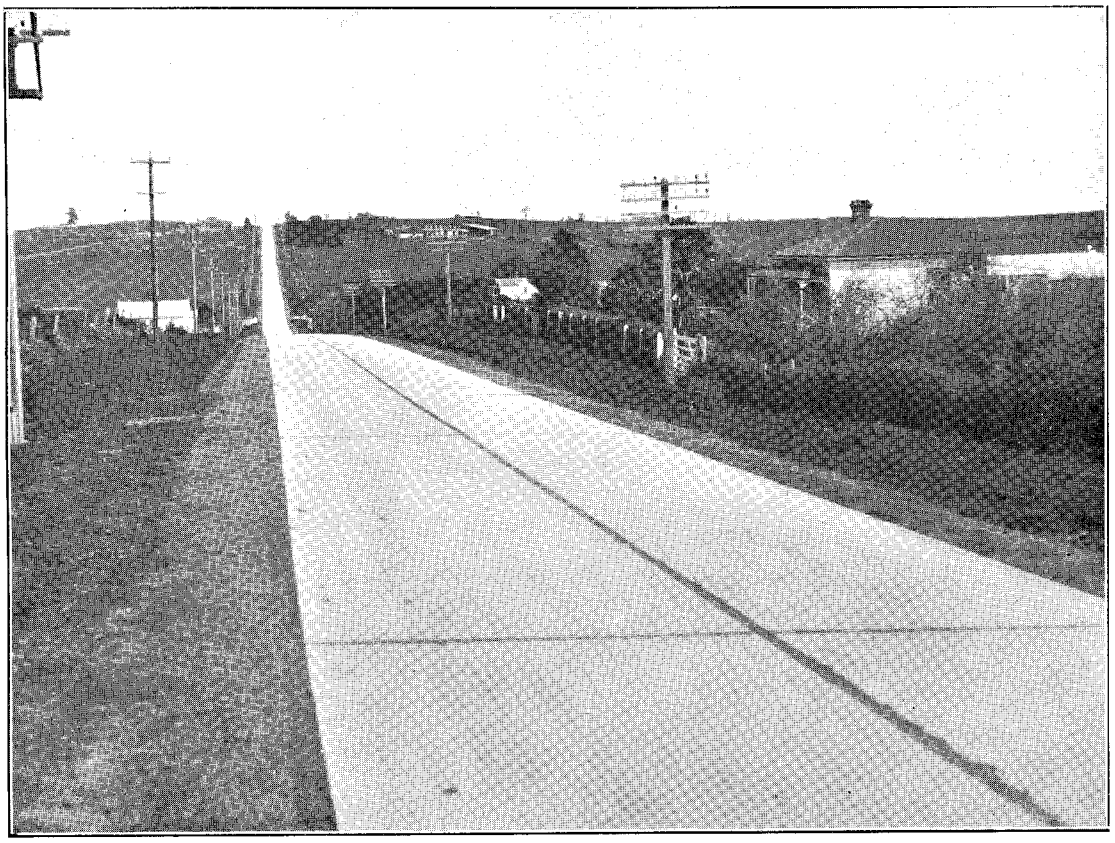
Carterton-Gladstone Main Highway.—Kokotau Road Bridge.
Nine 45 ft. spans, reinforced concrete; 18 ft. roadway.



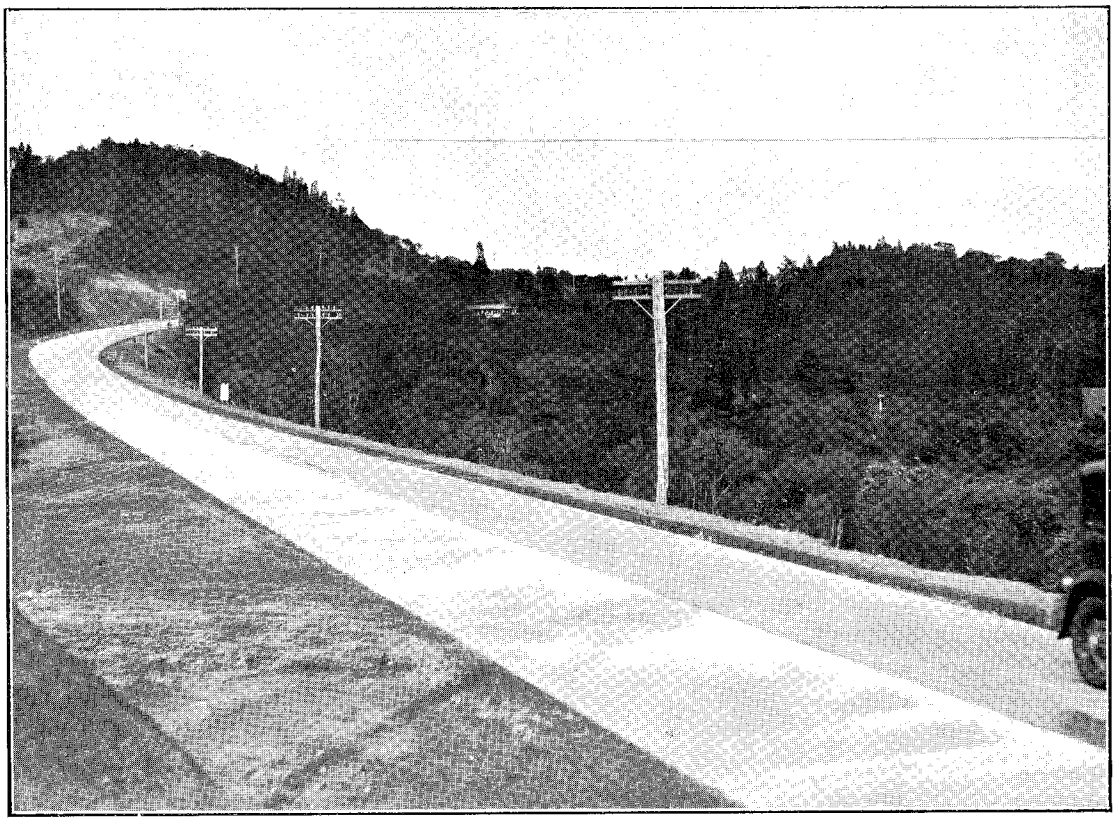
Nelson–Westport Main Highway.—Newton River Bridge.
One 120 ft. through steel truss span, and two 30 ft. rolled-steel-joist spans; 12 ft. roadway.



Picton–Bluff Main Highway.—Ashburton River Road-bridge.
Thirty-two 35 ft. spans, reinforced concrete; 22 ft. roadway and 6 ft. footway.



Panmure–Howick Main Highway.—Portland-cement Concrete Pavement.



Titirangi Road.—Portland-cement Concrete Pavement.