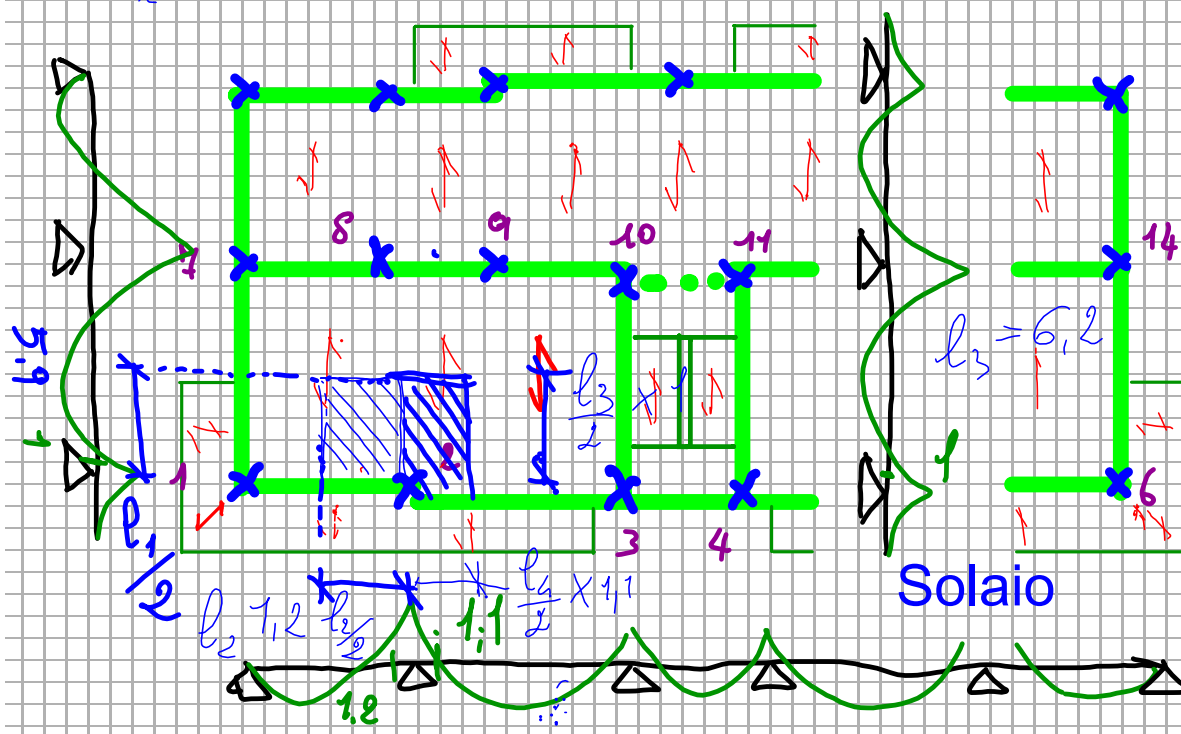


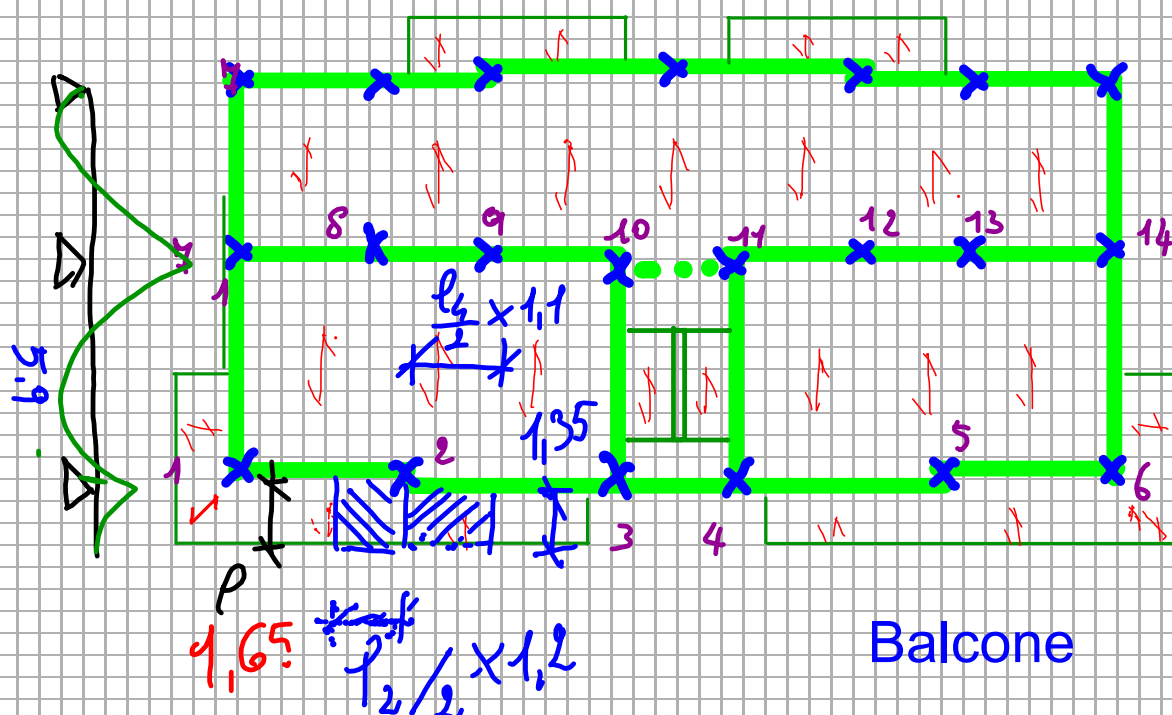
$$A_i = \frac{5,9}{2} \times 1 \times \frac{4,6}{2} \times 1,2 + \frac{6,2}{2} \times 1 \times \frac{5,7}{2} \times 1,1 = 17,9 \text{ m}^2$$

$$P_i^s = (6,43 + 0,8 \times 5,4) \times 17,9 = 192,4 \text{ KN}$$



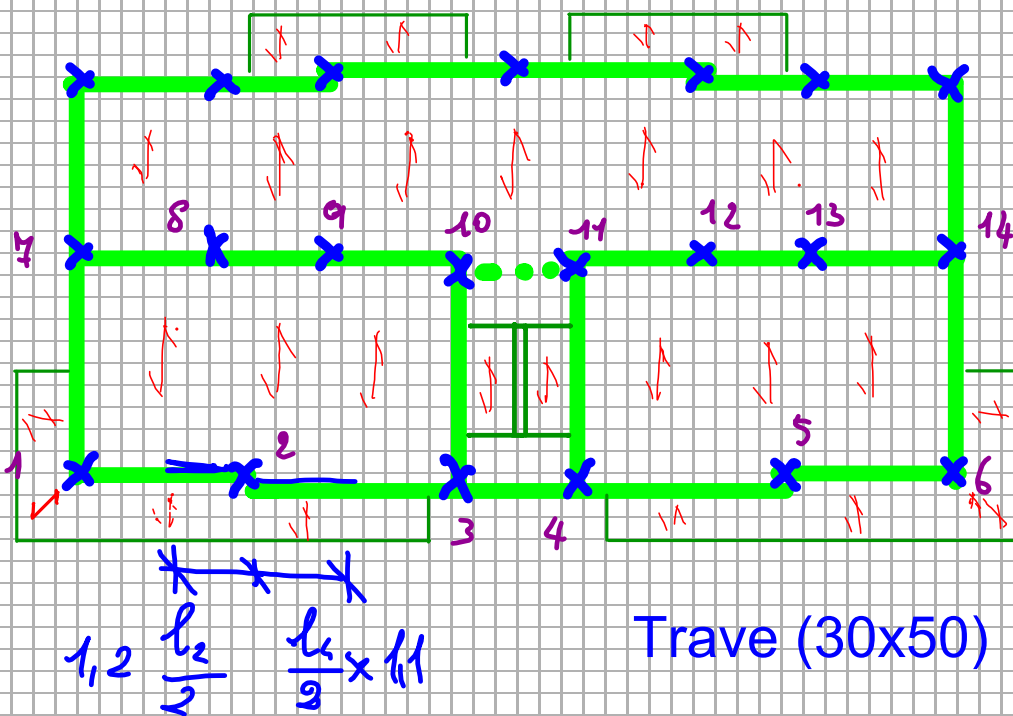
$$A_i = 1,65 \times \frac{4,6}{2} \times 1,2 + 1,35 \times \frac{5,7}{2} \times 1,1 = 8,8 \text{ m}^2$$

$$P_i^b = (5,72 + 0,8 \times 6) \times 8,8 = 92,6 \text{ KN}$$



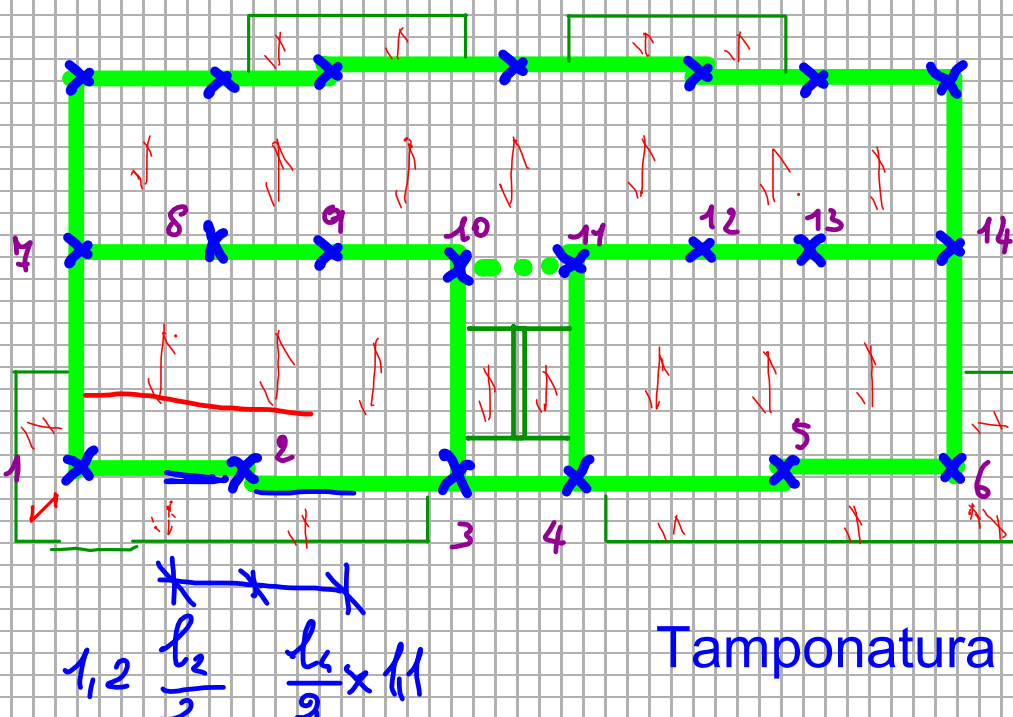
$$l_1^{te} = 1,2 \times \frac{4,6}{2} + 1,1 \times \frac{5,7}{2} = 5,9 \text{ m}$$

$$P_i^{te} = 3,69 \times 5,9 = 21,8 \text{ KN}$$



$$l_1^t = 1,2 \times \frac{4,6}{2} + 1,1 \times \frac{5,7}{2} = 5,9 \text{ m}$$

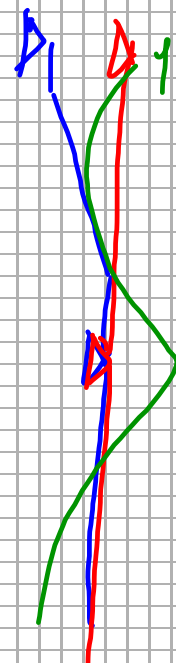
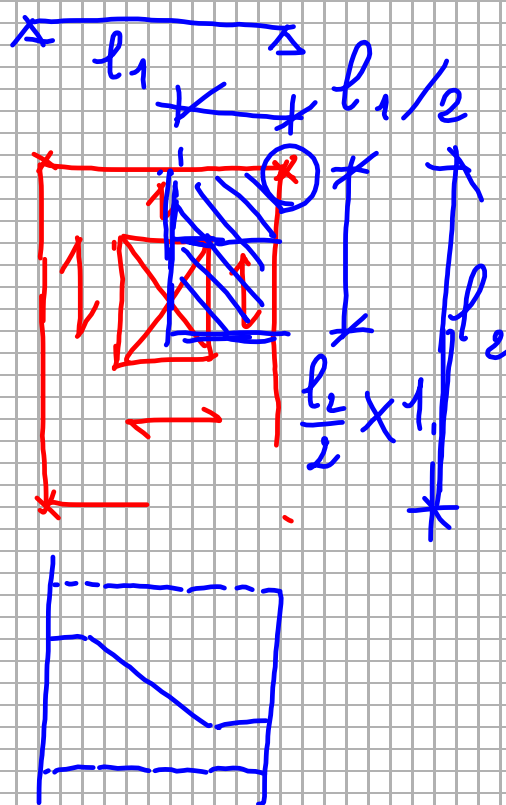
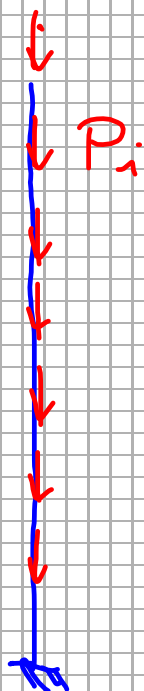
$$P_i^t = 6,6 \times 5,9 = 38,9 \text{ KN}$$



$$P_i = 192,4 + 92,6 + 21,8 + 38,9 = 345,6 \text{ kN}$$

$$P_{\text{proprio}} \text{ hilastro} \quad 90\% \times 345,6 = 24,2 \text{ kN}$$

$$369,8 \text{ kN}$$



Normative: NTC 2008 e
relative circolari
EC2

Calcestruzzo

Resistenza ~~C16/20~~

Durabilità C25/30

$$f_{ck} = 25 \text{ MPa}$$

$$f_{ed} = \alpha_{cc} \frac{f_{ck}}{\gamma_c} = \frac{0,85 \times 25}{1,5} = 14,2 \text{ MPa}$$

$$f_{etm} = 0,3 \sqrt[3]{f_{ek}^2} = 0,3 \times \sqrt[3]{25^2} = 2,56 \text{ MPa}$$

$$f_{ek} = 0,7 f_{etm} = 0,7 \times 2,56 = 1,80 \text{ MPa}$$

$$f_{efk} = 1,2 f_{ek} = 1,2 \times 1,8 = 2,16 \text{ MPa}$$

$$E_{cm} = 22000 \left(\frac{f_{cm}}{10} \right)^{0,3} = 22000 \times 33^{0,3} = 31500 \text{ MPa}$$

$$f_{cm} = f_{ek} + 8 = 33 \text{ MPa}$$

B450 C

Staffe $\phi 8$

Arretr. $\phi 10, \phi 14, \phi 20$
longitudinale

$$f_{yk} = 450 \text{ MPa}$$

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{450}{1,15} = 391,3 \text{ MPa}$$

Pilastro 2

$$1,2 \times N_{Ed} \leq N_{Rd} = A_c f_{cd} + A_s f_{yd}$$

$$M_{Ed} = N_{Ed} l$$

$$l = \max(5\% h, 20 \text{ mm})$$

PROGETTO PILASTRI

$$A_c = \frac{N_{Ed}}{f_{cd}}$$

$$A_s = \frac{0,2 N_{Ed}}{f_{yd}}$$

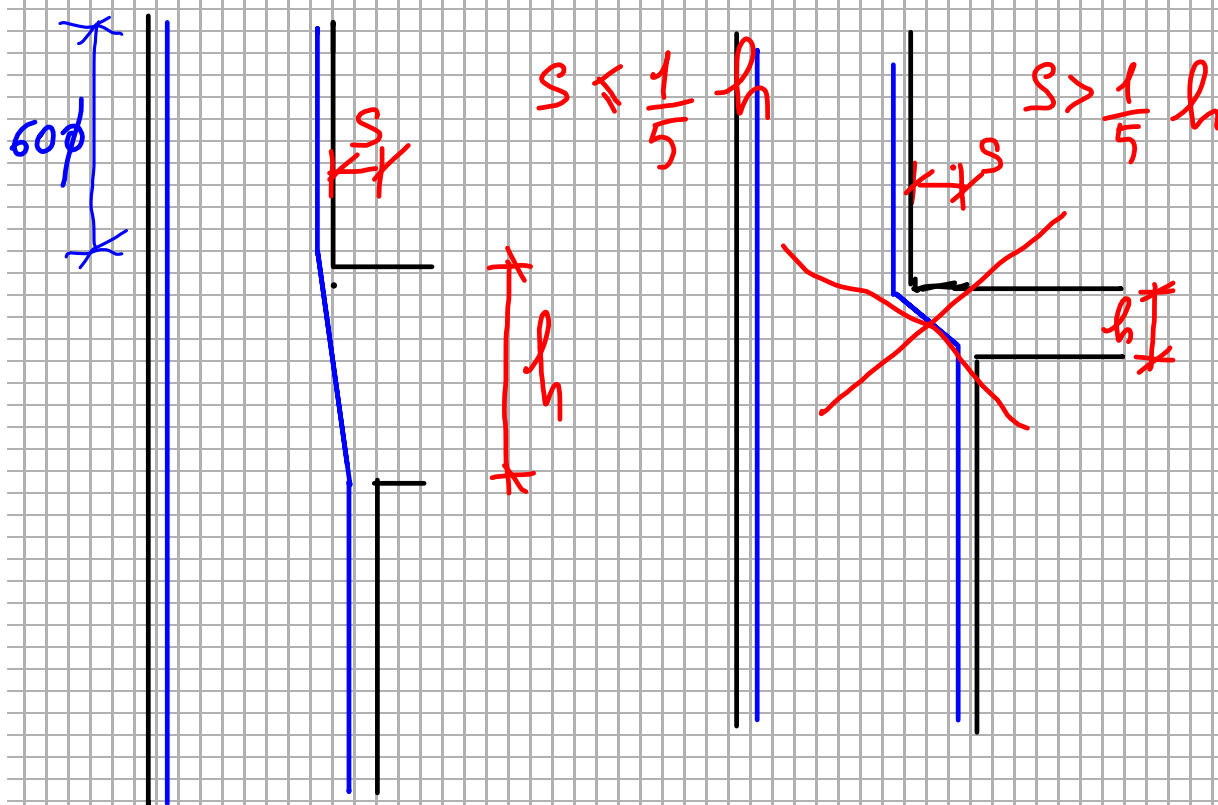
	N_{Ed}	
7	369,8	$\downarrow P_2$
6	739,6	$\downarrow P_2$ 7
5	1109,4	6
4	1479,2	$\uparrow N_{Ed}$
3	1849,0	
2	2218,8	
1	2588,6	

	N_{Ed}	$A_c (cm^2)$
7	369,8	260,4
6	739,6	
5	1109,4	
4	1479,2	
3	1849,0	
2	2218,8	
1	2588,6	

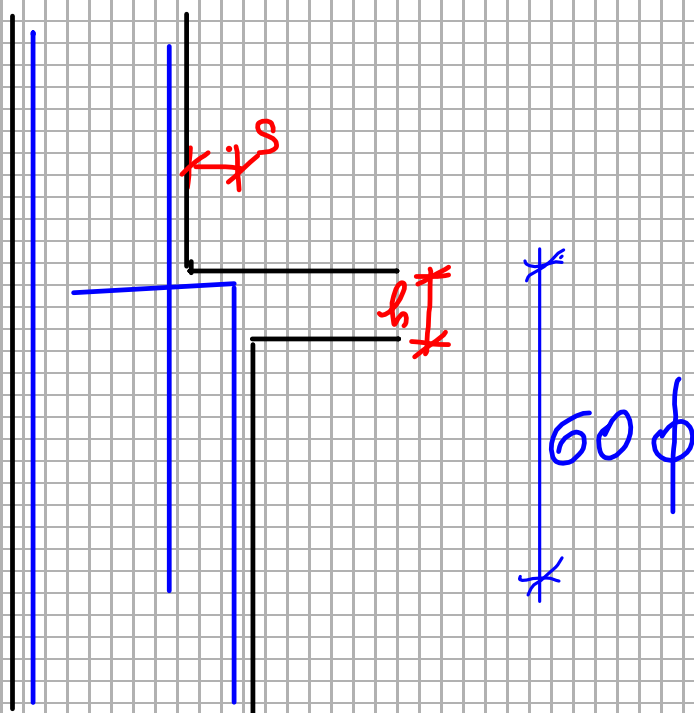
$$A_c = \frac{N_{Ed}}{f_{cd}} = \frac{369,8}{14,2} \times \frac{10^3}{10^2} = 260,4 \text{ cm}^2$$

	N_{Ed}	$A_c (cm^2)$	Sezione
7	369,8	260,4	30x30 (900 cm ²)
6	739,6	520,8	30x30
5	1109,4	781,2	30x30
4	1479,2	1041,6	30x40 (1200 cm ²)
3	1849,0	1302,0	30x50 (1500 cm ²)
2	2218,8	1562,4	30x60 (1800 cm ²)
1	2588,6	1822,8	30x70 (2100 cm ²)

RISEGHE



RISEGHAE



	N_{Ed}	$A_c (cm^2)$	A_s
7	369,8	900	1,89
6	739,6	900	3,78
5	1109,4	900	5,67
4	1479,2	1200	7,56
3	1849,0	1500	9,45
2	2218,8	1800	11,34
1	2588,6	2100	13,23

$$A_s = \frac{0,2 N_{Ed}}{f_{yd}} = \frac{368,8}{391,3} \times 10 = 1,89 \text{ cm}^2$$

	N_{Ed}	$A_c (cm^2)$	A_s	A_{smin}	A_s
7	369,8	900	1,89	<u>5,4</u>	5,4
6	739,6	900	3,78	<u>5,4</u>	5,4
5	1109,4	900	<u>5,67</u>	5,4	5,67
4	1479,2	1200	<u>7,56</u>	7,2	7,56
3	1849,0	1500	<u>9,45</u>	9,0	9,45
2	2218,8	1800	<u>11,34</u>	10,8	11,34
1	2588,6	2100	<u>13,23</u>	12,6	13,23

$$A_s \geq \cancel{0,3\%} A_c$$

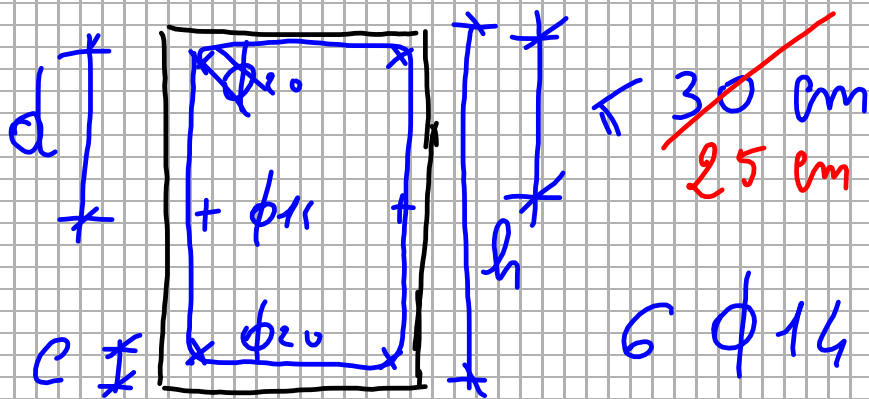
0,6%

	N_{Ed}	$A_c (cm^2)$	A_s	barra
7	369,8	900	5,4	4 $\phi 14$
6	739,6	900	5,4	4 $\phi 14$ (6,16)
5	1109,4	900	5,67	4 $\phi 14$
4	1479,2	1200	7,56	6 $\phi 14$ (9,24)
3	1849,0	1500	9,45	8 $\phi 14$ (12,32)
2	2218,8	1800	11,34	8 $\phi 14$
1	2588,6	2100	13,23	10 $\phi 14$ (15,1)

$$\phi_s \geq 12 \text{ mm}$$

$$\phi_{14} \quad A_s = 1,54 \text{ cm}^2$$

$$\phi_{20} \quad A_s = 3,14 \text{ cm}^2$$



$$c = c + \phi_{st} + \frac{\phi_e}{2} = 30 + 8 + \frac{20}{2} = 48 \text{ mm}$$

$$d = \frac{70 - 2 \times 5}{2} = 30 \text{ cm}$$

50 mm
5 cm

$$\phi_{st} \geq \frac{1}{4} \phi_{l, \min} \geq 6 \text{ mm}$$

$$\frac{14}{4} = 3,5 \text{ cm}$$

$\phi 8$

NTE 2008

$$S_{st} \leq 12 \phi_{l, \min} = 12 \times 14 = 168 \text{ mm}$$

16,8 cm

EC2

$$S_{st} \leq 20 \phi_{l, \min}$$

$\phi 8 / 15$

$$S_{st} \leq 0,6 \cdot 20 \phi_{l, \min}$$

$$0,6 \times 16,8 = 10,1 \text{ cm}$$

$\phi 8 / 10$

30×70 