Indications of further changes and encroachments are apparent at many places, especially on the southern side, and any works undertaken with the object of controlling the course of the river in that direction, would necessarily be both costly and troublesome to construct and maintain, and would further be continually liable to accident and destruction from the effects of the floods. Under such circumstances, I do not think it would be prudent to erect a bridge across the river at any place below the upper end of the large island.

Between the upper end of the island and the upper ferry the river bank becomes better defined, and the channel deeper the higher the river is ascended, and at many places the water, during ordinary conditions of the river, flows entirely in one channel.

I made several careful examinations of this part of the river, and had levels and sections taken at various places which appeared to offer the greatest advantages as a site for the bridge.

About four miles below the Upper Ferry, the general direction of the main terraces and river course changes from about South by East, to about South-east by East, the change in direction amounting to about 40° towards the East. Near this elbow the river at present flows in one channel, which infringes upon the main terrace on the north side, and I am informed that, within the last five years or six years, the river has cut into the main terrace (which is here between 60 and 70 feet high), to the extent of about 30 feet, for a length of several chains.

From personal observations, and from information derived from persons acquainted with the river, I am inclined to think that the channel and banks have been altered to a much greater extent below this great natural bend than they have above it; this opinion received partial confirmation from the plans furnished to me by the Provincial Government, which proves that at some parts of the course the main banks have not been altered to any appreciable extent since the surveys were made several years ago.

The selection of site was finally limited to that now recommended, and to another about two miles lower down, about a quarter of a mile above the hut and stockyard erected on the river flat on Mr. Wilson's run. The latter site possessed the greater advantage of general convenience, and of shortening the length of the main road by about two miles and a half, but on making detailed examinations and sections of the river bed and adjoining ground, I was reluctantly obliged for many reasons to abandon it, in favour of that higher up.

A comparative idea of the leading features of these two sites may be obtained from the following particulars:—

	Upper Site	Lower Site.
Width between sound banks	1,160ft.	1,550ft.
Area between banks available for flood waters above ordinary bed of river, superficial feet	6,380	4,130
Average depth for flood waters	5.50	2.66

The slope of the river being also greater at the upper site, it possesses much greater capacity than the lower one for the discharge of flood waters without overflowing the banks; the channel being also narrower and deeper tends to retain the river within present limits, and to aid its action in carrying off shingle brought down by the floods; the higher banks also interpose a greater obstacle to any tendency of the river to leave its present course and cut new channels through the shingle plains.

I therefore recommend the site shown on the accompanying drawing as possessing the balance of advantages in its favour for the construction of a bridge across the river, in a position which is reasonably convenient for the traffic from both the upper and lower districts of the plains.

The new route between Timaru and Ashburton, either by Geraldine or the Orari, will be about seven miles longer than the present road by the lower ferry; the upper portion of the plains and the agricultural districts around Geraldine will be benefited by being placed in close proximity to the main line of road.

The detailed plans and sections of the site recommended are not yet completed, nor have I had time to fully mature my ideas as to the most suitable and economical class of structure to be erected, but I may mention that, from sketches and calculations already made, I think I see my way to providing a bridge with piers of indestructible materials, and a superstructure of timber, which will not exceed the amount of money now at the disposal of the Board for that purpose.

In anticipation of the approval of the site recommended, the drawings for the bridge are now in course of preparation.

I would also suggest that the accompanying drawing should be sent to the Provincial Government, with a request that the reserves for the bridge, and the lines of road in connection with it, should be made without delay.

I have, &c.,
J. Paterson.

P. B. Luxmore, Esq.,
Chairman, Timaru and Gladstone Board of Works.

No. 3.

Report by Messrs. C. N. Bell and T. S. Tancred.

Sir,— Public Works Office, Christchurch, 25th July, 1872.

In accordance with your instructions we have examined the River Rangitata, with a view to report upon the best crossing for the Great Southern Railway.

We find that by taking the upper crossing and passing over the bridge just completed, the line will be lengthened five and a half miles, and will have to ascend an extra height of 315 feet.

The existing bridge is not in our opinion sufficiently strong to carry combined road and railway traffic. We find that the main girders have barely sufficient strength, and that the cross girders are