

## 211 – Subsurface Investigations

**211.1 Subsurface and Foundation Investigation for Capital Construction Projects:** On Capital Construction projects the Architect-Engineer shall coordinate with the Project Manager on the requirements for subsurface investigations. On larger projects these investigations will be approached in two phases.

- The first phase is to be initiated in Pre-Design or early Phase A with the intent of providing preliminary information for the Phase A design.
- The second phase investigation, at the beginning of Phase B, is intended to give more detailed information for foundation design and special site conditions.

The Architect-Engineer shall provide the recommended locations for subsurface core sampling and other similar testing that are required by the Project.

The subsurface investigation shall be made available to the Architect-Engineer for use in the foundation and structural design, and site grading and drainage of the building project. This information shall be included in the specifications and made a part of the contract documents.

**211.2 General Requirements:** This section outlines the general requirements and content of the Subsurface Investigations Report that will be required for the work necessary in the design and advance planning of the Project.

The Division of Engineering and Contract Administration will provide to the Architect-Engineer an engineering firm that will develop a comprehensive Subsurface Investigation Report. This work typically is performed by a subsurface engineering firm that has a Master Agreement with the Division. The Architect-Engineer shall contact the engineering firm and coordinate and arrange for the subsurface investigation.

**211.3 Purpose:** The purpose of the subsurface and foundation investigation is to provide information on subsurface conditions and give the Architect-Engineer a basis for the structural design of the facility. It also provides the Architect-Engineer and the construction contractor a reasonable basis for cost estimation, including, but not limited to, the following information:

- The elevation of rock likely to be encountered in the excavation of the project, including the installation of utility lines, the nature of such rock and the probable method required for removal.
- The probable extent of unsuitable fills or other material requiring removal or special design consideration.
- The stability and bearing pressure of soils and rock encountered and the recommended type of foundations suitable. The Architect-Engineer shall supply to the subsurface engineer information on probable loading of the structure.
- The likelihood of caverns or interstitial layers of clay or other soft material below the surface of rock affecting the structural design of the project.
- The probability of seismic conditions, mudslides, subsidence or other external factors affecting the site.

The subsurface investigation work will be performed in two phases:

- The initial subsurface investigation at Pre-Design or early Phase A is to assist the Architect-Engineer in preliminary site assessment. The Architect-Engineer shall use this information in the design of the site and building as a part of the Phase A work.
- The second phase subsurface investigation, to be initiated at the beginning of Phase B, is intended to provide additional information based on the Phase A plan. This additional information will be used in the design of the foundations of the building and in the design of special site conditions. The Architect-Engineer shall include this information in the Contract Documents to give the Contractors a reasonable basis for cost estimation.

**211.4 Content:** The basic content of the Subsurface Investigations Report shall be as follows, however, specific project requirements may modify the content requirements:

- Provide a general site description and discussion of borings in relation to plan geometry.
- Discuss the geology of the locale.
- Indicate the methods used in the investigation and why the methods used were chosen.
- Present the results of the subsurface investigation and laboratory testing and offer recommendations for the design of foundations, pavements, and other structural features.
- Provide logs of borings and soundings
- Reference all borings and soundings to the project baseline.
- Ensure that at least one boring extends to bedrock or to a minimum depth of 50 feet.

The report shall provide the following recommendations based upon conclusions reached from the borings:

- Soil bearing capacities
- Soil infiltration rates - LEED certification requirement
- Foundation design
- Recommendations for site preparation and site drainage
- New embankment material
- Footing excavation and placement
- Sub-grade preparation for slabs
- Information relative to any site condition that could endanger the constructed facility (i.e.: the possibility of soil movement or excess water encroaching on the site
- Pavement sub-grades design for rigid and flexible pavements and the allowable design CBR and modulus of subgrade reaction parameters. Guidance shall be offered on the types of base course materials available in the area and design strengths.
- Water table information
- Location of fill or dump areas near site which may jeopardize foundation
- Existing buried utilities that may conflict with new foundation

**211.5 Report Submittal and Distribution Requirements:** The completed report shall be provided on 8-1/2" x 11" white bond paper. Large format (24" x 36" or 30" x 42") sheets may be provided for boring logs and other related drawings.

The large format sheets shall bear the Division of Engineering and Contract Administration title block. This title block shall contain all information contained on the title blocks of the Architect-Engineer created sheets.

The Subsurface Investigations Engineer shall coordinate the sheet size with the Architect-Engineer so that the sheets fit into the Architect-Engineer created set of construction documents without alteration.

The distribution is to be as follows, unless specifically indicated in the authorization letter:

- One copy of the report to the Using Agency.
- One copy of the report to the Project Manager.
- Two bound and one un-bound copies of the report, original mylar tracing(s) and two prints of all boring layout, boring log and other drawings to the Architect-Engineer under contract for providing A/E services.
- An electronic copy of all information to the Architect-Engineer.

The original mylar tracings remain the property of the Commonwealth and will be included as part of the Contract Document mylars by the Architect-Engineer without alteration.