**METU-Civil Engineering Department**

**CE464 GROUND IMPROVEMENT**

**HOMEWORK II**

Q1) There will not be any settlement since the surcharge change occurs immediately

Q2)

1. To calculate Δδ; Boussinesq equation should be used which is:

Where q0= 21 kN/m3 x 2 m = 42 kPa

When α1 and α2 are calculating according to Boussinesq equation, z is taken as the mid depth of clay parts.

SPT results and plasticity indexes are used to calculate mv. In SPT results, the last two numbers are summed in each blow and for each layer average of the N’s are taken.

Having mv and Δδ is enough to calculate settlement. But this is the settlement according to oedometer test. To get real value, it has to be multiplied with a correction number. I take 1.1 as µ for all clay layers to get a higher settlement value.

**Total settlement = 6.152 cm**

The table of calculations can be seen below:



After this, with assuming a permeable layer under the bottom most clay layer, time factor for settlements can be easily calculated. The table below shows the settlement of three clay layer in different months. Thus, it can be calculated degree of consolidation for each month. In the table I choose months randomly instead of typing each number as months. This is why the month column goes like 1, 2, 3, 4, 5, 8, 10, 12, and 13. After each layer reaches 95% of settlement I stopped the table.



Also, the settlement vs month graph can be plotted as: