

Both extensions would consist of close whole-timber piling, the bays or distance apart of the braced frame being 8 feet from centre to centre, and 31 feet in width transversely to the respective lines of the piers from outside to outside of the piles at the top level. Three piles with suitable horizontal and diagonal ties would form each bay. Between the outer main or "bay" piles, the sides of the piers would consist of close whole-timber sheeting, driven to a depth of about 8 feet below the future bed of the channel in the entrance, or to 17 feet below low-water level. The hearting or spaces between the piles should consist of rubble-stone, if suitable material can be obtained at a less cost than small concrete blocks, failing which the latter should be employed. The top of the piers would be battened down at intervals of 2 feet by the upper horizontal ties, and by special athwart half-timbers. I may mention that the above mode of construction is very similar to that which was successfully executed by Mr. Carruthers at Napier, but somewhat heavier to suit the altered conditions of exposure.

The depth in the entrance on the complete execution of the extensions would be about 9 feet at low water, or 16 feet at high water of spring tides, and the fluctuations in this depth in consequence of the disturbances of the shingle by gales would of course be less in extent, and of less frequent occurrence, than would be experienced upon the completion of the works contemplated under the first instalment.

It is desirable that I should here refer to the width of 450 feet being subject to some modification, either by increase or diminution, should experience show that a change is necessary. The lines of the works have been so devised as to admit of the width of the opening being determined as may appear desirable, although calculation and the results of somewhat analogous cases point to 450 feet or thereabouts as being correct.

In view of the uncertainties which attend the procuring of suitable stone in the locality, I have not considered it desirable to name a sum as the estimated cost of the works comprising the second instalment of the improvements. Should these works be ultimately decided upon, it will be requisite that the district should be thoroughly explored, with a view to ascertain if rubble-stone for filling the piers cannot be obtained at a reasonable cost.

Future Channels.

I have shown upon the plan, by crossed red lines, the position of a future channel with half-tide training-banks on either side. These would not, of course, be executed until required and justified by the requirements of trade. It is highly probable that the scour of the currents would require some aid from dredging for the formation of a satisfactory channel throughout the length indicated, but its maintenance when once formed would, I believe, be effected by the scour alone.

Future Wharfage.

I have also indicated upon the plan the best position for a line of future wharfage along the face of a portion of the Marine Parade on the south bank of the Wairoa above the bend. The river at this point would always afford a sufficient depth of water in front of the wharves.

Protection of River-bank at Bend.

Should the river currents prove to be cutting into the concave face of the bank at the bend, which seems probable from the plans, then the bank where so affected should be protected at an early date by a facing of faggots weighted and backed by clay or other suitable material, the top of the fascine protection being carried above the highest recorded flood level.

Modification of Bend.

I have not put forward any proposal for flattening or otherwise modifying the abrupt bend in the course of the river near Clyde Township. The requirements of the case certainly do not call for any remedial measures at present, nor are they likely to be required in the immediate future, especially as the observations taken by Mr. Jones clearly show that the bend does not interfere with the tidal development in the river, the seaward compartment of which is now perfectly filled each tide.

The Secretary, Marine Department, Wellington, New Zealand.

I have, &c.,
JOHN COODE.