admit of the travel of the shingle across the mouth of the harbour, and at the same time to afford the fullest measure of concentration of the currents where most required. Mr. Weber has proposed, in his report of 25th March, 1879, to extend the eastern pier 400 feet; but unless this were accompanied by a corresponding prolongation of the western work, but little benefit would accrue to the entrance, for, notwithstanding that a considerable addition to the storage area for shingle eastward of the east pier would thus be provided, no practical addition to the scouring effect of the currents would be afforded. Moreover, after a time this increased area would also become filled, and the low-water line would again reach the end of the extended pier, whereupon the travel across the mouth of the harbour would be resumed, and it would then become imperative for the keeping open of the entrance that the west pier should be similarly prolonged. My view is that both piers should be extended simultaneously, and if funds cannot be found for the adoption of this course, that the works should remain at their present lengths, securing their outer ends to prevent damage by inshore gales. I regard the maintenance of the relative positions of the two existing pier-heads as of the highest importance, whether extensions be undertaken or otherwise.

The mode of construction I would recommend for the proposed extensions is similar to that of the existing piers, except that the continuous sheeting, or facing, both on the sea and channel sides, should be of whole instead of half timbers, and that the external piling should be battered at $1\frac{1}{4}$ inches to 1 foot instead of being driven vertically, the internal diagonal ties being securely double-bolted to the piles, instead of attached to the cross braces. The top of the innermost 150 feet of each extension should be inclined at a gradient of 1 in 50 from 6 feet above high water of spring tides, the level of the present piers, to 9 feet above high water, at which latter level the remainder of the work would be finished. The addition to the thickness of the sheeting, and the increased height of the extensions, are necessary in order to provide for greater wave-stroke and exposure than in the case of the present structures. During the execution of the foregoing works, the channel between the piers should be deepened for a width of 150 feet, so as to give 10 feet at low water, or 15 feet 6 inches at high water of spring tides, being the permanent navigable depth in the entrance which the pier extension and improved channel may be expected to afford. It would no doubt be practicable to execute, in course of time, the requisite deepening of the

It would no doubt be practicable to execute, in course of time, the requisite deepening of the channel by the use of dynamite and a rake, as practised prior to the date of Mr. Weber's report; but it is in every way preferable, in the interests of economy and progress, that this deepening should be effected in the usual manner by dredging, aided perhaps by the occasional use of dynamite to loosen, and if need be to break up, any boulders that may be closely packed together or too large to be lifted by the dredging apparatus. I may observe that, without pronouncing a positive opinion on the point, it is not made clear to me that these boulders have travelled along from Napier Bluff. The quantity of material to be removed is not large, and if advantage were taken of periods of slack water and low tides a dredge might be employed with useful effect, notwithstanding the rapid currents to which I have referred.

Second Instalment of Proposed Works.

The second instalment of the works for the improvement of the entrance would consist of a further prolongation of the east and west pier each to the extent of 400 feet, still maintaining a parallel waterway between the structures of 400 feet in width. The mode of construction would be the same as described for the first instalment, except that the seaward end of each pier would terminate with a mass of Portland cement concrete, deposited within a sheet-piled casing. The channel would be still further improved by dredging to at least 12 feet below low water of spring tides, or 17 feet 6 inches below high water, a bottom width of 150 feet being still maintained. This increased depth in the fairway would enable full advantage to be obtained for navigation purposes of the benefits to be derived from the prolongation of the piers.

Under existing conditions, the tide continues to run into the harbour until the water level has fallen 12 inches below high water at sea, and similarly it runs out at low water until the tide has risen 15 inches at sea, thus showing that the existing entrance is of insufficient sectional capacity to perfectly fill and empty the tidal reservoir. In the case of such a large area it is not practicable to fill the entire backwater to the level of high water at sea during springs, but nevertheless the improved channel will tend in this direction, and therefore add to the tidal volume.

Prospective Works.

I have indicated by red-edged lines on the drawing the manner in which the "Iron Pot" might be converted into a small tidal basin, having a capacity of $8\frac{3}{4}$ acres. I have also shown by dotted red lines how the berthage accommodation can be still further increased, if required at any time hereafter, by constructing in sections, as desired, an inner floating basin or dock connected with the proposed outer basin on the site of the Iron Pot. A swing bridge between the two floats would carry the main road from the railway-station across the entrance to the inner dock.

Estimates.

I estimate the cost of the proposed works as follows :---First Instalment-£ Extension of east pier, 400 feet in length ... 18,813 Extension of west pier, 400 feet in length ... 18,878 37,691 Deepéning entrance-channel to 10 feet below low water of spring tides 3,552 Total first instalment ... £41,243 •••