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Abstract	Shallow foundations are usually built above ground water table. In such cases, this soil is considered as dry in analysis and design, while it is actually an unsaturated soil. This unsaturated soil can raise many geotechnical problems upon wetting and drying resulting in swelling upon wetting and collapsing in drying and changing in the soil shear strength causing changing in soil bearing capacity. The classical principles of saturated soil are often not suitable in explaining these phenomena. A number of studies actually dealt with the expansive unsaturated soil. But limited studies dealt with such soil in case of large scale model close to the field conditions and therefore, there is much more room for improvement. Also it may be the first time that an experimental relation between direct measurements of soil suction with swelling or suction with time is obtained to Iraqi expansive and non-expansive soils. Solving the unsaturated soil problems needs the assessment of suction variation in time and space as a response to the variation of environmental factors such as rainfall and evaporation. That's why the tensiometers were used in this study since the tensiometer is the more applicable device to be used in large scale models and field conditions. In this study, expansive (bentonite and sand mixture) and non-expansive (kaolin) soils were tested at different water contents and dry unit weights chosen from the compaction curve to examine the effect of water content change on soil properties (swelling pressure , expansion indices, shear strength (soil cohesion) and soil suction by the filter paper method) for the small soil samples. Large scale model was also used to show the effect of water content change on different relations (swelling with time, suction with time, bearing capacity of shallow footing …). The soil water retention curve (SWRC) was measured in this study by two methods (the filter paper and tensiometer). The fitting equations in the (Soil Vision) program were used after inserting the required soil properties (specific gravity, dry unit weight, gravimetric water content, grain size analysis and at least three points of suction with the corresponding water

	content). The study reveals that the initial soil conditions (water content and dry unit weight) affect the soil cohesion, soil suction and soil swelling, where all these parameters marginally decrease with the increase in soil water content especially on the wet side of optimum. The bearing capacity of a shallow footing on these soils decreases noticeably with the decrease in soil suction for both the expansive and the non-expansive soils even though the drop in soil bearing capacity is larger in the expansive soil. The study also shows that the relation between swelling and time has a double peak curve shape due to the high density of the soil used in the model which leads to microstructure expansion. This mechanism causes a decrease in the macro-structural void ratio while the micro-structural void ratio expands under wetting.