

Geotechnical Engineering – An Owner’s Primer

Foundation and Earthwork Problems



Unanticipated conditions, delays, change orders, cost overruns, and failures. These are the far-too common hallmarks of modern construction, leading to disputes that drain time and money.

Where do the most significant risks stem from? Foundations and earthwork; construction elements that, for decades, have been responsible for more claims than any others¹. Project sites in urban, re-developed settings, or projects with unique elements such as foundation underpinning or deep foundations, or that involve historic, high-performing, or movement-sensitive buildings, swimming pools, deep backfill, steep slopes, retaining walls, and deep excavations, are particularly at risk.

No matter what you do, you cannot eliminate these risks. However, with a competent, empowered geotechnical engineer on the team, you can confront the risks and keep them under control.

Geotechnical Engineering – Tame the Risks



The geotechnical engineer’s participation should include subsurface site characterization early in the project timeline to inform programming, concept design and planning. It should continue through design-phase, and through construction-phase with construction monitoring, testing and inspection of foundation and earthwork elements. Of note, the geotechnical engineer develops foundation and earthwork interpretations, models, and recommendations based on limited testing and observation of soil borings that typically explore less than 0.1% of the subsurface materials affecting construction. Hence, the geotechnical engineer should be involved during construction to observe exposed excavations and to modify and/or finalize the *provisional* recommendations developed during

characterization of the site. Observed conditions that differ from those inferred to exist are a relatively common occurrence.

Subsurface problems continue to be a principal cause of construction delays, cost overruns, claims, disputes and failures. While you cannot eliminate all such risks, you can manage them. To that end, the Geoprofessional Business Association (GBA) recommends that owners – encouraged and supported by other project design professionals - take the following steps:

Step 1 – Choose a trusted geotechnical engineer to be the project geotechnical engineer-of-record based on technical, professional and business merit.

Step 2 – Mutually develop a sensible geotechnical scope of service, with owner, geotechnical engineer, and other project and design team members (architect, structural engineer, general contractor, foundation specialty contractor, and civil/site engineer) closely involved in this process.

Step 3 – Once an initial geotechnical engineering report is available, meet to discuss findings and recommendations, considered *provisional*, and continue to involve the geotechnical engineer in design tasks that are essential to project success such as verifying that documents prepared by other design professionals are consistent with geotechnical recommendations, and assisting develop foundation and earthwork design specifications as needed.

Finally, involve the geotechnical engineer during construction:

Step 4 – Allow the geotechnical engineer to verify, modify, and finalize the *provisional* geotechnical recommendations through construction-phase observations. These recommendations will remain *provisional* until the geotechnical engineer observes actual subsurface conditions during construction.

Step 5 – Engage the geotechnical engineer-of-record [who has been involved in design and pre-construction phases, and who has developed a unique understanding of subsurface conditions and risks for the project] – not a replacement firm – to provide seamless site review during construction.

¹ Geoprofessional Business Association (GBA), A Message to Design Professionals, Geotechnical Business Council