

The University of Iowa
Dept. of Civil & Environmental Engineering
53:030 Soil Mechanics
Fall Semester, 2003
Writeup Guidelines for Labs 11 and 12

A. Client Requests

For the write-up of these two labs, please assume the roles once again of geotechnical engineers working in your own geotechnical engineering/soils testing company. Hearing of the very competent and professional soils testing services that your company provides, Mr. Halmost Dunn principal of the Dunn & Feenstra Group (DFG) has contacted you to perform some soils testing work in support of a design project his company has undertaken. Specifically, DFG has designed an innovative retaining structure to support a sand embankment constructed of soil FI-6. Before recommending that the structure be constructed, DFG wants to do some further analysis of the design using the finite element method. To do this, they need to know the shear strength properties of the sand in both loose and dense states. Accordingly, they have asked your company to perform the following tests on the sand:

- a. Direct shear tests at a number of different normal stresses; and
- b. Consolidate drained (CD) triaxial compression tests at two confining stresses.

From your test results, DFG wants you to estimate the range of realistic drained Mohr-Coulomb friction angles ϕ_D for the FI-6 sand in both “loose” and “dense” states. They anticipate that you might possibly obtain different values of ϕ_D from the direct shear and triax tests, and so they have requested that you tell them which test results that they should give more credibility, and why.

B. The Writeup

B.1 Letter

Your group writeups will consist of a cover letter to the client Mr. Halmost Dunn and a brief report. In the cover letter you should:

- state which tests were performed,
- **briefly** summarize the results of the experimental tests which you performed, and
- make recommendations for further tests/computations if any are required.

As usual, keep the tone of the letter courteous and professional.

B.2 Main Body of Report

In the brief report you should include such standard items as:

- a title page,
- a table of contents

For this particular report, you should also include:

- a table with all of the known physical and mechanical properties of sand FI-6, including the measured friction angles in both the loose and dense states, and representative values of C_s and C_c from the 1-D compression tests, performed in Lab #8 and the average estimated elastic Young's modulus (for both the loose and dense sands) from the CD triax tests.
- plots of τ_{\max} vs. σ'_n for both loose and dense sands as measured from direct shear tests, along with best fits showing the Mohr-Coulomb envelopes,
- plots of the Mohr-Coulomb failure envelopes as measured by the CD triax tests on the loose and dense sands, and
- a brief discussion/explanation of the tests performed and the results obtained. (Also address the issue of which test provides the more reliable estimate of the sand's friction angle in this discussion.).

B.3 Appendices

The report should have an appendix devoted to experimental procedures in which you include:

- experimental procedure or a reference in which the experimental procedure can be found for each test performed.

The report should also have an additional appendix for each experiment performed. The appendices and the results in each should be as follows:

- Direct shear of sand:
 - plots of τ vs. δ_h for each direct shear test performed,
 - plots of vertical displacement δ_v vs. δ_h for each direct shear test performed,
- CD Triax tests on sand:
 - plots of $\Delta\sigma'_1$ vs. ϵ_1 for each test performed, and
 - estimates of ϕ_D and failure plane angle θ for each test performed.

C. Notes

As always, the writeups will be graded based on both technical content and presentation style. Good Luck!