TR15-64-66

# 16. Foundation conditions at Tamar Avenue, George Town

*P.C. Stevenson*

The Tamar region has suffered from slope failures for many decades and as new areas are developed the problem of identification of areas of potential failure requires continuing attention. The writer addressed a meeting of the Public Health Officers Association in Launceston on 7 May 1970 and was able to point out some of the features of past, active and incipient landslips. The Public Health Inspector for the George Town Council, Mr Moore, approached the Department of Mines a few days later, and asked than an inspection be made of a new subdivision at Tamar Avenue, George Town.

Tamar Avenue runs parallel with the bank of the Tamar River c.105 m from it and along a bluff rising from 12-27 m above it. About ten houses have already been built in the section of the avenue south of Little Street. They stand on the eastern edge of the plateau and look down the steep bluff to the river.

From the regional geological mapping of the Beaconsfield Quadrangle the area is known to consist of the rocks shown in the following section.

| | *m* |
|---|---|
| Windblown sands | c.1.2 |
| Clays and sands | |
| Weathered basalt | c.25 |
| Unweathered basalt | |
| Clays and siltstones of the Launceston Beds | |

This last unit, the Launceston Beds, is known to be a thick series of plastic grey and brown clay with intercalated unconsolidated sandstone and conglomerate. The clays are an ever present feature of all landslips in the Tamar region.

An inspection of the Tamar Avenue area (fig.15 ) showed that the surface of the plateau consisted of a thin soil formed on windblown sands and that brown clays were present at about 1 m from surface. The slope of the river bank also showed blown sand with a spread of basalt boulders in a matrix of weathered basalt clay forming the lower slope. Along the shore and for about 3 m above it, the grey clay of the Launceston Beds was seen, locally these beds were seen to be or to have recently been, in mass movement. The plastic clay when liberally soaked in water, becomes sufficiently fluid to move downhill under its own weight. The clay is then capable of flowing slowly round trees and other obstructions and this has occurred to a small extent along the shore.

An area about halfway down the slope and including the seaward ends of Blocks 122, 121, 120, 119, 118, 89, 88, 87 does not conform to the rest of the slope but is flattened into a shelf. This feature is characteristic of old slips and represents part of the old top-of-slope level which has been dropped by slipping. The age of this slip is unknown but judging from the size of the trees now growing on it, it could be 40-60 years old. The clay displaced from below the block has long since been removed by the river.

Other smaller slip areas are seen downslope from Blocks 124, 126, 127.

Because of the disturbed nature of the slope, the plant cover and boulder spread, it was impossible from surface mapping to form an adequate idea of the nature of the rock succession forming the slope. Therefore it was suggested that a cored diamond drill hole be put down, inland from the slip area, to establish the undisturbed succession. Shallow auger holes confirmed the known regional picture and these were used to construct the attached map of surface geology. Springs issuing from the ground on Blocks 76-80 were taken to indicate the probable base level of the basalt in the area.

An NX diamond drill hole was put down close to the roadside and on the mutual boundary of Blocks 118 and 119 during the week ending 24 July 1970.

The drilling log shows that soft plastic clayey sands and clays, with a stiff clay layer underlie 1.2 m of windblown sand. This passes downwards into weathered basalt in the form of a crumbly brown clay and then into solid, fresh black basalt at c.7 m. The bore passes through the solid material to c.18 m and then through broken basalt and into black organic clay at 20 m. Black, brown and grey clay with occasional hard siltstone bands continue to 30 m where soft brown plastic silt are seen and probably constitute the rest of the hole to 31 m. The bottom 1.2 m of core was lost.

It is notable that the sediments above the basalt are soft silt, sand and clay and it is on these that the houses are founded. The basalt is too deep at the bore site to be of any use as a foundation, although the same may not be true at the lower end of Tamar Avenue where basalt boulders have been mapped up to the roadway.

The basalt is hard strong rock, but it is subject to rapid lateral variation so that the borehole may not be representative of the whole basalt mass.

The clay below the basalt in the borehole appears to be consolidated, firm though moist, and undisturbed by any movement. When the core is moistened and rubbed it easily plasticises and slurries but this has not been seen to have occurred by any natural process in the core in the borehole.

The borehole has shown that the shelf on the slope below Blocks 122-87 is an old slip, for it has displaced the basalt downward. In confirmation, auger holes drilled in the sand of the slope above the slip showed the presence of basalt, the significance of which is indicated on the cross section.

## CONCLUSIONS

It has been established that a slip has taken place on Blocks 122, 121, 120, 119, 118, 89, 88, 87 in the historical past and in other smaller areas below Blocks 124, 126, 127.

The borehole has revealed that two materials having slip potential exist in the 30 m vertical section under these blocks. These are the clays and deeply weathered basalt within 6 m of the surface, and the clays at a depth greater than 20 m from the surface. The latter must have been involved in the historical slip and are seen in grey weathered form on the present shoreline. The upper clays do not appear to have been the cause of the historical slip as they are normally well supported and to some extent drained by the basalt. The lower clays are usually well protected by the basalt but are sensitive to the percolation of water and can locally become very fluid and weak. When this happens their support of the basalt fails and if the basalt is well jointed it may fracture and precipitate a slip.

The essential features to be added to the geology as revealed by the borehole are the existence of vertical jointing in the basalt enabling water to percolate down to the lower clays, and the ability of this water to permeate the lower clays, weaken them and cause them to squeeze out and leave the basalt unsupported.

These conditions do not always exist but nevertheless geological erosion processes, of which this is one, continue inexorably and will in time find such a weakness, and movement will then take place. The process here outlined is clearly distinguishable from many of the landslips in the Tamar region where, because of the absence of the basalt, man's intervention is unlikely to be able to stabilise the slope permanently. Diversion of surface water would perhaps stabilise the upper clays but these do not appear to constitute a threat. No possible amount of surface water control could prevent it entering the basalt and here, in time, it will weather and weaken that rock, pass down into the clays and cause a slip. It is quite impossible in our present state of knowledge, even after extensive investigation, to predict when this may happen as the cause of failure could be of small extent but large enough to carry moisture to a vital part of the lower clay. The slip could therefore take place at any time or could be delayed for centuries.

A similar situation exists in many places in northern Tasmania and has been previously recognised (Hughes, 1959; Jennings, 1963; Matthews, 1968; Stevenson, 1971; Stevenson, 1972).

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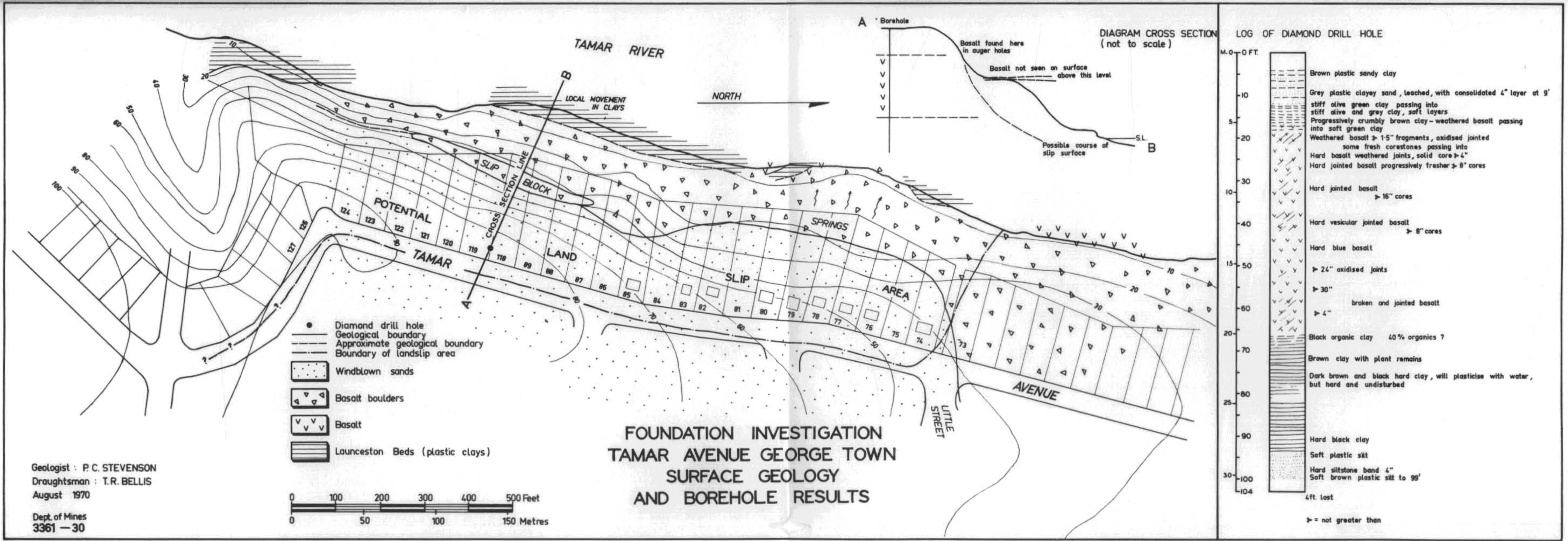


Figure 15.

TR15-64-66