

APPENDIX F.

MIDLAND RAILWAY. — REPORT on the proposed Arthur's Pass Route by Mr. V. G. Bogue, C.E.

SIR,—

Wellington, 17th February, 1902.

I have concluded the investigations of the Arthur's Pass Railway problem, in accordance with the commission I had the honour to receive from you, and beg to submit below my report and conclusions relative thereto.

ARTHUR'S PASS.

The reports of the reconnaissances and surveys made across various passes of the Southern Alps, for the purpose of determining which would be the best route for a railway connecting the West Coast with Canterbury, are quite complete and satisfactory. A study of them leaves no doubt in my mind that Arthur's Pass, all things considered, is the best, and that its selection as such was not only wise, but was practically necessary in view of the data obtained by the surveys. The range presents difficulties of somewhat exceptional character, especially as relates to the great rainfall, said to be 120 in. or more per annum, which produces heavy and sudden floods, and also with respect to parts where the slopes are unstable. The large streams shift from year to year from one side to the other of the valleys, seldom having well-defined channels for any distance—at one time narrow and insignificant, at another flooding all the bottom lands, and carrying large deposits of shingle towards the sea. Near the divide the slopes are steep and crooked, cut up by sharp ravines and gullies, and often present cliff-like spurs, formidable obstacles to railway-construction.

In such a range we are fortunate if we find the shortest line has comparatively easy approaches and grades towards the summit, and that the greater difficulties are concentrated at or near the divide. These are practically the conditions presented by the Arthur's Pass route. It is true that at and near Staircase Gully, thirty odd miles east of the pass, there are several tunnels and two important bridges; but as a whole the approach from Canterbury is not difficult, but, on the contrary, is fairly easy.

On the west slope the railway has already been built from Greymouth to Otira, between which point and the summit there are but seven miles by the coach-road. The topographical features of the country along these seven miles constitute serious obstacles to construction, and present in themselves the principal reason why there is a railway problem at Arthur's Pass.

At the summit the elevation is 3,000 ft. This is not a great height when we consider the altitudes attained by many railways in various parts of the world. One in Peru, for instance, crossing the Andes at an elevation of 15,645 ft.; many in America reaching 5,000 ft. to 10,000 ft.; while in the Alps of Europe the elevation of grade at Mount Cenis Tunnel is 3,900 ft., and that at St. Gothard 3,600 ft.

The Otira River, which heads in Rolleston Glacier, on the high divide south of the pass, takes a sharp bend a little west of the summit, and flows westwards for a few hundred feet along Pegleg Flat to the so-called moraine, whence it plunges in cascades into the narrow depths of Otira Gorge. The fall from the summit to the entrance of the Gorge near Dyer's, a distance of 3·6 miles, is 1,540 ft., about 430 ft. per mile.

While the general direction of Otira Gorge is quite straight, its slopes are crooked and very steep, almost vertical in many places, and are cut up by steep though narrow ravines. At Dyer's, Rolleston Creek, an important stream, comes in from the south, and it is at the end of Rolleston Spur, which lies in the angle formed by the Otira and the Rolleston, that the entrance to the gorge is located. Below this point the valley is wider, and the fall thence to Otira Station, nearly two miles, only about 205 ft.

On the Bealey side the fall of the Bealey River is 210 ft. per mile to a point 3·2 miles in a direct line from the summit, and is therefore much more gradual than that of the Otira River. If the fall of the Bealey River was more rapid and approximate to that of the Otira the problem of the pass would be less difficult, since a summit tunnel at any given elevation would then be much shorter than it can be under actual conditions.

It must be evident from the above that any line approaching the pass from the west, having a short tunnel in view, must lie upon the slopes of Otira Gorge at least for some distance. As to the northerly slopes, it may as well be stated now that they are so broken by ravines and by the moraine that it would be impracticable to find supporting-ground for a railway upon them except at prohibitive cost. The southerly slopes of the gorge, however, although rugged and somewhat cut up, present much more favourable conditions, and have the merit of being solid and free from slips, while the valley or gorge of Rolleston Creek lends opportunity for developing a line which may reach any altitude upon them.

The geology of the pass is described in a memorandum of the Government Geologist, prepared at my request, of which the following is a copy:—

"SIR,—

"Wellington, 15th February, 1902.

"At the request of Mr. V. G. Bogue, C.E., I have the honour to forward you for his information some account of the geology of Arthur's Pass and the mountains through which the Otira Gorge has been cut.

"Approaching Arthur's Pass from the east, the rocks are alternations of sandstones and shales that are either of Permian or Carboniferous age.

"The general dip is to the north-west, and, apart from surface-slips (which are not common), I anticipate they will form good standing-ground on being mined or tunnelled into.