As we proceed seaward from the eastern mole the present slopes of the sea-bed show a fall of 1 ft. in 94 ft.; then there is a further fall of 1 ft. in 198 ft.; between this point and the beginning of the sandspit, a distance of 1,815 ft., the fall is 1 ft. in 257 ft.; the south side of the sandspit rises for a short distance on a gradient of 1 ft. in 82 ft., and then rises sharply on a gradient of 1 ft. in 37 ft.; from the top of the sandspit, which is 3,630 ft. from the east mole, it falls seaward upon a gradual slope of 1 ft. in 157 ft.

In estimating the quantity of material to be removed by dredging from this channel the batter of the side slopes on the eastern and western sides must be assumed, as it would obviously be wrong to estimate only for a channel 600 ft. in width with plumb sides, similar to a railway-cutting through tough rock. In an ordinary road and railway cutting through sand provision has to be made for the flattening of the slopes due to the prevailing winds, more particularly if the strong winds blow across the road or railway. On the lee side the slopes may become flatter by the sand forming the top of the cutting being blown away from the centre-line. The effect, however, on the weather side is possibly for the top of the cutting to be reduced by the sand being blown into or beyond the road; and also other sand well on the weather side may be transported and deposited in or beyond the original cutting. In the channel under consideration we have a fine sand saturated with water subjected to the transporting-power of very heavy seas running across the channel. The seas, in rough weather, when approaching the sandspit are said to be at least 15 ft. in height, so that by the time they arrive at the sandspit, where the depth of water at the top is only 19 ft., they have become waves of translation with an abundance of transporting-power. It will be noticed that the outer (or sea) side of this spit has, under the conditions it is subjected to, assumed a comparatively flat slope of 1 ft. in 157 ft. The question is as to whether the side slopes of the channel can safely be left at a steeper slope without incurring heavy maintenance dredging. We would point out that to provide for slopes of 1 in 157 the width at the shallowest part of the spit would be 600 ft. at the bottom and some 5,040 ft. at the top, which would result in practically the whole of the spit being removed.

We here set out some relevant extracts from the various engineers' reports and evidence.

Messrs. Maxwell, Williams, and Mason in their reply of the 19th October, 1909, addressed to the Secretary of the Napier Harbour Board (see Exhibit 8, page 34), express their opinions as follows: "The question [asked by the Secretary] suggests that the underlying idea is that a channel something like a cutting in solid material on dry land, with defined slopes, can be made. No such simple conditions are, however, involved." The conditions are—(1) The open ocean subject to the greatest recorded seas, due to a vast reach and the greatest ocean depths off the coast; (2) about 4,000 ft. of continuous sand-drift to get through for a depth of 35 ft. (the distance in 1927 is 5,808 ft.); (3) the natural inclination of the sandy bottom, apparently about 1 in 200, more or less, varying with the weather.

Sir John Coode, M.Inst.C.E., in his report of 1880 does not deal with dredging an entrance channel outside the moles, and suggests dredging between the moles only to a depth of 12 ft. below low water.

Mr. W. Culcheth, M.Inst.C.E., in his report of 1883 provides for only dredging between the moles to a depth of 20 ft. at low water, no dredging being required outside the moles.

Mr. J. Goodall, M.Inst.C.E., in his report of 1884 does not deal with dredging an approach channel, as he suggested a breakwater harbour.

Messrs. Bell and Scott in their report upon Mr. Goodall's scheme do not deal with dredging an approach channel to the Inner Harbour, as they approved of Mr. Goodall's breakwater scheme.

Messrs. Bell and Maxwell in their report of 1894 do not deal with dredging an approach channel, as this report is principally concerned with damage to the breakwater by storms in 1894.

Mr. C. Napier Bell in his report of 1899 on dredging only refers to dredging between the moles to a depth of 19 ft. below low water, and also for a distance of 900 ft. seaward. Mr. C. Napier Bell in his report of 1900 deals only with dredging and reclamation within the entrance between the moles.

Mr. Marchant, M.Inst.C.E., in his report of 1906 provides a mole on the east side of his proposed entrance channel, the mole to extend in line with the existing eastern mole and to terminate in 27 ft. of water; the channel to be dredged to a depth of 27 ft. on the lee side of the proposed new mole; the bottom of channel to be 400 ft. wide. He states that the annual cost of maintaining this full depth of water under the lee of breakwater (mole) is a matter of conjecture, and states that is would probably cost not less than £4,000 a year. In referring to the assistance to be anticipated by the lagoon scour, he states it is certain that under the lee of such a breakwater (mole) there will be some deposit which must be removed by dredging, allowing to the current all the scouring-power of which it is capable (see Exhibit 6, page 1). The important point in Mr. Marchant's provision of a mole is that he considered it absolutely necessary to protect the approach channel on the eastern side against accretion, and the attendant heavy maintenance costs, and the possibility of serious shoaling after completion.

Mr. George Nelson, M.I.Mech.E., in 1909 submitted a scheme to the Napier Harbour Board for an Inner Harbour, in which he states in relation to the dredging of the approach channel: "According to Mr. Marchant's survey of 1906, the 5-fathom line is 75 chains distant, measured due north off the eastern pier-head. So as to give access to the proposed harbour for vessels of the largest size it would be necessary to dredge a channel out to this line. The material is, no doubt, Tutaekuri silt, ideal stuff for suction dredge to handle. In 1906 the average depth of water between the pier-head and the 5-fathom line was 23 ft. at low water; a channel through this 7 ft. deep, so as to give a depth of 30 ft. at low water, with an average bottom width of 400 ft., and its banks sloped down to a batter of 10 to 1, would cost under £20,000. The formation of this channel presents no difficulty whatever." (See Exhibit 8, page 9 or page 11.) The quantity to be dredged he estimated at 770,000 cubic yards. To enable the Commissioners to guage the value of Mr. George Nelson's opinion upon harbour matters, seeing that his qualifications are those of a mechanical engineer, Mr. R. W. Holmes, who recently retired from the position of Engineer-in-Chief of Public Works, was asked whether Mr. Nelson had experience