5.4-3 Determine the smallest value of yield stress F_y for which a W-, M-, or S-shape from Part 1 of the *Manual* will become slender. To which shapes does this value apply? What conclusion can you draw from your answer?

FLANGE $\lambda > \lambda_r \Rightarrow b_f/2t_f > \sqrt{E/F_y}$

$(b_f/2t_f)^2 = E/F_y \Rightarrow F_y = E/(b_f/2t_f)^2$

$(b_f/2t_f)_{MAX} \Rightarrow$ M4X6 $b_f/2t_f = 11.9$

$$F_y = \frac{29{,}000\,ksi}{(11.9)^2} = \underline{204.79\,ksi}$$

WEB $\lambda > \lambda_r \Rightarrow h/t_w > 5.70\sqrt{E/F_y}$

$$F_y = \frac{E}{(\lambda/5.7)^2} = \frac{29{,}000\,ksi}{(74.8/5.7)^2} = 168.4\,ksi$$

$\lambda = \left(\frac{h}{t_w}\right)_{MAX} = 74.8$ M12.5X12.4
M12.5X11.6

WEB CONTROLS $\underline{F_y = 168.4\,ksi}$