

NAME(s): _____

INTRODUCTION TO SOILS

GEOTECHNICAL Part 2: Construction Materials

Purpose: Part 2 of this geotechnical project allows you to become familiar with construction documents and what it means to be a Geotechnical Soil Scientist. You will acquire the following skills in this laboratory:

- (1) How to read basic construction site plans
- (2) Determining regions of cut and fill based on topographic maps
- (3) Interpret laboratory soil reports to evaluate soils for construction uses

Background: You are the on-site soil scientist for a construction project. The project consists of building a local farm stand. You have been provided 3 site maps: a topographic map of the site, a topographic map with the location of the building pad, and a topographic map with building pad and borehole locations. The building pad is the flat location that will act as the foundation for the farm stand. Here you will be asked to solve problems that typically come up before and during the construction phase. To help you with the lab, you will use resources provided in class, your soil analysis from Part I of the Geotechnical Project, and the following information provided in this lab:

I. Maps and Cross-sections

Become familiar with the topography maps provided. The contour interval is 1' (yes, the maps are in feet, not meters). If you are not accustomed to viewing or using topographic maps, it may be beneficial to draw multiple cross sections similar to the one that has already been done for you. Identify regional hills; locate basins (one basin is within the footprint of the building pad).

Look at the topography profiles before and after the building pad is constructed to determine locations of cut and fill?

II. Laboratory Soil Reports

Attached are three Laboratory Soil Reports. The numbers on these reports correspond to the borehole numbers found on the map (I realize there is no report for Borehole #3). These reports are often called "Proctor Reports". There exists a lot of information on these reports but most of it should be familiar to you by now. Although each lab will have a different format when reporting there are 5 basic sections to be familiar with:

- (1) Sample Information – this is typically found at the top of the report and often includes the date, location, sample number, brief description, and client.
- (2) Sieve Analysis – the grain size distribution is usually found on the left side of the report.
- (3) Atterberg Limits – the Liquid and Plastic Limit along with the Plastic Index is typically reported on the right side.
- (4) Soil Type – below the Atterberg Limits is the soil classification. The classification scheme should also be listed there are multiple methods in classifying a soil.
- (5) Proctor Results – many of these soils, if used for fill, will have a proctor analysis which is essentially a laboratory compaction test. If the soil is used as fill it should be compacted to 95% of the laboratory compaction results. The compaction results are found at the bottom of the soil report; this analysis was not included in this project.

Directions: Hopefully you have become familiar with the map and the three soil reports. The numbers on the soil reports correspond to the borehole numbers on the map. Locate on your site where you have clays, sands, and gravels. Borehole #3 will be the soil you analyzed in lab.

(1) Create a Laboratory Soil Report from your lab analysis. Use the examples provided in class as a template. Note: not all of the information in these examples (i.e. Proctor compaction test, Group Index, Mica Content) may be applicable in your report.

(2) After viewing the topography maps and profiles it should be clear that in some areas of the building pad is below the proposed building pad elevation. Here, sediment fill will be required to bring it up to the correct elevation (27'). Some regions within the building pad footprint are above 27'; these areas require soil removal (or cut). Using the topography map with the building pad, color in the region where you propose fill is required. Use a different color to shade what areas require soil removal (cut).

(3) The farm stand owners requests a level parking lot and a pond in on its property. The parking lot is to be approximately the same size as the building pad. Use a map to sketch where you propose to place a parking lot and driveway between the road and the parking lot. NOTE: plastic clays/silts known as "fat" clays should not exist beneath buildings, roads, or parking lots.

(4) What will be the elevation of the parking lot? Will the location of the parking lot require fill or cut? Shade your map accordingly.

(5) The property owners also request a small pond (again, about the size of the building pad). Think about what soil type would be best for the liner to the pond. Draw the location of the pond on your map.

Questions:

(1) Explain your reasoning behind the placement of the driveway and parking lot.

(2) Explain your reasoning behind the placement of the pond. What soil would you propose using for the liner?

(3) Suppose the construction crew runs out of building fill material and requires more. Would the hill associated with Borehole #3 be a good source of foundation soil? Where else might you suggest?