

faces, in a depth of from 8 to 9 feet at low water, and from 18 feet 6 inches to 19 feet 6 inches at high water of spring tides.

Assuming that the formation of the channel over the bar hereinafter referred to is postponed, a further extension of this jetty, as indicated by dotted red lines, might be undertaken hereafter, when the requirements of the trade may out-grow the accommodation which would be afforded by the work recommended for construction forthwith.

It will be observed from the detailed views that the mode of construction I have suggested would result in the formation of a work possessing much greater strength and stiffness than either of the existing jetties or wharves; less material could not, however, be employed without prejudicing the permanence and stability of the structure or impairing its utility.

#### *Extension of Jetty at Te Kopu.*

The second work to which I have to refer is an extension of the proposed jetty at Te Kopu. Bearing in mind the advantageous position and depth of water at this place, and the certainty of the maintenance of at least the present depth along the right or eastern shore of this part of the river, I have shown on the drawings by red colour and in dotted red lines, respectively, two extensions of the work of which I expressed approval in my report of 25th May of last year. The prolongation tinted in red should be executed forthwith, and the further extension carried out hereafter when found desirable. It will be seen that the suggested works would commence from the westward termination of the jetty which I have previously approved, and extend, in prolongation of that work, for a length of 160 feet. From thence it would turn in a north-westerly direction for a length of 300 feet, so that craft lying alongside would be directly fore-and-aft with the currents of the river—a material advantage, affording also the means for berthing vessels alongside either face of the jetty. The mode of construction I would recommend is shown on Figs. 2 and 3 on Drawing No. 2, and is somewhat similar to that previously described for the Tararu Jetty; the character of the timber to be employed would also be the same. The deck would be 40 feet wide over-all, and placed at the level of 7 feet above high water at spring tides. Provision would be made for laying two lines of railway hereafter, to be connected with the shore by curves passing over a triangular platform placed in the re-entering angle, between the inner face of the extension and the north face of the approach, as shown by a dotted line on Fig. 1, Drawing No. 2.

#### *Improvement of the Outfall of the Kauaeranga, below Shortland Wharf.*

I have indicated on Drawing No. 1 an improved course which might be given to the lower portion of the channel of the Kauaeranga. The harbourmaster, Captain Best, informed me at the time of my visit that there appeared to be a natural tendency for the currents to form a channel somewhat in the direction shown by red colour on the drawing. This should be encouraged by artificial means to the extent of excavating a cut down the foreshore, so that the tidal and river currents might follow the new course, and thus scour the channel, and improve both the depth and the direction of the navigable approach to Shortland Wharf.

#### *Turnwater Bank and Telegraph Crossing.*

On Drawing No. 1 I have also shown by red dotted lines the position and direction of a turnwater or training bank of rubble-stone, which I would recommend to be carried out on the right or eastern side of the river, opposite to Orongo, at the Telegraph Crossing. It was apparent at the time of my inspection that such a work as this was very desirable, in order to prevent the splitting of the tidal currents, whereby the stream is divided into two branches, one following the main track of the river, the other that of the subsidiary channel between the long sand-bank (which is dry at low water) and the right foreshore of the river. The training bank I have recommended would close this subsidiary channel, and cause the whole volume of water, both tidal and fresh, to pass along the direct and main course; the improved scour due to this concentration of the currents would exercise a beneficial influence in deepening the water at the tail or seaward end of the sand-bank to which I have referred.

#### *Suggested Improvement at Entrance of River.*

The great obstacle to the navigation of the Thames is the shoal or bar which exists at its mouth. Upon referring to Drawing No. 1 it will be seen that for a length of two miles, and entirely across the entrance to the river, there is a depth of from  $4\frac{1}{2}$  feet to 6 feet only at low water of spring tides; whereas between the landward side of this shoal and Te Kopu there is, with one slight exception, a navigable depth of not less than 12 feet at low water; seaward the depth regularly increases, and is free from further obstruction. The rise of tide at springs is 10 feet 6 inches, hence on the crest of the bar, at the shoalest part, there is 14 feet 9 inches at high water of those tides, and about 2 feet less at neaps. This depth, allowing for "scend" or undulation, is barely sufficient for the passage of ordinary coasting vessels under favourable conditions of weather, and is altogether inadequate for the accommodation of a regular steam service into and out from the river by vessels of a reasonable size.

It is not improbable, in fact I may say it would seem to be inevitable, in view of the growth and development of this rich and important district, that sooner or later the question of the formation of a deeper approach to the river will have to be taken in hand: I have therefore shown on Drawing No. 2 what, having regard to the information now available, would appear to be the best position for a cut or channel to be dredged across the shoal in a W.N.W. direction. The bottom of this channel would, in the first instance, be not less than 8 feet below low water of spring tides for a width of 220 feet, as explained on the note and section Fig. 7, Drawing No. 2. As soon as this preliminary cut has been carried through it should be deepened, so as to afford a navigable approach to the river of not less than 12 feet at low water of spring tides, over a width of 200 feet.

The question naturally arises as to whether such a channel would be kept clear by the natural scour due to the efflux and reflux of the tidal and river waters, without being trained and contracted