

## Critical Heights of Sloped Unsupported Trenches in Unsaturated Sand

**Authors :** Won Taek Oh, Adin Richard

**Abstract :** Workers are often required to enter unsupported trenches during the construction process, which may present serious risks. Trench failures can result in death or damage to adjacent properties, therefore trenches should be excavated with extreme precaution. Excavation work is often done in unsaturated soils, where the critical height (i.e. maximum depth that can be excavated without failure) of unsupported trenches can be more reliably estimated by considering the influence of matric suction. In this study, coupled stress/pore-water pressure analyses are conducted to investigate the critical height of sloped unsupported trenches considering the influence of pore-water pressure redistribution caused by excavating. Four different wall slopes (1.5V:1H, 2V:1H, 3V:1H, and 90°) and a vertical trench with the top 0.3 m sloped 1:1 were considered in the analyses with multiple depths of the ground water table in a sand. For comparison, the critical heights were also estimated using the limit equilibrium method for the same excavation scenarios used in the coupled analyses.

**Keywords :** critical height, matric suction, unsaturated soil, unsupported trench

**Conference Title :** ICSMGE 2019 : International Conference on Soil Mechanics and Geotechnical Engineering

**Conference Location :** New York, United States

**Conference Dates :** June 04-05, 2019