

Tasks and Tools

I. Loads

Task 1: Check live load and dead load assumptions for a staggered truss system with a joist, deck and slab floor, and a hollow core precast plank floor.

- a) Estimate a deck size and slab depth for steel joist floor system to find dead loads.
- b) Determine dead load for hollow-core precast plank floor with a topping.
- c) Estimate initial dead load of staggered truss framing members.

II. Design Floor Systems

Task 1: Alternative 1 (Steel Joist Floor)

- a) Using the deck and slab sizes found in the previous section, design the steel joists for the live and dead loading conditions for each span.
- b) Check self weight

Task 2: Alternative 2 (Precast Concrete Plank)

- a) Using the PCI handbook, design precast concrete plank to span the bays under the live and dead loading conditions found.
- b) Check self weight with design loads

III. Design Trusses

Task 1: Estimate trial sizes for design

- a) Use the gravity loads found in part (I) to estimate spacing and approximate chord sizes of the trusses.

Task 2: Analyze trial trusses

- a) Using STAAD, analyze the trial truss sizes under gravity loads.
- b) Adjust member sizes to be larger or smaller based on stresses and interior forces found.

IV. Preliminary Column Design

Task 1: Determine axial loads on columns

- a) Find the gravity loads transferred to the columns by the trusses and the columns above.

Task 2: Determine moments on columns

- a) Using lateral loads from Tech #3 as values to estimate loads. These will be recalculated at a later point.

V. Design Lateral System

Task 1: Determine Lateral Loads

- a) Check wind loads for any changes.
- b) Recalculate seismic loads for moment connections and braced frame connections

Task 2: 3-D model

- a) Build a 3-D model using a computer program such as ETABS.
- b) Place calculated controlling lateral forces on model and analyze.
- c) Check drift, stresses, and interior forces of trusses, lateral members, and columns

Task 3: Check members and adjust as necessary

VI. Analyze coordination of trades to decide if an all steel system or steel with concrete plank would be better.

VII. Size equipment and flow rates for an open loop heat rejection to lake water as well as estimate the savings in equipment and peak energy costs for this system.

VIII Prepare final presentation