

Laboratory Assignment

Mike Haggerty

Civil Engineering/Geology 4301: Soil Mechanics II

The laboratory exercises will be performed in groups, and one assignment is required for the group with each member of the group receiving the same grade. However, you may choose to present an individual assignment for which you will receive an individual grade.

The write-up will be in the form of an engineering report, consisting of a one-page letter and supporting material. Consider it a final document to be presented to your client once testing is completed. The report will be graded on the following criteria:

- Engineering content (how well the problem is answered)
- Statement of objectives or purpose of the experiments
- Summary, conclusions, or recommendations, as appropriate
- Presentation and style
- Appendices—content and style

In preparing the report, the organization should be considered from the standpoint of the reader; the reader is interested in the nature of the problem, the method used to solve the problem, the results obtained in the experiment, and the analysis of the data.

There are several specific requirements and guidelines that need to be adhered to.

Title Page

The title page should include the class (CE\GEOE 4301), the experiment performed, the lab section, and if written in a group, the names of the group members.

Engineering Cover Letter

The engineering cover letter is a brief summary of the tests that were performed, the results that were found, and any recommendations that you make.

The outline of the cover letter should be as follows:

- List the client's name, address, etc. on the top left of the page.
- If the client has a title, for example Andrew Drescher, PhD, then always greet the client with "Dear Dr. or Professor Drescher." Avoid using informal greetings.

- The first paragraph is used to remind the client of when he/she contacted you and what the contact was for.
- The second paragraph is used to briefly describe the procedures used for the tests performed (e.g. consolidated-drained triaxial compression test).
- The third paragraph is used to state the test results that you found.
- The fourth paragraph is used to state any recommendations that you may be required to make within the context of the project.
- The last paragraph is used for closing salutations and thanking the client for sending his/her business your way.
- Close the letter with "Sincerely" and supply your *name, address, and phone number*.

Table of Contents

The table of contents should follow the cover letter. It should include report section titles, figures, and appendices with their corresponding page numbers.

Procedure

Type up the procedure used to perform the test. Your goal is to provide a resource by which someone who is generally familiar with the test you ran could EXACTLY reproduce your test. You must cite material taken from your lab manual or any other sources. You need not type portions of the procedure that were performed exactly as listed in the lab manual or some other published source. Instead, you may simply state the resource that contains the procedure you followed. However, the lab manual does not completely describe how you ran your test. Details that are not covered by the lab manual and any deviations from the lab manual must be described. This is also an appropriate place for a description of the soil you tested.

Results

Results consist of graphs, figures, and/or tables that present your findings in a concise manner. Additionally, this section should have text that describes what you are presenting in each of your graphs, figures, and/or tables.

Your results should be either neatly drawn or computer generated. In general, if the x and y axes have the same units (e.g., Shear stress in kPa versus Normal stress in kPa), then the scales of these axes should be equal.

All graphs, figures, and tables should be clearly presented such that they could be removed from the report and still maintain their meaning. Thus, all graphs, figures, and tables should have a title, brief soil description, type of test, date on which the test was performed, and the names of the persons who performed the test.

Sample Calculations

Sample calculations are intended to show exactly what calculations you performed in order to obtain your results. They include numeric examples. If a calculation is repeated many times in a spreadsheet, show a sample calculation for only one of the data points. It is important to include these in the body of your report (NOT in an appendix). These can be written up as a separate section or they can be included with the results. Word processing programs such as Microsoft Word® have equation writing subroutines that you can easily access.

Recommendations

List any recommendations that you have in this section. Often this is easier if you start out by writing, "What I'm trying to say is...", or "I want you to understand that...", and then delete these clauses after you have written the section.

References

Any materials that you reference need to be cited. This is not as much of a technical issue as it is a professional ethics issue. ***This is very important.*** You may use any sensible format for your references; just be consistent and use the same format throughout your report.

Appendices

If you have extensive data or a long calculation that may be of interest to someone reading the report, but is not necessarily crucial to the message you are conveying in the report (multiple graphs), then an appendix is appropriate. For your reports, your data and spreadsheet calculations should go in an appendix. Include only the first page of long spreadsheets.

Things to make your task easier:

- Write the body of the paper first. Don't try to write the cover letter first. When you see the data and results, it becomes a much simpler task to make recommendations to the client.
- Keep the cover letter brief. Graphical and tabled results are not put into the cover letter but it is necessary to tell the client where to find them. Single sentence and numerical results such as, "*the unconfined compressive strength of the soil is $q_u = 450 \text{ kPa}$* " or "*soil sample #1 is a poorly graded, well rounded, coarse sand*" should be included in the cover letter.
- Recommendations are reiterated in the cover letter, always.
- Double check to make sure that your units are consistent and accurate; the same units must be used in the tables, graphs, and cover letter.

- Avoid using first person narratives. It is not appropriate to write out a cover letter using 'I' and 'we.' The action that has taken place is what is important, not who did it.

The best piece of advice that I can give concerning your reports is to write it as soon as possible after performing the tests. These should not be difficult to write and if you have any questions don't hesitate to ask.

Items from each test to include in the results section for each write-up:

Unconfined Compression Test

- Unconfined Compressive Strength (q_u)
- Stress - Strain Plot
- Young's Modulus (E)
- Undrained cohesion (C_u)
- Sketch of the failed specimen

Direct Shear Test

- Mohr Coulomb Plot
- Angle of Internal Friction
- Unit Weight of Soil (γ)
- Shear Stress vs. Shear Displacement Plot
- Normal Displacement vs. Shear Displacement Plot

Triaxial Test

- Mohr Coulomb Plot
- Angle of Internal Friction
- Initial Void Ratio (e_o)
- Volumetric Strain vs. Axial Strain Plot
- Deviatoric Axial Stress vs. Axial Strain Plot

Grading Breakdown for Soils II Lab

- Unconfined Compression = 6
- Direct Shear = 6
- Triaxial Test = 6
- Total = 18

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