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PARLIAMENT OF TASMANIA.

$E M U \quad B A Y \quad B R E A K W A T E R$:

REPORT BY C. NAPIER BELL, M. INST. C.E.

Presented to both Houses of Parliament by His Excellency's Command.

(No. 58.)



REPORT ON EMU BAY BREAKWATER.

By C. NAPIER BELL, M. Inst. C.E.

April, 1890.

Sir,

SINCE my last visit to this place the concrete breakwater has been constructed in accordance with the plans supplied by me for a length of 480 feet, and with a depth of 24 feet at low water. The work appears very satisfactory, and is exceedingly well built; there has been very little settlement, consequently the joints are regular, and no cracking or displacement has occurred. This good result is due to the care and constant attention which has been given to the foundations, where, notwithstanding the cost, the overlying sand has been removed from the clay, and the blocks made to rest on a good bottom.

The question now arises, how the work shall be terminated? The original design showed the end to be built with an inward cant or angle with the object of ensuring calm water. Upon enquiry, however, I am informed that the present straight breakwater affords satisfactory shelter, provided a vessel is moored sufficiently far from the outer end, and, that being so, a straight breakwater is always preferable to one having an angle in it, because, in the first place, a vessel has less trouble in manœuvring to get alongside; in the second place, there is less danger of sand accumulating in the enclosed corner; and lastly, it requires special contrivances, and causes expense and trouble, to get the crane and the blocks round the angled part.

I would recommend that the breakwater be terminated straight, and that it be lengthened sufficiently to give satisfactory shelter to such length of it as is likely to be wanted for vessels. The present length would accommodate one steamer of 260 feet and a smaller vessel of 120 feet. If this is sufficient for the trade of the port, it follows that the breakwater should be lengthened about 200 feet so as to give good shelter to that part already constructed, which, with the blocks now in the water, is 490 feet long. In ordinary weather then nearly the whole length of 690 feet could be used, but in rough easterly weather vessels must be drawn 150 feet or 200 feet from the end to lie securely.

By terminating the breakwater straight the extension of it could always be resumed, and, I think, under present circumstances, it is advisable that it should be left in a position to be extended at some future time.

The original design showed the blocks to be inclined at a slope of fourteen degrees, but some of them have slipped slightly forward at the foot, so that the slope of the blocks is now nineteen

degrees. I consider this to be unsafe, as the blocks, if they should happen to rest on a softer place than usual, might slip forward. This slope should be at once corrected by building for 30 feet or so with bevelled blocks, so as to gradually raise the slope to nine degrees. This is steeper than the original design, which was drawn for a less depth of water, but the depth and weight is now so great that the slope of the blocks must be steepened to prevent any danger of their slipping forward at the foot. At the great depth at which the structure now stands I consider it would be advisable to increase the width to 27 feet 8 inches, so as to give more bearing and stability. This can be done by adding one foot to the present length of the blocks, and the inside being kept flush the widening will take place on the outside.

The end of the work requires to be secured with special care to prevent the blocks from slipping forward at the foot, and also from being sucked out by the sea; the last row of blocks should be sunk into the solid clay, and four blocks placed in front of them, the lower blocks also sunk into the clay. Mr. Sheard proposes to cast the end blocks with a large hole through each, and, when set, to place a four-inch rod of iron through the whole of them, and then fill the hole with cement grout. This is an excellent precaution, and should be carried out.

In building the parapet as shown on original drawings, pieces of old 40lb. rail, 6 feet long, should be built into the body of the work, and project up into the parapet at intervals of 10 feet.

The first work which was done at the breakwater was to widen the old jetty on the seaward side with concrete in mass. This was placed on bags of concrete under water, but the violence of the sea in the corner formed by the shore and the jetty has washed out the small stones on which these bags rested, and some of the bags have been also washed out, leaving parts of the wall undermined. This should be repaired without delay. I submit a drawing showing how Mr. Sheard proposes to repair this damage, which will, I believe, be quite satisfactory, and should be done at once.

Before the new breakwater was commenced the end of the old jetty was damaged by a gale, which cracked the head of it in several places on the harbour side, and tilted it over. This should be repaired and made good by under-pinning the foundations where required, then cutting out the cracked work and building it up again with fresh concrete, in which old rails should be buried to tie the old and new work together.

The original plans showed heavy rubble to be placed along the foot of the breakwater on the seaward side to protect the foundations from being disturbed by the recoil of the waves. Mr. Sheard has had the whole length carefully examined by divers, who report that sand has piled up against the wall, and there is no sign of disturbance by the waves. Mr. Sheard proposes to place rubble against the foot of the wall for about 200 feet from the end of the old jetty, where, the water being shallower, the waves disturb the bottom, and before finishing the work to again examine the whole length, and if no disturbance is found to omit the rubble protection. I agree that this is all that is necessary.

I find that the crane is employed to draw out every setting of 28 blocks, and there are only 12 trucks to carry the blocks, every block requiring two trucks. The crane, therefore, weighing about 90 tons, has to make 14 trips from the quarry to the end of the wall to draw out a setting of 28 blocks, making 10 feet of the breakwater. Besides the great loss of time, amounting to 30 hours for each setting of blocks, there is unnecessary wear and tear of the rails and the crane, which might be saved by having a small winding engine to haul out to the crane her supply of blocks, and providing 28 trucks to haul out at once a rake of 14 blocks. It must also be borne in mind that travelling the crane so many unnecessary trips over the breakwater incurs considerable risk of her breaking the rails or her own wheels, an accident that might involve serious consequences.

I find also that the removal of the sand from the top of the clay in such deep water by divers is excessively slow and costly, amounting to from £70 to £80 for a ten-foot length, or from 28s. to

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32s. per cubic yard of sand removed. I believe the dredge Agnew could run round and dredge a length of 100 feet for £50 or £60, leaving the bottom to be trimmed off by the divers. If this could be done the saving would be very large.

The new breakwater is acknowledged by everyone to be of immense utility to the trade of Emu Bay, which is a rapidly rising district, with increasing production. It frequently happens that two large steamers require to be berthed at the breakwater, and if the wind is easterly, and blowing strong, two vessels cannot lie at it with safety. If it were lengthened about 200 feet the accommodation would be sufficient, and two large steamers could lie alongside in almost any weather.

I wish to express my obligations to Mr. Sheard, the Superintending Engineer, and to Mr. Derrig, the Foreman of the work, for the assistance and information kindly furnished to me by them.

I have the honor to be,

Sir,

Your obedient Servant,

C. NAPIER BELL, M. Inst. C.E.

The Honorable the Minister of Lands and Works, Tasmania.

WILLIAM THOMAS STRUTT, GOVERNMENT PRINTER, TASMANIA.

BAY BREAKWATER. EMU

- Plan attached to Mr Napier Bell's Report April 1890. -- SCALE ---SCALE OF DUNIN PLAN OF PROTECTION AT COMMENCEMENT. APPROS LINE OF WALL SET IN CEMENT MORTAN 22 TONS CONCRETE BLOCHS SPECIAL BLOCK LANK IT SCHLETCHE CHARM OUT IN MERSEY NEW THE AND .0 SITE REQUIRES PROTECTION 72:0 13 IRON NED SECTION

LONGITUDINAL ELEVATION







SECTION.

