

BRIDGE THE GAP

A Discussion About Where the Responsibilities of the Geotechnical Engineer of Record Ends and the Geotechnical Specialty Contractor Begins

Over the last quarter of a century, the geotechnical contracting industry has experienced explosive growth. Many options for ground improvement, earth retention and deep foundations have been introduced and now enjoy widespread use. And new technologies are continuing to be developed.

Point:

Relatively rapid introduction of new technologies has created challenges for geotechnical engineers. It is difficult to develop competency when things are changing so quickly. In some cases, geotechnical specialty contractors closely hold information about design methods to maintain competitive advantage, which contributes to the slow development of geotechnical competency. Traditionally, geotechnical engineers have usually functioned as design consultants rather than prime designers. Some of the design work using these new technologies is being done by the geotechnical specialty contractors themselves, but not always. When the geotechnical specialty contractor is not delivering the project using the design-build method, and the geotechnical engineer is reluctant to be responsible for the geotechnical design, a gap in project leadership occurs. Another all-too-often gap occurs when the geotechnical engineer is involved early in the design process when the data needed for the specialty design is undefined. All of this has led to fuzziness in defining where the responsibilities of the geotechnical engineer end and the geotechnical specialty contractor begins.

Counterpoint:

The primary tools used in geotechnical explorations are well established and generally include SPT (1903), CPT (1950s) and GPR (1970s). The forefathers of the industry include Atterberg and Rankine (1800s), Karl Terzaghi (1900), Arthur Casagrande (1930) and Ralph Peck (1940). While the concepts they developed to model soil behavior haven't seen substantial changes in several generations, the electronic computer has evolved from a behemoth machine of switches and tubes to a high-speed device that fits in your hand. The computer has revolutionized the field of geotechnology from laborious hand calculations to the near-instantaneous processing of highly complex and iterative calculations to evaluate a multitude of scenarios in seconds. Despite the putting of these enormously powerful tools in the hands of engineers, in some respects it has reduced the level of analysis. Instead, computers are being mostly used as word processors because of the convenience of cutting and pasting.

While there have been rapid advances in the field of ground modification in the last 25 years, there has been a significant decline in the data and engineering content in geotechnical reports. Many reasons are cited for both subjects. Nonetheless, the design of ground modification and specialty foundations proceeds based on more conservative assumptions and extensive experience with each specific system. Projects suitable for these specialty techniques still require knowledge of the fundamental soil properties such as

shear strength, groundwater depth, and other basic properties. A significant number of geotechnical reports are drastically reducing the number of borings, laboratory testing programs and field measurements of groundwater depths to be more “cost competitive to get the work”.

Ground improvement and specialty foundation projects designed with insufficient subsurface data are designed more conservatively. The lack of data also commonly leads to change orders for differing site conditions. And an even costlier situation can result from the geotechnical engineer recommending a traditional foundation system when ground improvement would result in a building being constructed on spread footings.

Response:

The Geoprofessional Business Association, GBA, formed a special task force to address this gap. Representatives from prominent geotechnical specialty contracting firms and geotechnical consulting firms met in Seattle, Washington on October 13, 2016. A few of the key findings from the task force included:

- The scope of the geotechnical exploration is often defined by the owner or the design team and may be limited.
- There is a wide range in the capability of geotechnical practitioners. There is a group that wish to elevate our profession by assuming a lead role, including preparation of designs. There is another group of geotechnical practitioners who function primarily as data collectors and limit their consulting role.
- Geotechnical practitioners and contractors look at risk at differently. Geotechnical practitioners are generally more conservative because a claim can cost them hundreds of thousands of dollars, a large amount of money compared to their fee. If the contractor makes a mistake, they might have to install the foundation a few feet deeper than they had assumed. While this can also be a large sum of money it is against a much larger fee.

The task force developed the following matrix to help think about possible roles for the geotechnical engineer:

	Site Characterization	Geotechnical Design Parameters	Design	Construction
Design-Bid-Build	x	x	Maybe	
Design-Build	x	Maybe		
Engineer-Procure-Construct	x	x	x	x

Regardless of the geotechnical engineer's role on the project, there is an opportunity to lead that is often not being taken. This can include additional characterization and development of geotechnical design parameters on design-build projects, making the geotechnical specialty contractor part of the design and construction team early in the project to help identify appropriate design options, and consulting with the owner when the geotechnical specialty contractor is assuming a design-build role. The geotechnical engineer of record should seek being the quarterback of the team helping to make sure the project is successful regardless of their proper role and seek being the prime designer when it makes sense to do so.

Continuing the Discussion:

Mike Marasa, P.E. and Rick Heckel, P.E., D.GE will lead a discussion exploring the respective perspectives of the geotechnical specialty contractor and geotechnical engineer of record. By extending the work of the task force, it is hoped the Geotechnical Business Council will be able to prepare a best practices paper for use by GBAs membership.