

Title : Slope Stability Analysis of Southern Ban Mae Sa Noi Area, Pong Yaeng Subdistrict, Mae Rim District, Chiang Mai Province

Author(s) : 1. Worachit Wongpun

Student ID : 650510445

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Advisor(s) : 1. Assistant Professor Dr. Nipada Santha

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ABSTRACT

The northern of Thailand, particularly Chiang Mai Province, is characterized as mountainous terrain and steep slopes, making it highly susceptible to landslides during periods of heavy rainfall. Southern Ban Mae Sa Noi in Pong Yaeng Subdistrict, Mae Rim District, is a residential and agricultural area located on steep valley slopes. Therefore, evaluating slope stability and investigating the engineering properties of the soil in this area is crucial to provide a baseline for disaster monitoring and management. This study aims to investigate the engineering properties of the soil and evaluate the stability of the slopes. Fieldwork was conducted to collect soil samples from 14 locations to determine physical properties, including grain size distribution, Atterberg limits, Unified Soil Classification System (USCS) classification, and shear strength, as well as in-situ soil permeability testing. The obtained parameters were then utilized to construct a slope stability model using GEO5 software, ranging from to calculate the factor of safety under five varying degrees of water saturation 10%, 30%, 50%, 70%, and 90%. The results revealed that the soil in the study area is classified under USCS as poorly graded silty sand with very poor drainage properties. The soil exhibited an average liquid limit of 44.25%, an average plastic limit of 35.88%, and an average plasticity index of 8.37%. Furthermore, the average cohesion was 0.29 t/m², the average internal friction angle was 32.92 degrees, and the in-situ permeability coefficient was extremely low at 2.43x10⁻⁶ cm/s. Regarding the slope stability simulation, the representative area S-MSN-1 yielded a factor of safety of less than 1.0 across all degrees of water saturation, indicating critically low stability and a consistently high risk of landslides. Conversely, the representative area S-MSN-2 maintained stability at water saturation levels between 10% and 70%; however, as the saturation level increased to 90%, the factor of safety dropped below 1.0, rendering the area highly prone

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to landslides. This analysis suggests that water accumulation in poorly drained soil layers is a primary factor contributing to the reduction in slope stability, thereby increasing the likelihood of landslide occurrences in the study area.