

REPORT OF MARINE ENGINEER.

Marine Department, Wellington, 27th September, 1880.

I HEREBY certify that the construction of a concrete breakwater at New Plymouth, as shown on the plans marked M.D. 404, 405, 406, and 407, will not be or tend to the injury of navigation.

— JOHN BLACKETT, Marine Engineer

FORSTER GORING, Clerk of the Executive Council.—28th September, 1880.

F.—REPORT BY SIR JOHN COODE, C.E.

5, Westminster Chambers, London, S.W., 17th March, 1880.

SIR,—

New Plymouth Harbour

Adverting to previous correspondence, I have now the honour to inform you that, after receiving from Mr Rees particulars of the relative proportions of stone of different sizes procurable from, and in the vicinity of, Paretutu, which particulars were supplemented by the Board's telegram of December, it became evident that the stone available in the locality was not suitable for a rubble mound section as had appeared to be so probable.

The information supplied by Mr. Rees was to the effect that the trials had proved that seven-tenths of the stones would be of less size than 20cwt. two-tenths from 20cwt. to 30cwt., and one-tenth over 30cwt. Under these circumstances, there was no other course open than that of altering the mode of construction by substituting a concrete work for one of rubble-stone—à *pierres perdues*—a course which I felt should only be adopted as a matter of necessity, arising from the proved deficiency of stone of suitable sizes, knowing, as I did, that such a change must inevitably lead to considerable additional expenditure for a given length of work. I may remark that the result has fully demonstrated the propriety of making the preliminary investigations recommended in my report of 28th February, 1879, with a view to determine the quantity and quality of the stone that would be available.

Acting upon the instructions contained in your letter of 3rd October ultimo, and after due consideration of the whole matter I have prepared such designs as I have considered to be necessary to meet the requirements of the case—that is to say that, whilst the works I have now to recommend are of sufficient strength to resist the force of the seas to which a breakwater in such an exposed situation must of necessity be occasionally subjected, they possess a proper, but not more than a proper, margin of safety to resist exceptional gales. I have, at the same time, so arranged the form and details of the structure that for the whole of that portion of its length which is in more than 9ft. at low water of spring-tides the profile on the inner or harbour-face will serve as a quay adapted for the berthage of vessels, and for discharging and taking in cargoes, or landing and embarking passengers, when lying alongside, protection being afforded as far as practicable by a sheltering parapet on the seaward face. A line of railway would be laid throughout the whole length of the pier and along the berthage portion a second line would be provided, these would, I apprehend, be connected with the general railway system of the colony. The position and direction of the breakwater pier as now recommended are precisely the same as proposed for adoption in my report of the 28th February, 1879.

A section formed of concrete blocks, set with sloping bond, is not, in my opinion, adapted to meet the requirements at New Plymouth. This system has its advantages in some positions, in fact, I am at present carrying out an extensive breakwater of this character in one of the Crown colonies, but it is not, in my view, adapted for a work which necessitates the provision of a high sheltering parapet, which latter would inevitably be seriously cracked and dislocated were it to be erected on a base specially subject to, and adapted for settlement, as in the case of a structure arranged with sloping blocks. I therefore propose, as will be seen from the drawings, in such portion of the pier as would be formed with a vertical face, and adapted for berthage, to employ massive concrete blocks, placed as "headers" throughout, having horizontal beds, with both longitudinal and transverse bond.

The mode of construction I have to recommend for adoption is fully set out on the seven sheets of drawings, and described in the specifications sent herewith.

The extent of the work recommended for execution is coloured red on drawing No. 1. The letters YY on this sheet correspond in position with similar letters on the plan which accompanied the report of the 28th February, 1879.

From the starting-point out to about low water the root and harbour-walls would consist of concrete deposited in mass, a sufficient quantity of Portland cement for which can, I understand from Mr Rees, be obtained in the colony. These walls might be started on the return of the Resident Engineer, in anticipation of the arrival of the special plant. During the execution of this part of the pier and the formation of the workyard, shops, and sheds, the special plant (the designs for which have been matured) might be proceeded with, so that upon the arrival in the colony of the machinery the pier proper seaward of the root, might be forthwith commenced and carried on in accordance with the drawings and specifications.

It will be seen that the section next beyond the root consists of a substructure of bags of concrete, which would be deposited in suitably-contrived boxes of the character shown on drawing No. 7, and thus brought up to low-water mark, and there levelled off to receive the superstructure formed of massive blocks of Portland cement concrete. The adoption of bags of concrete for the underwater portion of the pier will afford considerable advantages over the employment of blocks, as they would readily conform to the shape of the bottom upon being deposited, and would admit of being placed in position from the top with but little aid from divers, a point of considerable importance near the shore, where on most occasions there would be a belt of surf, which would considerably interfere with diving operations.