KNE316

Project 3

(Worth 10% of total mark)

Design of Column and Footing (Group Project)

For your **third** part of the project design and detail the reinforcement of the column and footing (in groups of 2 students):

Part A - Column Design:

- Design the second column under the beam designed in Project 2,
- Assume 40 mm cover for corrosion and fire resistance,
- Determine the ultimate axial loads (kN) either by using the reactions from the beam or by using the tributary area method,
- Determine whether the column is slender or short (the column is in a braced frame),
- Determine the bending moment applied on the column (no moment magnifier is required, i.e $\delta=1$ since the column is braced),
- Determine the longitudinal reinforcement using one of the charts given in Appendix C of the "Cross-Section Strength of Columns" attached on MyLO (mark the loads on the chart and included it in your assignment),
- Determine the transverse reinforcement,
- Draw one full typical elevation showing the main and transverse reinforcement of the column and splicing of reinforcement with columns above and below.
- Draw 2 cross sections, one at mid-height and one at the lower section of the column (where it splices with the column under.

Notes:

- Consider the column to be braced (horizontal forces are resisted by lift shaft walls not shown on sketch),
- Floor-to-floor clear height is to be taken as 3.4 m,
- The column is carrying 7 levels above (consider all seven levels to have the same loads).
- Column section is 400x400 mm as previously indicated,
- Columns above and below have the same reinforcement.
- Use N50 concrete.

Part B - Footing Design:

- Determine the required cover. Assume the footing is cast in non-aggressive soil without using a damp-proof membrane;

- Use the loads from the column calculated in part A of the project to determine the dimensions of the footing assuming that the footing sits directly under the previously designed column,
- Determine the main reinforcement of the footing,
- Draw a sketch (one elevation and one plan – top view) showing the dimensions and the reinforcement of the footing and the column.

Notes:

- The soil bearing capacity is to be taken as 250 kPa,
- Design the footing only for axial force.
- Assume the column to have the same reinforcement and dimensions as determined in Part A.

The Reinforcement Detailing Handbook and the lecture notes (Topics 9 and 10) contains useful information about detailing for both footings and columns

This project must be submitted to MyLO by 17:00 on the 11th of October.