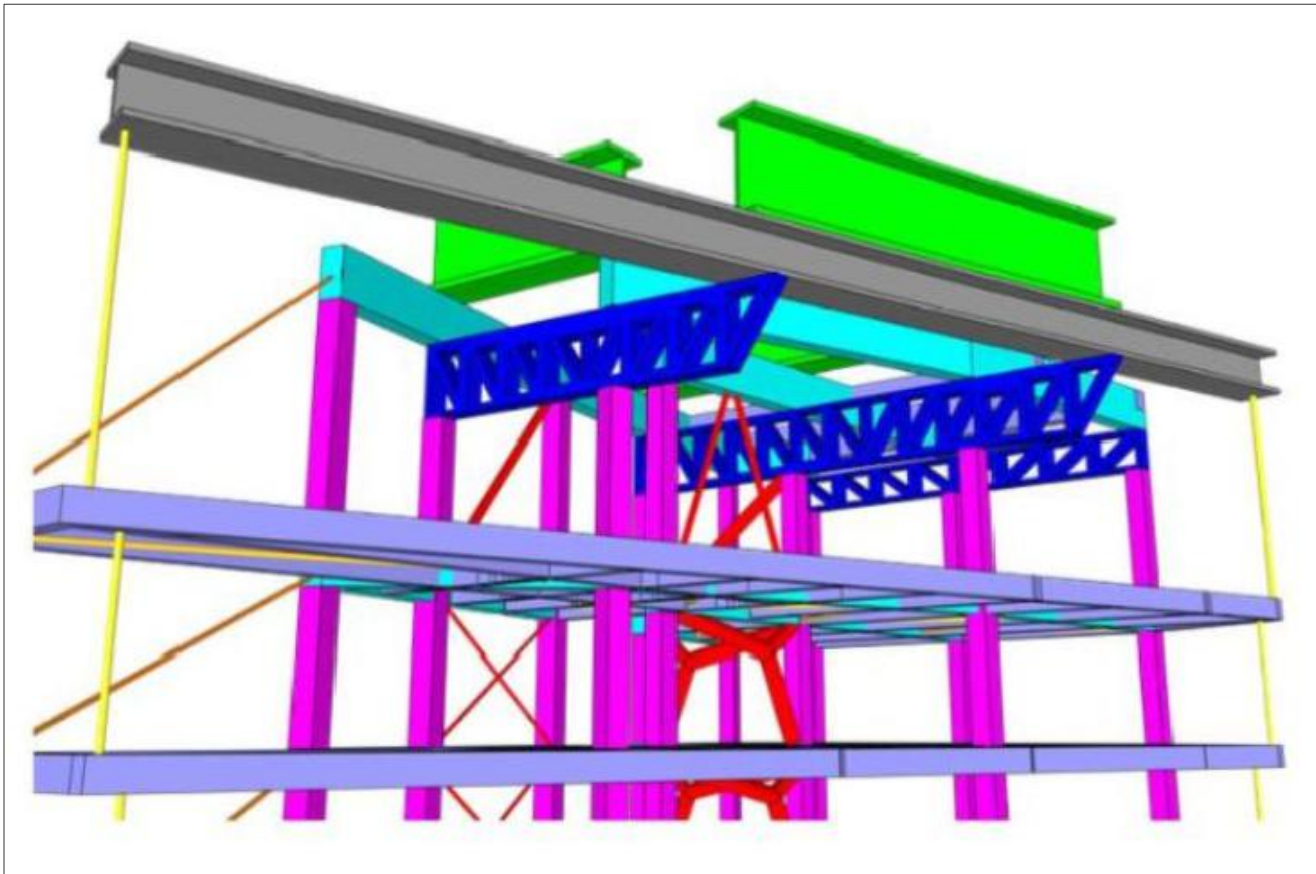


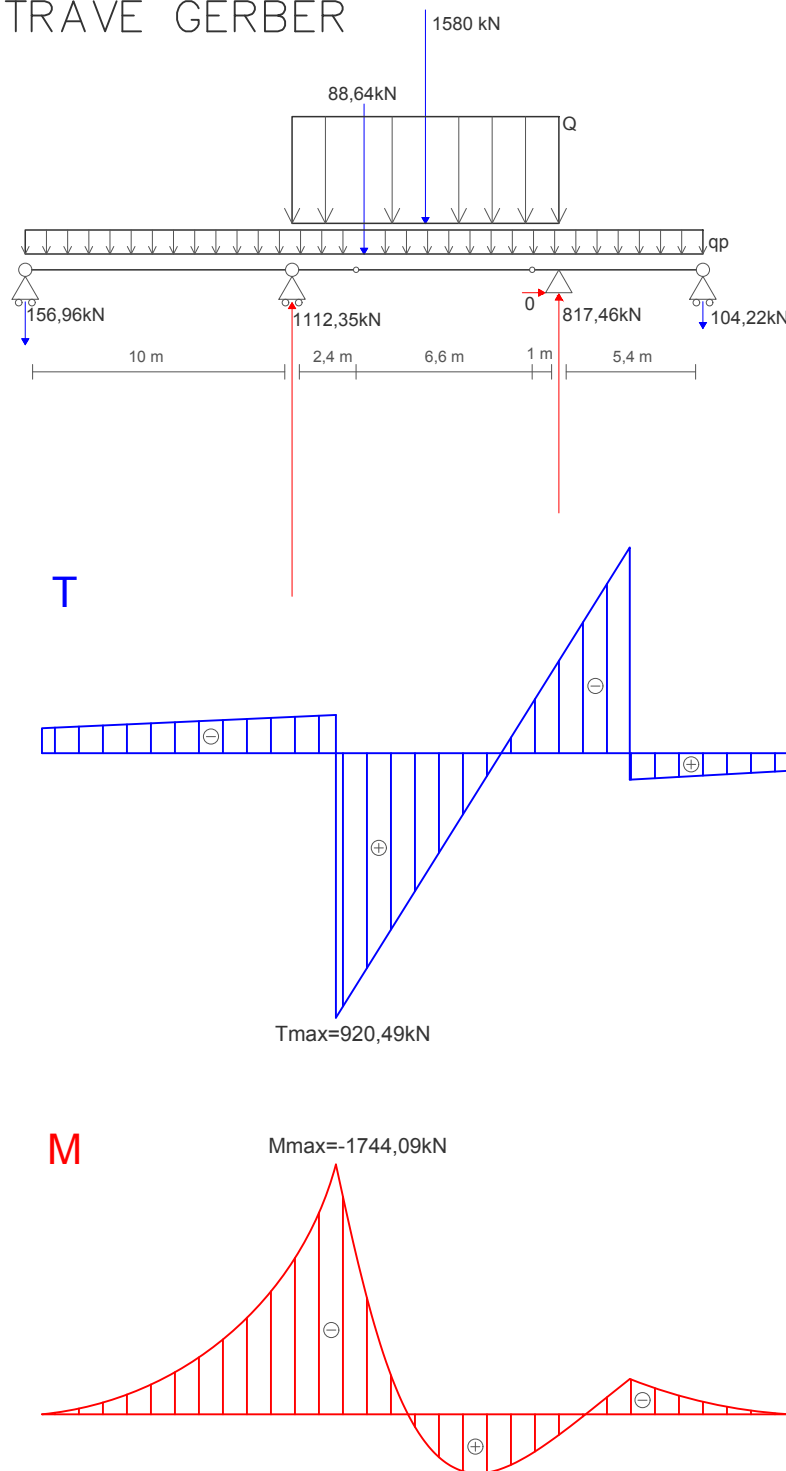
# MODELLO 3D COPERTURA



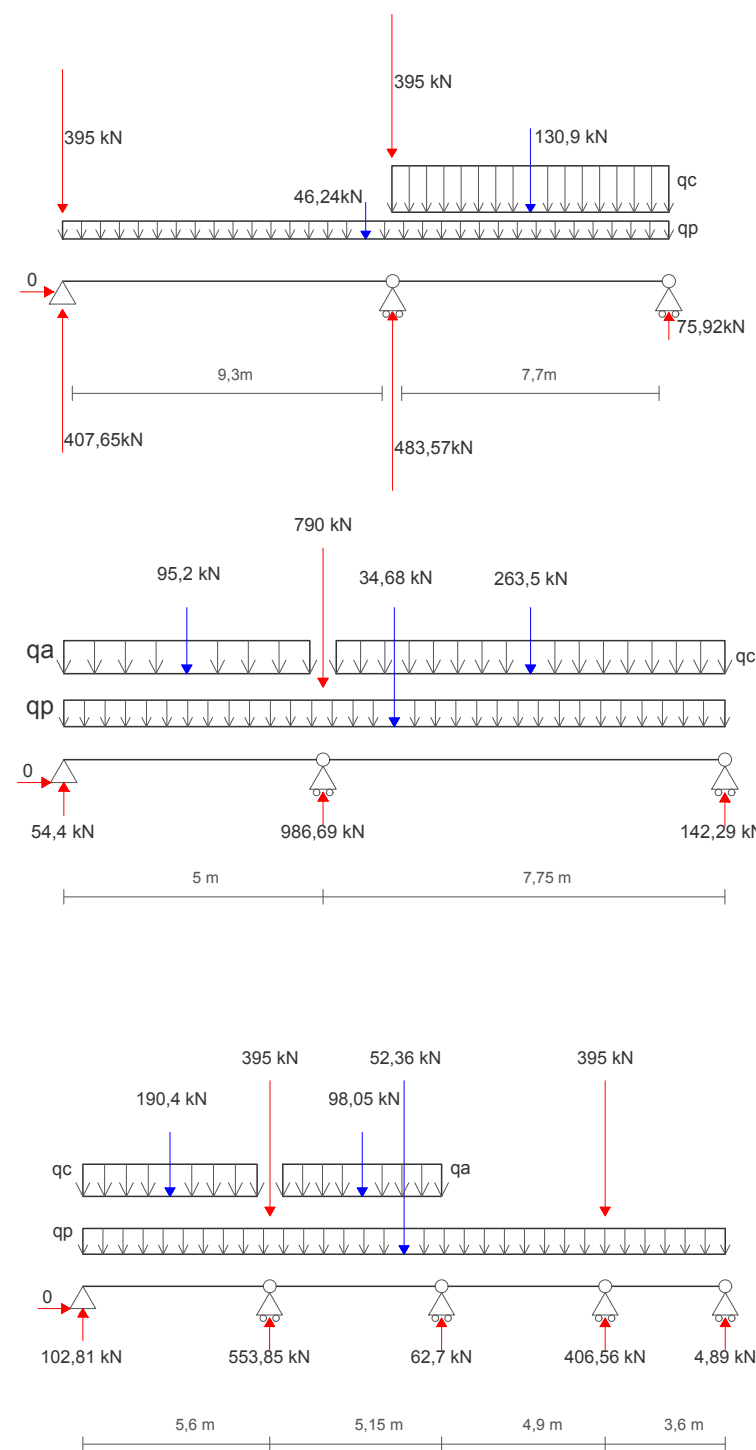
## DESCRIZIONE COPERTURA

La copertura è strutturata da tre ordini di travi: travi reticolari in acciaio con un'altezza di 1,5 metri. Portate dalle travi reticolari, ci sono le travi principali HEA 1000 in altezza di trave Gerber (in affaccio sul lato Sud-Ovest) e infine una serie di travi secondarie in spessore di primarie. Per via dell'aggetto crescente all'aumentare dei piani sono presenti uno strallo sul lato Nord, collegato direttamente alla trave principale, e due pendini, collegati entrambi alle estremità della trave Gerber. Sulla copertura sono presenti tre travi con sezione a doppia T, 1x2 metri, per ottenere una condizione di carico che permetta di avere agli estremi della trave Gerber forze dirette verso l'alto.

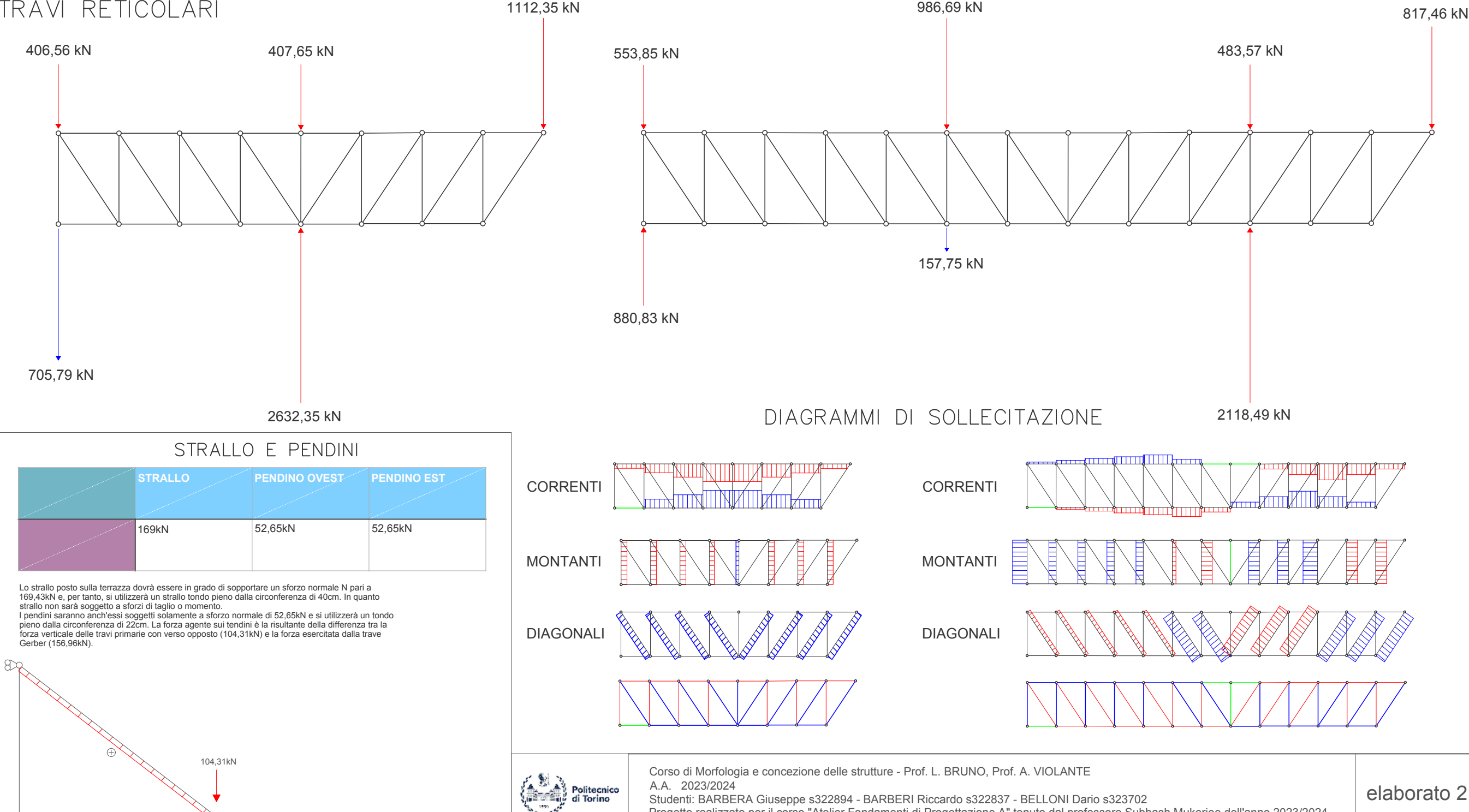
## TRAVE GERBER



## TRAVI PRINCIPALI



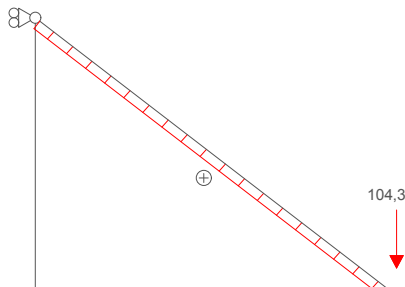
## TRAVI RETICOLARI



### STRALLO E PENDINI

|  | STRALLO | PENDINO OVEST | PENDINO EST |
|--|---------|---------------|-------------|
|  | 169kN   | 52.65kN       | 52.65kN     |

Lo strallo posto sulla terrazza dovrà essere in grado di sopportare un sforzo normale N pari a 169,43kN e, per tanto, si utilizzerà uno strallo tondo pieno dalla circonferenza di 40cm. In quanto strallo non sarà soggetto a sforzi di taglio o momento. I pendini saranno anch'essi soggetti solamente a sforzo normale di 52,65kN e si utilizzerà un tondo pieno dalla circonferenza di 22cm. La forza agente sui pendini è la risultante della differenza tra la forza verticale delle travi primarie con verso opposto (104,31kN) e la forza esercitata dalla trave Gerber (156,96kN).



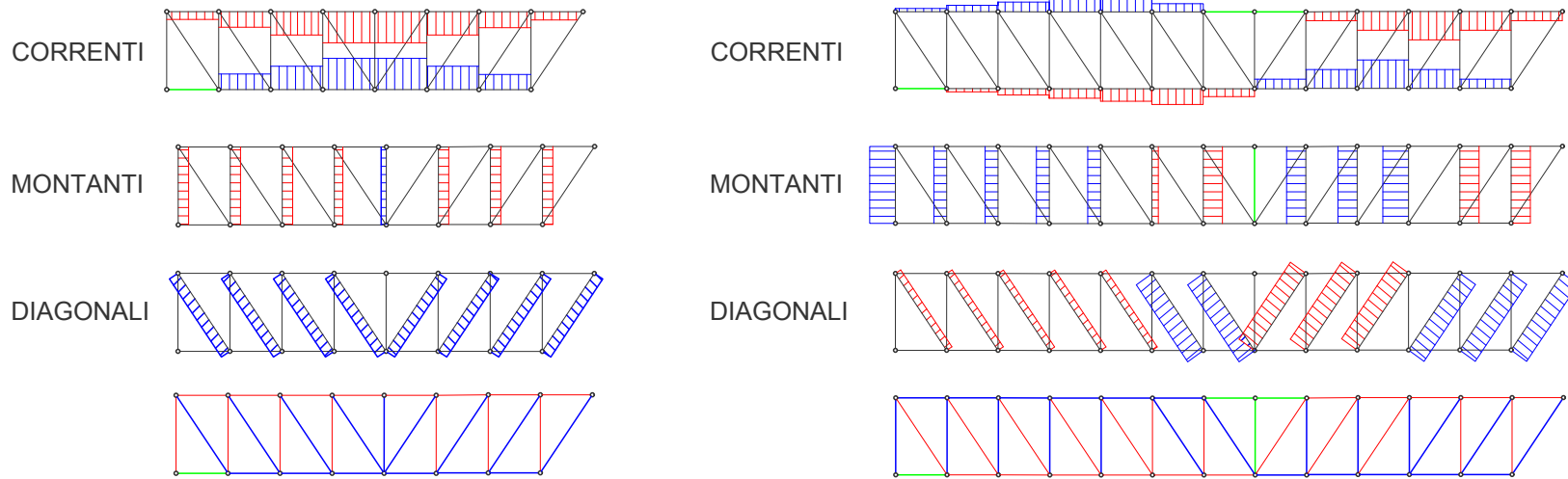
## Tr1

| DATI                    | RvL                          | RvN          | Unit | Profilato      |
|-------------------------|------------------------------|--------------|------|----------------|
| L=1 metro               | Htr1A=0                      | 0kN          |      |                |
| Ftr1(1)=Vtp3D=406,56 kN | Vtr1A=Ftr1(1)-Ftr1(3)        | -705,79kN    |      |                |
| Ftr1(2)=Vtp1A=407,65 kN | Vtr1B=Ftr1(2)+2Ftr1(3)       | 2632,35kN    |      |                |
| Ftr1(3)=VlgB=1112,35 kN |                              |              |      |                |
| RFtr1TOT.=1926,56 kN    | Rrvl=Ftr1(1)+Ftr1(2)+Ftr1(3) | 1926,56kN    |      |                |
| NaTr1                   |                              |              |      |                |
| L=1 metro               | Na(1)Tr1=Ftr1(3)-Ftr1(1)     | 705,79kN     |      | φ 177.8 x 10.0 |
| θ=arctan(2/3)=α/180     | Na(2)Tr1=0                   | 0kN          |      | HEM 120        |
|                         | Na(3)Tr1=Ftr1(3)/cosθ        | -1112,52kN   |      | HEM 200        |
|                         | Na(4)Tr1=2Ftr1(3)/3          | 741,56kN     |      | φ 177.8 x 10.0 |
|                         | Na(5)Tr1=2Ftr1(3)/3          | -741,56kN    |      | HEM 120        |
|                         | Na(6)Tr1=Ftr1(3)/cosθ        | -1112,52kN   |      | HEM 200        |
|                         | Na(7)Tr1=4Ftr1(3)/3          | 1483,13kN    |      | φ 273.0 x 12.0 |
|                         | Na(8)Tr1=Ftr1(3)             | 1112,35kN    |      | φ 244.5 x 10.0 |
|                         | Na(9)Tr1=4Ftr1(3)/3          | -1483,13kN   |      | HEM 180        |
|                         | Na(10)Tr1=Ftr1(3)/cosθ       | -1112,52kN   |      | HEM 200        |
|                         | Na(11)Tr1=2Ftr1(3)           | 2224,7kN     |      | φ 406.4 x 16.0 |
|                         | Na(12)Tr1=Ftr1(3)            | 1112,35kN    |      | φ 244.5 x 10.0 |
|                         | Na(13)Tr1=2Ftr1(3)           | -2224,7kN    |      | HEM 220        |
|                         | Na(14)Tr1=Ftr1(3)/cosθ       | -1112,52kN   |      | HEM 200        |
|                         | Na(15)Tr1=8Ftr1(3)/3         | 2966,26kN    |      | φ 406.4 x 16.0 |
|                         | Na(16)Tr1=Ftr1(3)            | 1112,35kN    |      | φ 244.5 x 10.0 |
|                         | Na(17)Tr1=2Ftr1(3)           | -2224,7kN    |      | HEM 220        |
|                         | Na(18)Tr1=Ftr1(3)/cosθ       | -1112,52kN   |      | HEM 200        |
|                         | Na(19)Tr1=8Ftr1(3)/3         | 2966,26kN    |      | φ 406.4 x 16.0 |
|                         | Na(20)Tr1=Ftr1(2)            | -407,65kN    |      | HEM 100        |
|                         | Na(21)Tr1=4Ftr1(3)/3         | -1483,13kN   |      | HEM 180        |
|                         | Na(22)Tr1=Ftr1(3)/cosθ       | -1112,52kN   |      | HEM 200        |
|                         | Na(23)Tr1=2Ftr1(3)           | 2224,7kN     |      | φ 406.4 x 16.0 |
|                         | Na(24)Tr1=Ftr1(3)            | 1112,35kN    |      | φ 244.5 x 10.0 |
|                         | Na(25)Tr1=2Ftr1(3)/3         | -741,56kN    |      | HEM 120        |
|                         | Na(26)Tr1=Ftr1(3)/cosθ       | -1112,52kN   |      | HEM 200        |
|                         | Na(27)Tr1=4Ftr1(3)/3         | 1483,13kN    |      | φ 273.0 x 12.0 |
|                         | Na(28)Tr1=Ftr1(3)            | 1112,35kN    |      | φ 244.5 x 10.0 |
|                         | Na(29)Tr1=0                  | 0kN          |      | /              |
|                         | Na(30)Tr1=Ftr1(3)/cosθ       | -1112,52kN   |      | HEM 200        |
|                         | Na(31)Tr1=2Ftr1(3)/3         | 741,56kN     |      | φ 177.8 x 10.0 |
|                         | Na(32)Tr1=Ftr1(3)            | 1112,35kN    |      | φ 244.5 x 10.0 |
|                         | Na(33)Tr1=0                  | 0kN          |      | /              |
| MAX Na -                | Na(17)Tr1=2Ftr1(3)           | -2224,7kN    |      |                |
|                         | Corr. Inf.[1m]=HEM           | HEM 220      |      |                |
| MAX Na +                | Na(15)Tr1=8Ftr1(3)/3         | 2966,26kN    |      |                |
|                         | Corr. Sup.[1m]=T.circ.       | φ 406.4x16.0 |      |                |

## Tr2

| DATI                    | RvL                                  | RvN          | Unit | Profilato      |
|-------------------------|--------------------------------------|--------------|------|----------------|
| L=1 metro               | Htr2C=0                              | 0kN          |      |                |
| Ftr2(1)=Vtp3D=817,46 kN | Vtr2A=Ftr2(1)+Ftr2(2)                | 2118,49kN    |      |                |
| Ftr2(2)=Vtp1B=483,57 kN | Vtr2B=Ftr2(3)-Ftr2(1)/5              | -157,75kN    |      |                |
| Ftr2(3)=Vtp2B=986,69 kN | Vtr2C=2Ftr2(1)/5+Ftr1(4)             | 880,83kN     |      |                |
| Ftr2(4)=Vtp3B=553,85 kN |                                      |              |      |                |
| RFtr2TOT.=2841,57 kN    | Rrvl=Ftr2(1)+Ftr2(2)+Ftr2(3)+Ftr2(4) | 2841,57kN    |      |                |
| NaTr2                   |                                      |              |      |                |
| L=1 metro               | Na(1)Tr2=2Ftr2(1)/5-Ftr2(4)          | -880,83kN    |      | HEM 140        |
| θ=arctan(2/3)=α/180     | Na(2)Tr2=0                           | 0kN          |      | φ 114.3 x 6.0  |
|                         | Na(3)Tr2=2Ftr2(1)/5cosθ              | 327,03kN     |      | φ 139.7 x 8.0  |
|                         | Na(4)Tr2=Ftr2(1)/3                   | -272,48kN    |      | HEM 100        |
|                         | Na(5)Tr2=2Ftr2(1)/5                  | -326,98kN    |      | HEM 100        |
|                         | Na(6)Tr2=Ftr2(1)/3                   | 272,48kN     |      | φ 114.3 x 6.0  |
|                         | Na(7)Tr2=2Ftr2(1)/5cosθ              | 327,03kN     |      | φ 139.7 x 8.0  |
|                         | Na(8)Tr2=8Ftr2(1)/15                 | -435,97kN    |      | HEM 100        |
|                         | Na(9)Tr2=2Ftr2(1)/5                  | -326,98kN    |      | HEM 100        |
|                         | Na(10)Tr2=8Ftr2(1)/15                | 435,97kN     |      | φ 139.7 x 8.0  |
|                         | Na(11)Tr2=2Ftr2(1)/5cosθ             | 327,03kN     |      | φ 139.7 x 8.0  |
|                         | Na(12)Tr2=4Ftr2(1)/5                 | -653,96kN    |      | HEM 120        |
|                         | Na(13)Tr2=2Ftr2(1)/5                 | -326,98kN    |      | HEM 100        |
|                         | Na(14)Tr2=4Ftr2(1)/5                 | 653,96kN     |      | φ 177.8 x 10.0 |
|                         | Na(15)Tr2=2Ftr2(1)/5cosθ             | 327,03kN     |      | φ 139.7 x 8.0  |
|                         | Na(16)Tr2=16Ftr2(1)/15               | -871,95kN    |      | HEM 140        |
|                         | Na(17)Tr2=2Ftr2(1)/5                 | -326,98kN    |      | HEM 100        |
|                         | Na(18)Tr2=16Ftr2(1)/15               | 871,95kN     |      | φ 193.7 x 10.0 |
|                         | Na(19)Tr2=2Ftr2(1)/5cosθ             | 327,03kN     |      | φ 139.7 x 8.0  |
|                         | Na(20)Tr2=4Ftr2(1)/3                 | -1089,94kN   |      | HEM 160        |
|                         | Na(21)Tr2=2Ftr2(1)/3                 | -169,23kN    |      | HEM 100        |
|                         | Na(22)Tr2=4Ftr2(1)/3                 | 1089,94kN    |      | φ 244.5 x 10.0 |
|                         | Na(23)Tr2=Ftr2(1)/cosθ               | -817,58kN    |      | HEM 160        |
|                         | Na(24)Tr2=2Ftr2(1)/3                 | -544,97kN    |      | HEM 100        |
|                         | Na(25)Tr2=Ftr2(1)                    | 817,46kN     |      | φ 193.7 x 10.0 |
|                         | Na(26)Tr2=2Ftr2(1)/3                 | 544,97kN     |      | φ 168.3 x 8.0  |
|                         | Na(27)Tr2=Ftr2(1)/cosθ               | -817,58kN    |      | HEM 160        |
|                         | Na(28)Tr2=0                          | 0kN          |      | HEM 100        |
|                         | Na(29)Tr2=0                          | 0kN          |      | HEM 100        |
|                         | Na(30)Tr2=2Ftr2(1)/3                 | -544,97kN    |      | HEM 100        |
|                         | Na(31)Tr2=Ftr2(1)/cosθ               | 817,58kN     |      | φ 193.7 x 10.0 |
|                         | Na(32)Tr2=0                          | 0kN          |      | HEM 100        |
|                         | Na(33)Tr2=Ftr2(1)                    | -817,46kN    |      | HEM 140        |
|                         | Na(34)Tr2=4Ftr2(1)/3                 | -1089,94kN   |      | HEM 160        |
|                         | Na(35)Tr2=Ftr2(1)/cosθ               | 817,58kN     |      | φ 193.7 x 10.0 |
|                         | Na(36)Tr2=2Ftr2(1)/3                 | 544,97kN     |      | φ 168.3 x 8.0  |
|                         | Na(37)Tr2=Ftr2(1)                    | -817,46kN    |      | HEM 140        |
|                         | Na(38)Tr2=2Ftr2(1)                   | -1634,92kN   |      | HEM 200        |
|                         | Na(39)Tr2=Ftr2(1)/cosθ               | 817,58kN     |      | φ 193.7 x 10.0 |
|                         | Na(40)Tr2=4Ftr2(1)/3                 | 1089,94kN    |      | φ 244.5 x 10.0 |
|                         | Na(41)Tr2=Ftr2(1)-Ftr2(2)            | -1301,03kN   |      | HEM 200        |
|                         | Na(42)Tr2=4Ftr2(1)/3                 | -1089,94kN   |      | HEM 160        |
|                         | Na(43)Tr2=Ftr2(1)/cosθ               | -817,58kN    |      | HEM 160        |
|                         | Na(44)Tr2=2Ftr2(1)                   | 1634,92kN    |      | φ 355.6 x 12.0 |
|                         | Na(45)Tr2=Ftr2(1)                    | 817,46kN     |      | φ 193.7 x 10.0 |
|                         | Na(46)Tr2=2Ftr2(1)/3                 | -544,97kN    |      | HEM 100        |
|                         | Na(47)Tr2=Ftr2(1)/cosθ               | 817,58kN     |      | HEM 160        |
|                         | Na(48)Tr2=4Ftr2(1)/3                 | 1089,94kN    |      | φ 244.5 x 10.0 |
|                         | Na(49)Tr2=Ftr2(1)                    | 817,46kN     |      | φ 168.3 x 8.0  |
|                         | Na(50)Tr2=0                          | 0kN          |      | /              |
|                         | Na(51)Tr2=Ftr2(1)/cosθ               | -817,58kN    |      | HEM 160        |
|                         | Na(52)Tr2=2Ftr2(1)/3                 | 544,97kN     |      | φ 168.3 x 8.0  |
|                         | Na(53)Tr2=0                          | 0kN          |      | /              |
| MAX Na -                | Na(38)Tr2=2Ftr2(1)                   | -1634,92kN   |      |                |
|                         | Corr. Inf.[1m]=HEM                   | HEM200       |      |                |
| MAX Na +                | Na(44)Tr2=2Ftr2(1)                   | 1634,92kN    |      |                |
|                         | Corr. Sup.[1m]=T.circ.               | φ 355.6x12.0 |      |                |

### DIAGRAMMI DI SOLLECITAZIONE



Corso di Morfologia e concezione delle strutture - Prof. L. BRUNO, Prof. A. VIOLANTE  
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Progetto realizzato per il corso "Atelier Fondamenti di Progettazione A" tenuto dal professore Subhash Mukerjee dell'anno 2023/2024

elaborato 2