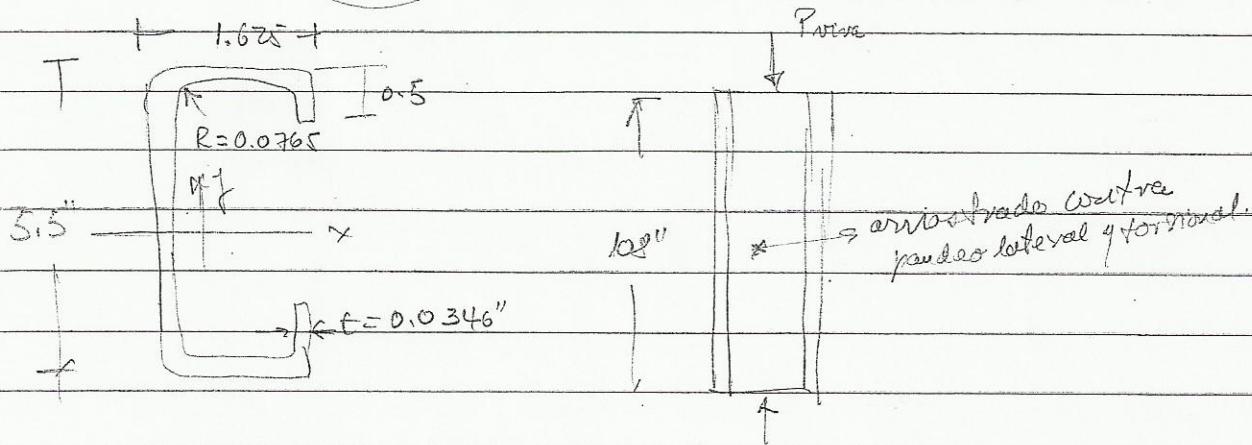


# Diseño de Estructuras de Acero I



$F_y = 33 \frac{K}{\text{ft}^2}$ ; Sección 550 S 162-33 ;  $K_x = K_y = K_t = 1$

Determine la carga  $P$  crítica. Propiedades: pg I-20.

Selección

$A = 0.327$  //  $r_{xx} = 2.11$  //  $r_{yy} = 0.589$

$J = 0.000130 \text{ in}^4$  //  $C_w = 0.713 \text{ in}^6$

$X_o = -1.11 \text{ in}$  //  $X_o = 2.46 \text{ in}$

1. Pandeo Flexión

a) Pandeo flexión

$$\frac{K_x L_x}{r_{xx}} = \frac{(1)(102)}{2.11} = 48.3$$

$$\frac{K_y L_y}{r_{yy}} = \frac{(1)(54)}{0.589} = 91.7 \text{ Controla}$$

$$F_e = \frac{\pi^2 E}{(K_y L_y / r_{yy})^2} = \frac{\pi^2 (29500)}{(91.7)^2} = 34.64 \frac{K}{\text{in}^2}$$

b) Pandeo flexo-torsional.

$$F_e = \frac{1}{2\beta} \left[ (\sigma_{ex} + \sigma_t) - \sqrt{(\sigma_{ex} + \sigma_t)^2 - 4\beta \sigma_{ex} \sigma_t} \right]$$

$$\beta = 1 - \left( \frac{X_o}{r_o} \right)^2 = 1 - \left( \frac{-1.11}{2.46} \right)^2 = 0.795$$

$$\sigma_{ex} = \frac{\pi^2 E}{(K_x L_x / r_{xx})^2} = \frac{\pi^2 (29500)}{(48.3)^2} = 111.1 \text{ K/in}^2$$

$$\sigma_t = \frac{1}{A r_o^2} \left[ G J + \frac{\pi^2 E C_w}{(K_t L_t)^2} \right] = \frac{1}{(0.327)(2.46)^2} \left[ (11300)(0.000130) + \right.$$

$$\left. \frac{\pi^2 (29500)(0.713)}{(1 \times 54)^2} \right] = 36.72 \frac{K}{\text{in}^2}$$

$$F_e = 33.71 \text{ K/in}^2$$

El menor de los dos  $F_e$  gobierna:  $F_e = 33.71 \frac{K}{\text{in}^2}$