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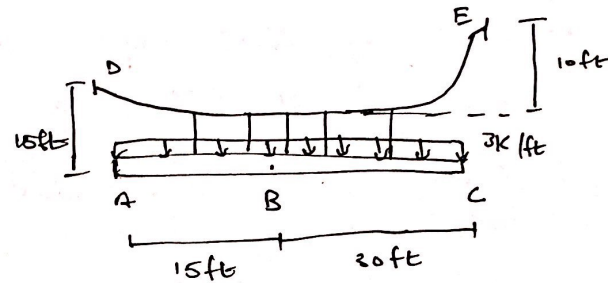
ID 7480

Subject Structural Analysis I

Teacher Engr Amjad Islam

Assignment Cables & Arches

Q1



Member BC :-

$$\rightarrow \sum F_x = 0 ; B_x = 0$$

Member AB :-

$$\rightarrow \sum F_x = 0 ; A_x = 0$$

→ FBD 1 :

$$\downarrow \sum M_A = 0$$

$$F_H (1) - B_y (15) - 45 (7.5) = 0$$

→ FBD 2 :

$$\downarrow \sum M_C = 0$$

$$-F_H (10) - B_y (30) + 45 (30) = 0$$

Now

$$B_y = 0 ; F_H = F_{min} = 135k$$

Now Max cable force occurs at E ;  
where slope is maximum

$$w_0 = 2F_H \frac{ch}{l^2} = \frac{2(135)(10)}{30^2} = \frac{2700}{900}$$

$$w_0 = 3k/ft$$

$$F_{max} = w_0 L \left( \sqrt{1 + \left( \frac{L}{2h} \right)^2} \right) = 3 \times 30 \left( \sqrt{1 + \left( \frac{30}{2(10)} \right)^2} \right)^2$$

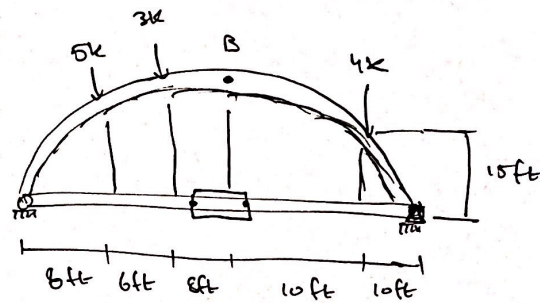
$$F_{max} = 162.24k$$

Each truss carries 7.5 ft of  $w_0$

$$T = (3k/ft)(7.5ft)$$

$$T = 22.5k$$

Q 2



$$\sum M_A = 0$$

$$-5(6) - 3(12) - 4(30) + C_y(40) = 0$$

$$C_y = 30 + 36 + \frac{120}{40}$$

$$= \frac{186}{40}$$

$$= 4.65 \text{ K}$$

$$\sum F_y = 0$$

$$D_y = 4.65 - 5 - 3 - 4 = 0$$

$$D_y = 12 - 4.65 = 7.35 \text{ K}$$

Section BC :-

$$\sum M_B = 0$$

$$-4(10) - T(15) + 4.65(20) = 0$$

$$T = \frac{53}{15} = 3.534 \text{ K}$$