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18. The stability of slopes at the Bay View Motel site, Strahan.

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The Department was requested to advise on the stability of steep slopes in sand and gravel standing above a site for a new motel between Esk Street, the Esplanade, and Harvey and Harold Streets, Strahan [CP618318].

The Tertiary weakly cemented sand with occasional silty or clay layers is well exposed in the cuts made for the old railway in faces about 16 m high. The materials stand at angles of 30-45° and are naturally scrub covered, but many of the cuts have shown some failure, producing toe slopes of about 20°. This two-segment style of slope is common, and may be complicated by the presence of weak gravel which stand vertically at the top of the face.

The two-segment slope is present along the west side of the site, and the main road from Queenstown (Harold Street and Harvey Street which meet in a corner at the west of the slope). This corner is reported to have been involved in a slope failure in 1907, when the footpath nearest the slope was partly removed. This corner was reconstructed, and appears completely stable from the evidence of stable joints in concrete paving slabs. Some undercutting of the pavement is apparent, and cracking of the slabs may be expected sooner or later. The slope is used as a short cut by children and more agile adults and there is some erosion from this cause, but the growth of the trees gives a guide to the long term history of the slope. Older trees estimated at more than 60 years old are kinked at a point about half their height, whilst younger trees of about 20 years old are straight throughout their height. This has commonly been accepted in landslip studies as an indication of past movement, and here it would indicate the stability of the slope during the past 20-30 years.

The slope may be followed north where it has been gullied and an analogous two-segment style can be seen but apart from small areas where it has been affected by springs or drainage of effluent from houses the slope is quite stable and at a lower angle.

When followed south towards the town centre the slope lies very closely behind the buildings. It still has a steep, though apparently stable, upper segment occupied by the road and a lower segment with a 20° slope. This has been cut into to provide more flat ground for the buildings at the foot, and has been retained by walls, for instance behind Hamers Hotel and behind the Council Chambers. These structures appear at the moment to be quite stable. It is understandable however that removal of the toe and building right up to the resulting face without any appreciable support as has apparently been done, could cause trouble from reactivation of the toe slope.

These observations indicate the kind of limitations which are imposed on the motel site by the topography. The slipping is a natural property of the sediments of the area, but these can be regarded as relatively inactive material because of their high sand content. Although natural erosion in the long term and probably inadequate or unwise drainage in the short term can cause failure, such an event is not difficult to guard against.

Low cuts of 900 mm involving little removal of material could no doubt be retained by simple walls, assuming filters and drains were provided. Excavation of preliminary trial cuts by back-hoe would readily provide information on the natural stability, clay content, water content and free draining properties of the toe material.

Higher cuts of 3 m would run a correspondingly higher risk of

reactivating the toe, and retaining wall and drain design would be more critical; investigation as described above would again be appropriate. The toe, unlike many landslip situations has no function in retaining the upper segment of the slope for there are many cliffs without toe slopes. The upper segment depends for its stability on prevention of water access to the crest of the slope and no doubt to maintaining tree cover. Trees at this site could contribute much, adding to the stability of all parts of the slope, forming a screen, and generally replacing the blackberry bushes and tea-tree with a more pleasing ground cover. Species could be selected for their soil retaining and soil water removal properties.

Toe movement, if it occurred, would not be expected to be rapid or very extensive, and if a working space could be allowed between buildings and the retaining wall then the space could be cleared by machine and damage to buildings could be prevented.

Depending on the results of the trial cuts, some additional drains in the toe slope might be found necessary.

SUMMARY AND CONCLUSIONS

The steep slope is stable and with good road maintenance may be expected to remain so.

The toe slopes could be reactivated by the access of excess water.

Trial cuts in the toe slope could give information on the stability of permanent cuts, but simple retaining walls will probably be adequate.

Trees will aid the stability of the toe slopes.

The excess water of the site attracted some attention. The site is largely on sands and probably peats arising from the presence of the creek which must be the main means of drainage, and is being cleaned out to this end. Additional drainage could be achieved by means of agricultural drains laid in the wetter areas and draining into the creek. A particularly wet area on the flat could be related to stormwater and effluent drainage from a house on the east side of the site.

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