

INFLUENCE OF TOPOGRAPHIC AND GEOLOGICAL STRUCTURES ON ROAD-CUT FAILURES, CENTRAL HIGHLANDS OF SRI LANKA

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The elaborate highway road network in the mountainous areas plays a vital role in transportation activities. However, the instability of slopes along the roads can lead to disruption of traffic, considerable damage to lives, property and the environment. Road-cut failures typically occur, when a natural slope is too steep or a cut slope in soil and/or weathered rock contains weak materials or adverse slip surfaces. The Central Highlands consists of high grade metamorphic rocks and they are well-banded formations. Such foliated metamorphic rocks are susceptible to failure along their natural planes of weakness. The purpose of the study was to classify the topography and study the variation of road-cut failures with different types of slopes. In that endeavor, influence of topographic and geological structures on such failures was studied.

Field studies were done at 136 road-cut failure sites in the Central and Sabaragamuwa provinces. Strike and dip of foliation planes of bedrocks, and ground slope directions and angles of the topographic surfaces were measured at each location. The deviation angles- *a measure of the difference between dip and ground slope directions*- were calculated at failure sites and classified principally into different categories of dip, intermediate, and scarp slopes. However, the deviation angle refers only to horizontal variation of geological structural and topographic attributes. For that reason, topographic classification was done as over-dip, under-dip, steepened escarpment, and subdued escarpment based on *d* - difference of two angles viz *apparent dip angle* of foliation plane towards the direction of topographic slope and *ground slope angle*. Both deviation angle in the horizontal plane and *d* in the vertical plane are represented in this classification which makes it more acceptable.

Based on the results of the present study, it is noted that road-cut failures are slightly higher in dip slopes than in scarp slopes and they are rare in intermediate slopes. Deviation angles range from 0° to 10° is highly unstable in the construction or widening of roads. Road-cuts in under-dip conditions are more favorable to failure than those in over-dip conditions. Furthermore, road-cuts in subdued escarpments are more susceptible to failure than those in steepened escarpments. Road-cuts in ground slope angle range of 21° - 30° have a higher susceptibility to failure than those in other ranges. Road-cut failures are rare in locations where slope angles are greater than 40° in dip slopes and less than 11° in scarp slopes.

