Excavation and Site Work

Almost all construction projects involve some degree of excavation and site work, whether it be as simple as removing some existing asphalt pavement and base before the installation of a new driveway or parking lot, or includes mass cuts and fills on a large suburban building site. Nowhere will the requirement for proper scheduling, staging and contingency planning be more acute than in this critical stage of the construction cycle where unknown subsurface conditions and unpredictable weather will put a superintendent’s knowledge and skills to the test.

Working with readily compactible, properly draining soils is one thing, but dealing with deep structures on less than adequate bearing surfaces surrounded by poorly draining soils can be quite another. This chapter will deal with soil characteristics and classifications, and the next chapter will discuss coping with difficult soil conditions.

THE SITE INVESTIGATION PRIOR TO THE START OF CONSTRUCTION

Site investigation begins in the bidding stage of the project, when the contractor is assembling an estimate. Most bid documents stipulate that the contractor is to visit the site and become familiar with any existing conditions that such a visit could disclose. This site visit, along with any test borings accompanying the bid documents, will make the contractor more aware of existing soil conditions prior to preparing the site-work portion of the estimate.

So if time and opportunity permit, a thorough investigation of the site should be made prior to preparing the final estimate to check out the following:

1. Composition and consistancy of soils that are apparent from a visual inspection.
2. The presence of rock or rock outcroppings.
3. The presence of surface water or underground water.
4. The composition of any existing buildings or structures to be demolished, or foundations or concrete slabs remaining from previously demolished buildings.
5. The presence or absence of any utilities—water, storm and sanitary sewer, gas, electricity.
6. Any other site structures that may have to be abandoned, such as headwalls, bridge abutments, underground vaults.

If there are questions about subsurface conditions, and if time permits and the owner grants permission, it might make good sense to dig a test pit or two to clarify matters. The costs associated with this exploratory work may prove to be a bargain if rock, underground water or buried obstructions are encountered when the bid documents fail to note them. Of course any such test pits should be covered up immediately so as not to provide the competition with the fruits of your company's labor.

If there had been other structures built on the site and it is possible to talk to the excavator who performed that work, valuable information about soil conditions may be obtained.

TEST BORINGS—WHAT DO THEY REVEAL AND WHAT DON'T THEY TELL YOU

Test borings included in bid documents provide the structural engineer with information about soil composition and bearing capacities prior to the final foundation design, and they also provide some information about subsurface conditions. These test borings can be performed in a number of ways:

Auger boring—By either hand or with power equipment. This method is frequently used for shallow explorations above a known water table where partially saturated sands, silts and soft to stiff cohesive soils are expected.
Hollow stem flight auger—Power operated. The hollow stem of the auger serves as a casing and will hold a coring sample.
Wash type boring—A jetting action created by drilling fluid acting directly on a light bit drilling head that removes cuttings from holes. This is a common method used to obtain samples in sand and gravel where boulders are not likely to be encountered. Due to the nature of the procedure, undisturbed samples cannot be obtained.
Rotary drilling—A power-driven bit removes cuttings from a hole aided by circulating fluid. This type of boring is generally limited to soil samples and rock cores that will be only six inches deep.
Percussion drilling—This method is actually power chopping with a limited amount of water at the bottom of the hole creating a slurry. Sometimes used in combination with auger boring when penetration of coarse gravel, boulders or rock formations are encountered.
Rock core drilling—When coring into weathered rock or bedrock, a power drill is used in combination with circulating water.

The most common form of test boring is one in which a steel casing is driven into the ground and a clean sample of the soil is removed from within the casing using a