

line further north than Whale's Creek may, I think, be left for future consideration, as the damage, if any occurs, will probably be of a gradual character, and will give time for arranging means to avert it.

The Hon. the Minister for Public Works,  
Wellington.

I have, &c.,  
JOHN BLACKETT,  
Marine Engineer.

P.S.—Mr. Lowe has been supplied with sketches and particulars of the proposed works, so that he can proceed with them at once.—J. B.

NOTE.—For sketch showing position of encroachments, see plan attached, No. 3.

### Enclosure in No. 3.

MEMORANDUM from the RESIDENT ENGINEER, Christchurch, to the COMMISSIONER of RAILWAYS, Middle Island, *re* Encroachment of the Sea near Timaru.

Resident Engineer's Office, W. R., Christchurch, 26th June, 1879.

DURING the south-east gales that were experienced on the 21st and 22nd instant, the shingle beach was entirely swept away, from the Timaru Breakwater northwards to a point beyond Whale's Creek. The principal part of the distance named is more or less protected by rock, solid in places, loose in others; but wherever the clay bluffs are exposed the sea is making rapid inroads. There are three points within three-fourths of a mile of the breakwater where the railway is seriously threatened. The most immediate danger is at Whale's Creek Bridge. At this point the rock terminates; the foot of the perpendicular clay bluff is exposed to the full force of the waves. The bluffs are rapidly undermined, and fall in.\* The south end of the Whale's Creek Bridge rests on this clay bluff; ordinary tides are now continually wearing it away. To retard this work of destruction, I am putting a facework of heavy stone. Should, however, another gale come on from the east, north-east, or south-east, our temporary protection will be swept away, the viaduct will give way, and the traffic will be stopped. We shall then divert the railway on to the public road alongside, and by that means get the traffic through for a few weeks longer; but it can only be a short time when the diversion of the railway and public road will likewise succumb to the sea. Permanent repairs will be of enormous cost. The best and most complete means of repairing the line will be by a sea-wall. To repair present breaches, this must be between 300 feet to 350 feet long, and 21 feet in height. It must be strong enough to bear the full brunt of the sea broadside on. It will cost at a rough estimate £10,000. The filling-up of the embankment inside the wall, and securing the ends, will bring this estimate to about £12,000. A plan that may perhaps be somewhat less costly, will be to rebuild the bridge in masonry, piers sunk below low water. These piers will have to be forty feet high. The clay approaches at each end will require strong groins to protect them, and the slope of the road will require facing with stone. This cannot be reckoned at much under £8,000; but I do not give this as a definite estimate, as it will require more time to consider fully how it would answer. It is to be borne in mind that this is but the beginning. Two other points will soon suffer between this and the breakwater. There is abundant evidence, too, that other places further north will be affected later on. Such disastrous results from the first gale that has taken place since the breakwater commenced, give rise to the gravest apprehension. I have no doubt whatever that the whole of these damages arise from the stoppage of the shingle at the breakwater. An enormous accumulation of shingle has taken place to the southward. Had this shingle been allowed to travel along in its natural course, the present damages would not have occurred. If it should be allowed to travel again, the damages could be repaired at a comparatively trifling cost by erecting small groins just northward of the breach, and thus bank up the shingle again, which would be as good a protection as the costly sea-wall.

J. HENRY LOWE,  
Resident Engineer.

The Commissioner of Railways, Middle Island.

### No. 4.

The COMMISSIONER of RAILWAYS, Middle Island, to the COLONIAL MARINE ENGINEER.

SIR,—

Christchurch, 14th January, 1880.

I have the honor to hand you the Resident Engineer's report No. 1 (which you already have in the shape of a letter from that officer) upon the encroachment of the sea at Whale's Creek, Timaru.

I have, &c.,

W. CONYERS,  
The Colonial Marine Engineer, Wellington.      Commissioner of Railways, Middle Island.

### Enclosure in No. 4.

MEMORANDUM for the COLONIAL MARINE ENGINEER *re* Sea Encroachment at Whale's Creek, and Protective Works, Timaru:—(Report No. 1.)

Christchurch, 4th October, 1879.

THE abutment and wing wall is just finished, and is a substantial work. A quantity of rock has been sloped out on the beach, and does not give any signs of travelling. Unless it does, I do not think we need go into the piling. All the charges for the masonry work are not yet in, so I cannot state the actual cost, but it will be well under the estimate. We have thrown about 2,000 cubic yards on the

\* See plan attached, No. 4.