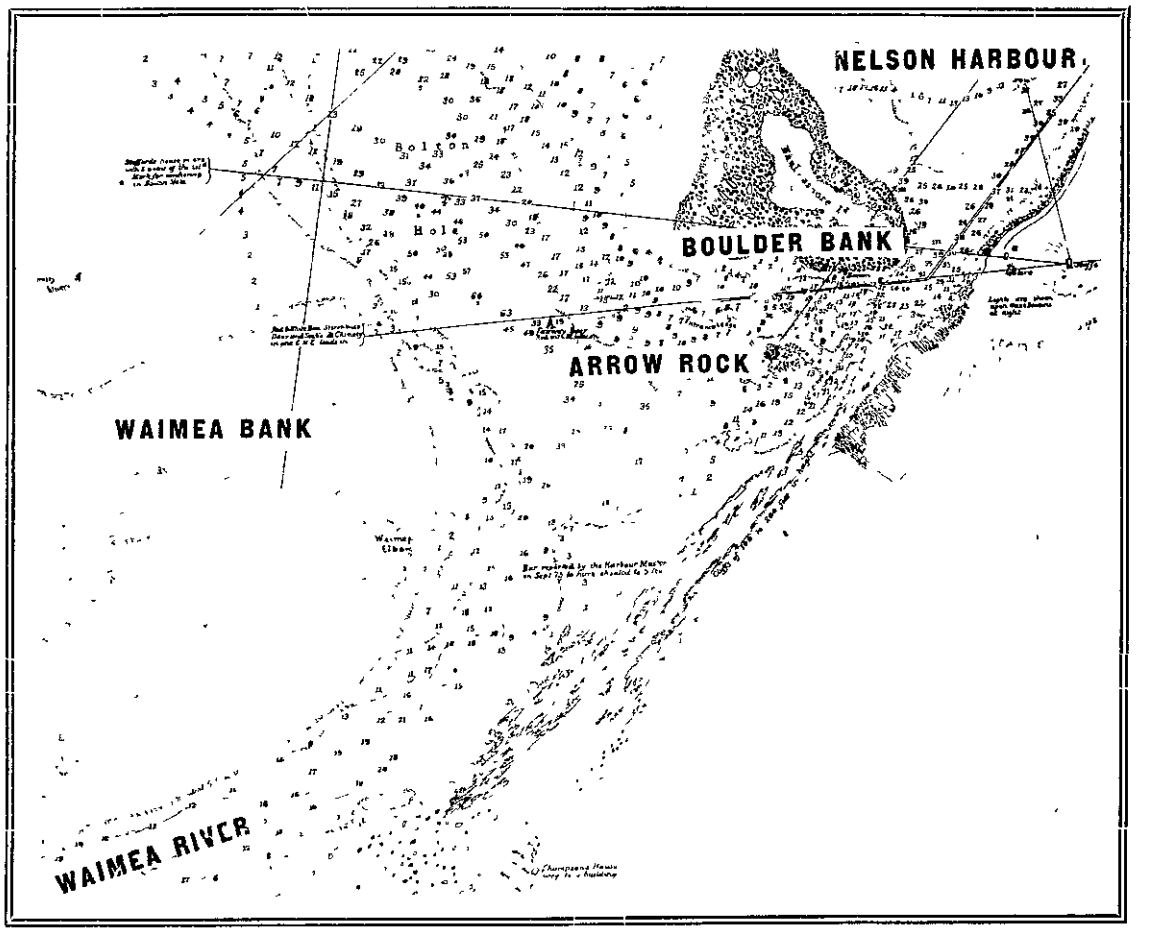
... Nelson ... Harbour Improvements.

PROGRESS OF THE UNDERTAKING.

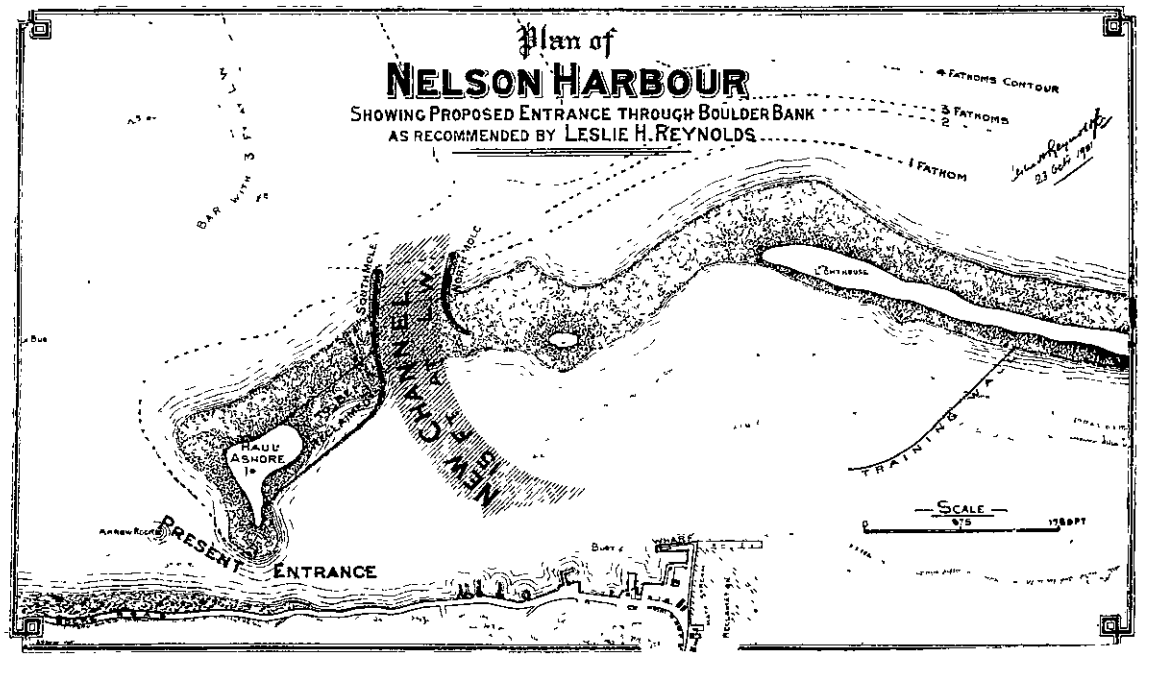
Written for PROGRESS.

THE Nelson harbour works now in progress embrace the cutting of a new entrance to the harbour through what is known as the boulder bank. The suggestion to open a new channel through the boulder bank emanated from Mr. Leslie H. Reynolds, in 1889, when he was called in by the Government to suggest the best method of improving the entrance to the harbour. Mr. Reynold's idea was considered at the time a fairly bold move, especially as the previously expressed opinion concerning the formation of the boulder bank presupposed a rock core. As it happens, subsequent operations in dredging through the cut have practically disproved such conclusions. For some years prior to 1899 the navigable depth on the bar lay well beyond the entrance proper; and, as it continued to seriously decrease, it became absolutely necessary for the harbour authorities to move in the matter. The first investigations were made for the Admiralty by Captain J. L. Stoke R.N., in 1850, at which time the Waimea river discharged the bulk of its tidal and river waters through its eastern outlet shown upon plan No. 1, in a volume somewhat in excess of the outflow of the Nelson harbour. The combined flow of the Waimea river and haven waters made seaward in an almost northerly direction, and was sufficient to maintain a minimum depth of from nine to ten feet at low water.

It appears that about the year 1875 the eastern outlet of the Waimea river commenced to shoal, and shortly following became entirely blocked, thus leaving the haven outflow to alone contend against the heaving-up action of the sea, with the result that the wave forces speedily acted upon the seaward slope of the shoal, particularly to depths extending to 12 or 15 feet below low water, and drove the sand inshore, forming a crest, or bar, having a depth of 6 feet at low water, as shown on the chart prepared by the late Capt. Johnson in 1882. Since that date the sea forces have driven the bar in a direction inshore towards the boulder bank some 900 feet, and the two fathoms contour line an average distance of 700 feet, with the result that the low water depth on the bar crest has been reduced to about 5 feet during favourable conditions, and to 4 feet following north-west seas. This inshore travel of the bar has seriously interfered with the sailing course, and has made the incoming or outgoing of vessels a difficulty, to say nothing of the delay occasioned through waiting for the tides, as it is only towards high water that the larger vessels can negotiate the bar. Mr. Reynold's scheme of cutting a new channel through the boulder bank was favourably received by the Marine Department, but to make doubly sure the Nelson Chamber of Commerce, a few months later, obtained a report from the late Mr. Napier Bell, who was supplied with Mr. Reynold's plans and data; and Mr. Bell evolved a scheme somewhat similar to that of Mr. Reynolds, the estimated cost of whose design was £63,000. Up to this time the harbour was in the hands of the Marine Department, but in 1901 the Nelson Harbour Board was formed, with the object of taking over the harbour and prosecuting the proposed work. The first of the contracts for machinery and plant were let in June, 1902, and the work of excavating the new cut was put in hand early in 1903. The works, as designed by Mr. Reynolds, embrace the construction of north and south moles, as shown on No. 2 plan, flanking a cut seaward through the boulder bank and harbour shoals, which would give an entrance of 600 feet in width, and a depth of 15 feet at low water spring tides, and at high water spring tides a total depth of 27 feet—the average rise of the spring tide in Nelson being 12 feet. With this depth the port could be worked by the largest vessels now trading there at any state of the tides. The Harbour Board, in carrying out the scheme, have for the present decided to construct the south mole only, and dredge the channel in the first instance some 600 feet in width; but whether they are wise in omitting the north mole and narrowing the channel remains to be seen. The dredging is a fairly heavy work, especially through the boulder bank, which is composed almost entirely of grey syenite, ranging from sand and shingle overlain for some 10 or 12 feet by boulders up to nearly half a ton in weight, and operations are being carried out by a dredge of the combine type, with ladder and buckets, and centrifugal-pump discharge. The buckets empty the dredged material into a revolving screen, which is perforated with holes of about 2¼ inches diameter, through which the finer material passes to the pump and is discharged on to the reclamation area shown on plan; the heavier material being delivered from the screen into barges, and utilised in the formation of the walls. The dredge, designed by Mr. Reynolds, was constructed by the Otago Foundry, Dunedin, and is a fairly heavy machine. The engines are compound condensing, and are capable of developing 375 h.p., while the boilers, of which there are two of the dry-back marine type, are designed to give the full head of steam required by the main engine, the winch engines and the electric light plant, with which the dredge is supplied. The boulder bank extends from what is known as Mackay's bluff for a distance of some twelve or fourteen miles, without a break, and it has always been an interesting feature in connection with Nelson haven, many theories having been advanced regarding the manner in which it was formed. Hochstetter, commenting on the matter, says:—"The boulders are entirely of syenite, and the same rock is found on the precipitous bluff which abuts upon the sea beyond Drumduan. The source is thus explained: fragments are constantly falling from the cliffs, and the action of the heavy northerly swell, combined with a strong current, takes them towards the south. The reason of their being deposited on the existing line is that in all probability a submarine reef underlies them, of which the Arrow rock, in the entrance of the Nelson harbour, may be regarded as the southern termination. This supposition is strengthened by the fact of the Arrow rock being of the same altered schists as occur immediately to the south of the syenite." Others again have maintained that a reef underlies the bank, and is the nucleus of its formation. Mr. Reynold's theory, which, as already explained, so far appears to be correct was given by him in his report of 1899, wherein he says:—"The question of the presence of a reef formation underlying the boulder bank was mentioned to me during my inspection of the port but I can see nothing which



PLAN NO 1: THE WAIMEA RIVER AND APPROACH TO NELSON HARBOUR AS THEY EXISTED 30 YEARS AGO.



PLAN NO. 2: THE WORKS AS THEY ARE TO BE COMPLETED.