

of the toes of same vary a good deal at different places, in some bays being well back, while at others they come out beyond the raker piles, this indicates clearly that the same result may be expected wherever the conditions approach that of any bay of the existing staiths; I have accordingly drawn on one of the cross-sections of the existing staiths the average cross-section shown by Sir John Coode's for the new work, allowing for the greater depth to which experience has shown us that we must expect the river to scour—viz., 20ft. A glance at these sections will show that the position in the two cases is practically identical. The slopes drawn on at this greater depth bring the bilge of a vessel directly on to the stone work, and this allows for no differences in the range of spring tides, which vary from 8ft. to 11ft., and for no inequalities of contour which may be taken by the stone apron, and which will have to be provided for, otherwise the position will be distinctly dangerous.

"I should say, in explanation of this apron, that, with regard to the stone protection indicated by Sir John Coode, this can be hand-pitched as far as low water spring tides, but below that level it will have to be tipped at random, as was done at the back of the existing staiths; a certain portion of this stone gathers at the toe of the slope and forms an apron, which secures it. The principle of his class of protection is that as the bottom of the river-scour approaches the stone work part of the apron falls in and fills up the vacancies. If the scour goes so far as to swallow up the apron completely the stone above will begin to slip, so that if the bank-protection does its work and fulfils the purpose for which it was designed, the stones must roll out unless prevented by some obstruction such as face filing. The reason no apron appears on the cross-sections of existing staiths is that the stones have been lifted as they rolled out.

"I may point out that no retreating of the foreshore a few feet back will materially alter this position; it would have to be retreated very considerably back, and then it would still leave the commencement and the end of the new works for a considerable distance (268ft.) exposed to the danger besides entailing a departure from one of the recommendations Sir John Coode puts most strongly.

"Should this work be allowed to drift by now without being done it will cause considerable loss and inconvenience, as it will have to be put in hand when vessels commence to frequent the new berths; and with an increased output due to the opening of the northern mines, the amount of unavoidable delay will be considerable during its progress. We found it so when carrying out the original facing. The pile facing can be more efficiently constructed if carried out when the rest of work is in hand than it can if carried out when the coal-staiths extension is finished, as it has then to be placed out of line with the main piles of the structure owing to its being virtually impossible to drive piles in this line beneath the overhanging staiths (see details, cross-section); consequently there is a vacancy left between the main piles and the end face piles in each bay and each raker (see sketch below), which in some cases amounts to 4ft. Through these openings stones have continued to roll on the existing staiths up till now, and have had to be lifted and the openings blocked by means of sleepers placed across them by a diver."

In the face of these facts, I think it would be unwise to delay the work.

I have, &c.,

The Chairman, Westport Harbour Board.

JAMES WILSON, A.M.I.C.E.

SOUNDINGS shown below are reduced to Low Water Spring Tides, Westport, 20th September, 1889.

Top end				Top end					
		4 off ⁽¹⁾	22½ off ⁽¹⁾	45 off ⁽¹⁾			4 off ⁽¹⁾	22½ off ⁽¹⁾	54 off ⁽¹⁾
		Ft. in.	Ft. in.	Ft. in.			Ft. in.	Ft. in.	Ft. in.
Coal-staiths—					Coal-staiths—				
Bay No.	1	13 1	13 6	12 6	Bay No.	35	19 4	20 4	20 10
"	3	13 5	14 2	12 11	"	37	19 4	20 4	18 4
"	5	12 5	13 11	13 2	"	39	19 5	20 5	19 5
"	7	14 1	14 1	13 7	Lower pile		19 6	20 6	18 6
"	9	15 1	15 1	13 4	Below staiths		19 10	19 10	19 10
"	11	13 4	15 10	13 10	"	50ft.	18 10	19 10	18 10
"	13	17 1	15 7	14 1	"	75ft.	17 10	17 10	17 10
"	15	16 4	16 4	15 1	"	100ft.	16 4	16 10	17 10
"	17 ⁽²⁾	16 1	16 1	15 1	"	125ft.	16 10	16 10	16 10
"	19	16 4	16 1	16 1	"	150ft.	16 11	16 11	15 11
"	21	16 4	17 4	17 4	"	175ft.	15 0	16 0	16 0
"	23	20 1	20 1	21 7	"	200ft. ⁽³⁾	14 2	14 2	15 2
"	25	22 1	20 1	20 1	"	225ft.	14 2	15 2	15 2
"	27	23 1	21 1	19 1	"	250ft. ⁽⁴⁾	15 8	15 2	15 8
"	29	21 3	22 3	19 3	"	⁽⁵⁾	19 4	19 4	15 10
"	31	19 3	23 3	21 3	"	⁽⁶⁾	19 4	24 4	23 4
"	33	21 4	20 4	20 4					

⁽¹⁾ To the south-west. ⁽²⁾ Has been dredged up to bay 17. ⁽³⁾ Opposite crane. ⁽⁴⁾ Lower side of crane-wharf. ⁽⁵⁾ Watermen's stairs. ⁽⁶⁾ Packington Street, upper pile of 3.

The Assistant-Engineer, Harbour Board.

S. A. LEACH, Harbourmaster.