This thesis investigates the three-dimensional influence of discontinuity sets and topography on kinematics of rock slope stability and failure mechanisms. A field data collection methodology was developed to provide the inputs to a slope stability investigation which utilises three-dimensional geometric, limit equilibrium and distinct element codes. Conceptual slope geometries in addition to three case studies are employed to evaluate the influence of discontinuity set orientation and lateral kinematic confinement on the failure mechanism and slope stability conditions. The influence of varying the discontinuity persistence and block size in a three-dimensional distinct element code are also investigated. Systematic studies of these parameters are performed for the planar sliding and block toppling failure mechanisms. This thesis presents the first detailed description and slope stability analysis of the McAuley Creek Landslide and the Chehalis Lake Landslide. New data and analyses of the potentially unstable rock mass at Third Peak on Turtle Mountain are also presented. Two recently developed representations of complex topography in the three-dimensional distinct element code are applied to the case studies. The results obtained in this thesis are compared to the description of other local and international large rock slope failures published in the literature.