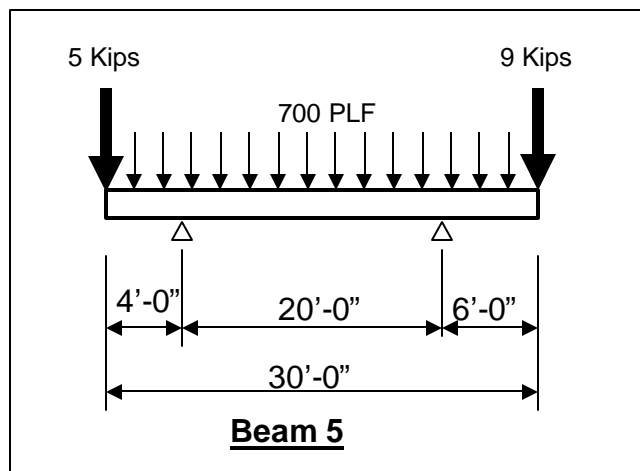
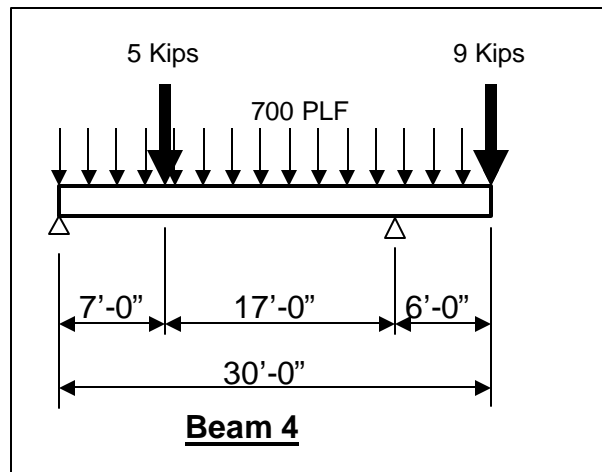
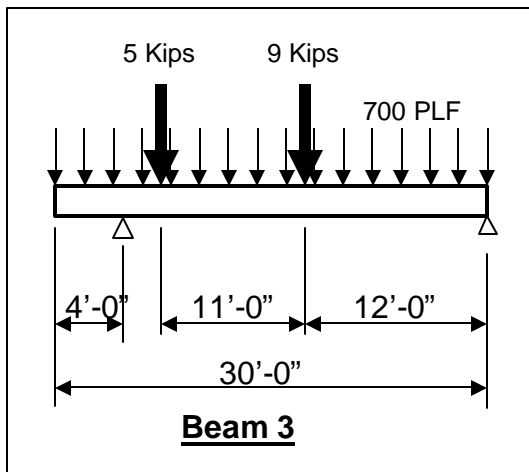
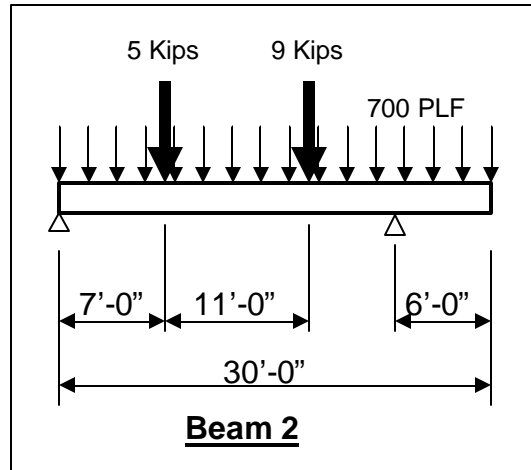
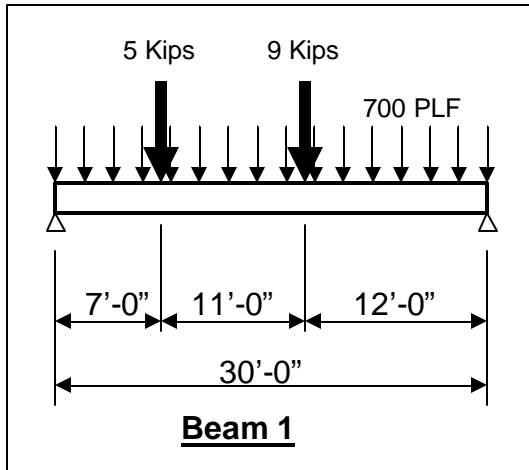


**Problem 1 (10 points each)**

**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.



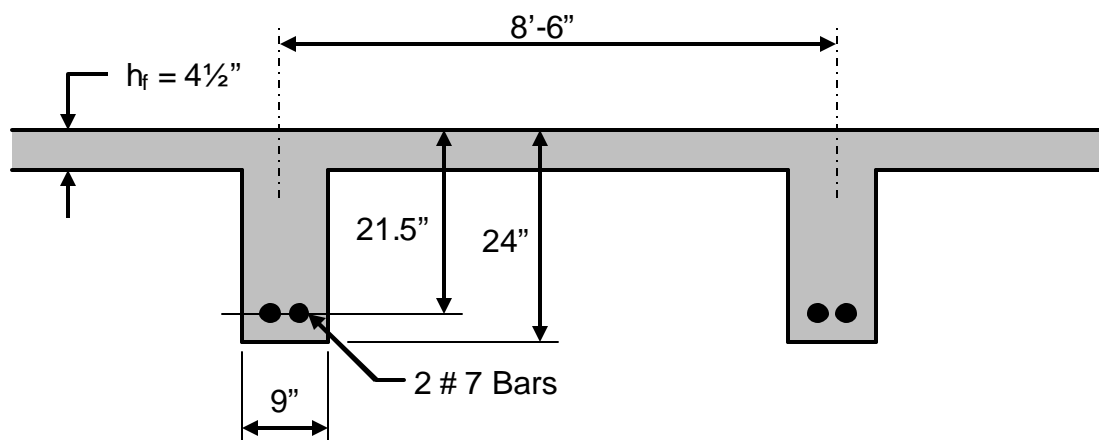
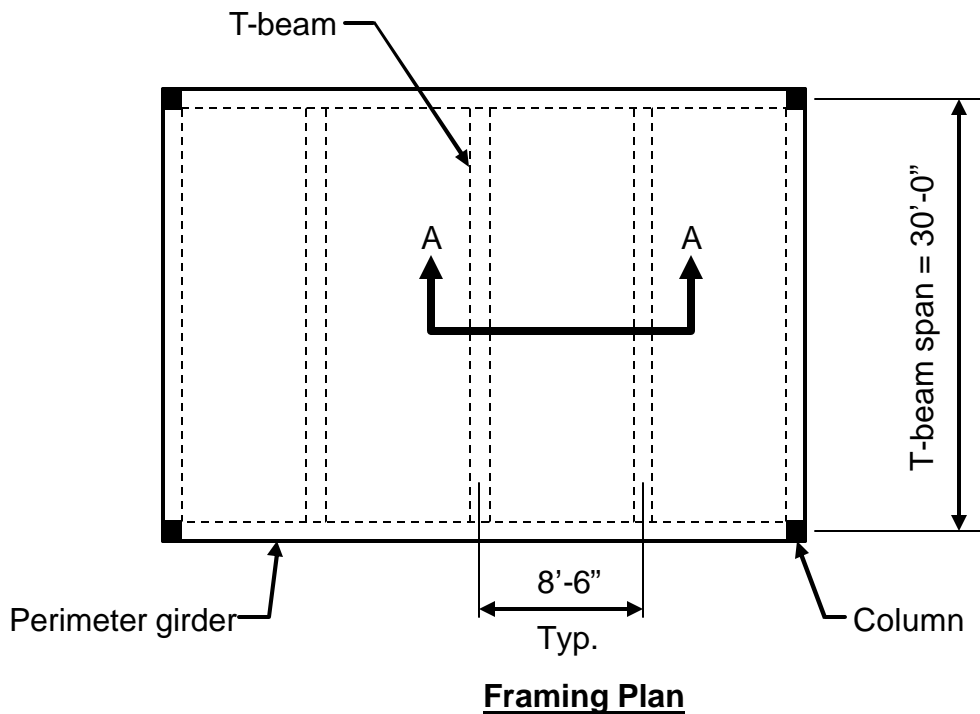
## Problem 2 (25 points)

**GIVEN:** A commercial building has T-beams spaced 8'-6" (center-to-center) with a 4½" 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 = 75 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.



### Problem 3 (25 points)

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

- Concrete  $f'_c = 3000$  PSI
- Grade 60 tension bars
- Concrete cover =  $1\frac{1}{4}$ "
- Superimposed floor SERVICE dead load = 59 PSF (NOT incl. slab wt.)
- Superimposed floor SERVICE live load = 100 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.

