1914.

NEW ZEALAND.

REPORT OF MR. T. RONAYNE, RETIRING GENERAL MANAGER, AND OF MR. J. HENRY LOWE, C.E., ON CONDITION OF NEW ZEALAND RAILWAYS.

Laid on the Table by Leave of the House.

SIR,— Wellington, 31st October, 1913.

I have the honour to submit for your information a report on the working of the New Zealand Government railways for the twenty-eight weeks covering the period 1st April to 11th October, 1913.

The mileage of line open for traffic on the latter date was 2,851 miles, as against 2,842 miles for the corresponding period of the previous year. The revenue amounted to £2,042,594 16s. 3d., against £2,019,556 3s. 11d.—an increase of £23,038 12s. 4d. The expenditure amounted to £1,513,173 17s. 8d., against £1,403,139 11s. 3d.—an increase of £110,034 6s. 5d. The net revenue was £529,420 18s. 7d., against £616,416 12s. 8d.—a decrease of £86,995 14s. 1d. The expenditure per cent. of revenue was 74·08, against 69·48—an increase of 4·60 per cent. compared with the preceding year. Although the variation in percentage of expenditure is considerable it is not unusual, as in the earlier parts of the financial year many essentials have to be provided for, and the early requirements of one year differ materially from another. Hence the results of operation cannot be determined accurately until the close of the year; but it is, however, safe to say that the higher rates of pay and other improvements in the working-conditions of the staff will result in an increase of expenditure and an advance in the percentage of cost to revenue.

The total number of passengers carried was 6,358,595, against 6,128,701—an increase of 229,894. Season tickets issued numbered 148,022, against 139,867—an increase of 8,155. The number of parcels, horses, carriages, and dogs carried was 684,914, against 673,506—an increase of 11,408. The total number of cattle, calves, sheep, and pigs carried was 3,285,290, against 2,799,845—an increase of 485,445 head. The total goods tonnage was 3,253,180, against 3,293,705—a decrease of 40,525 tons. This decrease resulted from a falling-off of 115,305 tons in the grain traffic and of 385 tons in timber. Chaff, wool, firewood, merchandise, and minerals show increases aggregating 75,165 tons.

The receipts were adversely affected by the smallpox epidemic, which necessitated the imposition of severe restrictions and materially reduced the volume of passenger traffic. Labour unrest also became very acute, and ultimately culminated in strikes of considerable magnitude, which caused dislocation of trade and heavy loss of traffic to the Department. Despite the pressure to which they were subjected, the Railway staff remained loyal and did excellent work, frequently under very trying circumstances, in connection with the transport of men, horses, and equipment required to assist in maintaining order.

The increase in expenditure was caused by advances in the rates of pay under the Classification Act of 1912, which came into operation on the 1st April, 1913, and also by the fact that I had, in anticipation of the labour difficulty, taken the precaution of laying in large stocks of coal at various depots in order to enable the Department to carry on its operations and meet its obligations to the public in the event of a crisis arising. The wisdom of this action was made apparent during the acute period of the strike, as at no time was there the slightest danger of the train services being in any way curtailed or upset for want of coal.

During the period under review I submitted for the consideration of the Government a revised scale of pay for members of the First Division of the Railway service, and for the juniors employed in the Second Division. Amended staff regulations, modifying and improving the conditions of railway employment, and providing for concessions to superannuated members and

their wives, were prepared and submitted at the same time. The proposals were discussed with representatives of the Railway staff, who expressed their appreciation of the improvements which the draft Act and regulations contained. The alterations made in the Act and regulations will involve a very considerable increase in the operating-expenses. In view, however, of the fact that the financial exigencies of the Department had prevented any material advances being given to members of the First Division for some time, they were in equity entitled to receive consideration and benefit.

For many years past large concessions in rates have annually been made on various local commodities carried over the railways. Many of these rates were fixed for the purpose of inducing settlement and enabling struggling industries to get firmly established at a time of depression when the prices of all local products were very much lower than they now are. The conditions prevailing at the time rate-reductions were granted have completely changed. The country has entered upon and been passing through an era of prosperity. Land has appreciated in value, prices of all our staple products have steadily advanced, and numerous industries have been established on a sound commercial and financial basis. The railways have contributed in no small degree to this satisfactory position, and the efforts of the Railway staff deserve any recognition that has been made. Therefore, should it now be found that the normal increase in the railway traffic is insufficient to enable the Department to meet the increased operating-expenses and at the same time pay the interest required by the Government on the capital invested, the rates for conveyance of goods and live-stock should, in my opinion, be reviewed and fixed on a more remunerative basis, having regard to the prevailing commercial and industrial conditions.

In view of my retirement on superannuation, I deemed it desirable that a report on the condition of the New Zealand Government railways should be obtained from an independent engineer of standing and experience. The Government approved my recommendation that advantage should be taken of the presence in New Zealand of Mr. John Henry Lowe, who was formerly connected with the New Zealand railways, to furnish such a report. Mr. Lowe's time would not permit of his seeing the whole of the railway-lines, but he inspected about 1,700 miles out of the total system of 2,859 miles. His report is attached hereto, and will repay perusal. It shows that very material improvements have been made in the lines generally; that the expenditure which has in the past been devoted to improving the permanent-way and other structures has been justified, and that the money has been expended on right lines. I do not subscribe to Mr. Lowe's view that increased traffic should be dealt with by running more trains and the building of more engines within the present limits rather than by the utilization of locomotives of greater power than those at present employed to haul heavier loads. Railway experience in all countries is that for the purpose of economical working it is essential to employ engines of the greatest tractive power. This enables the maximum loads to be hauled by the minimum number of trains required to deal with a given traffic, and so increases the capacity of the line. Employment of engines of small tractive power involves a corresponding increase in the number of trains required to deal with an equal tonnage, a reduction of the tonnage hauled per train, and results in overcrowding the line, reducing its capacity, and rendering duplication necessary earlier than it otherwise would be. The practice followed on the New Zealand railways has been to gradually increase the weight and tractive force of the locomotives employed, and very satisfactory results have been achieved. The policy of replacing the lighter types of engines by heavier locomotives with a fixed limit of axle-load should undoubtedly be continued.

As this will by my final report I may be pardoned for making reference to the alterations that have taken place in the railway system during my regime as General Manager. Dealing first with the staff, the number of men employed on 31st March, 1895, was 4,597. The minimum rate of pay for members (cadets) of the First Division was £30 per annum, and the maximum £800, which was the salary of the General Manager. In the Second Division the minimum rate was 3s. per day for juniors, 6s. 6d. for adult labourers, and the maximum was 13s. per day. This latter rate was paid to eight members only. The hours of labour were, as a rule, not defined. Engine-drivers and guards worked fifty-four hours per week, other members of the Traffic Branch at least sixty hours per week, but, generally speaking, they worked as long as required without payment for overtime. Leave of absence was to a considerable extent irregular.

The number of men now employed is 14,434. A system of classification of the staff has been introduced and firmly established. The minimum salary for members (cadets) of the First Division is £50 per annum, and the maximum £3,000 (General Manager). The minimum rate of pay for juniors, Second Division, is 5s. 6d. per day, for adults 9s. per day, and the maximum paid is 15s. per day. The hours of labour, where the work is continuous, are eight per day. Married men and widowers with children dependent on them are paid a minimum of £140 17s. per annum irrespective of length of service. Overtime rates are paid to engine-drivers, firemen, guards, and shunters for any time worked over forty-eight hours per week. Sunday duty is paid for separately at special rates. The men in various grades advance from the minimum to the maximum rates by fixed annual increments. Travelling and night allowances of members of both divisions have been increased. Members of the First Division, when absent through sickness or accident, receive full pay for fixed periods specified in the regulations, and in the case of the Second Division payment is provided for under the Workers' Compensation Act for time off duty through injury sustained at their work, and in the event of death their legal representatives receive compensation under the same Act. Leave of absence varying from nine days to three weeks is annually granted to members of the service. Fortnightly pay has been inaugurated for the purpose of enabling employees to pay cash for their purchases instead of having to obtain credit, it being represented that this is more advantageous than the four-weekly system of pay previously in force. Free passes are granted to members of the staff stationed at isolated

places to enable them to travel to the nearest store for the purchase of household commodities. In other cases privilege tickets at quarter ordinary rates are obtainable. Members and their wives are granted privilege tickets once a week instead of monthly as previously. First-class passes for period of annual leave are issued once a year to all members of the First Division and to members of the Second Division with over ten years' service; second-class passes are issued to other members. Social halls for the use of members have been provided at centres and sub-depots. A Superannuation Fund has been established. A Railway Appeal Board has been established in both Islands. Codes of instructions for the use of members of the Traffic, Locomotive, and Maintenance Branches have been compiled and supplied to members. The rules and regulations have been revised, and conform as closely as possible to the requirements of the English Board of Trade.

The following indicate the direction in which the principal reductions have been made in rates:—

To travelling public: Reduction in ordinary and suburban passenger fares, and season and commutation ticket rates; extension of availability of single and return tickets; introduction of holiday and school excursion rates, workers' weekly 2s. and twelve-trip tickets, sectional season tickets, and week-end tickets to seaside resorts; cheap rates for apprentices and young persons travelling to employment; concessions to religious bodies; judges travelling to shows, pleasure and theatrical parties, and teams travelling to sports; extension of use of tourist tickets to persons residing in the Dominion; through booking by rail and steamer for inter-Island traffic; establishment of check-luggage system for local and inter-Island traffic; cartage of inter-Island luggage between railway-stations and steamers at Wellington at contract rates, which has resulted in large saving in cost of transport to passengers; checking, collection, and delivery of passengers' luggage by New Zealand Express Company; reduction in excess-luggage rates; concessions to workers in connection with tools taken as luggage.

The principal concessions in coaching and goods rates apply to parcels, racehorses, hounds, milk, bicycles, private-siding rent, show stock, frozen meat, live-stock, wool, grain, timber, chaff, lime, manures, lime for manuring farm lands (free), butter, cheese, honey, hemp, bacon, poultry, store sheep, sheep-dip, fencing, New-Zealand-grown fruit and vegetables, flax, and coal.

Rolling-stock Equipment.

Since 1895, 251 locomotives have been added to the stock, making the total tractive power 6,754,663 lb. In 1895 the average tractive power of the 269 engines then in use was 6,528 lb. per engine; at the present time the average tractive power per engine is 12,989 lb.—an increase of 99 per cent. The heaviest locomotive in 1895 was 63 tons, while at the present time the largest locomotive running on the lines weighs 94 tons. Twenty-two engines of low power were converted to improved types and made serviceable for present-day requirements. 112 new locomotives have been manufactured in the railway workshops, and fifty in the private engineering establishment of Messrs. Price Bros., Thames. A number of engines of obsolete type have been scrapped and replaced by engines of modern type.

New carriages to the number of 832, of which 786 were manufactured in the railway workshops, have been added to the stock, bringing the seating-accommodation up to 55,937 passengers. The maximum seating-accommodation of the cars in use in 1895 was thirty-five passengers per car; the seating-accommodation of the carriages now in use is forty-two passengers per car—an increase of 20 per cent. All second-class cars are now fitted with cushion seats. The system of car-lighting is now by Pintsch gas, acetylene, or electricity, which have supplanted colza-oil and kerosene lamps. The gaslight is used on all the main-line systems, and acetylene or electricity on the small sections. 123 out-of-date carriages, which were in good condition, have been converted into up-to-date vehicles, and twenty-four obsolete cars which were written off have been replaced by vehicles of modern type. Dining-cars have been placed on the Rotorua–Auckland, Auckland–Wellington, Wellington – New Plymouth, and Christchurch–Dunedin express trains, and sleeping-cars on the Wellington–Auckland express services. The express trains on the Hurunui–Bluff and Auckland–Wellington Main Trunk Sections are now heated by steam. 2,358 foot-warmers have been provided, and these are used on all the principal main line and suburban trains on all sections.

One thousand four-wheeled and fifty-four bogie sheep-trucks have been added to the stock, and the whole of the 1,443 sheep-trucks now in use have been fitted with grated floors, which not only facilitate cleaning, but reduce the mortality where sheep get down during transit. 147 four-wheeled and 108 bogie freezers have been added to the stock. The total number of wagons of all classes now in use is 19,236, with a carrying-capacity of 160,218 tons. This represents an increase of 10,972 wagons of all classes since 1895, of which number 10,012 were built in the railway workshops. 17,987 wagon-axles have been replaced with new axles of greater strength, thus increasing the carrying-capacity of wagons so fitted by 2 tons each. The additional carrying-capacity obtained by using stronger axles is equivalent to adding another 2,981 four-wheeled trucks to the stock, bringing the total equivalent increase in wagon stock up to 13,953 wagons since 1895.

The cost of conversion and replacement of carriages and locomotives and of the improvements to wagons by the substitution of new axles, &c., has been paid for out of working-expenses.

The Westinghouse continuous air-brake has been installed on all the principal sections of railway; the number of vehicles at present fitted with this appliance is 482 locomotives, 1,209 carriages, 320 brake-vans, and 15,962 wagons. Eighty-four wagons have in addition been "piped," so that they may be run on trains on which the air-brake is in use. All new rolling-stock built in the railway workshops and in Messrs. Price Bros. foundry is fully equipped with Westinghouse-brake appliances before leaving the shops. The expenditure incurred in fitting the Westinghouse brake has been £486,946.

Railway Workshops.

The railway workshops have been considerably extended, and a new workshop erected at Invercargill. Obsolete machinery has been replaced by modern machinery wherever practicable. Electricity has been installed as motive power in some of the shops, and, generally speaking, the improvements have been of a character that has brought the shops well up to date, making it possible for them to carry out annually an extensive programme for the building of rolling-stock, including the manufacture of locomotives, cars, and wagons. The amount expended on the equipment and extension of the workshops has been £246,294, of which £182,625 represents cost of new machinery.

Maintenance.

In the Maintenance Branch a large expenditure has been incurred in providing increased accommodation at both officered and flag stations. Eighty-four new station buildings have been erected, and hundreds of miles of additional sidings laid to provide for the requirements of the increased traffic and to enable the long trains hauled by the most powerful engines to be handled expeditiously. All wooden bridges on main lines of the North Island have been replaced by steel structures or renewed in ironbark. A ferro-concrete wharf has been erected at Picton, and a new timber wharf, capable of dealing with large oversea vessels, has been built at Nelson. The lighting and water services have been modernized wherever practicable. Verandas have been provided at a large number of stations, and a considerable number of new houses have been erected for the staff and material improvements made in the older dwellings.

Out of 1,995 miles of track operated in 1895, 71 miles were laid with 30 lb. rails, 1,847 miles with 40 lb., 52 lb., and 53 lb. metals, 17 miles with 56 lb., and 60 miles with 70 lb. rails. A large amount of relaying has since taken place, and up to the present time 1,070 miles have been relaid with 70 lb., 26 miles with 64 lb., 733 miles with 56 lb., 858 miles with 52 lb. and 53 lb. rails, and there now exists only 171 miles of 40 lb. track or under. During the last ten years 2,929,011 sleepers have been put into the track, and 4,061,269 tons of ballast were used during the same period. The expenditure incurred in relaying and respacing sleepers amounted to £2,672,451, all of which has been charged to working-expenses.

A comprehensive programme of regrading and, where necessary, deviating the lines for the purpose of obtaining reductions in grades and so increasing the hauling-capacity of the locomotives has been laid down. Several deviations and grade improvements have been undertaken and successfully carried out by the Working Railways Department, including the New Plymouth–Waiwakaiho River deviation, Aramoho–Wanganui deviation, deviation of the Napier line near Ormondville, and deviation near Riverton, including erection of new bridge over the Aparima River. In addition the Department has carried out the duplication of the lines between Auckland and Penrose, Addington and Rolleston, Milton and Clarkesville, Dunedin and Mosgiel, and Wellington–Lower Hutt road improvement and railway duplication. The expenditure incurred on these works was £1,061,368.

Safety appliances in the nature of electric tablet, interlocking, telegraph and telephones, lock-and-block, electric-train staff and ticket have been installed. The tablet is in operation at 299 stations, controlling 1,389 miles of line. Seventy-five stations have been interlocked. 1,441 telegraph and telephone instruments have been installed, 5,640 miles of telegraph and telephone wires have been laid on, and 2,096 miles of poles for carrying the wires. Lock-and-block working is in operation on 38½ miles of railway-line, and fixed signals have been erected at 215 stations.

Maintenance Workshops.

Maintenance depots have been established and new workshops erected and equipped at Penrose, Kaiwarra, Addington, and Dunedin.

As a result of the judicious expenditure incurred over a period of years in the betterment of the lines and their equipment, I assert with the utmost confidence that their condition at the present moment is better than at any other period of their history, and as a going concern their value is greatly in excess of the capital invested in them.

The rolling-stock equipment in use on the railways when I took over sole control in 1895 was found to be inadequate to meet requirements, and the increased prosperity which then set in resulted in an unprecedented advance in railway business. As it was impossible at that time to undertake the building of rolling-stock with sufficient rapidity in the railway workshops (which were originally designed and equipped for repairs work only), I was reluctantly constrained to recommend the importation of eighty-nine locomotives, sixty-three carriages, and one thousand wagons. Contracts for the construction of these were let in due course. At the same time close attention was devoted to the question of improving and extending the railway workshops and their equipment, so as to enable the rolling-stock required to meet future traffic expansion to be manufactured therein. By 1899 the workshops were in a position to undertake the manufacture of rolling-stock with sufficient expedition to justify me in stating that after the contracts referred to above were fulfilled it would for many years be unnecessary to go abroad for rolling-stock equipment for the New Zealand railways. From that date up to the present time the whole of the rolling-stock required has been manufactured in the New Zealand railway workshops, supplemented by fifty locomotives built in the Dominion under contract by the engineering firm of Messrs. Price Bros., Thames.

Motor Services.

The development of motor traction in other countries has been closely watched for some time past, and, after having investigated the results achieved by tests of different types of rail motor-cars, I placed an experimental order for two cars—one with the British Westinghouse Brake Com-

pany and the other with the Leyland Company. Both cars should arrive in the Dominion at an early date.

Road motor-cars have been placed on the run between Culverden and Hanmer Springs to provide for the tourist and other traffic. Altogether five cars are employed in this service, which has been satisfactory.

Lake Wakatipu Service.

The Lake Wakatipu steamer service was purchased by the Government in 1902, since which date it has been controlled by and worked in conjunction with the New Zealand Government Railways Department. With a view to popularizing the Wakatipu trip a contract was let to Messrs. McGregor and Co., of Dunedin, for the building of a new twin-screw steamer to run between Kingston and the head of the lake in conjunction with the "Mountaineer." The new vessel, "Earnslaw," has a speed of 15 knots an hour and a capacity of 1,000 passengers. It was launched and placed in commission in October, 1912. The increased speed of the new steamer and the improved passenger accommodation provided thereon have already been much appreciated, and the vessel should be capable of meeting the demands of traffic on the lake for many years to come.

General.

The linking-up of the Wairarapa line with the Napier–Taranaki line at Woodville in December, 1897; the acquisition of the Midland Railway-line (82 miles 68 chains) in July, 1900; the driving of the last spike in the Main Trunk Railway at Manganui-o-te-ao on the 6th November, 1908, thereby connecting Wellington with Auckland; and the taking-over of the Wellington-Manawatu Railway Company's line (83 miles 67 chains), connecting Wellington with Longburn, on the 7th December, 1908, marked important epochs in the history of the New Zealand railways, and had considerable influence in the settlement and development of the country. Immediately the Midland and Manawatu Railway Companies' lines were incorporated with the Government railways steps were taken to bring them up to a standard as nearly as possible approximating to that of other portions of the main lines, and in the case of the Manawatu Railway increased accommodation and up-to-date signalling, interlocking, and other equipment had to be provided to meet the requirements of the additional through traffic resulting from the diversion of business from the Wairarapa to the Longburn route.

During practically the whole period from 1895 up to date the railway-lines have been going through a transition stage. As originally constructed they were only capable of dealing with a small volume of traffic, and the light form of construction restricted the weight of vehicle that could be run. With the rapid and continual expansion of traffic following closely on the policy adopted of utilizing the lines for the purpose of developing settlement, and regarding the earning of a large amount of revenue as a secondary consideration when compared with the national benefits that would accrue from settling people on the land, it became essential to bring the lines up to a standard that would enable them to deal satisfactorily with the traffic offering. This necessitated the carrying-out of a comprehensive scheme of betterment, practically involving during the period the relaying of the main lines twice and branch lines once; at the same time the everyday requirements of the commerce of the country had to be fully provided for and met.

The capabilities of the Department to satisfactorily meet emergencies were fully demonstrated on several unique occasions—namely, the departure of the ten New Zealand Contingents for South Africa in 1899 and 1900; the visits of the Imperial troops in February, 1901, and of Their Majesties the King and Queen (then the Duke and Duchess of York) in June, 1901; the visit of the American Fleet in 1908; and lastly the arrival of the battleship H.M.S. "New Zealand" during the present year. The manner in which the requirements of these memorable occasions were met was clearly stated at the time and is now a matter of history.

During my regime the railway policy was changed three times. Under the original policy laid down in 1897 the railways were required to return 3 per cent. on the capital cost of construction, and after this had been achieved to grant to the public concessions in fares, rates, and improved train facilities, and to improve the conditions of the staff. In 1909 the railways were required to give a return of $3\frac{3}{4}$ per cent. In 1910, 4 per cent. was required. On the basis of the existing traffic the reductions that have been made in the rates represent a concession of £350,000 per annum as compared with the rates that were ruling in 1895. During the whole of my regime the operations have been conducted strictly in conformity with the policy laid down for my guidance, and, notwithstanding the additions to train mileage in the shape of experimental and often unprofitable train services, the opening of short sections of new lines, the many reductions made from time to time in fares and freights, the advances in pay and reduction in hours of duty of railway employees, and the many difficulties inseparable from operating a system divided into several disjointed sections, the railways have never failed to yield a net return that exceeded the stipulated requirements of the Government policy.

I have on more than one occasion urged that steps should be taken to provide funds to meet the expenditure that will be involved in carrying out projected deviations and grade improvements that have been outlined in reports already made, and other large works such as new stations and yards at Auckland and Wellington, and alterations at Lyttelton, Christchurch, Timaru, and Invercargill. Up to the present time, however, the exigencies of finance have militated against my recommendations being carried into full effect. There is no doubt, however, that with the continuous and rapid development that is taking place in the country the demands made on the railways for transport facilities are fast assuming proportions that render the provision of the necessary funds a matter of urgency and imperative necessity.

In view of the important part railway communication and facilities play in connection with the mobilization and transport of troops and their equipment, and seeing also that the everyday operations of the railways rendered it impracticable to relieve simultaneously for camp training the large number of railway men who are within the age-limit for compulsory training under the Defence Act, a proposal to form a Railway Corps was made to the Defence Department in 1910. The suggestion being accepted, steps were taken to organize the corps, which consists of two battalions of eight companies each. Four Instructors have been obtained from the Defence Department, two being stationed in the North Island and two in the South Island. Officers have been appointed to each of the sixteen companies, and they are located in the best positions to ensure training, which commenced some time ago, being systematically carried on in a way that will make for the efficiency of the corps. The Wellington companies held a week-end camp at Gollan's Valley on the 26th, 27th, and 28th October, 1913. This was the first camp held by the New Zealand Railway Corps. Eighty men took part, and I was very pleased with their general bearing and the keenness they evinced. From personal observation in this camp and elsewhere I am convinced that the Railway Corps will be of immense value to the country in any emergency that may arise, also that the training and discipline received in the corps will manifest itself beneficially when the men are performing their ordinary avocations. The strength of the corps is now fifty-three officers and 1,860 men. Rifles and equipment for the whole of the North Island Battalion are on hand, but I considered it inadvisable to issue the arms during the industrial unrest. Equipment for the South Island Battalion has been on order for some time.

The following is a comparative statement of the traffic during the first and last years of my control of the railways:—

——	Year ended 31st March, 1895.	13th October, 1912, to 11th October, 1913.	Increase.	Increase per Cent.
Passengers .. .. Number	3,905,578	13,353,773	9,448,195	242
Season tickets .. .. .. ,,	28,623	273,414	244,791	855
Parcels .. .. ,,	444,981	1,334,599	889,618	200
Horses .. .. ,,	11,185	21,890	10,705	91
Carriages .. .. ,,	750	2,859	2,109	281
Dogs .. .. ,,	23,517	55,196	31,679	135
Drays .. .. ,,	705	3,242	2,537	359
Cattle .. .. ,,	40,890	238,036	197,146	483
Sheep .. .. ,,	1,519,921	5,857,482	4,337,561	285
Pigs .. .. ,,	43,292	136,457	93,165	215
Chaff, lime, &c. .. .. .. Tons	36,972	234,479	197,507	534
Wool .. .. ,,	103,328	149,611	46,283	45
Firewood .. .. ,,	85,102	120,952	35,850	42
Timber .. .. ,,	198,578	694,675	496,097	249
Grain .. .. ,,	388,556	1,066,594	678,038	174
Merchandise .. .. .. ,,	377,938	867,265	489,327	129
Minerals .. .. ,,	857,917	2,753,904	1,895,987	221
Total tonnage	2,048,391	5,916,480	3,868,089	188
Total revenue	£1,150,851	£3,994,041	£2,843,190	247
Total expenditure	£732,160	£2,815,642	£2,083,482	284
Train mileage run	3,221,620	9,219,824	5,998,204	186
Locomotives .. .. Number	269	520	251	93
Locomotives (tractive power) .. .. lb.	1,756,178	6,754,663	4,998,485	285
Passenger-cars .. .. .. Number	498	1,330	832	167
,, (seating-accommodation) ..	17,455	55,937	38,482	220
Brake-vans .. .. Number	204	396	192	94
Sheep-wagons .. .. .. ,,	390	1,443	1,053	270
Total wagons, all classes .. .. ,,	8,264	19,236	10,972	133
Wagon carrying-capacity .. .. Tons	50,861	160,218	109,357	215

In conclusion, I desire to express my appreciation of the courtesy and consideration extended to me by the various Ministers of the Crown under whom I have had the honour to serve. In severing my connection with the service I am gratified at handing over to my successor the lines and their equipment in good order and condition, together with an efficient and contented staff. I am fully sensible of the loyal support given me by the rank and file of the service, and cordially thank them for their co-operation in connection with the working of the greatest of all our State systems.

I have, &c.,

T. RONAYNE,

General Manager.

The Hon. the Minister of Railways.

REPORT ON NEW ZEALAND RAILWAYS BY J. HENRY LOWE, CIVIL ENGINEER.

Order of Reference.—When the New Zealand railways were taken over by the Government from the Railway Commissioners a special Commission was appointed to report on their condition. In view of another contemplated change in the administration it is desired to obtain an opinion on the present condition of the railways, and particularly as compared with their condition when I retired from office as Chief Engineer about thirteen years ago.

Extent of Inspection.—It was understood that the time at my disposal would not admit of my seeing the whole of the lines, but I have inspected about 1,700 miles out of the approximate total of 2,859 miles, including the lines next mentioned, viz. :—

North Island: Main Trunk, Wellington to Auckland; Auckland North line; Frankton to Thames and Waihi; Morrinsville–Rotorua; Wellington–Manawatu; Palmerston North and New Plymouth; Palmerston North – Woodville and Napier; Woodville–Wairarapa and Wellington.

South Island: Lyttelton to Bluff; Invercargill to Kingston; Lumsden to Gore; Otago Central to Middlemarch; Rolleston–Sheffield; Oxford to Rangiora; Rangiora to Addington.

The large proportion of the railways seen has so many features in common that I am assured it may be taken as a fair average of the whole.

The mileage opened for traffic has been increased from 2,084 miles in 1899 to 2,807 at date of last official return, to 31st March, 1912, and is further extended, approximately, to 2,859 miles at the present time.

Beginning with the most important item, the maintenance of the permanent-way, I have found the running-surface and alignment in excellent condition. It shows that great care has been given, and attention to details, with only a very few exceptions.

I consider the proportion of the mileage in uniformly excellent condition is greater than formerly; also a greater proportion of the mileage has a full complement of ballast. In respect of ballasting, there are nevertheless many miles that require more or less additional ballast. The deficiency at present existing, I understand, has been due to difficulty in obtaining engine-power enough to fully overtake the work.

Relaying of Rails.—The improvement noted in permanent-way is due in very large measure to the relaying of the lines with heavier rails. The main lines, formerly laid with 53 lb. and 56 lb. rails, have been replaced with 70 lb. steel rails to the extent of nearly 1,000 miles, and nearly 300 miles of branch lines have been relaid with rails of heavier type which had been removed from the main lines, and are still in such good condition that they will serve the lighter traffic of the branch lines for many years. Taken together this represents a practical renewal of rails over 1,300 miles of a considerably more substantial character than originally. The increased strength of rails over the whole of the lines may be easily apprehended by the following comparative table, showing proportion of weight of metals in the years under comparison :—

1899.			1912.		
Weight of Rail.	Miles.	Per Cent.	Weight of Rail.	Miles.	Per Cent.
30 lb. iron	64	3·0	30 lb.	All out	..
40 lb. and 45 lb. ..	563	27·0	40 lb. and 45 lb. ..	202	7·2
52 lb. to 56 lb.	1,397	67·0	52 lb. to 56 lb. ..	1,588	56·6
64 lb. and 70 lb. iron ..	56	3·0	65 lb. steel	26	1·5
70 lb. steel	4		70 lb. iron	16	
			70 lb. steel	973	34·7
			100 lb. steel	2	
Totals	2,084	100·0	Totals ..	2,807	100·0

Check-railing of sharp curves and guard-railing for bridges have been greatly extended, providing increased security against derailment and protection in case of derailment.

Sidings.—Another very noticeable addition is in the number and length of sidings at stations, particularly the lengthening of crossing loops, to meet the requirement of trains much longer than were formerly provided for. A very great number of additional sidings have also been laid down.

Junctions.—A great number of station-yards have been reconstructed and greatly extended, and at the same time improvements effected, particularly in the arrangement of junctions and approaches to large stations, providing for shunting clear of main lines, much of which was necessitated in arranging for interlocking of points with signals.

Sleepers.—New sleepers have been laid throughout the mileage relaid, and additional sleepers per rail-length put in to bring the lines up to an increased standard of support for the rails, besides extensive renewals of sleepers in tracks not yet relaid.

It is a satisfaction to note that the recommendation made in my last annual report (1899) as to the rate of renewal of rails and sleepers during the then enusing ten years was very closely carried out. Relaying proposed—896 miles in ten years; actually relaid in same period—new, 768 miles, and second-hand, 161 miles. Sleeper renewals anticipated for six years, 1900 to 1906 inclusive, 2,264,000 sleepers; number laid in same years, 2,282,251.

Sleeper-supply.—The supply of sleepers in sufficient quantities of suitable timber has always been a subject of the greatest concern. In the earlier days of the railways by far the largest number of sleepers was of native totara. It was a very durable and reliable timber, and enormous numbers have been used, and have lasted to a great age. As traffic increased these sleepers began to wear out from deficient hardness, while still free from decay. Great numbers of silver-pine were used later on, and have proved admirable for durability. At present the supplies of these timbers are diminishing and the price is rising. Birch timber has been largely used in the past, but has proved indifferent in quality through tendency to crack and warp, and is not as durable as other timbers. At a later period creosoted pine timbers were used in large quantities, and have given moderately fair results, but a difficulty arose in the regular and sufficient supply of material for the treatment, and the cost was against these sleepers. Jarrah and other hardwood sleepers have been used for years on bridges and positions where extra strength is necessary.

To keep up a sufficient supply of reliable sleepers jarrah and hardwoods have been more extensively used, with great benefit to the maintenance of the lines. More recently a trial has been made of the Powell process of preserving white- and red-pine sleepers. The first experimental lot was unsuccessful. Further experiments are now being made by the promoters of this system under altered conditions. The Department is also making similar trials, and have a plant established for the purpose. It is to be hoped these fresh experiments may be more successful than the first, and that sufficient time will be given to test results before large quantities of this nature are obtained. Meanwhile the demand for sleepers is increasing yearly, and jarrah and hardwood must be relied on for a large proportion of the supply, supplemented by such totara and silver-pine as can be obtained for use on lines of lighter traffic.

I consider the lines have been fully kept up and strengthened so as to provide for the great increase in traffic.

Deviations in Alignment and Grades.—Great improvements have been made in alignment, and reduction of gradients on deviations of the line, which have been completed in a large number of instances, some very extensive and many of minor extent. This has effected immense improvement, and has greatly increased haulage-capacity and economy.

Bridges and Culverts.—There has been an immense amount of work done in the strengthening of bridges to carry increased engine-loads, and also in many cases complete reconstruction of timber structures which have been replaced by steel.

The Manawapou Viaduct is now being rebuilt on a deviation giving improved alignment and grades, replacing the original timber viaduct with a new structure having concrete and steel piers and steel superstructure. This is the last of similar viaducts which have in turn been replaced upon the Wanganui and Napier lines. The old Manawapou Viaduct has done good service for over thirty years. Much of the timber is still sound, but increased engine-loads demand a new structure.

The renewal of eight of these viaducts has been a most important and valuable work. It was commenced in my term of office with the Kopua and Makotuku. There have been rebuilt since then, in succession, the Piripiri, Mangatera, Ormondville, Mangatewainui, and Tongahoe. The Manawapou now in hand will complete the series, and I am pleased to have seen the last of these works now in progress.

The Hamilton Bridge (over the Waikato) has been strengthened on lines decided on before I left by the addition of an extra line of steel trusses, requiring for support two additional cylinders in the river and the widening of the concrete abutments. It is a fine work, and successfully carried out. Similarly, the large span bridges at Ngaruawahia, Wanganui, and Balclutha have been strengthened for heavier engines.

Close sleepering with hardwood sleepers on bridges has also been carried out almost throughout.

Fencing.—There has been a considerable increase in the mileage of fencing. The main lines are now almost entirely fenced, and the fences appear to be fairly well maintained.

Signals.—A very great addition to the lines has been made in respect of station signals and interlocking of points and signals, which seem well arranged and uniform in pattern and working-parts, which is a matter of the greatest importance.

Water-services, &c.—Water-services, cranes, and fixed appliances of various descriptions have all been greatly increased in number and capacity. A great number of power pumps for raising water have been introduced. The great variety of types adopted I think somewhat excessive, and likely to prove troublesome in maintenance.

Buildings.—Next to expansion in details of the permanent-way, which have been mentioned, is the extension under the heading of station buildings and dwellinghouses. This has been very great. Numbers of stations have been entirely rebuilt; platforms extended to greater length and width; small shelter-sheds have been replaced by station offices with waiting and luggage rooms, and verandas over platforms. This, together with additional sidings, has necessitated in many cases entire rearrangement of station-yards. Dwellinghouses provided at country stations for employees have been largely increased in number and accommodation.

Besides what may be regarded as additions to the structures, there has no doubt been considerable increase in cost of ordinary repairs due to age of wooden buildings. In many instances worn-out buildings have been replaced by new, having much greater accommodation.

Painting.—Among other obvious improvements is to be noted the general condition of the paint-work of iron-bridge structures, ironwork in structures generally, and on buildings. This is being kept up with requirements much more fully now than formerly, when painting was liable to be in arrears by reason of pressure for retrenchment.

EXPENDITURE.

With so large an increase in the work by the Maintenance Department in almost every direction it is only to be expected that there would be a very large increase in annual expenditure.

The returns are not yet completed for the current financial year which ends in a few days, so that the expenditure for this year is given only approximately at about £760,000. For the year ending 31st March, 1912, the maintenance expenditure was £735,545 13s. 11d. The corresponding expenditure for the year 1899 was £357,188 14s. 5d. This shows that the expenditure has more than doubled. Part of this increase is due to extension of the lines, and part is undoubtedly caused by the general rise in price of materials of all kinds and in the increased rate of wages paid for labour of lower grades.

By reducing the totals to a rate per mile of railway maintained we get a more just basis of comparison. In 1899 the cost of maintaining 2,084 miles was £171 per mile. In 1912 the cost of maintaining 2,807 miles was £262 per mile, or more than half as much again—say, an increase of 53 per cent. per mile of railway. An analysis of this expenditure is given in the annual Railways Statement (Return 10), from which the subjoined table is compiled.

Cost of Maintenance in 1899 compared with 1912.

—	1899 (2,084 Miles).		1912 (2,807 Miles).		Increase.
	£	Per Mile. £	£	Per Mile. £	Per Mile. £
Track surfacing	119,557	57·4	239,514	85·3	27·9
Track renewals	101,048	48·5	173,067	61·7	13·2
Ballasting	11,290	5·4	29,945	10·7	5·3
Banks, cutting, &c.	13,944	6·7	22,106	7·9	1·2
Bridges, culverts, &c.	49,761	23·9	84,385	30·1	6·2
Fences, gates, &c.	9,333	4·4	22,784	8·1	3·7
Roads, approaches, &c.	2,896	1·4	6,712	2·4	1·0
Water-services, signals, cranes, &c.	7,140	3·4	34,484	12·3	8·9
Wharves	7,146	3·4	9,050	3·2	0·2
Buildings	24,550	11·8	86,875	30·9	19·1
Miscellaneous	7,298	3·5	23,024	8·2	4·7
General charges	3,224	1·6	3,596	1·3	0·3
Totals	£357,187	£171·4	£735,542	£262·1	..

	£
Gross increase	91·2
Less decrease	0·5
Total increase, per mile	£90·7

Cost of Track Surfacing.—From this it will be seen that the item of the greatest increase is the "track surfacing," which has risen close upon £120,000 a year. This represents a rise from 57·4 to 85·3 per mile. This item includes the greatest number of men at the lowest rate of pay in the service. Moreover, the greatest part of this expenditure consists of payments for wages. I find the number of platelayers and surfacemen employed at present is 1,420 men at 9s. on 2,807 miles, as compared with 997 men at 6s. 6d. on 2,084 miles. These numbers of men employed are practically the same as before—that is, approximately one man to two miles of railway—the greatest number now employed corresponding with the additional mileage almost exactly. The difference of the total expenditure on this head, therefore, is accounted for by the greater mileage and the extra amount of pay and allowances now given.

I do not find the men do more work than formerly, but that they work less hours, and conclude that this item of £239,514 is raised about £66,000 a year by the extra rate of pay and allowances. With this great rise in pay of the surfacemen the pay of the ganger has not been adequately raised to correspond with his vastly greater position of trust and responsibility, and this seems to me to disparage a service on which safety of the lines so largely depends.

I attribute the improved condition of the tracks to the very greatly enhanced stability of the material in the lines due to the relaying, which enables the tracks to be kept in better condition with less work.

Cost of Buildings.—The next highest increase of cost is in the items "Station buildings and houses," which has risen £62,325—that is, from £11·8 per mile to £30·9—a rise of £19·1 per mile. The great additions to and renewals of stations and buildings and extra cost of materials have already been noticed, and I think this rise is thereby accounted for.

Cost of Track Renewals.—This shows a rise of £13·2 per mile. This increase is fully accounted for by the great amount of relaying done in the period. I consider it the most satisfactory increase; it represents an enhanced asset of the Railway property, and, together with the strengthening of bridges, is the line on which the exigencies of increasing traffic has been and is provided for.

Other Increases in Cost.—The other items of increased expenditure correspond with the additional work done in maintaining and improving existing works, as has been already described.

General increases of expenditure on the various classifications are inevitably due to increased age of lines, requiring extensive repairs or renewal of structure, and appliances of all kinds, and not the least is increase of cost due to the general rise in price of materials.

Addition to Capital Cost of the Railway.

Very considerable works of reconstruction have been carried out under special Acts of Parliament and Ministerial authority. These include the duplication of lines—from Auckland to Penrose, Wellington to Lower Hutt, Addington to Rolleston, and Dunedin to Mosgiel; also large deviations of line—from New Plymouth to Waiwakaiho River, Ormondville deviation and viaduct, Aramoho to Wanganui, Riverton deviation, and bridge over the Aparima Estuary. All these I have visited, and note that in the cases of duplications in Wellington and Dunedin there is practically a new double line of railway, replacing entirely the original single line, providing a far better alignment, curves of much greater radius and much easier gradients. In all of the duplications, except Christchurch, numerous public streets and road-level crossings have been superseded by bridges either under or over the railway. In all the stations yards and buildings have been reconstructed as was necessary to suit the new double lines of railway, and public accommodation at stations and access thereto have been greatly improved. In the cases of Auckland and Christchurch the alignment and grades have not been so greatly altered. All the works are necessarily of a very costly nature, and have further involved the acquisition of additional land, some of very expensive character.

The deviations named, and several others of great extent, have vastly improved the capacity of the railways. The value of these works in enabling increasing traffic to be dealt with more efficiently and economically, and with greater security, will doubtless be proved and realized more as time goes on. These charges necessarily add to the capital cost of the railways as a whole; besides which all new railway-construction in recent years must have become more costly per mile by reason of general increase in wages and price of materials, and generally more difficult nature of country traversed.

The result is given in the annual statement of cost of railways (see Return 15, 1912), which show—

——	Miles open.	Cost.	Cost per Mile of Railway.
		£	£
1899	2,090	16,404,076	7,849
1912	2,801	30,506,089	10,864

Appliance for economizing Work.

Among other improvements I notice with the greatest satisfaction that the Maintenance work depots are much better furnished with machine tools than formerly. This is a most important element economizing maintenance work. It enables the men at work on the line to be most expeditiously supplied with wrought materials. Delay in such supplies formerly added greatly to the cost of maintenance work of every kind.

Office Work and Management.

With some exceptions the system, method, and practice established in the Maintenance Department appear to have been maintained, and have been found adaptable to the great expansion of the work.

Land and Leasing.

In the matter of land and leases the work in this Department has been greatly developed. Revision of the plans of the Railway lands has been all but completed, a most important and difficult work; also the registration of land titles has been greatly advanced. This work was only in an initial stage when I left, and has now been very nearly brought to completion.

The Land and Leases Department now undertakes the preparation of statutory Proclamations and negotiations of terms of compensation, and registers the details of completed transactions. The system of leasing of spare lands has been maintained as heretofore, but has very greatly extended, as the subjoined table shows.

Leases granted in 1899 and 1913.

	1898–9.	1912 to 1st March, 1913.
Leases registered in the year	311	703
Leases current at end of year	1,497	4,337
Aggregate annual rental of same	£13,749	£32,505
Sidings granted in year	7	33
Siding agreements current at end of year ...	252	355
Aggregate annual rental of same	£4,162	£7,082
Agreements for working private railways entered into during year		5
Land Proclamations completed	3	36
Land Proclamations in hand (additional to above) ...		42
Compensation paid		£15,116

General Remarks.

The general advance and expansion which has been noted is evidently due to the prosperity of the country, resulting in the very great increase in goods and passenger traffic.

Progress.—This necessarily requires more engine-power, which has been supplied by introduction of types of locomotives of increased weight and power. This has demanded the strengthening of tracks and bridge structures. Simultaneously with increased weight of engines has been the introduction of heavier cars and wagons, the latter to carry augmented loads. More powerful engines haul longer trains, requiring greater length of sidings, particularly crossing-loops, greater traffic demanded general increase of siding accommodation, greater coal-storage, more water-supply, and augmentation of accommodation and appliances of all kinds. With increased number of trains it was necessary to provide for greater security, which has been done in the extension of signals, interlocking of points and signals, and introduction of the tablet system. This again multiplied the number of officered stations, and required more dwellinghouses for the officers.

It is hoped and expected that the prosperity of the country will continue to increase, and that the traffic on the railways will grow in like manner.

This leads me to suggest the consideration of a matter which I regard as of great importance. It is possible and probable that the traffic may continue to increase indefinitely; but the method of providing for such increase by building still heavier engines and drawing still longer trains cannot possibly be continued indefinitely with safety.

When the New Zealand Government undertook the construction of railways on a general and extensive basis the gauge of 3 ft. 6 in. was determined upon. With that gauge there was also determined certain limits of dimensions of heights and widths of rolling loads, the lengths of locomotives and cars, suitable to a 3 ft. 6 in. gauge. Based on such limitations of rolling loads, the corresponding dimensions of structures was also determined, providing a safe margin of clearance between fixed structures and rolling-stock. On this basis railways were built, and there exist numbers of tunnels, curved tunnels, overbridges, doorways, and multitudinous other structures built to standrad clearances. Similarly, bridge structures have been built, to the value of millions, to suit engine-loads of given weight. The increase from time to time of width and length of engines, cars, and wagons has already trenched on the margin of clearance, and many vehicles exist on the rails that cannot travel throughout the lines. If the increase of weight of locomotives is still further increased the structures already brought up to a certain standard will be invalidated, which means an enormous schedule of reconstruction. But this is not all. I consider the train-lengths of common practice now cannot be increased without trenching on limits of security, and it should not be contemplated to provide for augmented traffic on the present gauge of railways by further increase in size, weight, and power of engines, but the necessary provision should be by means of more engines within present limits, and running more trains of a limited length, and when this is insufficient to meet requirements by extending duplication of lines.

During the greater period of my term of office I was very frequently subjected to pressure from the Government to economize, retrench, and postpone expenditure in every way possible; and it was a continual effort to keep up the lines in a condition of safety and yet keep down the expenditure to the lowest possible limit. I am glad my successors have experienced more prosperous times.

Good judgment has been shown in devoting the more ample means available to the strengthening and improvement of the railways, so providing for increasing traffic and the wear-and-tear inevitable with increasing age, and so securing lasting value in return for the outlay.

The wisdom of expenditure upon costly buildings is less obvious, but appears to keep pace with the general advance in that direction observable in new buildings, both private and public, throughout the Dominion.

In conclusion, I desire to thank the Hon. the Minister of Railways for giving me the opportunity of seeing the development of the New Zealand railways on which I spent many years, and revisiting so many scenes of interest. I trust the prosperity of which there is so much evidence may continue.

It has been a very great pleasure to me to meet again a great many of my old friends still in the service, a pleasure only tempered with regret occasioned by many other vacant places.

J. Henry Lowe.

1st, April 1913.

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