

SECTION 1

SOILS (Grading, Excavation, and Filling)

OBJECTIVE

Earthwork as presented in this section includes, in general, those soils construction activities normally associated with special grading, excavation, and filling. The purpose of earthwork observation and testing is to verify that the work is done in compliance with the approved plans and specifications, and, in particular, with the recommendations of the project geotechnical report.

Soil is a highly variable material, is very sensitive to moisture fluctuations, and requires close attention to construction quality control in order to achieve the desired result. Many factors contribute to its suitability and effective performance. Identifying and properly controlling these factors can be divided into two general areas of activity. The first involves the observation or monitoring during construction with particular attention that placement and compaction operations are followed as specified in the contract documents and geotechnical report. The second involves tests to document the soils properties and to verify compliance to the quality specified.

Materials engineering laboratories that offer services in this field provide special expertise and equipment to verify the objectives of the design and project specifications. However, this is best accomplished when the design geotechnical consultant provides these construction-related services and can, in turn, achieve continuity and integration of the design-construct process. Without involvement of this geotechnical engineer, the constructed earthwork may not meet the performance requirements intended.

OBSERVATION DUTIES

A. Documents

1. Review the approved plans, specifications, and the geotechnical engineer's report.
2. Note and record the equipment being used on site.

B. Verification

1. Verify materials below footings are adequate to achieve the desired bearing capacity.
2. Verify excavations are extended to proper depth and have reached proper material.
3. Perform classification and testing of controlled fill materials.
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill.
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.

C. Sampling of Materials

1. Sample and verify that the following materials are delivered to the Materials Engineering Laboratory for any required testing:
 - a) Subgrade materials;
 - b) Native-fill materials;
 - c) Imported materials; and
 - d) Additive materials (lime, cement, sand, pozzolan, etc.).

D. Testing

1. Perform soils classification and properties tests as required on native and/or imported soils.
2. Perform laboratory moisture-density relationship tests or other structural property tests as required.
3. Where applicable, conduct a laboratory testing program to determine soils' properties resulting from admixtures such as cement or lime.
4. In the field, conduct in-place field density and moisture tests using procedures specified in the contract documents. Frequency of testing should be predetermined to allow for representative coverage of each lift, while interfering as little as possible with the earthwork operation's schedule.
5. Conduct testing in a timely manner to avoid having to retest previously covered work. Similarly, test methods should be predetermined so as to take into account the Contractor's procedures and soil types.
6. Periodically sample materials in the field to verify continued compliance with specification requirements (recommended).

E. Reports

1. Submit written progress reports describing the tests and observations made and showing the action taken to correct nonconforming work.