ARCH 324 - Structures 2, Winter 2009

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\[ X = \frac{1}{2} A \cdot d = \frac{12(5.5) + 10(2.5)}{12 + 10} = 4.136" \quad \text{(From Fig. 701)} \]
\[ J_X = \frac{12(1)^3 + 12(1.564)^3 + 5(5)^3}{12} = 1.864"^2 \quad \text{(From Fig. 701)} \]
\[ J_X = 70.936 \text{ in}^4 \quad \text{CONTROLS} \]
\[ J_Y = \frac{1}{12} \frac{(120)^3}{12} = 147.33 \text{ in}^4 \]
\[ A = 12 + 10 = 22 \]
\[ r_X = \sqrt{\frac{J_X}{A}} = \sqrt{\frac{70.936}{22}} = 1.7956 \text{ in} \]
\[ K \frac{f}{r_X} = \frac{1(120)}{1.7956} = 66.83 \]

\[ I = \frac{1}{4} \pi 3^4 - \frac{1}{4} \pi 2.5^4 = 32.94 \text{ in}^4 \]
\[ A = \pi 3^2 - \pi 2.5^2 = 8.639 \text{ in}^2 \]
\[ r = \sqrt{\frac{J}{A}} = \sqrt{\frac{32.94}{8.639}} = 1.952 \]
\[ K \frac{f}{r} = \frac{1(120)}{1.952} = 61.458 \]