ABSTRACT

Construction of light structures in arid climates generally results in an increase in water content of the subsoil profile due primarily to irrigation and a reduction of evapo-transpiration. Water introduced by irrigation at the surface migrates downward and increases the water content at depth as it advances. Although the subsurface is wetted significantly, the soil above the wetting front may not become saturated. If the wetting front encounters an aquatard, a perched water condition may develop and the soils above the aquatard may become saturated.

Determination of a final water content profile for design of foundations on expansive soils is an important design parameter. In the absence of other data, it is conservative to assume that the entire profile is saturated. Alternately, modeling of water migration in the vadose zone can be performed to determine water content profiles for various site conditions. The results of this rigorous analysis can be used to determine a final water content profile for use in optimizing the design of foundations. However, this rigorous analysis is not always economical for small projects. Thus, a simplified procedure is presented that can be used to hand calculate final unsaturated water content profiles for design of foundations on expansive soils.

The results of the water migration modeling and hand calculation methods are presented and the applicability of these methods is discussed. The resulting foundation design based on the final water content profiles determined from these two methods, as well as the assumption of full saturation, is presented and discussed.