1947

NEW ZEALAND

MINISTRY OF WORKS STATEMENT

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

MR. SPEAKER,—

I submit my report for the year ended the 31st March, 1947, together with a statement of expenditure certified by the Controller and Auditor-General as provided for under section 8 of the Public Works Act, 1928.

The year under review, which might be termed the first full post-war year of public-works activity, has been attended with rehabilitation difficulties as well as difficulties connected with the settling-down of the reorganized administration during a period of shortages in man-power and materials. Without exception similar difficulties are being experienced in all countries during these immediate post-war years.

The whole building and construction industry has been extremely sensitive to this condition as it faced the bank of deferred demands occasioned by the war years, as well as the need for new works necessary for the country's further economic development.

During the current year the functions and activities of the Ministry of Works, particularly in relation to the Public Works Department, have been more adequately defined based upon the experience gained during the preceding year.

The investigations which the Commissioner of Works has made during the past year have shown that the accumulated demands, and the potential demands, upon the construction industry are now greater than they have been at any previous time in the Dominion's history, and the rate at which all sections of this demand is being satisfied is substantially lower than the rate at which demands continue to accumulate. The Government accordingly has found it necessary to prepare a works programme of State and State-subsidized works for the current year on realistic lines related to available finance, man-power, and materials, and to ensure orderly progress of approved developmental works. This programme for 1947–48 is the first prepared following my announcement of the regional schedules of works, and may be regarded as the first step in the practical initiation of the Government's policy in respect to national and regional development. This programme will be followed each successive year with further programmes designed to secure the completion of works which are most advantageous to the whole economy of the Dominion.

The labour force at present available to the construction industry is considerably less than pre-war strength. In 1939, 47,000 men were employed in the industry, whereas indications are that only approximately 36,000 are available to-day. The number of workmen engaged on State and State-subsidized works on 31st March last was approximately 18,500, or 10,000 less than the number employed on similar works at the outbreak

of war in 1939. In relation to the urgency of many major works, the loss of man-power is very serious. Employment is available immediately for 4,000 workmen, skilled and unskilled. However, owing to the continued prosperity of the Dominion, the required man-power is not available, and, according to the latest figures supplied by the Department of Labour and Employment, only 45 fully employable males plus 43 suitable for light work only are registered unemployed. The Government is alive to the need for a greater labour force to carry out its planned post-war developmental programme, and works under my control will be taken into account in connection with the Government's immigration policy.

Stocks of key construction materials exhausted by wartime construction continue to be scarce, and industry, both within the Dominion and overseas, faces a tremendous task in its endeavours to improve these conditions. My Officers have taken every step to secure supplies during the year, even to the extent of importing quantities of materials, including cement, normally supplied by local industry. Local production of cement is less than two-thirds of current annual requirements. The limited supply of steel available to the Dominion is of great concern to the construction industry in that progress on major works of the highest priority is retarded. The total quantity of steel imported last year was equal to only two-fifths of the average amount imported during the immediate pre-war years. Other key-construction materials in which supply is far exceeded by demand include bricks, timber, enamel baths, sanitary earthenware, roofing-materials, and builders' hardware.

The operation of the Building Control Emergency Regulations has been an exceedingly difficult problem in view of these shortages. Nevertheless, it can be claimed that the Building Controller has been able to exercise sufficient restraint in the issue of permits to bring the gap between the demand and accomplishment within controllable limits. The issue of housing permits has continued to receive preference over other types of buildings, and it is likely that this policy will continue to an even greater degree than hitherto with additional restraint upon commercial, industrial, and similar types of structures until there is an appreciable improvement in the man-power and materials available to the industry.

As a result of these conditions and the restrictions placed on civil engineering works by the exercise of the Building Control Emergency Regulations the activities of the Public Works Department have been particularly handicapped in this field, which is its major sphere of operations. Apart from essential maintenance, the only new major engineering construction works of any consequence possible have been those connected with the Government's plans for hydro-electric development.

On the building side efforts have been concentrated on housing, by the erection of State rental houses, and also by granting first priority to housing in the issue of building permits and facilitating supplies for housing generally. I am gratified to be able to report that a record number of houses, 9,612 (State and private), were completed during the past year. The Government will do all in its power to improve further on this achievement during the current year, and so continue until the existing acute housing shortage has been overtaken. In addition to housing, much has been done to undertake the more urgent works for education and hospital purposes.

During the currency of the period of restraint upon civil engineering construction works the Ministry of Works will continue to assemble information with a view to effecting improvements in administration and engineering technique. Such matters as adequate means of reporting and recording construction progress and construction costs in relation to modern methods of construction have been the subject of investigation and report. Engineers are at present overseas investigating modern methods of heavy construction. Similarly in the field of works planning, a great deal of attention has been given to the more detailed study of those projects which are considered as having sufficient priority to warrant accelerated investigation in preparation for the time when labour

and materials will permit their construction. No doubt when this time arises physical planning and programming of works for national, urban, and regional development will be a most important administrative process associated with the implementation of the Government's full employment policy.

In completing the announcement of the regional schedules of works, popularly, but erroneously, termed "ten-year plans," I have faced throughout the country audiences comprising every shade of political thought, and there has been no criticism whatever of the principle of regional planning which, although on the statute-book since 1929, has made little progress.

The unusual circumstances following the war required a review of accumulated Government and local-body works, and presented a unique opportunity for the Government in publishing the review to put the principles of regional planning into practical effect. Briefly it represented an earnest endeavour on the part of Government to associate local bodies with the forward development of the country by publishing in a comprehensive manner, as a first step only, works currently under consideration. These should now be reviewed by regional authorities in conjunction with the Government Departments concerned and with all relative information available regarding the natural resources of each particular region. This initial step in the planning process should be followed by investigation, planning, and preparation of actual drawings and specifications according to the priority determined from year to year. I hope that plans for the future development of each region will be built up, and when that is done we will have for the first time some conception of what New Zealand can be like in the future. It may well be that this investigation and preparation of national, urban, and regional development works for eventual association with and contribution to full employment will yet prove the most fruitful endeavour of the Ministry during the period of man-power and material shortages. I cannot too strongly stress the need to realize that if we are to make advances in this field of development linked with full employment, the Government's policy to associate Central Government with local authorities constituted through regional or metropolitan authorities is of the utmost importance. New Zealand has reached a stage in its progress when the development proposals of Central and local Government, and indeed those of major private interests, must be considered together.

Improved transport and communications have entirely altered the relations local bodies have to each other, and we cannot wait for local bodies to argue out individual differences whilst rivers, floods, and other natural forces take no notice of administrative boundaries. Land-development, highways, railways, aerodromes, harbours, and similar works can only be decided with due regard to all interests which will use these facilities. The Government therefore finds it impossible to plan efficiently ahead on the basis of representations from a very large number of individual local bodies where these are not associated on some basis of community of interest. Nor should it be left to the Government alone—local people know more about their districts than any one else, and as they have to live amongst and use the works provided they are entitled to some say in the matter. It was an endeavour to group local authorities in associations of community of interest that resulted in the conception of Regional Councils. This does not mean that there will be undue interference with established procedure.

There are works which are purely national in character, such as hydro-electric proposals, making heavy demands on man-power and materials, also there are local works which are parochial and solely the concern of the individual local authority and regarding which representations can be made direct to the Government separately by local bodies as in the past. Within this latter category come mainly county road works, which have no general or regional significance except in local demands upon man-power and materials. The bulk of the proposals in the works schedules, however, are regional in character and are those which concern all local authorities grouped in the area. In the preparation of annual public-works programmes, the Government will particularly seek the advice and assistance of regional authorities in respect of such works.

The Government quite appreciates the undesirability of creating more local authorities or interfering with the statutory powers of existing local bodies. Until the whole question has been reviewed by the Local Government Commission recently set up there can be no thought of giving Regional Councils overriding authority. They must remain advisory bodies only, but the advice given would always receive the serious consideration of the Government. Ultimately the question of giving Regional Councils executive powers will arise, and the Government's decision in this respect would no doubt be largely influenced by the results of the working of Regional Councils in their present form. No common approach is possible. The problems vary according to the character of each region. In the metropolitan areas there has been a ready response. In the rural areas the response has been slower and further progress must await a much closer study than so far had been possible of information available regarding the natural resources.

It is now really a matter for the local people. If deep-rooted parochial interests were to prevent the setting-up of Regional Councils in certain areas it would be disappointing. The Government itself will in any case from now on plan regionally. It could do nothing else, but I sincerely hope that in this the Government will have the co-operation it desires from local authorities in all parts of New Zealand. In turn, the Government realizes the need to associate centrally those Departments of State most intimately concerned with forward development of the country on a national and regional basis, and is taking the necessary steps in this direction.

The co-ordination of Central and local Government development as it affects town-planning offers an immediate test for such administration, and it is nowhere better illustrated than in Auckland and Wellington, where Government proposals in the works schedules are of such a type and nature as to demand revision of all existing planning and zoning schemes as soon as possible.

The difficulties associated with the granting of subsidies to local bodies engaged on development works is one of those matters concerning which the Ministry of Works, on behalf of the Treasury, has been called upon to investigate on several occasions since the cessation of hostilities. In the past subsidies have in the main been provided for roading and highways on an established basis formulated to suit stable peacetime conditions unaffected by the abnormalities of war years. The demand for new urban and regional development works requires a close examination of the existing basis of payment of Government subsidy, which, in my opinion, does not offer sufficient elasticity. I therefore propose, during the ensuing year, to ask the Commissioner of Works to review the whole question of subsidies, paying particular attention to those for works which are regional in character.

Whilst no general amendment to the Public Works Act has been enacted for some years, there are already indications that attention must shortly be given to reviewing the several existing statutes under which the Ministry of Works is required to function. The only legislation directly affecting the Ministry which was enacted during the past year was contained in :—

(*a*) The Soil Conservation and Rivers Control Amendment Act, 1946.
(*b*) The Finance Act, 1946, section 23.
(*c*) The Finance Act, 1946 (No. 2), section 5.

Reference was made in my statement last year to the setting-up of a Royal Commission to consider what trans-harbour facilities were necessary in the Auckland Metropolitan Area to provide adequately for future traffic requirements of all kinds. The order of reference included also certain subsidiary questions relating thereto. The Commission has submitted its report, and this has received preliminary consideration by Government. Cabinet has generally approved the findings and recommendations of the Commission, and surveys are already in hand to enable a more detailed examination of the various proposals to be made. I desire to express my appreciation to the members of the Commission, especially to the Chairman, Sir Francis Vernon Frazer, K.B., M.A., LL.B., for their careful and painstaking work.

My colleague the Hon. the Minister of Marine secured the services of Messrs. E. J. Buckton and A. J. Clark, senior partner and senior engineer respectively of Messrs. Rendel, Palmer, and Tritton, London, a highly reputable firm of consulting engineers, for the purpose of obtaining an independent report on Westport, Greymouth, and the West Coast Harbours generally. Full assistance was given these two gentlemen by my technical staff in carrying out a four weeks' intensive survey and study of the conditions at these ports during July and August, 1946.

A detailed report has since been received and is now being studied by a special committee.

FINANCE

The payments and receipts in connection with the Public Works Account and other associated votes and accounts for the year 1946–47 are shown in the tabulation following.

The expenditure for the year administered through the Department reached a total of £20,078,102. In addition, a sum of £992,452 was expended from the Public Works Account by the Education Department on School Buildings, &c. The miscellaneous receipts totalled £5,620,591.

Class of Work.	Expenditure 1946-47.
EXPENDITURE, PUBLIC WORKS ACCOUNT	£
Railway-construction	231,272
Housing construction	6,193,779
Public buildings	728,143
Education buildings	992,452
Lighthouses and harbour-works	13,181
Roads, &c.	227,426
Soil conservation and rivers control	270,864
Irrigation, water-supply, and drainage	482,861
	9,139,978
Electric Supply Account: construction (public works)	2,114,793
EXPENDITURE, OTHER VOTES AND ACCOUNTS	
Main Highways Account—	
Construction, reconstruction, and improvements	563,188
Maintenance, repairs, and renewals	2,191,685
Administration, plant, and miscellaneous expenditure	218,897
Interest, fees, &c.	28,997
Permanent appropriations (rate subsidies, &c.)	241,005
Consolidated Fund—	
Salaries and expenses, Public Works Department and Ministry of Works	896,416
Maintenance, Public Buildings, Roads, &c.	1,347,075
Plant, material, and miscellaneous services	3,037,633
Other accounts (expenditure by Public Works Department): amounts not included above	1,290,887
Total, other votes and accounts	9,815,783
Grand total of expenditure, Public Works Account and other votes and accounts for the year ended 31st March, 1947	21,070,554

Class of Work.	Receipts.
RECEIPTS,* PUBLIC WORKS DEPARTMENT	
Ordinary Revenue Account—	£
Departmental receipts, vote, "Maintenance of Public Works and Services"	2,855,156
Irrigation receipts for year	28,544
Miscellaneous receipts for year—	
Public works	148,836
Housing	10,955
Electric Supply Account: miscellaneous receipts (public works)	105,857
Main Highways Account—	
Repayment of advances, &c., and interest	9,084
Miscellaneous receipts	144,389
Public Works Account	
Sale linen-flax assets, &c.	442,238
Miscellaneous receipts	1,875,532
	5,620,591

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

Summary

—	Public Works Department.	Other Departments.	Total.
	£	£	£
Expenditure	20,078,102	992,452	21,070,554
Recoveries and receipts	4,670,627	949,964	5,620,591

The ratio which the various classes bear to the whole is shown below—that is, expenditure plus receipts:—

	£	Per Cent.
Roads, including construction and maintenance of main and state highways	3,471,198	13·00
Hydro-electric (construction by Public Works Department)	2,114,793	7·92
Railway-construction and improvements to open lines	334,933	1·25
Housing construction	6,193,779	23·21
Public buildings, including schools	1,720,595	6·45
Soil conservation and rivers control	270,864	1·01
Irrigation, water-supply, and drainage	482,861	1·81
Public buildings and roads, &c. (maintenance)	1,347,075	5·05
Plant, material, and services, other Departments	3,037,633	11·38
Miscellaneous	909,597	3·41
War Expenses expenditure	1,187,226	4·45
Miscellaneous receipts, &c.	5,620,591	21·06
	£26,691,145	100·00

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, 1948

Vote.	Loans.	Consolidated Fund.	Total.
	£	£	£
Railway-construction	145,000	..	145,000
Housing construction	7,482,000	..	7,482,000
Public buildings	1,600,000	250,000	1,850,000
Lighthouses and harbour-works ..	32,000	..	32,000
Roads, &c.	382,000	..	382,000
Soil conservation and rivers control ..	350,000	50,000	400,000
Irrigation, water-supply, and drainage ..	400,000	..	400,000
Highways construction	561,000	..	561,000
Highways maintenance	..	3,427,089	3,427,089
Maintenance of public works and services	..	5,184,885	5,184,885
	10,952,000	8,911,974	19,863,974

HOUSING

As already stated, housing generally has been in the forefront of the Government's activities over the past year, and, despite the many problems and difficulties encountered, a further 2,595 house units have been completed and handed over for occupation, thus alleviating still further the housing needs of the people. As at 31st March, 1947, 3,631 house units were in course of construction and a further 1,472 in the hands of contractors but not started.

The short supply of nearly all kinds of building materials has necessitated the increasing use of alternatives and experiments in new methods of construction. Unfortunately, many of the materials for these alternative methods are themselves in short supply, and in order to assess the position accurately in regard to supplies a complete survey is being undertaken of all materials required to meet the building programme, both private and State building, during the current year in an endeavour to accelerate this most important work.

Considerable progress has been made in the provision of houses and farm buildings for rural settlement of ex-servicemen. A total of 152 houses have so far been completed in addition to 323 farm buildings, while contracts have been let for a further 170 houses and 346 farm buildings.

With a view to increasing timber-production the Ministry has undertaken the erection of prefabricated houses for timber-workers. It is anticipated that 1,200 of these houses will be provided within the next three years, and contracts involving the erection of 150 of these houses have already been let and further contracts are pending for an additional 150.

When operations were resumed in the Hutt Valley at the beginning of 1944 we were faced with a £7,000,000 project representing the construction of 1,000 houses per annum over a period of four years. Depsite considerable difficulties, the programme is well up to schedule.

Good progress is also being made with the Tamaki Scheme at Auckland, whilst the work at Mount Roskill, where large areas are being developed, is proceeding rapidly. In Christchurch development is proceeding satisfactorily in large blocks at Shirley and Bryndwr, whilst the large project at Corstorphine, in Dunedin, is being rapidly built up and completed. Investigations are in hand for future development in the Dunedin metropolitan area. Similar work is progressing in the smaller towns and centres

There are twenty-eight carpentry schools for the training of ex-servicemen operating in different parts of the country, and during the year these schools completed 319 house units, making a total of 544 to the 31st March, 1947. These men are also working on contracts involving 1,075 house units.

To provide for future development, suitable land continues to be purchased, and at present some 20,327 sites are held for future operations.

PUBLIC BUILDINGS

Consequent upon the shortage of materials and man-power, and the fact that housing has been granted highest priority, the Government efforts in other building spheres have been considerably restricted, and many of the essential works which accumulated during the war years are, as yet, only in the early stages of construction, and in many cases not yet commenced.

Education Department.—Amongst the major works undertaken by the Public Works Department have been the provision of hostel accommodation at Lincoln and Massey Colleges for rehabilitation students. The new class-room block at the Wellington Girls' College was completed, the temporary school at Waddington, Hutt Valley, erected and occupied, while the Southland Technical College and Hutt Intermediate School are under construction. Class-room and recreational accommodation and, in addition, many new works of lesser magnitude have been provided by the conversion and reconstruction of surplus defence buildings throughout the country.

Health Department.—A large maternity hospital is being constructed at Christchurch, and a nurses' home at Nelson, accommodating seventy nurses, is now occupied.

Mental Hospitals Department.—A large programme is being carried out for this Department. The Lake Alice Institution is proceeding, though only slowly on account of labour and material shortages, and additional villas are under way at Porirua. New institutions were established at Weraroa by conversion of Air Force station buildings, and at Ravensthorpe, by conversion of an Army convalescent hospital.

Police Department.—The new police station and residence at Kingsland, Auckland, has been completed and occupied, and the Whitianga station is in course of erection. At the Dunedin Central Station additional accommodation was provided.

Public Works Department.—A plant workshop at Sockburn was completed, and new bulk stores buildings in Blenheim Road, Christchurch, are under construction.

Rehabilitation Department.—Rehabilitation training centres have been provided at Palmerston North, Napier, Whangarei, Kaikohe, and Kaitaia.

Scientific and Industrial Research.—A modern concrete building to house the plant research laboratory near Massey College at Palmerston North was completed and occupied.

Land and Income Tax Department.—In connection with the decentralization of the Land and Income Tax Department, office accommodation was provided in various centres.

Government Buildings.—At Palmerston North a building purchased for Government accommodation was converted to the needs of various Departments.

Miscellaneous.—The transfer, re-erection, and conversion of surplus defence buildings into office and other accommodation for various Government Departments has entailed much work. In addition, the maintenance, repair, and renovations of Government buildings has presented a heavy programme of work, much of which has been an effort to overtake arrears which accumulated during the war.

War graves are receiving regular service, and a large number of permanent graves have been constructed and temporary crosses erected.

HYDRO-ELECTRIC DEVELOPMENT

Special priority has again been given to hydro-electric development, though construction has been hampered extensively by present-day difficulties in obtaining suitable workmen and materials.

At Waikaremoana Upper Development, construction is now so far advanced that the first unit is expected to be running in September. The main portion of the work yet to be completed is the intake channel leading from deep water in the lake-bed to the tunnel entrance. Some 80,000 cubic yards of clay and rock have to be excavated to form the intake channel to a depth of 53 ft. below normal lake-level, a difficult task that may take an appreciable time. However, the work has been planned in such a manner that water for the new station will be available as soon as the turbines are ready to operate.

Lake Waikaremoana has been very low during the year and the three 4 ft. siphons installed at Onepoto last year have proved invaluable in maintaining the water-supply for Tuai and Piripaua Stations. On the other hand, the low lake-level has permitted a considerable amount of the intake channel to be excavated in the dry.

Work on the Karapiro Development had reached such a stage by the end of last year that the lake was filled at the beginning of April, 1947, when No. 1 unit commenced generating. As part of the road-deviation work made necessary by the filling of Karapiro Lake, a notable steel-girder bridge with concrete deck—the Maungatautari Bridge over the Waikato River—has been built to replace an old low-level timber structure.

As construction work at Karapiro drew towards a conclusion staff and workmen were transferred to Mangakino, farther up the Waikato. At this site, which will serve as headquarters for constructing Maraetai and two other projects, a model town is now rising from the bare plain to house over two thousand workers and their families. Mangakino Village is necessary because further power projects on the Waikato River are isolated from existing settlements, and, therefore, the village will be equipped with all the amenities of a small town, such as shops, bus terminal, public garage, recreation-halls, churches, sports-grounds, &c.

The Maraetai project is now taking shape. Much preliminary work has been done; works buildings, including a sawmill, are well under way. Of the permanent work, the diversion tunnel is being pushed ahead, and 100 lineal feet had been fully excavated by the end of the year.

Investigation of the foundation conditions at Cobb River have reached a point where a decision has been made to build a concrete gravity-type dam, and construction has been authorized. The Cobb Valley has most unusual geological features, being sited high up on mountains, and the dam-site has required more than usual engineering and geological examination.

Progress on the Lake Tekapo tunnel has shown a marked improvement, especially since the shield at the south end has penetrated beyond the old exploratory drive that held up work in the early stages. The tunnel is now being driven from both ends.

At Lake Pukaki outlet an earth dam is to be built to provide storage of spring floods. Control of the lake outflow will be by means of a reinforced-concrete culvert through the dam having five 10 ft. by 10 ft. barrels, each regulated by a sluice-gate; the water will be released in such a way that the flow in the Waitaki River will be increased during the dry winter period.

Investigation work has been proceeding at alternative dam-sites on the Clutha River at Coal Creek with a view to starting construction there as soon as possible.

MAIN HIGHWAYS

As indicated in last year's Budget, legislation was passed during the year whereby the Main Highways Board was relieved of any liability with regard to either interest or principal on an amount of £1,226,000 advanced by way of loan in 1930. In addition

to the foregoing concession, the Government decided to write off arrears of interest to 31st March, 1946, amounting to £1,416,297, and also the 1946–47 interest of approximately £520,000.

The activities of the Main Highways Board for the past financial year are described in its annual report, which is attached to this statement. The report indicates that the total receipts from revenue sources amounted to £2,861,016, as compared with £2,174,337 for the preceding year. Considerable progress was made during the year in overtaking the arrears of maintenance, and, while some highways have not yet been brought back to pre-war standard, every effort will be made to attain this object in the shortest possible time.

With the limitations on materials and man-power it has not been possible to embark upon any extensive bridging or construction programmes, but the need for bridge renewals throughout the Dominion is one of extreme urgency and within the availability of resources every effort is being made to meet the position.

In view of the shortages for bridging and for heavy construction works, expenditure and effort for the immediate future will be concentrated to a considerable extent on the extension of dustless surfacing which does not draw heavily on man-power and for which it is anticipated that materials will not be in such short supply. The most appreciated benefit which can be provided for motorists and the road transport industry will be an early extension of dustless surfacing.

ROAD-CONSTRUCTION

Road-construction has been on a modest but increased scale, the limits having been dictated largely by available man-power. Particular attention has been given to roading on land made available by the Government for the rehabilitation of ex-servicemen.

As stated on previous occasions, I am most anxious to provide improved road access to settlers who do not enjoy reasonable facilities in this direction, and hope that next year a very considerable advance will be possible to this end.

Eighty-three miles of formation, 150 miles of metalling, and 1,174 ft. of bridging have been completed; and a further 700 ft. of bridging is in progress.

The Government has had in mind for some time the amelioration of conditions on Chatham Islands, where road access has always been backward, and I am happy to state that a good start has been made with a roading programme there. Earth-moving plant was shipped from New Zealand, and 6 miles of formation and a 130 ft. bridge over the Nairn River have been completed already.

RAILWAYS-CONSTRUCTION

With the near-completion of the South Island Main Trunk Railway no large-scale railway-construction is proceeding at present.

In the metropolitan areas investigations have been pursued actively into the rail-access works included in the ten-year schedules of works announced by me. Extensive investigations are in hand upon proposals for provision of suburban railway facilities in the vicinity of Auckland and Wellington.

Survey of one of the Christchurch metropolitan works, the Sockburn Styx industrial railway loop, was carried out during the war, and I am pleased to say that the route now proposed will avoid damaging the best of the agricultural land in the vicinity.

The Government has purchased the 19-mile length of the Taupo-Totara Timber Co.'s line, from Putaruru to Tokoroa, and it is now being operated by the Public Works Department. As a result it will be possible to transport closer to the works on this line materials needed for construction of Maraetai and other hydro-electric projects

on the upper reaches of the Waikato River, with a corresponding reduction in road haulage, while timber from exotic forests in the vicinity will be railed out from Tokoroa. Surveys are being carried out with the object of improving alignment and gradients.

Trial surveys have been carried out for a possible extension of the railway beyond Tokoroa as far as Reporoa with a view to tapping large afforested areas, and there have been discussions between the Commissioner of Works and the several interested Departments concerning the most suitable rail access to the forests on the Kaingaroa Plains and adjacent areas.

I am pleased to say that, in spite of cement shortage, relining and grouting of Turakina Tunnel was completed by July, 1946, and work is rapidly nearing completion on the Fordell Tunnel.

My engineers have made exhaustive engineering surveys to decide on the final location of the Rimutaka Tunnel and approaches. The technical and financial aspects have received very close study by the Commissioner of Works and the Public Works and Railways Departments. In earlier reports it was envisaged that the tunnel portal at the east end would be near Cross Creek, but with further surveys carried out it has been established that Lucena Creek (3 miles north-east of Cross Creek) is more advantageous for the east portal. Officers of the Lands and Survey Department have been engaged on a precise survey. Orders for the substantial plant required have been placed, and it is hoped that sufficient trained tunnelling personnel will be available to make a start on the underground work as soon as this plant arrives. Difficulties in regard to the dollar position have necessitated placing orders in Great Britain, with consequent delay in delivery.

The Hutt Valley Railway is operating now as far as Taita. Eventually the line will be extended to join up with the existing Wellington – Upper Hutt Railway at Silverstream. Full consideration has been given to the best location for continuing the line through the Taita Gorge, and it has now been decided to cross to the west bank of the Hutt River in the vicinity of Haywards and pass through the Gorge along the present route of the railway line.

On the South Island Main Trunk the Railways Department is running a full passenger and freight service and has taken over ordinary maintenance, although some cleaning up still remains. A major work on this line almost completed during theyear is the stop-bank protection on both banks of the Hapuka River up-stream of the railway bridge. A reinforced-concrete overbridge carrying the highway over the railway at Oaro has been completed during the year. In view of the characteristics of the country through which some of the tunnels have been driven it has been deemed prudent to pressure-grout behind the linings of these tunnels to ensure maximum stability. A sea-wall (1,400 ft. long) in the vicinity of Oaro is almost complete; the wall skirts the toe of an unstable bluff that is creeping towards the sea very gradually, and the line can now be deviated easily at this point should it become necessary.

AERODROMES

The year has seen a very definite reversion of aerodrome activities from wartime to civil usage. This has resulted in a period of planning for future development pending a clarification as to civil aviation policy. There has therefore been little new construction on New Zealand aerodromes, and work has been confined chiefly to maintenance. At Milson temporary buildings have been erected and altered to accommodate civil aviation and meteorological staff, and at Hokitika a start has been made on the new Seaview Airfield.

In the Pacific a number of airfields that will be required for the New Zealand regional or international service have been taken over from the American Forces and are being maintained by key New Zealand staff using local and Native labour.

At present the Public Works Department is maintaining 36 civil aerodromes, 23 landing-grounds in remote localities, 13 emergency-landing grounds, 6 seaplane-alighting areas, and 10 R.N.Z.A.F. stations in New Zealand, and, in addition, 4 civil aerodromes and 2 R.N.Z.A.F. stations in the Pacific.

IRRIGATION AND WATER-SUPPLY

The irrigation season was marked in Central Otago by abnormally dry weather, especially during the latter part of the season. The resulting increase in demand was greater than could be met from the established schemes. By contrast, unusually wet weather has been experienced in Canterbury, with a consequent small demand for water.

On the Ashburton-Lyndhurst scheme a further 1,356 acres of land have been prepared for irrigation by the border-dyke method, making a total of 2,947 acres completed.

Construction of the Mayfield-Hinds scheme is proceeding slowly because of shortage of man-power and plant. A scheme to irrigate 140,300 acres between the Rakaia and Ashburton Rivers has received preliminary investigation, and detail survey is now in hand.

Work has been continued on the Wellington water-supply scheme. On the longest tunnel, 2,375 ft. of a total of 9,000 lineal feet have been excavated during the year. Access roads for the pipe-line have been formed. The plans and specifications for fabrication and construction of the pipe-line are almost complete, and tenders will be called shortly.

LAND IMPROVEMENTS

Steady progress has been made with sand-dune reclamation by tree-planting on the Woodhill-Helensville, Maioro (Manukau Heads), and Hokio-Manawatu areas, though work has been restricted to some extent by lack of man-power.

Land clearing by machinery has been carried on in the Ohakune, Westport, and Southland districts for farmers who find the use of plant for stumping, heavy disking, &c., economical. The demand for this service in Southland has been most pleasing, and work has been extended to drain-excavation. A feature of this work is the unique form of assistance now possible to farmers through the Government making available costly large plant as a means of mutual assistance in the development of new land.

SOIL CONSERVATION AND RIVERS CONTROL

During the year under review the Soil Conservation and Rivers Control Council entered into the final year of its first term of office. Honourable members will remember that the Soil Conservation and Rivers Control Act was passed during the height of hostilities, and at the time the view was expressed that if, during the remaining period of war and the immediate post-war years, the Council could do no more than establish the organization provided for under the Act and become fully acquainted with the problems to be overcome, much valuable work would have been accomplished.

I am pleased to report that much more headway than was ever anticipated has been possible. Eleven Catchment Boards, covering approximately 40 per cent. of the Dominion, are now actively operating, and credit is due for the effective and enterprising manner in which they have faced up to the existing difficulties, particularly in respect to finance and shortage of man-power and materials. In general, constructional work has increased beyond that of the previous year, more particularly in respect to small river-protection works which prior to the advent of Catchment Boards were usually neglected, resulting ultimately in the necessity for heavier and much more costly protective work.

Several proposals for major schemes for river and flood control have been completed, but construction is temporarily held up due to consideration of finance and restricted availability of man-power and materials. Fortunately, with the exception of Clutha River (although even it was not as serious as the previous year), no major flood damage occurred during the year.

It is also pleasing to report a notable advance in soil-conservation work where a real start has been made, more particularly in the North Island, in the stabilizing of moving hillsides and the repair of eroding gullies by tree-planting and construction of soil-saving dams of light live types.

During the year the Soil Conservation and Rivers Control Act was amended. The principal amendment reconstituted the Council to give increased representation to both local bodies and interested Government Departments. Other amendments were made to overcome certain administrative difficulties which arose as a result of experience gained in the practical application of the Act, and it is anticipated that additional amendments will be required as opportunity offers to enable the Act to be more effectively administered.

I trust that the day is not far distant when conditions will permit the construction of the more important of the major schemes for river and flood control, and with their completion we will be further on the road in our efforts to obviate the wanton destruction of land by uncontrolled rivers.

COAL-PRODUCTION

The Public Works Department has again made a substantial contribution to opencast mining operations. In some cases the Department's heavy plant is used for shifting overburden only, the Mines Department and private owners arranging for the coal-extraction. In other cases the Department undertakes shifting and also coal-winning and delivery into wagons. Again, as at Stockton, for instance, the Department's repair and maintenance facilities are used to keep the Mines Department plant in working-order.

Most opencast mines are in isolated wet localities where the use and repair of heavy earth-moving plant entails very great effort by Public Works staff and men, and I wish to place on record my personal appreciation of their work.

LIGHTHOUSES AND HARBOUR-WORKS

Maintenance and miscellaneous works have been carried out.

PLANT AND MECHANICAL

The magnitude of the Government's post-war developmental programme demands new construction machinery in addition to that purchased early last year from the American Services in the Pacific. However, the existing world-wide shortage in this direction is reflected in our inability to proceed with certain major projects as speedily as desired. The Public Works Department's Construction Engineer, Mr. C. E. K. Alecock, who is at present visiting the United States for the purpose of investigating major construction methods in North America, is also making inquiries regarding new types of construction plant. Difficulty is also being experienced owing to the shortage of skilled staff, and the non-availability from overseas of spare parts, which has necessitated the manufacture of replacements locally, causing delay at times in the overhaul of heavy machinery.

The assembly of one of the large tower excavators imported from America has been completed, and in November last the machine was put to work straightening the channel of the Otaki River. This is one of three machines purchased chiefly for river-control work.

I wish here to pay a tribute to the officers and technicians who without previous experience or instruction assembled the giant machine at Otaki River and successfully learned to operate it. The machines have a span of 1,000 ft., a turret 130 ft. high, and the huge bucket holds 18 tons of shingle. In actual operation on the Otaki River this machine, working two ten-hour shifts per day, has averaged approximately 300 cubic yards per hour. This machine is being used for the training of personnel to staff the other two machines for the South Island.

Main repair workshops are being established at Sockburn and Mangere, and accommodation is being erected at both places for the workmen.

Many plant items have been diverted to opencast coal-mining and to sawmilling operations, while several large compressors loaned by the Public Works Department played a big part in salvage operations on the M.v. "Wanganella."

SERVICES TO OTHER GOVERNMENT DEPARTMENTS AND LOCAL BODIES

Not the least important of the functions of the Ministry of Works are those professional and general services rendered to many Government Departments and numerous local bodies which can be correctly described as most comprehensive in scope and character. In this connection the past year presented the usual demand for these services, particularly in the field of engineering work and investigations, architectural and town-planning services, valuations, purchase of supplies, advertising tenders and arranging contracts, maintenance and reconditioning of plant, legal services, and land purchases.

Under the wartime agreement made with the three Defence Services, which still continues, the Public Works Department is responsible for the general maintenance of camps, barracks, aerodromes, and other defence establishments. The extent of this work can be gauged by the fact that it provides regular employment for over nine hundred workmen in addition to contractors' employees.

To the services mentioned and rendered during the past year must be added the work involved in the handling of the whole of the construction plant, workshop machinery and other equipment, timber, steel huts, hardware, and general stores purchased by the War Assets Realization Board from the United States Services in the Pacific. This work was, of course, in addition to the plant, &c., purchased by my Department for its own use and already referred to in this report. Eleven ships, each with a complete cargo aggregating 47,000 tons, were expeditiously cleared. My staff also rendered much assistance to the War Assets Realization Board in the valuation, salvage, and disposal of buildings, plant, machinery, and stores.

PUBLIC WORKS WORKERS' AGREEMENT

I recently renewed the Public Works Workers' agreement for a further period of two years from 1st April, 1947. The revised agreement provides for a wage increase approximating 5s. per week for all Public Works Department's employees, and this raises their remuneration to a level commensurate generally with the rates provided for similar workers operating under industrial awards.

A general all-round improvement has been effected in working-conditions, including recreational amenities in isolated localities. In this connection I wish to acknowledge the willing co-operation at all times of the Young Men's Christian Association National Headquarters Council. The Y.M.C.A. has for many years conducted recreational

activities, canteen, and library services in all large camps on behalf of the Government. They have also conducted, on behalf of the Post and Telegraph Department, postal, &c., facilities which have been greatly appreciated by my Department as well as the workmen domiciled in the camps.

The workmen engaged on Public Works construction works throughout the Dominion are members of the New Zealand Workers' Union, and I am happy to say that our negotiations with the executive officers of the union have always been conducted in an atmosphere of harmony and good will. I also wish to express my thanks and appreciation to all workers directly associated with the works being carried out by my Department for their loyalty and efficient service. It is a tribute to their good work and the spirit of co-operation in which the union executives have presented their requests to myself and my departmental officers that the works of this Department have for so very many years been free of any serious labour disruption.

The agreement covering conditions of employment of workers engaged on maintenance of roads and main highways will come under review in the near future.

STAFF

The staff at the close of the year under review numbered 3,239 officers, comprising 1,227 permanent and 2,012 temporary officers. My statement would not be complete without an expression of my appreciation of the most efficient manner in which the staff have attended to their onerous duties during another difficult year. I am pleased to be able to say that most of those officers who were on active service have now returned to the Department. I desire to place on record the Government's appreciation of the services of the only two senior officers who retired during the year—viz., Messrs. Alex Dinnie, District Engineer, Napier, and J. G. Hannah, Senior Clerk, Head Office. Absenteeism due to sickness has been reasonably moderate. Unfortunately, it has claimed two senior officers, Messrs. T. G. Beck, Deputy Commissioner of Works, and G. W. Knapp, Assistant Under-Secretary. Their early recovery and return to duty is hoped for.

The loss of trained personnel causes concern, particularly the loss of officers of long service who during their training have become experienced in special spheres of the Ministry's functions, whether in the professional, administration, or executive fields. It is generally known that the wide ramifications of the Public Works Department produces officers of the most versatile type, who for this reason are sought after by other interests.

CONCLUSION

I attach to my statement the annual report of the Commissioner of Works on the activities of his office for the past year, and, in keeping with usual custom, I also attach annual reports prepared by the Engineer-in-Chief, the Government Architect, and the Director of Housing Construction. In addition, there are submitted, in compliance with section 24 of the Main Highways Act, 1922, the annual report of the Main Highways Board; also, in compliance with section 33, subsection (2), of the Soil Conservation and Rivers Control Act, 1941, the annual report of the Soil Conservation and Rivers Control Council for the year ended 31st March, 1947.

In conclusion, Mr. Speaker, I desire to assure this House and the country that during the current year the whole resources of the Ministry of Works will be applied towards maximum acceleration of all works of national and local importance, and achievement will be limited only by those retarding factors over which the Ministry has no control.

R. SEMPLE,
Minister of Works.

APPENDICES

TO THE

MINISTRY OF WORKS STATEMENT, 1947

APPENDIX A

AUDITED STATEMENT OF EXPENDITURE ON PUBLIC WORKS OUT OF THE PUBLIC WORKS ACCOUNT FOR THE YEAR 1946–47

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

Public Works Department, Wellington,
18th June, 1947.

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.

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 FOR THE YEAR 1946-47

	Appropriation.	Expenditure.		
	£	£	s.	d.
Railway construction	400,000	231,272	6	9
Housing construction	7,833,900	6,193,778	10	0
Public buildings	800,000	715,889	7	5
Education buildings	1,250,000	992,274	10	6
Lighthouses and harbour-works	40,000	13,181	8	10
Roads, &c.	350,000	227,426	8	6
Soil conservation and rivers control	450,000	270,864	6	11
Irrigation, water-supply, and drainage ..	700,000	482,860	12	3
Unauthorized expenditure: services not provided for	..	12,430	18	7
Totals	11,823,900	9,139,978	9	9

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.

E. R. MCKILLOP, M.I.C.E., Permanent Head.

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

APPENDIX B

ANNUAL REPORT OF COMMISSIONER OF WORKS

The COMMISSIONER OF WORKS to the Hon. MINISTER OF WORKS.

SIR,—

I have the honour to submit the following report on the general activities of my office for the year ended 31st March, 1947.

The policy of this office was clearly laid down in my report to you last year, and every endeavour has been made during the year just past to conform to the general principles laid down in that report.

The Ministry of Works has continued to serve as a clearing-house for all building and constructional proposals accumulated in the post-war period, and has maintained relations with all Departments of State, local authorities, and private interests involved in the building field. Particular attention has been given to proposals involving the expenditure of State funds, and in this connection the closest liaison has been maintained with Treasury.

The following is a review of the operations of this office, as distinct from those of the Public Works Department and other constructing authorities coming within the general field of the Ministry of Works.

GOVERNMENT WORKS AND THE CONSTRUCTION INDUSTRY

It would not be an overstatement to say that every interest involved in building and constructional work to-day is embarrassed by lack of labour and materials. The loss to the State and to the individual occasioned by work far exceeding its normal economic time of construction is very considerable indeed. This condition has been brought about by a failure to equate work to the man-power and materials supply—admittedly a matter of great difficulty towards the end of the war, when much of the present commitment was entered into.

In the year just past the Ministry of Works has carried out a review of the whole construction industry in an endeavour to secure a better relation between work in hand and the facilities available to carry this work out. This may mean temporarily a tighter control of critical materials, and in this respect some extension of control into new fields. While the objections to control in all its forms are fully realized, there is no alternative, as matters stand, if the present conditions, unsatisfactory as they are, are not going to be made much worse. Every effort is being made to improve the position of material supply so that controls can be released and finally removed as soon as possible. *This represents the proper and only satisfactory solution to the whole problem.*

The results of the review are incorporated in a separate report to you, but some points are of general interest. The estimates of man-power available to the construction industry and made some twelve months ago have proved unduly optimistic. In actual fact, the labour force now available to the construction industry, on a basis proportionate to population, is lower than it has been at any other time during this century. In normal times approximately 7½ per cent. of the employed population is engaged in the construction industry. The census figures for 1945 reveal that 700,000 persons were employed, which, on the basis of 7½ per cent., would mean that 52,500 employees should now be employed in the industry, whereas indications are that only 36,000 can safely be assumed to be available this year. In 1939, when 670,000 people were fully employed, 47,000 were available to the construction industry, of which 28,500 were employed on Government and State-subsidized works and 18,500 on work carried out for private enterprise. These figures compare with 18,000 in each of the corresponding fields for 1947–48, making up a total of 36,000 referred to. Thus the reduction in man-power available to the construction industry is entirely within the field of Government and local-authority works, which indicates that some 10,000 workers have been attracted to other industries or occupations or are not otherwise available. Some small addition to the total available number may be taken into account in respect of seasonal workers, farm hands, Native, and other types of labour employed on an intermittent basis and not accounted for by the National Employment Service figures.

The material resources are probably lower in relation to demand than they have been during the past quarter century. Stocks have long been exhausted by wartime construction, and those industries, both within the Dominion and overseas, which supply materials, plant, and tools for works are still functioning under serious difficulties, the cumulative effect of which is still to keep supplies at an inadequate level. Whilst to-day the most critical limitation is material, it would seem that a relatively small improvement in this field would make labour, particularly skilled labour, the critical factor.

The main purpose of the review was to prepare a programme of State and State-subsidized works related to man-power and material available. The levels of this programme have been fixed after making allowance for meeting a reasonable proportion of competing demands of similar priority which may be expected from local authorities on account of their own works and by private enterprise. The draft programme for Government works has been prepared after careful pruning, with the fullest co-operation from all the Departments concerned, and it sets their allocations well below those which they claim as indispensable to meet their most modest needs. The Government programme, the full details of which have been separately submitted to you, can therefore be looked upon as realistic, in view of the existing conditions. In fact, it provides for expenditure by the State, both directly or by way of subsidy, of a total of £24·98 millions after making allowance in the field of private enterprise and unsubsidized local-body works of £2·04 millions. In pre-war years expenditure by the State usually approximated 60 per cent. of the total, but, due to reduced man-power, the State's programme for this

year will total 55 per cent. The estimated annual capacity of the whole works industry of the Dominion at the present time can be divided as follows:—

£(m.)
21·73 upon housing and buildings:
23·65 upon engineering works other than buildings:

or a total of £(m.)45·38 which may be further divided as follows:—

	£(m.)	Sub-totals £(m.)	
State works—			
Housing	6·5		
Buildings other than houses	2·9		
Engineering and other works	11·0		
		20·4	
Local-authority works subsidized by the State—			
Buildings, including houses	2·33		
Engineering and other works	2·25		
		4·58	
			24·98
Local-authority works non-State subsidized—			
Buildings, including houses	0·25		
Engineering and other works	9·7		
		9·95	
Private-enterprise works—			
Houses	7·0		
Buildings other than houses	2·75		
Engineering and other works	0·7		
		10·45	
			20·40
Total		£(m.)	45·38

Building-control policy throughout the year will be adjusted in terms of the above, so that at the end of the year there will be a much closer relation between man-power and materials and works in hand than is possible at the present time.

In regard to the portion of expenditure—viz., £24·98 millions—representing State and State-subsidized works, the departmental estimates provide for it being allocated as under:—

	Building Construction. Per Cent.	Civil Engineering Construction. Per Cent.
(1) Land-development	8	27
(2) Industrial and commercial	3	..
(3) Communications	6	43
(4) Utilities (hydro-electric development)	2	25
(5) Housing	55	..
(6) Social services and public administration	23	1
(7) Defence	3	4
	100	100

It was noted in the review that the reduction in man-power available had taken place almost entirely in the field of local-body and Government work. The implications of this are quite obvious. In the first place, it would appear that conditions of private employment are at the present time much more attractive, and as the major proportion of private work is urban in character the amenities provided by urban employment have had the effect of attracting workers to the larger centres of population. Unless steps are taken to overcome this, we will have the greatest difficulty in getting completed major public works and buildings in the rural areas. Rural housing is already held up, and all large hydro-electric construction works suffer from lack of man-power.

Especial reference should be made here to the necessity for prosecuting with all possible speed the Government's hydro-electric construction programme. This is the subject of a separate report, but it is not out of place to refer here to the urgency and importance of this work. The financial loss to the Government and the Power Boards due to reduced sales of power is substantial enough, but when the value to the community of lost production and service is taken into account, and the inconvenience and hardship of the consumer added, the importance of closing the gap between supply and demand becomes paramount. Electricity is now not only a necessity—an essential component of our national economy—but is rapidly increasing its influence on the form and location of industrial development and of housing. A careful investigation into the many factors involved in reducing the gap between supply and demand was commenced last year, and unremitting efforts have continued to accelerate the design and construction of new plants. The whole question will be the subject of a separate report, but sufficient evidence is now available to indicate here that unless unusual steps are taken the completion dates aimed at will not be realized. The money absorbed in the undertakings and lost to the nation by delays in completion is in itself such as to justify continuous working on such portions of all the schemes as are liable to hold up completion. The hours of working now generally applicable throughout the Dominion should not apply to these critical works. With the amount of urban work available there will remain the difficulty of attracting suitable labour into the remote areas where hydro-electric construction is being carried out or proposed, and in this particular field the possibility of augmenting the limited numbers available by immigration will have to be considered.

BUILDING CONTROL

Within the field of the Building Controller, which, in the main, covers houses and all other building, during 1946–47, work to the value of £20·449 millions was completed (housing, £13·56 millions; other works, £6·889 millions). The volume of work which in this field can be carried out during 1947–48 has, as previously stated, been estimated at £21·73 millions.

The effective controls which can be exercised within the full capacity of the construction industry, estimated at £45·38 millions are:—

(*a*) £24·98 millions can now be controlled per medium of the proposed works programme for State and State-subsidized works.

(*b*) £10 millions fall within the scope of the present operations of the Building Control Regulations and outside the scope of the programme of State and State-subsidized works, although certain works within the programme total of £24·98 millions are also at present subject to control by the Building Controller.

(*c*) £10·4 millions fall in a field not previously subject to control, except where substantial quantities of critical materials have been involved. These works are chiefly in the field of local-body unsubsidized engineering works.

Apart from a progressive increase in the total of building permits by daily issues, there is to-day outstanding and ready to become a load upon the works industry a total of—

(i) £16·1 millions of work covered by building permits already issued and representing works not yet commenced or not yet completed.

(ii) £10·1 millions of building-permit applications for which approval has been deferred.

Of the £16·1 millions it is estimated £12 millions will be completed during the year ending 31st March, 1948, and thus be a charge on this year's building capacity of £21·73 millions. The remaining £4·1 millions will be a carry-over into 1948–49.

During the twelve months ended 31st March, 1947, the Building Controller authorized the issue of 38,027 permits, viz.—

(*a*) Building projects other than housing ..	14,699
(*b*) State and other Government housing ..	3,166
(*c*) Private housing	11,329
(*d*) Housing additions	8,833
	38,027

The following table sets out the classification of work covered by permits issued during the year:—

Type of Work.	Permits approved.		Permits deferred.	
	Number.	Value.	Number.	Value.
		£		£
Engineering	26	98,085	2	15,613
Hospitals	119	748,423	11	60,470
Schools	210	929,346	21	138,546
Other Government	386	504,987	16	163,526
Local bodies	160	268,220	26	110,380
Commercial	2,373	2,108,277	1,385	3,484,743
Factories	658	1,882,804	351	1,573,211
State housing	2,870	4,567,091	..	..
Other Government housing	296	428,291	1	1,885
Rehabilitation housing	499	752,304	2	2,130
Private housing	10,830	15,024,535	511	692,089
Housing additions	8,833	1,714,802	536	139,247
Community buildings	381	193,124	234	708,782
Farm buildings	2,838	535,148	46	24,047
Miscellaneous	7,548	495,090	1,700	174,209
Totals	38,027	30,250,527	4,842	7,288,878

Permits for houses and housing additions aggregated £22,487,023 in value and represented 74·7 per cent. of the total value of all permits issued.

To this stage the statistical figures record permits authorized by the Building Controller. The following table, showing coverage of permits uplifted on a district basis, is more factual, in that the figures record work actually proceeded with. It should be understood that many applicants who are granted permits do not for one reason or another uplift their permits and proceed with the work immediately.

Permits operated on

District.	Private Houses.		State Houses.		Other Works.	
	Number.	Value.	Number.	Value.	Number.	Value.
		£		£		£
Auckland	3,734	5,227,600	896	1,415,592	3,001	1,955,530
Hamilton	1,381	1,933,400	453	714,381	1,876	760,340
Palmerston North ..	941	1,317,400	275	433,675	339	911,060
Napier	739	1,034,600	180	283,860	403	469,497
Wellington	1,442	2,018,800	694	1,094,438	1,868	914,865
Christchurch	1,517	2,123,800	339	534,603	2,664	1,301,029
Dunedin	874	1,223,600	329	518,833	2,633	1,505,181
	10,628	14,879,200	3,166	4,995,382	12,784	7,817,502
Total ..	..	..	..	..	..	27,692,084

MATERIAL SUPPLY

Associated with building control is the question of material supply. It is appreciated that control in all its forms is negative in character and a solution of the difficulties most acceptable would be an increase in the material-supply position. Throughout the year every endeavour has been made to secure this, and this office has utilized to the full all channels of supply available in New Zealand and overseas. The chief difficulties internally are those of transport—shipping and rail—and man-power in the producing industries. External to New Zealand there is also fierce competition for all building-materials, and in this field also bottlenecks are constantly occurring due to demand exceeding supply and to lack of shipping. The importance of securing increased bulk supplies is well recognized by the Government, and, as you are aware, a special committee has been set up in this connection. Some improvement can be expected for the current year, 1947–48, and it is likely the position will substantially improve in the year to follow as the result of steps which are being taken now to improve production and transport.

The following schedule covers the supply position of the principal building-materials for the building year 1947–48 so far as this can be foreseen:—

Cement

(Demand, 300,000 tons; estimated production, 200,000 tons)

The actual demand is approximately 400,000 tons, but it is considered that industry, because of the man-power factor, could not use more than 300,000 tons. The capacity of New Zealand plants is 315,000 tons, but, due to transport and plant maintenance problems and shortage of coal, these works are producing (in total) only about two-thirds of capacity. Arrangements have been made to import cement, although the amount to be received will undoubtedly be limited by the availability of shipping to perhaps 25,000 tons for the year. Existing plant extensions and new plant proposals cannot become effective within the next two years.

Bricks

(Demand, 36,000,000 bricks; estimated production, 18,000,000 bricks)

Use of bricks as an alternative building-material to cement and timber could be increased considerably if local production were more satisfactory. Plant capacity is at least 36,000,000, but in no instance does any brickworks appear to produce consistently to capacity. Production difficulties are due to coal and power shortages, transport, and lack of labour because of the low wage rate compared with alternative occupations. In the South Island these difficulties are accentuated by weather conditions, which affect the working of the clay-pits.

Timber

(Total demand, 418,000,000 super feet; total estimated production, 345,000,000 super feet)

The building industry is, of course, only one user of timber, but is perhaps affected more by to-day's shortage than any other. Because of transport difficulties supply in some North Island districts is bad, whilst deliveries from the South Island to the North Island are only about one-seventh of normal. Actually, in spite of transport, labour, and equipment shortages, timber-production has never been higher, but any advantage due to overall increased production is more than offset by the reduced production of indigenous timber and by the almost complete lack of stocks, as well as increased demands in other categories.

Structural and Reinforcing Steel

(Demand, 50,000 tons; estimated available for New Zealand, 25,000 tons)

The full quantity required is not offering from overseas, particularly Australia, largely because of coal and steel strikes, combined with the intensity of local demand. Even so, approximately 50 per cent. more steel could have been obtained last year if trans-Tasman shipping had been more satisfactory. Delivery of the 1947–48 25,000 tons quoted above hinges largely on the availability of shipping.

Enamel Baths

(Demand, 25,000 baths; estimated supply, 7,500 baths)

Unfulfilled orders already amount to over 13,500 baths, with the figure increasing rapidly. Whereas the sole New Zealand manufacturer has a capacity of 20,000 to 25,000 baths, the present rate is reduced to 7,500 per annum due to pig-iron and coke shortages and lack of labour. The two materials involved come from Australia, and again shortage of shipping-space has prevented supply being maintained. Labour is short, since the wages offered are unattractive when related to the heavy and dirty nature of the work. Prospects for the importation of baths are not encouraging, in spite of the availability of import licences.

Wallboards

(Demand, 60,000,000 square feet; estimated production, 60,000,000 square feet)

Production would appear to be quite satisfactory, especially when it is known that increased production of Gibraltar board amounting to 19,000,000 square feet is contemplated. However, production is spasmodic for all classes of board, due to raw material, labour, and transport difficulties. Orders are many months behind in delivery, and present production is not sufficient to allow the leeway to be made up.

Sanitary Earthenware

(Demand, 56,000 pieces; estimated supply, 39,000 pieces)

Local production of reasonable-quality articles is only 18,000 pieces. Production is hampered by lack of transport, imported material, and labour shortages. Production of second-grade articles is much too high in proportion to first-grade, whilst seasonal difficulties in working the clay-pits are met. Because of production difficulties and a high domestic demand, the United Kingdom has imposed an export quota on these goods and importations are thus unlikely to be increased.

Roofing-materials

(1) Asbestos cement—corrugated and flat; (2) galvanized iron—corrugated; (3) cement and earthenware tiles.

Present availability is approximately: (1) 3,000,000 square yards; (2) 2,000 to 3,000 tons; (3) 7,000,000 tiles. Production of asbestos-cement products is hampered by coal, power, transport, asbestos, and labour shortages. Galvanized iron is wholly imported and availability amounts to little more than 10 per cent. of pre-war supplies. Tile-production is increasing rapidly and further production amounting to 4,600,000 tiles per annum should be available this year. Had other roofing-materials been available to meet a portion of the demand, the tile position would undoubtedly be satisfactory. There is an immediate shortage of 2,000,000 square yards of asbestos-cement products and 18,000 tons of corrugated iron, much of which would go on urgent repairs to existing roofs. However, any improvement in the supply of any one product, such as the extra tile-production proposed, will assist the position for roofing.

Builders' Hardware; Plumbers' Supplies; Electrical Fittings

In many cases the availability of these goods is largely dependent on the continuance of an adequate supply of raw materials from overseas. Generally speaking, plant and labour are available in sufficient quantities to maintain output at a rate high enough to meet demand. On occasion, however, fluctuations in the receipt of raw materials have caused temporary shortages in supply. Whilst there is no great surplus in any one line, current requirements are being met. This necessitates a considerable amount of substitution at times, as there are no stocks from which to draw.

PERMANENT HOUSING

This subject is of sufficient importance to warrant special comment. There is no doubt at all that throughout the whole Dominion, and particularly in the metropolitan areas, there is at present a very grave housing shortage, but on the broader or longer-term basis the figures popularly quoted as representing the housing shortage are open to question. These would indicate that the country will be faced within the next fifteen years with finding 160,000 to 180,000 houses, representing an expenditure in the order of £300,000,000. Increasing the capital assets of the nation by so large an amount in this respect only within such a comparatively short period must undoubtedly have an effect on the national economy. With housing taking up over two-thirds of the whole building potential, the remaining potential is not sufficient to satisfy the demands for commercial buildings, hotel accommodation, industries,

and the Government requirements for post-offices, Courthouses, police-stations, hospitals, schools, &c. Restrictions on this latter class of building result in an ever-increasing accumulation of demand which cannot indefinitely be postponed.

So far as State housing is concerned, building has followed the applications made in the various centres. These applications do not represent actual needs, and in a general way to provide for cases of necessity the applications could be reduced by approximately 50 per cent. Applications for State houses create a demand which to some extent snowballs upon itself, and has resulted in an undue proportion of houses being built in the North Island, and of this number an undue proportion in the proximity of Auckland and Wellington. It is difficult to arrest this trend with the conditions at present prevailing, but if steps in this direction are not taken very soon, in a few years undesirable conditions will arise prejudicial to the interests of the country as a whole. The Government has recently approved of the policy of decentralization of industry, and the benefits of this are already becoming apparent in regard to proposed industrial expansion in the South Island. If more active steps in this direction can be taken, further movement can be expected away from the larger metropolitan areas and towards the South Island. There is difficulty also in getting houses built in the rural areas on account of the amount of metropolitan work offering and on account also of the scarcity of materials, contractors being reluctant to take up country work, which, on account of its isolation, is more affected by material shortages and consequent stoppages.

Generally, on the question of housing, the attempt which is being made to secure houses up to the standard of State housing for all those people living in indifferent accommodation, is fraught with difficulty in a period when there is such a shortage of available man-power and materials. The solution can only be attempted on the basis of priority of need whilst this condition continues.

TRANSIT HOUSING

During the year past applications were dealt with from nineteen local bodies, resulting in a further 443 family units being made available, at a cost to the State of £129,265. To date transit accommodation has been made available for 1,031 family units, at a total cost of £281,000 to the State.

A further survey has recently been made of all camps and other military establishments remaining, and disposal of buildings thereby revealed as surplus is now under consideration with a view to providing more temporary accommodation.

PUBLIC WORKS POLICY

The Public Works Department is the principal constructing agency of the State and has throughout the year been very seriously handicapped in all its activities by lack of supplies and man-power. The structure of the Department is such that it could undertake a very much larger programme of work than is likely to be available to it for the next year or so ahead. This particularly refers to the engineering division, which is concerned with the construction of developmental works, as distinct from the erection of Government buildings and State housing. So far as engineering works are concerned, to prosecute satisfactorily work which should be commenced within the next twelve months and to accelerate work on projects already in hand a total of 4,100 additional men will be required—viz., 2,700 labourers, 330

tunnellers, and 1,070 tradesmen. Even with restriction of jobs of lesser priority, there appears little prospect of increasing the labour force available without the importation of selected labour from abroad. Broadly, it would appear that for the next year or so the work of the Department in this respect will largely consist of keeping the present highways in good repair, replacing bridges, and pushing ahead with the very considerable programme of hydro-electric construction. Attention will also be given to the improvement of highways outlets from the main centres of population, where difficulties have long been experienced in dealing with increasing traffic flow.

It is desired to decentralize, as far as it is practicable, certain functions of the Department from Wellington. A commencement in this direction has already been made, and the matter is under current examination with the Public Service Commission.

So far as the future policy of the Department is concerned, there appears to be a need for a redefinition of the works which should be carried out by the Central Government itself as distinct from those which could be more advantageously carried out by selected local authorities under Central Government direction, and a redefinition also in regard to the work which must, on account of its nature, be carried out by day labour as distinct from that which could more efficiently be let by contract. This and other related matters will be the subject of special investigation during the current year. Steps have been taken during the year to associate more closely the operations of the Public Works Department with those of the Ministry of Works.

WORKS: PROGRESS AND COSTS

(*a*) Construction Progress

The Public Works Department has during the past year improved upon the system in operation for reporting projects on construction works. These improvements will also make possible the setting-up and maintenance of a central system of progress reporting in this office. Up-to-date and accurate records of progress will later be available on all important Government construction projects.

(*b*) Construction Costs

Costs of all works have increased, and are still increasing. There is little prospect of a reversal in this trend until labour and materials are in better supply.

You will recollect that last year an officer of this Department, accompanied by an officer of Treasury, was sent to the United States of America to study modern methods of costing engineering construction works. These officers have now returned and are engaged upon the design of a system suitable for introduction into the Public Works Department.

The system, when functioning, should provide complete knowledge and control over the costs of all phases of works at frequent regular periods during their construction, and information for the preparation of estimates of cost for future works, which at the present time it is difficult to obtain with any degree of accuracy.

TOWN-PLANNING

The administration of the Town-planning Act has been transferred to the Ministry of Works. At the last Municipal Conference a resolution was passed urging that further trained personnel should be made available by the Government for the assistance of local authorities.

In one form or another assistance has been given by the Ministry of Works in regard to the town-planning proposals of most of the local authorities in the Dominion. Having regard to the lack of independent professional advice, town-planning schemes have been prepared for a number of smaller local bodies at their direction and charge, while many more are now in the course of preparation.

Special committees have been set up to deal with the problem of localizing Government office accommodation in the larger cities in properly planned Government centres, and considerable progress in this direction has been made.

Liaison has been continued with the larger metropolitan authorities who have assumed responsibility for the preparation of their own town plans, and in this connection the benefits have become apparent of the public announcement of the regional schedules of works, which enable the metropolitan authorities to proceed with the planning of their areas in the full knowledge of the Government's intentions. It is not too much to say that, had this step not been taken in Auckland and Wellington at least, consideration of Government and local-body schemes in isolation would have rapidly produced most unfortunate effects. The problem in Auckland itself is of sufficient magnitude to warrant the special appointment of a District Commissioner of Works, and this was made in the early part of this year.

There is now a general realization by most local authorities that future developments cannot safely be permitted in the absence of properly prepared town plans, and steps to have these built up are now being taken. It will be some years before the benefits of this will become generally apparent. In the meantime, however, assistance is being given in regard to traffic and zoning problems already causing acute difficulty in some of the larger centres.

It is much to be desired that local authorities should, wherever practicable, assume responsibility for the preparation of their own town-planning schemes, but it is realized that, with the limited professional advice available outside the larger areas, it will be some time before this can be attained.

The University is looking to this office to provide opportunities for architectural, engineering, and geography students and graduates to obtain experience in the planning field. Useful employment, therefore, is given to a number of students during the long vacations. Although graduates may remain only a year or so, even this limited experience in the planning field will serve to broaden their approach to the problems they will encounter in their basic professions.

REGIONAL PLANNING

You have now completed the public announcement of the regional schedules of works covering the whole Dominion. These have been popularly, but erroneously, termed "ten-year plans." They can serve only as a basis from which development plans can be prepared after much more consideration has been given to the characteristics of each region by both the Government Departments and the local authorities concerned. What is actually meant by regional planning is the examination of the natural resources of each particular region with a view to its further development,

and, with this background of knowledge, the determination of the necessary works in priority to bring the development into effect. The problem varies from one region to another as the potentialities of each region vary, but unless a serious attempt is made to cover the Dominion on this basis it is difficult to see how any approximation can be made of future population and its location. Is is not suggested that all this can be done by Regional Councils, but it can best be done by these working in the closest association with Government Departments instead of, as at the present time, local authorities and Government Departments working very largely in isolation.

There has been little criticism of the principle of regional planning, which has been on the statute-book for the last eighteen years. As you have presented it, it represents the desire of the Government to have the advice and assistance of local interests in the planning of works to benefit areas in which these interests are constituted, as distinct from works which are more national in character and for which the Government must retain primary responsibility.

In the metropolitan areas the problem is relatively simple. The need for co-ordinated planning is very evident and needs no justification, but in the more rural areas the setting-up of further reviewing authorities in the form of Regional Councils has brought up certain objections. The fact remains, however, that the Dominion has reached a stage in its development when it is no longer possible to plan ahead on the basis of representations from the very large number of local bodies, often in direct competition, and without regard to community interests or the interests of the Dominion as a whole.

There are many problems with which we are now faced, such as highway and road development, river control and soil conservation, main drainage and water-supply, railway extensions, aerodromes, harbours, zoning of industrial and housing areas, &c., which cannot be determined within local-body limits as they exist at present. The facts of the matter are that modern methods of transport and communications have altered the whole internal economy of the Dominion, and the reasons which no doubt existed in the earlier days for the setting-up of many of the smaller local authorities have now disappeared. If it were possible to arrange local-body administration more in conformity with topographical considerations, or on a basis of community of interest as this now exists, substantial savings should be possible and it should be much easier to implement a policy of regional planning.

This, no doubt, will be a matter which in due course will receive the consideration of the local Government Commission, recently set up, and until the Commission has completed its work it would be undesirable to consider the form Regional Councils will ultimately take. In the meantime, however, every assistance should be given to Regional Councils as these are now constituted to carry on, and advice offered by them in regard to developmental projects and the priorities these should take should receive every consideration. It should be remembered that, though more difficult, it is possible to plan regionally in consultation with individual local bodies and without Regional Councils. Where, therefore, these Councils are not active, steps will be taken by the Ministry of Works to ensure that all proposals coming forward for consideration from any particular region relate to the interests of the whole region, rather than to those of the particular local authority or local interest advancing the proposals. It is much more preferable, however, that proposals originating locally should be reviewed locally before submission to the Government.

It is to be regretted that the policy of regional planning could not have been instituted at a time more favourable to the commencement of some of the major projects which have been described. Some time must elapse before this position is reached, but in the meantime many of the more urgent projects are being reviewed by the Ministry of Works, with the assistance of Government Departments concerned, so that there will be no delay when man-power and materials become available for construction to commence.

WORKS AND PLANNING LEGISLATION

The legislation under which this office is required to function includes the Ministry of Works Act, 1943, the Public Works Act, 1928, the Main Highways Act, 1922, the Town-planning Act, 1926, the Soil Conservation and Rivers Control Act, 1941, the Housing Improvement Act, 1945, and their numerous amendments, some of which are normal Amendment Acts, while others are included in the Statutes Amendment, Finance, and other enactments that were convenient at the time.

Statutes and subordinate legislation affecting the control of building-materials and labour and the welfare of the building industry generally are important in the administration of this office. So, too, are enactments such as the Land Subdivision in Counties Act, 1946, and the various Acts constituting and empowering local authorities and delegates of the Crown to undertake public works and affecting the development of any town or region.

This mass of legislation reflects the reactions of several generations of legislators to the problems of their times, and approaches to the same problem by different Departments from different directions, coupled with the difficulty of getting a clear view on account of the diverse amendments, have sometimes resulted in parallels, omissions, and lack of clarity.

Better co-ordination of constructional and developmental activities should follow the review and correlation of these statutes, and consideration is being given to the directions in which administrative improvements might be achieved by this means.

GENERAL INVESTIGATION

Throughout the year investigations have been carried out on behalf of Treasury into proposals within the engineering and building fields involving the expenditure of State funds. Similar investigations have also been carried out on behalf of separate Ministers of the Crown. Many of the proposals examined have been for works of substantial character involving the expenditure of large sums of public money.

In these investigations the advice of all Government Departments has been readily available, and full acknowledgment is made of the assistance they have given in this respect.

The staff of Treasury is being further increased to provide facilities for economic studies which will be availed of by the Ministry of Works in the review of major developmental proposals now being undertaken. There is still a lack of information in regard to such questions as immigration, population distribution, industrial development and location, employment types and distribution, financial relationship between Central Government and local government, &c., required to provide adequate background for the justification for many of the larger projects now advanced in the proposal form which, if approved, will represent a heavy charge on public funds.

CONCLUSION

In conclusion, I wish to express thanks to the many interests, private and public, who have been associated with the workings of this office throughout the year for their co-operation and understanding of the difficult conditions under which we have had to operate.

Acknowledgment is made of the assistance which has been rendered by the Public Works Department in a field external to its normal activities and to the members of this office who have been charged with the responsibility of acquiring and co-ordinating information necessary for a review of the whole construction industry and of exercising the controls, often under most difficult conditions, which have been necessary to ensure that works which the nation requires first have been given the necessary priority.

E. R. McKILLOP, M.I.C.E.,
Commissioner of Works.

APPENDIX C

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 upon the various works completed and in progress throughout the Dominion during the year ended 31st March, 1947:—

RAILWAYS

Auckland–Morningside Deviation.—Survey work is continuing and alternative routes have been examined. Borings have been made to investigate the substrata on the tunnel line.

Putaruru–Reporoa Railway.—During the year a trial line survey has been completed from the 19-mile peg on the Taupo–Totara Tramway (at Tokoroa) eastward to Reporoa and Waiotapu, a distance of 52 miles.

After purchase of the Putaruru–Tokoroa length of the Taupo–Totara Timber Co.'s railway (19 miles), a trial survey was started with the object of eliminating substandard gradients and curvature and allowing Railways Department's rolling-stock to be run on this section.

Turakina–Okoia Deviation.—In spite of delays caused by cement shortage, good progress has been made with the tunnel relining. Relining and grouting of the Turakina Tunnel was completed in July, 1946, and the relining party was transferred to the Fordell Tunnel, where work is continuing.

Formation throughout the deviation has been trimmed, and the Railways Department has been carrying out ballasting and platelaying work over the whole length of the section, except in the immediate vicinity of the Fordell Tunnel.

Pier extensions to the Wangaehu Bridge have now been completed. The girders of both the Turakina and Wangaehu Bridges have been bedded and painted.

Rimutaka Deviation.—Extensive surveys have been carried out during the year to ensure that the best route is obtained. An access road has been built to the Wairarapa end of the long tunnel, where preliminary earthwork is in hand.

Hutt Valley Railway Extension.—A single track has now been extended to Taita Station (1½ miles beyond Nae Nae), where a temporary platform and station building have been erected. A passenger service to Taita commenced on 13th April, 1947.

South Island Main Trunk.—The Railways Department has been carrying out ordinary maintenance throughout the year, but final clearing up and ballasting work has been continued by the Public Works Department. A total of 5¼ miles of fencing was constructed during the year.

On the Kaikoura section construction of stop-banks on north and south banks of the Hapuka River has been continued almost to completion. Covering with topsoil and sowing is finished, and the planting of willows is in hand. Concrete-slab protection is complete and stone-pitching of the banks is well in hand.

The concrete sea wall, 1,400 ft. long, at 64 m. 50 ch. has been finished, except for the coping, 3,406 cubic yards of concrete, 7,520 cubic yards of rubble filling, and 6,335 cubic yards of sand filling having been placed.

A reinforced-concrete overbridge has been built at Oaro to carry the highway over the railway, and the approach ramp at the south end has been completed.

HYDRO-ELECTRIC DEVELOPMENT: CONSTRUCTION WORKS AND INVESTIGATIONS

Waikaremoana Upper Development.—Construction has been pushed on as rapidly as possible; although much finishing and cleaning-up work remains to be done, it is expected that water will be available through one penstock and the first machine will operate in September.

The last major portion of the job to be commenced is the intake channel leading from the bed of the lake to the tunnel entrance. The work involves excavation and removal of 80,000 cubic yards of rock and earth to a depth of 53 ft. below normal lake-level and protection of the batters of the excavation with concrete and stone work to reduce the risk of slips and erosion by wave-action. The material to be excavated consists of sandstone and papa rocks varying in size from small stones to gigantic blocks set in a matrix of puggy clay. This, coupled with the fact that so much of it is under water, makes excavation an unusually difficult task. It is necessary, therefore, to work to a carefully planned method by which water will be available for operating the turbines should the power-house machinery be ready before the intake channel is finished. All available earth-moving plant is being used on the excavation, which is being taken out in layers, each layer having to be broken up first with explosives. Excavation was started in February, and 25,000 cubic yards had been removed by the end of March.

At the entrance to the 10 ft.-diameter pressure tunnel a 12·5 ft. shaft has been carried down from the surface through country made safe and watertight by grouting beforehand. The shaft was lined with precast concrete rings to form a vertical pipe down which lake water will flow to the turbines pending completion of the intake channel.

The 10 ft. tunnel was pushed forward from the headgate shafts to the intake, a distance of 700 ft., through well-grouted country, and its concrete lining has been practically completed.

In this region 50,337 lineal feet of boring has been done during the year and 1,810 tons of cement injected into the country in the form of grout. All told, 233,574 lineal feet have been bored and 10,550 tons of cement have been used in grouting operations on the Waikaremoana Upper Development.

The two headgate shafts have been lined, the gates and winches installed, and the gate-houses built.

The twin 8 ft. tunnels extending from the headgates to the head of the pipe-lines have been concreted and grouted. These tunnels are to be lined with steel plate; the steel liner for No. 1 tunnel has been placed and welded up, and the annular space between the steel liner and the primary concrete has been filled with concrete, thus completing No. 1 tunnel.

The first 7-ft.-diameter pipe-line is well advanced and 350 ft. of the second one has been completed.

The power-house is complete except for minor finishing work, and erection of the first machine was well advanced by the end of March. The outdoor station and the tailrace are both complete.

The new Kaitawa weir, on the Waikaretaheke River near the power-house, is built, with two 50-ft.-long automatic regulating gates. In January the work of widening the canal leading to Lake Kaitawa was finished.

As the level of Lake Waikaremoana dropped during the year, two of the three siphons at the lake outlet were extended into deeper water in order that the supply of water to Tuai and Piripaua Stations could continue in full operation.

A grid of test holes was bored in the outlet barrier of the lake for the purpose of investigating the leakage area.

Karapiro Development.—Work on this scheme reached such a stage by the end of the year that the first machine was operating in April.

The major part of the excavation carried out during the year was the removal of the lower coffer-dam and some 70,000 cubic yards upstream of the intake and spillway sections of the dam. Up to 31st March a total of 685,000 cubic yards of spoil had been excavated.

All concreting has been completed except that round Nos. 2 and 3 machines. During the year 30,000 cubic yards were placed, making a total of 220,024 cubic yards to 31st March. All grouting is finished. With the completion of concreting, three batching plants have been dismantled.

Plastering of the power-house walls was completed, and interior finishing is complete except for plaster-board.

Sand blasting and painting of the three penstocks is under way, No. 1 penstock and spiral casing being completed. The scroll case for No. 2 machine has been assembled and welded, and the erection of No. 3 scroll case is in hand. No. 1 machine was completely concreted in, and the concreting of No. 2 machine is 80 per cent. complete.

All draught-tube gates were completed and sealed by December, allowing pumping at the downstream coffer-dam to be stopped.

The workshop and the outdoor station are complete.

Installation of the intake and spillway gates was 90 per cent. finished by 31st March.

The construction of a porous concrete-pipe drain and filter-bed on the Karapiro Stream side of the Tunakawa–Karapiro Ridge was completed in February. This work included 2,108 lineal feet of pipe and filter and 624 ft. of outlet drain.

Lakeside clearing has been almost completed; trees and scrub to 10 ft. below lake-level have been removed, and flats that would be submerged to not more than 30 ft. were cleared to provide feeding-grounds for trout.

A large amount of road construction has been necessary, both to provide access to the different parts of the work during building and when in operation and also to ensure that the Hamilton–Rotorua State Highway and county roads will be above the level of Karapiro Lake.

In the vicinity of the power-house the low-level road has been completed. This road required 82,600 cubic yards of excavation. A roadway has been constructed over the dam, and the left abutment approach has been completed.

The State highway deviation in the Maungatautari Gorge was opened to traffic on 16th March. The sides of fillings have been given a protective coating of rotten rock to stop erosion during wet weather, and a heavy base

course of rock was placed prior to metalling because of the tendency of the subgrade to soften during rain. A petrol-station on the old section of highway has been shifted to a new site on the deviation.

A new bridge across the Pokaiwhenua Stream near Horahora was completed and opened for traffic in November, together with the adjacent road deviation.

The Maungatautari deviation across the Waikato River was opened to traffic last April on completion of the Maungatautari Bridge. Much work was carried out during the year on this notable bridge; the whole of the steel-plate girders were erected and the reinforced-concrete deck was laid. The Hauoira deviation of the Maungatautari Road has also been opened.

Traffic commenced to use the Pairere deviation in December.

Rock amounting to 33,500 cubic yards was won from the Horahora Quarry for road-works.

With the near completion of the project, the number of workmen on the job has been considerably reduced, the average number during the year being 663.

A total of 146 married quarters and 150 single quarters have been transferred to Mangakino construction village.

Maraetai Development.—Much of the preliminary work on this project had been completed at the end of the year.

Formation of the 16-mile access road from Tokoroa to the dam-site was finished and base course metalling done. Five miles of the road received top course metal and 2 miles were sealed. A road to Whakamaru, site of the next projected power-station upstream from Maraetai, has been formed and culverted and base-course metalling is in hand. Formation of the Maraetai Power-house access road (left bank) is finished. In addition, works service roads and a temporary crossing of the Waikato River near the dam-site by means of a Bailey bridge are complete.

Headquarters for construction of Maraetai and adjacent hydro-electric projects will be at Mangakino, near the Maraetai site, originally a bare plain. Not only have various works buildings to be erected there, but also housing complete with all the amenities necessary for a small town. Up to 31st March, 4 miles of street-formation, 3½ miles of water-mains and reticulation, 1½ miles of sewers, and a water-supply reservoir and pump had been completed or installed. Of the new Mangakino type of married quarters, 37 were complete, and 117 married quarters had been transferred from Karapiro and enlarged. For single men a 200-man camp has been erected complete with messing and ablution blocks and recreation building. Other amenities completed are a temporary shop and two school buildings.

Of the works buildings, three (each 100 ft. by 60 ft.) have been erected for the sawmill, the timber-dressing, and the joiners' shop; the sawmill is being equipped with machinery to cut 12,000 superficial feet a day. A bulk store (100 ft. by 85 ft.) and several smaller service buildings have been erected.

Work on the major scheme is proceeding actively, the first big job to be tackled being the diversion tunnel. Both portals have been opened up and 100 lineal feet of tunnel has been excavated to full size. An extensive grouting programme has been undertaken in order to reduce flow of water into the tunnel workings.

At the dam-site preparatory work for the cableways, concrete-batching plant, and tunnel-aggregate plants is proceeding.

Waikato River Hydro-electric Development Investigations.—Investigations for future dam-sites on the Waikato River are now being carried out by the Public Works Department operating in close liaison with the State Hydro-electric Department.

Efforts were concentrated last year mainly at Whakamaru, with the object of reaching a final decision regarding the dam there as soon as possible.

Bunnythorpe Substation.—Excavation and levelling of the site was started in May, 1946, and was completed, except for trimming to falls for drainage, by March, when 64,000 cubic yards had been moved.

Formation for the railway siding is almost complete, the work including culverting, and the bottom lift of ballast has been placed.

Roading is in hand, 44 chains of formation being complete, including culverting; and a start has been made with metalling.

Cobb River Development.—Investigations of the foundation conditions at the proposed dam-site were continued. The geology of this area is unique and the country has needed an extremely thorough examination.

In anticipation of an early start with construction, accommodation is being renovated and increased, routine maintenance of access roading has been carried out, and the full lengths of the roads from Upper Takaka to power-house and power-house to dam-site have been metalled.

Prospecting for suitable concrete aggregate has been carried out and a quarry-site has been chosen 3¼ miles distant from the dam by road. Formation of an access road to the quarry has been finished.

An average of 73 men have been employed throughout the year.

Lake Tekapo Development.—The principal work done during the year was on the tunnel, on which progress has shown a very great improvement. At the south end the old drive, which was such an obstacle to speed, has been passed and most of the preliminary troubles with the shield are over. At the north end a second shield was erected in the gate-shaft chamber and is now driving towards the first shield. A total of 516 ft. of tunnel has been excavated and lined with concrete blocks at the south end and 255 ft. at the north end.

A dock-site excavation amounting to 30,000 cubic yards has been removed at the lake shore for construction of part of the intake. A start has been made with the power-house excavation.

During the year a further 62 married quarters and 35 single men's quarters have been erected. By March there were 220 men employed on the job.

Lake Pukaki Control.—This work comprises a dam and spillway and sluices equipped with gates for controlling the outflow from Lake Pukaki into the Waitaki River.

The first step in controlling the lake is construction of the sluices. Excavation for the sluice structure, involving 84,000 cubic yards, was completed using heavy earth-moving plant; and the reinforced-concrete construction is in hand.

It was necessary to build and equip a camp, and this was rushed so that most use could be made of the summer weather.

Black Jack's Point Investigations: Waitaki River.—This proposed site for a dam has to be thoroughly investigated, and a 10-mile road has been constructed to provide access for men and plant.

Clutha River Investigations.—Investigation of three possible sites for a major development near Coal Creek upstream from Roxburgh has been under way, and foundation conditions are being examined by means of open cut, shaft-sinking, tunnelling, and boring. It was necessary to build a camp to accommodate staff and workmen and to construct access roading.

IRRIGATION

Central Otago.—In contrast to those of last year, weather conditions have been exceptionally dry, especially during the latter part of the season. The rainfall registered in Alexandra was 6·87 in. from May to December and 2·40 in. from January to March. The driest conditions of all were in the Tarras area, which has an average annual rainfall of 20 in.; here 3·29 in. of rain fell between October and March, of which only 1·69 in. was precipitated after January.

After the end of January the level of the river supplying the Ardgour and Tarras Schemes fell until only 33 cusecs were available for sale to an area of 4,254 acres. Even so, supplies to both schemes were better than in the 1938–39 season, when the January–March rainfall was heavier. On the Hawkdun Scheme similar conditions have prevailed.

On all other schemes the storage dams were at a high level at the beginning of the irrigation season and water-supplies have been well maintained.

The dryness of the season has been reflected in sales of water on the Omakau Scheme, operating on a supply-and-demand basis. Up to 31st March the consumption was 10,534 acre-feet, compared with the previous highest total of 10,380 acre-feet for the whole of the 1937–38 season.

The areas supplied on all schemes and the number of irrigators show little change, the figures being 53,000 acres and 511 irrigators.

The financial statement for the Central Otago schemes shows revenue as £28,133 and working-expenses as £32,809, a loss of £4,676.

Normal maintenance work and renewals have been carried out and the recording of stream flows and meteorological data have been continued.

Survey parties have been engaged on new proposals for irrigation on the Maniototo Plain, and on the Fraser River and Upper Clutha power and irrigation schemes.

Canterbury.—The season's irrigation operations have been hampered by unusually wet weather with high ground-water conditions.

Levels Plain Scheme—commanding 12,000 acres—has been in operation nine years. This year 550 acres have been irrigated for a revenue of £85 from fifteen irrigators.

Redcliff Scheme—commanding 4,600 acres—has been in operation ten years. This year no irrigation water has been used and the revenue was £52.

Ashburton–Lyndhurst Scheme—commanding 68,000 acres—has been in operation two years. This year 2,030 acres have been irrigated for a revenue of £256 from forty-four irrigators.

A further 1,356 acres of land were prepared for irrigation by the border-dyke method, making a total of 2,947 acres completed.

Mayfield–Hinds Scheme—to command 81,000 acres—is under construction, but is retarded by the shortage of man-power and plant.

Rakaia Scheme—total area proposed, 140,300 acres—is projected to serve the area bounded by the Rakaia and Ashburton Rivers and extending from the sea-coast to the 500 ft. contour. A preliminary report and estimate has been prepared.

Rangitata Diversion Race: Routine maintenance work, including removal of noxious weeds and growth, was carried out during the winter of 1946. During the summer the silt and sand deposited in the race were cleaned out with mechanical plant in order that Highbank Power-station could operate to capacity during the 1947 winter.

Three racemen-caretakers have been appointed, and cottages have been erected for them.

WATER-SUPPLY

Downlands Water-supply.—Normal maintenance has been continued. A supply of pipes arrived during the year, and 60 per cent. of the Waimate County area is now watered.

Wellington Water-supply.—Work is proceeding on three concrete bridges on the access road to the headworks, two over the Pakuratahi River and one over Farm Creek; Pakuratahi No. 2 bridge is almost complete.

Excavation for the foundations of the flume bridge between Nos. 1 and 2 tunnels is in hand.

Work was started in July, 1946, on the 9,200 ft. No. 2 tunnel; this is the longest tunnel on the scheme. Tunnelling operations are proceeding at both ends, and 2,375 lineal feet had been excavated up to the end of the year.

Access to the Duck Creek area has been commenced, and a road following the proposed pipe-line route has been almost completed from Judgeford to the head of Takapu Road. This road will give access to Nos. 3 and 4 tunnels at the head of Cannons Creek and will greatly facilitate pipe-laying operations. Highway widening and benching for No. 1 section of the pipe-line have been carried out.

A length of the pipe-line is to be laid along the Haywards–Paremata Main Highway, and the work of improving the highway alignment and width is in hand.

Plans and specifications for fabrication and construction of the pipe-line are now being prepared. No such work of this magnitude has been undertaken in New Zealand previously.

Erection of accommodation has been continued at Trentham and Kaitoke.

COAL-PRODUCTION

Work on the opencast mines has been continued at Glen Afton, Glen Massey, Waitewhenua, Stockton, Ohai, and Wangaloa.

At Glen Afton for the year up to the end of February, 1947, a total of 16,646 tons of coal was extracted, necessitating the removal of 78,524 cubic yards of overburden, and at Glen Massey 55,023 tons of coal was extracted for the removal of 528,129 cubic yards of overburden.

Despite the difficulty of excavating in a swamp, work has continued satisfactorily on the Wangaloa Opencast Mine. For the year stripping amounted to 103,000 cubic yards and coal output to 32,759 tons.

In the Southland area overburden totalling 250,000 cubic yards was removed for State and privately owned mines.

LIGHTHOUSES AND HARBOUR-WORKS

Maintenance of lighthouses and attached buildings has been carried out during the year; routine maintenance work on all Diesel-electric lighthouse plant has also been carried on.

At Waipapapa Point a standby electric generator has been installed, and electrification is in hand at Chickens Island, Cape Egmont, and Nugget Point Lighthouses.

A 77-chain access road to Waipapapa lighthouse is in hand.

A wind-power electric generating plant was designed and built for Kahurangi Point Lighthouse, but it has been handed over to the Department of Scientific and Industrial Research for the study of electricity generation by wind-power.

Extension of the Little Wanganui Wharf is well advanced, and the Okarito Wharf and shed are being repaired.

Cables and blocks have been installed at the Nuggets to enable the launching of fishing-boats from the beach.

AERODROMES

In all districts maintenance of airfields and buildings has been continued.

Ohakea.—Shifting of the general engineering shop to Ohakea from Hamilton is in hand, and an area of 55,000 square yards of hardstanding has been completed and treated with sludge oil.

Milson.—Temporary buildings have been erected and altered to accommodate the Civil Aviation and Meteorological staff. Additional workshop space, stores, and offices are in course of erection at the south end of the old hangar. A start has been made with foundations for a new Butler hangar being erected for National Airways Corporation, and 1,500 cubic yards of metal have been placed on the apron and taxiway required for the new hangar. Maintenance of the aerodrome has received continuous attention, work including the laying of 4 miles of shallow stone drains, principally on the northern side of the flying-field.

Harewood.—Because of the present considerable traffic, the facilities are being improved by the installation of a radio range 3 miles from the aerodrome. Approximately 21 chains of access road have been formed to the range-site, and alterations to fencing are in hand.

Weedons.—Only minor works have been carried out; tennis-courts fenced; rubber-storage room constructed; water-supply overhauled; and main power supply and transformer shifted.

Timaru.—Serious flooding in October breached the stop-banks, but these have been repaired and the field is again in good order. Surveys have been completed for a new aerodrome at Levels, and an anemometer has been installed there.

Hokitika.—A start has been made with construction of a new aerodrome on the Seaview site.

Pacific Islands.—Following on the decision to seal the runways at Nandi, the greater part of the preparatory work has been done and a first coat of tar has been applied to an area of 21,000 square yards.

Reconstruction of existing accommodation at Faleolo Airfield (Samoa) and Aitutaki Airfield has been carried out in order to provide passenger-handling and maintenance facilities.

LAND IMPROVEMENTS

Whangarei Sub-district.—At Oyster Point Block 73 chains of new fences have been erected, and 46½ chains of stop-banks have been rebuilt involving 9,500 cubic yards of earthwork. Ordinary maintenance has been carried out in addition to repairs to stop-banks extensively damaged by high winds and tides.

Sand-dune Reclamation.—Work at reclamation areas has progressed steadily during the year and, in spite of man-power shortage, a considerable amount has been accomplished.

At Woodhill–Helensville reclamation line-clearing for the year amounted to 766 miles; line-cutting, 211 miles; internal roading, 5½ miles; buildings erected, 15; rabbits trapped, 5,550; marram replanted, 223 acres; trees planted, 246,734; and trees lined out in nurseries, 464,950.

At Maioro (Manukau Heads) reclamation new planting of marram-grass amounted to 248 acres; lupin sown, 350 acres; line-cutting, 132 miles; line-clearing, 1,723 miles; trees planted, 143 acres; trees lined out in nurseries, 184,000; seedlings sold to farmers, 15,800; and seeds sown to raise 465,000 trees. Telephone-lines totalling 187 chains have been erected to fire-fighting depots. On the Kariotahi Block, 4,000 trees have been planted.

At the Hokio–Manawatu reclamation 41 acres have been planted with a total of 172,260 trees and 55 acres have been planted with marram. In the nursery 47,050 seedlings have been lined out. Pruning of the larger trees on 550 acres has been carried out. A further 1,200 acres adjacent to the nursery block is to be acquired shortly.

Land Clearing.—Land clearing and drainage for farmers has again fulfilled a want, especially in Southland, where the demand for the use of the Department's mechanical plant for the purpose has been great.

In the Ohakune area 865 acres have been stumped and 376 acres rooted. Total expenditure, £5,475; total recoveries, £5,862.

In the Westport area land-clearing work had of necessity to be curtailed because of the demand for the machines on priority jobs connected with open-cast coal-mining. Nevertheless, 53½ acres have been cleared, 45 acres heavy disc-ploughed, and 47 acres light disced.

In Southland, 1,920 acres have been cleared, 2 miles 11 chains of farm access roads formed, 1 mile 30 chains of stop-banks formed for flood-protection of farms, and 15 miles 76 chains of drains dug for farm drainage and reclamation of 600 acres of swamp.

Berwick State Forest.—During the year a further 7½ miles of road have been gravelled. Some 35 chains of stream channel have been improved.

HOUSING SERVICES CONSTRUCTION

In Wellington City and Johnsonville 6,000 square yards of road have been formed and metalled for 193 housing units, 5,750 square yards of road sealed, 4,300 lineal feet kerbed and channelled, 18,500 lineal feet of sewers and storm-water drains laid, and 1,100 lineal feet of water reticulation completed.

In the Hutt Valley 29,000 square yards of road have been formed and metalled for 275 housing units, 12,000 square yards of road have received a priming coat, 18,326 lineal feet kerbed and channelled, 39,000 lineal feet of sewers and storm-water drains laid, 56,000 lineal feet of water reticulation completed, and 5,200 square yards of concrete footpaths laid.

CONSTRUCTION AND IMPROVEMENT OF ROADS

The past year has seen some increase in roading activity, particularly in the direction of providing access to farms and to soldiers' settlement blocks.

Routine maintenance and metalling and the improvement of existing roads by widening, re-forming, and the elimination of small radius bends were continued.

On the Jackson's Bay–Haast Road 1 mile between Okura and Turnbull River was formed and metalled, and apart from the replacement of a number of small temporary bridges and additions to the Arawata River Bridge the work on this road is practically completed.

At the Chatham Islands a good start has been made with the roading programme. Formation has been completed for 6 miles, and a bridge 130 ft. long erected over the Nairn River.

Work completed for the year amounted to 83 miles of formation, 150 miles of metalling, and 1,174 ft. of bridging; and a further 700 ft. of bridges are in progress.

PLANT AND MECHANICAL EQUIPMENT

The increased activity on hydro-electric construction and Wellington Water-supply Scheme has absorbed a quantity of major plant items.

One of the large tower excavators obtained from the United States of America has been working satisfactorily at Otaki on river clearing and straightening work, and is now shifting over 3,000 cubic yards per ten-hour shift worked.

The Department has continued to hire plant to other Government Departments and to local bodies, and the reciprocal arrangements with the latter have been sustained.

The system of pooling adopted for the mechanical plant continues to maintain the effective distribution and use of the present equipment, which now approaches 10,000 items.

The mechanical condition of the plant has improved during the year, notwithstanding the shortage of repair staff and materials.

Design and manufacture of special plant has been put in hand.

Items of plant which have become too expensive to maintain have been disposed of through the War Assets Realization Board, while a few replacements have been made.

DEFENCE WORKS

Maintenance of camps and establishments belonging to the Armed Services has been continued throughout the year, as has maintenance and caretaking of surplus camps and buildings awaiting disposal by the War Assets Realization Board.

Restoration work at a number of camp-sites on city parks and rural areas has been completed and the areas handed back to the owners.

Construction work has been confined almost solely to the Devonport Naval Base.

The new reinforced-concrete breastwork, 800 ft. long, has been completed, and after dredging was finished, 780 lineal feet of heavy fixed fendering was erected.

In the boiler-shop, foundations for the 40 ft. by 2 in. plate rolls were built, and the machine is now erected. The 250-ton press and a large guillotine have also been erected. The whole of the earth floor (2,400 square yards) has been given a bituminous covering 1½ in. thick.

Work on the bulk-fuel-oil tunnels is practically complete and the main items of equipment have been received and installed. During the year 1,655 cubic yards of concrete have been placed and 22,000 square yards of guniting and 15,000 square yards of silicate of soda treatment of the tunnels has been carried out.

Roading at the base is almost complete and the laying of fresh- and salt-water fire-fighting mains is well advanced.

Work on the new entrance at Stanley Bay has been started and erection of the unclimbable fences and concrete boundary walls completed.

About 80 per cent. of the fixed harbour boom defence has been dismantled and the salvaged material stored on the new Stanley Bay reclamation.

DESIGN OFFICE

The principal work during the year has been the design and preparation of plans of bridges, including a number ranging from 900 ft. to 1,250 ft. in length. An unusual type was the Mangakino Bridge, on the access road to the Maractai power development, with two 85 ft. and one 110 ft. reinforced-concrete box-girder spans on 110-ft.-high piers. The central 110 ft. span will be the largest single girder span in reinforced concrete built in this country. Other bridges designed include reinforced-concrete arches, long-span plate-girders, and steel trusses.

Several reservoirs of up to 500,000 gallons capacity have been designed; also other hydraulic structures.

The plans and specifications for the Wellington water-supply pipe-line and structures have been an important feature of the year's work. This has involved a considerable amount of design and checking. Preparation of the specification for the pipe-line, which incorporates features novel to New Zealand, has been a formidable task. In order to clear up a number of important points in connection with this specification it was necessary for the Chief Designing Engineer to visit Australia, where similar problems have been met; the visit proved to be of great value and much useful information has been obtained.

The preparation of a series of standard drawings for structures required by the Soil Conservation and Rivers Control Council was undertaken.

Steel formwork for the diversion tunnel at Maractai hydro-electric development was another difficult design problem.

Numerous bridge proposals submitted by district offices, counties, and consulting Engineers had to be examined and approved. Local Government Loans Board proposals have been received in increasing numbers for examination and design check; they included water-supply, sewerage, storm-water drainage, bridge, and street proposals.

To ascertain the position regarding sewerage and water-supply systems in cities and boroughs of over 3,000 inhabitants a survey was made during the year; the summarized information will prove valuable to departmental and municipal Engineers.

A complete sewage-treatment plant for Cherry Farm Hospital is being designed.

The allocation and issue of reinforcing and structural steel to public-works jobs is under the control of the Chief Designing Engineer, and this work presents many difficult problems because of shortage of supplies and depleted stocks.

STAFF

I wish to place on record my appreciation of the loyal and efficient service given by my staff during the past year.

I have, &c.,
F. LANGBEIN, M.I.C.E.,
Engineer-in-Chief.

APPENDIX D

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, 1947:—

The operation of the Division in three zones as reported last year under reorganization of the Department and decentralization is proving successful, and, although shortages of staff, man-power, materials, and transport have curtailed activities, a year of solid achievement is recorded. The study of up-to-date methods, both in construction and the use of new materials which will make for greater economy and efficiency in Government building projects, is constantly kept in view. Overseas design, both in function and æsthetics, is also kept under a constant review so that State architecture is in keeping with modern developments and requirements.

Procurement of staff is still difficult, especially of experienced personnel, and this condition has led to a heavy burden on the existing staff. However, with training schemes in operation, especially as applied to rehabilitation of returned servicemen, satisfactory results are becoming apparent, and in a few years present-day difficulties should be eliminated.

Working drawings were prepared for buildings of a total value of £1,287,654; in addition, sketch-plans were prepared for buildings and ancillary works of a total value of £3,003,300.

A large amount of work is carried out for other Departments, and professional and technical advice given in connection with Commissioner of Works' projects, Government and civic centres, and war memorial proposals, also to the Public Service Commission on accommodation matters and to the War Assets Realization Board, Standards Institute, and the Earthquake Damage Commission. Where it has been necessary to assist some Departments with their architectural work members of the staff have been seconded to those Departments for their assistance. All building schemes, both sketches and working drawings, including as they do numerous projects to the value of several millions of pounds, which are submitted to the Local Government Loans Board for loan purposes, are also examined and reported on.

Assistance is given to and received from the Administration, Engineering, and Housing Divisions, between whose officers and mine there exists a very good spirit of co-operation and collaboration.

During the year the following works were carried out:—

Department of Agriculture.—A new modern milking-shed, complete with yards, fences, loading-stands, &c., has been erected at Flock House. Two three-roomed workmen's cottages have been constructed at Hall's Road Farm, in the Waikato. Renovations and general maintenance repairs have been carried out to eight Stock Inspectors' Residences.

Army Department.—A new sprinkler system and new fire mains have been installed at Hopu Hopu Camp stores, and the magazine buildings at Kelm's Road are being resheeted with asbestos-cement. General maintenance and repairs have been carried out to twenty drill-halls, the Blenheim drill-hall being subject to very extensive repairs and renovations.

Navy Department.—Substantial store accommodation at Calliope was completed, and other works, additions, alterations, and maintenance carried out there and at Tasman and Tamaki.

Air Department.—Administration buildings have been constructed for National Airways at Kaitaia, Kaikohe, and Onerahi, in the Northland district. Restoration of buildings, &c., to pre-war colours has been carried out for the Taieri Aero Club, Masterton Aero Club and, at Kukuhia, buildings have been altered to form a kitchen, and a stove has been installed, also sumps and drainage. Aerials have been dismantled and maintenance of buildings carried out in respect of Radar Stations Nos. 5, 6, and 7, while the extensions were completed for Unahi D.F. Station.

Education Department.—At Wellington Girls' College a new class-room block was completed in September last and the building officially opened and occupied. The gymnasium and assembly hall for Stratford Technical High School constructed from an Army recreation hall is nearly completed. Owing to the growth of the housing area in the Hutt Valley, a temporary school at Waddington had to be urgently constructed from an existing mess building on the site of the artisans' camp. Substantial progress has been made on the construction on new Lower Hutt Intermediate School, although some temporary delays have occurred due to shortage of labour and materials. The domestic-science block for King Edward Technical College, Dunedin, is two-thirds completed. Work is also in progress on the additions at Southland Technical College, Invercargill, the concrete foundations and retaining-walls being in position. Renovations, &c., are proceeding at Anderson's Bay Girls' Receiving Home and the Otekaieke Special School for Boys. Work is in hand, and approximately 50 per cent. completed, on the provision of hostel accommodation for rehabilitation students attending Massey College. At Lincoln College temporary accommodation was provided for trainees, while preparations are in hand for increasing the water-supply. A tender has also been received for a dormitory block at the same college. In the Auckland district materials from demolished camp buildings have been utilized in construction of school buildings at Takapuna Grammar, Balmoral, Manukau, Avondale, and Kawhia Intermediate Schools, Otahuhu Technical High School, Auckland University, and Elam School of Art.

Government Buildings.—For the purpose of improving Government office accommodation at Alexandra, the transfer of a building from Clydevale Linen-flax Factory, purchased from the War Assets Realization Board, was made. Repairs and renovations were carried out at Invercargill and Napier. Extensive alterations to a building purchased in Palmerston North were carried out for the purpose of accommodating various Departments.

Health Department.—The construction of the new nurses' home at Nelson Hospital to accommodate seventy beds was completed and the building occupied last year, while the new kitchen block is in course of construction. Work on the sewerage at Queen Mary Hospital, Hanmer, was suspended last June owing to shortage of labour, but was resumed in February of this year. Excavation was completed for the Imhoff tank and a commencement made with the walls. A large maternity hospital, St. Helens, is now under construction at Christchurch. Kitchen alterations were completed at St. Helens Hospital, Auckland.

District Nurses' cottages were erected at Ororu, National Park, and tenders called for repairs and renovations to doctor's residence at Denniston. Huts ments for Maori T.B. patients have been erected in various localities.

Internal Affairs Department.—At Turangi plumbing repairs to the water-supply have been carried out at the fish hatchery. Restoration work is nearly completed at Pompallier House, Russell. A large number of permanent head-stones have been constructed and temporary crosses erected to war graves, which are receiving prompt and regular attention. A high-altitude hut for deer-culling parties was erected in the Western Tararua Range, the material being dropped by aeroplane.

Island Territories.—Rarotonga: An Ionosphere Observatory Station for the Department of Scientific and Industrial Research was commenced and is progressing satisfactorily. A power-house and residence to supply power and light is in course of construction.

Niue Island: An x-ray clinic is in course of construction.

Marketing Department.—The carpenters' shop and boiler at the dehydration factory, Motueka, which were seriously damaged by fire last January, were completed and hose-reels installed throughout the factory. A tender has been accepted for a new lemon-processing factory at Tauranga.

Land and Income Tax Department.—A heating and ventilating system was installed in the Whangarei district office. Substantial alterations and renovations being carried out for the Department in Napier are completed. The new Nelson office, which was constructed from a building dismantled ex Air Force Delta Camp, Blenheim, was completed and occupied. Additional room was taken over by the Department in Dunedin and is now in use. Alterations were completed, and the Department went into occupation at Palmerston North, Greymouth, and Timaru.

Marine Department.—Commencement has been made with electrifying lighthouse, dwelling, and standby plant at Nugget Point and Chickens Island Light. At the Puysegur Point Light, concrete water-tanks have been constructed, cottages reroofed with asbestos-cement, and buildings repaired. A new dwelling has been erected for the Principal Keeper at Cape Reinga Lighthouse. General maintenance has been effected to a number of other lighthouses.

Mental Hospitals Department.—Progress with the new institution at Lake Alice, Marton, is proceeding very slowly on account of labour and material shortages. During the year staff cottages 1–8 were completed, 100-000-gallon water-tower completed, and villas 7, 8, and 9–18 are in course of erection. Contracts have been let for the sewage-treatment plant, laying main water-supply pipe-line, and roading work has been carried out on all building-sites, &c. At Porirua construction of villas has proceeded, villas 4 and 5 having been completed and occupied, while 7 and 8 are half-finished. The new laundry block was completed last March, and installation of equipment is now proceeding. An automatic sprinkler system is being fitted into the auxiliary buildings. Work carried out during the year at Seacliff included demolition of tower and stone and brick gables, construction of new fire-escapes, and a new kitchenette in D Ward for T.B. patients. Miscellaneous work carried out at other institutions is shown by erection of six cottages at Kingseat, conversion of buildings at Raventhorpe, new soak-pit at Templeton, roadwork at Waitati, and alterations at Levin Farm (Weraroa), an ex Air Force Station, to provide accommodation for mental patients.

National Employment Service.—Artisans' Camp, Waddington, was shifted to Petone to release the school-site at the former place. By reconstruction and conversion of Army buildings at Waikaraka Park and Mangere Crossing, Auckland, accommodation was provided for industrial camps.

Police Department.—Police-station and residence at Kingsland, Auckland, has been completed, and a new station and residence at Whitianga is in course of erection. A new police residence at Tauranga was completed during the year. At the Dunedin Central Police-station the accommodation buildings have been completed. In addition, seven garages have been erected and yard asphalted. Repairs and renovations were carried out at a number of stations, which include Hamilton, Dunedin South, Dunedin North, and Te Awamutu. Minor repairs and maintenance were carried out at forty-seven other stations throughout the country, and the contract for new station at Omakau has been completed.

Post and Telegraph Department.—A new post-office and line-store was erected at Kaikohe and is now completed. Automatic telephone-exchanges were erected at Island Bay and Karori, Wellington, but installation of apparatus at Karori is not yet completed. Work commenced late in 1946 on a modern two-story post-office at Feilding. Concrete to first-floor level of new post-office at Te Kuiti has been completed. Other works carried out include removal of clock-tower at Gore and completion of reinforced-concrete line building there. New line-stores have been erected at Papakura, Huntly, and Wairoa. A tender has been accepted for new post-office at Balclutha, and a contract let for removal of Nelson clock-tower.

Public Works Department.—Permanent climb-proof fencing has been provided at Zone Workshops, Sockburn, and a deep-well pump and sewerage pump connected to Wigram pressure sewer. The main workshop building at Sockburn was handed over during March, but electrical installations and reticulation, boiler equipment, and steam-heating will take several months to complete. The temporary plant depot at Dunedin has required roof repairs, and the blacksmith's shop has been extended. At Hamilton extra garage accommodation has been provided at Knox Street. The internal alterations to rooms, painting, and papering of the departmental building have been completed. In the Whangarei district maintenance to twenty-four departmental houses and buildings and twelve huts erected at Maungaturoto for workmen. Temporary accommodation for surfacemen has been provided at Whakatane and Opotiki. Concrete stores are under construction at Blenheim Road, Christchurch.

Rehabilitation Department.—Painting-training centres have been established at Miramar and Palmerston North, where an old Y.M.C.A. building was shifted from Air Force Station at Milson. Linklater's Farm was purchased, and also twenty Army huts from Ohakea to establish the Disabled Servicemen's Farm (Milson). At Napier, three steel hutments were erected and fitted up for use as training-school by disabled servicemen. The Corstorphine Training Centre, Dunedin, was built with a Quonset hut fitted up with partitions. Trainees' accommodation has also been provided at Whangarei, Kaikohe, and Kaitaia.

Department of Scientific and Industrial Research.—In connection with plant research, a modern concrete laboratory building near Massey College, Palmerston North, was completed and occupied during the year, and several Army buildings were fitted up for use in Wellington.

Miscellaneous.—In Auckland City, military camps have been converted for civil purposes. Demolition of buildings was carried out at Victoria Park, Inner Domain, and Market Road. The former Army buildings at Camp Oranje were converted into thirty-six flats for transit housing.

The Polish Children's Camp at Pahiatua was maintained during the year.

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 above-mentioned works, building engineering services, including heating, electrical, air-conditioning, refrigeration, and mechanical installations, were carried out to the value of £176,585.

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 E

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 Department's activities for the year ended 31st March, 1947:—

(1) *General.*—The past year has been a most difficult one for the Department, due almost entirely to the shortage of building materials and fittings necessitating a large amount of work and research in the endeavour to obtain substitute materials. Notwithstanding this handicap, I am pleased to be able to report that the efforts of the Department have been successful in alleviating still further the acute housing shortage in this country.

The number of houses completed during the year totalled 2,595, as against 2,985 for the preceding year, while at the end of the year a further 3,631 houses were in various stages of completion. The slight drop in production was due entirely to the difficulty experienced by builders under contract to the Department in obtaining the required materials, as the Department is geared up to a production greatly in excess of the actual houses completed during the year. This is reflected in the number of houses in course of construction, number of contracts let, and the number advertised for tender, which in all cases exceeded those of the previous year.

(2) *Building Construction.*—Due to the shortage of building materials, the Department has been forced to utilize substitute materials in increasing quantities, and considerable research and experimental work has been carried out. I desire to stress that the use of these substitute materials has not in any instance lowered the high standard of the buildings which has been a feature of this Department's activities. It is unfortunate that the number of alternatives available are themselves restricted. Owing to this supply position, the completion of houses is delayed and, because building contractors wish to keep their men employed, they have been forced to adopt the expedient of taking contracts which they cannot hope, with the present material shortages, to complete in the normal time.

This, however, is to the ultimate benefit of the community, as the contractors' organizations are kept more or less intact, men are fully employed, and, although the procedure is criticized in some quarters, there is no doubt that its advantages far outweigh any disadvantages.

The past year has seen an increase in the number of units built in materials other than timber. At present very nearly three-quarters of the houses being built are either sheathed in or constructed of materials other than timber, the alternatives being brick veneer, total brick, asbestos sidings and sheathing, concrete blocks and slabs, "No Fines" concrete, and concrete sheathing-boards.

The various types of concrete construction being employed by this Department have been set back by the acute steel and cement shortages. "No Fines" concrete, however, continues to be popular with the smaller builders. An experimental contract in Rotorua using pumice aggregate is being watched with interest, and it is proposed to use scoria aggregate in Auckland if suitable scoria can be obtained.

Preliminary investigations have been made, and it is hoped to interest a suitable contractor in rammed-earth construction. It is not anticipated that this method of construction will be adopted to any large extent.

Arrangements are, however, already in hand for a contract in Alexandra using earth blocks, a type of building already being used to some extent in Central Otago.

The increased use of treated timber is allowing for more non-heart timber to be used, the amount used depending on the availability and capacity of the treating-plants. *Pinus radiata,* dried to a suitable moisture content, is also being used for framing above floor-level, thus relieving the supply position of rimu.

A new departure in housing has been the design of transportable houses that can be shifted by road in completed sections. These houses have been designed primarily for the Timber-workers' Accommodation Improvement Scheme, but it is being considered for other schemes where houses are required in isolated localities. The portable nature of the building allows them to remain available to the timber industry when mills are shifted to new localities.

While houses have been the major objective of this Department, since June of last year 22 flat-units have been handed over for occupation, 154 units are at present under construction, while tenders have been received for a further 55.

With the development of certain areas, it has become increasingly vital to establish shopping centres. In some instances, due to lack of materials and the need for speeding up the construction it has been necessary to build two-unit houses, or garage blocks, and use these as temporary shops until such time as permanent ones can be erected.

Contracts have been either completed, let, or prepared for both permanent and temporary shops in Lower Hutt, Wellington, Hamilton, and Christchurch, and plans are under way for shops in Masterton, Invercargill, Dunedin, Rotorua, Christchurch, and Auckland.

(3) *Purchase of Land.*—Owing to the dearth of serviced sections on existing roads, almost all the land now acquired requires complete roading and servicing by the Department, and this entails a greater proportion of investigational and developmental work. Very few properties are now offered for sale to the Department of the owners' own volition, and the Department's officers have to seek out owners willing to sell or, alternatively, acquire land compulsorily under the provisions of the Public Works Act if suitable properties are not available for ordinary purchase. During the year properties have been acquired which will provide 2,913 building-sites, bringing the cumulative total to 48,751. Of this total, exclusive of the land on which houses have been completed, some 5,103 unit sections either have houses under construction on them or building contracts have been let. There remain approximately 20,327 sites still unused, although a good deal of development has still to be undertaken before they will be ready for use.

In conformity with the Government's decision to make available, where possible, a proportion of sites for purchase by returned servicemen and the general public in localities where a demand exists, some 211 sections have been, or are being, transferred to the Lands and Survey Department for disposal in various localities. This policy is being continued, and a greater number of sections will be made available as the development of land progresses.

(4) *Land-planning.*—Considerable attention has been given to the over-all planning, particularly in correlating long-range housing development, with the ten-year plans and local town-planning schemes.

The planning of major schemes at Tamaki and Mount Roskill (Auckland), and Hutt Valley, and Shirley (Christchurch) has progressed satisfactorily, whilst the preliminary work on Porirua has reached the stage where the outline scheme is almost ready for discussion with the other Departments and local bodies concerned. Besides the schemes mentioned above, major schemes in the larger towns are receiving consideration, while in other towns routine planning work on smaller blocks has been carried out as required.

(5) *Land-development.*—Despite the fact that this section of the Division has been handicapped throughout the past year by an acute shortage of field staff and a lack of transport, a total of 3,725 units has been made available for building purposes.

More and more unserviced land has had to be acquired and the necessary services supplied, and many miles of roads and drainage have been completed during the year.

Excellent progress on roading and services on the large Tamaki scheme at Auckland is keeping the development programme in that area well in advance of building activity. Delays experienced by the Drainage Board in the construction of the main sewer has necessitated the provision of alternative means of sewerage disposal for this block.

Investigations into the provision of essential services for the Porirua area are proceeding. The main difficulty being experienced is the lack of pipes for drainage and water reticulation, this shortage being occasioned by not only the steel and cement position, but the scarcity of labour.

In some areas, especially in Wellington and Christchurch, wherever practicable, advantage has been taken of the availability of Public Works Department equipment to undertake heavy development work.

It is pleasing to note, however, that there appears over the past twelve months to have been a revival of interest by private contractors in the developmental work associated with housing.

Adequate reserves in the form of recreation and children's playgrounds are planned in State housing areas in full co-operation with local bodies, and work on these amenities is proceeding steadily.

Attention is given towards beautifying these housing areas, and here again this Division works in the closest collaboration with local authorities in the planting of trees and shrubs on street frontages. To date over two million trees and shrubs have been supplied and planted.

(6) *Community Planning.*—This important aspect of State housing has been attended to by this Division and schemes prepared for several major projects. In full co-operation with other Departments, a scheme for the proposed housing activities in the Porirua Basin has been prepared which

includes the question of reclamation of portion of Porirua Harbour, stream-diversion, location of schools and communal amenities, main highway, railway-line, and zoning of industrial, residential, and recreational areas.

Plans for housing schemes at Whangarei, Christchurch, Mangakino, Kaingaroa, Rotorua, and other districts, including a proposal for the Maori village at Orakei, have also been prepared by this Division.

(7) *Standards.*—The Department is maintaining the high standards of living accommodation adopted at its inception, and although substitute materials have been used in increasing quantities for those in short supply no departure has been made from the standard of house previously provided. In many instances temporary expedients have been resorted to in order that homes may be made available at the earliest possible date, such as the inclusion of galvanized-iron baths in lieu of porcelain.

(8) *Housing Improvements.*—Considerable interest has been evinced by local authorities in many parts of the country in this very important subject. Good progress has been made in the preparation of regulations prescribing minimum physical standards for housing accommodation and measures to prevent overcrowding, and their gazetting early in the forthcoming financial year is ensured. Following this action, considerable activity in housing improvement can be confidently expected judging from the number and nature of the inquiries received from local authorities generally.

(9) *Rural Housing.*—(*a*) Applications for houses under the Rural Housing Emergency Act, 1944, have now been almost satisfied. Difficulty has been experienced in obtaining satisfactory tenders for the erection of these houses in country areas causing unavoidable delays in satisfying the applications, but farmers have expressed their appreciation of high standard of house provided. A total of 140 houses has been erected under this scheme, whilst contracts for a further 13 have either been let or drawn up.

(*b*) The erection of houses and farm buildings for the settlement of ex-servicemen has steadily progressed. A total of 152 houses has so far been completed in addition to 140 milking-sheds, 143 implement-sheds, and 40 sundry buildings, while there are, in addition, 170 houses, 125 milking-sheds, 176 implement-sheds, and 45 sundry buildings for which contracts have been let.

(10) *Man-power.*—The man-power position in the building industry generally has shown some improvement, but in certain industries the shortage of fittings is attributable to the lack of labour in the factories.

(11) *Expenditure.*—The cumulative net expenditure up to 31st March, 1947, for the purchase and servicing of land, the erection of houses and other buildings, including all administrative charges, amounted to £40,120,379, while liabilities and commitments amounted to a further £8,592,968. The net expenditure under the vote for the year under review was £6,193,778, whilst miscellaneous receipts amounted to £88,790. The total cost of administration of the Department (exclusive of interest charges) for the year under review was £242,576, or 4·19 per cent. of the net expenditure (excluding administrative costs and interest), while the total administrative cost since inauguration amounted to £1,228,463, or 3·19 per cent. of the net expenditure.

(12) *Carpentry Training Schools.*—These schools for training ex-servicemen have become increasingly popular, and the Department has employed them to their full capacity. Up to the 31st March, 1947, contracts have been arranged with the Rehabilitation Department for the labour involving 1,619 house-units scheduled in twenty-seven towns. Of these, 544 house-units have been completed, 319 of which were completed during this financial year.

(13) *Statistics.*—The cumulative progress of the Department over the successive years since its inception is as follows:—

STATEMENT SHOWING THE CUMULATIVE PROGRESS AS AT 31ST MARCH SINCE THE INCEPTION OF THE DEPARTMENT

——	1937–38.	1938–39.	1939–40.	1940–41.*	1941–42.*	1942–43.*	1943–44*.	1944–45.*	1945–46.	1946–47.
	Units.	Units.	Units.	Units.	Units.	Units.	Units.	Units.	Units.	Units.
(*a*) Houses advertised ..	3,172	6,698	11,071	14,084	17,029	17,443	20,910	24,581	27,845	30,874
(*b*) Contracts let	2,507	6,188	10,353	13,647	16,522	16,799	19,487	22,349	25,331	28,424
(*c*) Houses under construction ..	1,560	2,326	2,847	2,444	2,033	1,209	2,078	3,442	3,253	3,631
(*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	20,248	22,590
Other Government Departments	..	..	27	88	108	273	297	349†	478†	731†
(*e*) House-unit sections acquired	9,296	13,949	20,421	23,953	28,990	36,613	40,184	42,061	45,838	48,751
	Towns, &c.	Towns, &c.	Towns, &c.	Towns, &c.	Towns, &c.	Towns, &c.	Towns, &c.	Towns, &c.	Towns, &c.	Towns, &c.
(*f*) Towns and localities, work conducted in	70	106	121	137	141	146	153	184	321†	379†
	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.	Contractors.
(*g*) Principal contractors engaged	145	240	291	326	345	346	406	506	634	699
(*h*) Payments—	£	£	£	£	£	£	£	£	£	£
Land and services ..	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	6,518,500
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	30,050,500
Other Government Departments	..	..	26,700	128,400	191,400	325,200	523,700	678,600	1,203,500	1,864,000
Joinery-factories, including machinery	48,900	50,500	52,600	49,400	45,900	46,700	46,700	45,700	45,700	42,100
Vehicles, plant and equipment, store buildings, and yards	2,600	6,200	12,900	17,200	19,100	21,600	23,100	30,600	42,800	63,700
Interest during construction	6,600	21,000	31,000	52,200	93,500	117,600	154,000	226,200	276,400	353,100
Administration ..	66,200	166,400	281,300	406,400	539,800	685,700	659,100	785,000	985,800	1,228,500
	1,476,400	5,446,100	10,610,600	16,278,000	20,352,600	22,178,500	23,945,100	28,390,700	34,016,000	40,120,400

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

† Includes rural housing.

(14) *Building for other Departments.*—During the past year even greater use has been made of this Department's organization for the erection of dwellings and other buildings for other Departments. Expenditure under this heading amounted to £660,430 for the year, bringing the accumulated total to £1,863,944. The total number of houses erected is 731, of which 292 were erected for land-settlement and rural housing. Buildings have been erected for twenty-two Departments.

(15) *Proposals for Ensuing Year.*—The uncertainty of supply of materials make it very difficult to assess correctly the anticipated number of State houses which will be completed during the ensuing year, but houses will be erected to the full extent to which materials are available. It would, however, be adopting a negative attitude to assume that world shortages will continue indefinitely and that we will not participate in the improvement which other countries are endeavouring to effect. The Department's organization is geared up and capable of a very large output, and every endeavour will be made to complete a record number of houses.

The State Advances Corporation continues to offer building loans to those desiring to erect houses for themselves, and during the year ended 31st March, 1947, 3,356 of these loans were granted to a total of £4,395,383, exclusive of loans granted to local authorities under Part III of the Housing Act, 1919, which latter amounted to £244,500.

(16) *Staff and Staff Accommodation.*—A competent staff deals with all aspects of the Department's activities and has been called upon to give assistance to contractors in their endeavour to obtain materials in short supply. The accommodation, although improved, is still in some cases of a temporary nature, which adds to the difficulties which the staff are called upon to overcome.

The total staff of the Department as at 31st March, 1947, was 629.

The lack of motor-vehicles for transport continues to be a matter of concern, and an improvement on the present position would be welcomed.

(17) *Administration.*—The decentralization of the Department's activities has been advanced a further stage, but is not yet completed.

In conclusion, I have pleasure in again recording the loyal and efficient service given by members of the staff 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.

APPENDIX F

TWENTY-THIRD 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-third annual Report for presentation to Parliament. The report covers the period 1st April, 1946, to 31st March, 1947.

General.—The present length of main highways maintained or subsidized by the Board is 12,476 miles, and particulars of expenditure for the year ended 31st March, 1947, as well as a detailed statement on the position of various works, are shown later in this report. Of the total length of main highways, 3,982 miles, have been classified as State highways.

The total expenditure from the Main Highways Account for the financial year ended 31st March, 1947, amounted to £3,031,250, compared with £2,814,522 for the year immediately preceding. It should be noted, however, that, whereas no interest is included in the 1947 figure, the 1945–46 year includes £518,717 for interest.

The registration of motor-vehicles has never been higher, and the petrol-consumption is very close to the highest pre-war figure. The amount of heavy traffic now carried on the highways is considerably in excess of that carried prior to the war.

During the year the dustless paving was extended by 16 miles and existing sealed surfaces were renewed over a length of 376 miles, being an increase of 90 miles over that of the previous year. The length of new bridging was 3,102 lineal feet, compared with 2,211 lineal feet in the previous period. With the limitation of materials and skilled man-power, the lag in the bridging programme has now become a serious matter, and to help provide against an emergency the Board placed an order for ten Bailey bridges during the year. This is additional to the five Bailey bridges at present available.

Legislation.—Section 7 of the Finance Act, 1946, repealed section 5 of the Finance Act (No. 2), 1943, and the Board was thus relieved of any liability with regard to either interest or principal on an amount of £1,226,000 which was made a liability of the Board in 1930. In order to further assist the Board the Government decided to write off not only the arrears of interest, amounting to £1,416,297 to 31st March, 1946, but also the 1946–47 interest of approximately £520,000.

Finance.—The actual income of the Main Highways Account from revenue sources for the financial year 1946–47 amounted to £2,861,016, compared with £2,174,337 for the financial year 1945–46, and £2,814,939 for the financial year 1938–39, which was the previous peak year.

Works.—Owing to difficulties of bridging caused by the shortages of material, particularly cement and steel, and the difficulties of carrying out any large-scale improvement works on account of the man-power position, the Board has found it necessary to recast its policy to some extent. Deferred maintenance and ordinary routine maintenance will, of course, continue to receive full attention, but on account of the difficulties mentioned above the Board considers that the most appreciated of the earliest benefits which it can provide for motorists will be a considerable extension of dustless surfaces. Indications at this stage are that there will be no shortage of bituminous materials for the summer of 1947–48, and the man-power factor is not a large one with work of this nature. If a bottleneck does occur, it is likely to be caused by shortage of stone chips, but instructions have already been issued for full production of these to commence immediately.

Firstly, attention will be given to the bituminous sealing of those highways, which were reconstructed to modern standards just prior to 1940, but on which surfacing was delayed by the war. Secondly, there are many miles of important highways where the country is easy and the lay-out comparatively good and little more than the strengthening of the metal crust will be necessary before sealing. These highways will also be included in the programme for early dustless treatment. Thirdly, there are many gaps in the highway system where alignment is not right up to modern requirements. In the past there has been a reluctance to seal any highway which was not fully in accord with the best standards of construction and geometrical lay-out. Under the conditions which then obtained this policy was sound, but, if dustless surfacing is to await full reconstruction under present-day limitations, the motorist will have to bear the extra cost of vehicle operation and endure the hazards and discomfort of dust, loose shingle, and potholes for many years to come.

Whenever there appears a little likelihood of reconstructing such highways within a period of five or six years, then the highway will be treated with a light type of bituminous surfacing to serve until reconstruction can take place. Lastly, but frequently of first importance, highways through villages and townships will be prepared and sealed without delay. Dustless streets in residential areas will be fully appreciated not only by motorists, but also by the local residents.

In so far as man-power and resources will permit, the aim will be to have all unsealed gaps along the important trunk routes sealed within five years. At the same time the extension of dustless surfacing on the local highways will receive energetic attention.

Everything possible will be done on the highways to the end of safety, comfort, and economy of transport.

The principal works carried out in the various districts are as follows:—

The Whangarei district experienced an extremely wet winter, the highest known annual rainfall being recorded, and this had disastrous effects on road-surfaces and foundations. The summer months have been devoted to restoring the damage as far as possible, particularly on the State highways. This has included the sub-draining and patching of 40 miles of bituminous surfaces, 6½ miles being completely resealed.

A substantial bridge programme has again been carried out, a total of 1,300 ft. being erected, including an overbridge at Whakapara railway-crossing. The Tangiteroria Bridge, 610 ft. long, is 60 per cent. complete, and the 2-mile western approach is nearing completion. A total of twenty-one bridges and large culverts were completed or are in progress.

In the Auckland district, also, weather conditions have been very detrimental to the highway surfaces, particularly on weak sub-soils. The limited supply of chips and shortage of man-power have been serious difficulties in the way of restoration, but the worst sections were made good as speedily as possible, and the work is being continued. Forty-five miles of bituminous surfaces have been renewed and 7 miles of new sealing applied.

Five bridges have been completed, two are in hand, including the Coronation Bridge at Henderson, and preparations for the erection of several others are under way; the limits of steel, cement, and man-power are affecting this class of work here as in other districts.

Extensive resealing has been carried out in the Hamilton district, and reconstruction work is in progress on the Hamilton–Rotorua and Te Awamutu – Pirongia highways.

In the Tauranga district widening and improvement work has been continued on the State highway at Lake Rotoiti, and has been commenced in the Waimana and Waioeka Gorges. A deviation at Taneatua to avoid a flood area is in hand. The metalling of the 5-mile clay gap on the Rotorua–Tauranga highway has been completed, making this an all-weather direct route. Widening is in progress on several sections of the Opotiki – Te Araroa Highway.

In the Gisborne area no works of importance have been undertaken, except the reconstruction of 5 miles on Trafford's Hill, Whakatane–Gisborne Highway, which is in progress. Damage has been caused by floods and by tidal waves, the principal item being the destruction of the Pouawa Bridge on the coast highway north of Gisborne, which was replaced temporarily by a 120 ft. Bailey bridge.

The State highway north of Napier is being improved by the reconstruction and metalling of several lengths. The sealing-work on the Devil's Elbow section has been strengthened by a coat of plant-mix surfacing. Tree-planting has been continued at the Tangoio Afforestation Reserve, and a nursery established at Waikoau.

On the Napier – Palmerston North Highway 1½ miles was reconstructed near Woodville, and a deviation at Poukawa has been commenced. Of this highway, 6¼ miles has been resurfaced, principally with plant-mix.

The renewal of the 1,360 ft. Ngaruroro Bridge at Fernhill is in progress, all piles having been cast and over half of these driven. Work is proceeding on the piers. It is hoped to call tenders for the 1,080 ft. Van Asch's Bridge over the Tuki Tuki at an early date. The Black Bridge at Haumoana has been strengthened to serve until a new structure can be erected later on.

In the Taumarunui district the reconstruction north of Te Kuiti has been completed over 3 miles, and 2 miles was sealed south of the borough. Heavy rains in September caused a certain amount of damage throughout the district, but, on the whole, winter conditions were better than usual.

In the Taranaki district preparations for the new Mohakatino and Tongaporutu Bridges south of the Mokau have been in progress, by way of test-piles and approach surveys. Regrading and improvements were undertaken between Mount Messenger and Urenui. A resealing programme of some 31 miles was carried out in this district, and several lengths of reconstruction were completed on subsidized highways in the Taranaki, Stratford, and Hawera Counties.

In the Wanganui district the principal work of reconstruction is the 1,628 ft. Bulls Bridge, the contract for the substructure of which is now complete, and the fabrication and erection of girders are in progress. North

of Wanganui the re-formation and metalling at Nukumaru have been completed over 3½ miles. On the National Park – Wanganui Highway (Parapara Road) improvements are in progress on eight lengths. The reconstruction of 4 miles from Greatford to Cliff Road is complete except for 1 mile of sealing. On the Pipiriki–Raetihi–Ohakune Highway 3 miles of reconstruction has been carried out, also a short length on the Greatford–Ashhurst Highway. In the district 23 miles of resealing was carried out.

The two Wellington districts again record an extensive resurfacing programme, comprising 77 miles of resealing (including plant-mix) and 9¾ miles of original sealing.

In the Taita Gorge 500 30 cwt. concrete slabs have been placed to check river-erosion.

On the Wellington–Paekakariki Highway work is in progress on the new alignment between Johnsonville and Tawa Flat, 5½ miles, the earthwork completed being equal to a one-half-mile length of formation.

On the Upper Hutt – Waikanae Highway new sealing was applied over 4½ miles near Upper Hutt, and three-quarters of a mile at the northern end.

The 60 chains of major deviation on the Haywards–Paremata Highway between Haywards and Judgeford is in active progress, being approximately half-completed. The total earthwork involved is some 200,000 cubic yards. This work has been commenced earlier than otherwise would have been the case to facilitate the installation of the Wellington City water-supply pipeline in its final position.

On the Hutt County section of the Masterton–Wellington Highway a length of 40 chains has been widened to provide extra traffic lanes and an 80 ft. Bailey bridge erected temporarily as part of this widening until the new Hull's bridge, which has now been commenced, has been completed.

In the Masterton and Wairarapa South Counties shoulder-widening has been carried out over 2½ miles, also three-quarters of a mile on the Woodville–Masterton Highway. The 217 ft. Ngawapurua overbridge has been completed to deck-level, and a contract let for the approaches. The 220 ft. Tutaekara Bridge on the highway of that name has been completed, also several smaller bridges on other highways in the district. A major slip on the Masterton–Weber Highway has continued to give trouble, and a 94-chain deviation to avoid this is proposed. Traffic is being maintained by means of a short, temporary bridge.

In the Nelson–Marlborough district the chief items undertaken have been the reconstruction of the 6¼ mile Para–Tuamarina section of the Picton–Christchurch Highway, the raising of 22 chains at Spring Creek above flood-level, the preparation for sealing of 3 miles on the Wangamoa Hill, and the reconstruction of 1¾ miles near Takaka.

The 100 ft. Jubilee Bridge, with 26 chains of approaches, near Motueka, has been completed, and the 50 ft. Brown River Bridge in the Rai Valley is in progress, the approaches, totalling 47 chains, being completed. A contract has been let for the 681 ft. bridge over the Waimea River at Appleby, and the work has been commenced.

Works in the West Coast district have been delayed by man-power and material shortages, and have been confined principally to bridge and culvert renewals. Flood-damage during the winter included several major slips, the principal disaster being the collapse of the combined road-rail bridge at Larry's Creek on the Inangahua–Greymouth Highway. A Bailey bridge was erected within a week to provide for the highway traffic.

On the Nelson–Westport Highway the Four-mile Creek water drive approaches and the 130 ft. Island Creek Bridge are in progress, and on the Greymouth–Waiho Highway the Gunn's Creek Bridge and Nolan's Creek culvert have been completed. The Donnelly's Creek Bridge and the approaches to Duffer's Creek Bridge are in hand. The realignment work at Horse Shoe Bend culvert on the Waiho–Karangarua Highway has been completed. On the Westport–Karamea Highway the Deadman's Creek Bridge and three culverts have been constructed, and the Granite Creek Bridge is in progress. Eight miles of sealing and resealing were carried out in the district.

The three Canterbury districts carried out a considerable programme of bituminous surfacing, consisting almost entirely in the renewal of existing seal-coats, the total length being 82 miles. About one-quarter of this was in the form of a plant-mix coat.

In North Canterbury the 60 ft. Lyell Creek Bridge in the Kaikoura Township was completed, and the Ohau Stream culvert and Irongate Bridge on the State highway put in hand. In South Canterbury the Rona and McIntosh Stream Bridges on the Timaru–Cromwell Highway are in progress, and on the North Otago section of this highway the 85 ft. Omarama Bridge is now practically completed. Major slips have occurred on the Skippers and Wanaka–Haast Highways in this district and have been very difficult to rectify. On the Timaru–Dunedin Highway 4 miles of the Maheno–Herbert section has been widened and prepared for a smoothing-coat. The 75 ft. Queen's Flat Bridge on the Waiareka–Duntroon Highway is in hand.

South of Dunedin the reconstruction of the 14¼-mile unsealed Clinton–Arthurton section has been commenced, but, as with other works, this has been retarded by man-power shortage.

In addition to the resurfacing of 22 miles of sealed surfaces, the principal works in the Southland district have been widening and footpath work on a 2¼-mile length of the Queenstown–Invercargill Highway adjacent to Invercargill City, and the reconstruction of 4¾ miles of the Wallace County section of the Lorne–Riverton Highway. A contract has been let for the 168 ft. Makarewa Bridge on this highway. The Camp Creek Bridge, on the Riverton–Tuatapere Highway, is in progress, and the 43 chains approach deviation is practically completed.

Visit of Inspection to the Central and Southern Portions of the North Island and contact with Local Bodies and Automobile Associations.—It is very satisfactory for the Board to be able to record that it has now made a complete tour of New Zealand since the cessation of hostilities, and contact has been made with all local authorities interested in the control of main highways, as well as with all automobile associations.

In early February, 1947, the Wairarapa, Napier, and Gisborne areas were visited, and towards the latter part of April, 1947, the King Country, Taranaki, Wanganui, and Wellington West areas were inspected.

It was evident to the Board that the increasing heavy traffic now using the highways has caused a keen demand for improvements as a means towards development of the various districts, and in order to assist with the economic transport of produce from the respective areas. The cry for an extension of dustless surfacing is an ever-increasing one, and the Board intends to do all it can in this respect. In conferences with the local bodies and automobile associations, the Board discussed matters of local interest as well as giving an outline of its general policy concerning main and State highways. The Board appreciates the co-operative spirit shown by all those local authorities and automobile associations with whom it came in contact.

Signposting, Centre Line Marking, &c.—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 £6,153. The marking of centre-lines on paved surfaces and the lettering of standard warning notices on pavements adjacent to railway-crossings and other dangerous localities have been continued.

Advances to Local Authorities.—During the year ended 31st March, 1947, the Board entered into seven agreements with local bodies in regard to advancing to them their shares of the cost of works carried out on main highways. The principal of these advances amounted to £17,967 10s. The total of principal outstanding at 31st March, 1947, in respect to past advances was £24,339 1s. 9d.

Plant.—The facilities provided by the Board to enable local authorities to acquire plant under the hire-purchase system were taken advantage of to a much greater extent than in the preceding year. The purchases for 1946–47 amounted to £45,219 11s. 6d., as against £17,702 for 1945–46. The total value of plant purchased under this system since its inauguration is £431,309 12s. 6d., of which sum only £56,597 18s. 2d. remained outstanding at the 31st March, 1947.

Operations of Magnetic Truck and Trailers.—During the year the magnetic truck and one trailer-type magnet operated in the North Island, and the other trailer-type magnet operated solely in the South Island. These machines, which are utilized for clearing main highways of iron or steel puncture-producing articles cleared 3,765 miles in the North Island and 4,977 miles in the South Island. The weight of material picked up was 13,862 lb. in the North Island and 7,983 lb. in the South Island. The average yield per mile of highway in the North Island was 3·68 lb. and the South Island 1·604 lb., compared with 4·4 lb. and 0·484 lb. respectively for the previous year.

Examination for Foremen and Overseers of Road Construction.—The twentieth examination for Foremen and Overseers of Road Construction was held on 20th November, 1946, when twelve candidates presented themselves for examination.

Ten papers on general road construction and maintenance and four papers on tar, bituminous, and concrete road construction were returned. Four candidates were successful in passing paper No. 1 and three passed paper No. 2. No candidate passed the full examination, five secured a partial pass, and two, who had previously secured a partial pass, completed the examination.

The Board acknowledges the continued co-operation of the Public Works Department in matters relating to main-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, 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, 1947, AND TOTAL TO DATE

—	Construction and Improvement of Main Highways.		Renewals of Main Highways.		Maintenance, Repairs, &c., of Main Highways.		Totals.	
	Total for Year 1946-47.	Total since Inception of Main Highways Act, 1922, to 31/3/47.	Total for Year 1946-47.	Total since 1/4/36 to 31/3/47.	Total for Year 1946-47.	Total since Inception of Main Highways Act, 1922, to 31/3/47.	Total for Year 1946-47.	Total since Inception of Main Highways Act, 1922, to 31/3/47.
Highway District—	£	£	£	£	£	£	£	£
No. 1	40,394	*1,498,824*	70,614	*393,480*	149,319	*1,486,750*	260,327	*3,379,054*
No. 2A	56,977	*2,969,324*	12,647	*200,489*	208,386	*2,815,607*	278,010	*5,985,420*
No. 2B	15,951		1,993		75,338		93,282	
No. 3	63,439	*1,001,342*	355	*68,194*	146,815	*1,668,586*	210,609	*2,738,122*
No. 4	23,875	*661,728*	563	*81,894*	85,458	*1,120,525*	109,896	*1,864,147*
No. 5	58,561	*910,035*	34,546	*115,545*	108,871	*1,629,787*	201,978	*2,655,367*
No. 6	23,399	*837,545*	696	*26,364*	76,762	*1,109,967*	100,857	*1,973,876*
No. 7	21,986	*940,023*	1,924	*40,287*	94,265	*1,076,542*	118,175	*2,056,852*
No. 8	73,007	*1,054,780*	37,450	*126,912*	106,885	*1,206,285*	217,342	*2,387,977*
No. 9	73,857	*1,552,902*	601	*111,096*	97,077	*1,298,314*	171,535	*2,965,312*
No. 10	5,257	*430,686*	9,291	*99,683*	64,125	*918,829*	78,673	*1,449,198*
Totals for North Island ..	456,703	*11,857,189*	170,680	*1,266,944*	1,213,301	*14,331,192*	1,840,684	*27,455,325*
No. 11	44,904	*1,074,239*	14,403	*42,057*	86,603	*1,177,997*	145,910	*2,294,293*
No. 12	14,421	*1,093,107*	21,683	*149,034*	107,275	*1,840,088*	143,379	*3,082,229*
No. 13	4,257	*355,753*	23,178	*18,615*	51,233	*557,363*	78,668	*961,731*
No. 14	6,406	*866,100*	3,619	*27,772*	66,454	*797,195*	76,479	*1,691,067*
No. 15	9,104	*563,363*	8,997	*29,125*	69,148	*864,413*	87,249	*1,456,901*
No. 16	17,675	*897,795*	4,907	*22,485*	65,588	*742,445*	88,170	*1,662,725*
No. 17	9,513	*845,541*	226	*16,627*	55,711	*650,103*	65,450	*1,512,271*
No. 18	14,448	*1,038,339*	2,990	*46,661*	80,483	*872,390*	97,921	*1,957,390*
Totals for South Island ..	120,728	*6,734,237*	80,003	*382,376*	582,495	*7,501,994*	783,226	*14,618,607*
Totals for Dominion	577,431	*18,591,426*	250,683	*1,649,320*	1,795,796	*21,833,186*	2,623,910	*42,073,932*

MAIN HIGHWAYS ACCOUNT—*continued*

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 1947, AND TOTAL TO DATE

EXPENDITURE.		Total for Year 1946–47.	Total since Inception of Main Highways Act, 1922, to 31/3/47.
		£	£
Net expenditure on construction, renewals, maintenance, &c. (see separate statement)		2,623,910	*42,073,932*
Administration—			
Administration expenses (including salaries, travelling-expenses, office rents, printing, stationery, postages, and miscellaneous expenses) ..	£ 171,045	..	*1,712,310*
Fees and travelling-expenses of members of the Main Highways Board other than Government members	1,239	..	*25,098*
Miscellaneous expenses—			
Advertising, maps, rent of halls, traffic tallies, transport of samples, depreciation of furniture, &c. ..	51	..	*5,979*
Compassionate grants to widows and relatives of deceased employers	..	..	*4,000*
Compensation under section 3, Public Works Amendment Act, 1925	..	..	*1,015*
Exchange on remittances ..	..	..	*9,887*
Grant to Transport Department towards Traffic inspection ..	..	..	*42,906*
Petrological laboratory and other experimental work, expenses of	1,716	..	*20,702*
Total, administration ..		174,051	*1,821,897*
Loan charges—			
Charges and expenses of raising loans, management charges of Consolidated Stock on account of Construction Fund, &c.		..	*88,080*

INCOME.		Total for Year 1946–47.	Total since Inception of Main Highways Act, 1922, to 31/3/47.
		£	£
Loans raised under Main Highways Act, 1922, and National Development Loans Act, 1941 ..		317,250	*12,159,168*
Securities redeemed, Loans Redemption Account		..	*1,313,613*
Consolidated Fund—Public Debt Repayment Account		..	*55,720*
		317,250	*13,528,501*
Revenue transferred from the Consolidated Fund—			
Motor-registration licences, fees, and fines (section 24, Motor-vehicles Act, 1924)	£ 615,828		
Less Commission on collection by Post and Telegraph Department—			
Motor-registration fees and licences ..	£ 24,857		
Fees for registration and change of ownership	8,581		
	33,438		
		582,390	*9,597,766*
Motor-spirits tax (section 9, Motor-spirits Taxation Act, 1927)		2,058,274	*25,558,027*
Mileage-tax (Finance Act, 1931–32 (No. 2), section 19)		13,177	*115,153*
Tire-duty (sections 13 and 14, Main Highways Act, 1922)		207,265	*3,164,139*
Interest from investments		..	*218,444*
Interest from local authorities on plant purchased on their behalf		1,793	*41,931*
Interest on advances to local authorities ..		870	*48,429*
Miscellaneous receipts		3,935	*37,564*
Rent of and tolls from ferries		..	*2,082*

Interest on amount appropriated out of Public Works Fund and paid into Main Highways Account Construction Fund			*796,900**
Interest on loans, recoupment to Consolidated Fund (section 4, Finance Act, 1919)			*2,803,201**
Transfer to reserve for redemption of main highway securities			*1,252,130†*
Payment to local authorities in commutation of toll-gate charges (Finance Act, 1925, section 20)	1,518		*40,825*
Payment to Wellington City Council in commutation of fees chargeable in respect of motor-vehicles using Hutt Road (Hutt Road Act, 1939, section 6)	14,704		*436,972*
Total, loan charges		16,222	*5,418,108*
Subsidies, &c., in respect of other than main highways—			
Municipal Corporations (Municipal Corporations Act, 1933, section 71)	34,977		*501,713*
County Councils and other local authorities (Finance Act, 1930, section 37)	182,090		*2,935,802*
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		217,067	*4,101,213*
Balance, being excess of income over expenditure, carried to General Balance-sheet		153,704	*332,886*
		£3,184,954	*£53,748,036*

Transfer from Consolidated Fund (section 14, Main Highways Act, 1922)		*210,000*
Transfer from Public Works Fund (section 16, Main Highways Act, 1922)		*1,226,009*
	£3,184,954	*£53,748,036*

* Interest charges for period 1st July, 1941, to 31st March, 1947, remitted under Section 3 of Finance Act (No. 3), 1943.

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

MAIN HIGHWAYS ACCOUNT—*continued*

General Balance-sheet as at 31st March, 1947

LIABILITIES.	——	Total.	ASSETS.	——	Total.
	£	£		£	£
Accumulated Revenue Account—			Cash in Public Account—		
Balance at 1/4/46	*Dr.*1,237,115		At call	..	2,873
Less interest remitted under section 3 of Finance Act, 1943 (No. 3), (to 31/3/46)	1,416,297		Sundry debtors	..	23,774
	179,182		Advances to local authorities (Main Highways Amendment Act, 1926, section 2)	..	24,339
Excess of income over expenditure for 1946–47	153,704		Motor-registration fees in hands of Postal Department	..	177,310
		332,886	Interest due and accrued	..	1,243
Sundry creditors	..	290,289	Buildings and land	..	97,494
			Stocks of materials, tools, &c.	..	189,621
			Furniture, fittings, &c.—		
			Expenditure to 31/3/47	927	
			Less depreciation to 31/3/47	820	
					107
			Plant and equipment—		
			For Main Highways Board—		
			Expenditure to 31/3/47	647,871	
			Less depreciation charged to works ..	598,055	
					49,816
			Purchased for local authorities—		
			Expenditure to 31/3/47	431,310	
			Less repayments of principal	374,712	
					56,598
		£623,175			£623,175

Note.—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, M.I.C.E., 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 enfaced thereon.—J. P. Rutherford, Controller and Auditor-General.

APPENDIX G

FIFTH ANNUAL REPORT OF THE SOIL CONSERVATION AND RIVERS CONTROL COUNCIL

The Hon. the 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 fifth annual report for presentation to Parliament.

The report covers the period 1st April, 1946, to 31st March, 1947.

THE COUNCIL

At the close of the previous financial year Mr. W. L. Newnham, on his retirement as Engineer-in-Chief, Public Works Department, relinquished his appointment on the Council and was replaced by Mr. F. Langbein. Mr. T. G. G. Beck was appointed Chairman, which position he held until his appointment as Deputy Commissioner of Works. Mr. R. G. Macmorran, Under-Secretary for Lands, also retired from the Public Service and the Council, and was succeeded by Mr. D. M. Greig. During the year the constitution of the Council was altered to provide additional local-body and departmental representation, and the personnel of the reconstituted Council is now as under:—

W. L. Newnham, representing the Commissioner of Works (Chairman).
F. Langbein, Engineer-in-Chief, Public Works Department.
D. M. Greig, Under-Secretary for Lands.
A. R. Entrican, Director of Forestry.
E. J. Fawcett, Director-General of Agriculture.
G. A. Monk, C. V. Kirke } representing the New Zealand Counties' Association.
J. W. Andrews, representing the Muncipal Association of New Zealand.
A. J. Davey, representing agricultural and pastoral interests.
J. Callesen, representing River, Drainage, and Catchment Boards.

During the year the Council met on ten occasions. Visits of inspection were made in North Auckland, Waikato, Hawke's Bay, and Marlborough districts, and meetings with local bodies in connection with the constitution of additional catchment districts were held in Hamilton, Dunedin, and Roxburgh.

LEGISLATION

During the last session of Parliament an amendment to the principal Act was passed. Among other things, this provided for the alteration in the constitution of the Council previously mentioned; the management of soil conservation reserves by Catchment Boards; the extension of the purposes of grants or loans by the Council; the delegation of certain powers by Catchment Boards and the amendment of the procedure to be followed in connection with the dissolution of River and Drainage Boards, and the abolition of River and Drainage Districts.

It will be necessary to introduce further amendments from time to time as opportunity offers to enable the Act to be fully and efficiently administered.

General

In general, constructional work has still been restricted to a minimum by reason of the existing situation in regard to man-power and materials, and until such time as conditions improve the tempo of work will not materially alter. It is pleasing to report, however, that soil-conservation work has increased during the year, and as the greater part of this important work is now being undertaken, without recourse to outside labour, by the land occupier himself, under subsidy from the Council, a further increase in this direction may be expected. Expenditure under the vote increased from £212,000 in the previous year to £298,000 for the period under review.

Catchment Boards

The election and first meeting of the newly constituted Hauraki Catchment Board was held during the year.

Many of the administrative difficulties experienced by Catchment Boards in previous years have now been overcome, but as a result of experience gained by the operating Boards, and as indicated above, further amendments to the Soil Conservation and Rivers Control Act will require attention.

A further conference of Catchment Boards was held at Christchurch in May, at which a Catchment Boards Association was constituted. Much value was obtained as a result of the conference, which in future will be held annually by the Association, assisted by the Council where necessary.

Catchment Districts

Existing Catchment Districts now cover approximately 40 per cent. of the Dominion. Proposals for further catchment districts, particularly in Clutha, Bay of Plenty, Waikato, and Marlborough Districts, are under consideration, and will be submitted to the Local Government Commission at the earliest opportunity.

The following is a complete list of catchment districts, the statistics being obtained from Local Authorities Handbook, 1941–42:—

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	Te Aroha.
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.
Totals, eleven catchment districts	42,663	166·8	98·2	265·0	616,660	..
Totals, New Zealand, 1st April, 1941	103,416	311·9	310·8	622·7	1,616,070	..
Percentage cover by catchment districts	41	53	32	42	38	..

Soil Conservation Districts

The Council is now in a position to proceed with the constitution of soil conservation districts. Consideration has already been given to this matter, which has had to be postponed on account of shortage of administrative staff. During the year four senior Soil Conservation Officers were appointed, and seven juniors have completed a special training course arranged with the Canterbury Agricultural College and Canterbury University College. The Council wishes to record its appreciation of the co-operation received from the college authorities and staff in making the course a success.

Soil Conservation Reserves

Several problem areas have been acquired by the Council under section 16 of the Act on which valuable experimental and preliminary restoration work is in progress.

Esk, an area of approximately 7,500 acres on the headwaters of the Esk River (Hawke's Bay).—Preliminary surveys to delineate areas which after treatment can be farmed from land that must be planted or allowed to regenerate have been completed. In addition, access to such areas has been planned and a tree-nursery site selected. Active rabbit-control was also carried out. In two months some 2,000 rabbits were killed by poisoning and cynogas.

Tangoio.—On this area of nearly 1,000 acres, a total of 196,000 trees were planted, the main species being *Cupressus macrocarpa,* Douglas fir, *Pinus radiata,* and *Eucalyptus viminalis.* The nursery at Waikoau was well established with approximately 30,000 seedlings of *Pinus radiata,* Douglas fir, *Cupressus macrocarpa,* Californian redwood, *Pinus ponderosa,* and cedar of Lebanon.

Destruction of pests during the year accounted for about 2,000 rabbits and 95 goats, but this work requires continuance.

Fencing of an additional area of 92 acres for the 1947 planting has been completed.

Waerenga-o-kuri.—The Council acquired, but has not yet taken possession of, a property of 998 acres of typical eroded Gisborne hill country, seventeen miles from Gisborne, for research and demonstration purposes. Plans are being prepared for experimental and land management work to commence when the lessee's term expires at the end of this year.

Wither Hills.—Research work on the reserve has been continued during the year, and further progress has been made in assisting the property to recover. When taken over it was essentially a depleted danthonia pasture, with no great evidence of other grasses and herbs, and, contrasted with this state, there has been a marked regeneration of the vegetative cover since grazing on the area has been controlled. On the shady faces and gully bottoms there is now an optimum density of plants.

Experiments on twenty-three plots, sown with individual species and mixtures of species, have been continued, and the results of these experiments will be awaited with interest.

The trees planted in August, 1944, have mostly survived in spite of severe droughts, and during 1947 further plantings will be made.

Debris dams have proved effective in filling the eroded gullies, and they have been added to, raised, and strengthened where required.

Maintenance work, such as additional storm-water supplies, destruction of rabbits and hares, firebreaks, and seeding of a 15 acre accidental burn has been carried out.

Some 20 head of heifers were grazed for over twelve months and sold at an average profit per head of £11 5s. These cattle are being replaced with 33 head of steers.

Upper Wangamoa Valley.—It has not been possible to carry out any work except the general supervision of the area, the cutting of firebreaks, and the destruction of pests, including 10 deer, 24 pigs, 12 goats, and 47 opossums.

Research

The Council's work has continued during the year, but has been restricted by initial difficulty of obtaining suitable areas. It is hoped that this important activity will progress by the acquisition of suitable areas in the North and South Islands.

Educational and Publicity Work

During the past year publicity has been carried per medium of bulletins, press articles, film strips, movie films, and agricultural show displays.

During the year the Council published a further two bulletins:

Bulletin 5: "Down to the Sea in Slips."
Bulletin 7: "Fire! Public Enemy No. 1."

Some 20,000 copies of the former and 60,000 copies of the latter were distributed directly to those people most interested through Catchment Boards, local bodies, Federated Farmers, and Education Boards.

Bulletin 6: "Willows and Poplars" is with the press, while "Glossary of Terms: Hydrologic and Associated Soil and River Engineering Terms" has been issued provisionally before final editing and publishing.

The mobile cinema unit has completed the first circuit of screenings in New Zealand not only covering the eleven catchment districts, but to organized farmers' meetings in Otago, Waikato, Bay of Plenty, and Northland. Screenings were made regardless of local electric-power supply, as the unit had its own generating-plant, while daylight screenings at public gatherings and agricultural shows were made on many occasions.

Some 44,840 persons attended these screenings, as follows:—

	Number of Screenings.	Attendance.
Public	196	12,335
Secondary schools	117	32,506
Total	313	44,841

Films for the Council's requirements are made by the Cine Section of Public Works Department, while other films of direct use have been obtained from overseas or loaned by film libraries. Copies of films made are supplied to the National Film Library and are thus available to the public from two sources. There are so many 16 mm. projectors variously owned, and New Zealand films are in such demand, that all copies available are in continuous circulation.

Soil conservation displays at agricultural shows are catered for by two units—one in each Island.

The main element in each display has been a duplicate model of a typical farm on rolling country, one model showing poor farm practices and evident erosion, and the other model showing the same country with soil conservation practices.

This display, supplemented by photographs of different types of erosion, has been a very successful means of arousing interest.

These displays were exhibited at twelve of the leading Agricultural and Pastoral shows in the North Island and fourteen in the South Island.

Hydrology

The technical committee set up by the Council to study the question of hydrologic data, as mentioned in the last annual report, has explored the whole position and has made full recommendations as to what further information should be obtained.

A skeleton series of run-off stations is to be established on the main rivers, and further rainfall stations are to be added to the existing national network to give comprehensive cover over the whole Dominion.

This programme will be a gradual one spread over several years, dependent on availability of labour and supplies of materials and equipment.

On the rainfall data side some advance has been made during the year. Whereas at the beginning of the year there were in the Meteorological Service national network some 578 manual rain-gauge stations and 28 automatic rain-gauge stations, at the end of the year there were 688 manual and 32 automatic rain-gauges. Arrangements have been made for the establishment of approximately 1,000 manual and 130 automatic rain-gauges by the end of 1949 within the national network. In addition, there are now well over 100 rain-gauges, privately owned, whose records are now being made available to the meteorological office for inclusion in analyses and publications.

River-gauging stations, requiring before establishment a lengthy survey and the construction of a permanent structure to house a water-level recorder, with, in many cases, a cableway, from which discharge measurements will be made, naturally take longer to establish. However, the Council has now authorized four stations, and surveys are being carried out on a further 70 automatic stations and 130 staff gauge-stations. There are already in existence some 26 automatic stations and 97 staff gauging-stations. Some 12 automatic water-level recorders were received from England, a further 12 were ordered, while the first 9 current meters have been shipped.

A proposal in regard to the control of ground-water and involving new legislation has been prepared.

Destruction of Pests

The Council is very conscious of the importance of destruction of pests, particularly deer, opossums, and rabbits, to achieve soil conservation. It has not actively undertaken any work itself, but has deeply interested itself in the work of other Departments, particularly the Wildlife Branch of Internal Affairs, in deer, goat, and opossum destruction, and is gratified with the recent regulations relating to the taking of the latter. It is considered that perhaps the biggest menace is the rabbit problem, and is anxious to implement more effective measures of control.

Fire-control

The Council has co-operated during the year with the State Forest Service in a fire-prevention-publicity campaign, and is endeavouring to expand its activities in this direction.

APPRECIATION

The Council desires to express its appreciation from overseas agencies in South Africa, India, Australia, and the United States, who are working for the same objects, and, in particular, for the varied assistance freely and readily given by the Soil Conservation Service of the United States Department of Agriculture.

Mention should also be made of the keen co-operation received from other Departments of State, Catchment Boards, and local bodies.

WORKS

Bank-protection, generally, has been by far the most important single aspect of river-control and, while individually not spectacular or costly, has usually taken the form of live willow and poplar, and whole trees, relying, as far as possible, on increase in strength of the protection brought about by natural growth.

In several rivers the straightening of rivers by the cutting-out of meanders with artificial cuts has been undertaken where the meander itself was causing severe bank-erosion and bank-protection could be undertaken better on the improved alignment.

Drainage and willow clearing works have continued to be undertaken extensively, but there are many large areas still to be treated. This work entails much plant and man-power, and intensification will depend upon availability of men and tools. Surveys have been made of many drainage, river, and willow clearing projects which, while economically justifiable, cannot be undertaken at present due to present shortages.

The first big drag-line excavator was assembled at Otaki River during the year and has commenced straightening and stop-banking. Experience on an accessible job such as this was necessary in order to gain full information before using the machine on large jobs.

One notable advance has been in soil conservation work, where a real start has been made, notably in the North Island in stabilizing moving hillsides and in repair of eroding gullies and tree-planting and construction of soil saving dams of light live construction. It has in the main been undertaken in association with the property-owner, and is capable of great expansion as it is adaptable to unskilled labour and can utilize services of land-occupiers themselves.

The following is a brief *résumé* of the principal activities in the various districts during the year under review:—

Auckland District

Uwhiroa Stream Clearing, Herekino.—Widening and clearing is now completed.

Ruawai Drainage.—Extension of "G" Canal: 206 chains have been deepened 2 ft. and batters trimmed to restore the canal to its original width of 20 ft.

Awaroa–Ruawai Stop-bank: Stone facing and repairs were carried out.

Smith's Canal: Work is in hand in deepening and restoring to a width of 20 ft.

Waihou and Ohinemuri Rivers Improvement Scheme.—General maintenance of flood-gates and doors. 900 chains of stop-bank have been cleared and willows ringbarked.

Ngahina Wharf.—Stringers and decking renewed.

Restoration of Stop-banks.—From 12 m. peg, left bank 80 chains completed.

Smith's Drain at Hikutaia.—18½ chains new drain completed and 20 chains of protective fence erected.

Hikutaia Drainage Area, Wharepoa.—112 chains of central drain cleaned with 9 small flood-gates installed. Onetai Drain, 16 chains new cut, 21 chains of old drain, and 70 chains of old dredged portion cleaned. This completes these works.

Turua Stop-banking: Left Bank.—275 chains this year, making completed work of 549 chains, inclusive of 12 flood-gates and 44 chains of outlet drain.

Omahu-Puriri Stop-banking: Right Bank.—3 miles 43 chains of survey completed and plans prepared.

Otaua Swamp Drainage (Franklin County).—Awaroa Stream, 386 chains; Otaua Stream, 100 chains. These lengths were bottom dredged and widened by drag-line.

Aka Aka Swamp Drainge (Franklin County).—Approximately 1,026 chains of drains were reconditioned by drag-line during the year. A considerable improvement to the drainage of the above areas has resulted from the above work.

Waikato District

Wanganui River Protective Works, Taumarunui Borough.—25 chains of rip-rap boulder protection work were completed. The debris and growth on the largest island opposite Kelland's property has been removed and a relief channel excavated down the centre of it. Repairs were carried out to the concrete crib work.

Mangaorongo Stream, Willow Clearing, Otorohanga County.—The ring-barking carried out the previous year has proved fairly successful, but all trees have been ranged over and those requiring attention have been recut. Cleaning up and burning of debris previously pulled has also been carried out.

Taupiri Drainage District, Waikato County.—The Taupiri Drainage Board has proposals approved and works in hand totalling £12,680.

Rangiriri Willow Clearing, Waikato County, Te Onetea Stream.—A tender has been let for the clearing of willows for a width of 90 ft. over a length of 111 chains of the full length of 136 chains.

Nurseries.—Out of sixty shipmast locust roots planted, forty-two trees are growing, some of which are 8 ft. high. In addition, bitter willow and poplar plantations, partly on private property adjoining the Whakatane River and partly in our Whakatane depot, are making satisfactory growth.

Whakatane River (Right Bank above Taneatua).—Three settlers have completed their portion of the work, and the remainder has been deferred until next season.

Whakatane River (Engineering Survey).—The survey of 28 miles of the Whakatane River from its mouth to Ruatoki was put in hand and has been completed.

Whakatane River (Miss Tuihi Wilson).—This small river protection work at Ruatoki was completed.

Whakatane River Erosion (above Whakatane Bridge).—Heavy rock protection work was placed where the river threatened to encroach on the highway and by-pass the Whakatane River Bridge. An additional length of rock protection work at the lower end of the previous work was completed.

Waiotapu Stream Diversion (Taupo County).—The object was straightening to reduce flooding of farm land and consists of ten diversions in the present stream and deepening and straightening throughout. The work has been completed.

Waioeka River Erosion (J. G. Murray).—Willow protection work is 85 per cent. complete, the balance being deferred until fencing-wire is obtainable.

Otara River Erosion (Mrs. Wingate and Mrs. Steel).—Willow protection planting and fencing to protect valuable dairy land has only just been commenced, but is deferred until next willow-planting season.

Otara River Erosion (A. G. Thompson).—Heavy willow protection work is 75 per cent. complete, but a small portion of the planting and fencing has been deferred until next year.

Stage Recorders (Waimana River and Rangitaiki River).—Sites for these gauges have been selected, and it is intended to erect these two stations by contract as soon as the special iron work required has been fabricated.

Tide Gauges, Tauranga and Whakatane.—Tentative sites for these two gauges have been selected and observations of tides have been undertaken, and it is hoped to erect these two gauges at the same time as the stage recorders for the Waimana and Rangitaiki Rivers.

Napier District

Waipaoa River Flood Control: Diversion of River-mouth.—Preparation to open a new mouth for the Waipaoa, shortening the river by two miles, and reducing the flooding on the lower reaches was put in hand in 1944. The work entailed building a groyne 675 ft. long and cutting a pilot channel to the sea. The actual releasing of the water through the pilot cut had to be done while the river was sufficiently in flood to establish a new mouth. This was carried out successfully on the 29th June.

Waipaoa River, Te Wairau Bend.—Work consists of protection of the river-bank with fascines covered with anti-torpedo nets. Preparatory work on the site has commenced.

Waipaoa River, Survey.—5 miles of completed survey with cross-sections has been done this year, finishing half a mile above Matawhero Bridge.

Hikuwai River: Willow-clearing.—6 miles 58 chains of trees forming obstruction have been cut and disposed of. Trees which could be left for a while have been ringbarked. About 40 per cent. of the work is complete.

Stream and Drain Clearing, Cook County Council.—The following work was completed.

Ngatapa Stream: 4 miles willow-clearing. Clearing stream and widening.

Totangi Stream: Three-quarters of a mile clearing and widening.

Te Arai Stream: 3 miles willow-clearing.

Manutuke Drain: 3½ miles clearing, widening, and regrading.

Kaiti-Wainui Drains: 4 miles drains clearing and widening. Clearing blackberry and willow.

Taruheru and Waiherere Drains: 12 miles cleared.

Taruheru Stream Clearing. Work commenced. Clearing, widening, and regrading 2 miles have been completed.

Tapuwaeroa River, Waiapu County.—Construction of three groynes almost completed.

McClutchie's Cutting.—Stabilization by tree-planting; 15 per cent. of this work is completed.

Poverty Bay Catchment Board Subsidy Schemes.—Conservation Tree-planting: Under this scheme sixteen grants have been paid to farmers on a pound-for-pound basis. On these grants, 12,300 trees have been planted. Work undertaken by farmers.

Mobile Unit Scheme: Work carried out by a Public Works mobile gang under an Overseer. Under this scheme the farmer found one-quarter of the cost of the work.

Work was completed for eleven applicants, one being outside the Catchment Board's area and dealt with directly by the Public Works Department.

The type of work consisted mostly of building debris dams for gully protection and a certain amount of tree-planting.

The total work for the eleven applicants included building 78 debris dams and planting 6,400 trees.

Nursery.—Ship-mast locust (*Robinia pseudo-acacia* var. *rectissima*), forty-four plants have been well established at the small nursery at White-pine Bush; no root-cuttings have been taken, however; two attempts at striking softwood cuttings have been carried out, but with little success.

Tukituki River Control at Waipukurau.—The scheme for the Tukituki River control works between Pah Flat and the Tukipo River Junction has been almost completed. 80 per cent. of clearing has been finished, while all excavation for the pilot channel is completed. A fair amount of planting is still required.

Tukituki River Control: Re-alignment Tennants Bend.—This work is about 30 per cent. completed.

Meeanee Drainage.—The work represents the drainage improvement of the low-lying area between Napier and Taradale, and has generally been completed.

Kumeti Drain.—On two occasions during the year the bed of the Kumeti Stream has been cleaned out for a distance of 3 chains downstream and a distance of 9 chains up-stream of the Kumeti Road Bridge. On the last occasion 5,000 cubic yards of shingle were removed from the stream-bed. A stone gabion groyne 40 ft. long was built on the right-bank approach to the Kumeti Road Bridge. Maintenance work has been carried out between weir No. 2 and weir No. 7.

River Gauges.—Investigation has been carried out over the whole area and preliminary reports forwarded. Detailed survey for the more urgent sites will be carried out as soon as possible.

Wellington District

Rangitikei River (near Flock House).—Shoals formed by meanders were opened up and the river channel put back to the alignment of the first pilot cuts. The river was blasted through into the newly formed channel. A heavy willow protection was constructed on the channel edge of Dr. Walls' property.

Tangimoana Foreshore Protection, Rangitikei River.—The work of laying manuka with torpedo-net cover on the foreshore was completed for a distance of 18 chains. The work was laid out approximately 11 yards wide throughout, and is holding well after several floods and heavy continual westerlies. The bank area down to the tidal limits has been sown with rye-grass, brown-top, and fescue.

Otaki River.—The major work of excavating a new channel for the river below the railway and highway was commenced early in November, and the tower excavator has removed 121,700 cubic yards of shingle in a length of 25 chains. In addition, the river has been diverted approximately 40 chains above the railway in order to give a better alignment at the bridges, and a large bank containing 5,000 cubic yards constructed with shingle and weighted torpedo nets. This will represent a major improvement to the lower river, but at the moment is only in its initial stages.

Manawatu River: Whirokino Cut.—Early in this year a bank containing approximately 7,000 cubic yards was built across the old loop of the river above Foxton to reduce the rate of silting.

The drift of sand-dunes into the river near Foxton was checked during the winter by the planting of marram-grass.

Manawatu River: Bank-protection.—On the right bank at Awapuni (Cowdrey's) on 40 chains of protection using trees weighted down, with willows planted between, was completed. At Hansen's Bend, in the Makerua Board's area, 30 chains of protection was carried out. The stop-bank was also set back for a distance of 15 chains. Other isolated points were protected by trees and willows as maintenance works.

Manawatu River: Taupunga Cut.—This work was delayed by floods several times and is still in hand. A piled retard was constructed across the river below the entrance to No. 2 cut and a bank was built across the old loop between the two cuts, while the mouth of No. 2 cut was deepened and widened. This work is still troublesome, due to the material of the second cut offering resistance to development.

Stop-banking, Newman's and Aratangata Banks.—A total of 96 chains, 7 ft. to 8 ft. high, were constructed as one contract. As a result of flooding in August, repairs to breached banks were necessary, 40 chains of low bank, containing 3,000 yards, was constructed on the left bank of the Mangaore Stream adjacent to the Manawatu River.

The setting-back of the bank at Barber's, involving 10,000 cubic yards of excavation, was completed.

Ohau River.—Bad erosion and flooding for a distance of approximately 80 chains above the highway is being checked by means of bank-protection, cuts, and stop-banks.

Kahuterawa Stream.—Bank-protection and stop-banking has been commenced between the highway and the foothills over a distance of 60 chains.

Oroua River.—At the foot of Simon Street, Feilding, bad erosion was checked by use of netted groynes and a small cut.

Pohangina River.—Small protection works were completed.

Buckley Drainage Board.—Jackson's Drain was deepened over a distance of 40 chains. The cleaning-out of the upper Koputaroa Stream was completed early in the year.

Makerua Drainage Board.—Bank protection on the left bank of the Manawatu in various places was carried out at cost of approximately £4,000. All work was of the willow mattress type. The removal of willows in lower Tokomaru Stream is in hand.

The construction of banks at Whitanui and Seymours, each 8 to 10 chains long, is in progress.

Mangahao River: Marima Bridge Erosion.—Work carried out consisted of two small piled deflection groynes on left bank above bridge approach, and heavy crated stone and tethered weighted tree protection for a length of 5 chains on right bank below bluff, backed by an earth stop-bank 12 chains in length and 6 ft. in height. 45 per cent. of the final proposals has been completed.

Mangatainoka River.—Milne's Erosion: A small crated-stone deflection groyne has been constructed and small channel improvements affected to protect access and to re-establish old channel.

Allen's Erosion: A short shingle-end tree groyne with two small downstream crated-stone groynes were constructed to prevent access road being outflanked and to protect a power-line.

O'Brien's Erosion: A small cut off bank was constructed to prevent overflow and flooding at dairy factory. The major portion of this work, consisting of a large diversion cut 29 chains in length, has been deferred.

Ruamahanga River: Te Ore Ore River Board Length.—The proposals covered work consisting mainly of earth stop-banking and bank-protection of crated stone, and willow mattress thatching, protected by stock fencing, and work as follows was carried out:—

Willow Thatching and Stone Gabions: No. 8 (Savages), $\frac{3}{4}$ chain; No. 9 (Moores), 3 chains; No. 10 (Ewingtons and Wyeths), 10 chains; No. 12 (Burlings No. 1), 2 chains.

Stop-banking: No. 13 (Coles and Coopers), 59 chains; No. 14 (Coopers to Sewer Outfall), 22 chains.

Otaraia Peninsula, Kahautara River Board: A new stop-bank, 18 chains in length, and 36 ft. of 9 in. pipe culvert have been completed.

Waipoua River: Erosion (Estate of Buick and others).—11½ chains of stop-bank have been completed to protect Buick Estate.

Waiohine River.—Waiohine River Board: The erection of three small deflection groynes is 60 per cent. completed.

Turanganui River Diversion: This proposal was required to divert the Turanganui River direct into Lake Onoke, and thus avoid deposition of detritus in the Lower Ruamahanga River. The completed work consisted of removal and re-erection of fences, the construction of 110 chains of new stop-bank and pilot channel, raising of 21 chains of existing stop-bank and the removal of 13 chains of existing stop-bank, the construction of seepage drains, removal of trees, scrub, and various miscellaneous works in connection with the project.

Tauherenikau River Diversion.—A survey and complete scheme has been prepared to divert this river by a shorter course into Lake Wairarapa. This will render possible the reclamation of several hundred acres of lagoon area marginal to the lake and drainage improvement and flood protection of farm lands adjoining the river.

Lake Wairarapa Land Development.—Further investigation is in hand of a scheme to reclaim about 28,000 acres of lagoon and low-lying country by a major diversion of the Ruamahanga River.

Pakuratahi River at Kaitoke.—Work has been completed on scattered bank-protection, and two small diversions in the shingle-river bed.

Hutt River.—Opposite Upper Hutt Borough, with a view to preventing erosion of valuable land, the river was straightened by some 60 chains of pilot cuts and the construction of a stop-bank on the right bank. Some additional work, comprising widening of the new channel at the north, was completed, and permeable obstructions are in hand in the old channel at Pine Avenue. Two solid banks were completed across the old channel to prevent erosion opposite Newton Street.

Wairoa River: Fennel Island.—Further opening-up of the intake to the cut by bulldozing about 3,000 cubic yards across the river was done. The cut appears to be functioning satisfactorily, but has not yet shown much sign of scouring to the full width.

Wai-iti River.—Attention was given to several of the sections near Wakefield, which were cleared last year to induce stream-flow towards the centre of the river. Several of the loops are silting satisfactorily.

Motueka River.—Clearance of gorse, &c., from the stream bed in North's property, Motupiko, was necessitated by severe bank-erosion above the foot-bridge. The bank was protected by layered willow trees, and the stream diverted through the area cleared.

Lower Motueka.—Clearance of the gorse-and-broom-covered point half a mile above the State Highway bridge, partly by bulldozer but mostly by heavy plough was completed during the year.

Anatoki River.—The work of restoring the weir between the river and Onespec Creek has been completed.

About half a mile down-stream from the weir a 4-chain length of layered willow weir was constructed to prevent splitting of the stream. Some deepening of the right-hand stream and removal of growth from an island near the right bank was also done.

Takaka River (J. G. Page Estate).—A 30-chain length of stone facing has been completed with hard limestone. Lighter stone (half a ton) than on previous jobs was used over a short length, and, although generally satisfactory, some has washed out and had to be replaced. Approximately 2,658 cubic yards of stonework was placed and 3,974 cubic yards of gravel backing.

Jenkins Point has been removed to improve the river approach to Page's Cut down-stream, completed the previous year. This work has been almost completed, and the material has been used to build a stop-bank from the old cross stop-bank at O.M. 1022 (left bank) to O.M. 6744 (left bank) near the Pupu River. This is a distance of 51¼ chains, with a quantity of 21,100 cubic yards. The maximum stop-bank height was 12 ft., and the whole of the bank has been sown with grass-seed. Fencing has not yet been completed.

Lindsay's Property. Anchoring of willows with bolsters and bulldozed shingle was done as edge protection round a sharp curve over a length of 10 chains.

Waingaro River.—Channel improvements to induce stream-flow through the centre stream of three has been done in the most western part of Longford's property.

Aorere River: Morley's Creek Entrance.—Leakage between the end of the weir and the bank caused some erosion, and the weir was lengthened by about 20 ft. and the bank covered with manuka fascining and stones.

Christchurch District

Karamea River.—Erosion at Ferris' extended up-stream from original danger point, and stone-protection work was carried out over a distance of about 3 chains.

Little Wanganui River.—Owing to lack of plant, little work has been done.

Nile River Erosion.—No work has been done during the year owing to lack of plant; 80 per cent. complete.

Oparara River Erosion.—Serious damage to training-wall and road at Rhinds at the mouth of the groyne was repaired by heavy stone facing. Training-wall was rebuilt and strengthened.

Stop-bank at Simpsons.—Work completed, but not entirely successful owing to water seeping up inside bank.

Oparara River Erosion (Satherleys); Waimangaroa River; Giles Creek; and 14 m. Stream (Buller County Council).—Work completed.

Arapito Drainage Scheme.—Survey completed.

Little Wanganui (Poerua) River Protection Works.—The existing stop-bank was raised and the extensions proposed during the year completed. Heavy rock has been dumped in front of the up-stream portion of the stop-bank and around the remains of the old groyne.

Ahaura River Protection Works at Draytons.—Work was commenced and good progress has been made in the construction of mattress for strong-head.

Dry Creek, Poerua Valley.—Stop-bank above road bridge and diversion cut below the bridge completed. Further work may be required if damaged by floods.

Inangahua: River-control at Cronadun.—Smith's erosion works about 90 per cent. complete.

Arahura River Protection above Malfroy's Bridge.—Bank has been graded to an easy slope and fascined. Work nearly completed.

Wataroa River Protection.—Stop-bank completed and torpedo nets used for fascining work.

Surveys completed:—

(1) River-control, Grey County, Big River erosion.
(2) Taramakau, at Inchbonnie.
(3) Arahura River survey about Malfroy's Bridge.
(4) Crooked River, at Rotomau.
(5) Grey River, at Ikamatua.
(6) Waiho River, Gibbs Bros.
(7) Hokitika River, Camelback to Hokitika Gorge—river and bank survey.
(8) Dry Creek, Wataroa River.

Ashburton River Control Scheme.—This work was completed during the year.

2,464 acres of willow and scrub growth were removed to provide a flood-discharge fairway for the river, and 31½ miles of stop-banks, containing 259,000 cubic yards of material, were erected.

Seadown Drainage.—This work, which consists of the excavation of some 10 miles of drainage ditches in the Seadown district, was started in September, 1946, and is now 67 per cent. completed. The completed sections of

the work have entirely drained the surrounding areas, and when the drainage system is completed it is expected that ground-water troubles in this area will be overcome.

Surveys and Investigations.—River-gauging sites on the Waiau and Hurunui Rivers have been surveyed.

Oxford to Sea Drainage: Preliminary surveys and tentative estimates have been completed.

Selwyn River Improvement: Survey is in hand.

Irwell Creek clearing and straightening and Taumutu Creek clearing: Surveys and plans completed.

Hinds River: Survey completed.

Rain-gauges: Sites for these have been arranged for in Westland and in the Canterbury district north of the Rangitata.

Kowhai River, Kaikoura.—The north bank in the vicinity of the railway-bridge has been protected with willows.

Waiau River, Spotswood.—2¾ miles of heavy anchored willow protection have been completed.

Waitohi River, Busch's Frontage.—40 chains have been protected with willows.

Ashley River.—A gap in the stop-bank above the Rangiora traffic bridge was repaired and 50 chains of stop-bank to act as a second line of defence has been constructed behind the gap.

Stop-banks at the mouth of the river were repaired and the river-bed between the main highway bridge and the sea has been cleared of willows.

Eyre River.—Clearing of the river-bed is now completed between the Waimakariri River and the Oxford Township.

Greig's Drain and Kaikanui Stream Diversion have been completed.

Garry's Creek.—A bank protected with willows has been constructed for a length of 7 chains.

Okuti Stream, Little River.—This has been cleared of willows for a length of 30 chains at its lower end.

Greenpark Drain Diversion has been completed.

Minchins Creek, Blacklers, and Townsends Drains, Tai Tapu, have been cleared of trees and widened for a length of 3 miles.

L. 1 and L. 2 rivers have been widened and cleared of willows for a distance of 6 miles, commencing at Lake Ellesmere, and brought about a profound drainage improvement.

Taumatu Culvert.—The larger culvert, twin 4 ft. 6 in. pipes, which drains Cooper's Lagoon into the sea, is practically completed.

Ashburton-Hinds Drainage.—37½ miles of drains have been cleared, widened, and regraded, and the Shepperd's Bush and Wheatstone cutoffs have been completed. This work entailed 148,000 yards of excavation.

Rangitata River.—Protection work on Hearne Bros.' frontage has been completed.

Orari River.—The stop-banks washed out in the July, 1945, flood have been replaced, a channel has been cut in the river-bed adjacent to the Geraldine Borough, and the bank protected with willows.

A construction survey is now well in hand for a comprehensive scheme of river-control, utilizing a tower-excavator.

Waihi and Kakahu Rivers.—Stop-banks have been constructed on Allens', Coles', and Malvena's frontages.

Temuka River.—Hannifin's frontage has been protected and a house moved.

Opihi River.—Shaw's frontage has been protected with willows and a stop-bank.

Waimate Creek.—A stream-diversion and stop-bank have been completed in the vicinity of the hospital.

Dunedin District

Taieri River.—Lee Creek Channel: Work was continued on the widening of the Lee Creek Channel, within the Taieri stop-bank area.

Outer Area Henley Locks: The installation of the locks was proceeded with. Four locks were installed.

Momona Drain: Approximately 100 chains of new drain was constructed The work will improve approximately 280 acres of good farming land.

Taieri River-bank Protection: Bank-protection work and a small relief cut in the locality of the Riverside Bridge at Blair's property is proceeding.

Flood Protection, Middlemarch.—March and Clark's Creek in the locality of Middlemarch were cleaned out.

Clutha River.—Flood Damage, Balclutha: Restoration of the heavy damage caused by the flood in the Clutha River during February, 1945, has been continued, partly by the Department and partly by the Lower Clutha River Trust. The major works undertaken comprises repairs to the Inchclutha main-drain locks and rubble protection of river-bank to prevent extension of erosion. More of the latter work has still to be done.

A further severe flood in October, 1946, threatened to inundate about 18,000 acres on the river-flats below Balclutha. The river was successfully held within its banks, but much work is required repairing weakness caused by the flood.

Lower Clutha River Survey.—The survey of the lower reaches of the Clutha River and the surrounding flats with a view to the preparation of comprehensive river control and drainage proposals is approximately 50 per cent. completed.

Inchclutha Drainage.—Drains totalling 130 chains in length have been constructed at Morrison's, Botting's, and Telegraph Road on Inchclutha.

Matau Drainage.—A pump has been purchased in connection with the permanent drainage system of the Matau area. During the heavy September rains is was set up in a temporary position to de-water flooded lands.

Crookston Burn, Kelso.—In order to obviate flooding of the township of Kelso by the Crookston Burn a new channel 64 chains in length is being excavated for the stream, and willows are being cleared. The work is 80 per cent. complete.

Pomahaka River, Greenvale.—The river has been straightened over a length of 12 chains and the banks protected over a length of 3 chains to prevent the extension of erosion.

Waitaki River.—Some small jobs were carried out, including the reopening of the pilot channel cut the previous year, and the cutting of a new channel to the south.

Henderson's Creek: Channelling.—5 miles 79 chains completed.

Kingswell Creek: Channelling.—2 miles 47 chains completed.

Winton Channel: Improvements.—4 miles 9 chains.

Mataura River.—Bank-protection, Gore, Linen-flax Factory, 17 chains completed; division channel, 17 chains completed; Pyramid diversion cut, 17 chains completed.

Taunamau Stream.—Lowering railway culvert completed.

Wallace County Council: Pinckney's Drainage.—Channels, 50 chains completed.

STAFF

The staff has been supplemented during the year by appointment to districts of four senior soil conservation officers and seven juniors.

In addition, one officer has been seconded full time from the State Forest Service. The Council wishes to express appreciation of the services rendered by its small but efficient staff.

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

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

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