

MUHAMMAD AZAN QAZI

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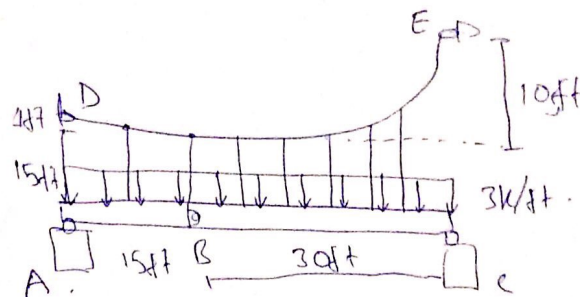
Sec A.

Civil Engineering Department.

Cable and Arches

Sir Amjad Islam

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Member BC \Rightarrow

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

Member AB \Rightarrow

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

FBD 1 \Rightarrow

$$\curvearrowright \sum M_A = 0;$$

$$F_H(15) - B_y(45) - \cancel{30}(7.5) = 0.$$

FBD 2 \Rightarrow

$$\curvearrowright \sum M_C = 0;$$

$$-F_H(40) - B_y(30) + \cancel{45}(30) = 0.$$

Now

$$B_y = 0; \quad F_H = F_{min} = \cancel{150} 135 \text{ K.}$$

Now Max Cable force occurs at E ; Where
Slope is maximum.

$$W_0 = \frac{2F_H h}{L^2} = \frac{2(135)(10)}{30^2} = \frac{3000}{900} = \frac{2700}{900}$$

$$W_0 = 3 \text{ K/ft.}$$

$$F_{\max} = W_0 L \sqrt{1 + \left(\frac{L}{2h}\right)^2} = 3 \times 30 \sqrt{1 + \left(\frac{30}{2(10)}\right)^2}$$

$$F_{\max} = 162.24 \text{ K.}$$

Each hanger carries 7.5 ft of W₀.

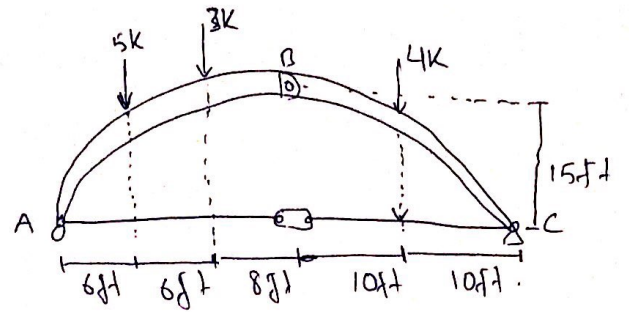
$$T_2 = (3 \text{ K/ft})(7.5 \text{ ft}).$$

$$T_2 = 22.5 \text{ K}$$



Q2) \Rightarrow

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For Entire Arch:

$$\sum M_A = 0$$

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

$$C_y = \frac{30 + 36 + 120}{40} = \frac{186}{40} = 4.65 \text{ k}$$

$$\sum F_y = 0$$

$$A_y + 4.65 - 5 - 3 - 4 = 0$$

$$A_y = 12 - 4.65 = 7.35 \text{ k}$$

Section BC \Rightarrow

$$\sum M_B = 0$$

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

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