Geotechnical reports are critical to overall design and construction success. Project owners use geotechnical reports in evaluating property acquisitions and site development costs. Design professionals rely on the technical information to design foundations, retaining walls, earth embankments, drainage systems and buried utilities. Contractors count on the information to estimate rock excavation, dewatering, soil compaction and shoring costs.

Working with subsurface information is a project-long imperative that, if not effectively managed, can negate the geotechnical engineer’s value to the design-construction process, increase the likelihood that critical subsurface information will fall through a crack and perpetrate unintended consequences that are rarely, if ever, good. However, there are steps design professionals can take to assure the geotechnical information is leveraged over the life of the design-construction process, start to finish.

Project Owner Issues
Project owners benefit from geotechnical investigations when evaluating proposed building sites. Soil conditions, rock excavation, dewatering and hazardous waste removal are key drivers in the site selection process. Bringing the design team and geotechnical engineer together to discuss the proposed development including the site layout, grading plan and anticipated bearing loads for all structures is essential to the site selection process.

While there is little disagreement over the need for geotechnical testing, agreeing on who should provide the services can be challenging. Some owners may want to saddle design professionals with their site-related risks by asking you to hold the geotechnical contract. When they ask, say no, and be prepared to explain why.

Owner’s Site—Owner’s Risk—Site-related risks should remain with the project owner. Explain that you are more than willing to accept the risks associated with providing design services, but not the owner’s risks associated with the project site. You wouldn’t ask the owner to contract directly with all your subconsultants. They shouldn’t ask you to contract directly with the geotechnical engineer.

Undue Risk—Assuming this vicarious liability exposes you to risks you can’t manage, control or mitigate. A professional liability claim against a geotechnical engineer can easily deplete his/her available insurance coverage putting your deductible and your policy limits in jeopardy.

Accepted Practice—Explain that the design-construction industry endorses the practice of the project owner contracting directly with the geotechnical engineer. Provide examples of other projects where the owner contracted directly with geotechnical consultant.
Risk and Reward—A study by the Construction Industry found that:

“The ideal contract—one that will be most cost effective—is one that assigns each risk to the party that is best equipped to manage and minimize that risk.”

Source: Construction Industry Institute

Site development costs can be extensive. By making subsurface investigations part of their site selection process, owners can manage and minimize these financial risks.

Design Phase Issues
While vitally important to structural designs, geotechnical reports provide valuable information that touches every aspect of the design process:

- Soil and rock stratum
- Bearing capacities
- Slope stability
- Ground and surface water
- Adjacent property risks
- Environmental hazards
- Retaining walls
- Soil compaction
- Seismic class

Mechanical engineers need to understand soil settlement characteristics to design underground piping connections. Civil engineers use subsurface data to design cuts/fills, slopes and retaining walls as well as evaluate the quality of off-site borrow pits.

Having information you may not need is always preferable to never getting the information you may need. Regardless of your role in the design process, reviewing the geotechnical report is always a good idea and may keep you from missing that one unique subsurface parameter that turns an otherwise good design into a claim for professional negligence.

Construction Issues
Geotechnical information helps contractors take the “guess work” out of estimating construction costs and evaluating subsurface risks. The geotechnical information provides a baseline for evaluating the reasonableness of contractor’s claims for subsurface surprises. Having the geotechnical engineer of record actively involved during construction results in better construction, better risk management and better overall project quality.

The Contractor’s Reliance on Geotechnical Report—There was a time when project owners would go to great lengths to distance themselves from the geotechnical report. It was common practice to make geotechnical information available to prospective bidders while at the same time taking the position that bidders were not entitled to rely on anything provided in the report. Fortunately, most of today’s project owners understand that providing the geotechnical report gives contractors the information needed to price the costs and risks of subsurface conditions which often decreases the amount of contingency funds for unknown site conditions.

Differing site Conditions—Even the most comprehensive geotechnical investigations do not always provide a complete picture of subsurface conditions. When surprises happen, there needs to be a way to handle them. This is where the term “differing site conditions” plays an important role. A differing site condition is defined as a physical condition encountered while performing the work that was not visible and not known to exist at the time of bidding that is materially different from the conditions thought to exist at the time of bidding, and that could not have been discovered by a reasonable site investigation. Examples of differing site conditions include unanticipated groundwater (static or percolating), quicksand, muck, rock formations (or excessive or insufficient quantities of rock); and artificial (man-made) subsurface obstructions.
**Type I and Type II Differing Site Conditions**—Traditionally, there are two types of differing site conditions: Type I is a condition differing materially from the conditions indicated in the information about the job site that is provided to bidders. Type II is an unforeseen and unusual condition that differs materially from the kind of conditions ordinarily encountered in the particular type of work in the particular locality.

**Materiality**—Regardless of whether it is Type I or Type II, the differing site condition must be “materially different” from the conditions indicated in the information about the job site that is provided to bidders (Type I) or from the kind of conditions ordinarily encountered in the particular type of work in the particular locality (Type 2). Materiality usually turns upon the unique facts existing on the particular job. Facts that often bear on the question of materiality are: (a) differences in the quality of the substances encountered, (b) differences in the quantity of work required as a result of the condition, or (c) changes in the construction techniques required to deal with the condition.

**Site Inspection**—Regardless of whether a Type I or Type II differing site condition is claimed to exist, may not qualify as a differing condition to if it could have been discovered during a reasonable site inspection by the bidders. However, the failure to perform a site inspection may not defeat the claim, unless condition would have been identified during a reasonable site inspection.

**Develop a Process for Evaluating Differing Site Condition Claims**—Investigating a differing site condition claims needs to be performed quickly, as well as thoroughly, to avoid project delays and cost increases. Having a protocol in place can help:

**Step 1**—Review all geotechnical information available during the bidding process

**Step 2**—Review and document actual subsurface conditions. Involve the geotechnical engineer of record. Photograph and video conditions

**Step 3**—Evaluate information
- Are soils material materially different?
- Are rock type/elevations materially different?
- Are ground water tables materially different?
- Should the contractor have recognized the conditions during a field inspection?
- What is the impact on overall project performance
- What is the impact on construction equipment
- What is the impact on the project schedule
- What is the impact on project costs

**Step 4**—Work quickly to resolve to avoid delays and unnecessary costs increases

**Geotechnical Engineer’s Role during Construction**—The Geotechnical Engineer of Record (GER) participation in the construction process is important. The GER should be retained to monitor the site and provide special inspections during construction. Having the GER involved provides the consistency needed to assure that the recommendations of geotechnical report are properly interpreted and implemented. Equally important, the GER is in the best position to identify and evaluate site conditions that may impact the report recommendations or trigger a differing site condition claim. Those responsible for retaining the special inspection professional should always look to the GER for soil-related inspections. Design professionals need to address the role of the geotechnical engineer during contract negotiations. Explain to clients that the geotechnical engineer’s value to the project goes far beyond providing the geotechnical report.
Conclusions
Assuring that geotechnical information is developed and used throughout the design and construction process is important. This checklist helps connect the dots and deal up front with what’s down under:

• Have a geotechnical engineer provide a “brown bag” presentation focused on how designers and geotechnical engineers can work together to manage subsurface risks
• Confirm that the Project Owner is providing a geotechnical report. Recommend that quality based selection (QBS) is used in selection process.
• Verify that the geotechnical engineer of record carries professional liability insurance
• Work with the owner and geotechnical engineer to develop the a complete scope of services for the subsurface investigation
• Assure that all design team members have access to the geotechnical information

• Make the geotechnical engineer of record an active participant in the design process
• Allow the geotechnical engineer of record review the final contract documents
• Assure the appropriate geotechnical information is provided to the bidders
• Involve the geotechnical engineer of record in the pre-bid conference
• Involve the geotechnical engineer of record in the pre-construction conference
• Confirm that the Owner-Contractor agreement includes a detailed differing site conditions provision
• Retain the geotechnical engineer of record to provide site observations during construction
• Engage the geotechnical engineer of record to perform all geotechnical-related special inspections
Comparison of Differing Site Condition Clauses

The following table compares the contract provisions of the American Institute of Architects (AIA), Engineers Joint Contract Documents Committee (EJCDC) and the Associated General Contractors (AGC) endorsed ConsensusDocs. Each organization’s contract provisions are included for reference.

Consumer Product Safety Commission Anti-Entrapment Requirement

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<tr>
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<tr>
<td>Contractor’s Duty to Inspect the Site</td>
<td>Affirmative duty to inspect site prior to bidding.</td>
<td>Addressed in the EJCDC Owner Contract agreements. Contractor represents he/she has visited the Site and become familiar Site conditions that may affect cost, progress, and performance of the Work.</td>
<td>Does not require a site visit but contractor acknowledges that the opportunity to inspect the site was provided prior to bidding. Site inspection is limited to a visual inspection.</td>
</tr>
<tr>
<td>Geotechnical Information</td>
<td>No specific reference</td>
<td>Differentiates between the complete geotechnical report and included “technical data”. Contractor can rely on “technical data” included in the supplementary conditions. The complete geotechnical report is not part of the contract documents.</td>
<td>No specific reference</td>
</tr>
<tr>
<td>Type I Differing Site Condition Defined</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Type II Differing Site Condition Defined</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Contractor Notice of Differing Site Condition</td>
<td>Notice to both Owner and Architect within 21 days.</td>
<td>Prompt written notice to both the Owner and the Engineer</td>
<td>Prompt written notice to both the Owner and Architect/Engineer. Contractor shall stop Work.</td>
</tr>
<tr>
<td>Evaluation of Differing Site Condition</td>
<td>Architect makes evaluation and determines whether a differing site condition exists.</td>
<td>Engineer will evaluate and provide written conclusions and recommendations that may include more geotechnical testing.</td>
<td>No specific requirement for the Architect/Engineer to make a formal determination of a differing site condition.</td>
</tr>
<tr>
<td>Resolution</td>
<td>If the Architect determines that a differing site condition exists, a change order addressing both time and money will be executed. If the contractor disagrees with the Architect’s findings, then the issue becomes a claim which is addressed separately in the Owner Contractor agreement.</td>
<td>If the Engineer determines that a differing site condition exists, a change order addressing both time and money will be executed. If the contractor disagrees with the Engineer’s findings, then the issue becomes a claim which is addressed separately in the Owner Contractor agreement.</td>
<td>Owner and contractor negotiate a change order or the issue is resolved as claim. No specific requirement for the Architect/Engineer to be involved in the change order of claims process.</td>
</tr>
</tbody>
</table>
Comparison of Differing Site Condition Clauses
AIA A 201 2007

3.2.1 Execution of the Contract by the Contractor
is a representation that the Contractor has visited
the site, become generally familiar with local
conditions under which the Work is to be
performed and correlated personal observations
with requirements of the Contract Documents.

3.7.4 Claims for Concealed or Unknown
Conditions If the Contractor encounters
conditions at the site that are (1) subsurface or
otherwise concealed physical conditions that
differ materially from those indicated in the
Contract Documents or (2) unknown physical
conditions of an unusual nature, which differ
materially from those ordinarily found to exist
and generally recognized as inherent in
construction activities of the character provided
for in the Contract Documents, the Contractor
shall promptly provide notice to the Owner and
Architect before conditions are disturbed and in
no event later than 21 days after first observance
of the conditions. The Architect will promptly
investigate such conditions and, if the Architect
determines that they differ materially and cause
an increase or decrease in the Contractor’s cost
of, or time required for, performance of any
part of the Work, will recommend an equitable
adjustment in the Contract Sum or Contract
Time, or both. If the Architect determines that the
conditions at the site are not materially different
from those indicated in the Contract Documents
and that no change in the terms of the Contract
is justified, the Architect shall promptly notify
the Owner and Contractor in writing, stating the
reasons. If either party disputes the Architect’s
determination or recommendation, that party
may proceed as provided in Article 15.

Appendix A—Comparison of Differing Site Condition Clauses
EDCJC–C700 2007

4.02 SUBSURFACE AND PHYSICAL
CONDITIONS

A. Reports and Drawings the
Supplementary Conditions identify:
1. those reports known to the Owner of
explorations and tests of subsurface
conditions at or contiguous to the Site; and
2. those drawings known to the Owner of physi-
cal conditions relating to existing surface or
subsurface structures at the Site (except
Underground Facilities).

B. Limited Reliance by Contractor on Technical
Data Authorized: Contractor may rely upon
the general accuracy of the “technical data”
contained in such reports and drawings, but
such reports and drawings are not Contract
Documents. Such “technical data” is identified in
the Supplementary Conditions. Except for such
reliance on such “technical data,” Contractor may
not rely upon or make any claim against Owner
or Engineer, or any of their Related Entities with
respect to:

1. the completeness of such reports and drawings
for Contractor’s purposes, including, but not
limited to, any aspects of the means, methods,
techniques, sequences, and procedures of
construction to be employed by Contractor,
and safety precautions and programs incident
thereto; or

2. Other data, interpretations, opinions, and
information contained in such reports or
shown or indicated in such drawings; or

3. Any Contractor interpretation of or conclusion
drawn from any “technical data” or any such
other data, interpretations, opinions, or
information.
4.03 differing subsurface or physical conditions

A. Notice: If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions originally encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. Engineer’s Review: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. Possible Price and Times Adjustment

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
   b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor’s making such final commitment; or
   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
Comparison of Differing Site Condition Clauses
ConsensusDOCS 200 2007

3.16 WORKSITE CONDITIONS

3.16.1 WORKSITE VISIT The Contractor acknowledges that it has visited, or has had the opportunity to visit, the Worksite to visually inspect the general and local conditions which could affect the Work.

3.16.2 CONCEALED OR UNKNOWN SITE CONDITIONS If the conditions at the Worksite are (a) subsurface or other physical conditions which are materially different from those indicated in the Contract Documents, or (b) unusual or unknown physical conditions which are materially different from conditions ordinarily encountered and generally recognized as inherent in Work provided for in the Contract Documents, the Contractor shall stop Work and give immediate written notice of the condition to the Owner and the Architect/Engineer. The Contractor shall not be required to perform any work relating to the unknown condition without the written mutual agreement of the Parties. Any change in the Contract Price or the Contract Time as a result of the unknown condition shall be determined as provided in Article 8. The Contractor shall provide the Owner with written notice of any claim as a result of unknown conditions within the time period set forth in Paragraph 8.4

8.1 CHANGE ORDER

8.1.1 The Contractor may request and/or the Owner may order changes in the Work or the timing or sequencing of the Work that impacts the Contract Price or the Contract Time. All such changes in the Work that affect Contract Time or Contract Price shall be formalized in a Change Order. Any such requests for a change in the Contract Price and/or the Contract Time shall be processed in accordance with this Article 8.

8.1.2 The Owner and the Contractor shall negotiate in good faith an appropriate adjustment to the Contract Price and/or the Contract Time and shall conclude these negotiations as expeditiously as possible. Acceptance of the Change Order and any adjustment in Contract Price and/or Contract Time shall not be unreasonably withheld.

8.4 CLAIMS FOR ADDITIONAL COST OR TIME

Except as provided in Subparagraph 6.3.2 and Paragraph 6.4 for any claim for an increase in the Contract Price or the Contract Time, the Contractor shall give the Owner written notice of the claim within fourteen (14) Days after the Contractor first recognizes the condition giving rise to the claim, whichever is later. Except in an emergency, notice shall be given before proceeding with the Work. Thereafter, the Contractor shall submit written documentation of its claim, including appropriate supporting documentation, within twenty-one (21) Days after giving notice, unless the Parties mutually agree upon a longer period of time. The Owner shall respond in writing denying or approving the Contractor’s claim no later than fourteen (14) Days after receipt of the Contractor’s claim. Any change in the Contract Price and/or the Contract Time resulting from such claim shall be authorized by Change Order.