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ARCH 324 - Structures 2, Winter 2009

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\[ M = \frac{W l^2}{8} = \frac{(212.5 \times 12^2) \times 12}{8} = 3825 \text{ in}^3 = 45.9''^k \]

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

\[ 45.9''^k = \left( \frac{f_e b x}{2} \right) \left( 4 - \frac{x}{3} \right) \]

\[ 0 = -2.7x^2 + 32.4x - 45.9''^k \]

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

\[ x = 1.64'' \]

\[ M_{9''^k} = R_e \left( 4 - \frac{x}{3} \right) = A_s f_s \left( 4 - \frac{1.64''}{3} \right) = A_s (20 \text{ ksi}) \left( 4 - \frac{1.64''}{3} \right) \]

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