

Jitima Tapparnich 2010: Mechanical Behaviour of Soil in Laplae Area of Uttaradit Province with Applications to Landslide. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Mr. Apiniti Jotisankasa, Ph.D. 214 pages.

Numerous shallow slope failures took place in residual soils derived from sedimentary rock formation of Uttaradit province, Northern Thailand in 2005, due to prolonged and intense rainfall. In this study, mechanical behaviour of soils and slope behaviour in Laplae Area of Uttaradit Province were investigated, such as field measurement of pore water pressure, slope movement, soil property, shear behaviour as well as water retention, in order to understand the slope failure mechanism. Fully saturated consolidated-drained (CD) as well as suction-monitored direct shear tests have been performed on undisturbed samples collected from depths of 0.3-1 m. A miniature tensiometer has been used for suction measurement during these tests. In addition, influence of number of drying/wetting cycles on saturated shear strength is investigated. Also studied are unsaturated soil property functions including hydraulic conductivity function and soil water characteristic curve. These test results are used in seepage and stability analysis using Finite Element 1D and Infinite Slope methods.

The test results of drying/wetting influence shear strength shows that when increasing drying/wetting cycles, shear strength (cementation) of soil decreased until reaching a value similar to a residual shear strength. It is summarised that the weathering of soil decreased its cementation and cohesion. The seepage finite element analysis also confirm the accuracy of the continuous method for k-function and SWCC measurement. The major slope destabilization mechanism is found to be a combination of pore water pressure increase, material degradation, impeded drainage layer and critical thickness of soil. Understanding these parameters of slope failure leads to a better development of the warning system.

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Thesis Advisor's signature