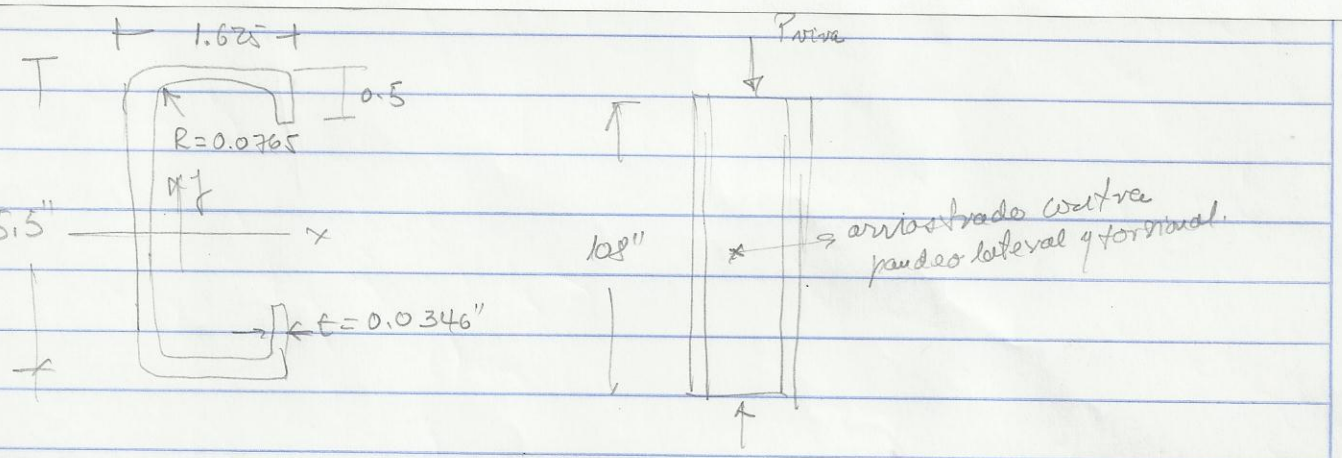
Diseño de Estructuras de Acero I



$F_y = 33 \frac{K}{pg^2}$; Sección 550S162-33 ; $K_x = K_y = K_t = 1$

Determine la carga P_{nivel}. Propiedades: pg I-20

Solución

$A = 0.327$ // $r_x = 2.11$ // $r_y = 0.589$

$J = 0.000130\ pg^4$ // $C_w = 0.713\ pg^6$

$x_o = -1.11$ pg // $r_o = 2.46$ pg

1. Pandeo Flexionante

a) Pandeo flexionante

$$\frac{K_x L_x}{r_x} = \frac{(1)(108)}{2.11} = 51.2$$

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

$$F_e = \frac{\pi^2 E}{(K_y L_y / r_y)^2} = \frac{\pi^2 (29500)}{(91.7)^2} = 34.64 \frac{K}{pg^2}$$

b) Pandeo flexo-torsional.

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

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

$$\sigma_{ex} = \frac{\pi^2 E}{(K_x L_x / r_x)^2} = \frac{\pi^2 (29500)}{(51.2)^2} = 111.1\ K/pg^2$$

$$\sigma_t = \frac{1}{A r_o^2}\left[GJ + \frac{\pi^2 E C_w}{(K_t L_t)^2}\right] = \frac{1}{(0.327)(2.46)^2}\left[(11300)(0.000130 + \frac{\pi^2 (29500)(0.713)}{(1 \times 54)^2}\right] = 36.72 \frac{K}{pg^2}$$

$F_e = 33.71\ K/pg^2$