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ARCH 324 - Structures 2, Winter 2009

von Buelow, Peter

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\[ M = \frac{w l^2}{8} = \frac{(212.5 \text{ kips})(12)^2}{8} = 382.5 \text{ k-in} = 45.9 \text{ k-in} \]

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

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

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

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

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

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

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

\( f_c = 3625 \text{ kips/ft}^2 \quad n = 8 \)

\( E_c = 150 \text{ PSF} \)

\( D_L = 62.5 \text{ PSF} \)

\( T_L = 212.5 \text{ PSF} \)

\( f_s = 2.5 \text{ kips/in} \)

\( \frac{f_s}{n} = 20 \text{ kips/in} \)

\( f_c = 1.35 \text{ kips/in} \)

\( A = 0.66 \text{ in}^2 \)