

4. *Lake Lyndon Route.*—From Homebush, on the White Cliffs Branch, *via* Hororata, the Rakaia and Acheron Valleys, Lake Lyndon, and Craigieburn, to the Cass where it merges into the Arthur's Pass route.

Continuation to Brunnerton.—The continuation of the line from Bruce's Paddock to Brunnerton is common to both the Hurunui and Arthur's Pass routes. It goes by the western side of Lake Brunner and the Arnold Valley.

Amuri Pass.—In addition to the above a reconnaissance survey has been made of the Amuri Pass, to ascertain the length of the tunnel through the main range, and otherwise to determine the general character of the works.

DESCRIPTION OF LINES.

Cannibal Gorge Route.—This line commences at a point in the northern extension of the main line, through the Amuri Plain, 2 miles 54 chains from the end of the Balmoral section, now in progress, 71 miles 42 chains from Christchurch, and near to the Red Post. It follows up the valleys of the Waiau, Hope, Boyle, and Lewis to the main range, which is crossed by a long tunnel under the Lewis Pass. The line comes out on the Maruia River, at the upper end of the Cannibal Gorge, then follows down the river to the Maruia Plains. The plain is crossed in a tolerably direct course to the Rahu River, which is followed up to the Grey Saddle. After crossing the saddle the line skirts the foot of the hills above the Mary River for a short distance, and, doubling on itself, ascends to the Rahu Saddle, which is crossed by an open cutting. From this point to Reefton the course is down the valley of the Inangahua River. The present survey of this route has not been carried beyond Reefton, as the remaining portion to Brunnerton had previously been surveyed in connection with the proposal to construct a railway from Nelson to Greymouth.

The Cannibal Gorge line ascends with tolerable regularity from its commencement on the Amuri Plain to the Lewis Saddle, which is tunnelled at an altitude of 2,550 feet. After this comes a descent to 1,430 feet on the Maruia Plains, a rise to 2,200 feet at the Rahu Saddle, and finally a descent to 640 feet at Reefton, which is 20 feet higher than the starting point on the Amuri Plain.

As pointed out by the Royal Commission last year, the greatest difficulty in the way of easy gradients is the ascent from the Maruia Plains to the Rahu Saddle. The saddle is too flat to tunnel to advantage, and there is no suitable ground in the direct course on which to run out a gradient. The railway as surveyed doubles on itself two miles; the distance in a straight line between two points four miles apart by the railway being only about 35 chains. Notwithstanding this highly-objectionable feature, it has been necessary to introduce a 5-chain curve and increase the gradient to 1 in 40 to bring the work within practical limits. It is impossible to get a good line at this place without a large expenditure, unless a zigzag is introduced, and this is anything but a desirable expedient. So far as crossing the main range is concerned, the difficulties on the Cannibal Gorge route are less than on any of the others; but this is balanced by the heavy works on the subsidiary range that forms the watershed between the Maruia and Inangahua Rivers, the country on both sides of the Rahu Saddle being very rough. There is also a considerable extent of heavy work on the eastern side of the main range, more particularly in the vicinity of the Hope and Waiau Junction.

Taking it only to Reefton, the point to which the estimates are made in detail, the total grading on the Cannibal Gorge line is somewhat more than on the other lines right through to Brunnerton, the item earthwork being considerably larger. On the other hand the bridging is very much less—only about one-half.

Altogether there are sixteen tunnels on the line between the Red Post and Reefton, of the aggregate length of 3 miles 64 chains: four on the eastern side of the range, 1 mile 6½ chains; the summit tunnel through the Lewis Saddle, 2 miles 15½ chains; and eleven in the Cannibal Gorge and at other places in the Maruia Valley, 42 chains in total length. Three of the tunnels on the eastern side are respectively 40, 32, and 12½ chains long; all the others on both sides are very small, they are scarcely worth calling tunnels, being only from 2 to 6 chains long.

Including 2 miles 54 chains of the northern line not yet begun, and 1 mile 30 chains partly done at the Brunnerton end the total length of railway to make by the Cannibal Gorge route is 142 miles. The estimated cost, including all charges necessary to complete and equip the line, is £1,875,000—say, £13,200 a mile. This estimate is worked out in detail for the portion between the Red Post and Reefton; but the remainder of the distance to Brunnerton is only taken at an average rate per mile.

Hurunui Route.—This line leaves the main trunk railway near the new Township of Hawarden, on the Horsley Downs, 53 miles 34 chains from Christchurch. It strikes across the open country to the Waitoha Gorge, ascends the Waitoha to the saddle, and by a tunnel reaches the Hurunui Valley, which is followed right up past Lake Sumner to the source of the river in the main range. The pass is pierced by a tunnel, which brings the line into the head-waters of the Teremakau River. The Teremakau Valley is then followed down on the northern side to a point opposite Jackson's, about seven miles below the Otira Junction, where the Arthur's Pass and the Hurunui routes merge into each other.

Commencing at an altitude of 780 feet the line soon begins to rise, reaching an elevation of 1,530 feet at the Waitoha Saddle. It then falls to 1,370 feet at the point where the Hurunui River is struck, after which there is an almost continuous rise, with occasional pieces of level, all the way to the main range, the summit level being 2,360 feet. From the pass the line descends rapidly westward,—the 1-in-50 gradient having scarcely a break for fifteen miles,—till the river-bed is reached at a level of about 800 feet. After this, to the junction with the Arthur's Pass line, at 530 feet, the line follows generally the fall of the river, with occasional rises to get over shingle-fans.