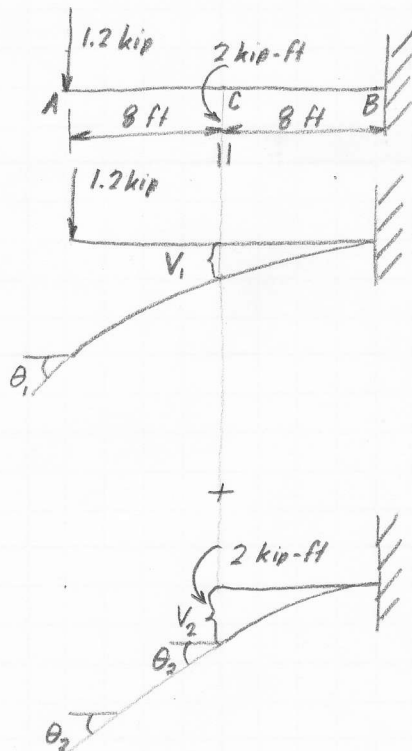


(12-89)



A-36 steel, $E = 29.0 \times 10^3 \text{ ksi}$
 W8 x 48, $I = 184 \text{ in}^4$

$$V_1 = V_{@ \frac{L}{2}} = \frac{-P \left(\frac{L}{2}\right)^2}{6EI} \left(3L - \frac{L}{2}\right) = \frac{-5PL^3}{48EI}$$

$$\theta_1 = \theta_{\max} = \frac{-PL^2}{2EI}$$

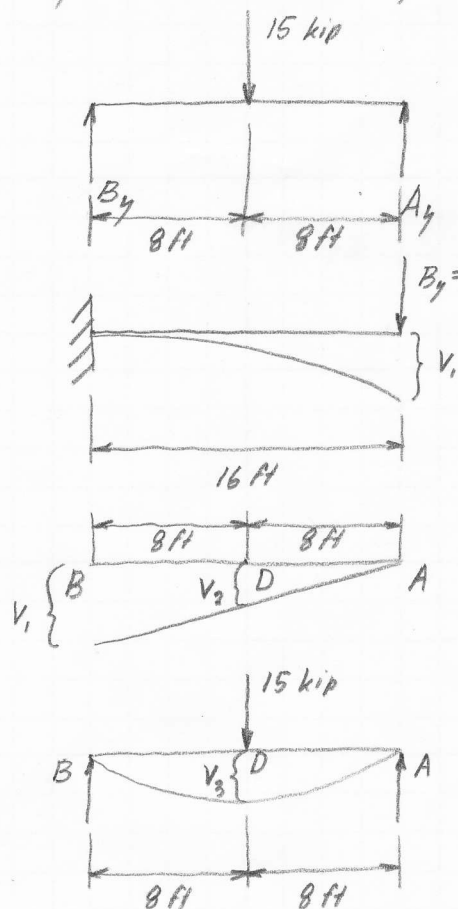
$$V_2 = V_{\max \text{ with } L = \frac{L}{2}} = \frac{-M_0 \left(\frac{L}{2}\right)^2}{2EI} = \frac{-M_0 L^2}{8EI}$$

$$\theta_2 = \theta_{\max \text{ with } L = \frac{L}{2}} = \frac{-M_0 \left(\frac{L}{2}\right)}{EI} = \frac{-M_0 L}{2EI}$$

$$\begin{aligned} V_{@C} &= V_1 + V_2 = \frac{-5PL^3}{48EI} - \frac{M_0 L^2}{8EI} \\ &= \frac{-L^2}{48EI} (5PL + 6M_0) \\ &= \frac{-(16\text{ft})^2 \left(\frac{12\text{in}}{1\text{ft}}\right)^2}{48(29.0 \times 10^3 \frac{\text{kip}}{\text{in}^2})(184\text{in}^4)} \left(5(1.2\text{kip})(16\text{ft}) \left(\frac{12\text{in}}{1\text{ft}}\right) + (6)(2\text{kip-ft}) \left(\frac{12\text{in}}{1\text{ft}}\right)\right) \\ &= \boxed{-0.1865 \text{ in}} \end{aligned}$$

$$\begin{aligned} \theta_{@A} &= \theta_1 + \theta_2 = \frac{-PL^2}{2EI} - \frac{M_0 L}{2EI} \\ &= \frac{-L}{2EI} (PL + M_0) \\ &= \frac{-(16\text{ft}) \left(\frac{12\text{in}}{1\text{ft}}\right)}{2(29.0 \times 10^3 \frac{\text{kip}}{\text{in}^2})(184\text{in}^4)} \left((1.2\text{kip})(16\text{ft}) \left(\frac{12\text{in}}{1\text{ft}}\right) + (2\text{kip-ft}) \left(\frac{12\text{in}}{1\text{ft}}\right)\right) \\ &= -4.577 \times 10^{-3} \text{ rad or } \boxed{-0.00458 \text{ rad}} \end{aligned}$$

(12-96)



$$A_y = B_y = 7.5 \text{ kip}$$

$$\text{A-36 steel, } E = 29 \times 10^3 \text{ ksi}$$

$$I_x = 118 \text{ in}^4$$

$$V_1 = \frac{-PL^3}{3EI} = \frac{-(7.5 \text{ kip})(16 \text{ ft})^3 \left(\frac{12 \text{ in}}{1 \text{ ft}}\right)^3}{3(29 \times 10^3 \frac{\text{kip}}{\text{in}^2})(118 \text{ in}^4)}$$

$$= -5.1709 \text{ in}$$

$$\frac{V_2}{V_1} = \frac{8 \text{ ft}}{16 \text{ ft}}$$

$$V_2 = -2.5854 \text{ in}$$

$$V_3 = \frac{-PL^3}{48EI} = \frac{-(15 \text{ kip})(16 \text{ ft})^3 \left(\frac{12 \text{ in}}{1 \text{ ft}}\right)^3}{48(29 \times 10^3 \frac{\text{kip}}{\text{in}^2})(118 \text{ in}^4)}$$

$$= -0.64636 \text{ in}$$

$$V_{\text{total}@D} = -2.5854 \text{ in} + -0.64636 \text{ in}$$

$$= \boxed{-3.23 \text{ in}}$$