



CMCE 2415 Elements of Structural Design - Concrete Assignment 3: T-Beam Design as a part of floor system

Purpose: To apply techniques learned to the design of a concrete T-Beam for moment.

Directions:

The proposed building is a two-story commercial office building. At this stage as an engineer, you should design a one-way slab as a part of floor system at roof for just one span, according to the information provided in the following:

Design Criteria:

- Roof area is 60'x80'.
- In 60' direction, there are 4 columns, which have divided the width of the roof to 3 equal spans.
- In 80' direction, there is just one span (No column in between).
- Concrete construction is normal weight concrete with $f'_c = 4000$ psi.
- Reinforcing steel is new and conforming to ASTM A615 grade 60 ($f_y=60,000$ psi).
- Assume that each span is separate from others, and simply supported.
- Design moment for each T-beam is obtained using the design distributed load (w_u) for each t-beam span ($S=9.875$ ft) Figure (3)
- You can ignore the width of columns, in order to find the L of span.
- Roof Loads: 365 lb/ft² dead load, 490 lb/ft² service live load. Include weight of the concrete as a dead load in design for moment.

Submission: Each student is required to complete and submit the following:

- Design the flexural reinforcing for a T-beam according to ACI code provisions (e.g. reinforcing bars arrangement).
- Estimate construction quantities: a) the volume of concrete and b) the total weight of steel reinforcement for the entire roof.
- Estimate the cost assuming that concrete is \$1000/cubic yard and reinforcing steel is \$10/pound. The prices include materials and labor need to complete the work. Compare your results with your second assignment.
- Report: Write a report according to the given template. The report is to be typed on 8.5" x 11" white computer paper unless otherwise noted.
- Calculations: are to be done by hand on 8.5" x 11" engineering paper.
- Design Drawing: Draw your final sketch using AutoCad. It should contain all of the details.

Due: This project is DUE on May 9th 2012.
NO LATE ASSIGNMENTS ACCEPTED!

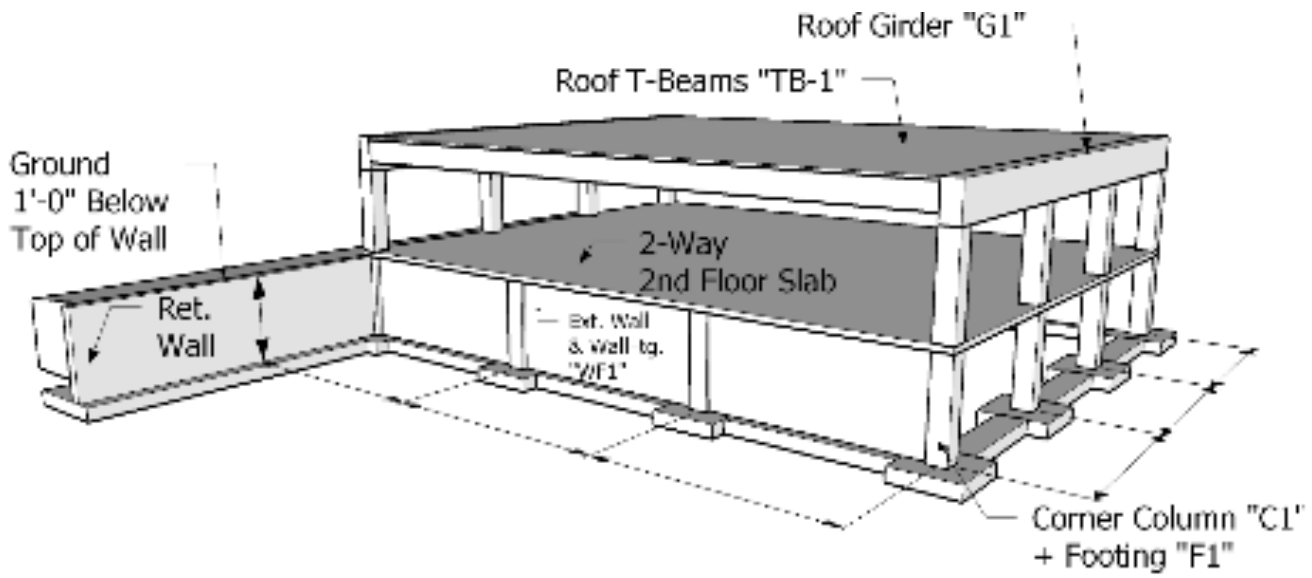


Figure 1. View of the building

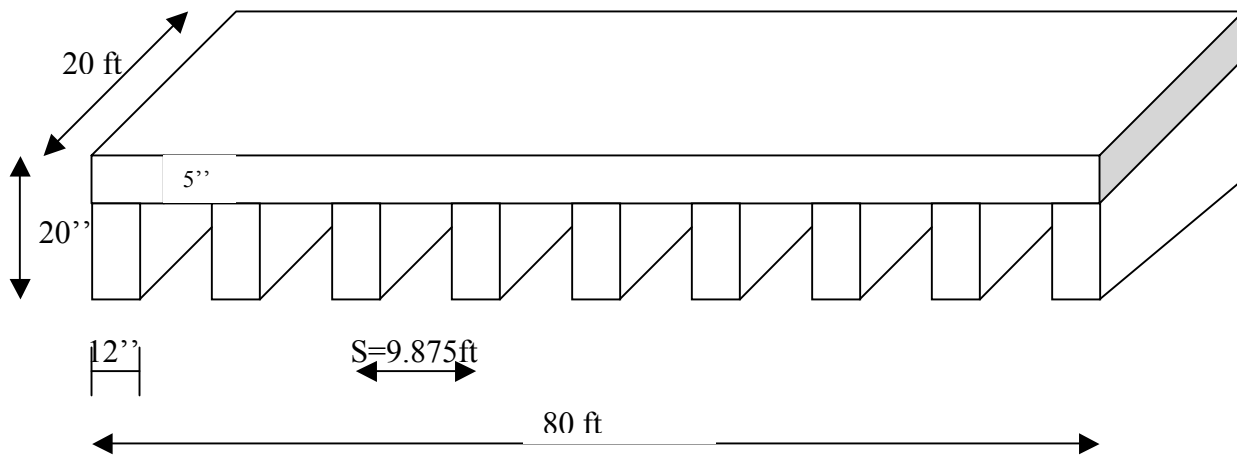


Figure 2. Floor of the roof for on span.

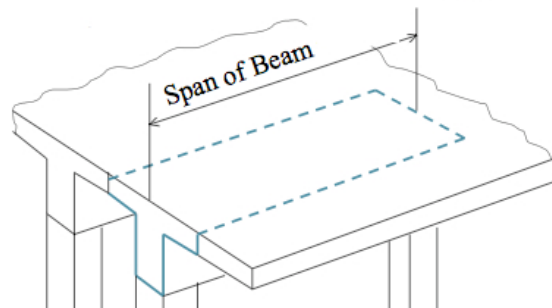


Figure 3. The load area that each T-beam can carry on.