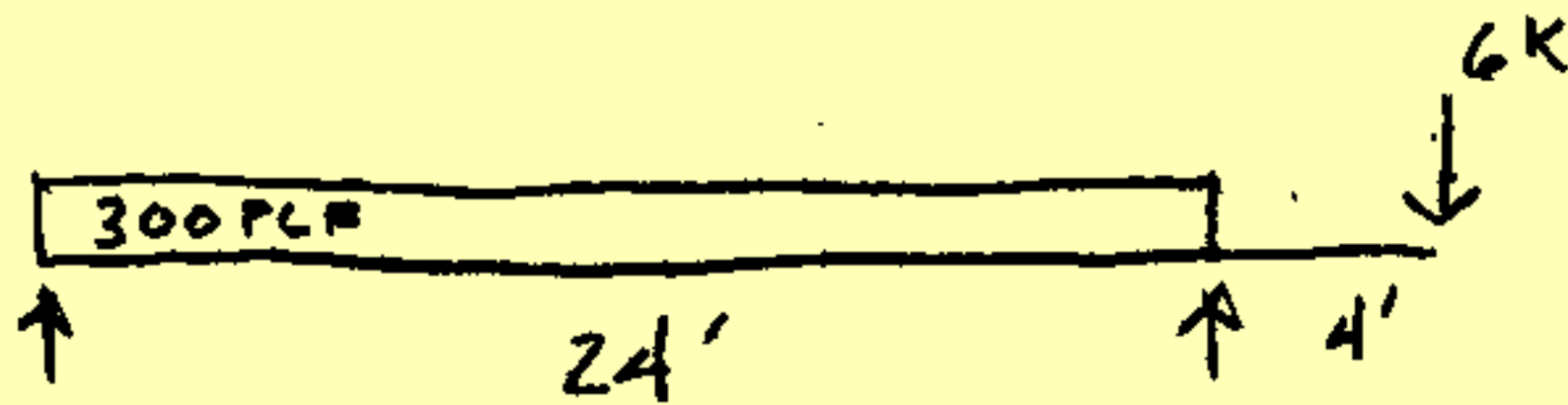


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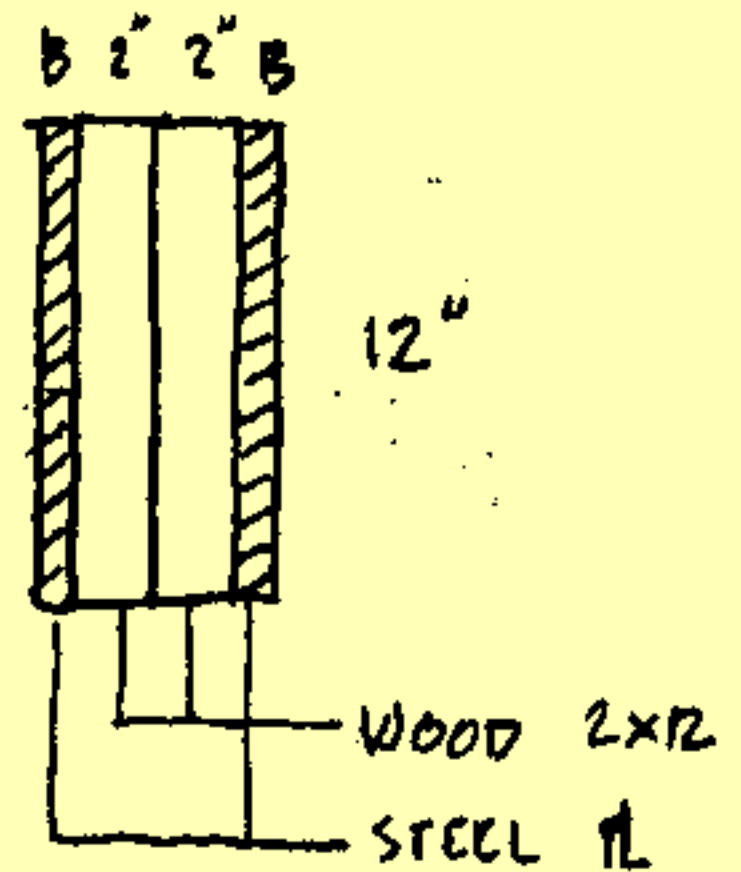
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$E_{WOOD} = 2000 \text{ KSI}$
 $E_{STEEL} = 30000 \text{ KSI}$

$F_b \text{ WOOD} = 15 \text{ KSI}$
 $F_b \text{ STEEL} = 22.5 \text{ KSI}$



REACTIONS:

$$\sum M_{R1} = 0 = 7.2(12) - R_2(24) + 6(28)$$

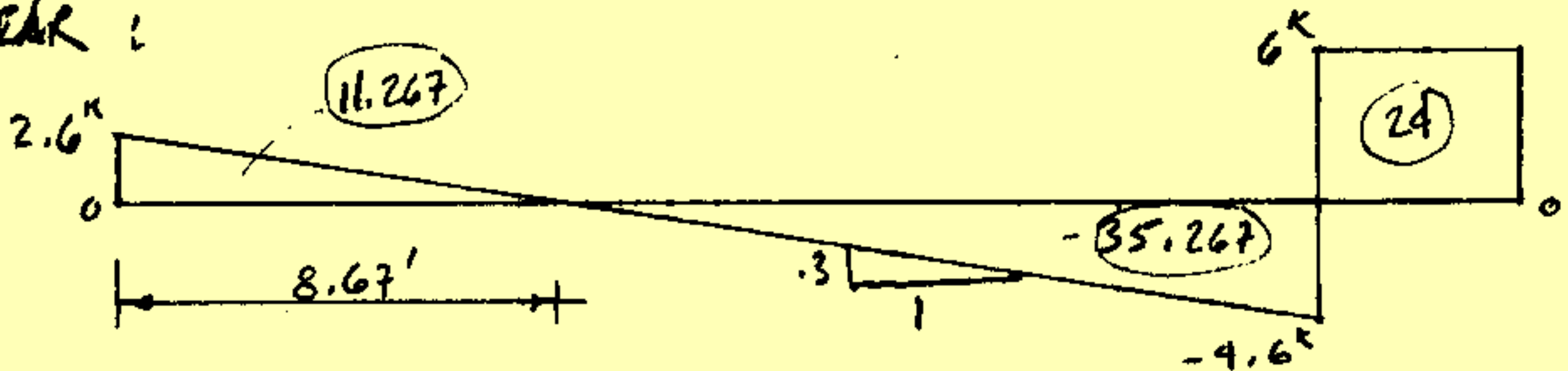
$$R_2 = 10.6 \text{ K}$$

$$\sum M_{R2} = 0 = R_1(24) - 7.2(12) + 6(4)$$

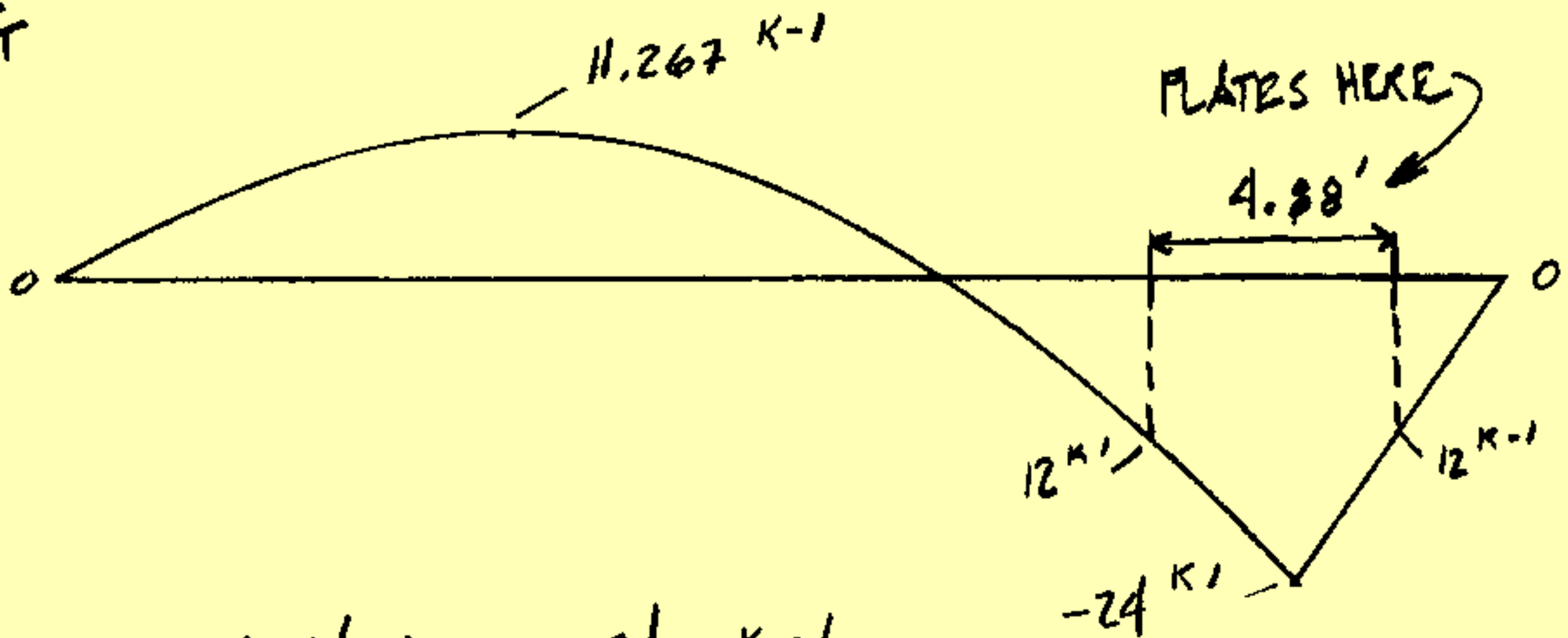
$$R_1 = 2.6 \text{ K}$$

CHECK $\sum F_v = 10.6 + 2.6 - 7.2 - 6 = 0$ ✓

SHEAR:



MOMENT



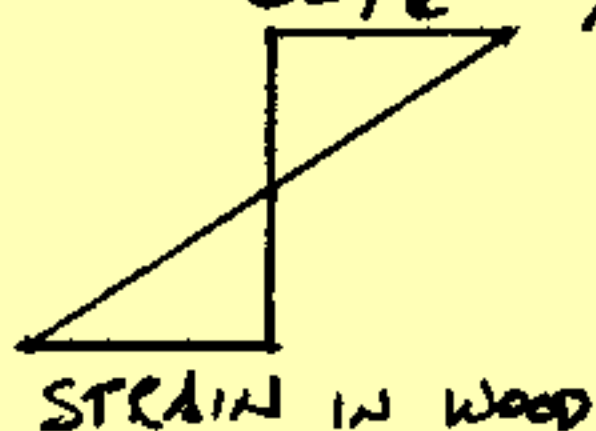
∴ DESIGN MOMENT = 24.0 K-ft



STRAIN COMPATIBILITY:

ASSUME WOOD CONTROLS STRAIN:

$$\epsilon = \frac{f}{E} = \frac{1.5}{2000} = 0.00075$$



CHECK →

$$f = E\epsilon = 30000(0.00075) = 22.5 = f_s$$



∴ STEEL AND
WOOD HAVE
BALANCED
STRAIN AS IS

FIND MOMENT CARRIED BY WOOD:

$$M_{WOOD} = f_s S = 1.5 \left(\frac{4(12)^2}{6} \right) = 144 \text{ K}\cdot\text{ft}$$

$$= 12 \text{ K}\cdot\text{ft}$$

FIND MOMENT CARRIED BY STEEL:

$$M_{STEEL} = M_{TOTAL} - M_{WOOD} = 24 - 12 = 12 \text{ K}\cdot\text{ft}$$

FIND b OF STEEL PLATES: TWO PLATES

$$M_s = f_s S = f \left(\frac{b d^2}{6} \right) \times 2 = 22.5 \left(\frac{b(12)^2}{6} \right) \times 2 = 12 \times 12$$

$$\underline{\underline{b = .133''}}$$

FIND LENGTH OF PLATES (SEE MOMENT DIAGRAM)

WOOD WILL CARRY $12 \text{ K}\cdot\text{ft}$ ALONE, THEREFORE FIND PORTION OF MOMENT DIAGRAM $> 12 \text{ K}\cdot\text{ft}$

ON CANTILEVER:

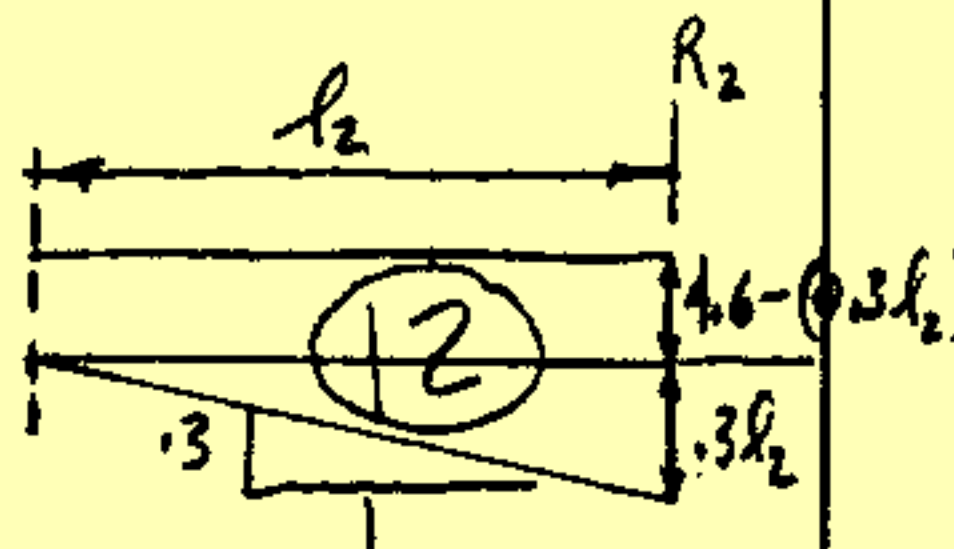
$$6 \times l_1 = 12 \quad l_1 = 2'$$

BETWEEN SUPPORTS:

$$12 = l_2(4.6 - .15l_2) + l_2(.15l_2)$$

$$0 = -0.15l_2^2 + 4.6l_2 - 12$$

$$l_2 = \frac{-4.6 \pm \sqrt{4.6^2 - 4(.15)12}}{-2(.15)} = 2.879'$$

FROM SHEAR
DIAGRAM →

$$L_{TOTAL} = l_1 + l_2$$

$$= 2 + 2.88$$

$$= \underline{\underline{4.88'}}$$