CLASSWORK - STUDIO SESSION #2

The design of any floor structure starts with identifying the components of the structure, i.e. support columns location, beam(s) identification and slab(s) action.

Required

1. For the floor layout of Homework #1, determine the location of columns, beams and slabs.

2. Determine the static scheme of beams

3. Identify the tributary area for each beam

4. Estimate the height of the beams using ACI requirements.

5. Estimate the thickness of the slab and determine the dead loads on one of your beams.

6. Estimate the live loads on one beam (same as in 5).

7. Determine all the load cases for one beam (same as in 5). Do not calculate moments

8. Repeat 1 through 7 for Homework #2.

9. Submit work done in 8 at end of the session.
HOMEWORK 2

Design the beams on third floor assuming that the slab is supported in one direction on beams along axes 1, 2, 3, and 4.

Required

1. Determine the slab thickness by approximation and determine the dead load.

2. Determine the load on the beams by “tributary area” method.

3. Determine the design moments and shear in critical sections according to the approximate ACI requirements (and comments) for all beams – use ACI tables.

4. Determine the moment and shear envelopes of one beam only (i.e., along axis 2 using the computer (STRAND, STAAD, or equivalent)).

5. Adjust negative and positive moments determined in Step #4 by “redistribution” (where it applies). Compare results here with those in Step #3. [Do not redistribute moments from Step #3]

6. Determine the dimensions of the beams’ cross sections and the reinforcement for bending and shear. Consider all beams to have T sections or inverted L.

7. Determine graphically or analytically the length of the reinforcement for proper (bond) development and lab splices where applies (show on diagrams) based on cover of moment envelope.

8. Show the reinforcement on a sketch with all the required details – bars and cross sections.

9. Show in a table all necessary materials, i.e., concrete volume and reinforcement.