



Engineering Sciences Section - 2016

D26 An Engineering Perspective on Case Studies Where Performance Does Not Match Scientific Predictions — The Expansive Nature of Collapsible Soils and Other Engineering Oddities

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After attending this presentation, attendees will be able to: (1) describe how soils issues relate to construction defect claims; (2) describe the challenges in accurately predicting soil behavior; (3) describe potential mistakes made by parties assessing the nature of soil movement; and, (4) present multiple case studies which illustrate engineering oddities and challenges.

This presentation will impact the forensic science community by describing some common challenges when assessing construction defect cases involving soil movement and by improving the understanding of engineering principles which can be applied in the field and laboratory to more accurately evaluate construction claims involving such movements.

Soils-related issues are among the most common allegations described in construction defect claims today. Generally, soils-related allegations include inadequate grading and drainage and questionable soil compaction. The more expensive and troubling allegations generally include foundation modification based on the presence of expansive or collapsible soil. Less common but equally challenging allegations include perched groundwater conditions and corrosive soils. These issues have been documented as being a significant contributing factor to financial demands in construction defect claims. Case review of several hundred construction defect claims has shown that alleged damage related to soils issues constitutes several hundred million dollars in recommended repairs.

Because questionable structural performance may be attributable to a variety of soils-related issues, it is important to adequately assess the composition and behavior of soil in a laboratory. Likewise, it is important to compare one's hypothesis against the performance of the structure (and vice versa). Understanding the nature and predicted performance of soil is generally the first step in a forensic evaluation.

Experience has shown that observational evidence or performance of a structure alone is generally insufficient to provide a scientifically supportable opinion. This is particularly true when formulating opinions on causation or potentially responsible parties. In some cases, settlement of soils may be attributable to design-related issues (e.g., hydro-collapsible or compressible soils) and in other cases, settlement may be attributable to construction-related issues (e.g., inadequately compacted soil). While the term "soil settlement" may be an appropriate diagnosis, it is important to understand the underlying cause of the soil settlement since the observed condition may be attributable to the party who designed the project or the party who constructed it — or potentially both parties.

When assessing soil conditions and resultant structural performance, there are several challenges facing forensic engineers. In the case studies provided, examples will be presented in which the performance of a structure did not match the predictions or opinions offered by the forensic engineer. In a few instances, the performance of a structure was the opposite of the predicted behavior, yet the forensic engineer maintained an unsupportable opinion throughout the course of litigation. The case studies provided will demonstrate that the consistent application of the scientific method will reduce the risk of erroneous opinions.

Structural, Performance, Defects