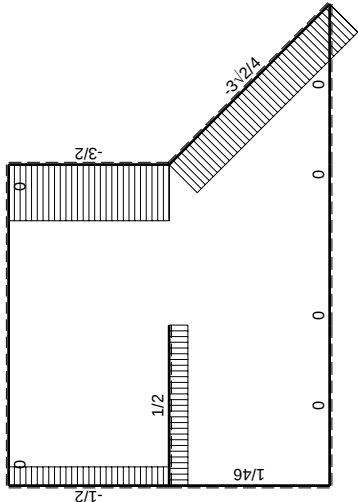
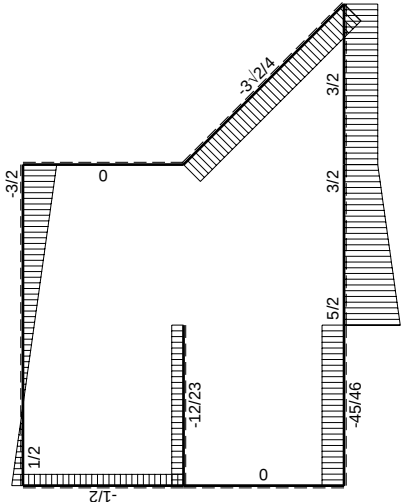
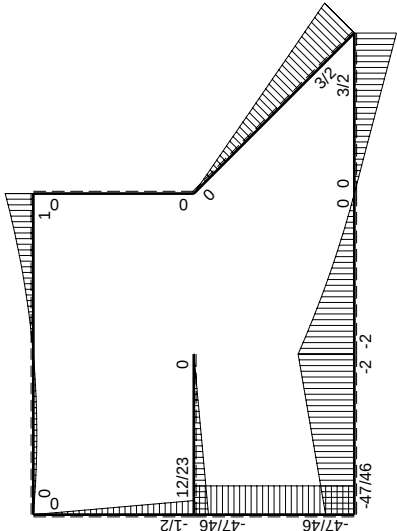




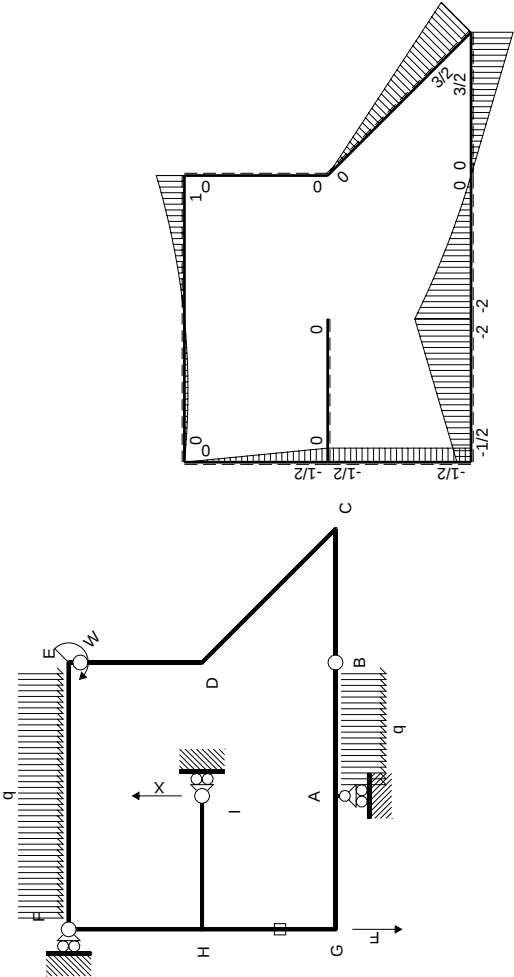
$\left[\begin{array}{c} + \\ - \end{array} \right] \rightarrow F$



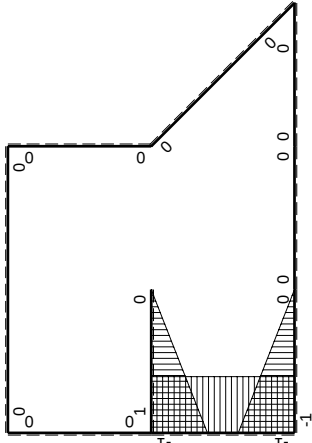
$\uparrow \left[\begin{array}{c} + \\ - \end{array} \right] \downarrow F$



$\left[\begin{array}{c} + \\ - \end{array} \right] F_b$



$\left(\left[\begin{array}{c} + \\ - \end{array} \right] \right) M_0$ flessione da carichi assegnati



$\left(\left[\begin{array}{c} + \\ - \end{array} \right] \right) M_x$ flessione da iperstatica X=1

Quadro contributi PLV per iperstatica $X=V_I$

→	$M_x(x)$	$M_o(x)$	$M_x M_o$	$M_x M_x$	$\int M_x M_o / EJ dx$	$\int X M_x M_x / EJ dx$
AB b	0	$-2Fb+5/2Fx-1/2qx^2$	0	0	0	0
BA b	0	$3/2Fx+1/2qx^2$	0	0		
BC b	0	$3/2Fx$	0	0	0	0
CB b	0	$-3/2Fb+3/2Fx$	0	0		
CD $\sqrt{2}b$	0	$3/2Fb-3\sqrt{2}/4Fx$	0	0	0	0
DE b	0	0	0	0	0	0
ED b	0	0	0	0		
EF 2b	0	$Fb-3/2Fx+1/2qx^2$	0	0	0	0
FE 2b	0	$1/2Fx-1/2qx^2$	0	0		
GA b	-b+x	$-1/2Fb-3/2Fx$	$1/2Fb^2+Fbx-3/2Fx^2$	$b^2-2bx+x^2$	$1/2Fb^3/EJ$	$1/3Xb^3/EJ$
AG b	x	$2Fb-3/2Fx$	$2Fbx-3/2Fx^2$	x^2		
FH b	0	$-1/2Fx$	0	0	0	0
HF b	0	$1/2Fb-1/2Fx$	0	0		
HI b	b-x	0	0	$b^2-2bx+x^2$	0	$1/3Xb^3/EJ$
IH b	-x	0	0	x^2		
HG b	-b	$-1/2Fb$	$1/2Fb^2$	b^2	$1/2Fb^3/EJ$	Xb^3/EJ
GH b	b	$1/2Fb$	$1/2Fb^2$	b^2		
HG	elongazione asta $N_{1HG} \epsilon_{HG} L_{HG}$				$-Fb^3/EJ$	
A	molla nodo $-V_{1A}(V_{oA}+XV_{1A})/k_A$				$-Fb^3/EJ$	$1/4Xb^3/EJ$
	totali				$-Fb^3/EJ$	$23/12Xb^3/EJ$
	iperstatica $X=V_I$				$12/23F$	

Sviluppi di calcolo iperstatica

$$L_{GA}^{XX} = \int_0^b (1 - 2x/b + x^2/b^2) b^2 1/EJ dx = \left[x - x^2/b + 1/3 x^3/b^2 \right]_0^b b^2 1/EJ$$

$$= (b - b + 1/3 b) b^2 1/EJ = 1/3 b^3/EJ$$

$$L_{AG}^{XX} = \int_0^b (x^2/b^2) b^2 1/EJ dx = \left[1/3 x^3/b^2 \right]_0^b b^2 1/EJ$$

$$= (1/3 b) b^2 1/EJ = 1/3 b^3/EJ$$

$$L_{HI}^{XX} = \int_0^b (1 - 2x/b + x^2/b^2) b^2 1/EJ dx = \left[x - x^2/b + 1/3 x^3/b^2 \right]_0^b b^2 1/EJ$$

$$= (b - b + 1/3 b) b^2 1/EJ = 1/3 b^3/EJ$$

$$L_{IH}^{XX} = \int_0^b (x^2/b^2) b^2 1/EJ dx = \left[1/3 x^3/b^2 \right]_0^b b^2 1/EJ$$

$$= (1/3 b) b^2 1/EJ = 1/3 b^3/EJ$$

$$L_{HG}^{XX} = \int_0^b (1) b^2 1/EJ dx = \left[x \right]_0^b b^2 1/EJ$$

$$= (b) b^2 1/EJ = b^3/EJ$$

$$L_{GH}^{XX} = \int_0^b (1) b^2 1/EJ dx = \left[x \right]_0^b b^2 1/EJ$$

$$= (b) b^2 1/EJ = b^3/EJ$$

$$L_{GA}^{Xo} = \int_0^b (1/2 + x/b - 3/2 x^2/b^2) Fb^2 1/EJ dx = \left[1/2 x + 1/2 x^2/b - 1/2 x^3/b^2 \right]_0^b Fb^2 1/EJ$$

$$= (1/2 b + 1/2 b - 1/2 b) Fb^2 1/EJ = 1/2 Fb^3/EJ$$

$$L_{AG}^{Xo} = \int_0^b (2x/b - 3/2 x^2/b^2) Fb^2 1/EJ dx = \left[x^2/b - 1/2 x^3/b^2 \right]_0^b Fb^2 1/EJ$$

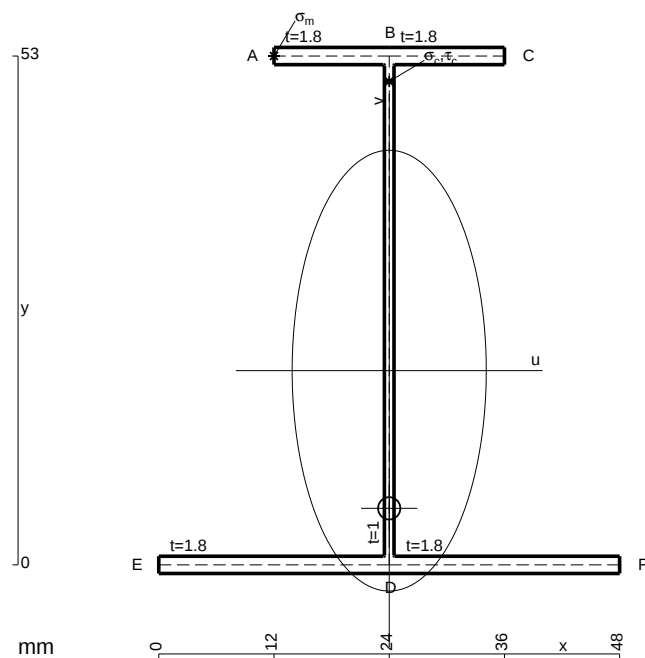
$$= (b - 1/2 b) Fb^2 1/EJ = 1/2 Fb^3/EJ$$

$$L_{HG}^{Xo} = \int_0^b (1/2) Fb^2 1/EJ dx - 1 (-1) (-1) Fb^3/EJ = \left[1/2 x \right]_0^b Fb^2 1/EJ - 1 (-1) (-1) Fb^3/EJ$$

$$= (1/2 b) Fb^2 1/EJ - 1 (-1) (-1) Fb^3/EJ = -1/2 Fb^3/EJ$$

$$L_{GH}^{Xo} = \int_0^b (1/2) Fb^2 1/EJ dx - 1 (-1) (-1) Fb^3/EJ = \left[1/2 x \right]_0^b Fb^2 1/EJ - 1 (-1) (-1) Fb^3/EJ$$

$$= (1/2 b) Fb^2 1/EJ - 1 (-1) (-1) Fb^3/EJ = -1/2 Fb^3/EJ$$



$$\begin{aligned}
 A &= 182.6 \text{ mm}^2 \\
 J_u &= 96241. \text{ mm}^4 \\
 J_v &= 18662. \text{ mm}^4 \\
 J_t &= 157.6 \text{ mm}^4 \\
 y_o &= -14.34 \text{ mm} \\
 y_g &= 20.23 \text{ mm} \\
 T_y &= 1075. \text{ N} \\
 M_x &= -576200. \text{ Nmm} \\
 x_m &= 12. \text{ mm} \\
 y_m &= 53. \text{ mm} \\
 u_m &= -12. \text{ mm} \\
 v_m &= 32.77 \text{ mm} \\
 \sigma_m &= -Mv/J_u = 196.2 \text{ N/mm}^2 \\
 x_c &= 24. \text{ mm} \\
 y_c &= 53. \text{ mm} \\
 v_c &= 32.77 \text{ mm} \\
 \sigma_c &= -Mv/J_u = 196.2 \text{ N/mm}^2 \\
 \tau_c &= TS^*/tJ_u = 15.81 \text{ N/mm}^2 \\
 \tau_g &= TS^*/tJ_u = 15.81 \text{ N/mm}^2 \\
 t_c &= 430. \text{ mm} \\
 \sigma_o &= \sqrt{\sigma^2 + 3\tau^2} = 198.1 \text{ N/mm}^2
 \end{aligned}$$