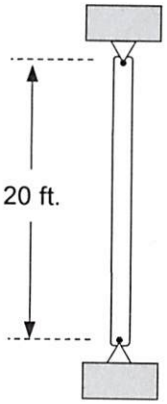
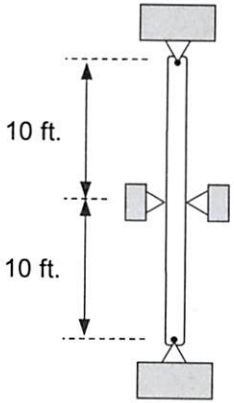
**Classroom Problem 4.7-1**: A **W18 x 130** with $F_y$ = 50 *ksi* is used as a column. Compute the nominal strength.




Support in strong direction




Support in weak direction

FROM TABLE 1-1 (1-22) $A_g = 38.3\ in^2$ $r_x = 8.03\ in$ $r_y = 2.70\ in$

$$\frac{L_{cx}}{r_x} = \frac{20ft(12in/ft)}{8.03in} = 29.89$$

$$\frac{L_{cy}}{r_y} = \frac{10ft(12in/ft)}{2.70\ in} = 44.44\ *$$ LARGER VALUE CONTROLS

LIMIT $4.71\sqrt{\frac{E}{F_y}} = 4.71\sqrt{\frac{29{,}000ksi}{50ksi}} = 113.43$ $\quad \frac{L_{cy}}{r_y} < 4.71\sqrt{\frac{E}{F_y}} \Rightarrow$ E3-2

$$F_e = \frac{\pi^2 E}{(L_c/r_y)^2} = \frac{\pi^2(29{,}000ksi)}{(44.44)^2} = 144.9ksi$$

$$F_n = F_y\left(0.658^{F_y/F_e}\right) = 50ksi\left(0.658^{50/144.9}\right) = 43.28ksi$$

$$P_n = F_n A_g = 43.28ksi(38.3in^2) = \underline{\underline{1{,}653^{K}}}$$