

The University of Iowa
Department of Civil & Environmental Engineering
Fall Semester, 2003
53:030 Soil Mechanics
Writeup Guidelines for Labs 5–7

A. Client Requests

For the writeup of these three labs you are again to assume the role of engineers working in a fictitious geotechnical engineering/soils testing company with a name of your choosing. Having been so pleased with the quality of your work, your previous client has highly recommended you to the River Engineering Associates Corporation (REAC) which has hired you for your services. They have undertaken two separate design/construction projects.

For the first project, pertaining to the design of bridge pier foundations, they sent you three soil samples: FI-6 (the sand you dealt with in Labs 1 and 2); GRA-1 (a crushed gravel); and CLA-2 (a finer crushed limestone aggregate). For these three soils, REAC requests that you measure and report their hydraulic conductivities. For the soil FI-8 (the uniform sand in the upward seepage tank) REAC has asked you to experimentally estimate its bearing capacity coefficient N_γ .

REAC's second work request to you is unrelated to the first and pertains to the design and construction of a levee for flood control. REAC requests that you analyze the geometry for their preliminary design along with the design water levels and tell them:

- a. what the seepage rate will be beneath the levee per unit length of distance along the levee. REAC seeks to have a total seepage rate of $.03\text{m}^3/\text{hr}\cdot\text{m}$ or less;
- b. what the pore pressure distribution along the base of the levee will be; and
- c. what is the exit hydraulic gradient on the back side of the levee and what is the factor of safety against instability for the soil in the exit region. (Assume $\gamma_{\text{sat}}=20\text{kN}/\text{m}^3$ for the soil on which the levee rests.)

The geometry for the levee is the same as that which you were assigned to analyze in Lab 6. REAC needs to know whether the current design is adequate with respect to flow rates and liquefaction potential. If the current design is not adequate, how might they change it to improve its adequacy?

B. The Writeup

B.1 Letter

Your individual writeups will consist of a cover letter to the client and a brief report. In the cover letter you should:

- state which tests and analyses were performed;
- briefly summarize the results of the experimental tests and numerical computations you performed;
- address specific questions which the client has posed (for example tasks/questions posed in the handouts for Labs 5,6,7); 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:

- a title page;
- a table of contents;
- In the body of the report include:
 - a table with the properties of soils FI-6, CLA-2, and GRA-1;
 - a plot of the bearing capacity of the soil FI-8 as a function of upward hydraulic gradient i ;
 - a sketch/drawing of the levee problem;
 - the computed flow rates beneath the levee;
 - a plot of the pore-pressure distribution beneath the levee along with an explanation of how you obtained the result;
 - recommendations to the client regarding the suitability of the preliminary design;

B.3 Appendices

The report should have an appendix in which you include:

- experimental procedure for the constant head permeability test (either write the procedure yourself, or insert the procedural portion of Lab 5 handout.),
- a reference to the software used in Lab 6. (Just tell the client which program you used.)
- experimental procedure used with the liquefaction tank (Lab 7),

The report should also have a second appendix for raw experimental/computational results, consisting of:

- raw data collected in Lab 5;
- printout of the input data file used to solve the assigned problem of Lab 6:
- a **short** printout of the results file from Lab 6 which gives nodal coordinates, the computed head values at each node, and the discharge velocities in each element;
- the head distribution plot; and
- raw data collected in Lab 7.

As before, the writeups will be graded based on both technical content and presentation style. A specific grading guideline for the reports is included with this handout.

Good Luck!

Grading guidelines for Labs 5–7.

Letter (20 points)	
statement of work performed (4)	recommendations (4)
brief statement of results (4)	style and appearance (8)
Presentation Style (20 points)	
Title page (2)	Table of Contents (2)
Summary table - (FI-6,FI-8,CLA-2,GRA-1) (4)	
Appendices 2 @ 3 each (6)	Overall appearance and style (6)
Lab 5 (21 points)	
FI-6 conductivities (5)	FI-6 Hazen's C (3)
CLA-2 conductivities (5)	CLA-2 Hazen's C (3)
GRA-1 conductivities (5)	FI-8 Hazen's C (3)
Lab 6 (20 points)	
Pore pressure distribution (7)	Computed flow rates (7)
FS against instability (6)	
Lab 7 (19 points)	
measured i_{crit} (7)	measured N_γ for soil FI-8 (6)
plot of q_u vs. i (6)	