

## REPORTS OF THE ENGINEER-IN-CHIEF.

### I.—VISIT TO THE PROVINCES OF CANTERBURY AND OTAGO.

#### No. 1.

Mr. J. CARRUTHERS to the Hon. W. GISBORNE.

SIR,—

Public Works Office, Wellington, 2nd November, 1871.

I have the honor to submit the following general report on my visit to Otago and Canterbury.

On the 31st of August I left Wellington for the Bluff, where I arrived on the 5th of September. Mr. Blair, District Engineer, joined me at Dunedin, and accompanied me throughout the Province of Otago.

The objects of my visit were to make myself acquainted with the country, to ascertain what prices obtained, and to examine the general direction of the lines which have been laid out.

I have little to remark on the lines from Winton to Kingston, and from Invercargill to Dunedin; beyond that the best general direction has been selected for them. As to details, it would have been impossible for me to have examined them, even if I had had time, as the engineers who laid out the line have been, in every case, so sparing of marks on the ground that it will be necessary to resurvey the lines before they can be used even as base lines.

#### *Clutha River.*

I fully agree with Mr. Brunton (see his Report on line from Mataura to Clutha) that steps should be taken to guard against the Clutha River cutting away the isthmus on which Balclutha is situated. It will probably cost very little to prevent this happening; but it will have to be attended to before the bridge over the Clutha is begun.

#### *Chain Hills Tunnel.*

At both ends of the tunnel through the Chain Hills, near Dunedin, careful surveys are required in order to place the line in the best position. These can be done by the staff at present engaged, and will cost only the chainbearers' wages. They should be undertaken at once.

I had no time to examine the branch line to Tuapeka.

#### *Dunedin to Moeraki.*

From Dunedin to Moeraki no line has yet been proposed; but as it is more than likely that it will be eventually built, I took the occasion of my stay at Moeraki to make a reconnoissance of part of the country. There will be no difficulty in making a line from Moeraki to Waikouaiti. I have requested Mr. Blair to make a reconnoissance from Waikouaiti to Dunedin, when he could do so without detriment to his other work, and without incurring expense.

#### *Moeraki Jetty.*

At Moeraki I examined the proposed site for the jetty. I cannot at all agree with Mr. Miller in his remarks as to the direction of the present jetty (*vide* his report on line from Moeraki to Waitaki). It appears to me to have been very well chosen; and I consider the proposed jetty to be placed as nearly in the same direction as can be done, with due regard to reaching deep water with a short length of jetty and of connecting with the railway.

#### *Moeraki Branch.*

A branch line has been laid out to connect the Port of Moeraki with the main line. This will be a work of great expense. The soil is very liable to slip, and there will be difficulty in keeping up the slopes of open cuttings, which latter are moreover very heavy. There is also a tunnel of 220 yards in length, through what Mr. Miller describes as "one moving mass of saponaceous clay." This is estimated at £10 per lineal yard, but I have no doubt it would cost not less than £35 or £40. The Caversham Tunnel, requiring no lining, and through a remarkably easy material, is costing £10 a yard, and it cannot be expected that a lined tunnel through swelling clay could be built for the same. The lining alone would cost more than twice Mr. Miller's estimate for the whole. Instead of incurring this great expense I would recommend the use of gradients of 1 in 25, with curves of about 10 chains, which would avoid the tunnel and heavy cuttings, and would be quite sufficient for the trade of Moeraki. A 10-ton engine would be able to take twenty tons net at each trip, and would make the single trip in quarter of an hour or twenty minutes.

#### *Moeraki to Waitaki.*

Although for the present the terminus of the line is at Moeraki, it must be taken into consideration that at some future time it will be extended to Dunedin. It therefore becomes desirable to keep the gradients as flat as possible, as hereafter the traffic between Christchurch and Dunedin will pass over them.

Between Christchurch and Oamaru there is no steep gradient; between Oamaru and Moeraki there is one gradient close to Oamaru of 1 in 50, and another near Herbert of the same, which cannot be avoided without great expense. One in fifty may therefore be taken as the ruling gradient, which it is desirable not to increase, but which may be used whenever anything is saved by doing so.