



A Preliminary Design of a Calibration Chamber for Evaluating the Stability of Unsaturated Soil Slope

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The unsaturated soil slopes, which have ground water tables and are easily failure caused by heavy rainfalls, are widely distributed in the arid and semi-arid areas. For analyzing the stability of slope, in situ tests are the direct methods to obtain the test site characteristics. The cone penetration test (CPT) is a popular in situ test method. Some of the CPT empirical equations established from calibration chamber tests. The CPT performed in calibration chamber was commonly used clean quartz sand as testing material in the past. The silty sand is observed in many actual slopes. Because silty sand is relatively compressible than quartz sand, it is not suitable to apply the correlations between soil properties and CPT results built from quartz sand to silty sand. The experience on CPT calibration in silty sand has been limited. CPT calibration tests were mostly performed in dry or saturated soils. The condition around cone tip during penetration is assumed to be fully drained or fully undrained, yet it was observed to be partially drained for unsaturated soils. Because of the suction matrix has a great effect on the characteristics of unsaturated soils, they are much sensitive to the water content than saturated soils. The design of an unsaturated calibration chamber is in progress. The air pressure is supplied from the top plate and the pore water pressure is provided through the high air entry value ceramic disks located at the bottom plate of chamber cell. To boost and uniform distribute the unsaturated effect, four perforated burettes are installed onto the ceramic disks and stretch upwards to the midheight of specimen. This paper describes design concepts, illustrates this unsaturated calibration chamber, and presents the preliminary test results.