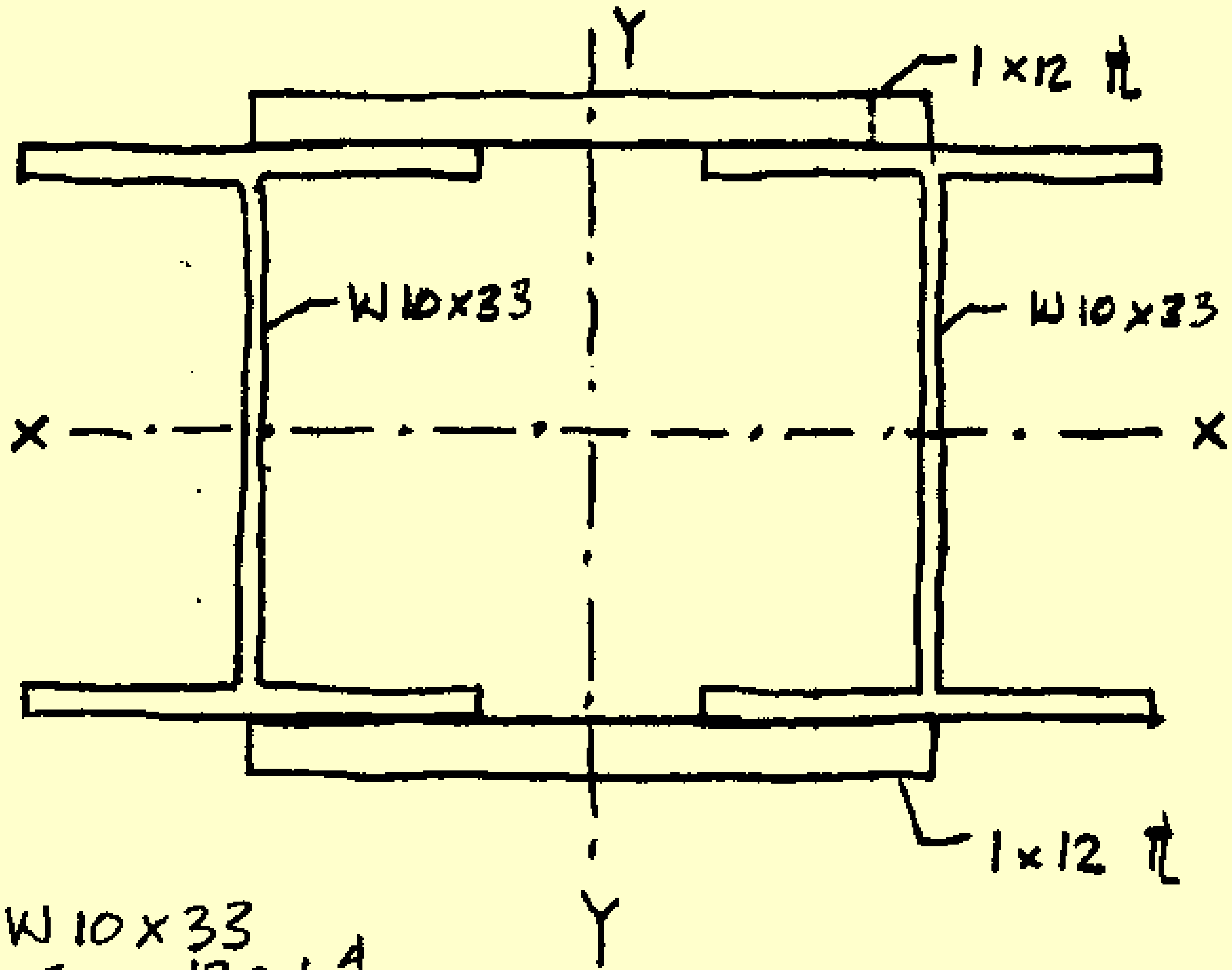
ARCH 331 | PROBLEM 18-3 | 30 NOV 91 PUB



FIND P_{ALL} LOAD:

COLUMN:

LENGTH 30′

K = 1.0

f_y = 36 KSI

E = 29 000 KSI

F.S. 3

NO BRACING

W 10×33

$I_x = 170 \text{ in}^4$

$I_y = 36.6 \text{ in}^4$

$A = 9.71 \text{ in}$

$$\text{TOTAL AREA} = 2(9.71) + 2(12) = 43.42 \text{ in}^2$$

$$I_x = 2(170) + 2\left(\frac{12(1)^3}{12}\right) + 2\left(12\left(\frac{9.73}{2} + .5\right)^2\right) = 1032.80 \text{ in}^4 \leftarrow \text{CONTROLS}$$

$$I_y = 2(36.6) + 2\left(\frac{1(12)^3}{12}\right) + 2\left(9.71(6)^2\right) = 1060.32 \text{ in}^4$$

$$r_x = \sqrt{\frac{1032.8}{43.42}} = 4.877 \text{ in}$$

$$P_{cr} = \frac{\pi^2 EA}{(K\ell/r)^2} = \frac{\pi^2\, 29000(43.42)}{(1(360)/4.877)^2} = 2281^K$$

$$P_y = f_y A = 36(43.42) = 1563^K \leftarrow \text{CONTROLS}$$

$$P_{ALLOW.} = 1563/3 = 521^K$$