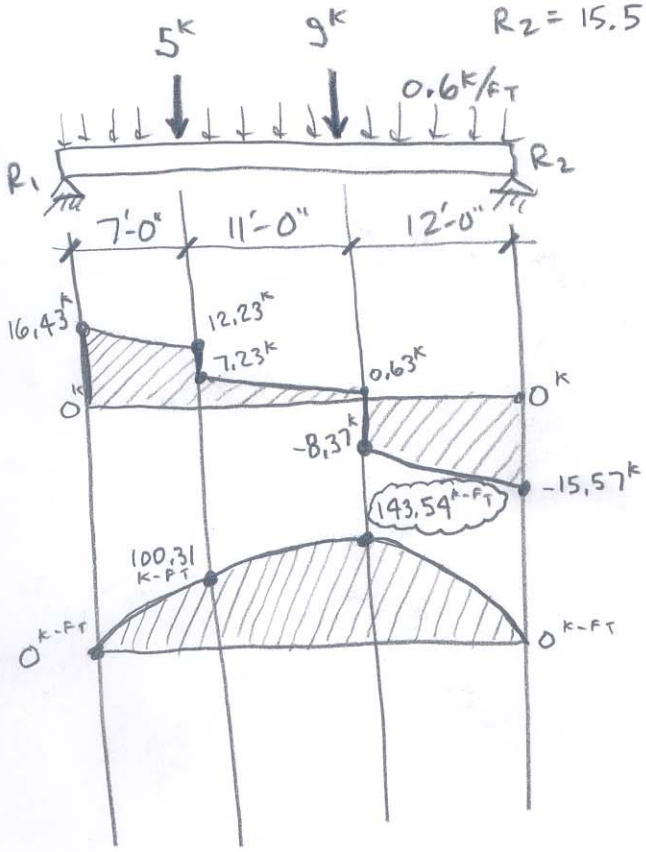
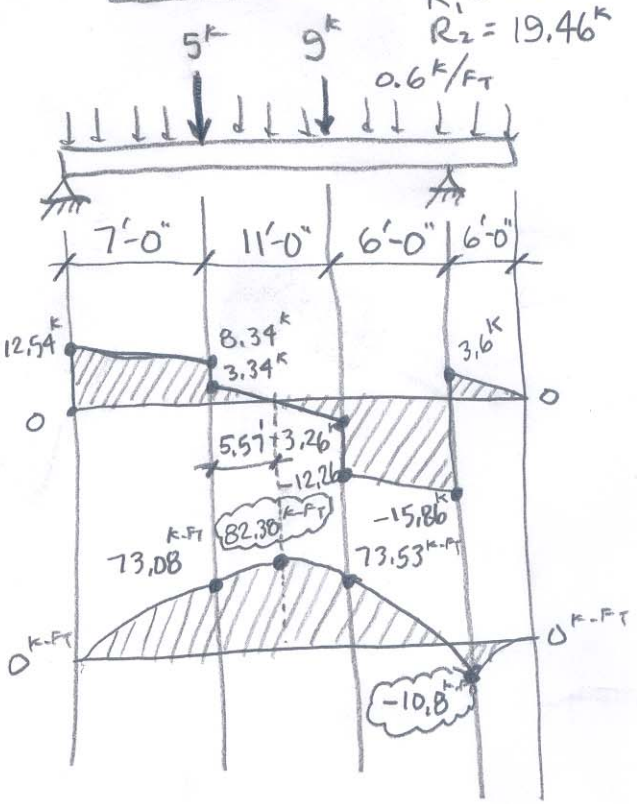
BEAM 1:

$R_1 = 16.43^K$
$R_2 = 15.57^K$



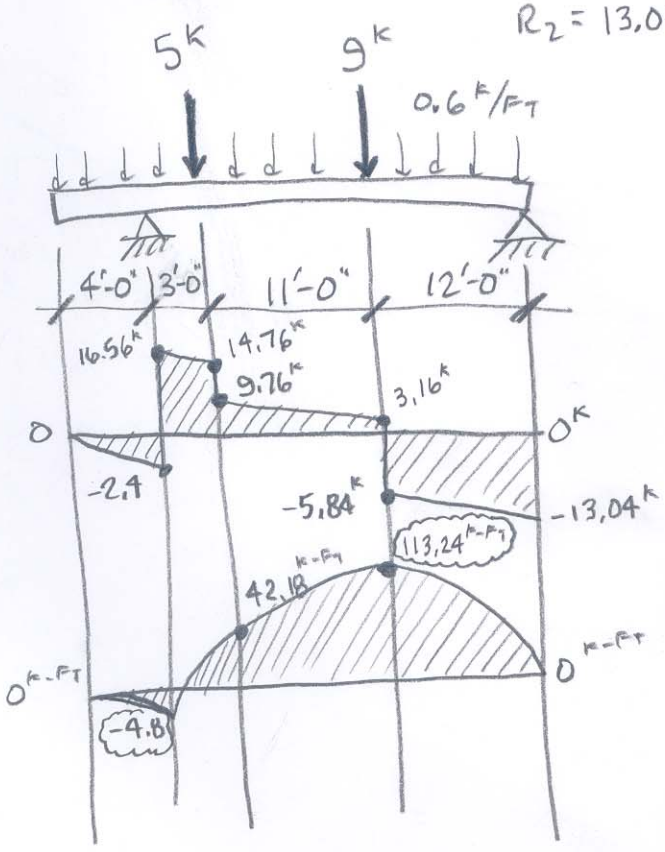
BEAM 2:

$R_1 = 12.54^K$
$R_2 = 19.46^K$



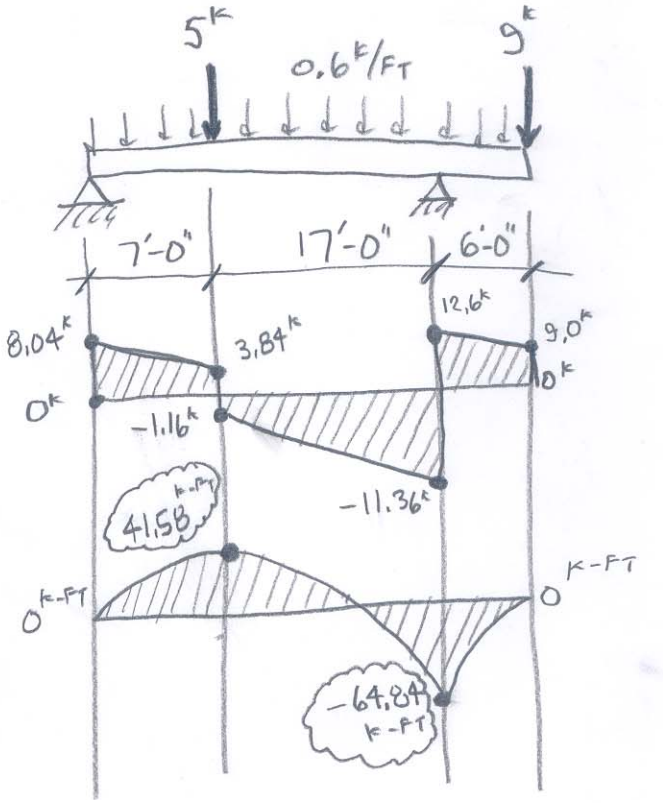
BEAM 3:

$R_1 = 18.96^K$
$R_2 = 13.04^K$



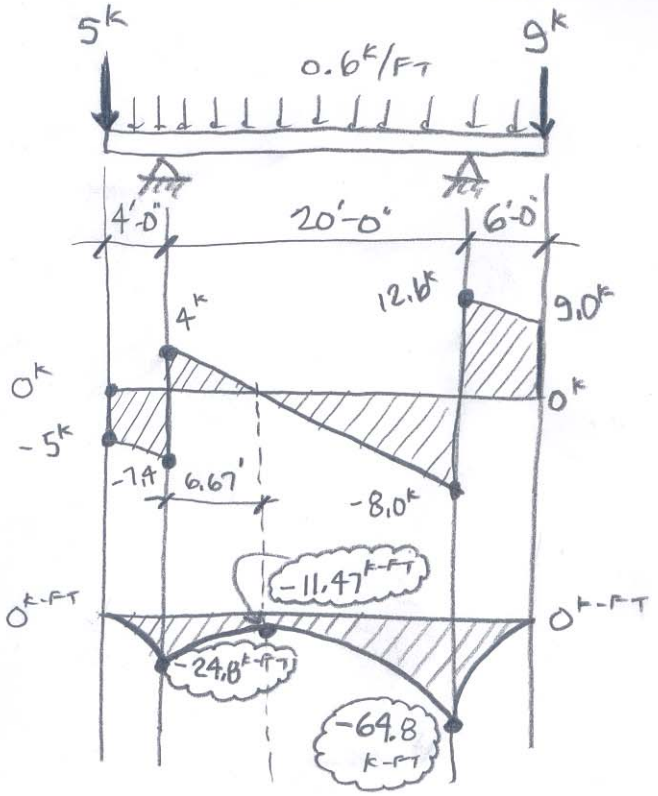
BEAM 4:

$R_1 = 8.04^K$
$R_2 = 23.96^K$

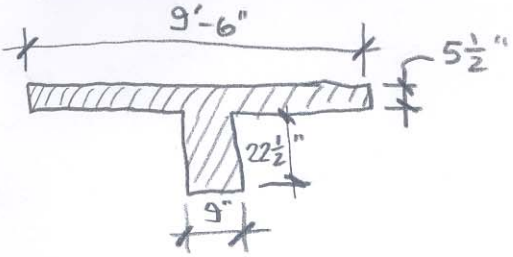


BEAM 5:

$R_1 = 11.4^k$
$R_2 = 20.6^k$



PROBLEM 2:



WT. OF T-BEAM:

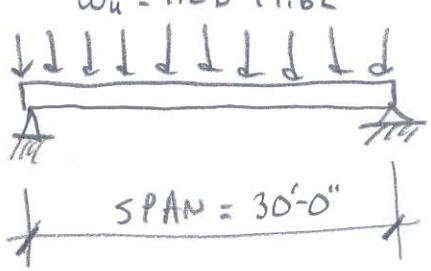
$\text{AREA} = \left(9'\text{-}6" \times \frac{5\frac{1}{2}"}{12}\right) + \left(\frac{22\frac{1}{2}"}{12} \times \frac{9"}{12}\right)$

$= 5.76\ FT^2$ PER 1'-0" LENGTH

$\text{WT. OF T-BEAM} = \left(5.76\ FT^2 \times 150\ \frac{lb}{FT^3}\right)$

$= 864\ lb/FT$ SERVICE DEAD LOAD

$w_u = 1.2D + 1.6L$



CHECK OVERHANG WIDTH

= SMALLER { $8(h_f) = 8(5.5") = 44"$ OR $\frac{1}{2}$ Clear $= \frac{105"}{2} = 52.5"$

CHECK EFF. FLANGE WIDTH — USE ↓

= SMALLER { $\frac{1}{4}$ SPAN $= 90"$ OR $2 \times OH + b_w = 97"$

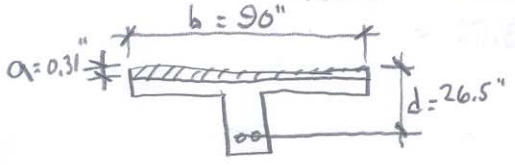
DET. EFF. CONC. COMP. AREA "A_c"

$T = A_s f_y$

$= 2(0.79\ in^2/BAR)(60\ ksi)$

$T = 94.8^{k\text{-}IPS}$

$A_c = \frac{T}{0.85 f'_c} = \frac{94.8^k}{0.85(4\ ksi)} = 27.88\ in^2$



$a = \frac{A_c}{b} = \frac{27.88\ in^2}{90"} = 0.31"$

$z = d - \frac{a}{2} = 26.5" - \left(\frac{0.31"}{2}\right) = 26.35"$

$M_u = \phi z T = 0.9(26.35")(94.8^k) = 2248^{k\text{-}in} = 187.3^{k\text{-}FT} = M_u$

$w_u = 1.2D + 1.6L$

$= 1.2\left[9.5'(62\ psf) + 864\ \frac{lb}{FT}\right] + 1.6\left[9.5'(100\ psf)\right]$

$= 1744\ PLF + 1520\ PLF$

$w_u = 3264\ PLF$

$w_u = 3.26\ KLF$

$M_{MAX} = \frac{w_u L^2}{8}$

$= \frac{(3.26^k/FT)(30'\text{-}0")^2}{8}$

$M_{MAX} = 366.8^{k\text{-}FT}$

SINCE $M_u = 187.3^{k\text{-}FT} < 366.8^{k\text{-}FT}$ NO GOOD