ward to a depth varying from five fathoms off Patiti Point to two fathoms in Caroline Bay. Beyond the reefs the bottom is sandy, deepening very gradually, and affords, I am told, excellent holding-ground for shipping.

I have already stated that the heaviest seas come from the south-east: Mr. Eliot, however, informs me that gales from the north-east are of frequent occurrence, and produce a short, broken sea, dangerous to vessels lying at anchor in the roadstead; he also says that gales from the east but seldom occur.

Conditions to be fulfilled.—I take it that harbour works at Timaru, in order to be successful, must fulfil the following conditions: First, that the travel of the shingle northward must not be interfered with; second, that shelter must be provided from north-east around to south-east, to enable vessels to lie afloat at all times in perfect safety, with quay to facilitate the landing and embarking of cargoes; third, that the available sheltered depth at low water of the lowest tides should not be less than 20 feet, so as to accommodate vessels of carrying capacity adequate to the wants of the over-sea trade; fourth, that means should be afforded for connecting the quay with the railway system of the province; and fifth, that, in order to insure a fair rate of progress, the works should be of such a character that they can be carried out practically independent of divers, since the exposed situation and the prevalence of surf would render diving operations possible only at rare intervals.

I am fully aware of the difficulties which would have to be overcome in carrying out harbour works of this character at Timaru; but, after giving the matter my best consideration, I do not hesitate to say that it is practicable to construct such works, although their accomplishment can only be effected by a heavy expenditure. In considering this question, and the character of the works to be executed, I have kept prominently in view that Timaru is only at present a small though rising town, and I have therefore endeavoured to confine the extent and first cost of the works to the narrowest limits compatible with the fulfilment of the conditions which I hold to be essential for their success, and to provide means for extension hereafter if required. The design which I am about to describe may therefore be considered as the least in extent which ought to be constructed; and if money be not forthcoming for its execution, then I see no alternative but to continue the surf-boat service, as at present, with perhaps the addition of steam tuggage, and vessels to lie in roadstead.

Any work of the character of an open jetty only may be so constructed as not to interfere with the travel of the shingle; but vessels could not lie alongside of it, and it would not thus be of any use except as a means for facilitating the discharge of the surf-boats in fine weather, as has been suggested by Mr. Carruthers.

Proposals.—The works which I have to recommend may be carried out in two stages—namely, in the first place, those which are the least that can be constructed to afford the accommodation necessary at the present time; and, secondly, those which may be executed at a subsequent date, should it be proved that an extension would be desirable.

Works to be executed in First Instance.—The works should be commenced by constructing an artificial reef from A to B (drawing No. 2), formed of blocks of concrete, each of forty tons weight, deposited in a "pell-mell" form from barges, and carried up to 4 feet above high water of spring tides. This reef would be nearly parallel to the coast-line, at a distance of 1,300 feet from low-water mark, and end-on to the south-east sea. It is evident that such a work as this would not of itself afford any obstruction to the free travel of the shingle northward. Mr. Carruthers states in his report that it is not necessary that the breakwater should be attached to the shore. "Still water is as effectual a barrier as a masonry wall." This would doubtless be the effect of a structure which curtailed to any extent the action of the south-east seas upon the shingle, but could not result from a work placed, as that which I propose would be, "end-on" to the sea.

Upon the completion of the mound of blocks from A to B, the "return" ends from A to C, and from B in the direction of D, would be carried out. The latter arm may, in my opinion, be safely extended to the point D without in any way interfering with the northward travel of the shingle; the exact point, however, for the landward termination of this arm would be determined by observation and experience. The blocks for the formation of the mound would be made upon the waste piece of land near the railway viaduct at the south-west angle of Caroline Bay, and transported from thence, and deposited in the work, by properly-constructed barges.

Upon the completion of the block-mound from C to D in the manner I have indicated, being a length of 1,240 feet in all, I would recommend that a quay or harbour-wall should be formed parallel to the mound, and under the lee or sheltered side, between the points E and F, being a length of 400 feet. Simultaneously with the formation of this wall, the inner end of the mound should be connected with the shore by an open iron viaduct extending from G, near the present Government boat-shed, to D, being a length of 900 feet.

The top of this viaduct would be 21 feet 6 inches above high water of spring tides, and the top of the new quay, from E to F, 8 feet above high-water mark of spring tides. These works should be connected by a temporary timber stage, extending in a straight line from D to F, and gradually falling from the level of the viaduct to that of the quay.

The mound of blocks, with the 400 feet of quay-wall, the viaduct, and the staging, constitute the works that should be constructed in the first instance, and are the least in extent that can be relied upon to afford accommodation for the present trade of Timaru. By means of these works large vessels could be afloat with perfect safety in all states of wind and weather within the sheltered area afforded by the arm from C to D, and discharge and take in cargo directly in connection with the railway system of the province.

Extension and Accommodation.—Should the trade of Timaru outgrow the accommodation that would be afforded by the works I have indicated, as it would in all probability do at an early date, the design thereon upon the drawings* should be completed by continuing the harbour-wall from the point F to D, and from E to C, under the lee of the block-mound. From C to D would thus become a breakwater

* *See* plan attached, No. 2.