

**TRAVE**

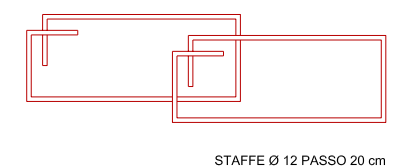
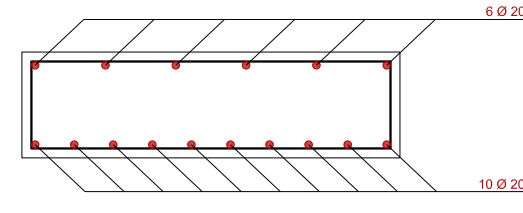
b = 300 mm e = 20 mm  
 h = 280 mm h<sub>0</sub> = 253 mm  
 c = 20 mm h<sub>1</sub> = 274 mm  
 Rck = 450

**CAMPATA AB**

**ARMATURA**  
 W = 0,302  
 $R_s \cdot b \cdot d \cdot \rho \leq 0,0158 + 0,179 \cdot d \cdot (-0,176 \cdot d) \geq 1,45 \cdot 10^{-6}$   
 $7782,2 \text{ cm}^3 \leq 82016 \text{ cm}^3 \leq 1,45 \cdot 10^6$   
 d = 143,8 mm  
 $A_s = \frac{W \cdot b \cdot d \cdot \rho}{h_0} = 3189 \text{ mm}^2 \rightarrow 10 \text{ } \varnothing 20$   
 $A_{s1} = 0,5 \cdot A_s = 1594,5 \text{ cm}^2 \rightarrow 6 \text{ } \varnothing 20$   
 $A_{s2} = 1,5 \cdot A_s = 4783,5 \text{ cm}^2 \rightarrow 16 \text{ } \varnothing 20$   
 $\rho = A_{s1}/b \cdot d = 0,21 \Rightarrow 1,1 \% > 0,25\% \text{ (prescritta)}$

**VERIFICA**  
**STADCO I**  
 $X = \frac{A_s \cdot f_{yk}}{b \cdot \sigma_{ct}} \cdot \left( 1 + \sqrt{1 + \frac{2 \cdot \sigma_{ct}}{f_{yk}} \cdot \frac{h_0}{X}} \right)$   
 $X = 47,13 \cdot 2,06 = 113,11 \text{ mm}$   
 $\sigma_c = \frac{M}{I} \cdot \frac{X}{h_0} = 0,012 \text{ MN/m}^2 = 12 \text{ N/m}^2 < 23,3 \text{ N/m}^2 \text{ VERIFICATO}$   
 $\sigma_s = \frac{M}{I} \cdot \frac{h_0 - X}{h_0} = 0,21 \text{ MN/m}^2 = 210 \text{ N/m}^2 < 374 \text{ N/m}^2 \text{ VERIFICATO}$

**STADCO III**  
 $X = \frac{h_0 \cdot A_{s2}}{b \cdot \sigma_{ct}} = 63 \text{ mm}$   
 $\sigma_c = 0,8 \cdot X = 91,6 \text{ mm}$   
 $z = e - \sigma_c = 224,8 \text{ mm}$   
 $M = A_s \cdot f_y \cdot z = 264164,2 \text{ MNmm}$   
 $M = 264164,2 \text{ MNmm} > M_{max} = 145000 \text{ MNmm} \text{ VERIFICATO}$



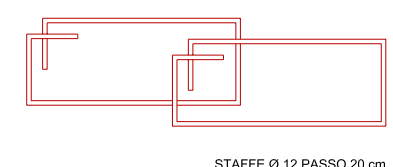
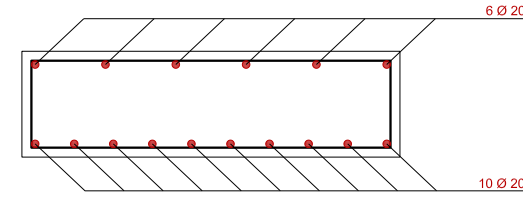
STAFFE  $\varnothing 12$  PASSO 20 cm

**CAMPATA BC**

**ARMATURA**  
 W = 0,302  
 $R_s \cdot b \cdot d \cdot \rho \leq 0,0158 + 0,179 \cdot d \cdot (-0,176 \cdot d) \geq 1,33 \cdot 10^{-6}$   
 $7782,2 \text{ cm}^3 \leq 82016 \text{ cm}^3 \leq 1,33 \cdot 10^6$   
 d = 136,1 mm  
 $A_s = \frac{W \cdot b \cdot d \cdot \rho}{h_0} = 2984 \text{ mm}^2 \rightarrow 10 \text{ } \varnothing 20$   
 $A_{s1} = 0,5 \cdot A_s = 1492 \text{ cm}^2 \rightarrow 6 \text{ } \varnothing 20$   
 $A_{s2} = 1,5 \cdot A_s = 4476 \text{ cm}^2 \rightarrow 16 \text{ } \varnothing 20$   
 $\rho = A_{s1}/b \cdot d = 0,21 \Rightarrow 1,1 \% > 0,25\% \text{ (prescritta)}$

**VERIFICA**  
**STADCO I**  
 $X = \frac{A_s \cdot f_{yk}}{b \cdot \sigma_{ct}} \cdot \left( 1 + \sqrt{1 + \frac{2 \cdot \sigma_{ct}}{f_{yk}} \cdot \frac{h_0}{X}} \right)$   
 $X = 51,8 \cdot 2,06 = 111,11 \text{ mm}$   
 $\sigma_c = \frac{M}{I} \cdot \frac{X}{h_0} = 0,011 \text{ MN/m}^2 = 11 \text{ N/m}^2 < 23,3 \text{ N/m}^2 \text{ VERIFICATO}$   
 $\sigma_s = \frac{M}{I} \cdot \frac{h_0 - X}{h_0} = 0,19 \text{ MN/m}^2 = 190 \text{ N/m}^2 < 374 \text{ N/m}^2 \text{ VERIFICATO}$

**STADCO III**  
 $X = \frac{h_0 \cdot A_{s2}}{b \cdot \sigma_{ct}} = 63 \text{ mm}$   
 $\sigma_c = 0,8 \cdot X = 91,6 \text{ mm}$   
 $z = e - \sigma_c = 222,8 \text{ mm}$   
 $M = A_s \cdot f_y \cdot z = 264164,2 \text{ MNmm}$   
 $M = 264164,2 \text{ MNmm} > M_{max} = 132000 \text{ MNmm} \text{ VERIFICATO}$



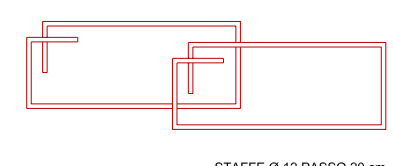
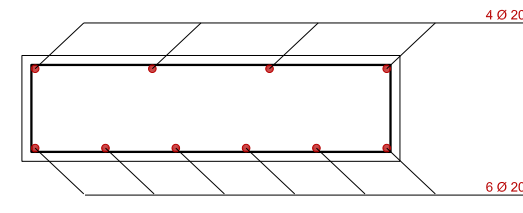
STAFFE  $\varnothing 12$  PASSO 20 cm

**CAMPATA CD**

**ARMATURA**  
 W = 0,302  
 $R_s \cdot b \cdot d \cdot \rho \leq 0,0158 + 0,179 \cdot d \cdot (-0,176 \cdot d) \geq 0,45 \cdot 10^{-6}$   
 $7782,2 \text{ cm}^3 \leq 82016 \text{ cm}^3 \leq 0,45 \cdot 10^6$   
 d = 81,5 mm  
 $A_s = \frac{W \cdot b \cdot d \cdot \rho}{h_0} = 1787 \text{ mm}^2 \rightarrow 6 \text{ } \varnothing 20$   
 $A_{s1} = 0,5 \cdot A_s = 893,5 \text{ cm}^2 \rightarrow 6 \text{ } \varnothing 20$   
 $A_{s2} = 1,5 \cdot A_s = 2680,5 \text{ cm}^2 \rightarrow 16 \text{ } \varnothing 20$   
 $\rho = A_{s1}/b \cdot d = 0,26 \Rightarrow 0,6 \% > 0,25\% \text{ (prescritta)}$

**VERIFICA**  
**STADCO I**  
 $X = \frac{A_s \cdot f_{yk}}{b \cdot \sigma_{ct}} \cdot \left( 1 + \sqrt{1 + \frac{2 \cdot \sigma_{ct}}{f_{yk}} \cdot \frac{h_0}{X}} \right)$   
 $X = 28,27 \cdot 3,3 = 93,3 \text{ mm}$   
 $\sigma_c = \frac{M}{I} \cdot \frac{X}{h_0} = 0,004 \text{ MN/m}^2 = 4 \text{ N/m}^2 < 23,3 \text{ N/m}^2 \text{ VERIFICATO}$   
 $\sigma_s = \frac{M}{I} \cdot \frac{h_0 - X}{h_0} = 0,11 \text{ MN/m}^2 = 110 \text{ N/m}^2 < 374 \text{ N/m}^2 \text{ VERIFICATO}$

**STADCO III**  
 $X = \frac{h_0 \cdot A_{s2}}{b \cdot \sigma_{ct}} = 37,8 \text{ mm}$   
 $\sigma_c = 0,8 \cdot X = 30,24 \text{ mm}$   
 $z = e - \sigma_c = 229,3 \text{ mm}$   
 $M = A_s \cdot f_y \cdot z = 165902 \text{ MNmm}$   
 $M = 165902 \text{ MNmm} > M_{max} = 45000 \text{ MNmm} \text{ VERIFICATO}$



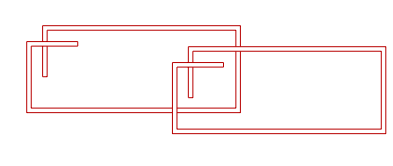
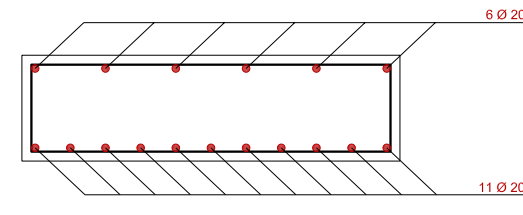
STAFFE  $\varnothing 12$  PASSO 20 cm

**CAMPATA DE**

**ARMATURA**  
 W = 0,302  
 $R_s \cdot b \cdot d \cdot \rho \leq 0,0158 + 0,179 \cdot d \cdot (-0,176 \cdot d) \geq 1,67 \cdot 10^{-6}$   
 $7782,2 \text{ cm}^3 \leq 82016 \text{ cm}^3 \leq 1,67 \cdot 10^6$   
 d = 153,8 mm  
 $A_s = \frac{W \cdot b \cdot d \cdot \rho}{h_0} = 3328 \text{ mm}^2 \rightarrow 11 \text{ } \varnothing 20$   
 $A_{s1} = 0,5 \cdot A_s = 1664 \text{ cm}^2 \rightarrow 6 \text{ } \varnothing 20$   
 $A_{s2} = 1,5 \cdot A_s = 4992 \text{ cm}^2 \rightarrow 16 \text{ } \varnothing 20$   
 $\rho = A_{s1}/b \cdot d = 0,21 \Rightarrow 1,2 \% > 0,25\% \text{ (prescritta)}$

**VERIFICA**  
**STADCO I**  
 $X = \frac{A_s \cdot f_{yk}}{b \cdot \sigma_{ct}} \cdot \left( 1 + \sqrt{1 + \frac{2 \cdot \sigma_{ct}}{f_{yk}} \cdot \frac{h_0}{X}} \right)$   
 $X = 51,8 \cdot 2,06 = 111,11 \text{ mm}$   
 $\sigma_c = \frac{M}{I} \cdot \frac{X}{h_0} = 0,013 \text{ MN/m}^2 = 13 \text{ N/m}^2 < 23,3 \text{ N/m}^2 \text{ VERIFICATO}$   
 $\sigma_s = \frac{M}{I} \cdot \frac{h_0 - X}{h_0} = 0,22 \text{ MN/m}^2 = 220 \text{ N/m}^2 < 374 \text{ N/m}^2 \text{ VERIFICATO}$

**STADCO III**  
 $X = \frac{h_0 \cdot A_{s2}}{b \cdot \sigma_{ct}} = 69,3 \text{ mm}$   
 $\sigma_c = 0,8 \cdot X = 95,4 \text{ mm}$   
 $z = e - \sigma_c = 222,3 \text{ mm}$   
 $M = A_s \cdot f_y \cdot z = 287166 \text{ MNmm}$   
 $M = 287166 \text{ MNmm} > M_{max} = 167300 \text{ MNmm} \text{ VERIFICATO}$



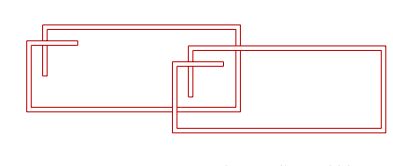
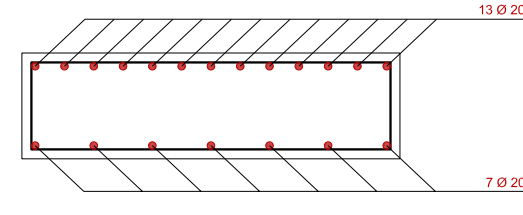
STAFFE  $\varnothing 12$  PASSO 20 cm

**APPOGGIO B**

**ARMATURA**  
 W = 0,302  
 $R_s \cdot b \cdot d \cdot \rho \leq 0,0158 + 0,179 \cdot d \cdot (-0,176 \cdot d) \geq 2,41 \cdot 10^{-6}$   
 $7782,2 \text{ cm}^3 \leq 82016 \text{ cm}^3 \leq 2,41 \cdot 10^6$   
 d = 183,3 mm  
 $A_s = \frac{W \cdot b \cdot d \cdot \rho}{h_0} = 3979 \text{ mm}^2 \rightarrow 13 \text{ } \varnothing 20$   
 $A_{s1} = 0,5 \cdot A_s = 1989,5 \text{ cm}^2 \rightarrow 10 \text{ } \varnothing 20$   
 $A_{s2} = 1,5 \cdot A_s = 5968,5 \text{ cm}^2 \rightarrow 16 \text{ } \varnothing 20$   
 $\rho = A_{s1}/b \cdot d = 0,21 \Rightarrow 1,4 \% > 0,25\% \text{ (prescritta)}$

**VERIFICA**  
**STADCO I**  
 $X = \frac{A_s \cdot f_{yk}}{b \cdot \sigma_{ct}} \cdot \left( 1 + \sqrt{1 + \frac{2 \cdot \sigma_{ct}}{f_{yk}} \cdot \frac{h_0}{X}} \right)$   
 $X = 61,23 \cdot 2,02 = 123,6 \text{ mm}$   
 $\sigma_c = \frac{M}{I} \cdot \frac{X}{h_0} = 0,016 \text{ MN/m}^2 = 16 \text{ N/m}^2 < 23,3 \text{ N/m}^2 \text{ VERIFICATO}$   
 $\sigma_s = \frac{M}{I} \cdot \frac{h_0 - X}{h_0} = 0,28 \text{ MN/m}^2 = 280 \text{ N/m}^2 < 374 \text{ N/m}^2 \text{ VERIFICATO}$

**STADCO III**  
 $X = \frac{h_0 \cdot A_{s2}}{b \cdot \sigma_{ct}} = 81,8 \text{ mm}$   
 $\sigma_c = 0,8 \cdot X = 65,44 \text{ mm}$   
 $z = e - \sigma_c = 217,2 \text{ mm}$   
 $M = A_s \cdot f_y \cdot z = 331592 \text{ MNmm}$   
 $M = 331592 \text{ MNmm} > M_{max} = 241400 \text{ MNmm} \text{ VERIFICATO}$



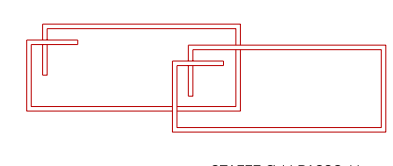
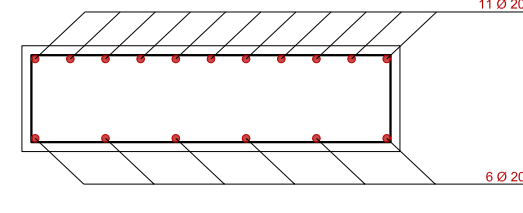
STAFFE  $\varnothing 14$  PASSO 7 cm

**APPOGGIO C**

**ARMATURA**  
 W = 0,302  
 $R_s \cdot b \cdot d \cdot \rho \leq 0,0158 + 0,179 \cdot d \cdot (-0,176 \cdot d) \geq 1,64 \cdot 10^{-6}$   
 $7782,2 \text{ cm}^3 \leq 82016 \text{ cm}^3 \leq 1,64 \cdot 10^6$   
 d = 150,3 mm  
 $A_s = \frac{W \cdot b \cdot d \cdot \rho}{h_0} = 3300 \text{ mm}^2 \rightarrow 11 \text{ } \varnothing 20$   
 $A_{s1} = 0,5 \cdot A_s = 1650 \text{ cm}^2 \rightarrow 6 \text{ } \varnothing 20$   
 $A_{s2} = 1,5 \cdot A_s = 4950 \text{ cm}^2 \rightarrow 16 \text{ } \varnothing 20$   
 $\rho = A_{s1}/b \cdot d = 0,22 \Rightarrow 1,2 \% > 0,25\% \text{ (prescritta)}$

**VERIFICA**  
**STADCO I**  
 $X = \frac{A_s \cdot f_{yk}}{b \cdot \sigma_{ct}} \cdot \left( 1 + \sqrt{1 + \frac{2 \cdot \sigma_{ct}}{f_{yk}} \cdot \frac{h_0}{X}} \right)$   
 $X = 51,8 \cdot 2,06 = 111,11 \text{ mm}$   
 $\sigma_c = \frac{M}{I} \cdot \frac{X}{h_0} = 0,013 \text{ MN/m}^2 = 13 \text{ N/m}^2 < 23,3 \text{ N/m}^2 \text{ VERIFICATO}$   
 $\sigma_s = \frac{M}{I} \cdot \frac{h_0 - X}{h_0} = 0,22 \text{ MN/m}^2 = 220 \text{ N/m}^2 < 374 \text{ N/m}^2 \text{ VERIFICATO}$

**STADCO III**  
 $X = \frac{h_0 \cdot A_{s2}}{b \cdot \sigma_{ct}} = 69,3 \text{ mm}$   
 $\sigma_c = 0,8 \cdot X = 95,4 \text{ mm}$   
 $z = e - \sigma_c = 222,3 \text{ mm}$   
 $M = A_s \cdot f_y \cdot z = 287166 \text{ MNmm}$   
 $M = 287166 \text{ MNmm} > M_{max} = 154100 \text{ MNmm} \text{ VERIFICATO}$



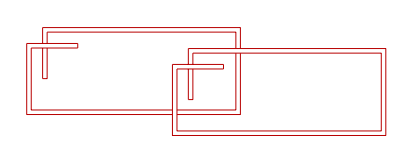
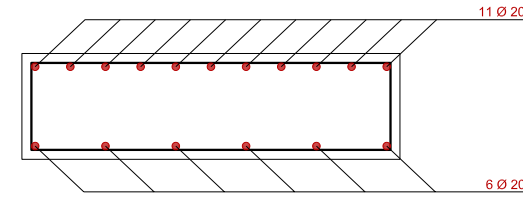
STAFFE  $\varnothing 14$  PASSO 11 cm

**APPOGGIO D**

**ARMATURA**  
 W = 0,302  
 $R_s \cdot b \cdot d \cdot \rho \leq 0,0158 + 0,179 \cdot d \cdot (-0,176 \cdot d) \geq 1,67 \cdot 10^{-6}$   
 $7782,2 \text{ cm}^3 \leq 82016 \text{ cm}^3 \leq 1,67 \cdot 10^6$   
 d = 153,8 mm  
 $A_s = \frac{W \cdot b \cdot d \cdot \rho}{h_0} = 3328 \text{ mm}^2 \rightarrow 11 \text{ } \varnothing 20$   
 $A_{s1} = 0,5 \cdot A_s = 1664 \text{ cm}^2 \rightarrow 6 \text{ } \varnothing 20$   
 $A_{s2} = 1,5 \cdot A_s = 4992 \text{ cm}^2 \rightarrow 16 \text{ } \varnothing 20$   
 $\rho = A_{s1}/b \cdot d = 0,21 \Rightarrow 1,1 \% > 0,25\% \text{ (prescritta)}$

**VERIFICA**  
**STADCO I**  
 $X = \frac{A_s \cdot f_{yk}}{b \cdot \sigma_{ct}} \cdot \left( 1 + \sqrt{1 + \frac{2 \cdot \sigma_{ct}}{f_{yk}} \cdot \frac{h_0}{X}} \right)$   
 $X = 51,8 \cdot 2,06 = 111,11 \text{ mm}$   
 $\sigma_c = \frac{M}{I} \cdot \frac{X}{h_0} = 0,013 \text{ MN/m}^2 = 13 \text{ N/m}^2 < 23,3 \text{ N/m}^2 \text{ VERIFICATO}$   
 $\sigma_s = \frac{M}{I} \cdot \frac{h_0 - X}{h_0} = 0,22 \text{ MN/m}^2 = 220 \text{ N/m}^2 < 374 \text{ N/m}^2 \text{ VERIFICATO}$

**STADCO III**  
 $X = \frac{h_0 \cdot A_{s2}}{b \cdot \sigma_{ct}} = 69,3 \text{ mm}$   
 $\sigma_c = 0,8 \cdot X = 95,4 \text{ mm}$   
 $z = e - \sigma_c = 222,3 \text{ mm}$   
 $M = A_s \cdot f_y \cdot z = 287166 \text{ MNmm}$   
 $M = 287166 \text{ MNmm} > M_{max} = 167300 \text{ MNmm} \text{ VERIFICATO}$



STAFFE  $\varnothing 12$  PASSO 11 cm

