

Stability of a block of land at Dilston

by W. L. Matthews

The Commonwealth Department of Housing requested an examination of a house and property at Dilston, owned by Mr J. S. Roxburgh. It has been reported that movement has occurred causing some damage to the house.

The house is situated about 50 yards north of the Dilston Post Office near the crest of a ridge which separates the River Tamar from the East Tamar Highway. The slopes to the river and the highway probably average 10° to 15°.

The area is underlain by interbedded clay and clayey sand, of probable Tertiary age, the clayey sand containing some wood fragments. Permian mudstone can be seen near the highway about 200 yards north of the area examined and a shaft has been dug in search of coal in baked Permian rocks east of the area. A shaft has been dug much nearer to the property concerned (i.e. 50 yards west of the Dilston Post Office) where a coal seam was struck at the bottom of a shaft dug to a depth of 50 feet (Longman, 1966). This shaft probably extended below sea level and there are no obvious occurrences of Permian rocks on the surface in the immediate vicinity of the block examined. The house is therefore sitting on Tertiary clay with minor bands of clayey sand.

The house has been built about ten years and has developed numerous cracks in the brickwork, some of which, according to the owner, open and close at various intervals, while others have not opened any further during the last two years. Door and window frames have shifted and ease of opening and closing of doors and windows has been variable. One large crack along the southern part of the house extends diagonally upwards from ground level towards the top of the house.

An examination of the land surface around the house indicated that there has been no obvious recent mass movement of the soil, which suggests that land slippage is not the cause of the crack formation. Below the house, on the River Tamar side, there are two cracks extending in the direction of the ridge but they only appear to be cracks formed by dehydration of the clay as there is no vertical movement on them. This drying of the soil during the summer causing contraction, and subsequent wetting and expansion during the winter, could well be the main cause of the formation of the cracks in the house. If the foundations of the house were in the zone which drains at some periods, it could be expected that effects would be found in the house itself. The fact that the house is on a fairly steep-sided ridge would promote drainage and drying of the soil.

The large crack in the southern end of the house is possibly due to settlement caused by excess loading of the clay, although the owner indicated that the footings of the foundations were spread so that the weight would be distributed over a fairly wide area.

Although there are no indications of recent mass movement, there are signs that such movements have taken place in the past. Between the house and the river there is a bench, arcuate in shape, with a small area of internal drainage. Similar and larger such benches with internal drainage occur further to the north (up to 200 yards away). There is a strong possibility that these features were formed as a result of a series of landslides in the past although there are no signs of recent movement on these old slips and they may well have stabilised.

The probable old slip just west of Mr Roxburgh's house has a small area of internal drainage, and some drainage from the house and the septic tank are diverted to this area. Some time ago the owner intended to drain the area and a French drain was partially installed, but because of council regulations it could not be diverted to the nearby street. In the toe zone of this probable old slip a nearby property owner has made a vertical cut about 10 feet high in clay and clayey sand containing wood fragments.

CONCLUSIONS

As no signs of recent mass movement of the soil can be seen in this area it is considered that the cracks in the house have been formed mainly by expansion and contraction of the soil on which the house is built because of wetting and drainage of the land, and perhaps they are partly due to excess loading of the clay which could be expected to have a low bearing capacity when wet.

Because features which appear to be old slip areas are present care should be taken to avoid reactivation of these areas. Reactivation and movement on these slips could remove some support from areas which are now stable, and could alter this stability. Areas of internal drainage should be drained and water should not be allowed to accumulate in them from septic tanks or from storm water drainage. Vertical cuts in the toe zone of such areas should also be avoided because removal of material from this area reduces the stability of the old slip.

REFERENCE

LONGMAN, M. J. 1966. Geological Atlas One Mile Series. K/55-7-39. Launceston. *Expl. Rep. geol. Surv. Tasm.*

[30 May 1968].