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1914.

NEW ZEALAND.

# REPORT ON NEW ZEALAND GOVERNMENT RAILWAYS, BY MR. E. H. HILEY, GENERAL MANAGER.

*Laid on the Table of the House by Leave.*

The Hon. Minister of Railways.

SIR,— Wellington, 1st August, 1914.

I landed in Auckland on the 24th September, 1913, having travelled out via Canada. During my three weeks in that country the Railway authorities afforded me every facility for investigating Canadian railway practice, a courtesy I much appreciated.

Mr. Ronayne retired from the General Managership on the 1st November last, and I assumed control on the same date. Since arriving in the Dominion I have inspected every section of the New Zealand railways (except the Gisborne Section, which I have not yet had an opportunity of visiting). The proposals and comments contained in this report are the result of my investigations.

Routine duties in connection with the position of General Manager have occupied a great portion of my time during the few months I have been in charge of the New Zealand railways, but it was obvious to me at the outset that the conditions and requirements of the other important centres outside Wellington demanded my immediate personal attention, as they would need dealing with in this report, consequently I have found it necessary to spend almost as much time on inspections away from Wellington as at headquarters.

The restrictions to travel resulting from the smallpox epidemic, followed closely by the dislocation of trade arising out of the waterside workers' strike, which extended from the 20th October, 1913, to the 12th January, 1914, created abnormal railway conditions lasting for some time after the cessation of the strike.

These complications rendered it extremely difficult to gauge the railway requirements for effectively dealing with traffic offering under normal circumstances. The preparation of this report had necessarily to be held over until business resumed its proper level.

The conclusion arrived at after reviewing the railway situation in New Zealand is that the system has outgrown its present organization. Established, no doubt, on sound lines in the first instance, it is evident that the rapid growth of the system and expansion of business has rendered the machinery for traffic control unequal to the demands put upon it by existing circumstances. The staff requires to be strengthened and the staff arrangements remodelled in some cases. This is particularly necessary in the Traffic branches.

The Department is short of engine-power and rolling-stock for dealing promptly with the business now offering. The terminal accommodation is inadequate at several important centres, and a forward policy is necessary in regard to duplication of congested suburban lines, regrading of main lines, bridge-strengthening, and additional signalling equipment if the traffic of the Dominion is to be fostered and handled economically, safely, and expeditiously.

## ORGANIZATION.

It is apparent throughout the system that the principal officers have to spend too great a portion of their time on office-routine duties instead of being able to devote themselves to matters of principle affecting the administration of their respective branches and obtaining first-hand information as to the requirements of the wide area served by the Government railways. This is distinctly detrimental to efficient control. The officers themselves realize the importance of personally supervising such matters, but are debarred from doing this to the extent necessary owing to the fact that they have not sufficient responsible assistants to carry on the routine duties of the business during the absence of the chief officers from headquarters.

*Head Office Organization.*

The evil starts at the very fountain-head, the General Manager and his assistant (the Chief Clerk) being often immersed in minutiæ and routine duties that could very well be dealt with by an officer in a lower grade. It is most desirable that the officials named should be at greater liberty to devote themselves to matters that directly concern administration and general management, but to secure this end a reorganization of the Head Office staff is necessary.

The Chief Clerk's present designation is entirely a misnomer. He has been acting as, and had the responsibilities of, Assistant General Manager for several years, and his position should now be properly defined by giving him this title. There was an Assistant General Manager in 1901, since which time the volume and importance of the work of the Department has vastly increased.

The General Manager, as well as the branch officers, ought to travel frequently so as to keep in touch with the public and the railway staff, and be able to form, from direct personal observation, their own conclusions as to the manner in which the railway business is being conducted and the efficiency of the staff in different localities. The General Manager will require to spend at least four months out of every twelve away from Wellington attending to important railway questions that arise in the other business centres, and making himself conversant with the development of business in different portions of the Dominion. Although the more important correspondence is forwarded to the General Manager when absent on inspection duties, his Chief Clerk must of necessity carry on a portion of the business in the General Manager's name during his absence. It is essential that the position of the officer acting for the General Manager on these occasions should be defined beyond question; I therefore recommend that in the next amendment to the Act Mr. McVilly's title be altered from "Chief Clerk, General Management," to "Assistant General Manager."

The designation "Chief Clerk" compels the holder of the position to perform a large number of detail clerical duties, and it is not possible for even the most willing worker to combine the duties appertaining to the very heavy routine correspondence of the Head Office as well as assist with the more important administrative matters without resultant delays to the matters in hand. Correspondence is not dealt with as promptly as I should like. With a view to relieving the position and expediting the conduct of the Head Office business, I recommend the appointment of a Chief Clerk, Head Office, Grade 4, maximum salary £475 per annum, on whom will fall the supervision of the clerical staff and routine duties in the Head Office.

*Traffic Branch Organization.*

When reviewing the method of traffic management on the New Zealand railways I was forcibly struck by the lack of systematic outside supervision by responsible officers, yet in no branch of railway business is personal supervision so essential. In this branch the traffic has completely outgrown the existing organization, and the strengthening and remodelling of the Chief Traffic Manager's and District Traffic Managers' offices must be undertaken to put matters on a satisfactory footing. Under the existing arrangements not only is there an insufficiency of outside supervision, but control from indoors is restricted owing to the limited amount of information recorded regarding traffic operations.

In order to provide for improved outside supervision I recommend the strengthening of the staff of the Chief Traffic Manager's Office by the appointment of an Assistant Traffic Manager, a position that can be filled by Mr. Piper, at present Traffic Superintendent in the North Island. The appointment of an assistant will enable the necessary additional outside supervision to be given without interfering with the other important duties of the Chief Traffic Manager's Office.

I also recommend the strengthening of the District Traffic Managers' offices in Auckland, Wellington, Christchurch, and Dunedin by the appointment of Assistant District Traffic Managers, such officials to be regarded as Assistants for outdoor-traffic working.

I am confident the appointment of the Assistants referred to above will enable both the Chief Traffic Manager and District Traffic Managers to keep more closely in touch with the staff and the varying traffic movements throughout the districts. Inquiries in regard to traffic operations and other matters that constantly arise in connection with the everyday routine of departmental business can be more quickly settled, frequently on the spot, and certainly with less correspondence than is now involved. Quicker decisions and a curtailment of correspondence in Traffic offices are matters very much to be desired. The appointment of Assistant District Traffic Managers will give an additional avenue for promotion to ambitious young officers, and form an excellent training for future District Traffic Managers. These positions will be filled from the ranks of rising officers, the selection being made strictly on the score of suitability, merit, and general qualification for the particular offices. Unless such positions are filled by thoroughly capable officers the benefit of the rearrangement will be to a great extent nullified.

The Assistant District Traffic Managers will devote personal attention to train-running, engine loading and working, yard and station working, car and wagon distribution, &c. They will make weekly and monthly reports to the District Traffic Managers, which will be forwarded to the General Manager via the Chief Traffic Manager.

As soon as the Chief and District Traffic Managers' offices are reorganized and strengthened they will be in a position to keep complete records of traffic operations which are the necessary equipment of every Traffic Manager's office, and effectively control the movements of locomotives, cars, and wagons, and the loading of trains. The time-records of trains will be more closely watched, and more prompt action will be taken to ensure punctuality in running. The staffing of stations and economical conduct of business can also be more strictly supervised, as well as the

handling of goods traffic so as to secure the best possible loading of goods wagons and trains and quick despatch to long-distance and other traffic. Data will be available to ensure the more punctual discharge and better use of wagons, and so reduce the number of complaints regarding shortage and wastage of truck-power.

Records will not, however, give the Traffic Manager that intimate personal knowledge of his staff and movements of traffic in his district that he should possess. Systematic outdoor supervision is the fundamental means by which responsible officers can familiarize themselves with the duties and become personally acquainted with the capabilities of their staff. Promotion must, in the interests of efficiency, be made strictly on merit and capability, seniority of service, of course, being the determining factor when qualifications are equal. The staff must, however, feel assured that the appraisement of their value is being made by officers who are thoroughly intimate with the conditions under which the work is carried out.

The strengthening of the Chief and District Traffic Managers' offices will render unnecessary the positions of Traffic Superintendents, which do not fit in with either the present or proposed organization. The Superintendents themselves are at present in a false position, as they have neither executive authority, responsibilities, nor staff. The outside supervision by officials acting with the authority of the Chief and District Traffic Managers, and with defined duties and responsibilities, will be much more efficient and infinitely preferable.

Under the existing organization there is attached to each District Traffic Manager's office an official known as a "Traffic Inspector." When these appointments were created it was intended that the officers filling them should devote their attention almost entirely to outside duties, but in the course of time they have been given routine duties to perform to such an extent that their original functions have been lost sight of and they have become more or less office men. Under my proposals the Traffic Inspectors will again become outside officers working under the direction of the Assistant District Traffic Managers.

When the proposed reorganization of the Traffic Managers' offices is completed inquiries into matters affecting traffic-working generally, which are now to a large extent dealt with by the Head Office, will be handed over to the Chief Traffic Manager, on whom will be fixed the responsibility for making investigations and reporting promptly to the General Manager, who will, as heretofore, keep closely in touch with the traffic operations. The Chief Traffic Manager will by this rearrangement be able to exercise a more comprehensive supervision over the traffic-working, and be in a position to deal immediately with questions affecting demand and supply of rolling-stock, train services, &c.

*Appointment of Commercial Agent.*

There is frequently a tendency to overlook the fact that the New Zealand Railway Department, although a State concern, is nevertheless a business undertaking established for the purpose of selling transport. In no other concern in which capital exceeding £32,000,000 has been invested would the organization be considered complete without the inclusion of a responsible official whose sole duty would be the development of new revenue-producing business. It is, however, a fact that there is no such official attached to the New Zealand railways.

The Railway Traffic officer is trained primarily to conduct traffic operations with the greatest possible economy consistent with safety. Economy ultimately becomes and remains almost second nature to the Traffic man, whose efficiency is largely judged by his ability to concentrate the traffic into big train-loads and to work with the minimum of train-mileage. Economy of haulage-power even to the extent of parsimony is regarded as a virtue and should be encouraged in the Traffic officer, but to get the proper balance in the conduct of the undertaking an antidote is necessary, otherwise there is a danger of new business which may ultimately become remunerative being stifled instead of nursed. The antidote I propose is the appointment of a "Commercial Agent." This official will not be held directly responsible for the cost of traffic operations, but will be expected to explain all decreases in business. His duty will be to increase the sale of transport by every means available, and he will usually be somewhat at variance with the Traffic Manager's economical views. The Traffic Manager, by reason of his training in economics, naturally views schemes involving additional train services or facilities with disfavour and the bait of additional business with scepticism. The Commercial Agent, on the other hand, will lend a ready ear to proposals in regard to new trade. He will act as the sympathetic advocate of the public at any discussion between departmental officials as to revised train services, questions of rating, improvement or increase of rolling-stock, or any other means by which passenger or goods business can in his opinion be attracted to the railway.

The officer controlling traffic-working may be a pessimist as far as suggestions from the public are concerned, the Commercial Agent should be an optimist of a pronounced description, constantly employing his ingenuity as a salesman in evolving schemes to popularize travel by rail. The Traffic officer may be trusted to act as an effective brake upon the Commercial Agent when the latter's efforts tend to spoil the average of operating-costs or loading-returns. The function of the General Manager is to hold the balance between these two extremists. It will not be harmful to the General Manager to have attached to his staff a responsible officer whose role is advocate for the customers of the Railway Department.

The Commercial Agent will be free from the routine of preparation of time-tables, traffic advertisements, or rates revision, but he should nevertheless be required to keep a watchful eye on these matters as well as on the cleanliness of passenger stock, smoothness of railway-track, running of trains, efficiency of the dining-car service, civility of staff, and convenience of facilities for dealing with traffic at passenger and goods stations, &c., because these and kindred matters tend towards the attraction or repulsion of business. Complaints from the public will concern

the Commercial Agent, because the public are his particular care, therefore it is clear that the position of Commercial Agent will not be a sinecure in a country where grumbling is not yet a lost art. The Commercial Agent should be independent of the Chief Traffic Manager's Branch, as he will on numerous occasions have to take a somewhat divergent view from the Chief Traffic Manager in regard to traffic proposals, and for this reason he will be attached to the staff of the Head Office.

*Maintenance Branch Organization.*

This branch is satisfactorily controlled by the Chief Engineer, who has adequate staff to deal with the business transacted by the branch under normal conditions. There is, however, no margin to spare to meet the demands that will be made when the new works which are referred to in a later portion of this report are put in hand. To meet this contingency when the occasion arises, I purpose strengthening the professional side of the Chief Engineer's Office by a temporary addition in the shape of an Assistant Inspecting Engineer. By this arrangement the Chief Engineer will be relieved of a number of routine duties which can be carried out by the Inspecting Engineer, and be able to devote more time to personal supervision of the important works in progress in his branch and to making outdoor inspections.

*Signal Engineer's Branch Organization.*

The signalling and interlocking work is at the present time under the jurisdiction of the Chief Engineer, the immediate control of the practical operations being in the hands of the Signal Engineer, who is attached to the Chief Engineer's Office. This combination was quite satisfactory when the installation of the signalling and the interlocking systems was first undertaken. The work cannot, however, be said to come within the purview of what is ordinarily understood to be the duties of Maintenance officers, and in view of the dimensions to which signalling, interlocking, electric tablet, telephones, and telegraph have now attained, and the necessity for rapid extension of the signalling system, it is proposed to relieve the Chief Engineer of his present responsibilities in regard to the Signal Branch, and to place the latter under the entire control of the Signal Engineer, who will, however, still confer with the Chief Engineer on all matters which affect jointly the Maintenance and Signal Branches, as, for instance, interlocking of signals and points.

The new works which I am recommending herein will put a considerable strain on the present staffing of the Signal Engineer's Office. Up to the present time the Signal Engineer has himself performed the major portion of the duties, and been responsible for the whole of the arrangements connected with the present interlocking and signalling systems. There is no other officer attached to the Department capable of relieving him to any appreciable extent from the technical work he has been performing, and his outdoor supervision of this important section of the Department cannot therefore be as thorough as is desirable. The time has arrived when it is essential to appoint a fully qualified Assistant Signal and Interlocking Engineer, who will be capable of relieving the Signal Engineer of routine duties, leaving him to devote his energies and time to outdoor supervision and the more vital principles involved in the signalling and interlocking systems.

There has apparently been no opportunity for, and no possibility of, any officer connected with the Department obtaining the requisite training and experience in New Zealand. This is unfortunate, as it will compel the Department to go outside the Dominion to obtain a suitable man. The qualifications required in the Assistant Signal and Interlocking Engineer are —thorough workshop and drawing-office training, and experience in the supervision and erection of outside work on large British, American, or Australian railways on which extensive and up-to-date electric signalling and interlocking installations have been made. He must also be thoroughly conversant with mechanical, electrical, and electro-pneumatic systems, electric block working for single and double lines as applicable to areas in which train services are crowded, and have a knowledge of telephone and electric telegraph installations. I recommend that applications be invited for the position at an early date from qualified men in Australia, the British Isles, and America, and that the salary to commence be £400 per annum.

The staff of the Signal Engineer is being increased by the appointment of additional Signal Inspectors, signal-adjusters, and linemen to improve the maintenance and inspection of signalling-apparatus.

*Chief Mechanical Engineer's Branch Organization.*

The supervision of the Locomotive Branch is good in so far as the limits of the present staff organization will permit. The Chief Mechanical Engineer, who has control of the branch, is charged with responsibility for the condition of the whole of the rolling-stock equipment of the New Zealand railways, as well as with the supervision of the various railway workshops. He is, however, confined too much to his office, owing to his having no qualified assistant. To remedy this I propose to strengthen the Chief Mechanical Engineer's Office by adding to it a technical officer, who as Office Engineer will be capable of dealing with many of the questions of a technical character, thus relieving the Chief Mechanical Engineer of routine work, and enabling him to watch more closely matters that affect the administration of the branch. Until recently there were two qualified engineers attached to the Chief Mechanical Engineer's Office, so that what is proposed is to a certain extent a reversion to the previous standard of organization, the difference being that the Office Engineer to be appointed will be expected to take full control in the absence of his chief.

The great strides that have been made during the last few years in connection with locomotive practice and designs render it desirable to also strengthen the staff engaged in the Locomotive

Draughting Office. The pending retirement of the Chief Draughtsman on superannuation makes this immediately necessary. The control of the clerical side of the Locomotive Head Office is efficiently carried out by the Chief Clerk.

It is essential in the interests of economy that the Chief Mechanical Engineer should have available for immediate reference more complete records of the performances of locomotives, showing mileage and tonnage hauled, running and standing time, consumption of stores, and cost of maintenance and repairs carried out in the different workshops, &c. I am arranging to improve the locomotive statistics in this respect.

*Stores Branch Organization.*

The organization of the Stores Branch is satisfactory and the staffing ample to meet requirements. Quite recently arrangements were made providing for the closest possible supervision and scrutiny being maintained in respect to the purchase and issue of stores. The practice followed in regard to tenders for the purchase of stores is satisfactory and ensures economy.

*Accounts Branch Organization.*

The staffing and organization of the Chief Accountant's Branch are satisfactory. Some alterations will, however, be made in the direction of simplifying station accounts.

A chart showing the proposed organization of the Department is attached to this report (see page 22).

*Education of Staff.*

The absence of facilities and inducement to the members of the Railway staff to qualify themselves in the higher branches of education as relating to the railway profession struck me very forcibly. Provision exists for crediting juniors who pass the Public Service Examinations and tests in shorthand and typewriting with periods of service varying from six to twelve months, but beyond this nothing is done to encourage men to study the higher branches of railway business.

The position in this country is in strong contrast to that in other countries where the railways are conducted by private enterprise, and the companies subsidize schools of economics to conduct classes dealing solely with railway subjects.

Where railway competition exists the rivalry to obtain traffic brings out the inventive faculties of the staff, resulting in the introduction of the best practical methods of handling and inducing business. A study of these is the best possible education for the student in railway operations.

In New Zealand the State has practically a monopoly of the whole railway business, and I regard it as obligatory on the Railway Department, in the interests of both the State and the employees, to provide in a practical way facilities for the education of its staff in the fundamental principles of efficient and economic railway operations.

With this end in view I recommend that each year two candidates from the Locomotive and Civil Engineering Branches respectively at the age of twenty-three years be given a two-years engineering course at Canterbury College, the Railway Department paying their full salaries and defraying college fees and costs of necessary books.

Those desiring to compete for entrance to the College course would be required, after passing successfully the qualifying examination laid down in the regulations, to sit at a competitive examination, on the results of which the four candidates would be selected annually.

The practice of appointing mechanical-engineering cadets will be discontinued, and in future duly qualified apprentices who have served their time in the railway workshops will have the opportunity of competing for the College course, after which the successful candidates will be trained to become mechanical engineers.

The course of training will include a period in the Running department of the Locomotive Branch, during which they will be expected to qualify and pass examination as firemen and engine-drivers.

A college course is not nearly so advantageous to men employed in the Traffic Branch as practical railway experience gained on proper lines. The Traffic Branch is the business department; the duties are specially connected with the movement of trains, the transport of traffic, and the working and organization of stations. The best training-ground for making capable Traffic officers is unquestionably on the relieving staff. The appointment to relieving staff will in future be by most careful selection, and the members in this grade will be reviewed annually, so that only the most competent remain to graduate through the various relieving positions until a final selection can be made of those most suitable to receive a special two-years training. The selected Traffic officers would be attached to the General Manager's Office, and be passed successively through the Locomotive Running Branch, Draughting Office of the District Engineer (Maintenance Branch), and the District Traffic Manager's Office, studying various problems in each of the branches. Traffic officers who undergo training on the lines indicated and profit by their opportunities should emerge qualified railway men.

The problems dealt with in each branch of the Railway service are complex in character, and the men on whom the ultimate administration of any branch of the service will fall should unquestionably be trained in a manner that will fit them for their responsibilities later in life.

## STAFF CONTROL

After having looked carefully into the method of dealing with the staff I have come to the conclusion that the general staff control must remain in the Head Office in order to ensure uniformity of treatment of the members of the various branches and to bring them under the comprehensive supervision of the General Manager.

## RATES.

Questions of rating will remain in the General Manager's Office and be under his immediate jurisdiction. At the present time a committee of railway officials is analysing the local and general rates in force on the various sections of railway and inquiring closely into the local conditions prevailing. When the investigations have been completed the whole of the rates will be reviewed by the General Manager personally, with the object of bringing the rates into conformity with the existing conditions and removing where possible and expedient any anomalies that may be found to exist. The complexity of the question and the magnitude of the interests involved make it imperative to proceed with caution before disturbing the incidence of rating. I find the local conditions here, as elsewhere, are all in the direction of increasing the cost of traffic operations, and when the question of revision is finally considered it will probably be found necessary to advance certain rates, so as to maintain the financial equilibrium and obtain a fair return from the Government railways undertaking.

## PROMOTIONS FROM SECOND DIVISION TO STATIONS.

With a view to offering additional opportunities to members of the Second Division to qualify for promotion to the First Division, it is proposed to earmark certain stations at which the outdoor work predominates, and fill them as far as possible from the ranks of the Second Division. Selection will be made from comparatively young, active, practical railway men (not necessarily the seniors on the classification) who have given evidence of possessing the qualifications for controlling and leading staff, and their work will be carefully watched. The appointments to this new grade will be purely experimental and strictly limited in the first instance, and it will depend entirely on the members themselves whether the experiment is extended or abandoned. The members chosen will, of course, be required to pass an examination in accounts, but from the fact that the accounting-work will be of less importance than the outdoor supervision the requirements of the examination will not be so severe as in cases where a greater amount of indoor work is involved.

## ROLLING-STOCK.

In the matter of upkeep the condition of the locomotives, cars, and wagons and their equipment is most creditable. The types at present in the railway workshops and under contract in the country are suitable and satisfactory.

*Locomotives.*

The locomotive stock, however, includes a considerable number of engines of types that are obsolete—altogether unsuitable for existing requirements. They are deficient in power, and consequently costly to operate. Their low tractive power and inability to take what is now considered a fair load retard the movement of traffic, cause congestion, and add greatly to the difficulties inseparable from single-line working. Altogether some seventy-two engines of various types come within the scope of these remarks. It is imperative that thirty-three of these should be scrapped and replaced at the earliest possible moment: the balance (thirty-nine) being similarly treated as opportunity offers.

The present shortage of haulage-power embarrasses the Department to a considerable extent, and emphasizes the shortage of wagons. No expenditure could make the engines to which I have referred efficient for present-day working, and it would be false economy to spend any considerable amount of money in overhauling, reboilering, or converting them. The manufacture of locomotives in New Zealand is confined to the Addington and Hillside Workshops and private workshops of Messrs. Price Bros., Thames. Each of these workshops is at present going at full pressure building locomotives. The rate of output of new engines from this source is insufficient to keep abreast of the current requirements. In view of the seriousness of the position I am constrained reluctantly to recommend the importation of twenty locomotives from abroad, ten of these to be Class A superheated simple engines similar to the New Zealand Railways Class A type, ten to be of the Garrett type (articulated engines); if a contract for the Class A type is placed in America these engines can be delivered within a few months. A measure of relief of the existing pressure will thus be obtained at an early date.

The Garrett type of engine is manufactured in England, and my inquiries indicate that the makers cannot give delivery of the engines for at least eighteen months. The Garrett engine has been put to practical tests in other countries where the conditions and gauge are similar to those appertaining to New Zealand. The inclusion of the Garrett engine will afford an opportunity for obtaining valuable data which will be of service in connection with future building of locomotives in New Zealand workshops. The Garrett type is in use on the 3ft.-6in.-gauge lines in Australia, where they successfully haul heavy loads over 1-in-40 inclines with 5-chain curves. An officer of the New Zealand Railways Locomotive staff was recently sent to Tasmania to get practical insight into the working of these engines, and was very favourably impressed with their capabilities and the smoothness of their running on curves and gradients, as well as with the tractive force they developed. (See plate.)

A special feature of the Garrett locomotive is that its design admits of the greatest tractive effort being obtained with a minimum of axle-load. It is particularly flexible on sharp curves. Garrett engines will be very suitable for the New Plymouth and Ohakune Sections.

The engines now on order in the railway workshops are more than sufficient to keep the shops at Addington and Hillside going at full pressure for the next two years, and the contracts already let to the outside engineering firm will similarly keep their establishment employed for the same period. There is no reason to doubt that engine-building at the shops within the Dominion will not be continued at high pressure for a considerably longer period.

The shortage of haulage-power is particularly felt in the North Island, the difficulties of the position being accentuated by the fact that a large amount of time is lost in obtaining the use of engines manufactured in the South Island and transferred to the North. It is desirable therefore to make provision for building locomotives in a railway workshop located in the North Island. I recommend the erection and equipment of a workshop for the building of locomotives at Newmarket, but it will take at least two years to complete the shop ready for operations. In the meantime, unless the position is faced in the manner recommended, the shortage of engine-power will go on accumulating and the transport business of the country will get into a very unsatisfactory condition. In connection with the expenditure involved in providing the workshops at Newmarket, I would mention the fact that the use of each engine transferred from the South Island to the North is lost for an average of twenty-eight days, and the expenses incidental to packing, unpacking, and reassembling amount to approximately £380 per engine. Fifty-four locomotives have been transferred from the South to the North Island during the past seven years. This has involved a cost of £20,520, apart from the loss of earning, which on a conservative estimate may be put in round figures at £46,000. Sea-freight charges involved an expenditure of £5,500, bringing the total debit for transfer of engines up to £71,000. On these facts it will be seen that the proposition to provide engine-building shops at Newmarket is commercially sound. It forms the only satisfactory solution to the engine-power problem, and will provide employment for an additional number of skilled artisans.

The standardization of the types of engines most suitable for future use is engaging attention. There are far too many types in use at the present time. Double-heading, which has to be resorted to very largely under the existing circumstances, is most expensive and objectionable, especially where superheated engines are employed through tunnels. The day when the smaller type of engine can be used with economy on the New Zealand railways is past; what is now required are powerful locomotives of standardized types.

*Passenger-cars.*

The passenger accommodation is insufficient to meet the requirements of the traffic. There are a number of cars under construction in the railway workshops, and an effort will be made to increase the output. I am not convinced that it is necessary at the present juncture to go outside the Dominion for cars, and I am anxious to avoid this if possible.

It would be uneconomical to provide cars sufficient to meet the heaviest demand made by rushes of traffic during the holiday season; nevertheless I am strongly of opinion that the practice of withdrawing a large number of wagons from traffic for utilization as passenger-vehicles is objectionable from both the departmental and the public point of view, and should be gradually restricted. To supplement the carriage-stock for use at rush periods vehicles of a special type suitable for the dual purpose of conveying passengers in cases of emergency and carrying goods at other times have been designed, being, in fact, an improved covered goods-van, with windows, ventilators, and lamps added. Vehicles of this type will provide more comfort when used in passenger service than the tarpaulin-covered trucks at present in use. The use of these vehicles will be extended if found suitable for the business, as the day is far distant when the whole of the requirements of passenger traffic can be provided for with carriage-stock.

The latest types of passenger-cars are designed on sensible lines, are comfortable, and well adapted to existing requirements. They are not luxurious, and are sometimes adversely compared with the passenger accommodation in the Old Country. Such a comparison is unfair unless it at the same time takes into consideration the difference between the passenger revenue of the two countries. The designs will be improved in some respects, but there are many necessities which should be provided on the New Zealand railways before we indulge in luxuries.

*Railway Motor-cars.*

A petrol-electric rail-motor-car was delivered and put into traffic on the 1st July, 1914, since which date it has been conveying passengers regularly between Thorndon and Johnsonville. No fault can be found with the engine supplied, it being to the power specified when this order was given in November, 1912, but the power developed is not sufficient for hauling the suburban traffic satisfactorily up the severe grades encountered in the neighbourhood of Wellington, Auckland, or Dunedin.

Undoubtedly rail-motors are the most convenient form of vehicle for dealing with suburban business, except at rush hours, and with a view to extending their use inquiries are now being made to ascertain whether suitable petrol-electric engines can be built, within the limits of our narrow gauge, of sufficient power to haul two large cars with passengers at a reasonable speed and economically up the grades such as those outside Wellington or Auckland.

*Car-lighting.*

The question of substituting electric lighting for gas on the main through trains is having consideration. Electric light has obvious advantages, but its installation on a large scale in New Zealand passenger-trains would involve too serious an expenditure to be contemplated at the present time.

In order to arrive at the cost of fitting the principal express trains and deciding on the best system to be adopted here I have ordered complete electric-lighting plant from the firms manufacturing the best-known systems. These will be fitted in New Zealand stock for experimental purposes, so that definite data can be obtained as to first cost of installation, cost of lighting and upkeep, as compared with gas lighting.

The present system of lighting with Pintsch gas is adequate for comfort, and as there are many more urgent matters on the railway requiring attention when funds are available a radical aleration in the car-lighting system need not be anticipated in the near future.

*Car-cleaning.*

The facilities and methods adopted for car-cleaning are not up to date, nor are the results always satisfactory. The business of the Department has now attained dimensions that make it essential to adopt modern methods for performing car-cleaning. With this end in view it is proposed, as funds permit, to erect at the important centres properly equipped sheds fitted with vacuum and other appliances, and lighted so that cars can be efficiently cleaned day or night. Car-cleaning sheds of the above description are included in the plans for the new stations at Wellington, Auckland, and Christchurch. The fact that the Department is short of spare car-stock, and that the stock available is so constantly in traffic, adds greatly to the difficulty of systematic cleaning. This, however, emphasizes the necessity for the erection of suitably equipped and lighted car-sheds, in which the stock can be thoroughly cleaned during the night.

*Wagons.*

The number of wagons available is insufficient to meet the demand, the deficiency being particularly pronounced in the case of sheep-trucks. The shortage of wagons is, however, much aggravated by the deficiency in engine-power, which retards the movement of both loaded and empty vehicles. A considerable number of new wagons are in course of construction in the railway workshops, and an effort is being made to relieve the position by keeping the shops fully employed. The transport facilities have also been improved as far as practicable by better organization of goods services, and arrangements have been made for shortening the period during which wagons are diverted temporarily from goods to passenger purposes. The more strict control of wagon-distribution brought about by the reorganization and strengthening of the Traffic Managers' offices should tend to a better use of the wagon-stock. I do not think the position justifies going outside the Dominion for wagon-stock.

*Westinghouse Brake.*

I have arranged for the installation of this necessary adjunct to railway working being carried out on the smaller sections. The Gisborne line has been fully equipped; the Whangarei Section is in hand, and the work will be undertaken on the Westland Section next, and on the other sections in rotation. The condition of the Westinghouse brake appliances where they are in operation is satisfactory.

## RAILWAY WORKSHOPS.

Railway workshops are established at Newmarket, East Town, Napier, Petone, Addington, Hillside, Invercargill, Greymouth, and Westport. The workshops have been well equipped in the first instance, but the requirements of increasing traffic will necessitate a considerable amount of extension and remodelling.

The East Town, Napier, Greymouth, and Westport shops are principally employed in carrying out repair-work and assembling rolling-stock transferred from time to time to those sections.

The present Newmarket Workshop undertakes the building of cars and wagons and any repairs required to rolling-stock running on the section north of Ohakune. The capacity of the shop is not equal to the demands made upon it, and it will be necessary to increase the accommodation of the blacksmiths', erecting, and machine shops. Locomotives for the North Island should also, in the interests of economy, be built at Newmarket, and provision is made for this in the scheme of new works submitted with this report. The work will cost £30,000, and take two years to complete.

The Petone Workshop, at which car and wagon building and general repairs are carried out for the Wellington–Napier – New Plymouth and Main Trunk line to Ohakune, requires remodelling and general extension, the accommodataion and existing structures being inadequate to meet present demands. The tender-repair shop, foundry, and lifters' shed will be extended, and a tool-room should be provided. £30,000 has been included in the proposed loan for this work, which will take two years to complete.

The Addington and Hillside Workshops, which are equipped for carrying out work connected with the manufacture of locomotives, cars, and wagons and general repair-work, require extensions, which in the case of Hillside shop will be somewhat extensive in character.

In the matter of equipment it is necessary to provide for more power in each of the latter shops, and to install additional plant and machinery as soon as the extensions to the buildings have been completed. The alterations and improvements necessary will be undertaken and paid for out of "Additions-to-open-lines" vote and revenue respectively, in accordance with the usual practice.

The Invercargill Workshop requires the addition of a lifting-shed, with the necessary roads.

## PASSENGER-TRAIN SERVICES.

Careful consideration has been given to the passenger-train-running, with the object of revising and improving the present time-table. The wholesale revision of a long-established time-table is not a simple matter, especially when practically the whole of the working is over single lines. The difficulty is increased by the distance between crossing-places and the congested condition of the lines in the suburban areas; this is particularly pronounced in the North Island.

The time-table to be brought into force on the 1st November will curtail materially the time occupied in transit between Wellington and Auckland (1 hour 25 minutes) and Wellington and Napier (64 minutes), and effect some improvement between Wellington and New Plymouth (30 minutes) and other stations in the North Island, but it can only be regarded as a first revision. The time-table will again be revised in a few months from the data already obtained and from actual experience of the working of the November retiming.

Additional crossing-places and some duplications are necessary, as well as regrading, before a satisfactory through train service can be run between Wellington and Auckland. In the revision now contemplated the economy in time has been mainly effected by saving time at stations and by rearrangement of the schedule so that crossings between opposing trains may be effected with less waiting-time.

The data obtained, which will be useful for future time-table revisions, brings out very clearly the extent to which the running of the so-called express trains is spoilt by stops at wayside stations for odd passengers, to the inconvenience of the majority. Stops at several stations of minor importance will have to be eliminated from the express trains before a satisfactory time-table can be presented.

The South Island November time-table will not show many alterations, the present timing of trains in that Island conforming more nearly to the standard required.

The issue of the public time-table monthly is an unnecessary labour and expense, and serves no useful purpose. The working time-table upon which the staff operate is only issued occasionally, and difficulty is experienced in noting all the monthly train alterations and keeping the working-book up to date. It is proposed, commencing 1st December, to issue the public time-table to cover four-monthly periods. A knowledge that the train services will remain unaltered during, say, the whole summer should be regarded by the public as a convenience; it will certainly be an advantage to the Traffic staff.

## ADVERTISING AT STATIONS.

*Trade Advertisements.*

There is an entire lack of regard for appearance in the manner in which trade and other advertisements are displayed as a rule at railway-stations. In many instances the trade advertisements are a positive eyesore and a disfigurement of the station buildings, rendering them a discredit to the neighbourhood. Steps will be taken to remedy this condition of affairs as the existing contracts expire. The net revenue at present obtained from advertising contractors does not compensate for the disfigurement and damage of station buildings after due allowance has been made for free conveyance of men and advertisements and the cost of the Department's labour in fixing and removing the same. Unless the revenue from this source can be materially increased I propose to abolish altogether public advertising on railway property. If the practice is continued the method of exhibiting advertisements will be strictly regulated.

*Departmental Notices.*

The manner in which these are displayed at stations leaves considerable room for improvement, and I am making arrangements which will result in better publicity being given to departmental notices which affect the public, while at the same time obtaining greater uniformity and neatness of display. I hope in time to see the staff taking a greater pride in the general appearance of their stations and approaches.

## TOWN TICKET-OFFICES.

Premises for a railway booking-office have now been secured in a central position in Wellington, and inquiries have been made with the object of obtaining suitable sites in Christchurch Auckland, and Dunedin. The Wellington office will be fitted up as soon as the premises are vacated by the present tenant.

The experiment of opening town offices in New Zealand will be carefully watched, to ascertain whether the patronage warrants the expense, and the extension or discontinuance of the arrangement will depend on the results. In the large towns in England town offices are regarded as an essential adjunct to railway business, being recognized as admirable media for advertising holiday resorts and catching tourist traffic, but the circumstances there are altogether different, the distances from the centres of the cities to the railway termini being much greater and the population more dense.

A town office in the neighbourhood of Queen Street, Auckland, will be of distinct convenience when the railway-station is moved slightly farther away from the business centre of the city.

## STATION BUILDINGS.

The station buildings and appurtenances have been maintained in a satisfactory condition, but it is unquestionable that the accommodation provided at many of the stations is out of date and below the standard of present-day requirements.

So far as the smaller stations are concerned, much has been done during recent years to modernize them and provide for the expansion of business out of the vote for "Additions to open lines" and out of revenue, and this practice will be continued. The funds available from these sources are, however, inadequate to meet the expenditure involved in prosecuting the works that the Department must put in hand immediately at the main centres where the business has already outgrown the accommodation. The stations and terminal accommodation at Auckland, Wellington, Christchurch, Palmerston North, Hastings, Lyttelton, and Timaru are altogether insufficient for present and future requirements. A loan is urgently necessary to provide funds

for the remodelling of these centres. I am dealing with the proposals in greater detail later in the report under the heading of "New works."

## MAINTENANCE OF PERMANENT-WAY.

The permanent-way, bridges, and other structures connected therewith are in excellent condition, and give practical evidence of the care and attention bestowed on their upkeep. The cost of maintenance per mile of railway is high, but an inspection of the track has satisfied me that the money has been wisely spent.

## BRIDGES.

The replacement of wooden bridges with iron and steel structures and rebuilding others in ironbark timber has been beneficial, but before the best results can be obtained from the expenditure incurred it will be necessary to still further strengthen some of the bridges to enable them to carry the heaviest type of locomotive in use, so that the maximum tractive force available can be utilized.

An item of £50,000 has been included in the loan asked for, in order to accelerate the strengthening of bridges. The fact that several bridges on the North Island Main Trunk line require strengthening to carry an X locomotive with an axle-load of only 11½ tons illustrates clearly the limitations placed upon the New Zealand Locomotive Engineer in designing more powerful locomotives and upon the Traffic department in making up good train-loads. The maximum locomotive-axle load allowed in England, France, and Belgium is 17 tons, whilst in the United States it is 23 tons, and in consequence vastly more powerful engines can be employed. New bridges in New Zealand are now being constructed to bear an axle-load of 14 tons.

## SIGNALLING AND INTERLOCKING.

The signalling and interlocking appliances that have already been installed are of the best-known type, and the work of erecting and installing has been well carried out. The system, however, now requires extension with greater expedition to comply with the requirements of safety in dealing with our expanding business. Interlocking should be installed and distant signals fixed at all crossing stations and junctions on the main lines. The signalling at switch-out stations requires remodelling, and in other respects considerable improvements are now desirable. It is not possible to carry out the necessary additional safeguards expeditiously out of the annual "Additions-to-open-lines" vote or out of revenue, and in the loan already referred to I am including an item of £250,000 for improvements in signalling and interlocking, which amount will be spent at the rate of £50,000 per annum over a period of five years.

## LEVEL CROSSINGS.

The experiments that have been made with the level-crossing automatic alarm installed at Levin having proved satisfactory, material has been ordered for 300 machines, which it is proposed to install at busy crossings and at other crossings where the view of the railway-line is restricted. It will take three years to complete the installation, which it is proposed to undertake at the rate of 100 machines per annum. The expenditure involved will be approximately £22,500.

To give timely warning to drivers of road vehicles of the approach to railway-crossings an offer has been made to local bodies which control roads under which the Railway Department would provide and erect advance notice-boards some distance from railway-crossings, provided the local bodies would afterwards maintain the notices. Up to the present the majority of the local bodies have declined to fall in with the suggestion. This is unfortunate in view of the fact that the Railway Department cannot maintain notices or perform works outside the railway boundaries. It was proposed that the distant warning-boards referred to should be in addition to and not in substitution of the warning notice-boards already placed by the Railway Department at the crossings.

The advent of the motor-car and other forms of motor traction has materially increased the danger at level crossings owing to the high rate of speed road vehicles now attain. Distant warning notices are therefore desirable in the interests of the users of the road, and the road authorities should undertake some responsibility in connection with the maintenance of such notices. I purpose communicating further with them on the matter, which is of general public interest.

## CONSTRUCTION OF NEW RAILWAYS.

The arrangements under which new railways are authorized and built in the Dominion are, I would respectfully suggest, capable of considerable improvement. At the present time a new line is undertaken without any consultation with the Railway Department, and in consequence the only official estimate available before the country is committed to additional expenditure is the Public Works Engineer's estimate of the cost of construction. The Department which will ultimately take over and work the new railway is not consulted as to the route, grades, and alignment, nor are the plans submitted to it before the new line is commenced. No estimate is obtained from the Railway Department as to the cost of building the additional rolling-stock required. No estimate is made of the annual cost in the shape of working-expenses, and no figures are prepared by the Railway Department as to the probable revenue from the proposed line, therefore no reliable calculation can be made as to whether the net revenue will represent a profit or a loss.

I show below the form of statement which I suggest should be prepared in future before new lines are authorized. The statement is similar to that submitted to the Parliamentary Standing Committee on Railways in Victoria. The procedure in that State is worthy of consideration. Proposals for new lines are submitted to a Parliamentary Standing Committee of Railways, which obtains from the Engineer full reports as to the routes proposed, the Working Railways Department submitting estimates as to the probable traffic, working-expenses, and net revenue. The Committee, after consideration of the figures submitted, makes a recommendation to Parliament, that body finally determining whether the railways shall be built or not. The Railway Committee is constituted on non-party lines.

The practice in New Zealand is to hand new railways over to the Working Railways Department entirely bare of rolling-stock, the expense for providing which has to come out of the annual grant of "Additions to open lines," which has often been inadequate for the purpose. This has contributed in no small degree to the shortage of rolling-stock now prevailing.

I believe I am correct in stating that there are over twenty new railways in course of construction at the present time, and I submit that this is not an economical method of procedure. It must be obvious that if the work of construction was concentrated upon, say, five of these railways, the cost of supervision would be lower and the speed at which the railways would be finished and become traffic-bearing and revenue-earning would be at least four times as rapid. Over twenty uncompleted and unremunerative railways are a serious handicap to a comparatively small undertaking. The Working Railways Department is vitally interested in economical construction, because the expenditure ultimately becomes a portion of the capital upon which interest has to be earned.

NEW ZEALAND RAILWAYS.—REPORT ON PROPOSED RAILWAY.

From to
Length: miles. Ruling grade, 1 in . Sharpest curve, chains radius.

COST OF CONSTRUCTION:—

*(Estimate submitted by Public Works Department.)*

The Chief Engineer for Railway-construction estimates the cost of construction at £ per mile, or a total of .. .. .. £

The Chief Mechanical Engineer estimates the cost of construction of rolling-stock at .. .. .. .. .. .. £

Total cost of construction of line and of rolling-stock .. £

*(Estimate submitted by General Manager of Railways.)*

ANNUAL COST:—

Interest on capital expended, at 4 per cent. .. .. .. £

WORKING-EXPENSES:—

Locomotive .. .. .. .. .. .. £
Traffic .. .. .. .. .. .. .. £
Permanent-way .. .. .. .. .. ..
General .. .. .. .. .. .. .. £
Total working-expenses .. .. .. .. £

Total annual cost.. .. .. .. .. £

ESTIMATED REVENUE FROM PROPOSED LINE:—

Passengers .. .. .. .. .. .. £
Goods (other than minerals) .. .. .. .. £
Live-stock .. .. .. .. .. .. £
Minerals.. .. .. .. .. .. .. £
All other traffic .. .. .. .. .. .. £

Total revenue from proposed line .. .. .. £

The revenue from carriage over existing railways of new traffic due to construction of proposed line, less for working-expenses, is estimated at .. .. .. £

Total revenue .. .. .. .. .. £
Profit [*or* loss] on proposed line .. .. .. £

## NEW WORKS.

*Improvements in the North Island Main Trunk Line.*

The North Island Main Trunk Railway, which is not only the means of communication between Wellington and Auckland, but is also the main arterial line for the whole of the North Island

traffic, is not suitably equipped to carry satisfactorily the business offering at present, and is certainly not capable of dealing with the business of the near future economically and expeditiously. Over 400 miles of single track unrelieved by duplications would under favourable conditions be considered as inadequate media of conveyance for the bulk of the North Island business, but the conditions are not favourable. The terminal accommodation at Wellington and Auckland is inadequate, there being insufficient room to deal with either the passenger or goods traffic at busy times. The suburban traffic has to be worked over the same single track at the Wellington end and over portions of it at the Auckland end: congestion occurs in consequence. The grades prohibit good train-loads, and so tend to crowd the line with extra trains. The bridges in some cases will not carry the more powerful engines, and so have the same effect. The crossing-places are too few and far between.

Palmerston North, the principal intermediate station and the exchange-point for traffic between the Napier and New Plymouth lines and the Main Trunk, is inadequate for the business, and therefore adds to the difficulty of working.

I am including in this report proposals for new works at a number of points on the main line between Wellington and Auckland. The amount involved is heavy, but I am convinced that the expenditure is absolutely necessary, having in view the present needs and the rapid expansion of business in the North Island.

*Grade-easements.*

A scheme has been in hand since March, 1911, for an easement of the grades in the vicinity of Auckland. Several grade-improvements between Paerata and Pokeno have already been carried out under this scheme at a cost of £92,000, but the full benefits from this expenditure will not be obtained until the whole scheme of reducing the grades from Penrose to Mercer to 1 in 100 has been completed, for the reason that the loads of engines cannot be increased over this section until all the grades which limit the loads have been reduced to the new standard. The total estimated cost of reducing the maximum grade between Penrose and Mercer to 1 in 100 is £242,000; deducting the value of the works already carried out, leaves £150,000 as the amount required to complete the work. The diagram attached to this report (Appendix No. 1) indicates the existing grades over which the traffic has to be worked and the suggested improvements. When the whole scheme is completed the load between Penrose and Mercer will be increased from 162 tons to 494 tons with the same type of engine—an increase of 232 tons per train.

Between Frankton and Te Kuiti a grade of 1 in 43 at Lake Road restricts the tonnage to a maximum of 209 tons. The proposed reduction of the existing grade to 1 in 100 will enable the same engine to take 494 tons—an increase of 285 tons from Te Kuiti to Auckland.

The loading of engines working between Palmerston North and Taihape is governed by the Greatford and Kakariki banks (1 in 44). The maximum load for this section is 209 tons, but when the grades are eased to 1 in 70 the load will be increased to 355 tons—an increase of 146 tons over a section of 64 miles. (Appendix No. 2.)

The grade-easement scheme which I recommend for adoption provides for the attainment of a grade of 1 in 100 where this can be done at reasonable cost, and for a grade of 1 in 70 where the cost of the flatter grade would be excessive. It covers that portion of the line between Penrose and Te Kuiti (a distance of 126 miles) and Palmerston–Taihape (64 miles). Between Te Kuiti and Taihape (a distance of 100 miles) the ruling gradient is 1 in 50, and it is quite impracticable to improve this except by entire reconstruction at prohibitive cost.

Between Palmerston North and Paekakariki (61 miles) the existing gradients are easy, the ruling grade being 1 in 100. Between Paekakariki and Wellington (27 miles) the load of south-bound trains is governed by a grade of 1 in 53 and north-bound trains by a grade of 1 in 35 out of Wellington. The capacity of this portion of the line is already very heavily taxed, and a means must be found at an early date to relieve the position. No surveys have been made, but an examination of the country and information available indicate that it would be feasible to obtain an outlet for the Wellington traffic with a ruling gradient of 1 in 100 between Wellington and Paekakariki by partial deviation of the line, duplication also being necessary. To duplicate the existing line, retaining the heavy gradients, would be a mistake if a grade of 1 in 100 can be obtained by deviation at reasonable additional cost, in view of the large saving in operating-expenses which would be effected thereby. Although I have not included this work in the scheme of improvement to be undertaken immediately, because more urgent matters must have precedence, I bring it under notice in order that the project may receive consideration and the country may be surveyed and reliable estimates prepared in readiness for the time when the work must necessarily be put in hand. There is no gainsaying the fact that the existing means of getting traffic into and out of Wellington leaves much to be desired.

*Effects of Gradients.*

The effect of gradients on trains is strikingly shown by the following figures:—

The resistance on a grade of 1 in 100 is 7·5 lb. per ton greater than on a grade of 1 in 150. On a grade of 1 in 50 the resistance is 22·4 lb. per ton greater than on a grade of 1 in 100. An engine capable of hauling 249 tons up a grade of 1 in 50 will haul 494 tons over a grade of 1 in 100 and 686 tons over a grade of 1 in 150. The economies resulting from grade-reductions are therefore obvious. Speeds are affected in about the same ratio: *e.g.*, a train weighing 220 tons and attaining a maximum speed of 15 miles per hour on a grade of 1 in 50 could attain a maximum of 30 miles an hour on a grade of 1 in 100 and 40 miles per hour on a grade of 1 in 150. (See Tables A, B, and C.)

*Bridge-strengthening (North Island Main Trunk).*

To enable X engines—the heaviest type of engines at present being built in New Zealand—to be used between Wellington and Auckland, and so facilitate the working of goods traffic on the Main Trunk line, it will be necessary to strengthen ten bridges between Frankton and Taumarunui. The cost of bringing the bridges up to our latest standard (maximum of 14 tons axle-load) will cost £22,000. I have included an item of £50,000 in the proposed loan to cover this, and so as to be in a position also to strengthen bridges on other sections where the trains are having to be limited for the same reason.

*Duplications.*

The main line between Auckland and Frankton is seriously congested at certain times, especially during the summer season, when the full Rotorua and Thames services are running. In order to effect the necessary relief it is proposed to duplicate the single line between Penrose–Papakura, Ohinewai–Huntly, and Horotiu–Frankton. The Horotiu–Frankton duplication will cost £40,000, and should be put in hand at once; it will take about a year to complete. The Ohinewai–Huntly duplication will cost £40,000, should be put in hand in two years' time, and will take two years to complete. The duplication from Penrose to Papakura is required both as a relief to the main line and to develop the Auckland surburban business. The capacity of the single line between these stations has reached its limit, yet there is every prospect of the suburbs spreading rapidly. The Department is not in a position to cope with additional traffic, and therefore the duplication should be taken in hand without delay. The work, which will cost £80,000, will take three years to complete. The new Parnell Tunnel, which is already in hand, will simplify the problem of handling the Auckland suburban traffic, and every effort is being made to push forward with the tunnelling-work.

*New Stations.*

The most serious question that has to be faced by the Department at the present moment, because of the expenditure involved, is the rebuilding of the stations and increasing the terminal accommodation in the principal towns in the Dominion—viz., Auckland, Wellington, and Christchurch. It is most unfortunate that the work at all the centres should have to be undertaken simultaneously, but the necessity for further accommodation is so urgent in each case that it is quite out of the question postponing the raising of the necessary loan any longer than is avoidable.

Statistics have been compiled to arrive at the extent of the present accommodation, the amount of traffic now being handled, and the growth of business, and it is evident from these records that if the rate of increase of recent years be maintained at Auckland and Wellington the railway traffic offering in eight years' time will be double what it is now, whilst the rate of progress beyond that period may be expected to be at least at the same ratio. In both the towns mentioned and at Christchurch the accommodation for both passenger and goods traffic is even now below requirements at busy seasons, and therefore it is evident that no time should be lost in undertaking the new works, having regard to the fact that they cannot be completed in much less than five years from commencement of operations.

In addition to the centres named, new stations and yards are required, involving considerable expenditure, at Palmerston North, Hastings, Lyttelton, and Timaru.

*Auckland Station and Yard.*

The accommodation at the existing station is already overtaxed, the business only being carried out at much inconvenience to the public and at excessive cost to the Department. Sufficient accommodation for the future cannot be provided on the present site, owing to its cramped position, being bounded on either side by Customs and Quay Streets, by the post-office at the west end, and by Breakwater Road at the east end. The platforms are too short, and to lengthen them would entail the closing of Breakwater Road, an undesirable proceeding.

In order to obtain sufficient space for a passenger-station capable of dealing with the Auckland traffic of the future and yet maintain a connection with the existing line to Kaipara and Penrose via Newmarket, a site on Beach Road opposite Eden Street has been selected, the suburban station, with connections to Newmarket, being elevated about 15 ft. above and to the south of the main-line station.

The intention in designing the new station is that the traffic north via the Kaipara line and the suburban traffic to Onehunga and south via Remuera will be dealt with at the High Level station, south main-line traffic being handled at the Low Level station and travelling on the proposed new line via Hobson and Orakei Bays and joining the present Main Trunk Railway at Westfield. The large area of land which the Department has been in process of acquiring by reclamation in Mechanic's Bay since 1911 as a site for the new station and yard all lies east of the Parnell junction with the present Main Trunk Railway, and in view of the situation it would be impossible to utilize this land to proper advantage and to lay out a workable station and yard without an alternative to the present outlet for south-bound traffic. The route via Hobson Bay is an admirable solution of the problem; by this means full advantage is made of the reclaimed ground, and the railway can be laid down with a maximum grade of 1 in 132 to Westfield, as against 1 in 43 via Newmarket, the difference in grade giving an increased engine-load of 150 per cent. A plan showing the lay-out of the station and yard is attached (Appendix No. 3).

The new railway will open out an entirely new suburban area for Auckland, bringing Orakei, Panmure, and the desirable country in this neighbourhood within a few minutes by train of the business centre of the city.

It is to be regretted that the Department cannot claim some compensation from the land-owners in the shape of a betterment rate, to assist in meeting the expense of building the railway.

A glance at the map accompanying this report (Appendix No. 4) will show that when the new railway to Westfield is completed and the present main line duplicated it will be possible to run an inner suburban circle service from the Auckland High Level Station via Orakei, Panmure, Westfield, Remuera, back to Auckland. The cost of the new station and marshalling-yard will be £450,000, and the cost of the new railway via Hobson Bay £375,000. Both will take about five years to complete. Ultimately a credit of £220,000 can be placed against this expenditure, being the value of the land between the post-office and Breakwater Road, at present occupied by the passenger-station.

At some future period when the traffic north of Auckland increases sufficiently to justify the expense it will be desirable to extend the Main Trunk line straight through Auckland Station, carrying the line westward over Queen Street and through the suburb of Ponsonby, and joining the present railway to Kaipara at either New Lynn or Kumeu.

A railway on this route would enable traffic from the north to be brought into Auckland over easier grades and by a shorter route than the present line via New Lynn and Newmarket, and will open out a suburban area not now served by a station. The site selected for the new station renders this extension possible. The route of the railway via Ponsonby is indicated on the map of the Auckland District attached (Appendix No. 4).

*Engine-depot, Hobson Bay.*

The reclaimed land in Mechanic's Bay will all be required ultimately for the station and traffic sidings. It will be necessary, therefore, for the engine-depot to be placed on reclaimed land in Hobson Bay. The reclamation for this purpose and erection of engine-sheds is estimated to cost £150,000.

It is proposed that the land which has been prepared for an engine-depot at Newmarket be utilized for an extension of the railway workshops, so as to admit of engines being built by the Railway Department in the North Island.

*Duplication of Newmarket – New Lynn Railway.*

The development of the suburban business on the Kaipara Branch, together with the increasing traffic from the district north of Auckland, renders necessary the duplication of the railway from Newmarket to New Lynn, together with a direct junction at Newmarket for trains running between Auckland and the stations on the Kaipara Branch. The severe gradients on this branch (1 in 40) tend to slow down the running, and emphasize the difficulty of working heavy traffic on a single track. The opportunity will be taken whilst duplicating the line to dispense with a number of level crossings and somewhat improve the grades. The work will cost £200,000, and will take five years to complete.

*Wellington Central Passenger and Goods Station.*

The Wellington business is at present carried on at two separate stations (not counting Te Aro), neither of which is laid out in a manner conducive to economical or expeditious handling, having been added to and patched as increasing traffic has necessitated. The present method of working is inconvenient to the public, whilst it is impossible for the Department to deal with the traffic satisfactorily.

It is estimated that the traffic to be handled in Wellington will, at the present rate of progress, double itself in less than ten years, and as the stations are now taxed to the utmost at busy periods, it is clear that no time should be lost in providing the increased accommodation in a central position.

Plans have been prepared showing a passenger-station fronting Bunny Street, and a goods-station slightly farther to the north, with entrance off Waterloo Quay. The station is in an admirable position, considering the area of ground required. It is necessary that the station should be adjacent to the wharves, especially the Ferry Wharf, to facilitate the exchange of both passenger and goods traffic.

The plan attached to this report (Appendix No. 5) sets forth in detail the lay-out of the station, the inset on the plan showing how the passenger accommodation can be increased when the necessity arises. The lay-out of the goods-yard can be straightened and improved when the reclamation is pushed out to the line of the future seawall, and when this occurs the Department will be able to dispose of the valuable land east of Thorndon Quay shown on the plan as occupied by goods sidings.

The engine-depot will be placed on land to be reclaimed between Thorndon and Kaiwarra. It is proposed that colliers with locomotive coal shall berth alongside the breastwork and discharge their coal directly on to the coal-stacking ground or into trucks for country stations.

The cost of the Wellington Central Station is £475,000, and the work will take five years to complete from date of commencement.

*Te Aro Station.*

The plan for the Central Station does not contemplate the continuance of the Te Aro Station, and I propose that this branch line be closed, the rails being taken up from Waterloo Quay, and the property occupied by Te Aro Station sold as a credit towards the expense of building the new Central Station.

I am aware that there is a section in Wellington living in the neighbourhood of Te Aro who not only wish the station to be retained, but desire it enlarged to deal with goods business. I have received a deputation from that section, and their wishes should be treated with every

respect, but I do not consider any case has been made out to justify the continuance of a branch line through the main street of the town to serve a terminus less than a mile from the Central Station. The sorting in Wellington of traffic for Te Aro would involve two additional handlings in the central warehouse, and finally a special-train service to Te Aro, which would make the expense to the merchant prohibitive, having regard to the short distance intervening between the two stations. The expense and the time lost in performing the additional terminal services would entirely preclude Te Aro Station being of any real value as a goods-depot. The plea advanced by the advocates of Te Aro is that cartage-costs would be saved; the additional railway charges would be considerably more than the 3d., or at most 6d. per ton for cartage.

If Te Aro is to be used for goods traffic, two lines of rails will have to be laid down Waterloo Quay across the entrance to the Harbour Board's property; additional land will have to be bought for a goods-station at Te Aro, and a portion of Taranaki Street practically closed to vehicular traffic.

It is not usual to have two stations within three-quarters of a mile of each other in towns such as Wellington. The traffic at present being dealt with at Te Aro is legitimate tram traffic, and can be better handled by the trams. In my opinion the greatest good to the greatest number will be promoted by closing Te Aro Station altogether.

*Wellington Suburban Lines.*

The necessity in the near future of relieving the Manawatu line out of Wellington by the construction of a new railway from Wellington, junctioning with the Manawatu line about Tawa Flat, has been referred to in dealing with the improvements of the Main Trunk.

Consideration of a deviation line to avoid the Rimutaka Incline is also referred to in this report. When the latter deviation is decided upon the Hutt Valley line should be duplicated between Lower and Upper Hutt.

Both the north line and the Hutt Valley schemes affect the future of Wellington vitally, because it will not be possible to cater satisfactorily for a much-increased suburban business without additional facilities for working the traffic. The north line is the more urgent, because of the heavy through traffic and the limitation caused by the severe grades.

*Wairarapa Line.*

Train-working on the Wairarapa line is greatly interfered with by the heavy gradients existing between Upper Hutt and Summit, and the Rimutaka Incline between Cross Creek and Summit. The grade of the latter is 1 in 15, and the length 2 miles 79 chains. Special engines have to be employed exclusively for this portion of the line. The maximum load per engine is 60 tons dead weight (say, about 20 tons actual traffic); frequently four engines are employed to haul a train of 240 tons, dead weight, from Cross Creek to Summit. The minimum time for the journey is forty minutes. Every train has to be remarshalled at the Summit and similarly at Cross Creek. This involves a loss of at least fifteen minutes to a train at each station. On an average one hour twenty minutes is required to negotiate the three-mile journey up the incline. This puts a definite limit upon the amount of business from the Wairarapa which can be dealt with. The cost per engine-mile is 3s. 1d. A special track with a third rail for gripping and braking purposes has to be maintained at considerable additional expense compared with the ordinary track. The importance of this route and the productivity of the country which the existing and projected railways will serve justify consideration of the abandonment of the incline and the construction of a deviation with gradients that will enable all trains to be worked with the standard types of engines. A really satisfactory service via the Wairarapa route is impracticable while trains have to be worked over the Rimutaka Incline. A considerable expenditure will be involved in carrying out the deviation, but the work, nevertheless, will have to be considered in the near future.

*Accommodation at Christchurch and Lyttelton.*

The facilities for dealing with the Christchurch and Lyttelton business have been short of requirements for some years; the work can only be carried on with difficulty and at excessive cost.

A new station and marshalling-yard is required at Christchurch, a double line through the tunnel, and a new yard at Lyttelton. The inter-working between the two places is so intimate that it is necessary to regard the requirements as a whole.

*Christchurch Station and Yard.*

The available room for the station and yard in Christchurch is limited, the surrounding property having been built over. The station is penned in on the north by Moorehouse Avenue and on the south by Carlyle and Mowbray Streets, whilst numerous crossing streets restrict the length of the station east and west.

At the present time inconvenience and delay are caused to trams, vehicles, and pedestrians owing to shunting over Colombo Street. This cannot be avoided while the station and yard, which abut the street, have to be shunted from the west end. In order to reduce the inconvenience to a minimum the rearrangement includes shifting the station away from Colombo Street and back to its original site, with the main entrance off Madras Street. The goods-yard has been laid so as to remove the shunting off Colombo Street, and by this means the obstruction of this street will be reduced to trains entering and leaving the station. The space available is only sufficient to provide for the passenger and goods stations, and in consequence another site has had to be found for the necessary yard for sorting and holding Christchurch traffic. It is proposed to place this yard on vacant land between Addington and Middleton. The scheme has the advantage of economy, whilst in addition relieving Christchurch streets of a considerable amount of obstruction during the shunting operations.

The cost of the Christchurch Station is £320,000, and it will take five years to complete. The cost of the Addington marshalling-yard is £100,000, and it will take three years to complete.

For plans see Appendices Nos. 6 and 7.

*Lyttelton Tunnel.*

A double line through the tunnel is urgently required, the existing track being entirely inadequate as a means of communication between Christchurch and its port. Smoke in a single-track tunnel one mile and a half long is at times most objectionable. The tunnel can be widened to permit of a second track without impeding traffic during the operation.

The work will cost £125,000, and take four years to complete. It should be put in hand as soon as possible.

*Lyttelton Yard.*

This yard cannot cope with the volume of business now passing through the port. It is short of siding-room, but, above all, it is badly planned. It is impossible to shunt any two adjacent wharves at the same time through lack of independent shunting-necks. The plan proposed gives the necessary accommodation in addition to room for expansion, and will allow of the necessary number of engines working without interfering with one another. The plan further provides for an up-to-date passenger-station for the ferry steamers on the Gladstone Pier. This is the only place in Lyttelton Harbour where a station can be placed alongside the ships. The plan has the approval of the Harbour Board.

The cost of the work will be £100,000, and it will take four years to complete.

For plan see Appendix No. 8.

*Electrification, Lyttelton–Christchurch Line.*

In studying the conditions at Lyttelton and Christchurch I have given careful consideration to the proposal to electrify the line. The advocates of electrification of the Lyttelton–Christchurch line have an exaggerated idea as to the benefits to be derived from the substitution of electrical haulage for steam between these two points, especially those out-and-out enthusiasts who press for electrification in preference to duplication. The substitution of electricity for steam haulage over the single line would merely cure the smoke nuisance. The congestion and delay to traffic caused by the disabilities of the single line would remain uncured.

It is obvious that what is immediately required is an up and down track to facilitate the means of traffic-working between Christchurch and its watergate. The present single line cannot cope with the business when shipping is brisk.

It remains to be seen to what extent there will be any annoyance from smoke when the double tunnel is completed. It is difficult to imagine it will be a serious matter, bearing in mind that the tunnel is not on a steep gradient, and that if necessary a fan can be erected to keep the tunnel clear of an excessive quantity of smoke.

I have had practical experience of the substitution of electrical power for steam on a working railway, and am an advocate of electrification under suitable circumstances. Electrification is most desirable in the case of railways serving densely populated suburban areas where stations are numerous and close together, and where practically a continuous passenger service is required; the rapid acceleration of electrical multiple-unit passenger trains enabling a quicker and more frequent service to be given. But the circumstances of Christchurch do not warrant the expenditure, the passenger business can easily be dealt with under steam haulage. The line is not densely populated, and the goods traffic can be as well, if not better, handled by steam. The double line is necessary between Lyttelton and Christchurch, but electrification under the circumstances would be an extravagance.

*New Stations.*

Items are included in the loan for new stations at Palmerston North, Hastings, and Timaru, the local business in each case having overtaken the accommodation, necessitating the stations and yards being enlarged and remodelled to meet requirements. Palmerston North will cost £40,000, and take two years to complete; Hastings £40,000, three years to complete; and Timaru £40,000, three years to complete.

Ashburton Station requires remodelling, but this will be undertaken out of "Additions-to-open-lines" vote. The completion of the Invercargill goods-shed and yard will be carried out under the same fund, as well as improvements at Avondale, New Lynn, Onehunga, Ngaruawahia, Mamaku, Ohakune, Taihape, New Plymouth, Wanganui, East Town, Makerua, Pukerua, Paremata, Porirua, Johnsonville, Khandallah, Woodville, Petone, Orari, Waipara, Springfield, Sutherland's, Otekaike, Port Chalmers, Hillside, Heriot, Winton, Picton, and a number of other stations in various parts of the railway system where the expenditure involved is not excessive.

## LOAN FOR NEW WORKS, IMPROVEMENTS, ETC.

The improvements to the working railways referred to in this report entail a total estimated expenditure of £3,250,000, spread over a period of five years, the rate of expenditure being as under:—

| | £ |
|---|---|
| First year after loan authorized | 434,200 |
| Second year | 839,200 |
| Third year | 968,200 |
| Fourth year | 609,200 |
| Fifth year | 399,200 |
| Total | £3,250,000 |

The amount asked for appears large, but nothing has been included without the most careful consideration and investigation, and I am convinced it is absolutely necessary if the transport business of the Dominion is to be conducted in a satisfactory manner.

As I have shown in this report, there are other improvements and facilities which I consider must also be provided in the near future, if not at once, unless the progress of the Dominion is to be retarded, but I have not taken the responsibility of asking directly for them because of the magnitude of the sum involved. I have confined myself to recommending the most urgent works, merely indicating the other needs so that they may receive consideration and surveys be undertaken by the Public Works where such have not already been made, in preparation for the time when the works will have to be taken in hand. I give below a summary of the items making up the loan :—

SCHEDULE OF WORKS PROPOSED TO BE CHARGED TO SPECIAL LOAN.

| | £ |
|---|---|
| New Stations and Station-yards— | |
| Auckland | 450,000 |
| Wellington | 480,000 |
| Palmerston North | 40,000 |
| Hastings | 40,000 |
| Lyttelton | 100,000 |
| Christchurch | 320,000 |
| Addington | 100,000 |
| Timaru | 40,000 |
| Duplications— | |
| Penrose–Papakura | 75,000 |
| Ohinewai–Huntly | 40,000 |
| Horotiu–Frankton | 45,000 |
| Newmarket – New Lynn | 200,000 |
| Lyttelton Tunnel | 125,000 |
| Grade-easements— | |
| Penrose–Mercer | 150,000 |
| Mercer–Frankton | 10,000 |
| Frankton – Te Kuiti | 40,000 |
| Palmerston North – Marton | 50,000 |
| New Engine-depot and Approach Lines— | |
| Auckland | 140,000 |
| Additions to Railway Workshops— | |
| Newmarket | 30,000 |
| Petone | 30,000 |
| New Lines— | |
| Auckland via Hobson Bay | 375,000 |
| Signalling and interlocking | 250,000 |
| Level-crossing alarms | 20,000 |
| Bridge-strengthening | 50,000 |
| Locomotives— | |
| Ten Garrett engines | 50,000 |
| | £3,250,000 |

Considerable credit is due to the Chief Engineer, the District Engineers concerned and their staffs, for the energy and ability displayed in preparing the plans in connection with this report. The planning of the new station and approach-lines at Auckland in particular proved a problem requiring much study and consultation before a satisfactory and workable scheme could be evolved. The layman has probably little idea of the amount of detailed information that has to be prepared when extensive new railway-works are contemplated, and before even a preliminary plan can be outlined.

It is not my wish that any portion of this report should be misinterpreted into a direct or indirect criticism of the administration of my predecessors. Nothing is farther from my desire and intention; in fact, I am glad to have this opportunity of expressing my appreciation of the good work of those who preceded me in building up so well the present railway system of New Zealand. During my inspection of the railways I have found ample evidence of the great care, forethought, and ingenuity that have been expended in the past in evolving such a complete system of communication in a comparatively undeveloped and sparsely populated country. There are many instances where it is evident that my predecessor and his assistants in the various departments were anxious to adopt improvements, fully realizing their value, but were precluded from doing so owing to the fact that the funds available were more urgently required for immediate necessities. The fact that what may have been considered unattainable when, for instance, the north Main Trunk was not completed has now to be included within the category of necessary equipment and organization is only further evidence of the evolution of the New Zealand railways from the steam-tramway stage to that of an actual main-trunk system with every probability of rapid development in the near future.

It is too much to expect that the railways of New Zealand, with their limitations in gauge and receipts per mile, will be able to meet every demand made upon their resources, but I am hopeful,

if the recommendations contained in this report are adopted, that as the country develops the Railway Department will be able to assist in its advancement and be in a position to offer its clients reasonable transport facilities for both business and pleasure.

E. H. HILEY,
General Manager.

P.S.—This report was completely drafted before a European war was contemplated, and the proposals were based on the assumption that the financial position would be normal. I have not modified the report in any way, because the necessities for improved equipment still remain and will, in fact, become more urgent by the time that the European money-market has recovered its equilibrium. It is unfortunate that delay in commencing the new works cannot be compensated for to any appreciable extent by acceleration in carrying out the alterations after the expenditure has been authorized, owing to the limited engineering staff available for supervision and prosecution of new works.—E. H. H.

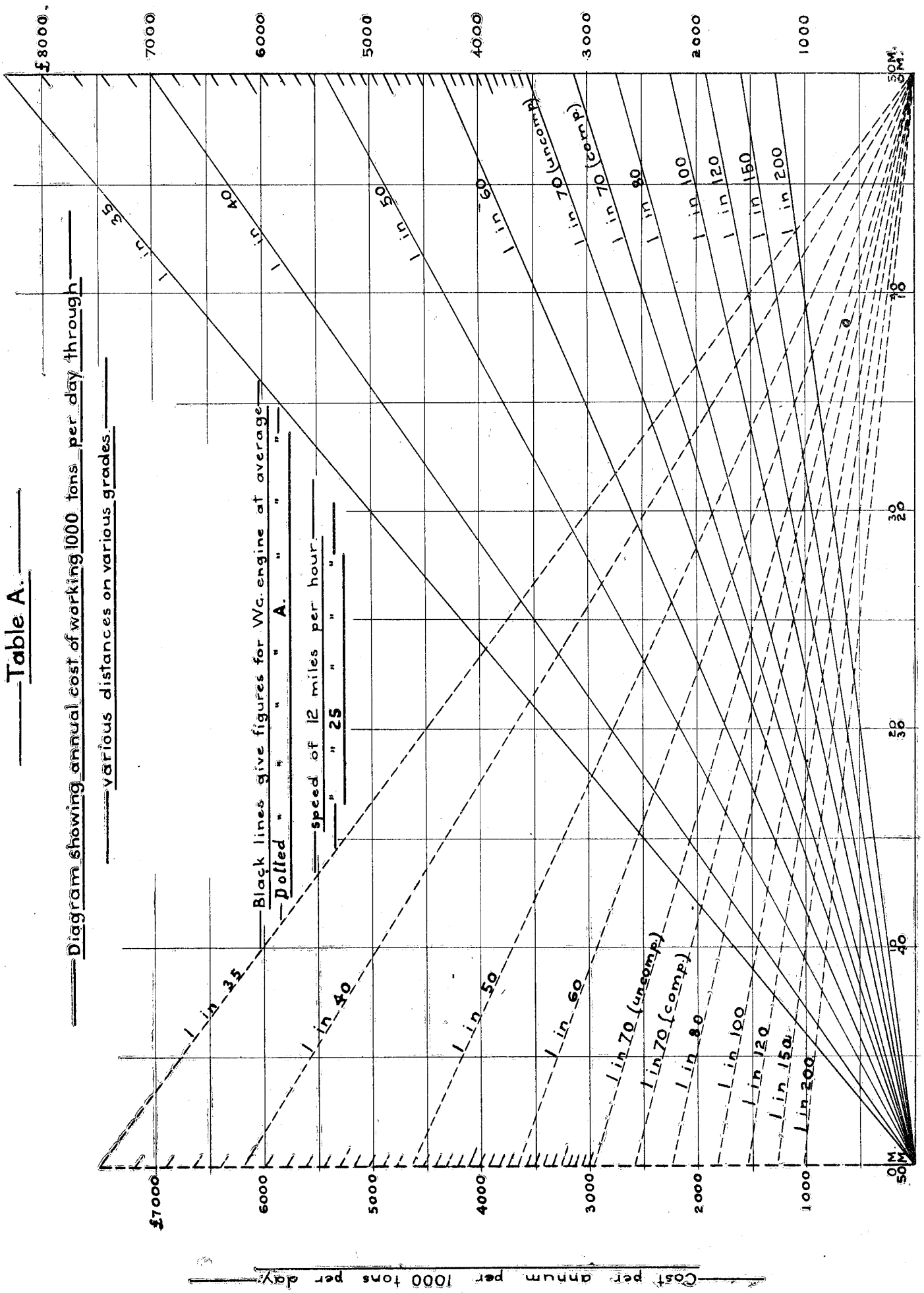
Table A.
Diagram showing annual cost of working 1000 tons per day through various distances on various grades.
Black lines give figures for Wc. engine at average speed of 12 miles per hour
Dotted " " " A. " " "
" " " 25 " " "
£8000
7000
6000
5000
4000
3000
2000
1000
50 M.
40
30
20
10
0
1 in 35
1 in 40
1 in 50
1 in 60
1 in 70 (uncomp.)
1 in 70 (comp.)
1 in 80
1 in 100
1 in 120
1 in 150
1 in 200
Cost per annum per 1000 tons per day

TABLE B.

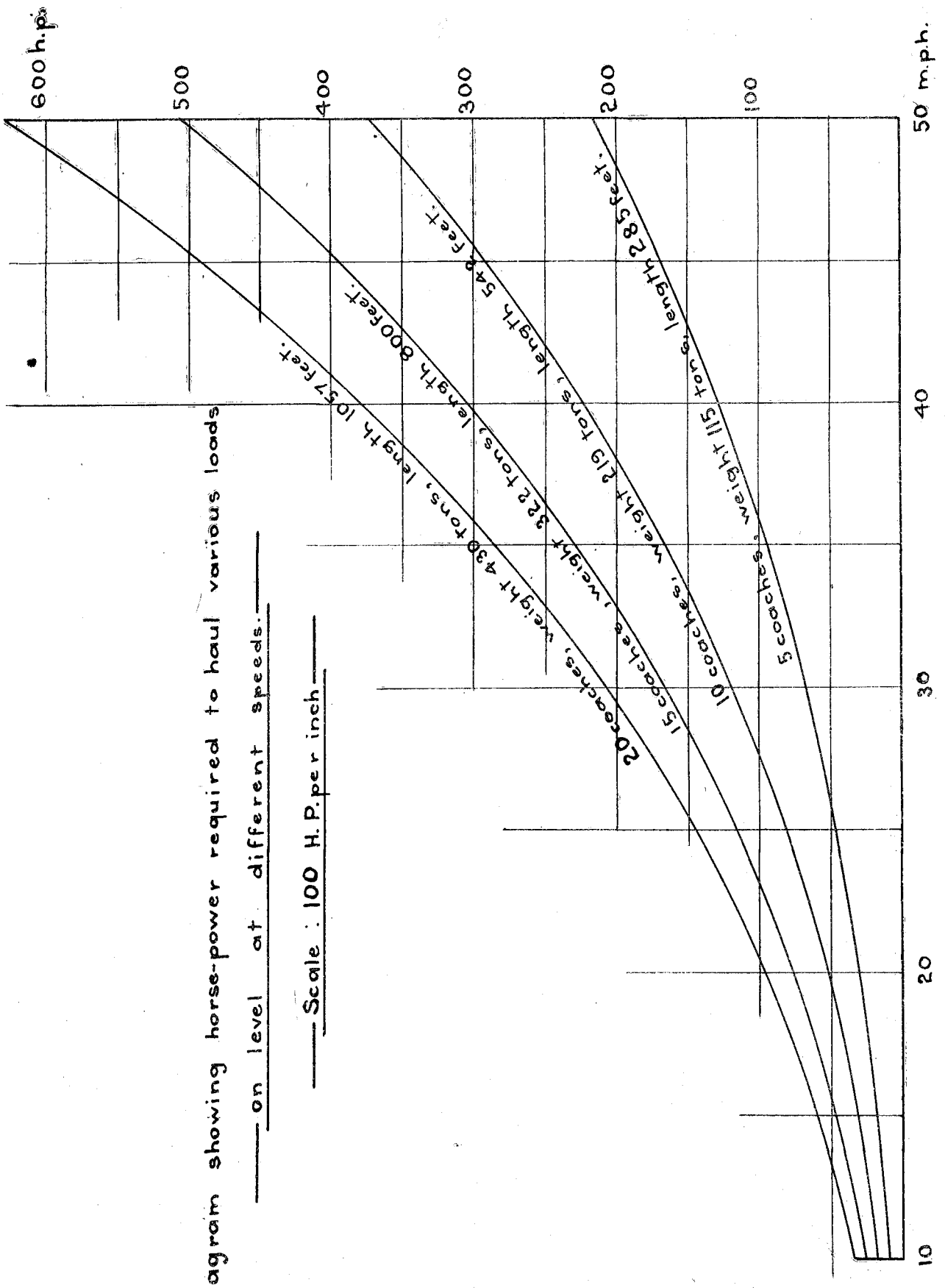
600 h.p.
500
400
300
200
100
10
20
30
40
50 m.p.h.
5 coaches, weight 115 tons, length 285 feet.
10 coaches, weight 215 tons, length 540 feet.
15 coaches, weight 325 tons, length 800 feet.
20 coaches, weight 430 tons, length 1057 feet.
Diagram showing horse-power required to haul various loads on level at different speeds.
Scale: 100 H.P. per inch

TABLE C.

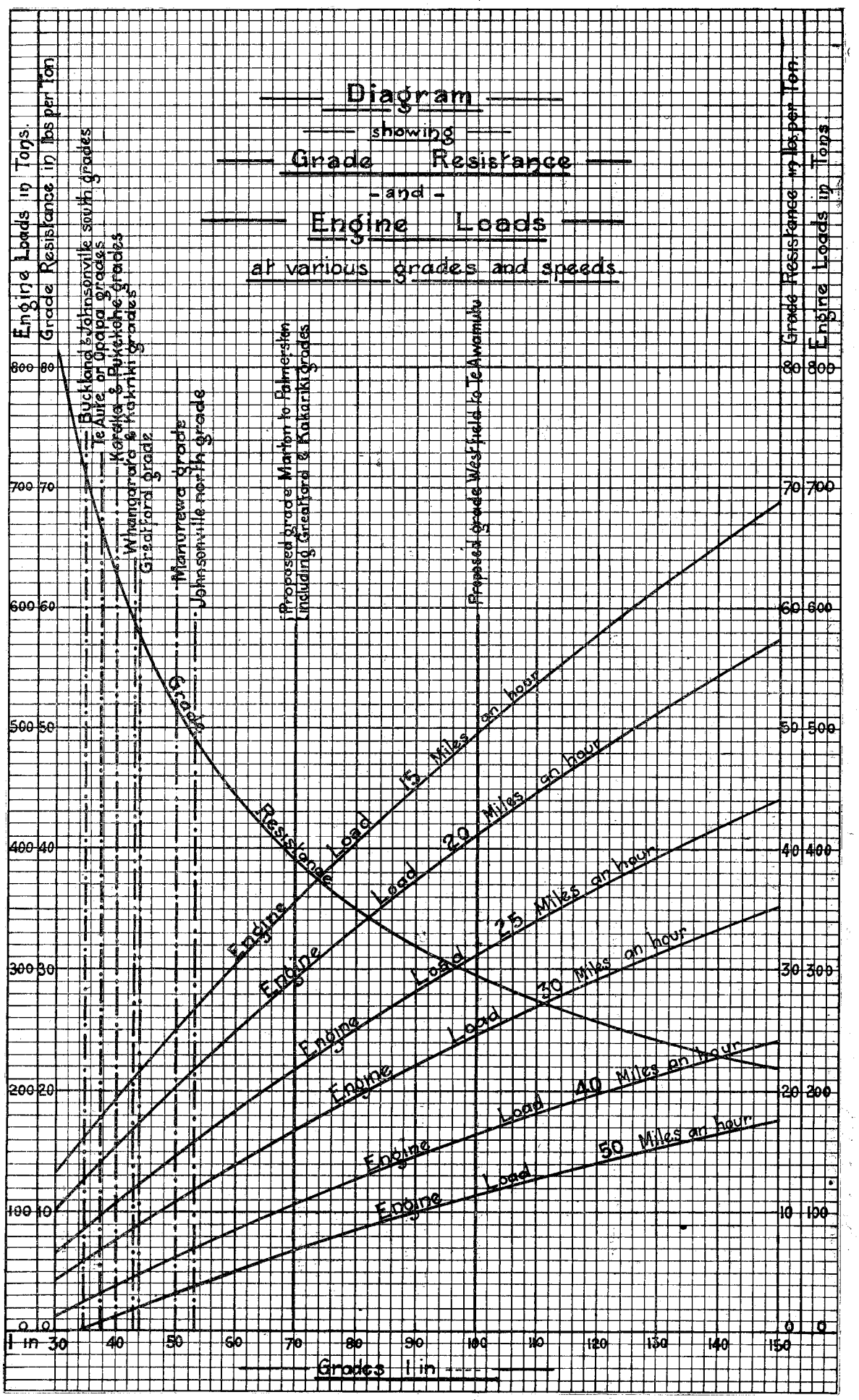
Diagram
showing
Grade Resistance
- and -
Engine Loads
at various grades and speeds.
Engine Loads in Tons.
Grade Resistance in lbs per Ton
Grade Resistance in lbs per Ton.
Engine Loads in Tons.
Auckland & Johnsonville south grades
Te Aute or Opapa grades
Karaka & Pukekohe grades
Whangarara & Kaimiki grades
Greatford grade
Manurewa grade
Johnsonville north grade
Proposed grade Marton to Palmerston
including Greatford & Kakariki grades
Proposed grade Westfield to Te Awamutu
Resistance
Engine Load
15 Miles an hour
20 Miles an hour
25 Miles an hour
30 Miles an hour
40 Miles an hour
50 Miles an hour
1 in 30
40
50
60
70
80
90
100
110
120
130
140
150
Grades 1 in

# CHART OF

# ORGANIZATION, NEW ZEALAND RAILWAYS.

MINISTER OF RAILWAYS.

GENERAL MANAGER.

**Chief Accountant.**

Chief Clerk.

Office Staff, Operating Expenditure, Receipts Staff, Statistics Staff, Station Accounts, Ticket-printing, Superannuation Fund Staff.

**Signal Engineer.**

Assistant Signal Engineer.

Chief Clerk, Electrician, Signal and Interlocking Inspector.

Electric Line Inspector, Foremen, Draftsmen, Office Staff.

Mechanicians, Workshops Staff, Erectors, Adjusters, Labourers, &c.

**Chief Engineer.**

Inspecting Engineer, Office Engineer, Dist. Engineers, Relieving Engineer.

Chief Clerk, Land Officer.

Assistant Engineers.

General Staff, Draftsmen, Inspector Bridge-construction, Accounts and Statistics Staff, District Office Staffs, Inspectors of Permanent-way, Foremen of Works, Bridge Inspectors, Shop Foremen, &c.

Leading Hands, Gangers, Bridgemen, Tradesmen, Surfacemen, Labourers, &c.

**Assistant General Manager.**

Commercial Agent.

Chief Clerk.

Staff Clerk, Rates Clerk.

General Staff, Staff-control, Rates Staff, Records Staff, District Office Staffs, Inspectors, &c.

**Chief Traffic Manager.**

Assistant Traffic Manager, District Traffic Managers.

Chief Clerk.

Assistant District Traffic Managers.

Office Staff, Wagon-control, Traffic Working, Timetables, Goods Agents, Stationmasters in Charge, Stationmasters, Traffic Inspectors, Ticket Inspectors, Timber Checkers, Foremen, &c.

Refreshment-car Supervisor, Assistant Supervisor, and Staff.

Guards, Shunters, Signalmen, Storemen, Porters, Labourers, Motor-car Service and Steamship Employees, Waiting-room Attendants, &c.

**Chief Mechanical Engineer.**

Office Engineer, Loco. Engineers, Relieving Loco. Engineers.

Chief Clerk, Chief Draftsman.

Assistant Loco. Engineers, Loco. Inspector, Boiler Inspector, Brake Inspector, Workshops Managers.

Office Staff, Draftsmen. Statistics Staff, Car and Wagon Inspectors. Running-shed Foremen. Workshops Foremen, &c.

Depot Chargemen, Leading Hands, Engine-drivers, Firemen, Cleaners, Tradesmen, Train-examiners, Lifters, Labourers, &c.

**Comptroller of Stores.**

Chief Clerk.

District Storekeeper, Sawmill Manager, Stores Audit Inspector.

Office Staff, Stationery Clerk, Accounts and Statistics.

Inspector of Timber. Foremen, Storemen, Millhands, Labourers, &c.

By Authority: John Mackay, Government Printer, Wellington.—1914.