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ARCH 324 - Structures 2, Winter 2009

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DETERMINE THE CRITICAL SLENDERENCE RATIO FOR EACH OF THE FOLLOWING ABOUT THE WEAK (Y-Y) AXIS.

USE 10' LENGTH

For the first section:

$$I_y = \frac{10(8)^3}{12} - 2\left(\frac{6(3)^3}{12}\right) - 2\left(3(6)(2.5)^2\right)$$

$$= 174.67 \text{ in}^4$$

$$A = 2(2)(8) + 2(6) = 44 \text{ in}^2$$

$$r_y = \sqrt{\frac{I_y}{A}} = \sqrt{\frac{174.67}{44}} = 1.972 \text{ in}$$

$$\frac{K_y}{r_y} = \frac{1(120)}{1.972} = 60.22$$

For the second section:

$$I_y = \frac{4(4)^3}{12} - \frac{3(3)^3}{12} = 14.583 \text{ in}^4$$

$$A = 4^2 - 3^2 = 7 \text{ in}^2$$

$$r_y = \sqrt{\frac{I_y}{A}} = \sqrt{\frac{14.583}{7}} = 1.443 \text{ in}$$

$$\frac{K_y}{r_y} = \frac{1(20)}{1.443} = 13.89$$