The combined effect of clay and moisture content on the behavior of remolded unsaturated soils

Al-Shayea, N.A.

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Abstract: The behavior of unsaturated clayey soil is highly influenced by the coupled interaction between water and clay content. Various aspects of the behavior of artificial clay-sand mixtures with variable water content were experimentally studied. Laboratory tests were utilized for the determination of consistency limits, the stress-strain relationship, strength parameters, hydraulic conductivity, and volume change characteristics for various combinations of water and clay content in soil mixtures. Results presented for various clay-sand mixtures include: new normalized consistency limits; the combined effect of clay content and water content on the stress-strain relationship and on the strength parameters (c and ∅); and the effect of clay content on hydraulic conductivity and swelling potential. The cohesion of clayey sand is found to increase with increasing water content to a certain limit, above which it decreases. The angle of internal friction for clayey sand is found generally to decrease with increasing water content. The degree of saturation is found to be better than the water content in explaining the strength behavior. The hydraulic conductivity sharply decreases with increasing clay content up to 40% beyond which the reduction becomes less significant. Simple empirical equations are proposed for predicting the swelling potential of clayey soils as a function of either the clay content or plasticity index.