Due 13:00, on 19th of May
Late penalty = 100 pts.

Spring'14 Soil Mechanics Homework 6

A retaining wall is to be constructed in a clayey sand deposit as shown in the figure below. Ground water table is 1 m below the bottom of the excavation. A 20 kN/m^2 surcharge pressure is applied over a wide area at the ground surface. Assume the wall moves into the excavation. Consider long-term analysis (as it is usually the more critical analysis in excavation problems). Ignore capillarity.

1. Draw Mohr Circles that show the effective stress state at points A, B and C. (Point C is far enough not to be affected by the excavation)
2. Calculate the depth of tension crack. On which side of the wall do tension cracks develop?
3. Calculate and sketch the active and passive horizontal <u>total</u> stress distributions along depth, using Rankine earth pressure theory. *(Instructor's note: I might have forgotten to say the name of the theory with K_a and K_p in the lecture. This is it.)*
4. When unsupported, this wall will collapse. Calculate required support force, if the supports will be placed every 4 meters into the page. *(Hint: By horizontal force equilibrum, the difference between the total active force and the total passive resistance will be carried by the supports.)*
5. How would you modify your solution to question 4, if the owner of the project does not tolerate horizontal displacement of the wall? *(Write no more than 3 sentences)*