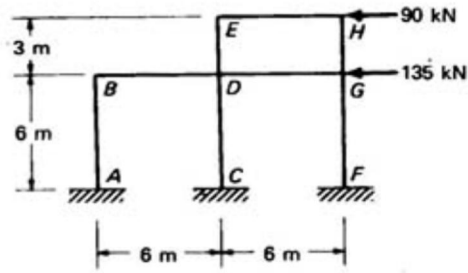
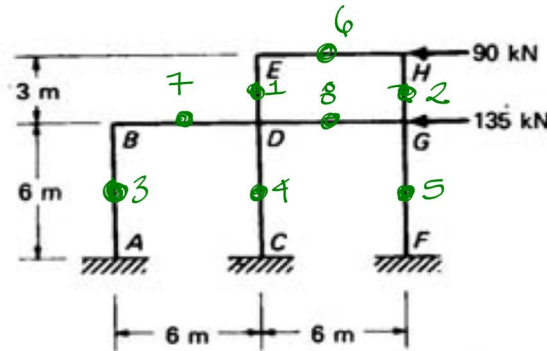


10.8 (Resp.: con el método del portal para FG: $V = 56.25 \text{ kN}$, $M = 168.75 \text{ kN}\cdot\text{m}$, $S = +101.25 \text{ kN}$; con el método del voladizo para FG: $V = 33.75 \text{ kN}$, $M = 101.25 \text{ kN}\cdot\text{m}$, $S = +78.75 \text{ kN}$)

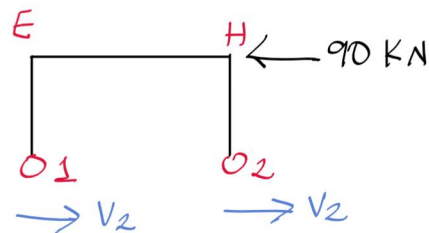


Método del portal

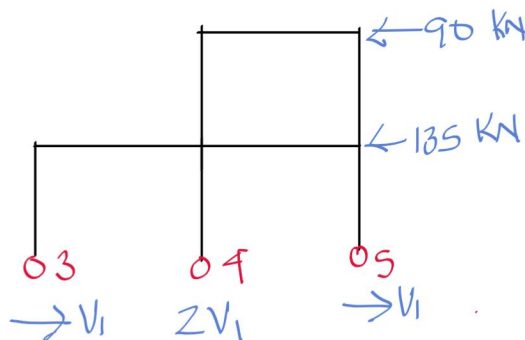
1) Ubicación de los P.I.



2) Cortantes en columnas

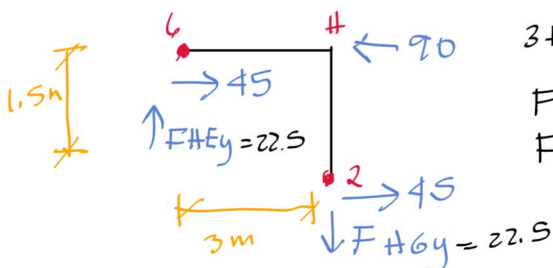


$$\begin{aligned}\sum F_x &= 0 \rightarrow + \\ 2V_2 &= 90 \\ V_2 &= 45 \text{ kN}\end{aligned}$$

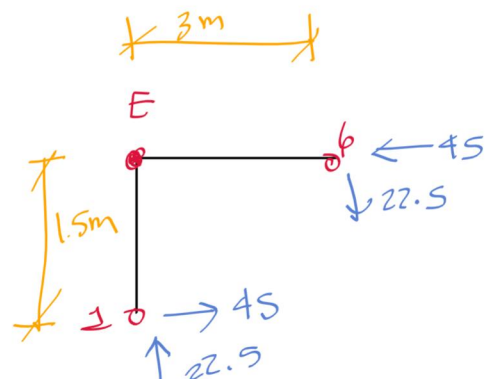


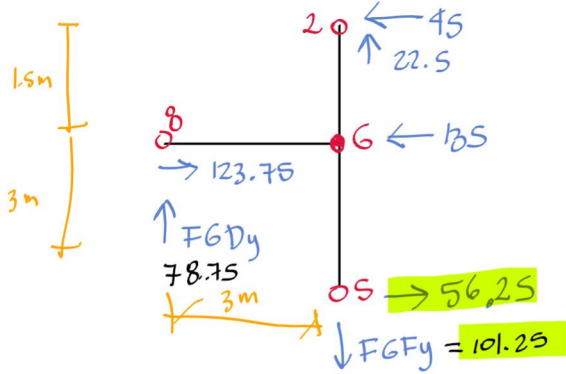
$$\begin{aligned}\sum F_x &= 0 \rightarrow + \\ 4V_1 &= 90 + 135 \\ V_1 &= 56.25 \text{ kN}\end{aligned}$$

3) Analisis Por Nudo



$$\begin{aligned}\sum M_4 &= 0 \uparrow + \\ 3F_{H6y} - 45(1.5) &= 0 \\ F_{H6y} &= 22.5 \text{ kN} \uparrow \\ F_{H6y} &= 22.5 \text{ kN} \downarrow\end{aligned}$$



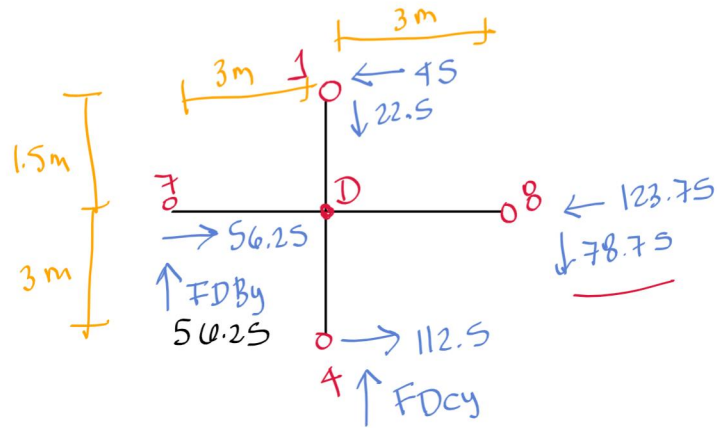


$$\sum M_6 = 0 \curvearrowright +$$

$$3F_{GDy} - 45 \cdot 1.5 - 56.25 \cdot 3 = 0$$

$$F_{GDy} = 78.75 \text{ kN} \uparrow$$

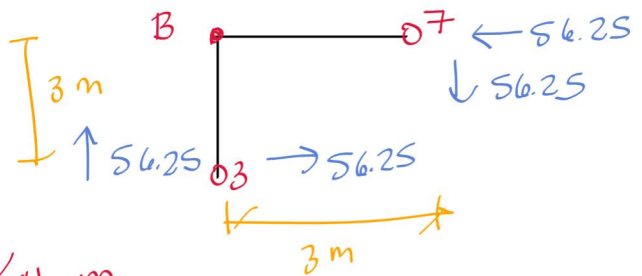
$$F_{GFy} = 101.25 \text{ kN} \downarrow$$



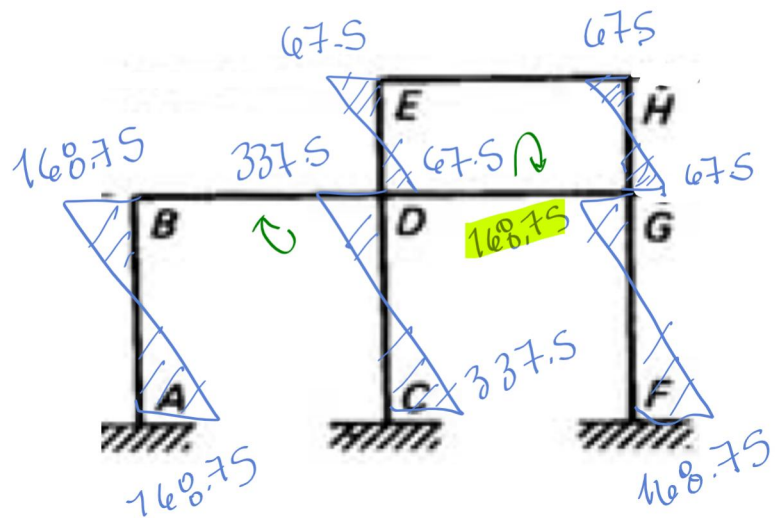
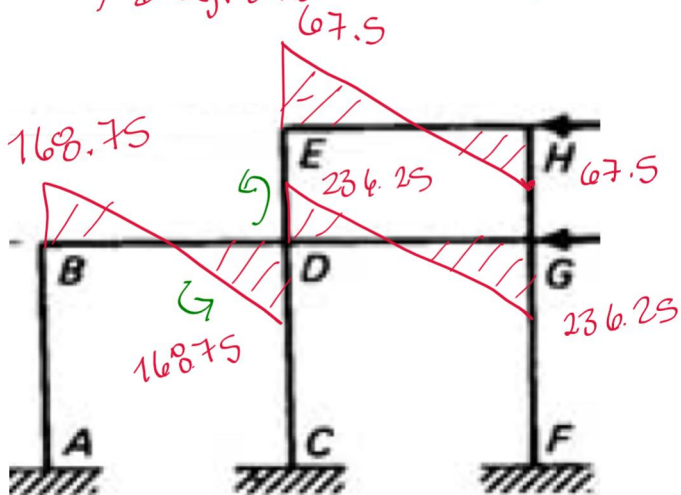
$$\sum M_D = 0 \curvearrowright +$$

$$3F_{DBy} - 45 \cdot 1.5 + 78.75 \cdot 3 - 3 \cdot 112.5 = 0$$

$$F_{DBy} = 56.25 \text{ kN} \uparrow \quad F_{Dcy} = 45 \text{ kN} \uparrow$$

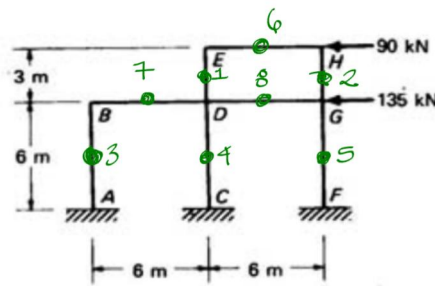


4) Diagrama de momentos KN-m



Método del voladizo

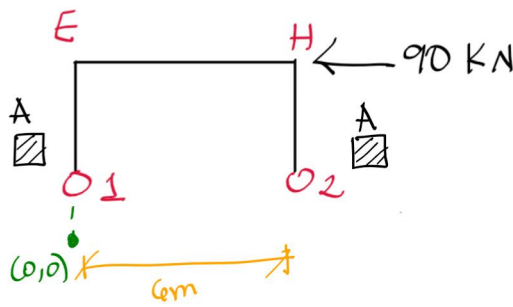
1) P.I



2) Fuerzas axiales en columnas

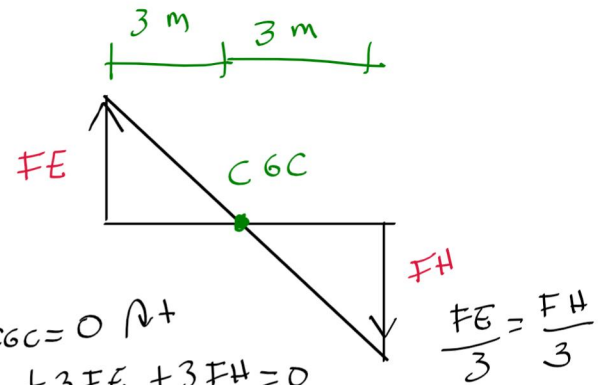
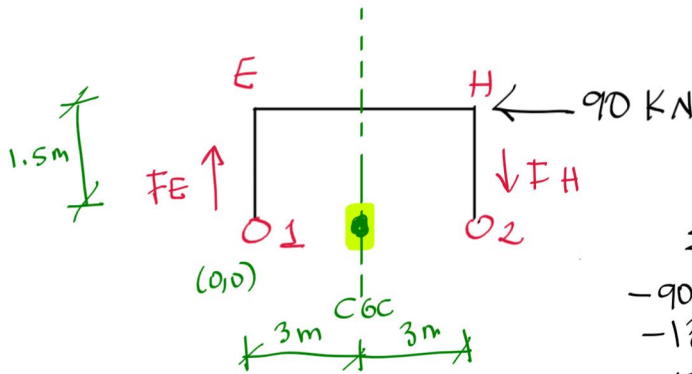
C.G.C

$$C.G.C. = \frac{\sum A_i \cdot X_i}{\sum A}$$

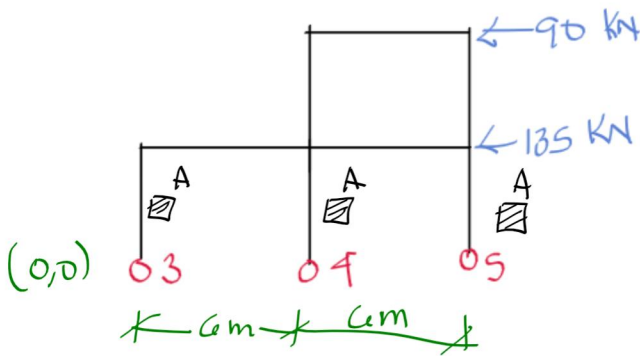


$$C.G.C. = \frac{A \cdot 0 + A \cdot 6}{2A} = \frac{6A}{2A}$$

$$C.G.C. = 3m$$

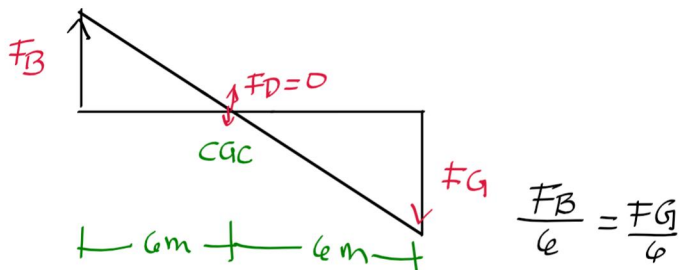


$$\begin{aligned} \sum M_{C.G.C} &= 0 \curvearrowright + \\ -90 \cdot 1.5 + 3F_E + 3F_H &= 0 \\ -135 + 6F_E &= 0 \\ F_E = F_H &= 22.50 \text{ kN} \end{aligned}$$



$$C.G.C. = \frac{A \cdot 0 + A \cdot 6 + A \cdot 12}{3A} = \frac{18A}{3A}$$

$$C.G.C. = 6m$$

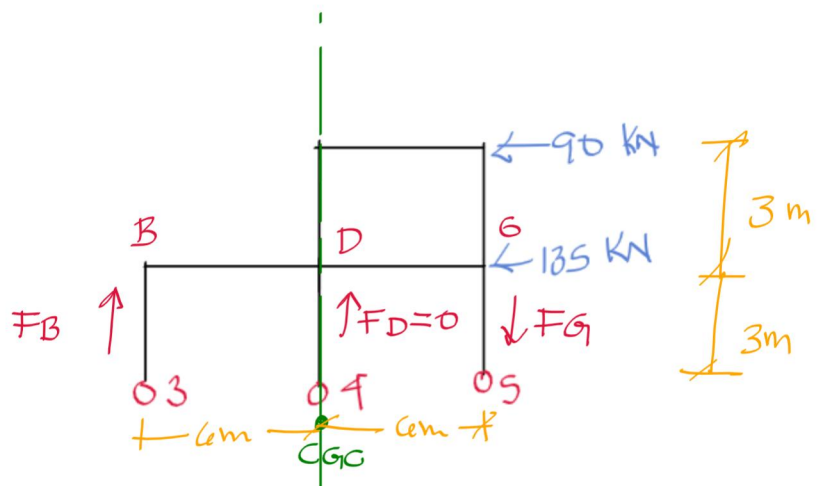


$$\frac{F_B}{6} = \frac{F_G}{6}$$

$$F_B = F_G$$

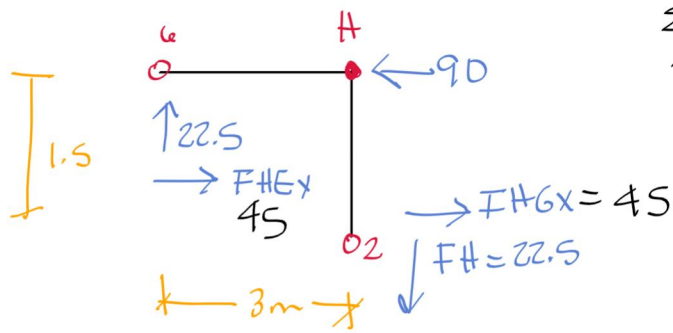
$$\sum M_{C.G.C} = 0 \curvearrowright +$$

$$-90 \cdot 6 - 135 \cdot 3 + 6F_B + 6F_G = 0$$



$$F_B = F_G = 78.75 \text{ kN}$$

3) Analisis de Nodos

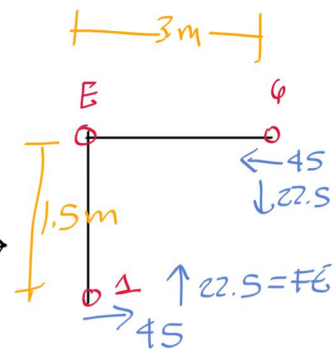


$$\sum M_H = 0 \quad (\curvearrowright +)$$

$$3 \times 22.5 - 1.5 F_{H6x} = 0$$

$$F_{H6x} = 45 \text{ kN} \rightarrow$$

$$F_{HEx} = 45 \text{ kN} \rightarrow$$

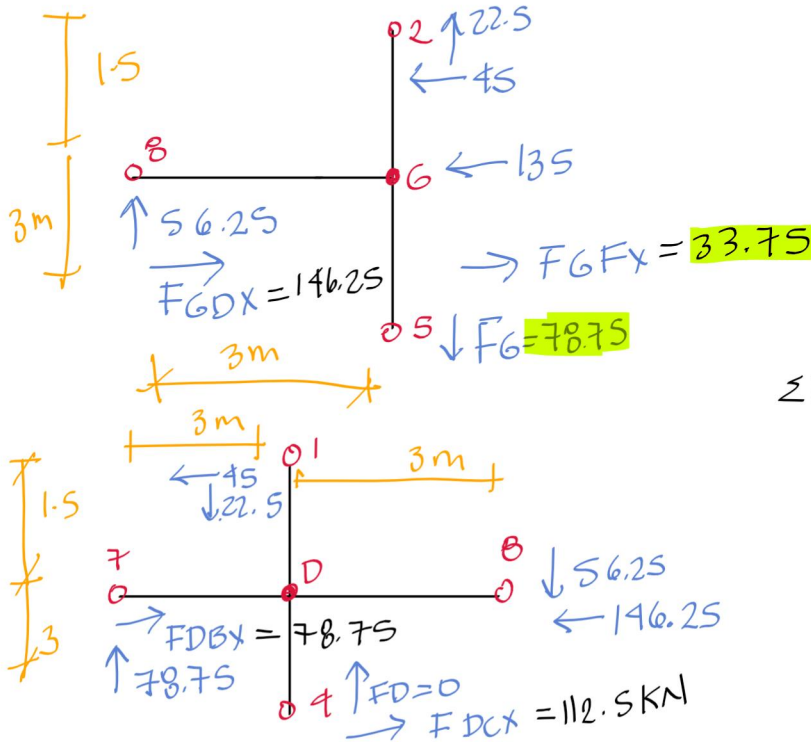


$$\sum M_E = 0 \quad (\curvearrowright +)$$

$$3 \times 56.25 - 45 \times 1.5 - 3 F_{6Fx} = 0$$

$$F_{6Fx} = 33.75$$

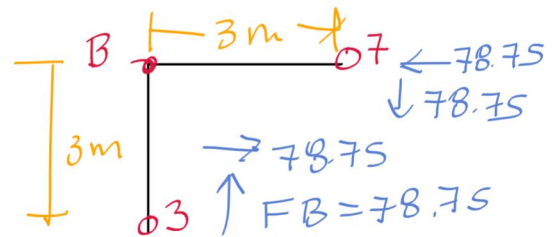
$$F_{6Dx} = 146.25$$



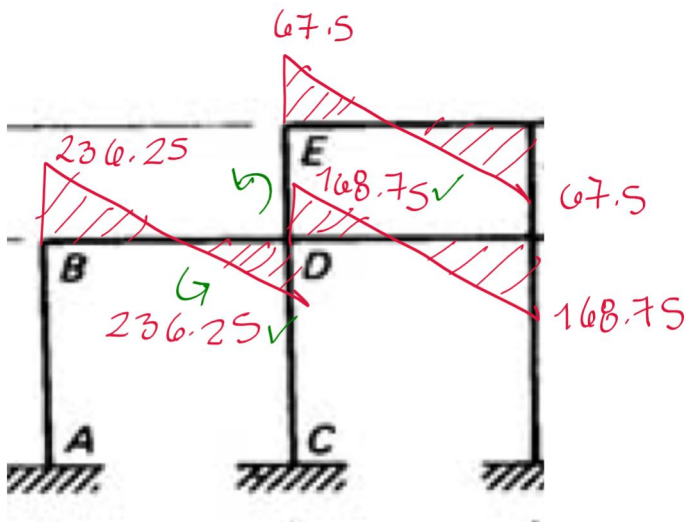
$$\sum M_D = 0 \quad (\curvearrowright +)$$

$$F_{DCx} = 112.5 \text{ kN}$$

$$F_{DBx} = 78.75 \text{ kN}$$

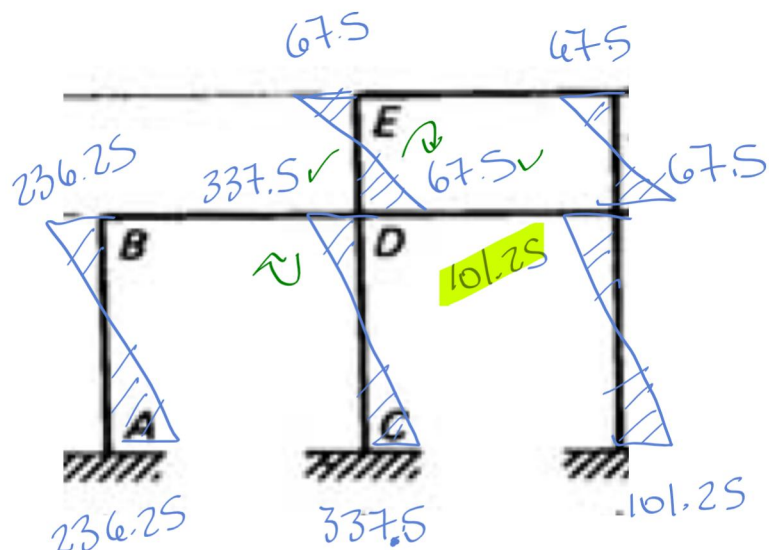


4) Diagrama de momentos KN-m

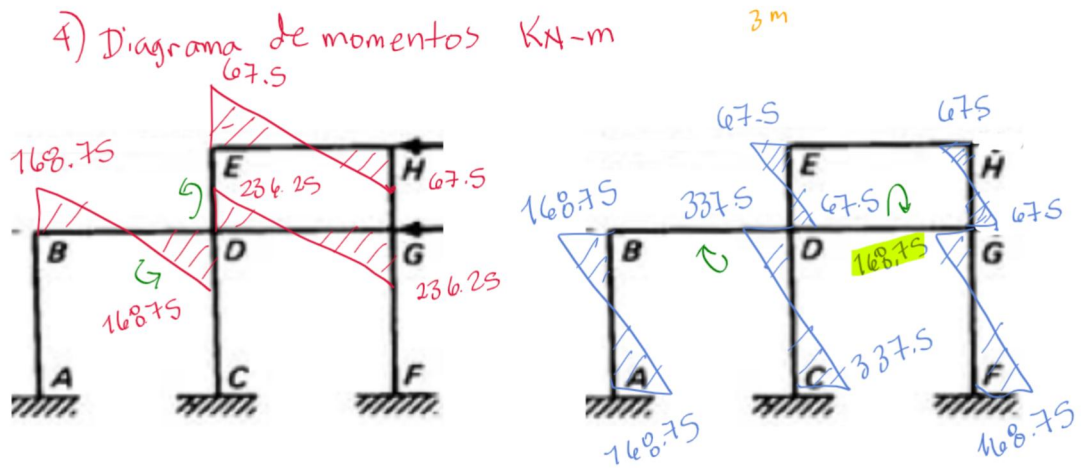


$$\sum M_D = 0 \quad (\curvearrowright +)$$

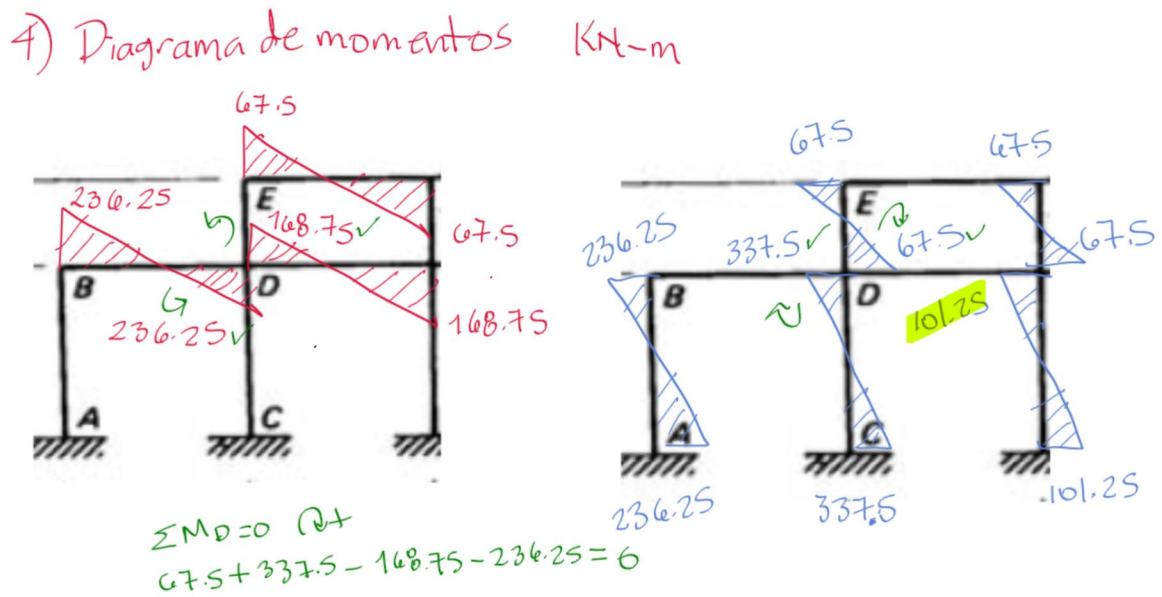
$$67.5 + 337.5 - 168.75 - 236.25 = 0$$



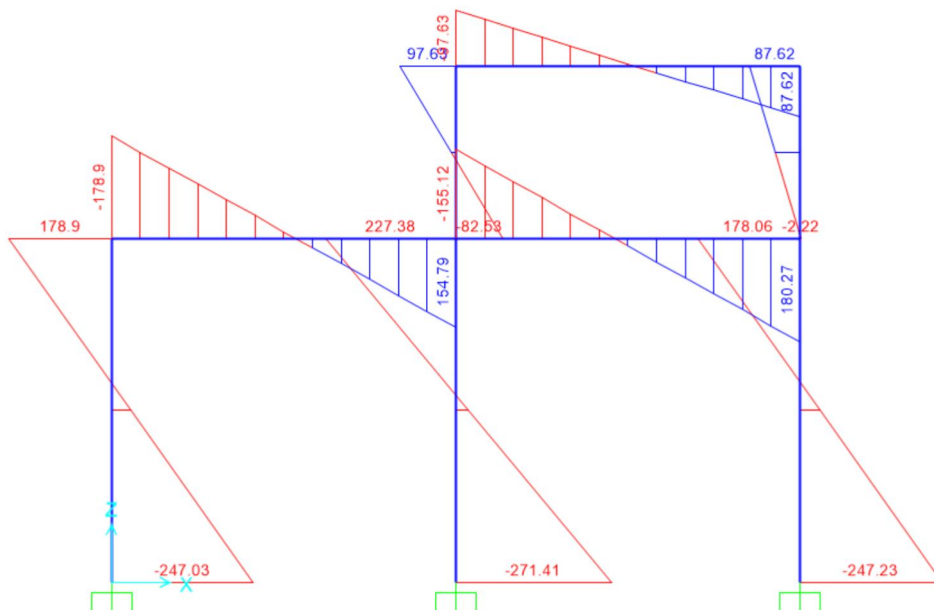
Método del portal



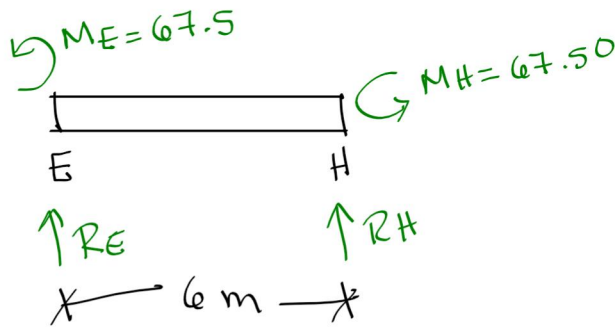
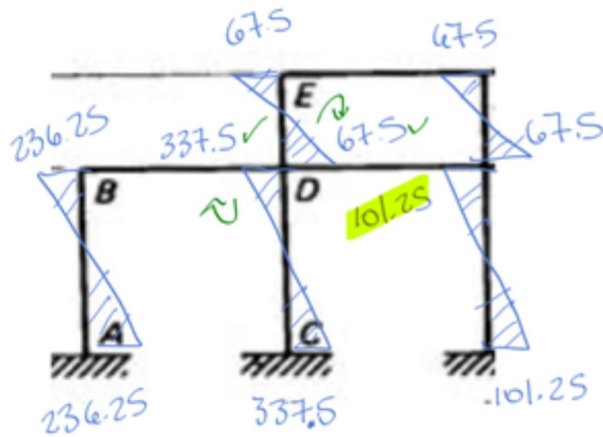
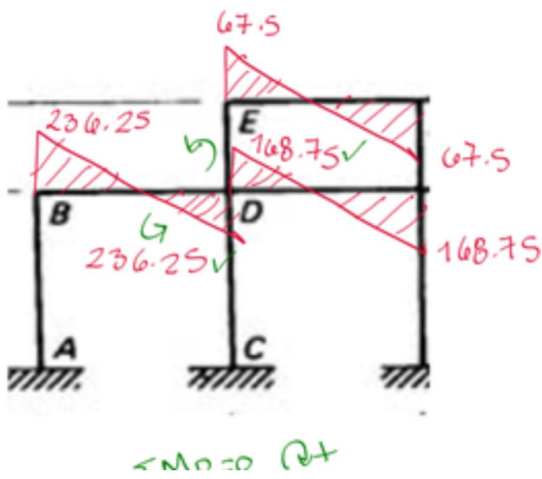
Método del voladizo



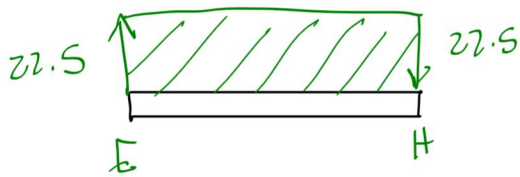
SAP 2000



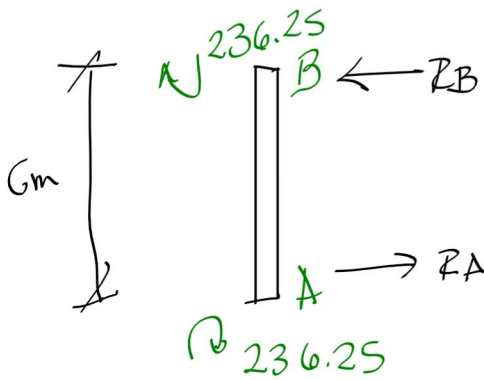
4) Diagrama de momentos KN-m



$$\begin{aligned}\sum M_H &= 0 \quad Q+ \\ 6R_E - 67.5 - 67.5 &= 0 \\ R_E &= 22.50 \text{ KN} \uparrow \\ \sum F_y &= 0 \quad \uparrow + \\ R_E + R_H &= 0 \\ 22.5 + R_H &= 0 \quad R_H = 22.5 \text{ KN} \downarrow\end{aligned}$$

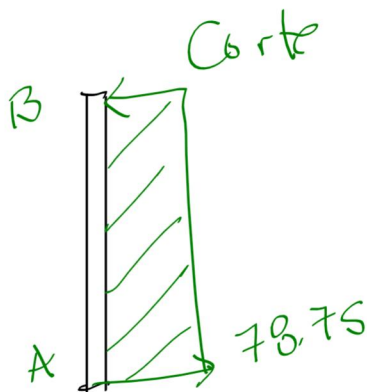


Corte

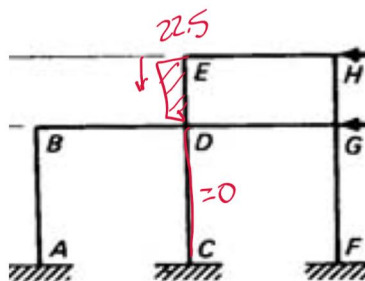
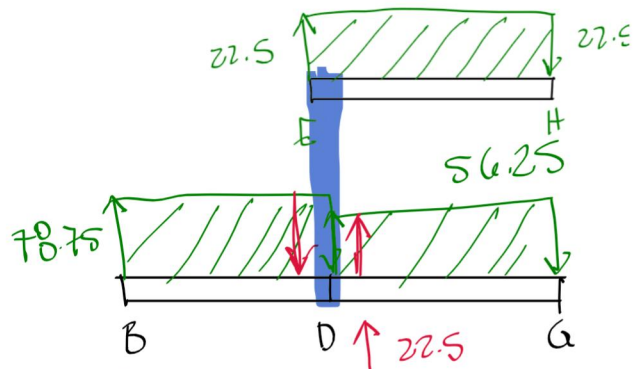


$$\begin{aligned}\sum M_B &= 0 \quad Q+ \\ 236.25 + 236.25 - 6R_A &= 0\end{aligned}$$

$$R_A = 78.75$$



Corte



$$\begin{aligned}78.75 - 56.25 &= 22.5 \text{ KN} \\ \Sigma &= 0\end{aligned}$$