

Case History and Causes of a Progressive Block Failure in Gently Dipping Bedrock

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ABSTRACT

A geotechnical investigation was conducted for a landslide adjacent to the south bank of the Colorado River in the Redlands area of Grand Junction, Colorado. A geotechnical and geological investigation was performed to determine the cause of slope movement. An apparent failure plane, a highly plastic clay zone, was identified in core samples obtained at the site, and showed movement during inclinometer monitoring over a two-year period.

Slope stability analyses were performed utilizing strength parameters obtained through geotechnical laboratory testing and correlation with Atterberg Limits. The initial failure was determined to be a block slide near the toe of the slope, which failed along the highly plastic clay zone. Analyses of subsequent failure blocks resulted in successively decreasing values of back-calculated shear strength. Failures continued up the slope due to progressively decreasing shear strength of the slide plane material and removal of slide debris at the toe of the slope. The decrease in back-calculated values of shear strength are explained by redistribution of strength along the failure plane due to progressive failure of diagenetic bonds within the clay and shale as strain continues along the failure plane. Successive failures occurred at shear strengths ranging from 9 to 14 degrees.

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