

C/18188 BR

Calcolo N.

Pagina N.

INA - CASA ISTITUTO CASE POPOLARI DI BRINDISI

Calc.n. 433 del 15.7.58

COSTRUZIONE DI CASE PER LAVORATORI IN LOCALITA'

COMMENDA -OVEST NEL COMUNE DI BRINDISI

Impresa : Consorzio Ravennate Coop.Produzione e Lavoro

Calcoli statici delle strutture c.a.

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GENERALITÀ

I calcoli delle strutture sono stati eseguiti secondo le norme del vigente regolamento.

Si preve che il conglomerato venga confezionato con cemento idraulico normale tipo "500" e che le armature siano di acciaio omogeneo.

Le strutture dei solai saranno di tipo misto con volterrane di altezza cm.14 e interasse cm.40.

Sulle volterrane si stenderà una soletta in calcestruzzo di spessore cm.5.

I vari sovraccarichi agenti sulle strutture orizzontali hanno i valori prescritti dal Capitolato d'Appalto e precisamente :

250 Kg/mq. per i solai e 400 Kg/mq. per scale e balconi.



S O L A IAnalisi dei carichi :

Solaio laterizio I4x40 cm.	100,- Kg/m ²
Soletta 5 cm.	110,- "
Pavimento e intonaco	70,- "
Sovraccarico accidentale	250,- "
	530,- Kg/m ²
Tramezzatura distribuita	100,- "
	630,- Kg/m ²

Corpi B_A e B_C

Campate di 5,05 m. e 4,60 m. in continuit  sull'appoggio centrale e parzialmente incastrate sugli appoggi laterali.

$$L = 5,05 \text{ m.}$$

$$M_{mx} = 630 \times 5,05^2 \times 1,05 \times 0,0715 = 1200 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{1200}} = 0,505$$

$$\sigma_c = 39 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 "$$

$$A_r = 0,152 \times \sqrt{1200} = 5,25 \text{ cm}^2 \text{ per m.}$$

Si provvede con 1 $\varnothing$ 12 d. + (1 $\varnothing$ 12 alt. 1 $\varnothing$ 10) p. ogni 40 cm. pari a $\frac{2,10}{0,40} = 5,25 \text{ cm}^2 \text{ per m.}$

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$$L = 4,60 \text{ m.}$$

$$M_{\text{mx}} = 630 \times 4,60^2 \times 1,05 \times 0,0715 = 1000 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{1000}} = 0,553$$

$$\sigma_c = 35 \text{ Kg/cm}^2$$

$$\sigma_t = 1400 \text{ "}$$

$$A_r = 0,138 \times \sqrt{1000} = 4,36 \text{ cm}^2 \text{ per m.}$$

Si provvede con 1 $\varnothing$ 10 d + (1 $\varnothing$ 10 alt. 1 $\varnothing$ 12) p ogni 40 cm.

$$\text{pari a } \frac{1,75}{0,40} = 4,37 \text{ cm}^2 \text{ per m.}$$

Appoggio centrale

$$- M = \frac{630 \times}{96,50} (4,60^3 + 5,05^3) = 1470 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{1470}} = 0,456$$

$$\sigma_c = 42 \text{ Kg/cm}^2$$

$$\sigma_t = 1400 \text{ "}$$

$$A_r = 0,170 \times \sqrt{1470} = 6,50 \text{ cm}^2 \text{ per m.}$$

Abbiamo : (1 $\varnothing$ 10 alt 1 $\varnothing$ 12) x 2 più 1 $\varnothing$ 10 sp. ogni 40 cm.

$$\text{pari a } \frac{2,71}{0,40} = 6,76 \text{ cm}^2 \text{ per m.}$$



Balcone 2 - 3 - 4Analisi dei carichi

Peso proprio: 0,11 x 1,00 x 2500	275,- Kg/m ²
Pavimento e intonaco	70,- "
Sovraccarico accidentale:	400,- "
	745,- Kg/m ²
Parapetto metallico	20,- Kg/m

$$L = 1,10 \text{ m.}$$

$$M_1 = 745 \times 1,10^2 \times 0,50 + 20 \times 1,10 = 450 + 22 = 472 \text{ Kgm.}$$

$$H = 12 \text{ cm.}$$

$$h = 10,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{10,50}{\sqrt{472}} = 0,48$$

$$\sigma_c = 40 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \text{ "}$$

$$A_f = 0,160 \times \sqrt{472} = 3,50 \text{ cm}^2 \text{ per m.}$$

Abbiamo : al balcone 2 dal solaio (1 Ø 10 alt. 1 Ø 12)p +
 1 Ø 16 sp. pari a 2,97 cm² per travetto pari a 7,45 cm² per
 m. al balcone 3 dal solaio : (1 Ø 8 alt. 1 Ø 10) + 1 Ø 14
 pari a $\frac{2,185}{0,40} = 5,35 \text{ cm}^2 \text{ per m.}$

$$\text{Al balcone 4 : } 1 \text{ Ø } 8 + 1 \text{ Ø } 10 \text{ a } 31 \text{ cm. pari a } \frac{1,29}{0,31} \\ = 4,17 \text{ cm}^2 \text{ per m.}$$

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Corpi agli angoli B e I

$$q = 630 \text{ Kg/m}^2$$

$$L = 3,90 \text{ m}$$

$$M_{\text{mx}} = 630 \times 3,90^2 \times 1,05 \times 0,0715 = 720 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{720}} = 0,653$$

$$\sigma_c = 29 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 0,116 \times \sqrt{720} = 3,11 \text{ cm}^2 \text{ per m.}$$

I $\emptyset$ 10 d + I $\emptyset$ 8 p ogni 40 cm. equivalgono a :

$$\frac{1,29}{0,40} = 3,22 \text{ cm}^2 \text{ per m.}$$

$$L = 3,55 \text{ m.}$$

$$M_{\text{mx}} = 630 \times 3,55^2 \times 1,05 \times 0,0715 = 590 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{590}} = 0,721$$

$$\sigma_c = 26 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 0,104 \times \sqrt{590} = 2,52 \text{ cm}^2 \text{ per m.}$$

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I Ø 8 d + I Ø 8 p. ogni 40 cm. equivalgono a :

$$\frac{I,0I}{0,40} = 2,522 \text{ cm}^2 \text{ per m.}$$

Appoggio centrale

$$- M = \frac{630 \times (3,55^3 + 3,90^3)}{74,50} = 880 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{880}} = 0,59$$

$$\sigma_c = 33 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \text{ "}$$

$$A_f = 0,128 \times \sqrt{880} = 3,80 \text{ cm}^2 \text{ per m.}$$

Abbiamo : 2 Ø 8 p. + I Ø 8 sp. ogni 40 cm. pari a :

$$\frac{I,5I}{0,40} = 3,80 \text{ cm}^2 \text{ per m.}$$

$$L = 3,65 \text{ m}$$

$$M_{mx} = 630 \times 3,65^2 \times 1,05 \times 0,0830 = 720 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{720}} = 0,653$$

$$\sigma_c = 29 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \text{ "}$$

$$A_f = 3,11 \text{ cm}^2 \text{ per m.}$$

Si arma con I Ø 10 d + I Ø 8 p. ogni 40 cm. pari a

$$\frac{I,29}{0,40} = 3,22 \text{ cm}^2 \text{ per m.}$$



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B A L C O N ECarico :

Peso proprio	: 0,12 x 2500	300,- Kg/m ²
Pavim. e intonaco :		70,- "
Sovraccarico accidentale :		400,- "
		770,- Kg/m ²
Parapetto		20,- Kg/m

$$L = 1,60 \text{ m.}$$

$$M_1 = 770 \times 1,60^2 \times 0,50 + 20 \times 1,60 = 980 + 32 = 1012 \text{ Kgm.}$$

$$H = 15 \text{ cm.}$$

$$h = 13,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{13,50}{\sqrt{1012}} = 0,425$$

$$\sigma_c = 44 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$K = 0,50$$

$$A_r = 0,180 \times \sqrt{1012} = 5,70 \text{ cm}^2 \text{ per m.}$$

$$A'_r = 2,85 \text{ cm}^2 \text{ per m.}$$

Si provvede con 3 $\varnothing$ 10 a 40 cm. pari a $\frac{2,36}{0,40} = 5,90 \text{ cm}^2$
per m.

$$\tau_{mx} = \frac{1250}{100 \times 12} = 1,04 \text{ Kg/cm}^2$$

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Corpi agli angoli A e H

$$q = 630 \text{ Kg/m}^2$$

$$L = 4,10$$

$$M_{\max} = 630 \times 4,10^2 \times 1,05 \times 0,0715 = 795 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{795}} = 0,62$$

$$\sigma_c = 31 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 "$$

$$A_r = 0,121 \times \sqrt{795} = 3,42 \text{ cm}^2 \text{ per m.}$$

Si provvede con 1 $\varnothing$ 10 d + 1 $\varnothing$ 8 alt. 1 $\varnothing$ 10 p. a 40 cm.

$$\text{pari a } \frac{1,435}{0,40} = 3,59 \text{ cm}^2 \text{ per m.}$$

$$L = 3,25 \text{ m.}$$

$$M_{\max} = 630 \times 3,25^2 \times 1,05 \times 0,0715 = 500 \text{ Kgm.}$$

$$r = \frac{17,50}{\sqrt{500}} = 0,783$$

$$A_r = 0,096 \times \sqrt{500} = 2,15 \text{ cm}^2 \text{ per m.}$$

(1 $\varnothing$ 8 alt. 1 $\varnothing$ 6) d + 1 $\varnothing$ 8 p. a 40 cm. equivalgono

$$\text{a } \frac{0,89}{0,40} = 2,22 \text{ cm}^2 \text{ per m.}$$



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Appoggio centrale

$$- M = \frac{630 \times (3,25^3 + 4,10^3)}{73,50} = 885 \text{ Kgm.}$$

$$r = \frac{17,50}{\sqrt{885}} = 0,59 \quad \sigma_c = 33 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \quad "$$

$$A_f = 0,13 \times \sqrt{885} = 3,87 \text{ cm}^2$$

Abbiamo (1 Ø 8 + 1 Ø 8 alt 1 Ø 10) p + 1 Ø 8 sp. pari

$$a : \frac{1,645}{0,40} = 4,11 \text{ cm}^2 \text{ per m.}$$

Solai della parte bassa

Sranno del tipo a camera d'aria, in laterizio e c.a.
Altezza 35 cm. compresa la soletta di spessore 5 cm.
Interasse nervature 80 cm.

Analisi dei carichi

Peso proprio solaio in opera	200,- Kg/m ²
Lastronato, pendenza, impermeabilizz.	200,- "
Sovraccarico accidentale	250,- "
	650,- Kg/m ²

Carico per m. di travetto

$$q = 650 \times 0,80 \times 520 \text{ Kg/m.}$$

$$L = 4,55 \text{ m.}$$

$$M_{\text{max}} = 520 \times 4,55^2 \times 1,05 \times 0,091 = 1030 \text{ Kgm.}$$

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$$H = 35 \text{ cm.}$$

$$h = 32 \text{ cm.}$$

$$b = 80 \text{ cm.}$$

$$r = \frac{32}{\sqrt{1290}} = 0,89$$

$$\sigma_c = 21 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 0,00087 \times 80 \times \sqrt{1290} = 2,50 \text{ cm}^2$$

Si provvede con 1 $\varnothing$ 14 d + 1 $\varnothing$ 12 p. ogni 80 cm.

pari a 2,67 cm²

$$L = 4,10 \text{ m.}$$

$$M_{mx} = 520 \times 4,10^2 \times 1,05 \times 0,091 = 830 \text{ Kgm.}$$

$$r = \frac{32}{\sqrt{1040}} = 0,992$$

$$\sigma_c = 17,00 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 0,00075 \times 80 \times \sqrt{1040} = 1,92 \text{ cm}^2$$

Si provvede con 1 $\varnothing$ 12 d + 1 $\varnothing$ 10 p pari a

1,92 cm² ogni 80 cm.

Appoggio intermedio :

$$- M = \frac{520 \times (4,10^3 + 4,55^3)}{8 \times 8,65} = 1230 \text{ Kgm.}$$

$$H = 35 \text{ cm.}$$

$$h = 33,5 \text{ cm.}$$

$$b = 20 \text{ cm.}$$

$$r = \frac{33,50}{\sqrt{6150}} = 0,427$$

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$$\sigma_c = 44 \text{ Kg/cm}^2$$

$$\sigma_r = 1300 \text{ "}$$

$$A_r = 0,00197 \times 20 \times \sqrt{6150} = 3,06 \text{ cm}^2$$

Abbiamo : (1 Ø I2 + 1 Ø I0) p + 1 Ø I2 sp. pari a
3,05 cm² p.t.

In compressione abbiamo 1 Ø I2 (1 Ø I4) pari a

$$\frac{1 \cdot 13}{3 \cdot 06} = 37 \% \quad \left(\frac{1 \cdot 54}{3 \cdot 06} = 50.5\% \right)$$



Zone a lato dei cortilotti

$$q = 520 \text{ Kg/m}$$

$$L = 4,55 \text{ m.}$$

$$M_{\text{max}} = 520 \times 4,55^2 \times 1,05 \times 0,125 = 1410 \text{ Kgm.}$$

$$H = 35 \text{ cm.}$$

$$h = 32 \text{ cm.}$$

$$b = 80 \text{ cm.}$$

$$r = \frac{32}{\sqrt{1760}} = 0,763$$

$$\sigma_c = 24 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 0,0009 \times 80 \times \sqrt{1760} = 3,02 \text{ cm}^2$$

Si provvede con 1 $\emptyset$ I6 d + 1 $\emptyset$ I2 p. pari a 3,14 cm²



Copertura fabbricati alti

$$q = 650 \times 0,80 = 520 \text{ Kg/m.}$$

$$L = \underline{5,05}$$

$$M_{mx} = 520 \times 5,05^2 \times 1,05 \times 0,091 = 1270 \text{ Kgm.}$$

$$H = 35 \text{ cm.}$$

$$h = 32 \text{ cm.}$$

$$b = 80 \text{ cm.}$$

$$r = \frac{32}{\sqrt{1590}} = 0,803$$

$$\sigma_c = 24 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \text{ "}$$

$$A_f = 0,0009 \times 80 \times \sqrt{1590} = 2,87 \text{ cm}^2$$

Si provvede con 2 $\emptyset$ 14 p.t. pari a 3,08 cm²

$$L = \underline{4,60 \text{ m.}}$$

$$M_{mx} = 520 \times 4,60^2 \times 1,05 \times 0,091 = 1060 \text{ Kgm.}$$

$$b = 80 \text{ cm.}$$

$$r = \frac{32}{\sqrt{1320}} = 0,882$$

$$\sigma_c = 20 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \text{ "}$$

$$A_f = 0,00084 \times 80 \times \sqrt{1320} = 2,44 \text{ cm}^2$$

Si provvede con 1 $\emptyset$ 14 d + 1 $\emptyset$ 12 p. pari a 2,67 cm²

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Appoggio intermedio

$$-M = \frac{520}{8 \times 9,65} (4,60^3 + 5,05^3) = 1530 \text{ Kgm.}$$

$$H = 35 \text{ cm.}$$

$$h = 33,50 \text{ cm.}$$

$$b = 20 \text{ cm.}$$

$$r = \frac{33,50}{\sqrt{7650}} = 0,384$$

$$\sigma_c = 45 \text{ Kg/cm}^2$$

$$\sigma_r = 1200 \text{ "}$$

$$K = 0,60$$

$$A_r = 0,00240 \times 20 \times \sqrt{7650} = 4,20 \text{ cm}^2$$

$$A'_r = 2,52 \text{ cm}^2$$

Abbiamo : (1 Ø I4 + 1 Ø I2) p + 1 Ø I4 sp. pari a 4,21 cm²

Inferiormente : 1 Ø I4 d + 1 Ø I2 sp. pari a 2,67 cm²

$$L = 4,10 \text{ m.}$$

$$M_{mx} = 520 \times 4,10^2 \times 1,05 \times 0,091 = 830 \text{ Kgm.}$$

$$H = 35 \text{ cm.}$$

$$h = 32 \text{ cm.}$$

$$b = 80 \text{ cm.}$$

$$r = \frac{32}{\sqrt{1040}} = 0,992$$

$$A_r = 1,92 \text{ cm}^2$$

Si arma con 1 Ø I2 d + 1 Ø I0 p.



$$L = 3,25 \text{ m.}$$

$$M_{\text{mx}} = 520 \times 3,25^2 \times 1,05 \times 0,091 = 525 \text{ Kgm.}$$

$$r = \frac{32}{\sqrt{660}} = 1,24$$

$$A_r = 0,0006 \times 80 \times \sqrt{660} = 1,24 \text{ cm}^2 \text{ p.t.}$$

Si provvede con 1 $\emptyset$ 10 d + 1 $\emptyset$ 8 p. pari a 1,29 cm^2

Appoggio intermedio

$$- M \frac{520}{8 \times 7,35} (3,25^3 + 4,10^3) = 917 \text{ Kgm.}$$

$$r = \frac{33,5}{\sqrt{4590}} = 0,494$$

$$A_r = 0,00155 \times 20 \times \sqrt{4590} = 2,08 \text{ cm}^2$$

Abbiamo : (1 $\emptyset$ 10 + 1 $\emptyset$ 8) p + 1 $\emptyset$ 10 sp. pari a
 2,09 per travetto

 $L = 3,90 \text{ m.}$

$$M_{\text{mx}} = 520 \times 3,90^2 \times 1,05 \times 0,091 = 755 \text{ Kgm.}$$

$$H = 35 \text{ cm.}$$

$$h = 32 \text{ cm.}$$

$$b = 80 \text{ cm.}$$

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$$r = \frac{32}{\sqrt{950}} = 0,035$$

$$\sigma_c = 19 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 0,00075 \times 80 \times \sqrt{950} = 1,85 \text{ cm}^2 \text{ p.t.}$$

Si provvede con 1 $\varnothing$ 12 d + 1 $\varnothing$ 10 p. pari a 1,92 cm²

$$L = 3,55 \text{ m.}$$

$$M_{\text{max}} = 520 \times 3,55^2 \times 1,05 \times 0,091 = 630 \text{ Kgm.}$$

$$r = \frac{32}{\sqrt{788}} = 1,14$$

$$A_r = 0,0007 \times 80 \times \sqrt{788} = 1,57 \text{ cm}^2$$

Si provvede con 2 $\varnothing$ 10 pari a 1,57 cm²

Appoggio intermedio

$$\Sigma M = \frac{520}{8 \times 7,45} (3,55^3 + 3,90^3) = 905 \text{ Kgm.}$$

$$r = \frac{33,5}{\sqrt{4530}} = 0,498$$

$$A_r = 0,00154 \times 20 \times \sqrt{4530} = 2,08 \text{ cm}^2$$

Abbiamo : 2 $\varnothing$ 10 p + 1 $\varnothing$ 8 sp. pari a 2,08 cm²

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$$L = 3,65 \text{ m.}$$

$$M_{\text{mx}} = 520 \times 3,65^2 \times 1,05 \times 0,120 = 880 \text{ Kgm.}$$

$$H = 35 \text{ cm.}$$

$$h = 32 \text{ cm.}$$

$$b = 80 \text{ cm.}$$

$$r = \frac{32}{\sqrt{1100}} = 0,967$$

$$\sigma_c = 20 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 0,000725 \times 80 \times \sqrt{1100} = 1,92 \text{ cm}^2$$

$$1 \text{ } \emptyset \text{ 12 d} + 1 \text{ } \emptyset \text{ 10 p} = 1,92 \text{ cm}^2 \text{ p.t.}$$

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$$\text{Trave } T_1 = T_2 = T_3$$

$$L = 2,80 \text{ m.}$$

Carico

$$\text{Solaio : } 630 \times I.83 \quad 1150,- \text{ Kg/m}$$

$$\text{Peso proprio : } 500,- "$$

$$\text{Balcone : } 770 \times I,60 + 20 \quad 1250,- "$$

$$2900,- \text{ Kg/m}$$

$$M_{\text{mx}} = 2900 \times 2,80^2 \times 1,05 \times 0,0833 = 2000 \text{ Kgm.}$$

Sopra il I° piano mezzeria

$$H = 45 \text{ cm.}$$

$$h = 42 \text{ cm.}$$

$$b = 40 \text{ cm.}$$

$$r = \frac{42}{\sqrt{5000}} = 0,594$$

$$\sigma_c = 32 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 "$$

$$A_r = 0,00128 \times 40 \times \sqrt{5000} = 3,63 \text{ cm}^2$$

Si provvede con 2 $\emptyset$ I2 d + 1 $\emptyset$ I4 p. pari a 3,80 cm²

Incastro

$$H = 45 \text{ cm.}$$

$$h = 42 \text{ cm.}$$

$$b = 20 \text{ cm.}$$

$$r = 0,42$$

$$\sigma_c = 44 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 "$$

$$K = 0,50 "$$

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$$A_r = 0,00186 \times 20 \times 100 = 3,72 \text{ cm}^2$$

$$A'_r = 1,86 \text{ cm}^2$$

Abbiamo 2 $\varnothing$ 8 d + 1 $\varnothing$ 14 p + 1 $\varnothing$ 12 sp. pari a

3,68 cm² in trazione e 2 $\varnothing$ 12 d in compressione pari

a 2,26 cm²

$$\tau_{mv} = \frac{4060}{20 \times 38} = 5,34 \text{ Kg/cm}^2$$

$$S = \frac{4060 \times 140}{2 \times 38} = 7500 \text{ Kg.}$$

1 $\varnothing$ 14 assorbe :

$$1,54 \times 1400 \times 1,41 = 3040 \text{ Kg.}$$

7 staffe $\varnothing$ 6 assorbono :

$$7 \times 0,56 \times 1400 = 5600 \text{ Kg.}$$

Sopra il piano terra :

Mezzeria e incastro

$$H = 45 \text{ cm.}$$

$$h = 42 \text{ cm.}$$

$$b = 40 \text{ cm.}$$

$$r = 0,594$$

$$A_r = 3,63 \text{ cm}^2$$

$$\tau_{mx} = \frac{4060}{40 \times 38} = 2,70 \text{ Kg/cm}^2$$



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Trave T₄

Carico :

Peso proprio	500,- Kg/m
Balcone e contropeso	1750,- "
Sovraccarico	230,- "
	2480,- Kg/m

L = 2,80 m. mezzeria

$$M_{\max} = \frac{2480 \times 2,80^2 \times 1,85}{12} = 1700 \text{ Kgm.}$$

H = 45 cm.

h = 42 cm.

b = 40 cm.

$$r = \frac{42}{\sqrt{4250}} = 0,64$$

$$\sigma_c = 30 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \text{ Kg/cm}^2$$

$$A_f = 0,00120 \times 40 \times \sqrt{4250} = 3,11 \text{ cm}^2$$

Si provvede con 2 Ø 10 d + 1 Ø 14 p pari a cm² 3.11

Appoggio

b = 20 cm.

$$r = \frac{42}{\sqrt{8500}} = 0,456$$

$$\sigma_c = 43 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 \text{ "}$$

$$A_f = 0,00175 \times 20 \times \sqrt{8500} = 3,22 \text{ cm}^2$$



Abbiamo : 2 $\emptyset$ 8 d + 2 $\emptyset$ 12 sp.

pari a 3,27 cm²

$$\tau_{mx} = \frac{3500}{20 \times 38} = 4,60 \text{ Kg/cm}^2$$

$$S = \frac{3500 \times 140}{2 \times 38} = 6500 \text{ Kg.}$$

1 $\emptyset$ 14 p. assorbe :

$$1,54 \times 1400 \times 1,41 = 3200$$

6 staffe $\emptyset$ 6 assorbono :

$$6 \times 800 = 4800 \text{ Kg.}$$



Trave T₅

L = 2,10 m

Carico :

Solaio : $630 \times \left(\frac{3,55 + 3,90}{2} \right)$

2400, - Kg/m

Peso proprio e sovraccarico
 $250 + 430 \times 0,45$

450, - "

2850, - Kg/m.

Mezzeria

$M_{\max} = 2850 \times 2,10^2 \times 1,05 \times 0,0833 = 1100 \text{ Kg} \cdot \text{m}.$

H = 20 cm.

h = 18 cm.

b = 60 cm.

$r = \frac{18}{\sqrt{1840}} = 0,42$

$\sigma_c = 44 \text{ Kg/cm}^2$

$\sigma_t = 1400 \text{ "}$

K = 0,50

$A_f = 0,0018 \times 60 \times \sqrt{1840} = 4,64 \text{ cm}^2$

$A'_{f_1} = 2,32 \text{ cm}^2$

Provvediamo con 3 $\varnothing$ 10 d in compressione e con 3 $\varnothing$ 10 d
+ 2 $\varnothing$ 14 p in trazione.

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Appoggio

$$b = 43 \text{ cm.}$$

$$r = \frac{18}{\sqrt{2560}} = 0,356$$

$$\sigma_c = 45 \text{ Kg/cm}^2$$

$$\sigma_r = 0,50$$

$$A_r = 0,0031 \times 43 \times \sqrt{2560} = 6,75 \text{ cm}^2$$

$$A'_r = 3,40 \text{ cm}^2$$

Abbiamo : 3 Ø IO d + 2 Ø I4 p. + I Ø I4 sp. pari a
6,98 cm² in trazione e 3 Ø IO d + I Ø I2 sp. in compressione.

Taglio

$$T_{mx} = 2850 \times 1,05 = 3000 \text{ Kg.}$$

$$\tau_{mx} = \frac{3000}{43 \times 16} = 4,35 \text{ Kg/cm}^2$$

$$S = \frac{3000 \times 105}{2 \times 16} = 10000 \text{ Kg.}$$

2 Ø I4 piegati a 45° assorbono :

$$3,08 \times 1400 \times 1,41 = 6100 \text{ Kg.}$$

5 staffe Ø 6 assorbono :

$$5 \times 0,57 \times 1400 = 4000 \text{ Kg.}$$

•/•



T₆ (al piano terra)

$$L = 2,60 \text{ m.}$$

Carico :

$$\text{Solai : } 630 \times \frac{5,05}{2} \times 3 \times 0,75 \quad 3600,- \text{ Kg/m.}$$

$$\text{Muratura: } 480 \times 7,00 \times 0,75 \quad 2500,- \text{ "}$$

$$\text{Peso p.} \quad 450,- \text{ "}$$

$$6550,- \text{ Kg/m.}$$

$$M_{\text{mx}} = 6550 \times 2,60^2 \times 1,05 \times 0,0833 = 3900 \text{ Kgm.}$$

$$H = 45 \text{ cm.}$$

$$h = 42 \text{ cm.}$$

$$b = 45 \text{ cm.}$$

$$r = \sqrt{\frac{42}{8700}} = 0,45$$

$$\sigma_c = 43 \text{ Kg/cm}^2$$

$$\sigma_t = 1400 \text{ "}$$

$$K = 0,25$$

$$A_r = 0,0017 \times 45 \times \sqrt{8700} = 7,15 \text{ cm}^2$$

$$A_r' = 1,79 \text{ cm}^2$$

Si provvede con 3 $\varnothing$ I2 d + 2 $\varnothing$ I6 p. pari a 7,41 cm²
in trazione e con 2 $\varnothing$ 8 + 1 $\varnothing$ 10 in compressione

Taglio

$$T_{\text{mx}} = 6550 \times 1,30 = 8500 \text{ Kg.}$$

$$\tau_{\text{mx}} = \frac{8500}{45 \times 38} = 4,96 \text{ Kg/cm}^2$$

./.



$$S = \frac{8500 \times 130}{2 \times 38} = 14600 \text{ Kg.}$$

2 $\varnothing$ I6 piegati a 45° assorbono

$$4,02 \times 1,41 \times 1400 = 7900 \text{ Kg.}$$

8,5 staffe $\varnothing$ 6 assorbono

$$8,5 \times 0,57 \times 1400 = 6800 \text{ Kg.}$$

Si metteranno $8,5 \times 2 = 17$ staffe per l'intera trave

•/•



T7 - T7'

$$L = 2,50 \text{ m.}$$

Carico :

$$\text{Solai : } 630 \times \frac{4,10}{2} \times 3 \times 0,75 \quad 2900, - \text{Kg/m}$$

Muratura:

$$480 \times 7,00 \times 0,75 \quad 2500, - "$$

$$\text{Peso proprio} \quad 450, - "$$

$$5850, - \text{Kg/m}$$

$$M_{mx} = 5850 \times 2,50^2 \times 1,05 \times 0,0833 = 3200 \text{ Kgm.}$$

$$H = 45 \text{ cm.}$$

$$h = 42 \text{ cm.}$$

$$b = 45 \text{ vcm.}$$

$$r = \frac{42}{\sqrt{7120}} = 0,497$$

$$\sigma_c = 40 \text{ Kg/cm}^2$$

$$\sigma_f = 1400 "$$

$$A_f = 0,00156 \times 45 \times \sqrt{7120} = 6,00 \text{ cm}^2$$

Si provvede con 3 $\emptyset$ I2 d + 2 $\emptyset$ I4 p pari a 6,47 cm²

Taglio

$$T_{mx} = 5850 \times 1,25 = 7300 \text{ Kg.}$$

$$\tau_{mx} = \frac{7300}{45 \times 38} = 4,30 \text{ Kg/cm}^2$$

$$S = \frac{7300 \times 125}{2 \times 38} = 12000 \text{ Kg.}$$

2 $\emptyset$ I4 piegati

$$3,08 \times 1970 = 6100 \text{ Kg.}$$

7,5 staffe $\emptyset$ 6

$$7,5 \times 800 = 6000 \text{ Kg.}$$



T8

$$L = 2,80 \text{ m}$$

carico :

$$\text{Muratura} : 480 \times 7,00 \times 0,80$$

$$2700,- \text{ Kg/m}$$

Peso proprio :

$$450,- "$$

$$3150,- \text{ Kg/m}$$

$$M_{\text{mx}} = 3150 \times 2,80^2 \times 1,05 \times 0,0833 = 2160 \text{ Kgm.}$$

$$H = 45 \text{ cm.}$$

$$h = 42 \text{ cm.}$$

$$b = 45 \text{ cm.}$$

$$r = \frac{-42}{\sqrt{4800}} = 0,60$$

$$\sigma_c = 32 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ Kg/cm}^2$$

$$A_r = 0,00127 \times 45 \times \sqrt{4800} = 4,00 \text{ cm}^2$$

Si provvede con 2 $\varnothing$ 12 d + 1 $\varnothing$ 16 p. pari a 4,27 cm²

$$\tau_{\text{mx}} = \frac{4400}{45 \times 38} = 2,65 \text{ Kg/cm}^2$$

./.



S C A L A

Sara' formata da gradini in c.a. a sbalzo.

Carico :

Peso proprio gradino : $0,30 \times 0,13 \times 1,05 \times 2500 =$

100 , - Kg.

Intonaco e rivestimento

100, - "

Sovraccarico : $400 \times 0,30 \times 1,05 \times 1,50$

200, - "

400, - Kg.

Parapetto

14, - "

$L = 1,05 \text{ m}$

$$M_1 = 400 \times 1,05 \times 0,50 + 14 \times 1,05 + 75 = 210 + 15 + 75 =$$

$$= 300 \text{ Kgm.}$$

$b = 30 \text{ cm.}$ *30 cm* $\sigma_c = 45 \text{ Kg/cm}^2$

$$h' = 0,423 \sqrt{\frac{1000}{\sigma_c}} = 13,60 \text{ cm.}$$

Alzata di 16,50 cm.

$$13,60 = \frac{16,50}{2} + x - 2$$

$$x = 13,60 - 8,25 + 2 = 7,35 \text{ cm} \approx 7,50 \text{ cm.}$$

$$A_s = 0,00217 \times 30 \times \sqrt{\frac{1000}{\sigma_s}} = 2,06 \text{ cm}^2$$

Si provvede con 3 $\varnothing 8$ + 1 $\varnothing 10$ pari a $2,30 \text{ cm}^2$ per gradino.



•/•

$$\tau_{\text{max}} = \frac{450}{30 \times 12} = 1.25 \text{ Kg/cm}^2$$

Alzata di 19,5 (ultima rampa)

$$13,60 = \frac{19,50}{2} + x - 2$$

$$x = 13,60 - 9,75 + 2 = 5,85 \approx 6,00 \text{ cm.}$$

Si arma come in precedenza.



PIANEROTTOLICarico :

Come solai

530 Kg/m²

Maggiorazione sovraccarico

150,-"

680,-Kg/m²

$$L = 2,20 \text{ m.}$$

$$M_{\text{mx}} = 680 \times 2,20^2 \times 1,05 \times 0,10 = 345,00 \text{ Kgm.}$$

$$H = 19 \text{ cm.}$$

$$h = 17,50 \text{ cm.}$$

$$b = 100 \text{ cm.}$$

$$r = \frac{17,50}{\sqrt{345}} = 0,94$$

$$\sigma_c = 20 \text{ Kg/cm}^2$$

$$\sigma_r = 1400 \text{ "}$$

$$A_r = 1,52 \text{ cm}^2 \text{ per m.}$$

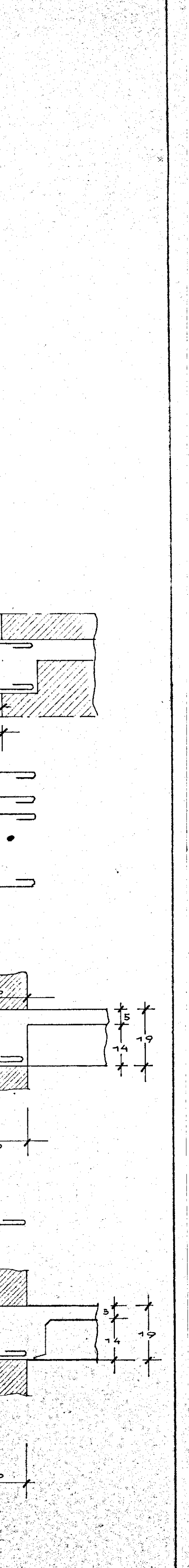
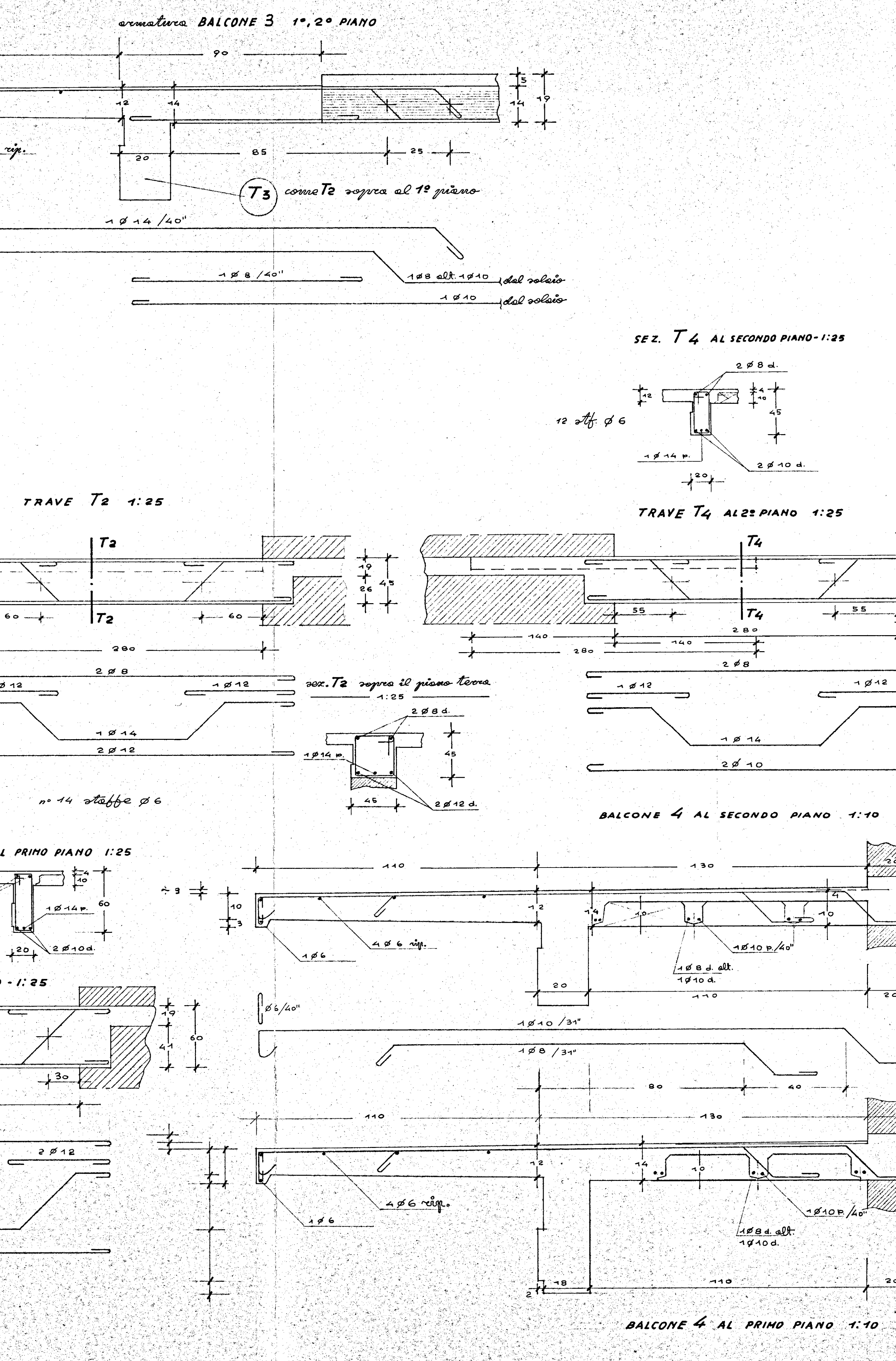
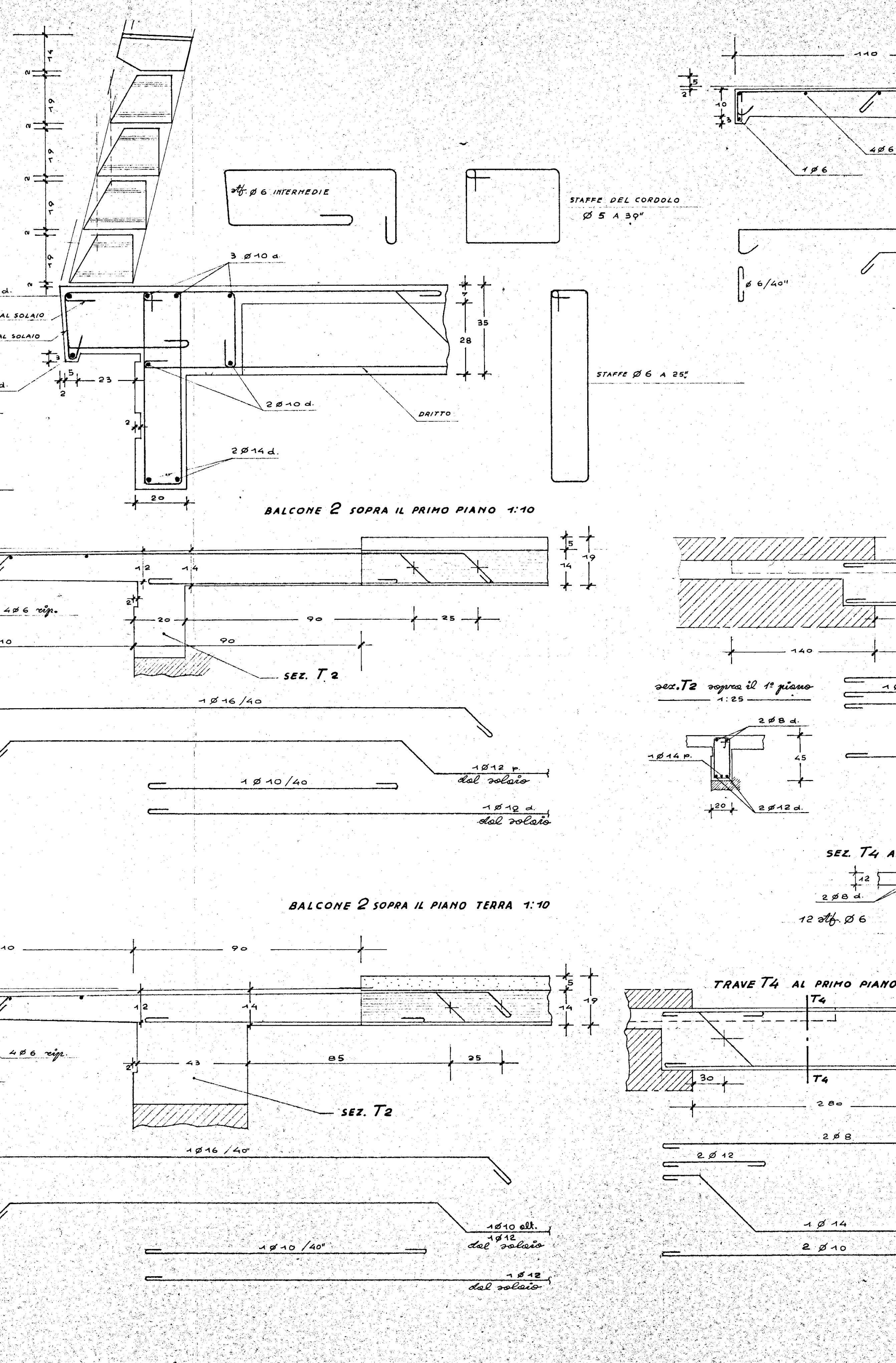
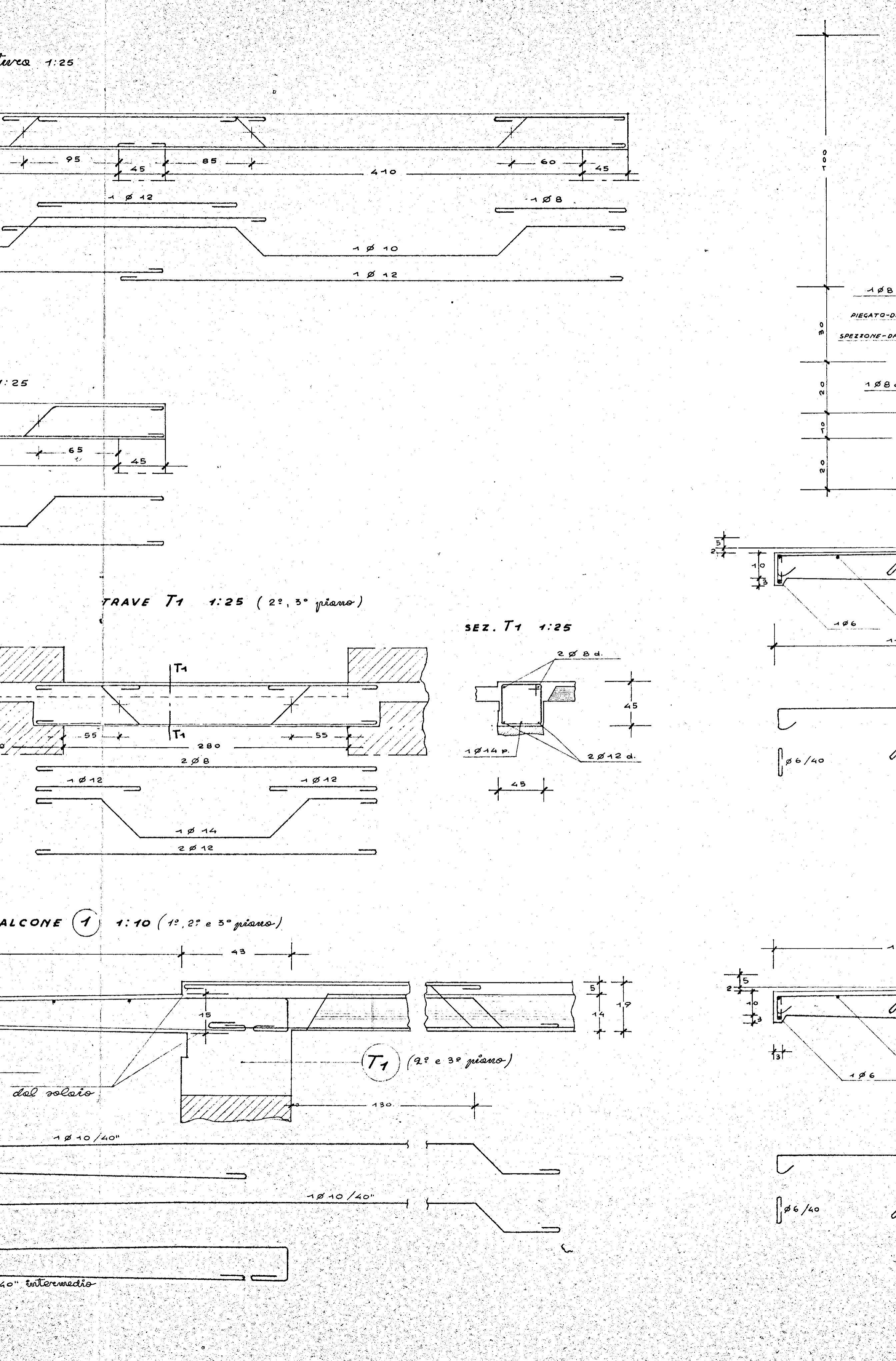
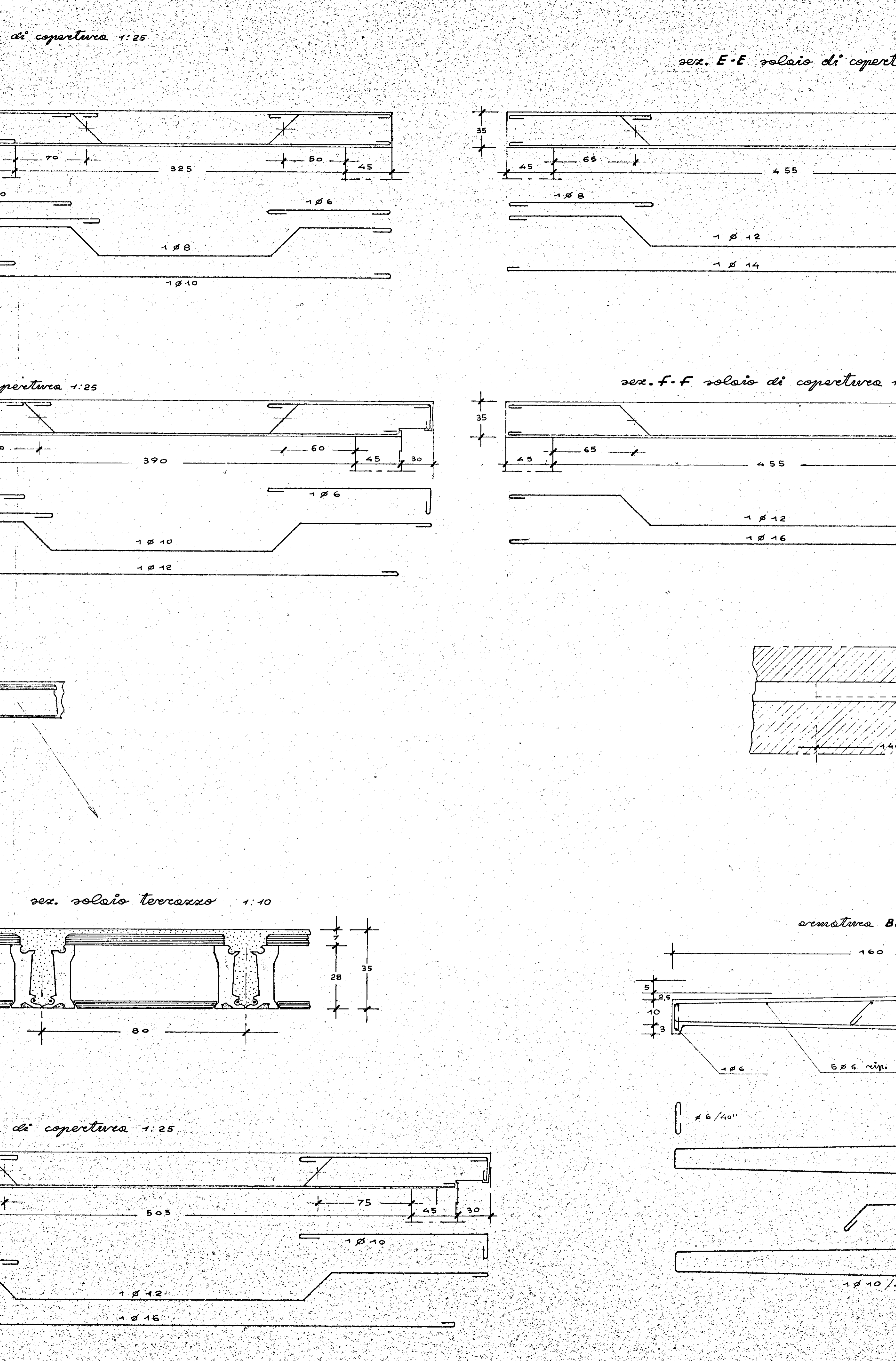
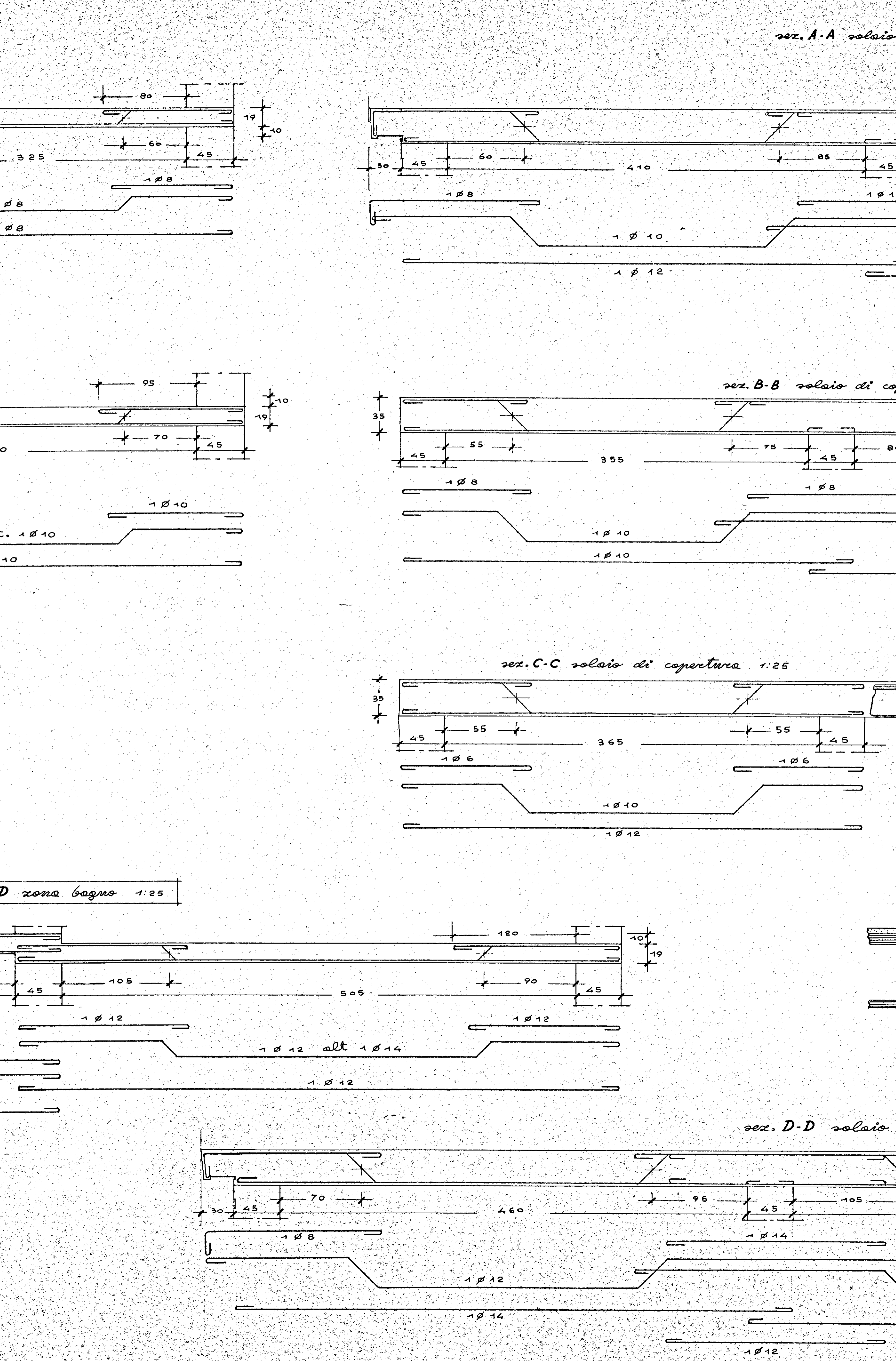
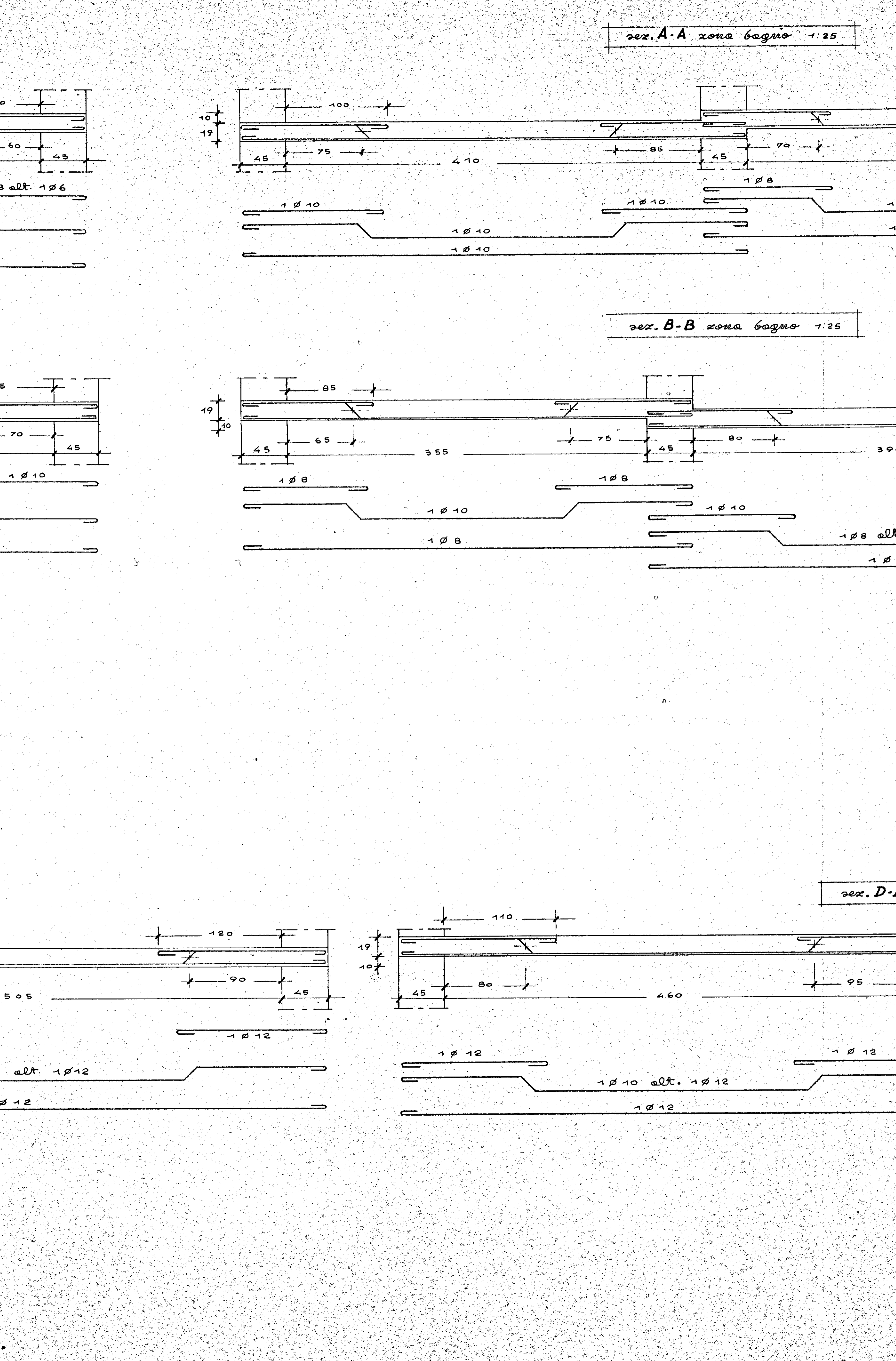
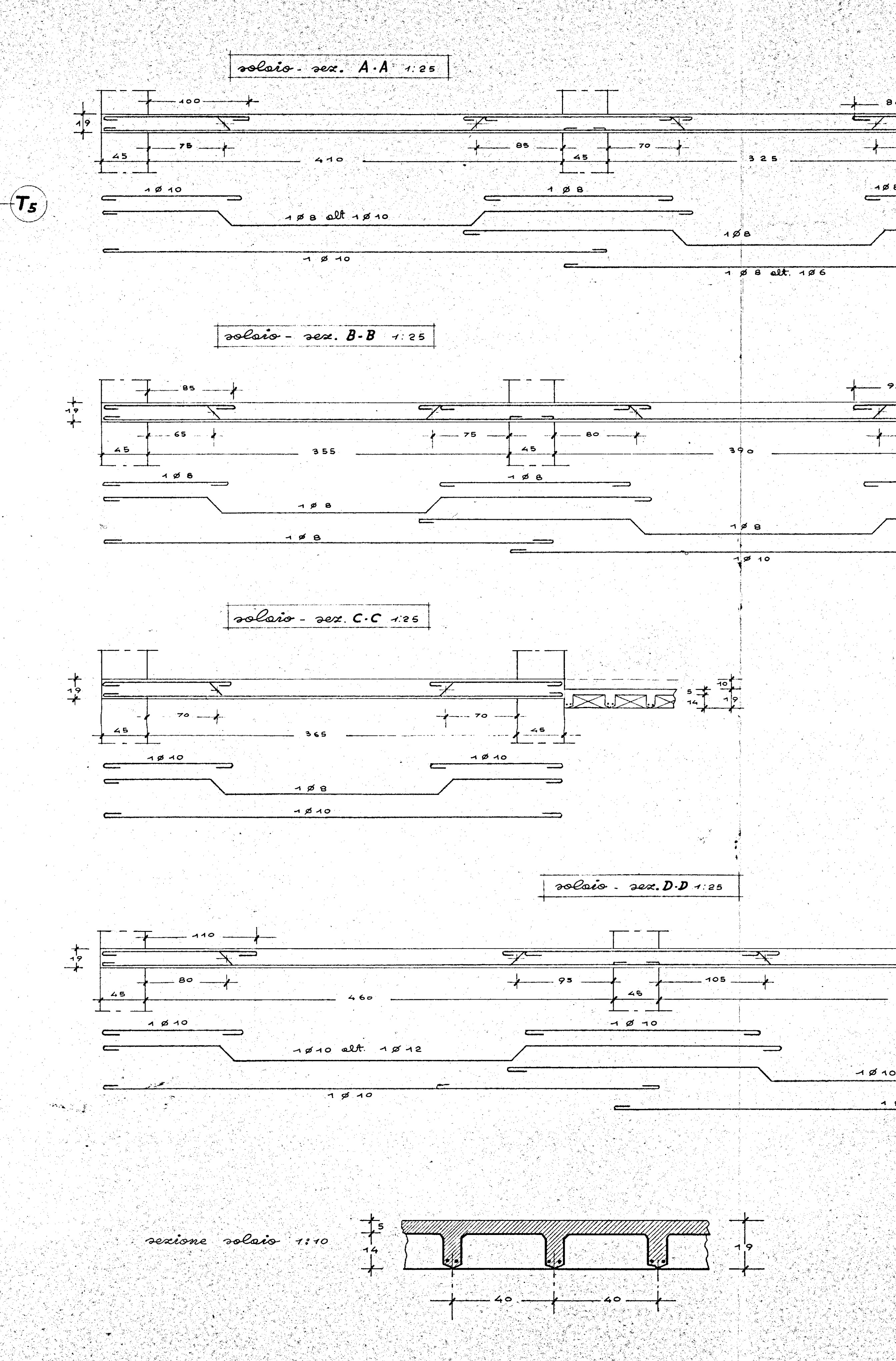
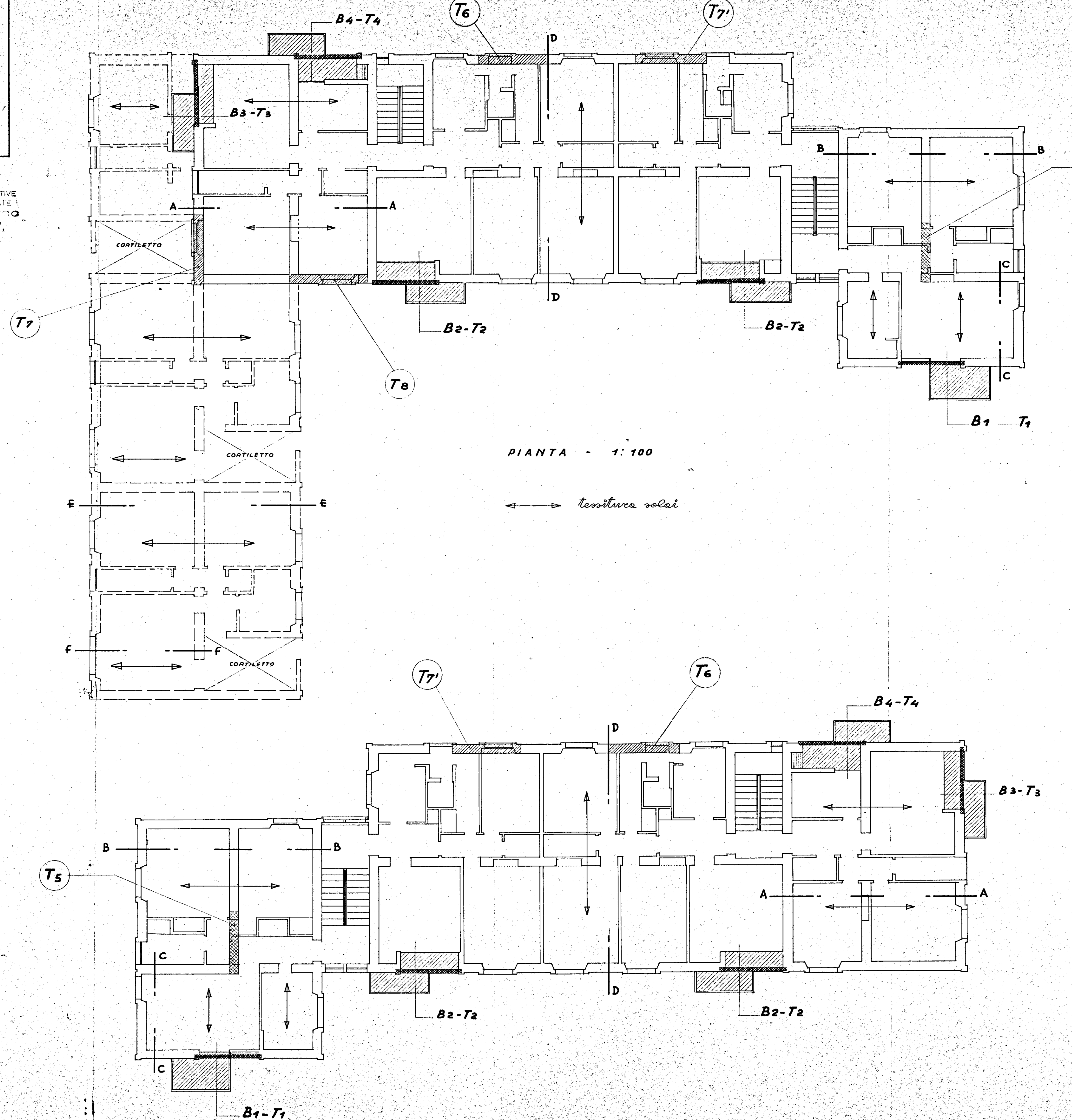
Si arma con 1 $\varnothing$ 8 d + 1 $\varnothing$ 6 p a 40 cm.

$$\text{pari a } \frac{0,78}{0,40} = 1,95 \text{ cm}^2 \text{ per m.}$$



ACER
CONTRATTO EDIZIONE N. 1000
LAVORO: CASA POPOLARE - RIONE CONCORDIA, QUARTIERE
PIANTA - EDIFICAZIONE
SOLAI - TRAVI IN ACCIAIO - BALCONI
1:25 - 1:10

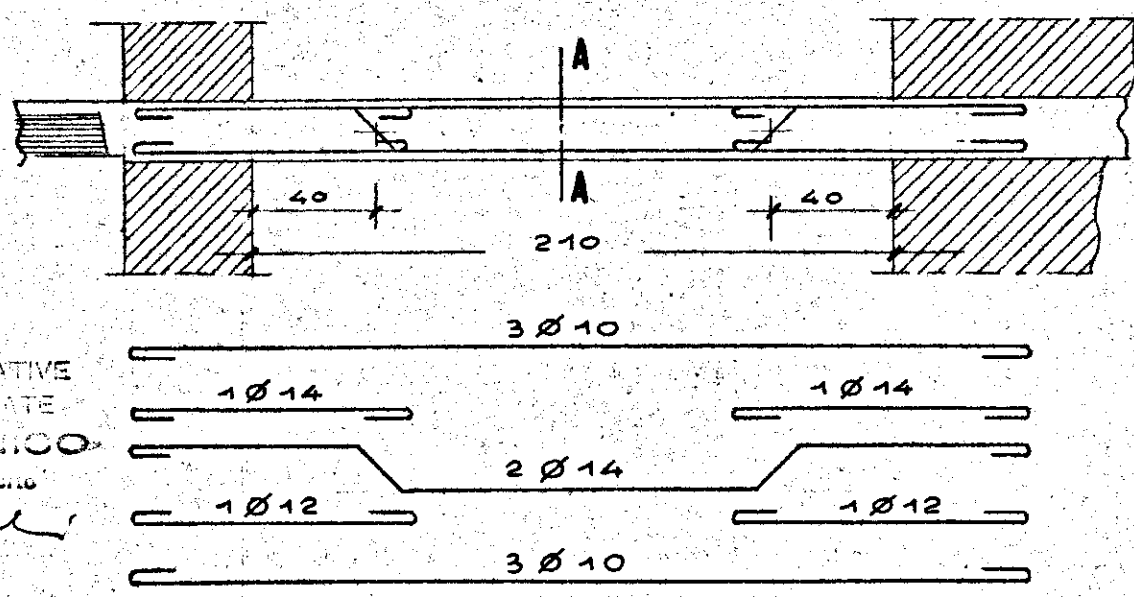
ALLEGATO COSTRUTTIVO
EDIZIONE N. 1000
1:25 - 1:10



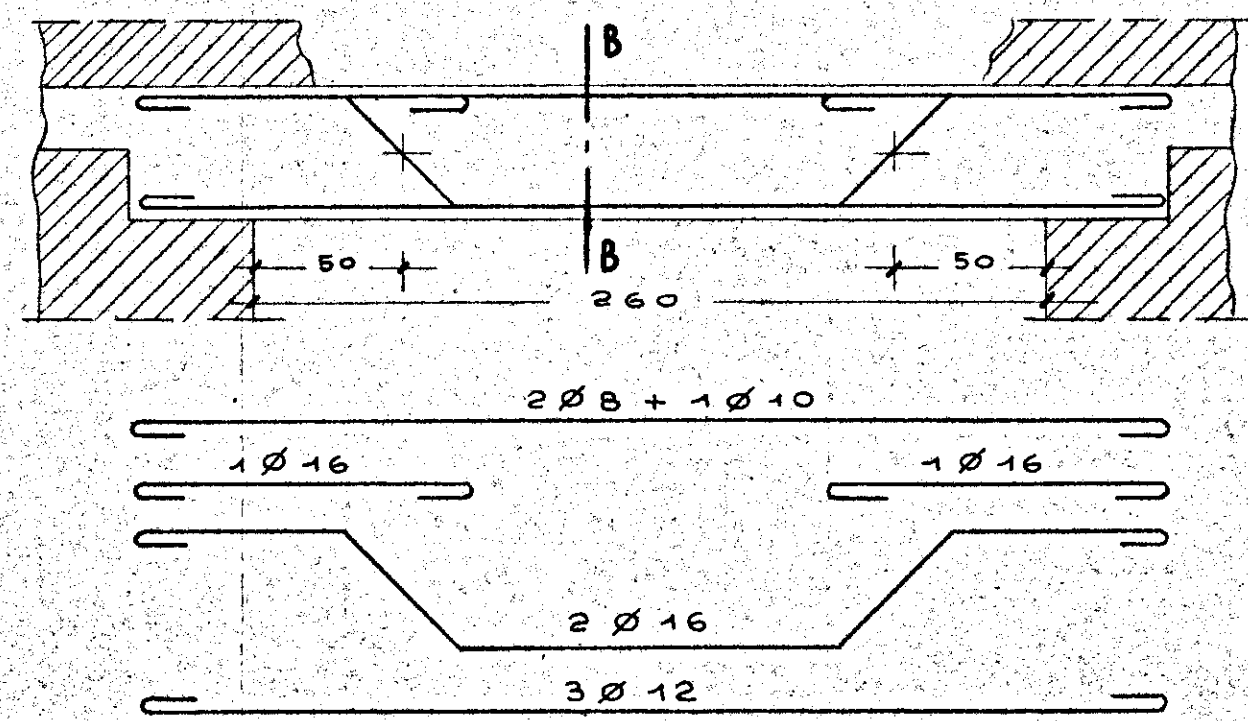
ACER RAVENNA	p. e. CONSORZIO COOP. DI PRODUZIONE E LAVORO - RAVENNA			
	Ente Appaltante INA CASA BRINDISI			
Tav. 2	Dis. 582	Calc. 433	Data 14.7.1958	<i>H. L. ...</i>
LAVORO: CASE POPOLARI - RIONE COMMENDA OVEST				
TRAVI - SCALE				Scala 1:25 1:10

ALL'INGEGNERIA COOPERATIVE
RAVENNA
UFFICIO TECNICO
61100 - CONSORZIO LAVORO
Arnesi

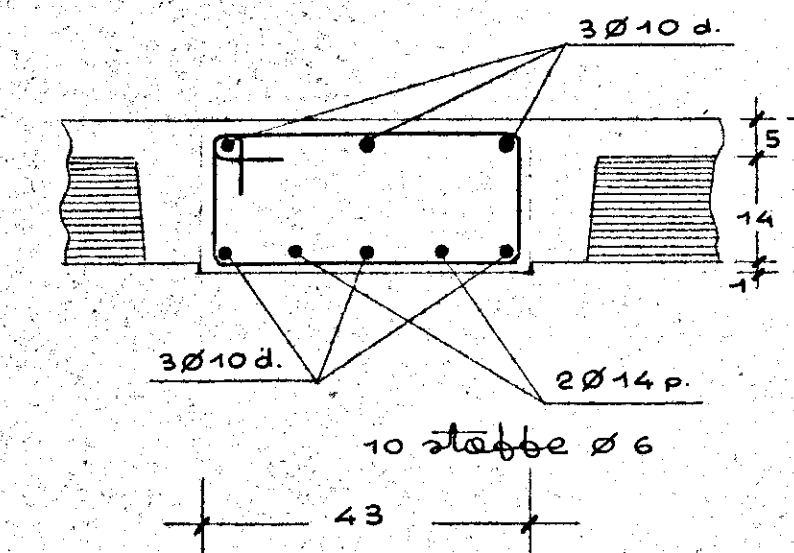
TRAVE T5 AL PIANO TIPO 1:25



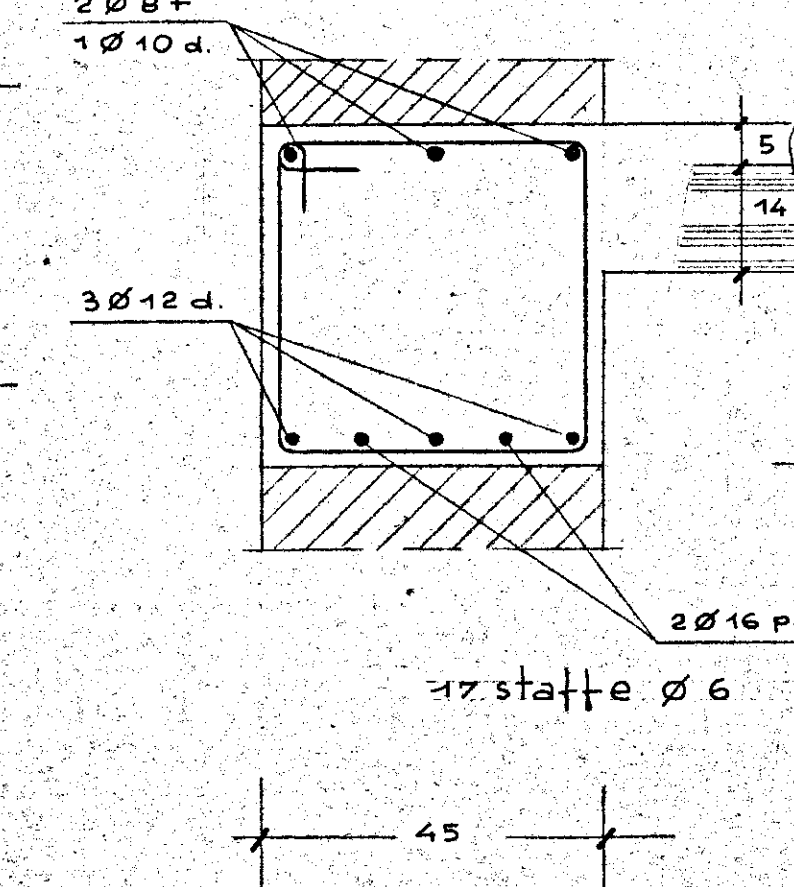
TRAVE T6 AL PIANO TERRA 1:25



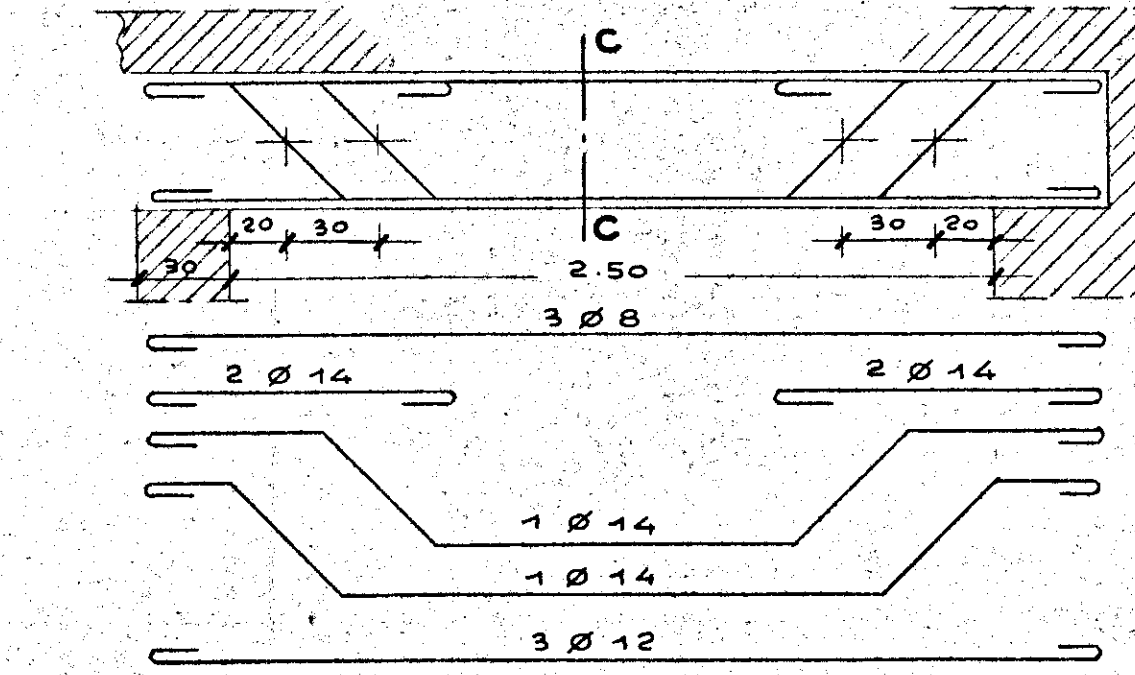
SEZ. A-A 1:10



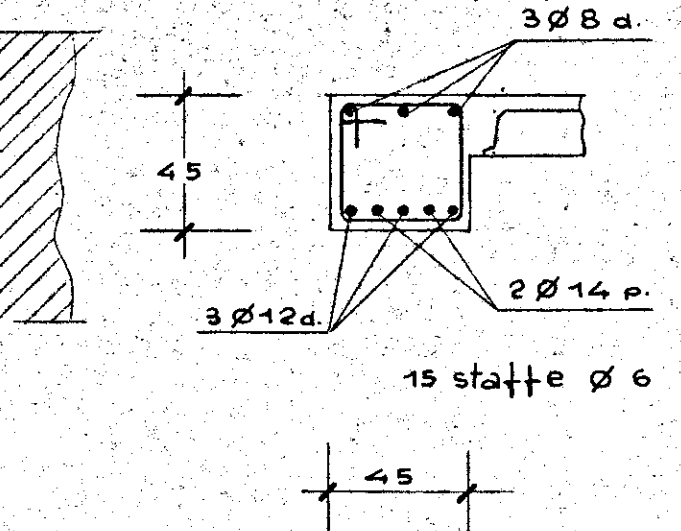
SEZ. B-B 1:10



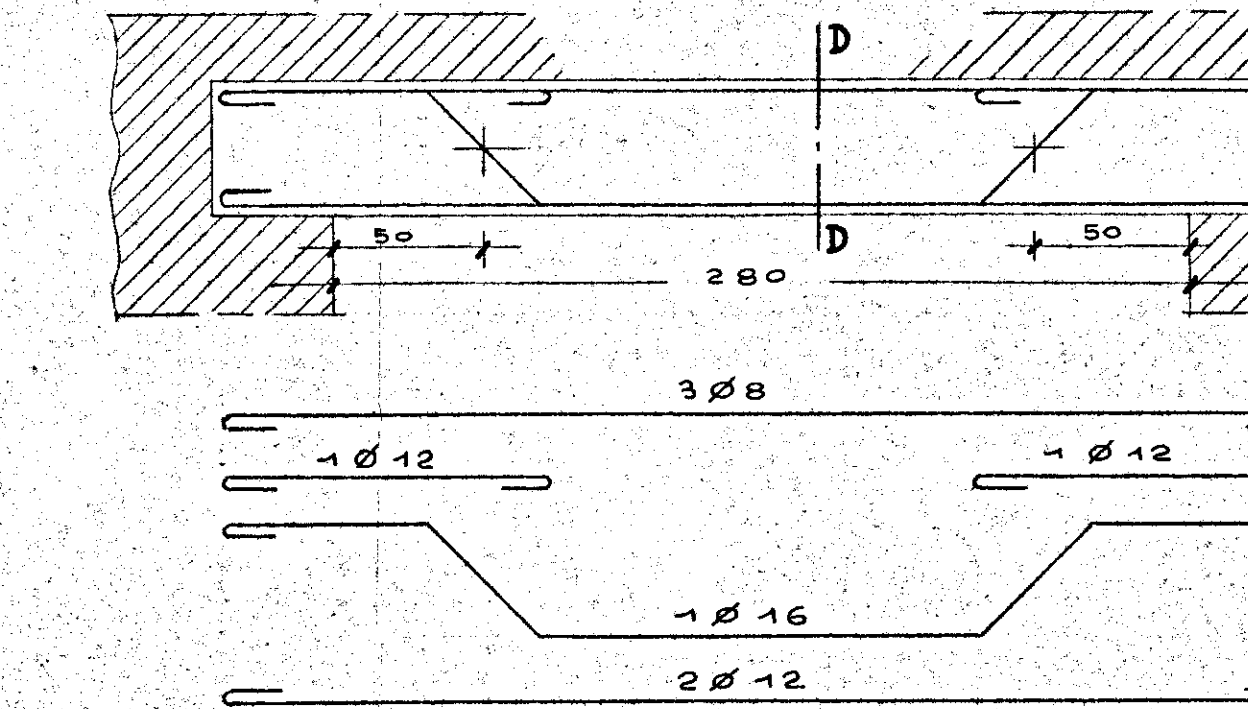
TRAVE T7 PIANO TERRA 1:25 (T7)



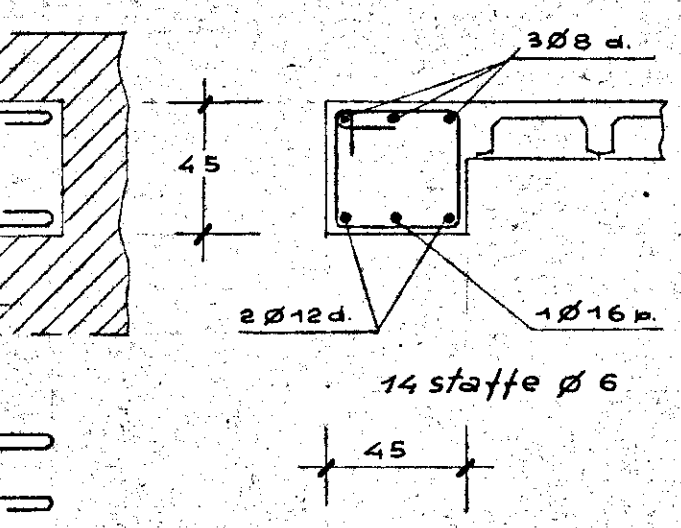
SEZ. C-C 1:25



TRAVE T8 (SOPRA IL VANO LIBERO DI PASSAGGIO) 1:25

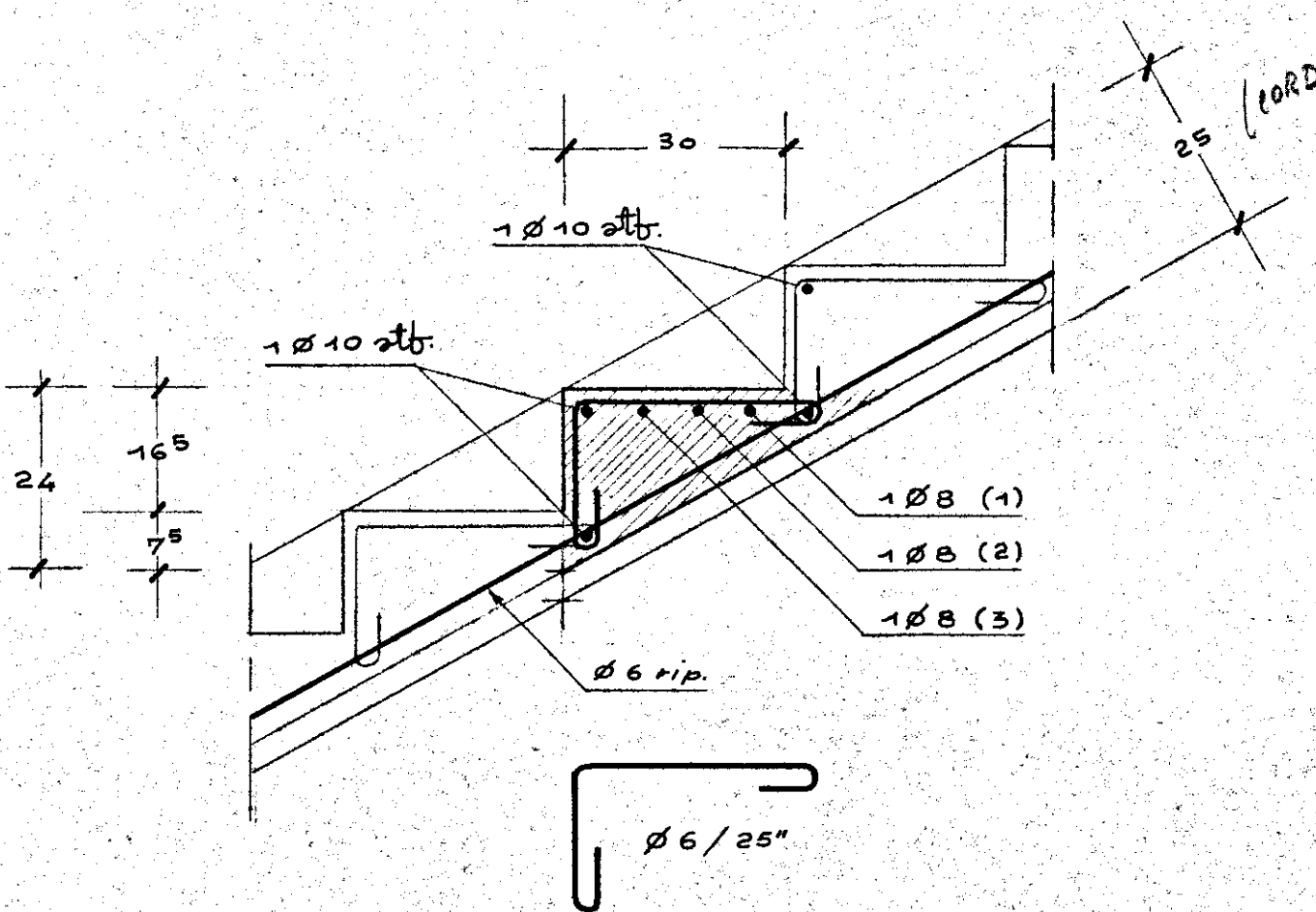
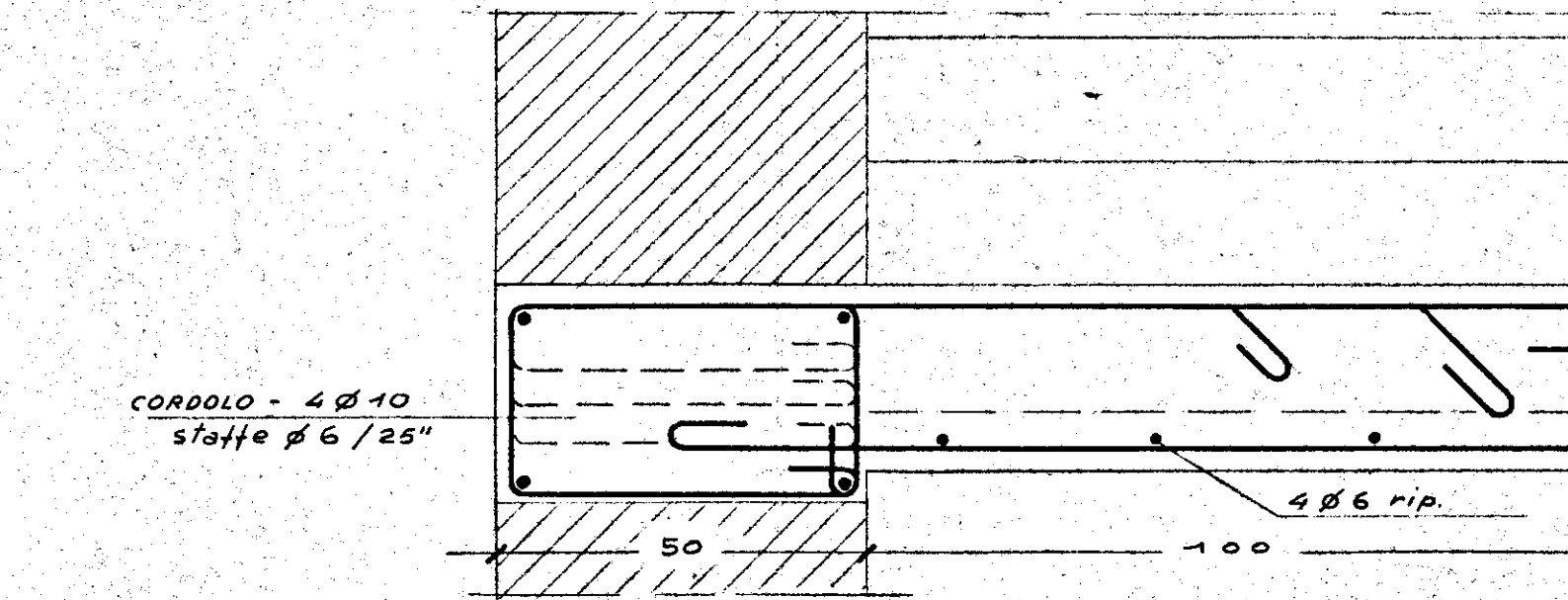


SEZ. D-D 1:25

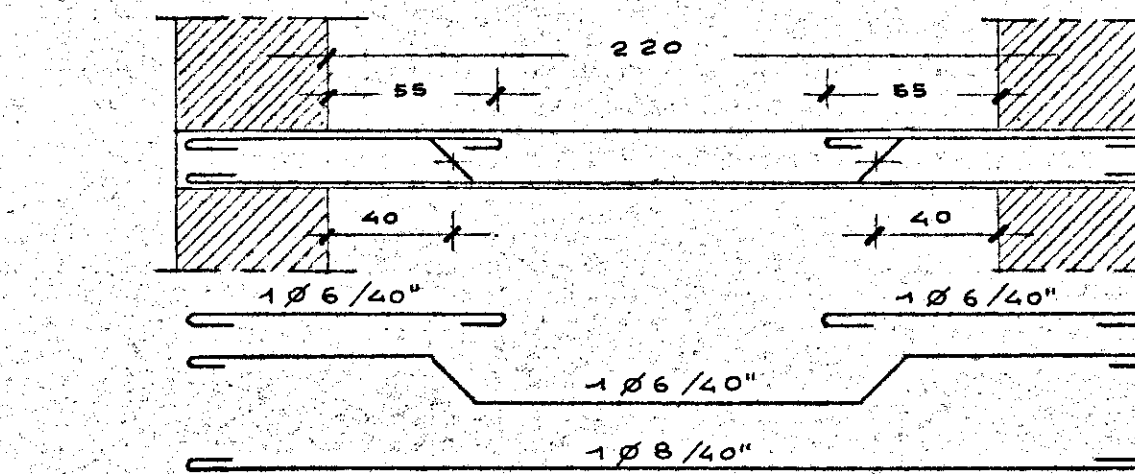


ARMATURA SCALA - 1:10

$$a = 16,5 - p = 30$$

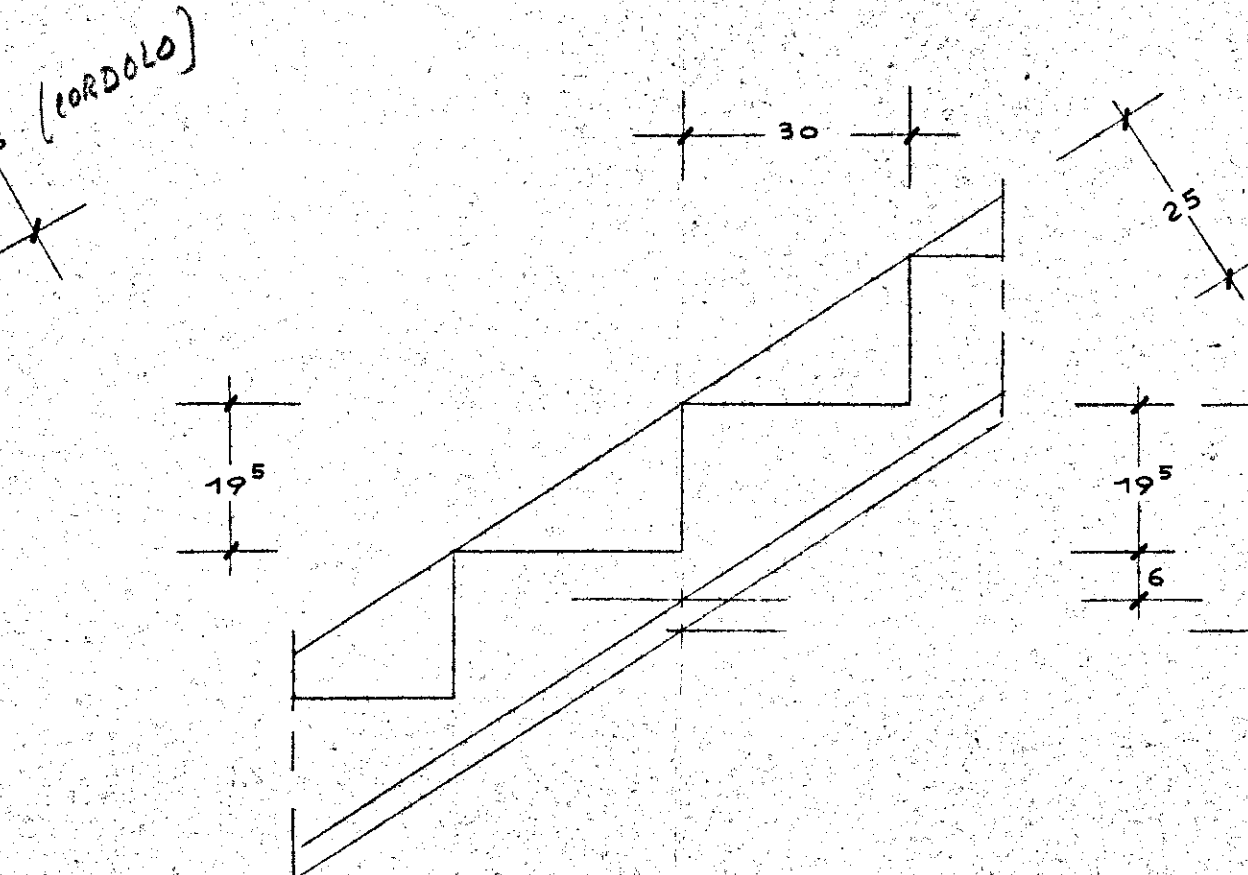


ARMATURA PIANEROTTOLI - 1:25



ULTIMA RAMPA - 1:10

$$a = 19,5 - p = 30$$



ARMATURA COME LA PRECEDENTE