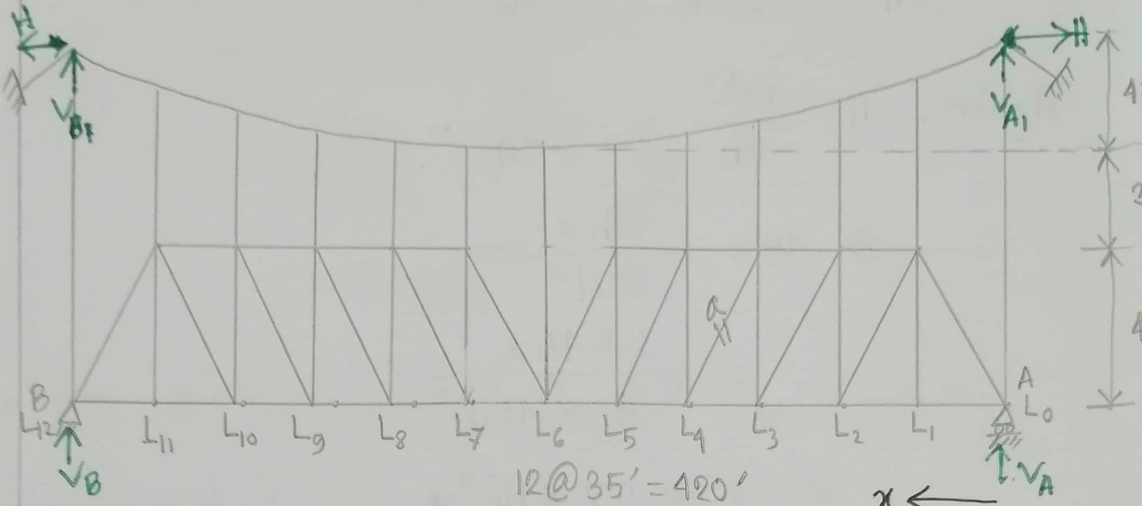
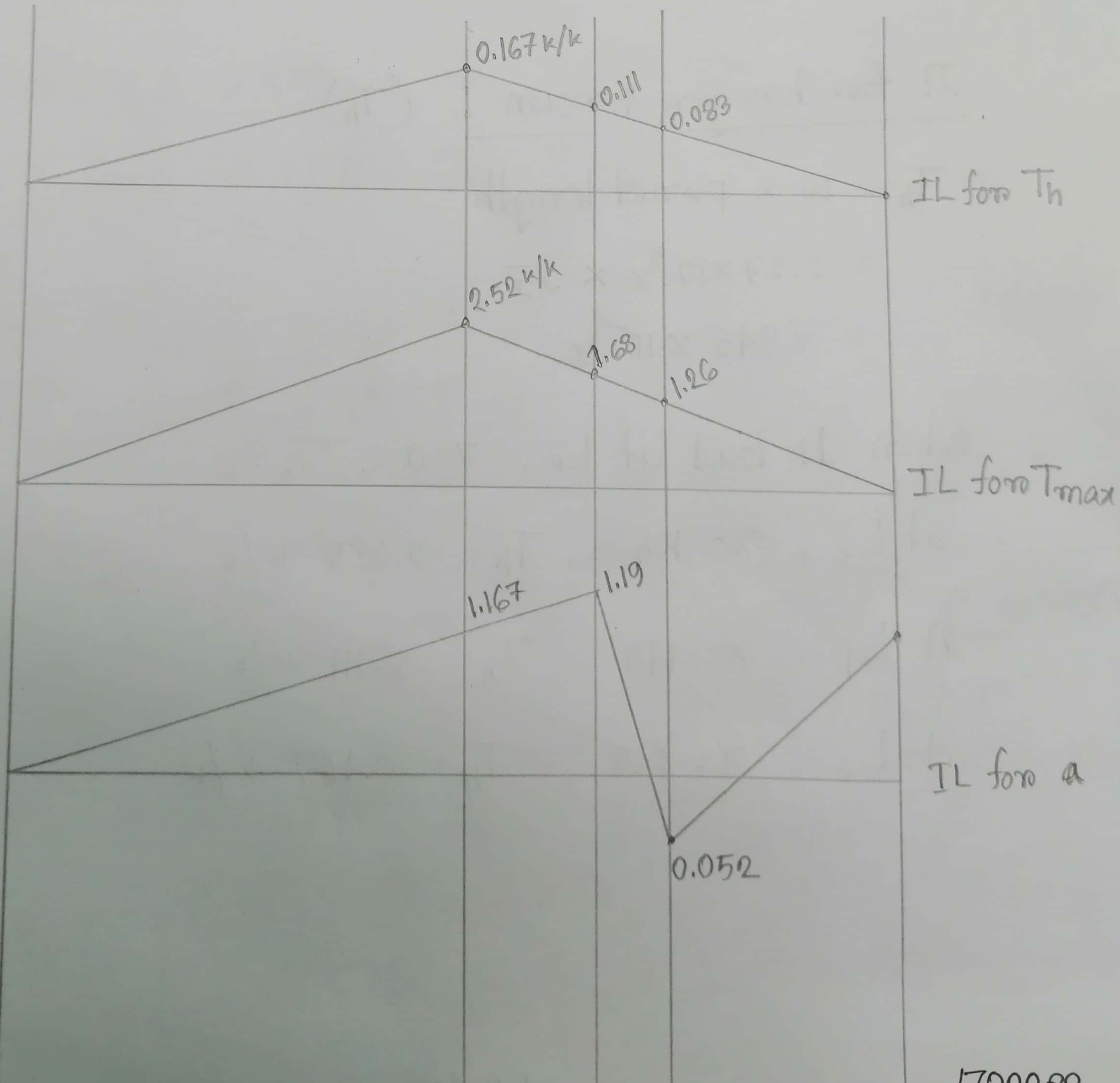
CT-02| Name : Most. Afroin Sultana CE 3111

Date: 24-8-21 1/5 Roll : 1700082

Answer No : 1





 1700082

$$H = \frac{x}{2h} = \frac{x}{2 \times 45} = \frac{x}{90}$$

Again, $H = \frac{wL^2}{8h} = \frac{x}{90}$

$$\Rightarrow w = \frac{8hx}{90L^2}$$

$$= \frac{8 \times 45x}{90 \times (420)^2}$$

$$= 2.27 \times 10^{-5} x$$

IL for hanger tension : (T_h)

$T_h = w \times$ panel length

$= 2.27 \times 10^{-5} x \times 35$

$= 7.945 \times 10^{-4} x$

When 1k load at L_0, $x = 0$, $T_h = 0$

at L_3, $x = 105$, $T_h = 0.083$ k/k

at L_4, $x = 140$, $T_h = 0.111$ k/k

at L_6, $x = 210$, $T_h = 0.167$ k/k

IL for maximum cable tension : (T_{max})

We know,

$$T_{max} = H\sqrt{1+16\theta^2}$$

$$= \frac{x}{890}\sqrt{1+16\left(\frac{45}{420}\right)^2}$$

$$= 0.012x$$

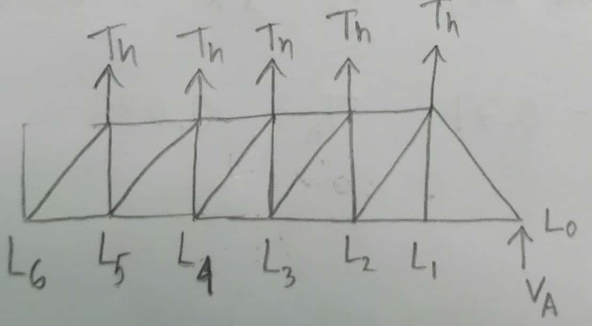
When 1k load at L_o, $x=0$, $T_{max} = 0$ k/k

at L_3, $x = 105$, $T_{max} = 1.26$ k/k

at L_4, $x = 140$, $T_{max} = 1.68$ k/k

at L_6, $x = 210$, $T_{max} = 2.52$ k/k

Now,



$\Sigma M_{L_6} = 0$

$V_A \times 210 + T_h(5+4+3+2+1)35 - 1(210-x) = 0$

$\Rightarrow V_A \times 210 + 7.945\times10^{-4}x \times 525 - 210 + x = 0$

$\Rightarrow V_A = \frac{210 ~~+1.39x~~ - 0.58x}{210}$

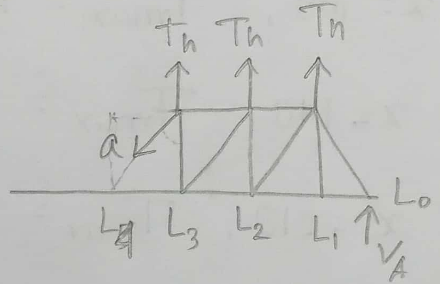
When 1k at L_0, $x = 0$, $V_A = 1$ k/k

at L_3, $x = 105$, $V_A =$ ~~1.695 k/k~~ 0.71 k/k

at L_4, $x = 140$, $V_A =$ ~~1.93 k/k~~ 0.61 k/k

at L_6, $x = 210$, $V_A =$ ~~2.39 k/k~~ 0.42 k/k

<u>IL for member 'a':</u>



When 1k load at L_0, $V_A = 1$k, $a = 0$

at L_3, $V_A = 0.71$, $T_h = 0.083$

$\tan\theta = \frac{35}{45}$

$\theta = 37.87°$

$\Sigma F_y = 0$

$0.71 - 1 + 3T_h - a_v = 0$

$\Rightarrow a_v = -0.041$ k/k

$$a = \frac{a_v}{\cos 37.87} = -0.052 \text{ k/k}$$

at L_{4}, $V_A = 0.61$ $T_h = 0.111$

$\Sigma F_y = 0$

$0.61 + 3T_h - a_v = 0$

$\Rightarrow a_v = 0.943$

$a = 1.19$ k/k

at L_6, $V_A = 0.42$, $T_h = 0.167$

$\Sigma F_y = 0$

$0.42 + 3T_h - a_v = 0$

$\Rightarrow a_v = 0.921$

$a = 1.167$ k/k

$\text{Max } T_h (+) = \left(\frac{1}{2} \times 420 \times 0.167\right) \times (5 + 0.25 \times 082) + 0.167 \times (15 + 0.50 \times 082)$

$= 910.57$ kips

$\text{Max } T_{max} (+) = \left(\frac{1}{2} \times 420 \times 2.52\right) \times (5 + 0.25 \times 082) + 2.52 \times (15 + 0.50 \times 082)$