

The estimates for the formation have been based upon the present cost of labour and materials in this district, as far as earthwork, bridges, and ballasting are concerned, and I feel satisfied that on these items a considerable saving may be effected. In fact, the road works of the Provincial Government are being executed, in even small contracts, at a lower rate than that forming the base of my estimates. A further saving on the estimated cost can doubtless be effected by slight deviations from the survey line when the working sections are being set out. Under these considerations, I have made no allowance for contingent expenditure, feeling satisfied that the estimates leave sufficient margin for them.

All cuttings have been calculated for a base of 14 feet, with slopes of 1 to 1 in ordinary soil; all embankments for a width of roadway of 11 feet, with slopes of  $1\frac{1}{2}$  to 1; and both have been brought to account at 1s. 6d. per cubic yard of cuttings and the same rate for surplus embankments.

The formation for more than one-half of the whole length will have to be made up out of side drains: the cost of those portions appears in the estimates at per chain, and is calculated at from 7d. to 18d. per cubic yard, according to circumstances, but in every instance at the full rate for present road works.

The estimates for bridges, viaducts, and large culverts have been based upon the cost of totara and matai (for superstructure) at 10s. to 15s. per 100 feet delivered, according to circumstances, which leaves a fair margin. To be all simple pile bridges, with spans not exceeding 26 feet. No separate estimate has been made for small culverts, as these are included in the calculation for the formation.

Wherever culverts are covered over 4 feet they have been estimated of bricks, which can be burned almost everywhere along the line, with the exception, perhaps, of the Ahuriri Plains.

The cost of bridges is set down at from £2 15s. to £4 10s. per running foot; of viaducts, from £2 to £3 per foot; flooring of footpath being only contemplated.

Sufficient totara will be obtained out of the Te Aute Bush, through which the line runs, for the portion between Napier and Te Aute; the upper portion of the line to be supplied from the Manawatu, Ruataniwha, and Tokokino Bushes, which are all conveniently situated.

Sleepers, 7 feet (8" x 5"), have been estimated at 2s. each, or at £200 per mile, inclusive of extra strength for joints.

Ballast is calculated at 2,000 cube yards per mile, at 2s. per yard. This rate is more than that paid at present to the road contractors, as limestone is convenient in the middle of the line, and river shingle at both ends.

Fencing has been estimated, for post and seven-wire fence, at £140 per mile, double line, reckoning posts at £4 per hundred, wire at £17 per ton; erection, £17 per mile.

Rails, with fittings, at £10 per ton in Napier, for 70 tons per mile; carriage and laying, £50 per mile.

As described in my preliminary report, the peculiar situation of Napier made it desirable to survey two lines to the inland district, namely, one from the Town of Napier and the other from Port Ahuriri, both lines intersecting the Ahuriri Plains; whence the Ruataniwha Plains, bordering on to the Manawatu Bush, can be reached by three leading valleys, each terminating in a saddle, which must be crossed to enter upon the upper plains, but each of which has at present a practicable dray road.

The line from the Town of Napier to the Karamu Junction is marked in the annexed plans and sections, Line A, and that from Port Ahuriri to the same point is marked B., by which designation I will describe them.

#### *Line A.*

Starts from the first mile-post (measured from the Post Office), the boundary of the Town of Napier. This point has been selected, as from it the line can be carried on the level to any part of the business portion of the town, and to Port Ahuriri round the southern base of the Island.

The selection of the terminus is (where, as in this instance, no difficulties exist) beyond the Province of the Engineer.

From the first mile-post, the line runs for four miles along the sea beach, on the crest of the shingle bank which connects the Island of Napier with the mainland. This beach is about 10 feet above ordinary high water, and is solid and in every respect safe. A road which has been formed there three or four years ago has never suffered, and, as it is not much used,—the inner natural beach track being generally preferred,—would serve as formation for the line. The estimate at £3 per chain will probably prove more than ample for this portion, and the fencing of at least one side line will be saved.

After leaving the beach, the line enters upon the plains, running over them to the junction with Line B and thence to Pakipaki, thirteen miles. The first 103 chains to the crossing of the main road near the bridge over the Ngaruroro, are subject to be flooded by the backwater from 1 to 6 feet, requiring embankments, the cost of which will average about £10 per chain, but the line will be safe. The Waitangi, a tidal stream 96 feet wide, taking its rise in the adjoining swamps, has to be bridged at an estimated cost of £400.

From the main road to the Karamu Junction, near the centre of the Ahuriri Plains, the line runs over rich alluvial lands, the only difficulties being the Tutaekuri-Waimata and the Ohiwia, two streams which have become of late formidable through the changing of the course of the Ngaruroro. These two creeks carry the water of the Ngaruroro, as will be described on their crossing by Line B.

Provision is made in the schedule for bridges of 120 feet and 320 feet, and for a viaduct of 420 feet, to provide for the storm water, which probably will give sufficient waterway.

The total estimated cost of those structures—£3,440—will prove ample.

From the Ohiwia to the junction with Line B the country offers no hindrances, and the average cost of formation will not exceed £6 per chain.

The distance from Napier to Karamu Junction is 12 miles 6 chains, and the estimated cost £9,067, which will probably prove over-rated.

#### *Line B.*

This line starts from the Government land at the boundary of the freehold sections at Port Ahuriri, but the starting-point can be fixed at any part of the port without altering materially the cost