TR14_84_88

20. Further report on a landslip in the Lawrence Vale area

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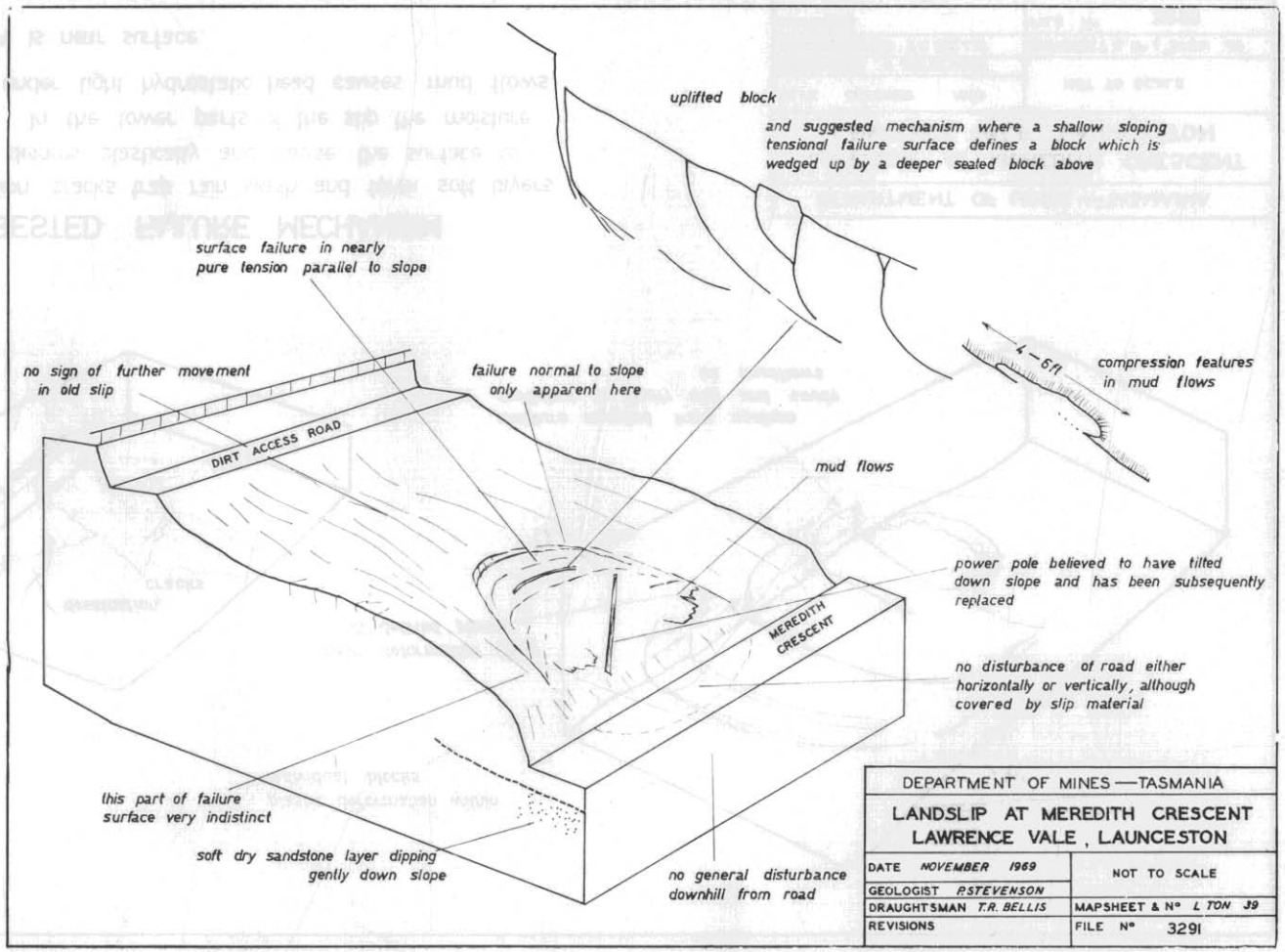
The deep drains recommended in the previous report (p. 82-84) were being constructed during the period 30 September-8 October 1969 and the opportunity was taken by one of us (P.C.S.) to examine the trenches cut by the backhoe before these were filled with broken stone. As a result of these examinations the nature of the landslip and its causes has been further revealed.

The southern of the two upslope drains was cut during the week ending 3 October. When examined on 30 September the trench had been cut to its full length and had been deepened to about 18 ft in the toe of the slip, so that it then penetrated about 12 ft below the level of the road. The lower 6 ft of the trench was cut in dry medium-grained sandstone which could be crumpled easily in the fingers while the upper part was in moist plastic brown-grey and red mottled clay. The trench showed no sign of collapse though left open for some hours and no discrete moisture was visible. Irregularly distributed zones of a few inches thick could be recognised as being softer than the rest, but no visible discontinuity was apparent. There were no visible joints, and dessication cracks did not appear to penetrate below the soil layer.

The northern of the two drains was cut on 7 and 8 October to a depth of about 12 ft along its full length and it likewise showed no discrete moisture and only scattered soft patches, mainly within 6 ft of the surface.


uplifted block
and suggested mechanism where a shallow sloping tensional failure surface defines a block which is wedged up by a deeper seated block above
surface failure in nearly pure tension parallel to slope
4 – 6 ft
compression features in mud flows
no sign of further movement in old slip
failure normal to slope only apparent here
DIRT ACCESS ROAD
mud flows
power pole believed to have tilted down slope and has been subsequently replaced
MEREDITH CRESCENT
no disturbance of road either horizontally or vertically, although covered by slip material
this part of failure surface very indistinct
soft dry sandstone layer dipping gently down slope
no general disturbance downhill from road
DEPARTMENT OF MINES — TASMANIA
LANDSLIP AT MEREDITH CRESCENT LAWRENCE VALE, LAUNCESTON
DATE NOVEMBER 1969
NOT TO SCALE
GEOLOGIST P.STEVENSON
DRAUGHTSMAN T.R. BELLIS
MAPSHEET & N° L TON 39
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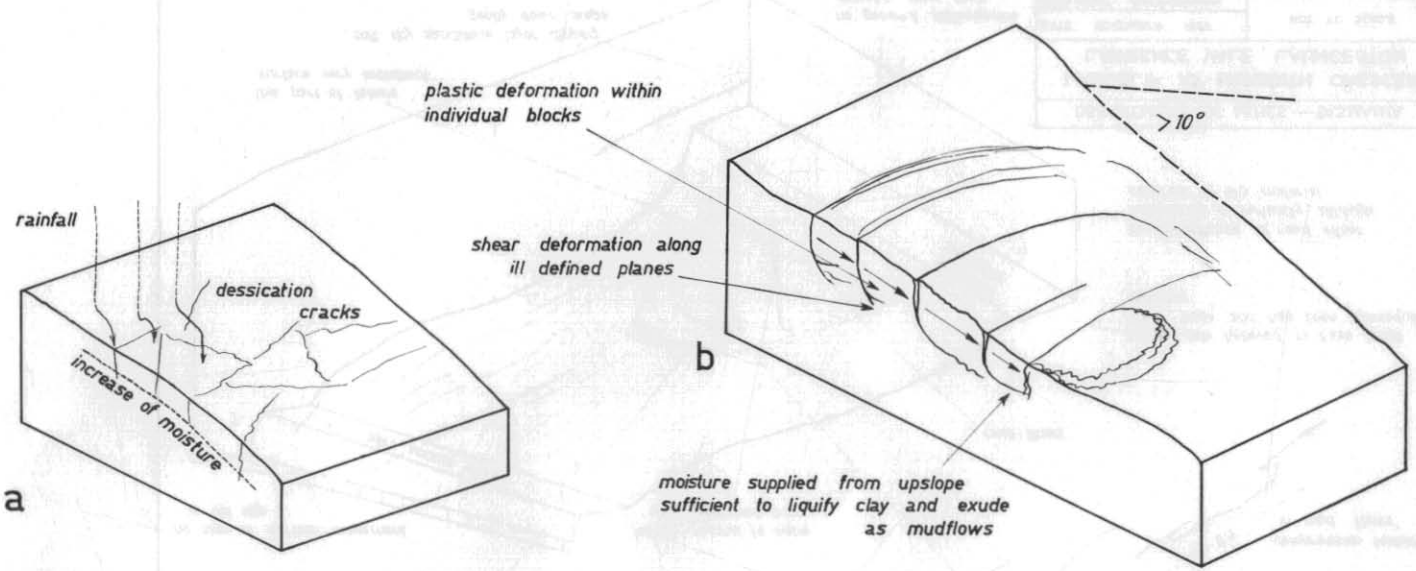
FILE N° 3291

FIGURE 24



SUGGESTED FAILURE MECHANISM

Where dessication cracks trap rain wash and form soft layers in clay. These deform plastically and cause the surface to fail in tension. In the lower parts of the slip the moisture increases and under light hydrostatic head causes mud flows

All deformation is near surface.

DEPARTMENT OF MINES — TASMANIA	
LANDSLIP AT MEREDITH CRESCENT LAWRENCE VALE, LAUNCESTON	
DATE OCTOBER 1969	NOT TO SCALE
GEOLOGIST P. STEVENSON	
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FIGURE 25

A lateral drain diagonal to the northern trench was cut on 8 October to a depth of about 8 ft. By removing support from the upper part of the slip, the cutting of this lateral produced a local movement of an area of ground about 12 ft x 8 ft so that the original width of the trench, 18 inches, was reduced to about 6 inches. This resulted from the downhill movement of the uphill face of the trench. Movement appeared to take place in two concurrent modes: slow shearing on a horizontal plane about 6 ft below the surface and by plastic deformation of the whole trench face.

Shear planes were often seen in the material removed from the trenches, but many of these were undoubtedly formed by the action of the backhoe bucket. Nevertheless it was often possible to recognise very soft, almost liquid layers in the excavated material, but because of the instability of the trench walls, it was impossible to examine these *in situ*.

The following observations made during a detailed examination of the site are summarised in a block diagram (fig. 24).

Surface cracks had been opened by the differential movement of the ground surface. In almost all cases, the movement had been mainly parallel to the ground surface and there was little evidence of a component of movement normal to the ground surface, as is usual in the classic rotational slip.

There was evidence of flows of plastic mud in the toe region of the slip: the surface of the ground had been rendered sufficiently moist to flow slowly downslope and to produce pressure ridges and overfolds in the toe region. It was probably the invasion of the roadway by these mudflows that first called attention to the slip following the recent wet winters. Remnants of the flows remain where they did not advance as far as the road.

An unusual feature though one which appear characteristic of landslips in the clays of the Launceston area, is the uplifting of blocks of ground between adjacent tension cracks in the centre to upper part of the slip. This has been noted (Eckel, E. B., 1958) as characteristic of shallow slips and appears from the writers' observations to be due to a mechanism as outlined in Figure 25.

CONCLUSIONS

The present slip shows few of the normal features of a rotational slip.

There has been no heave of the toe which would have disrupted the road. The toe is drained by the sandstone layer.

Deformation has been largely plastic as evidenced by the failure in the lateral trench, by the mudflows and indirectly by the tensional nature of the surface: this has resulted in downhill slope movement rather than backward tilting.

No cylindrical slip planes were seen in any excavation.

Very moist but shallow (<12 ft) zones which are connected with surface cracks are abundant in the excavations, though not visually obvious.

The mechanism shown in Figures 24 and 25 is suggested as the cause of the slip.

RECOMMENDATIONS

If these conclusions are correct, then the measures being taken are designed to provide both surface and subsurface drainage and are the best practicable measures to achieve this.

The sewer pipes which are known to pass through the area adjacent to the slip, and within the slip itself, constitute a serious hazard as they are subject to deformation by the slightest ground movement. As they are inflexible they may crack and leak, and will introduce water into the area at the worst possible position. They should therefore be re-routed to avoid potential slip areas and if possible laid with joints capable of absorbing several inches of movement without leakage.

REFERENCE

ECKEL, E. B. (ed.). 1958. Landslides and engineering practice. *Spec. Rep. Highway Res. Bd* 29.