

AS TO WHETHER OR NOT THE DANGER FROM TRAVELLING SHINGLE IS IMMINENT.

We are clearly of opinion that the magnitude and velocity of shingle-travel is such, that it will inevitably overlap the works in a short time, if steps are not taken to counteract it.

During the last 4 years, ending January 1891, the accumulation has progressed 500ft. along the breakwater.

That this result is not spasmodic or exceptional, may be judged from the fact, that it almost exactly agrees with the calculation of probable result made in August 1881.

It was then estimated that the high-water line would reach to a point 800ft. from root of the breakwater by January, 1893.

As compared with this estimate, the high-water line had got to 560ft. from root of breakwater in January last; and, if it progresses for the next 2 years at same rate as during the last 4 years, it will have got to 810ft. from root by January 1893. Thus the calculation made 10 years ago seems likely to be very closely borne out.

It is true that the estimate made in August 1881, is not exactly verified by the results in all its details. The visible accumulation averages only 80,000 cubic yards per annum, instead of 100,000 cubic yards as estimated (a good deal of the balance having probably been carried round the breakwater in the form of sand) but, as against this, the triangle of gathering-ground, over which the shingle has spread itself, in the vicinity of the breakwater, is somewhat more acute than was estimated (also probably due to the grinding of the shingle into sand) and, as it happens, these two discrepancies very nearly balance each other, so that the position of the shingle along the edge of the breakwater itself, is, as already stated, almost exactly what was estimated.

The conditions on which these calculations of August 1881, were based, still continue to prevail, and, seeing that the calculations, so far, are fully borne out by the results, it would be deliberately shutting one's eyes to the inevitable, to ignore the probability of corresponding results continuing to accrue in the future.

That the progress during short periods of time is not regular and uniform proves nothing. It would, in fact, under the circumstances, be unreasonable to expect uniformity; and it is not inconsistent with the conditions that there should, at times, be retrogression, rather than accumulation.

There have been such retrogressions during the last 4 years, but we have nevertheless the fact, that the accumulation along the edge of the breakwater, during the first 2 years of these 4 years, was 260ft., and during the second 2 years 240ft.

This undoubtedly indicates a close approach to uniformity of progress, over reasonable intervals of time, and strongly supports the contention, already advanced, that the progress during the last 4 years should be regarded as probably normal and reasonable, rather than spasmodic or exceptional.

To be reasonably careful, therefore, it should be assumed that the rate of progress of shingle-accumulation, along the edge of the breakwater, will be fully 125ft. per annum, and that it is even quite possible that it may be considerably more than that.

The toe of the shingle spit is now within 530ft. of the end of the straight-out mole. Beyond that point there is a curve for 340ft., and a cant for 678ft., total 1,018ft., trending towards the north.

Presuming that the conditions up to the end of the straight-out mole remain as hitherto, the end of the shingle spit, advancing at the rate of 125ft. per annum, may be expected to reach the end of the straight-out mole in 4½ years. There is, of course, no positive certainty that it will do so; but, on the other hand, there is no positive certainty that it will not, if unimpeded, get there very much sooner.

The volume of retarding influence, due to the back-wash from the breakwater, is continually getting less and less, and the triangle of gathering-ground may quite possibly become more acute, leading to the formation of a narrow spit, which would travel along the breakwater with great rapidity.

As to what value should be put upon the 1,018ft. of curve, and outer cant, in the way of postponing the time at which the shingle would begin to block the entrance to the harbour, it is difficult to say, but we cannot see our way to allowing much for it.

Under somewhat similar circumstances at New Plymouth, the accumulation of sand, which had taken several years to get to the end of the straight-out mole (1,400ft.) went on, the remaining 550ft., along curve and north-easterly cant, in about 4 months.

Also, where the the circumstances favour a rapid travel, as along the beach between Patiti Point and Timaru, it was found, by experiments made by Mr. Balfour, that boulders travelled from 500ft., to 5,000ft. in a day.

In view of all the circumstances of the case therefore, it is clearly evident that steps should at once be taken to avert the danger of the shingle overlapping the works, which seems to be at present imminent, and that the measures to be adopted should be such as to admit of this being carried out promptly, efficiently, and continuously, for many years, or possibly for generations. To wait longer before taking action would be very unwise.

In view of the uncertainties and contingencies involved in the situation, it is highly desirable to have an ample margin of time to come and go upon.

BEST MEANS OF AVERTING THE DANGER.

Only two means of preventing destruction to the harbour from the growing accumulation of shingle appear to be practicable—namely, (1) the retention of the shingle at the south side of the breakwater, either by extending the mole in its original direction (or possibly in a direction a little more to the east) or by isolated groins; or else (2) the dredging of the shingle-accumulation as it accrues.