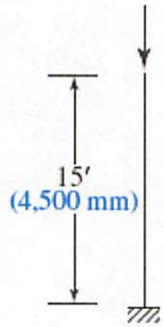
4.3-3 Compute the nominal compressive strength of the member shown in Figure P4.3-3. Use AISC Equation E3-2 or E3-3.



HP10 × 57 (HP250 × 85)
A572 Grade 50
F_y = 50 ksi (345 MPa)

$K = 2.1$ $\quad A_g = 16.7\,in^2$ $\quad r_{min} = 2.45\,in$

$$\frac{KL_c}{r} = \frac{(15\,ft(12\,in/ft))2.1}{2.45\,in} = 154.29$$

$$4.71\sqrt{E/F_y} = 4.71\sqrt{\frac{29{,}000\,ksi}{50\,ksi}} = 113.43$$

$$F_e = \frac{\pi^2 E}{(KL/r)^2} = \frac{\pi^2(29{,}000\,ksi)}{(154.29)^2} = 12.02\,ksi$$

$$\frac{KL}{r} > 4.71\sqrt{E/F_y} \Rightarrow \text{USE EQ E3-3}$$

$$F_n = 0.877F_e = 0.877(12.02\,ksi) = 10.54\,ksi$$

$$P_n = F_n A_g = 10.54\,ksi(16.7\,in^2) = \underline{\underline{176.04\,k}}$$