AE 340 Lab 1: Tillage Due Tues. 13 Sept. 2006

Question1: A soil specimen has a water content of 35%, a wet bulk density of 1.8 g/cc and the specific gravity of solids is 2.70. Find the void ratio and degree of saturation.

Question 2: A soil sample weighs 1903 g and has a volume of 930 cc. The water content is 10%. The specific gravity of the solids is 2.70. Determine the wet bulk density, dry bulk density, void ratio and degree of saturation.

Question 3: A soil sample is taken from a field prior to harvest. The dry bulk density of the soil is 1.5 g/cc, and the degree of saturation is 50%. The particle density is 2.7 g/cc. Determine:

i). The porosity and void ratio of the sample.
ii). The mass of soil and water in 1 cc of bulk sample.
iii). The wet bulk density and water content of the soil.

During harvest compaction of the soil results in the total void volume being reduced to the void volume originally occupied by the water. After two days, the compacted soil drys such that the degree of saturation returns to 50%. A second soil sample is taken from a field. (The particle density does not change.) Determine:

iv). The total volume of bulk compacted soil occupied by 1.5 g of dry soil.
v). The volume of solids occupied by 1.5 g of soil particles.
vi). The porosity and void ratio of the compacted sample.
vii). The dry and wet bulk density of the compacted soil.
viii). The water content of the soil.

If your soil management philosophy was primarily based on No-Till planting unless required, would you, a) continue with No-Till the next season, or b) strongly consider some form of tillage prior to planting.

ix). What would be your decision, and justify this decision.

Question 4: In a triaxial test, a soil sample was tested with two different hydrostatic stresses (200, 400 kPa)and loaded to failure with the results shown below:

Sample	σ_3	σ`
1	200	350
2	500	500

i). Determine the values of c and Φ for total stress.
ii). The maximum shear and normal stresses on the failure planes for both cases.