

shorter line has a decided advantage as regards the freight on produce and maintenance of the road: many thousands of pounds would be saved yearly on these two items of expenditure. On the other hand, towards the north, the distance by Arthur's Pass *viâ* Oxford to Rangiora is 5 miles longer than by the Hurunui, but north of Rangiora the distances are in favour of the latter route. Besides the advantage of shortness possessed by the Arthur's Pass route over that by the Hurunui, it would have the use of the present coach road in the conveyance of men and material for construction; whereas, if the Hurunui route were adopted, no work could be undertaken simultaneously along the line, until a tolerably good road was formed from Horsley Downs to the Teremakau River.

The height at which the line would cross the main dividing-range of mountains would be about the same on both; there would be the same length of line still to be made on each, and the tunnels at the summits of the Hurunui would be about 1,500 feet longer than on the Arthur's Pass. The height of the Arthur's Pass is 3,014 feet, that of the Hurunui 3,150. Height of summits.

It may be worth while to notice, in favour of the Arthur's Pass route, that there is an abundant supply of water on the very top of the Pass, by which machines for boring the tunnel could be driven; or, if an ascent over the Pass by rope-traction instead of a long tunnel were adopted, the trains could be lifted over the Saddle by machinery driven by the headwaters of the Bealey; on the other hand, the engineering difficulties are considerably greater than would be found on the Hurunui route. The Otira Valley presents a rougher descent than the upper part of the Teremakau Valley; and on the ten miles at the Waimakariri Gorge there are difficulties of a serious nature, chiefly in the form of lofty bridges and precipitous rocky hill-sides. Having examined the sections taken over this part of the line, the Commission was of opinion that one or two of the worst features could be remedied by careful resurvey, or by taking the opposite side of the river, and the estimate of cost might be considerably reduced. The line through this gorge, bad as it is, has the advantage of descending gradients in the direction of the heavy traffic, and is about sixteen miles shorter than the diversion by way of Lake Lyndon and Homebush, proposed by the Government Engineers. This diversion has also to rise over a summit between the Lake and the Rakaia River; it is estimated to cost about £440,000 less than the Waimakariri Gorge line, and £54,000 less than the Hurunui line; it would be five miles longer to Christchurch, and twenty-five miles shorter to Rolleston, than the Hurunui: so that the advantages seem still to be with the Arthur's Pass route, even when diverted round by Lake Lyndon and Homebush. Engineering difficulties.

The estimated cost of the Arthur's Pass route by way of the Gorge is given in the tables at £2,030,000, but it is probable this might be reduced to £1,800,000. Diversion by Lake Lyndon.

The Lake Lyndon route is estimated to cost £1,587,000; but, being sixteen miles longer than the other, the maintenance of this extra length at £380 per mile per annum, which capitalized at 5 per cent. amounts to £121,600, should be credited to the route by the Waimakariri Gorge.

If the tunnel at the summit is abandoned for some system of rope-traction over the top of the Pass, the estimate of cost would be reduced by about £250,000.

The Hurunui route would leave the present north line of railway at Horsley Downs, and ascending the valley of the Waitohi, which is a crooked and rough piece of country, would cross the summit dividing the head waters of the Waitohi from the Hurunui Valley. This summit is 1,814 feet high, and would necessitate a tunnel of about fifty chains long. There are then eight or ten miles of the Hurunui Valley, which is very rough, with steep, rocky hill-sides and deep lateral gorges; but from a point just below Lake Sumner to the summit there is a fine open valley. The Saddle, which is 3,150 feet high, is flat on the east side, but very steep on the west, and would require a long tunnel. The descent from the summit would be about twelve miles of one in fifty gradient, which would bring the line to the river bed of the Teremakau, near the confluence of the Otira, from which point the line would take the same route to Brunnerton as that by the Arthur's Pass. The twelve miles descending from the summit would be a very rough and costly piece of work, in some places subject to heavy slips of shingle falling from the top of the ranges. Hurunui route.

Notwithstanding its disadvantages, from an engineering point of view the Hurunui route is the most favourable of any.

The Commission examined the Amuri and Lewis Passes, and were shown sections taken over the Hope and Ada Passes by the Government Engineers. Other Passes.

The Hope Pass line, which is the most southern of these, follows the Hurunui route as far as Lake Sumner. Thence it passes over a summit at the head of the Kiwi Creek, and,