

The maximum grade required is 1 in 70 against the traffic to the Wairarapa, and 1 in 80 against the traffic from the Wairarapa, which is the larger quantity: they are therefore situated in the most advantageous position. The accompanying section indicates the extent and rates of the grades.

The maximum curvature required is $7\frac{1}{2}$ chains radius, which may possibly be reduced to 10 chains radius. The sharp curvature is confined to two parts of the line, situated between the 3rd and 6th mile pegs, and between the 16th and 20th mile pegs, which aggregate a length of seven miles; the rest of the line consists of long straights with flat curves: the line will therefore be an extremely favourable one for fast travelling, both as regards grades and curvature.

The estimated cost of deviation, complete with all equipment, is £463,547, made up as follows:—

From	To	Distance.	Item.	Rate.	Amount.
M. CH.	M. CH.	M. CH.		£	£
0 0	3 0	3 0	Mile	7,000	21,000
3 0	6 40	3 40	"	30,000	105,000
6 40	12 50	6 10	"	5,000	30,625
12 50	16 20	3 50	"	59,840	216,922
16 20	19 60	3 40	"	10,000	35,000
19 60	30 60	11 00	"	5,000	55,000
					£463,547

Average rate, £15,075 per mile.

The long tunnel must be on a grade of 1 in 100, descending towards the Wairarapa. Should the products of combustion emitted by the locomotives prove troublesome, ventilation may be effected by sinking a shaft from the Orongorongo Valley, and driving a current of air down it into the tunnel by means of a small stream of falling water derived from the river, and delivered near bottom of shaft at a high pressure by means of piping, a pressure derived from a head of 800 ft. being available; or the water may be led to the lower adit of tunnel from the point marked X on plan, and there, with an available head of 700 ft., be used to either drive air through tunnel by means of fans, or to generate electricity and work the up-traffic by means of electrical locomotives.

The country between the reservoir in the Wainuiomata Valley and the narrow belt of flat country along the Wairarapa Lake is quite unfit for settlement; it is only fit for a forest reserve, or to act as a catchment-basin for supplying Wellington with water and power as far as the Orongorongo Valley is concerned. The Wairongomai Valley is merely a precipitous mountain-gorge.

The chief points in favour of this route are: (1) Shorter by 3 miles 47 chains than constructed line; (2) low summit-level—viz., 560 ft. above sea-level; (3) only one bridge of any magnitude—viz., that over the Hutt River; (4) easily maintained; (5) very easy grades; (6) does not interfere with present line through Featherston.

R. W. HOLMES, Resident Engineer.

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