

$\epsilon_g \alpha = 1/2; \sum H_B = 0 \rightarrow N_{Acy} \cdot 2L - 4L \cdot q \cdot 2L - 2L \cdot qL = 0$

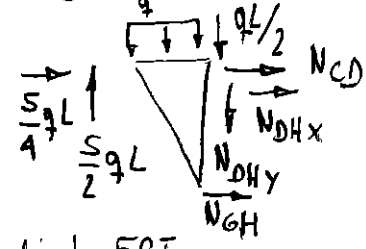
$N_{Acy} = \frac{5}{2} qL \quad \left(\epsilon_g \alpha \right) \quad N_{Acx} = \frac{5}{4} qL$

$\sum \text{vert} = 0 \rightarrow 4L \cdot q - \frac{5}{2} qL = V_B \rightarrow V_B = \frac{3}{2} qL$

$N_{Ac} = \frac{5\sqrt{5}}{4} qL$

$\sum \text{hor} = 0 \rightarrow \frac{5}{4} qL + qL = H_B \rightarrow H_B = \frac{9}{4} qL$

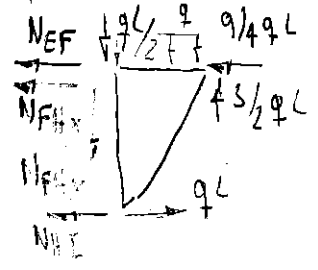
Aislo CDG:



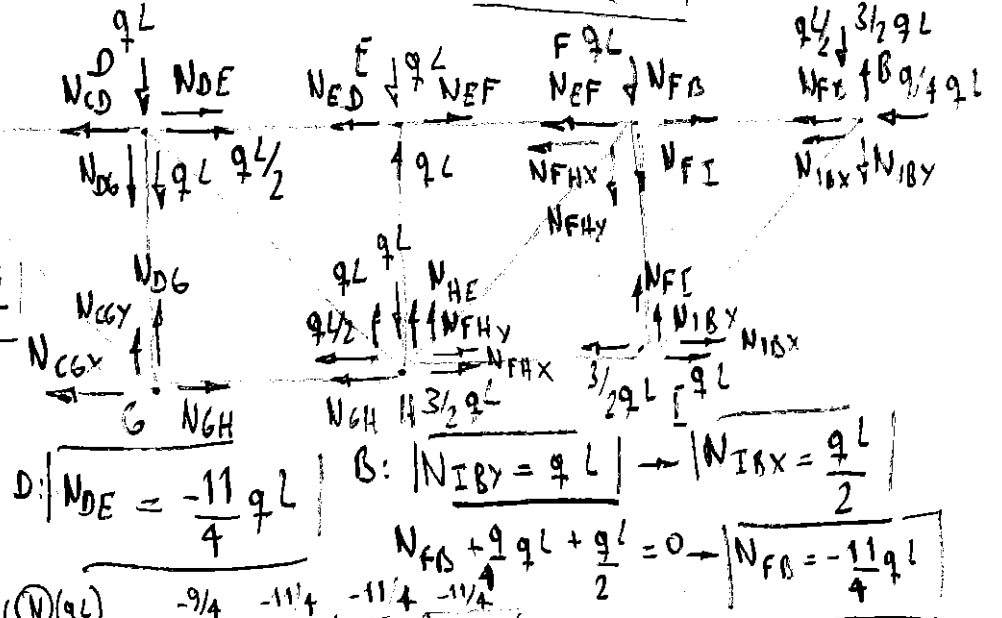
$\sum \text{vert} = 0 \rightarrow \frac{5}{2} qL - \frac{5}{2} qL + N_{DHY} = 0 \rightarrow N_{DHY} = qL \rightarrow N_{DHX} = \frac{qL}{2}$

$N_{DH} = \frac{\sqrt{5}}{2} qL$

Aislo FBI:



$\sum H_F = 0 \rightarrow N_{HE} \cdot 2L - qL \cdot 2L + qL \cdot \frac{1}{2} - 3/2 qL \cdot L = 0 \rightarrow N_{HE} = 3/2 qL$



NVL C: $N_{CGy} = 2qL \rightarrow N_{CGx} = qL$

$N_{CD} = -\frac{9}{4} qL$

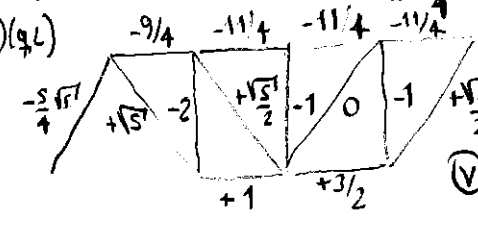
G: $N_{GH} = qL \quad N_{GB} = -2qL$

D: $N_{DE} = -\frac{11}{4} qL$

B: $N_{IBY} = qL \rightarrow N_{IBX} = \frac{qL}{2}$

$N_{FB} + \frac{9}{4} qL + \frac{qL}{2} = 0 \rightarrow N_{FB} = -\frac{11}{4} qL$

I: $N_{FI} = -qL \quad F: N_{FH} = 0$



⊙ y ⊕ nulos en todas las barras, menos en el cordón superior Jón's.

c) Cordón sup. $\sigma_{adm} \geq \frac{M}{I} + \frac{N}{A} \Rightarrow \text{PNI 12}$

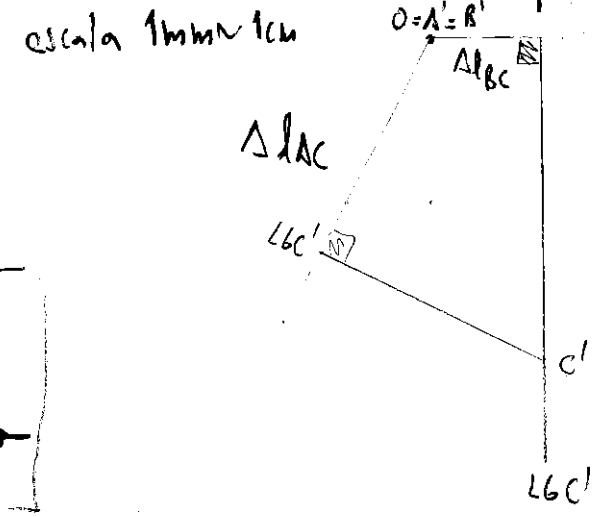
$M = qL^2/8; N = -11/4 qL$

barras restantes dimensiones AC; $\sigma_{adm} \geq \frac{N}{A} \Rightarrow I = 8,9 \text{ cm}^4$

d) $\Delta_{BC} = \sum \Delta_{\text{cord sup}} = \frac{L}{(EA)_{\text{cord sup}}} (3N_{FB} + N_{CD}) = -1,41 \text{ mm}$

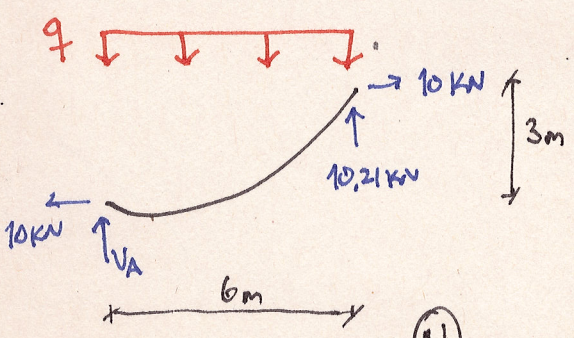
$\Delta_{AC} = \left(\frac{NL}{A} \right)_{AC} \frac{1}{E_{\text{horm}}} = 3,13 \text{ mm}$

$\Delta_{\text{vert c}} = 4,3 \text{ mm} \uparrow$
 $\Delta_{\text{hor c}} = 1,41 \text{ mm} \rightarrow$



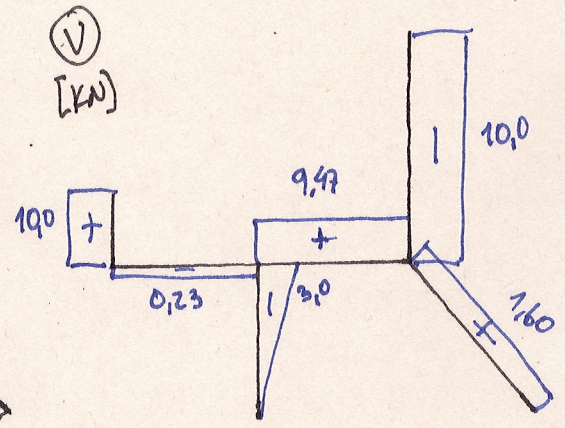
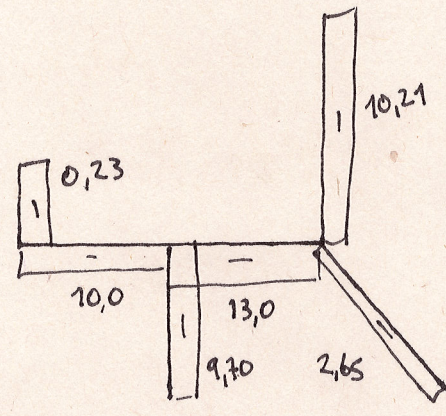
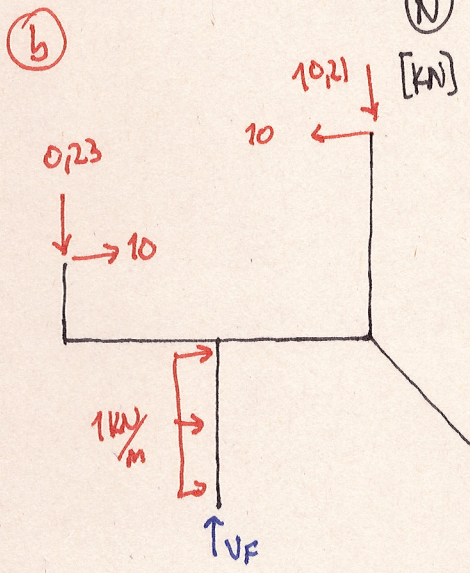
(a) $H = 10 \text{ kN} = 0,7 \cdot T \Rightarrow T = 14,29 \text{ kN}$

T_{max} se da en el punto B $\Rightarrow T^2 = H^2 + V_B^2 \Rightarrow V_B = \sqrt{T^2 - H^2} = 10,21 \text{ kN}$

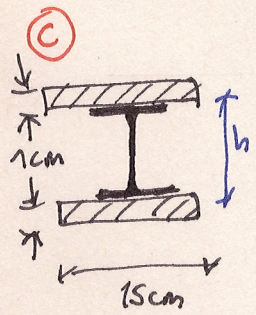
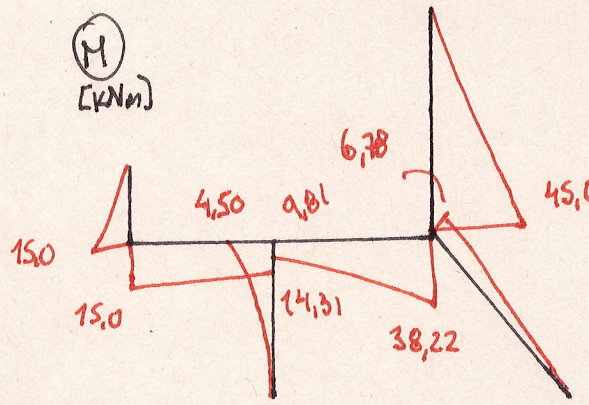
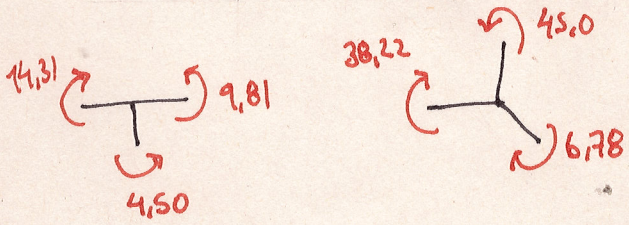


$\sum M_A = 0 \Rightarrow q \times 6 \times 3 \text{ m}^2 + 10 \times 3 \text{ kNm} = 10,21 \times 6 \text{ kNm} \Rightarrow q = 1,74 \frac{\text{kN}}{\text{m}}$

$\sum F_v = 0 \Rightarrow 1,74 \times 6 \text{ kN} = 10,21 \text{ kN} + V_A \Rightarrow V_A = 0,23 \text{ kN}$



$10,21 \times 3 + 10 \times 7,5 + 0,23 \times 9 - 10 \times 4,5 - 1,74 \times 1,5 - V_F \times 6 = 0$
 $\Rightarrow V_F = 9,70 \text{ kN} \Rightarrow V_G = 0,74 \text{ kN}$



$\sigma_{\text{adm}} = 140 \text{ MPa}$
 $I_x = 2 \times \left(\frac{15 \times 1^3}{12} + 15 \times 1 \times \left(\frac{h}{2} + 0,5 \right)^2 \right) + I_x$
 $W_x = \frac{I_x}{\frac{h}{2} + 1}$ $A = 2 \times 15 \times 1 + A_x$

$M_{\text{max}} = 45 \text{ kNm}$ $N_{\text{max}} = 10,21 \text{ kN}$ $\sigma = \frac{45 \text{ kNm}}{W_x} + \frac{10,21 \text{ kN}}{A} \leq \sigma_{\text{adm}}$

	A (cm ²)	I _x (cm ⁴)	W _x (cm ³)	σ (MPa)
PN1 12	44,20	1598,00	228,29	199,43 X
PN1 14	48,30	2263,00	282,88	161,19 X
PN1 16	52,80	3105,00	345,00	132,37 ✓

Se utiliza PN1 16.

(d) $V_{\text{max}} = 10,0 \text{ kN}$

$A = 1 \times 15 \times (8 + 0,5) \text{ cm}^2 = 127,5 \text{ cm}^2$

$\tau_{\text{max}} = \frac{V_{\text{max}} \cdot A}{I \cdot b}$
 $= \frac{10 \times 127,5 \text{ kN}}{3105 \times 7,4 \text{ cm}^2} = 0,55 \frac{\text{kN}}{\text{m}^2}$

$\Rightarrow \tau_{\text{max}} = 0,55 \text{ MPa}$