



AMBO UNIVERSITY WOLISO CAMPUS
DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND
MANAGEMENT

Foundation Engineering Final Exam for 3rd Year Cotm Students

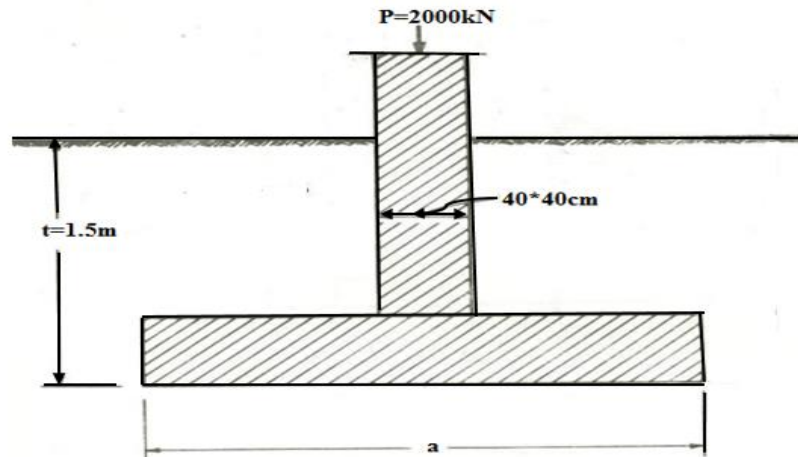
Time Allowed 3:00 hr

Instructions

- ❖ Write your name and ID number on each page of the answer sheet
- ❖ Write your answer clearly with neat hand writing
- ❖ The exam is open-book

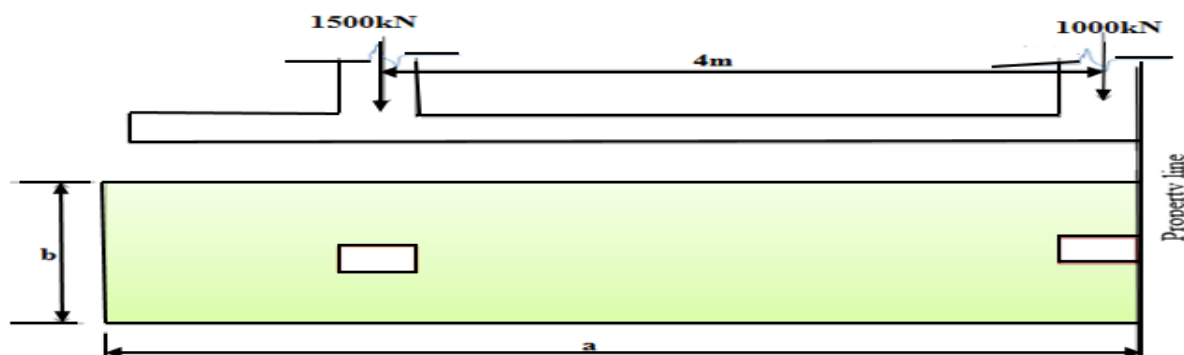
Questions

1. Using the data given below, design a rectangular footing by using ULSD method for the loading condition shown in fig below. Take width of the footing (B) = 2.5m, $\phi=9.5^\circ$, $\gamma_{\text{sat}}=20\text{KN/m}^3$, $N_q=8.23$, $S_q=1.2$, $S_r=0.7$, $f_{yk}=300\text{MPa}$, C30mpa, factor of safety = 1.5, load factor = 1.4, Use $\phi=16$ mm, assume $d=0.6\text{m}$ (check only punching shear), and Ground Water table location is 0.6m below ground surface. (Hint: Use Hansen Bearing Capacity equation and ignore weight of soil and footing).



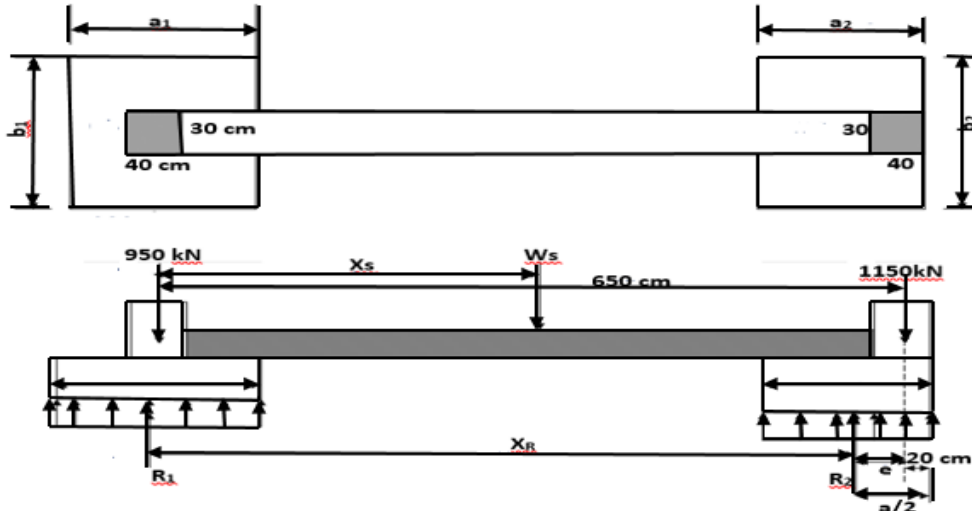
2. Determine the thickness of rectangular combined footing by using wide-beam shear for the data given below?

Given Column 1 size 50x 50, Reinf. 4 $\phi 22$
 Column 2 size 40x 40cm, Reinf. 4 $\phi 22$
 Ultimate soil bearing pressure, $q_{\text{ult}} = 200\text{kPa}$
 $f_{yk} = 300\text{MPa}$ and C30



3. Determine the dimension of strap footing

Given Column 1 size 40x 30, Reinf. 4 ϕ 20
 Column 2 size 40x 30cm, Reinf. 4 ϕ 20
 Ultimate soil bearing pressure, $q_{ult} = 150\text{kPa}$



4. Design mat foundation by the conventional method (rigid method) of strip A for the loadings shown in Fig. below.

All columns are 40X40cm

Ultimate soil bearing pressure, $q_{ult} = 150\text{kPa}$

$f_{yk} = 300\text{Mpa}$ and C30

