ARCH 324 - Structures 2, Winter 2009

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COLUMN:
LENGTH 30'
K = 1.0
$f_y = 36$ ksi
$E = 29,000$ ksi
F.S. 3
NO BRACING

TOTAL AREA = 2(9.71) + 2(12) = 43.42 in²
$I_x = 2(170) + 2\left(\frac{12(12^2)}{12}\right) + \frac{2(12(9.71 + 5)^2)}{2} = 1032.80 in⁴ \leftarrow$ controls
$I_y = 2(36.6) + 2\left(\frac{112^3}{12}\right) + 2(9.71(6)^2) = 1060.32 in⁴

F_x = \sqrt{\frac{1032.8}{43.42}} = 4.877 in

$P_{cr} = \frac{\pi^2 EA}{(K^2r^2) = \frac{\pi^2 29,000(43.42)}{(1(3600)/4.877)^2}} = 0.2281 k$

$P_y = f_y A = 36(43.42) = 1563 k \leftarrow$ controls

$P_{allow} = 1563 / 3 = 521 k$