ARCH 324 - Structures 2, Winter 2009

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Problem 18-3 III

Find allowable for F.S. = 3:

\[ \text{Area} = (4 \times 12) - (3 \times 11) = 15 \]

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

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

\[ K_{Ly} = \sqrt{\frac{243.25}{15}} = 4.027 \]

\[ K_{Lx} = \sqrt{\frac{39.25}{15}} = 1.618 \]

\[ \frac{K_{Ly}}{F_y} = \frac{1.618}{36 \text{ ksi}} = 59.33 \]

\[ \frac{K_{Lx}}{F_y} = \frac{71.52}{1.618} = 59.33 \]

X-X Axis controls:

\[ P_{cr} = \frac{\pi^2 EA}{(KL/r)^2} = \frac{\pi^2 (29000)(15)}{71.52^2} = 839.4 \text{ k} \]

\[ P_y = F_y A = 36 \times 15 = 540 < 839.4 \text{ k} \text{ : Yielding controls} \]

\[ P_{allow} = \frac{540}{3} = 180 \text{ k} \]