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Design-Build Delivery in Today's Marketplace: Growing Demands on the Geotechnical Engineering Community

In today's market of shorter schedules, smaller budgets and risk management, geotechnical engineers across the globe are finding increased opportunities to expand their scope of services beyond the traditional. Implementation of the design-build delivery approach to construction has increased significantly over the past decade.The advantages to this approach include shorter delivery times, fewer miscommunications, less risk to the owner, and greater profit potential for contractors.It also provides engineers with unique opportunities to use both their engineering expertise and their creative abilities to develop new and challenging approaches to design. As much as one third of all public owners in the United Steates are now using or are planning to use design-build delivery for their projects in the coming year. The future of construction has a new and exciting look, and geotechnical engineers are learning to embrace and understand the impacts to their business practices.

Design-build is generally defined as a type of project delivery system in which an owner contracts with a single entity to perform both the design and construction of the project. This process implements many of the same general procedures as the traditional design-bid-build approach, but creates a much closer working relationship between contractor and designer.

By using this method, the owner must clearly outline conceptual and performance requirements for the project prior to the contract award. The owner relinquishes control of the project design to the design-build team. The D-B team assumes much more risk/responsibility for project completion, including project costs and schedule. This process requires that the construction team become heavily involved in the design and the design team to be closely integrated into construction activities. Many times, design and construction overlap significantly, requiring both parties to work congruently to achieve a mutual unified goal.

So how does this affect the geotechnical community? There are, of course, both positive and negative consequences to the growing trend of design-build utilization. With decreased delivery times, geotechnical engineers are faced with the task of producing pertinent project information faster than ever before without sacrificing quality or reliability. This applies not only to the traditional drill-test-report type work common to most, but also to the extended scope of foundation related design services now being offered by geotechnical firms. With design-build projects, it is even more critical that owners provide sufficient geotechnical information to the D-B team prior to award.

This necessitates a thorough geotechnical study and the use of differing site condition clauses in the D-B contract. In addition, allowances should be made to ensure the designer has sufficient authority to implement the required standard of care in the design. Contactors often have cost-driven considerations that may involve construction methods of lesser scope than originally designed. And, to provide a sensible system of checks and balances on the projects, an owner should consider the use of an independent observer for construction activities.

Geotechnical engineers may provide preliminary subsurface information as well as perform design functions related to many below grade structures. This may include footing design, pile type selection, pile cap design, retaining wall design and application of ground modification techniques. In D-B projects, the geotechnical engineer must work closely with both the contractor and the structural engineer to ensure the design goals of the project are met.

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Although this tends to increase risk to the geotechnical engineer, it provides opportunity to apply new design and construction technologies to real projects. Many owners try to pass along all ground condition risks to the contractor, who, in turn, will pass them along to the geotechnical engineer. The prime agreement, therefore, becomes very important to the designer. There must be terms in place to not only to promote quality, but also to protect all parties from the assumptions of underground conditions. When D-B goes underground, these added considerations may cause extreme turmoil during construction.

When understood and handled properly, the D-B approach can actually speed along necessary corrective measures required to complete the project.

It is with this understanding that Ellis & Associates has ventured into the foundation design industry. Services now include design of many foundation elements and ground modification techniques. In order to serve clients better, the need for this knowledge prior to completion of the design function is crucial to saving the owner money.

Today's contractors are more highly skilled and have many more tools in their arsenal of techniques to tackle problems efficiently and economically. The role of the geotechnical engineer in this process now requires an understanding of soil structure interaction, which was largely ignored in the past. Computer-aided design tools such as PLAXIS, a finite element modeling program designed exclusively for soil structure interaction, are now in common use throughout the industry. These new tools give geotechnical engineers the ability to develop the entire structural foundation package prior to completion of the superstructure design. This allows the structural engineer to decrease delivery times and, many times, eliminate redesign steps along the way.

Although design-build brings new challenges, it serves to provide geotechnical engineers with many more opportunities to provide increased value to our ever expanding client directory. This will only serve to expand on the working relationships now enjoyed by owners, engineers and contractors, and to increase the prosperity of the industry as a whole.
