Florida Department of Transportation Research

Seasonal Variability of Near Surface Soil Water and Groundwater Tables in Florida – Phase II
BD545-55

Reliable predictions of the seasonal high groundwater table (SHGWT) at potential construction sites are critical for roadway designs. Maximum SHGWT levels can affect the construction and maintenance of roads, and the design and operation of stormwater ponds. If the SHGWT is underpredicted, high water levels can shorten a facility's service life. If the water table rises higher than predicted and interacts with and weakens the roadway base, for example, premature rutting can occur. Conversely, overpredicting the SHGWT can result in overly conservative and expensive designs. Accurate predictions optimize the cost of design and the service life of the facility.

Many factors cause groundwater levels to fluctuate during the year, which makes predicting SHGWT a complex process. In the initial phase of study (BC354-79), the researchers evaluated commonly used methods of determining SHGWT and concluded that an improved prediction method was needed. In Phase II, they developed a computer-based analysis tool that stores historical reference well data and uses that data to estimate probable seasonal water table elevations of potential construction sites.

The tool is based on a US Geological Survey (USGS) methodology that compares water table measurements taken at potential construction sites with measures taken the same day from nearby reference wells with a known history of water table elevations. The USGS method assumes that water tables will fluctuate in a consistent manner within areas sharing similar topography, soil characteristics, climate, and rainfall. This method has proven to be reliable at other locations in the US.

Researchers take measurements at an observation well.

The researchers obtained data from 322 observation wells in the South Florida Water Management District (SFWMD), correlating the wells to remove outliers and identify the wells that are the best indicators of the SHGWT. The researchers identified 76 reference wells that they grouped into six geographical reference zones within the SFWMD, and they created an Excel-based reference well database for each zone. The tool uses this data to generate predictions.

Designers can use the tool to compare water table elevations from a potential construction site with data from a set of correlated reference wells. Using a set of wells, rather than the single most similar well, the tool identifies a range of values the designer can use to project best and worst case scenarios.

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For more information, visit http://dot.state.fl.us/research-center.