REPORT NO. 2 ON THE GEOLOGICAL CONDITIONS AT BELL BAY, AS AFFECTING WHARF CONSTRUCTION

This report deals with the portion of Bell Bay lying to the east of the White Beacon, which is situated between High and Low water marks, the previous report having dealt with that portion situated to the south-west of the Beacon.

The same geologicaand topographic units continue in the area under review as existed in the area to the westwards already reported upon, but in such modified forms and relationships as to indicate the possibility that part of this portion of Bell Bay may be quite suitable for wharf construction.

It may be said at once, however, that the portion of Bell Bay extending from the White Beacon for a distance of 300 feet in a north-easterly direction has exactly the same characteristics as the portion already reported upon and is therefore unsuitable, as the angle of slope under water taken in conjunction with that above high water mark, is too great to be safe under the loads and conditions incidental to activities in the vicinity of wharves.

However, an examination of the (under-water) contour plan of Bell Bay shows a marked change in the slope north-eastwards of this point. It becomes much less abrupt and continues so for 1,100 feet, beyond which the soundings have apparently not been taken. At the same time the landward slope becomes gentler for a portion, at least, of this distance.

The maximum slope in this area from L.W.M. towards the bed of the river and backwards towards the top of the rise is well within the range of safety if the whole of the rock down to river bottom consisted of basalt as it does at high water mark. It is not certain, however, whether basalt does so persist to the river bottom, although the under water topography taken in conjunction the the fact that the basalt becomes thicker as Long Beach is traversed upstream, would seem to indicate the possibility. The importance of ascertaining definitely whether the basalt persists to the river bottom is obvious. This can only be decided by boring in the same way as has been done in the area previously reported on.

If the basalt does not persist to river bottom, but is underlain by pipe-clay at some depth, the decision as to whether the site is suitable or otherwise for wharves is more difficult, as all of the following factors have to be taken into consideration:-

(1) The average slope from L.W.M. to river-bottom.

(2) The maximum slope from L.W.M. to river-bottom.

(3) The average slope from L.W.M. to level of the country behind the escarpments.

(4) The maximum slope from L.W.M. to level of the country behind the escarpments.

(5) The distance of the latter maximum slope from L.W.M.

(6) The depth below L.W.M. at which clay outcrops.

(7) The amount and direction of dip of the basalt-clay contact.

(8) The amount of the proposed filling between wharves and H.W.M.

(9) The maximum loads the whole wharf sites will be expected to experience.

(10) The effect of vibration added to the static load.

(11) The possibility of the deepening of the river-bed by scouring if the bottom is on soft clay.

The data which have been readily placed at my disposal by the Engineer to the Marine Board, give the necessary information in regard to items (1), (2) and (8). Items (3), (4) and (5) can only be obtained from a contour plan of the shore, which apparently does not exist. Factors (6) and (7) can only be ascertained definitely by boring. Item (9) could be estimated by the Engineer to the Marine Board. Factors (10) and (11) are for the judgement of the Geologist on the evidence and data obtainable.

Accordingly I would recommend that the following work be carried out by the Marine Board, and that on its completion, if basalt is not proved to persist to river-bottom, the results be submitted to me to enable me to make the required calculations, so that I can submit a final report as to the safety of the ground for wharf construction. If basalt is proved to persist to river-bottom, the area extending for 1,100 feet north-eastwards from a point 300 feet north-east of the White Beacon may be taken as safe for wharf construction, without any further report from the Geological Survey.

The following should be the order in which the work is carried out:-

A - The putting down of three pairs of bores at distances in a north-easterly direction from the White Beacon of 300 feet, 800 feet, and 1,400 feet respectively. The innermost of every pair of bores to be at the 5 feet under-water contour and the other to be in every case 100 feet further outstream. I would recommend that samples of all material passed through be carefully preserved for examination by the Geological Survey. Each bore to be 60 feet in depth.

In the event of these bores passing from basalt to clay downwards the following should be carried out:

B - The preparation of a contour plan of the shore in the area indicated extending from L.W.M. to the flat country behind the escarpments. The contour interval should be 5 feet.

C - The calculation of the probable total load on the wharves and the shore, including buildings, &c., and its distribution.

If it is desired to investigate the area north-eastwards of the above area the same procedure should be adopted as above, surveying the under-water and shore contours at 5 feet intervals, and putting pairs of bores down at 500 or 600 feet intervals to as far eastwards as in the opinion of the Marine Board's Engineer the wharves may ultimately extend.

(Signed) LOFTUS HILLS, M.B.E., M.Sc.
GOVERNMENT GEOLOGIST.

Geological Survey Office,
Launceston,
3rd June, 1920.