

Working with a Geotechnical Engineer

By ACEC Staff and CASE Executive Committee

Structural engineers charged with designing a structure depend upon the input of geotechnical engineers to determine the appropriate foundation type for a particular site and building design. Although both are critical team members on a project, the geotechnical engineer and structural engineer may be engaged through different processes, and each may have different clients though parallel responsibilities.

Structural engineers are often the most qualified members of the design team to advise the owner on what services, recommendations, and documentation are required from a Geotechnical Engineer on their project. Aside from the geotechnical engineers themselves, SEs have the best understanding of the likely structural and foundation systems and loadings, the implications of site soil characteristics on the structural design, and the most common local foundation design and construction strategies.

A request for a proposal for geotechnical engineering services should be prepared by the owner or owner's representative (architect) with input from the structural engineer. The RFP should include building type, anticipated loads, and specific design criteria desired by the design team and/or required by building codes. The selection of a geotechnical engineer should be based primarily on qualifications rather than fees. The right geotechnical engineer reduces risks and could result in savings for the Owner in construction costs for the project. (*A comprehensive list of the Geotechnical Engineer's scope of work is contained in CASE Tool 6-2.*)

One of the geotechnical engineer's primary scopes of service is to prepare a geotechnical report that includes data from field and laboratory work which documents the data collected, the geotechnical engineer's interpretation of the information, and his/her recommendations for foundations and earthwork for the proposed project. There is no fixed template for a good geotechnical report. The geotechnical issues for a particular project depend on the local geology, site topography, project scope, and applicable code. A geotechnical report should be prepared early in the project before finalizing significant design decisions. The geotechnical report provides vital information for the design team to complete their work.

Guidance available from CASE

- **CASE Guideline 962-I:** *Structural Engineer's Guide to Working with a Geotechnical Engineer*
- **CASE Tool 6-2:** *Scope of Work for Engaging Subconsultants*
- **CASE Contract #10:** *An Agreement Between Structural Engineer of Record and Geotechnical Engineer of Record*

Although the Geotechnical Report may be provided to the contractor as a reference document, it should be clearly stated that the report is not part of the contract documents prepared by the structural engineer. The geotechnical report is provided for informational purposes only since subsurface conditions are never guaranteed. Such reports often contain non-mandatory language, multiple foundation options, or references to proposed designs that are no longer part of the project. The contract documents themselves need to define the entire scope of work for a project without relying on reference documents such as a Geotechnical report. Examples would be defining the depth of over-excavation or minimum pile embedment. However, the structural engineer can cite the geotechnical report (title/author/date) in the structural drawing set as a basis of design.

The geotechnical engineer should be retained to review the Contract Documents before they are issued for bids. The purpose of such a review is multi-fold. It gives the geotechnical engineer a chance to ensure the design team interprets and implements their foundation design recommendations correctly. Also, if the project design has evolved since the geotechnical report was written, as it frequently does, the geotechnical engineer can be brought back into the communication loop. The last review confirms that the design still reflects the best geotechnical advice. It is also a good time to confirm the Special Inspection program for the foundation work that can be spelled out in the relevant specification sections. The geotechnical engineer can provide, or at least edit, the earthwork, deep foundation spec sections, and Foundation portion of the Statement of Special Inspections.

Geotechnical recommendations in a project geotechnical report are typically based upon the results of limited subsurface exploration. As a result, geotechnical recommendations are considered preliminary until the actual site conditions are verified through

field observation and testing. Geotechnical observations and testing include verification of fill material and compaction requirements, confirmation of bearing conditions for shallow building foundations and proper installation procedures for deep foundations, and the supervision of pile load tests. These tests and observations are critical to ensuring that the recommendations included within the geotechnical report are consistent with actual field conditions and result in adequate foundation design and construction. As such, they should only be performed by a qualified, licensed geotechnical engineer.

Structural engineers should either directly specify or strongly recommend to owners that the geotechnical engineer for the design phase be retained to perform geotechnical observations and testing for the foundations, even if that engineer is not retained to perform observations and testing for the entire project. The project geotechnical engineer has the benefit of involvement in the project's design phase. The continuity in responsibility for the original geotechnical recommendations and on-site verification of those recommendations provides clarity in any legal disputes that may arise. When the owner engages a second geotechnical engineer, state engineering practice laws and regulations should be referenced for guidance regarding liability.

A properly prepared geotechnical report for a project is essential for the structural engineer to adequately design and analyze the structures for which they are responsible. All parties involved should understand the critical role that the geotechnical engineer and the structural engineer play. Properly engaging both disciplines with explicit scopes of service and expectations enhances any project. ■



The Coalition of American Structural Engineers (CASE) resources, a Coalition of the American Council of Engineering Companies, can be found at www.acec.org/CASE.