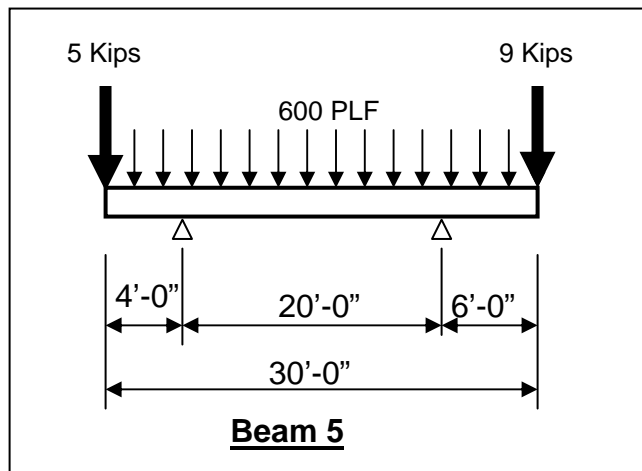
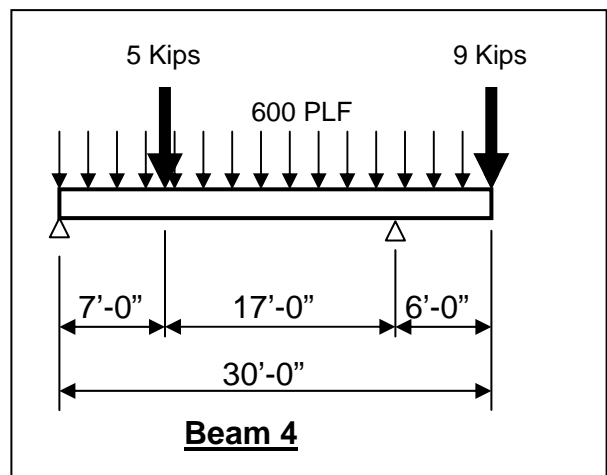
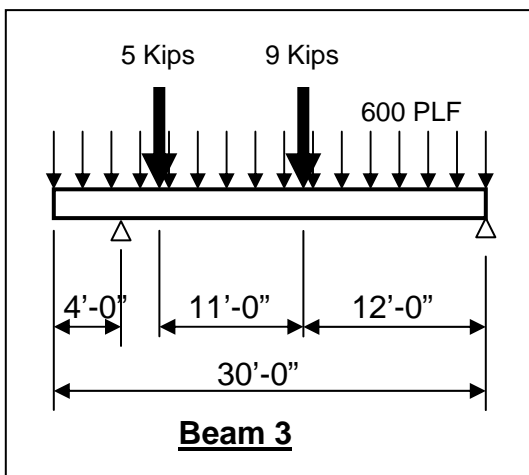
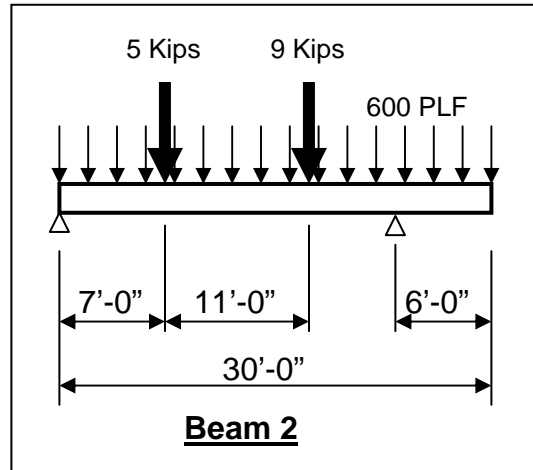
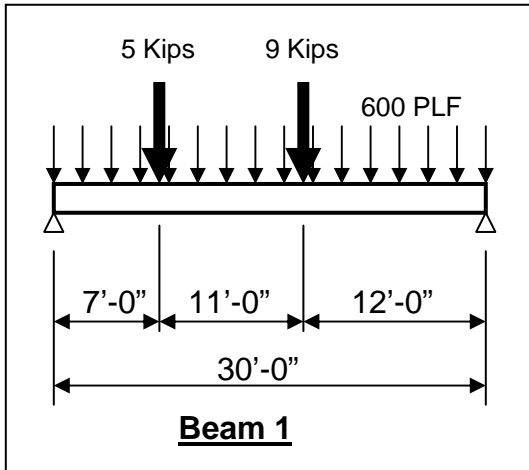


Problem 1 (10 points each)

GIVEN: The 5 different beam loading diagrams as shown.

REQUIRED: NEATLY draw (using straightedge) and label the complete **shear + moment diagrams** to each on separate pages. CIRCLE + HIGHLIGHT Maximum positive & negative moments.



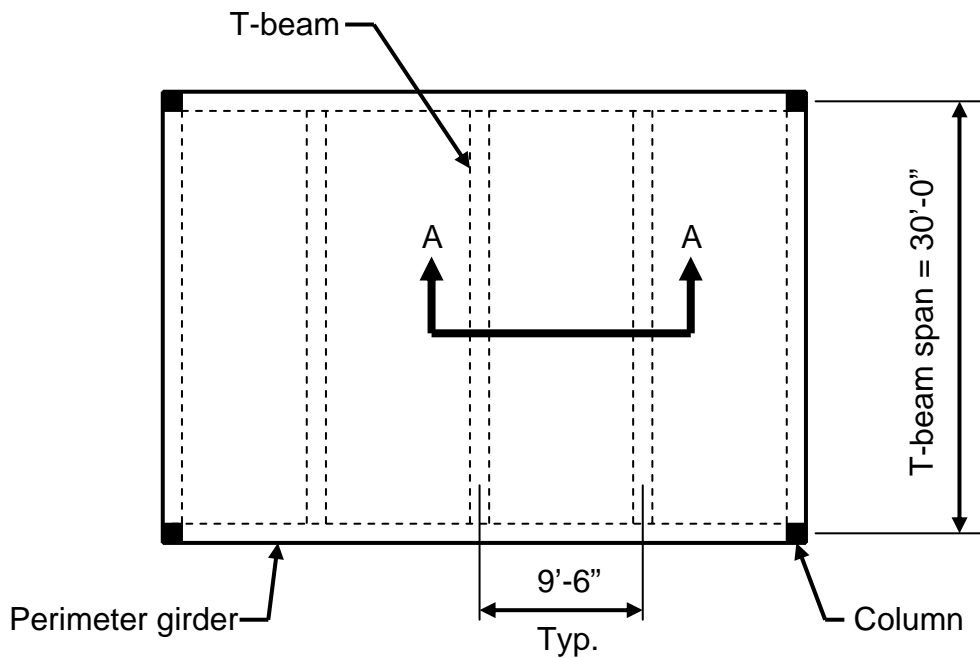
Problem 2 (25 points)

GIVEN: A commercial building has T-beams spaced 9'-6" (center-to-center) with a 5½" thick concrete slab as shown in the framing plan and cross-section views below. Use the following information:

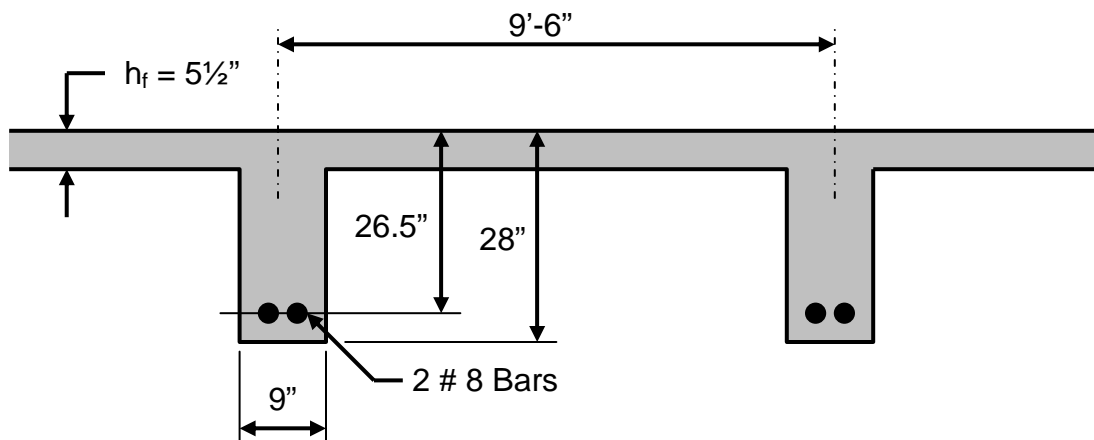
- Superimposed service floor dead load (NOT including conc. wt.) = 62 PSF
- Superimposed service floor live load = 100 PSF
- Concrete $f'_c = 4000$ PSI
- ASTM A615 Grade 60 bars

REQUIRED:

- 1) Determine the maximum factored moment, M_{max} , on the T-beam.
- 2) Determine the usable moment capacity, M_u , for the T-beam, and state whether or not the T-Beam is acceptable based on your M_{max} obtained from part 1.



Framing Plan



Section "A-A" Thru T-Beams

(NOTE: stirrups and top bars not shown)

Problem 3 (25 points)

GIVEN: A one-way concrete slab as shown below. Use the following:

- Concrete $f'_c = 4000$ PSI
- Grade 60 tension bars
- Concrete cover = $1\frac{1}{4}$ "
- Superimposed floor SERVICE dead load = 46 PSF (NOT incl. slab wt.)
- Superimposed floor SERVICE live load = 125 PSF (per IBC)

REQUIRED:

- 1) Design the slab, including thickness (to nearest $\frac{1}{2}$ "), main tension bars and shrinkage bars.
- 2) Draw a sketch (using AutoCAD) and provide notes of the slab construction in sufficient detail such that it can be built from the sketch.

