

EXPANSIVE SOILS POSE RISK THAT CAN'T BE ELIMINATED

The home building industry in the Denver area has been impacted significantly by construction defect litigation, much of which has focused on expansive soils as a contributor to alleged construction defects. In the 1990s, most of the litigation was aimed at builders and developers. More recently, plaintiffs (and now, in some instances, builders or their insurers) have targeted local soils engineers.

The resulting business climate has become so adversarial that several geotechnical firms have chosen to stop providing design-level services for residential work. We don't blame them. The financial reality is simple: For \$500 in investigation and observation work at 10 percent profit, it takes 2,000 investigations to cover a \$100,000 settlement.

Experts for home owner plaintiffs often misrepresent the standard of practice for soils engineers and use overly conservative assumptions of depth of wetting when calculating potential future heave. In contrast, most local soils engineers use an assumed depth of about 20 feet, or possibly 25 feet. The experts also state that prediction of heave should be part of the standard of practice. We are aware of no local firms who currently attempt to predict potential pier or slab movements for every house.

In 2001, the Colorado Association of Geotechnical Engineers initiated a study of depth of wetting. The results have been summarized in a paper that was submitted to the American Society of Civil Engineers in 2006 for publication. We are still waiting for the paper to be accepted.

In summary, the study revealed a comparatively high probability that wetting (significant decrease in soil suction) will not extend past a depth of 20 feet. The data indicate only about 30 percent probability that suction changes will extend deeper than 20 feet, about 7 percent probability for 25 feet and virtually zero beyond 33 feet.

Wetting below 20 feet doesn't guarantee that movement of a pier foundation designed based upon an assumption of 20 feet of significant wetting will cause damage. Likewise, it doesn't guarantee damage will occur to houses built on an overexcavation that was designed to mitigate movement in the top 20 feet. The probability of damage is the product of the probability of wetting exceeding design and the likelihood that damage will occur given that the wetting occurs. We don't know much about the second factor despite years of experience.

In the future, soils engineers may use the CAGE data to provide probability-based design that the builder and home buyer can evaluate with regards to cost and risk. When a buyer is not involved with this evaluation, builders can decide what risk they will take and how they should inform potential buyers. If soils engineers are to evaluate potential heave, it will require a significant increase in investigation, lab testing and time. But this may be necessary if soils engineers are to continue providing design services to the home building industry.

The bottom line is that we need to inform you about the risks you must take to build on expansive soil sites, and you need to inform home buyers with a strong warning. There is no practical way to eliminate the risk, and builders should never imply otherwise to a buyer. We believe that our practices must evolve because of the CAGE research and the business climate. As a result, you are very likely going to pay more for soils reports. You must be prepared to proactively repair those homes that are significantly affected. 🏠

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