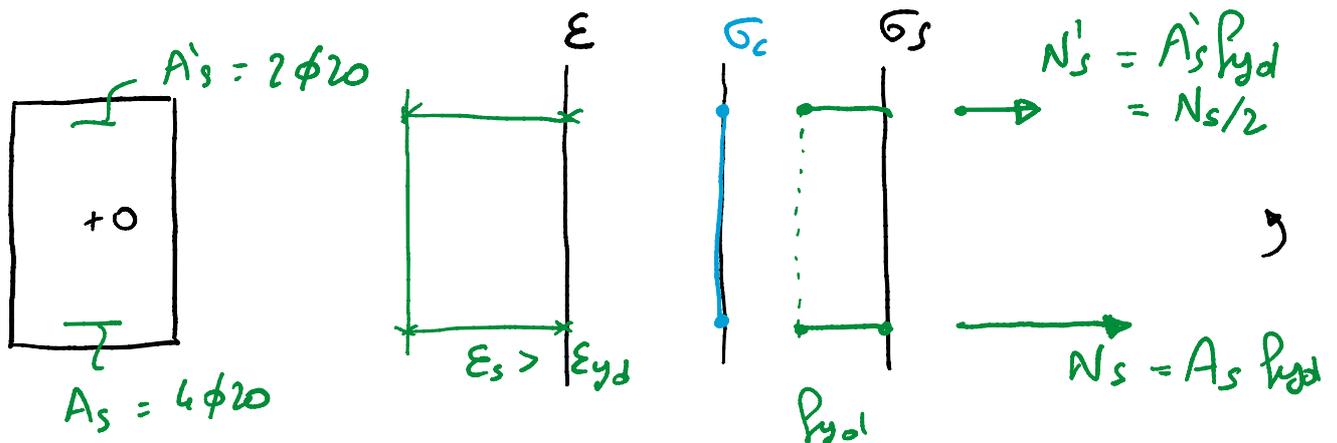


ESEMPIO DIAGRAMMA A - ARMATURE ASIMMETRICHE

giovedì 21 maggio 2020 13:08



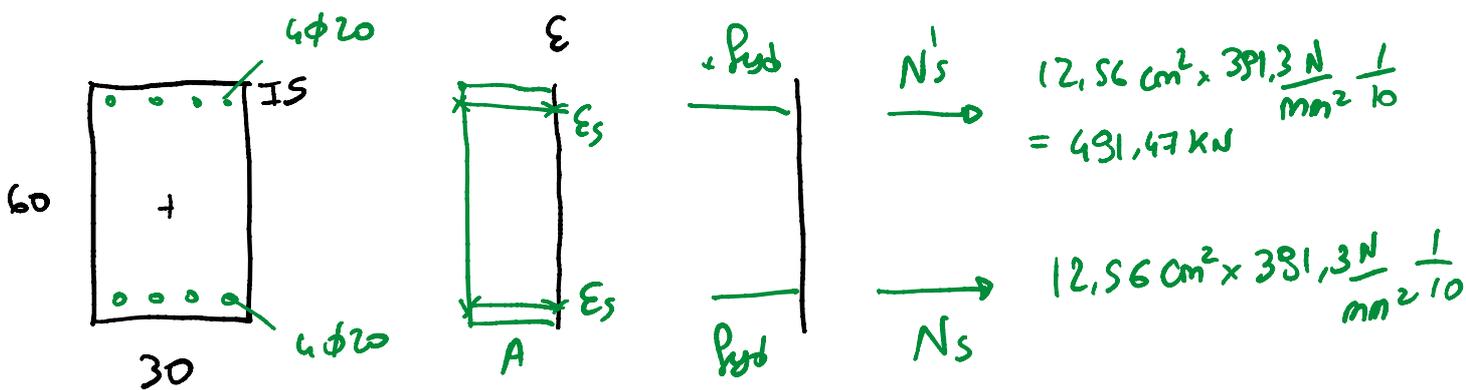
$$N_{rd}^A = A_s P_{yd} + A'_s P_{yd} = \frac{3}{2} A_s P_{yd}$$

$$M_{rd}^A = A_s P_{yd} \left(\frac{h}{2} - c\right) - A'_s P_{yd} \left(\frac{h}{2} - c\right)$$

$$= A_s P_{yd} \left(\frac{h}{2} - c\right) - \frac{A_s}{2} P_{yd} \left(\frac{h}{2} - c\right) = \frac{A_s}{2} P_{yd} \left(\frac{h}{2} - c\right)$$

ESEMPIO CON ARMATURE SIMMETRICHE

DIAGRAMMA A

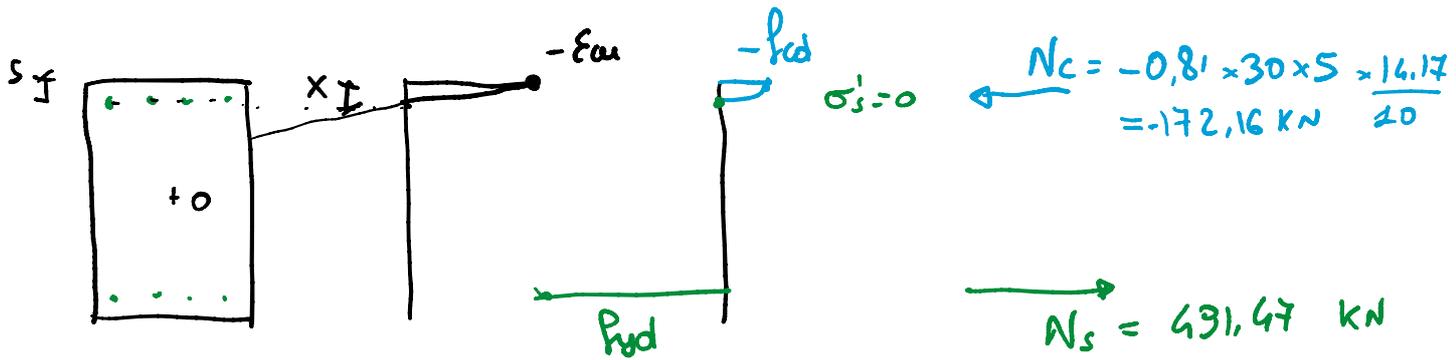


$$N_{rd} = 491,47 \times 2 = 982,9$$

$$M_{rd} = 0$$

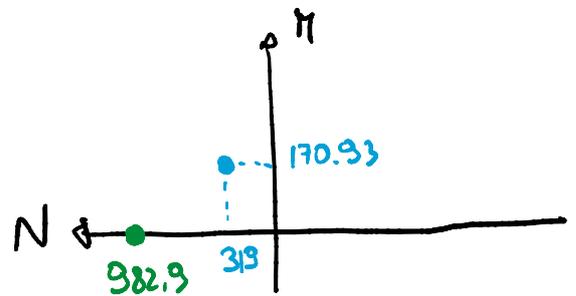


DIAGRAMMA LIMITE CON $X = 5 \text{ CM}$



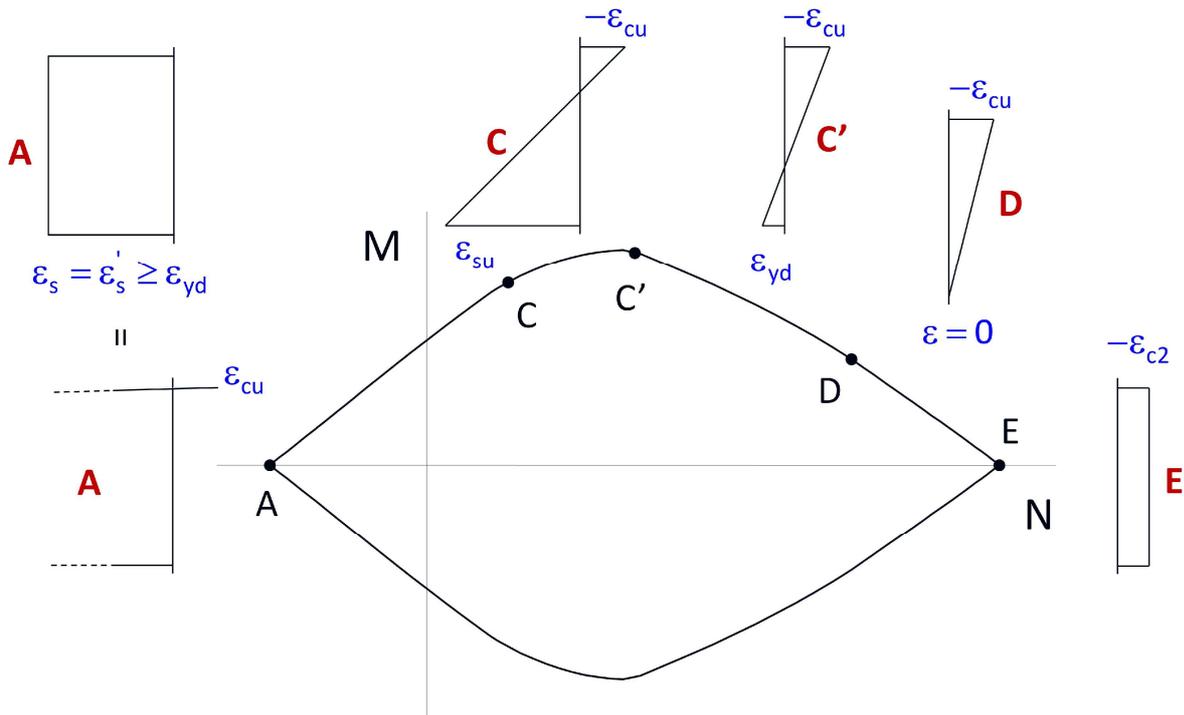
$$N_{red} = 491,47 - 172,16 \text{ kN} = 319,3 \text{ kN}$$

$$\begin{aligned}
 M_{red} &= N_s \left(\frac{h}{2} - c \right) - N_c \left(\frac{h}{2} - kx \right) = \\
 &= 491,47 \times \left(\frac{30 - 5}{100} \right) + 172,16 \times \left(\frac{30 - 0,416 \times 5}{100} \right) = \\
 &= 170,93 \text{ kNm}
 \end{aligned}$$

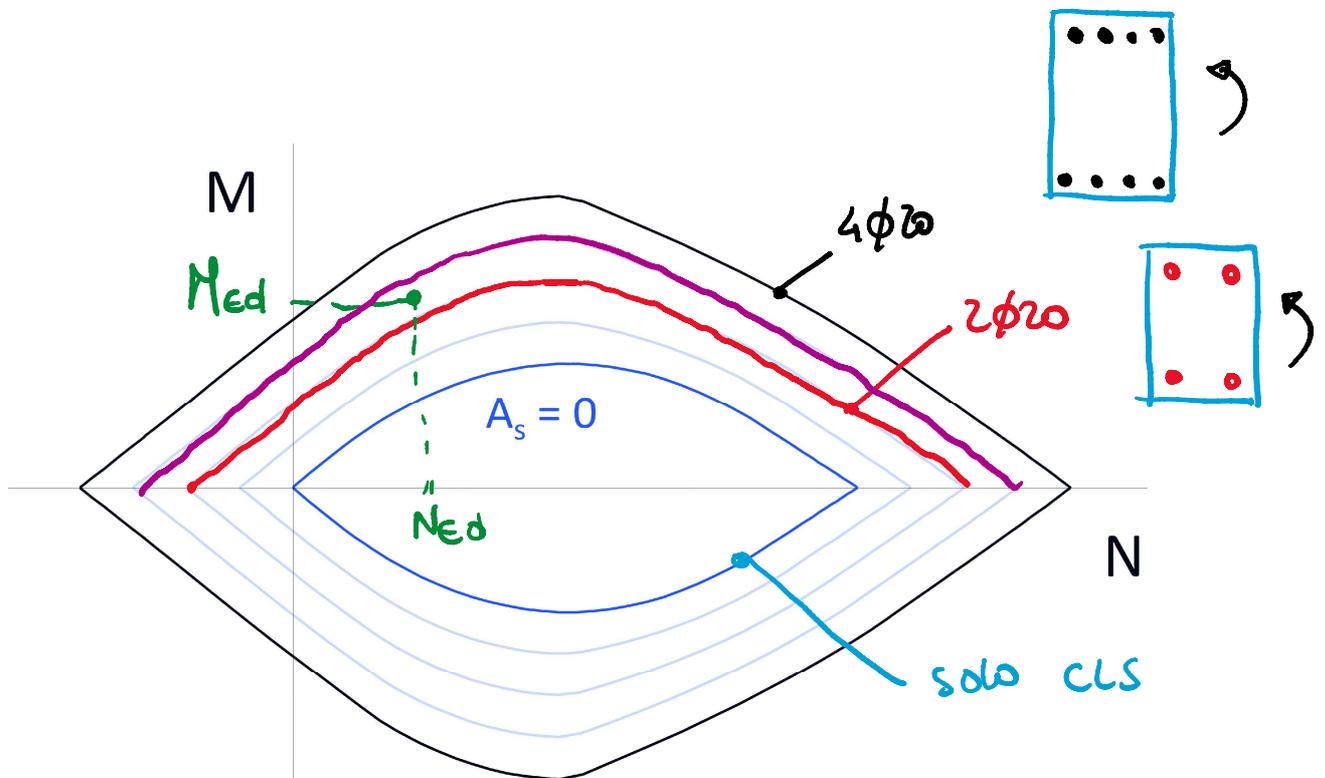


FORMA DEL DOMINIO (ARMATURE SIMMETRICHE)

giovedì 21 maggio 2020 16:17



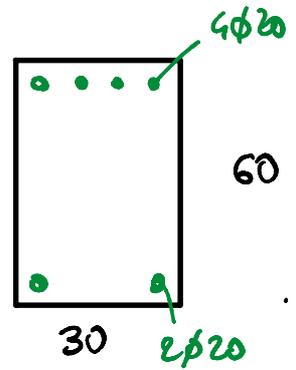
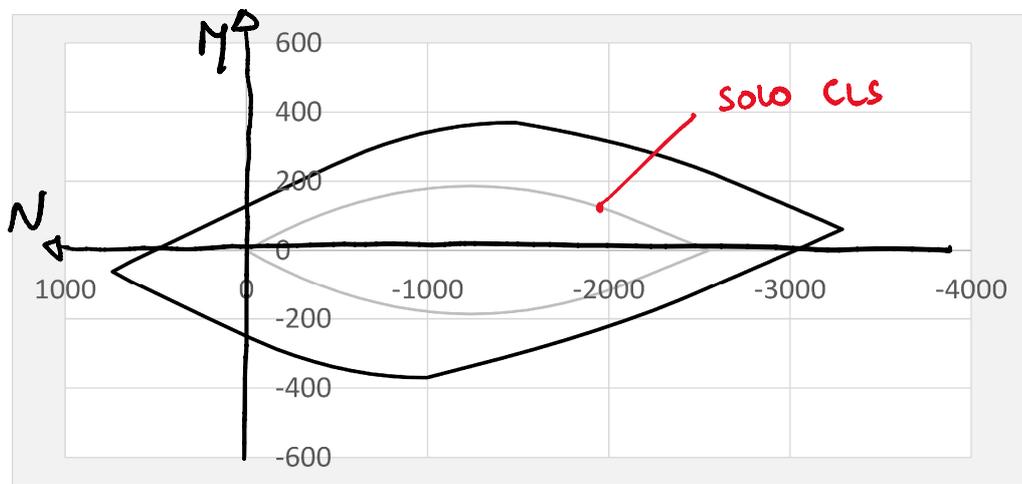
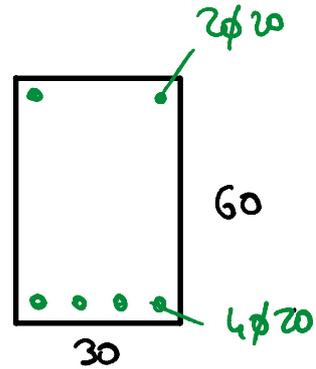
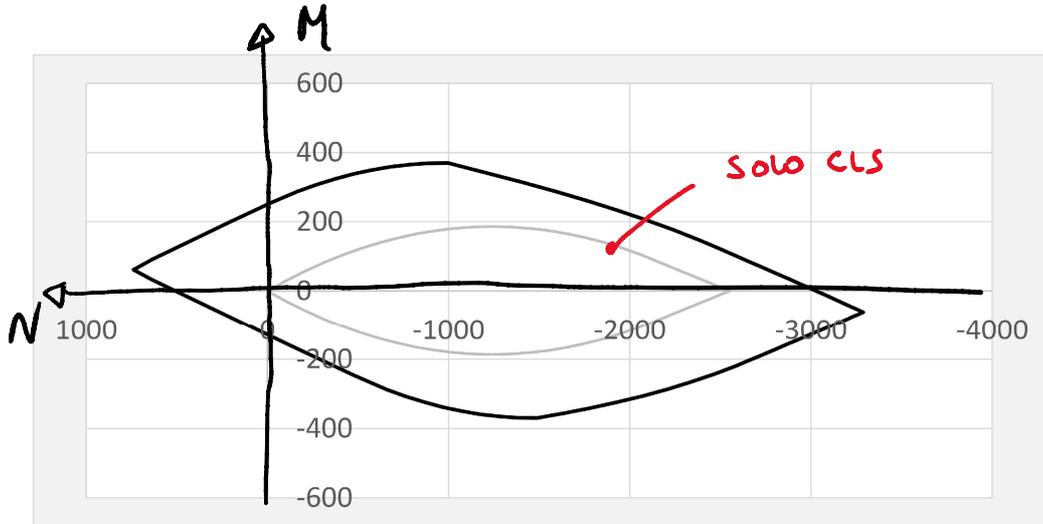
UTILIZZO DI DOMINI PER IL PROGETTO



PER $N_{ed}, M_{ed} \Rightarrow$ NECESSARI $3\phi 20$ PER LATO

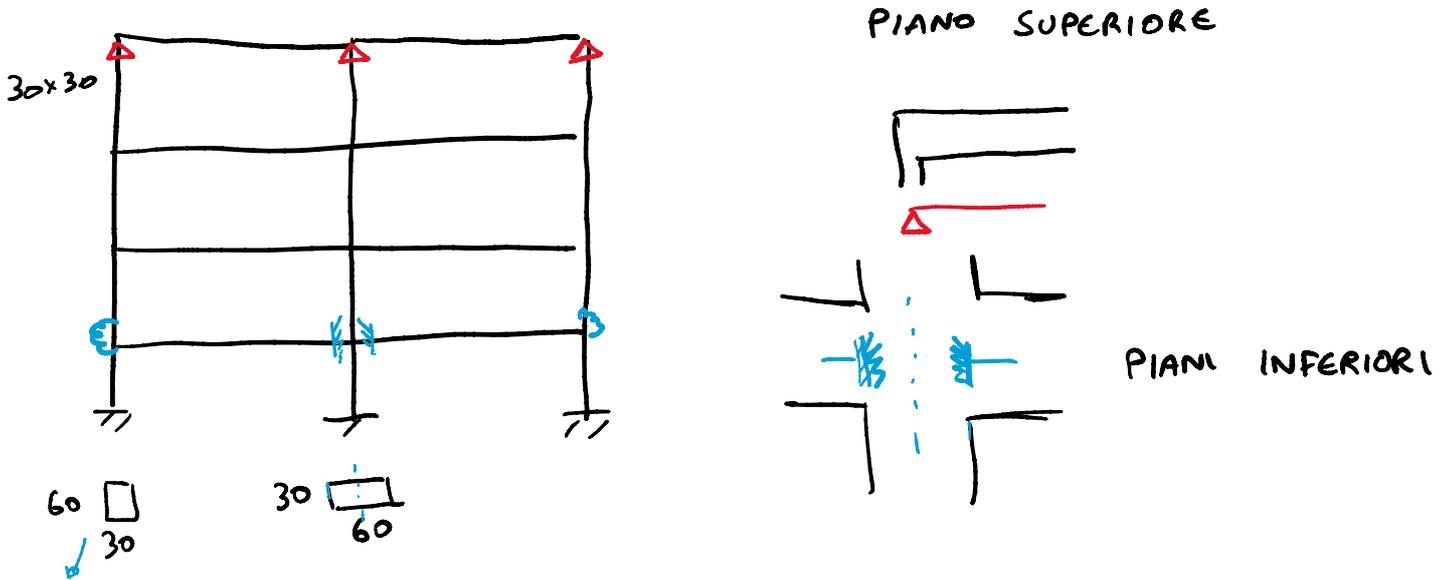
DORINI (SEZIONE CON ARMATURA NON SIMMETRICA)

giovedì 21 maggio 2020 16:28



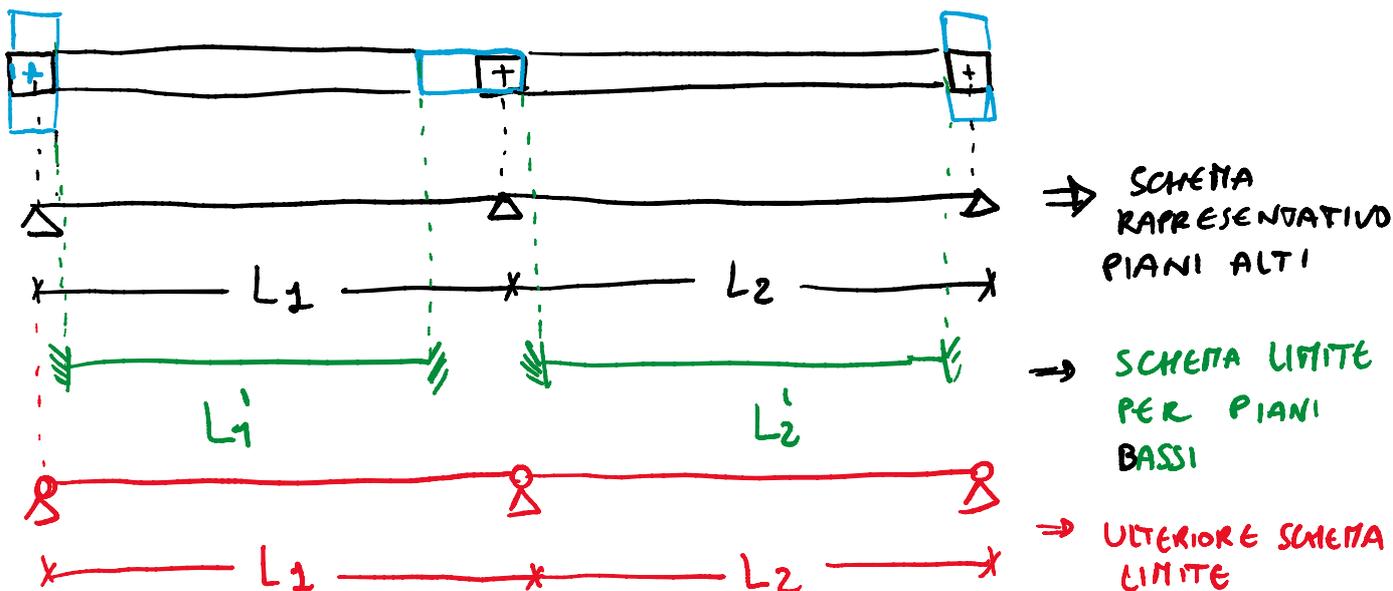
PROGETTO : MODELLO NUMERICO TRAVE

giovedì 21 maggio 2020 14:32



SE EDIFICIO PROGETTATO PER CARICHI VERTICALI,
I CARICHI SULLE TRAVI SONO UGUALI A TUTTI I PIANI

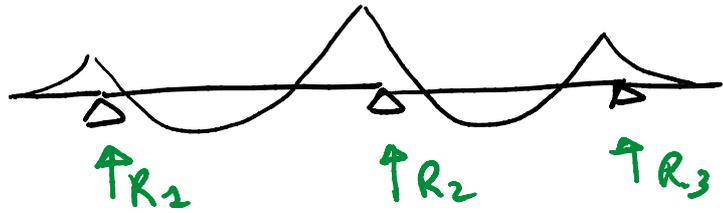
→ CRITERIO DI FASCIA



CARICHI SULLA TRAVE

giovedì 21 maggio 2020 14:41

DAL SOLAIO \Rightarrow



R_1, R_2, R_3 SONO, A MENO DEL SEGNO, I CARICHI CHE AGISCONO SU 2m DI TRAVE

NON UTILIZZO QUESTO METODO X 2 MOTIVI :

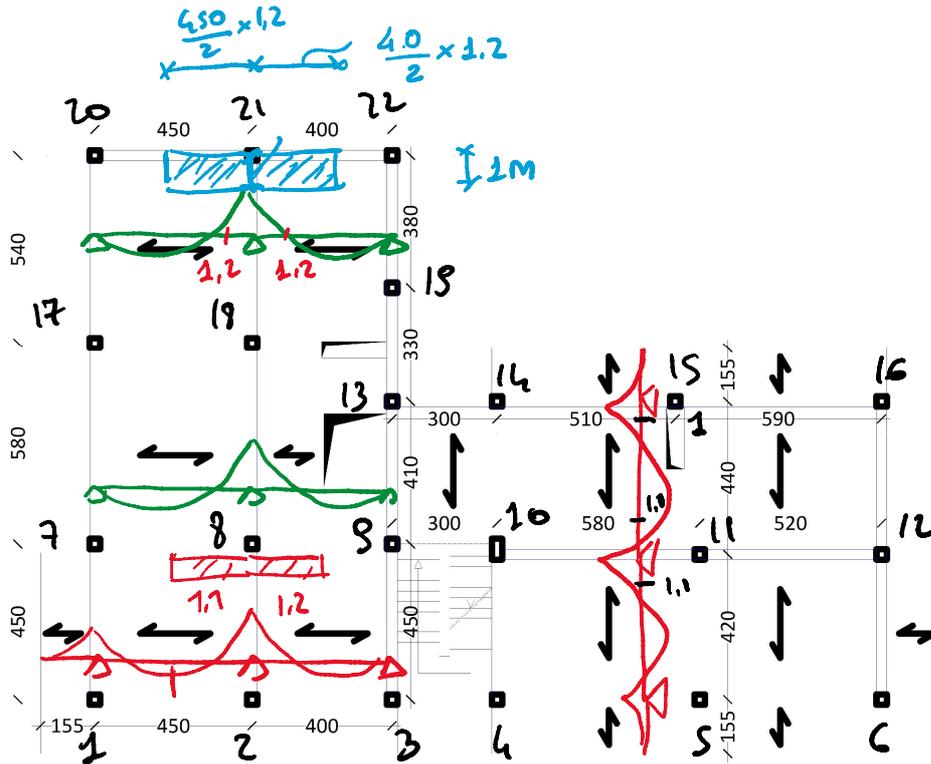
1. NON HO STUDIATO TUTTI I SOLAI
2. NECESSITA' DI DISTINGUERE q_d, q_d



UTILIZZO I COEFFICIENTI DI CONTINUITA'

COEFFICIENTI DI CONTINUITÀ TRAVI

giovedì 21 maggio 2020 14:45



INDIVIDUO TRAVE EMERGENTE CON M_{max}

$L^2 \Rightarrow$ TRAVI LUNGHE, MOLTO CARICATE
9

TRAVI SOSPETTE CAMPATA 8-18
CAMPATA 15-16

CARICHI SULLA CAMPATA 8-18, 13-21 (A M LINEARE)

FONTE CARICO	LUCE \times d	kN/m ²		q_d	kN/m		Q_d
		q_{dmax}	q_{dmin}		G_{dmax}	G_{dmin}	
SOLAIO SX	$\frac{4,5}{2} \times 1,2 = 2,7$	8,68	7,85	3,00	23,46	21,20	8,1
SOLAIO DX	$\frac{4,0}{2} \times 1,2 = 2,4$	"	"	"	20,86	18,84	7,2
PESO PROPRIO					4,72	4,72	

$G_{dmax} = 49,04 \text{ kN/m}$
 $G_{dmin} = 44,76 \text{ kN/m}$
 $Q_d = 15,3 \text{ kN/m}$

CARICHI SULLA CARPATA 2-8

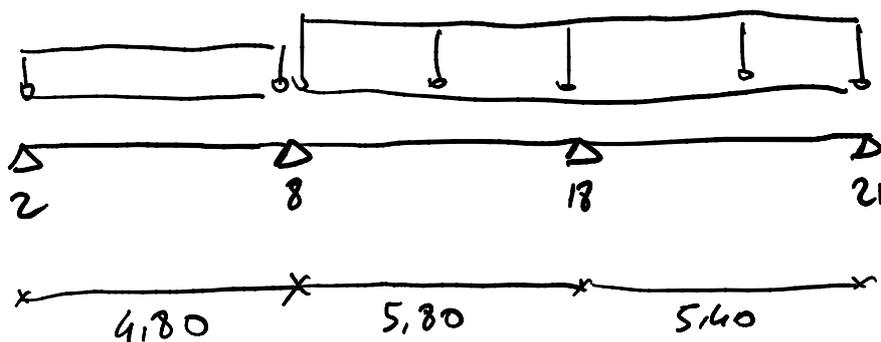
FONTE CARICO	Luce \times α	kN/m ²		q _d	kN/m		Q _d
		q _{dmax}	q _{dmin}		G _{dmax}	G _{dmin}	
SOLAIO SX	$\frac{4,5}{2} \times 2,1 = 2,48$	8,69	7,25	3,00	21,51	13,43	7,43
SOLAIO DX	$\frac{4,0}{2} \times 2,2 = 2,4$	"	"	"	20,86	18,84	7,2
PESO PROPRIO					4,72	4,72	

$$G_{dmax} = 47,1 \text{ kN/m}$$

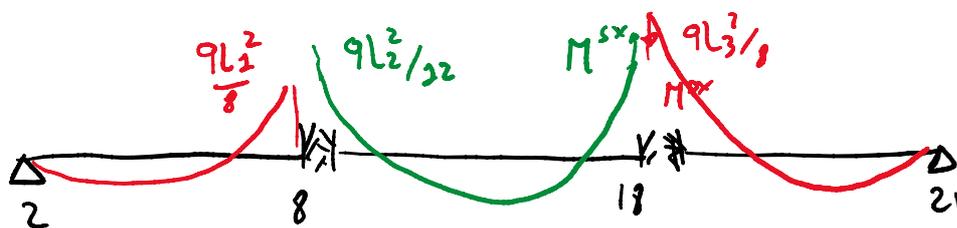
$$G_{dmin} = 43,0 \text{ kN/m}$$

$$Q_d = 14,6 \text{ kN/m}$$

STIMO M_{max} NELL'APPOGGIO 18



IPOTIZZO CHE I PILASTRI INTERNI BLOCCANO LE ROTAZIONI

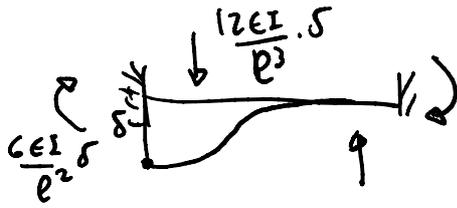


SOLUZIONE
CONGRUENTE
MA NON
EQUILIBRATA

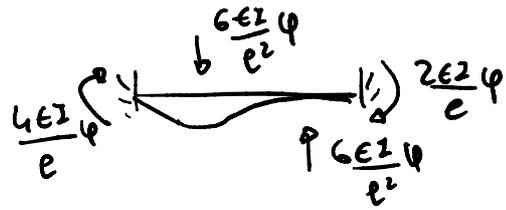
AL GENERICO APPOGGIO i
 \Rightarrow NASCONO ROTAZIONI DEI NODI TALI DA GARANTIRE

$$M_i^{sx} = M_i^{dx}$$

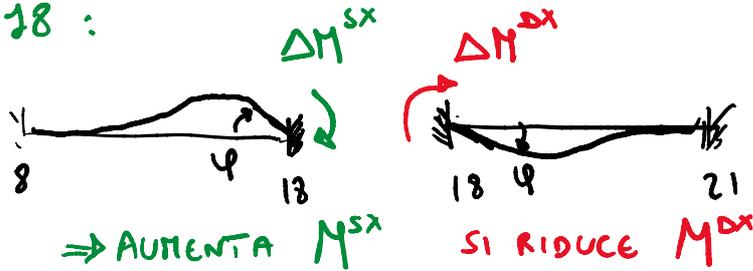
EFFETTO DI UNO SPOSTAMENTO



EFFETTO ROTAZIONE



NEL NODO 18 :



IN PRIMA APPROSSIMAZIONE: $M_i = \frac{M^{sx} + M^{sx}}{2}$

STIMO M_{18}

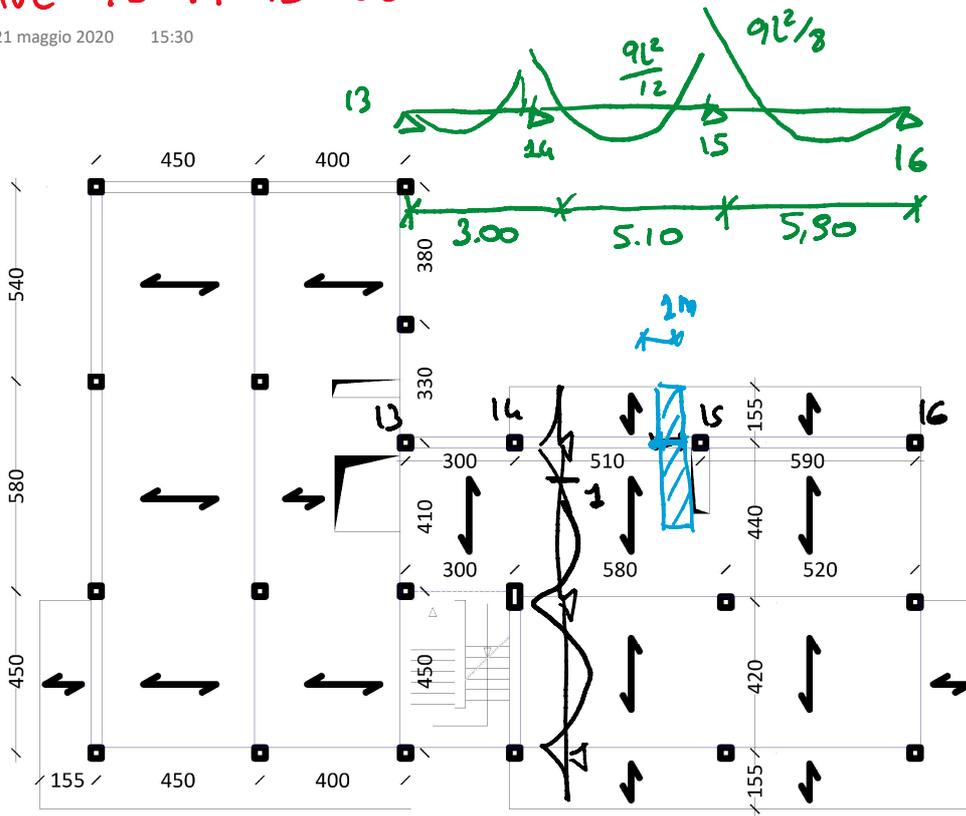
$$M_{18}^{sx} = \frac{(G_{dmax} + Q_d)_{8-18} L_{8-18}^2}{12} = \frac{(49,04 + 15,3) \cdot 5,8^2}{12} = 180,37 \text{ kNm}$$

$$M_{18}^{sx} = \frac{(G_{dmax} + Q_d)_{18-21} L_{18-21}^2}{8} = \frac{(49,04 + 15,3) \cdot 5,4^2}{8} = 234,52 \text{ kNm}$$

$$M_{18} \approx \frac{180,37 + 234,52}{2} = 207,45 \text{ kNm}$$

TRAVE 13-14-15-16

giovedì 21 maggio 2020 15:30



CARICHI SULLA CARPATA 14-15, 15-16

	Luce x α	KN/m ²			KN/m		
		q _{d max}	q _{d min}	q _d	G _{d max}	G _{d min}	Q _d
SOLAIO INF	$\frac{4,40}{2} \times 1$	8,69	7,85	3,00	19,12	17,27	6,7
BALCONE	1,55	5,59	5,59	6,72	8,66	8,66	10,4
TAMPONAT.					6,79	6,79	
PESO PR.					4,72	4,72	

$$G_{d max} = 39,29 \text{ KN/m}$$

$$G_{d min} = 37,44 \text{ KN/m}$$

$$Q_d = 17,1 \text{ KN/m}$$

$$M_{15}^{SX} = \frac{(39,29 + 17,1) \times L_{14-15}^2}{12} = 122,33 \text{ KNm}$$

$$M_{15}^{DX} = \frac{(39,29 + 17,1) \times L_{15-16}^2}{8} = 245,58 \text{ KNm}$$

$$\rightarrow M_{15} = 184 \text{ KNm}$$

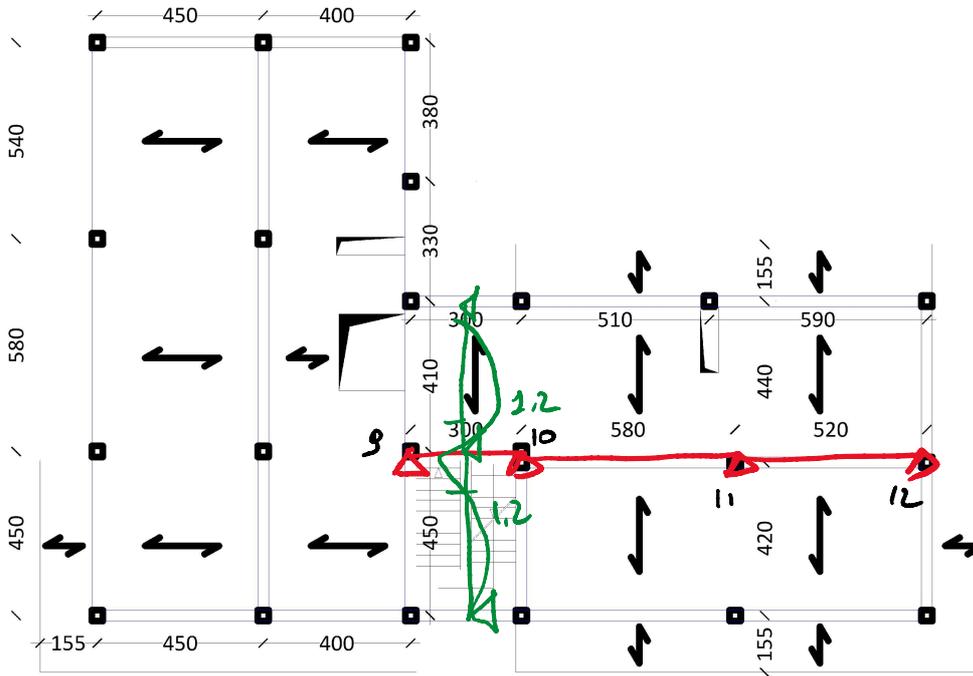
TRA I DUE CASI $M_{max} = 207 \text{ KNm}$

$$\Rightarrow d = r' \sqrt{\frac{M}{b}} = 0.017 \sqrt{\frac{207}{0.30}} = 0.45 \text{ m}$$

$$h = 50 \text{ cm}$$

DIMENSIONAMENTO TRAVE A SPESSORE

giovedì 21 maggio 2020 15:43



CARICHI CAMPATA 9-10

	LUCE x α	g_{dmax}	g_{dmin}	q_d	$G_{dmax} + Q_d$	G_{dmin}
SOLAIO	$\frac{4,10}{2} \times 1,2$	8,69	7,85	3,00	28,76	19,31
SCALA	$\frac{4,50}{2} \times 1,2$	9,11	9,11	6,00	40,81	24,61
PESO PR					2,96	2,96

$$G_{dmax} + Q_d = 72.53 \text{ kW/m}$$

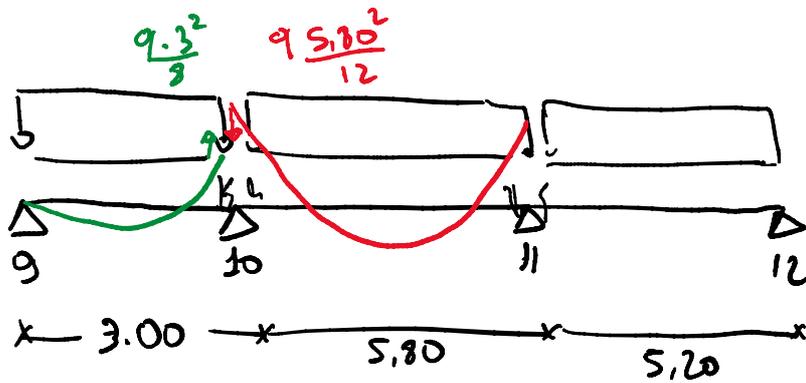
$$G_{dmin} = 46.88 \text{ kW/m}$$

ALTRE CAMPATE

	LUCE x α	g_{dmax}	g_{dmin}	q_d	$G_{dmax} + Q_d$	G_{dmin}
SOLAIO	$\frac{4,20}{2} \times 1,1$	8,69	7,85	3,00	27,00	18,13
SOLAIO	$\frac{4,40}{2} \times 1,1$	8,69	7,85	3,00	28,29	19,00
PESO PR					4,72	4,72

$$G_{dmax} + Q_d = 60.01 \text{ kW/m}$$

$$G_{dmin} = 41.85 \text{ kW/m}$$



$\frac{EI_1}{L_1^2}$ $\frac{EI_2}{L_2^2}$
 ↑
 TRAVE A
 SPESSORE PIU'
 DEFORMABILE

$$M_{10}^{SX} = \frac{72.53 \times 3^2}{8} = 81.6 \text{ kNm}$$

$$M_{10}^{DX} = \frac{60.02 \times 5.8^2}{12} = 168.23 \text{ kNm}$$

$$M_{10} = \frac{81.6 + 168.23}{2} = 124.91 \text{ kNm} \quad \text{SOVRASTIMATA}$$

$$b_{\text{TRAVE}} \Rightarrow M = \frac{bd^2}{\gamma^2} \Rightarrow b = \gamma^2 \frac{M}{d^2}$$

$$h_{\text{SOALIO}} = 23 \text{ cm} \Rightarrow C = 4 \Rightarrow \phi = 19 \text{ cm}$$

ATTENZIONE PER TRAVI A SPESSORE

$$\gamma = \frac{C}{d} = \frac{4}{19} = 0.21; \quad \text{se } \gamma = 0.25 \rightarrow S' = 0 \Rightarrow \gamma$$

$$\gamma' = 0.019$$

$$b = 0.019^2 \cdot \frac{124.9 \text{ kNm}}{0.19^2} = 1.25 \text{ m}$$

$$b = 1.00 \text{ m} \quad (\text{MOMENTO SOVRASTIMATO})$$