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GENERAL EQUATION:

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

$$M_B = \frac{3}{20 + 30} \times \left[ \frac{pL^2}{12} + \frac{W L^2}{24} \right] = \frac{3}{50} \times \left[ \frac{56 (20)^2}{12} + \frac{56 (30)^2}{24} \right]$$

$$M_B = 210 \text{ k-ft}$$

REACTIONS BY SUPERPOSITION:

WITH LOADS:

$$\begin{array}{c}
56 \\
\downarrow \\
\uparrow \\
28 \\
\uparrow \\
28
\end{array} \quad \begin{array}{c}
56 \\
\uparrow \\
28 \\
\uparrow \\
28
\end{array}$$

WITH MOMENT:

$$\begin{array}{c}
10.5 \\
\uparrow \\
210 + 210 \\
\uparrow \\
10.5 \\
\uparrow \\
7.0 \\
\uparrow \\
7.0
\end{array}$$

TOTAL:

$$\begin{array}{ccc}
17.5 \uparrow & 73.5 & 21 \uparrow \\
A & B & C
\end{array}$$
PART (A)

\[ f = 24 \times 51 = \frac{M}{S} = \frac{210 \times 12}{S} \]

\[ S = 105 \]

\[ \therefore \text{USE W24 x 55} \quad S_a = 114 > 105 \quad \checkmark \text{OK} \]

PART (B)

\[ M_{Span1} = \frac{PL}{4} = \frac{56 \times 20}{40} = 280^{\text{in.k}} \quad \text{CONTROLS} \]

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

\[ \therefore \text{USE W21 x 68} \quad S_a = 140 \]