

GEOTECHNICAL ENGINEERING

A MESSAGE TO

OWNERS

FROM

ASFEE

"The Best People on Earth"

Unanticipated conditions, delays, change orders, cost overruns. These rapidly are becoming hallmarks of contemporary construction, engendering disputes that ultimately benefit only those whose job it is to resolve others' differences.

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No aspect of construction is more susceptible to problems than earthwork: All too often what's found was not expected. Although nothing can be done to eliminate subsurface risks altogether, they can be managed, *but only with your involvement*. ASFEE recommends that you implement these four measures.

1. Select a consulting geotechnical engineering firm based on the technical, professional, and administrative competence of the principals and staff who will be assigned to your project. Consider their experience with area subsurface conditions and the type of construction you contemplate.
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2. Emphasize to your other design professionals that the geotechnical engineer is to serve as a full member of the design team, with initial responsibility for developing the scope of geotechnical services needed for your project.
3. Insist that the geotechnical engineer communicate directly with the other design professionals who will rely on the geotechnical recommendations, and that the geotechnical engineer review the plans and specifications they develop.
4. Be sure the geotechnical engineer observes construction for compliance with applicable portions of plans and specifications, and to provide prompt reaction to any unanticipated conditions that may arise during construction.

If you already rely on a geotechnical engineering firm that has provided effective service for similar projects, you need look no further. Otherwise, you will need to select a firm. ASFE has no policy about selection methods and a number of them are used.

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Qualifications-based selection (QBS) may be the most popular. The private sector has been using QBS-type procedures for more than a century. QBS is the *only* method federal agencies use to select geotechnical engineers and other design professionals, and it is used by most state governments as well.

Professional registration alone is not a guarantee of professional performance.

The QBS process begins as most others do, when you obtain recommendations from colleagues and design professionals, among others, to identify several candidate firms. Invite each to submit a statement of qualifications and speak with the references they list. Remember, you are entrusting your geotechnical engineer with far more than a fee. The quality of geotechnical services can mean the difference between your project's success and failure. Professional registration alone is not a guarantee of professional performance.

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After you have completed your review, identify the two or three firms you believe are most qualified. Interview representatives of each firm to discuss your project. Some may be far more concerned than others about the risks your assignment could impose, and that may be a good sign. Those who are concerned about their own risks are far more likely to be concerned about yours, because your risks and theirs are so intertwined. After the interviews, decide which firms are most qualified and, of those, select the one with which you feel most comfortable. Notify that firm of your decision and set a date for mutual scope development; i.e., the process through which you and your geotechnical engineer together develop the geotechnical scope of service that identifies what the geotechnical engineer will do for you. Mutual scope development is one of the most important elements of a geotechnical engineering assignment, because it determines the level of risk *you* will have to bear. Other design professionals you have retained, such as an architect, structural engineer, or civil engineer, should also participate in mutual scope development, so principal project participants are aware of one another's concerns. The geotechnical engineer will recommend a scope of service that you should review in detail. Ask appropriate questions to determine why certain procedures are preferred, what the options are, and the pros and cons of each. *Developing a scope of service satisfactory to all involved parties is a key to reducing risks and future problems.*

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After the scope of service has been developed, the geotechnical engineer can set the price (fee plus expenses) of implementing it. *The price should include an allowance for the unexpected.* If the price is more than you anticipated, let the geotechnical engineer know. The scope of service can be modified to reduce costs, but implementing a cost reduction alternative increases your risks. Manage your risks by learning more about the cost-reduction alternatives, so the scope of service ultimately decided on reflects your own risk management priorities. A geotechnical scope of service usually encompasses more than subsurface exploration. Typically, it also includes development of a written report that analyzes findings and provides recommendations, as well as communications with other design professionals to review how they have treated geotechnical issues in their plans and specifications. Be certain that construction observation is included. Research conducted by ASFE as well as an oversight subcommittee of the House Committee on Science and Technology, among others, has found that lack of adequate construction observation has been a significant factor in a number of project failures. By observing construction, geotechnical engineers can evaluate contractors' adherence to applicable portions of plans and specifications, and can react quickly to unanticipated conditions.

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Mutual scope development is a common element of many professional engagements. It is an extension of the principle that the professional involved is uniquely qualified to explain and recommend alternatives and options. It assumes the professional will make recommendations in an unbiased manner, applying specialized technical knowledge and experience without consideration of personal enrichment. The qualifications-based selection process is far more effective when you are a direct participant. If you prefer to refrain from direct involvement, at least provide oversight. Otherwise, your risk may be increased needlessly, as when architects, civil engineers, or others lacking geotechnical expertise prepare unilateral geotechnical scopes in order to create the "level playing field" needed to compare various firms' price estimates. The problem is, experience shows, such unilateral scopes often tend to be incomplete or vague, because those who developed them aren't geotechnical experts. Geotechnical engineers who respond must therefore make assumptions in order to set a price. To submit the low fee they assume is preferred, many geotechnical engineers will also assume the owner is willing to accept a somewhat skimpy, higher-risk approach. What's your position? Are you willing to make the trade-off? Are you willing to accept an "off-the-shelf" solution for a unique set of needs? Are you willing to accept "rules of thumb" instead of careful analysis? Are you willing to accept an expensive-to-implement defensive design that aims to reduce the risks imposed by a restricted subsurface exploration program? Are you willing to accept liability for the adequacy of a geotechnical engineering scope prepared by someone other than a geotechnical engineer?

Cheap engineering can be expensive.

Of course, you do not want to pay more for geotechnical engineering than necessary. But, by the same token, you don't want to bear higher-than- necessary cost for subsurface construction. For example, consider a case where Foundation A costs \$100,000 more than Foundation B. Despite the significant cost difference, the geotechnical engineer may recommend A because the engineer knows it will be acceptable, and because the fee proposed was not sufficient to support the additional study needed to determine whether or not the less costly alternative would work as well. This is why some say that cheap engineering can be so expensive.

How much are you willing to pay for a lower fee?

Few firms of which ASFE is aware offer only one level of service on a "take-it-or-leave-it basis." Almost all offer service levels that vary within certain limits. Common sense dictates that firms will not generally offer their "top of the line" services to clients who evidently are more interested in low fee than high quality. However, should lowest fee be absolutely essential, recognize that mutual development of the scope of service gives you the opportunity to work with the firm you consider most qualified to determine what will be eliminated or modified in order to reduce fees and costs, in light of your own risk management preferences.

For more information on this important subject, speak with a member of ASFE or contact ASFE directly.

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