

Mr. J. D. Holmes who consider a parapet necessary; and as Mr. Marchant only advises it to prevent seas coming over and to provide calm water, and as the evidence tendered to your Commission was that seas coming over the breakwater did not cause rough water, we are left with Mr. J. D. Holmes as the only advocate in 1927 for the provision of a parapet. I am of the opinion that as the Breakwater Harbour has now been in use for thirty years, and that as no serious damage to vessels has taken place, that there is no justification for the inclusion of the additional cost of a parapet in Mr. J. S. Holmes's estimate, and therefore eliminate same from further consideration.

The greatest discrepancy between Mr. J. D. Holmes and Mr. Furkert's evidence are their respective estimates of the west mole. I have taken out the quantity of rock required in accordance with Cullen and Keele's 1925 plan, and find that after deducting 40 per cent. for voids and adding 10 per cent. for loss in settlement, 180,000 solid cubic yards would be required. At Mr. Holmes's estimate of £330,000 this works out at £1 16s. 8d. per cubic yard.

Mr. J. D. Holmes (page 102 of evidence) mentions that Cullen and Keele's estimate of £49,690 equals a unit cost of 4s. 4d. per cubic yard. The £49,690 therefore represents 229,515 cubic yards, which must be taken as Mr. Holmes's estimate of the quantity of stone required. On page 102 he states that he adopted 15s. as his unit cost. I would point out that 229,515 cubic yards at 15s. equals £172,136, and not £330,000 as given by Mr. J. D. Holmes on page 101 and included in his estimate.

Mr. Furkert states that Mr. Clapcott, Borough Engineer of Napier, informed him that local quarries near the Bluff were supplying the Council with spalls at 4s. 6d. per yard. Mr. Furkert considers that even if stone had to be brought fifty miles by water the cost would not exceed 12s. per cubic yard.

Mr. Furkert suggests that there is no necessity to construct this mole to a greater height than 2 ft. 6 in. above high water. See his evidence, page 526. This will reduce the quantity required to 140,000 solid cubic yards, which at his estimate of £85,000 equals 12s. 0-14d., which agrees very closely with his unit price of 12s. as per his evidence, page 375.

Messrs. Hay and Rochfort estimate the cost of stone from the Lighthouse Reserve at 4s. (see Exhibit 46, page 2). Mr. J. P. Kenny, Secretary to the Board, in Exhibit 155, gives the cost of rubble as 5s. 6d. per cubic yard. Adopting Messrs. Hay and Rochfort's estimate that 20 per cent. of the bluff at the Lighthouse Reserve would be stone (see Exhibit 46, page 2), and also that the height of the bluff at the base of the breakwater is 300 ft., about 2 acres would be required to supply the 180,000 cubic yards of stone required, and the surplus spoil would almost complete the reclamation of the North and South Ponds, which, per Hay and Rochfort, require 815,000 cubic yards.

The cubic yards in 2 acres, 300 ft. deep, equal 968,000. 180,000 cubic yards required for the moles leave 788,000 for reclamation purposes. As 2 acres can readily be made available on the outskirts of the Bluff Reserve, and as the foundations for the present breakwater were obtained from this source, I see no adequate reason for looking elsewhere for the stone required for the construction of the west mole. After allowing for all contingencies, such as somewhat confined working-space, and the selection and reserving of the larger stones for the western face of the mole, I am of the opinion that 10s. a yard is an ample price to allow for obtaining the stone required and placing it in the mole. My estimate for this portion of the work 6 ft. above high water, as designed by Cullen and Keele, is therefore £90,000. In the event of its being decided to adopt Mr. Furkert's suggestion of reducing the height to 2 ft. 6 in. above high water, the estimated cost could be reduced to £70,000.

I note that in Mr. J. D. Holmes's detail of estimate of his £330,000 for the mole he provides for the expenditure of £225,000 for a concrete apron, for which I can see no justification, as the whole of this mole on the lee side of the breakwater is well protected from the heaviest seas.

#### EXTENSION OF BREAKWATER.

In regard to Mr. J. D. Holmes's estimate for the extension of the breakwater at £386,800 he gives the following details:—

| Breakwater extension, 1,550 lineal feet (at present level)—     |    | £        |
|-----------------------------------------------------------------|----|----------|
| Concrete in cap: 43,000 cubic yards at £2 15s. . .              | .. | 118,000  |
| Concrete in blocks: 72,000 cubic yards at £2 15s. . .           | .. | 198,000  |
| Rubble in foundation: 59,000 cubic yards at £1 . . .            | .. | 59,000   |
| 20 per cent. allowance for loss: 11,800 cubic yards at £1 . . . | .. | 11,800   |
|                                                                 |    | <hr/>    |
|                                                                 |    | £386,800 |
|                                                                 |    | <hr/>    |

In the first place, I do not agree with the quantities adopted by Mr. Holmes. I estimate that to extend the breakwater 1,550 ft., with concrete cap and blocks and ballast foundation, the following materials are required: Concrete cap to breakwater, 20,000 cubic yards; concrete blocks in breakwater, 42,000 cubic yards; concrete blocks, wave-breaker, 18,000 cubic yards; ballast foundation, 45,000 cubic yards.

The next question is as to why Mr. Holmes should adopt £2 15s. a cubic yard as the unit price of his concrete, when the Board's Secretary gives the actual price of concrete as made by the Board's employees with their existing plant at £1 8s. 6½d. per cubic yard (see Exhibit 155), or placed in position £1 11s. 0½d. See Mr. Furkert's evidence, page 373. To justify his price Mr. Holmes referred to tenders which had recently been received by the Board, the lowest price being £2 18s. 9d.; also, to support Mr. Holmes's estimate, the Board tendered the evidence of several contractors, whose prices for concrete placed in the moulds ranged from £1 19s. 6d. per cubic yard to £2 4s. 11d. Dealing in detail with the price of £2 4s. 11d. per yard, it is made up as follows (cost of cement in store, £5 14s. per ton): Shingle, 4s. 3d. per cubic yard of