

1946
NEW ZEALAND

PUBLIC WORKS STATEMENT

(BY THE HON. R. SEMPLE, MINISTER OF WORKS)

MR. SPEAKER,—

In accordance with the provisions of section 8 of the Public Works Act, 1928, I submit my report for the year ended 31st March, 1946, together with a statement of expenditure certified by the Controller and Auditor-General.

The past year has been a transition period of planning and reorganizing to a peacetime basis in preparation for the programmes of works which will require to be undertaken during the next few years, and of which some indication has already been made public. I have, following my usual practice, visited various parts of the Dominion, in order to gain first-hand information and to discuss with those concerned the various problems and proposals which come within my jurisdiction as Minister of Works.

Honourable members will recall that in my report last year reference was made to the functions and activities of the Ministry of Works, particularly in regard to co-ordinated planning of constructional and developmental projects contemplated by the State and by the various public authorities in the post-war years. At that time it was not practicable to convey, in other than general terms, the nature and extent of the planning operations which were being carried out at my direction by the Commissioner of Works, but I have since obtained from the Commissioner a report in which these operations are reviewed. This report has been tabled so that honourable members may be informed upon the vitally important considerations which arise in connection with post-war planning. The report also provides a summary of the important work, some of which has not previously been published, undertaken by the Commissioner of Defence Construction during the difficult war years and the subsequent developments which led to the appointment of the Commissioner of Works and the creation of the Ministry of Works.

With the resignation of Mr. W. L. Newnham as Permanent Head and Engineer-in-Chief on the 31st March last, it was decided the time was opportune to reconstitute the Department in four separate Divisions responsible to the Commissioner of Works, who thus now assumes overall administrative control of the Department.

The Ministry of Works was set up for the purpose of surveying the post-war proposals of all Government Departments, of local authorities, and, so far as is possible, of private interests. The purpose of the survey was to ensure that works which were needed first obtained the necessary materials and labour, that major construction proposals did not conflict in interest, in timing, or physical location, and that the huge post-war demands for buildings and developmental works, plus heavy arrears of maintenance, were met on an ordered basis. The Ministry of Works, therefore, is primarily concerned with the planning of works, the allocation of priorities, the supply of materials and labour, and the inauguration of projects in which the Government has a major interest. It is charged also with the responsibility of ensuring that where State funds and, to some extent, other public moneys, are involved, works are properly designed and are efficiently prosecuted to time within the limits of the Government's financial approval. For this reason it is required to examine generally each proposal from a technical as well as from an economic point of view, and to be satisfied that major engineering decisions are properly taken, and that the works, when approved for construction, are carried out in accordance with approved plans.

It will be seen, therefore, that the Ministry of Works covers a field much wider than that of the Public Works Department, and in future the annual report on the operations of the Department will be submitted by the Commissioner of Works, with individual reports on the operations of each Division, and the reports of the Main Highways Board and Soil Conservation and Rivers Control Council and other statements, as usual, submitted as Appendices. In view of the much wider scope to be covered by future reports, and in view also of the change in my designation from "Minister of Public Works" to "Minister of Works," it is only fitting that this statement should in future be known as the "Ministry of Works Statement."

During the period under review steps have been taken to give effect to the intention expressed by me in the Public Works Statement for last year that I would, as soon as it was possible to do so, make known the Government's proposals in regard to major development works, particularly in the four main metropolitan centres.

A considerable amount of investigation was carried out by the Planning Division of the Ministry of Works who were engaged on the preparation of a long-range programme of works, with the result that I was able, shortly before the close of the year under review, to make a public announcement disclosing the Government's major works proposals in respect of the Hutt Valley, Tawa Flat, Porirua, and Titahi Bay districts. Since the end of the financial year further notices were gazetted, and public announcements made in respect to other comprehensive areas throughout the country. It is interesting and encouraging to find that the policy of indicating the Government's proposals on a long-range plan, as well as the general details of the various programmes so far proclaimed, have been so well received by the public, local bodies, and the press everywhere.

I should like here to remove some misconceptions which appear to have arisen as to the meaning of these programmes. They have been referred to popularly as ten-year programmes, but it should be understood that the schedules which have been notified do not commit the Government or other authority to undertake all the works enumerated therein before the expiry of a ten-year period. It is intended that the schedules convey some indication of major construction works which are regarded as likely to require consideration within that period. Actually it will be necessary to review these proposals from time to time and to make such adjustments in priorities, &c., as may be necessary to best serve the economy of the country and accommodate movements in the labour market and availability of materials.

The primary purpose in making known the Government's intentions in regard to developmental works is the realization that, without knowledge of the Government's intentions, it is scarcely possible for local authorities and for private interests to plan safely ahead. This is particularly the case in urban areas, and the review of all proposals conducted by the Ministry of Works has shown that it is not possible to regard the works of Government Departments in isolation and that these must be considered jointly with those of local authorities and of private people. It is hoped that, by enlisting the support of local authorities on a regional basis, the Government will have much valuable advice bearing upon its own works, and by this method in time a broad developmental plan for each region will be prepared in which the interests not only of the Government, but of local authorities and of primary and secondary industry, will be fully observed.

The annual estimates of expenditure from the Public Works Account will, of course, bear a direct relationship to the works programme of the Dominion as a whole as determined from time to time by the Ministry of Works. The adoption of some means whereby the use of resources to the best advantage will be facilitated by planning in advance will aid in promoting full-time and economic employment for workers and also a balanced distribution of labour between various community and industrial needs. The method of framing the annual estimates in conformity with these ideals may require adjustment from time to time until the most satisfactory basis has been evolved from practical experience.

The supply of steel is still most acute, and, although production has now been resumed at Broken Hill, Australia, indications are that considerable delays must be expected in fulfilling orders which have been placed. Inquiries through the High Commissioner for New Zealand, London, revealed that round mild-steel rods could be delivered at a comparatively early date, and steps have therefore been taken to obtain a supply from this source.

As far as construction works are concerned, the supply of cement is still very much below requirements. To relieve the demand on local supplies and with a view to facilitating continuity of construction of the more important works—i.e., hydro-electric dams, power-houses, the general housing schemes—my Department placed orders for a supply of Australian cement, some of which has come to hand.

The passing of the Electricity Act, 1945, effected the constitution of the State Hydro-electric Department as a separate departmental unit, thereby severing this State activity from the Public Works Department, with which it had been associated since its inception. Though the design work in connection with new hydro-electric schemes will be executed by the State Hydro-electric Department, the construction work will continue to be undertaken by the Public Works Department, whilst operation and maintenance of completed sections will be under the direct jurisdiction of the new department.

My Department is experiencing considerable difficulty arising from the shortage of trained staff in practically all classifications. Of the 1,369 officers who were granted leave for military service, only 1,006 have so far returned to duty. Many of the younger men who served with the Armed Forces had not acquired very much departmental experience before proceeding on active service. Returning after four, five, and, in some cases, six years' absence, they are obviously handicapped in respect of tasks that, in normal circumstances, would have been assigned to them. Every endeavour is being made to assist these officers by special training and instruction, and several have taken advantage of the special refresher course provided by the Public Service Commissioner. A number are attending full-time University courses and, in the case of engineers, some, who for one reason or another were unable to take the University course this year, are in the field receiving practical training. Part-time University courses and correspondence

courses with the recognized institutions are also being taken by members of the staff who are likely to benefit from special study. My Department has done all in its power to co-operate with the Rehabilitation Department to enable returned members of the staff to take the fullest advantage of the facilities available to them to fit themselves to resume their rightful positions in the Department and the community.

A Commission appointed in 1928 to consider the question of the erection of a bridge over the Auckland Harbour stated in its findings submitted in April, 1930 :—

Your Commissioners are of the opinion that the time for the erection of a bridge across the Waitemata Harbour will not arrive in less than twenty years, though it might be advisable in, say, **ten years' time** to have the position reviewed.

At the conclusion of the war, and in response to representations from the interested local bodies and associations, my Government agreed that the time was opportune for the position to be reviewed. Accordingly, by Order in Council published in a supplement to the *N.Z. Gazette* dated 26th March, 1946, Sir Francis Vernon Frazer, Knight Bachelor, M.A., LL.B., of Wellington (Chairman), William Richard Beaver, Esq., B.C.E., A.M.Inst.E. (Aust.), of New South Wales, Engineer; and Roland Harry Packwood, O.B.E., A.M.Inst.C.E., District Engineer of the Public Works Department, Auckland, were appointed a Commission to inquire into and report upon the following matters :—

- (1) What trans-harbour facilities were necessary in the Auckland Metropolitan Area and the approaches thereto to provide adequately for future traffic requirements of all kinds, both from within and from outside the metropolitan area, including through traffic, having regard to improvements in the railway and roading systems in the area that were contemplated by the Railways Department and the roading authorities respectively;
- (2) Should the facilities include means of direct access between the City and the North Shore suburbs in addition to or instead of the existing ferry services;
- (3) If so, what should be the nature of this direct access, and where should it be located—
 - (a) If by a bridge, what should be the minimum navigational clearances, and what should be the provisions for traffic on the bridge and its approaches;
 - (b) If by a tunnel or tunnels, what should be the number of such tunnels, and what provisions for traffic should be made in each;
 - (c) In either of cases (a) and (b) above, what would be the approximate cost of the proposed access, including the necessary approaches; -
 - (d) If any other alternatives were investigated, what were they and what would be the approximate cost of each;
- (4) Upon what basis or bases could such direct access be provided and financed, with special reference to construction, maintenance, and operation;
- (5) If such direct access was not considered necessary at present, within what period of time would the probable growth of population, and the use of motor-vehicles together with other forms of transport, render it necessary;
- (6) If it was considered that the existing ferry services should remain in operation, either with or without other means of direct access, what improvements, if any, should be made in the services now provided; and
- (7) Generally, any other matters arising out of the premises that might come under notice in the course of inquiries, and which it was considered should be investigated therewith.

The Commission was required to communicate its findings to His Excellency the Governor-General by 31st July, 1946, and its report has since been referred to the Government.

FINANCE

The payments and receipts in connection with the Public Works Account and other associated votes and accounts for the year 1945-46 are shown in the tabulation following.

The expenditure for the year administered through the Department reached a total of £22,703,748, of which sum £2,577,969 was on account of the Dominion's defence programme and ancillary expenditure in connection with the war. The amounts received by way of credits-in-aid and miscellaneous receipts totalled £7,300,189. As from 1st April, 1945, receipts which were previously shown as credits-in-aid in all votes within the Public Works Account and Subdivisions I and II of vote "Maintenance of Public Works and Services," Consolidated Fund, have been included as "Miscellaneous Receipts." This procedure will be followed in future for all subdivisions of vote "Maintenance of Public Works and Services" and for all votes within the Public Works Account.

Class of Work.	Expenditure, 1945-46.
EXPENDITURE, PUBLIC WORKS ACCOUNT	£
Railway construction	308,050
Housing construction	5,710,135
Public buildings	665,264
Education buildings	1,187,823
Lighthouses and harbour-works	11,593
Roads, &c.	171,604
Soil conservation and rivers control	212,272
Lands, miscellaneous	59,691
Irrigation, water-supply, and drainage	390,312
Linen-flax development	403,809
Totals, Public Works Account	9,120,553
Electric Supply Account—	
Construction	3,302,033
Working-expenses	1,039,166
	4,341,199
EXPENDITURE, OTHER VOTES AND ACCOUNTS	
Main Highways Account—	
Construction, reconstruction, and improvements	179,600
Maintenance, repairs, and renewals	1,886,633
Administration, plant, and miscellaneous expenditure	90,862
Interest, fees, &c.	29,923
Permanent appropriations (rate subsidies, &c.)	258,099
Consolidated Fund—	
Salaries and expenses, Public Works Department and Ministry of Works	813,720
Maintenance, Public Buildings, Roads, &c.	582,369
Plant, material, and miscellaneous services	2,822,821
Other accounts (expenditure by Public Works Department): Amounts not included above	2,577,969
Totals, other votes and accounts	9,241,996
Grand total of expenditure, Public Works Account and other votes and accounts, for the year ended 31st March, 1946	22,703,748

Of the expenditure of £22,703,748 previously mentioned, £12,469,969 may be regarded as having been expended from loan-moneys (£6,872,000 Public Works Account, £2,920,000 Electric Supply Account, £100,000 Main Highways Account, and £2,577,969 War Expenses Account), the balance—*i.e.*, £10,233,779—being expended from loan recoveries, revenue, and taxation.

The ratio which the various classes bear to the whole is shown below—that is, expenditure plus receipts (including credits-in-aid) :—

	£	Per Cent.
Roads, including construction and maintenance of Main and State highways	2,616,721	= 8·72
Hydro-electric (construction and working expenses) ..	4,341,199	= 14·47
Railway construction	308,050	= 1·03
Housing construction	5,710,135	= 19·03
Public buildings, including schools	1,853,087	= 6·18
Land improvements and soil conservation	271,963	= 0·91
Irrigation, water-supply, and drainage	390,312	= 1·30
Linen-flax development	403,809	= 1·34
Public buildings and roads, &c. (maintenance)	582,369	= 1·94
Plant, material, and services, other Departments	2,822,821	= 9·41
Miscellaneous	825,313	= 2·75
Navy, Army, Air, and Civil Defence expenditure	2,577,969	= 8·59
Revenue receipts and credits-in-aid	7,300,189	= 24·33
	<u>£30,003,937</u>	<u>= 100·00</u>

Class of Work.	Receipts.
RECEIPTS,* PUBLIC WORKS DEPARTMENT	
Ordinary Revenue Account—	£
Credits-in-aid, vote “ Maintenance of Public Works and Services ” ..	2,276,567
Departmental receipts (previously credits-in-aid)	400,312
Irrigation : Receipts for year	25,676
Miscellaneous receipts for year	102,024
Electric Supply Account—	
Sales of electrical energy	2,761,145
Miscellaneous receipts	145,212
Main Highways Account—	
Repayment of advances, &c., and interest	10,020
Miscellaneous receipts	173,294
Public Works Account—	
Sale of linen flax and by-products	577,018
Miscellaneous receipts	828,921
	<u>7,300,189</u>

* Excludes motor-spirits tax, registration fees, &c., collected by other Departments.

Summary

	Public Works Department.	Other Departments.	Total.
	£	£	£
Expenditure	21,112,116	1,591,632	22,703,748
Recoveries and receipts	6,706,448	593,741	7,300,189

Summary of Votes under the Control of the Minister of Works and Proposed Ways and Means of raising the Necessary Funds, Year ending 31st March, 1947

Vote.	Miscellaneous Receipts.	Loans.	Consolidated Fund.	Special Revenue.	Total.
	£	£	£	£	£
Railway Construction	45,000	355,000	..	..	400,000
Housing Construction	332,000	7,500,000	..	..	7,832,000
Public Buildings	250,000	550,000	..	..	800,000
Lighthouses and Harbour-works	2,000	38,000	..	..	40,000
Roads, &c.	10,000	340,000	..	..	350,000
Soil Conservation and Rivers Control	80,000	370,000	..	..	450,000
Irrigation, Water-supply, and Drainage	115,000	685,000	..	..	800,000
Main highways	170,000	1,180,000	..	2,150,000	3,500,000
Maintenance of Public Works and Services	2,418,000	..	2,402,500	..	4,820,500
	3,422,000	11,018,000	2,402,500	2,150,000	18,992,500

For the current financial year, 1946–47, a sum of £2,402,500 will be provided from the Consolidated Fund for expenditure on the purchase of plant and on maintenance of public works and services. The expenditure on main highways (including permanent appropriations estimated at £256,225) is estimated to reach £3,756,225, of which a sum totalling £2,406,225 is expected to be raised by way of special revenue and special funds for employment of seasonal workers on highways works.

Miscellaneous receipts (previously shown as credits-in-aid) for all votes are estimated at £3,422,000.

MAIN HIGHWAYS

During the year every effort has been made to overtake arrears of maintenance, and the extent of the resealing carried out exceeded that of the previous year by 134 miles. Extra graders and other roading machinery have recently become available, and with the possibility of securing additional man-power it is hoped that by the end of the approaching paving season there will be considerable improvement in highway surfaces, but much will still remain to be done to restore the highways to the standard which obtained prior to the outbreak of war.

It is unfortunate that the supply position is retarding the bridge-renewal programme, but everything possible is being done to improve matters.

It has been found possible to resume work on some of the improvement schemes that were suspended during the war period, and further improvement works will be put in hand as circumstances require and plant and man-power become available.

The promotion of every means whereby the safety of highways can be improved for all classes of road-users is one of the most important matters which have received attention. At the outbreak of war, studies were being made of design problems affecting routes in the vicinity of urban areas where conditions were becoming serious because of congestion and the wide variety of traffic involved.

In approaching this problem it was recognized that what might be termed the traditional roading methods would not offer a satisfactory solution, but that consideration would have to be given to some adaptation of the divided highway which has secured world recognition through the effective results obtained from experience in older and more-developed countries. It is now almost universally recognized that, where traffic densities are not even as great as those of our more important national roads, there must be segregation of motor-vehicles from other forms of traffic, and that, while the all-purpose roads will remain for property access, for pedestrians, cyclists, stock, and for local and inter-village motor traffic, there should, in some cases, be motorways solely for the use of motor-vehicles. These would by-pass towns and built-up areas, and would traverse the country without ribbon development. Turn-outs from and entrances to the motorways would be limited to selected points where the layout of the junctions would incorporate the safety principles recognized by highway engineers. The motorways would traverse the country in the manner of a railway with no ribbon development, and with no access except at properly designed junction stations.

The provision of this type of highway has become a matter of necessity in the interest of safety and economic transport, and to this end motorways are now being surveyed and designed in localities where the demand is most urgent.

At the same time, all-purpose and inter-village roads will receive due attention, and the highways farther afield, where traffic densities do not justify motorways, will continue to be developed along lines of safety and economy of transport for both passengers and goods.

PUBLIC BUILDINGS

With the cessation of defence construction, activities have been concentrated on urgent civil works, included amongst which are the following :—

Department of Agriculture.—Buildings have been erected in connection with the animal research station at Manutuke, near Gisborne.

Air Department.—A new signals area has been completed at Gisborne Aerodrome, and a new control tower is in course of erection at Wigram.

Army Department.—Six large store buildings, ex Waterloo, Pahautanui, and McKay's Crossing, have been re-erected at Trentham, and additions to the Ordnance Stores at Hopu Hopu Military Camp have been completed.

Education Department.—The lodge has been completed at Lincoln College, and the new Wellington Girls' College, Lower Hutt Intermediate School, and a new dormitory block at Burwood Girls' Home are under construction.

Government Buildings.—Reconstruction of the Manawatu Building in Palmerston North is well in hand, and rearrangement of offices at Hamilton, Hokitika and Invercargill have been completed.

Health Department.—New or additional hospital accommodation has been provided at Hanger and Nelson; and staff accommodation at Nelson and Palmerston North. Additional accommodation has been provided at the Children's Health Camp at Maunu. The emergency block No. 2 at Burwood Hospital is nearing completion.

Marketing Department.—Extensions to buildings in connection with dehydration plants have been completed at Riccarton and Pukekohe. Two wool-stores have been erected at Napier.

Island Territories Department.—A new sanatorium, designed in New Zealand, has been erected at Rarotonga.

Justice and Prisons Department.—New farm buildings have been erected at the Arohata Borstal Institution, utilizing prison labour.

Land and Income Tax Department.—Office accommodation has been provided or is under construction at Christchurch, Dunedin, Greymouth, Invercargill, Nelson, New Plymouth, Wanganui, and Whangarei.

Mental Hospitals Department.—New buildings erected include an occupational training school and workshop at Avondale; villas 4, 5, 7, and 8, together with the new laundry block at Porirua; villas 7 and 8, water-tower, and 8 staff cottages at Lake Alice, Marton; and alterations to dormitory block at Weraroa are under construction. Preliminary work is in hand in connection with the new hospital at Cherry Farm.

Mines Department.—Camp accommodation has been provided at Glen Massey opencast mine.

Native Department.—A housing scheme has been completed at Moerewa Freezing-works, and 8 houses have been erected at Hamilton.

Police Department.—A new station has been erected at Dunedin Central, and two residences completed at Hamilton East.

Post and Telegraph Department.—New buildings were constructed or are under construction at Culverden, Dargaville, Darfield, Gore, Island Bay, Kaikohe, Karori, Oreti Beach, Papakura, Seddon, and Whangarei. Several clock-towers have been demolished as a precaution against earthquake damage.

Public Works Department.—Buildings have been completed or are in course of erection at Dunedin, Kaitaia, and Sockburn for various departmental activities.

Rehabilitation Department.—Accommodation comprising offices and training centres, &c., has been provided in eight centres.

Railways Department.—A new goods-shed at Christchurch, a large reinforced-concrete structure, is nearing completion.

Scientific and Industrial Research Department.—Farm buildings have been erected at Lincoln, and a laboratory for plant research at Palmerston North is nearing completion.

State Forest Service.—Accommodation for workmen has been provided at Berwick, Dunedin.

War Assets Realization Board.—Sundry buildings on Air Force and naval stations have been disposed of, and the valuation and reclamation of material and equipment have been undertaken on behalf of the War Assets Realization Board.

Miscellaneous.—Buildings of all designs and sizes, from small stores to large warehouses, from roadmen's cottages to completed camp accommodation for workmen, offices, workshops, &c., have been erected, extended, altered, repaired, and, in addition, the continuous task of maintenance has been attended to, in spite of difficulties in respect of labour and material supplies.

HYDRO-ELECTRIC DEVELOPMENT

Construction work on hydro-electric schemes has been given special priority during the year. The power-house at Waikaremoana Upper Development was completed in February of this year, and erection of the first turbine, some, but not all of the parts of which have arrived in New Zealand, is proceeding. It is hoped to complete the 10-ft.-diameter tunnel from the headgates shaft to the intake structure by December of this year, when practically all construction work, with the exception of penstocks and the sealing of leakage from the lake, will be completed. This sealing will be undertaken at some future time after the new intake is in operation and the lake is at a low level.

As a means of increasing the quantity of water available for Tuai and Piripaua Stations, three 4-ft.-diameter steel siphons have been installed at Onepoto and are in continuous operation.

At Karapiro the major part of the excavation and the power-house structure have been completed, and 10 per cent. only of the work on the spillway section and siphons remains to be done. It is anticipated that construction work will be virtually completed by December, 1946.

Portal excavation at the diversion tunnel has commenced at Maraetai, and foundations investigations continue at Cobb River and Lake Tekapo Schemes. A commencement has also been made on the construction of the large intake tunnel on the Tekapo Scheme. This tunnel is constructed through glacial moraine, and in this type of material it is difficult to provide full watertightness with the usual methods of tunnelling and lining. At Tekapo, for the first time in New Zealand, we are utilizing methods evolved abroad to secure on completion a thoroughly sound job. Unfortunately, this work has been interfered with by the war, and some initial difficulties have been experienced which have to date delayed progress. Most of these troubles have been overcome, and it is hoped that in the near future much better progress will be obtained.

Work continues on access to the proposed site at Black Jack's Point Scheme, on the Waitaki River, but it seems more likely that the Coal Creek Development on the Clutha River above Roxburgh will be given priority.

The Highbank Power Scheme, the power-house of which is situated on the banks of the Rakaia River and which uses water from the Rangitata Diversion Race, was put into operation during the year.

HOUSING

The diversion of production from military to civilian needs has made possible an increase in the output of housing construction, both public and private.

It was expected that production would be limited by the amount of man-power and materials available. To overcome the former, carpentry training centres for the training of ex-servicemen have been expanded, and so far there has been no real shortage of tradesmen. At 31st March, 4,473 workmen were employed by contractors on the actual construction of State houses, and it is significant to note that over recent months almost one-third of the total number of tradesmen engaged have been trainees under rehabilitation schemes.

The shortage of materials has, however, not been overcome, but every effort is being made to keep up the production of houses by the use of substitute materials until the supply position improves.

In spite of these difficulties, 2,954 house units were completed by the Department during the year, as compared with 1,969 the previous year, and, in addition, 3,147 units were under construction at the end of the year. To be added to these figures are 31 rural houses built and 106 houses in course of construction under the rehabilitation scheme for the settlement of returned servicemen on farms. Also, over 450 temporary dwellings were erected for farmers under the Rural Housing Emergency Act, and some 370 miscellaneous farm buildings, such as milking-sheds, wool-sheds, &c., were either erected or are in course of erection on farms settled by returned servicemen.

To provide for future sites, suitable land is continually being bought, and at present some 21,400 sites are held for future operations. In addition, plans are in hand for the development of large-scale housing schemes adjacent to the different towns, the most important schemes being Tamaki at Auckland, and the Porirua Basin at Wellington. Each of these latter housing undertakings will be fully developed and will ultimately provide for a population of some thirty thousand people. The plans embrace all amenities in accordance with the most modern town-planning practice.

HOUSING CONSTRUCTION SERVICES

The Public Works Department has undertaken a considerable amount of work in preparation of building-sites, construction of roads and footpaths, and installation of water, sewerage, and drainage services in connection with housing construction, especially in the Hutt Valley, where 1,500 sections were made available for building purposes during the year. Except for delays in the construction of kerbs, channels, and concrete footpaths due to the cement shortage, good progress was maintained throughout.

COAL PRODUCTION

All possible assistance has been given to the Mines Department in the development and operation of opencast mines in various localities. My Department has appreciated the seriousness of the coal shortage, and heavy excavation plant has been used with a view to producing the maximum tonnage of coal in the minimum of time.

Opencast production has been greatly hampered by adverse weather conditions, which have frequently prevailed; nevertheless, a steady coal output has been maintained from all mines.

The new mine at Wangaloa, upon which work commenced late in 1945, had produced 8,632 tons of coal by March of this year, despite the considerable amount of development work involved in constructing one mile and a half of access road, a railway siding, screening-plant, and workmen's accommodation.

LIGHTHOUSES AND HARBOUR-WORKS

The electrification of Godley Head Lighthouse, the completion of a sewage disposal and drainage system at Portland Island Lighthouse, and the installation of marker buoys in the Kaipara Harbour, were the only new works undertaken for lighthouse services.

Extensive repairs to the Hokitika Wharf were effected.

SOIL CONSERVATION AND RIVERS CONTROL

During the year under review ten Catchment Boards have been in operation, while an eleventh has been constituted, but the election of its members has not yet been held. The recruitment of staff for these Boards is still a problem, but with the return of technical men from the fighting Services these difficulties should shortly be solved.

I am pleased to advise honourable members that Catchment Boards have been submitting to the Soil Conservation and Rivers Control Council well-conceived proposals for holding rivers and for protecting land and settlement from erosion and inundation. At the same time all Boards have been investigating the origin of their problems, which are situated mainly in the headwaters of the streams and, with much assistance from the technical Government nominees on their Boards, are making surveys and, in certain cases, have already consolidated proposals for the steady development of remedial measures in particular areas.

As I have addressed honourable members on an earlier occasion, "hill country drained by large rivers has been permitted to be denuded of forests, willows have been allowed to grow till they have choked the flow of rivers and allowed flood-waters to escape over surrounding country, and rivers have been left to erode their banks and fill up their beds with silt, soil, and shingle. All these causes of flooding could long ago have been removed, or at least very much mitigated, by judicious reafforestation, and maintenance and control of river-beds."

With the availability of heavy earth-moving plant and the return of servicemen to their peacetime avocations, it is expected that comprehensive river-control schemes in the lower reaches of the more important rivers can be commenced as soon as surveys and plans and financial arrangements are completed.

However, I must again impress honourable members with the fact that such measures are mainly in the nature of a short-term palliative. Remedial or protective steps must go further than this and relate to work designed to prevent the soil and debris from being washed from the land and from being deposited in the river-channels.

On the steep hinterlands, where pasture cannot be held satisfactorily, large areas must be retired from grazing by animals, protected from all fires, and either be regenerated in native forest or be reafforested; this will not only provide the necessary protective covering, but in the years to come will supplement the nation's sources of useful timber. On sloping lands, where it is practicable to retain pasture, activities should be along the lines of strengthening this pasture cover by reseedling, by provision of fertilizers, or by better methods of pasture management and better control of land use. In many cases there are small isolated works, of holding slips, or plugging gullies, or retiring small areas of steep slope. These may require in some instances modest engineering works to save the soil, but it is evident that the greatest results will come from improvements in the use of the land. The conditions referred to are the sources of much of the soil and debris which pour down into the main river valleys to raise the beds of the rivers and imperil by flood or deposit the richest of our low lands; it is from here that our irreplaceable soil is lost; it is here that by good farming and conservation the amount of rain which soaks into the soil can be increased and surface run-off of the balance of the rain can be delayed so that it trickles rather than runs down erodible slopes and stream beds; from here flood crests can be lessened and the amount of soil washed annually to sea can be decreased.

These are some of the problems which confront the Soil Conservation and Rivers Control Council, but, with the assistance and co-operation of Government Departments, Catchment Boards, local bodies, and landowners, a definite plan of campaign is emerging. It is by the progressive execution of such a plan that lasting benefit to the nation will be achieved.

RAILWAY CONSTRUCTION

Another important milestone in the history of railway construction in New Zealand was reached when the South Island Main Trunk Railway was opened for through traffic. It was my privilege to drive the last spike on the 29th September, 1945, and subsequently the settlers of North Canterbury and Marlborough celebrated the long-awaited occasion which marked the formal introduction of through railway transport facilities in these districts. In the last section of the line constructed a considerable amount of tunnelling was necessary, and some of the tunnels are through unstable and difficult country. Difficulties, to which I have alluded before, have been encountered, and possibly later some further strengthening work will be required. This, it is thought, will not necessitate any interruption of the service, and will be put in hand as labour and materials permit.

Consequent upon the development of State housing projects in the Hutt Valley, existing railway facilities have had to be extended, and a regular service is now running as far as Naenae Station, 1 mile 40 chains beyond Waterloo. It is hoped that a single track to Taita Station, 1 mile 40 chains beyond Naenae, will be completed soon. Investigations are in hand in connection with several alternative schemes for extending the line through the Taita Gorge to join the existing line near Silverstream.

The shortage of cement seriously curtailed operations on the Turakina-Okoia Railway Deviation, no cement deliveries being made from August, 1945, until January, 1946. From January onward work continued as limited supplies of cement became available, and I am glad to say that the Turakina Tunnel, 6,830 ft. in length, is almost completed, and good progress has been made with Fordell and Wangaehu Stations, the Wangaehu Bridge, and the trimming of the formation in preparation for platelaying by the Railway Department.

ROAD CONSTRUCTION

During the year road construction for the whole of New Zealand was on a very moderate scale.

Fifty-five miles of formation, 98 miles of metalling, and 1,800 lineal feet of bridging were completed, and general investigations and surveys have been carried out as circumstances allowed and with the limited staff available.

IRRIGATION AND WATER-SUPPLY

As with the preceding year, the past irrigation season has been marked by unseasonal rains and floods, lowering the demand for water and increasing the amount of maintenance necessary on most schemes.

Of considerable importance was the completion of the water-race system and the initial operation of the Ashburton-Lyndhurst Scheme, where 699 acres of land prepared by the border-dyke method were regularly irrigated and a further 705 acres of unprepared land supplied at a time when crops were threatened by dry conditions which prevailed at the end of the season. Preparation of land by the border-dyke method continues with a view to eventually bringing a total of 68,000 acres under irrigation.

Construction on the Mayfield-Hinds Scheme, designed to irrigate an even greater area—78,000 acres—is being pushed ahead as conditions permit. Additional flood-discharge siphons have been installed on the Rangitata Diversion Race, and investigation work for the Marlborough and Maniototo Irrigation Schemes is proceeding as opportunity offers.

This year the Irrigation Engineer returned from visits to Australia and America, where he made a comprehensive first-hand study of irrigation projects, methods, and conditions over a very wide field. The experience and information so gained, when co-ordinated with the regular investigations which are being carried out in this country, will be of the utmost value to my Department and the Government in planning and operating future irrigation schemes for the further development of our natural resources.

Considerable flood damage which occurred in the Downlands Water-supply Scheme has been remedied. Progress on the important Wellington Water-supply Scheme has been hampered by the lack of technical staff and skilled labour. However, much of the preliminary work, such as surveys, the construction of a two-mile access road to the Weir Intake site and the erection of workmen's accommodation has been carried out.

LANDS IMPROVEMENT

In the programme of work under this head there has been little variation from the operations of the previous year, and the same difficulties of labour shortage and lack of plant because of more urgent work have limited progress in the past year.

Steady progress was maintained on sand-dune reclamation at Woodhill-Helensville, Maioro and Hokio (Manawatu) Schemes, whilst in the South Island the settlers of Invercargill and Westport districts took full advantage of the Government's land-clearing scheme to increase production.

PLANT AND MECHANICAL

The expansion of industries during the war has had a marked influence on the demand for men trained in the mechanical trades and, despite the return of so many men from the Armed Forces, a shortage still exists. Lack of these skilled men has somewhat held up work in the Department's workshops, and, where possible, available firms have been engaged to carry out certain work.

The role of mechanical equipment in an organization such as the Public Works Department can scarcely be overemphasized. It not only reduces the cost and increases the speed of many types of construction, but it greatly extends the range of economic feasibility. Certain types of works would have been impossible without the aid of machines, notably large drainage and river clearing works and others quite uneconomic, such as stumping and land clearing for agricultural purposes. The use of mechanical plant has reduced the physical demands on workmen and generally has improved the working-conditions and lowered the risk of accident. Most important, perhaps, is the strong interest of the younger generation, especially returned servicemen, in the use and maintenance of machinery of all kinds, arising no doubt from the call for mental as well as physical aptitude.

Before the war the Public Works Department had reached a high level of mechanization with the best type of plant then available, but the extraordinary demands of the war construction programme, coupled with the direct loss of much plant to the Forces overseas, had, at the cessation of hostilities, greatly weakened the plant position. Mechanical equipment played a prominent part in the prosecution of the war, and when it ended I foresaw an exceptional opportunity to replace much of what we had lost. Accordingly, my Chief Mechanical Engineer and other experts were sent to the Pacific area, where arrangements were made for the purchase of a considerable amount of plant and machinery from the American Forces. Most of this equipment has reached New Zealand and has been examined and sorted for distribution to the various districts as transport becomes available. I am pleased to be able to say that the transaction was eminently satisfactory to both parties, and that as a result the Department's mechanical equipment has been restored to its pre-war efficiency, and, in some respects, is now superior. With the addition of certain items still to arrive the Department will possess sufficient equipment to enable it to undertake the large programme of works which lie ahead.

I wish to acknowledge the loyal and efficient co-operation given by officers and workmen throughout the whole of the Department.

In particular, I desire to place on record the Government's appreciation of the services of the following officers who have retired after completing forty years' service:—Mr. W. L. Newnham, Engineer-in-Chief; Mr. T. M. Ball, Assistant Engineer-in-Chief; Mr. H. Watkinson, Inspecting Engineer; Mr. John Thompson, Divisional Officer; Mr. V. C. Curtis, Chief Clerk, Christchurch; Mr. G. F. Jackson, Roads Clerk, Head Office.

Further information relating to public works carried out during the past year is included in the attached reports by the Engineer-in-Chief, the Government Architect, and the Director of Housing Construction.

The report of the Chief Electrical Engineer, which hitherto was attached to the Public Works Statement, is being submitted separately this year in view of the constitution of the State Hydro-electric Department, and will be included in parliamentary paper D-4.

In accordance with section 24 of the Main Highways Act, 1922, the annual report of the Main Highways Board for the year ended 31st March, 1946, is also submitted herewith, *vide* Appendix E.

As required by subsection (2) of section 33 of the Soil Conservation and Rivers Control Act, 1941, I also submit with this statement the annual report of the Soil Conservation and Rivers Control Council covering the operations of the Council for the year ended 31st March, 1946.

R. SEMPLE,

Minister of Works.

APPENDICES

TO THE

PUBLIC WORKS STATEMENT, 1946

APPENDIX A

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS OUT OF THE PUBLIC WORKS ACCOUNT AND ELECTRIC SUPPLY ACCOUNT FOR THE YEAR 1945-46

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

Public Works Department, Wellington,
17th June, 1946.

SIR,—

In compliance with the eighth 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 Account and to the Electric Supply Account.

I have, &c.,

R. SEMPLE,

Minister of Works.

The Controller and Auditor-General, Wellington.

STATEMENT OF EXPENDITURE ON ALL WORKS AND SERVICES CHARGEABLE TO THE
PUBLIC WORKS ACCOUNT AND ELECTRIC SUPPLY ACCOUNT FOR THE YEAR 1945-46

—					Appropriation.	Expenditure.		
					£	£	s.	d.
Railway Construction	..	..	..	..	211,000	308,050	8	5
Housing Construction	..	..	..	..	5,590,000	5,709,995	3	2
Public Buildings	..	..	..	..	780,000	665,263	13	9
Education Buildings	..	..	..	..	1,205,000	1,187,822	19	11
Lighthouses and Harbour-works	..	..	..	..	47,350	11,593	4	2
Roads, &c.	..	..	..	..	210,000	171,603	12	1
Soil Conservation and Rivers Control	..	..	..	..	200,000	212,271	9	6
Lands, Miscellaneous	..	..	..	..	57,540	59,690	11	11
Irrigation, Water-supply, and Drainage	..	..	..	..	640,670	390,312	15	0
Linen Flax Development	..	..	..	..	536,917	403,809	5	8
Unauthorized expenditure : Services not provided for					..	140	0	0
Totals, Public Works Account	..			..	9,478,477	9,120,553	3	7
Electric Supply Account	..			..	5,016,934	4,341,199	5	9
Totals	..			..	14,495,411	13,461,752	9	4

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. W. SCOTT, A.R.A.N.Z.,
Chief Accountant.

W. L. NEWNHAM, M.Inst.C.E.,
Permanent Head.

The Statement of Expenditure charged to the Public Works Account and the Electric Supply Account has been examined and found correct.—J. P. RUTHERFORD, Controller and Auditor-General.

APPENDIX B

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

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

SIR,—

I have the honour to submit the following report on the various public works completed and in progress throughout the Dominion during the year ended 31st March, 1946 :—

RAILWAYS

Turakina-Okoia Railway Deviation.—Tunnel reconstruction was well in hand at the beginning of the year, but the increasing shortage of cement seriously curtailed operations until August, 1945, when the supply ceased. No further cement deliveries were made until January, 1946. Meanwhile the workmen were, as far as possible, employed on alternative work, including highway maintenance, until October, when key tunnel-workers and maintenance tradesmen only were retained.

As cement became available from January, 1946, onward, tunnel-work was continued on a reduced scale, and the Turakina Tunnel, 6,830 ft. long, is almost completed.

Good progress has been made with the construction of both the Fordell and Wangahu Stations.

The launching of the Wangahu Bridge was achieved early in the year, but the pier extensions have yet to be completed.

The approaches, formation, metalling, and fencing of Wangahu overbridge are completed, and the strengthening of one pier of Turakina Bridge is well advanced.

Formation trimming has been commenced at the northern end in preparation for platelaying, to be undertaken by the Railway Department.

Hutt Valley Railway Extension.—The train is now running as far as Naenae Station (Park Road), $1\frac{1}{2}$ miles beyond Waterloo Station. In the near future it is hoped to extend a single track for approximately 1 mile 40 chains to Taita Station, up to which formation was completed this year.

Temporary railway platforms and stations have been constructed at Epuni and Naenae. At Taita metalling of the station-yard in readiness for track laying has been completed.

Test piles have been driven on the sites of railway overbridges at Waterloo, Park Avenue, Cemetery Road, and Taita Road, and investigations in connection with several alternative schemes for the proposed extension of the railway through Taita Gorge to Silverstream—a distance of approximately $3\frac{1}{2}$ miles from Taita Station—are proceeding.

South Island Main Trunk.—The last spike was driven on 29th September, 1945, and the completed line opened for through traffic on 15th December. During the year ballasting and platelaying were completed and general cleaning up effected; 16,597 cubic yards of ballast was spread and packed, 2 miles 31 chains of platelaying laid, and 622 feet of culverting constructed.

On the Kaikoura section construction continues on the Hapuka Stopbank where approximately 45 chains of stone pitching and 1,280 cubic yards of mass concrete block construction have been completed to date and for the year 44,000 cubic yards of filling placed.

On the Hundalee-Puketa Section $9\frac{3}{4}$ chains of tunnel barrel extension in the open has been completed and 34 lineal feet of continuous invert constructed in Amuri Tunnel.

Work on sea and river protection is in hand, 7 chains of concrete seawall having been finished.

HYDRO-ELECTRIC DEVELOPMENT : CONSTRUCTION WORKS

Waikaremoana Upper Development.—Construction continues as speedily as conditions will permit, March, 1947, being the target date set for the completion of this work.

The first turbine for installation in the recently completed power-house is due to arrive in New Zealand in July, the second following three months later.

By December, 1946, it is anticipated that the 10-ft.-diameter pressure tunnel between the headgates shaft and the intake structure will be completed. The latter has not been commenced, but no great difficulties are anticipated in construction.

Of the 6,000 ft. of 7-ft.-diameter welded pipe required for the pipe-line, none has yet been manufactured; but the contractor's installations are almost ready.

For grouting and investigations, 90,219 lineal feet of boring has been completed and 4,850 cubic yards of grout, requiring 4,490 tons of cement, were injected during the year.

Work has been completed on the twin tunnels from the portals to the headgate shafts, a total length of 806.5 ft. having been excavated and concrete lined during the year. To expedite construction, tunnelling operations have been carried on continuously since November, 1945—twenty-four hours a day, seven days a week—No. 1 tunnel reaching completion by 16th January and No. 2 tunnel by 17th February, 1946.

The twin 8-ft.-diameter tunnels will be merged into a single 10-ft.-diameter tunnel near the intake at a point some 90 ft. on the lake side of headgates shafts, and since February, 1946, the excavation and lining of this length of No. 1 tunnel only has been pushed ahead continuously. No. 1 headgate shaft was sunk to the required level—1,945.8 ft.—by 17th July, 1945, and No. 2 headgate shaft completed under difficulties by 12th February, all being in readiness for concrete-pouring by the end of March.

Concrete placed per lineal foot of tunnel averaged 2.13 cubic yards in each tunnel, and grouting behind the tunnel lining utilized 1,800 cubic yards of grout for 1,306 lineal feet of tunnel and 40,711 ft. of boring, of which 16,289 ft. was reboring. The maximum flow of water in tunnels while under construction was 16 cusecs. Six standard penstock pedestals were concreted and the penstock "raft" section excavation and that for all anchor blocks was completed.

In the construction of the tailrace 990 cubic yards of concrete were placed. Concreting of the power-house building was completed in February, 1946, and the 60-ton overhead crane has been erected and is now in use.

Considerable progress has been made with the outdoor substation structures, 724 cubic yards of concrete being placed.

Work on the Kaitawa weir and canal widening is proceeding satisfactorily, and water was turned through the 500-ft.-long fluming in February, 1946.

To increase the quantity of water available for the existing Tuai and Piripaua Stations, three 4-ft.-diameter steel siphons have been installed at the outlet to the lake, and these have operated most satisfactorily. The necessity for difficult coffer-dam work was eliminated by the unusually low lake-levels.

Investigating work for future leak-sealing in the outlet barrier consisted of driving eight test bores in the vicinity of the outlet and forming access roads for boring machinery over the whole outlet leakage area.

Karapiro Development.—The major part of the excavation has been completed including an additional extension to the gravity extension at the right abutment, the excavation of the core walls at both abutments, and the foundations of the draught-tube extension, where it was necessary to cut 10 ft. below sea-level in certain parts to obtain solid. Up to 31st March, 1946, 575,000 cubic yards of spoil have been excavated and 191,930 cubic yards of concrete placed, 60 per cent. of which was included in the main structures.

Owing to slips, additional excavation was necessary for the low-level road, the base-course metalling of which has now been laid.

All that remained of consolidation grouting was completed with the finishing of the left abutment, though 20 per cent. of the curtain-wall grouting remains to be done.

During the year the power-house structure concreting was completed, the roof asphalted, and 80 per cent. of the internal and external plastering done; the finishing of the interior—such as lining and painting—and the office block are well in hand.

The scroll-case draught-tube liner, &c., for No. 1 unit and the six concrete draught-tube gates were installed, and the erection of scroll case No. 2 and draught-tube extensions is under way.

All but 10 per cent. of the work on the spillway section of the dam and siphons has been completed, the work in hand being the side walls and end wingwalls of the spillway, a footpath, and hand-railing. The intake section is 80 per cent. complete, with 40,500 cubic yards of concrete placed. The arch section has been completed to a level 20 ft. below the roadway over the dam, with 85,500 cubic yards of concrete placed to date.

Left and right abutments and gravity extensions have almost reached completion, as has the core wall, which can now be joined into the two abutments.

Preparations are in hand for the sand blasting and painting of the penstock steel linings, the installation and welding of the auxiliary penstocks, and by-pass pipes having been done during the year.

The outdoor station main structures have been completed and the surrounds levelled for grassing.

Work was commenced during the year on the Karapiro Stream side of the Tunakawa-Karapiro Ridge. To date, 60 per cent. of the 3 ft. porous-concrete pipes have been cast, 200 ft. of drain with filter completed, 400 ft. of outlet drains laid, and two 90 degree V-notch weirs have been constructed at the outlets of the drain.

A 7½ ton radial cableway was erected during the year, this being used mainly for the concreting of the arch and left abutment sections.

In the permanent village, levelling, grassing, kerbing, and channelling continues with 20 per cent. of the work yet to be done. The erection of the substation and hose-reel house is in hand.

The Little Waipa, Pairere, and Maungatautari road deviations were completed during the year, and on the State highway deviation of approximately 1 mile in length some 100,000 cubic yards of earthwork was moved. Work is now in hand on base-course metalling. Maungatautari Bridge—730 ft. long—is well advanced, foundation work, all piers, and two 60 ft. reinforced-concrete spans being completed.

Some 17,000 cubic yards of stone have been won from the old departmental quarry at Horahora, recently reopened to provide material for stone pitching future submerged portions of fills and for base courses.

Incidental structural work for No. 5 unit at Arapuni power-house was commenced during the year and is almost completed.

The maximum number of men employed during the year was 1,136, the average 1,035, of which 135 were carpenters, 230 tradesmen other than carpenters, and 670 labourers. The highest employment figure for carpenters was 180 for July, dropping to 95 in March. The abolition of man-power control made it difficult to obtain tradesmen, particularly carpenters. Records show that 8.3 per cent. of total available time worked was lost through absenteeism.

Maraetai Scheme.—Most of the work for the year was of a preliminary nature, good progress being made with access roading, temporary bridging, extensive surveys, and investigations.

Work was commenced on rock excavations for the inlet and outlet ends of the diversion tunnel.

Although mechanical means were fully employed, the shortage of artisans was a handicap.

Highbank Power Scheme.—The power-station operated during the winter of 1945. An extra 150 ft. has been added to the concrete lining of the tailrace, and the construction of a new access roadway to the station is now in hand. Certain permanent village buildings damaged by the flood of 1945 were resited, and a new water-supply, drainage, and roading has been completed.

Lake Tekapo Scheme.—During the past year progress has been difficult owing to loose and broken country above the old test drive, and the presence of a seam of large boulders requiring boring and shooting. The seam is gradually lifting, and the shield should soon pass under it. Certain mechanical difficulties have been experienced with the shield, but these have largely been overcome, and the experience gained with this shield is built into a second shield which has been manufactured at Temuka Workshops and erected in the gate-shaft chamber at the lake end of the tunnel. A ventilation system has also been installed.

Detailed surveys have been carried out for the siting of the power-house, surge chamber, tailrace, and the dock-site for the section of the tunnel intake which is to be built and floated into position. A rotary screen, belt-conveyers, new sand-wash, and new batching-plant have been installed, and sufficient washed and screened stock pile of concrete aggregates is available for winter months.

General maintenance and improvements have been carried out on roads, accommodation, and facilities.

Black Jack's Point Scheme : Waitaki River.—A contract has been let for metalling 10 miles of access road to the proposed site. The design for a suspension bridge is under consideration.

Cobb River Scheme.—Work during the year covered further investigations of the foundations on the dam-site, with a view to the further development of this useful scheme. As in the past, difficult conditions were met in the exploration shafts, due to water inflow. An average of 53 men was employed. Routine maintenance was carried out on access roads and workmen's accommodation.

IRRIGATION

In both Otago and Canterbury, wet winter and spring conditions increased the amount of maintenance work necessary on some schemes. Further flooding after the major flood of 1945 caused damage in particular localities in Canterbury, and the whole irrigation season in Otago was characterized by unusually heavy rains, which continued into January. In the first five months of the season, commencing September, 1945, the Alexandra rainfall amounted to 72 per cent. of the annual average.

Central Otago.—The sales on the Omakau Scheme, operating on a demand basis, improved upon last year's figures, being 6,518 acre/feet, compared with 3,624 acre/feet for 1945.

New construction work was limited to minor extensions on the Ida Valley Scheme and shortage of casual labour hampered maintenance work in the off-season.

Further surveys and investigations for the proposed Maniototo Scheme were undertaken.

The number of irrigators has increased from 443 (1944-45) to 445. Out of twelve schemes commanding a total of 53,000 acres, 43,832 acres were actually irrigated in the 1945-46 season.

The financial statement for Central Otago Schemes shows revenue at £24,700 and working-expenses £29,778, which include the cost of a new raceman's cottage and £800 for pipe-line replacements. The loss there is £5,078.

Rates collected have decreased from £26,616 (1945) to £24,566 (1946).

The term of irrigation agreements in various schemes has now expired and the question of future irrigation charges is being investigated, so that new agreements can be made.

Canterbury.—This year saw the completion of the waste-race system and initial operation of the Ashburton-Lyndhurst Irrigation Scheme; also the installation of additional flood-discharge siphons on the Rangitata diversion race.

Levels Irrigation Scheme—commanding 12,000 acres—has been in operation eight years. This year 1,780 acres were irrigated for a revenue of £402 from forty-three irrigators. Working-expenses, £2,877.

Redcliff Scheme—commanding 4,600 acres—has been in operation nine years. Twenty-eight acres were irrigated this year for a revenue of £54 from two irrigators. Working-expenses, £858. Irrigation has been effected by rainfall and the prevalent high ground-water conditions.

Ashburton-Lyndhurst Scheme—commanding 68,000 acres—commenced operation this year, irrigating 1,404 acres for a revenue of £428 from thirty-six irrigators. Working-expenses were £7,279.

Water was applied regularly to 699 acres previously prepared by the border-dyke method. Unprepared areas also received water to save turnip crops during dry conditions at the end of the season.

Whilst the waste-race system was proceeding to completion, extra flood-discharge siphons were installed on many points of the scheme, and work was carried out on small race extensions, of which one only remains to be completed.

Mayfield-Hinds Scheme—eventually to provide for 78,000 acres—is under construction, work being confined to small concrete structures on the race reticulation. No start has been made on the intake works, but extra camps have been set up to accommodate seasonal workers expected during the winter season.

Rangitata Diversion Race.—Additional flood-discharge siphons have been installed, and the repair and strengthening of concrete protective work on the crossings of the North and South Ashburton and South Hinds Rivers has been completed. Maintenance on the race section and banks is being carried out. Access crossings, fencing, and the erection of a control-gear structure have been completed.

Marlborough.—Systematic water level readings were taken in the Wairau River during the year in connection with the proposed Marlborough Irrigation Scheme.

WATER-SUPPLY

Downlands Water-supply.—A considerable amount of flood damage occurred during the flood which followed the major flooding of February, 1945.

It was necessary to re-establish No. 1 sub-main crossing over the Opihi River, where several piers were washed away, and also the main crossing of the North and South Pareora Rivers. Recaulking of the main pipe-line has been effected over $2\frac{3}{4}$ miles, and general maintenance and operation of the scheme undertaken.

Wellington Water-supply.—Progress on this most important scheme has been hampered by the lack of technical staff and skilled labour.

Survey work has continued slowly, and a limited amount of testing of construction materials has been possible. A technical Committee, consisting of officers of the Wellington City Council and Public Works Department, has been set up to co-ordinate and decide upon technical matters relating to the execution of the work.

At Kaitoke a camp to accommodate one hundred men has been erected, and part of the Trentham Military Camp has been taken over as central headquarters for the job.

A two-mile access road has been constructed through bush to the Weir intake-site. Thirty-four miles of steel pipe, mostly 36 in. diameter, will be required for the whole job, and details for letting a contract for 10½ miles are almost complete.

COAL-PRODUCTION

Work was continued on coal-winning from opencast mines at Glen Afton, Glen Massey, Waitewhena, Stockton, and Ohai, production being affected by adverse climatic conditions and heavy rain.

During August a new mine was opened up at Wangaloa, where development involved the construction of 1½ miles of access roading, a railway siding, screening-plant, and accommodation for workmen. Up to the end of March 60,000 cubic yards of overburden were removed and 8,632 tons of coal extracted.

At Glen Massey 867,480 cubic yards of overburden have been removed for the extraction of 44,881 tons of coal, at Glen Afton 372,260 cubic yards of overburden for 32,583 tons of coal, and at Waitewhena 227,688 cubic yards of overburden for 42,818 tons of coal.

LIGHTHOUSES AND HARBOUR-WORKS

Improvements, renovations, and maintenance of lighthouses and attached buildings have been carried out during the year, together with routine overhaul of equipment. A light access road has been completed at Moeraki Lighthouse, a complete water-supply, sewage disposal, and drainage system installed at Portland Island Lighthouse, and the electrification of Godley Head Lighthouse commenced.

In general, living accommodation has been made more comfortable and access and services improved.

Marker buoys have been installed in the Kaipara Harbour, whilst at Waikokopu a launch jetty has been constructed and a start made on the demolition of the wharf.

Extensive repair work was carried out on the Hokitika Wharf, involving the placing of 2,000 tons of quarry stone, driving 1,000 lineal feet of piling, and placing 3,000 superficial feet of timber. The collapsed portion of the wharf was dismantled.

AERODROMES

In marked contrast with previous years of rapid expansion, the year showed little activity in aerodrome work. This was to be expected as hostilities drew to a close.

As from September, 1945, the responsibility for maintenance of R.N.Z.A.F. stations reverted to the Department, though staffs employed were largely personnel from R.N.Z.A.F. Works Maintenance Unit.

Wigram.—A new flying-field was completed, and subsequently extensive maintenance was necessary to remedy boggy areas and eradicate grass-grub infestation. Work on the control tower was well advanced, and general maintenance of the whole field and residences undertaken.

Harewood.—General maintenance of the whole field has been carried out. Many of the station buildings have been handed over to the Christchurch City Council for transit housing.

Weedons.—Maintenance, including the resealing of the parade-ground, has been effected.

Timaru.—Heavy flooding resulted in damage to the surface and stop-banks. Maintenance along economical lines continues. The survey for an alternative site is at present under way.

In all other districts routine maintenance, and in some cases resowing, took place.

LAND IMPROVEMENTS

Whangarei Sub-district.—Very little work was carried out during the year, although tentative reports on water-supply schemes in various parts of the district were submitted at the instigation of farming organizations and local authorities.

Kaipara Harbour Reclamation.—A new stop-bank and floodgate were constructed, in addition to general maintenance.

Sand-dune Reclamation.—Depending upon the availability of man-power, work at reclamation areas, with the exception of Kaipara Heads, progressed steadily during the year. Stocks of seedlings have been built up, general maintenance and cultivation carried out, and fire-protection measures taken.

At Woodhill-Helensville reclamation line-clearing for the year totalled 1,107 miles; line-cutting, 172 miles; internal roading, 11 miles; and 212,000 trees were planted. In the Woodhill nursery 286,690 trees were lined out.

At Maiero sand-dune reclamation 233 acres of Marram-grass were planted, 410 acres sown in lupin, 291,000 seedlings lined out, and 85,700 trees planted.

On the Hokio-Manawatu area 64½ acres were planted during the year, using 57,800 two-year-old pinus and macrocarpa trees. In the nursery, 72,900 trees were lined out. Of a total of 1,500 acres, 75 acres only remain to be fixed with lupin and marram. All the best areas, a total of approximately 1,200 acres, have been planted in trees.

Land Clearing.—Full advantage is being taken by settlers of the opportunity to increase production through land clearing. Operations continue over widely scattered areas, and mainly in the Invercargill and Westport districts. Unfortunately, work has sometimes been handicapped during the most favourable time of the year due to plant being required upon more urgent works.

In the Westport area during the past year sixty-four jobs were completed, involving land clearing, 339 acres; disking, 46 acres; harrowing, 9 acres; disk-ploughing, 9 acres; clearing of new fence-lines, 129 chains. Machine costs for the year were £686; total expenditure, £907; and total recoveries, £956.

In the Invercargill district, besides a considerable amount of levelling and filling of sections, 1,809½ acres were cleared, 8 miles of track formed, 4½ miles of drainage channels completed, and 2 miles 60 chains of stop-banks raised. Total expenditure amounted to £11,493, and recoveries £13,133. Since the inception of the scheme, 6,292 acres have been cleared.

Berwick State Forest.—Roading and draining of the State Forest Service's new property at Berwick and construction there of a permanent staff camp were undertaken. The camp-site has been levelled and terraced, one mile of road formed and lightly gravelled, and 10 chains of 24 ft. by 6 ft. creek channel excavated. One mile of road is under construction.

HOUSING SERVICES CONSTRUCTION

In housing districts where the scope of work permits the use of plant to any extent, the Public Works Department performs a considerable amount of work on road-formation, footpath and kerb construction, and services installation. In the Hutt Valley all this work is done by the Public Works Department, and in Auckland approximately half. Construction of kerbs, channels, and concrete footpaths was curtailed by the shortage of cement, though good progress was maintained in all other work.

In the Hutt Valley, where 1,500 sections were made available for building purposes during the year, road-formation amounted to 556 chains, sealing 107,860 square yards, and 122,478 lineal feet of sewers, water-mains, and drains were laid.

In Wellington City, amongst other items, 10 acres of land were cleared, 56 chains of road formed, 41,074 square yards of road sealed, approximately 31,000 lineal feet of water-mains, sewers, and drains laid, and 10,510 square yards of footpaths constructed.

CONSTRUCTION AND IMPROVEMENT OF ROADS

Except in Westland County, where an average of sixty-five men was employed continuously on the Jackson's Bay - Haast Section of the Main South Road, extensive road-construction was not carried out during the past year. Routine maintenance on all road surfaces and work on widening and re-forming existing roads and constructing access roads to coalfields, timber areas, and farm settlements was continued.

Flood damage was fairly general, closing the Makarora-Haast Road and necessitating the construction of 72 chains of deviation on the Awahokomo Road.

On the Jackson's Bay - Haast Section, 76 chains of road was formed and a road opened to Haast. The Hindley Creek and Potter's Creek bridges and one at 13 miles 28 chains were completed, and a temporary bridge built over the North flood channel at Arawhata.

Work completed throughout New Zealand for the year totalled 55 miles of formation, 98 miles of metalling, approximately 9,200 ft. of culverts, and 1,800 lineal feet of bridging.

PLANT AND MECHANICAL EQUIPMENT

The return to normal activity within the Department following the cessation of hostilities has not been achieved as rapidly as was expected.

Though many of the mechanical engineering staff have been demobilized, compared with those mobilized, the numbers returning to the Department are few, and it is unfortunate that the suitable mechanical staff required by the Department find more favourable conditions prevailing in the outside engineering world.

This factor, coupled with the relaxation of man-power control, has considerably delayed the planned establishment of the new mechanical workshops. The establishment of the zone workshops is, nevertheless, proceeding according to plan, and when fully staffed and equipped should enable the Department to handle the bulk of its repair-work.

The return from America and the Pacific of the Chief Mechanical Engineer has resulted in the acquisition by the Department of a large quantity of earth-moving plant and workshops equipment. The foresight shown in arranging this purchase will aid materially the furtherance of the ten-year plan recently announced.

The plant received for this and other Government Departments comprises large and medium crawler-type tractors, excavators, carry-all scrapers, scoops, power-graders, road machinery, loaders, and bitumen-spraying plant. Much is ready for immediate use, but a percentage requires reconditioning, and that is being put in hand now to facilitate the replacement of existing mechanical equipment long in need of overhaul.

Generally, the mechanical condition of plant in New Zealand is in direct ratio to the supply of spare parts and the availability of man-power in the engineering trade. As in the past, the Department still has to produce certain consumable spares, not obtainable from overseas, by manufacture in its own shops when practicable and economic.

From a mechanical standpoint the major works on the Waikato River and at Waikaremoana have been well maintained, no serious holdups being experienced. A certain amount of mechanical trouble met with at the Tekapo scheme has been gradually overcome.

The rehabilitation of returned servicemen through adult apprenticeship has been carried out, a large number of men being profitably redirected into industry under this scheme.

Regular maintenance and inspection of all general plant throughout the year has resulted in a gradual return to the high pre-war level of plant efficiency.

The value of the zoning system of plant has been further demonstrated during the year. The increased facility with which concentration of plant can be made where required from the total departmental resources, and at the same time control effected over plant repairs so as to ensure that all labour and spare parts are utilized on machines required on highest priority works is most gratifying. The zone control is producing the maximum machine-hours for all operational machines and consistently directing the flow of materials to maintain the present equipment in good operational condition.

DEFENCE WORKS

The cessation of hostilities has reduced the scope of construction work necessary for defence to such an extent that the completion of work at the Devonport Naval Base and on certain gun emplacements elsewhere are the only items worthy of mention.

The usual general maintenance on the grounds and buildings of remaining service camps, not disposed of by the War Assets Realization Board, the demolition of air-raided shelters, road-blocks, and general defence works, and the restoration of parks and school grounds, continues. General improvements have been effected at the Polish Children's Camp, Pahiātua.

At Devonport Naval Base the Department was called upon to undertake extensive additions to workshops, berthage, and oil-storage facilities.

A new reinforced-concrete breastwork, 800 ft. long and 28 ft. wide, with provision for a 10-ton travelling crane, is almost complete. The berthage has been dredged to give a depth at low water of 18 ft., the spoil being used for reclamation; as soon as the Stanley Bay Wharf has been rebuilt on a new site the approaches will be put in hand. Adjacent to the breastwork a new repair boiler-shop, 450 ft. by 80 ft. has been constructed to house modern machine tools required for major repairs and refits.

Considerations of space and vulnerability against enemy attack led to the adoption of an underground layout for the bulk fuel-storage extension. As far as this country is concerned the type of construction is unique, presenting new construction problems.

Based on an Admiralty design modified to suit local conditions, the layout consists, initially, of four underground concrete-lined storage tunnels, approximately 30 ft. in diameter 380 ft. long, and with a capacity of 24,000 tons of fuel oil.

To prevent the development of cracks due to cooling and shrinkage of concrete, elaborate precautions, when placing the unreinforced-concrete lining, were necessary. The effectiveness of the measures adopted was demonstrated when the first tunnel was put under a full test head of water, leakage being surprisingly small. The new works also included underground substation pumps for new tanks, tunnel access to Ngatarine Bay, and extensive store buildings.

The manufacture of furniture and concrete products at Featherston Prisoner of War Camp ceased when the Japanese prisoners were repatriated last December.

STAFF

I take this opportunity of expressing my appreciation of the loyal and efficient service rendered by the staff throughout the year.

The return of many who had been on service with the Armed Forces was a matter for gratification. With their services available to the Department, the execution of the large programme of work envisaged in the near future will be greatly facilitated.

I have, &c.,

F. LANGBEIN, A.M.Inst.C.E.,

Acting-Engineer-in-Chief.

APPENDIX C

ANNUAL REPORT ON BUILDINGS BY THE GOVERNMENT ARCHITECT

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

SIR,—

I have the honour to submit the following report on the activities of the Architectural Division for the year ended 31st March, 1946 :—

During the year and in conformity with the reorganization of the Department this Division has decentralized to three zones, each including two engineering districts, and District Architects have been appointed and staffs set up in Auckland, Wellington, and Christchurch, whilst Resident Architects, acting under these main centres, have also been established at Hamilton, Palmerston North, and Dunedin. The results have been beneficial to all concerned and greater efficiency and expedition in the handling of works is already evident. Details of a full establishment to give 100 per cent. service to the Government have been drawn up, but it is expected that some time will elapse before this objective can be reached, as the necessary skilled and experienced staff, both professional and technical, as is common in other activities, is not yet available. However, training schemes are in operation both for new appointees and rehabilitation assistance for returned soldiers, and it is expected that a flow of these young men will be progressively coming forward with benefit to the architectural work of the Government and the Department. Training of apprentices and building overseers is also being taken in hand, and it is expected to build up a division of highly trained supervisory and inspectoral staff to fully and adequately supervise all building construction work, which will ensure that our plans and specifications are properly carried out.

Working drawings were prepared for buildings of a total value of £563,231. In addition, sketch plans were prepared for buildings and ancillary works of a total value of £1,103,139.

Wherever possible and when suitable, use has been made of buildings erected for Service purposes and prefabricated steel huts ex-Pacific, the records and information of the War Assets Realization Board being available for this purpose. My officers are also called upon to assist with professional advice and technical investigations in connection with earthquake damage and restorations, with the Commissioner of Works, the War Assets Realization Board, the Standards Institute, the War Damage Commission, with research work, and schemes submitted to the Local Government Loans Board for report and examination.

The closest liaison is maintained with the Administration, Engineering, and the Housing Divisions, whose officers co-operate with mine in a most satisfactory manner, their services being utilized to the full in a consultant capacity.

In addition to certain defence works, costing about £396,000, the following works were carried out :—

Department of Agriculture.—Accommodation has been provided for the Animal Research Station at Manutuke, near Gisborne, and a library block fitted up at Ruakura Animal Research Station. A small animal laboratory is in hand at Wallaceville ; office accommodation has been provided for Plant Research at Hall's farm and the installation of agitators and alterations to existing plant undertaken at Te Kauwhata Winery.

Renovations have been carried out to the Stock Inspector's residence at Lumsden, and alterations to the Stock Inspector's residence at Otautau are in hand.

Air Department.—A new signals area for flying control has been completed at Gisborne Aerodrome and a new control tower is in course of erection at Wigram. General maintenance has been carried out at Rukuhia Aerodrome, Te Rapa Stores Depot, and at Central Camp.

Army Department.—The erection of six large store buildings, ex-Waterloo, Pahautanui, and McKay's Crossing, at Trentham Military Camp has been completed. A new fire-station at Hopu Hopu Military Camp, Ngaruawahia, has been completed, and the installation of fire-fighting mains is well in hand. Additions to the Ordnance Stores have been carried out and tenders have been called for the installation of a sprinkler system.

Earthquake repairs have been carried out to the Artillery and Garrison Halls, Buckle Street, Wellington.

Broadcasting Department.—Renovations to Station 3ZR, Greymouth, and broadcasting studio at Invercargill have been carried out, and additions to residence at 4YA, Highcliff, Dunedin, have been completed.

Customs Department.—Renovations have been carried out to the Westport office and the residence for the Collector of Customs at Greymouth.

Education Department.—The lodge was completed at Lincoln College, and works of a minor nature were completed at Gore High School, Greymouth Technical School, Hokitika School, Westport Technical School, and the boys' and girls' high schools at Whangarei. A tender has been accepted for the erection of additional accommodation at Massey College, Palmerston North, for male students.

The new Wellington Girls' College, Lower Hutt Intermediate School, and a new dormitory block at the Burwood Girls' Home are under construction.

Government Buildings.—Reconstruction of the Manawatu building to provide office accommodation for various Departments in Palmerston North is well in hand. Repairs, renovations, and rearrangement of offices at Hamilton, Hokitika, and Invercargill have been completed.

Government Life Insurance Office.—Renovations have been completed to the Greymouth Office.

Health Department.—A new nurses' home providing accommodation for seventy beds and a bulk store at Nelson Hospital have been completed; a new kitchen for the nurses' home is under construction. Extensions to the dining-room at Hanmer Hospital have been completed and the male massage block and additions to the quiet-room are under construction. Renovations have been completed to the Caccia Birch Convalescent Home for nurses at Palmerston North.

Earthquake repairs and renovations have been carried out at St. Helens Hospital, Wellington, and alterations and renovations completed at the St. Helens Hospital at Invercargill.

Additional accommodation has been provided at the children's health camp at Maunu.

Alterations to the District Nurse's cottage at Hikurangi have been carried out and a new residence for the District Nurse at Oruru is nearing completion.

Emergency block No. 2 at Burwood Hospital is nearing completion.

A tender has been accepted for the new St. Helens Hospital at Christchurch.

A new residence for the District Nurse at National Park is in course of erection, utilizing prison labour.

Internal Affairs Department.—Repairs have been carried out to explosive magazines at Greymouth and Westport and to the custodian's residence at Hokitika. Restoration work is in hand at Pompallier House, Russell. A new soldiers' cemetery has been laid out at Hamilton East. A number of permanent graves have been constructed and temporary crosses provided as required.

Marketing Department.—Extensions to the staff quarters and sundry works at the dehydration factory at Riccarton, Christchurch, have been completed, a cafeteria, kitchen, and lavatory block erected at Hastings utilizing R.N.Z.A.F. standard hutments, and additions to the cafeteria and boiler-house at the Pukekohe Dehydration Factory have been carried out. Two wool-stores have been erected at Port Ahuriri, Napier, using "W" type warehouse panels ex-Pacific.

Island Territories Department.—A new sanatorium, which was designed in New Zealand, has been erected in Rarotonga.

Justice and Prisons Department.—Repairs and renovations have been carried out to Courthouses at Bluff, Dargaville, Gore, Invercargill, Kaeo, Otautau, Reefton, Te Awamutu, Westport, Winton, Cambridge, and Hamilton. Repairs and renovations have been carried out at the Borstal institution at Invercargill and new farm buildings have been erected at the Arohata Borstal Institution, Wellington, utilizing prison labour. A tobacco-curing barn, the installation of new ovens, and the reconditioning of existing equipment at Waikeria Borstal Institution have been completed.

Land and Income Tax Department.—Office accommodation has been fitted up at Dunedin, Invercargill, and Whangarei. Similar work is in hand at Christchurch, Greymouth, Nelson, New Plymouth, and Wanganui, and tenders have been called for the fitting-up of offices at Timaru.

Lands and Survey Department.—Office accommodation has been fitted up for the Land Sales Branch at Hamilton and alterations to the Invercargill office are in hand. Alterations and additions have been completed to six small-farms cottages in the Whangarei district.

Marine Department.—A surplus residence has been removed from Poutu Lighthouse and re-erected at Whakapirau. A new residence is in course of erection at Cape Reinga. Minor works, repairs, and alterations have been carried out to lighthouses at Centre Island, Dog Island, Cape Brett, Cape Saunders, Puysegur Point, and Waipapa Point.

Mental Hospitals Department.—A new villa has been completed at Waitati and an occupational training school and workshop erected at Avondale. Renovations to the officers' quarters and mess at Weraroa have been completed, and alterations to dormitory blocks A, B, and C to accommodate patients are in hand. Repairs and renovations to several buildings and maintenance have been carried out at Tokanui. The augmenting of the water-supply at Seacliff is in hand and a new switch-room has been erected at Hokitika.

At Porirua, villas 4, 5, 7, and 8 and the new laundry block are under construction. The demolition of No. 3 block is in hand. At Lake Alice, Marton, villas 7 and 8, water-tower, and eight staff cottages are in the course of erection. Tenders have been accepted for eleven-patient villas, Nos. 9-18.

Preliminary work is in hand in connection with the new mental hospital at Cherry Farm.

Tenders have been called for a medical officer's residence at Templeton, and general maintenance to buildings and services has been carried out at Kingseat.

Mines Department.—Camp accommodation, comprising married quarters, single quarters, cookhouse, offices, and subsidiary buildings, has been erected at the Glen Massey opencast mine. Renovations to office have been completed at Westport and repairs to cottage at Ngakawau are in hand.

National Service Department.—Alterations to offices for the Employment Division at Whangarei have been completed.

Native Department.—Eight houses have been erected at Hamilton and a housing scheme has been completed at Moerewa Freezing-works.

Police Department.—The new station at Dunedin Central is completed and a new office, residence, and garage is in hand at Omakau. Alterations and additions to stations have been completed at Nightcaps and North Invercargill. Repairs to stations and residences have been carried out at Denniston, Frankton Junction, Granity, Greymouth, Hokitika, Huntly, Kanieri, Kumara, Ngaruawahia, Ross, Wataroa, and Westport.

A new lavatory block has been completed at Rawene and sewer drainage installed at Dargaville.

Two residences have been completed at Hamilton East, and a new sergeant's residence at Kingsland is in hand.

Structural repairs are being carried out at Newton, and alterations and renovations are in hand at Bluff, Coalgate, and Lincoln.

Post and Telegraph Department.—A new post-office building is practically completed at Kaikohe. A line-store has been erected at Whangarei, and similar buildings are in course of erection at Darfield, Gore, and Papakura. A new telephone exchange has been completed at Island Bay and a similar building is under construction at Karori. A carrier-telephone building is nearing completion at Seddon.

Earthquake repairs and renovations have been carried out at Kaiwarra and Te Aro. The re-roofing of the post-office building at Whangarei has been completed and a lavatory block is in course of erection at Dargaville and Kaitaia line-stores.

A false roof has been constructed over the telephone exchange at Wellesley Street East Post-office. A tender has been accepted for a new post-office building at Te Kuiti.

The removal of the clock towers has been completed at Bluff, Greymouth, and Lyttelton, and similar work is in hand at Ashburton, Gore, and Sydenham.

A cable-terminal hut has been erected at Oreti Beach and a tender has been accepted for a repeater station at Culverden.

Alterations and additions to staff cottages at Awarua Radio Station are in hand.

Minor works have been carried out at Waikaia, Tuatapere, Gisborne, Reefton, and Ross. Repairs have been completed to the Post and Telegraph Depot at Frankton Junction.

Public Trust Office.—Repairs and maintenance to the Greymouth office have been completed.

Public Works Department.—A temporary plant depot has been completed at Dunedin and a new plant depot at Sockburn is in course of erection. The fitting-shop and No. 1 cottage at Kaitaia Depot are nearing completion and renovations to staff cottages and offices are in hand. Painting and repairs to store at Invercargill have been carried out and repairs and renovations to offices at Greymouth, Hokitika, and Westport completed.

Additions to the surfaceman's cottage at Mangahauini have been completed.

The installation of fire-fighting equipment in the Public Works Department garage at Whangarei is in hand, and tenders have been accepted for a new stores block at Blenheim Road, Christchurch.

Office accommodation for the Housing Division was fitted up at Dunedin and Hamilton.

Rehabilitation Department.—Offices were fitted up at Gore, Greymouth, Hamilton, Invercargill, Westport, and Whangarei.

Trade-training schools were completed at Hamilton, Kaikohe, and Invercargill. A disabled servicemen's shop has been fitted up at Napier and a training centre has been completed at Riccarton. Alterations and additions to the building at Invercargill are in hand.

Railways Department.—The erection of the new goods-shed, a large reinforced-concrete structure, at Christchurch is nearing completion.

Scientific and Industrial Research Department.—The construction of farm buildings and seed-dryer at Lincoln have been completed. A laboratory for plant research at Palmerston North is nearing completion. Additions to the Magnetic Observatory at Christchurch are in hand.

Social Security Department.—Alterations to office accommodation at Greymouth have been completed.

State Advances Corporation.—Two sectional cottages were transferred to provide accommodation for farm workers and repairs carried out to eighty cottages in the Hamilton District.

State Forest Service.—Accommodation for workmen has been provided at Berwick, Dunedin.

Tourist and Publicity Department.—Improvements to kitchen block at the Hermitage, Mount Cook, are in hand, and repairs to buildings at Cascade Creek, Invercargill, and Milford Sound have been completed.

War Assets Realization Board.—Sundry buildings on Air Force and naval stations have been disposed of on behalf of the War Assets Realization Board in the Whangarei district and restoration and maintenance work carried out at Whangarei racing-stables.

The valuation and reclamation of material, equipment, &c., in a number of buildings and camp areas in the Hamilton district and elsewhere throughout New Zealand have been undertaken, two officers being on loan to this Department for the greater part of the year.

Miscellaneous.—Minor alterations and additions have been carried out at the Polish children's camp at Pahiatua, and alterations to the W.A.A.C. Camp at Miramar, Wellington, have been completed to provide accommodation for Dutch East Indies evacuees.

Plans and specifications were prepared for alterations to buildings at the Boat Harbour, Oriental Bay, to provide hostel accommodation, the work being undertaken by the Wellington City Council. The buildings have since been taken over as a Public Services hostel and further alterations carried out to provide additional staff accommodation.

Bunks were fitted to United States Navy L.S.T.s Nos. 373 and 375 to accommodate Japanese prisoners of war being returned to Japan.

Valuing for restoration or compensation was undertaken in connection with properties taken for defence purposes.

Fire protection work has been carried out for various Departments, many automatic systems being installed.

Furniture and office fittings, &c., were manufactured in workshops and supplied to various Departments throughout New Zealand.

In addition to services included under the aforementioned works, building engineering services, including heating, electrical, air-conditioning, refrigeration, and mechanical installations, were carried out to the value of £181,386.

General maintenance of buildings and services has been carried out where required.

In conclusion, I wish to place on record my appreciation of the continued loyalty and efficient service of my staff and the co-operation of the staffs of other Divisions and Departments and of the master builders and their organizations.

I have, &c.,

R. A. PATTERSON, F.N.Z.I.A., F.I.A.A.,

Government Architect.

APPENDIX D

ANNUAL REPORT OF THE CHIEF ELECTRICAL ENGINEER

The CHIEF ELECTRICAL ENGINEER to the Hon. the MINISTER OF WORKS.

SIR,—

Upon the passing of the Electricity Act, 1945, the Electrical Branch of the Public Works Department was raised in status to that of a separate Department of State. The new Department is charged with the administration of the various Acts relating to electric supply, and takes over the administration of Part XIII (except section 323) of the Public Works Act, 1928.

The annual report of the General Manager will be found in paper D.-4.

I have &c.,

F. T. M. KISSEL, B.Sc., M.I.E.E., A.M.I.C.E.,

Chief Electrical Engineer.

APPENDIX E

TWENTY-SECOND ANNUAL REPORT OF THE MAIN HIGHWAYS BOARD

The Hon. MINISTER OF WORKS, Wellington.

SIR,—

In accordance with the requirements of section 24 of the Main Highways Act, 1922, the Main Highways Board has the honour to submit its twenty-second annual report for presentation to Parliament.

The report covers the period 1st April, 1945, to 31st March, 1946.

General.—While the general position regarding road-building materials is still fairly acute, it is satisfactory to record a slight improvement in the supply of bituminous material, and in consequence of this, and increased man-power, the maintenance situation is now somewhat better.

During the year the dustless paving was extended by only 21 miles, but existing sealed surfaces were renewed over a length of 286 miles, being an increase of 134 miles over that of the previous year.

This is still well below the figure required to maintain the highways at a satisfactory standard, which was estimated in 1944 as 400 miles per annum.

The bridge-renewal programme has again been delayed through continued shortage of steel and cement, and the length of new bridging erected was 2,211 linear feet, compared with 2,239 linear feet in the previous period. A number of new structures are in progress, but their early completion cannot be expected under present supply conditions. The pre-war aim of the Board was to renew 9,000 linear feet of bridging per annum, and on account of the limited length erected during the war years a greater length per annum is now necessary if we are to avoid placing loading restrictions on a great number of our bridges and thus increase transport charges.

Personnel.—In consequence of the death of Mr. F. R. Flatman, who had been a member of the Board for three years, Mr. D. H. Cockburn, Chairman of the Lake County Council, was appointed to be a member of the Board on the 18th October, 1945, on the recommendation of the New Zealand Counties' Association. By reason of his retirement from the position of Permanent Head of the Public Works Department, Mr. W. L. Newnham relinquished his seat on the Board and the office of Chairman on the 11th July, 1946, and Mr. T. G. Beck, Deputy Chairman of the Board, on account of his appointment as Deputy Commissioner of Works, relinquished his seat on the Board on the same date. To replace these gentlemen Mr. F. Langbein was appointed Chairman, and Mr. R. Trevor Smith, Deputy Chairman. With the recent return of Mr. F. M. Hanson from overseas, he has now taken up his position as Highways Engineer, the position having previously been held by Mr. F. D. Grant in an acting capacity. Mr. Grant will now occupy the position of Assistant Highways Engineer.

Finance.—Although the revenue of the Board showed an advance on that of the previous year, expenditure increased also, and whilst receipts were sufficient to provide for standing charges, maintenance, and renewals, interest on loans raised was again deferred for the year.

Works.—The principal works carried out in the various districts during the year are as follows :—

In the Whangarei district activities were again mainly centred on the furtherance of the five-year bridge programme. Twelve bridges and six large culverts were completed, the total length being 1,485 ft. A further length of 1,904 ft. is in hand.

The principal formation work was the construction and culverting of a $2\frac{1}{2}$ mile deviation as an eastern approach to the Tangiteroria Bridge. When this is metalled, a section subject to severe flooding will be eliminated from the Whangarei-Dargaville State Highway.

Three miles of reconstruction and sealing and $3\frac{3}{4}$ miles of maintenance sealing were carried out.

In the northern division of the Auckland district (now No. 2A Highway District), work has been chiefly of a maintenance character, including making up arrears due to war conditions and military traffic.

Although difficulty has been experienced in obtaining chips, an effort has been made to keep up the resealing programme on both State and main highways, and, including plant-mix surfacing, a total of 44 miles has been accounted for. Two and a half miles of new work was also carried out.

Two concrete bridges aggregating 215 ft. are in hand, several others being held up on account of shortage of steel.

Two miles of footpaths have been constructed.

In No. 2B (Hamilton) District the supply of materials has been very limited and little sealing was done until towards the end of the season. However $2\frac{1}{4}$ miles of new and $23\frac{1}{2}$ miles of maintenance surfacing were carried out. The $\frac{1}{2}$ mile of approaches to the Otorohanga Overbridge received a priming-coat. Two bridges totalling 154 ft. and two large culverts were constructed.

In Te Awamutu Borough the traffic-filter, a modified "roundabout," which has been under trial and discussion for some considerable time, has been put in hand in its final form.

In the Tauranga district, 9 miles of resealing was done, and the metalling of the 5 mile clay gap on the Rotorua-Tauranga (direct) Highway commenced, 2 miles of base course being completed.

Twenty-seven chains of concrete cycle-track was laid in Tauranga Borough.

The Gisborne district reports considerable damage to highway foundations from shrinkage cracks, due to the drought experienced during the summer. This has resulted in numerous irregularities in sealed surfaces and an increased development of corrugations. Four miles of surfaces have been resealed.

Flood-damage repairs have been carried out, and two small bridges replaced by culverts.

At the Mangahauini Conservation Block 91,000 trees were planted out.

Twenty-one chains of footpath was constructed at Tokomaru Bay.

In the Napier district one of the principal works has been the reconditioning, widening, and sealing of the Devil's Elbow section, necessitated by the heavy flood damage sustained in 1944, and the reconstruction of the Esk Bridge—Whirinaki length, which was destroyed in the same flood. A 160 ft. concrete bridge with 40 chains of approaches was constructed at Eskdale.

The Tangoio afforestation project was adopted by the Board, in conjunction with the Soil Conservation Council, to prevent serious damage to the State highways during heavy rains. A large number of trees were planted on the 400 acres resumed, but the drought which followed killed about 75 per cent. of them. Further planting is being undertaken this season.

Improvements to surfacing were also carried out on various lengths of the Napier—Palmerston North Highway, including the reconstruction and sealing of $1\frac{1}{4}$ miles near Dannevirke and $4\frac{3}{4}$ miles of road-mix treatment near Waipawa.

A total of $12\frac{1}{4}$ miles of resealing was undertaken in the district.

A 23 chain deviation was constructed on the Nuhaka-Waikokopu Highway to avoid unstable ground, and a 15 chain deviation, with two major stream diversions, on the Dannevirke-Waipukurau Highway.

As has been so frequently the case, the highways of No. 6 District (Taumarunui) suffered severely from floods in the spring, the worst damage being in the Awakino Gorge and on the Raurimu Hill. The necessary repairs have been made. The reconstruction of a 5 mile unsealed gap on the State highway between Hangitiki and Te Kuiti has been commenced. Four miles of maintenance sealing has been applied, also a short length of new seal in the Mapiu Township.

The Taranaki district undertook a heavy resealing programme for the year, covering $41\frac{1}{4}$ miles in all, of which two-thirds was incurred on State highways and the balance carried out by the local authorities. Flood-damage restoration and bridge-repair work, including the redecking of the Mohakatino Bridge, near Mokau, were also attended to.

The chief construction works in progress in the Wanganui district are the Bulls Bridge and the reconstruction of 4 miles of the State highway between Bulls and Greatford. On the latter the formation was 86 per cent. complete at 31st March and the metalling 40 per cent.

The contract for the substructure of the Bulls Bridge had, at the above date, reached the stage where all piles had been driven and steel placed in seven piers and partly in the eighth. Falsework and staging were in position to the eleventh pier, and all steel bent to shape.

Twenty-two miles of maintenance sealing was applied in this district during the year.

Apart from ordinary maintenance and several bridge and formation items, work in the Wellington districts (Nos. 9 and 10) was almost entirely confined to the reconditioning and improvement of sealed surfaces, of which 40 miles were treated in No. 9 District and $16\frac{1}{4}$ in No. 10.

The pavement was widened by 4 ft. over $1\frac{3}{4}$ miles between Sanson and Bulls and a light plant-mix coat applied for the full width. Similar work was carried out on a mile length near Palmerston.

Sub-grade as well as surface repairs, due to damage by military traffic, were carried out over 6 miles between Foxton and Himatangi.

Extensive repairs to the 1,060 ft. Lower Gorge Bridge over the Manawatu River have been completed.

Twelve chains of the deviation south of the new Whirokino Bridge was formed and metalled, to check wind-erosion.

On the Longburn-Tangimoana Highway the 165 ft. Oroua Bridge was erected.

The remetalling of the 7 mile Foxton-Shannon Highway, necessitated by detour traffic by-passing the Whirokino Bridge, was completed.

An 8-chain deviation in Shannon Borough was formed and metalled.

A surfaceman's cottage has been erected at the State Highway Depot at Otaki.

A contract has been let for the construction of the 217 ft. Ngawapurua Overbridge near Woodville, and the erection of the 220 ft. Tutaekara Bridge over the Mangatainoka River is in progress.

The 55 ft. Cemetery Bridge at Mauriceville has been completed.

No major works are in progress in the Nelson district, but some short lengths of sealing and 8 miles of resealing have been carried out. A $2\frac{1}{4}$ -mile length of the Picton-Christchurch Highway near Spring Creek is being reconditioned in preparation for sealing.

On the Richmond-Collingwood Highway the erection of the Jubilee Bridge, near Motueka, has been commenced, and the new Coal Creek Bridge on the Westport Highway has been brought into use by the completion of the approach deviation.

A considerable amount of bridge repairs and flood-damage restoration have been carried out.

On the West Coast the excessive rainfall reported last year continued well into the period under review and was the cause of considerable damage. A major slip at Inangahua required a permanent 8-chain deviation.

Construction work included the Cave Creek Bridge and a retaining-wall on the Nelson-Westport Highway, flood-protection works, and the erection of two surfacemen's cottages.

Five and a half miles of new and $3\frac{1}{2}$ miles of maintenance sealing were applied.

In the Canterbury districts the bridge over the Deadman Creek on the Picton-Christchurch Highway was put in hand by contract and has now been completed, and the Weka Creek Bridge commenced. The Aniseed Stream Bridge has also been completed.

The Kaiapoi Bridge has been completed and opened to traffic, the sealing of the approaches remaining to be done.

On the Christchurch-Timaru Highway, $4\frac{1}{2}$ miles between Rolleston and Burnham and $3\frac{3}{4}$ miles between Winchester and Temuka received a plant-mix maintenance coat. One and a half miles of similar work was carried out between Sumner and Lyttelton. Reconstruction and sealing through Winchester Borough were completed.

The Broad Gully Culvert, north of the Waitaki River, has been completed.

The Rakaia Gorge Bridge, on the Darfield-Arundel Highway, is nearly completed.

In three Canterbury districts $28\frac{3}{4}$ miles of maintenance surfacing was carried out.

In Otago a contract has been let for an 85 ft. concrete bridge at Omarama, on the Timaru-Cromwell Highway, and for the Queens Flat Bridge, on the Waiareka-Duntroon Highway. The approaches to the latter have been completed. A short concrete bridge was erected over Lug Creek near Middlemarch, and also one of 40 ft. span over the Sludge Channel at St. Bathans.

Thirteen miles of resealing was undertaken in the two Otago districts.

In the Southland district improvements comprise the widening to two-lane width of the Charlton Creek Bridge, on the Gore-Invercargill Highway, and the replacement of a narrow bridge at Waimatuku with a modern concrete structure.

On the Queenstown-Invercargill Highway the approaches to the four new bridges and some corner improvements were carried out over a length of 1 mile 56 chains.

The 60 ft. Camp Creek Bridge, on the Riverton-Tuatapere Highway, is in progress, and the approaches, $\frac{1}{2}$ mile in length, are 50 per cent. complete.

Throughout the district, $12\frac{3}{4}$ miles of resealing has been effected and a considerable amount of metalling of worn-out gravel surfaces is in hand.

Visit of Inspection to the South Island and Contact with Local Bodies and Automobile Associations.—As mentioned in last year's report, the Board made its first tour of inspection since the commencement of the war in Europe, in February-March 1945, and visited the northern portion of the North Island. During the latter part of January and early February, 1946, the southern portion of the South Island was inspected, and the northern part of the South Island was visited towards the end of April. These visits are particularly necessary now with a view to fixing programmes of operations during the years ahead. Opportunity was taken to inspect several schemes for future

improvements, in addition to which local problems brought forward by several local authorities and automobile association representatives were discussed and the Board's general policy outlined. The Board was pleased to renew acquaintances with the local authorities and the motor organizations in their respective localities, and is grateful for their continued good will and co-operation.

Elimination of Level Railway-crossings.—It was necessary to suspend the Board's programme during the war years, and shortages of essential material have not allowed any work since the war, but as far as the more urgent works are concerned something will have to be done at an early date.

Magnetic Truck.—During the year this machine operated solely in the North Island, clearing main highways, aerodromes, and military camps. The machine is also hired, when requested, to local authorities and private concerns for the same purpose—that is, picking up puncture-producing materials. During the year the weight of these articles picked up on highways was 10,249 lb. (over a distance of 2,341 miles), on defence areas 8,747 lb., and on local-body and private areas 16,698 lb. The average weight of materials picked up on North Island highways for the year has therefore been 4.4 lb. per mile, as compared with the previous year's average of 2.95 lb. per mile.

The trailer-type magnet operated solely in the South Island and was engaged on similar work to the North Island machine. The weight of puncture-producing material picked up during the year on main highways was 2,884 lb. (over a distance of 5,836 miles), on defence areas 437 lb., and on local-body and private areas 1,036 lb. The average weight of material picked up on South Island highways for the year has therefore been 0.484 lb., per mile as compared with the previous year's average of 0.867 lb. per mile.

Sign-posting.—The amount expended by the Board during the year in subsidizing the erection and maintenance of road signs by the automobile associations of New Zealand was £3,465.

Examination for Foremen and Overseers of Road Construction.—The nineteenth examination for Foremen and Overseers of Road Construction was held on 12th December, 1945, when eleven candidates presented themselves for examination.

Eight papers on general road construction and maintenance and seven papers on tar-, bituminous-, and concrete-road construction were returned. Five candidates were successful in passing paper No. 1 and five passed paper No. 2. Two candidates passed the full examination, and a further five, who had previously secured a partial pass, completed the examination. The candidate who was successful in one paper only was credited with a partial pass.

The Board acknowledges the continued assistance given by the Public Works Department in matters relating to highways administration, and records its appreciation of the valuable service rendered by officers of that Department in carrying out the Board's programme.

Signed on behalf of the Main Highways Board :

F. LANGBEIN, A.M.I.C.E., Chairman.

MAIN HIGHWAYS ACCOUNT

STATEMENT SHOWING PARTICULARS OF NET EXPENDITURE ON CONSTRUCTION, RENEWALS, MAINTENANCE, ETC., FOR THE YEAR ENDED 31ST MARCH, 1946, AND TOTAL TO DATE

Highway District—	Construction and Improvement of Main Highways.		Renewals of Main Highways.		Maintenance, Repairs, &c., of Main Highways.		Totals.	
	Total for Year 1945-46.	Total since Inception of Main Highways Act, 1922, to 31/3/46.	Total for Year 1945-46.	Total since 1/4/36 to 31/3/46.	Total for Year 1945-46.	Total since Inception of Main Highways Act, 1922, to 31/3/46.	Total for Year 1945-46.	Total since Inception of Main Highways Act, 1922, to 31/3/46.
£	£	£	£	£	£	£	£	£
No. 1 ..	38,174	1,458,430	94,418	322,866	90,920	1,337,431	223,512	3,118,727
No. 2 ..	57,538	2,896,396	7,799	185,849	248,161	2,531,883	313,498	5,614,128
No. 3 ..	5,254	2,937,903	129	67,839	124,504	1,521,771	129,887	2,527,513
No. 4 ..	103	637,853	..	81,331	70,478	1,033,067	70,381	1,754,251
No. 5 ..	19,620	851,474	8,548	80,999	83,354	1,520,916	111,522	2,453,389
No. 6 ..	3,966	814,146	778	25,668	71,101	1,033,205	75,845	1,873,019
No. 7 ..	1,214	918,037	1,055	38,363	89,039	982,277	91,308	1,938,677
No. 8 ..	5,982	981,773	35,664	89,462	94,827	1,099,400	136,473	2,170,635
No. 9 ..	11,398	1,479,045	12,129	113,495	99,094	1,201,237	122,621	2,793,777
No. 10 ..	537	425,429	6,286	90,392	49,371	854,704	56,194	1,370,525
Totals for North Island ..	143,786	11,400,486	166,806	1,096,364	1,020,849	13,117,891	1,331,441	25,614,641
No. 11 ..	10,718	1,029,335	3,136	27,654	72,011	1,091,394	85,805	2,148,383
No. 12 ..	14,208	1,078,686	9,355	127,351	129,652	1,732,813	153,215	2,938,850
No. 13 ..	2,810	351,496	17,853	25,437	51,399	506,130	72,062	883,063
No. 14 ..	4,836	859,694	8,149	24,153	66,221	730,741	79,206	1,614,588
No. 15 ..	584	554,259	5,089	20,128	65,908	793,265	71,581	1,369,652
No. 16 ..	686	880,120	4,153	17,378	57,941	676,857	62,780	1,574,555
No. 17 ..	634	836,028	1,408	16,401	49,051	594,392	51,093	1,446,821
No. 18 ..	4,994	1,023,891	1,579	43,671	64,514	791,907	71,087	1,859,469
Totals for South Island ..	39,470	6,613,509	50,722	302,373	556,697	6,919,499	646,889	13,835,381
Totals for Dominion ..	183,256	18,013,995	217,528	1,398,637	1,577,546	20,037,390	1,978,330	39,450,022

Loan charges—
Charges and expenses of raising loans,
management charges of Con-
solidated Stock on account of Con-
struction Fund, &c.

Interest on amount appropriated out of Public Works Fund and paid into Main Highways Account Construction Fund	49,040					2,932	33,629
Interest on loans, recoupment to Consolidated Fund (section 4, Finance Act, 1919)	469,677						210,000
Transfer to reserve for redemption of main highways securities							2,082
Payment to local authorities in commutation of toll-gate charges (Finance Act, 1925, section 20) ..	1,509						1,237,115
Payment to Wellington City Council in commutation of fees chargeable in respect of motor-vehicles using Hutt Road (Hutt Road Act, 1939, section 6)	24,847					535,282	
Total loan charges		545,073	6,818,783				
Subsidies, &c., in respect of other than main highways—							
Municipal Corporations (Municipal Corporations Act, 1933, section 71)	27,273		466,736				
County Councils and other local authorities (Finance Act, 1930, section 37)	192,324		2,753,712				
Subsidies to County Councils for rebate to ratepayers (Finance Act (No. 4), 1931, section 45) ..			253,893				
Subsidy on rates levied on farming land (Finance Act (No. 3), 1934, section 28)			363,887				
Maintenance and construction of roads giving access to outlying areas (Finance Act (No. 3), 1931)			45,918				
Total subsidies		219,597	3,884,146				
		£2,814,522	£51,800,197			£2,814,522	£51,800,197

* Excludes £61,482 9s. 11d. interest credited.

MAIN HIGHWAYS ACCOUNT—continued
GENERAL BALANCE-SHEET AS AT 31ST MARCH, 1946

LIABILITIES.		ASSETS.		Total.
	£		£	£
Consolidated Fund: Interest due	..	Cash in Public Account—		
Sundry creditors	..	At call	..	17,794
		Sundry debtors	..	26,794
		Advances to local authorities (Main Highways Amendment Act, 1926, section 2)	..	22,823
		Motor-registration fees in hands of Postal Department	..	40,894
		Interest due and accrued	..	828
		Buildings and land	..	95,157
		Stocks of materials, tools, &c.	..	137,208
		Furniture, fittings, &c.—		
		Expenditure to 31/3/46	927	
		Less depreciation to 31/3/46	772	155
		Plant and equipment—		
		For Main Highways Board—		
		Expenditure to 31/3/46	649,987	
		Less depreciation charged to works	593,905	56,082
		Purchased for local authorities—		
		Expenditure to 31/3/46	385,637	
		Less repayments of principal	361,734	23,903
		Excess of expenditure over income for 1945-46	535,282	
		Balance at 31st March, 1945	701,833	1,237,115
				£1,658,753

NOTES.—(a) No liability is included for interest on loans redeemed out of Public Debt Repayment Account. (b) The two funds, previously known as "Construction" and "Revenue" were amalgamated as from 1st April, 1936, and are now termed the "Main Highways Account," in accordance with section 3, Finance Act (No. 2), 1935.

J. W. SCOTT, A.R.A.N.Z., Chief Accountant, Public Works Department.
 F. LANGBEIN, Chairman, Main Highways Board.

I hereby certify that the Income and Expenditure Account 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, subject to the departmental notes en faced thereon.—J. P. RUTHERFORD, Controller and Auditor-General.

APPENDIX F

FOURTH ANNUAL REPORT OF THE SOIL CONSERVATION AND RIVERS CONTROL COUNCIL

The Hon. MINISTER OF WORKS.

SIR,—

In accordance with the requirements of section 33 of the Soil Conservation and Rivers Control Act, 1941, the Soil Conservation and Rivers Control Council has the honour to submit its fourth annual report for presentation to Parliament.

The report covers the period 1st April, 1945, to 31st March, 1946.

GENERAL

The Council met on nine occasions during the year and with the easing of the man-power situation investigational and constructional activities increased. Expenditure under the vote increased from £50,000 in the previous year to £212,000 for the period under review.

CATCHMENT BOARDS

The ten operating Catchment Boards have continued to function on an increasing scale and many of the administration difficulties referred to in last year's report have been overcome, with a result that expansion of Boards' activities in the future can be looked to. A conference of delegates of Catchment Boards was held in Wellington and as a result certain amendments to the Act are under consideration.

A further conference has been arranged to take place in the forth-coming year.

CATCHMENT DISTRICTS

One additional catchment district, embracing an area of 1,500 square miles of the catchment area draining into the Hauraki Gulf, was constituted in February, and arrangements for the first election of the Board have been completed.

In addition, preliminary discussions have taken place between the Council and interested local authorities in connection with proposals to form districts in the Bay of Plenty, Waikato, Marlborough, and Clutha catchments, and further discussions will take place in the forthcoming year.

The following is a complete list of catchment districts constituted to date :—

Name.	Area (Approximate) (Square Miles).	Rateable Capital Valuation. (Approximate) (£ Million).			Population. (Approximate.)	Headquarters of Board.
		Rural.	Urban.	Total.		
Hauraki	1,500	13·9	3·4	17·3	45,000	Not fixed.
Rangitikei	2,756	13·0	3·2	16·2	26,470	Marton.
Manawatu	2,680	29·6	12·9	42·5	75,800	Palmerston North.
Hawke's Bay	3,070	18·3	10·3	28·6	57,800	Napier.
Wairarapa	2,230	13·8	4·0	17·8	26,250	Masterton.
Poverty Bay	2,097	10·8	4·3	15·1	31,500	Gisborne.
Nelson	2,460	5·1	4·4	9·5	30,570	Nelson.
Westland	6,254	2·3	2·2	4·5	26,820	Greymouth.
North Canterbury	4,290	21·6	35·1	56·7	162,750	Christchurch.
South Canterbury	4,326	21·0	8·5	29·5	61,850	Timaru.
Southland	11,000	17·4	9·9	27·3	71,850	Invercargill

SOIL CONSERVATION DISTRICTS

Preliminary details of areas which may suitably be incorporated in soil conservation districts under section 13 of the Act are being obtained. As previously mentioned, these will be the more sparsely populated areas where no large river problems pertain and where Catchment Board control is not warranted. This question is also bound up with the shortage of suitable administrative staff. Arrangements have been completed with the Canterbury Agricultural College and Canterbury University College for a special training course for Junior Soil Conservators to be appointed by the Council. The question of appointing a number of Senior Soil Conservators is also at present under consideration.

SOIL CONSERVATION RESERVES

The Council has, under section 16 of the Act, acquired several small areas in various parts of the country. The land involved is typical problem land, and valuable preliminary experimental work has been carried out during the year, the initial results of which are most encouraging. As additional technical staff becomes available, increased activity in this direction may be expected.

Ruatoria and Ihungia.—Surveys have been completed for the taking of land for these reserves.

Tangoio : Waikoau - Te Ngau.—On this area of about 1,000 acres of steep country adjoining the Napier-Wairoa State Highway some 104,000 trees were planted during the winter, mostly Douglas fir and macrocarpa, but owing to the very severe drought most of these died and the area will have to be replanted next winter.

Esk.—An area of approximately 7,500 acres comprising part of the headwaters of the Esk River has been resumed by the Crown. The object is to arrest the rapid run-off of heavy rain concentrations and thus prevent a repetition of the 1938 disaster in the lower Esk. Work has not yet been commenced on the control of the area acquired.

Wither Hills.—Contour and soil surveys and maps have been completed for the whole area. Fences have been maintained stock proof and grazing limited to three paddocks on the flats. Work has continued on the experimental grass flats. In spite of severe drought conditions, it may be assumed that the majority of the trees planted on the worst eroded portion of the reserve which did survive have a very good chance of ultimate survival. The original close spacing has obviated the necessity of replacements. The debris dams in the gullies have been raised and strengthened as necessary, while the live willow and flax planted in the dams are making good growth and assisting in soil retention.

Upper Wangamoa Valley.—This reserve has now been acquired. A cottage on the property houses the highway surfaceman, who also acts as caretaker of the reserve. A land survey has been completed of a further 70 acres of Native reserve adjacent which it is also proposed to acquire. The programme for development is almost complete.

RESEARCH AND EXPERIMENTAL WORK

Close co-operation with Government Departments associated in their work with the land, its soil, water, and vegetal resources, has been maintained through the Council's advisory Central Standing Committee, on which all such Departments are represented. A programme of research and experimental work on the conservation of soil was evolved, and through the Departments directly concerned the Council has commenced the implementation of some of these projects. The results of survey work on soils, pastures, vegetation, and land use are expected soon, while applied research into regrassing and improvement of eroded land has been commenced in the Poverty Bay Catchment District. In various localities in the South Island experimental work with new strains of grasses is under way.

With the demobilization of technical and other staffs and the return of Departments to their normal activities, it is anticipated that good progress can be expected and maintained in the extension of these fundamental studies and investigations.

The Council believes that it is its duty, before embarking on large-scale soil-conservation or river-control measures, to collate all existing information and put this into practice to the best advantage, having in mind the particular conditions as to vegetal cover, soil type, climate, &c., that apply; contemporaneously, by small trials and research, to undertake investigations into as many different types of problem land as possible, with a view to finding improved techniques to be put into practice as information becomes available.

The Council is planning and inaugurating this long-time programme, integrating into a single enterprise for the national welfare all workers on the problem—departmental, local body, and farmers—so that our national resources can be preserved in order to hand on to the coming generations what we have enjoyed and, indeed, something better.

EDUCATIONAL AND PUBLICITY WORK

Progress in the development of the Council's programme of educational and publicity work has been confined to the preparation of bulletins, press articles, film strips, and movie films.

Three bulletins were published during the year. The Council has now published the following :—

Bulletin 1 : "The Menace of Soil Erosion in New Zealand."

Bulletin 2 : "Tackling High Country Problem Land."

Bulletin 3 : "From Forest to Farm Land."

Bulletin 4 : "First Steps in Soil Conservation."

Further bulletins are in course of preparation as follows :—

"Down to the Sea in Slips"—the problems in the East Coast area of the North Island.

"Use of Willow and Poplar for River Protection."

"Soil Conservation"—methods applicable to the farm lands of New Zealand.

"Glossary of Terms: Hydrologic and Associated Soil and River Engineering Terms."

The policy of distributing bulletins to Catchment Boards, farmers, local authorities, schools and colleges, libraries, banks, stock and station agents and kindred overseas organizations on an exchange basis, has been continued with gratifying results.

Three additional film strips, two being in natural colour, have been prepared and circulated to Catchment Boards, schools, colleges, and learned societies for teaching purposes and are available to field officers for lecturing purposes.

There has been an increasing demand by various organizations throughout the country for showings of 16 mm. cinematograph films. The Public Works Department has photographed and produced for the Council five topical soil erosion and conservation sound films, three being in natural colour. Production of further films showing district problems is in hand.

Arrangements have now been completed for the first mobile cinema unit to undertake a planned itinerary of three weeks' duration in each catchment district. In each district the Catchment Board is organizing the screenings to suit local bodies, Federated Farmers, and Young Farmers' Clubs by night and district-high and secondary schools by day. If theatres or halls are not available, the unit can show, by means of its daylight screen, to audiences in the open either in daylight or dark. The unit can supply its own

power. In view of the public interest displayed last year at agricultural and pastoral shows where exhibitions were given, the Council decided to foster further displays at several leading shows during this year. Enlarged photographs of soil erosion and conservation of general as well as of local interest were displayed, while erosion in action was demonstrated by means of a working model and by continuous sound films. Liberal use was made of American productions until the New Zealand films were available.

HYDROLOGY

During the year the Council has tackled the problem of organizing on a national basis the co-ordinated collection and analysis of hydrologic data and making it available in suitable form to the community at large and particularly to those concerned in the design, construction, and maintenance of works associated with hydro-electric, water-supply, drainage, bridges and culverts, irrigation, rivers control, soil conservation, and land use.

Such persons require data of indisputable character concerning rainfall, snowfall, evaporation, runoff, ground water, infiltration, consumptive use, and suspended and bed loads in rivers collected over the longest possible period of years. A wealth of such data whose standards can be accepted already exists hidden in the archives of Government Departments, local bodies, and interested private individuals; it requires only analysis and publication in an intelligent way.

The present coverage, however, of such fundamental data is very meagre and many more data-collecting stations will have to be installed in the more important drainage basins throughout New Zealand to provide even a satisfactory skeleton network.

A technical committee is being set up to explore the problem and bring down clear recommendations as to what permanent organization should be established to cover this field.

The Council hopes, by co-operation with Government Departments, local bodies, and private individuals, that a steady increasing programme for this vital work can be initiated as demobilization of the Armed Services makes skilled staffs available.

Opportunity was taken in the middle of the prolonged drought during February and March to gauge low flows in over one hundred rivers and streams in Northland, Waikato, Bay of Plenty, and East Coast districts. The most striking low flow gauging was in the Waipaoa River, Gisborne, where 24 cubic feet per second was measured in February as flowing from a watershed of 683 square miles. In March, 1944, at the same gauging spot, a flood flow of 100,500 cubic feet per second was calculated.

INSPECTION

During the year the Council visited Northland, Auckland, and the Waikato districts, and it has held meetings with local bodies in Clutha district, Dunedin, Blenheim, Hamilton, Te Aroha, Tauranga, and Whakatane regarding the establishment of further catchment districts.

APPRECIATION

The objects for which the Council has been established cannot be achieved without, firstly, the fullest co-operation and whole-hearted enthusiasm of the various Government Departments, Catchment Boards, and local bodies associated with the Council in its work, and, secondly, without the active co-operation of the occupiers and users of the land where soil erosion and flood damage is both apparent and potential.

The Council desires to record that this appreciation and co-operation is growing more apparent as the aims and work of the Council are extending.

WORKS

By a co-ordinated, carefully balanced plan for the efficient regulation and wise use of both land and water along the headwater drainage of our streams, water can be kept out of the streams and the soil can be saved. Until this long-term object can be achieved, short-term palliatives for the control of water once in the streams and its guiding into the sea without damage to farm lands and settlements are necessary and both more spectacular and expensive.

The following is a brief résumé of the principal activities in the various districts for the control of concentrated flood flows :—

Auckland District.—Ruawai Drainage : “ G ” Canal was cleared for its full length of silt accumulated over a number of years. Work commenced in 1943 on stone pitching of Raupo foreshore was completed.

Ruakaka Lake : Work for deepening and extending main drain from Ruakaka River to the northern end of the lake completed.

Uwhiroa Stream, Herekino : Work of clearing and deepening in hand.

Waihou and Ohinemuri Rivers Improvement Scheme : Thirteen miles of stop-banks have been cleaned, Komata Stream cleared of willows, and flood-gates and doors overhauled. Ngahina Wharf and goods-shed have received considerable repairs.

Matatoki Drainage Area, Wharepoa : Four miles of stop-bank have been formed, six flood-gates placed, and 2 miles of drains cleaned.

Hudsons Floodgate : Installation of one flood-gate has completed the programme of work.

Tirohia-Rotokohu Drainage Area : Four and a quarter miles of drains have been cleaned, completing this work.

Turua Stop-banking, Guntown Road to Orongo : Three and one-half miles of stopbanking have been built to full height.

Waikato District.—Shipmast Locust (*Robinia pseudoaccacia erectissima*) : The plantings at Whakatane of these imported rooted cuttings are well established.

Whakatane River : Above Taneatua five settlers are being assisted with willow protection to banks, and work is more than half completed. The work of holding erosion above the Whakatane Bridge by bank protection with loose rock is completed. The willow and netting groyne protection at Ruatoki Bridge was completed. The engineering survey of 28 miles of the river is now in hand.

Waioeka and Otara Rivers : Two small subsidized river-bank-protection works were completed by settlers.

Waimana River : A cut 25 chains long, protected by netting groynes, has been completed and has successfully straightened the river and reduced the danger of a break through.

Waiotapu River, Reparoa : This work, which consists of cuts and diversions to reduce flooding of farm lands, is nearly one-third complete.

Wanganui River, Taumarunui : A concrete block facing 5 chains long by 16 ft. deep, together with a stop-bank was completed in the borough, and although damaged by a very severe flood stood up to the attack and prevented the erosion of the bank at a critical point. Heavy boulder protection of 25 chains of river frontage is in hand.

Tokaanu Stream and Korohe Drain, Turangi : Weed-clearing and drain-cleaning were completed.

Tongariro River, De Latours Pool : Willow protection works were completed.

Napier District.—Tuki Tuki River at Waipukurau: Contracts have been let and work should be completed next year for the control of a 5-mile length of river by cutting diversions, constructing willow groynes, and clearing the channels of growth and debris.

Wairoa River: A length of bank erosion was successfully checked by willow protection work.

Kumeti Stream: Seven chains of the bed was cleaned out and a stop-bank 13 chains long constructed.

Waipaoa River: The cut-off groyne, $2\frac{1}{2}$ miles north of the present mouth, has had the toe reinforced by placement of additional stone. Soundings show, as desired, a steady building up of the river-bed behind the groyne. The pilot cut to the sea just north of the groyne has been maintained, but a summer flood did not eventuate to develop fully this cut. (A flood subsequent to this report has made a successful new opening to the sea.)

Hikuwai River: Willow-clearing was commenced towards the end of the year.

Mangatoetoe Stream: Willow-clearing was completed over 3 miles of the stream and river straightened by digging 16 chains of cuts.

Lavenham Stream: A flood-gate was installed.

Wellington District.—Rangitikei River: Willow-planting was carried out to protect the banks and safeguard the cuts made the previous year. Above Tangimoana serious bank erosion was checked for a length of 30 chains by placing weighted pine-trees. At Tangimoana work is about to commence for protecting the foreshore against river and wave erosion.

Manawatu River: Work was confined to Taupunga Cut No. 2, which was almost completed, minor stop-banking, and maintenance work and surveys.

Otaki River: Survey and proposals for major channel improvements were completed, and commencement of work depends upon the assembly of the tower excavator. Minor erosion has been checked and maintenance carried out.

Mangaone Stream: Realignment and cleaning out of the lower Mangaone was completed.

Pohangina River: Several small bank protection jobs were completed.

Te Awa Erosion: A dam with concrete spillway to control severe erosion in one gully, together with small live debris dams, was completed. Space planting, of willows and poplars, together with work on the second similar gully, is under way.

Upper Koputaroa Stream: About one-third of a scheme for widening and cleaning the bed has been completed.

Tokomaru Stream: The removal of willows from approximately $1\frac{1}{2}$ miles of the lower Tokomaru was almost completed.

Waiohine River: Flood damage at 6M. necessitated the reconstruction of 8 chains of stop-bank.

Ruamahanga River: Below Te Ore Ore 8 chains of thatching and gabion work was completed. Below Tuhitarata 42 chains of stop-bank have been completed. Proposals and plans have been completed for the reclamation of about 26,500 acres in the Wairarapa Lake vicinity.

Mangatainoka River: Above the Stirling Bridge 20 chains of stop-bank have been completed. To protect Walton Park a 12-chain diversion cut has been dug and 17 chains of stop-banks constructed. At Pahiatua Borough a 10-chain pilot cut was constructed above the bridge. Proposals have been approved for a 29-chain diversion cut to arrest erosion near the township of Mangamutu.

Pakuratahi River: One small diversion at Kaitoke has been completed, while another and some bank protection is in hand.

Hutt River: Work on straightening the river near the Borough of Upper Hutt over a length of 60 chains has been commenced.

Waimea River: One-half mile of new stop-banking adjacent to the Appleby Bridge, together with repairs and raising of old banks, was completed. A 3-chain breach in O'Connor's stop-bank required 4,500 cubic yards of material to repair.

Wairoa River: Ninety-five chains of river straightening immediately below Brightwater and 70 chains of clearing and diversion cuts was done in the vicinity of Fennel Island. Eleven chains of filter barriers were constructed. Near the Wai-iti River mouth 8 chains of diversion was completed, while 13 chains of stop-bank were restored and raised in Appleby Bridge area. Thirty chains of Redwoods Valley stream was deepened and willow-pulling done.

Wai-iti River: Three and one-half miles of river diversion was completed, and cut-off loop is silting up satisfactorily. Near Wakefield 2½ miles of extensive island clearance of gorse and willows, and less extensive clearance was completed over the remainder of the river to Brighwater. At Springs Grove 8 chains of stop-bank was constructed. Some continuous crate protection above Wai-iti Domain was renewed.

Motueka River: Above Motupiko 15 chains of gorse and willow clearance and diversion cuts were completed. At Mararewa Railway-station a 13-chain filch cut and a 12-chain stop-bank were constructed and willows removed. Minor works included clearing of stranded willows and broom growth and bank-protection above Motueka Bridge with large boulders.

Tadmor River: Willow-clearance, opening an old channel, and bank-protection with anchored willows was carried out.

Takaka River: A large cut involving 25,000 cubic yards and 30 chains of stop-bank were completed. Nineteen and one-half chains of continuous stonework was done at Kotinga. Thirty chains of stone facing was placed near Takaka. Over another length of 32 chains two diversion cuts were completed.

Anatoki River: A stop-bank 8 chains long and 8 ft. high was constructed to prevent river changing its course into the Onespec Creek.

Waingarua River: A crated wall 5 chains long and 5 ft. high was constructed to prevent overflows.

Aorere River: A crated stone weir 2½ chains long was constructed to check rapidly increasing scour.

Shipmast Locust: Fifty per cent. of the plantings in the Nelson City Council's nursery are alive and most are showing vigorous growth.

Christchurch District.—Karamea River: Twenty chains of massive stone bank-protection and a stub groyne were constructed, while minor works were also attended to.

Little Wanganui River: Periodical attention was given to the training-work.

Bullei River: Near Rahui moderately successful work was done by the construction of a diversion cut to deflect some of the flood waters from the left bank.

Nile River: Work was not completed.

Oparara River: Training-wall at the mouth was completed and severe flood damage to protection works repaired.

Giles Creek: Half the work of cleaning and deepening has been completed.

Waimaigaroa River: River channels have been straightened to prevent further bank erosion.

Simpson's, Karamea: Stop-bank is under construction to prevent tidal flooding of farm lands.

Arahura River: Maintenance work carried out to groyne work and proposals complete for a stop-bank and stronghead.

Canoe Creek: A small scheme for training and stop-banking was completed.

Hokitika River: At Camelback the stop-bank and stronghead were completed, the stronghead requiring additional heavy boulder protection.

Taramakau River: After continual flood delays 20 chains of stop-bank with a massive stronghead and mattress of stone wire crates was completed.

Waitaha River: A diversion channel was cut to relieve an eroding bank threatening a county road and farms.

Poerua (Little Wanganui) River: A start was made with permanent riprap protection to the stop-bank, and minor works were also carried out.

Waitangi River: Temporary repairs were carried out to the stop-bank, but a major scheme is required.

Clarence River: Large concrete blocks were placed to protect the railway bridge and stone gabions for bank-protection.

Hapuku River: Forty-four thousand cubic yards of stop-banking and a 1,280 cubic yard concrete block at the end of a groyne were placed. Forty-eight chains of stop-bank were stone faced. Large concrete blocks were placed to protect the railway Bridge.

Kowhai River: A large stone gabion groyne was constructed to protect the railway bridge. A scheme has been drawn up for protection of both north and south banks from overflows of the river. Thirteen and one-half chains of groynes were erected to protect the north bank.

Ashburton River: The whole of the willow and scrub clearing, totalling 2,464 acres, has been completed, together with 22 miles of stop-banks involving 193,000 cubic yards.

Waihao River: Protection from erosion at mouth of river was completed.

Waimate Creek: Near the hospital a contract has been let for the protection of 27 chains of river-bank.

Elephant Hill Canal: One mile of the canal was cleared and flood damage repaired.

Opihi River: An anchored willow groyne was established and a stream diverted.

Temuka and Orari Rivers: Seventeen chains of new stop-banks have been erected and 58 chains of stop-banks repaired.

Waihi and Kakapu Rivers: Extensive flood-damage repairs have been carried out.

Cam River: Four miles of river channel have been widened, cleared, and stop-banked.

Eyre River: The main channel has been cleared of growth and obstacles for 7 miles.

Halswell River: Near Tai Tapu 5 miles of the channel has been cleared out.

Waiau River: A contract has been let for the protection of 180 chains of river-bank at Spotswood.

Ellesmere County Drains: The tramway reserve has been widened and graded over a length of 2 miles and the Hanmer Road drain over a length of 4 miles.

Dunedin District.—Waitaki River: A pilot channel over 70 chains in length which was constructed has afforded considerable relief to the south bank. At Jackson's all farm buildings have been removed and established in a safer locality. Cross-sections of Lake Waitaki have been taken from the head of the lake to Waitangi Bridge for purposes of checking siltation.

Taieri River: Protection work near the railway bridge at Riverside has been completed. Flood-damage repairs and minor works have been carried out to Lee Creek channel, at Otokia, Henley, and Berwick Lock. Survey is in hand for the flood protection scheme.

Clutha River: Twenty-four chains of drain has been cut to improve and extend the area draining into Matau main drain. Waitepeka Creek has been cleaned and improved for a length of 170 chains. Damage caused by the major flood of February, 1945, has been restored. On the Puerua Stream a stop-bank 220 chains in length to protect Barker's property is nearing completion. Survey of Lower Clutha is in hand.

Oreti River: The Survey for control of 25 miles of river has been completed.

Pyramid Block: The survey of nearly 9 miles of drainage channels has been completed.

STAFF

The Council again wishes to place on record its appreciation of the services rendered during the year by its staff of four officers. Arrangements are being made for the appointment of soil conservators, hydrology staff, projectionists, and a forestry liaison officer.

Signed on behalf of the Soil Conservation and Rivers Control Council.

W. L. NEWNHAM, M.Inst.C.E., Chairman.

APPENDIX G

ANNUAL REPORT OF THE DIRECTOR OF HOUSING
CONSTRUCTION

The DIRECTOR OF HOUSING CONSTRUCTION to the Hon. the MINISTER OF WORKS.

SIR,—

I have the honour to submit the following report on the Housing Division's activities for the year ended 31st March, 1946 :—

(1) *General*.—The number of houses completed during the year reached the total of 2,985, an increase of more than 51 per cent. over the previous year's total, and at the end of the period there were a further 3,400 in various stages of completion.

The shortage of materials and fittings referred to in my last annual report has been even more evident during the past year. House contractors have been seriously hampered by delayed delivery or absolute lack of many essential items, and last-minute substitutions have frequently had to be authorized. Most evident have been short supplies of timber, cement, and bricks, while other items such as baths, electric ranges, roofing-materials, and water-pipe fittings have caused frequent delays. A frequently recurring difficulty is, and has been, the inability of suppliers to deliver timber to dimension.

The removal of man-power restrictions during the year had a depleting effect upon the staffing position, principally among the technical and skilled workers, and many builders have experienced difficulty in obtaining fully qualified "finishing hands."

(2) *Building Construction*.—(a) With the supply position of most building-materials becoming increasingly difficult, maximum effort was directed to the task of keeping the building industry fully employed, and the use of substitute materials has been extensively explored.

Conservation of timber has been practised to the fullest possible extent, and in this direction the use of concrete products has been extended. Houses of various experimental types and using various materials are being constructed under close scrutiny, and it is anticipated that from these experiments we may be able to eliminate some of the troubles attendant upon the short supply of materials hitherto regarded as standard.

For instance, use is being made of treated timbers in order to conserve heart timber for joinery and other essential purposes. *Pinus insignis*, specially treated, is being used as a framing timber in so far as it is available, and it is hoped that the supply will be increased so that its use may be extended.

Excluding flats, about one-third of the houses erected are either constructed of or are sheathed in materials other than timber, the principal substitutes being brick veneer, total brick, asbestos sheathing, reinforced concrete exterior walls, asbestos sidings, concrete blocks, "no fines" concrete, &c.

Of the various types of construction being tried experimentally, "no fines" concrete appears to hold most promise. This material is being used with metal or pumice aggregate in conjunction with a special type of shuttering.

Other experiments include the use of reinforced-concrete sheets with reinforced-concrete columns and beams, hollow concrete blocks, concrete blocks erected to form cavity walls, pumice-concrete panels, and concrete cavity walls cast on the flat and hoisted into position with cranes, and "stressed skin" concrete in conjunction with the "Gunite" process.

(b) During the past year 189 flat units were in course of construction, while 42 were handed over for occupation. Plans have been completed for the calling of tenders for an additional 28 flat units in Auckland and 20 in Christchurch, while 578 more are in the design stage.

(c) Although the Division has for some time concentrated upon the building of houses to the exclusion of other buildings, there are instances, by reason of the creation of new communities isolated from normal amenities, where it has been necessary to provide some shopping facilities. Contracts have accordingly now been let for the erection of a few shops in Lower Hutt, Hamilton, and Christchurch, while plans are in preparation for others in Auckland, Dunedin, Invercargill, Masterton, and Palmerston North.

(3) *Purchase of Land.*—In the main centres and even in many of the provincial towns the acquisition of satisfactory land which is or can be served by existing city and borough water and drainage services has been limited. There has been little movement in private subdivision and development of residential sections in recent years, and local authorities have paid small attention to the extension of their services. These conditions are forcing the Division into the development of larger blocks, which involve increased costs in the extension and provision of these services, and in some cases necessitate the enlargement of borough areas by the inclusion of adjacent county lands.

During the year the purchase of building-sites has been considerably increased over the previous year's figures. Some 3,590 sites were acquired, bringing the cumulative total to 45,838. Of this total, exclusive of the land on which houses have been completed, some 4,200 unit sections are embraced in housing contracts let or under construction, and there remain approximately 21,400 sites for dwellings, although much of this land has still to be developed.

(4) *Land-development.*—As can be realized, a great amount of planning must be done before real land-development can commence, and in this phase of the Division's activities, besides the actual production of finished scheme plans, much investigatory and preparatory work has been performed with a long-term view.

Despite limitations of staff, man-power, and materials, a total of 2,482 serviced sections were produced by this section of the Division and passed to the architects for siting. Creditable as this appears, the actual position is even better, as at the end of the year nearly as many more, mostly in Auckland, were almost ready for siting.

Considerable difficulty has been experienced—and this has not been overcome—in obtaining engineering and survey staff. It is significant that this difficulty has not as yet arisen in Auckland, where there is still keen competition among roading and drainage contractors. Elsewhere, particularly in Wellington, development work is seriously hampered by this staff shortage and contractors' apathy. An attempt to transfer staff and contractors from Auckland to Wellington was unsuccessful—lack of house accommodation in Wellington was a detrimental factor.

In Wellington, Palmerston North, and Christchurch the formation of streets and house-sites has been done with the assistance of the Public Works Department's earth-moving plant. In Napier the lack of plant and operators is delaying development.

(5) *Housing Improvement*.—The Housing Improvement Act was passed by Parliament in 1945 and became operative on 1st November last. Designed to operate primarily through the local authorities, it aims at the improvement of the physical condition of residential buildings throughout the country and provides for the reclamation of decadent areas. Regulations implementing the provisions of the Act have been outlined in collaboration with the Health Department and are now in the hands of the Law Draftsman.

(6) *Rural Housing*.—(a) Most of the applications for houses and huts approved under the Rural Housing Emergency Act, 1944, have now been fulfilled. The difficulty of obtaining satisfactory tenders delayed some contracts, but practically all contracts are now either completed or well advanced in construction.

(b) The erection of houses and other farm buildings for the land-settlement scheme operated by the Department of Lands and Survey has progressed satisfactorily, considering the difficulties encountered.

In order to overcome the reluctance of building contractors to tender for this scattered work, often remote from towns, it has been necessary for senior officers of the Department to visit the districts and secure tenders by personal negotiation with builders' associations and individual builders. Several tours have been made covering all parts of the country with this object in view, and the results have been very satisfactory. It is apparent that this practice will have to be continued, if building under this scheme is to continue in an adequate volume.

Difficulties in the supply of timber, roofing, and other materials, and in inducing building tradesmen to undertake this out-of-town work, are constantly arising, and despite every endeavour result in delays.

The major part of the design work in connection with farm houses and buildings has been completed, although special problems arise from time to time which require new designs to meet them. The conversion and renovation of existing buildings by its very nature involves considerable work for the Department's staff, but the maximum possible use is extracted from these existing facilities in order to conserve new materials.

To date work has been undertaken in connection with 112 land blocks involving approximately 320 holdings. Contracts have been let for over 230 houses and a proportionate number of milking - sheds, implement - sheds, wool - sheds, and other buildings. Contracts for approximately 70 houses, together with other buildings, are available for tendering. Completed under this scheme are 54 houses and nearly 70 other buildings.

(7) *Man-power*.—The man-power position in the building industry continues to improve commensurate with the release of men from the Armed Forces, although shortage of skilled workers in certain of the subsidiary industries tends to delay supplies of essential fittings. The total labour force employed directly by the Division and contractors at 31st March was 4,742, as against 3,645 a year ago.

(8) *Expenditure*.—The cumulative net expenditure up to 31st March, 1946, for the purchase and servicing of land and the erection of joinery-factories and houses, including all administrative charges, amounted to £34,015,996, while liabilities and commitments amounted to a further £8,221,286. The net expenditure for the year under review was £5,625,296. The total cost of administration of the Department (exclusive of interest charges) from its inauguration to date was £985,820, or 3·09 per cent. of the net expenditure (excluding administrative costs and interest). The percentage for the year ended 31st March, 1946, was 3·73.

(9) *Training Schools*.—There are now 39 schools of trainees associated with building trades—25 carpentry, 3 bricklaying, 3 plastering, and 8 painting—operating in 19 towns. The total number of trainees who completed the course during the year was 224.

The Division is making increasing use of trainees, and up to 31st March, 1946—has arranged 125 contracts with the Rehabilitation Department for the labour involved in 709 houses, situated in 17 towns. Of these, 215 have been completed.

(10) *Statistics.*—As at 31st March the cumulative progress since the inception of the Department is as follows:—

	1937-38.	1938-39.	1939-40.	1940-41.*	1941-42.*	1942-43.*	1943-44.*	1944-45.*	1945-46.
(a) Houses advertised	Units. 3,172	Units. 6,698	Units. 11,071	Units. 14,084	Units. 17,029	Units. 17,443	Units. 20,910	Units. 24,581	Units. 27,845
(b) Contracts let	2,507	6,188	10,353	13,647	16,522	16,799	19,487	22,349	25,331
(c) Houses under construction ..	1,560	2,326	2,847	2,444	2,033	1,209	2,078	3,442	3,253
(d) Houses completed and handed over for occupation— Housing Department ..	399	3,064	6,432	10,337	13,525	14,619	15,475	17,392	20,736
Other Government Depart- ments ..	..	..	27	88	108	273	297	349†	478†
(e) House-unit sections required ..	9,296	13,949	20,421	23,953	28,990	36,613	40,184	42,061	45,838
(f) Towns and localities work con- ducted in ..	70	106	121	137	141	146	153	184	Towns, &c. 321†
(g) Principal contractors engaged	Contractors. 145	Contractors. 240	Contractors. 291	Contractors. 326	Contractors. 345	Contractors. 346	Contractors. 406	Contractors. 506	Contractors. 634
(h) Payments	£ 298,500	£ 890,600	£ 1,638,900	£ 2,549,100	£ 3,086,400	£ 3,665,500	£ 4,212,300	£ 4,934,000	£ 5,621,000
Land and services	..	..	..	..	..	..	..	..	..
Dwellings-construction— Housing Department ..	1,053,600	4,311,400	8,567,200	13,075,300	16,376,500	17,316,200	18,326,200	21,690,600	25,840,800
Other Government Depart- ments ..	..	..	26,700	128,400	191,400	325,200	523,700	678,600	1,203,500
Joinery-factories, including machinery ..	48,900	50,500	52,600	49,400	45,900	46,700	46,700	45,700	45,700
Vehicles, plant, and equip- ment ..	2,600	6,200	12,900	17,200	19,100	21,600	23,100	30,600	42,800
Interest during construction	6,600	21,000	31,000	52,200	93,500	117,600	154,000	236,200	276,400
Administration	66,200	166,400	281,300	406,400	539,800	685,700	659,100	785,000	985,800
	1,476,400	5,444,100	10,610,600	16,278,000	20,352,600	22,178,500	23,945,100	28,390,700	34,016,000

* Work retarded due to the temporary diversion of contractors and the Department's organization to defence works.

† Includes Rural Housing.

(11) *Building for other Departments.*—During the year the Division's organization has been utilized to a still greater extent for the erection of dwellings and other building projects. Expenditure under this heading amounted to £524,909 for the year, bringing the accumulated total up to £1,203,509. The number of houses totalled 115 for the year and an accumulated total of 418.

(12) *Proposals for Ensuing Year.*—The hope expressed in last year's report that materials would become increasingly available has not been realized; in fact, the position has steadily worsened. Nevertheless, by use of substitutes and an assiduous combing of all possible sources of materials it is anticipated that it will be possible to continue with the acceleration of the housing programme. Provision for a total expenditure of £7,832,871 has been made in the current year's estimates, and the envisaged programme provides for the completion of 4,000 house units.

The State Advances Corporation continues to offer building loans to those desiring to erect houses for themselves, and during the year ended 31st March, 1946, granted 2,175 of these loans to a total of £2,716,662, exclusive of loans granted to local authorities under Part III of the Housing Act, 1919, which latter amounted to £290,100.

(13) *Staff Accommodation.*—This continues to cause the Division considerable concern. In Wellington particularly the District Office is housed in four separate buildings, with consequent loss of co-ordinating efficiency.

(14) *Administration.*—Decentralization of the Division's activities is progressing as rapidly as staffing and accommodation will permit and is practically complete in some districts. The staffing position is still very difficult, especially in the professional and technical ranks. The total staff of the Division at 31st March, 1946, was 562, of whom 25 were absent with the Armed Forces and 24 were on indefinite leave of absence.

In conclusion, it gives me pleasure to record once again that the staff of the Division has loyally supported me in the execution of the housing policy and that relations with the building industry and the general public continue to be excellent.

I have, &c.,

G. W. ALBERTSON, A.M.I.C.E.,

Director of Housing Construction.

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