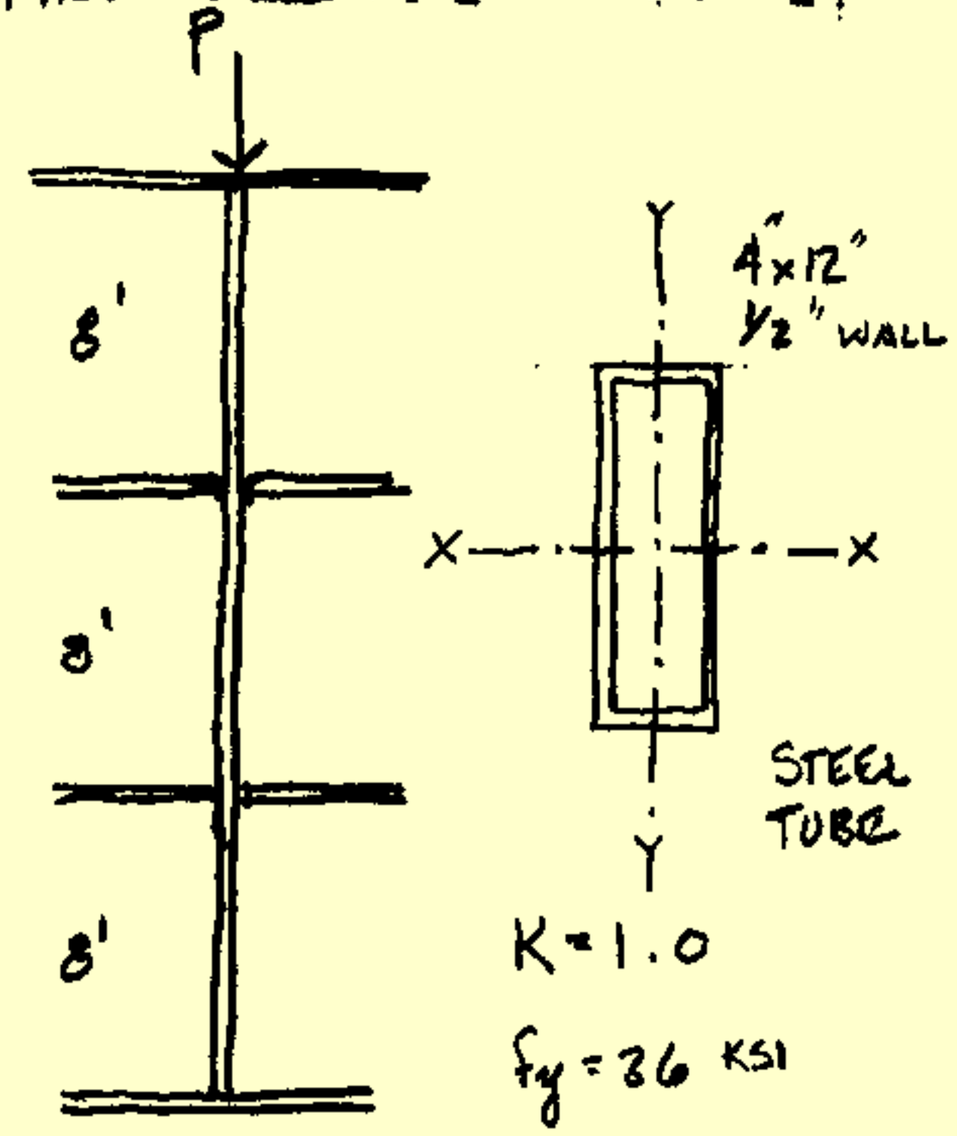
open.michigan

FIND $P_{ALLOWABLE}$ FOR F.S. = 3 :



y-y BRACING

K = 1.0

f_y = 36 KSI

F.S. = 3

$$\text{AREA} = (4\times12)-(3\times11) = 15$$

$$I_x = \frac{4(12)^3}{12} - \frac{3(11)^3}{12} = 243.25$$

$$I_y = \frac{12(4)^3}{12} - \frac{11(3)^3}{12} = 39.25$$

$$\frac{Kl_y}{r_y} = \sqrt{\frac{243.25}{15}} = 4.027$$

$$r_y = \sqrt{\frac{39.25}{15}} = 1.618$$

$$\frac{Kl_x}{r_x} = \frac{1(24\times12)}{4.027} = 71.52 \leftarrow \text{CONTROLS}$$

$$\frac{Kl_y}{r_y} = \frac{1(8\times12)}{1.618} = 59.33$$

X-X AXIS CONTROLS -

$$P_{cr_x} = \frac{\pi^2 EA}{(Kl/r)^2} = \frac{\pi^2(29000)(15)}{71.52^2} = 839.4^{K}$$

$$P_y = f_y A = 36(15) = 540 < 839.4 \quad \therefore \text{ YIELDING CONTROLS}$$

$$P_{ALLOW.} = 540 / 3 = 180^{K}$$