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Slope failures can arise from many factors and hazards of such failure might have big impact on public and private infrastructure. Micropiling is an efficient technique in slope stabilization applications and has been adopted by many agencies and used in many problematic sites across the globe. However, uncertainties in development of forces in micropiles within moving soil are unknown. The objective of the research presented is to provide direly needed experimental data and provide a method to improve the prediction of limit loads for micropiles in slope stabilization applications. The experimental data were obtained from tests of 1-g model slopes 8 ft by 14 ft in plan view with heights of 5 ft. This scale is large enough to permit construction of model slopes and stabilization schemes using techniques that mimic field procedures. Models were constructed in lifts before installing micropiles. A pore pressure control system was used to wet the models, which were tilted incrementally throughout testing until failure. Fourteen tests with different pile arrangement and spacing ratios were performed in a large-scale laboratory apparatus. During testing, loads on micropiles, water pressures in the slope and soil movement were monitored and recorded continuously. Load transfer on piles within moving soil was analyzed using soil-structure interaction analyses, and a method is developed to scale the predictions of existing models in order to obtain more accurate limit loads on micropiles.