

ABSTRACT

GEOTECHNICS AND ZONATION OF "LANDSLIDES"

IN UPPER ST. ANDREW, JAMAICA,

WEST INDIES

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"Landslides" are frequent geomorphic events on the steep slopes of the Upper St. Andrew area. Following torrential rainfall, numerous failures occur and cause many engineering, environmental, social and economic repercussions.

The purpose of this study is to examine these geomorphic phenomena, their engineering and geological characteristics and prepare a "landslide" susceptibility map for the area, such that it can be used in land-use planning.

The susceptibility analysis is based on a geo-statistical approach, using factor analysis as the main tool. This method enables prediction of "landslide" susceptibility based on soil engineering properties, engineering-geologic properties of bedrock, slope conditions, "landslide" frequency and distribution.

Field mapping revealed that most of the failures

in the area along roads and are a direct result of road construction. These failures occur mostly in debris and to a lesser extent, in bedrock and earth. The failures mapped were either flows or slides frequently associated with 20° to 30° slopes, but are rare on slopes less than 10° and greater than 45° . Highly weathered materials fail more frequently than less weathered ones, with granular soils showing similar susceptibility to failures as fine soils. Field and laboratory investigations revealed that soils in the area are mostly granular and cohesionless, enabling rapid fluidization during rainfall events. Failures were also observed on vegetated slopes, suggesting some mechanical instability developing within underlying soils.

Landslide susceptibility analyses suggests that Old Landslide Deposits have the highest degree of susceptibility to future slope movements, while White Limestone lithologies are the least susceptible. Slopes between 30° to 45° (steep slopes) are generally more susceptibility to slope movements than gentle ones (less than 10°). Both clays and granular soils show similar degrees of susceptibility to future failures, but on slopes 20° to 45° and 30° to 45°

respectively. Increase in slope angle increases the susceptibility to failures, but only on slopes up to 45° .

Consideration of the engineering properties of soils as subgrades and bases revealed a wide range in their suitability as foundations. However, poor road design induces failures in all types of sub-grades, regardless of their suitability.