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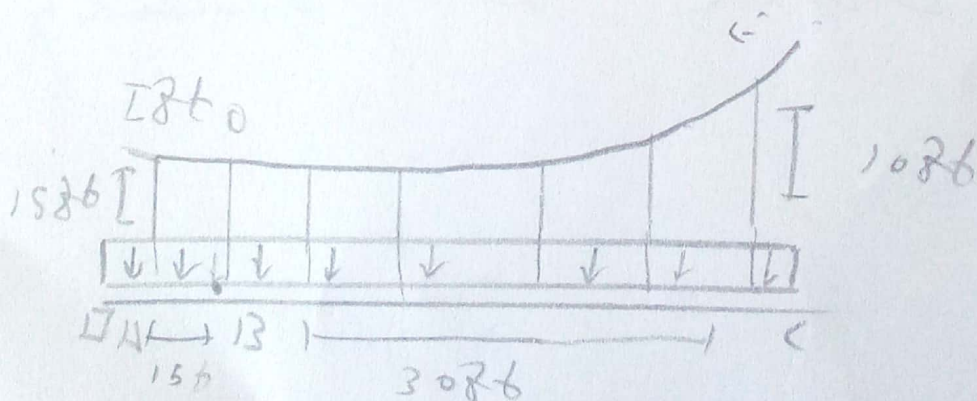
Date ~ 13 July 2020

# Assignment No. # 04

## Cables and Arches

### Question no 1

Determine the minimum and maximum tension in the parabolic cable and force in each of the strangles. The girder is subjected to the uniform and is pin connected at B.



Solution :

Member BC

$$\sum \overset{+}{\rightarrow} F_x = 0$$

$$B_x = 0$$

Member AB

$$\sum \overset{+}{\rightarrow} F_x = 0$$

$$A_x = 0$$

Moment At A

$$\sum EM_A^+ = 0 \quad F_x(1) - B_y(15) - 45(7.5) = 0 \rightarrow \textcircled{1}$$

FBD

$$\sum M_C^+ = 0 - F_H(10) - B_y(30) + 45(30) = 0$$

$$\boxed{F_H = 153.4}$$

$$B_y = 0$$

$$w_0 = \frac{2 F_H h}{l^2} = \frac{2 (153.4) (10)}{30^2}$$

$$= \frac{3068}{900} = 3.40$$

3

$$W_o = 3.40 \text{ k/ft}$$

$$F_{max} = W_o L \sqrt{1 + \left(\frac{L}{24}\right)^2}$$
$$= 3.4 (30) \sqrt{1 + \left(\frac{30}{24}\right)^2}$$

$$F_{max} = 183.6 \text{ k}$$

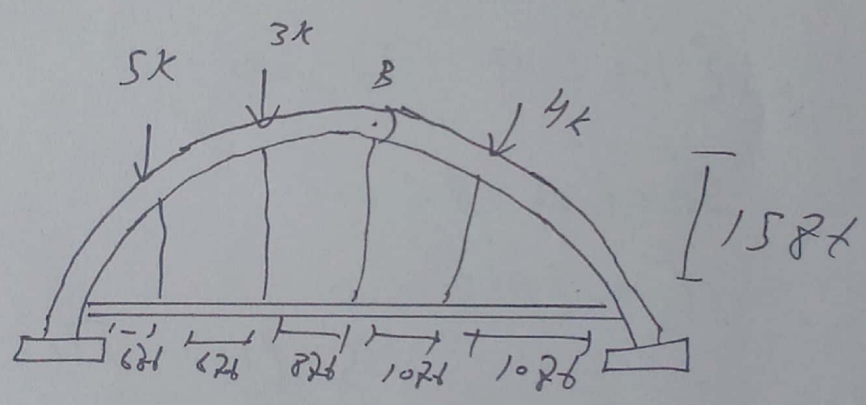
Each hanger carries 586 lb  $\approx$   $W_o$

$$T = (586) (3.4 \text{ k/ft})$$

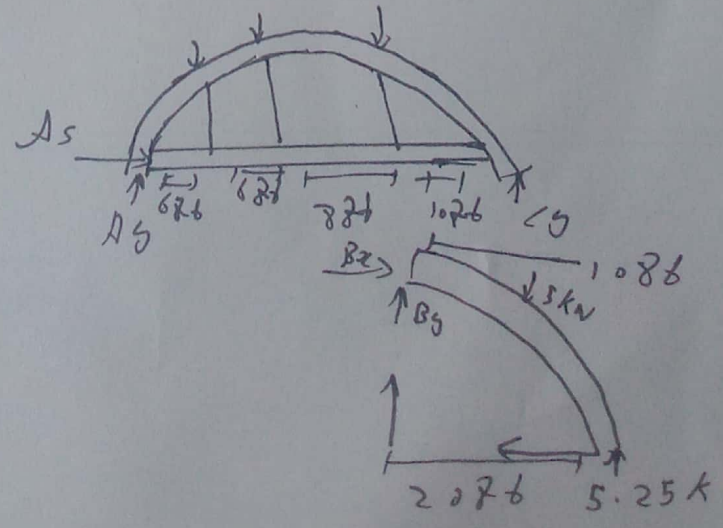
$$T = 17 \text{ k}$$

# Question No #2

The tied three hinged arch is subjected to the loading shown. Determine the components of reaction at A and C and the tension in the rod.



## Solution



(5)

Entire asp h<sub>2</sub>

$$\downarrow + \sum M_A = 0; -4(6) - 3(2) - 5(30) + C(40) = 0$$

$$C = 5.25k$$

$$+\uparrow \sum F_y = 0$$

$$A_y + 5.25 - 4 - 3 - 5 = 0$$

$$A_y = 6.75k$$

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

Section BC = ~

$$\downarrow + \sum M_B = 0$$

$$-5(10) - T(15) + 5.25(20) = 0$$

$$T = 3.67L$$