1 November 2005

53:030 Soil Mechanics Experts
3505 Seamans Center for Engineering
Arts Sciences
University of Iowa
Iowa City, Iowa 52242-1527

Dear Soil Mechanics Experts:

We are a relatively new and small engineering firm in the Cedar Rapids area and we have just received a contract to do some preliminary site assessments for an advanced technology business park to be located off of Collins Road in Cedar Rapids. Your geotechnical-testing firm was highly recommended to us by one of your prior clients REAC who mentioned that you have done some excellent work for them this fall. To facilitate our site assessment, we are requesting that you take a core sample from the site at an appropriate depth and that you perform a one-dimensional consolidation test on it. In terms of results from this test, we are especially interested in the fine-grained soil's:

1. e vs. log[σ_v'] behavior in 1-D consolidation, including estimates of C_s, C_c, and $(\sigma_v')_c$;
2. permeability k as a function of void ratio e, and
3. consolidation index c_v as a function of void ratio e.

For the sandy soil (FI-6) to be brought in to the site and compacted to a dry density of 17 kN/m^3 we are interested in its compressibility behavior. (Please note that a loose 1 kg specimen of this sand accompanies this letter.)

While we will plan on doing most of our own bearing capacity and foundation settlement analysis once you provide us the relevant properties for both the sand and clayey silt soils, we would also request that you provide us your calculations of:

a. expected site settlement due to emplacement of the 4m fill layer;
b. the expected time scale on which the settlement would occur (for example, what are t_{50}, t_{75}, and t_{90} ?).
c. Once the site has fully consolidated under the 4m fill, the additional ultimate expected consolidation settlements beneath the center and corners of the building foundation.

The maximum allowable settlement that we can take under these foundations is 1.0 inch (2.54 cm). Therefore, if your computed settlements are any larger than this, please design a site pre-loading plan for us, so that with the same bearing stresses beneath the foundations, the settlements will be tolerable.

We will pay your firm the going rate of $125 per person-hour billed up to a maximum of $3500 to complete this request. We look forward to receiving your report no later than 5 pm of 18 November 2005.

Sincerely,

Diego Rivera, P.E.
Civil Engineer

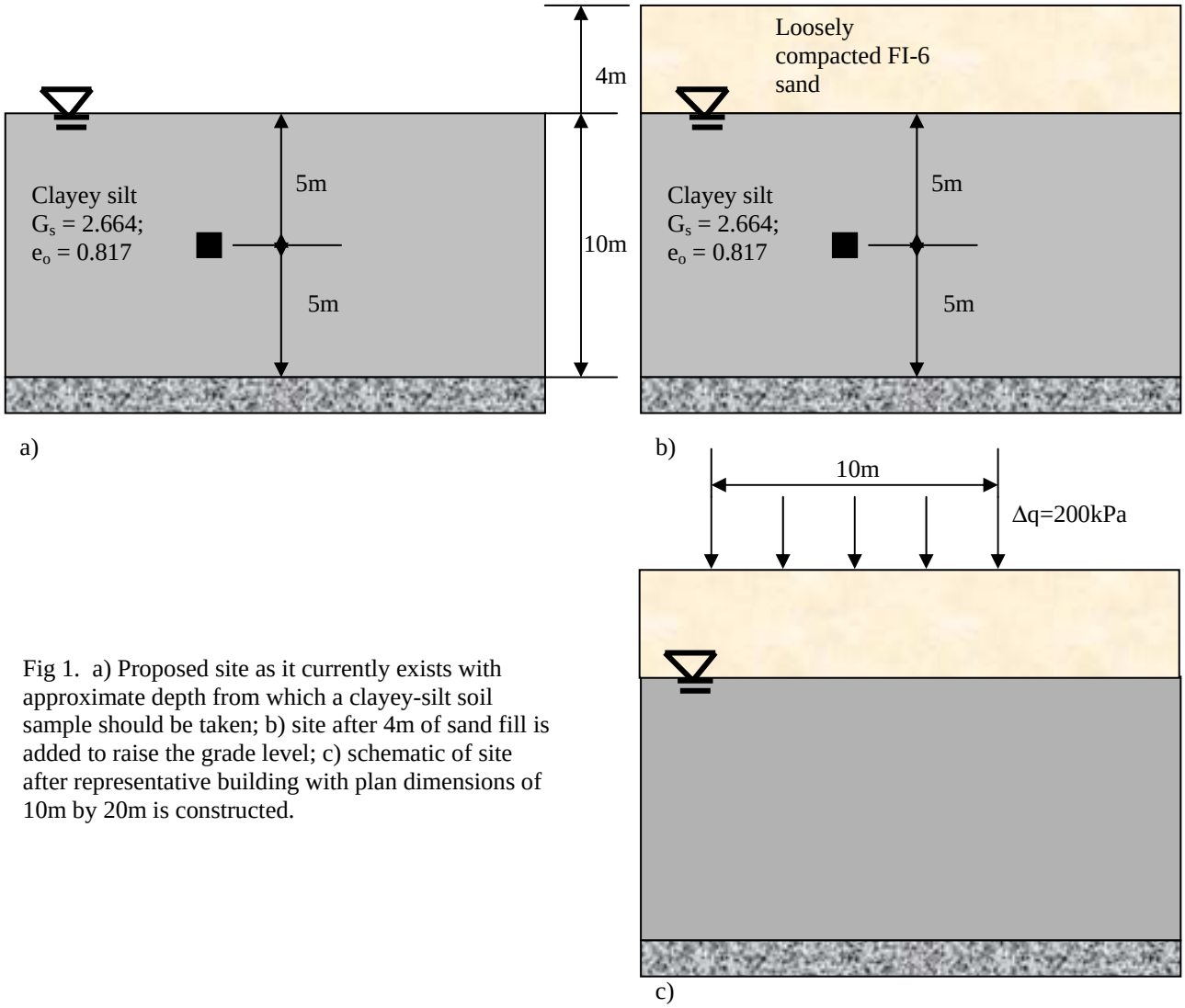

Fig 1. a) Proposed site as it currently exists with approximate depth from which a clayey-silt soil sample should be taken; b) site after 4m of sand fill is added to raise the grade level; c) schematic of site after representative building with plan dimensions of 10m by 20m is constructed.

Soil Mechanics 53:030
Labs 8-9 Writeup Guidelines
Fall 2003

A. Client Requests

As you can see from the preceding letter, the client has requested that you collect an undisturbed soil sample from the proposed site location and that you perform a one-dimensional consolidation test on the fine-grained specimen. In addition, the client requests that you perform simple one-dimensional compression tests on samples of the sand that will comprise the 4m fill layer. In terms of results from this test, they are interested in:

a. e vs. log(σ_v') for both the sand and fine-grained soils;
b. permeability k as a function of void ratio e for the fine-grained soil; and
c. consolidation index c_v as a function of void ratio e for the fine-grained soil.

For other basic properties of these soils, you can use those of soil FI-6 and FI-10, which you have dealt with in preceding lab sessions.

B. Processing the Lab 9 Data

When you obtain the data, it will be in the form of the nine separate files listed below. Each file contains a history of ΔH vs. t for a specific load increment or decrement. To obtain these data files:

a. Log on to an ECSS HP work station.
b. Create a directory where you wish to save the files, and move into that directory.
c. Copy the data files into your directory by typing: cp /usr/ui/class/examples/cee5330/lab9/* For all of the loading tests, use the one-dimensional consolidation model developed in class and in the textbook to complete the data in Table 1 of your Lab 9 handout. For the unloading tests, you need not compute or t_{50}, c_v, k, etc but only the e vs. log(σ_v') behavior of the soil.

03_50l	load from 25 kPa to 50 kPa;
03_100l	load from 50 kPa to 100 kPa;
03_200l	load from 100 kPa to 200 kPa;
03_400l	load from 200 kPa to 400 kPa;
03_800l	load from 400 kPa to 800 kPa;
03_1600l	load from 800 kPa to 1600 kPa;
03_400ul	unload from 1600 kPa to 400 kPa;
03_100ul	unload from 400 kPa to 100 kPa;

;

C. The Write-up

By now, you should have a good idea as to how to organize the write-up (professional cover letter, title page, table of contents, main body, appendix, *etc*.) and what information and figures to include. As before, this write-up will be graded based on both technical content (how you analyze the data, find the soil properties, and perform the necessary settlement computations) and presentation style. Good Luck!