



Ash Recycle Facility (under construction) | Roosevelt, WA

SOILS REPORT

When is it Required?

By Mike Daily, PE

With many small projects, the benefit of a geotechnical investigation comes under question and scrutiny because of the expense it adds to the overall project. Larger projects, on the other hand, require a professional geotechnical engineer to prepare a geotech report to ensure that the proper foundation type is designed. The foundation tends to be the most critical element of any project's structural design and construction. But if a geotechnical investigation has not been executed or inappropriate design parameters are assumed, this can compromise the entire structure at some point in its design life. Settlement of the foundation can be a major economic setback for the owner, requiring subsequent geotechnical investigation and alternate design repairs that were not budgeted for.

So when is a geotechnical investigation required? It is imperative that there is a clear understanding between the building owner, structural engineer and geotechnical engineer with regard to the technical aspect and liabilities associated with the installation of heavy equipment, new building foundations and site structure foundations. Interpreting the building code and applying those requirements appropriately are essential coordination efforts between professional engineers and their clients. Chapter 18 of the International Building Code (IBC) is the Soils and Foundation chapter, and section 1803 specifically

addresses geotechnical investigations. Section 1803.2 of the IBC states, "Geotechnical investigations shall be conducted in accordance with sections 1803.3 through 1803.5." These sections clearly state the site-specific conditions that trigger the need for an investigation by a registered geotechnical professional. Those sections also provide the "Basis of Investigation" (1803.3) and the "Scope of Investigation" (1803.3.1), define who is a "Qualified Representative" (1803.4), and outline the required "Reporting" (1803.6) associated with these investigations, which includes the following items:

- **Questionable soil** – When soil classification, strength or compressibility is in doubt.
- **Expansive soil** – When soil is likely to be expansive.
- **Groundwater table** – Determination of whether the groundwater table is above or within 5 feet below the elevation of the lowest floor level.
- **Deep foundations** – Where deep foundations will be used.
- **Rock strata** – Where the project site indicates variations or doubtful characteristics in the structure of rock upon which the foundations are to be constructed.
- **Alternate setback and clearance** – Demonstration that the intent of section 1808.7 is satisfied.

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- **Seismic Design Categories C through F** – Seismic design.
- **Seismic Design Categories D through F** – Seismic design.

These code provisions should be clear to the structural engineer of record (SER), as should the impact they impose technically on the design of foundations. Within each of the sections listed above, there are parameters that the SER must consider as part of the design process. The SER must also understand these provisions in order to clearly communicate to the owner during the design process the need for a geotechnical investigation.

Does this mean that a geotechnical investigation is always required? Not necessarily; it is required only if the above conditions exist based on a reasonable interpretation of the building code and the size of the project. The IBC also provides the following language:

*“**Exception:** The building official shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available that demonstrate an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 through 1803.5.12.”*

In this instance, a geotechnical investigation may not be required, especially if adjacent sites have reasonable soil data to form a recommendation based on the “Presumptive Load Bearing Values,” as categorized in Table 1806.2 of the IBC, as long as the area shows no evidence of the following:

- **Questionable or expansive soil.**
- **High groundwater table.**
- **Need for piles.**
- **Irregular rock strata.**
- **Restrictive setbacks and/or clearances.**
- **Slope stability.**
- **Liquefaction.**

At the onset of any project, it is always prudent to determine the need, type and extent of a geotechnical investigation. Weighing the cost of that investigation versus the cost of the repairs that may result from the effects of unstable soil conditions usually affirms the prudence of funding the investigation. That said, this paper is not intended to promote or diminish the need for geotechnical investigation. Rather, it is intended to inform that decision process by the relative code section of the IBC (chapter 18) and provide a clearer understanding and context of the referenced language. Although the building official “is permitted to waive” a geotechnical investigation, the ultimate responsibility for that decision still falls on the SER. A clearer understanding of the code provisions related to the geotechnical investigations allows the project owner to make a decision consistent with the public safety intent within the code and with the best long-term interest for the project. ■

For more information on how PACE can help with any of your engineering needs, please contact Patrick Murphy, PE, Principal Structural Engineer, at 503.597.3222 or patrickm@paceengrs.com.