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$E_c = 3025 \text{ ksi} \quad n = 8$

\[ M = \frac{wL^2}{8} = \frac{(212.5 \text{ #1})(121)^2}{8} = 3825 \text{ in}^2 = 45.9 \text{ in}^k \]

\[ M_{\text{resist}} = R_c \left( 4 - \frac{x}{3} \right) \]

\[ 45.9 \text{ in}^k = \frac{\left( 1.35 \text{ ksi} \right) (12) (x) \left( 4 - \frac{x}{3} \right)}{2} \]

\[ 0 = -2.2x^2 + 32.4x - 45.9 \text{ in}^k \]

\[ x = \frac{-32.4 \pm \sqrt{(32.4)^2 - (4)(-2.2)(-45.9)}}{2(-2.7)} \]

\[ x = 1.64 \text{ in} \]

\[ M = 45.9 \text{ in}^k = R_T \left( 4 - \frac{x}{3} \right) = A_s f_s \left( 4 - \frac{1.64}{3} \right) = A_s (20 \text{ ksi}) \left( 4 - \frac{1.64}{3} \right) \]

\[ A_s = 0.66 \text{ in}^2 \]