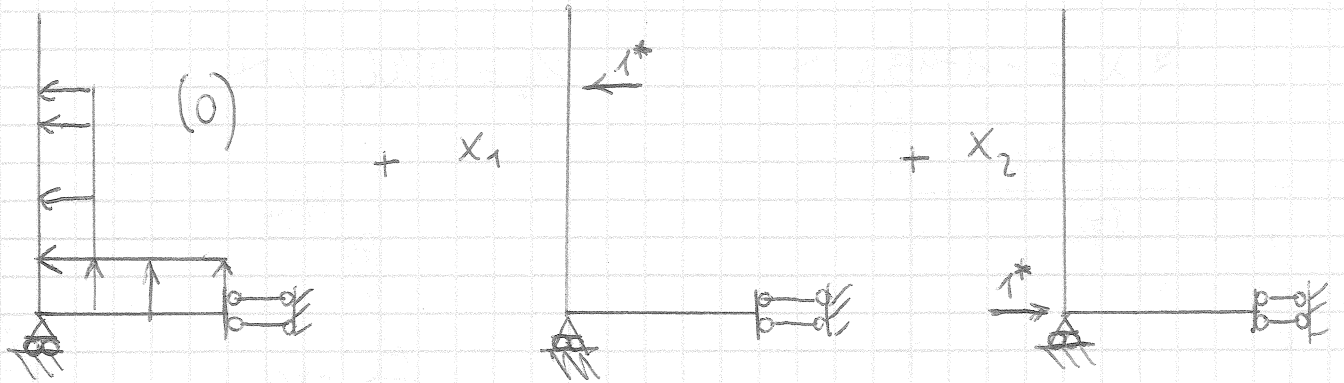
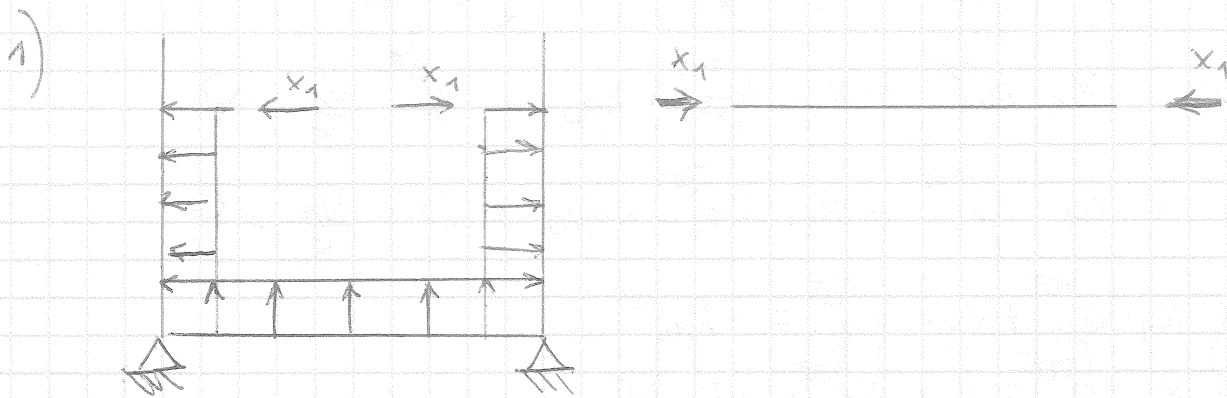


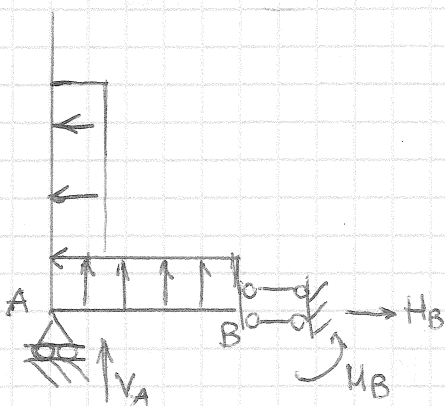
$L = 6m$

$H = 4m = \frac{2}{3}L$

$q = 2000 N/m$



SISTEMA (0)

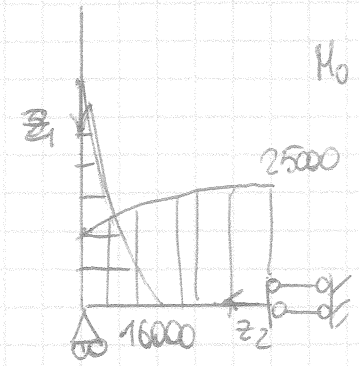
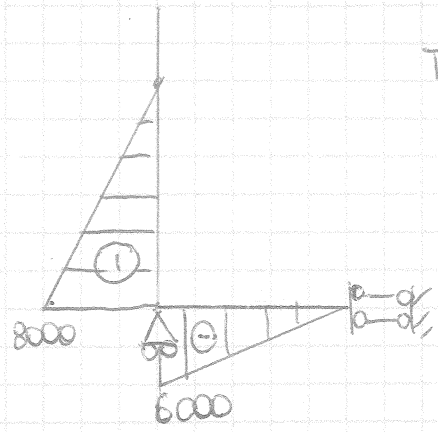
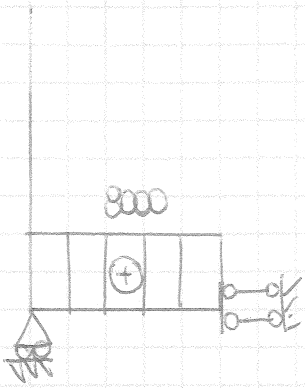


$\rightarrow) H_B = \frac{2}{3}ql$

$\uparrow) V_A = -\frac{ql}{2}$

$A) M_B + \frac{q}{2} \cdot \frac{4}{9}ql^2 + \frac{ql^2}{8} = 0$

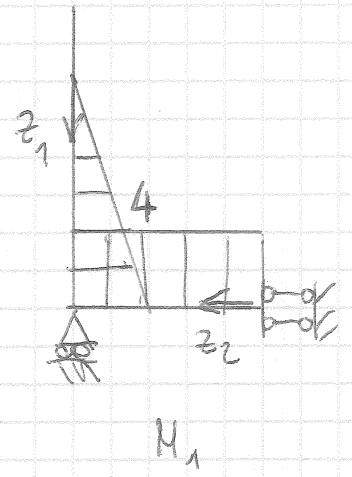
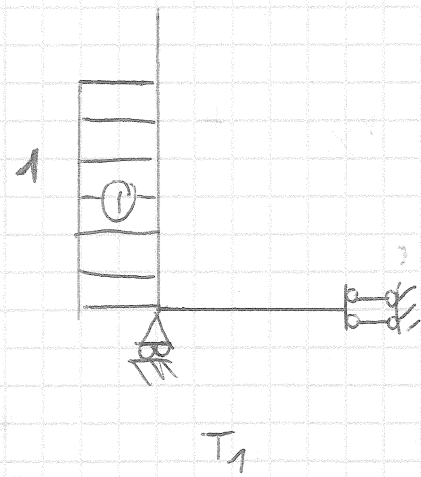
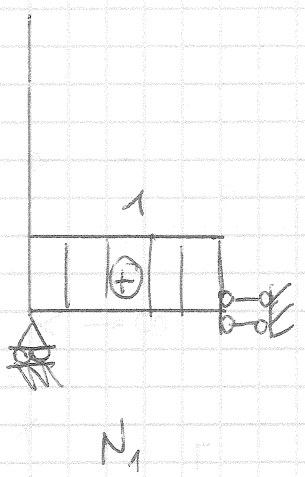
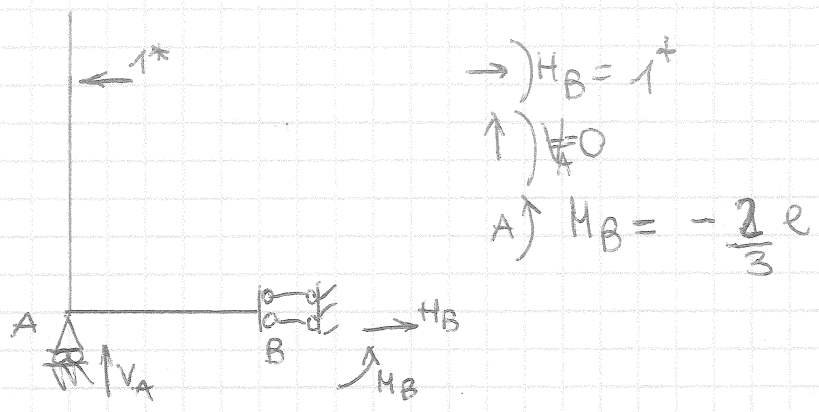
$M_B = -\frac{25}{72}ql^2$



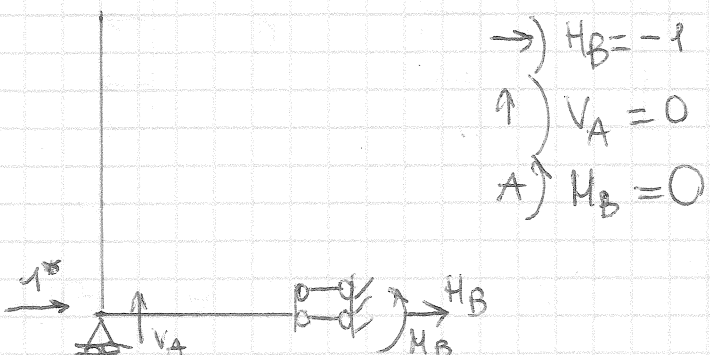
$$M(z_1) = -\frac{qz^2}{2}$$

$$M(z_2) = -\frac{25}{72}ql^2 + \frac{qz^2}{2}$$

SISTEMA (1)

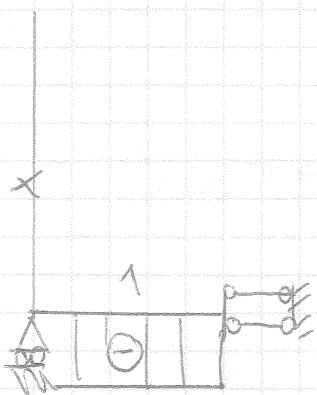


SISTEMA (2)

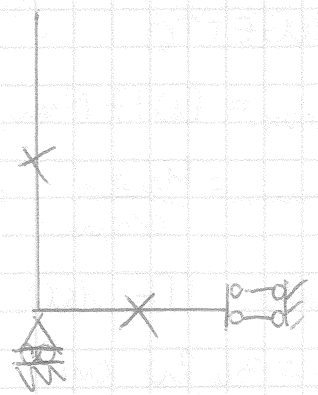
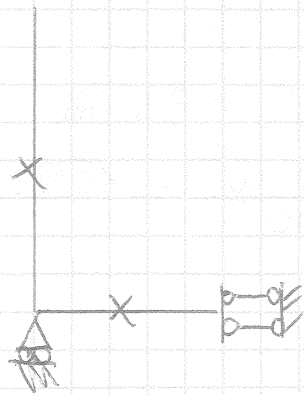


$$M(z_1) = -z$$

$$M(z_2) = -\frac{2}{3}e$$



N_2



$$M_{10} = \frac{1}{EJ} \left[\int_0^{\frac{2}{3}l} (-z) \left(-\frac{qz^2}{2} \right) dz + \int_0^{\frac{l}{2}} \left(-\frac{27}{72} ql^2 + \frac{qz^2}{2} \right) \cdot \left(-\frac{2}{3}l \right) dz \right] = \frac{ql^4}{EJ} \frac{41}{324}$$

$$M_{20} = 0$$

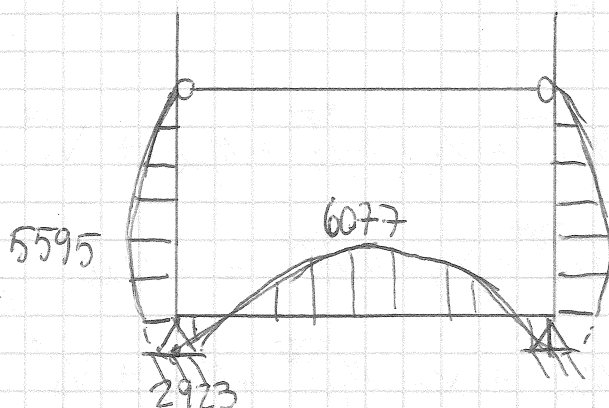
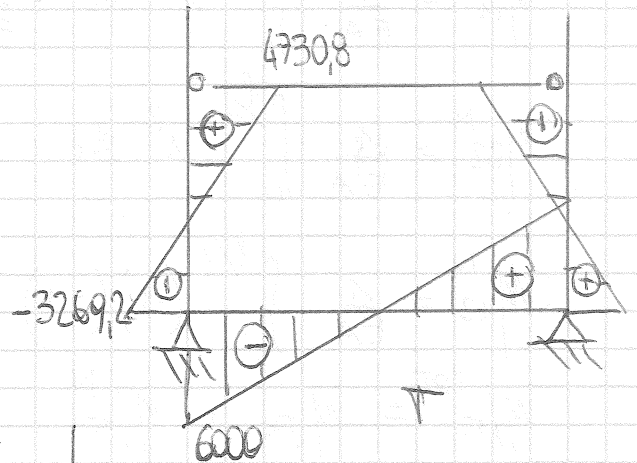
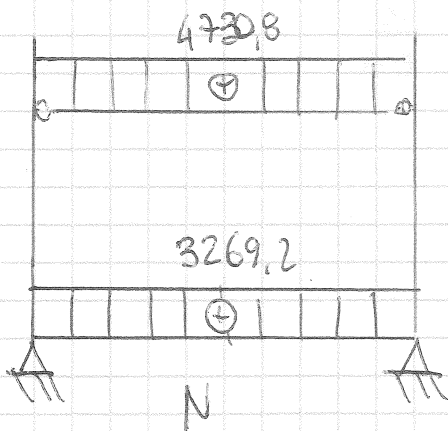
$$M_{11} = \frac{1}{EJ} \left[\int_0^{\frac{2}{3}l} z^2 dz + \int_0^{\frac{l}{2}} \frac{4}{9} l^2 dz \right] = \frac{26}{81} \frac{l^3}{EJ}$$

$$M_{22} = 0$$

$$X_2 = 0$$

$$M_{12} = 0$$

$$X_1 = -\frac{M_{10}}{M_{11}} = 4730,8 \text{ N}$$



M

2) PROGETTO

$$M_{\max} = 6077 \text{ Nm} \quad \sigma_{\text{am}} = 390 \text{ MPa}$$

$$W_{\min} = \frac{M_{\max}}{\sigma_{\text{am}}} = \frac{6077 \cdot 10^3}{390} = 15582,1 \text{ mm}^3 \rightarrow 15,6 \text{ cm}^3$$

Adatto IPE 100

$$W_x = 34,20 \text{ cm}^3$$

$$J_x = 171,0 \text{ cm}^4$$

$$A = 10,32 \text{ cm}^2$$

VERIFICA

$$\sigma_{\max} = \frac{N}{A} + \frac{M}{W_x} = \frac{3269,2}{1032} + \frac{6077 \cdot 10^3}{1032 \cdot 10^3} = 180,9 < 390$$

$$3) \quad M_{10}^N = \frac{1}{EA} \int_0^{\frac{l}{2}} \left(\frac{2}{3}ql\right)(1) dz = \frac{ql}{3EA}$$

$$M_{20}^N = \frac{1}{EA} \int_0^{\frac{l}{2}} \left(\frac{2}{3}ql\right)(-1) dz = -\frac{ql}{3EA}$$

$$M_{11}^N = \frac{1}{EA} \int_0^{\frac{l}{2}} 1^2 dz + \frac{1}{EA} \int_0^{\frac{l}{2}} (-1)^2 dz = \frac{l}{EA}$$

$$M_{22}^N = \frac{1}{EA} \int_0^{\frac{l}{2}} 1^2 dz = \frac{l}{2EA}$$

$$M_{12}^N = \frac{1}{EA} \int_0^{\frac{l}{2}} (1)(-1) dz = -\frac{l}{2EA}$$

$$M_{jK}^{\text{TOT}} = M_{jK} + M_{jK}^N$$

$$(1) \quad LVE = LVi = X_1 \cdot M_{11}^{\text{TOT}} + X_2 \cdot M_{12}^{\text{TOT}} + M_{10} + V_A^{\uparrow} \cdot \frac{V_A}{K} = 0$$

$$= X_1 \cdot M_{11}^{\text{TOT}} + X_2 \cdot M_{12}^{\text{TOT}} = -M_{10}$$

$$(2) \quad LVE = LVi = X_1 \cdot M_{12}^{\text{TOT}} + X_2 \cdot M_{22}^{\text{TOT}} + M_{20} + V_A^{\uparrow} \cdot \frac{V_A}{K} = 0$$

$\begin{cases} (1) \\ (2) \end{cases}$

$$\Rightarrow \begin{cases} X_1 \cdot M_{11}^{TOT} + X_2 \cdot M_{12}^{TOT} = -M_{10}^{TOT} \\ X_1 \cdot M_{12}^{TOT} + X_2 \cdot M_{22}^{TOT} = -M_{20}^{TOT} \end{cases}$$

$$X_1 = -4730,4 \text{ N} \qquad X_2 = 3269,6 \text{ N}$$

