



When are Geotechnical Reports Required?

NCSEA Advocacy Committee – Code Officials & Government Agencies Subcommittee

With the significant role that the foundation design and construction play in any successful building project, a geotechnical investigative report at the beginning of the process is obviously very beneficial. However, it is an expense that must be incurred by the owner, and many often question if it is really warranted. This white paper will look at the language in the *2012 International Building Code (IBC)* under section 1803 that describes the conditions under which geotechnical investigations and reports are required, and will elaborate on the rather vague “exception” caveat in section 1803.2 which states that “...the building official shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available...”. Also addressed will be the minimum load bearing soil design parameters in effect when a detailed geotechnical investigation is not conducted for a project site. The interface between the building owner, structural engineer, and geotechnical engineer is very important from both a technical and liability perspective on practically any building project. Understanding how to interpret and apply the building code requirements in this area are vital to this interface between professionals and their client.

IBC Section 1803 defines the requirements for how geotechnical investigations shall be performed and reported, as well as providing a definitive list of site specific conditions that drive the need for a geotechnical investigation. Subsection 1803.5 provides this list of applicable project site conditions that require soil investigations in paragraphs 1803.5.1 through 1803.5.12. While the Structural Engineer of Record (SER) should be very familiar with all of these code provisions and their technical impact on the foundation design, the following are likely to be more critical in determining the overall project challenges for a typical site:

- 1803.5.2 Questionable Soil*
- 1803.5.3 Expansive Soil*
- 1803.5.5 Deep Foundations*
- 1803.5.6 Rock Strata*
- 1803.5.11 Seismic Design Categories C through F*

For each of these sections/subject matter, the building code explicitly states that a geotechnical investigation shall be conducted, including specifying parameters to be considered as part of that investigation. An example would be the rock strata section where the code states that borings shall extend a minimum of 10 feet below the foundation in project site areas affected by irregular rock



formations. While the incorporation of these requirements in the geotechnical investigation and report is the responsibility of the geotechnical engineering professional on the project, the SER would be well advised to have a general familiarity with them as well.

While subsection 1803.5 clearly denotes project site conditions for which geotechnical investigations are required, the natural question is “are there conditions or sites for which geotechnical investigations are not required”? The short answer is that the building code does not directly address this. However, it is a reasonable interpretation of the building code to presume that if none of these conditions exist at the project site, then a geotechnical investigation is not strictly required. For instance, if the project site was classified as seismic design category A or B, shallow footings were being utilized, and there was no prior evidence of questionable or irregular soil strata, then the geotechnical investigation would not be strictly required by the building code.

The building code in Section 1803.2 addresses one other instance where a geotechnical investigation may not be required with the following language:

Exception: *The building official shall be permitted to waive the requirements for a geotechnical investigation where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.11.*

More simply put, this exception is allowing the building official to waive the geotechnical investigation requirement for the case where existing soils data for an adjacent area shows no evidence of the following:

- *Questionable Soil*
- *Expansive Soil*
- *High Ground Water Table*
- *Need for Deep Foundations (i.e., piles)*
- *Irregular Rock Strata*
- *Restrictive Setbacks or Clearances*
- *Slope Stability*
- *Liquefaction*

The data/recommendations from the geotechnical investigation report that is most relevant to the SER is the allowable soil bearing pressure. This parameter determines the size of the various footings (walls, columns, etc.). Table 1806.2 provides “Presumptive Load Bearing Values” based on different material classifications of soils which in addition to the allowable vertical foundation pressure includes the lateral bearing pressure and the lateral sliding resistance (i.e., coefficient of friction). For project sites where a geotechnical investigation is not required, the foundation design shall be based on values not exceeding



those listed in Table 1806.2. An important point of clarity is that even for project sites where a geotechnical investigation is performed, unless the report contains data that explicitly substantiates the use of higher values than shown in Table 1806.2, the table values shall not be exceeded for the particular classification of soil.

Since building foundation repairs are typically very expensive, if not impractical, the liability associated with the integrity and quality of the geotechnical investigation report is absolutely critical to any construction project. This is even more relevant when considering whether to forego a formal geotechnical investigation for a particular project site. The discussion presented here is not intended to diminish or interfere with this consideration. The intent is strictly to focus on the specific language within Chapter 18 of the building code and work through the requirements for when and if a geotechnical investigation is required at a project site. A clear understanding of these requirements is an essential part of planning and executing a successful and cost efficient building project.