

Wellington, 28th September, 1903.

Memorandum for the Hon. the Minister for Public Works.

HEREWITH are Mr. Dobson's plans, descriptions of lines, and estimates of the various routes, so far as they have been compiled or surveyed, for the proposed railway-line over Arthur's Pass, for transmission to Mr. V. G. Bogue.

Line A is the six-mile tunnel line.

Line A 1 is a modification of the A line on a steeper grade. It runs up the gorge for about three quarters of a mile above the road. I think the estimate for this line is too low; also it runs for too great a distance on steep hillsides to be worth considering.

Line A 2 runs up the gorge below the road. This line, I think, could be improved, and the cost, perhaps, slightly lowered. The fan of Westley's Creek prevents the best line being got. There are several possible variations of this route, but as even then it would not be so good as the A 4 line, these have not been worked out. This line crosses the Otira above Barrack Creek, to give a road and railway bridge.

Line A 3 is a part of the A 2 line, with a tunnel on 1-in-33 grade starting at the same point at the Otira end as the six-mile tunnel.

Line A 4 is likely to be the cheapest of any of the lines so far proposed (except the Abt. line). It is quite clear of the hillsides, which is a great consideration in a country where rocks are constantly rolling down the hillsides in frosty weather. There is one cutting below the Rolleston, through an old moraine, flat on top. This can be made quite safe. The large banks on the left bank of the Rolleston and Otira would be made from tunnel-spoil. The grade is 1 in 30, and there is one $7\frac{1}{2}$ -chain curve shown on the plans, but this would be altered to 15 chains if the line were adopted. This line is shorter than B 1 line by 1 mile $27\frac{1}{2}$ chains. The summit-height is 93 ft. lower, the curves are of less radius, and the total curvature is much less; and I do not think it would cost so much. The working-expenses would be much less; when extra patrolling and extra maintenance are allowed for, I should say £1,200 to £1,500 a year less than on the B 1 line.

Mr. Bogue's B line had to be abandoned, as there was not cover enough for the tunnel in the Otira River bed just above the Otira entrance. Three variations of the B line have been worked out. Of these B 1 is the cheapest. According to the quantities and prices taken, its estimated cost stands at £512,000, but in view of the cost of the line at the Springfield end as compared with the Middle Island estimates, on which these are based, I put it at £528,000 at least.

Line B 2 was taken across the Rolleston three times to ascertain the cost of avoiding in this way the running ground opposite Dyer's. Its probable cost puts it out of consideration as compared with the A or A 4 line, and the same may be said of the B 3 line.

The steeper lines suggested by Mr. Bogue were not surveyed, as time was limited, and it is not likely that the Government would adopt the Shay locomotive to work any of these lines, in view of the discontent continually expressed by the public about the Fell line over the Rimutaka.

With any of the B lines there is also the contingency that if any accident happened, or the public become alarmed by rocks rolling on the line, as they certainly would, a demand would be made for tunnels at the dangerous places. If what happened at Purakanui Cliffs and in the Manawatu Gorge recurred at Otira, supposing B 1 line were made, probably £70,000 or £80,000 would be required for short tunnels. On the steep grades these would be objectionable.

The choice will, I think, finally be between the A and A 4 line.

P. S. HAY,
Superintending Engineer.

MIDLAND RAILWAY: ARTHUR'S PASS.—ALTERNATIVE LINES.—SHORT DESCRIPTION.

1. Line A (red): Original six-mile tunnel.
2. Line A 1: Crossing Otira at Goat Creek, and going above road to tunnel at lower road-bridge.
3. Line A 2: Crossing Otira at Dyer's, and going below road to tunnel at lower road-bridge.
4. Line A 3: Common to A 2 to summit-tunnel mouth of Line A, with tunnel 1 in 33.
5. Line A 4: Moye's Creek route.
6. Line B 1: Mr. Bogue's original B 1.
7. Line B 3: Three crossings of Rolleston River,
8. Line B 2: Common most of the way to A 1 and B 3, with spiral on Rolleston Spur.

MIDLAND RAILWAY: ARTHUR'S PASS.—LIST OF DRAWINGS OF ALTERNATIVE LINES.

Contour-plan showing country between Otira Railway-station and roadman's hut, in Otira Gorge. Scale $1\frac{1}{2}$ chains to an inch. Two sheets.

Plan showing country from Park's Creek on Otira side to common point (41 m. 70 ch. from Springfield) in Bealey Valley. One sheet.

Longitudinal Sections (scales, 3 chains horizontal, and 30 ft. vertical, to an inch) as follows: Line A, 4 sheets; line A 1, 4 sheets; line A 2, 3 sheets; line A 3, 1 sheet; line A 4, 2 sheets; line B 1, 2 sheets; line B 2, 1 sheet; line B 3, 7 sheets: total, 24 sheets.

Total: 3 sheets of plans, and 24 sheets of longitudinal sections—27 sheets.

MIDLAND RAILWAY: ARTHUR'S PASS SECTION.—DESCRIPTION OF ALTERNATIVE LINES.

Line A.

This line crosses the Otira River not far above the railway-station, and follows up the right bank, and goes into tunnel about 20 chains above the mouth of the gorge, and comes out on the left bank of the Bealey River, and follows that side down to a peg marked 41 m. 70 ch. from Springfield, which is the common termination of the several alternative lines.