

improve and make the bridge safer if a land span of, say, 20 ft. at the northern end and one of 16 ft. at the southern end were added, at a probable cost of £185.

*Alfredton-Weber Road, North End, Makukupara Section.*

Numerous slips have come down on this end of the road. One of considerable extent forced the pier of a 12 ft. span bridge clean out of position, and it will require to be shifted further up the stream some 25 ft. or 30 ft., and an approach excavated to it from both sides. Another large slip completely smashed a 12 in. by 12 in. culvert and carried it into the river. The 40 ft. span bridge now under construction had the scaffolding washed away, lost the camber, and the piers canted over slightly. The damage done may be set down at £200.

*Mount Arthur Road.*

A bridge on this road across the Makukupara Stream at its junction with the Akitio River, fortunately, was only recently started, and the damage sustained was consequently slight, and consisted of the washing-away of a quantity of stacked timber. The bridge will require to be placed at a higher level and the land spans lengthened, and this can easily be added at a probable cost of £75. Total damages, about £150.

*Oroua Bridge (Apiti).*

Government gave £1 for £1 for the erection of the above. That portion of the bridge resting on the concrete piers and cylinders remains perfectly sound; but the two eastern land spans had a narrow escape. The centre pier of these was erected on a wooden sill let down several feet through the old road-bed, well away from the river-bank, but the great attrition of the water widened the river on this side to such an extent that the pier became nearly undermined, and, should another flood take place, would no doubt be carried away.

A large amount of cliff-excavation will be necessary to form an easy turn at the end of the bridge. To make these alterations will necessitate an outlay of not less than £500.

*Mangawharariki Road.*

Considerable damage has been done to this road by slips coming down and solid formation breaking away. An extra number of men had to be employed to open the road up for traffic. Cost of repairs from Wairaki to Fraser's Creek, £95; from Fraser's Creek to peg 5 miles 52 chains, £300: total cost, £395.

*Auputa Road.*

Seven men were employed opening it up for horse traffic, and the damages sustained by bridges and culverts, and the cost of removing slips, will amount to £325.

*Conspicuous Road.*

The ford at the Mangaira Stream has been completely swept away. Before the flood the road on the southern or Apiti side of the stream was taken along a flat beside the river for a distance of about 20 chains. This flat is now altogether unsuitable for roading purposes, as it is packed with huge birch-trees, silt, or river deposit, *débris*, &c. The damage and cost of repairs amount to £450.

*Kawhatau Valley Road and Mangawharariki Bridge.*

This road on both sides of the Mangawharariki Bridge was 6 ft. under water, and on the northern side was covered for a distance of about 12 chains, and reduced in width to less than 6 ft., which will necessitate a large amount of papa-rock excavation from off the cliff at a higher level.

The Mangawharariki Bridge was a truss bridge 58 ft. in length. The river rose 33 ft. in height, and the floods may be characterized as phenomenal. A large area of forest, some trees of which must have taken far more than a hundred years to grow, have been washed clean away down the Rangitikei River, rendering the whole river bridgeless. The bridge was seen by Mr. Gibson from the Rangitikei Cliff opposite when carried away, but not before the water had risen to between the handrails and the upper chords of truss, and several trees had passed. One large tree came down with great force in the raging torrent and smashed into the truss, breaking it away from the piers. Until the bridge is re-erected considerable inconvenience will be caused, as it afforded means of access to the Kawhatau Improved-farm settlers and others on the Kawhatau Block, besides many more on the northern part of Marton Nos. 1 and 2.

The papa rock at this place seems to lie in a peculiar position. Huge layers and flakes of rock lie one against the other in an almost perpendicular position, and ranging in thickness from 6 in. to 6 ft. These layers and flakes are constantly peeling off from the cliffs above, but the cost of removing the present slips will not be more than £50, the extensive damage done being to the road itself. The torrent, having been several feet above the road-level, has torn layer after layer of the papa rock from the outer part of the road, leaving only 3 ft. to 7 ft. of roadway for about 12 chains. To widen the road to its full width of 16 ft. means very heavy work, on account of the almost perpendicular face of rock which will require to be excavated.

As the flood-waters at the junction of the Mangawharariki Stream and the Rangitikei River were 5 ft. above the bridge-decking, it will be necessary to carry out my proposals—viz., to build a new bridge, about 80 ft. span, and 10 ft. to 12 ft. above the old level, and a chain further up the Mangawharariki Stream. To enable this to be done 4 chains of very heavy work will require to be done, necessitating deep block and sideling cuttings through the papa rock. The total cost of removing slips, widening and forming road, and erecting bridge will not be less than £1,000.

As directed, I have given the necessary instructions to have the different flood-levels carefully marked and registered, and these are now being carried out.

A. C. TURNER, Road Surveyor.