CalGeo℠
The California Geotechnical Engineering Association

Geotechnical Engineer of Record Policy Recommendation

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The Role and Responsibilities of the Geotechnical Engineer of Record (GEOR)

PURPOSE STATEMENT

The purpose of this paper is to provide public agencies with context regarding the role of the Geotechnical Engineer of Record (GEOR) in the design and construction of private and public works. This paper was prepared by members of CalGeo, the organization which represents Geotechnical Engineering and Engineering Geology firms in the State of California. This document will outline not only the Geotechnical Engineer's role, but also provide some model guidance on best practices for interacting with and making the geotechnical engineering consultant part of the design and construction process to improve (1) the overall quality of the project as well as (2) safety and compliance with state and local building code requirements.

INTRODUCTION

Geotechnical engineers are commonly engaged as consultants in the initial stages of a project's design, particularly when an owner or public agency intends to develop land or build a project. Similar to a surveyor who determines the topography of the site, geotechnical engineering consultants are brought in to ascertain the soil and geological conditions, hazards, and potential risks that may impact the project below the surface. This initial phase is called the ***Site Exploration Phase***. Following the initial investigation, the GEOR for the project will interact and collaborate with other design professionals and contractors during the ***Design Development Phase***. As the project moves into construction, the critical role of the GEOR moves into the ***Construction Observation and Testing Phase.*** During this pivotal phase of the project, the GEOR plays a vital role in conducting confirmation testing and making observations to validate the accuracy of the geotechnical design parameters. Additionally, the GEOR observes that the construction activities align with the intent of the original geotechnical design requirements, providing guidance that the project is progressing according to plan.

DISCUSSION

Geotechnical engineers formulate their opinions based on a combination of geological research, targeted subsurface explorations, and experience. Depending on the type and amount of subsurface explorations, the data collected is typically a very small fraction of the overall subsurface conditions for a project site. Geotechnical engineers are required to perform interpolation and extrapolation with a limited amount of data, given the site-specific and project-specific nature of their work. Conclusions and recommendations are derived from the data, augmented by research and experience, to review their accuracy and reliability. During construction, geotechnical engineers will observe that subsurface conditions encountered align with expectations, thereby providing critical guidance to the project team.

PHASE 1 – Site Exploration

The first phase of geotechnical design typically involves subsurface explorations, consisting of drilling, Cone Penetration Testing (CPT), and/or test pits. Depending on the exploration method used, soil and/or rock samples are collected at depths pre-determined by the geotechnical engineer. A geologist or engineer working under the responsible charge of the

geotechnical engineer will review, perform the exploration and obtain soil and rock samples, and log the borings and/or test pits. The geotechnical engineer will then assign the laboratory testing to be performed on the soil samples to determine the pertinent engineering properties necessary for analysis and design. The geotechnical engineer uses the data to characterize the subsurface conditions, performs engineering analyses, exercises sound engineering judgment, and prepares a design report that summarizes the geotechnical findings and recommendations for the project.

Deliverables at this phase may include:

- Preliminary Feasibility Reports
- Data Reports
- Design-Level Geotechnical Exploration Reports
- Geotechnical Interpretative Reports

PHASE 2 – Design Development

After the publication of the design report, the geotechnical engineer will collaborate with the design team to address questions, deliberate on alternate design considerations, and provide other necessary consultation for the project. The geotechnical engineer is a crucial member of the design team and should be consistently consulted throughout the process. The engineer must also review the design plans as they are developed to review if the geotechnical recommendations are correctly incorporated into the design. These plan reviews should take place during the initial stages of development, rather than at the very end of the process. Depending on the requirements of the governing agency, the geotechnical review may involve a letter confirming the review or stamping the plans directly, indicating that they are generally in compliance with the intent of the design recommendations.

Deliverables at this phase may include:

- Supplemental design memos
- Report addendums
- Recommendations for design-build elements
- Plan Review Letter (critical)

PHASE 3 – Construction Observation and Testing

The final phase of geotechnical services is construction observation and testing. In this phase, the geotechnical engineer will typically monitor the grading, foundation installation, excavation/shoring, retaining walls, and other geotechnical aspects of the project. This phase of work often involves the participation of engineering technicians, staff engineers, and staff geologists who are working under the responsible charge of the GEOR. The engineer's field representative will prepare daily field reports that summarize these construction activities, including testing, which will be reviewed by the geotechnical engineer. The aim of these services is to observe and confirm that the site conditions exposed during construction are as

expected and to provide recommendations in case unexpected conditions arise. The ability to adapt the geotechnical conclusions and recommendations provided during Phases 1 and 2 is critical to the success of a project, as unforeseen conditions could lead to a claim for differing site conditions or distress to the project improvements. The geotechnical engineer will typically provide recommendations to the contractor and design team in response to the Request for Information (RFI) process, documenting the issue and agreed-upon mitigation by the owner, design team, and contractor. Once the geotechnical aspects of the construction are concluded, the geotechnical engineer will prepare a construction summary report documenting the observations and testing for the owner's records.

Deliverables at this phase may include:

- Special Inspection Letters
- Final Grading or Pad Letters
- Daily Field Reports (DFRs)
- Construction Summary Reports
- Geotechnical As-Built Plans

CONCLUSIONS: RECOMMENDED BEST PRACTICES / PROCEDURES

The GEOR plays an important role in the development of any type of project and should be incorporated into relevant phases of project development. Project owners, development teams, and public officials should consider the following recommended practices when either hiring a GEOR or overseeing their role in project review and oversight:

- During the initial design development stage, the GEOR should have an understanding of the final design concept, including site grading, building elevations, structural loading, and structure locations.
- The GEOR shall prepare the design-level geotechnical report that incorporates their understanding of the project along with the soil and rock properties of the planned development.
- Following the initial design report, the design team should consult with the GEOR for any modifications to design requirements based on the evolving project design.
- Public agencies should require that the GEOR perform a plan review of the civil, structural, and shoring plans for construction. This is especially important to prevent potential conflicts between the geotechnical design report and project plans and is in the best interest of the project owner.
- Soils testing and observations should only be performed by the Geotechnical Engineer of Record (GEOR) or the GEOR's representative. Continuity of service has the following benefits:
    - The first and primary benefit is the geotechnical engineer retained during Phases 1 and 2 is most knowledgeable of the site and subsurface conditions. The geotechnical engineer also has firsthand knowledge from verifying samples collected during field explorations, observing the laboratory test data, and

understanding the approach to the specific geotechnical engineering analyses performed.
    - The second benefit is to reduce the potential for any misinterpretation by another geotechnical engineer during the construction phase. If the geotechnical engineer from Phases 1 and 2 is replaced during Phase 3, additional costs could occur for any explorations, testing, or analyses that the incoming geotechnical engineer may require to accept the responsibility to perform the roles of the geotechnical engineer of record.
    - The third and final benefit is the continuity in service during the exploratory and design phase. The geotechnical engineer from Phases 1 and 2 has then worked with the various members of the design team and engaged in discussions related to the design that the incoming new geotechnical engineer would not be aware of.

CalGeo acknowledges that owners have a choice in selecting a geoprofessional during the construction phase and that other issues may play a role in the selection process. If the GEOR from Phases 1 and 2 is not retained to provide construction observation services, the responsibility is transferred to the new firm that is providing these services and the following procedures are recommended:

- The new GEOR should review the geotechnical report and confirm that they agree with the design-level recommendations. They should also review the project plans and specifications and prepare a plan review letter confirming that they agree with the implementation of the design. This letter should include a statement of agreement and also state that they are assuming the role of GEOR.
- The letter should be submitted to both the original GEOR and to the public agency which may have oversight. In accordance with the Rules of the State Board of Professional Engineers and Land Surveyors, State of California Code of Regulations, Title 16, Chapter 5, 404.1 (c) and (d), as well as the Professional Engineers Act, this letter shall release the original GEOR from any additional geotechnical engineering responsibilities for the project.
- At the original GEOR's discretion, they can elect to maintain involvement with the project on a consulting basis. However, this is at their discretion.
- Any site grading and foundation observation and testing should be performed under the responsible charge of a professional engineer experienced in geotechnical engineering.

The purpose of this document is to emphasize the importance of the GEOR's role, responsibilities, and best practices. We believe that continuity of service is in the best interest of the project team. For more information and assistance in the selection and retention of a GEOR, please contact CalGeo.