ARCH 324 - Structures 2, Winter 2009

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GENERAL EQUATION:

\[ M_B = \frac{3}{L_1 + L_2} \left[ EI\theta_1 + EI\theta_2 \right] \]

\[ M_B = \frac{3}{20 + 30} \times \left[ \frac{PE}{16} + \frac{WL^2}{24} \right] = \frac{3}{50} \times \left[ \frac{56(20)^2}{16} + \frac{56(30)^2}{24} \right] \]

\[ M_B = 210 \text{ k-ft} \]

REACTIONS BY SUPERPOSITION:

WITH LOADS:

\[ 56 \]

\[ 28 \]

\[ 28 \]

\[ 56 \]

\[ 28 \]

\[ 28 \]

WITH MOMENT:

\[ 210 \]

\[ 10.5 \]

\[ 10.5 \]

\[ 7.0 \]

\[ 7.0 \]

TOTAL:

\[ 17.5 \uparrow \]

\[ 73.5 \]

\[ 21 \uparrow \]
**PART (A)**

\[ f = 24 \frac{K}{S} = \frac{H}{S} = \frac{210 \times 12}{S} \therefore S = 105 \]

\[ \therefore \text{USE W24x55} \quad S_a = 114 > 105 \quad \checkmark \text{OK} \]

**PART (5)**

\[ M_{\text{SPAN}_1} = \frac{PL}{4} = \frac{56(20)}{40} = 280 \frac{K}{IN} \quad \text{CONTROLS} \]

\[ M_{\text{SPAN}_2} = \frac{WL}{8} = \frac{56(30)}{8} = 210 \frac{K}{IN} \]

\[ f = 24 = \frac{280 \times 12}{S} \therefore S = 140 \]

\[ \therefore \text{USE W21x68} \quad S_a = 140 \]