

## Water Retention Characteristics for Expansive Soils

K.C. Chao<sup>1</sup>, D.B. Durkee<sup>2</sup>, D.J. Miller<sup>3</sup>, & J.D. Nelson<sup>4</sup>

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### **ABSTRACT**

Volume change in expansive soils occurs due to changes in the soil water system that change the stress equilibrium of the soil. Consequently, when determining the soil water retention characteristic of an expansive soil, it is important to consider the volume change that occurs as the suction, and hence water content, changes during the test.

Modified laboratory tests combining pressure cell tests, filter paper tests, and CLOD tests were conducted to take into account the effect of the volume changes on the soil water retention characteristic of expansive soils. Two kinds of undisturbed soils including Pierre Shale obtained from Fort Collins, Colorado, USA and a black plastic clay obtained from San Antonio, Texas, USA were used in the study. The soil water data were fitted with the equations of Brooks and Corey (1964) and van Genuchten (1980) by utilizing a retention curve computer program, RETC (van Genuchten et al., 1991). The RETC program uses a nonlinear least-squares optimization approach to estimate the unknown model parameters from observed retention and hydraulic conductivity data. Laboratory tests were conducted on undisturbed field-saturated samples obtained from various depths, undisturbed vacuum-saturated samples obtained from various depths, and remolded samples.

The results indicated that the van Genuchten equation provides a better fit to the experimental data than the Brooks and Corey equation does, but that neither method may be appropriate for expansive soils. A bilinear curve fit appears to more appropriately model the observed data.

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<sup>1</sup> Geotechnical Engineer, Shepherd Miller, Inc., 3801 Automation Way, Suite 100, Fort Collins, Colorado 80525, USA.

<sup>2</sup> Geotechnical Engineer, Shepherd Miller, Inc., 3801 Automation Way, Suite 100, Fort Collins, Colorado 80525, USA.

<sup>3</sup> Geotechnical Engineer, ESA Consultants, Inc., Fort Collins, Colorado, USA.

<sup>4</sup> Professor, Civil Engineering Department, Colorado State University, Fort Collins, Colorado 80523, and Corporate Consultant, Shepherd Miller, Inc., 3801 Automation Way, Suite 100, Fort Collins, Colorado 80525.