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1890.

PARLIAMENT OF TASMANIA.

CIRCULAR HEAD (STANLEY) HARBOUR:

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

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

REPORT ON CIRCULAR HEAD (STANLEY) HARBOUR.

By C. Napier Bell, *M. Inst. C.E.*

April, 1890.

Sir,

Acting under the instructions conveyed to me in your letter of 26th ult., I proceeded to Circular Head in company of the Engineer-in-Chief and Mr. Sheard, the Superintending Engineer of this district.

I made a careful examination of the port and the bay, as well as the inlet or lagoon which is believed to be causing the increased shoaling of the water recently observed. With the assistance of Mr. Sheard I extended the survey of the shore round the "Nut," and took a number of soundings of the port and the deep water off the "Nut."

On examining the port I at once noticed that the sands, which, as mentioned in my former report, accumulate round the port and cause shoaling of the water, have increased considerably. I was informed that this increase has been specially noticeable during the past twelve months, and is attributed to prolonged easterly winds; however that may be, the accumulation of sand at the port has been observed for many years, and I believe it has been caused by the cattle browsing on and treading over the sand dunes or hills which line the beach from the port eastwards as far as Rocky Point. These were formerly closely covered up with vegetation, and therefore fixed; now they are mostly uncovered, and the sand is blown by S.W. winds into the sea, and by E. and N. winds into the inlet. That which is blown into the sea probably works its way along the shore towards the port by the set of the shore currents in easterly winds, which is towards the "Nut." The greater part, however, is carried from the inlet directly to the port by the strong ebb tide setting out of the inlet, which, flowing by the channel of the inlet, discharges into the sea at the old jetty. This inlet channel is enclosed from the sea by a long sand-bank or spit, covered at high water. At low water this spit is dry, and the easterly winds blow the sand off it into the channel, and this, together with sand blown from the sandhills of the sea beach into the inlet, is carried at each ebb tide to be deposited where the channel discharges into the sea, which is at the port.

The long sandspit which encloses the channel from the sea as far as the port is not a new feature, being shown on the Admiralty chart of 40 years ago; but until recent years the channel discharged at the end of the sandhills (*see* sketch), with the effect of only thickening the spit. When in recent years this opening was closed by the sea, the inlet channel became entirely bounded by the spit, and began to discharge at the end of it which was near the port, and from that time, of course, the sand carried by the channel discharged near the port, and has been continually shoaling the water until now the enclosing spit has passed the old jetty, and is slowly advancing into deep water toward the "Nut."

It appears evident, from the features of the coast, and the fact of the "Nut" having once been an island, that this action of the sand, accumulating under the shelter of it, has been going on for centuries. But the great increase noticed in recent years is due to the channel of the inlet; and if this could be prevented from acting, the accumulation of sand would continue, but much more slowly.

It is, therefore, the channel of the inlet which has destroyed the old port; and I consider that if its action is not checked, the present rate of advance of the sand would always be a cause of anxiety for the preservation of deep water at the proposed breakwater.

If the channel could be diverted the advance of the sands would be so much slower that a breakwater, in the position shown, would, in all probability, not be injuriously affected for a great many years—no one can tell how long—but, most likely, for so long a period that its ultimate shoaling need not be considered by the present generation.

There are two projects for the diverting of the channel which are worth considering, and I beg to refer you to the accompanying sketch made by me, in the absence of any survey, to explain the whole position.

If an opening were cut through a narrow neck of the sandhills of the sea-beach at the point A, and a dam of earth placed across the channel of the inlet at C, the strong tidal flow through the channel would be checked. I would expect the sea would then close up the channel, and the inlet would be forced to discharge at A. It is to be expected that from this new outlet the sand would still creep along the coast with the south-east set of the current in easterly winds; but the increase of sand at the port from this action would, as mentioned above, be very slow. It would not cost much to do this work, as the sand could be excavated with a horse-shovel; and there is plenty of clay close at hand to form a dam at C, which should not be commenced until the new opening at A was finished.

For want of a survey and the necessary levels I could not form an estimate of the cost for this Report.

Another proposal is to cut an opening for the inlet to discharge into the Black River. This would require a channel about two miles long through low sandy country; and in addition to the cost of this the dam to close the present channel would have to be made very strong and water-tight, because the inlet having then to be filled every tide by a small shallow cutting two miles long would not fill up to the level of high-water in the sea by several feet, while the full high-water level would stand against the outside of the dam, and there would be this difference of level of the water on either side of it, which would require it to be very well constructed to prevent its being under-mined by the flow of water through the sand either underneath it or round its ends.

Although an opening were made at the spot shown at A on sketch, I quite anticipate that there will always be some difficulty in keeping it open against the action of the heavier waves tending to close it up, whereas the present opening under shelter of the Nut has much smaller waves to fight against, and this is just the reason why the channel has a tendency to creep round to the more sheltered position for its discharge into the open sea. Nevertheless, if it is the intention to construct a breakwater, I would recommend that the work of cutting a new opening for the discharge of the inlet be undertaken, and every means be used from time to time to keep it open.

There can be no doubt that to make the inlet discharge into the Black River would be the most effectual cure for this evil, but the expense would be great, and I have not the data at hand to estimate it.

Upon observing the advance of the sands at the old jetty, I saw the advisability of removing the proposed site for a breakwater as far from it as possible. The effect of this is to place the break-water as now shown in very deep water, which of course will increase the cost for the same length. It should not be less than 500 feet, for the security of steamers, and this will place it in 34 feet of water at low water spring tide.

As the construction of the breakwater is likely to be continued in future years when more means are available, it would be advisable at present to finish it straight, and without the cant or angle, which would give the best shelter. The straight breakwater would give shelter as good as that at Emu Bay breakwater, which is found to be satisfactory.

The style of construction would be rubble embankment, tipped from trucks without staging, the outer slopes being protected with heavy rock, as the exposure is very severe in such deep water. The heavier the rock placed on the slopes the steeper will these stand, and consequently the less rock will the breakwater take. Smaller rock will allow the sea to "claw" down the slopes till they take such flat inclination as 3 to 1, or even 5 to 1.

The economy of placing on the slopes the heaviest rock is therefore evident, and there is also greater security from the stability of the work, as smaller rock is much rolled about, and finally ground to pieces.

I would recommend the wharf for berthing ships to be placed alongside the stonework, for the reason that the closer ships lie to the stonework the better the shelter would be.

The piles of this wharf should be of the best jarrah, great care being taken to see that it is the durable kind, and cut at the right seasons. Jarrah is said to resist the sea-worm for many years, and when finally destroyed new piles can be driven into the stumps of the old ones cut off just above the bottom.

The least amount of plant necessary to carry out this work in an efficient manner should consist of not less than one ten-ton and one twenty-ton cranes, travelling on a 3ft. 6in. gauge, but not self-

propelling. The type of cranes procured by me for the Westport (New Zealand) Harbour works I found to be very satisfactory. These two cranes would load about 40,000 tons in a year's work.

The number of tipping trucks, both side and end tip, would be regulated by experience of the progress made in quarrying, loading, and conveying the stone, the relative numbers of each kind being about one side-tip to three end-tip trucks.

The rails for conveying the stone from the quarry to the breakwater may be 45lb., or even 40lb. steel, as an extra number of sleepers will compensate for the lightness of the rail. A small locomotive should be used to shunt, convey, and tip the loaded trucks.

I estimate the cost of this breakwater for 500 feet, and with 300 feet of timber wharf, at £4773; and this does not include the necessary road from the town to the wharf.

From the great depth of water at this breakwater, and from the distance and depth of water between it and the advancing sands near the old jetty, I do not think that the depth of water at the breakwater will be injuriously affected by shoaling of the water for a great many years, perhaps as long as the settlement has already existed, because the quantity of sand required to silt up the space between the old jetty and the proposed breakwater would be considerably more than has accumulated in that space of time.

I have the honor to be,
Sir,
Your obedient Servant,
C. NAPIER BELL, *M. Inst. C.E.*

The Hon. the Minister of Lands and Works.

Approximate estimate of cost of breakwater and wharf—	£
Stone breakwater, 500 feet	28,300
Railway, engines, plant, and tools (less re-sale after completion)	3300
Wharf	4773
	£36,373

WILLIAM THOMAS STRUTT,
GOVERNMENT PRINTER, TASMANIA.

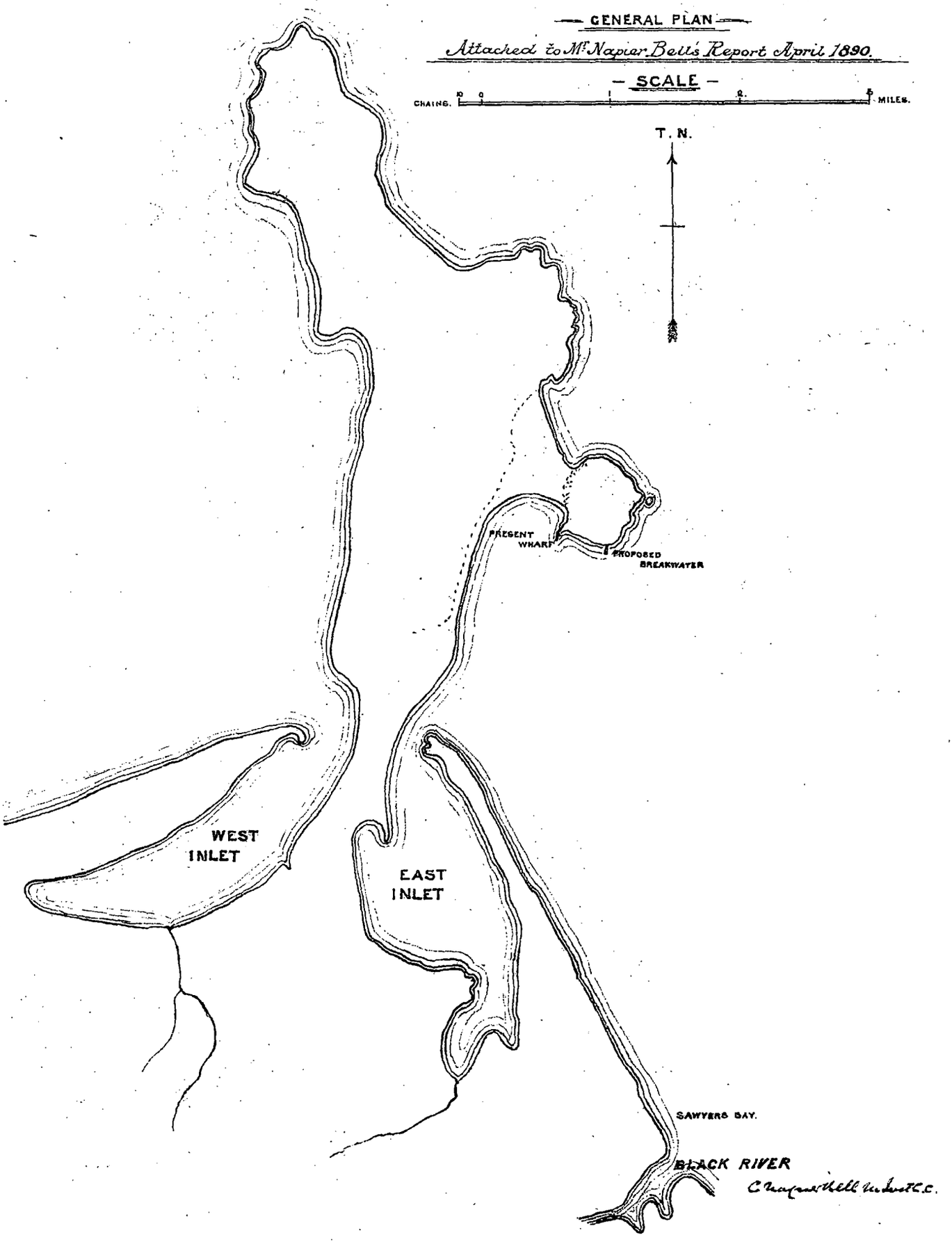
STANLEY HARBOUR
CIRCULAR HEAD

— GENERAL PLAN —

Attached to Mr Napier Bell's Report April 1890.

— SCALE —

CHAINS. 10 0 1 2 5 MILES.



C Napier Bell Inst C.E.

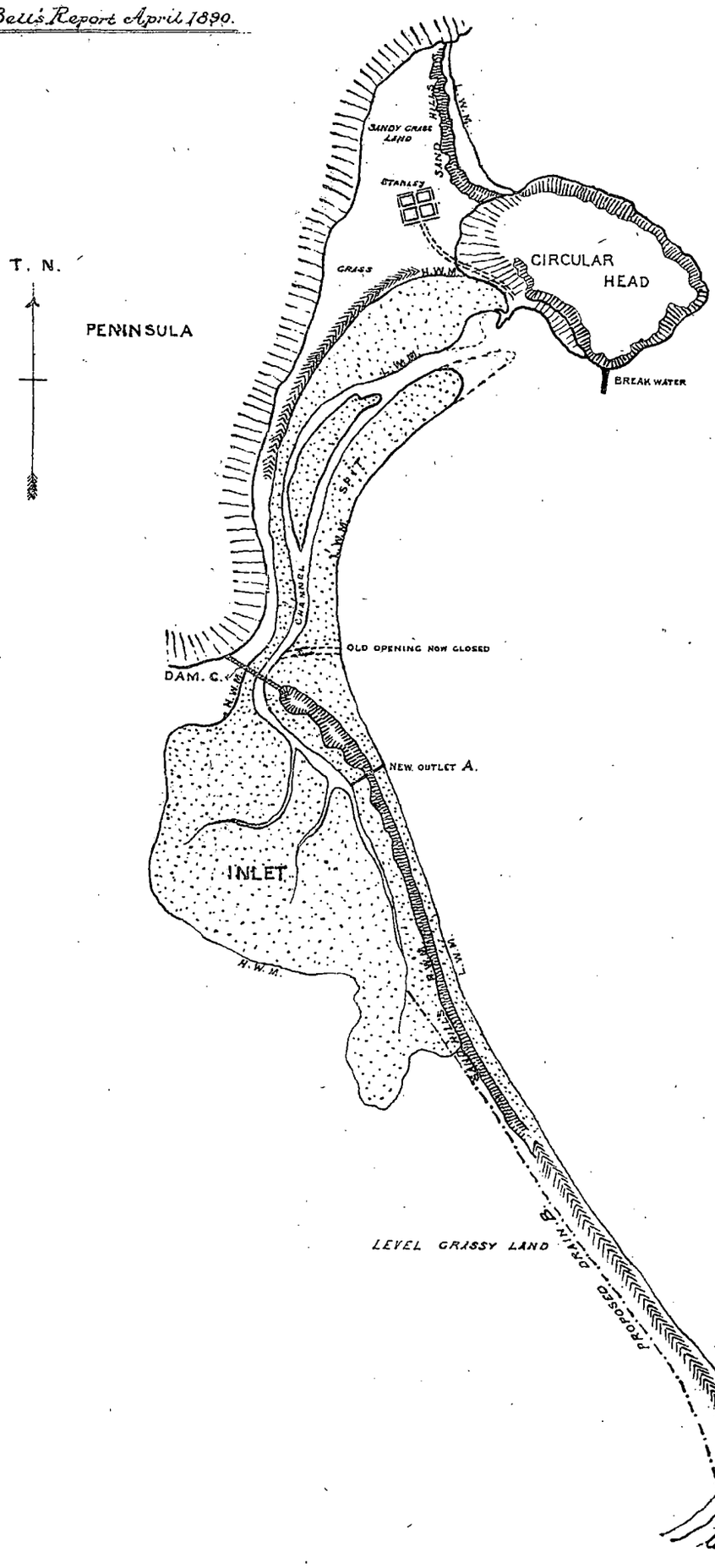
STANLEY HARBOUR
CIRCULAR HEAD

— SKETCH PLAN —

OF

SHEWING THE CHANNEL OF INLET AND THE ENCROACHMENT OF SAND.

Attached to Mr. Napier Bell's Report April 1890.

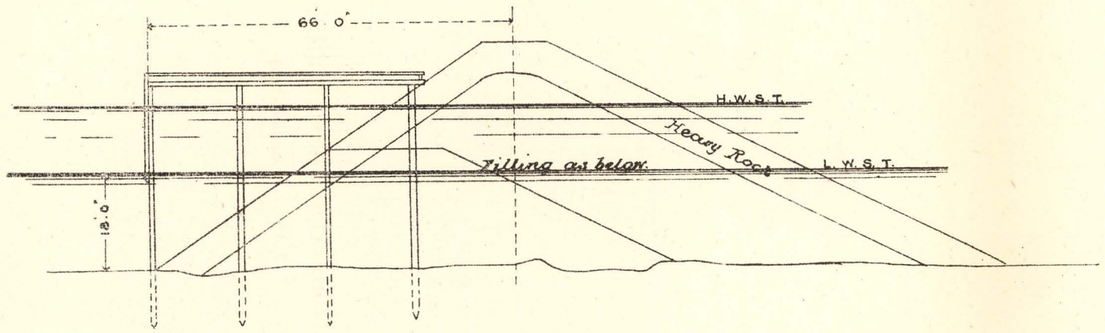


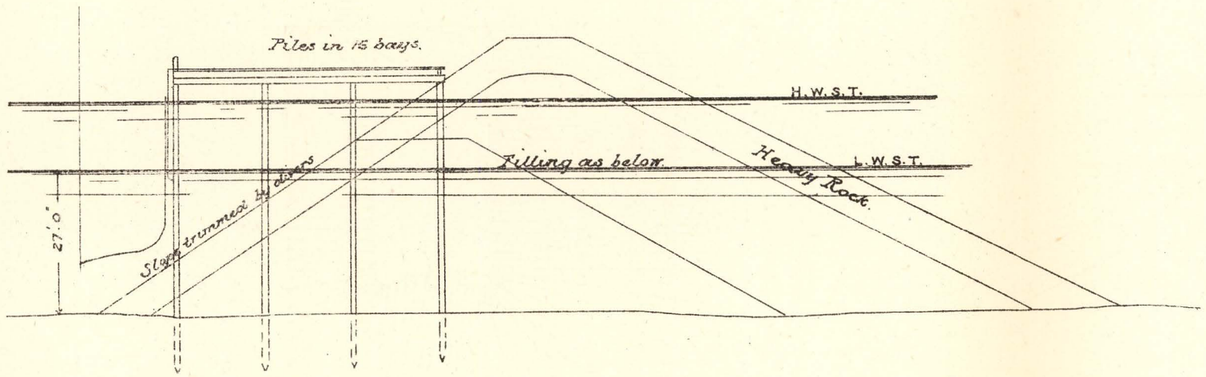
STANLEY HARBOUR.

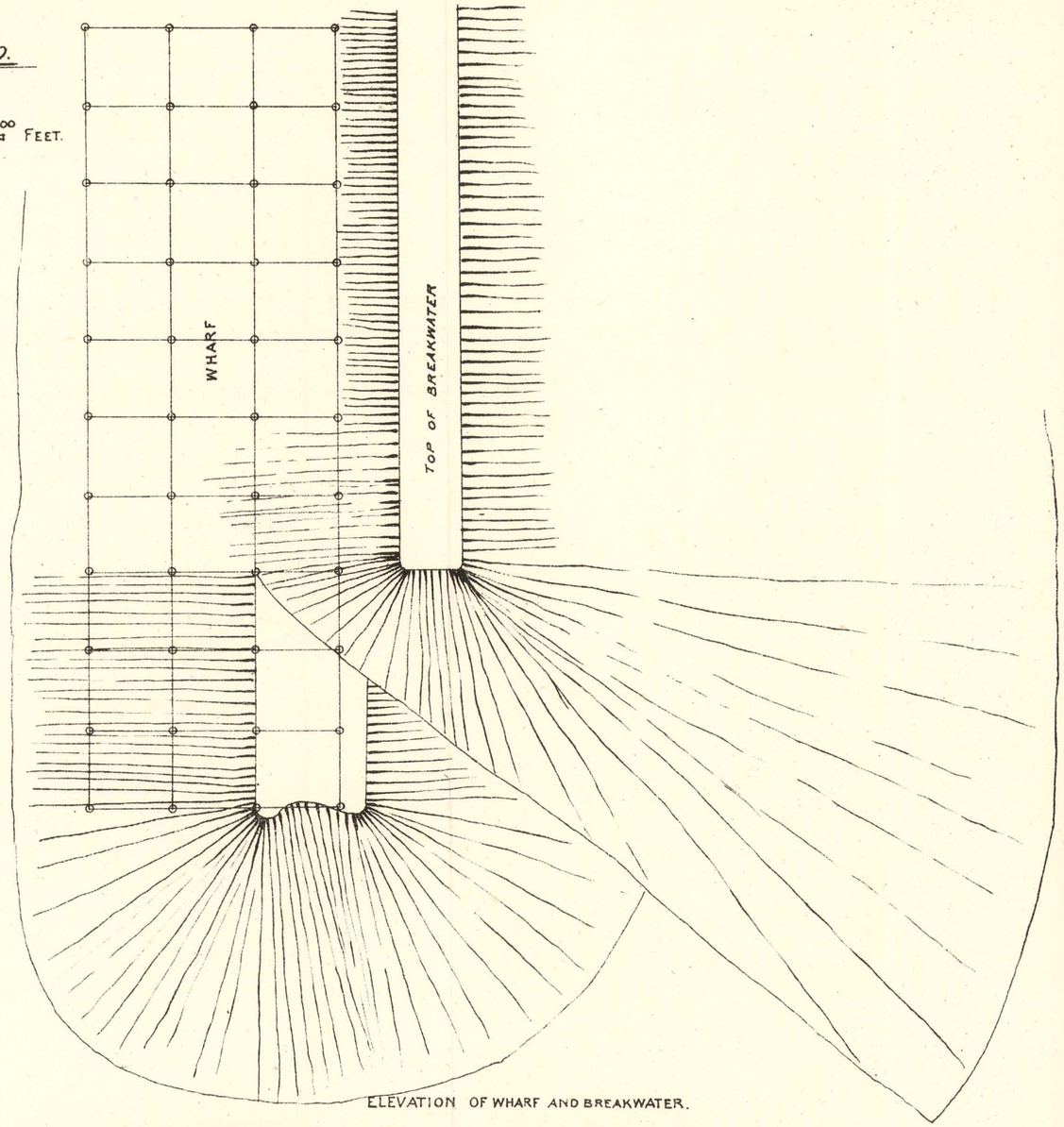
Plan attached to Mr C. Napier Bell's Report April 1890.

SCALE.

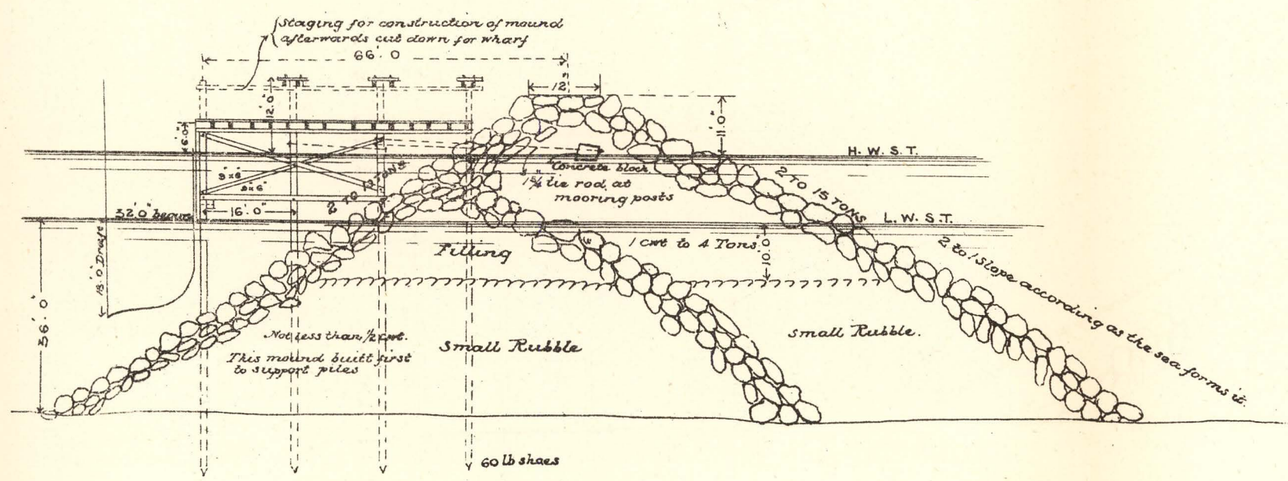
10. 5. 50. 40. 30. 20. 10. 0. 50. 100 FEET.

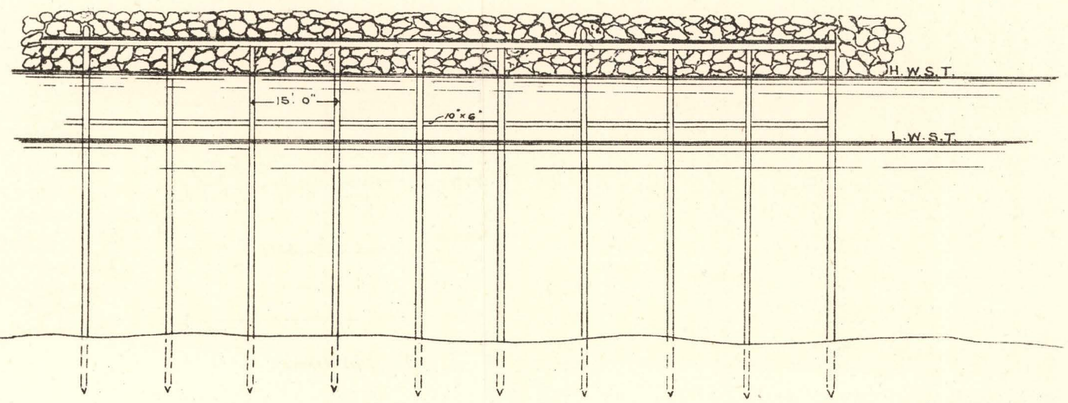






ELEVATION OF WHARF AND BREAKWATER.





C. Napier Bell M. Inst C.E.

STANLEY HARBOUR.

Plan attached to Mr C. Napier Bell's Report April 1890.

SCALE

LINKS 100. 50. 5. 4. 3. 2. 1. 0 5. 10. 15 CHAINS.

SOUNDINGS IN FEET BELOW L.W.O.S.T.