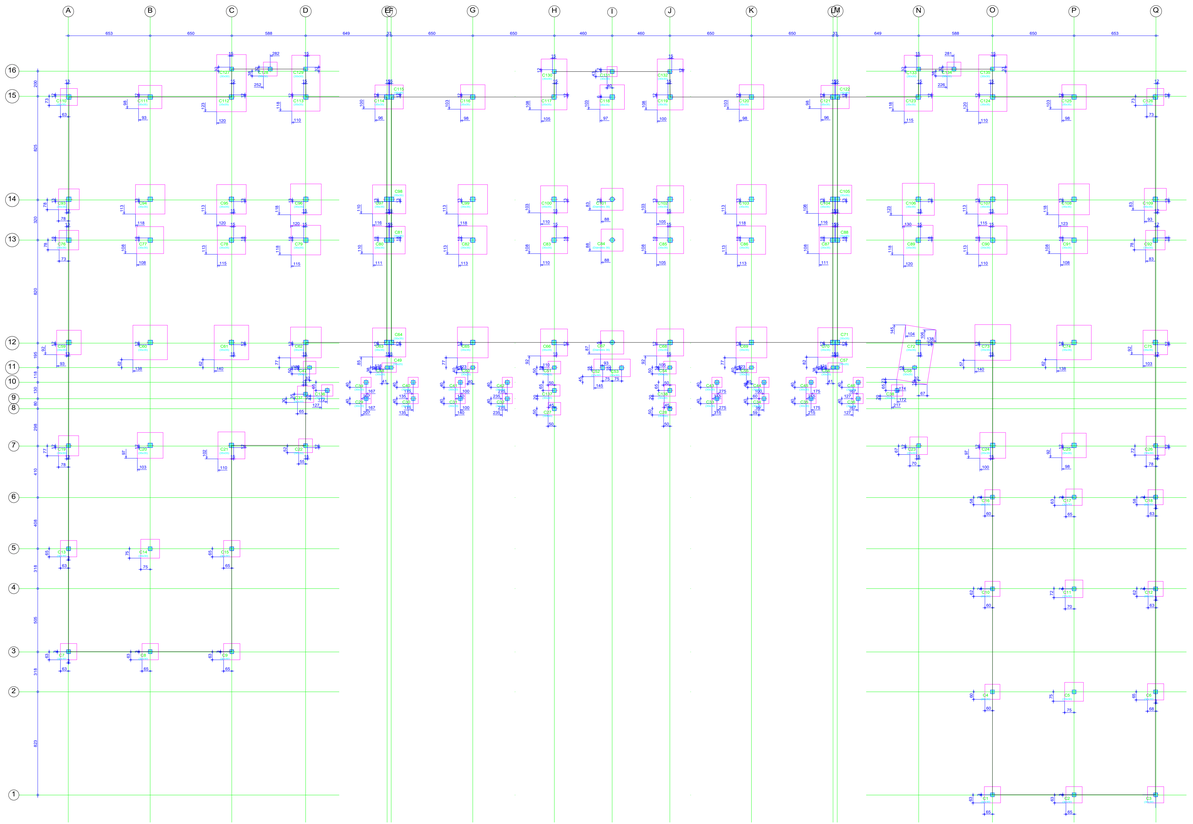


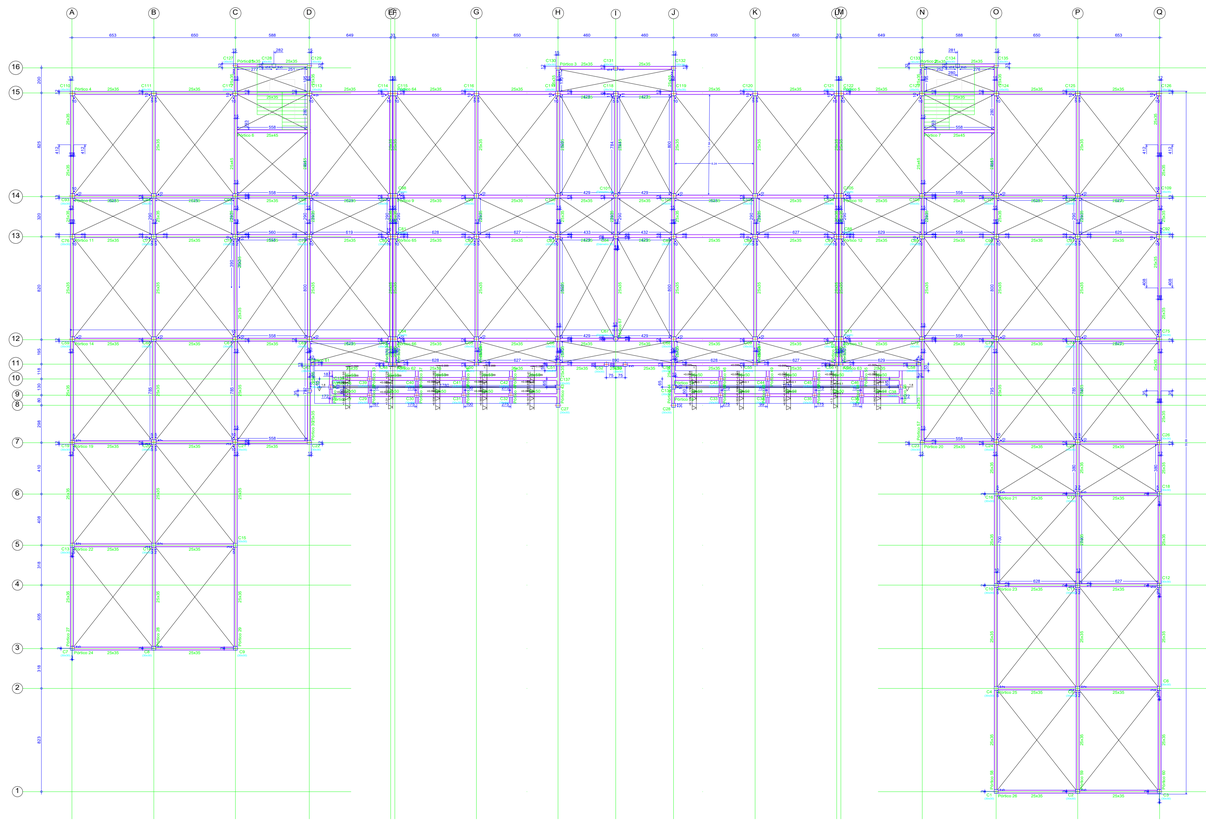


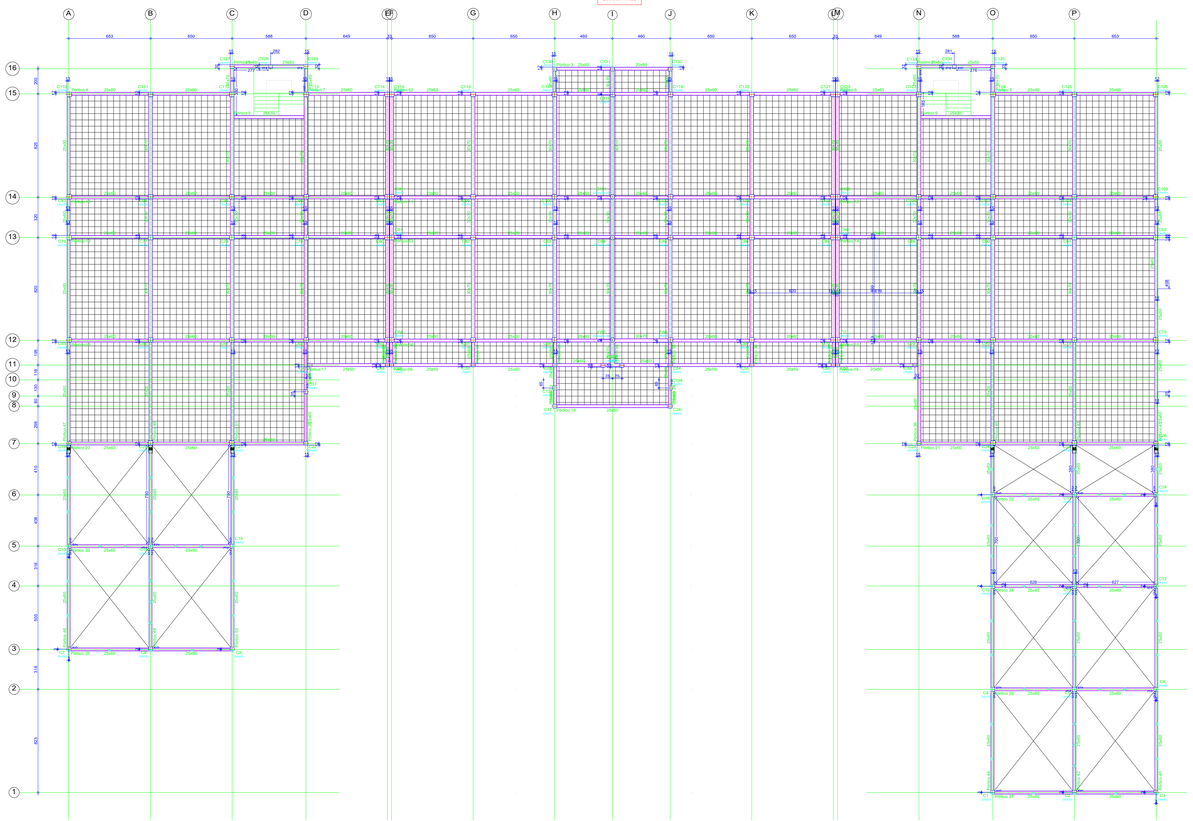


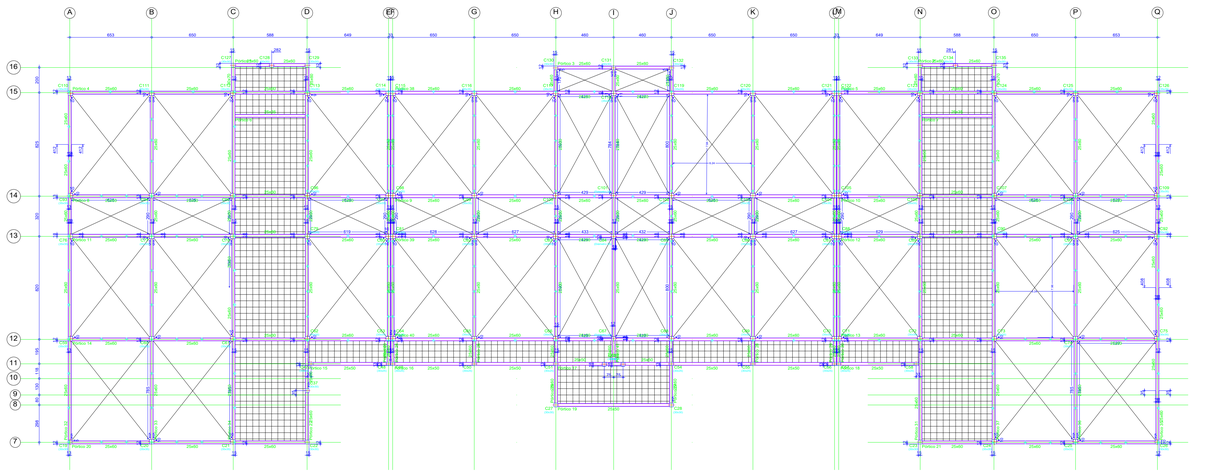


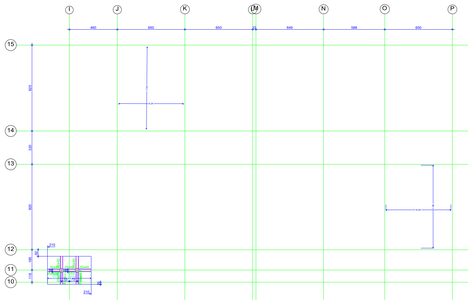


UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA:
INDICADAS

LAMINA:
1/1

CONTENIDO:
REPLANTEO DE ELEMENTOS ESTRUCTURALES

FECHA :
NOVIEMBRE DE 2024

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| C1=C2=C3=C6=C7=C8=C9=C13=C15=C17 | 1 | Ø12 | 5 | 187 | 935 | 8.3 |
| | 2 | Ø12 | 5 | 187 | 935 | 8.3 |
| | 3 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 4 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 45.9 |
| | | | | | (kG) | 506.9 |
| C4=C10=C12=C16=C18 | 5 | Ø12 | 5 | 177 | 885 | 7.9 |
| | 6 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 7 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 8 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 45.0 |
| | | | | | (kG) | 220.0 |
| C5=C14 | 9 | Ø12 | 6 | 207 | 1242 | 11.0 |
| | 10 | Ø12 | 6 | 207 | 1242 | 11.0 |
| | 11 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 12 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 51.8 |
| | | | | | (kG) | 153.6 |
| C11 | 13 | Ø12 | 6 | 197 | 1182 | 10.5 |
| | 14 | Ø12 | 6 | 197 | 1182 | 10.5 |
| | 15 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 16 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 50.7 |
| C19 | 17 | Ø12 | 7 | 182 | 1274 | 11.3 |
| | 18 | Ø12 | 7 | 182 | 1274 | 11.3 |
| | 19 | Ø16 | 4 | 370 | 1480 | 23.7 |
| | 20 | Ø20 | 4 | 402 | 1608 | 39.7 |
| | 21 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 95.4 |
| C20 | 22 | Ø16 | 7 | 240 | 1680 | 26.5 |
| | 23 | Ø16 | 7 | 240 | 1680 | 26.5 |
| | 24 | Ø12 | 8 | 358 | 2864 | 25.4 |
| | 25 | Ø12 | 4 | 357 | 1428 | 12.7 |
| | 26 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 126.5 |
| C21 | 27 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 28 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 29 | Ø16 | 8 | 384 | 3072 | 48.5 |
| | 30 | Ø12 | 4 | 357 | 1428 | 12.7 |
| | 31 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 129.3 |
| C22=C128=C134 | 32 | Ø12 | 4 | 167 | 668 | 5.9 |
| | 33 | Ø12 | 8 | 324 | 2592 | 23.0 |
| | 34 | Ø12 | 8 | 324 | 2592 | 23.0 |
| | 35 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 59.7 |
| | | | | | (kG) | 177.3 |
| C23 | 36 | Ø12 | 6 | 197 | 1182 | 10.5 |
| | 37 | Ø12 | 6 | 197 | 1182 | 10.5 |
| | 38 | Ø12 | 8 | 324 | 2592 | 23.0 |
| | 39 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 49.2 |
| C24 | 40 | Ø16 | 7 | 240 | 1680 | 26.5 |
| | 41 | Ø16 | 7 | 240 | 1680 | 26.5 |
| | 42 | Ø12 | 8 | 384 | 3072 | 48.5 |
| | 43 | Ø12 | 4 | 357 | 1428 | 12.7 |
| | 44 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 126.5 |
| C26 | 45 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 46 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 47 | Ø16 | 8 | 380 | 3040 | 48.0 |
| | 48 | Ø12 | 4 | 353 | 1412 | 12.5 |
| | 49 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 109.9 |
| C28 | 50 | Ø12 | 6 | 207 | 1242 | 11.0 |
| | 51 | Ø12 | 6 | 207 | 1242 | 11.0 |
| | 52 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 53 | Ø20 | 4 | 397 | 1588 | 39.2 |
| | 54 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 93.8 |
| C27 | 55 | Ø12 | 4 | 157 | 628 | 5.6 |
| | 56 | Ø12 | 4 | 157 | 628 | 5.6 |
| | 57 | Ø12 | 8 | 323 | 2584 | 22.9 |
| | 58 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 38.3 |
| C29 | 59 | Ø12 | 4 | 157 | 628 | 5.6 |
| | 60 | Ø12 | 4 | 157 | 628 | 5.6 |
| | 61 | Ø12 | 8 | 322 | 2576 | 22.9 |
| | 62 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 38.3 |
| | | | | | Ø6 | 24.3 |
| | | | | | Ø12 | 1442.5 |
| | | | | | Ø16 | 440.0 |
| | | | | | Ø20 | 86.9 |
| | | | | | Total | 1992.4 |

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| C29 | 1 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 2 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 3 | Ø12 | 8 | 459 | 3672 | 32.6 |
| | 4 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 44.6 |
| C30 | 5 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 6 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 7 | Ø12 | 8 | 422 | 3376 | 30.0 |
| | 8 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 41.7 |
| C31 | 9 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 10 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 11 | Ø12 | 8 | 459 | 3672 | 32.6 |
| | 12 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 38.7 |
| C32 | 13 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 14 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 15 | Ø12 | 8 | 347 | 2776 | 24.6 |
| | 16 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 35.8 |
| C35 | 25 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 27 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 28 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 35.8 |
| C36 | 29 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 30 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 31 | Ø12 | 8 | 459 | 3672 | 32.6 |
| | 32 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 44.8 |
| C37 | 33 | Ø12 | 5 | 187 | 935 | 8.3 |
| | 34 | Ø12 | 5 | 187 | 935 | 8.3 |
| | 35 | Ø12 | 8 | 324 | 2592 | 23.0 |
| | 36 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 44.3 |
| C38=C136 | 37 | Ø12 | 3 | 147 | 441 | 3.9 |
| | 38 | Ø12 | 3 | 147 | 441 | 3.9 |
| | 39 | Ø12 | 8 | 466 | 3728 | 33.1 |
| | 40 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 41.7 |
| | | | | | (kG) | 99.4 |
| C39 | 41 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 42 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 43 | Ø12 | 8 | 521 | 4168 | 37.0 |
| | 44 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 44.8 |
| | | | | | (kG) | 206.8 |
| C40=C45 | 45 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 46 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 47 | Ø12 | 8 | 558 | 4464 | 39.6 |
| | 48 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 47.5 |
| | | | | | (kG) | 176.4 |
| C41 | 49 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 50 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 51 | Ø12 | 8 | 595 | 4760 | 42.2 |
| | 52 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 50.2 |
| C42=C43 | 53 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 54 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 55 | Ø12 | 8 | 632 | 5056 | 44.9 |
| | 56 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 58.1 |
| | | | | | (kG) | 192.2 |
| C44 | 57 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 58 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 59 | Ø12 | 8 | 595 | 4760 | 42.2 |
| | 60 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 50.2 |
| | | | | | (kG) | 205.2 |
| C46 | 61 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 62 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 63 | Ø12 | 8 | 521 | 4168 | 37.0 |
| | 64 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 45.4 |
| | | | | | (kG) | 101.6 |
| C47=C51=C54 | 65 | Ø12 | 4 | 157 | 628 | 5.6 |
| | 66 | Ø12 | 4 | 157 | 628 | 5.6 |
| | 67 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 68 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | | Total+10% | 36.6 |
| | | | | | (kG) | 170.4 |
| C50=C55 | 69 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 70 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 71 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 72 | Ø6 | 3 | 98 | 294 | 0.6 |
| | | | | | Total+10% | 35.4 |
| | | | | | (kG) | 70.8 |
| C59 | 73 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 74 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 75 | Ø12 | 12 | 353 | 4236 | 37.6 |
| | 76 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 84.7 |
| | | | | | Ø6 | 1.4 |
| | | | | | Ø12 | 942.3 |
| | | | | | Ø16 | 1345.6 |
| | | | | | Total | 2306.6 |

| Elemento | Pos. | Diám. | No | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| C60=C74 | 1 | Ø16 | 10 | 260 | 3120 | 49.2 |
| | 2 | Ø16 | 12 | 260 | 3120 | 49.2 |
| | 3 | Ø12 | 12 | 372 | 4464 | 39.6 |
| | 4 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 152.7 |
| | | | | | (kG) | 305.4 |
| C61 | 5 | Ø16 | 12 | 260 | 3120 | 49.2 |
| | 6 | Ø16 | 12 | 260 | 3120 | 49.2 |
| | 7 | Ø12 | 12 | 372 | 4464 | 39.6 |
| | 8 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 152.7 |
| C62=C96 | 9 | Ø16 | 10 | 230 | 2300 | 36.3 |
| | 10 | Ø16 | 10 | 230 | 2300 | 36.3 |
| | 11 | Ø12 | 12 | 362 | 4344 | 38.5 |
| | 12 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 123.6 |
| | | | | | (kG) | 247.6 |
| C65=C69=C108 | 13 | Ø16 | 10 | 230 | 2300 | 36.3 |
| | 14 | Ø16 | 10 | 230 | 2300 | 36.3 |
| | 15 | Ø12 | 12 | 362 | 4344 | 38.5 |
| | 16 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 123.6 |
| | | | | | (kG) | 371.4 |
| C66=C100 | 17 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 18 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 19 | Ø12 | 12 | 357 | 4284 | 38.0 |
| | 20 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 103.4 |
| | | | | | (kG) | 206.8 |
| C67 | 21 | Ø12 | 10 | 170 | 1700 | 15.1 |
| | 22 | Ø12 | 10 | 170 | 1700 | 15.1 |
| | 23 | Ø12 | 10 | 353 | 3530 | 31.3 |
| | 24 | Ø6 | 3 | 98 | 294 | 0.6 |
| | | | | | Total+10% | 68.3 |
| C68=C102 | 25 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 26 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 27 | Ø12 | 12 | 357 | 4284 | 38.0 |
| | 28 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 103.4 |
| | | | | | (kG) | 206.8 |
| C73 | 29 | Ø16 | 14 | 270 | 3780 | 59.7 |
| | 30 | Ø16 | 14 | 270 | 3780 | 59.7 |
| | 31 | Ø12 | 12 | 377 | 4524 | 40.2 |
| | 32 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 176.4 |
| C75 | 33 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 34 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 35 | Ø12 | 12 | 353 | 4236 | 37.6 |
| | 36 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 84.7 |
| C76 | 37 | Ø12 | 6 | 212 | 1272 | 11.3 |
| | 38 | Ø12 | 6 | 212 | 1272 | 11.3 |
| | 39 | Ø12 | 12 | 362 | 4176 | 36.5 |
| | 40 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 59.9 |
| C77=C91 | 41 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 42 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 43 | Ø12 | 12 | 357 | 4284 | 38.0 |
| | 44 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 103.4 |
| | | | | | (kG) | 206.8 |
| C78 | 45 | Ø16 | 8 | 210 | 1680 | 26.5 |
| | 46 | Ø16 | 8 | 210 | 1680 | 26.5 |
| | 47 | Ø12 | 12 | 362 | 4344 | 38.5 |
| | 48 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 101.6 |
| C79 | 49 | Ø16 | 9 | 220 | 1980 | 31.3 |
| | 50 | Ø16 | 9 | 220 | 1980 | 31.3 |
| | 51 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 52 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | | Total+10% | 112.2 |
| | | | | | Ø6 | 17.5 |
| | | | | | Ø12 | 942.3 |
| | | | | | Ø16 | 1345.6 |
| | | | | | Total | 2306.6 |

UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
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DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

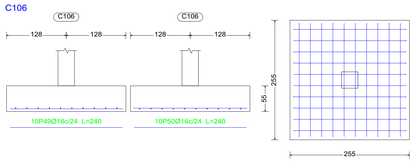
ESCALA:
1:100

LAMINA:
1/2

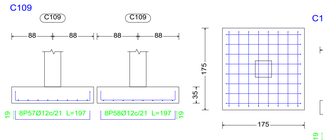
CONTENIDO:
DETALLE Y ARMADO DE ZAPATAS

FECHA :
NOVIEMBRE DE 2024

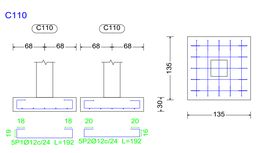
## C106



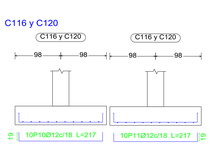

## C109



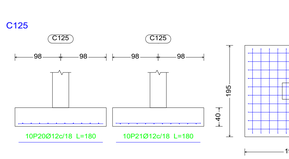

## C110



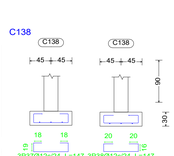

## C116 y C120



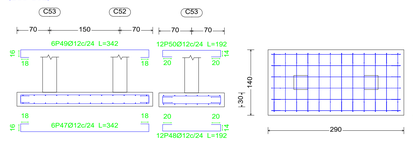

## C125



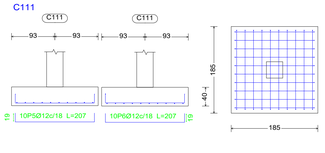

## C138



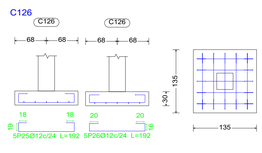

## (C53-C52)



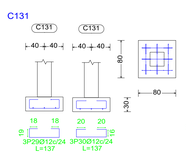

## C111



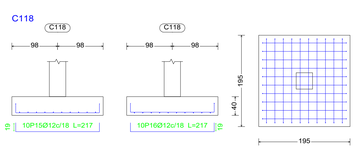

## C126



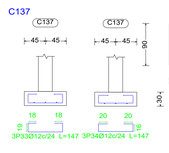

## C131




## C118




## C137




## (C49-C48)

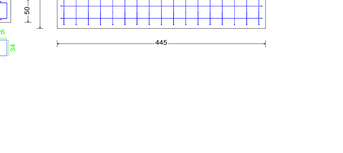



## (C56-C57)

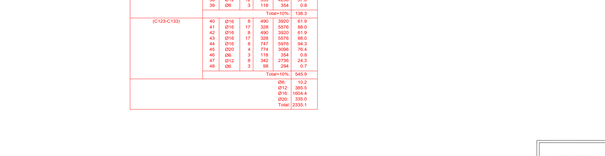



## (C64-C63) y (C98-C97)

## (C72-C58)




## (C124-C135)




## (C70-C71)




## (C87-C88)



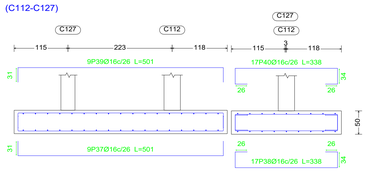

## (C81-C80)



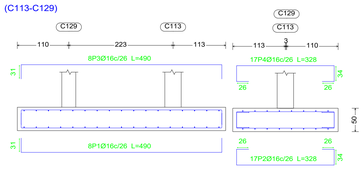

## (C104-C105)



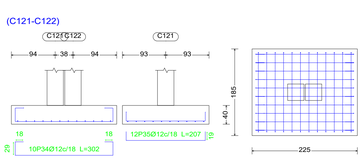

## (C112-C127)



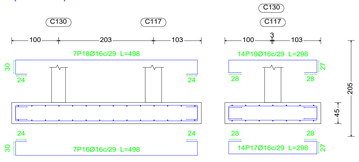

## (C113-C129)



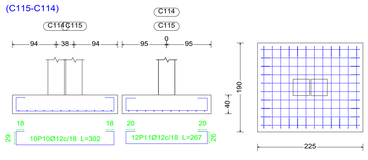

## (C121-C122)



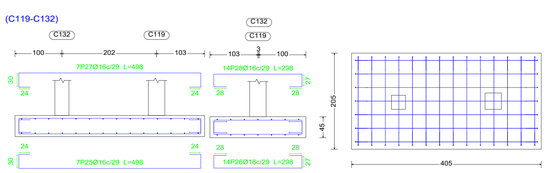

## (C117-C130)



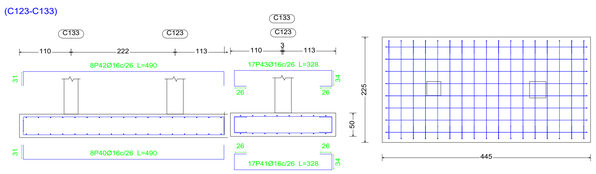

## (C115-C114)




## (C119-C132)




## (C123-C133)




| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| C82=C86 | 1 | Ø16 | 8 | 260 | 2080 | 32.8 |
| | 2 | Ø16 | 8 | 260 | 2080 | 32.8 |
| | 3 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 4 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 115.5 |
| | | | | (x2) | | 231.0 |
| C83 | 5 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 6 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 7 | Ø12 | 12 | 357 | 4284 | 38.0 |
| | 8 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 103.4 |
| C84 | 9 | Ø12 | 8 | 197 | 1576 | 14.0 |
| | 10 | Ø12 | 8 | 197 | 1576 | 14.0 |
| | 11 | Ø12 | 10 | 346 | 3460 | 30.9 |
| | 12 | Ø6 | 3 | 95 | 285 | 0.6 |
| | | | | Total=10% | | 65.5 |
| C85 | 13 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 14 | Ø16 | 7 | 250 | 1750 | 27.6 |
| | 15 | Ø12 | 12 | 357 | 4284 | 38.0 |
| | 16 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 102.4 |
| C89 | 17 | Ø16 | 9 | 220 | 1980 | 31.3 |
| | 18 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 19 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 20 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 112.2 |
| C90 | 21 | Ø16 | 8 | 210 | 1680 | 26.5 |
| | 22 | Ø16 | 8 | 210 | 1680 | 26.5 |
| | 23 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 24 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 101.6 |
| C92 | 25 | Ø12 | 6 | 212 | 1272 | 11.3 |
| | 26 | Ø12 | 6 | 212 | 1272 | 11.3 |
| | 27 | Ø12 | 12 | 343 | 4116 | 36.5 |
| | 28 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 60.9 |
| C93 | 29 | Ø12 | 7 | 187 | 1309 | 11.6 |
| | 30 | Ø12 | 7 | 187 | 1309 | 11.6 |
| | 31 | Ø12 | 12 | 346 | 4152 | 36.8 |
| | 32 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 61.2 |
| C94 | 33 | Ø16 | 9 | 270 | 2430 | 38.4 |
| | 34 | Ø16 | 9 | 270 | 2430 | 38.4 |
| | 35 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 36 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 127.8 |
| C95 | 37 | Ø16 | 9 | 270 | 2430 | 38.4 |
| | 38 | Ø16 | 9 | 270 | 2430 | 38.4 |
| | 39 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 40 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 127.8 |
| C99=C103 | 41 | Ø16 | 9 | 220 | 1980 | 31.3 |
| | 42 | Ø16 | 9 | 220 | 1980 | 31.3 |
| | 43 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 44 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 112.2 |
| | | | | (x2) | | 224.4 |
| C101 | 45 | Ø12 | 8 | 197 | 1576 | 14.0 |
| | 46 | Ø12 | 8 | 197 | 1576 | 14.0 |
| | 47 | Ø12 | 10 | 346 | 3460 | 30.9 |
| | 48 | Ø6 | 3 | 95 | 285 | 0.6 |
| | | | | Total=10% | | 60.5 |
| C106 | 49 | Ø16 | 10 | 240 | 2400 | 37.9 |
| | 50 | Ø16 | 10 | 240 | 2400 | 37.9 |
| | 51 | Ø12 | 12 | 367 | 4404 | 39.1 |
| | 52 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 127.3 |
| C107 | 53 | Ø16 | 9 | 270 | 2430 | 38.4 |
| | 54 | Ø16 | 9 | 270 | 2430 | 38.4 |
| | 55 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 56 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 127.8 |
| C108 | 57 | Ø12 | 8 | 197 | 1576 | 14.0 |
| | 58 | Ø12 | 8 | 197 | 1576 | 14.0 |
| | 59 | Ø12 | 12 | 346 | 4152 | 37.1 |
| | 60 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 72.5 |
| | | | | Ø6: | | 14.8 |
| | | | | Ø12: | | 840.8 |
| | | | | Ø16: | | 957.7 |
| | | | | Total | | 1723.3 |

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| C110 | 1 | Ø12 | 5 | 192 | 960 | 8.5 |
| | 2 | Ø12 | 5 | 186 | 930 | 8.3 |
| | 3 | Ø12 | 12 | 343 | 4116 | 36.5 |
| | 4 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 60.7 |
| C111 | 5 | Ø12 | 10 | 207 | 2070 | 18.4 |
| | 6 | Ø12 | 10 | 207 | 2070 | 18.4 |
| | 7 | Ø16 | 4 | 740 | 2960 | 42.7 |
| | 8 | Ø20 | 4 | 747 | 3009 | 73.7 |
| | 9 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 227.4 |
| C116=C120 | 10 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 11 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 12 | Ø16 | 8 | 740 | 5920 | 93.4 |
| | 13 | Ø20 | 4 | 767 | 3068 | 75.7 |
| | 14 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 228.4 |
| | | | | (x2) | | 456.8 |
| C118 | 15 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 16 | Ø12 | 10 | 217 | 2170 | 19.3 |
| | 17 | Ø12 | 4 | 334 | 1336 | 11.9 |
| | 18 | Ø16 | 4 | 355 | 1420 | 22.4 |
| | 19 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 81.1 |
| C125 | 20 | Ø12 | 10 | 180 | 1800 | 16.0 |
| | 21 | Ø12 | 10 | 180 | 1800 | 16.0 |
| | 22 | Ø16 | 8 | 740 | 5920 | 93.4 |
| | 23 | Ø20 | 4 | 767 | 3068 | 75.7 |
| | 24 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 194.4 |
| C126 | 25 | Ø12 | 5 | 192 | 960 | 8.5 |
| | 26 | Ø12 | 5 | 186 | 930 | 8.3 |
| | 27 | Ø12 | 12 | 343 | 4116 | 36.5 |
| | 28 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 54.7 |
| C131 | 29 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 30 | Ø12 | 3 | 137 | 411 | 3.6 |
| | 31 | Ø12 | 8 | 324 | 2592 | 23.0 |
| | 32 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 34.0 |
| C137 | 33 | Ø12 | 3 | 147 | 441 | 3.9 |
| | 34 | Ø12 | 3 | 147 | 441 | 3.9 |
| | 35 | Ø12 | 8 | 341 | 2728 | 24.2 |
| | 36 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 36.1 |
| C138 | 37 | Ø12 | 3 | 147 | 441 | 3.9 |
| | 38 | Ø12 | 3 | 147 | 441 | 3.9 |
| | 39 | Ø12 | 8 | 341 | 2728 | 24.2 |
| | 40 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 36.0 |
| (C49-C48) | 41 | Ø16 | 9 | 220 | 1980 | 31.3 |
| | 42 | Ø12 | 5 | 132 | 660 | 5.9 |
| | 43 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 44 | Ø16 | 17 | 328 | 5576 | 88.0 |
| | 45 | Ø6 | 3 | 88 | 264 | 0.6 |
| | | | | Total=10% | | 150.1 |
| (C53-C52) | 47 | Ø12 | 6 | 342 | 2052 | 18.2 |
| | 48 | Ø12 | 6 | 192 | 1152 | 10.2 |
| | 49 | Ø12 | 6 | 342 | 2052 | 18.2 |
| | 50 | Ø12 | 12 | 192 | 2304 | 20.5 |
| | 51 | Ø12 | 8 | 322 | 2576 | 22.9 |
| | 52 | Ø16 | 4 | 774 | 3096 | 76.4 |
| | 53 | Ø12 | 8 | 322 | 2576 | 22.9 |
| | 54 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 191.1 |
| (C56-C57) | 55 | Ø12 | 3 | 172 | 516 | 4.6 |
| | 56 | Ø12 | 5 | 132 | 660 | 5.9 |
| | 57 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 58 | Ø6 | 3 | 88 | 264 | 0.6 |
| | 59 | Ø12 | 8 | 343 | 2744 | 24.4 |
| | 60 | Ø6 | 3 | 88 | 264 | 0.6 |
| | | | | Total=10% | | 66.5 |
| | | | | Ø6: | | 12.9 |
| | | | | Ø12: | | 733.2 |
| | | | | Ø16: | | 835.0 |
| | | | | Ø20: | | 335.2 |
| | | | | Total: | | 1485.2 |

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| (C13-C129) | 1 | Ø16 | 9 | 490 | 3920 | 61.9 |
| | 2 | Ø16 | 17 | 328 | 5576 | 88.0 |
| | 3 | Ø16 | 8 | 490 | 3920 | 61.9 |
| | 4 | Ø16 | 17 | 328 | 5576 | 88.0 |
| | 5 | Ø16 | 8 | 747 | 5976 | 94.3 |
| | 6 | Ø20 | 4 | 774 | 3096 | 76.4 |
| | 7 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 8 | Ø12 | 8 | 342 | 2736 | 24.3 |
| | 9 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 545.9 |
| (C115-C114) | 10 | Ø12 | 10 | 302 | 3020 | 26.8 |
| | 11 | Ø12 | 12 | 267 | 3204 | 28.4 |
| | 12 | Ø16 | 4 | 747 | 2988 | 47.2 |
| | 13 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 14 | Ø12 | 12 | 353 | 4236 | 37.6 |
| | 15 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 145.2 |
| (C117-C130) | 16 | Ø16 | 7 | 498 | 3486 | 55.0 |
| | 17 | Ø16 | 14 | 298 | 4172 | 65.8 |
| | 18 | Ø16 | 7 | 498 | 3486 | 55.0 |
| | 19 | Ø16 | 14 | 298 | 4172 | 65.8 |
| | 20 | Ø16 | 8 | 747 | 5976 | 94.3 |
| | 21 | Ø20 | 4 | 768 | 3072 | 75.8 |
| | 22 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 23 | Ø12 | 8 | 335 | 2680 | 23.8 |
| | 24 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 479.9 |
| (C119-C132) | 25 | Ø16 | 7 | 498 | 3486 | 55.0 |
| | 26 | Ø16 | 14 | 298 | 4172 | 65.8 |
| | 27 | Ø16 | 7 | 498 | 3486 | 55.0 |
| | 28 | Ø16 | 14 | 298 | 4172 | 65.8 |
| | 29 | Ø16 | 8 | 741 | 5928 | 93.6 |
| | 30 | Ø20 | 4 | 768 | 3072 | 75.8 |
| | 31 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 32 | Ø12 | 8 | 335 | 2680 | 23.8 |
| | 33 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 479.9 |
| (C121-C122) | 34 | Ø12 | 10 | 302 | 3020 | 26.8 |
| | 35 | Ø12 | 12 | 267 | 3204 | 28.4 |
| | 36 | Ø12 | 12 | 353 | 4236 | 37.6 |
| | 37 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 38 | Ø12 | 12 | 353 | 4236 | 37.6 |
| | 39 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 138.3 |
| (C133-C133) | 40 | Ø16 | 9 | 490 | 3920 | 61.9 |
| | 41 | Ø16 | 17 | 328 | 5576 | 88.0 |
| | 42 | Ø16 | 8 | 490 | 3920 | 61.9 |
| | 43 | Ø16 | 17 | 328 | 5576 | 88.0 |
| | 44 | Ø16 | 8 | 747 | 5976 | 94.3 |
| | 45 | Ø20 | 4 | 774 | 3096 | 76.4 |
| | 46 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 47 | Ø12 | 8 | 335 | 2680 | 23.8 |
| | 48 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 545.9 |
| | | | | Ø6: | | 12.2 |
| | | | | Ø12: | | 385.6 |
| | | | | Ø16: | | 1604.4 |
| | | | | Ø20: | | 335.0 |
| | | | | Total: | | 2335.1 |

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| (C64-C63)=(C98-C97) | 1 | Ø16 | 9 | 374 | 3366 | 53.1 |
| | 2 | Ø16 | 9 | 374 | 3366 | 53.1 |
| | 3 | Ø16 | 8 | 362 | 4344 | 38.6 |
| | 4 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 5 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 6 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 350.7 |
| (C70-C71) | 7 | Ø16 | 9 | 318 | 2862 | 45.2 |
| | 8 | Ø16 | 11 | 220 | 2420 | 38.2 |
| | 9 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 10 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 11 | Ø12 | 12 | 367 | 4404 | 39.1 |
| | 12 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 179.5 |
| (C72-C58) | 13 | Ø16 | 10 | 494 | 4940 | 78.0 |
| | 14 | Ø16 | 10 | 302 | 3436 | 85.8 |
| | 15 | Ø12 | 12 | 367 | 4404 | 39.1 |
| | 16 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 17 | Ø12 | 8 | 367 | 2936 | 26.1 |
| | 18 | Ø6 | 3 | 88 | 264 | 0.6 |
| | | | | Total=10% | | 253.4 |
| (C81-C80) | 19 | Ø16 | 8 | 364 | 2912 | 46.0 |
| | 20 | Ø16 | 10 | 329 | 3290 | 51.9 |
| | 21 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 22 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 23 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 24 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 194.4 |
| (C87-C88) | 25 | Ø16 | 8 | 364 | 2912 | 46.0 |
| | 26 | Ø16 | 10 | 250 | 2500 | 39.5 |
| | 27 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 28 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 29 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 30 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 180.7 |
| (C104-C105) | 31 | Ø16 | 8 | 274 | 2992 | 47.2 |
| | 32 | Ø16 | 10 | 210 | 2100 | 33.1 |
| | 33 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 34 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 35 | Ø12 | 12 | 362 | 4344 | 38.6 |
| | 36 | Ø6 | 3 | 118 | 354 | 0.8 |
| | | | | Total=10% | | 179.0 |
| (C112-C127) | 37 | Ø16 | 9 | 501 | 4509 | 71.2 |
| | 38 | Ø16 | 17 | 328 | 5745 | 90.7 |
| | 39 | Ø16 | 9 | 501 | 4509 | 71.2 |
| | 40 | Ø16 | 17 | 328 | 5746 | 90.7 |
| | 41 | Ø16 | 8 | 747 | 5976 | 94.3 |
| | 42 | Ø20 | 4 | 774 | 3096 | 76.4 |
| | 43 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 44 | Ø12 | 8 | 342 | 2736 | 24.3 |
| | 45 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 582.0 |
| (C124-C135) | 46 | Ø16 | 9 | 493 | 3944 | 62.2 |
| | 47 | Ø16 | 8 | 493 | 3944 | 62.2 |
| | 48 | Ø16 | 17 | 328 | 5576 | 88.0 |
| | 50 | Ø16 | 8 | 747 | 5976 | 94.3 |
| | 51 | Ø20 | 4 | 774 | 3096 | 76.4 |
| | 52 | Ø6 | 3 | 118 | 354 | 0.8 |
| | 53 | Ø12 | 8 | 342 | 2736 | 24.3 |
| | 54 | Ø6 | 3 | 98 | 294 | 0.7 |
| | | | | Total=10% | | 540.8 |
| | | | | Ø6: | | 16.3 |
| | | | | Ø12: | | 635.8 |
| | | | | Ø16: | | 1072.1 |
| | | | | Ø20: | | 168.1 |
| | | | | Total: | | 2491.3 |

UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

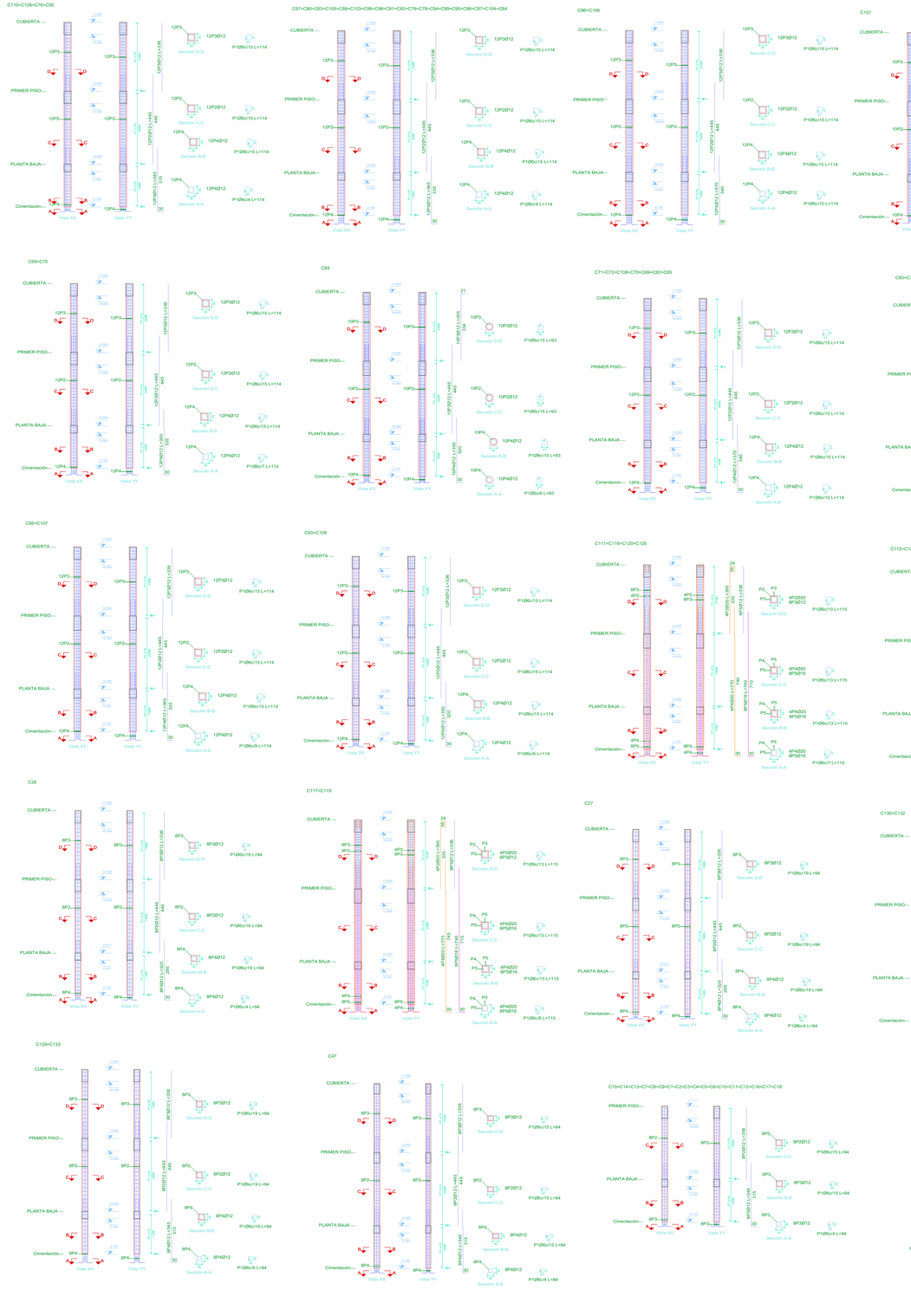
UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA:
1:100

LAMINA:
2/2

CONTENIDO:
DETALLE Y ARMADO DE ZAPATAS

FECHA:
NOVIEMBRE DE 2024




Pilares que nacen en PLANTA BAJA y mueren en TANQUE ELEVADO
Hormigón: H-21
Acero en barras: AH-500
Acero en estribos: AH-500

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| C110=C126=C76=C92 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 225 / 82 | 345 | 4140 | 36.8 |
| | | | | | Total+10% (x4): | | 149.8 699.2 |
| C114=C115=C122=C121 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 235 / 82 | 355 | 4260 | 37.8 |
| | | | | | Total+10% (x4): | | 150.9 703.6 |
| C97=C80=C83=C105=C88=C103=C99=C98=C81=C82=C79=C78=C94=C89=C90=C86=C87=C104=C64 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 244 / 83 | 365 | 4380 | 38.9 |
| | | | | | Total+10% (x19): | | 152.1 2889.9 |
| C71=C72=C108=C70=C69=C62=C65 C60=C74=C61 C73 C67 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 249 / 83 | 370 | 4440 | 39.4 |
| | | | | | Total+10% (x71): | | 152.7 1955.9 |
| C102=C100=C77=C91=C68 C66=C63=C85 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 239 / 83 | 360 | 4320 | 38.4 |
| | | | | | Total+10% (x6): | | 151.8 1212.8 |
| C96=C106 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 249 / 83 | 370 | 4440 | 39.4 |
| | | | | | Total+10% (x2): | | 152.7 305.4 |
| C95=C107 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 244 / 83 | 365 | 4380 | 38.9 |
| | | | | | Total+10% (x2): | | 152.1 304.2 |
| C60=C74=C61 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 254 / 83 | 375 | 4500 | 40.0 |
| | | | | | Total+10% (x3): | | 153.3 459.9 |
| C59=C75 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 235 / 82 | 355 | 4260 | 37.8 |
| | | | | | Total+10% (x2): | | 150.9 301.8 |
| C93=C109 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 230 / 82 | 350 | 4200 | 37.3 |
| | | | | | Total+10% (x3): | | 150.4 300.8 |
| C73 | 1 | Ø6 | 64 | 27 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø12 | 12 | 353 / 85 | 445 | 5340 | 47.4 |
| | 3 | Ø12 | 12 | 336 | 336 | 4032 | 35.8 |
| | 4 | Ø12 | 12 | 12 229 / 83 | 380 | 4560 | 40.5 |
| | | | | | Total+10% | | 153.9 |
| C101 | 1 | Ø6 | 64 | 27 / 27 | 93 | 5952 | 13.2 |
| | 2 | Ø12 | 10 | 353 / 85 | 445 | 4450 | 39.5 |
| | 3 | Ø12 | 10 | 336 | 336 | 3360 | 29.8 |
| | 4 | Ø12 | 10 | 12 230 / 82 | 350 | 3500 | 31.1 |
| | | | | | Total+10% | | 125.0 |
| C111=C116=C120=C125 | 1 | Ø6 | 76 | 27 / 27 | 115 | 8740 | 19.4 |
| | 2 | Ø20 | 4 | 27 / 335 / 27 | 395 | 1580 | 39.0 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø20 | 4 | 12 390 / 1837 | 770 | 3080 | 76.0 |
| | 5 | Ø16 | 8 | 12 593 / 1807 | 740 | 5920 | 93.4 |
| | | | | | Total+10% (x4): | | 279.9 1117.6 |
| C112=C124 | 1 | Ø6 | 76 | 27 / 27 | 115 | 8740 | 19.4 |
| | 2 | Ø20 | 4 | 27 / 335 / 27 | 395 | 1580 | 39.0 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø20 | 4 | 12 599 / 1838 | 780 | 3120 | 76.9 |
| | 5 | Ø16 | 8 | 12 602 / 1808 | 750 | 6000 | 94.7 |
| | | | | | Total+10% (x2): | | 279.3 558.6 |
| C84 | 1 | Ø6 | 64 | 27 / 27 | 93 | 5952 | 13.2 |
| | 2 | Ø12 | 10 | 353 / 85 | 445 | 4450 | 39.5 |
| | 3 | Ø12 | 10 | 354 / 1 | 355 | 3550 | 31.5 |
| | 4 | Ø12 | 10 | 12 230 / 82 | 350 | 3500 | 31.1 |
| | | | | | Total+10% | | 125.8 |
| C67 | 1 | Ø6 | 64 | 27 / 27 | 93 | 5952 | 13.2 |
| | 2 | Ø12 | 10 | 353 / 85 | 445 | 4450 | 39.5 |
| | 3 | Ø12 | 10 | 354 / 1 | 355 | 3550 | 31.5 |
| | 4 | Ø12 | 10 | 12 235 / 82 | 355 | 3550 | 31.5 |
| | | | | | Total+10% | | 127.3 |
| | | | | | Ø6: | | 1132.5 |
| | | | | | Ø12: | | 7732.6 |
| | | | | | Ø16: | | 919.8 |
| | | | | | Ø20: | | 1734.6 |
| | | | | | Total: | | 12483.7 |

UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

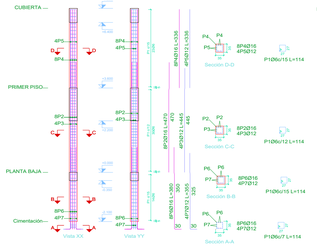
ESCALA:
1:100

LAMINA:
1/2

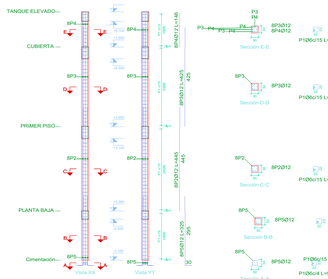
CONTENIDO:
DETALLE Y ARMADO DE COLUMNAS

FECHA :
NOVIEMBRE DE 2024

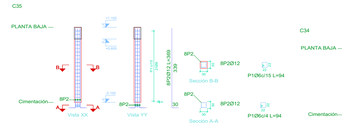
C25



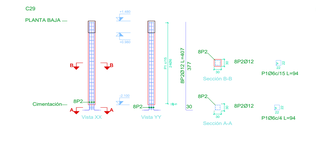

C53=C52



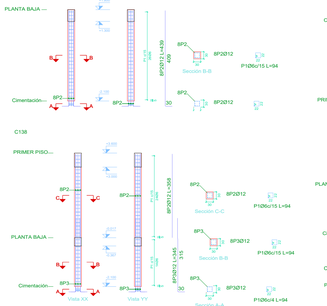

C35



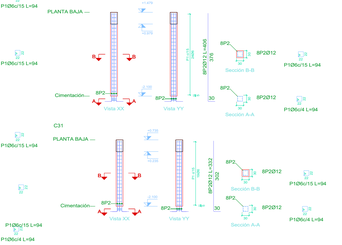

C29




C38=C136



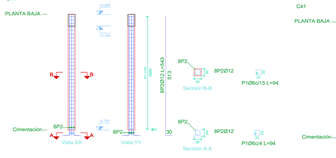

C36



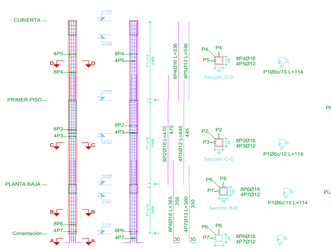

C31



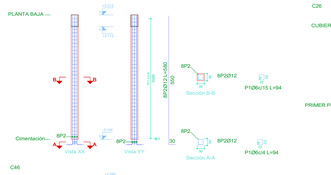

C44



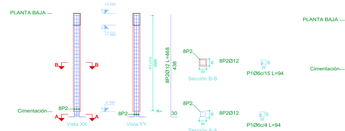

C21=C20=C24




C43=C42

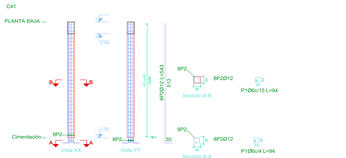



C46

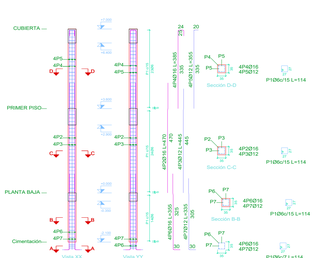



C30

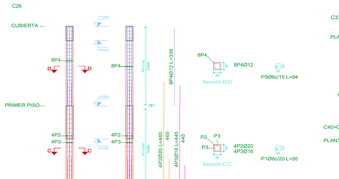
C41



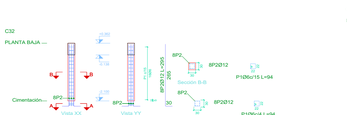

C118



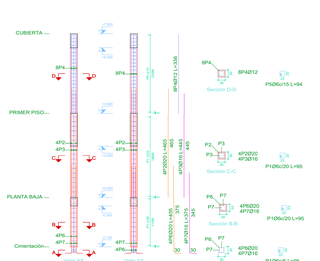

C26



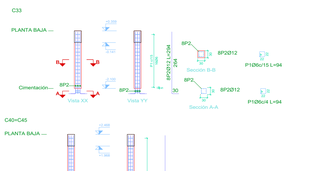

C32



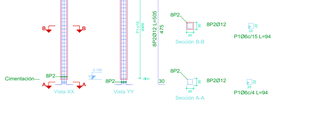

C19



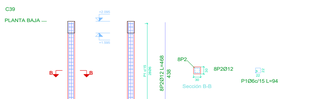

C33



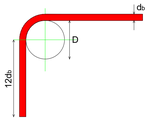

C40=C45



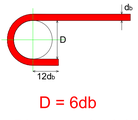

C39



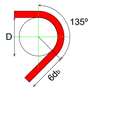

Doblez 90º




Doblez 180º




Doblez 135º




D = 6db

D = Diametro de doblez

db = Diametro de la barra

Cuadro de pilares
Escala 1:60
Hormigón: H-21
Acero en barras: AH-500
Acero en estribos: AH-500

| C19=C26 | C21=C20=C24=C25 | C22=C131=C23=C37=C27=C28 C127=C128=C129=C130=C132 C133=C134=C135 | C29=C36 | C30=C35 | C33=C32 | C34=C31 | C38=C136 | C39=C46 | C40=C45 | C43=C42 | C44=C41 | C53=C52 | C57=C48=C47=C49=C50 C51=C55=C56=C58=C54 | C84=C67 | C101 | C110=C114=C115=C97=C90 C93=C122=C105=C121=C88 C71=C126=C103=C102=C100 C99=C86=C81=C82=C79=C96 C95=C78=C69=C59=C93=C76 C94=C77=C75=C74=C73=C72 C69=C91=C31=C92=C98=C87 C104=C106=C107=C108=C70 C109=C83=C85=C80=C89=C60 C109=C64=C65=C61 | C111=C112=C113=C116 C117=C119=C120=C123 C124=C125 | C118 | C138=C137=C15=C14=C13 C7=C8=C9=C1=C2=C3=C4 C5=C10=C11=C12=C16 C17=C18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Ø12<br>1Ø6(95) | | | | | | | TANQUE ELEVADO |
| | | | | | | | | | | | | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 150 / 10 / 15 | | | | | | | |
| Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | Ø16<br>Ø12<br>1Ø6(115)<br>Arm. Long.: 8Ø16+4Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 18 / 19 | | | | | | | | | | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | Ø12<br>1Ø6(85)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | Ø12<br>1Ø6(95)<br>Arm. Long.: 10Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | Ø12<br>1Ø6(95)<br>Arm. Long.: 10Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | Ø12<br>1Ø6(115)<br>Arm. Long.: 12Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | Ø12<br>Ø20<br>Ø12<br>1Ø6(116)<br>Arm. Long.: 4Ø20+8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 27 / 13 | Ø12<br>Ø16<br>Ø12<br>1Ø6(115)<br>Arm. Long.: 4Ø16+4Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 340 / 23 / 15 | | CUBIERTA |
| Ø16<br>Ø20<br>Ø16<br>1Ø6(96)<br>Arm. Long.: 4Ø20+4Ø16<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 18 / 20 | Ø16<br>Ø12<br>1Ø6(115)<br>Arm. Long.: 8Ø16+4Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 30 / 12 | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 19 / 19 | | | | | | | | | | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 24 / 15 | Ø12<br>1Ø6(85)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 24 / 15 | Ø12<br>1Ø6(95)<br>Arm. Long.: 10Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 24 / 15 | Ø12<br>1Ø6(95)<br>Arm. Long.: 10Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 24 / 15 | Ø12<br>1Ø6(115)<br>Arm. Long.: 12Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 24 / 15 | | Ø12<br>Ø16<br>Ø12<br>1Ø6(115)<br>Arm. Long.: 4Ø16+4Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 24 / 15 | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 360 / 24 / 15 | PRIMER PISO |
| Ø16<br>Ø20<br>Ø16<br>1Ø6(96)<br>Arm. Long.: 4Ø20+4Ø16<br>Arranque: 4Ø20+4Ø16<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 11 / 20<br>Arranque / 3 / - | Ø16<br>Ø12<br>1Ø6(115)<br>Arm. Long.: 8Ø16+4Ø12<br>Arranque: 8Ø16+4Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 14 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 208 / 11 / 19<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 358 / 24 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 321 / 21 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 246 / 16 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 283 / 19 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 390 / 26 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 420 / 28 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 457 / 30 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 531 / 35 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 494 / 33 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 14 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(85)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 14 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 10Ø12<br>Arranque: 10Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 14 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 10Ø12<br>Arranque: 10Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 14 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(115)<br>Arm. Long.: 12Ø12<br>Arranque: 12Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 14 / 15<br>Arranque / 3 / - | Ø16<br>Ø20<br>Ø16<br>1Ø6(116)<br>Arm. Long.: 4Ø20+8Ø16<br>Arranque: 4Ø20+8Ø16<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>210 a 570 / 29 / 13<br>0 a 210 / 17 / 13<br>Arranque / 3 / - | Ø12<br>Ø16<br>Ø12<br>1Ø6(115)<br>Arm. Long.: 4Ø16+4Ø12<br>Arranque: 4Ø16+4Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 210 / 14 / 15<br>Arranque / 3 / - | Ø12<br>1Ø6(95)<br>Arm. Long.: 8Ø12<br>Arranque: 8Ø12<br>Estribos: Ø6<br>Intervalo (cm) / Nº / Separación (cm)<br>0 a 208 / 14 / 15<br>Arranque / 3 / - | Cimentación |

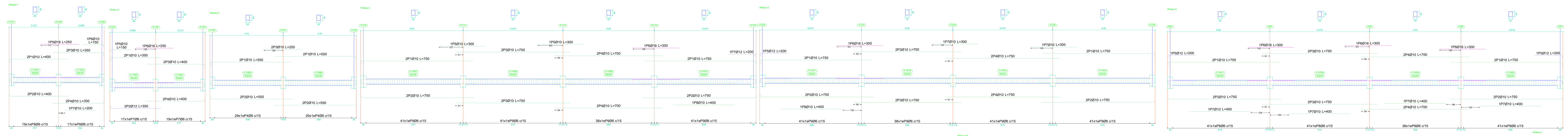
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| C25 | 1 | Ø6 | 70 | 22 / 27 | 114 | 7980 | 17.7 |
| | 2 | Ø16 | 8 | 300 10;110 | 470 | 3760 | 59.3 |
| | 3 | Ø12 | 4 | 353 85 | 445 | 1780 | 15.8 |
| | 4 | Ø16 | 8 | 336 | 336 | 2688 | 42.4 |
| | 5 | Ø12 | 4 | 336 | 336 | 1344 | 11.9 |
| | 6 | Ø16 | 8 | L=225 12;107 | 380 | 3040 | 48.0 |
| | 7 | Ø12 | 4 | L=225 62 | 355 | 1420 | 12.6 |
| | | | | | Total+10% | | 228.5 |
| C118 | 1 | Ø6 | 64 | 22 / 27 | 114 | 7296 | 16.2 |
| | 2 | Ø16 | 4 | 300 10;110 | 470 | 1880 | 29.7 |
| | 3 | Ø12 | 4 | 353 85 | 445 | 1780 | 15.8 |
| | 4 | Ø16 | 4 | 336 25 | 385 | 1540 | 24.3 |
| | 5 | Ø12 | 4 | 335 | 355 | 1420 | 12.6 |
| | 6 | Ø16 | 4 | L=233 12;82 | 355 | 1420 | 22.4 |
| | 7 | Ø12 | 4 | L=225 62 | 335 | 1340 | 11.9 |
| | | | | | Total+10% | | 146.2 |

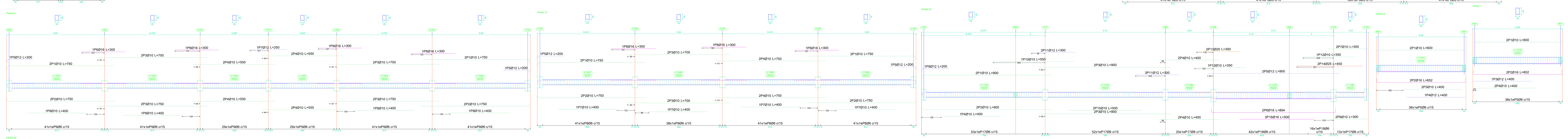
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| C19 | 1 | Ø6 | 32 | 22 / 27 | 95 | 3040 | 6.7 |
| | 2 | Ø20 | 4 | 348 13;105 | 465 | 1860 | 45.9 |
| | 3 | Ø16 | 4 | 350 10;85 | 445 | 1780 | 28.1 |
| | 4 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 5 | Ø6 | 23 | 22 / 27 | 94 | 2162 | 4.8 |
| | 6 | Ø20 | 4 | L=225 13;137 | 405 | 1620 | 40.0 |
| | 7 | Ø16 | 4 | L=228 10;107 | 375 | 1500 | 23.7 |
| | | | | | Total+10% | | 190.4 |
| C26 | 1 | Ø6 | 32 | 22 / 27 | 95 | 3040 | 6.7 |
| | 2 | Ø20 | 4 | 348 13;105 | 465 | 1860 | 45.9 |
| | 3 | Ø16 | 4 | 350 10;85 | 445 | 1780 | 28.1 |
| | 4 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 5 | Ø6 | 23 | 22 / 27 | 94 | 2162 | 4.8 |
| | 6 | Ø20 | 4 | L=220 13;137 | 400 | 1600 | 39.5 |
| | 7 | Ø16 | 4 | L=223 10;107 | 370 | 1480 | 23.4 |
| | | | | | Total+10% | | 189.5 |
| C53=C52 | 1 | Ø6 | 74 | 22 / 27 | 94 | 6956 | 15.4 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 353 85 | 425 | 3400 | 30.2 |
| | 4 | Ø12 | 8 | 146 | 146 | 1168 | 10.4 |
| | 5 | Ø12 | 8 | L=225 62 | 325 | 2600 | 23.1 |
| | | | | | Total+10% | | 121.8 (x2) 249.6 |
| C39 | 1 | Ø6 | 31 | 22 / 27 | 94 | 2914 | 6.5 |
| | 2 | Ø12 | 8 | L=438 | 468 | 3744 | 33.2 |
| | | | | | Total+10% | | 43.7 |
| C46 | 1 | Ø6 | 31 | 22 / 27 | 94 | 2914 | 6.5 |
| | 2 | Ø12 | 8 | L=438 | 468 | 3744 | 33.2 |
| | | | | | Total+10% | | 43.7 |
| C29 | 1 | Ø6 | 27 | 22 / 27 | 94 | 2538 | 5.6 |
| | 2 | Ø12 | 8 | L=377 | 407 | 3256 | 28.9 |
| | | | | | Total+10% | | 38.0 |
| C36 | 1 | Ø6 | 27 | 22 / 27 | 94 | 2538 | 5.6 |
| | 2 | Ø12 | 8 | L=379 | 406 | 3248 | 28.8 |
| | | | | | Total+10% | | 37.8 |
| C45=C45 | 1 | Ø6 | 33 | 22 / 27 | 94 | 3102 | 6.9 |
| | 2 | Ø12 | 8 | L=470 | 505 | 4040 | 35.9 |
| | | | | | Total+10% | | 47.1 (x2) 94.2 |
| C30 | 1 | Ø6 | 24 | 22 / 27 | 94 | 2256 | 5.0 |
| | 2 | Ø12 | 8 | L=339 | 369 | 2952 | 26.2 |
| | | | | | Total+10% | | 34.3 |
| C35 | 1 | Ø6 | 24 | 22 / 27 | 94 | 2256 | 5.0 |
| | 2 | Ø12 | 8 | L=339 | 369 | 2952 | 26.2 |
| | | | | | Total+10% | | 34.3 |
| C43=C42 | 1 | Ø6 | 38 | 22 / 27 | 94 | 3572 | 7.9 |
| | 2 | Ø12 | 8 | L=580 | 580 | 4640 | 41.2 |
| | | | | | Total+10% | | 54.0 (x2) 108.0 |
| C33 | 1 | Ø6 | 19 | 22 / 27 | 94 | 1786 | 4.0 |
| | 2 | Ø12 | 8 | L=264 | 294 | 2352 | 20.9 |
| | | | | | Total+10% | | 27.4 |
| C32 | 1 | Ø6 | 19 | 22 / 27 | 94 | 1786 | 4.0 |
| | 2 | Ø12 | 8 | L=295 | 295 | 2360 | 21.0 |
| | | | | | Total+10% | | 27.5 |
| C34 | 1 | Ø6 | 22 | 22 / 27 | 94 | 2068 | 4.6 |
| | 2 | Ø12 | 8 | L=302 | 332 | 2656 | 23.6 |
| | | | | | Total+10% | | 31.0 |
| C31 | 1 | Ø6 | 22 | 22 / 27 | 94 | 2068 | 4.6 |
| | 2 | Ø12 | 8 | L=302 | 332 | 2656 | 23.6 |
| | | | | | Total+10% | | 31.0 |
| C44 | 1 | Ø6 | 36 | 22 / 27 | 94 | 3384 | 7.5 |
| | 2 | Ø12 | 8 | L=513 | 543 | 4344 | 38.6 |
| | | | | | Total+10% | | 50.7 |
| C41 | 1 | Ø6 | 36 | 22 / 27 | 94 | 3384 | 7.5 |
| | 2 | Ø12 | 8 | L=513 | 543 | 4344 | 38.6 |
| | | | | | Total+10% | | 50.7 |

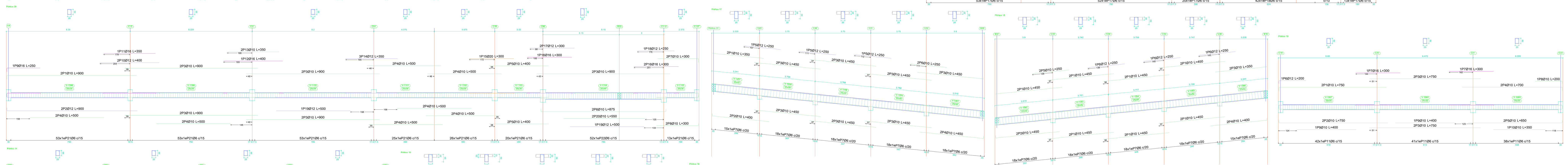
Pilares que nacen en PLANTA BAJA y mueren en TANQUE ELEVADO
Hormigón: H-21
Acero en barras: AH-500
Acero en estribos: AH-500

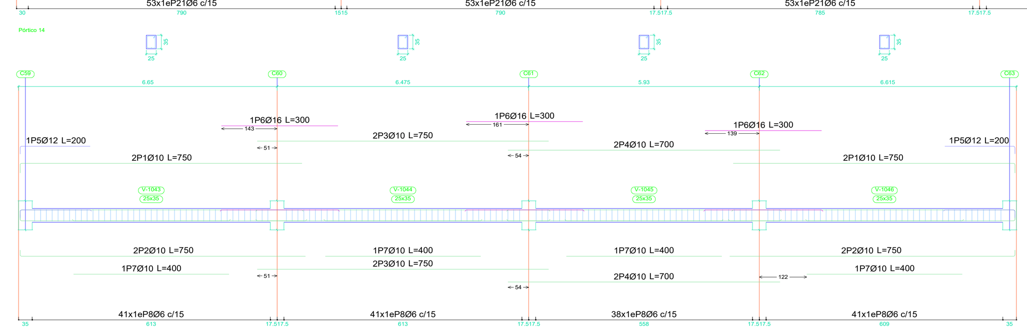
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| C113=C123 | 1 | Ø6 | 76 | 22 / 27 | 115 | 8740 | 19.4 |
| | 2 | Ø20 | 4 | 355 22 | 395 | 1580 | 39.0 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø20 | 4 | L=594 13;95 | 770 | 3100 | 76.5 |
| | 5 | Ø16 | 8 | L=602 13;95 | 750 | 6000 | 94.7 |
| | | | | | Total+10% (x2) | | 219.3 556.6 |
| C117=C119 | 1 | Ø6 | 76 | 22 / 27 | 115 | 8740 | 19.4 |
| | 2 | Ø20 | 4 | 355 22 | 395 | 1580 | 39.0 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø20 | 4 | L=594 13;95 | 770 | 3100 | 76.5 |
| | 5 | Ø16 | 8 | L=597 13;95 | 745 | 5960 | 94.1 |
| | | | | | Total+10% (x2) | | 278.2 568.4 |
| C22=C23=C37=C128=C134 | 1 | Ø6 | 51 | 22 | 94 | 4794 | 10.6 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=225 62 | 325 | 2600 | 23.1 |
| | | | | | Total+10% (x6) | | 98.1 490.5 |
| C131 | 1 | Ø6 | 51 | 22 | 94 | 4794 | 10.6 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=225 62 | 325 | 2600 | 23.1 |
| | | | | | Total+10% | | 98.1 |
| C27 | 1 | Ø6 | 51 | 22 | 94 | 4794 | 10.6 |
| | 2 | Ø12 | 8 | 354 84 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=225 64 | 325 | 2600 | 23.1 |
| | | | | | Total+10% | | 98.1 |
| C28 | 1 | Ø6 | 51 | 22 | 94 | 4794 | 10.6 |
| | 2 | Ø12 | 8 | 354 83 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=225 64 | 325 | 2600 | 23.1 |
| | | | | | Total+10% | | 98.1 |
| C127=C135 | 1 | Ø6 | 51 | 22 | 94 | 4794 | 10.6 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=244 63 | 345 | 2760 | 24.5 |
| | | | | | Total+10% (x2) | | 99.7 199.4 |
| C129=C133 | 1 | Ø6 | 51 | 22 | 94 | 4794 | 10.6 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=244 63 | 345 | 2760 | 24.5 |
| | | | | | Total+10% (x2) | | 99.7 199.4 |
| C130=C132 | 1 | Ø6 | 51 | 22 | 94 | 4794 | 10.6 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=239 63 | 340 | 2720 | 24.1 |
| | | | | | Total+10% (x2) | | 99.2 198.4 |
| C57=C48=C49=C50=C51=C55 C56=C54 | 1 | Ø6 | 64 | 22 / 27 | 84 | 5376 | 11.9 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=225 62 | 345 | 2760 | 24.5 |
| | | | | | Total+10% (x6) | | 103.1 618.6 |
| C47 | 1 | Ø6 | 64 | 22 / 27 | 84 | 5376 | 11.9 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=225 62 | 345 | 2760 | 24.5 |
| | | | | | Total+10% | | 103.1 |
| C58 | 1 | Ø6 | 64 | 22 / 27 | 84 | 5376 | 11.9 |
| | 2 | Ø12 | 8 | 353 85 | 445 | 3560 | 31.6 |
| | 3 | Ø12 | 8 | 336 | 336 | 2688 | 23.9 |
| | 4 | Ø12 | 8 | L=249 63 | 370 | 2960 | 26.3 |
| | | | | | Total+10% | | 103.1 |
| C38=C136 | 1 | Ø6 | 29 | 22 / 27 | 94 | 2726 | 6.0 |
| | 2 | Ø12 | 8 | L=409 | 439 | 3512 | 31.2 |
| | | | | | Total+10% (x2) | | 40.9 81.8 |
| C138 | 1 | Ø6 | 41 | 22 / 27 | 94 | 3854 | 8.6 |
| | 2 | Ø12 | 8 | 358 | 358 | 2864 | 25.4 |
| | 3 | Ø12 | 8 | L=223 64 | 345 | 2760 | 24.5 |
| | | | | | Total+10% | | 64.4 |
| C137 | 1 | Ø6 | 41 | 22 / 27 | 94 | 3854 | 8.6 |
| | 2 | Ø12 | 8 | 357 | 357 | 2856 | 25.4 |
| | 3 | Ø12 | 8 | L=224 64 | 345 | 2760 | 24.5 |
| | | | | | Total+10% (x16) | | 64.4 1155.6 |
| C15=C14=C13=C7=C8=C9=C1 C2=C3=C4=C5=C6=C10=C11 C12=C16=C17=C18 | 1 | Ø6 | 41 | 22 / 27 | 94 | 3854 | 8.6 |
| | 2 | Ø12 | 8 | 356 | 356 | 2848 | 25.3 |
| | 3 | Ø12 | 8 | L=225 62 | 345 | 2760 | 24.5 |
| | | | | | Total+10% (x18) | | 64.2 1155.6 |
| C21=C20=C24 | 1 | Ø6 | 70 | 22 / 27 | 114 | 7980 | 17.7 |
| | 2 | Ø16 | 8 | 300 10;110 | 470 | 3760 | 59.3 |
| | 3 | Ø12 | 4 | 353 85 | 445 | 1780 | 15.8 |
| | 4 | Ø16 | 8 | 336 | 336 | 2688 | 42.4 |
| | 5 | Ø12 | 4 | 336 | 336 | 1344 | 11.9 |
| | 6 | Ø16 | 8 | L=237 10;106 | 365 | 3080 | 48.6 |
| | 7 | Ø12 | 4 | L=239 63 | 360 | 1440 | 12.8 |
| | | | | | Total+10% (x2) | | 229.4 689.2 |
| | | | | | Ø6<br>Ø12<br>Ø16<br>Ø20<br>Total | | 679.0<br>808.7<br>1139.8<br>188.3<br>3015.1 |

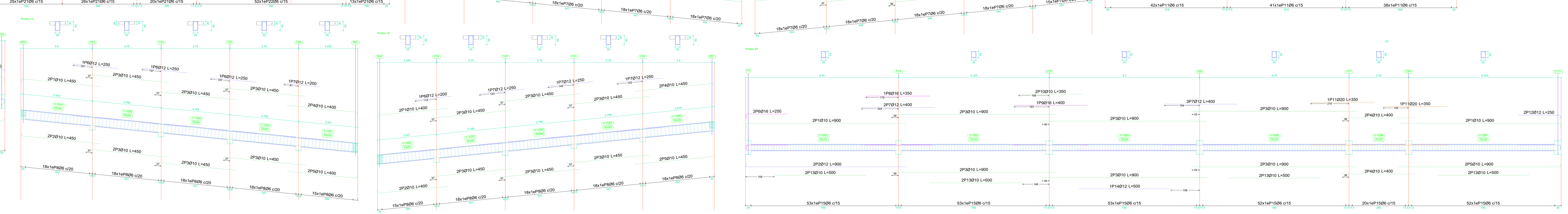
| | |
|---|---|
| UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO<br>FACULTAD DE CIENCIAS Y TECNOLOGIA | |
| MATERIA:<br>CIV502 PROYECTO DE INGENIERÍA CIVIL II | |
| PROYECTO:<br>DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO | |
| UNIVERSITARIO:<br>ALEX BRIAN ESPINOZA VELASQUEZ | ESCALA:<br>1:100 |
| CONTENIDO:<br>DETALLE Y ARMADO DE COLUMNAS | FECHA:<br>NOVIEMBRE DE 2024 |
| | LAMINA:<br>2/2 |











| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 28 | 1 | Ø10 | 4 | 25 / 875 | 900 | 3600 | 22.2 |
| | 2 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 3 | Ø10 | 12 | 900 | 900 | 10800 | 66.6 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 6 | Ø16 | 2 | 26 / 224 | 250 | 500 | 7.9 |
| | 7 | Ø12 | 5 | 400 | 400 | 2000 | 17.8 |
| | 8 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 9 | Ø16 | 1 | 400 | 400 | 400 | 6.3 |
| | 10 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 11 | Ø20 | 2 | 350 | 350 | 700 | 17.3 |
| | 12 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 13 | Ø10 | 8 | 500 | 500 | 4000 | 24.7 |
| | 14 | Ø12 | 1 | 500 | 500 | 500 | 4.4 |
| | 15 | Ø6 | 283 | 30 / 6 / 20 | 114 | 32262 | 71.6 |
| | | | | | | Total+10%: | 319.0 |
| Pórtico 30 | 1 | Ø10 | 2 | 25 / 475 | 500 | 1000 | 6.2 |
| | 2 | Ø10 | 2 | 16 / 484 | 500 | 1000 | 6.2 |
| | 3 | Ø10 | 6 | 500 | 500 | 3000 | 18.5 |
| | 4 | Ø10 | 6 | 900 | 900 | 5400 | 33.3 |
| | 5 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 6 | Ø16 | 2 | 26 / 842 / 26 | 894 | 1788 | 28.2 |
| | 7 | Ø10 | 2 | 275 / 25 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 9 | Ø10 | 1 | 200 | 200 | 200 | 1.2 |
| | 10 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 11 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 12 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 13 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 14 | Ø20 | 1 | 300 | 300 | 300 | 7.4 |
| | 15 | Ø16 | 1 | 500 | 500 | 500 | 7.9 |
| | 16 | Ø6 | 137 | 30 / 6 / 20 | 114 | 15618 | 34.7 |
| | 17 | Ø6 | 52 | 40 / 6 / 20 | 134 | 6968 | 15.5 |
| | | | | | | Total+10%: | 222.5 |
| Pórtico 11 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 155.3 |
| Pórtico 12 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 155.3 |
| Pórtico 13 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø12 | 3 | 20 / 180 | 200 | 600 | 5.3 |
| | 6 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 7 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 8 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 9 | Ø10 | 3 | 400 | 400 | 1200 | 7.4 |
| | 10 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 164.1 |
| Pórtico 14 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 155.3 |
| Pórtico 15 | 1 | Ø10 | 2 | 16 / 434 | 450 | 900 | 5.5 |
| | 2 | Ø10 | 2 | 16 / 434 | 450 | 900 | 5.5 |
| | 3 | Ø10 | 12 | 450 | 450 | 5400 | 33.3 |
| | 4 | Ø10 | 2 | 384 / 16 | 400 | 800 | 4.9 |
| | 5 | Ø10 | 2 | 384 / 16 | 400 | 800 | 4.9 |
| | 6 | Ø12 | 3 | 250 | 250 | 750 | 6.7 |
| | 7 | Ø12 | 1 | 200 | 200 | 200 | 1.8 |
| | 8 | Ø6 | 87 | 45 / 6 / 20 | 144 | 12528 | 27.8 |
| | | | | | | Total+10%: | 99.4 |
| Pórtico 16 | 1 | Ø10 | 2 | 16 / 384 | 400 | 800 | 4.9 |
| | 2 | Ø10 | 2 | 16 / 384 | 400 | 800 | 4.9 |
| | 3 | Ø10 | 12 | 450 | 450 | 5400 | 33.3 |
| | 4 | Ø10 | 2 | 434 / 16 | 450 | 900 | 5.5 |
| | 5 | Ø10 | 2 | 434 / 16 | 450 | 900 | 5.5 |
| | 6 | Ø12 | 1 | 200 | 200 | 200 | 1.8 |
| | 7 | Ø12 | 3 | 250 | 250 | 750 | 6.7 |
| | 8 | Ø6 | 87 | 45 / 6 / 20 | 144 | 12528 | 27.8 |
| | | | | | | Total+10%: | 99.4 |
| Pórtico 17 | 1 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 2 | Ø10 | 2 | 16 / 384 | 400 | 800 | 4.9 |
| | 3 | Ø10 | 14 | 450 | 450 | 6300 | 38.8 |
| | 4 | Ø10 | 2 | 434 / 16 | 450 | 900 | 5.5 |
| | 5 | Ø12 | 3 | 250 | 250 | 750 | 6.7 |
| | 6 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 7 | Ø6 | 87 | 45 / 6 / 20 | 144 | 12528 | 27.8 |
| | | | | | | Total+10%: | 100.2 |
| Pórtico 18 | 1 | Ø10 | 14 | 450 | 450 | 6300 | 38.8 |
| | 2 | Ø10 | 2 | 16 / 434 | 450 | 900 | 5.5 |
| | 3 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 4 | Ø10 | 2 | 384 / 16 | 400 | 800 | 4.9 |
| | 5 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 6 | Ø12 | 3 | 250 | 250 | 750 | 6.7 |
| | 7 | Ø6 | 87 | 45 / 6 / 20 | 144 | 12528 | 27.8 |
| | | | | | | Total+10%: | 100.2 |
| Pórtico 19 | 1 | Ø10 | 2 | 25 / 725 | 750 | 1500 | 9.2 |
| | 2 | Ø10 | 2 | 16 / 734 | 750 | 1500 | 9.2 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 2 | 675 / 25 | 700 | 1400 | 8.6 |
| | 5 | Ø10 | 2 | 634 / 16 | 650 | 1300 | 8.0 |
| | 6 | Ø12 | 1 | 20 / 180 | 200 | 200 | 1.8 |
| | 7 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 8 | Ø10 | 1 | 184 / 16 | 200 | 200 | 1.2 |
| | 9 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 10 | Ø10 | 1 | 350 | 350 | 350 | 2.2 |
| | 11 | Ø6 | 121 | 30 / 6 / 20 | 114 | 13794 | 30.6 |
| | | | | | | Total+10%: | 114.1 |
| | | | | | | Ø6: | 468.7 |
| | | | | | | Ø10: | 922.6 |
| | | | | | | Ø12: | 119.7 |
| | | | | | | Ø16: | 146.7 |
| | | | | | | Ø20: | 27.1 |
| | | | | | | Total: | 1684.8 |

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 29 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 3 | Ø10 | 10 | 900 | 900 | 9000 | 55.5 |
| | 4 | Ø10 | 14 | 500 | 500 | 7000 | 43.2 |
| | 5 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 6 | Ø10 | 2 | 17 / 842 / 17 | 875 | 1750 | 10.8 |
| | 7 | Ø10 | 2 | 275 / 25 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 9 | Ø16 | 1 | 26 / 224 | 250 | 250 | 3.9 |
| | 10 | Ø12 | 2 | 400 | 400 | 800 | 7.1 |
| | 11 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 12 | Ø16 | 1 | 400 | 400 | 400 | 6.3 |
| | 13 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 14 | Ø12 | 3 | 350 | 350 | 1050 | 9.3 |
| | 15 | Ø20 | 1 | 300 | 300 | 300 | 7.4 |
| | 16 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 17 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 18 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 19 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 20 | Ø10 | 2 | 550 | 550 | 1100 | 6.8 |
| | 21 | Ø6 | 243 | 30 / 6 / 20 | 114 | 27702 | 61.5 |
| | 22 | Ø6 | 52 | 40 / 6 / 20 | 134 | 6968 | 15.5 |
| | | | | | | Total+10%: | 343.3 |
| Pórtico 57 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 5 | 400 | 400 | 2000 | 12.3 |
| | 5 | Ø12 | 2 | 900 | 900 | 1800 | 16.0 |
| | 6 | Ø16 | 2 | 26 / 842 / 26 | 894 | 1788 | 28.2 |
| | 7 | Ø10 | 2 | 275 / 25 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 9 | Ø12 | 1 | 20 / 180 | 200 | 200 | 1.8 |
| | 10 | Ø10 | 1 | 550 | 550 | 550 | 3.4 |
| | 11 | Ø12 | 5 | 300 | 300 | 1500 | 13.3 |
| | 12 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 13 | Ø20 | 2 | 300 | 300 | 600 | 14.8 |
| | 14 | Ø25 | 2 | 450 | 450 | 900 | 34.7 |
| | 15 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 16 | Ø16 | 3 | 500 | 500 | 1500 | 23.7 |
| | 17 | Ø6 | 138 | 30 / 6 / 20 | 114 | 15732 | 34.9 |
| | 18 | Ø6 | 58 | 40 / 6 / 20 | 134 | 7772 | 17.2 |
| | | | | | | Total+10%: | 288.9 |

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 1 | 1 | Ø10 | 2 | 25 / 375 | 400 | 800 | 4.9 |
| | 2 | Ø10 | 2 | 16 / 384 | 400 | 800 | 4.9 |
| | 3 | Ø10 | 2 | 325 / 25 | 350 | 700 | 4.3 |
| | 4 | Ø10 | 2 | 334 / 16 | 350 | 700 | 4.3 |
| | 5 | Ø16 | 1 | 250 | 250 | 250 | 3.9 |
| | 6 | Ø10 | 1 | 134 / 16 | 150 | 150 | 0.9 |
| | 7 | Ø10 | 1 | 200 | 200 | 200 | 1.2 |
| | 8 | Ø6 | 36 | 30 / 6 / 20 | 114 | 4104 | 9.1 |
| | | | | | | Total+10%: | 36.9 |
| Pórtico 2 | 1 | Ø10 | 2 | 25 / 325 | 350 | 700 | 4.3 |
| | 2 | Ø12 | 2 | 20 / 330 | 350 | 700 | 6.2 |
| | 3 | Ø10 | 2 | 375 / 25 | 400 | 800 | 4.9 |
| | 4 | Ø10 | 2 | 384 / 16 | 400 | 800 | 4.9 |
| | 5 | Ø10 | 1 | 16 / 134 | 150 | 150 | 0.9 |
| | 6 | Ø16 | 1 | 250 | 250 | 250 | 3.9 |
| | 7 | Ø6 | 36 | 30 / 6 / 20 | 114 | 4104 | 9.1 |
| | | | | | | Total+10%: | 37.6 |
| Pórtico 3 | 1 | Ø10 | 4 | 25 / 525 | 550 | 2200 | 13.6 |
| | 2 | Ø10 | 4 | 16 / 534 | 550 | 2200 | 13.6 |
| | 3 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 4 | Ø6 | 58 | 30 / 6 / 20 | 114 | 6612 | 14.7 |
| | | | | | | Total+10%: | 49.5 |
| Pórtico 4 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 6 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 7 | Ø12 | 1 | 180 / 20 | 200 | 200 | 1.8 |
| | 8 | Ø10 | 1 | 400 | 400 | 400 | 2.5 |
| | 9 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 138.8 |
| Pórtico 5 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø12 | 1 | 20 / 180 | 200 | 200 | 1.8 |
| | 6 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 7 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 1 | 400 | 400 | 400 | 2.5 |
| | 9 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 138.8 |
| Pórtico 6 | 1 | Ø10 | 2 | 600 | 600 | 1200 | 7.4 |
| | 2 | Ø16 | 2 | 26 / 600 / 26 | 652 | 1304 | 20.6 |
| | 3 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 4 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 5 | Ø6 | 38 | 40 / 6 / 20 | 134 | 5092 | 11.3 |
| | | | | | | Total+10%: | 52.6 |
| Pórtico 7 | 1 | Ø10 | 2 | 600 | 600 | 1200 | 7.4 |
| | 2 | Ø16 | 2 | 26 / 600 / 26 | 652 | 1304 | 20.6 |
| | 3 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 4 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 5 | Ø6 | 38 | 40 / 6 / 20 | 134 | 5092 | 11.3 |
| | | | | | | Total+10%: | 52.6 |
| Pórtico 8 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 155.3 |
| Pórtico 9 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 4 | 300 | 300 | 1200 | 18.9 |
| | 7 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 8 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 9 | Ø6 | 222 | 30 / 6 / 20 | 114 | 25308 | 56.2 |
| | | | | | | Total+10%: | 211.1 |
| Pórtico 10 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø6 | 161 | 30 / 6 / 20 | 114 | 18354 | 40.7 |
| | | | | | | Total+10%: | 155.3 |
| | | | | | | Ø6: | 443.7 |
| | | | | | | Ø10: | 827.0 |
| | | | | | | Ø12: | 120.9 |
| | | | | | | Ø16: | 206.5 |
| | | | | | | Ø20: | 24.4 |
| | | | | | | Ø25: | 38.2 |
| | | | | | | Total: | 1660.7 |

PLANTA BAJA
Despiece de vigas
Hormigón: H-21
Acero en barras: AH-500
Acero en estribos: AH-500
Escala pórticos 1:125
Escala secciones 1:125
Escala huecos 1:125

UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA:
1:125

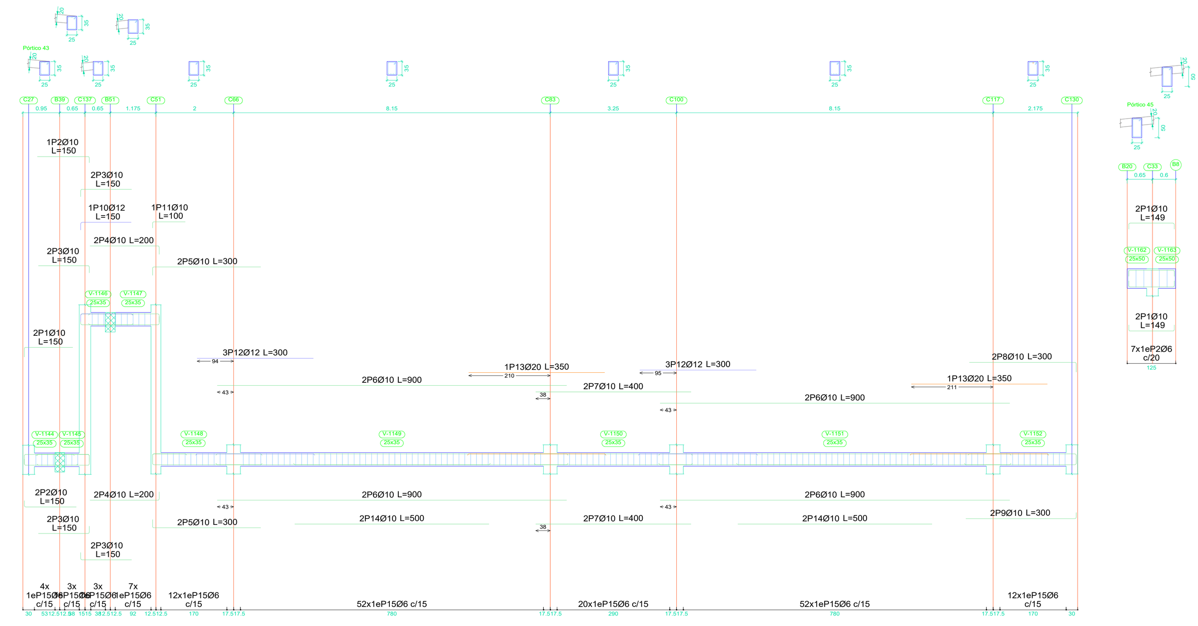
LAMINA:
1/2

CONTENIDO:
DETALLE Y ARMADO DE VIGAS PLANTA BAJA

FECHA :
NOVIEMBRE DE 2024

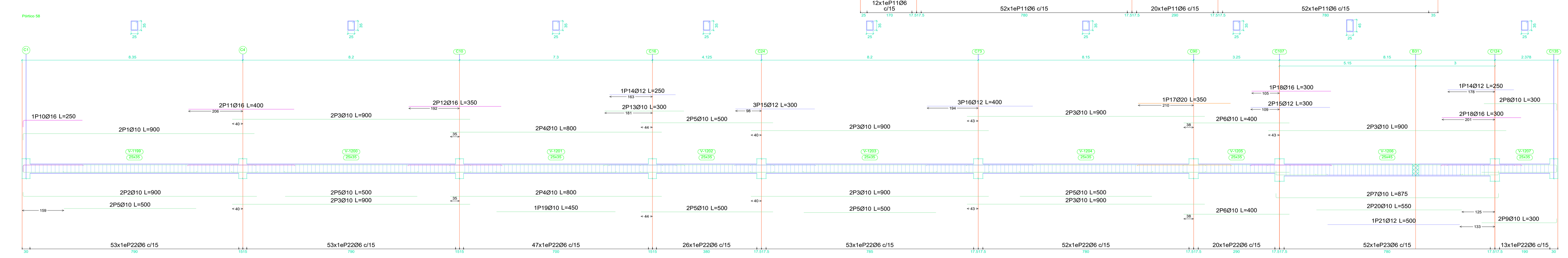
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 44 | 1 | Ø10 | 2 | 25 / 125 | 150 | 300 | 1.8 |
| | 2 | Ø10 | 3 | 16 / 134 | 150 | 450 | 2.8 |
| | 3 | Ø10 | 8 | 131 / 19 | 150 | 1200 | 7.4 |
| | 4 | Ø10 | 4 | 179 / 22 | 200 | 800 | 4.9 |
| | 5 | Ø10 | 4 | 22 / 279 | 300 | 1200 | 7.4 |
| | 6 | Ø10 | 8 | 900 | 900 | 7200 | 44.4 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø10 | 2 | 275 / 25 | 300 | 600 | 3.7 |
| | 9 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 10 | Ø12 | 1 | 20 / 130 | 150 | 150 | 1.3 |
| | 11 | Ø10 | 1 | 16 / 84 | 100 | 100 | 0.6 |
| | 12 | Ø12 | 6 | 300 | 300 | 1800 | 16.0 |
| | 13 | Ø20 | 2 | 350 | 350 | 700 | 17.3 |
| | 14 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 15 | Ø6 | 165 | 30 / 20 / 6 | 114 | 18810 | 41.7 |
| | | | | | | Total+10%: | 192.7 |

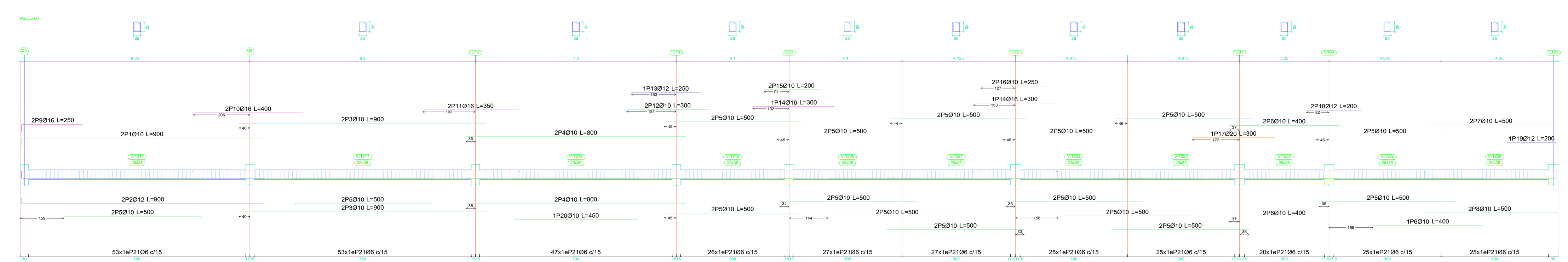
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 20 | 1 | Ø10 | 2 | 25 / 675 | 700 | 1400 | 8.6 |
| | 2 | Ø10 | 2 | 16 / 634 | 650 | 1300 | 8.0 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 2 | 725 / 25 | 750 | 1500 | 9.2 |
| | 5 | Ø10 | 2 | 734 / 16 | 750 | 1500 | 9.2 |
| | 6 | Ø10 | 1 | 16 / 184 | 200 | 200 | 1.2 |
| | 7 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 8 | Ø12 | 1 | 180 / 20 | 200 | 200 | 1.8 |
| | 9 | Ø10 | 1 | 350 | 350 | 350 | 2.2 |
| | 10 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 11 | Ø6 | 121 | 30 / 20 / 6 | 114 | 13794 | 30.6 |
| | | | | | | Total+10%: | 114.1 |
| Pórtico 21 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 5 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø6 | 84 | 30 / 20 / 6 | 114 | 9576 | 21.3 |
| | | | | | | Total+10%: | 80.5 |
| Pórtico 22 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 5 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø6 | 84 | 30 / 20 / 6 | 114 | 9576 | 21.3 |
| | | | | | | Total+10%: | 80.5 |
| Pórtico 23 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 5 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø6 | 84 | 30 / 20 / 6 | 114 | 9576 | 21.3 |
| | | | | | | Total+10%: | 80.5 |
| Pórtico 24 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 5 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø6 | 84 | 30 / 20 / 6 | 114 | 9576 | 21.3 |
| | | | | | | Total+10%: | 80.5 |
| Pórtico 25 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 5 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø6 | 84 | 30 / 20 / 6 | 114 | 9576 | 21.3 |
| | | | | | | Total+10%: | 80.5 |
| Pórtico 26 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 5 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø6 | 84 | 30 / 20 / 6 | 114 | 9576 | 21.3 |
| | | | | | | Total+10%: | 80.5 |
| Pórtico 27 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 3 | Ø10 | 12 | 900 | 900 | 10800 | 66.6 |
| | 4 | Ø10 | 5 | 400 | 400 | 2000 | 12.3 |
| | 5 | Ø10 | 12 | 500 | 500 | 6000 | 37.0 |
| | 6 | Ø10 | 2 | 475 / 25 | 500 | 1000 | 6.2 |
| | 7 | Ø10 | 2 | 484 / 16 | 500 | 1000 | 6.2 |
| | 8 | Ø16 | 2 | 26 / 224 | 250 | 500 | 7.9 |
| | 9 | Ø12 | 5 | 400 | 400 | 2000 | 17.8 |
| | 10 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 11 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 12 | Ø20 | 1 | 350 | 350 | 350 | 8.6 |
| | 13 | Ø12 | 2 | 200 | 200 | 400 | 3.6 |
| | 14 | Ø12 | 1 | 180 / 20 | 200 | 200 | 1.8 |
| | 15 | Ø6 | 281 | 30 / 20 / 6 | 114 | 32034 | 71.1 |
| | | | | | | Total+10%: | 312.7 |
| Pórtico 31 | 1 | Ø10 | 8 | 16 / 184 | 200 | 1600 | 9.9 |
| | 2 | Ø16 | 1 | 250 | 250 | 250 | 3.9 |
| | 3 | Ø6 | 12 | 45 / 20 / 6 | 144 | 1728 | 3.8 |
| | | | | | | Total+10%: | 19.4 |
| Pórtico 32 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 62 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 450 | 450 | 3600 | 22.2 |
| | 5 | Ø10 | 6 | 250 | 250 | 1500 | 9.2 |
| | 6 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 7 | Ø10 | 1 | 350 | 350 | 350 | 2.2 |
| | 8 | Ø6 | 224 | 30 / 20 / 6 | 114 | 25536 | 56.7 |
| | | | | | | Total+10%: | 186.6 |
| | | | | | | Ø6: Ø10: Ø12: Ø16: Ø20: Total: | 367.1 764.7 111.4 43.3 28.5 1315.0 |

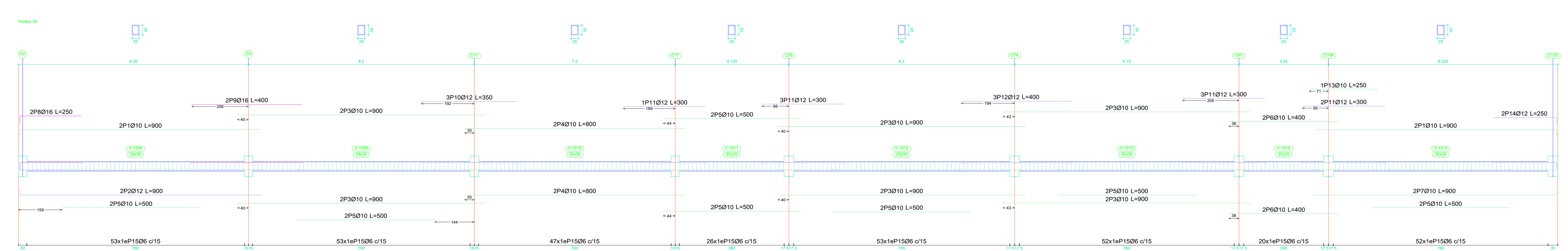


| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 58 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 14 | 900 | 900 | 12600 | 77.7 |
| | 4 | Ø10 | 4 | 800 | 800 | 3200 | 19.7 |
| | 5 | Ø10 | 12 | 500 | 500 | 6000 | 37.0 |
| | 6 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 7 | Ø10 | 2 | 17 / 842 / 17 | 875 | 1750 | 10.8 |
| | 8 | Ø10 | 2 | 275 / 25 | 300 | 600 | 3.7 |
| | 9 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 10 | Ø16 | 1 | 26 / 224 | 250 | 250 | 3.9 |
| | 11 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 12 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 13 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 14 | Ø12 | 2 | 250 | 250 | 500 | 4.4 |
| | 15 | Ø12 | 5 | 300 | 300 | 1500 | 13.3 |
| | 16 | Ø12 | 3 | 400 | 400 | 1200 | 10.7 |
| | 17 | Ø20 | 1 | 350 | 350 | 350 | 8.6 |
| | 18 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 19 | Ø10 | 1 | 450 | 450 | 450 | 2.8 |
| | 20 | Ø10 | 2 | 550 | 550 | 1100 | 6.8 |
| | 21 | Ø12 | 1 | 500 | 500 | 500 | 4.4 |
| | 22 | Ø6 | 317 | 30 / 20 / 6 | 114 | 36138 | 80.2 |
| | 23 | Ø6 | 52 | 40 / 20 / 6 | 134 | 6968 | 15.5 |
| | | | | | | Total+10%: | 414.5 |
| Pórtico 60 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 800 | 800 | 3200 | 19.7 |
| | 5 | Ø10 | 32 | 500 | 500 | 16000 | 98.6 |
| | 6 | Ø10 | 5 | 400 | 400 | 2000 | 12.3 |
| | 7 | Ø10 | 2 | 475 / 25 | 500 | 1000 | 6.2 |
| | 8 | Ø10 | 2 | 484 / 16 | 500 | 1000 | 6.2 |
| | 9 | Ø16 | 2 | 26 / 224 | 250 | 500 | 7.9 |
| | 10 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 11 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 12 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 13 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 14 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 15 | Ø10 | 2 | 200 | 200 | 400 | 2.5 |
| | 16 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 17 | Ø20 | 1 | 300 | 300 | 300 | 7.4 |
| | 18 | Ø12 | 2 | 200 | 200 | 400 | 3.6 |
| | 19 | Ø12 | 1 | 180 / 20 | 200 | 200 | 1.8 |
| | 20 | Ø10 | 1 | 450 | 450 | 450 | 2.8 |
| | 21 | Ø6 | 353 | 30 / 20 / 6 | 114 | 40242 | 89.3 |
| | | | | | | Total+10%: | 384.7 |

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 33 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 34 | 1 | Ø10 | 2 | 25 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 7 | Ø20 | 3 | 350 | 350 | 1050 | 25.9 |
| | 8 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 9 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 10 | Ø6 | 136 | 30 / 20 / 6 | 114 | 15504 | 34.4 |
| | | | | | | Total+10%: | 152.6 |
| Pórtico 35 | 1 | Ø10 | 2 | 25 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 7 | Ø20 | 2 | 350 | 350 | 700 | 17.3 |
| | 8 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 9 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 10 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 11 | Ø6 | 136 | 30 / 20 / 6 | 114 | 15504 | 34.4 |
| | | | | | | Total+10%: | 151.9 |
| Pórtico 36 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 37=Pórtico 51 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: (x2): | 6.5 13.0 |
| Pórtico 38 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 39 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 40 | 1 | Ø10 | 2 | 25 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 7 | Ø20 | 2 | 350 | 350 | 700 | 17.3 |
| | 8 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 9 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 10 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 11 | Ø6 | 136 | 30 / 20 / 6 | 114 | 15504 | 34.4 |
| | | | | | | Total+10%: | 151.9 |
| Pórtico 41 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 42=Pórtico 46 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: (x2): | 6.5 13.0 |
| Pórtico 43 | 1 | Ø10 | 2 | 25 / 125 | 150 | 300 | 1.8 |
| | 2 | Ø10 | 3 | 16 / 134 | 150 | 450 | 2.8 |
| | 3 | Ø10 | 8 | 131 / 19 | 150 | 1200 | 7.4 |
| | 4 | Ø10 | 4 | 179 / 22 | 200 | 800 | 4.9 |
| | 5 | Ø10 | 4 | 22 / 279 | 300 | 1200 | 7.4 |
| | 6 | Ø10 | 8 | 900 | 900 | 7200 | 44.4 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø10 | 2 | 275 / 25 | 300 | 600 | 3.7 |
| | 9 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 10 | Ø12 | 1 | 20 / 130 | 150 | 150 | 1.3 |
| | 11 | Ø10 | 1 | 16 / 84 | 100 | 100 | 0.6 |
| | 12 | Ø12 | 6 | 300 | 300 | 1800 | 16.0 |
| | 13 | Ø20 | 2 | 350 | 350 | 700 | 17.3 |
| | 14 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 15 | Ø6 | 165 | 30 / 20 / 6 | 114 | 18810 | 41.7 |
| | | | | | | Total+10%: | 192.7 |
| Pórtico 45 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| | | | | | | Ø6: Ø10: Ø12: Ø16: Ø20: Total: | 386.9 819.0 113.3 91.0 103.1 1513.3 |

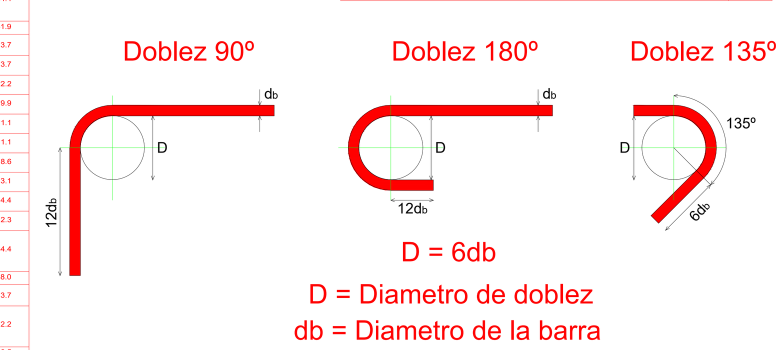






| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 65 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 4 | 300 | 300 | 1200 | 18.9 |
| | 7 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 8 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 9 | Ø6 | 222 | 30 / 20 / 6 | 114 | 25308 | 56.2 |
| | | | | | | Total+10%: | 212.1 |
| Pórtico 67 | 1 | Ø10 | 4 | 25 / 875 | 900 | 3600 | 22.2 |
| | 2 | Ø10 | 4 | 16 / 884 | 900 | 3600 | 22.2 |
| | 3 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 4 | Ø10 | 4 | 300 | 300 | 1200 | 7.4 |
| | 5 | Ø6 | 126 | 30 / 20 / 6 | 114 | 14364 | 31.9 |
| | | | | | | Total+10%: | 103.0 |
| Pórtico 61 | 1 | Ø10 | 2 | 16 / 671 / 25 | 712 | 1424 | 8.8 |
| | 2 | Ø10 | 2 | 16 / 671 / 16 | 703 | 1406 | 8.7 |
| | 3 | Ø6 | 44 | 30 / 20 / 6 | 114 | 5016 | 11.1 |
| | | | | | | Total+10%: | 31.5 |
| Pórtico 63 | 1 | Ø10 | 2 | 25 / 671 / 16 | 712 | 1424 | 8.8 |
| | 2 | Ø10 | 2 | 16 / 671 / 16 | 703 | 1406 | 8.7 |
| | 3 | Ø6 | 44 | 30 / 20 / 6 | 114 | 5016 | 11.1 |
| | | | | | | Total+10%: | 31.5 |

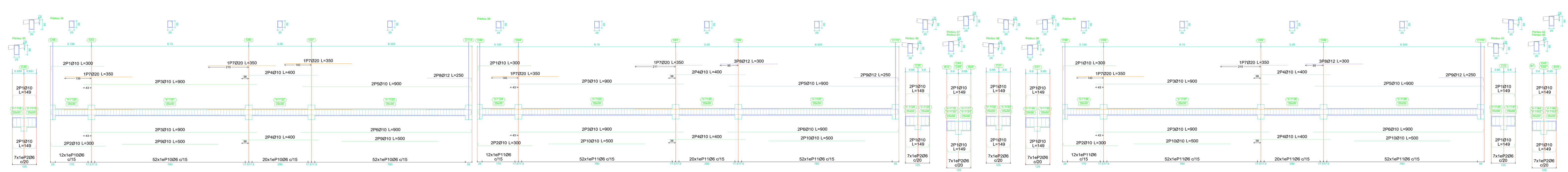
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 47 | 1 | Ø10 | 2 | 25 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 7 | Ø20 | 2 | 350 | 350 | 700 | 17.3 |
| | 8 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 9 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 10 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 11 | Ø6 | 136 | 30 / 20 / 6 | 114 | 15504 | 34.4 |
| | | | | | | Total+10%: | 151.9 |
| Pórtico 48 | 1 | Ø12 | 3 | 20 / 117 / 20 | 157 | 471 | 4.2 |
| | 2 | Ø10 | 2 | 16 / 117 / 16 | 149 | 298 | 1.8 |
| | 3 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 9.0 |
| Pórtico 49 | 1 | Ø12 | 3 | 20 / 117 / 20 | 157 | 471 | 4.2 |
| | 2 | Ø10 | 2 | 16 / 117 / 16 | 149 | 298 | 1.8 |
| | 3 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 9.0 |
| Pórtico 50 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 52 | 1 | Ø10 | 2 | 25 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 7 | Ø20 | 2 | 350 | 350 | 700 | 17.3 |
| | 8 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 9 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 10 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 11 | Ø6 | 136 | 30 / 20 / 6 | 114 | 15504 | 34.4 |
| | | | | | | Total+10%: | 151.9 |
| Pórtico 53 | 1 | Ø10 | 2 | 25 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 7 | Ø12 | 7 | 300 | 300 | 2100 | 18.6 |
| | 8 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 9 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 10 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 11 | Ø6 | 136 | 30 / 20 / 6 | 114 | 15504 | 34.4 |
| | | | | | | Total+10%: | 148.0 |
| Pórtico 54 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 55 | 1 | Ø10 | 4 | 16 / 117 / 16 | 149 | 596 | 3.7 |
| | 2 | Ø6 | 7 | 45 / 20 / 6 | 144 | 1008 | 2.2 |
| | | | | | | Total+10%: | 6.5 |
| Pórtico 56 | 1 | Ø10 | 8 | 16 / 184 | 200 | 1600 | 9.9 |
| | 2 | Ø16 | 1 | 250 | 250 | 250 | 3.9 |
| | 3 | Ø6 | 12 | 45 / 20 / 6 | 144 | 1728 | 3.8 |
| | | | | | | Total+10%: | 19.4 |
| Pórtico 59 | 1 | Ø10 | 4 | 25 / 875 | 900 | 3600 | 22.2 |
| | 2 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 3 | Ø10 | 12 | 900 | 900 | 10800 | 66.6 |
| | 4 | Ø10 | 4 | 800 | 800 | 3200 | 19.7 |
| | 5 | Ø10 | 14 | 500 | 500 | 7000 | 43.2 |
| | 6 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 7 | Ø10 | 2 | 884 / 16 | 900 | 1800 | 11.1 |
| | 8 | Ø16 | 2 | 26 / 224 | 250 | 500 | 7.9 |
| | 9 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 10 | Ø12 | 3 | 350 | 350 | 1050 | 9.3 |
| | 11 | Ø12 | 9 | 300 | 300 | 2700 | 24.0 |
| | 12 | Ø12 | 3 | 400 | 400 | 1200 | 10.7 |
| | 13 | Ø10 | 1 | 250 | 250 | 250 | 1.5 |
| | 14 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 15 | Ø6 | 356 | 30 / 20 / 6 | 114 | 40584 | 90.1 |
| | | | | | | Total+10%: | 384.1 |
| Pórtico 64 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 4 | 300 | 300 | 1200 | 18.9 |
| | 7 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 8 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 9 | Ø6 | 222 | 30 / 20 / 6 | 114 | 25308 | 56.2 |
| | | | | | | Total+10%: | 211.1 |
| Pórtico 66 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 6 | Ø16 | 4 | 300 | 300 | 1200 | 18.9 |
| | 7 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 8 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 9 | Ø6 | 222 | 30 / 20 / 6 | 114 | 25308 | 56.2 |
| | | | | | | Total+10%: | 212.1 |
| | | | | | | Ø6: Ø10: Ø12: Ø16: Ø20: Total: | 473.7 946.0 147.2 89.2 38.0 1694.1 |

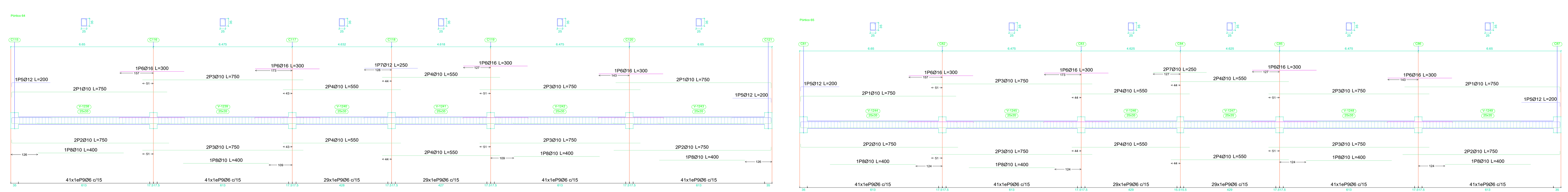


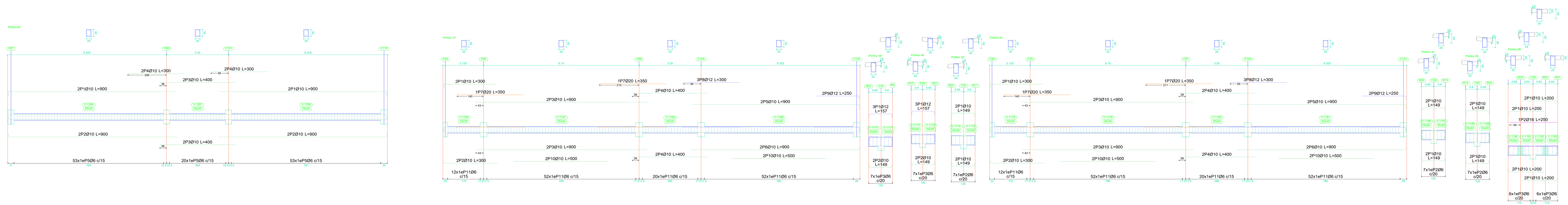

D = 6db

D = Diametro de doblez

db = Diametro de la barra







UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA: 1:100

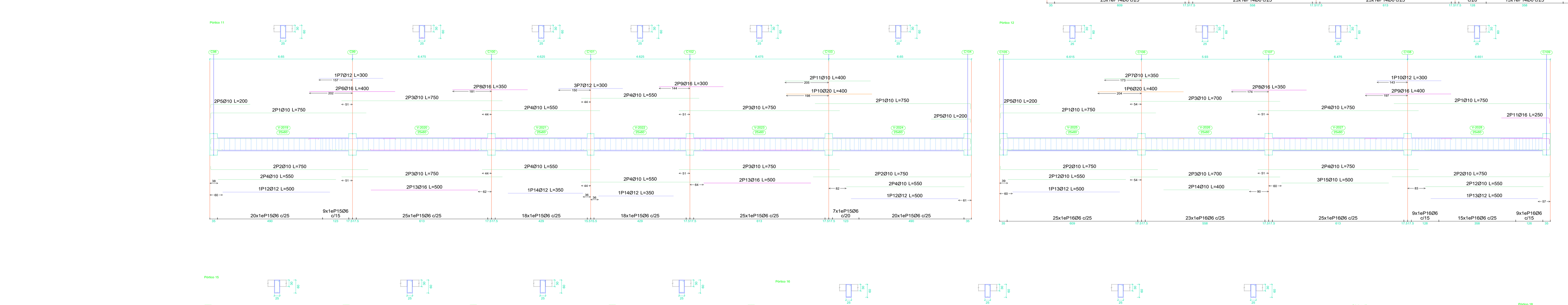
LAMINA: 2/2

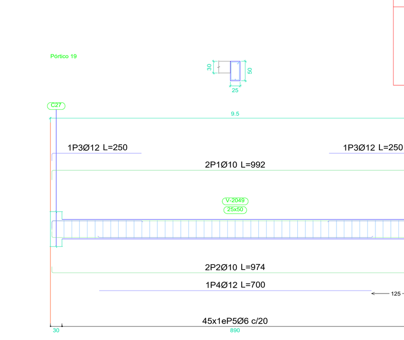
CONTENIDO:
DETALLE Y ARMADO DE VIGAS PLANTA BAJA

FECHA: NOVIEMBRE DE 2024

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 16 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø12 | 2 | 20 / 730 | 750 | 1500 | 13.3 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø10 | 2 | 734 / 16 | 750 | 1500 | 9.2 |
| | 6 | Ø12 | 1 | 20 / 180 | 200 | 200 | 1.8 |
| | 7 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 8 | Ø16 | 4 | 400 | 400 | 1600 | 25.3 |
| | 9 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 12 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 13 | Ø12 | 3 | 550 | 550 | 1650 | 14.6 |
| | 14 | Ø10 | 4 | 550 | 550 | 2200 | 13.6 |
| | 15 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 16 | Ø10 | 3 | 450 | 450 | 1350 | 8.3 |
| | 17 | Ø8 | 38 | 55 / 20 / 8 | 167 | 6346 | 25.0 |
| | 18 | Ø6 | 86 | 55 / 20 / 6 | 164 | 14104 | 31.3 |
| | | | | | | Total+10%: | 259.5 |
| Pórtico 19 | 1 | Ø10 | 2 | 25 / 942 / 25 | 992 | 1984 | 12.2 |
| | 2 | Ø10 | 2 | 16 / 942 / 16 | 974 | 1948 | 12.0 |
| | 3 | Ø12 | 2 | 20 / 230 | 250 | 500 | 4.4 |
| | 4 | Ø12 | 1 | 700 | 700 | 700 | 6.2 |
| | 5 | Ø6 | 45 | 45 / 20 / 6 | 144 | 6480 | 14.4 |
| | | | | | | Total+10%: | 54.1 |
| Pórtico 20 | 1 | Ø10 | 2 | 25 / 725 | 750 | 1500 | 9.2 |
| | 2 | Ø10 | 2 | 16 / 734 | 750 | 1500 | 9.2 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 2 | 675 / 25 | 700 | 1400 | 8.6 |
| | 5 | Ø10 | 2 | 634 / 16 | 650 | 1300 | 8.0 |
| | 6 | Ø10 | 2 | 16 / 184 | 200 | 400 | 2.5 |
| | 7 | Ø16 | 1 | 400 | 400 | 400 | 6.3 |
| | 8 | Ø10 | 3 | 300 | 300 | 900 | 5.5 |
| | 9 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 10 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 11 | Ø12 | 2 | 450 | 450 | 900 | 8.0 |
| | 12 | Ø6 | 73 | 55 / 20 / 6 | 164 | 11972 | 26.6 |
| | | | | | | Total+10%: | 129.3 |

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 11 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 12 | 550 | 550 | 6600 | 40.7 |
| | 5 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 6 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 7 | Ø12 | 4 | 300 | 300 | 1200 | 10.7 |
| | 8 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 9 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 10 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 11 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 12 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 13 | Ø16 | 4 | 500 | 500 | 2000 | 31.6 |
| | 14 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 15 | Ø6 | 142 | 55 / 20 / 6 | 164 | 23288 | 51.7 |
| | | | | | | Total+10%: | 304.3 |
| Pórtico 12 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø10 | 2 | 16 / 184 | 200 | 400 | 2.5 |
| | 6 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 7 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 8 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 9 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø16 | 2 | 224 / 26 | 250 | 500 | 7.9 |
| | 12 | Ø10 | 4 | 550 | 550 | 2200 | 13.6 |
| | 13 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 14 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 15 | Ø10 | 3 | 500 | 500 | 1500 | 9.2 |
| | 16 | Ø6 | 106 | 55 / 20 / 6 | 164 | 17384 | 38.6 |
| | | | | | | Total+10%: | 218.8 |
| Pórtico 13 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø10 | 2 | 16 / 184 | 200 | 400 | 2.5 |
| | 6 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 7 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 8 | Ø16 | 3 | 350 | 350 | 1050 | 16.6 |
| | 9 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 10 | Ø16 | 2 | 174 / 26 | 200 | 400 | 6.3 |
| | 11 | Ø10 | 4 | 550 | 550 | 2200 | 13.6 |
| | 12 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 13 | Ø16 | 1 | 500 | 500 | 500 | 7.9 |
| | 14 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 15 | Ø6 | 104 | 55 / 20 / 6 | 164 | 17056 | 37.9 |
| | | | | | | Total+10%: | 210.2 |
| Pórtico 14 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 6 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 7 | Ø16 | 3 | 350 | 350 | 1050 | 16.6 |
| | 8 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 9 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 10 | Ø10 | 4 | 550 | 550 | 2200 | 13.6 |
| | 11 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 12 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 13 | Ø16 | 1 | 500 | 500 | 500 | 7.9 |
| | 14 | Ø6 | 102 | 55 / 20 / 6 | 164 | 16728 | 37.1 |
| | | | | | | Total+10%: | 205.0 |
| Pórtico 15 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 1500 | 9.2 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø12 | 2 | 730 / 20 | 750 | 1500 | 13.3 |
| | 6 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 7 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 8 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 9 | Ø25 | 1 | 500 | 500 | 500 | 19.3 |
| | 10 | Ø20 | 2 | 450 | 450 | 900 | 22.2 |
| | 11 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 12 | Ø12 | 1 | 180 / 20 | 200 | 200 | 1.8 |
| | 13 | Ø10 | 2 | 550 | 550 | 1100 | 6.8 |
| | 14 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 15 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 16 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 17 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 18 | Ø12 | 3 | 550 | 550 | 1650 | 14.6 |
| | 19 | Ø6 | 99 | 55 / 20 / 6 | 164 | 16236 | 36.0 |
| | 20 | Ø8 | 29 | 55 / 20 / 8 | 167 | 4843 | 19.1 |
| | | | | | | Total+10%: | 266.9 |
| Pórtico 17 | 1 | Ø10 | 2 | 16 / 671 / 25 | 712 | 1424 | 8.8 |
| | 2 | Ø10 | 2 | 16 / 671 / 16 | 703 | 1406 | 8.7 |
| | 3 | Ø10 | 2 | 16 / 234 | 250 | 500 | 3.1 |
| | 4 | Ø6 | 33 | 45 / 20 / 6 | 144 | 4752 | 10.5 |
| | | | | | | Total+10%: | 34.2 |
| Pórtico 18 | 1 | Ø10 | 2 | 25 / 671 / 16 | 712 | 1424 | 8.8 |
| | 2 | Ø10 | 2 | 16 / 671 / 16 | 703 | 1406 | 8.7 |
| | 3 | Ø16 | 2 | 224 / 26 | 250 | 500 | 7.9 |
| | 4 | Ø6 | 24 | 45 / 20 / 6 | 144 | 3456 | 7.7 |
| | 5 | Ø8 | 9 | 45 / 20 / 8 | 147 | 1323 | 5.2 |
| | | | | | | Total+10%: | 42.1 |
| | | | | | | Ø6: | 321.0 |
| | | | | | | Ø8: | 54.2 |
| | | | | | | Ø10: | 801.9 |
| | | | | | | Ø12: | 214.1 |
| | | | | | | Ø16: | 222.1 |
| | | | | | | Ø20: | 89.8 |
| | | | | | | Ø25: | 21.3 |
| | | | | | | Total: | 1724.4 |





| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 28 | 1 | Ø10 | 2 | 25 / 475 | 500 | 1000 | 6.2 |
| | 2 | Ø10 | 2 | 16 / 484 | 500 | 1000 | 6.2 |
| | 3 | Ø10 | 6 | 500 | 500 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 5 | Ø16 | 4 | 26 / 874 | 900 | 3600 | 56.8 |
| | 6 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 7 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 8 | Ø16 | 2 | 274 / 26 | 300 | 600 | 9.5 |
| | 9 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 10 | Ø10 | 2 | 200 | 200 | 400 | 2.5 |
| | 11 | Ø10 | 1 | 450 | 450 | 450 | 2.8 |
| | 12 | Ø20 | 2 | 450 | 450 | 900 | 22.2 |
| | 13 | Ø20 | 2 | 800 | 800 | 1600 | 39.5 |
| | 14 | Ø16 | 1 | 700 | 700 | 700 | 11.0 |
| | 15 | Ø25 | 2 | 500 | 500 | 1000 | 38.5 |
| | 16 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 17 | Ø12 | 2 | 700 | 700 | 1400 | 12.4 |
| | 18 | Ø20 | 1 | 750 | 750 | 750 | 18.5 |
| | 19 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 20 | Ø16 | 2 | 924 / 26 | 950 | 1900 | 30.0 |
| | 21 | Ø6 | 40 | 55 / 20 / 6 | 164 | 6560 | 14.6 |
| | 22 | Ø6 | 95 | 65 / 25 / 6 | 194 | 18430 | 40.9 |
| | 23 | Ø8 | 28 | 65 / 25 / 8 | 197 | 5516 | 21.8 |
| | | | | | | Total+10%: | 455.4 |
| Pórtico 21 | 1 | Ø10 | 2 | 25 / 675 | 700 | 1400 | 8.6 |
| | 2 | Ø10 | 2 | 16 / 634 | 650 | 1300 | 8.0 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 2 | 725 / 25 | 750 | 1500 | 9.2 |
| | 5 | Ø10 | 2 | 734 / 16 | 750 | 1500 | 9.2 |
| | 6 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 7 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 8 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 9 | Ø10 | 2 | 184 / 16 | 200 | 400 | 2.5 |
| | 10 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 11 | Ø12 | 1 | 450 | 450 | 450 | 4.0 |
| | 12 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 13 | Ø6 | 73 | 55 / 20 / 6 | 164 | 11972 | 26.6 |
| | | | | | | Total+10%: | 132.0 |
| Pórtico 22=Pórtico 25 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 4 | Ø6 | 50 | 55 / 20 / 6 | 164 | 8200 | 18.2 |
| | | | | | | Total+10%: | 65.9 |
| | | | | | | (x2): | 131.8 |
| Pórtico 23 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø16 | 4 | 26 / 724 | 750 | 3000 | 47.3 |
| | 3 | Ø16 | 2 | 26 / 174 | 200 | 400 | 6.3 |
| | 4 | Ø25 | 1 | 550 | 550 | 550 | 21.2 |
| | 5 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 6 | Ø12 | 2 | 180 / 20 | 200 | 400 | 3.6 |
| | 7 | Ø16 | 1 | 500 | 500 | 500 | 7.9 |
| | 8 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 9 | Ø8 | 33 | 55 / 20 / 8 | 167 | 5511 | 21.7 |
| | 10 | Ø6 | 39 | 55 / 20 / 6 | 164 | 6396 | 14.2 |
| | | | | | | Total+10%: | 172.9 |
| Pórtico 24 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø16 | 4 | 26 / 724 | 750 | 3000 | 47.3 |
| | 3 | Ø12 | 3 | 20 / 180 | 200 | 600 | 5.3 |
| | 4 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 5 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 6 | Ø12 | 1 | 450 | 450 | 450 | 4.0 |
| | 7 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 8 | Ø6 | 46 | 55 / 20 / 6 | 164 | 7544 | 16.7 |
| | 9 | Ø8 | 26 | 55 / 20 / 8 | 167 | 4342 | 17.1 |
| | | | | | | Total+10%: | 153.6 |
| Pórtico 26 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø16 | 4 | 26 / 724 | 750 | 3000 | 47.3 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø25 | 1 | 600 | 600 | 600 | 23.1 |
| | 5 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 6 | Ø10 | 2 | 184 / 16 | 200 | 400 | 2.5 |
| | 7 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 8 | Ø16 | 1 | 500 | 500 | 500 | 7.9 |
| | 9 | Ø6 | 39 | 55 / 20 / 6 | 164 | 6396 | 14.2 |
| | 10 | Ø8 | 31 | 55 / 20 / 8 | 167 | 5177 | 20.4 |
| | | | | | | Total+10%: | 169.4 |

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 1 | 1 | Ø10 | 2 | 25 / 375 | 400 | 800 | 4.9 |
| | 2 | Ø10 | 2 | 16 / 384 | 400 | 800 | 4.9 |
| | 3 | Ø10 | 2 | 325 / 25 | 350 | 700 | 4.3 |
| | 4 | Ø10 | 2 | 334 / 16 | 350 | 700 | 4.3 |
| | 5 | Ø6 | 23 | 55 / 20 / 6 | 164 | 3772 | 8.4 |
| | | | | | | Total+10%: | 29.5 |
| Pórtico 2 | 1 | Ø10 | 2 | 25 / 325 | 350 | 700 | 4.3 |
| | 2 | Ø10 | 2 | 16 / 334 | 350 | 700 | 4.3 |
| | 3 | Ø10 | 2 | 375 / 25 | 400 | 800 | 4.9 |
| | 4 | Ø10 | 2 | 384 / 16 | 400 | 800 | 4.9 |
| | 5 | Ø6 | 23 | 55 / 20 / 6 | 164 | 3772 | 8.4 |
| | | | | | | Total+10%: | 29.5 |
| Pórtico 3 | 1 | Ø10 | 4 | 25 / 525 | 550 | 2200 | 13.6 |
| | 2 | Ø10 | 4 | 16 / 534 | 550 | 2200 | 13.6 |
| | 3 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 4 | Ø6 | 36 | 55 / 20 / 6 | 164 | 5904 | 13.1 |
| | | | | | | Total+10%: | 46.8 |
| Pórtico 4 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 1 | 16 / 184 | 200 | 200 | 1.2 |
| | 4 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 5 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 6 | Ø12 | 1 | 450 | 450 | 450 | 4.0 |
| | 7 | Ø6 | 50 | 55 / 20 / 6 | 164 | 8200 | 18.2 |
| | | | | | | Total+10%: | 91.1 |
| Pórtico 5 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 4 | Ø10 | 1 | 184 / 16 | 200 | 200 | 1.2 |
| | 5 | Ø12 | 1 | 450 | 450 | 450 | 4.0 |
| | 6 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 7 | Ø6 | 50 | 55 / 20 / 6 | 164 | 8200 | 18.2 |
| | | | | | | Total+10%: | 91.1 |
| Pórtico 6 | 1 | Ø10 | 2 | 25 / 671 / 25 | 721 | 1442 | 8.9 |
| | 2 | Ø10 | 2 | 16 / 671 / 16 | 703 | 1406 | 8.7 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 5 | Ø6 | 25 | 55 / 20 / 6 | 164 | 4100 | 9.1 |
| | | | | | | Total+10%: | 44.1 |
| Pórtico 7 | 1 | Ø10 | 2 | 25 / 671 / 25 | 721 | 1442 | 8.9 |
| | 2 | Ø10 | 2 | 16 / 671 / 16 | 703 | 1406 | 8.7 |
| | 3 | Ø12 | 2 | 20 / 180 | 200 | 400 | 3.6 |
| | 4 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 5 | Ø6 | 25 | 55 / 20 / 6 | 164 | 4100 | 9.1 |
| | | | | | | Total+10%: | 44.1 |
| Pórtico 8 | 1 | Ø10 | 2 | 16 / 610 / 16 | 642 | 1284 | 7.9 |
| | 2 | Ø12 | 2 | 20 / 610 / 20 | 650 | 1300 | 11.5 |
| | 3 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 4 | Ø16 | 2 | 26 / 610 / 26 | 662 | 1324 | 20.9 |
| | 5 | Ø6 | 38 | 30 / 20 / 6 | 114 | 4332 | 9.6 |
| | | | | | | Total+10%: | 60.3 |
| Pórtico 9 | 1 | Ø10 | 4 | 16 / 610 / 16 | 642 | 2568 | 15.8 |
| | 2 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 3 | Ø16 | 2 | 26 / 610 / 26 | 662 | 1324 | 20.9 |
| | 4 | Ø6 | 38 | 30 / 20 / 6 | 114 | 4332 | 9.6 |
| | | | | | | Total+10%: | 56.3 |
| Pórtico 10 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø16 | 4 | 26 / 224 | 250 | 1000 | 15.8 |
| | 6 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 7 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 8 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 9 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 10 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 11 | Ø10 | 4 | 550 | 550 | 2200 | 13.6 |
| | 12 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 13 | Ø10 | 3 | 500 | 500 | 1500 | 9.2 |
| | 14 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 15 | Ø6 | 110 | 55 / 20 / 6 | 164 | 18040 | 40.0 |
| | | | | | | Total+10%: | 224.8 |
| Pórtico 27 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 4 | Ø6 | 50 | 55 / 20 / 6 | 164 | 8200 | 18.2 |
| | | | | | | Total+10%: | 65.9 |
| Pórtico 29 | 1 | Ø12 | 2 | 25 / 275 | 300 | 600 | 5.3 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 4 | Ø12 | 4 | 20 / 880 | 900 | 3600 | 32.0 |
| | 5 | Ø20 | 2 | 500 | 500 | 1000 | 24.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 8 | Ø25 | 1 | 40 / 510 | 550 | 550 | 21.2 |
| | 9 | Ø20 | 1 | 350 | 350 | 350 | 8.6 |
| | 10 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 11 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 12 | Ø12 | 2 | 250 | 250 | 500 | 4.4 |
| | 13 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 14 | Ø12 | 3 | 650 | 650 | 1950 | 17.3 |
| | 15 | Ø12 | 3 | 700 | 700 | 2100 | 18.6 |
| | 16 | Ø6 | 7 | 55 / 20 / 6 | 164 | 1148 | 2.5 |
| | 17 | Ø6 | 93 | 65 / 25 / 6 | 194 | 18042 | 40.0 |
| | | | | | | Total+10%: | 245.7 |
| | | | | | | Ø6: | 404.9 |
| | | | | | | Ø8: | 89.1 |
| | | | | | | Ø10: | 727.3 |
| | | | | | | Ø12: | 245.2 |
| | | | | | | Ø16: | 473.5 |
| | | | | | | Ø20: | 189.9 |
| | | | | | | Ø25: | 114.4 |
| | | | | | | Total: | 2244.3 |

PRIMER PISO
Despiece de vigas
Hormigón: H-21
Acero en barras: AH-500
Acero en estribos: AH-500
Escala pórticos 1:125
Escala secciones 1:125
Escala huecos 1:125

UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA: 1:125

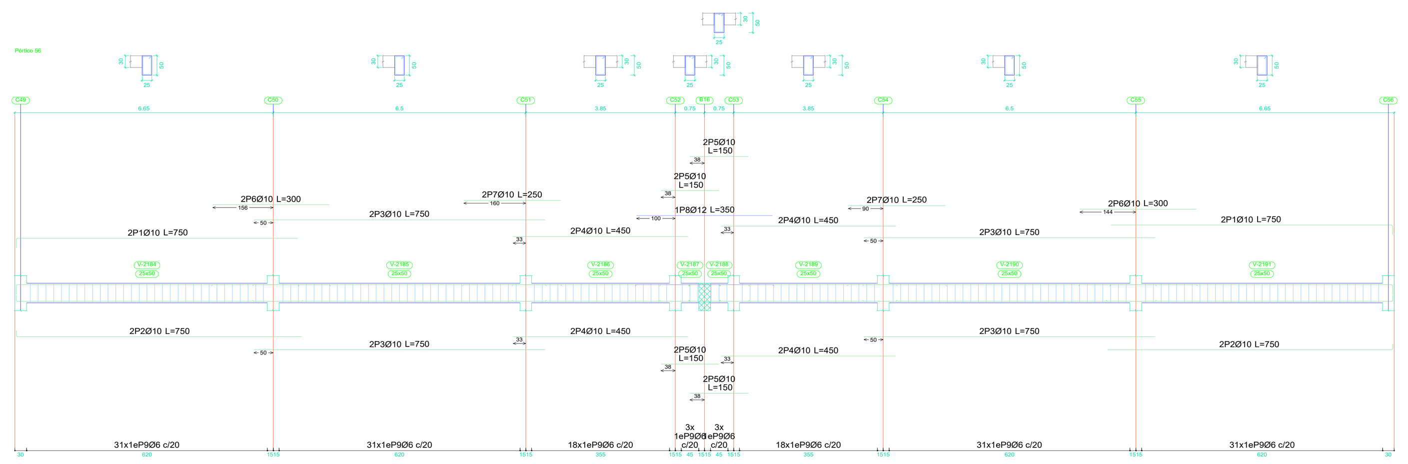
LAMINA: 1/2

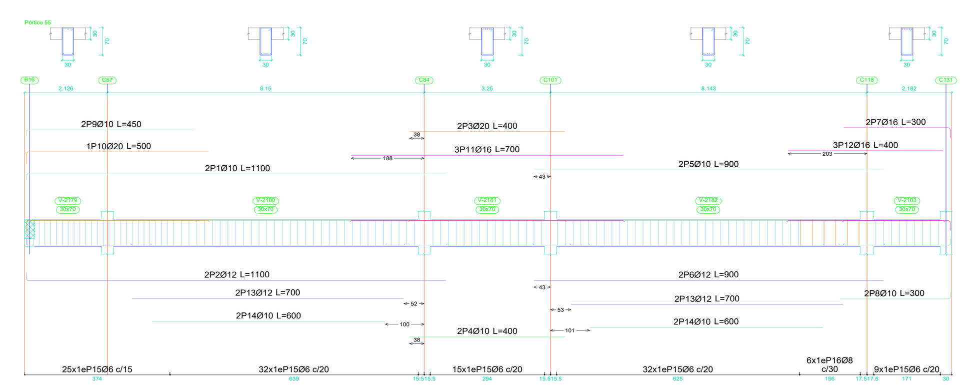
CONTENIDO:
DETALLE Y ARMADO DE VIGAS PRIMER PISO

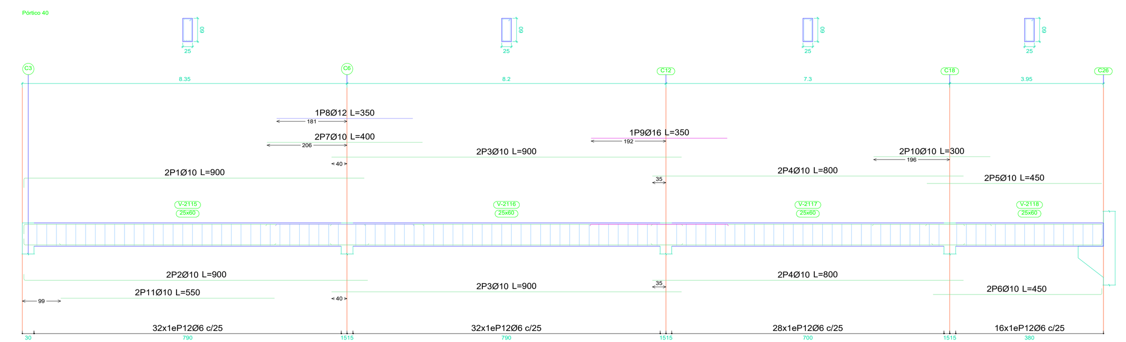
FECHA : NOVIEMBRE DE 2024

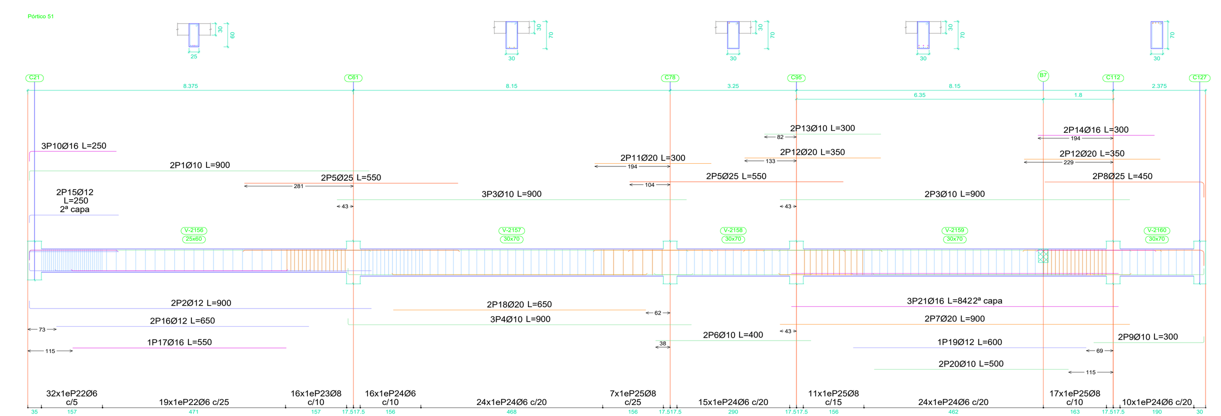
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 54 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 10 | 550 | 550 | 5500 | 33.9 |
| | 5 | Ø10 | 2 | 18 / 488 / 17 | 523 | 1046 | 6.4 |
| | 6 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 7 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 8 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 9 | Ø16 | 4 | 350 | 350 | 1400 | 22.1 |
| | 10 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 11 | Ø25 | 1 | 500 | 500 | 500 | 19.3 |
| | 12 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 13 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 14 | Ø12 | 2 | 400 | 400 | 800 | 7.1 |
| | 15 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 16 | Ø6 | 132 | 55 / 6 / 20 | 164 | 21648 | 48.0 |
| | 17 | Ø6 | 22 | 65 / 6 / 25 | 194 | 4268 | 9.5 |
| | | | | | | Total+10%: | 295.0 |
| Pórtico 55 | 1 | Ø10 | 2 | 15 / 1084 | 1100 | 2200 | 13.6 |
| | 2 | Ø12 | 2 | 20 / 1080 | 1100 | 2200 | 19.5 |
| | 3 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 4 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 5 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 6 | Ø12 | 2 | 900 | 900 | 1800 | 16.0 |
| | 7 | Ø16 | 2 | 274 / 26 | 300 | 600 | 9.5 |
| | 8 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 9 | Ø10 | 2 | 16 / 434 | 450 | 900 | 5.5 |
| | 10 | Ø20 | 1 | 32 / 468 | 500 | 500 | 12.3 |
| | 11 | Ø16 | 3 | 700 | 700 | 2100 | 33.1 |
| | 12 | Ø16 | 3 | 400 | 400 | 1200 | 18.9 |
| | 13 | Ø12 | 4 | 700 | 700 | 2800 | 24.9 |
| | 14 | Ø10 | 4 | 600 | 600 | 2400 | 14.8 |
| | 15 | Ø6 | 113 | 65 / 6 / 25 | 194 | 21922 | 48.6 |
| | 16 | Ø8 | 6 | 65 / 8 / 25 | 197 | 1182 | 4.7 |
| | | | | | | Total+10%: | 286.9 |

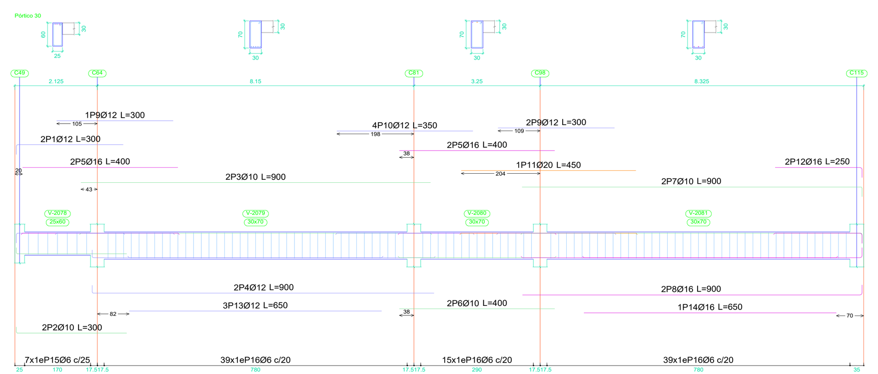
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 31 | 1 | Ø16 | 2 | 26 / 274 | 300 | 600 | 9.5 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 4 | Ø16 | 2 | 26 / 874 | 900 | 1800 | 28.4 |
| | 5 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 8 | Ø20 | 2 | 868 / 32 | 900 | 1800 | 44.4 |
| | 9 | Ø20 | 2 | 32 / 468 | 500 | 1000 | 24.7 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø20 | 3 | 750 | 750 | 2250 | 55.5 |
| | 12 | Ø16 | 3 | 224 / 26 | 250 | 750 | 11.8 |
| | 13 | Ø12 | 4 | 700 | 700 | 2800 | 24.9 |
| | 14 | Ø12 | 2 | 650 | 650 | 1300 | 11.5 |
| | 15 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 16 | Ø16 | 3 | 924 / 26 | 950 | 2850 | 45.0 |
| | 17 | Ø6 | 12 | 55 / 6 / 20 | 164 | 1968 | 4.4 |
| | 18 | Ø8 | 27 | 65 / 8 / 25 | 197 | 5319 | 21.0 |
| | 19 | Ø6 | 95 | 65 / 6 / 25 | 194 | 18430 | 40.9 |
| | | | | | | Total+10%: | 419.5 |
| Pórtico 32 | 1 | Ø16 | 4 | 26 / 274 | 300 | 1200 | 18.9 |
| | 2 | Ø10 | 4 | 16 / 284 | 300 | 1200 | 7.4 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø16 | 2 | 26 / 874 | 900 | 1800 | 28.4 |
| | 5 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø20 | 2 | 868 / 32 | 900 | 1800 | 44.4 |
| | 8 | Ø25 | 4 | 450 | 450 | 1800 | 69.4 |
| | 9 | Ø20 | 2 | 800 | 800 | 1600 | 39.5 |
| | 10 | Ø16 | 3 | 700 | 700 | 2100 | 33.1 |
| | 11 | Ø12 | 1 | 500 | 500 | 500 | 4.4 |
| | 12 | Ø12 | 1 | 600 | 600 | 600 | 5.3 |
| | 13 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 14 | Ø6 | 14 | 55 / 6 / 20 | 164 | 2296 | 5.1 |
| | 15 | Ø8 | 43 | 65 / 8 / 25 | 197 | 8471 | 33.4 |
| | 16 | Ø6 | 79 | 65 / 6 / 25 | 194 | 15326 | 34.0 |
| | | | | | | Total+10%: | 413.9 |
| Pórtico 33=Pórtico 34 | 1 | Ø10 | 2 | 25 / 167 / 25 | 217 | 434 | 2.7 |
| | 2 | Ø10 | 2 | 16 / 167 / 16 | 199 | 398 | 2.5 |
| | 3 | Ø6 | 5 | 55 / 6 / 20 | 164 | 820 | 1.8 |
| | | | | | | Total+10%: (x2): | 7.7 15.4 |
| Pórtico 35 | 1 | Ø16 | 4 | 26 / 274 | 300 | 1200 | 18.9 |
| | 2 | Ø10 | 4 | 16 / 284 | 300 | 1200 | 7.4 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø16 | 4 | 26 / 874 | 900 | 3600 | 56.8 |
| | 5 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø25 | 2 | 450 | 450 | 900 | 34.7 |
| | 8 | Ø20 | 2 | 800 | 800 | 1600 | 39.5 |
| | 9 | Ø16 | 5 | 700 | 700 | 3500 | 55.2 |
| | 10 | Ø16 | 2 | 424 / 26 | 450 | 900 | 14.2 |
| | 11 | Ø10 | 1 | 350 | 350 | 350 | 2.2 |
| | 12 | Ø10 | 4 | 300 | 300 | 1200 | 7.4 |
| | 13 | Ø12 | 1 | 500 | 500 | 500 | 4.4 |
| | 14 | Ø10 | 1 | 500 | 500 | 500 | 3.1 |
| | 15 | Ø6 | 14 | 55 / 6 / 20 | 164 | 2296 | 5.1 |
| | 16 | Ø8 | 43 | 65 / 8 / 25 | 197 | 8471 | 33.4 |
| | 17 | Ø6 | 79 | 65 / 6 / 25 | 194 | 15326 | 34.0 |
| | | | | | | Total+10%: | 399.4 |
| Pórtico 41 | 1 | Ø10 | 2 | 25 / 475 | 500 | 1000 | 6.2 |
| | 2 | Ø16 | 2 | 26 / 524 | 550 | 1100 | 17.4 |
| | 3 | Ø10 | 8 | 500 | 500 | 4000 | 24.7 |
| | 4 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 5 | Ø12 | 5 | 500 | 500 | 2500 | 22.2 |
| | 6 | Ø12 | 2 | 400 | 400 | 800 | 7.1 |
| | 7 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 8 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 9 | Ø12 | 2 | 880 / 20 | 900 | 1800 | 16.0 |
| | 10 | Ø12 | 1 | 20 / 180 | 200 | 200 | 1.8 |
| | 11 | Ø10 | 2 | 16 / 184 | 200 | 400 | 2.5 |
| | 12 | Ø20 | 1 | 500 | 500 | 500 | 12.3 |
| | 13 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 14 | Ø20 | 1 | 700 | 700 | 700 | 17.3 |
| | 15 | Ø10 | 2 | 700 | 700 | 1400 | 8.6 |
| | 16 | Ø10 | 2 | 234 / 16 | 250 | 500 | 3.1 |
| | 17 | Ø12 | 1 | 230 / 20 | 250 | 250 | 2.2 |
| | 18 | Ø10 | 2 | 600 | 600 | 1200 | 7.4 |
| | 19 | Ø10 | 2 | 650 | 650 | 1300 | 8.0 |
| | 20 | Ø12 | 1 | 600 | 600 | 600 | 5.3 |
| | 21 | Ø6 | 108 | 55 / 6 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10%: | 255.8 |
| Pórtico 56 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 450 | 450 | 3600 | 22.2 |
| | 5 | Ø10 | 8 | 150 | 150 | 1200 | 7.4 |
| | 6 | Ø10 | 4 | 300 | 300 | 1200 | 7.4 |
| | 7 | Ø10 | 4 | 250 | 250 | 1000 | 6.2 |
| | 8 | Ø12 | 1 | 350 | 350 | 350 | 3.1 |
| | 9 | Ø6 | 166 | 45 / 6 / 20 | 144 | 23904 | 53.0 |
| | | | | | | Total+10%: | 190.6 |
| | | | | | | Ø6:<br>Ø8:<br>Ø10:<br>Ø12:<br>Ø16:<br>Ø20:<br>Ø25:<br>Total: | 358.0<br>101.7<br>567.5<br>225.6<br>482.4<br>405.6<br>135.7<br>2276.5 |

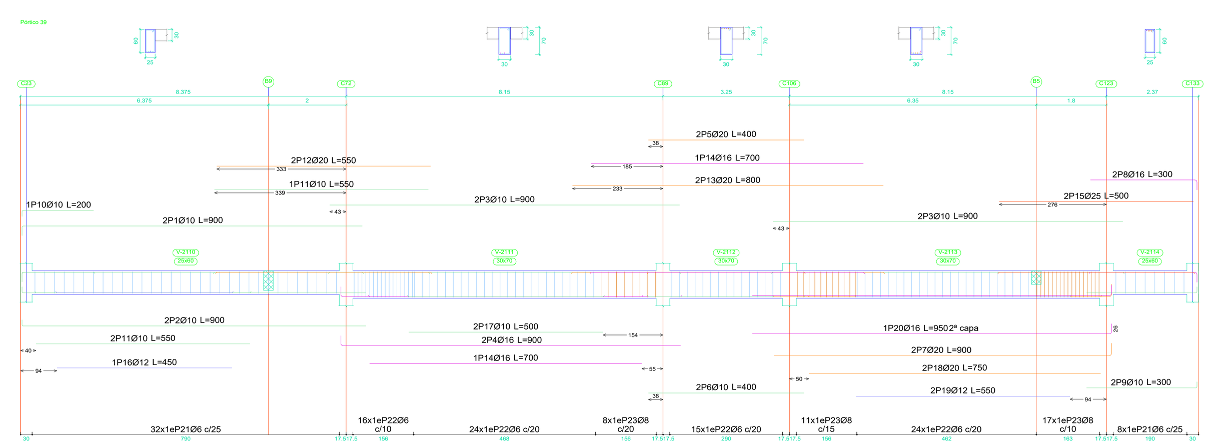


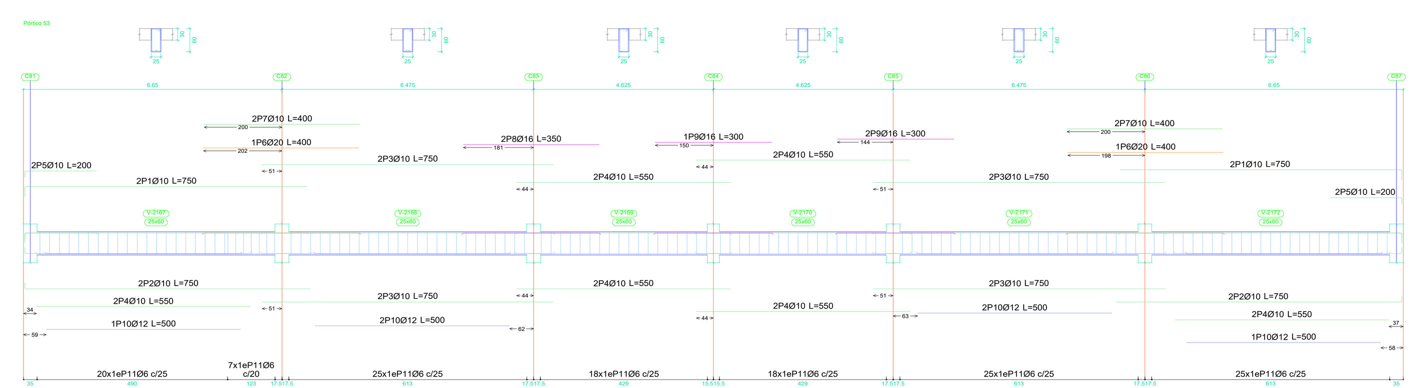


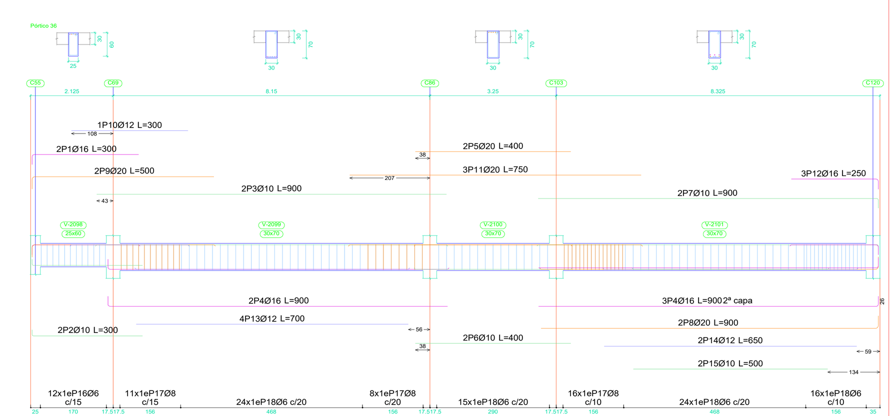


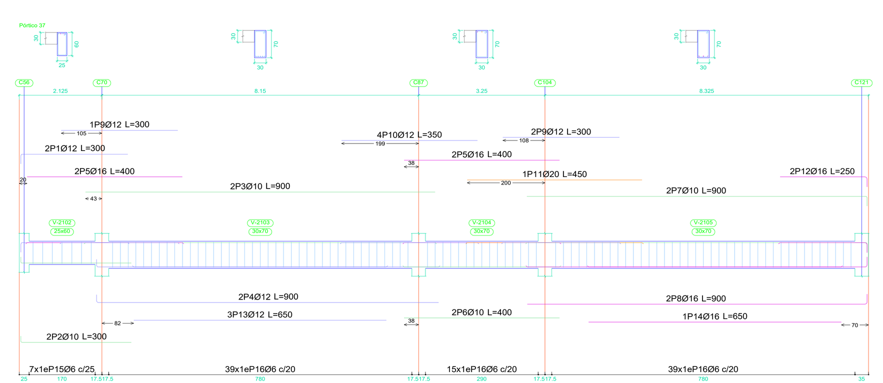


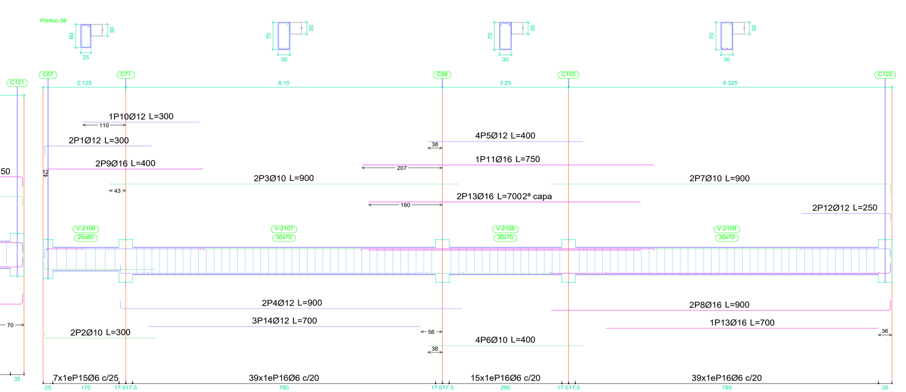










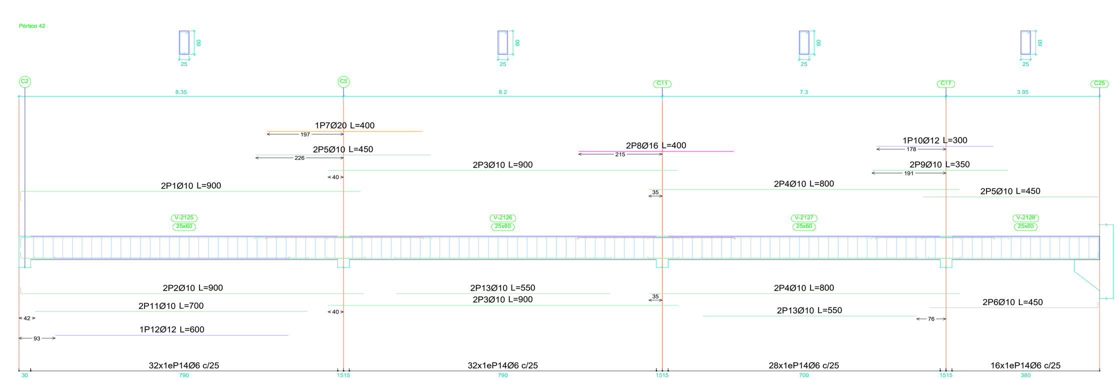


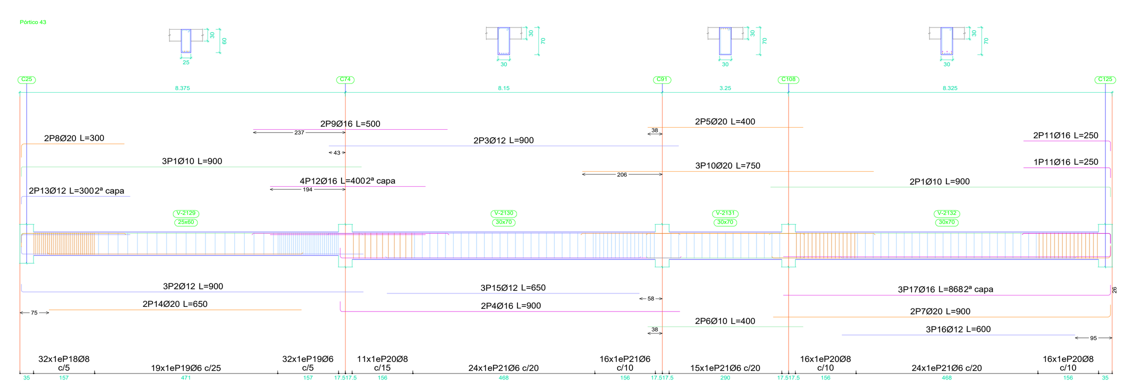
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 51 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 3 | Ø10 | 5 | 900 | 900 | 4500 | 27.7 |
| | 4 | Ø10 | 3 | 17 / 884 | 900 | 2700 | 16.6 |
| | 5 | Ø25 | 4 | 550 | 550 | 2200 | 84.8 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø20 | 2 | 900 | 900 | 1800 | 44.4 |
| | 8 | Ø25 | 2 | 410 / 40 | 450 | 900 | 34.7 |
| | 9 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 10 | Ø16 | 3 | 26 / 224 | 250 | 750 | 11.8 |
| | 11 | Ø20 | 2 | 300 | 300 | 600 | 14.8 |
| | 12 | Ø20 | 4 | 350 | 350 | 1400 | 34.5 |
| | 13 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 14 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 15 | Ø12 | 2 | 20 / 230 | 250 | 500 | 4.4 |
| | 16 | Ø12 | 2 | 650 | 650 | 1300 | 11.5 |
| | 17 | Ø16 | 1 | 550 | 550 | 550 | 8.7 |
| | 18 | Ø20 | 2 | 650 | 650 | 1300 | 32.1 |
| | 19 | Ø12 | 1 | 600 | 600 | 600 | 5.3 |
| | 20 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 21 | Ø16 | 3 | 842 | 842 | 2526 | 39.9 |
| | 22 | Ø6 | 51 | 55 / 6 / 20 | 164 | 8364 | 18.6 |
| | 23 | Ø8 | 16 | 55 / 8 / 20 | 167 | 2672 | 10.5 |
| | 24 | Ø6 | 89 | 65 / 6 / 25 | 194 | 17266 | 38.3 |
| | 25 | Ø8 | 35 | 65 / 8 / 25 | 197 | 6895 | 27.2 |
| | | | | | | Total+10%: | 573.0 |
| Pórtico 30 | 1 | Ø12 | 2 | 25 / 275 | 300 | 600 | 5.3 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 4 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 5 | Ø16 | 4 | 400 | 400 | 1600 | 25.3 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 8 | Ø16 | 2 | 874 / 26 | 900 | 1800 | 28.4 |
| | 9 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 10 | Ø12 | 4 | 350 | 350 | 1400 | 12.4 |
| | 11 | Ø20 | 1 | 450 | 450 | 450 | 11.1 |
| | 12 | Ø16 | 2 | 224 / 26 | 250 | 500 | 7.9 |
| | 13 | Ø12 | 3 | 650 | 650 | 1950 | 17.3 |
| | 14 | Ø16 | 1 | 650 | 650 | 650 | 10.3 |
| | 15 | Ø6 | 7 | 55 / 6 / 20 | 164 | 1148 | 2.5 |
| | 16 | Ø6 | 93 | 65 / 6 / 25 | 194 | 18042 | 40.0 |
| | | | | | | Total+10%: | 236.8 |
| Pórtico 36 | 1 | Ø16 | 2 | 26 / 274 | 300 | 600 | 9.5 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 4 | Ø16 | 5 | 26 / 874 | 900 | 4500 | 71.0 |
| | 5 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 8 | Ø20 | 2 | 868 / 32 | 900 | 1800 | 44.4 |
| | 9 | Ø20 | 2 | 32 / 468 | 500 | 1000 | 24.7 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø20 | 3 | 750 | 750 | 2250 | 55.5 |
| | 12 | Ø16 | 3 | 224 / 26 | 250 | 750 | 11.8 |
| | 13 | Ø12 | 4 | 700 | 700 | 2800 | 24.9 |
| | 14 | Ø12 | 2 | 650 | 650 | 1300 | 11.5 |
| | 15 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 16 | Ø6 | 12 | 55 / 6 / 20 | 164 | 1968 | 4.4 |
| | 17 | Ø8 | 35 | 65 / 8 / 25 | 197 | 6895 | 27.2 |
| | 18 | Ø6 | 79 | 65 / 6 / 25 | 194 | 15326 | 34.0 |
| | | | | | | Total+10%: | 416.1 |

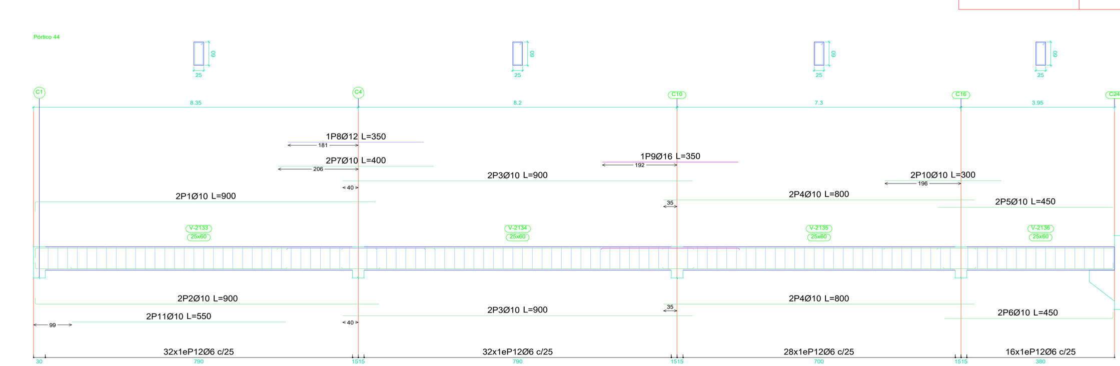
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 37 | 1 | Ø12 | 2 | 25 / 275 | 300 | 600 | 5.3 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 4 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 5 | Ø16 | 4 | 400 | 400 | 1600 | 25.3 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 8 | Ø16 | 2 | 874 / 26 | 900 | 1800 | 28.4 |
| | 9 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 10 | Ø12 | 4 | 350 | 350 | 1400 | 12.4 |
| | 11 | Ø20 | 1 | 450 | 450 | 450 | 11.1 |
| | 12 | Ø16 | 2 | 224 / 26 | 250 | 500 | 7.9 |
| | 13 | Ø12 | 3 | 650 | 650 | 1950 | 17.3 |
| | 14 | Ø16 | 1 | 650 | 650 | 650 | 10.3 |
| | 15 | Ø6 | 7 | 55 / 6 / 20 | 164 | 1148 | 2.5 |
| | 16 | Ø6 | 93 | 65 / 6 / 25 | 194 | 18042 | 40.0 |
| | | | | | | Total+10%: | 236.8 |
| Pórtico 38 | 1 | Ø12 | 2 | 25 / 275 | 300 | 600 | 5.3 |
| | 2 | Ø10 | 2 | 16 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 4 | Ø12 | 2 | 20 / 880 | 900 | 1800 | 16.0 |
| | 5 | Ø12 | 4 | 400 | 400 | 1600 | 14.2 |
| | 6 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 7 | Ø10 | 2 | 875 / 25 | 900 | 1800 | 11.1 |
| | 8 | Ø16 | 2 | 874 / 26 | 900 | 1800 | 28.4 |
| | 9 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø16 | 1 | 750 | 750 | 750 | 11.8 |
| | 12 | Ø12 | 2 | 230 / 20 | 250 | 500 | 4.4 |
| | 13 | Ø16 | 3 | 700 | 700 | 2100 | 33.1 |
| | 14 | Ø12 | 3 | 700 | 700 | 2100 | 18.6 |
| | 15 | Ø6 | 7 | 55 / 6 / 20 | 164 | 1148 | 2.5 |
| | 16 | Ø6 | 93 | 65 / 6 / 25 | 194 | 18042 | 40.0 |
| | | | | | | Total+10%: | 247.9 |
| Pórtico 39 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø16 | 2 | 26 / 874 | 900 | 1800 | 28.4 |
| | 5 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø20 | 2 | 868 / 32 | 900 | 1800 | 44.4 |
| | 8 | Ø16 | 2 | 274 / 26 | 300 | 600 | 9.5 |
| | 9 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 10 | Ø10 | 1 | 16 / 184 | 200 | 200 | 1.2 |
| | 11 | Ø10 | 3 | 550 | 550 | 1650 | 10.2 |
| | 12 | Ø20 | 2 | 550 | 550 | 1100 | 27.1 |
| | 13 | Ø20 | 2 | 800 | 800 | 1600 | 39.5 |
| | 14 | Ø16 | 2 | 700 | 700 | 1400 | 22.1 |
| | 15 | Ø25 | 2 | 500 | 500 | 1000 | 38.5 |
| | 16 | Ø12 | 1 | 450 | 450 | 450 | 4.0 |
| | 17 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 18 | Ø20 | 2 | 750 | 750 | 1500 | 37.0 |
| | 19 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 20 | Ø16 | 1 | 924 / 26 | 950 | 950 | 15.0 |
| | 21 | Ø6 | 40 | 55 / 6 / 20 | 164 | 6560 | 14.6 |
| | 22 | Ø6 | 79 | 65 / 6 / 25 | 194 | 15326 | 34.0 |
| | 23 | Ø8 | 36 | 65 / 8 / 25 | 197 | 7092 | 28.0 |
| | | | | | | Total+10%: | 486.4 |
| Pórtico 40 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 800 | 800 | 3200 | 19.7 |
| | 5 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 6 | Ø10 | 2 | 434 / 16 | 450 | 900 | 5.5 |
| | 7 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 8 | Ø12 | 1 | 350 | 350 | 350 | 3.1 |
| | 9 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 10 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 11 | Ø10 | 2 | 550 | 550 | 1100 | 6.8 |
| | 12 | Ø6 | 108 | 55 / 6 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10%: | 152.2 |
| Pórtico 53 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 12 | 550 | 550 | 6600 | 40.7 |
| | 5 | Ø10 | 4 | 16 / 184 | 200 | 800 | 4.9 |
| | 6 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 7 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 8 | Ø16 | 2 | 350 | 350 | 700 | 11.0 |
| | 9 | Ø16 | 3 | 300 | 300 | 900 | 14.2 |
| | 10 | Ø12 | 6 | 500 | 500 | 3000 | 26.6 |
| | 11 | Ø6 | 138 | 55 / 6 / 20 | 164 | 22632 | 50.2 |
| | | | | | | Total+10%: | 276.3 |
| | | | | | | Ø6:<br>Ø8:<br>Ø10:<br>Ø12:<br>Ø16:<br>Ø20:<br>Ø25:<br>Total: | 396.7<br>102.2<br>549.0<br>328.9<br>547.3<br>527.5<br>173.9<br>2625.5 |

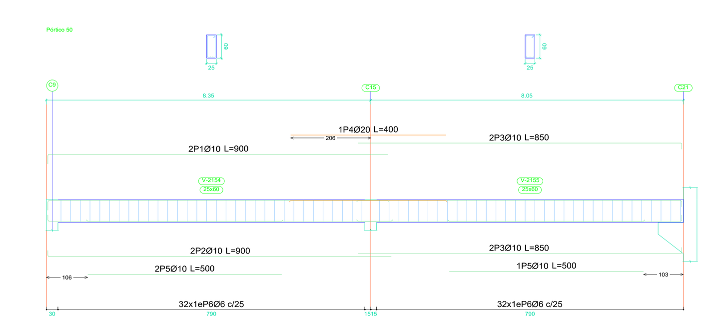
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 47 | 1 | Ø10 | 4 | 25 / 875 | 900 | 3600 | 22.2 |
| | 2 | Ø12 | 4 | 20 / 880 | 900 | 3600 | 32.0 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø12 | 2 | 400 | 400 | 800 | 7.1 |
| | 5 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 6 | Ø12 | 2 | 20 / 230 | 250 | 500 | 4.4 |
| | 7 | Ø10 | 4 | 16 / 234 | 250 | 1000 | 6.2 |
| | 8 | Ø20 | 1 | 500 | 500 | 500 | 12.3 |
| | 9 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 10 | Ø10 | 2 | 750 | 750 | 1500 | 9.2 |
| | 11 | Ø20 | 1 | 700 | 700 | 700 | 17.3 |
| | 12 | Ø12 | 2 | 650 | 650 | 1300 | 11.5 |
| | 13 | Ø10 | 4 | 650 | 650 | 2600 | 16.0 |
| | 14 | Ø12 | 1 | 550 | 550 | 550 | 4.9 |
| | 15 | Ø12 | 1 | 600 | 600 | 600 | 5.3 |
| | 16 | Ø6 | 108 | 55 / 6 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10%: | 243.1 |
| Pórtico 49 | 1 | Ø10 | 5 | 25 / 875 | 900 | 4500 | 27.7 |
| | 2 | Ø12 | 3 | 20 / 880 | 900 | 2700 | 24.0 |
| | 3 | Ø12 | 2 | 900 | 900 | 1800 | 16.0 |
| | 4 | Ø16 | 2 | 26 / 874 | 900 | 1800 | 28.4 |
| | 5 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø20 | 2 | 868 / 32 | 900 | 1800 | 44.4 |
| | 8 | Ø20 | 2 | 32 / 268 | 300 | 600 | 14.8 |
| | 9 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 10 | Ø20 | 3 | 750 | 750 | 2250 | 55.5 |
| | 11 | Ø16 | 3 | 224 / 26 | 250 | 750 | 11.8 |
| | 12 | Ø25 | 2 | 550 | 550 | 1100 | 42.4 |
| | 13 | Ø12 | 2 | 20 / 280 | 300 | 600 | 5.3 |
| | 14 | Ø20 | 2 | 650 | 650 | 1300 | 32.1 |
| | 15 | Ø12 | 3 | 650 | 650 | 1950 | 17.3 |
| | 16 | Ø12 | 3 | 600 | 600 | 1800 | 16.0 |
| | 17 | Ø16 | 6 | 815 / 26 | 841 | 5046 | 79.6 |
| | 18 | Ø8 | 32 | 55 / 8 / 20 | 167 | 5344 | 21.1 |
| | 19 | Ø6 | 51 | 55 / 6 / 20 | 164 | 8364 | 18.6 |
| | 20 | Ø8 | 43 | 65 / 8 / 25 | 197 | 8471 | 33.4 |
| | 21 | Ø6 | 79 | 65 / 6 / 25 | 194 | 15326 | 34.0 |
| | | | | | | Total+10%: | 611.5 |
| Pórtico 50 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 4 | 834 / 16 | 850 | 3400 | 21.0 |
| | 4 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 5 | Ø10 | 3 | 500 | 500 | 1500 | 9.2 |
| | 6 | Ø6 | 64 | 55 / 6 / 20 | 164 | 10496 | 23.3 |
| | | | | | | Total+10%: | 94.2 |
| Pórtico 52 | 1 | Ø10 | 4 | 25 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 16 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø10 | 2 | 16 / 184 | 200 | 400 | 2.5 |
| | 6 | Ø16 | 4 | 350 | 350 | 1400 | 22.1 |
| | 7 | Ø10 | 6 | 300 | 300 | 1800 | 11.1 |
| | 8 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 9 | Ø12 | 3 | 300 | 300 | 900 | 8.0 |
| | 10 | Ø12 | 4 | 550 | 550 | 2200 | 19.5 |
| | 11 | Ø12 | 2 | 450 | 450 | 900 | 8.0 |
| | 12 | Ø6 | 136 | 55 / 6 / 20 | 164 | 22304 | 49.5 |
| | | | | | | Total+10%: | 246.4 |

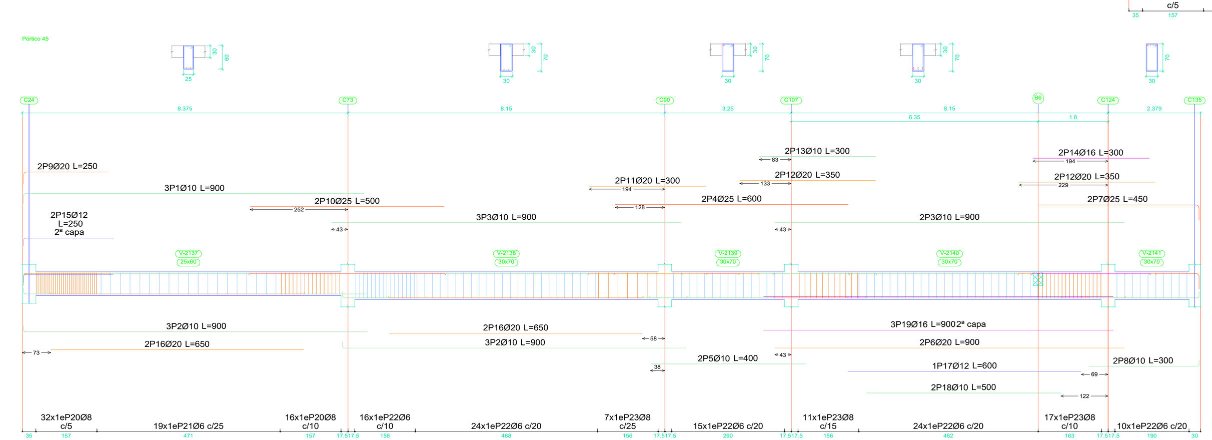
| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 42 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 800 | 800 | 3200 | 19.7 |
| | 5 | Ø10 | 4 | 450 | 450 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 434 / 16 | 450 | 900 | 5.5 |
| | 7 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 8 | Ø16 | 2 | 400 | 400 | 800 | 12.6 |
| | 9 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø10 | 2 | 700 | 700 | 1400 | 8.6 |
| | 12 | Ø12 | 1 | 600 | 600 | 600 | 5.3 |
| | 13 | Ø10 | 4 | 550 | 550 | 2200 | 13.6 |
| | 14 | Ø6 | 108 | 55 / 6 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10%: | 194.7 |
| Pórtico 43 | 1 | Ø10 | 5 | 25 / 875 | 900 | 4500 | 27.7 |
| | 2 | Ø12 | 3 | 20 / 880 | 900 | 2700 | 24.0 |
| | 3 | Ø12 | 2 | 900 | 900 | 1800 | 16.0 |
| | 4 | Ø16 | 2 | 26 / 874 | 900 | 1800 | 28.4 |
| | 5 | Ø20 | 2 | 400 | 400 | 800 | 19.7 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø20 | 2 | 868 / 32 | 900 | 1800 | 44.4 |
| | 8 | Ø20 | 2 | 35 / 265 | 300 | 600 | 14.8 |
| | 9 | Ø16 | 2 | 500 | 500 | 1000 | 15.8 |
| | 10 | Ø20 | 3 | 750 | 750 | 2250 | 55.5 |
| | 11 | Ø16 | 3 | 224 / 26 | 250 | 750 | 11.8 |
| | 12 | Ø16 | 4 | 400 | 400 | 1600 | 25.3 |
| | 13 | Ø12 | 2 | 20 / 280 | 300 | 600 | 5.3 |
| | 14 | Ø20 | 2 | 650 | 650 | 1300 | 32.1 |
| | 15 | Ø12 | 3 | 650 | 650 | 1950 | 17.3 |
| | 16 | Ø12 | 3 | 600 | 600 | 1800 | 16.0 |
| | 17 | Ø16 | 3 | 842 / 26 | 868 | 2604 | 41.1 |
| | 18 | Ø8 | 32 | 55 / 8 / 20 | 167 | 5344 | 21.1 |
| | 19 | Ø6 | 51 | 55 / 6 / 20 | 164 | 8364 | 18.6 |
| | 20 | Ø8 | 43 | 65 / 8 / 25 | 197 | 8471 | 33.4 |
| | 21 | Ø6 | 79 | 65 / 6 / 25 | 194 | 15326 | 34.0 |
| | | | | | | Total+10%: | 557.9 |
| Pórtico 44 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 800 | 800 | 3200 | 19.7 |
| | 5 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 6 | Ø10 | 2 | 434 / 16 | 450 | 900 | 5.5 |
| | 7 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 8 | Ø12 | 1 | 350 | 350 | 350 | 3.1 |
| | 9 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 10 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 11 | Ø10 | 2 | 550 | 550 | 1100 | 6.8 |
| | 12 | Ø6 | 108 | 55 / 6 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10%: | 152.2 |
| Pórtico 45 | 1 | Ø10 | 3 | 25 / 875 | 900 | 2700 | 16.6 |
| | 2 | Ø10 | 6 | 16 / 884 | 900 | 5400 | 33.3 |
| | 3 | Ø10 | 5 | 900 | 900 | 4500 | 27.7 |
| | 4 | Ø25 | 2 | 600 | 600 | 1200 | 46.2 |
| | 5 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 6 | Ø20 | 2 | 900 | 900 | 1800 | 44.4 |
| | 7 | Ø25 | 2 | 410 / 40 | 450 | 900 | 34.7 |
| | 8 | Ø10 | 2 | 284 / 16 | 300 | 600 | 3.7 |
| | 9 | Ø20 | 2 | 32 / 218 | 250 | 500 | 12.3 |
| | 10 | Ø25 | 2 | 500 | 500 | 1000 | 38.5 |
| | 11 | Ø20 | 2 | 300 | 300 | 600 | 14.8 |
| | 12 | Ø20 | 4 | 350 | 350 | 1400 | 34.5 |
| | 13 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 14 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 15 | Ø12 | 2 | 20 / 230 | 250 | 500 | 4.4 |
| | 16 | Ø20 | 4 | 650 | 650 | 2600 | 64.1 |
| | 17 | Ø12 | 1 | 600 | 600 | 600 | 5.3 |
| | 18 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 19 | Ø16 | 3 | 900 | 900 | 2700 | 42.6 |
| | 20 | Ø8 | 48 | 55 / 8 / 20 | 167 | 8016 | 31.6 |
| | 21 | Ø6 | 19 | 55 / 6 / 20 | 164 | 3116 | 6.9 |
| | 22 | Ø6 | 89 | 65 / 6 / 25 | 194 | 17266 | 38.3 |
| | 23 | Ø8 | 35 | 65 / 8 / 25 | 197 | 6895 | 27.2 |
| | | | | | | Total+10%: | 606.5 |
| Pórtico 46 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 4 | 834 / 16 | 850 | 3400 | 21.0 |
| | 4 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 5 | Ø10 | 3 | 500 | 500 | 1500 | 9.2 |
| | 6 | Ø6 | 64 | 55 / 6 / 20 | 164 | 10496 | 23.3 |
| | | | | | | Total+10%: | 94.2 |
| Pórtico 48 | 1 | Ø10 | 2 | 25 / 875 | 900 | 1800 | 11.1 |
| | 2 | Ø10 | 2 | 16 / 884 | 900 | 1800 | 11.1 |
| | 3 | Ø10 | 2 | 850 | 850 | 1700 | 10.5 |
| | 4 | Ø10 | 2 | 834 / 16 | 850 | 1700 | 10.5 |
| | 5 | Ø16 | 2 | 450 | 450 | 900 | 14.2 |
| | 6 | Ø12 | 1 | 350 | 350 | 350 | 3.1 |
| | 7 | Ø10 | 2 | 650 | 650 | 1300 | 8.0 |
| | 8 | Ø12 | 1 | 550 | 550 | 550 | 4.9 |
| | 9 | Ø12 | 2 | 700 | 700 | 1400 | 12.4 |
| | 10 | Ø10 | 1 | 500 | 500 | 500 | 3.1 |
| | 11 | Ø6 | 64 | 55 / 6 / 20 | 164 | 10496 | 23.3 |
| | | | | | | Total+10%: | 123.4 |
| | | | | | | Ø6:<br>Ø8:<br>Ø10:<br>Ø12:<br>Ø16:<br>Ø20:<br>Ø25:<br>Total: | 426.4<br>184.6<br>784.9<br>347.8<br>383.7<br>618.6<br>178.1<br>2924.1 |

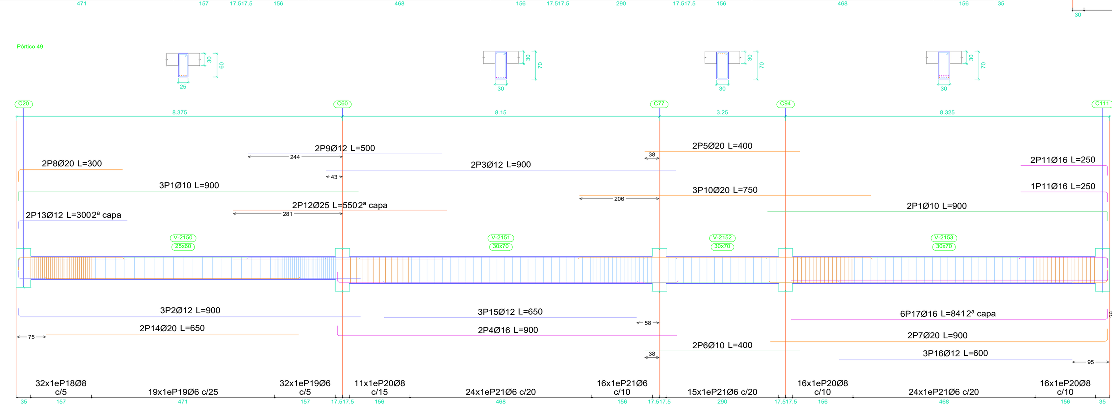












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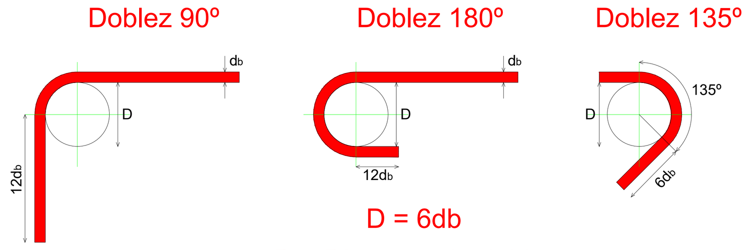
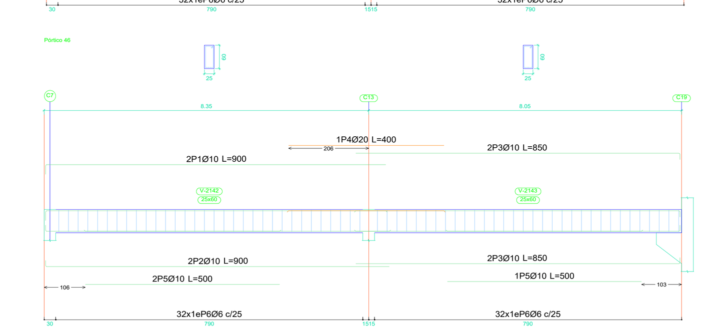
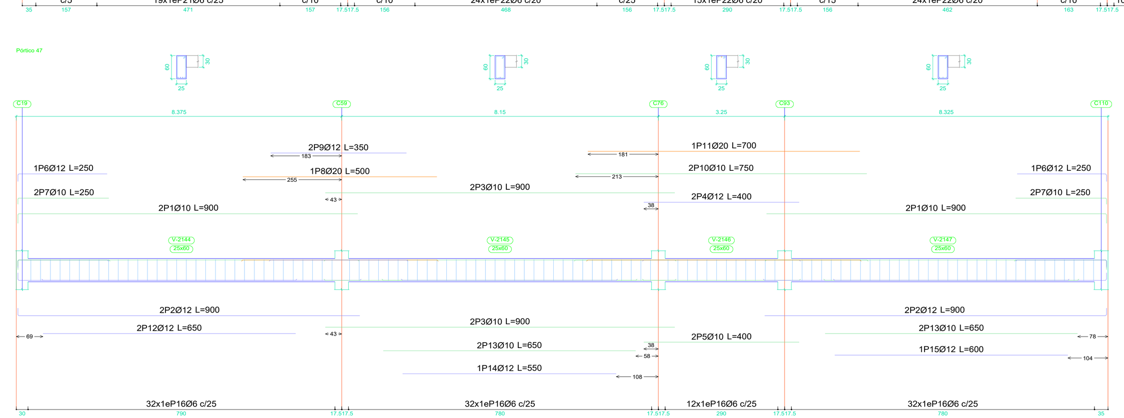


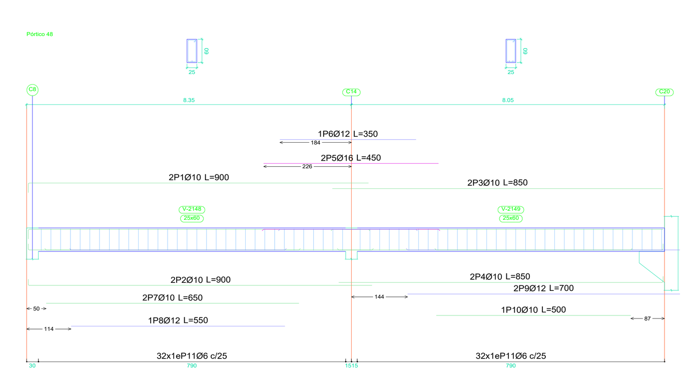
D = 6db

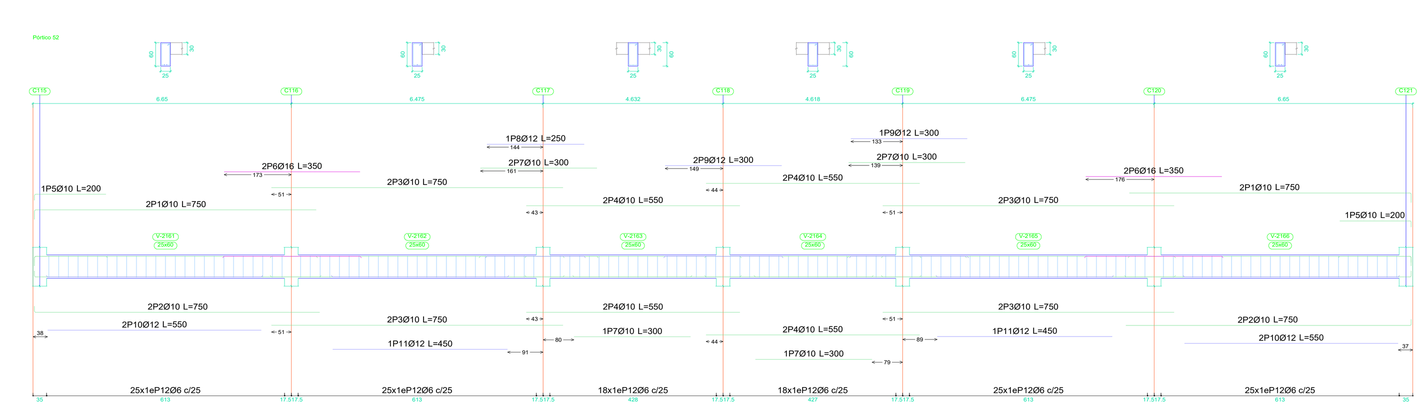
D = Diametro de doblez

db = Diametro de la barra









UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

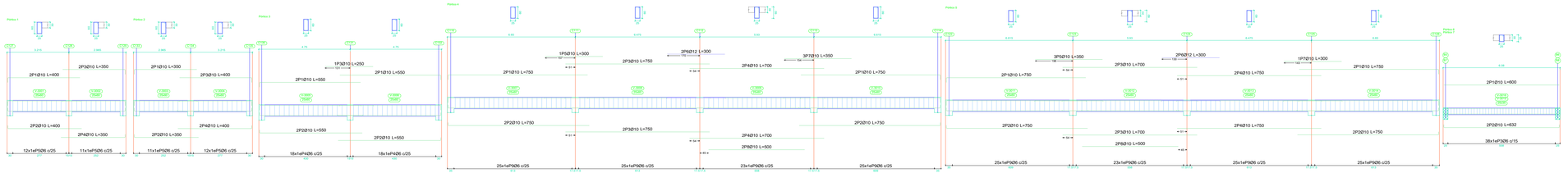
UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

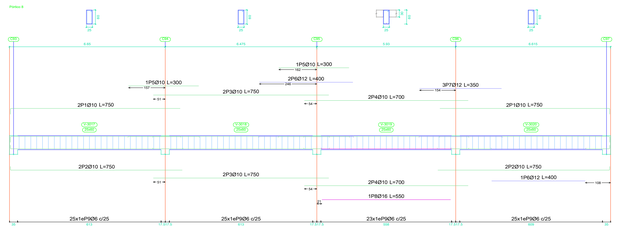
ESCALA: 1:125

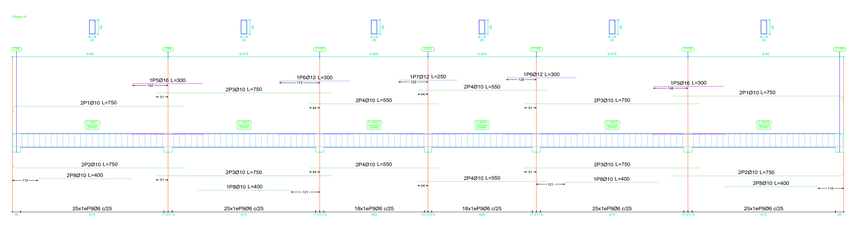
LAMINA: 2/2

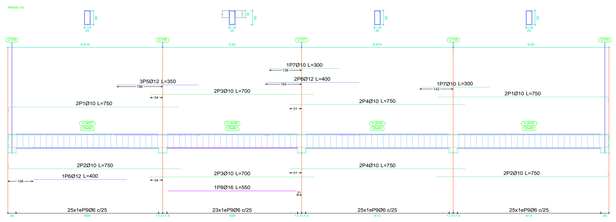
CONTENIDO:
DETALLE Y ARMADO DE VIGAS PRIMER PISO

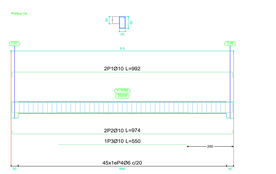
FECHA : NOVIEMBRE DE 2024

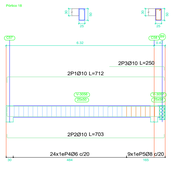


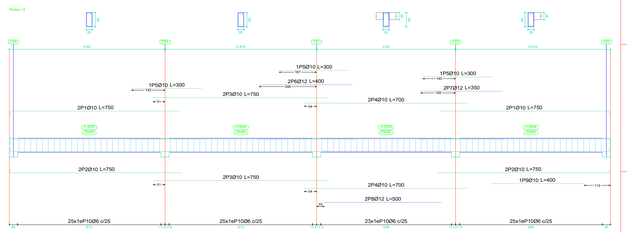



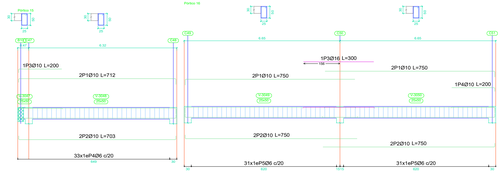



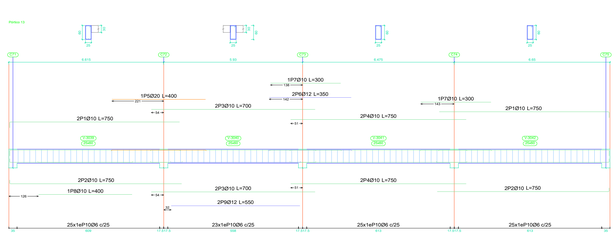



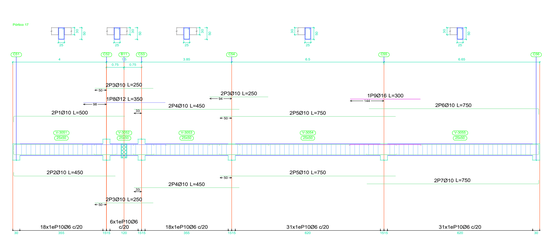



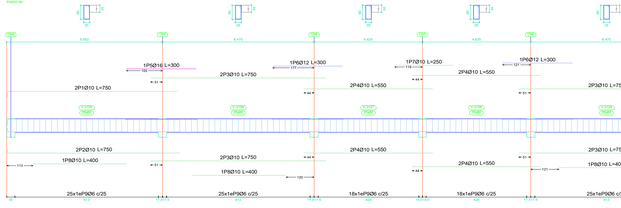



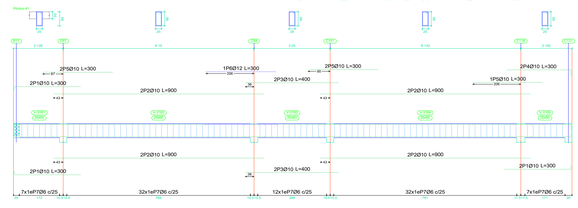



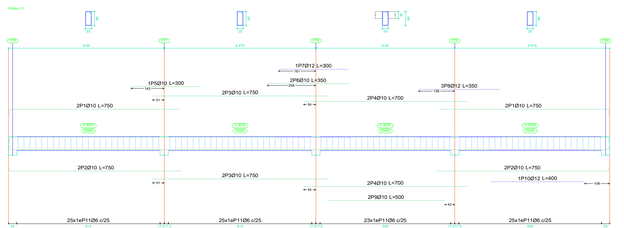



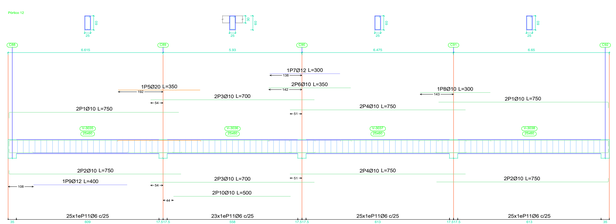



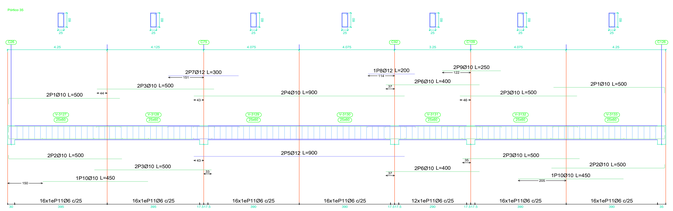



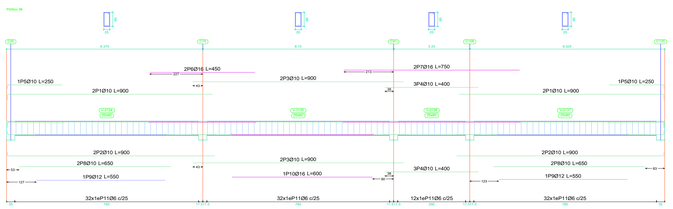



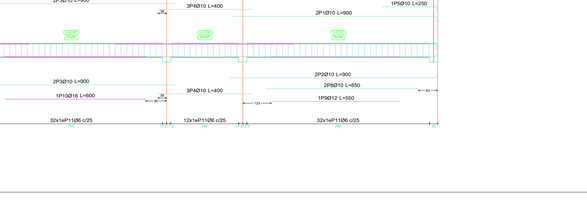



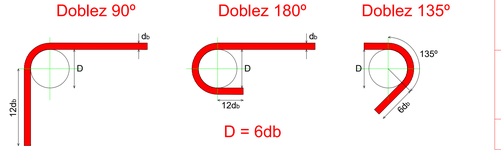










CUBIERTA
Despiece de vigas
Hormigón: H-21
Acero en barras: AH-500
Acero en estribos: AH-500
Escala pórticos 1:100
Escala secciones 1:100
Escala huecos 1:100

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 11 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 6 | Ø12 | 2 | 350 | 350 | 700 | 4.3 |
| | 7 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 8 | Ø12 | 3 | 350 | 350 | 1050 | 9.3 |
| | 9 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 10 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 11 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 150.0 |
| Pórtico 12 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø20 | 1 | 350 | 350 | 350 | 8.6 |
| | 6 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 7 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 8 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 9 | Ø12 | 1 | 400 | 400 | 400 | 3.6 |
| | 10 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 11 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 149.3 |
| Pórtico 13 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø20 | 1 | 400 | 400 | 400 | 9.9 |
| | 6 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 7 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 1 | 400 | 400 | 400 | 2.5 |
| | 9 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 10 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 154.7 |
| Pórtico 14 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø10 | 3 | 300 | 300 | 900 | 5.5 |
| | 6 | Ø12 | 2 | 400 | 400 | 800 | 7.1 |
| | 7 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 8 | Ø12 | 2 | 500 | 500 | 1000 | 8.9 |
| | 9 | Ø10 | 1 | 400 | 400 | 400 | 2.5 |
| | 10 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 152.6 |
| Pórtico 15 | 1 | Ø10 | 2 | 671 | 712 | 1424 | 8.8 |
| | 2 | Ø10 | 2 | 671 | 703 | 1406 | 8.7 |
| | 3 | Ø10 | 1 | 184 | 200 | 200 | 1.2 |
| | 4 | Ø6 | 33 | 20 30 | 144 | 4752 | 10.5 |
| | | | | | Total+10% | | 32.1 |
| Pórtico 16 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 4 | Ø10 | 1 | 184 | 200 | 200 | 1.2 |
| | 5 | Ø6 | 62 | 20 30 | 144 | 8928 | 19.8 |
| | | | | | Total+10% | | 69.0 |
| Pórtico 17 | 1 | Ø10 | 2 | 475 | 500 | 1000 | 6.2 |
| | 2 | Ø10 | 2 | 634 | 450 | 900 | 5.5 |
| | 3 | Ø10 | 6 | 250 | 250 | 1500 | 9.2 |
| | 4 | Ø10 | 4 | 450 | 450 | 1800 | 11.1 |
| | 5 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 6 | Ø10 | 2 | 725 | 750 | 1500 | 9.2 |
| | 7 | Ø10 | 2 | 734 | 750 | 1500 | 9.2 |
| | 8 | Ø12 | 1 | 350 | 350 | 350 | 3.1 |
| | 9 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 10 | Ø6 | 104 | 20 30 | 144 | 14976 | 33.2 |
| | | | | | Total+10% | | 120.9 |
| Pórtico 18 | 1 | Ø10 | 2 | 671 | 712 | 1424 | 8.8 |
| | 2 | Ø10 | 2 | 671 | 703 | 1406 | 8.7 |
| | 3 | Ø10 | 2 | 234 | 250 | 500 | 3.1 |
| | 4 | Ø6 | 24 | 20 30 | 144 | 3456 | 7.7 |
| | 5 | Ø8 | 9 | 20 30 | 147 | 1323 | 5.2 |
| | | | | | Total+10% | | 36.9 |
| Pórtico 40 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 8 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 6 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 7 | Ø10 | 1 | 250 | 250 | 250 | 1.5 |
| | 8 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 9 | Ø6 | 136 | 20 30 | 164 | 22304 | 49.5 |
| | | | | | Total+10% | | 194.5 |
| Pórtico 41 | 1 | Ø10 | 6 | 284 | 300 | 1800 | 11.1 |
| | 2 | Ø10 | 8 | 900 | 900 | 7200 | 44.4 |
| | 3 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 4 | Ø10 | 2 | 275 | 300 | 600 | 3.7 |
| | 5 | Ø10 | 5 | 300 | 300 | 1500 | 9.2 |
| | 6 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 7 | Ø6 | 90 | 20 30 | 164 | 14760 | 32.8 |
| | | | | | Total+10% | | 135.3 |
| | | | | | Ø6: | | 325.9 |
| | | | | | Ø8: | | 5.5 |
| | | | | | Ø10: | | 734.0 |
| | | | | | Ø12: | | 79.3 |
| | | | | | Ø16: | | 20.8 |
| | | | | | Ø20: | | 20.4 |
| | | | | | Total: | | 1185.2 |

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 1 | 1 | Ø10 | 2 | 375 | 400 | 800 | 4.9 |
| | 2 | Ø10 | 2 | 384 | 400 | 800 | 4.9 |
| | 3 | Ø10 | 2 | 325 | 350 | 700 | 4.3 |
| | 4 | Ø10 | 2 | 334 | 350 | 700 | 4.3 |
| | 5 | Ø6 | 23 | 20 | 164 | 3772 | 8.4 |
| | | | | | Total+10% | | 29.5 |
| Pórtico 2 | 1 | Ø10 | 2 | 325 | 350 | 700 | 4.3 |
| | 2 | Ø10 | 2 | 334 | 350 | 700 | 4.3 |
| | 3 | Ø10 | 2 | 375 | 400 | 800 | 4.9 |
| | 4 | Ø10 | 2 | 384 | 400 | 800 | 4.9 |
| | 5 | Ø6 | 23 | 20 | 164 | 3772 | 8.4 |
| | | | | | Total+10% | | 29.5 |
| Pórtico 3 | 1 | Ø10 | 4 | 525 | 550 | 2200 | 13.6 |
| | 2 | Ø10 | 4 | 534 | 550 | 2200 | 13.6 |
| | 3 | Ø10 | 1 | 250 | 250 | 250 | 1.5 |
| | 4 | Ø6 | 36 | 20 | 164 | 5904 | 13.1 |
| | | | | | Total+10% | | 48.0 |
| Pórtico 4 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 6 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 7 | Ø10 | 3 | 550 | 550 | 1650 | 10.2 |
| | 8 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 9 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 141.1 |
| Pórtico 5 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø10 | 3 | 350 | 350 | 1050 | 6.5 |
| | 6 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 7 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 8 | Ø10 | 3 | 500 | 500 | 1000 | 6.2 |
| | 9 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 141.1 |
| Pórtico 6=Pórtico 7 | 1 | Ø10 | 2 | 600 | 600 | 1200 | 7.4 |
| | 2 | Ø10 | 2 | 600 | 632 | 1264 | 7.8 |
| | 3 | Ø6 | 36 | 20 | 114 | 4332 | 9.6 |
| | | | | | Total+10% (x2) | | 27.3 54.6 |
| Pórtico 8 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 5 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 6 | Ø12 | 3 | 400 | 400 | 1200 | 10.7 |
| | 7 | Ø12 | 3 | 350 | 350 | 1050 | 9.3 |
| | 8 | Ø16 | 1 | 550 | 550 | 550 | 8.7 |
| | 9 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 155.0 |
| Pórtico 9 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 6 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 8 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø16 | 2 | 300 | 300 | 600 | 9.5 |
| | 6 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 7 | Ø12 | 1 | 250 | 250 | 250 | 2.2 |
| | 8 | Ø10 | 6 | 400 | 400 | 2400 | 14.8 |
| | 9 | Ø6 | 136 | 20 30 | 164 | 22304 | 49.5 |
| | | | | | Total+10% | | 200.6 |
| Pórtico 10 | 1 | Ø10 | 4 | 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 4 | 700 | 700 | 2800 | 17.3 |
| | 4 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 5 | Ø12 | 3 | 350 | 350 | 1050 | 9.3 |
| | 6 | Ø12 | 3 | 400 | 400 | 1200 | 10.7 |
| | 7 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 8 | Ø16 | 1 | 550 | 550 | 550 | 8.7 |
| | 9 | Ø6 | 98 | 20 30 | 164 | 16072 | 35.7 |
| | | | | | Total+10% | | 155.0 |
| Pórtico 19 | 1 | Ø10 | 2 | 942 | 992 | 1984 | 12.2 |
| | 2 | Ø10 | 2 | 942 | 974 | 1948 | 12.0 |
| | 3 | Ø10 | 1 | 550 | 550 | 550 | 3.4 |
| | 4 | Ø6 | 45 | 20 30 | 144 | 6480 | 14.4 |
| | | | | | Total+10% | | 46.2 |
| | | | | | Ø6: | | 281.4 |
| | | | | | Ø10: | | 734.0 |
| | | | | | Ø12: | | 64.1 |
| | | | | | Ø16: | | 20.4 |
| | | | | | Total: | | 999.8 |

UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

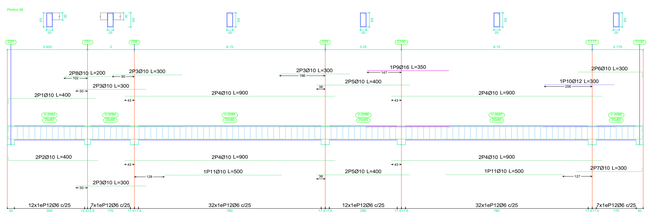
ESCALA:
1:100

LAMINA:
1/2

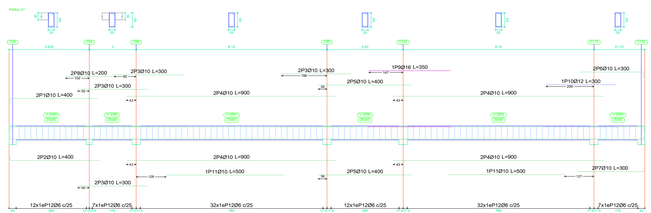
CONTENIDO:
DETALLE Y ARMADO DE VIGAS CUBIERTA

FECHA:
NOVIEMBRE DE 2024

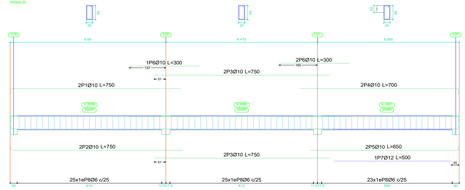
Pórtico 26




Pórtico 27



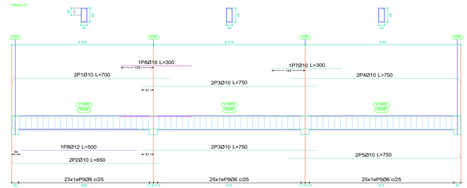

Pórtico 28



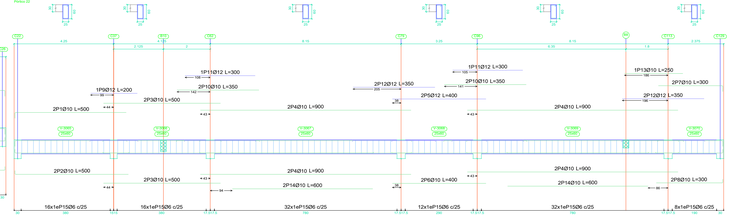

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 28 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø10 | 4 | 300 | 300 | 1200 | 7.4 |
| | 8 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 9 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 10 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 120.8 |
| Pórtico 29 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 8 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 9 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 106.9 |
| Pórtico 30 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 8 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 9 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 100.1 |
| Pórtico 31 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 8 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 9 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 106.9 |
| Pórtico 32 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 8 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 9 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 106.9 |
| Pórtico 33 | 1 | Ø10 | 4 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 4 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 6 | 400 | 400 | 2400 | 14.8 |
| | 5 | Ø10 | 5 | 500 | 500 | 2500 | 15.4 |
| | 6 | Ø10 | 2 | 67 / 475 / 15 | 500 | 1000 | 6.2 |
| | 7 | Ø10 | 2 | 51 / 484 / 67 | 500 | 1000 | 6.2 |
| | 8 | Ø12 | 2 | 350 | 350 | 700 | 4.3 |
| | 9 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 10 | Ø10 | 1 | 550 | 550 | 550 | 3.4 |
| | 11 | Ø10 | 1 | 450 | 450 | 450 | 2.8 |
| | 12 | Ø6 | 108 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10% | 156.0 |
| Pórtico 34 | 1 | Ø10 | 4 | 67 / 275 | 900 | 3600 | 22.2 |
| | 2 | Ø10 | 4 | 51 / 284 | 900 | 3600 | 22.2 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 6 | 400 | 400 | 2400 | 14.8 |
| | 5 | Ø10 | 2 | 67 / 234 | 250 | 500 | 3.1 |
| | 6 | Ø16 | 2 | 450 | 450 | 900 | 14.2 |
| | 7 | Ø16 | 2 | 750 | 750 | 1500 | 23.7 |
| | 8 | Ø10 | 4 | 650 | 650 | 2600 | 16.0 |
| | 9 | Ø12 | 2 | 550 | 550 | 1100 | 9.8 |
| | 10 | Ø16 | 1 | 600 | 600 | 600 | 9.5 |
| | 11 | Ø6 | 108 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10% | 214.7 |
| Pórtico 35 | 1 | Ø10 | 4 | 67 / 275 | 900 | 3600 | 22.2 |
| | 2 | Ø10 | 4 | 51 / 284 | 900 | 3600 | 22.2 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø12 | 2 | 400 | 400 | 800 | 7.1 |
| | 5 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 6 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 7 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 2 | 51 / 247 | 280 | 560 | 3.5 |
| | 9 | Ø16 | 3 | 400 | 400 | 1200 | 18.9 |
| | 10 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 11 | Ø12 | 2 | 350 | 350 | 700 | 6.2 |
| | 12 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 13 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 14 | Ø12 | 4 | 650 | 650 | 2600 | 23.1 |
| | 15 | Ø16 | 1 | 600 | 600 | 600 | 9.5 |
| | 16 | Ø6 | 108 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 17712 | 39.3 |
| | 17 | Ø6 | 10 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 194 | 1940 | 4.3 |
| | | | | | | Total+10% | 219.8 |
| Pórtico 36 | 1 | Ø10 | 4 | 67 / 475 | 500 | 2000 | 12.3 |
| | 2 | Ø10 | 4 | 51 / 484 | 500 | 2000 | 12.3 |
| | 3 | Ø10 | 8 | 500 | 500 | 4000 | 24.7 |
| | 4 | Ø10 | 2 | 900 | 900 | 1800 | 11.1 |
| | 5 | Ø12 | 2 | 800 | 800 | 1600 | 16.0 |
| | 6 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 7 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 8 | Ø12 | 1 | 200 | 200 | 200 | 1.8 |
| | 9 | Ø10 | 2 | 250 | 250 | 500 | 3.1 |
| | 10 | Ø10 | 2 | 450 | 450 | 900 | 5.5 |
| | 11 | Ø6 | 108 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 17712 | 39.3 |
| | | | | | | Total+10% | 155.4 |
| Pórtico 38 | 1 | Ø10 | 4 | 67 / 725 | 750 | 3000 | 18.5 |
| | 2 | Ø10 | 4 | 51 / 734 | 750 | 3000 | 18.5 |
| | 3 | Ø10 | 8 | 750 | 750 | 6000 | 37.0 |
| | 4 | Ø10 | 6 | 550 | 550 | 4400 | 27.1 |
| | 5 | Ø10 | 2 | 300 | 300 | 600 | 3.7 |
| | 6 | Ø10 | 1 | 250 | 250 | 250 | 1.5 |
| | 7 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 8 | Ø6 | 136 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 22304 | 49.5 |
| | | | | | | Total+10% | 184.9 |

| | |
|---|---|
| Ø6 | 424.0 |
| Ø10 | 1010.4 |
| Ø12 | 172.8 |
| Ø16 | 177.2 |
| Total | 1784.5 |

Pórtico 21



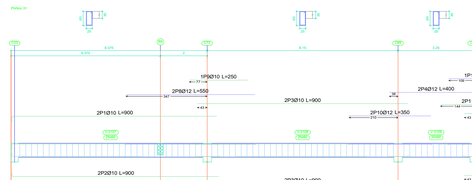

Pórtico 22



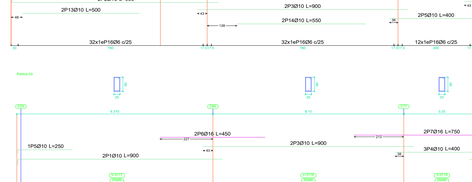

| Elemento | Pos. | Diám. | No. | Esquema (cm) | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|---|
| Pórtico 20 | 1 | Ø10 | 2 | 67 / 275 | 750 | 1500 | 9.2 |
| | 2 | Ø10 | 3 | 51 / 734 | 750 | 1500 | 9.2 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 2 | 873 / 15 / 67 | 700 | 1400 | 8.6 |
| | 5 | Ø10 | 2 | 51 / 634 / 67 | 650 | 1300 | 8.0 |
| | 6 | Ø10 | 1 | 500 | 500 | 500 | 3.1 |
| | 7 | Ø12 | 1 | 500 | 500 | 500 | 4.4 |
| | 8 | Ø6 | 73 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 11972 | 26.6 |
| | | | | | | Total+10% | 99.0 |
| Pórtico 21 | 1 | Ø10 | 2 | 67 / 675 | 750 | 1400 | 8.6 |
| | 2 | Ø10 | 2 | 51 / 634 | 650 | 1300 | 8.0 |
| | 3 | Ø10 | 4 | 750 | 750 | 3000 | 18.5 |
| | 4 | Ø10 | 2 | 725 / 15 / 67 | 750 | 1500 | 9.2 |
| | 5 | Ø10 | 2 | 51 / 734 / 67 | 750 | 1500 | 9.2 |
| | 6 | Ø16 | 1 | 300 | 300 | 300 | 4.7 |
| | 7 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 8 | Ø12 | 1 | 500 | 500 | 500 | 4.4 |
| | 9 | Ø6 | 73 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 11972 | 26.6 |
| | | | | | | Total+10% | 100.1 |
| Pórtico 22 | 1 | Ø10 | 2 | 67 / 675 | 500 | 1000 | 6.2 |
| | 2 | Ø10 | 2 | 51 / 684 | 500 | 1000 | 6.2 |
| | 3 | Ø10 | 4 | 500 | 500 | 2000 | 12.3 |
| | 4 | Ø10 | 8 | 900 | 900 | 7200 | 44.4 |
| | 5 | Ø12 | 2 | 400 | 400 | 800 | 7.1 |
| | 6 | Ø10 | 2 | 400 | 400 | 800 | 4.9 |
| | 7 | Ø10 | 2 | 275 / 15 / 67 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 2 | 51 / 284 / 67 | 300 | 600 | 3.7 |
| | 9 | Ø12 | 1 | 200 | 200 | 200 | 1.8 |
| | 10 | Ø10 | 4 | 350 | 350 | 1400 | 8.6 |
| | 11 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 12 | Ø12 | 4 | 350 | 350 | 1400 | 12.4 |
| | 13 | Ø10 | 1 | 250 | 250 | 250 | 1.5 |
| | 14 | Ø10 | 4 | 650 | 650 | 2400 | 14.8 |
| | 15 | Ø6 | 116 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 19024 | 42.2 |
| | | | | | | Total+10% | 192.6 |
| Pórtico 23 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 8 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 9 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 106.9 |
| Pórtico 24 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø12 | 2 | 300 | 300 | 600 | 5.3 |
| | 8 | Ø10 | 1 | 300 | 300 | 300 | 1.8 |
| | 9 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 106.9 |
| Pórtico 25 | 1 | Ø10 | 2 | 67 / 275 | 300 | 600 | 3.7 |
| | 2 | Ø10 | 2 | 51 / 284 | 300 | 600 | 3.7 |
| | 3 | Ø10 | 4 | 900 | 900 | 3600 | 22.2 |
| | 4 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 5 | Ø10 | 2 | 873 / 15 / 67 | 900 | 1800 | 11.1 |
| | 6 | Ø10 | 2 | 51 / 884 / 67 | 900 | 1800 | 11.1 |
| | 7 | Ø10 | 4 | 300 | 300 | 1200 | 7.4 |
| | 8 | Ø10 | 2 | 350 | 350 | 700 | 4.3 |
| | 9 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 10 | Ø6 | 83 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 13612 | 30.2 |
| | | | | | | Total+10% | 120.8 |
| Pórtico 26 | 1 | Ø10 | 2 | 67 / 375 | 400 | 800 | 4.9 |
| | 2 | Ø10 | 2 | 51 / 384 | 400 | 800 | 4.9 |
| | 3 | Ø10 | 8 | 300 | 300 | 2400 | 14.8 |
| | 4 | Ø10 | 8 | 900 | 900 | 7200 | 44.4 |
| | 5 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 6 | Ø10 | 2 | 67 / 275 / 15 | 300 | 600 | 3.7 |
| | 7 | Ø10 | 2 | 51 / 284 / 67 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 2 | 200 | 200 | 400 | 2.5 |
| | 9 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 12 | Ø6 | 102 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 16728 | 37.1 |
| | | | | | | Total+10% | 134.3 |
| Pórtico 27 | 1 | Ø10 | 2 | 67 / 375 | 400 | 800 | 4.9 |
| | 2 | Ø10 | 2 | 51 / 384 | 400 | 800 | 4.9 |
| | 3 | Ø10 | 8 | 300 | 300 | 2400 | 14.8 |
| | 4 | Ø10 | 8 | 900 | 900 | 7200 | 44.4 |
| | 5 | Ø10 | 4 | 400 | 400 | 1600 | 9.9 |
| | 6 | Ø10 | 2 | 67 / 275 / 15 | 300 | 600 | 3.7 |
| | 7 | Ø10 | 2 | 51 / 284 / 67 | 300 | 600 | 3.7 |
| | 8 | Ø10 | 2 | 200 | 200 | 400 | 2.5 |
| | 9 | Ø16 | 1 | 350 | 350 | 350 | 5.5 |
| | 10 | Ø12 | 1 | 300 | 300 | 300 | 2.7 |
| | 11 | Ø10 | 2 | 500 | 500 | 1000 | 6.2 |
| | 12 | Ø6 | 102 | 20 / 20 / 20 / 20 / 20 / 20 / 20 / 20 | 164 | 16728 | 37.1 |
| | | | | | | Total+10% | 134.3 |

| | |
|---|---|
| Ø6 | 380.8 |
| Ø10 | 906.4 |
| Ø12 | 47.9 |
| Ø16 | 17.4 |
| Total | 1377.5 |

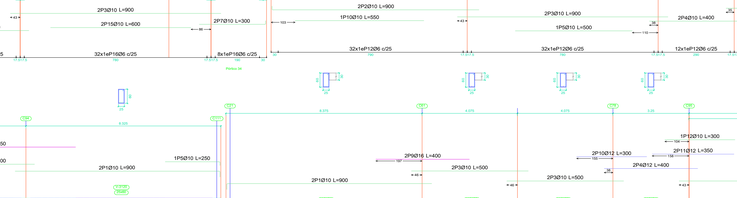
Pórtico 29



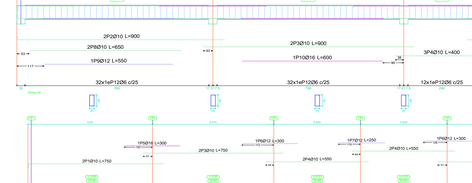

Pórtico 31



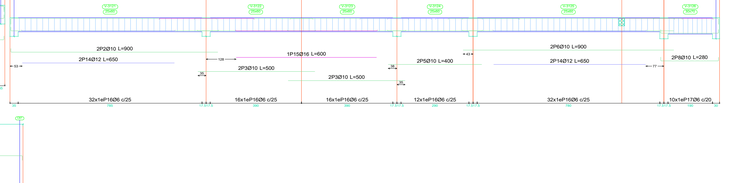

Pórtico 32



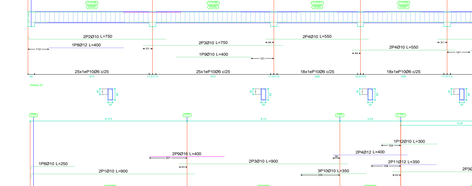

Pórtico 33



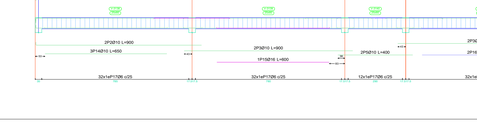

Pórtico 34



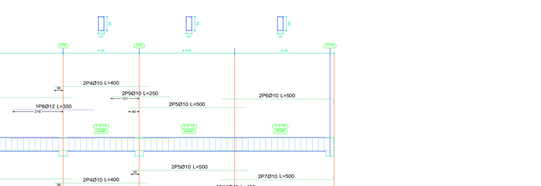

Pórtico 35




Pórtico 37




Pórtico 30




Pórtico 38



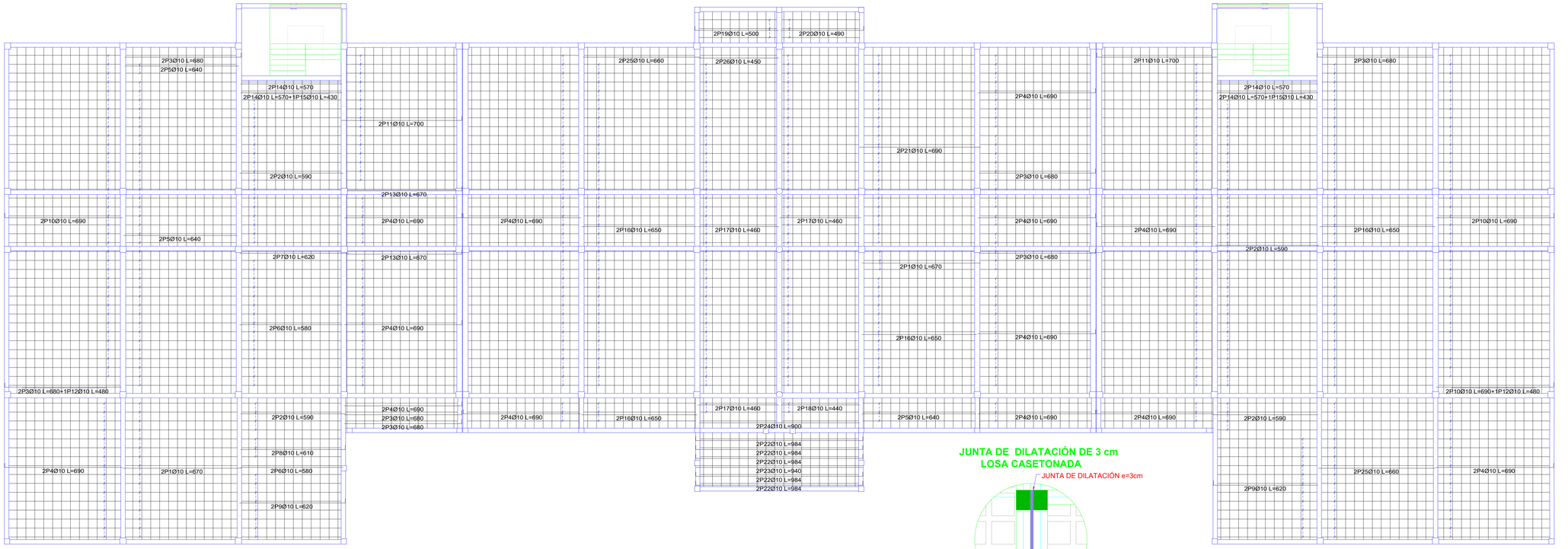

Pórtico 39




Pórtico 40

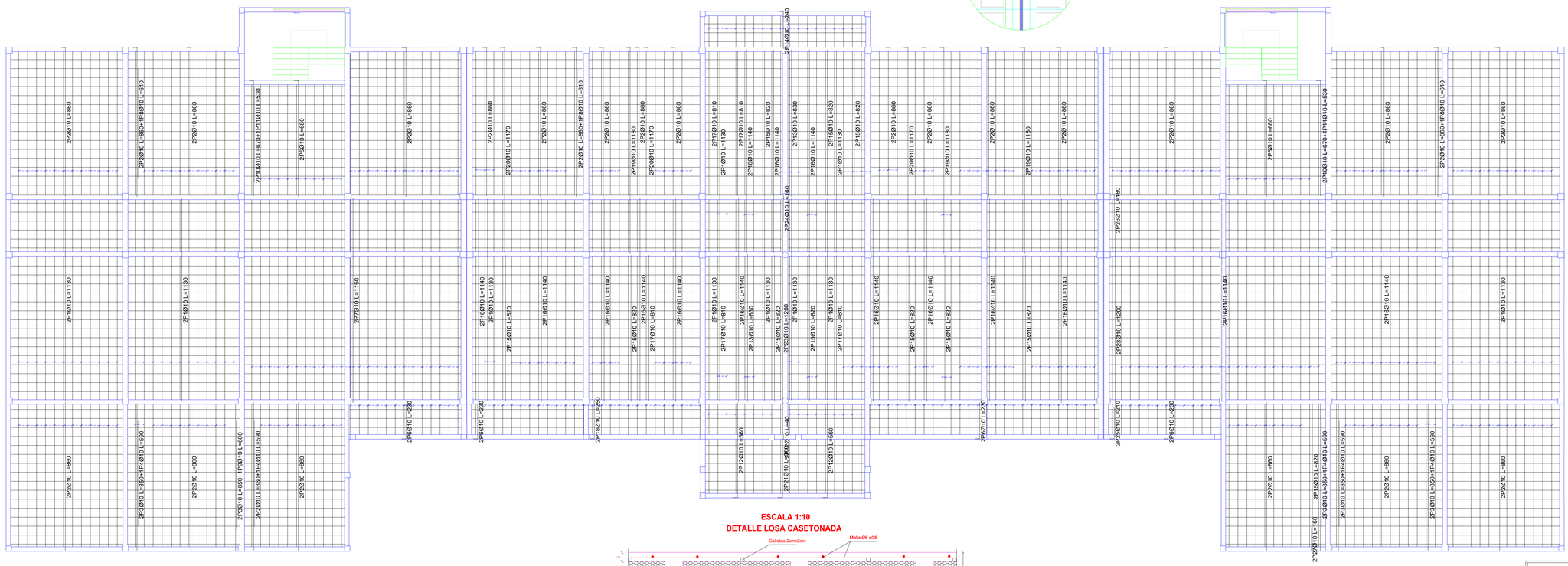



| | |
|---|---|
| UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO<br>FACULTAD DE CIENCIAS Y TECNOLOGIA | |
| MATERIA:<br>CIV502 PROYECTO DE INGENIERÍA CIVIL II | |
| PROYECTO:<br>DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO | |
| UNIVERSITARIO:<br>ALEX BRIAN ESPINOZA VELASQUEZ | ESCALA:<br>1:100 |
| CONTENIDO:<br>DETALLE Y ARMADO DE VIGAS CUBIERTA | FECHA:<br>NOVIEMBRE DE 2024 |
| | LAMINA:<br>2/2 |




PRIMER PISO
Armadura longitudinal inferior
Hormigón: H-21
AH-500
Escala: 1:100

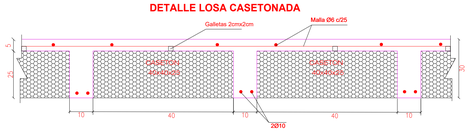
| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura longitudinal inferior | 1 | Ø10 | 38 | 670 | 25460 | 157.0 |
| | 2 | Ø10 | 116 | 590 | 68440 | 422.0 |
| | 3 | Ø10 | 38 | 680 | 25840 | 159.3 |
| | 4 | Ø10 | 324 | 690 | 223560 | 1378.3 |
| | 5 | Ø10 | 80 | 640 | 51200 | 315.7 |
| | 6 | Ø10 | 32 | 580 | 18560 | 114.4 |
| | 7 | Ø10 | 2 | 620 | 1240 | 7.6 |
| | 8 | Ø10 | 6 | 610 | 3660 | 22.6 |
| | 9 | Ø10 | 40 | 620 | 24800 | 152.9 |
| | 10 | Ø10 | 150 | 690 | 103500 | 638.1 |
| | 11 | Ø10 | 32 | 700 | 22400 | 138.1 |
| | 12 | Ø10 | 2 | 480 | 960 | 5.9 |
| | 13 | Ø10 | 4 | 670 | 2680 | 16.5 |
| | 14 | Ø10 | 8 | 570 | 4560 | 28.1 |
| | 15 | Ø10 | 2 | 430 | 860 | 5.3 |
| | 16 | Ø10 | 180 | 650 | 117000 | 721.4 |
| | 17 | Ø10 | 154 | 460 | 70840 | 436.8 |
| | 18 | Ø10 | 4 | 440 | 1760 | 10.9 |
| | 19 | Ø10 | 6 | 500 | 3000 | 18.5 |
| | 20 | Ø10 | 6 | 490 | 2940 | 18.1 |
| | 21 | Ø10 | 44 | 690 | 30360 | 187.2 |
| | 22 | Ø10 | 10 | 984 | 9840 | 60.7 |
| | 23 | Ø10 | 2 | 940 | 1880 | 11.6 |
| | 24 | Ø10 | 2 | 900 | 1800 | 11.1 |
| | 25 | Ø10 | 34 | 660 | 22440 | 138.4 |
| | 26 | Ø10 | 2 | 450 | 900 | 5.5 |
| | | | | | Total+10%: | 5700.2 |
| | | | | | Ø10: | 5700.2 |
| | | | | | Total: | 5700.2 |




PRIMER PISO
Armadura transversal inferior
Hormigón: H-21
AH-500
Escala: 1:100

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura transversal inferior | 1 | Ø10 | 92 | 1130 | 103960 | 641.0 |
| | 2 | Ø10 | 356 | 860 | 306160 | 1887.6 |
| | 3 | Ø10 | 14 | 850 | 11900 | 73.4 |
| | 4 | Ø10 | 7 | 590 | 4130 | 25.5 |
| | 5 | Ø10 | 40 | 680 | 27200 | 167.7 |
| | 6 | Ø10 | 104 | 230 | 23920 | 147.5 |
| | 7 | Ø10 | 48 | 1150 | 55200 | 340.3 |
| | 8 | Ø10 | 3 | 610 | 1830 | 11.3 |
| | 9 | Ø10 | 1 | 600 | 600 | 3.7 |
| | 10 | Ø10 | 4 | 670 | 2680 | 16.5 |
| | 11 | Ø10 | 2 | 530 | 1060 | 6.5 |
| | 12 | Ø10 | 34 | 560 | 19040 | 117.4 |
| | 13 | Ø10 | 10 | 830 | 8300 | 51.2 |
| | 14 | Ø10 | 36 | 240 | 8640 | 53.3 |
| | 15 | Ø10 | 32 | 820 | 26240 | 161.8 |
| | 16 | Ø10 | 170 | 1140 | 193800 | 1194.9 |
| | 17 | Ø10 | 12 | 810 | 9720 | 59.9 |
| | 18 | Ø10 | 50 | 250 | 12500 | 77.1 |
| | 19 | Ø10 | 8 | 1180 | 9440 | 58.2 |
| | 20 | Ø10 | 6 | 1170 | 7020 | 43.3 |
| | 21 | Ø10 | 2 | 360 | 720 | 4.4 |
| | 22 | Ø10 | 2 | 40 | 80 | 0.5 |
| | 23 | Ø10 | 4 | 1200 | 4800 | 29.6 |
| | 24 | Ø10 | 2 | 160 | 320 | 2.0 |
| | 25 | Ø10 | 2 | 210 | 420 | 2.6 |
| | 26 | Ø10 | 2 | 180 | 360 | 2.2 |
| | 27 | Ø10 | 2 | 160 | 320 | 2.0 |
| | | | | | Total+10%: | 5699.5 |
| | | | | | Ø10: | 5699.5 |
| | | | | | Total: | 5699.5 |

ESCALA 1:10
DETALLE LOSA CASETONADA




UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

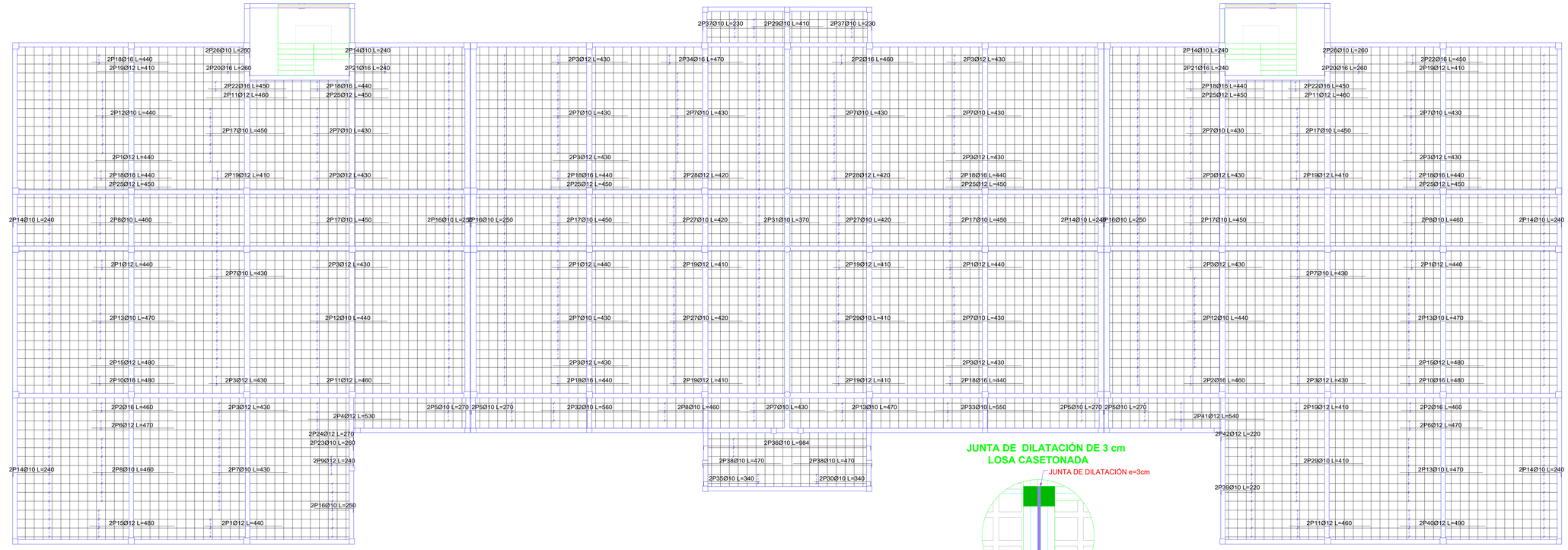
UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA:
1:100

FECHA:
NOVIEMBRE DE 2024

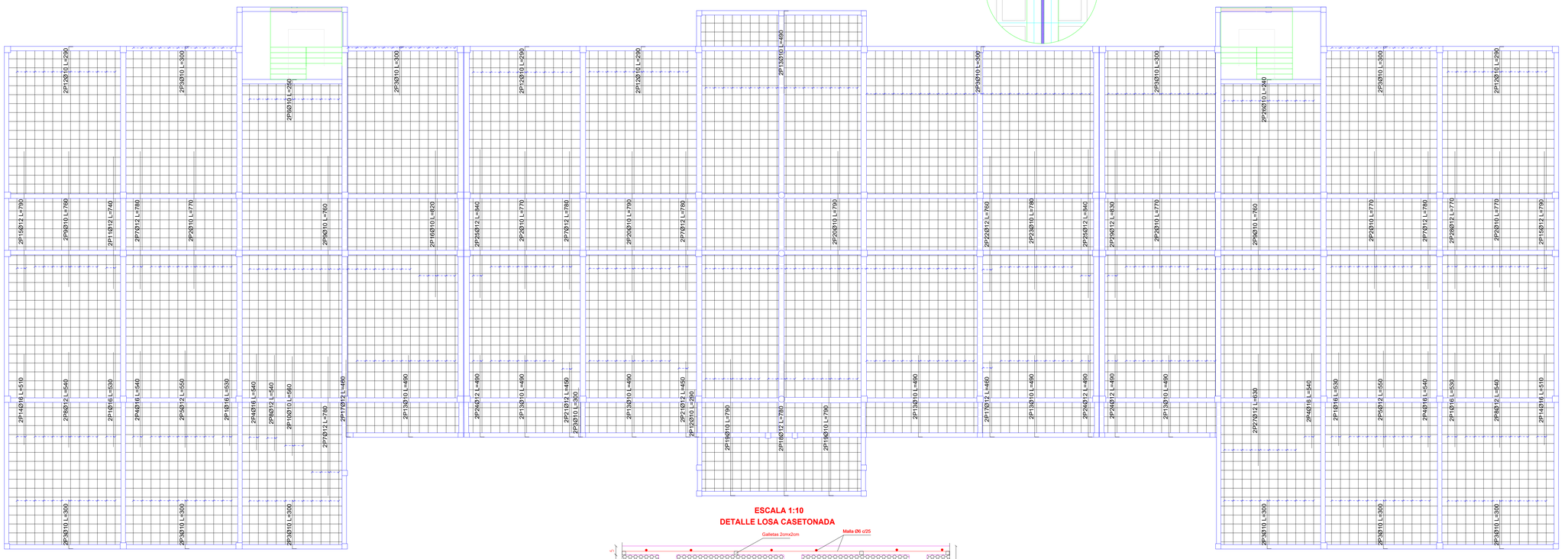
CONTENIDO:
DETALLE Y ARMADO DE LOSAS CASETONADAS
PRIMER PISO

LAMINA:
1/2




PRIMER PISO
Armadura longitudinal superior
Hormigón: H-21
AH-500
Escala: 1:100

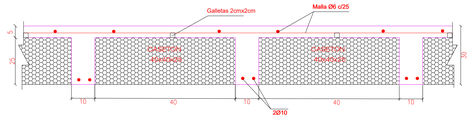
| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura longitudinal superior | 1 | Ø12 | 26 | 440 | 11440 | 101.6 |
| | 2 | Ø16 | 16 | 460 | 7360 | 116.2 |
| | 3 | Ø12 | 52 | 430 | 22360 | 198.5 |
| | 4 | Ø12 | 8 | 530 | 4240 | 37.6 |
| | 5 | Ø10 | 24 | 270 | 6480 | 40.0 |
| | 6 | Ø12 | 8 | 470 | 3760 | 33.4 |
| | 7 | Ø10 | 276 | 430 | 118680 | 731.7 |
| | 8 | Ø10 | 50 | 460 | 23000 | 141.8 |
| | 9 | Ø12 | 6 | 240 | 1440 | 12.8 |
| | 10 | Ø16 | 8 | 480 | 3840 | 60.6 |
| | 11 | Ø12 | 16 | 460 | 7360 | 65.3 |
| | 12 | Ø10 | 62 | 440 | 27280 | 168.2 |
| | 13 | Ø10 | 62 | 470 | 29140 | 179.7 |
| | 14 | Ø10 | 296 | 240 | 71040 | 438.0 |
| | 15 | Ø12 | 12 | 480 | 5760 | 51.1 |
| | 16 | Ø10 | 242 | 250 | 60500 | 373.0 |
| | 17 | Ø10 | 86 | 450 | 38700 | 238.6 |
| | 18 | Ø16 | 36 | 440 | 15840 | 250.0 |
| | 19 | Ø12 | 34 | 410 | 13940 | 123.8 |
| | 20 | Ø16 | 8 | 260 | 2080 | 32.8 |
| | 21 | Ø16 | 8 | 240 | 1920 | 30.3 |
| | 22 | Ø16 | 12 | 450 | 5400 | 85.2 |
| | 23 | Ø10 | 2 | 260 | 520 | 3.2 |
| | 24 | Ø12 | 2 | 270 | 540 | 4.8 |
| | 25 | Ø12 | 12 | 450 | 5400 | 47.9 |
| | 26 | Ø10 | 4 | 260 | 1040 | 6.4 |
| | 27 | Ø10 | 54 | 420 | 22680 | 139.8 |
| | 28 | Ø12 | 8 | 420 | 3360 | 29.8 |
| | 29 | Ø10 | 46 | 410 | 18860 | 116.3 |
| | 30 | Ø10 | 4 | 340 | 1360 | 8.4 |
| | 31 | Ø10 | 78 | 370 | 28120 | 173.4 |
| | 32 | Ø10 | 6 | 560 | 3360 | 20.7 |
| | 33 | Ø10 | 6 | 550 | 3300 | 20.3 |
| | 34 | Ø16 | 4 | 470 | 1880 | 29.7 |
| | 35 | Ø10 | 4 | 340 | 1360 | 8.4 |
| | 36 | Ø10 | 6 | 984 | 5904 | 36.4 |
| | 37 | Ø10 | 12 | 230 | 2760 | 17.0 |
| | 38 | Ø10 | 4 | 470 | 1880 | 11.6 |
| | 39 | Ø10 | 22 | 220 | 4840 | 29.8 |
| | 40 | Ø12 | 8 | 490 | 3920 | 34.8 |
| | 41 | Ø12 | 8 | 540 | 4320 | 38.4 |
| | 42 | Ø12 | 2 | 220 | 440 | 3.9 |
| | | | | Total+10%: | | 4720.3 |
| | | | | | Ø10: | 3192.9 |
| | | | | | Ø12: | 862.1 |
| | | | | | Ø16: | 665.3 |
| | | | | | Total: | 4720.3 |




PRIMER PISO
Armadura transversal superior
Hormigón: H-21
AH-500
Escala: 1:100

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura transversal superior | 1 | Ø16 | 16 | 530 | 8480 | 133.8 |
| | 2 | Ø10 | 68 | 770 | 67760 | 417.8 |
| | 3 | Ø10 | 294 | 300 | 88200 | 543.8 |
| | 4 | Ø16 | 16 | 540 | 8640 | 136.4 |
| | 5 | Ø12 | 32 | 550 | 17600 | 156.3 |
| | 6 | Ø10 | 22 | 250 | 5500 | 33.9 |
| | 7 | Ø12 | 24 | 780 | 18720 | 166.2 |
| | 8 | Ø12 | 36 | 540 | 19440 | 172.6 |
| | 9 | Ø10 | 82 | 760 | 62320 | 384.2 |
| | 10 | Ø10 | 6 | 560 | 3360 | 20.7 |
| | 11 | Ø12 | 4 | 740 | 2960 | 26.3 |
| | 12 | Ø10 | 68 | 290 | 28420 | 175.2 |
| | 13 | Ø10 | 162 | 490 | 79380 | 489.4 |
| | 14 | Ø16 | 8 | 510 | 4080 | 64.4 |
| | 15 | Ø12 | 8 | 790 | 6320 | 56.1 |
| | 16 | Ø10 | 10 | 820 | 8200 | 50.6 |
| | 17 | Ø12 | 6 | 460 | 2760 | 24.5 |
| | 18 | Ø12 | 8 | 780 | 6240 | 55.4 |
| | 19 | Ø10 | 28 | 790 | 22120 | 136.4 |
| | 20 | Ø10 | 82 | 790 | 64780 | 399.4 |
| | 21 | Ø12 | 8 | 450 | 3600 | 32.0 |
| | 22 | Ø12 | 4 | 760 | 3040 | 27.0 |
| | 23 | Ø10 | 18 | 780 | 14040 | 86.6 |
| | 24 | Ø12 | 12 | 490 | 5880 | 52.2 |
| | 25 | Ø12 | 8 | 840 | 6720 | 59.7 |
| | 26 | Ø10 | 22 | 240 | 5280 | 32.6 |
| | 27 | Ø12 | 18 | 630 | 11340 | 100.7 |
| | 28 | Ø12 | 4 | 770 | 3080 | 27.3 |
| | 29 | Ø12 | 4 | 830 | 3320 | 29.5 |
| | | | | Total+10%: | | 4500.1 |
| | | | | | Ø10: | 3047.6 |
| | | | | | Ø12: | 1084.4 |
| | | | | | Ø16: | 368.1 |
| | | | | | Total: | 4500.1 |

**ESCALA 1:10**
**DETALLE LOSA CASETONADA**




UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

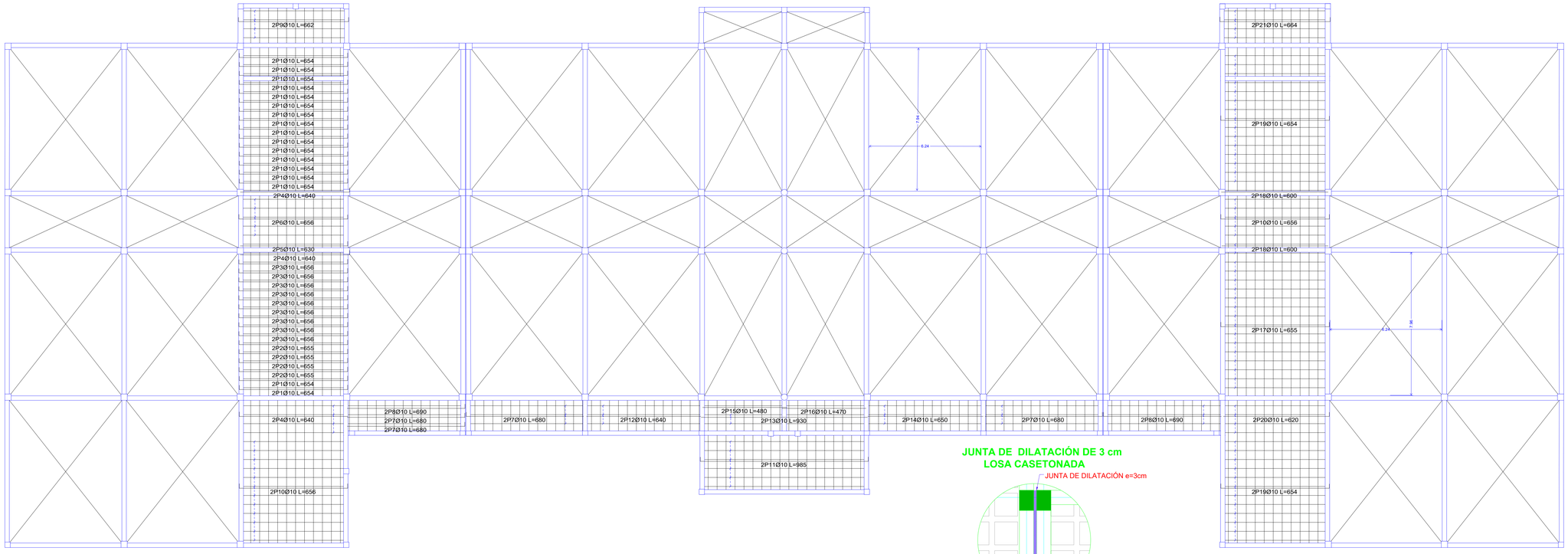
UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA:
1:100

LAMINA:
2/2

CONTENIDO:
DETALLE Y ARMADO DE LOSAS CASETONADAS
PRIMER PISO

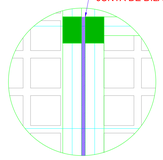
FECHA :
NOVIEMBRE DE 2024

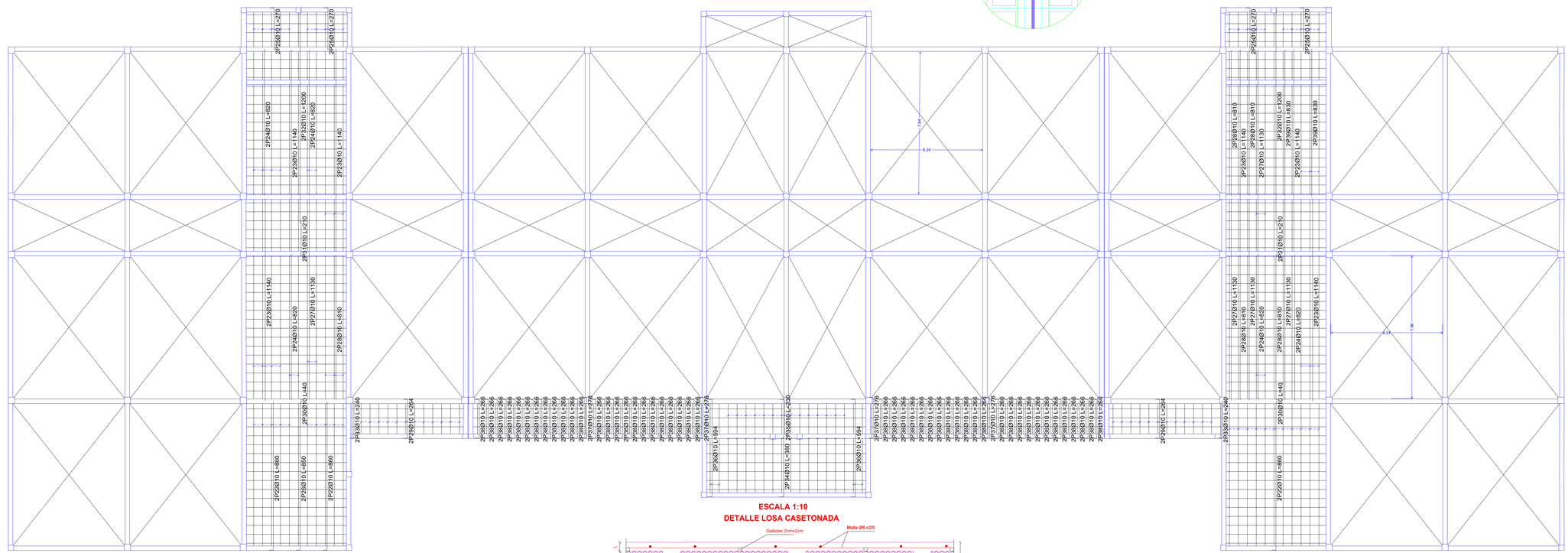



CUBIERTA
Armadura longitudinal inferior
Hormigón: H-21
AH-500
Escala: 1:100

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura longitudinal inferior | 1 | Ø10 | 34 | 654 | 22236 | 137.1 |
| | 2 | Ø10 | 8 | 655 | 5240 | 32.3 |
| | 3 | Ø10 | 18 | 656 | 11808 | 72.8 |
| | 4 | Ø10 | 12 | 640 | 7680 | 47.4 |
| | 5 | Ø10 | 2 | 630 | 1260 | 7.8 |
| | 6 | Ø10 | 10 | 656 | 6560 | 40.4 |
| | 7 | Ø10 | 16 | 680 | 10880 | 67.1 |
| | 8 | Ø10 | 8 | 690 | 5520 | 34.0 |
| | 9 | Ø10 | 8 | 662 | 5296 | 32.7 |
| | 10 | Ø10 | 34 | 656 | 22304 | 137.5 |
| | 11 | Ø10 | 12 | 985 | 11820 | 72.9 |
| | 12 | Ø10 | 6 | 640 | 3840 | 23.7 |
| | 13 | Ø10 | 4 | 930 | 3720 | 22.9 |
| | 14 | Ø10 | 6 | 650 | 3900 | 24.0 |
| | 15 | Ø10 | 2 | 480 | 960 | 5.9 |
| | 16 | Ø10 | 2 | 470 | 940 | 5.8 |
| | 17 | Ø10 | 30 | 655 | 19650 | 121.1 |
| | 18 | Ø10 | 6 | 600 | 3600 | 22.2 |
| | 19 | Ø10 | 54 | 654 | 35316 | 217.7 |
| | 20 | Ø10 | 8 | 620 | 4960 | 30.6 |
| | 21 | Ø10 | 8 | 664 | 5312 | 32.8 |
| | | | | | Total+10%: | 1307.6 |
| Armadura transversal inferior | 22 | Ø10 | 42 | 860 | 36120 | 222.7 |
| | 23 | Ø10 | 26 | 1140 | 29640 | 182.7 |
| | 24 | Ø10 | 22 | 820 | 18040 | 111.2 |
| | 25 | Ø10 | 40 | 270 | 10800 | 66.6 |
| | 26 | Ø10 | 2 | 850 | 1700 | 10.5 |
| | 27 | Ø10 | 14 | 1130 | 15820 | 97.5 |
| | 28 | Ø10 | 14 | 810 | 11340 | 69.9 |
| | 29 | Ø10 | 48 | 264 | 12672 | 78.1 |
| | 30 | Ø10 | 4 | 40 | 160 | 1.0 |
| | 31 | Ø10 | 4 | 210 | 840 | 5.2 |
| | 32 | Ø10 | 4 | 1200 | 4800 | 29.6 |
| | 33 | Ø10 | 4 | 240 | 960 | 5.9 |
| | 34 | Ø10 | 28 | 380 | 10640 | 65.6 |
| | 35 | Ø10 | 28 | 230 | 6440 | 39.7 |
| | 36 | Ø10 | 8 | 594 | 4752 | 29.3 |
| | 37 | Ø10 | 8 | 276 | 2208 | 13.6 |
| | 38 | Ø10 | 96 | 266 | 25536 | 157.4 |
| | 39 | Ø10 | 8 | 830 | 6640 | 40.9 |
| | | | | | Total+10%: | 1350.1 |
| | | | | | Ø10: | 2657.7 |
| | | | | | Total: | 2657.7 |

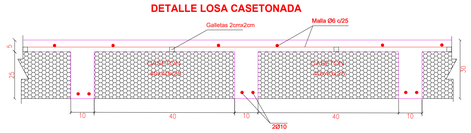
**JUNTA DE DILATACIÓN DE 3 cm**
**LOSA CASETONADA**




CUBIERTA
Armadura transversal inferior
Hormigón: H-21
AH-500
Escala: 1:100

**ESCALA 1:10**
**DETALLE LOSA CASETONADA**




UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
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MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

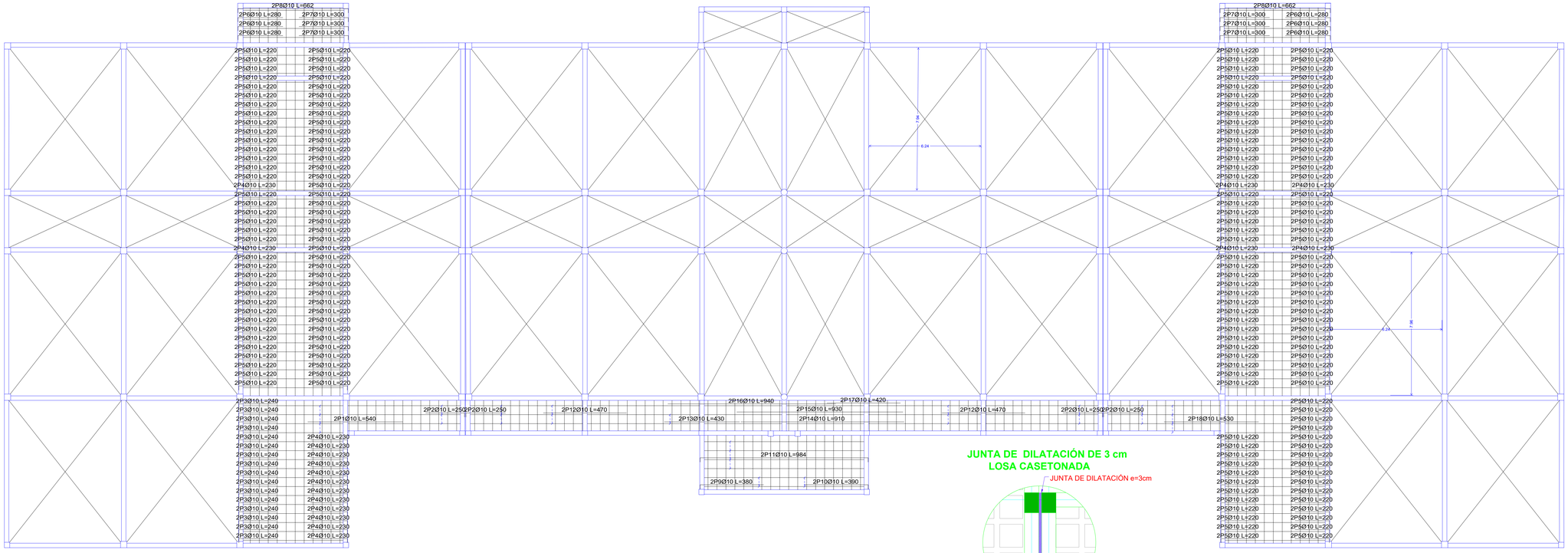
UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA:
1:100

LAMINA:
1/2

CONTENIDO:
DETALLE Y ARMADO DE LOSAS CASETONADAS
CUBIERTA

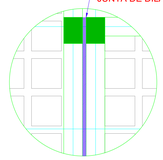
FECHA :
NOVIEMBRE DE 2024

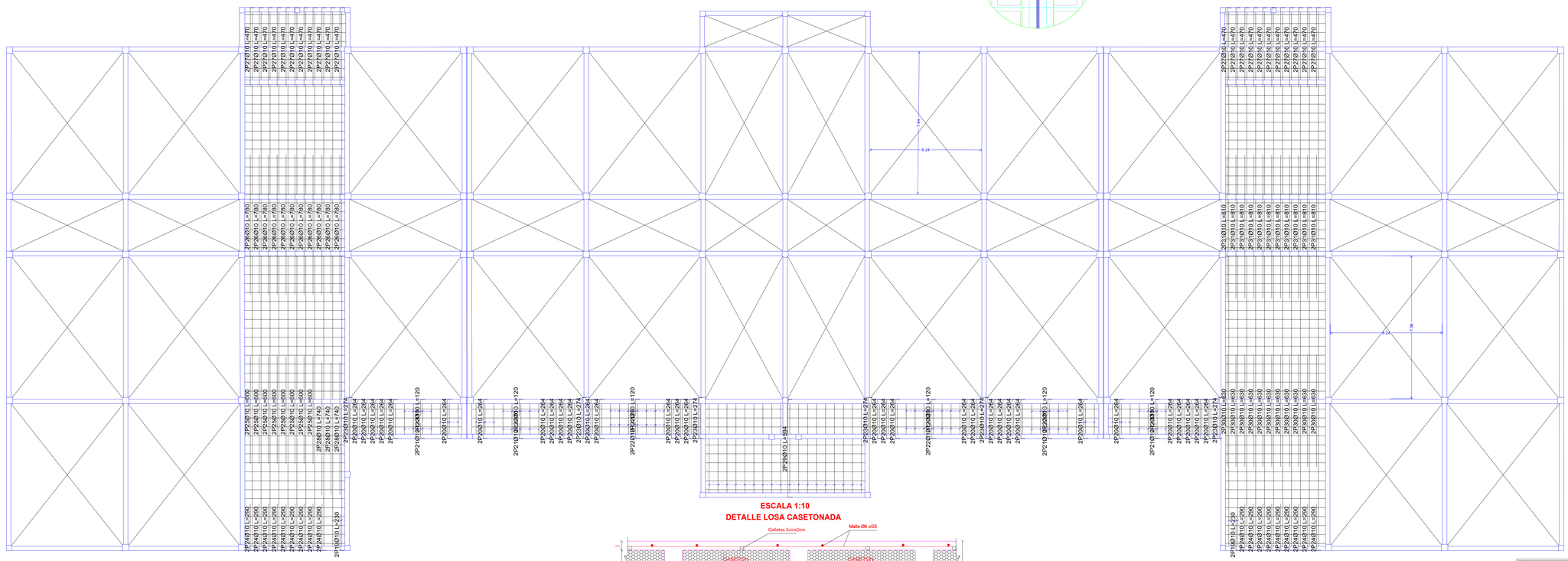



CUBIERTA
Armadura longitudinal superior
Hormigón: H-21
AH-500
Escala: 1:100

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura longitudinal superior | 1 | Ø10 | 8 | 540 | 4320 | 26.6 |
| | 2 | Ø10 | 24 | 250 | 6000 | 37.0 |
| | 3 | Ø10 | 32 | 240 | 7680 | 47.4 |
| | 4 | Ø10 | 36 | 230 | 8280 | 51.0 |
| | 5 | Ø10 | 348 | 220 | 76560 | 472.0 |
| | 6 | Ø10 | 12 | 280 | 3360 | 20.7 |
| | 7 | Ø10 | 12 | 300 | 3600 | 22.2 |
| | 8 | Ø10 | 4 | 662 | 2648 | 16.3 |
| | 9 | Ø10 | 4 | 380 | 1520 | 9.4 |
| | 10 | Ø10 | 4 | 390 | 1560 | 9.6 |
| | 11 | Ø10 | 8 | 984 | 7872 | 48.5 |
| | 12 | Ø10 | 12 | 470 | 5640 | 34.8 |
| | 13 | Ø10 | 4 | 430 | 1720 | 10.6 |
| | 14 | Ø10 | 2 | 910 | 1820 | 11.2 |
| | 15 | Ø10 | 2 | 930 | 1860 | 11.5 |
| | 16 | Ø10 | 2 | 940 | 1880 | 11.6 |
| | 17 | Ø10 | 2 | 420 | 840 | 5.2 |
| | 18 | Ø10 | 8 | 530 | 4240 | 26.1 |
| | | | | | Total+10% | 958.9 |
| Armadura transversal superior | 19 | Ø10 | 8 | 230 | 1840 | 11.3 |
| | 20 | Ø10 | 80 | 264 | 21120 | 130.2 |
| | 21 | Ø10 | 36 | 110 | 3960 | 24.4 |
| | 22 | Ø10 | 92 | 120 | 11040 | 68.1 |
| | 23 | Ø10 | 12 | 274 | 3288 | 20.3 |
| | 24 | Ø10 | 36 | 290 | 10440 | 64.4 |
| | 25 | Ø10 | 16 | 600 | 9600 | 59.2 |
| | 26 | Ø10 | 22 | 780 | 17160 | 105.8 |
| | 27 | Ø10 | 44 | 470 | 20680 | 127.5 |
| | 28 | Ø10 | 6 | 740 | 4440 | 27.4 |
| | 29 | Ø10 | 36 | 594 | 21384 | 131.8 |
| | 30 | Ø10 | 22 | 630 | 13860 | 85.5 |
| | 31 | Ø10 | 22 | 810 | 17820 | 109.9 |
| | | | | | Total+10% | 1002.4 |
| | | | | | Ø10 | 2021.3 |
| | | | | | Total: | 2021.3 |

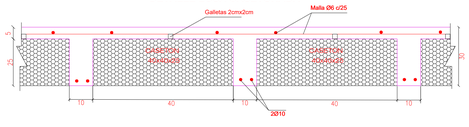
**JUNTA DE DILATACIÓN DE 3 cm**
**LOSA CASETONADA**




CUBIERTA
Armadura transversal superior
Hormigón: H-21
AH-500
Escala: 1:100

**ESCALA 1:10**
**DETALLE LOSA CASETONADA**




UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

ESCALA:
1:100

LAMINA:
2/2

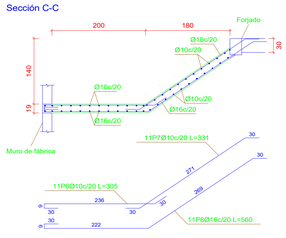
CONTENIDO:
DETALLE Y ARMADO DE LOSAS CASETONADAS
CUBIERTA

FECHA:
NOVIEMBRE DE 2024

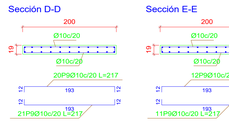
# Escalera 1 Escala 1:50

| Tramo 1 | | |
|---|---|---|
| Geometría | Ámbito | 2.000 m |
| | Espesor | 0.19 m |
| | Huella | 0.300 m |
| | Contrahuella | 0.200 m |
| | Desnivel que salva | 3.60 m |
| | Nº de escalones | 18 |
| | Planta final | PRIMER PISO |
| | Planta inicial | PLANTA BAJA |
| Cargas | Peso propio | 0.475 t/m2 |
| | Peldañeado (Realizado con ladrillo) | 0.133 t/m2 |
| | Solado | 0.100 t/m2 |
| | Barandillas | 0.200 t/m |
| | Sobrecarga de uso | 0.400 t/m2 |
| Materiales | Hormigón | |
| | Acero | |
| | Rec. geométrico | 3.0 cm |

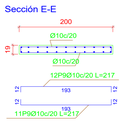
Sección C-C

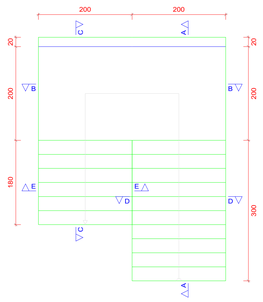



Sección D-D

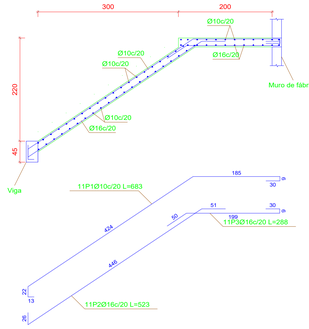



Sección E-E

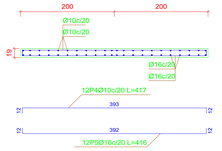



Sección A-A




Sección B-B

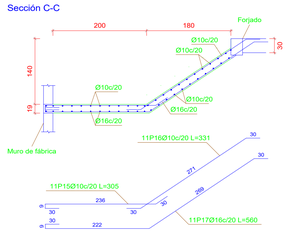



| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Escalera 1-Tramo 1 | 1 | Ø10 | 11 | 683 | 7513 | 29.6 |
| | 2 | Ø16 | 11 | 523 | 5753 | 90.8 |
| | 3 | Ø16 | 11 | 288 | 3168 | 50.0 |
| | 4 | Ø10 | 12 | 417 | 5004 | 19.7 |
| | 5 | Ø10 | 11 | 393 | 4323 | 17.0 |
| | 6 | Ø10 | 11 | 305 | 3355 | 13.2 |
| | 7 | Ø10 | 11 | 331 | 3641 | 14.4 |
| | 8 | Ø16 | 11 | 560 | 6160 | 97.2 |
| | 9 | Ø10 | 64 | 217 | 13888 | 54.8 |
| | | | | | Total+10% | 433.4 |
| Escalera 2-Tramo 1 | 10 | Ø10 | 11 | 683 | 7513 | 29.6 |
| | 11 | Ø16 | 11 | 523 | 5753 | 90.8 |
| | 12 | Ø16 | 11 | 288 | 3168 | 50.0 |
| | 13 | Ø10 | 12 | 417 | 5004 | 19.7 |
| | 14 | Ø16 | 12 | 416 | 4992 | 78.8 |
| | 15 | Ø10 | 11 | 305 | 3355 | 13.2 |
| | 16 | Ø10 | 11 | 331 | 3641 | 14.4 |
| | 17 | Ø16 | 11 | 560 | 6160 | 97.2 |
| | 18 | Ø10 | 64 | 217 | 13888 | 54.8 |
| | | | | | Total+10% | 493.4 |
| | | | | | Ø10: | 289.8 |
| | | | | | Ø16: | 997.0 |
| | | | | | Total: | 995.8 |

# Escalera 2 Escala 1:50

| Tramo 1 | | |
|---|---|---|
| Geometría | Ámbito | 2.000 m |
| | Espesor | 0.19 m |
| | Huella | 0.300 m |
| | Contrahuella | 0.200 m |
| | Desnivel que salva | 3.60 m |
| | Nº de escalones | 18 |
| | Planta final | PRIMER PISO |
| | Planta inicial | PLANTA BAJA |
| Cargas | Peso propio | 0.475 t/m2 |
| | Peldañeado (Realizado con ladrillo) | 0.133 t/m2 |
| | Solado | 0.100 t/m2 |
| | Barandillas | 0.200 t/m |
| | Sobrecarga de uso | 0.400 t/m2 |
| Materiales | Hormigón | |
| | Acero | |
| | Rec. geométrico | 3.0 cm |

Sección C-C

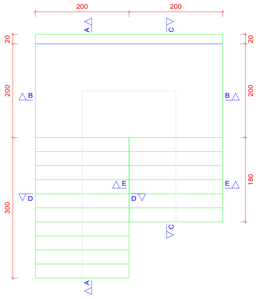



Sección D-D

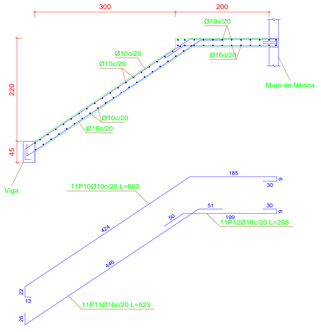



Sección E-E




Sección A-A




Sección B-B




Obra: MENSULAS CORTAS
Grupo: PRIMER PISO
Norma: NB 1225001
Escala: 1:25

Pórtico 46(C19) y Pórtico 40(C26)

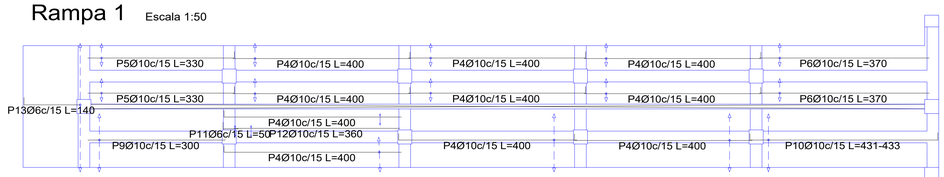



Pórtico 48(C20), Pórtico 50(C21), Pórtico 42(C25) y Pórtico 44(C24)

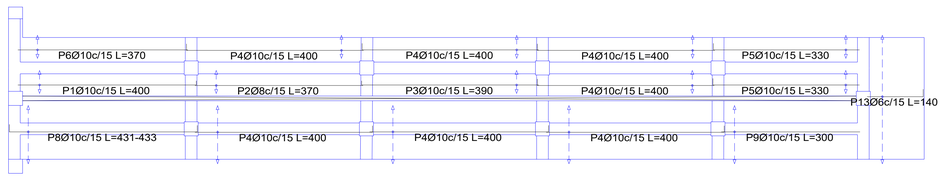



| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Pórtico 46(C19)-y Pórtico 40(C26) | 1 | Ø10 | 4 | 173 | 700 | 4.3 |
| | 2 | Ø6 | 4 | VAR. | 864 | 2.3 |
| | | | | | Total+10%: | 7.2 |
| | | | | | (x2): | 14.4 |
| Pórtico 48(C20)-yPortico 50(C21) | 3 | Ø10 | 4 | 173 | 700 | 4.3 |
| Portico 42(C25)-yPortico 44(C24) | 4 | Ø6 | 3 | VAR. | 864 | 2.3 |
| | | | | | Total+10%: | 7.2 |
| | | | | | (x4): | 28.8 |
| | | | | | Ø6: | 13.2 |
| | | | | | Ø10: | 25.8 |
| | | | | | Total: | 43.2 |

# Rampa 1 Escala 1:50



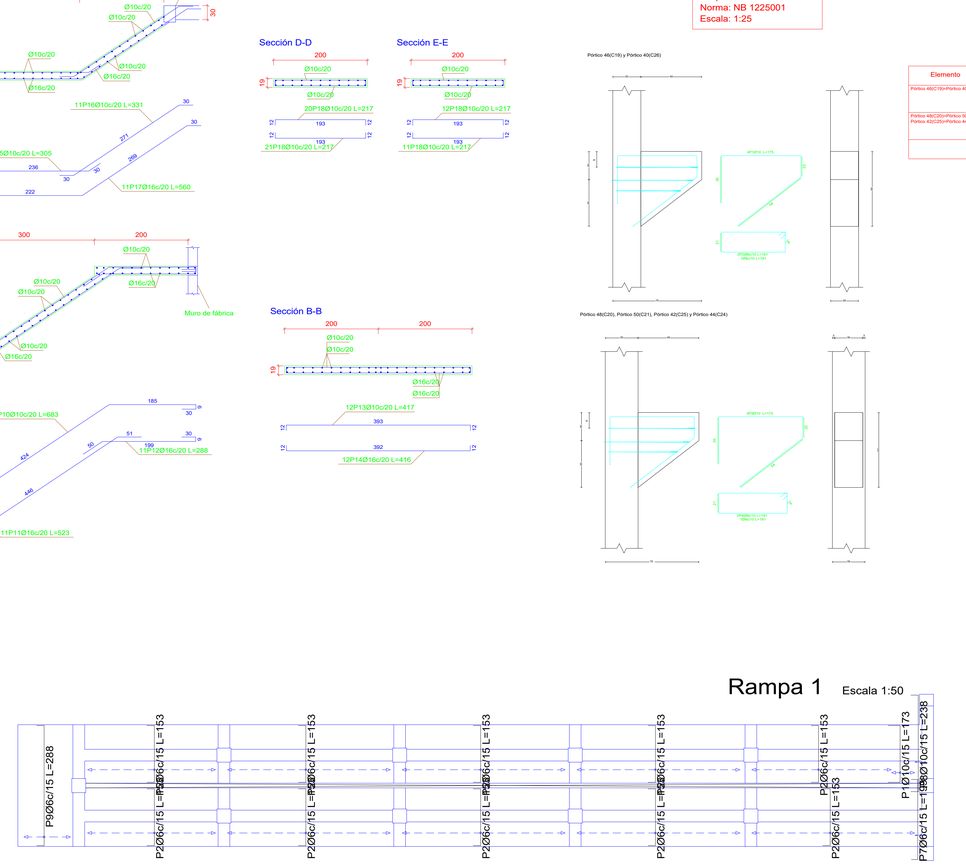

# Rampa 2 Escala 1:50



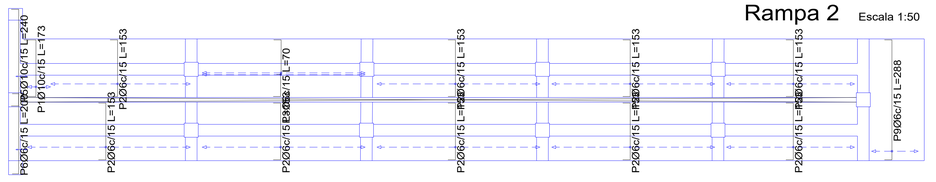

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura longitudinal inferior | 1 | Ø10 | 4 | 400 | 1600 | 9.9 |
| | 2 | Ø8 | 4 | 370 | 1480 | 5.8 |
| | 3 | Ø10 | 4 | 390 | 1560 | 9.6 |
| | 4 | Ø10 | 92 | 400 | 36800 | 226.9 |
| | 5 | Ø10 | 16 | 330 | 5280 | 32.6 |
| | 6 | Ø10 | 12 | 370 | 4440 | 27.4 |
| | 7 | Ø6 | 4 | 30 | 120 | 0.3 |
| | 8 | Ø10 | 9 | 433 | 3897 | 24.0 |
| | 9 | Ø10 | 18 | 300 | 5400 | 33.3 |
| | 10 | Ø10 | 9 | 433 | 3897 | 24.0 |
| | 11 | Ø6 | 2 | 50 | 100 | 0.2 |
| | 12 | Ø10 | 2 | 360 | 720 | 4.4 |
| | 13 | Ø6 | 38 | 140 | 5320 | 11.8 |
| | | | | | Total+10% | 451.2 |
| | | | | | Ø6: | 13.5 |
| | | | | | Ø8: | 6.4 |
| | | | | | Ø10: | 431.3 |
| | | | | | Total: | 451.2 |

| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura longitudinal superior | 1 | Ø8 | 8 | 200 | 1600 | 6.3 |
| | 2 | Ø6 | 4 | 190 | 760 | 1.7 |
| | 3 | Ø6 | 36 | 160 | 5760 | 12.8 |
| | 4 | Ø6 | 20 | 170 | 3400 | 7.5 |
| | 5 | Ø6 | 20 | 180 | 4680 | 10.4 |
| | 6 | Ø6 | 42 | 170 | 7140 | 15.8 |
| | 7 | Ø8 | 4 | 370 | 1480 | 5.8 |
| | 8 | Ø8 | 12 | 360 | 4320 | 17.0 |
| | 9 | Ø8 | 4 | 429 | 1716 | 6.8 |
| | 10 | Ø6 | 4 | 210 | 840 | 1.9 |
| | 11 | Ø6 | 2 | 56 | 112 | 0.2 |
| | 12 | Ø6 | 17 | 190 | 3230 | 7.2 |
| | 13 | Ø6 | 21 | 180 | 3780 | 8.4 |
| | 14 | Ø6 | 17 | 190 | 3230 | 7.2 |
| | 15 | Ø6 | 29 | 180 | 5220 | 11.6 |
| | 16 | Ø6 | 18 | 360 | 6480 | 25.6 |
| | 17 | Ø6 | 5 | 200 | 1000 | 2.2 |
| | 18 | Ø6 | 4 | 210 | 840 | 1.9 |
| | 19 | Ø6 | 12 | 190 | 2280 | 5.1 |
| | 20 | Ø6 | 4 | 210 | 840 | 1.9 |
| | 21 | Ø6 | 16 | 170 | 2720 | 6.0 |
| | 22 | Ø6 | 2 | 200 | 400 | 0.9 |
| | 23 | Ø6 | 2 | 56 | 112 | 0.2 |
| | 24 | Ø8 | 20 | 180 | 3600 | 14.2 |
| | 25 | Ø8 | 18 | 180 | 3240 | 12.8 |
| | | | | | Total+10% | 210.5 |
| | | | | | Ø6: | 113.1 |
| | | | | | Ø8: | 97.4 |
| | | | | | Total: | 210.5 |

# Rampa 1 Escala 1:50

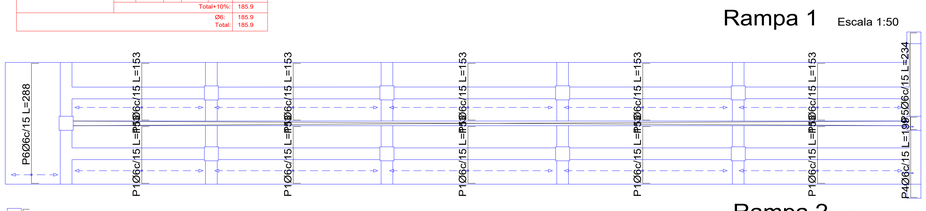



# Rampa 2 Escala 1:50




| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura transversal superior | 1 | Ø6 | 460 | 153 | 70380 | 156.2 |
| | 2 | Ø6 | 2 | 240 | 480 | 1.1 |
| | 3 | Ø6 | 2 | 200 | 400 | 0.9 |
| | 4 | Ø6 | 2 | 199 | 398 | 0.9 |
| | 5 | Ø6 | 2 | 234 | 468 | 1.0 |
| | 6 | Ø6 | 14 | 288 | 4032 | 8.9 |
| | | | | | Total+10% | 185.9 |
| | | | | | Ø6: | 185.9 |
| | | | | | Total: | 185.9 |

# Rampa 1 Escala 1:50

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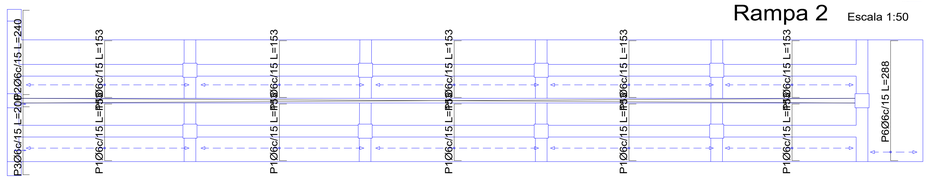
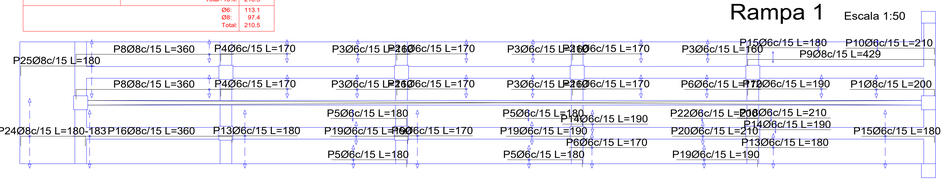
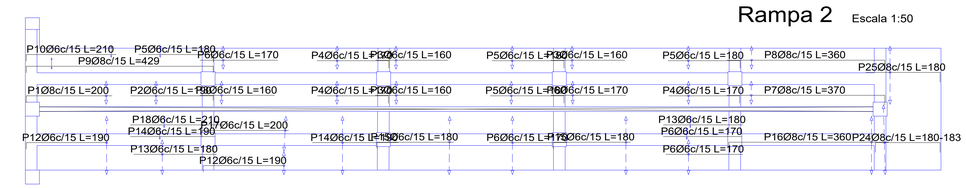



# Rampa 1 Escala 1:50




# Rampa 2 Escala 1:50




| Elemento | Pos. | Diám. | No. | Long. (cm) | Total (cm) | AH-500 (kg) |
|---|---|---|---|---|---|---|
| Armadura transversal inferior | 1 | Ø10 | 8 | 173 | 1384 | 8.5 |
| | 2 | Ø6 | 428 | 153 | 65484 | 145.3 |
| | 3 | Ø6 | 24 | 70 | 1680 | 3.7 |
| | 4 | Ø6 | 24 | 100 | 2400 | 5.3 |
| | 5 | Ø10 | 2 | 240 | 480 | 3.0 |
| | 6 | Ø6 | 2 | 200 | 400 | 0.9 |
| | 7 | Ø6 | 2 | 199 | 398 | 0.9 |
| | 8 | Ø10 | 2 | 238 | 476 | 2.9 |
| | 9 | Ø6 | 14 | 288 | 4032 | 8.9 |
| | | | | | Total+10% | 197.3 |
| | | | | | Ø6: | 181.5 |
| | | | | | Ø10: | 15.8 |
| | | | | | Total: | 197.3 |

UNIVERSIDAD AUTONOMA JUAN MISAEL SARACHO
FACULTAD DE CIENCIAS Y TECNOLOGIA

MATERIA:
CIV502 PROYECTO DE INGENIERÍA CIVIL II

PROYECTO:
DISEÑO ESTRUCTURAL UNIDAD EDUCATIVA FERROVIARIO

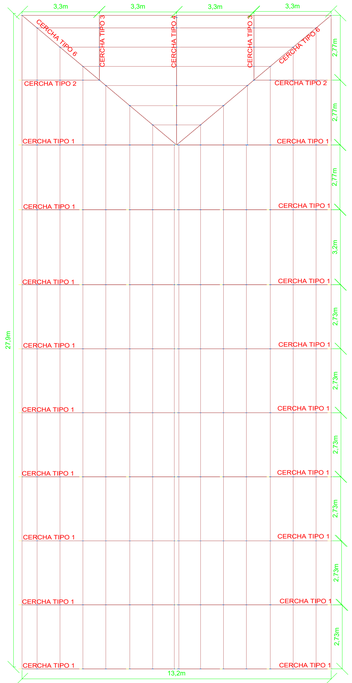
UNIVERSITARIO:
ALEX BRIAN ESPINOZA VELASQUEZ

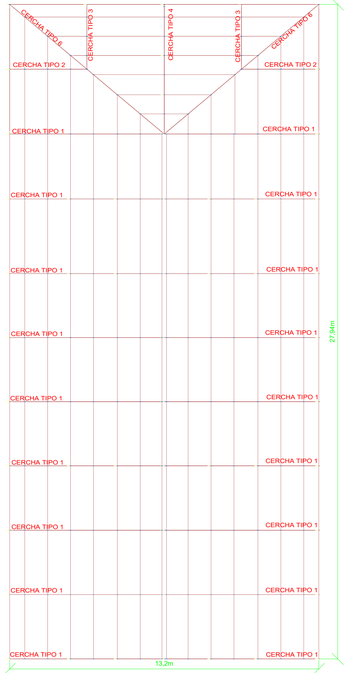
ESCALA:
INDICADAS

LAMINA:
1/1

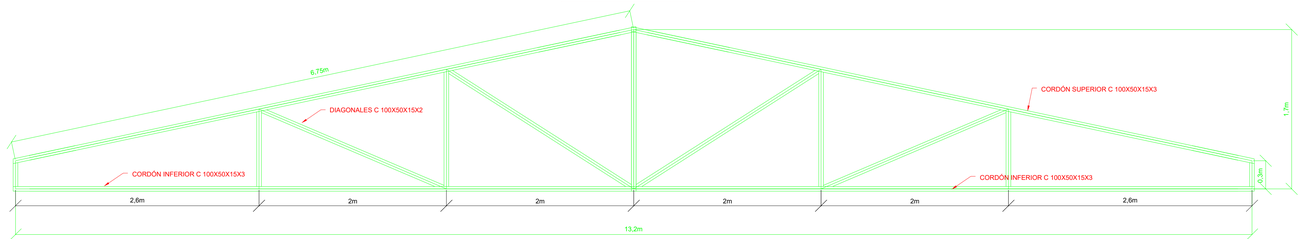
CONTENIDO:
DETALLE Y ARMADO DE ESCALERAS, RAMPAS Y MÉNSULAS CORTAS

FECHA :
NOVIEMBRE DE 2024



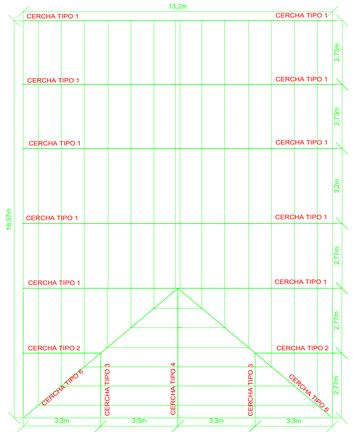


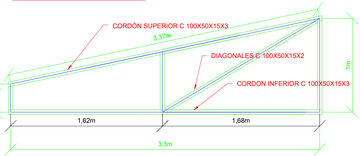

CERCHA TIPO 1
Perfiles
Escala: 1:25

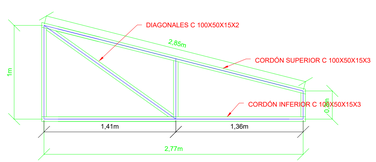



CERCHA TIPO 2
Perfiles
Escala: 1:25

CERCHA TIPO 3
Perfiles
Escala: 1:25

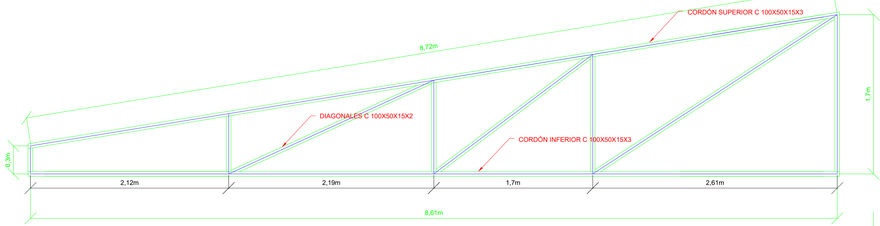


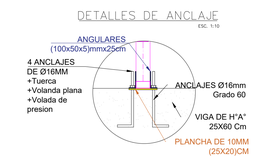



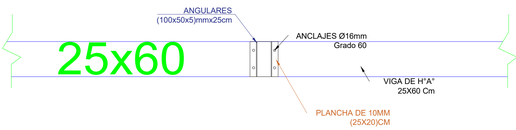




| Elemento | Perfil |
|---|---|
| Cordón Superior | C 100X50X15X3 |
| Diagonales | C 100X50X15X2 |
| Cordón Inferior | C 100X50X15X3 |
| Correa | C 100X50X15X2 |

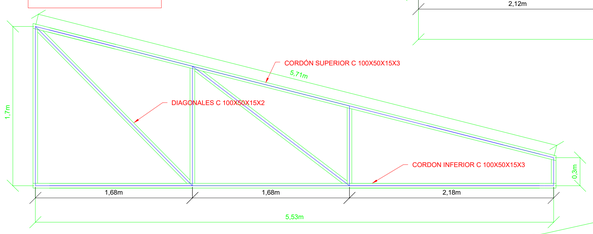
CERCHA TIPO 6
Perfiles
Escala: 1:25



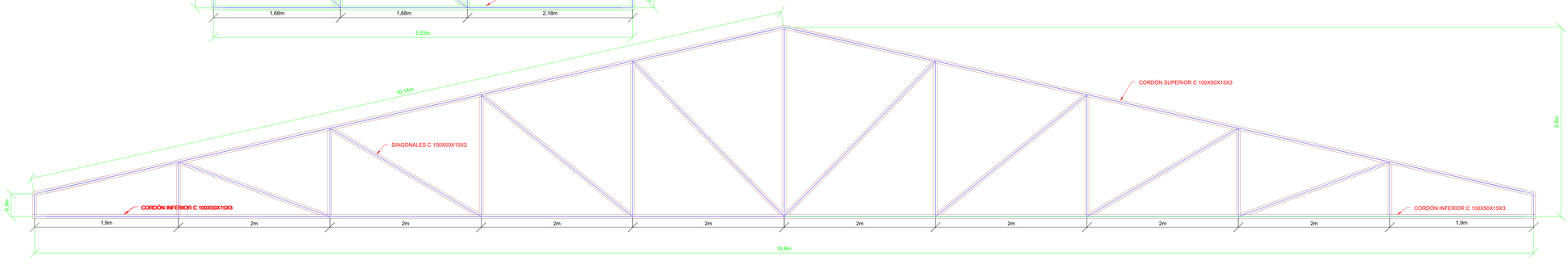




CERCHA TIPO 4
Perfiles
Escala: 1:25




CERCHA TIPO 5
Perfiles
Escala: 1:25







| | |
|---|---|
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| CONTENIDO:<br>CUBIERTA METÁLICA | FECHA :<br>NOVIEMBRE DE 2024 |

LAMINA:
1/1