HOMEWORK 4

Design the slab for the roof on columns (without beams). Note that the roof covers also the stairs and elevator shafts according to the contour shown in the plan. Use symmetry to reduce the amount of computations.

**Required**

- Show the structural floor plan in an engineering sketch and mark all columns, beams, slabs and the load transfer. The engineering sketch must indicate axes, dimensions, and all information about columns, beams, and slabs.

1. Divide the slab into frames suitable for the design using the *direct design method*.

2. Determine the thickness of the slab according to ACI requirements or class notes.

3. Determine the moments on the frames using the *direct design method*’s coefficients.

4. Divide the frame into suitable strips and distribute the longitudinal moment to these strips.

5. Determine the reinforcement for each strip.

6. Show the floor plan and display the reinforcement for each strip for each frame and show the lengths of the bars and the bends. Use the ACI-318 requirements. Show the reinforcement for each frame (each direction) in two different plans.

7. Prepare a list of materials: Show in a table all necessary materials, i.e., concrete volume and reinforcement sizes, length and number. Determine the total weight of (i) concrete and (ii) steel.

**Note:** If the material presented in class did not cover a subject, **do not complete the requirement** for the initial submittal but complete it for the submittal with the next homework.