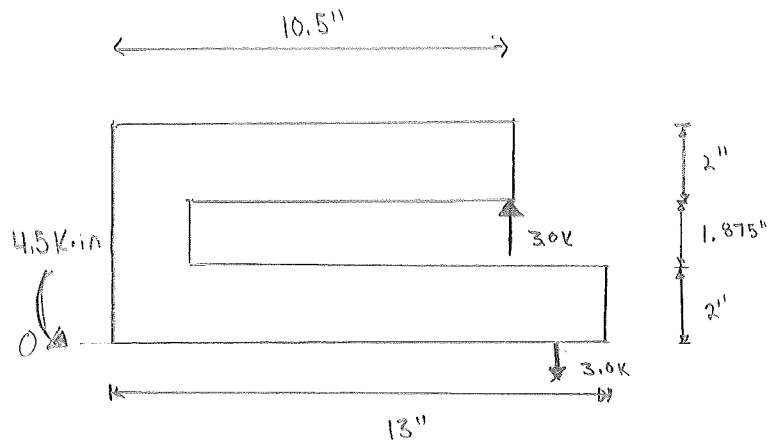


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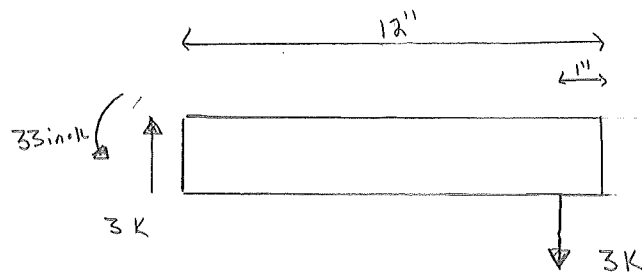
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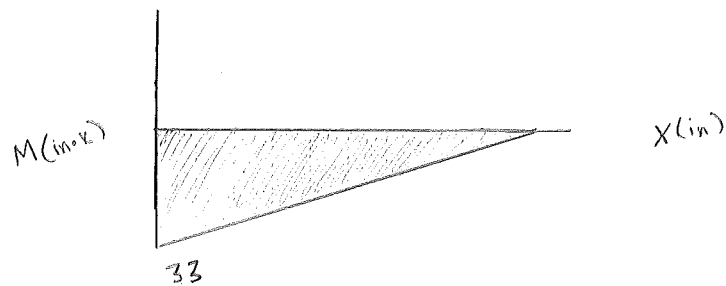
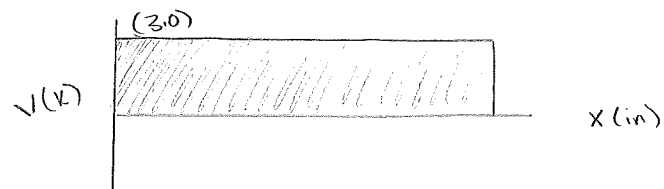


$$\sum M_o = 0; \quad (-3K \times 12") + 3K(10.5) + M_1 = 0$$

$$M_1 = 4.5 K \cdot in$$



$$\sum M_o = 0; \quad 3K(11") + M_2 = 0 \quad M_2 = 33 K \cdot in$$

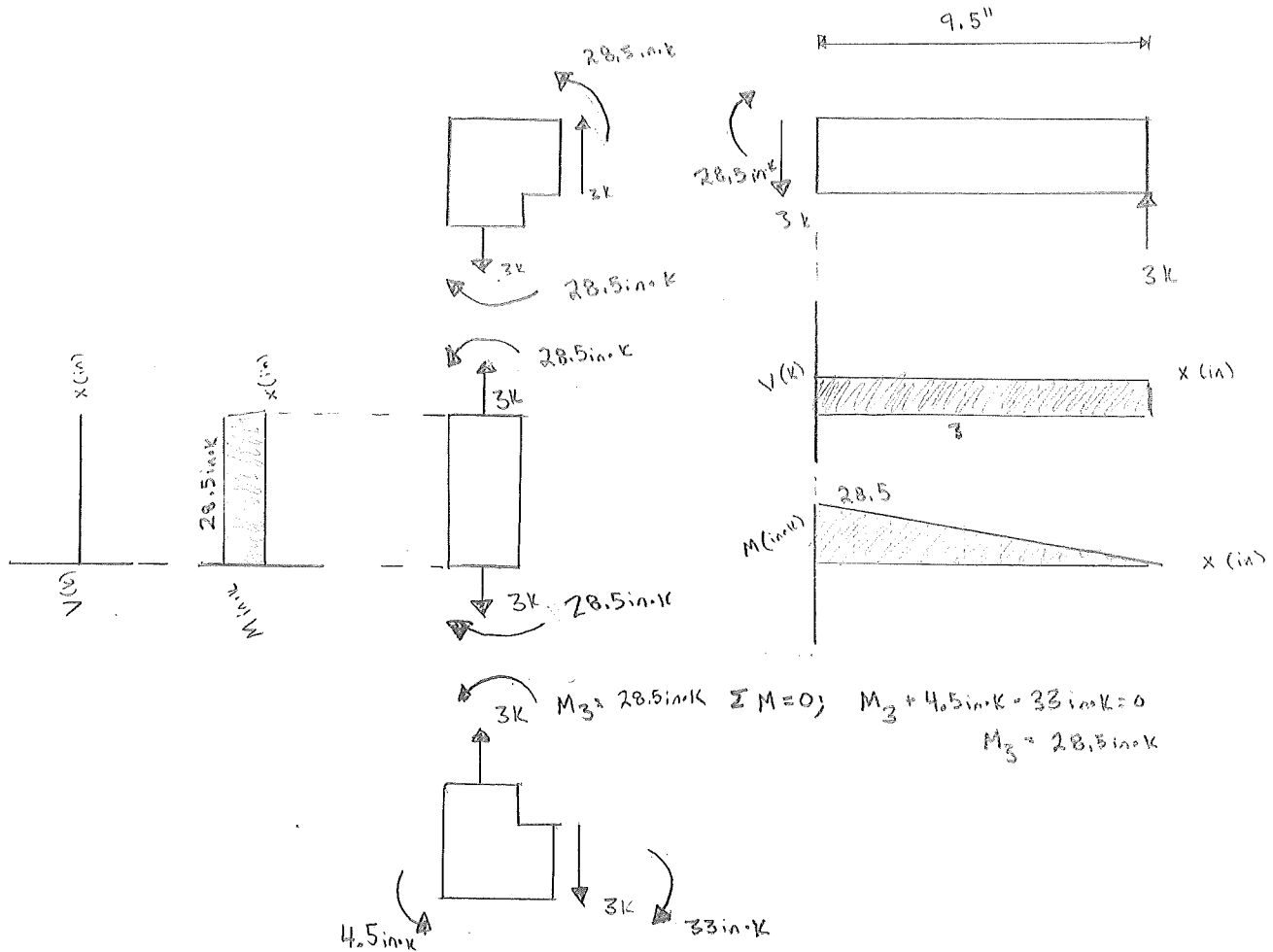


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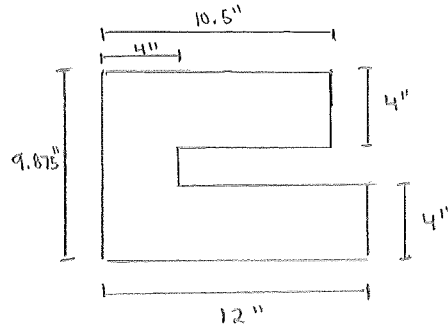
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[3-2.1] Tension

$$F_{gross} = \frac{3k}{4in^2} = 0.75 \text{ ksi}$$



$$(EQ 3-1) \quad F_{gross} = \frac{F_y}{N_d} = \frac{50 \text{ ksi}}{3.0} = 16.7 \text{ ksi}$$

$$U.C. = 0.045 \quad \frac{OK}{Tension}$$

Section Properties

$$I_y = \frac{1}{12} (1" \times 4")^3 = 5.33 \text{ in}^4$$

$$S_y = \frac{1}{6} (1") (4")^2 = 2.67 \text{ in}^3$$

$$I_x = \frac{1}{12} (4" \times 1")^3 = 0.333 \text{ in}^4$$

$$S_x = \frac{1}{6} (4" \times 1")^2 = 0.667 \text{ in}^3$$

$$A = (4" \times 1") = 4 \text{ in}^2$$

[3-2.3.3] Strong Axis Bending

$$L_b = 8" \quad (EQ 3-19) \quad \frac{L_b c}{I^2} = \frac{8" (4")}{(1")^2} = 32 \leq \frac{0.08 E}{F_y} = \frac{0.08 (29,000 \text{ ksi})}{50 \text{ ksi}} = 46.4$$

$$(EQ 3-20) \quad F_b = \frac{1.25 F_y}{N_d} = \frac{1.25 (50 \text{ ksi})}{3.0} = 20.83 \text{ ksi}$$

$$32 \leq 46.4 \quad \frac{OK}{=}$$

$$F_{by} = \frac{M_y}{S_y} \quad M_y = 33 \text{ in} \cdot \text{k} \quad F_{by} = \frac{33 \text{ in} \cdot \text{k}}{2.67 \text{ in}^3} = 12.36 \text{ ksi}$$

$$U.C. = 0.593 \quad \frac{Bending}{(strong)}$$

[3-2.3.4] Weak Axis Bending

$$F_{bx} = \frac{1.25 F_y}{N_d} = \frac{1.25 (50 \text{ ksi})}{3.0} = 20.83 \text{ ksi}$$

$$F_{bx} = \frac{(3k \times 0.05 \times 8")}{0.667 \text{ in}^3} = 1.8 \text{ ksi}$$

$$U.C. = 0.086 \quad \frac{Bending}{(weak)}$$

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[3-2.3.6] Shear

$$h/t = \frac{4''}{1''} = 4 \leq 2.45 \sqrt{\frac{E}{F_y}} = 2.45 \sqrt{\frac{29,000 \text{ ksi}}{50 \text{ ksi}}} = 59$$

OK

$$(EQ 3-28) F_v = \frac{F_y}{N_d \sqrt{3}} = \frac{50 \text{ ksi}}{3.0 \sqrt{3}} = 9.6 \text{ ksi} \quad F_v = \frac{3 \text{ K}}{4 \text{ in}^2} = 0.75 \text{ ksi}$$

$$U.C. = 0.078$$

Shear

[3-2.4] Combined Tension + Bending

$$(EQ 3-35) \frac{F_t}{F_t} + \frac{F_{bx}}{F_{bx}} + \frac{F_{by}}{F_{by}} \leq 1.0 = 0.045 + 0.593 + 0.086$$

$$= 0.724$$

$$U.C. = 0.724$$

Axial + Bend

[3-2.5] Combined Shear + normal Stress

$$F_x = F_a + F_{bx} + F_{by} = 0.75 \text{ ksi} + 12.36 \text{ ksi} + 1.0 \text{ ksi} = 14.910 \text{ ksi}$$

$$(EQ 3-37) F_{cr} = \sqrt{F_x^2 - F_x F_y + F_y^2 + 3 F_y^2} = \sqrt{14.910^2 + 3(0.75)^2} = 14.966 \text{ ksi}$$

$$F_{cr} = \frac{F_y}{N_d} = \frac{50 \text{ ksi}}{3.0} = 16.67 \text{ ksi}$$

$$U.C. = 0.90$$

Shear + Norm