# REPÚBLICA DEL PARAGUAY

## MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES

# LLAMADO MOPC N°  / 2012

**AD REFERENDUM A LA REPROGRAMACION PRESUPUESTARIA**

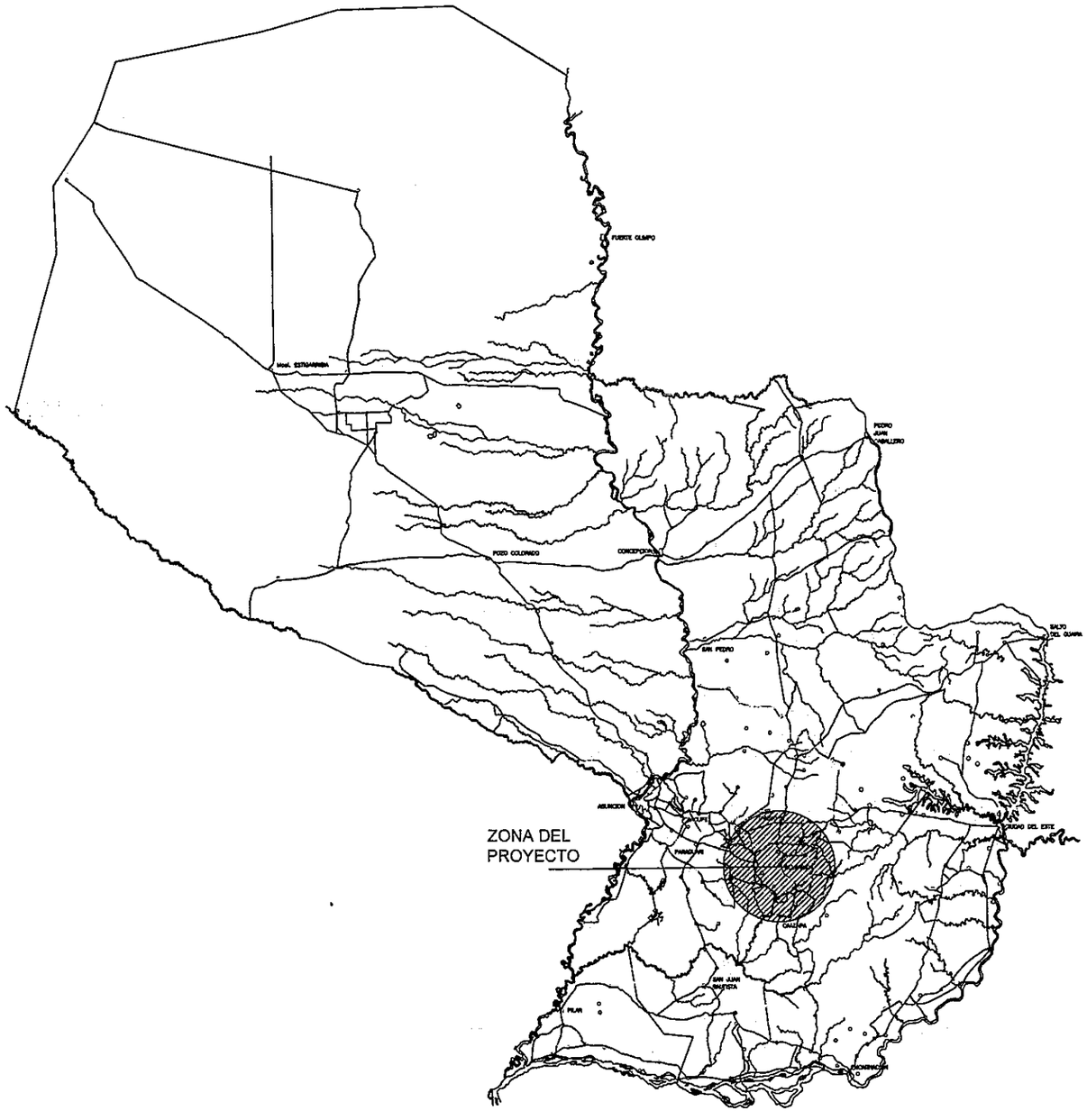
**LICITACIÓN PÚBLICA NACIONAL DE FIRMAS CONSTRUCTORAS ESPECIALIZADAS EN OBRAS VIALES PARA LA CONSTRUCCION DE PAVIMENTO TIPO EMPEDRADO EN VARIOS TRAMOS CAMINEROS EN LA REGION ORIENTAL**

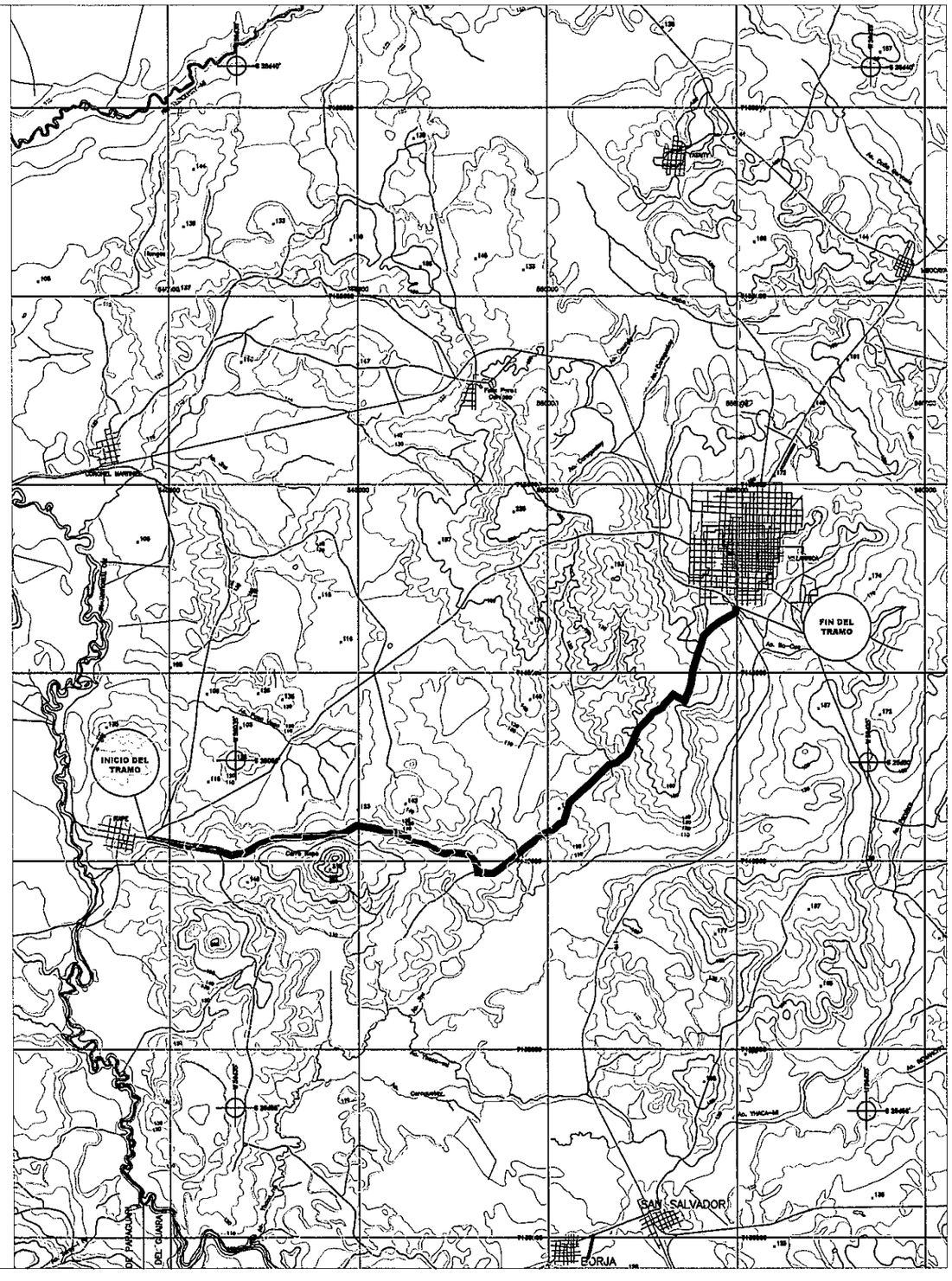
# ANEXO
# PLANOS DE OBRA

OBRA 1: VILLARRICA - ITAPÉ

**AÑO 2012**

**ASUNCIÓN, PARAGUAY**




| PARAMETROS TECNICOS | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Montiel
Representante Legal
Consorcio
CONSULPAR S.A.

CONSORCIO
CONSULPAR S.A.

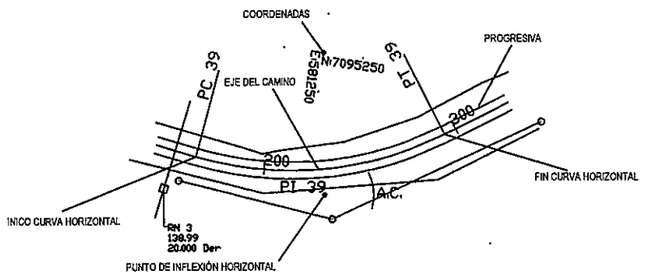
REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS
PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS
TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

PLANTA UBICACION

## CONVENCIONES DE PLANIMETRÍA




CATASTRO:

INDICADOR DE KILOMETRAJE

- CALLES O CAMINOS EXISTENTES
- ALAMBRADA
- CAUCES O CURSOS DE AGUA
- ALCANTARILLA TIPO
- SENTIDO DE ESCURRIEMIENTO

ABREVIATURAS:

| | |
|---|---|
| PI | PUNTO DE INFLEXIÓN HORIZONTAL |
| PC | PUNTO DE INICIO DE CURVA HORIZONTAL |
| PT | PUNTO DE TERMINACIÓN DE CURVA HORIZONTAL |
| TE | PUNTO DE INICIO DE CURVA DE TRANSICIÓN(ESPIRAL) |
| EC | PUNTO DE FIN DE ESPIRAL E INICIO DE CURVA CIRCULAR |
| CE | PUNTO DE TERMINACIÓN DE CURVA CIRCULAR E INICIO DE ESPIRAL |
| ET | PUNTO DE FIN DE CURVA DE TRANSICIÓN(ESPIRAL) |
| PL | PUNTO DE LINEA |
| Prog. | PROGRESIVA |
| A.C. | ANGULO DE DEFLEXIÓN |
| R | RADIO DE CURVA HORIZONTAL |
| D | DESARROLLO DE CURVA |
| T | TANGENTE |
| E | EXTERNA |
| d.p.m | DEFLEXIÓN POR METRO |
| P | PERALTE |
| Sa | SOBREANCHO |
| RN | REFERENCIA DE NIVEL |
| A.L | AMBOS LADOS |
| L.I | LADO IZQUIERDO |
| L.D | LADO DERECHO |

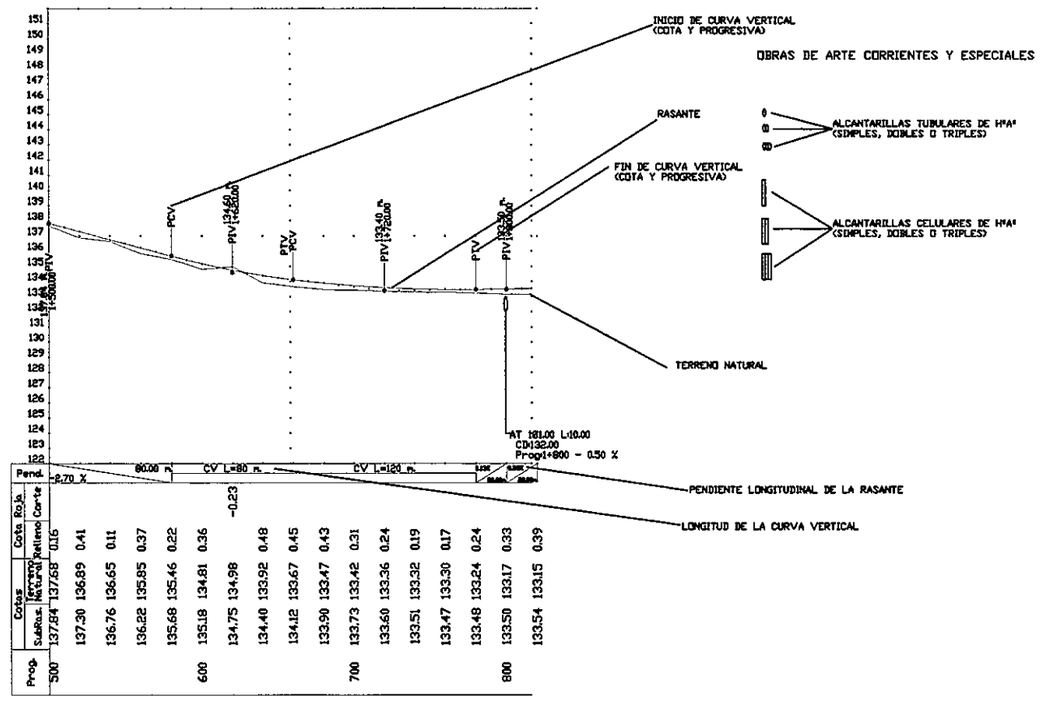
## CONVENCIONES DE ALTIMETRÍA

PERFIL LONGITUDINAL DEL PROYECTO

CUADRO DE RN

CUADRO DE DATOS DE REFERENCIAS DE NIVEL

| RN | Nº | Progresiva | Dist. al Eje | Cota | Este | Norte |
|---|---|---|---|---|---|---|
| RN | 3 | 1+500 | 20.00 D | 138.987 | 564697.01 | 7101608.65 |
| RN | 4 | 2+000 | 20.00 D | 138.083 | 565137.51 | 7101367.68 |
| RN | 5 | 2+500 | 20.00 D | 128.668 | 565633.60 | 7101287.93 |
| RN | 6 | 3+000 | 20.00 D | 124.553 | 566103.17 | 7101155.91 |




| Prog. | Cotas Subras. | Cotas Terreno | Cota Rojo Corte | Cota Rojo Relleno |
|---|---|---|---|---|
| 500 | 137.84 | 137.68 | | 0.16 |
| | 137.30 | 136.89 | | 0.41 |
| | 136.76 | 136.65 | | 0.11 |
| | 136.22 | 135.85 | | 0.37 |
| | 135.68 | 135.46 | | 0.22 |
| 600 | 135.18 | 134.81 | | 0.36 |
| | 134.75 | 134.98 | -0.23 | |
| | 134.40 | 133.92 | | 0.48 |
| | 134.12 | 133.67 | | 0.45 |
| | 133.90 | 133.47 | | 0.43 |
| 700 | 133.73 | 133.42 | | 0.31 |
| | 133.60 | 133.36 | | 0.24 |
| | 133.51 | 133.32 | | 0.19 |
| | 133.47 | 133.30 | | 0.17 |
| | 133.48 | 133.24 | | 0.24 |
| 800 | 133.50 | 133.17 | | 0.33 |
| | 133.54 | 133.15 | | 0.39 |

ESCALA HORIZONTAL

ABREVIATURAS:

| | |
|---|---|
| PIV | PUNTO DE INFLEXIÓN VERTICAL |
| PCV | PUNTO DE INICIO DE CURVA VERTICAL |
| PTV | PUNTO DE TERMINACIÓN DE CURVA VERTICAL |
| L | LONGITUD DE CURVA VERTICAL |
| e | ORDENADA MAXIMA DE LA CURVA VERTICAL |
| AT HºAº | ALCANTARILLA TUVULAR DE HORMIGÓN ARMADO |
| AC HºAº | ALCANTARILLA CELULAR DE HORMIGON ARMADO |
| CD | COTA DE DESAGUE ALCANTARILLA |
| I/D - D/I | SENTIDO DE ESCURRIMIENTO (IZQUIERDA-DERECHA O DERECHA-IZQUIERDA) |
| i | PENDIENTE LONGITUDINAL DE LA ALCANTARILLA |
| Long | LONGITUD DE AICANTARILLAS |
| NAM | NIVEL DE AGUAS MAXIMAS(OBSERVADO) |
| A.L | AMBOS LADOS |
| L.I | LADO IZQUIERDO |
| L.D | LADO DERECHO |

### PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 Km/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Monzier C.
Director Técnico
CONSULPAR S.A.

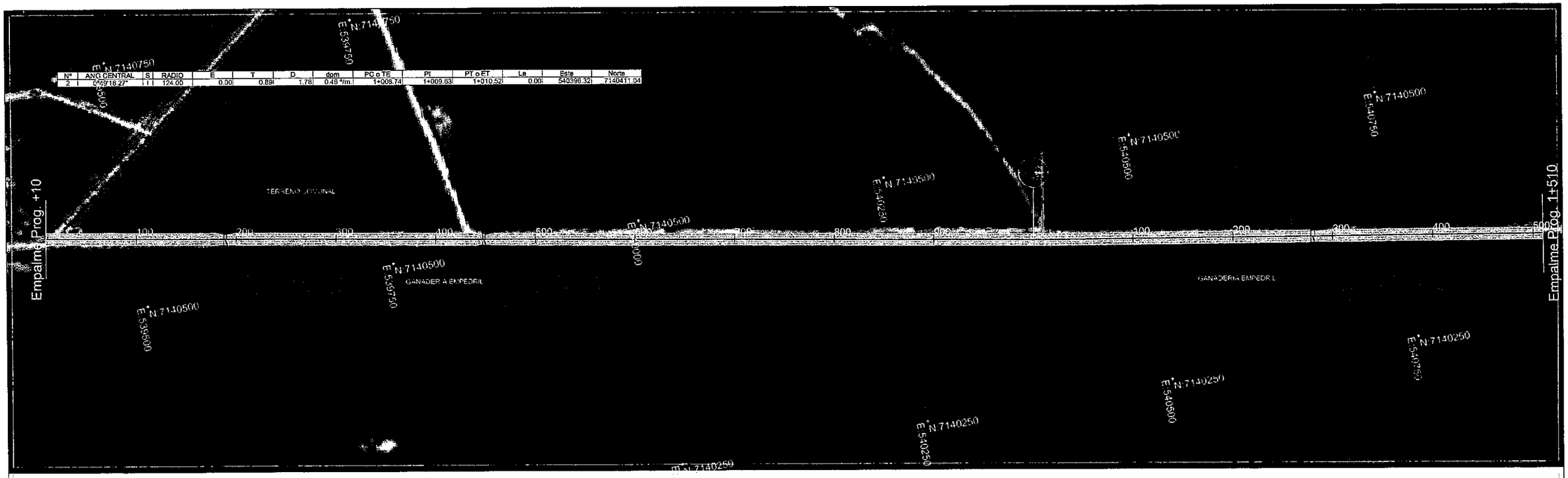
CONSORCIO
CONSULPAR S.A. - [illegible] S.A.

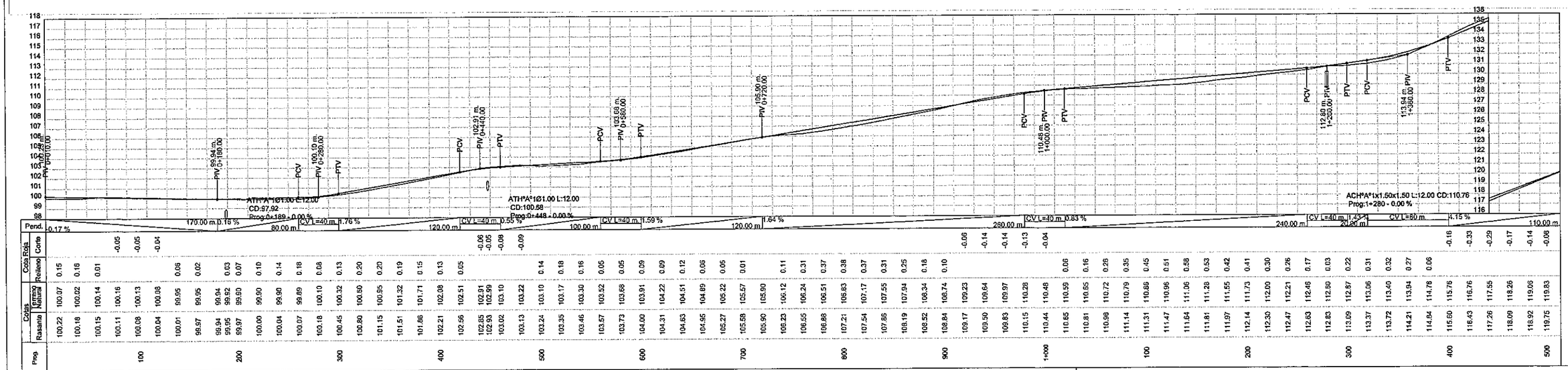
REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

CONVENCIONES Y ABREVIATURAS




## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
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CONSORCIO
CONSULPAR S.A. · GEOLATINA S.A.

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TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA N° |
|---|---|---|
| Prog: 0+010 - 1+510 | H = 1:2000 V = 1:200 | 1 |

3 tres

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 10°40'41.00" | D | 124.00 | 0.54 | 11.59 | 23.11 | 0.46 °/m. | 1+864.47 | 1+876.05 | 1+887.57 | 0.00 | 541251.62 | 7140272.67 |
| 4 | 33°31'59.91" | I | 124.00 | 5.51 | 37.36 | 72.57 | 0.46 °/m. | 2+223.35 | 2+260.71 | 2+295.93 | 0.00 | 541613.44 | 7140141.92 |
| 5 | 13°25'5.39" | D | 124.00 | 0.85 | 14.59 | 29.04 | 0.46 °/m. | 2+413.62 | 2+428.21 | 2+442.66 | 0.00 | 541778.28 | 7140181.99 |
| 6 | 32°13'24.74" | I | 400.00 | 16.35 | 115.54 | 224.96 | 0.14 °/m. | 2+509.74 | 2+625.29 | 2+734.70 | 0.00 | 541975.49 | 7140182.84 |
| 7 | 0°25'37.52" | D | 124.00 | 0.00 | 0.46 | 0.92 | 0.46 °/m. | 2+861.91 | 2+862.37 | 2+862.83 | 0.00 | 542180.68 | 7140313.41 |

Pend.: CV L=40 | 3.30 % | 298.57 m. | CV L=80 m. | -1.59 % | 61.43 m. | CV L=40 m. | 0.08 % | 222.83 m. | CV L=80 m. | -3.82 % | 157.17 m. | CV L=40 m. | -4.43 % | 80.00 m. | CV L=80 m. | -0.89 % | 240.00 m. | -0.94 % | 90.00 m.

| Prog. | Cota Roja Corte | Cota Roja Relleno | Cotas Terreno Natural | Cotas Rasante |
|---|---|---|---|---|
| | -0.04 | | 120.58 | 120.54 |
| | -0.07 | | 121.31 | 121.24 |
| | 0.00 | | 121.90 | 121.90 |
| | | 0.12 | 122.44 | 122.56 |
| 600 | | 0.37 | 122.85 | 123.22 |
| | | 0.56 | 123.32 | 123.88 |
| | | 0.68 | 123.86 | 124.54 |
| | | 0.63 | 124.57 | 125.20 |
| | | 1.62 | 124.24 | 125.86 |
| 700 | | 0.53 | 125.98 | 126.51 |
| | | 0.40 | 126.77 | 127.17 |
| | | 0.31 | 127.52 | 127.83 |
| | | 0.21 | 128.28 | 128.49 |
| | | 0.32 | 128.83 | 129.15 |
| 800 | | 0.40 | 129.41 | 129.81 |
| | | 0.55 | 129.92 | 130.47 |
| | | 0.67 | 130.46 | 131.13 |
| | | 0.69 | 130.96 | 131.65 |
| | | 0.52 | 131.41 | 131.93 |
| 900 | | 0.42 | 131.54 | 131.96 |
| | | 0.16 | 131.58 | 131.74 |
| | | 0.04 | 131.39 | 131.43 |
| | -0.03 | | 131.14 | 131.11 |
| | -0.05 | | 130.84 | 130.79 |
| 2+000 | | 0.08 | 130.47 | 130.55 |
| | | 0.28 | 130.21 | 130.49 |
| | | 0.43 | 130.07 | 130.50 |
| | | 0.49 | 130.03 | 130.52 |
| | | 0.55 | 129.99 | 130.54 |
| 100 | | 0.57 | 129.98 | 130.55 |
| | | 0.53 | 130.04 | 130.57 |
| | | 0.48 | 130.11 | 130.59 |
| | | 0.42 | 130.16 | 130.61 |
| | | 0.41 | 130.21 | 130.62 |
| 200 | | 0.35 | 130.29 | 130.64 |
| | | 0.35 | 130.31 | 130.66 |
| | | 0.34 | 130.33 | 130.67 |
| | | 0.33 | 130.29 | 130.62 |
| | | 0.62 | 129.75 | 130.37 |
| 300 | | 0.82 | 129.11 | 129.93 |
| | | 0.81 | 128.48 | 129.29 |
| | | 0.73 | 127.80 | 128.53 |
| | | 0.60 | 127.16 | 127.76 |
| | | 0.50 | 126.50 | 127.00 |
| 400 | | 0.25 | 125.99 | 126.24 |
| | | 0.10 | 125.37 | 125.47 |
| | | 0.00 | 124.71 | 124.71 |
| | -0.10 | | 124.05 | 123.95 |
| | -0.08 | | 123.26 | 123.18 |
| 500 | -0.03 | | 122.42 | 122.39 |
| | | 0.07 | 121.46 | 121.53 |
| | | 0.21 | 120.44 | 120.65 |
| | | 0.32 | 119.44 | 119.76 |
| | | 0.51 | 118.37 | 118.88 |
| 600 | | 0.59 | 117.40 | 117.99 |
| | | 0.49 | 116.70 | 117.19 |
| | | 0.35 | 116.22 | 116.57 |
| | | 0.31 | 115.82 | 116.13 |
| | | 0.34 | 115.52 | 115.86 |
| 700 | | 0.40 | 115.28 | 115.68 |
| | | 0.44 | 115.07 | 115.51 |
| | | 0.40 | 114.93 | 115.33 |
| | | 0.39 | 114.76 | 115.15 |
| | | 0.33 | 114.64 | 114.97 |
| 800 | | 0.16 | 114.63 | 114.79 |
| | | 0.20 | 114.41 | 114.61 |
| | | 0.07 | 114.36 | 114.43 |
| | 0.00 | | 114.26 | 114.26 |
| | | 0.01 | 114.07 | 114.08 |
| 900 | -0.01 | | 113.91 | 113.90 |
| | | | 113.72 | 113.72 |
| | | 0.03 | 113.50 | 113.53 |
| | | 0.00 | 113.34 | 113.34 |
| | -0.02 | | 113.18 | 113.16 |
| 3+000 | -0.02 | | 112.99 | 112.97 |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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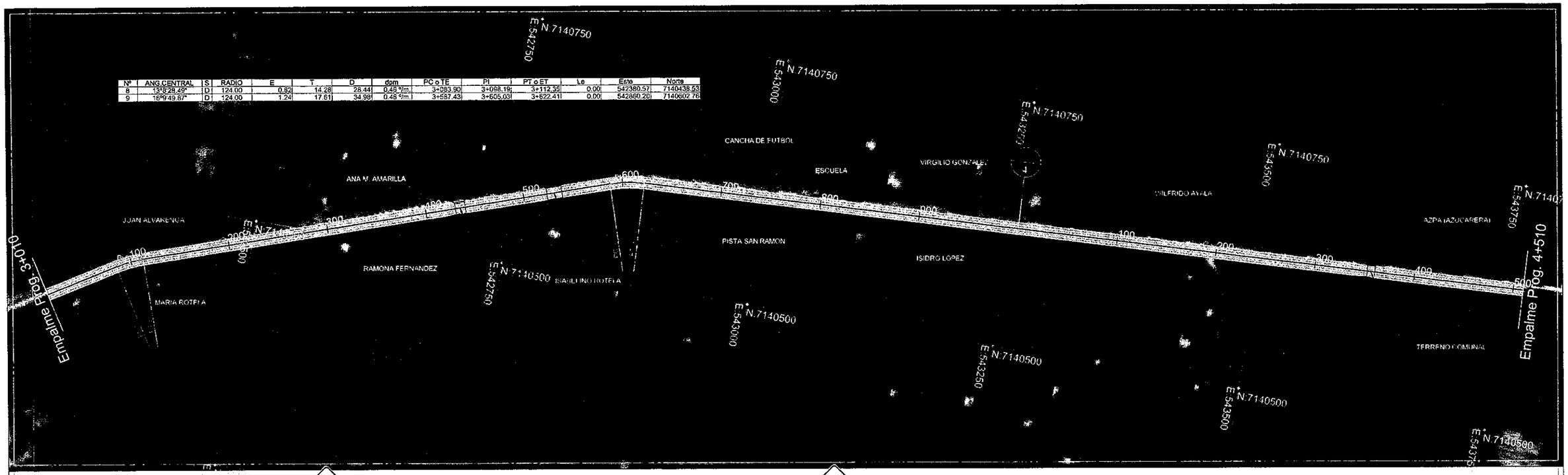
TRAMO: ITAPE - VILLARRICA

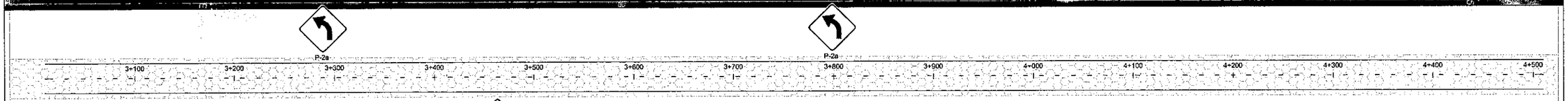
| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 1+510 - 3+010 | H = 1:2000<br>V = 1:200 | 2 |

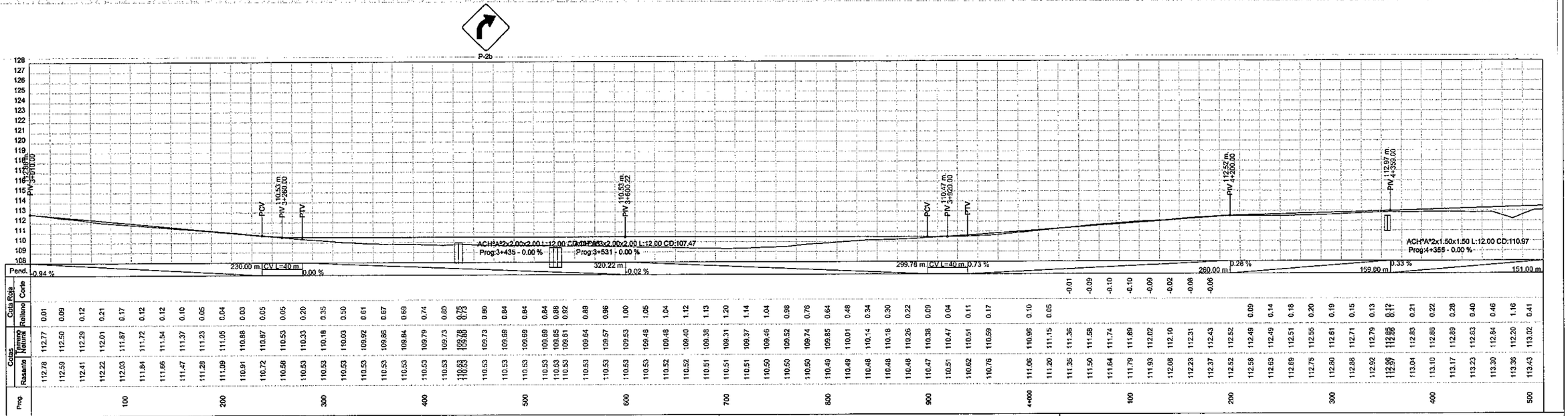
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

4 cuatro

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dom | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 13°8'28.49" | D | 124.00 | 0.82 | 14.28 | 28.44 | 0.45 %m | 3+083.90 | 3+098.19 | 3+112.35 | 0.00 | 542880.57 | 7140438.53 |
| 9 | 16°9'49.87" | D | 124.00 | 1.24 | 17.61 | 34.98 | 0.45 %m | 3+567.43 | 3+605.03 | 3+622.41 | 0.00 | 542860.20 | 7140602.76 |




## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 a 60 Km/h |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 m. |
| RADIO MINIMO HORIZONTAL: | 60 m. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 m. |

Ing. Raúl A. Montiel
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CONSORCIO
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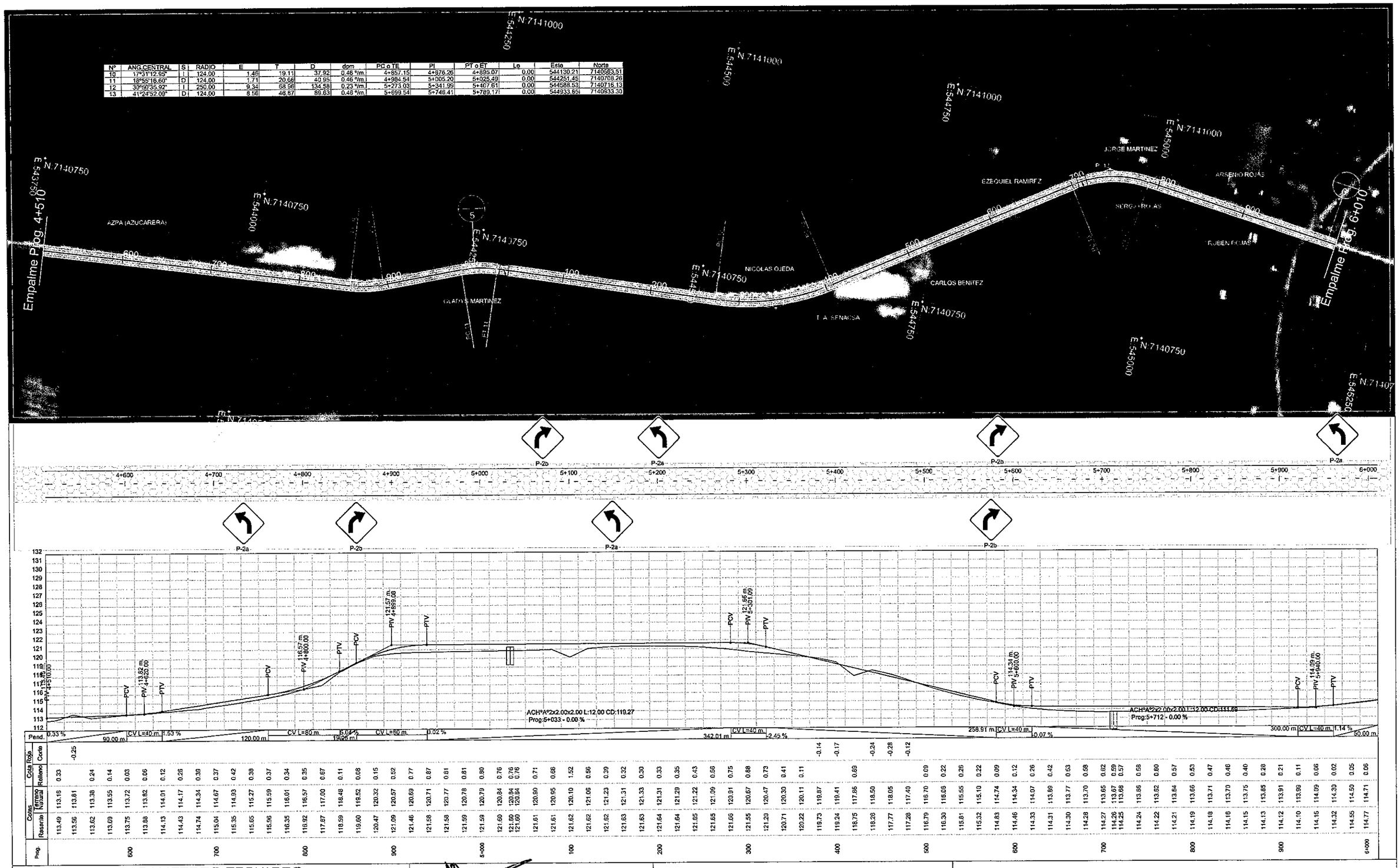
TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 3+010 - 4+510 | H = 1:2000<br>V = 1:200 | 3 |

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 17°31'12.95" | I | 124.00 | 1.46 | 19.11 | 37.92 | 0.46 °/m. | 4+857.15 | 4+876.26 | 4+895.07 | 0.00 | 544130.21 | 7140563.51 |
| 11 | 18°55'16.60" | D | 124.00 | 1.71 | 20.66 | 40.95 | 0.46 °/m. | 4+984.54 | 5+005.20 | 5+025.49 | 0.00 | 544251.45 | 7140708.26 |
| 12 | 30°50'35.92" | I | 250.00 | 9.34 | 68.96 | 134.58 | 0.23 °/m. | 5+273.03 | 5+341.99 | 5+407.61 | 0.00 | 544588.53 | 7140716.13 |
| 13 | 41°24'52.09" | D | 124.00 | 8.56 | 46.87 | 89.63 | 0.46 °/m. | 5+699.54 | 5+746.41 | 5+789.17 | 0.00 | 544933.65 | 7140933.30 |




## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Montiel
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TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 4+510 - 6+010 | H = 1:2000<br>V = 1:200 | 4 |

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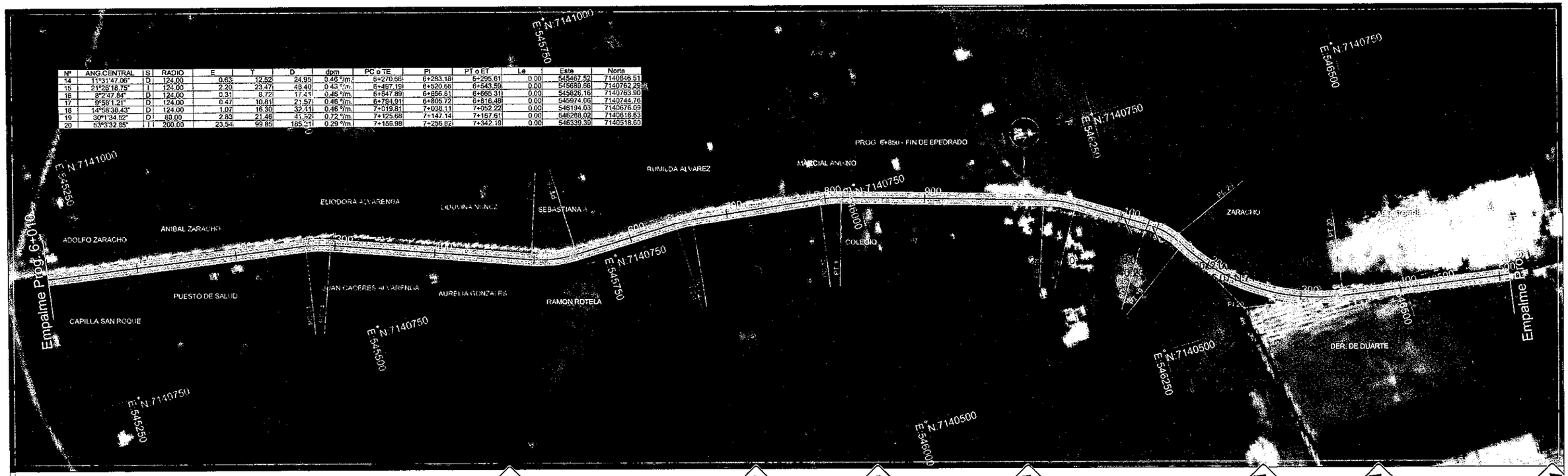
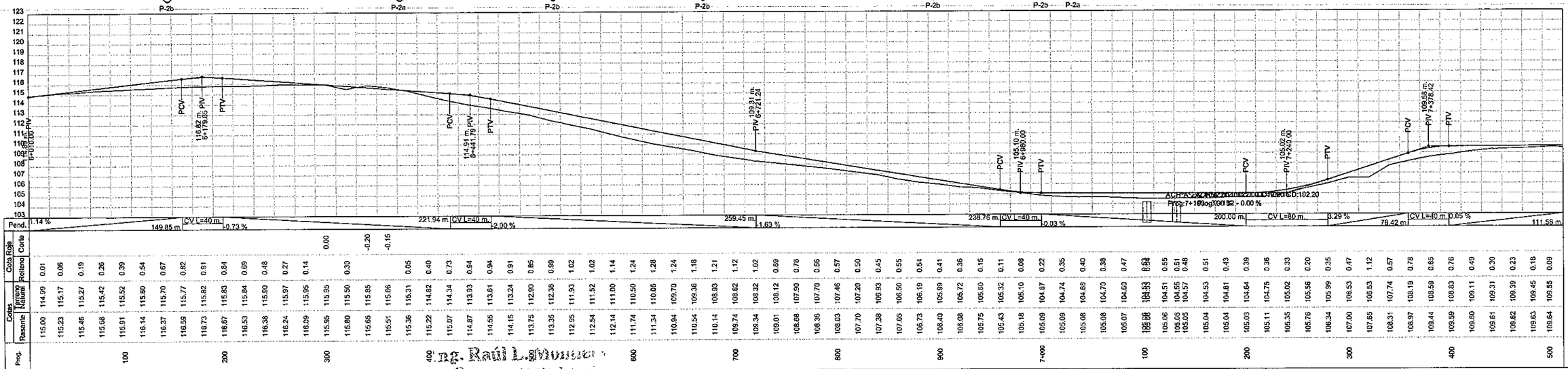
CONSULPAR S.A. - GEOLATINA S.A.

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 11°31'47.06" | D | 124.00 | 0.63 | 12.52 | 24.95 | 0.46 °/m | 6+270.66 | 6+283.18 | 6+295.61 | 0.00 | 545487.52 | 7140586.51 |
| 15 | 21°25'18.75" | I | 124.00 | 2.20 | 23.47 | 46.40 | 0.43 °/m | 6+497.19 | 6+520.66 | 6+543.59 | 0.00 | 545689.86 | 7140762.29 |
| 16 | 8°27'47.84" | D | 124.00 | 0.31 | 8.72 | 17.41 | 0.48 °/m | 6+547.99 | 6+856.51 | 6+665.31 | 0.00 | 545826.16 | 7140763.90 |
| 17 | 9°58'1.21" | D | 124.00 | 0.47 | 10.81 | 21.57 | 0.46 °/m | 6+794.91 | 6+805.72 | 6+816.48 | 0.00 | 545974.06 | 7140744.76 |
| 18 | 14°58'38.43" | D | 124.00 | 1.07 | 16.30 | 32.41 | 0.46 °/m | 7+019.81 | 7+038.11 | 7+052.22 | 0.00 | 546194.03 | 7140676.09 |
| 19 | 30°01'34.52" | D | 80.00 | 2.93 | 21.46 | 41.92 | 0.72 °/m | 7+125.68 | 7+147.14 | 7+167.61 | 0.00 | 546288.02 | 7140618.53 |
| 20 | 53°53'32.85" | I | 200.00 | 23.54 | 99.85 | 185.21 | 0.29 °/m | 7+156.98 | 7+256.82 | 7+342.19 | 0.00 | 546339.36 | 7140518.60 |




| Prog. | Rasante | Natural | Relleno | Corte | Cota Roja |
|---|---|---|---|---|---|
| 100 | 115.00 | 114.99 | 0.01 | | |
| | 115.23 | 115.17 | 0.06 | | |
| | 115.46 | 115.27 | 0.19 | | |
| | 115.68 | 115.42 | 0.26 | | |
| | 115.91 | 115.52 | 0.39 | | |
| 200 | 116.14 | 115.60 | 0.54 | | |
| | 116.37 | 115.70 | 0.67 | | |
| | 116.59 | 115.77 | 0.82 | | |
| | 116.73 | 115.82 | 0.91 | | |
| | 116.67 | 115.83 | 0.84 | | |
| | 116.53 | 115.84 | 0.69 | | |
| | 116.38 | 115.90 | 0.48 | | |
| 300 | 116.24 | 115.97 | 0.27 | | |
| | 116.09 | 115.95 | 0.14 | | |
| | 115.95 | 115.95 | | 0.00 | |
| | 115.80 | 115.50 | 0.30 | | |
| | 115.65 | 115.85 | | -0.20 | |
| | 115.51 | 115.66 | | -0.15 | |
| | 115.36 | 115.31 | 0.05 | | |
| 400 | 115.22 | 114.82 | 0.40 | | |
| | 115.07 | 114.34 | 0.73 | | |
| | 114.87 | 113.93 | 0.94 | | |
| | 114.55 | 113.61 | 0.94 | | |
| | 114.15 | 113.24 | 0.91 | | |
| | 113.75 | 112.90 | 0.85 | | |
| | 113.35 | 112.36 | 0.99 | | |
| 500 | 112.95 | 111.93 | 1.02 | | |
| | 112.54 | 111.52 | 1.02 | | |
| | 112.14 | 111.00 | 1.14 | | |
| | 111.74 | 110.50 | 1.24 | | |
| | 111.34 | 110.06 | 1.28 | | |
| | 110.94 | 109.70 | 1.24 | | |
| | 110.54 | 109.36 | 1.18 | | |
| 600 | 110.14 | 108.93 | 1.21 | | |
| | 109.74 | 108.62 | 1.12 | | |
| | 109.34 | 108.32 | 1.02 | | |
| | 109.01 | 108.12 | 0.89 | | |
| | 108.68 | 107.90 | 0.78 | | |
| | 108.35 | 107.70 | 0.66 | | |
| 700 | 108.03 | 107.46 | 0.57 | | |
| | 107.70 | 107.20 | 0.50 | | |
| | 107.38 | 106.93 | 0.45 | | |
| | 107.05 | 106.50 | 0.55 | | |
| | 106.73 | 106.19 | 0.54 | | |
| | 106.40 | 105.99 | 0.41 | | |
| 800 | 106.08 | 105.72 | 0.36 | | |
| | 105.75 | 105.60 | 0.15 | | |
| | 105.43 | 105.32 | 0.11 | | |
| | 105.18 | 105.10 | 0.08 | | |
| | 105.09 | 104.87 | 0.22 | | |
| 900 | 105.09 | 104.74 | 0.35 | | |
| | 105.08 | 104.68 | 0.40 | | |
| | 105.08 | 104.70 | 0.38 | | |
| | 105.07 | 104.60 | 0.47 | | |
| | 105.06 | 104.53 | 0.53 | | |
| | 105.06 | 104.51 | 0.55 | | |
| 7+000 | 105.05 | 104.55 | 0.51 | | |
| | 105.05 | 104.57 | 0.48 | | |
| | 105.04 | 104.53 | 0.51 | | |
| | 105.04 | 104.61 | 0.43 | | |
| | 105.03 | 104.64 | 0.39 | | |
| 100 | 105.11 | 104.75 | 0.36 | | |
| | 105.35 | 105.02 | 0.33 | | |
| | 105.76 | 105.56 | 0.20 | | |
| | 106.34 | 105.99 | 0.35 | | |
| 200 | 107.00 | 106.53 | 0.47 | | |
| | 107.65 | 106.53 | 1.12 | | |
| | 108.31 | 107.74 | 0.57 | | |
| | 108.97 | 108.19 | 0.78 | | |
| 300 | 109.44 | 108.59 | 0.85 | | |
| | 109.59 | 108.83 | 0.76 | | |
| | 109.60 | 109.11 | 0.49 | | |
| | 109.61 | 109.31 | 0.30 | | |
| | 109.62 | 109.39 | 0.23 | | |
| 400 | 109.63 | 109.45 | 0.18 | | |
| | 109.64 | 109.55 | 0.09 | | |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl Lamuniere
Representante Legal
Consorcio
CONSULPAR S.A.

REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS
PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 6+010 - 7+510 | H = 1:2000<br>V = 1:200 | 5 |

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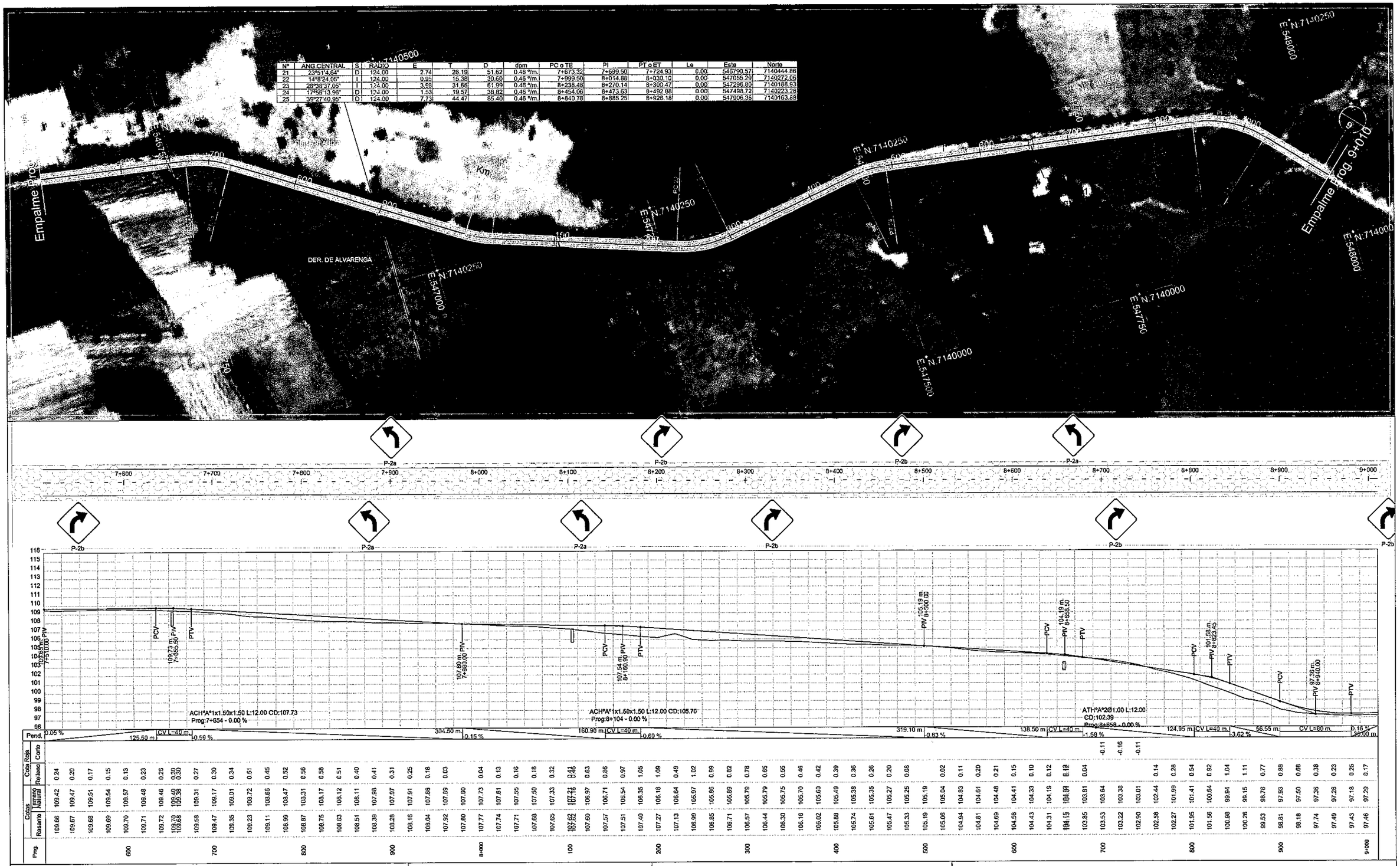


| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 23°51'4.64" | D | 124.00 | 2.74 | 26.19 | 51.62 | 0.46 °/m. | 7+673.32 | 7+699.50 | 7+724.93 | 0.00 | 546790.57 | 7140444.86 |
| 22 | 14°8'24.05" | I | 124.00 | 0.95 | 15.38 | 30.60 | 0.46 °/m. | 7+999.50 | 8+014.88 | 8+030.10 | 0.00 | 547055.29 | 7140272.06 |
| 23 | 28°38'37.05" | I | 124.00 | 3.98 | 31.66 | 61.99 | 0.46 °/m. | 8+238.48 | 8+270.14 | 8+300.47 | 0.00 | 547296.80 | 7140188.93 |
| 24 | 17°56'13.96" | D | 124.00 | 1.53 | 19.57 | 38.82 | 0.46 °/m. | 8+454.06 | 8+473.63 | 8+492.88 | 0.00 | 547498.72 | 7140223.26 |
| 25 | 35°27'40.95" | D | 124.00 | 7.73 | 44.47 | 85.40 | 0.46 °/m. | 8+840.78 | 8+885.25 | 8+926.18 | 0.00 | 547906.36 | 7140163.88 |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Montiel
Representante Legal
Consorcio:
CONSULPAR S.A.

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REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 7+510 - 9+010 | H = 1:2000<br>V = 1:200 | 6 |

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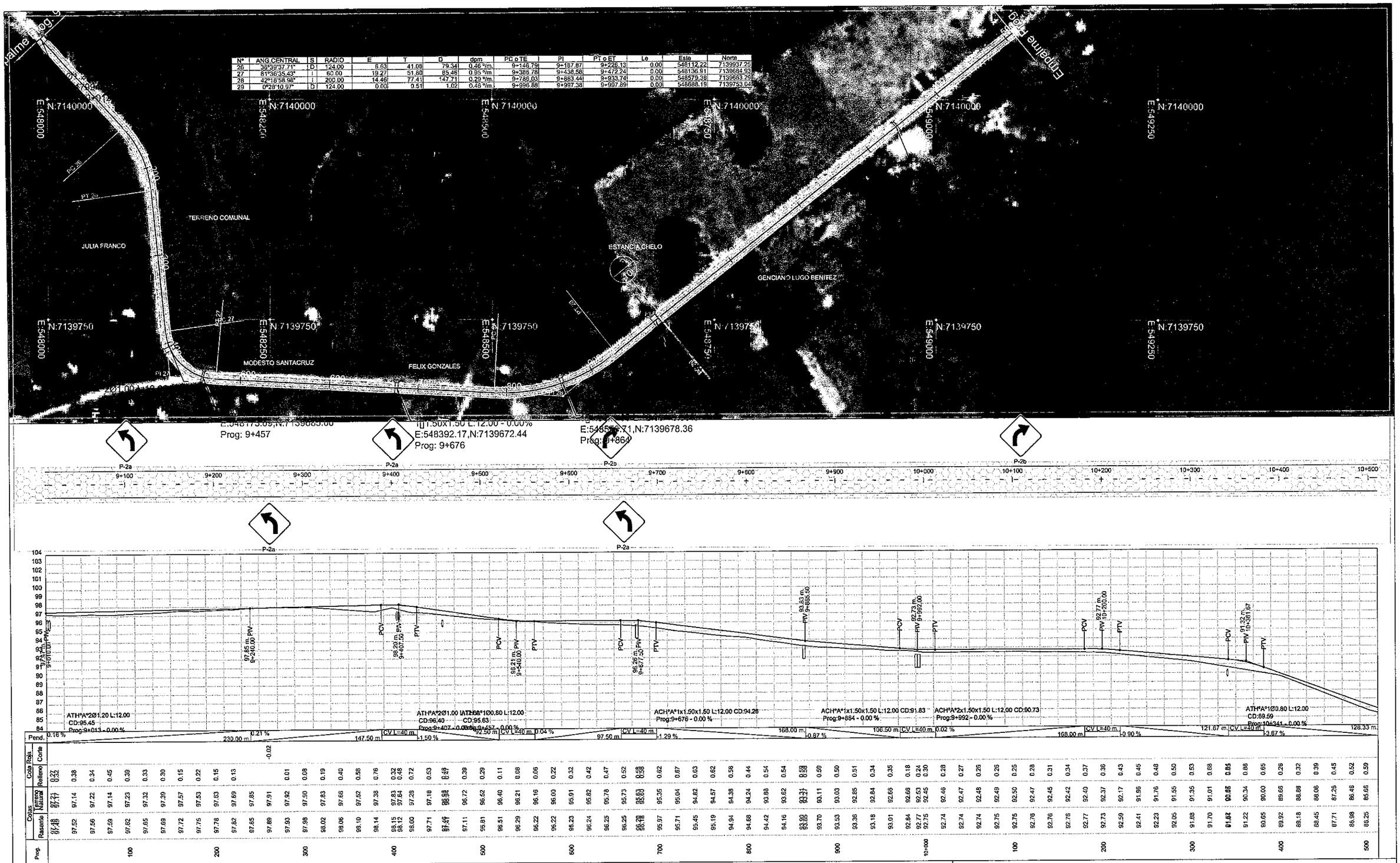


| N° | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | 36°39'37.71" | D | 124.00 | 6.63 | 41.08 | 79.34 | 0.46 °/m. | 9+146.79 | 9+187.87 | 9+226.13 | 0.00 | 548112.22 | 7139937.25 |
| 27 | 81°36'35.43" | I | 60.00 | 19.27 | 51.80 | 85.46 | 0.95 °/m. | 9+386.78 | 9+438.58 | 9+472.24 | 0.00 | 548136.91 | 7139684.93 |
| 28 | 42°18'58.98" | I | 200.00 | 14.46 | 77.41 | 147.71 | 0.29 °/m. | 9+786.03 | 9+863.44 | 9+933.74 | 0.00 | 548579.38 | 7139663.29 |
| 29 | 0°28'10.97" | D | 124.00 | 0.00 | 0.51 | 1.02 | 0.46 °/m. | 9+996.88 | 9+997.38 | 9+997.89 | 0.00 | 548688.19 | 7139753.04 |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raul L. Montiel
Gerente
CONSULPAR S.A.

CONSORCIO
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TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA N° |
|---|---|---|
| Prog: 9+010 - 10+510 | H = 1:2000<br>V = 1:200 | 7 |

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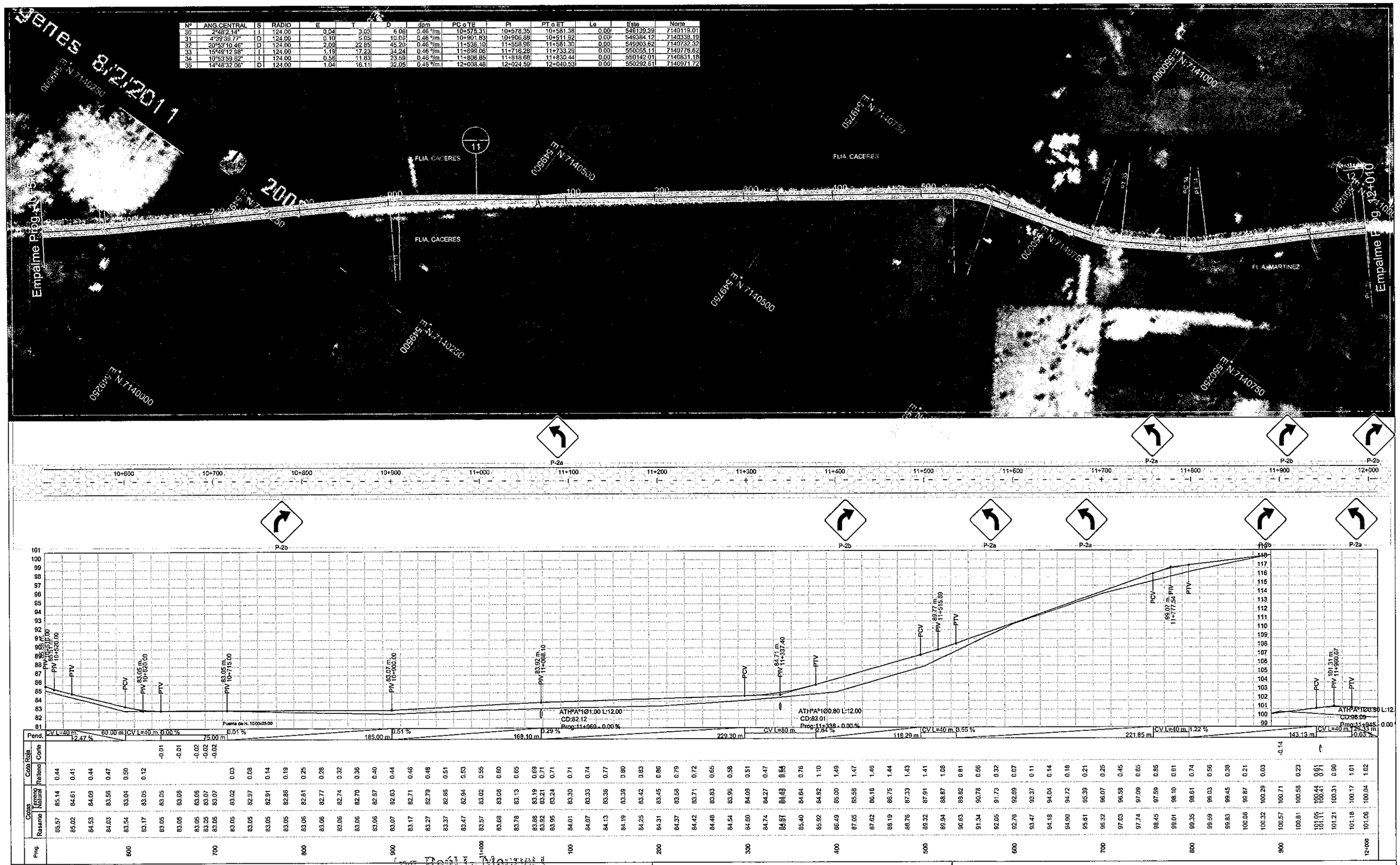
| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 2°48'2.14" | I | 124.00 | 0.04 | 3.03 | 6.06 | 0.46 °/m. | 10+575.31 | 10+578.35 | 10+581.38 | 0.00 | 549139.39 | 7140119.01 |
| 31 | 4°39'39.77" | D | 124.00 | 0.10 | 5.05 | 10.08 | 0.46 °/m. | 10+901.83 | 10+906.88 | 10+911.92 | 0.00 | 549384.12 | 7140338.19 |
| 32 | 20°53'10.46" | D | 124.00 | 2.09 | 22.85 | 45.20 | 0.46 °/m. | 11+536.10 | 11+558.96 | 11+581.30 | 0.00 | 549903.62 | 7140732.32 |
| 33 | 15°49'12.98" | I | 124.00 | 1.19 | 17.23 | 34.24 | 0.46 °/m. | 11+699.06 | 11+716.28 | 11+733.29 | 0.00 | 550055.11 | 7140778.62 |
| 34 | 10°53'59.62" | I | 124.00 | 0.56 | 11.83 | 23.59 | 0.46 °/m. | 11+806.85 | 11+818.68 | 11+830.44 | 0.00 | 550142.01 | 7140831.18 |
| 35 | 14°48'32.06" | D | 124.00 | 1.04 | 16.11 | 32.05 | 0.46 °/m. | 12+008.48 | 12+024.59 | 12+040.53 | 0.00 | 550292.61 | 7140971.72 |




## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Montiel
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TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 10+510 - 12+010 | H = 1:2000<br>V = 1:200 | 8 |

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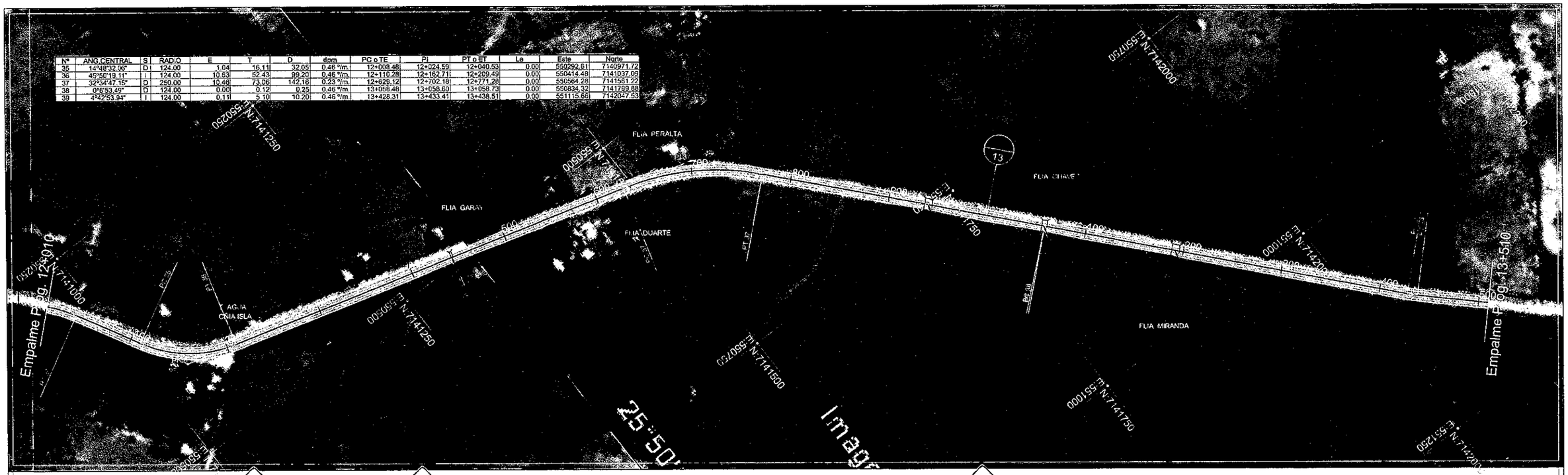
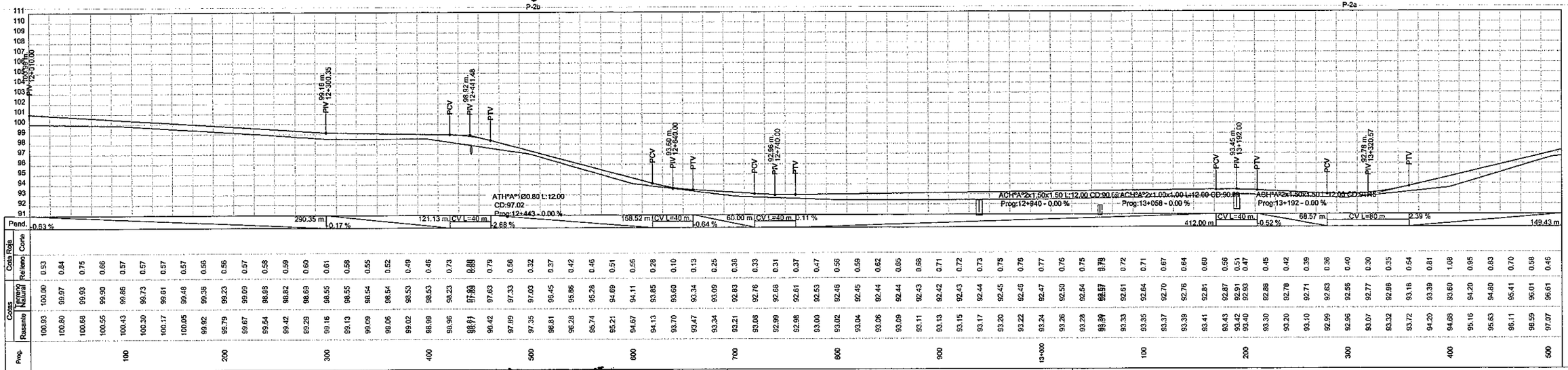
| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35 | 14°48'32.06" | D | 124.00 | 1.04 | 16.11 | 32.05 | 0.46 °/m. | 12+008.48 | 12+024.59 | 12+040.53 | 0.00 | 550292.61 | 7140971.72 |
| 36 | 45°50'19.11" | I | 124.00 | 10.63 | 52.43 | 99.20 | 0.46 °/m. | 12+110.28 | 12+162.71 | 12+209.49 | 0.00 | 550414.48 | 7141037.09 |
| 37 | 32°34'47.15" | D | 250.00 | 10.46 | 73.06 | 142.18 | 0.23 °/m. | 12+629.12 | 12+702.18 | 12+771.28 | 0.00 | 550564.28 | 7141561.22 |
| 38 | 0°6'53.49" | D | 124.00 | 0.00 | 0.12 | 0.25 | 0.46 °/m. | 13+058.46 | 13+058.60 | 13+058.73 | 0.00 | 550834.32 | 7141789.88 |
| 39 | 4°42'53.34" | I | 124.00 | 0.11 | 5.10 | 10.20 | 0.46 °/m. | 13+428.31 | 13+433.41 | 13+438.51 | 0.00 | 551115.66 | 7142047.53 |




| Prog. | Rasante | Natural | Relleno | Corte |
|---|---|---|---|---|
| 12+010 | 100.93 | 100.00 | 0.93 | |
| 12+020 | 100.80 | 99.97 | 0.84 | |
| 12+030 | 100.68 | 99.93 | 0.75 | |
| 12+040 | 100.55 | 99.90 | 0.66 | |
| 12+050 | 100.43 | 99.86 | 0.57 | |
| 12+060 | 100.30 | 99.73 | 0.57 | |
| 12+070 | 100.17 | 99.61 | 0.57 | |
| 12+080 | 100.05 | 99.48 | 0.57 | |
| 12+090 | 99.92 | 99.36 | 0.56 | |
| 12+100 | 99.79 | 99.23 | 0.56 | |
| 12+110 | 99.67 | 99.09 | 0.57 | |
| 12+120 | 99.54 | 98.96 | 0.58 | |
| 12+130 | 99.42 | 98.82 | 0.59 | |
| 12+140 | 99.29 | 98.69 | 0.60 | |
| 12+150 | 99.16 | 98.55 | 0.61 | |
| 12+160 | 99.13 | 98.55 | 0.58 | |
| 12+170 | 99.09 | 98.54 | 0.55 | |
| 12+180 | 99.06 | 98.54 | 0.52 | |
| 12+190 | 99.02 | 98.53 | 0.49 | |
| 12+200 | 98.99 | 98.53 | 0.46 | |
| 12+210 | 98.96 | 98.23 | 0.73 | |
| 12+220 | 98.91 | 97.89 | 0.88 | |
| 12+230 | 98.87 | 97.89 | 0.88 | |
| 12+240 | 98.42 | 97.63 | 0.79 | |
| 12+250 | 97.89 | 97.33 | 0.56 | |
| 12+260 | 97.35 | 97.03 | 0.32 | |
| 12+270 | 96.81 | 96.45 | 0.37 | |
| 12+280 | 96.28 | 95.86 | 0.42 | |
| 12+290 | 95.74 | 95.28 | 0.46 | |
| 12+300 | 95.21 | 94.69 | 0.51 | |
| 12+310 | 94.67 | 94.11 | 0.56 | |
| 12+320 | 94.13 | 93.85 | 0.28 | |
| 12+330 | 93.70 | 93.60 | 0.10 | |
| 12+340 | 93.47 | 93.34 | 0.13 | |
| 12+350 | 93.34 | 93.09 | 0.25 | |
| 12+360 | 93.21 | 92.83 | 0.38 | |
| 12+370 | 93.08 | 92.76 | 0.33 | |
| 12+380 | 92.99 | 92.68 | 0.31 | |
| 12+390 | 92.98 | 92.61 | 0.37 | |
| 12+400 | 93.00 | 92.53 | 0.47 | |
| 12+410 | 93.02 | 92.46 | 0.56 | |
| 12+420 | 93.04 | 92.45 | 0.59 | |
| 12+430 | 93.06 | 92.44 | 0.62 | |
| 12+440 | 93.09 | 92.44 | 0.65 | |
| 12+450 | 93.11 | 92.43 | 0.68 | |
| 12+460 | 93.13 | 92.42 | 0.71 | |
| 12+470 | 93.15 | 92.43 | 0.72 | |
| 12+480 | 93.17 | 92.44 | 0.73 | |
| 12+490 | 93.20 | 92.45 | 0.75 | |
| 12+500 | 93.22 | 92.46 | 0.76 | |
| 12+510 | 93.24 | 92.47 | 0.77 | |
| 12+520 | 93.26 | 92.50 | 0.76 | |
| 12+530 | 93.28 | 92.54 | 0.75 | |
| 12+540 | 93.30 | 92.57 | 0.73 | |
| 12+550 | 93.33 | 92.61 | 0.72 | |
| 12+560 | 93.35 | 92.64 | 0.71 | |
| 12+570 | 93.37 | 92.70 | 0.67 | |
| 12+580 | 93.39 | 92.76 | 0.64 | |
| 12+590 | 93.41 | 92.81 | 0.60 | |
| 12+600 | 93.43 | 92.87 | 0.56 | |
| 12+610 | 93.42 | 92.91 | 0.51 | |
| 12+620 | 93.40 | 92.93 | 0.47 | |
| 12+630 | 93.30 | 92.88 | 0.45 | |
| 12+640 | 93.20 | 92.78 | 0.42 | |
| 12+650 | 93.10 | 92.71 | 0.39 | |
| 12+660 | 92.99 | 92.63 | 0.36 | |
| 12+670 | 92.96 | 92.56 | 0.40 | |
| 12+680 | 93.07 | 92.77 | 0.30 | |
| 12+690 | 93.32 | 92.98 | 0.35 | |
| 12+700 | 93.72 | 93.18 | 0.54 | |
| 12+710 | 94.20 | 93.39 | 0.81 | |
| 12+720 | 94.69 | 93.60 | 1.08 | |
| 12+730 | 95.16 | 94.20 | 0.95 | |
| 12+740 | 95.63 | 94.80 | 0.83 | |
| 12+750 | 96.11 | 95.41 | 0.70 | |
| 12+760 | 96.59 | 96.01 | 0.58 | |
| 12+770 | 97.07 | 96.61 | 0.46 | |
| 12+780 | 97.55 | 97.21 | 0.34 | |
| 12+790 | 98.03 | 97.81 | 0.22 | |
| 12+800 | 98.51 | 98.41 | 0.10 | |
| 12+810 | 98.99 | 99.01 | | 0.02 |
| 12+820 | 99.47 | 99.61 | | 0.14 |
| 12+830 | 99.95 | 100.21 | | 0.26 |
| 12+840 | 100.43 | 100.81 | | 0.38 |
| 12+850 | 100.91 | 101.41 | | 0.50 |
| 12+860 | 101.39 | 102.01 | | 0.62 |
| 12+870 | 101.87 | 102.61 | | 0.74 |
| 12+880 | 102.35 | 103.21 | | 0.86 |
| 12+890 | 102.83 | 103.81 | | 0.98 |
| 12+900 | 103.31 | 104.41 | | 1.10 |
| 12+910 | 103.79 | 105.01 | | 1.22 |
| 12+920 | 104.27 | 105.61 | | 1.34 |
| 12+930 | 104.75 | 106.21 | | 1.46 |
| 12+940 | 105.23 | 106.81 | | 1.58 |
| 12+950 | 105.71 | 107.41 | | 1.70 |
| 12+960 | 106.19 | 108.01 | | 1.82 |
| 12+970 | 106.67 | 108.61 | | 1.94 |
| 12+980 | 107.15 | 109.21 | | 2.06 |
| 12+990 | 107.63 | 109.81 | | 2.18 |
| 13+000 | 108.11 | 110.41 | | 2.30 |
| 13+010 | 108.59 | 111.01 | | 2.42 |
| 13+020 | 109.07 | 111.61 | | 2.54 |
| 13+030 | 109.55 | 112.21 | | 2.66 |
| 13+040 | 110.03 | 112.81 | | 2.78 |
| 13+050 | 110.51 | 113.41 | | 2.90 |
| 13+060 | 110.99 | 114.01 | | 3.02 |
| 13+070 | 111.47 | 114.61 | | 3.14 |
| 13+080 | 111.95 | 115.21 | | 3.26 |
| 13+090 | 112.43 | 115.81 | | 3.38 |
| 13+100 | 112.91 | 116.41 | | 3.50 |
| 13+110 | 113.39 | 117.01 | | 3.62 |
| 13+120 | 113.87 | 117.61 | | 3.74 |
| 13+130 | 114.35 | 118.21 | | 3.86 |
| 13+140 | 114.83 | 118.81 | | 3.98 |
| 13+150 | 115.31 | 119.41 | | 4.10 |
| 13+160 | 115.79 | 120.01 | | 4.22 |
| 13+170 | 116.27 | 120.61 | | 4.34 |
| 13+180 | 116.75 | 121.21 | | 4.46 |
| 13+190 | 117.23 | 121.81 | | 4.58 |
| 13+200 | 117.71 | 122.41 | | 4.70 |
| 13+210 | 118.19 | 123.01 | | 4.82 |
| 13+220 | 118.67 | 123.61 | | 4.94 |
| 13+230 | 119.15 | 124.21 | | 5.06 |
| 13+240 | 119.63 | 124.81 | | 5.18 |
| 13+250 | 120.11 | 125.41 | | 5.30 |
| 13+260 | 120.59 | 126.01 | | 5.42 |
| 13+270 | 121.07 | 126.61 | | 5.54 |
| 13+280 | 121.55 | 127.21 | | 5.66 |
| 13+290 | 122.03 | 127.81 | | 5.78 |
| 13+300 | 122.51 | 128.41 | | 5.90 |
| 13+310 | 122.99 | 129.01 | | 6.02 |
| 13+320 | 123.47 | 129.61 | | 6.14 |
| 13+330 | 123.95 | 130.21 | | 6.26 |
| 13+340 | 124.43 | 130.81 | | 6.38 |
| 13+350 | 124.91 | 131.41 | | 6.50 |
| 13+360 | 125.39 | 132.01 | | 6.62 |
| 13+370 | 125.87 | 132.61 | | 6.74 |
| 13+380 | 126.35 | 133.21 | | 6.86 |
| 13+390 | 126.83 | 133.81 | | 6.98 |
| 13+400 | 127.31 | 134.41 | | 7.10 |
| 13+410 | 127.79 | 135.01 | | 7.22 |
| 13+420 | 128.27 | 135.61 | | 7.34 |
| 13+430 | 128.75 | 136.21 | | 7.46 |
| 13+440 | 129.23 | 136.81 | | 7.58 |
| 13+450 | 129.71 | 137.41 | | 7.70 |
| 13+460 | 130.19 | 138.01 | | 7.82 |
| 13+470 | 130.67 | 138.61 | | 7.94 |
| 13+480 | 131.15 | 139.21 | | 8.06 |
| 13+490 | 131.63 | 139.81 | | 8.18 |
| 13+500 | 132.11 | 140.41 | | 8.30 |
| 13+510 | 132.59 | 141.01 | | 8.42 |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 Km/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Martínez Reyes
Cons. Civil

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TRAMO: ITAPE - VILLARRICA

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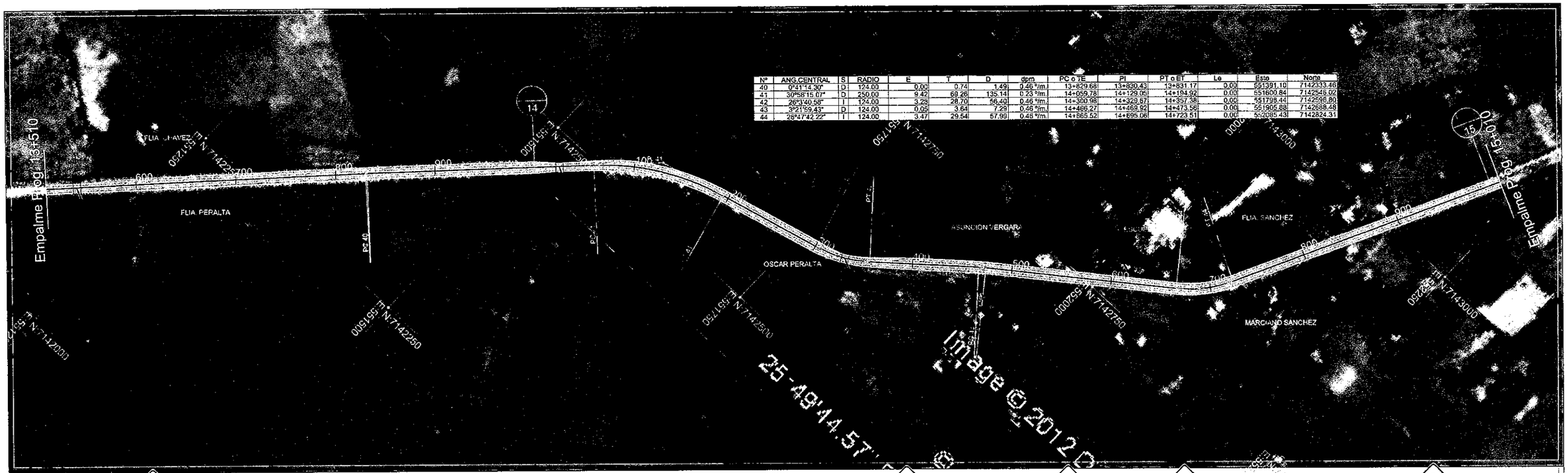
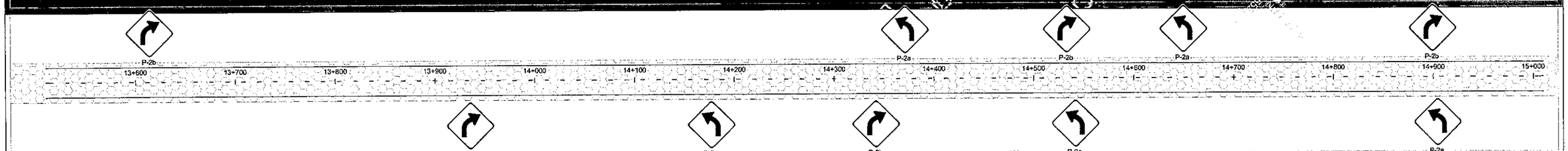
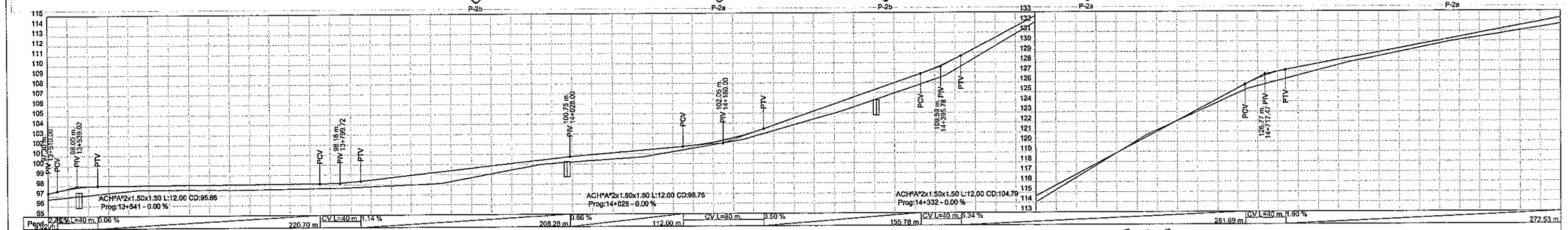
|---|---|---|
| Prog: 12+010 - 13+510 | H = 1:2000<br>V = 1:200 | 9 |




| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 0°41'14.30" | D | 124.00 | 0.00 | 0.74 | 1.49 | 0.46 °/m. | 13+829.68 | 13+830.43 | 13+931.17 | 0.00 | 551391.10 | 7142333.46 |
| 41 | 30°58'15.07" | D | 250.00 | 9.42 | 69.26 | 135.14 | 0.23 °/m. | 14+059.78 | 14+129.05 | 14+194.92 | 0.00 | 551600.84 | 7142546.02 |
| 42 | 26°34'40.58" | I | 124.00 | 3.29 | 28.70 | 56.40 | 0.46 °/m. | 14+300.98 | 14+329.67 | 14+357.38 | 0.00 | 551798.44 | 7142698.80 |
| 43 | 3°21'59.43" | D | 124.00 | 0.05 | 3.64 | 7.29 | 0.46 °/m. | 14+466.27 | 14+469.92 | 14+473.58 | 0.00 | 551905.88 | 7142688.48 |
| 44 | 28°47'42.22" | I | 124.00 | 3.47 | 29.54 | 57.99 | 0.46 °/m. | 14+565.52 | 14+695.06 | 14+723.51 | 0.00 | 552085.43 | 7142824.31 |




| Prog | Rasante | Terreno Natural | Relleno | Corte |
|---|---|---|---|---|
| 600 | 97.54 | 96.81 | 0.74 | |
| | 97.80 | 97.00 | 0.80 | |
| 700 | 98.01 | 97.20 | 0.81 | |
| | 98.02 | 97.39 | 0.63 | |
| 800 | 98.03 | 97.59 | 0.44 | |
| | 98.05 | 97.58 | 0.46 | |
| | 98.06 | 97.58 | 0.48 | |
| 900 | 98.07 | 97.57 | 0.50 | |
| | 98.08 | 97.57 | 0.52 | |
| | 98.10 | 97.55 | 0.54 | |
| | 98.11 | 97.59 | 0.52 | |
| | 98.12 | 97.61 | 0.51 | |
| | 98.13 | 97.64 | 0.49 | |
| | 98.15 | 97.66 | 0.48 | |
| | 98.21 | 97.69 | 0.52 | |
| | 98.39 | 97.78 | 0.61 | |
| | 98.61 | 97.87 | 0.75 | |
| | 98.84 | 97.95 | 0.89 | |
| | 99.07 | 98.04 | 1.03 | |
| | 99.30 | 98.13 | 1.17 | |
| | 99.52 | 98.51 | 1.02 | |
| | 99.75 | 98.88 | 0.87 | |
| | 99.98 | 99.26 | 0.72 | |
| | 100.20 | 99.63 | 0.57 | |
| | 100.43 | 100.01 | 0.42 | |
| | 100.62 | 100.08 | 0.54 | |
| | 100.85 | 100.28 | 0.57 | |
| 1000 | 101.02 | 100.42 | 0.61 | |
| | 101.19 | 100.55 | 0.64 | |
| | 101.37 | 100.69 | 0.68 | |
| | 101.54 | 101.03 | 0.51 | |
| | 101.71 | 101.37 | 0.34 | |
| | 101.94 | 101.71 | 0.23 | |
| | 102.31 | 102.05 | 0.26 | |
| | 102.82 | 102.39 | 0.43 | |
| | 103.45 | 102.96 | 0.48 | |
| | 104.15 | 103.54 | 0.61 | |
| | 104.85 | 104.11 | 0.73 | |
| | 105.55 | 104.69 | 0.86 | |
| | 106.24 | 105.26 | 0.98 | |
| | 106.94 | 105.94 | 1.00 | |
| | 107.36 | 106.35 | 1.01 | |
| | 107.64 | 106.63 | 1.01 | |
| | 108.34 | 107.31 | 1.03 | |
| | 109.05 | 108.00 | 1.05 | |
| | 109.68 | 108.68 | 1.20 | |
| | 110.89 | 109.87 | 1.02 | |
| | 111.95 | 111.06 | 0.90 | |
| | 113.02 | 112.24 | 0.78 | |
| | 114.09 | 113.43 | 0.66 | |
| | 115.16 | 114.62 | 0.54 | |
| | 116.23 | 115.84 | 0.39 | |
| | 117.29 | 117.06 | 0.24 | |
| | 118.36 | 118.27 | 0.09 | |
| | 119.43 | 119.49 | | -0.06 |
| | 120.50 | 120.71 | | -0.21 |
| | 121.57 | 121.62 | | -0.06 |
| | 122.63 | 122.54 | 0.10 | |
| | 123.70 | 123.45 | 0.25 | |
| | 124.77 | 124.37 | 0.40 | |
| | 125.83 | 125.28 | 0.55 | |
| | 126.69 | 125.80 | 0.88 | |
| | 127.20 | 126.32 | 0.87 | |
| | 127.58 | 126.85 | 0.73 | |
| | 127.96 | 127.37 | 0.59 | |
| | 128.34 | 127.89 | 0.45 | |
| | 128.72 | 128.30 | 0.41 | |
| | 129.09 | 128.71 | 0.38 | |
| | 129.47 | 129.13 | 0.35 | |
| | 128.85 | 129.54 | 0.32 | |
| | 130.23 | 129.95 | 0.28 | |
| | 130.61 | 130.27 | 0.35 | |
| | 130.99 | 130.58 | 0.41 | |
| | 131.37 | 130.90 | 0.47 | |
| | 131.75 | 131.21 | 0.54 | |
| 1500 | 132.13 | 131.53 | 0.60 | |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Consorcio:

CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS
PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 13+510 - 15+010 | H = 1:2000 V = 1:200 | 10 |

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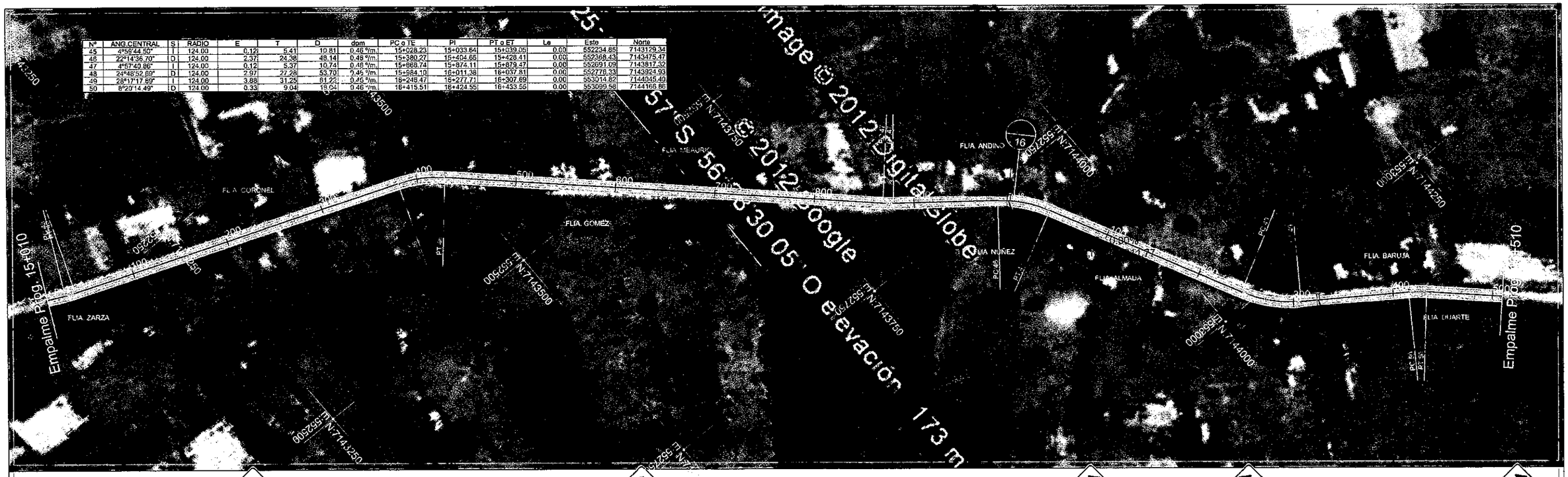
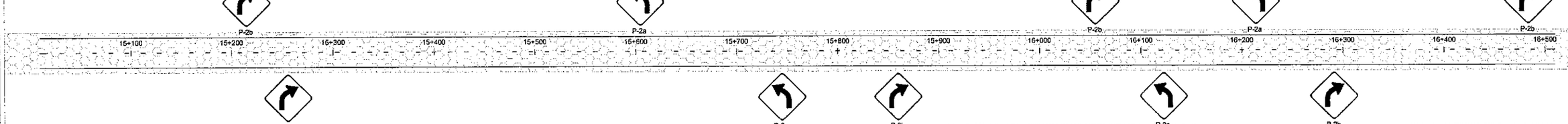
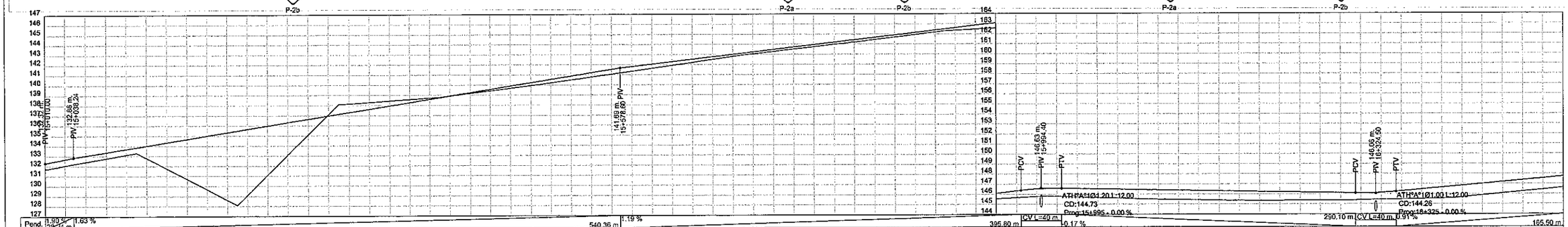
| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dom | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | 4°55'44.50" | I | 124.00 | 0.12 | 5.41 | 10.81 | 0.46 °/m. | 15+028.23 | 15+033.64 | 15+039.05 | 0.00 | 552234.85 | 7143129.34 |
| 46 | 22°14'36.70" | D | 124.00 | 2.37 | 24.38 | 48.14 | 0.48 °/m. | 15+380.27 | 15+404.65 | 15+428.41 | 0.00 | 552368.43 | 7143475.47 |
| 47 | 4°57'40.86" | I | 124.00 | 0.12 | 5.37 | 10.74 | 0.46 °/m. | 15+868.74 | 15+874.11 | 15+879.47 | 0.00 | 552691.09 | 7143817.32 |
| 48 | 24°48'52.69" | D | 124.00 | 2.97 | 27.28 | 53.70 | 0.45 °/m. | 15+984.10 | 16+011.38 | 16+037.81 | 0.00 | 552776.33 | 7143924.93 |
| 49 | 28°17'17.89" | I | 124.00 | 3.88 | 31.25 | 61.22 | 0.45 °/m. | 16+248.47 | 16+277.71 | 16+307.69 | 0.00 | 553014.82 | 7144045.49 |
| 50 | 8°20'14.49" | D | 124.00 | 0.33 | 9.04 | 18.04 | 0.46 °/m. | 16+415.51 | 16+424.55 | 16+433.55 | 0.00 | 553099.58 | 7144166.86 |




| Prog | Rasante | Natural | Relleno | Corte |
|---|---|---|---|---|
| 15+010 | 132.51 | 131.89 | 0.62 | |
| 15+020 | 132.89 | 132.25 | 0.64 | |
| 15+030 | 133.21 | 132.60 | 0.61 | |
| 15+040 | 133.54 | 132.96 | 0.58 | |
| 15+050 | 133.87 | 133.32 | 0.55 | |
| 15+060 | 134.19 | 132.28 | 1.92 | |
| 15+070 | 134.52 | 131.23 | 3.29 | |
| 15+080 | 134.85 | 130.19 | 4.66 | |
| 15+090 | 135.17 | 129.14 | 6.03 | |
| 15+100 | 135.50 | 128.10 | 7.40 | |
| 15+110 | 135.83 | 130.10 | 5.73 | |
| 15+120 | 136.15 | 132.10 | 4.06 | |
| 15+130 | 136.48 | 134.09 | 2.39 | |
| 15+140 | 136.81 | 136.09 | 0.72 | |
| 15+150 | 137.13 | 138.09 | | -0.96 |
| 15+160 | 137.46 | 138.23 | | -0.77 |
| 15+170 | 137.79 | 138.37 | | -0.59 |
| 15+180 | 138.12 | 138.52 | | -0.40 |
| 15+190 | 138.44 | 138.66 | | -0.22 |
| 15+200 | 138.77 | 138.80 | | -0.03 |
| 15+210 | 139.10 | 139.06 | 0.04 | |
| 15+220 | 139.42 | 139.31 | 0.11 | |
| 15+230 | 139.75 | 139.57 | 0.18 | |
| 15+240 | 140.08 | 139.82 | 0.26 | |
| 15+250 | 140.40 | 140.08 | 0.32 | |
| 15+260 | 140.73 | 140.36 | 0.37 | |
| 15+270 | 141.06 | 140.64 | 0.41 | |
| 15+280 | 141.38 | 140.93 | 0.46 | |
| 15+290 | 141.70 | 141.21 | 0.50 | |
| 15+300 | 141.94 | 141.49 | 0.45 | |
| 15+310 | 142.18 | 141.78 | 0.40 | |
| 15+320 | 142.42 | 142.07 | 0.34 | |
| 15+330 | 142.66 | 142.37 | 0.29 | |
| 15+340 | 142.89 | 142.66 | 0.23 | |
| 15+350 | 143.13 | 142.95 | 0.18 | |
| 15+360 | 143.37 | 143.18 | 0.19 | |
| 15+370 | 143.61 | 143.41 | 0.20 | |
| 15+380 | 143.84 | 143.63 | 0.21 | |
| 15+390 | 144.08 | 143.86 | 0.22 | |
| 15+400 | 144.32 | 144.09 | 0.23 | |
| 15+410 | 144.56 | 144.33 | 0.22 | |
| 15+420 | 144.79 | 144.58 | 0.22 | |
| 15+430 | 145.03 | 144.82 | 0.21 | |
| 15+440 | 145.27 | 145.07 | 0.20 | |
| 15+450 | 145.51 | 145.31 | 0.20 | |
| 15+460 | 145.75 | 145.41 | 0.33 | |
| 15+470 | 145.98 | 145.52 | 0.47 | |
| 15+480 | 146.22 | 145.62 | 0.60 | |
| 15+490 | 146.45 | 145.73 | 0.73 | |
| 15+500 | 146.69 | 145.80 | 0.89 | |
| 15+510 | 146.69 | 145.80 | 0.89 | |
| 15+520 | 146.59 | 145.77 | 0.82 | |
| 15+530 | 146.55 | 145.71 | 0.85 | |
| 15+540 | 146.52 | 145.64 | 0.87 | |
| 15+550 | 146.48 | 145.58 | 0.90 | |
| 15+560 | 146.45 | 145.52 | 0.93 | |
| 15+570 | 146.41 | 145.49 | 0.92 | |
| 15+580 | 146.38 | 145.45 | 0.93 | |
| 15+590 | 146.34 | 145.42 | 0.92 | |
| 15+600 | 146.31 | 145.38 | 0.93 | |
| 15+610 | 146.27 | 145.36 | 0.91 | |
| 15+620 | 146.24 | 145.36 | 0.88 | |
| 15+630 | 146.21 | 145.37 | 0.84 | |
| 15+640 | 146.17 | 145.37 | 0.80 | |
| 15+650 | 146.14 | 145.38 | 0.75 | |
| 15+660 | 146.10 | 145.39 | 0.71 | |
| 15+670 | 146.10 | 145.43 | 0.67 | |
| 15+680 | 146.12 | 145.44 | 0.68 | |
| 15+690 | 146.20 | 145.47 | 0.73 | |
| 15+700 | 146.38 | 145.51 | 0.87 | |
| 15+710 | 146.57 | 145.55 | 1.02 | |
| 15+720 | 146.75 | 145.59 | 1.16 | |
| 15+730 | 146.93 | 145.78 | 1.15 | |
| 15+740 | 147.11 | 145.97 | 1.14 | |
| 15+750 | 147.29 | 146.16 | 1.13 | |
| 15+760 | 147.48 | 146.35 | 1.13 | |
| 15+770 | 147.66 | 146.54 | 1.12 | |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 a 60 Km/h |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 m. |
| RADIO MINIMO HORIZONTAL: | 60 m. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 m. |

Ing. Civil L. Montiel
Consultor
Representante Legal por
CONSULPAR S.A.

CONSORCIO
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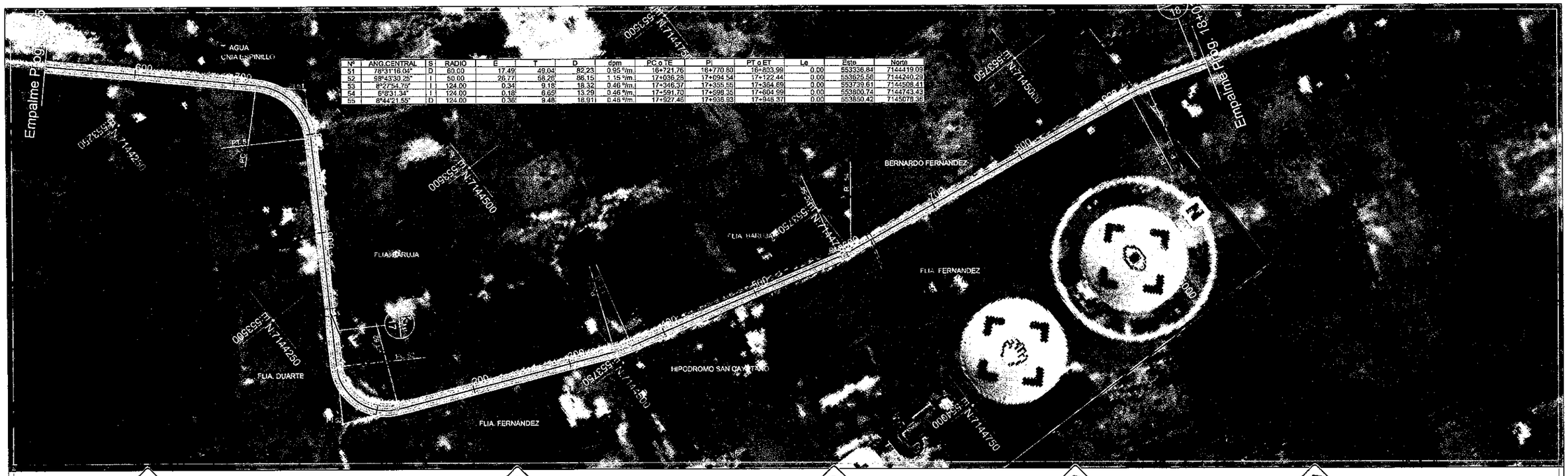
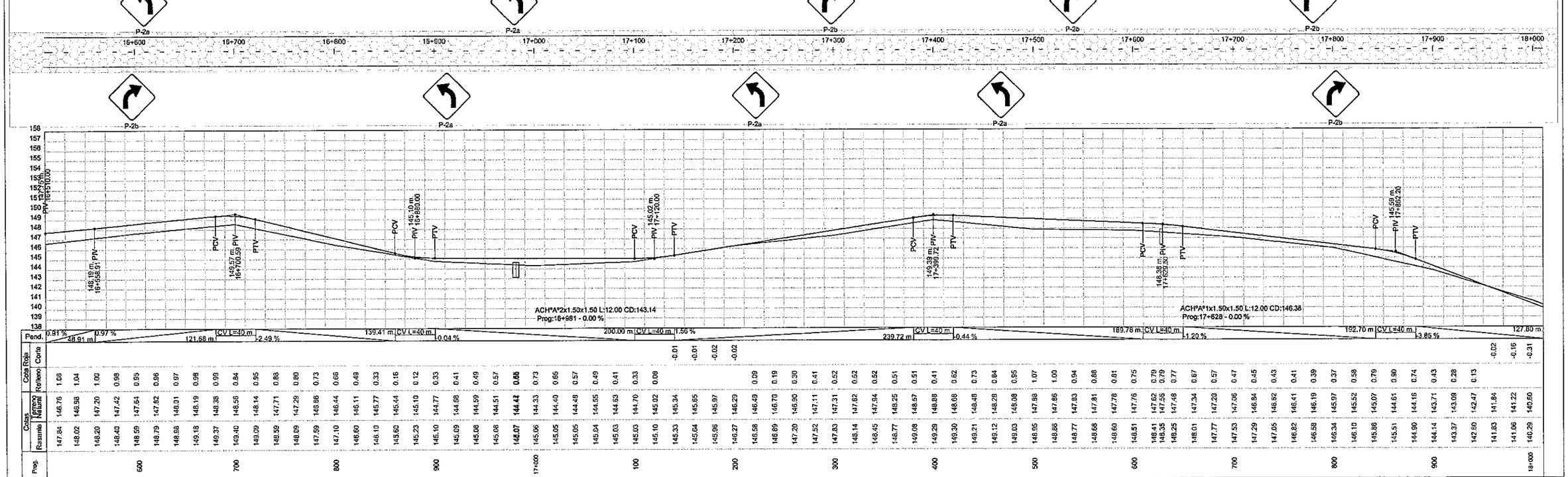
TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 15+010 - 16+510 | H = 1:2000<br>V = 1:200 | 11 |

13




| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | 78°31'16.04" | D | 60.00 | 17.49 | 49.04 | 82.23 | 0.95 °/m. | 16+721.76 | 16+770.80 | 16+803.99 | 0.00 | 553336.84 | 7144419.09 |
| 52 | 98°43'30.25" | I | 50.00 | 26.77 | 58.29 | 86.15 | 1.15 °/m. | 17+036.28 | 17+094.54 | 17+122.44 | 0.00 | 553629.58 | 7144240.29 |
| 53 | 8°27'54.79" | I | 124.00 | 0.34 | 9.18 | 18.32 | 0.46 °/m. | 17+346.37 | 17+355.55 | 17+364.69 | 0.00 | 553739.61 | 7144508.41 |
| 54 | 5°8'31.34" | I | 124.00 | 0.18 | 6.65 | 13.29 | 0.46 °/m. | 17+591.70 | 17+598.35 | 17+604.99 | 0.00 | 553800.74 | 7144743.43 |
| 55 | 8°44'21.55" | D | 124.00 | 0.36 | 9.48 | 18.91 | 0.46 °/m. | 17+927.46 | 17+936.93 | 17+946.37 | 0.00 | 553850.42 | 7145078.36 |




## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

ing. Raúl L. Montiel C.
Consultor Asesoría Legal
CONSULPAR S.A.

CONSORCIO
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TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 16+510 - 18+010 | H = 1:2000<br>V = 1:200 | 12 |

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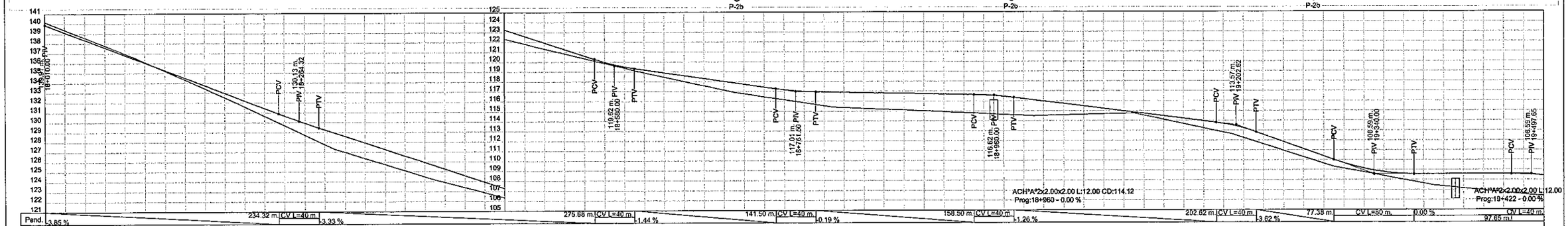
| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | 1°14'31.45" | I | 124.00 | 0.01 | 1.34 | 2.69 | 0.46 °/m. | 18+377.15 | 18+378.49 | 18+379.84 | 0.00 | 553980.82 | 7145500.26 |
| 57 | 2°18'41.56" | D | 124.00 | 0.03 | 4.50 | 5.00 | 0.46 °/m. | 18+608.32 | 18+610.83 | 18+613.33 | 0.00 | 554044.61 | 7145723.67 |
| 58 | 24°1'16.02" | D | 124.00 | 2.78 | 26.38 | 51.99 | 0.46 °/m. | 18+827.52 | 18+853.90 | 18+879.51 | 0.00 | 554120.71 | 7145954.52 |
| 59 | 7°52'37.47" | D | 124.00 | 0.29 | 8.54 | 17.05 | 0.46 °/m. | 19+102.40 | 19+110.94 | 19+119.45 | 0.00 | 554284.11 | 7146145.31 |
| 60 | 8°56'11.25" | D | 60.00 | 0.18 | 4.69 | 9.36 | 0.95 °/m. | 19+404.74 | 19+409.43 | 19+414.10 | 0.00 | 554523.27 | 7146336.61 |




| Prog. | Cota Rasante | Cota Natural | Cota Rellena | Cota Corte |
|---|---|---|---|---|
| 100 | 139.52 | 139.79 | | -0.27 |
| | 138.75 | 138.99 | | -0.24 |
| | 137.98 | 138.18 | | -0.20 |
| | 137.21 | 137.38 | | -0.16 |
| | 136.45 | 136.57 | | -0.12 |
| 200 | 135.68 | 135.68 | 0.00 | |
| | 134.91 | 134.78 | 0.13 | |
| | 134.14 | 133.89 | 0.25 | |
| | 133.37 | 132.99 | 0.38 | |
| | 132.60 | 132.10 | 0.50 | |
| | 131.83 | 131.14 | 0.69 | |
| | 131.06 | 130.18 | 0.88 | |
| 300 | 130.31 | 129.23 | 1.08 | |
| | 129.61 | 128.27 | 1.34 | |
| | 128.94 | 127.31 | 1.63 | |
| | 128.27 | 126.69 | 1.59 | |
| | 127.61 | 126.06 | 1.55 | |
| | 126.94 | 125.44 | 1.51 | |
| | 126.28 | 124.81 | 1.46 | |
| 400 | 125.61 | 124.19 | 1.42 | |
| | 124.95 | 123.67 | 1.28 | |
| | 124.28 | 123.15 | 1.13 | |
| | 123.61 | 122.62 | 0.99 | |
| | 122.95 | 122.10 | 0.85 | |
| 500 | 122.28 | 121.58 | 0.70 | |
| | 121.62 | 121.09 | 0.53 | |
| | 120.95 | 120.60 | 0.35 | |
| | 120.29 | 120.11 | 0.18 | |
| 600 | 119.71 | 119.62 | 0.09 | |
| | 119.33 | 119.13 | 0.20 | |
| | 119.04 | 118.69 | 0.35 | |
| | 118.76 | 118.25 | 0.51 | |
| | 118.47 | 117.81 | 0.66 | |
| | 118.18 | 117.37 | 0.81 | |
| 700 | 117.89 | 116.93 | 0.96 | |
| | 117.60 | 116.63 | 0.98 | |
| | 117.32 | 116.32 | 0.99 | |
| | 117.08 | 116.02 | 1.06 | |
| | 116.97 | 115.71 | 1.26 | |
| 800 | 116.93 | 115.41 | 1.52 | |
| | 116.89 | 115.33 | 1.57 | |
| | 116.85 | 115.24 | 1.61 | |
| | 116.81 | 115.16 | 1.66 | |
| | 116.78 | 115.07 | 1.70 | |
| 900 | 116.74 | 114.99 | 1.75 | |
| | 116.70 | 114.89 | 1.80 | |
| | 116.66 | 114.80 | 1.86 | |
| | 116.57 | 114.70 | 1.86 | |
| | 116.37 | 114.61 | 1.76 | |
| 19+000 | 116.12 | 114.51 | 1.61 | |
| | 115.86 | 114.56 | 1.30 | |
| | 115.61 | 114.61 | 1.00 | |
| | 115.36 | 114.67 | 0.70 | |
| | 115.11 | 114.72 | 0.39 | |
| 100 | 114.86 | 114.77 | 0.09 | |
| | 114.61 | 114.34 | 0.27 | |
| | 114.35 | 113.90 | 0.45 | |
| | 114.10 | 113.47 | 0.63 | |
| | 113.85 | 113.03 | 0.82 | |
| 200 | 113.51 | 112.60 | 0.91 | |
| | 112.93 | 111.95 | 0.99 | |
| | 112.21 | 111.30 | 0.92 | |
| | 111.49 | 110.64 | 0.84 | |
| | 110.76 | 109.99 | 0.77 | |
| 300 | 110.04 | 109.34 | 0.70 | |
| | 109.40 | 108.96 | 0.44 | |
| | 108.95 | 108.59 | 0.36 | |
| | 108.68 | 108.21 | 0.47 | |
| | 108.59 | 107.84 | 0.75 | |
| 400 | 108.59 | 107.46 | 1.13 | |
| | 108.59 | 107.06 | 1.53 | |
| | 108.59 | 106.85 | 1.73 | |
| | 108.59 | 106.65 | 1.94 | |
| 500 | 108.51 | 106.45 | 2.06 | |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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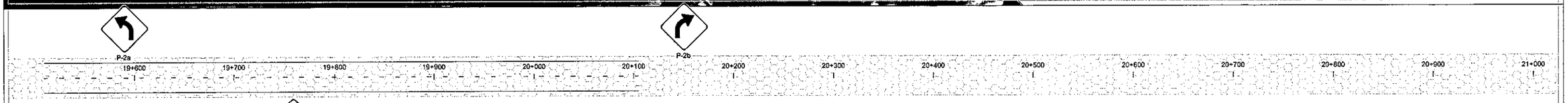
VICE MINISTERIO DE OBRAS PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

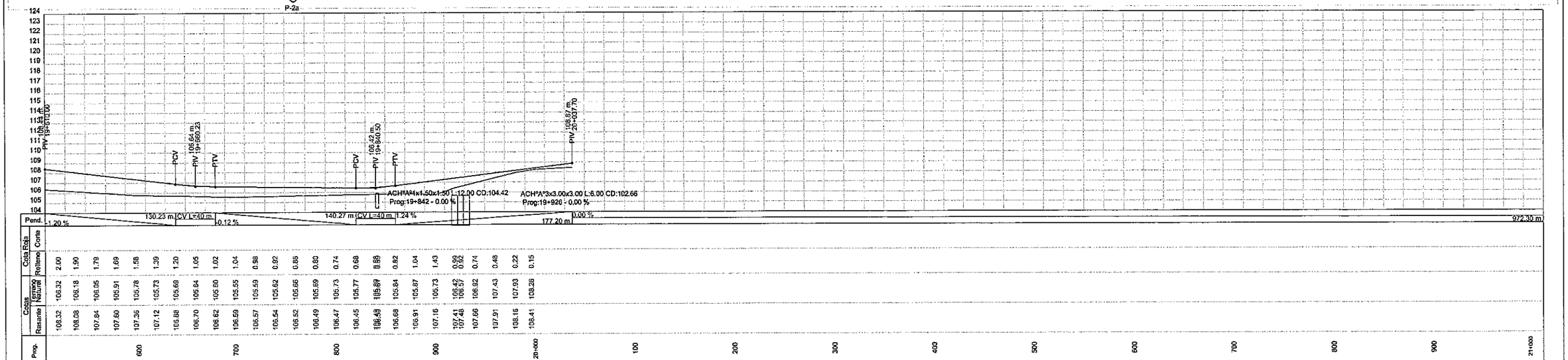
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 18+010 - 19+510 | H = 1:2000<br>V = 1:200 | 13 |

| N° | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 61 | 52°42'59.86" | I | 100.00 | 11.60 | 49.55 | 92.01 | 0.57 °/m | 19+883.13 | 19+932.68 | 19+975.14 | 0.00 | 554972.18 | 7146605.49 |
| 62 | 0°0'0.00" | | | 0.00 | | | | | 20+115.27 | | 0.00 | 554992.03 | 7146783.46 |




| Prog. | Rasante | Terreno Natural | Corte | Relleno |
|---|---|---|---|---|
| 600 | 108.32 | 106.32 | | 2.00 |
| | 108.08 | 106.18 | | 1.90 |
| | 107.84 | 106.05 | | 1.79 |
| | 107.60 | 105.91 | | 1.69 |
| | 107.36 | 105.78 | | 1.58 |
| | 107.12 | 105.73 | | 1.39 |
| | 106.88 | 105.68 | | 1.20 |
| | 106.70 | 105.64 | | 1.05 |
| | 106.62 | 105.60 | | 1.02 |
| 700 | 106.59 | 105.55 | | 1.04 |
| | 106.57 | 105.59 | | 0.98 |
| | 106.54 | 105.62 | | 0.92 |
| | 106.52 | 105.66 | | 0.86 |
| | 106.49 | 105.69 | | 0.80 |
| | 106.47 | 105.73 | | 0.74 |
| | 106.45 | 105.77 | | 0.68 |
| | 106.43 | 105.89 | | 0.89 |
| 800 | 106.68 | 105.84 | | 0.82 |
| | 106.91 | 105.87 | | 1.04 |
| | 107.16 | 105.73 | | 1.43 |
| | 107.41 | 106.42 | 0.99 | |
| | 107.48 | 106.57 | 0.92 | |
| | 107.66 | 106.92 | | 0.74 |
| | 107.91 | 107.43 | | 0.48 |
| 900 | 108.16 | 107.93 | | 0.22 |
| | 108.41 | 108.26 | | 0.15 |
| 20+000 | | | | |
| 100 | | | | |
| 200 | | | | |
| 300 | | | | |
| 400 | | | | |
| 500 | | | | |
| 600 | | | | |
| 700 | | | | |
| 800 | | | | |
| 900 | | | | |
| 21+000 | | | | |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 Km/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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TRAMO: ITAPE - VILLARRICA

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 19+510 - 20+100 | H = 1:2000<br>V = 1:200 | 14 |

16
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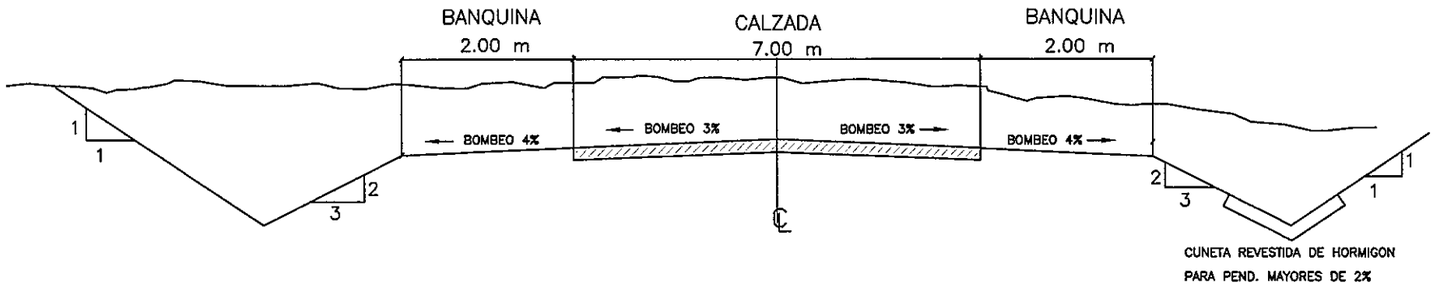
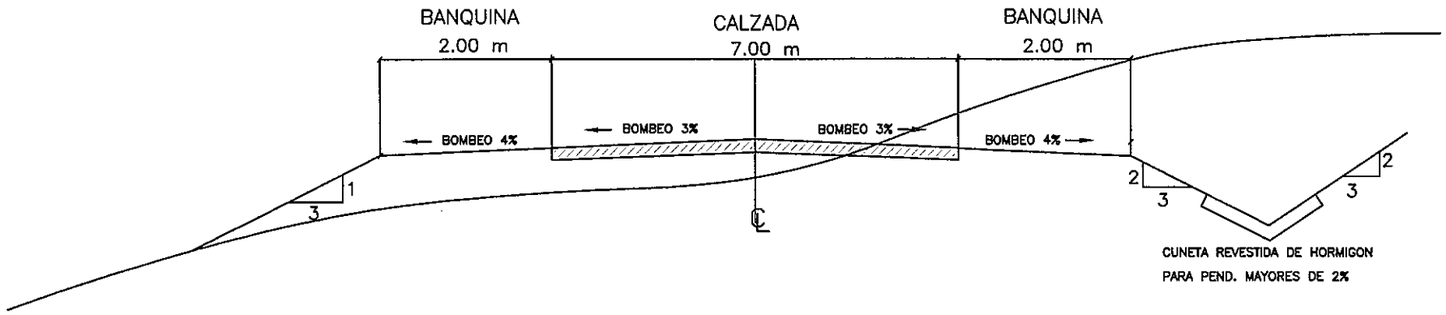
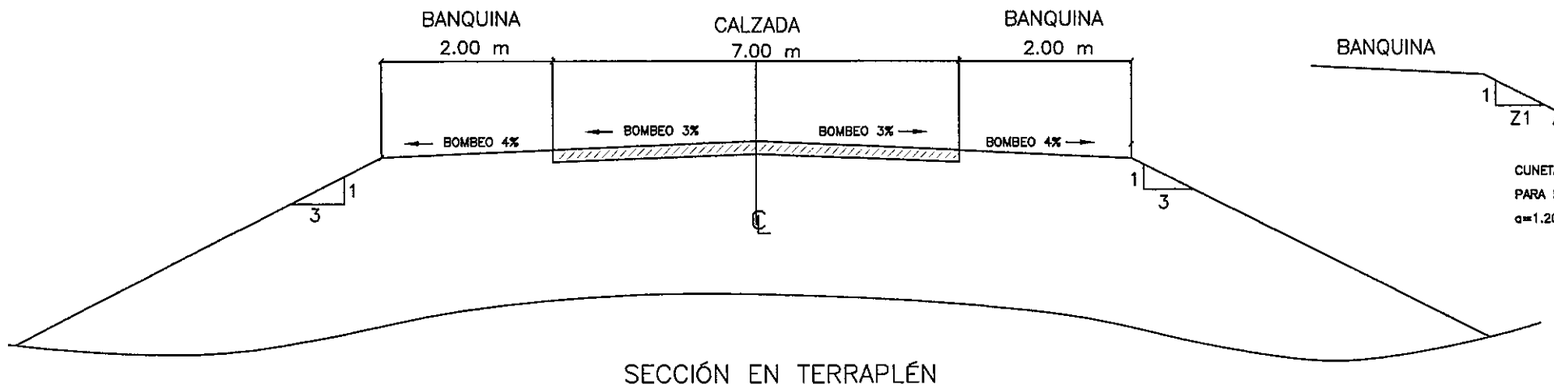



SECCIÓN EN DESMONTE

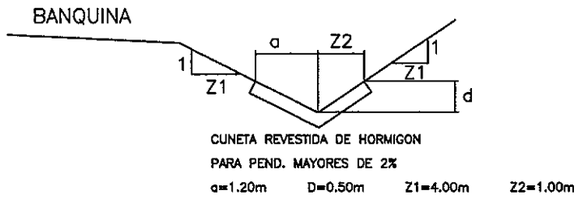



SECCIÓN EN MEDIA LADERA




SECCIÓN EN TERRAPLÉN

SECCIÓN TIPICA DE CUNETA TRIANGULAR




| PARAMETROS TECNICOS | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
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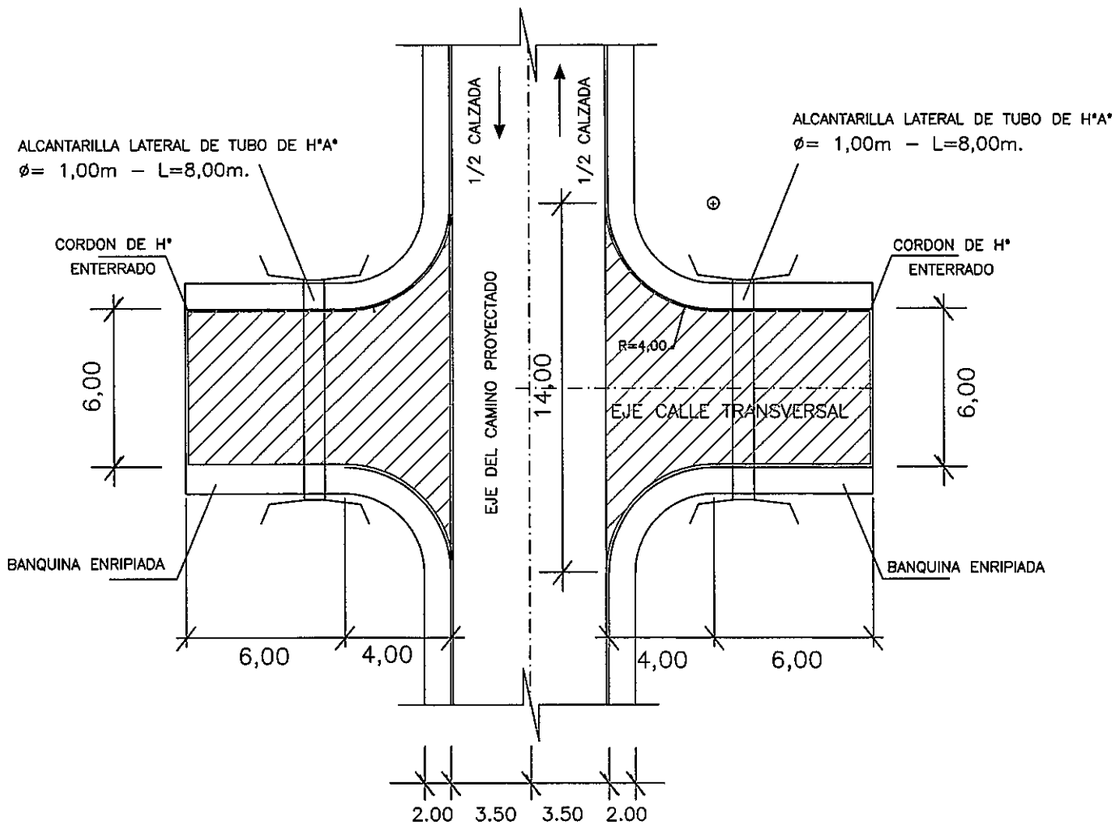
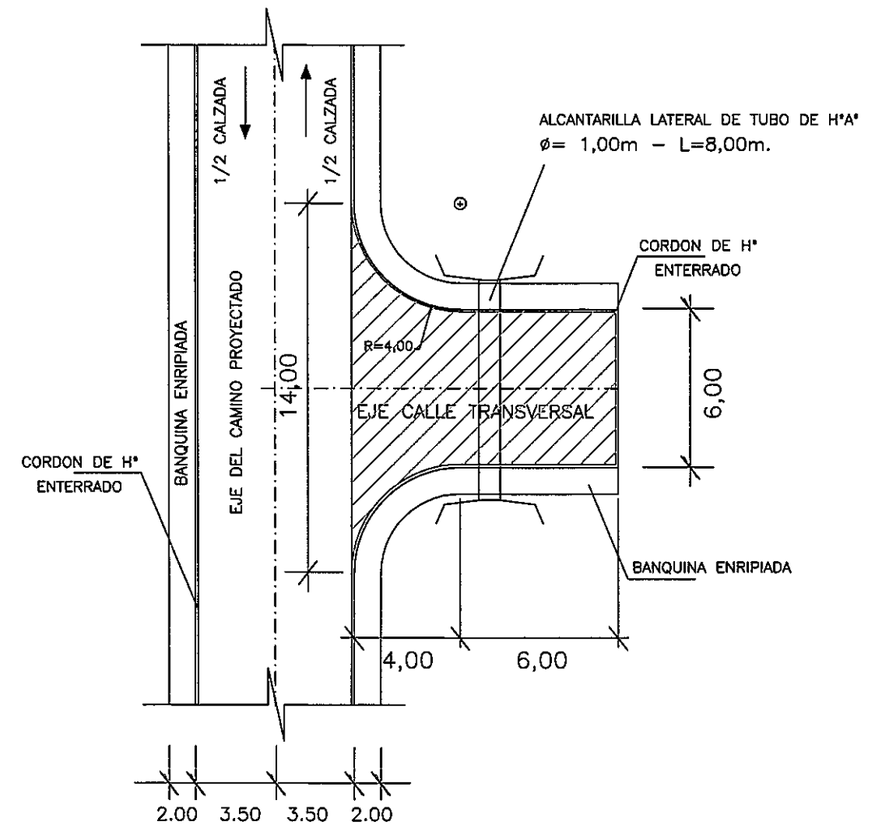
TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

SECCION TIPO

17
diez y siete




# EMPALME CALLE TRANSVERSAL
# PAVIMENTO TIPO EMPEDRADO

| PARAMETROS TECNICOS | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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TRAMO: ITAPE - VILLARRICA

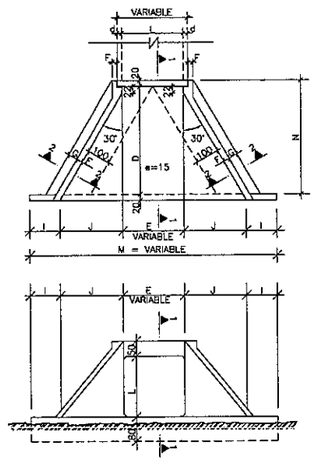
SECCION TIPO

Diez y ocho 18

# CABECERAS NORMALES PARA ALCANTARILLAS CELULARES

## ALCANTARILLA SIMPLE

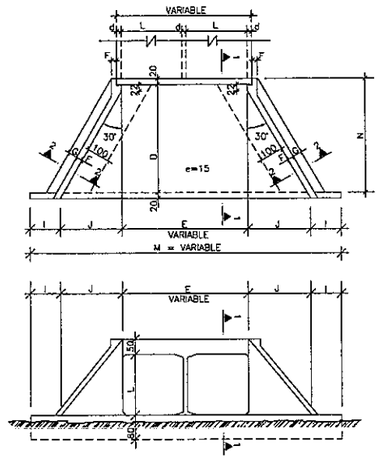
PLANTA - ESC.: 1:100




VISTA FRONTAL - ESC.: 1:100

## ALCANTARILLA DOBLE

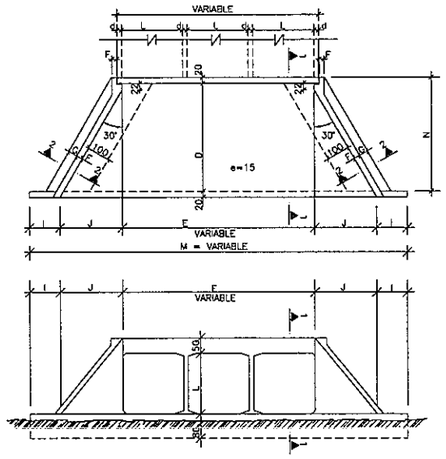
PLANTA - ESC.: 1:100




VISTA FRONTAL - ESC.: 1:100

## ALCANTARILLA TRIPLE

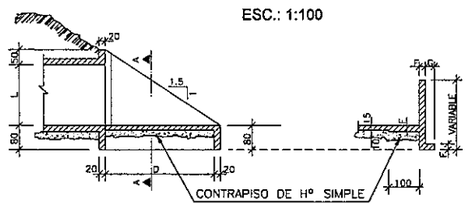
PLANTA - ESC.: 1:100

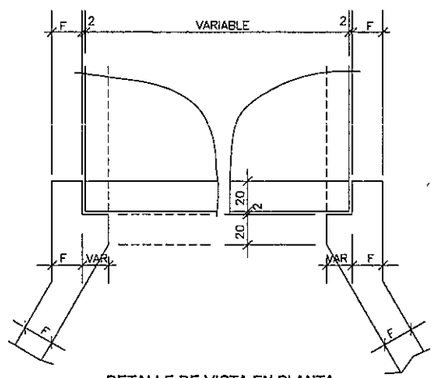



VISTA FRONTAL - ESC.: 1:100

CORTE 1-1 CORTE 2-2

ESC.: 1:100




DETALLE DE VISTA EN PLANTA
ESCALA: 1:20

### NOTAS

1– EL PROYECTO DE LAS CABECERAS SE APLICA A TODOS LOS TIPOS DE ALCANTARILLAS CELULARES NORMALES, ESTANDO REPRESENTADA LA ALCANTARILLA DE 2.00 x 2.00 m. PLANTA, VISTA FRONTAL Y CORTES EN ESCALA 1:100 ; DETALLE EN ESCALA 1:20.

2– LAS CANTIDADES INDICADAS EN LAS TABLAS SON PARA DOS CABECERAS COMPLETAS, ESTANDO COMPUTADAS: LAS ALAS (4x ); LOSA DE PISO ENTREALAS (2x ); VIGA DE BORDE INFERIOR DEL CUERPO DE LA ALCANTARILLA (2x ).

3– EL CONTRAPISO BAJO LA LOSA DE PISO ENTRE ALAS ES DE Hº SIMPLE fck ⩾ 9 MPa DE UN ESPESOR DE 10 cm.

4– HORMIGON PARA CABECERAS fck ⩾ 21 MPa.

5– NOMENCLATURA: fs = TENSION ADMISIBLE DEL SUELO BAJO LA GALERIA.

6– ADOPTAR P/ DETALLE DE ARMADURAS DE ALCANTARILLAS CELULARES DE 1,00 x 0,80m. LAS INDICACIONES P/ ALCANTARILLAS CELULARES DE 1,00 x 1,00m.

# TABLA DE DIMENSIONES Y CANTIDAD DE MATERIALES PARA AMBAS CABECERAS

### ALCANTARILLA SIMPLE

| (cm) | 1.00x0.80m. fs ⩾ 0.09 MPa | 1.00x1.00m. fs ⩾ 0.09 MPa | 1.50x1.50m. fs ⩾ 0.09 MPa | 2.00x2.00m. fs ⩾ 0.09 MPa | 2.50x2.50m. fs ⩾ 0.10 MPa | 3.00x3.00m. fs ⩾ 0.12 MPa |
|---|---|---|---|---|---|---|
| D | 280.0 | 280.0 | 280.0 | 355.0 | 430.0 | 505.0 |
| E | 100.0 | 100.0 | 150.0 | 200.0 | 250.0 | 300.0 |
| F | 15.0 | 15.0 | 15.0 | 20.0 | 20.0 | 25.0 |
| G | 30.0 | 30.0 | 30.0 | 30.0 | 50.0 | 50.0 |
| I | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| J | 160.5 | 160.5 | 160.5 | 204.0 | 247.0 | 290.5 |
| L | 80.0 | 100.0 | 150.0 | 200.0 | 250.0 | 300.0 |
| M | 621.0 | 621.0 | 671.0 | 808.0 | 944.0 | 1081.0 |
| N | 320.0 | 320.0 | 320.0 | 395.0 | 470.0 | 545.0 |

### ALCANTARILLA DOBLE

| MEDIDAS (cm) | 1.00x1.00m. fs ⩾ 0.10 MPa | 1.50x1.50m. fs ⩾ 0.10 MPa | 2.00x2.00m. fs ⩾ 0.13 MPa | 2.50x2.50m. fs ⩾ 0.21 MPa | 3.00x3.00m. fs ⩾ 0.21 MPa |
|---|---|---|---|---|---|
| D | 280.0 | 280.0 | 355.0 | 430.0 | 505.0 |
| E | 215.0 | | 2L + d | | |
| F | 15.0 | 15.0 | 20.0 | 20.0 | 25.0 |
| G | 30.0 | 30.0 | 30.0 | 50.0 | 50.0 |
| I | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| J | 160.5 | 160.5 | 204.0 | 247.0 | 290.5 |
| L | 100.0 | 150.0 | 200.0 | 250.0 | 300.0 |
| M | 636.0 | | 200 + 2J + E | | |
| N | 320.0 | 320.0 | 395.0 | 470.0 | 545.0 |

### ALCANTARILLA TRIPLE

| MEDIDAS (cm) | 1.50x1.50m. fs ⩾ 0.10 MPa | 2.00x2.00m. fs ⩾ 0.13 MPa | 2.50x2.50m. fs ⩾ 0.21 MPa | 3.00x3.00m. fs ⩾ 0.21 MPa |
|---|---|---|---|---|
| D | 280.0 | 355.0 | 430.0 | 505.0 |
| E | | 3L + 2d | | |
| F | 15.0 | 20.0 | 20.0 | 25.0 |
| G | 30.0 | 30.0 | 50.0 | 50.0 |
| I | 100.0 | 100.0 | 100.0 | 100.0 |
| J | 160.5 | 204.0 | 247.0 | 290.5 |
| L | 150.0 | 200.0 | 250.0 | 300.0 |
| M | | 200 + 2J + E | | |
| N | 320.0 | 395.0 | 470.0 | 545.0 |

### ALCANTARILLA SIMPLE

| DESCRIPCION | UNID | 1.00x0.80m. | 1.00x1.00m. | 1.50x1.50m. | 2.00x2.00m. | 2.50x2.50m. | 3.00x3.00m. |
|---|---|---|---|---|---|---|---|
| CONTRAPISO | $m^3$ | 1.69 | 1.69 | 4.35 | 6.30 | 8.70 | 11.55 |
| ENCOFRADO | $m^2$ | 58.20 | 65.16 | 83.50 | 113.00 | 144.00 | 181.00 |
| HORMIGON | $m^3$ | 7.11 | 7.96 | 10.85 | 17.86 | 24.35 | 36.53 |

### ALCANTARILLA DOBLE

| DESCRIPCION | UNID | 1.00x1.00m. | 1.50x1.50m. | 2.00x2.00m. | 2.50x2.50m. | 3.00x3.00m. |
|---|---|---|---|---|---|---|
| CONTRAPISO | $m^3$ | 2.60 | 3.93 | 6.45 | 9.75 | 13.65 |
| ENCOFRADO | $m^2$ | 71.70 | 92.00 | 120.80 | 155.00 | 193.00 |
| HORMIGON | $m^3$ | 8.57 | 12.35 | 20.86 | 30.05 | 44.43 |

### ALCANTARILLA TRIPLE

| DESCRIPCION | UNID | 1.50x1.50m. | 2.00x2.00m. | 2.50x2.50m. | 3.00x3.00m. |
|---|---|---|---|---|---|
| CONTRAPISO | $m^3$ | 5.40 | 8.85 | 13.20 | 18.45 |
| ENCOFRADO | $m^2$ | 104.00 | 136.00 | 174.00 | 217.00 |
| HORMIGON | $m^3$ | 16.40 | 26.26 | 35.75 | 52.43 |

### PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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TRAMO: ITAPE - VILLARRICA

ALCANTARILLA CELULAR

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# TABLA DE LAS DIMENSIONES DE MATERIALES PARA ALCANTARILLAS CELULARES

## ALCANTARILLA CELULAR DE 1.50 x 1.50

| SECCION L=150 | | 0 ⩽ h ⩽ 100 | | | 100 ⩽ h ⩽ 250 | | | 250 ⩽ h ⩽ 500 | | | 500 ⩽ h ⩽ 750 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fs ⩾ MPa | | 0.09 | 0.10 | 0.10 | 0.10 | 0.12 | 0.12 | 0.14 | 0.18 | 0.18 | 0.19 | 0.24 | 0.24 |
| MEDIDAS | UNID. | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE |
| A | cm. | 180 | 345 | 510 | 180 | 345 | 510 | 180 | 345 | 510 | 180 | 345 | 510 |
| B | cm. | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| C | cm. | 210 | 375 | 540 | 210 | 375 | 540 | 210 | 375 | 540 | 210 | 375 | 540 |
| a | cm. | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| b | cm. | — | 30 | 30 | — | 30 | 30 | — | 30 | 30 | — | 30 | 30 |
| d | cm. | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| CONTRAPISO | $m^3$ | 0.21 | 0.38 | 0.54 | 0.21 | 0.38 | 0.54 | 0.21 | 0.38 | 0.54 | 0.21 | 0.38 | 0.54 |
| ENCOFRADO | $m^2$ | 8.10 | 12.20 | 16.50 | 8.10 | 12.20 | 16.50 | 8.10 | 12.20 | 16.50 | 8.10 | 12.20 | 16.50 |
| HORMIGON | $m^3$ | 1.01 | 1.79 | 2.57 | 1.01 | 1.79 | 2.57 | 1.01 | 1.79 | 2.57 | 1.01 | 1.79 | 2.57 |

## ALCANTARILLA CELULAR DE 2.00 x 2.00

| SECCION L=200 | | 0 ⩽ h ⩽ 100 | | | 100 ⩽ h ⩽ 250 | | | 250 ⩽ h ⩽ 500 | | | 500 ⩽ h ⩽ 750 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fs ⩾ MPa | | 0.09 | 0.13 | 0.13 | 0.10 | 0.15 | 0.15 | 0.15 | 0.23 | 0.23 | 0.20 | 0.26 | 0.27 |
| MEDIDAS | UNID. | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE |
| A | cm. | 230 | 445 | 660 | 230 | 445 | 660 | 240 | 445 | 650 | 240 | 460 | 680 |
| B | cm. | 230 | 230 | 230 | 230 | 230 | 230 | 240 | 230 | 230 | 240 | 240 | 240 |
| C | cm. | 250 | 475 | 690 | 260 | 475 | 690 | 270 | 475 | 690 | 270 | 490 | 710 |
| a | cm. | 10 | 10 | 10 | 10 | 10 | 10 | 15 | 10 | 10 | 15 | 15 | 15 |
| b | cm. | — | 30 | 30 | — | 30 | 30 | — | 30 | 30 | — | 45 | 45 |
| d | cm. | 15 | 15 | 15 | 15 | 15 | 15 | 20 | 15 | 15 | 20 | 20 | 20 |
| CONTRAPISO | $m^3$ | 0.26 | 0.48 | 0.69 | 0.26 | 0.48 | 0.69 | 0.27 | 0.48 | 0.69 | 0.27 | 0.49 | 0.71 |
| ENCOFRADO | $m^2$ | 10.60 | 16.60 | 22.00 | 10.60 | 16.60 | 22.00 | 10.80 | 16.60 | 22.00 | 10.80 | 16.20 | 21.90 |
| HORMIGON | $m^3$ | 1.31 | 2.32 | 3.32 | 1.31 | 2.32 | 3.32 | 1.81 | 2.32 | 3.32 | 1.81 | 3.22 | 4.64 |

## ALCANTARILLA CELULAR DE 2.50 x 2.50

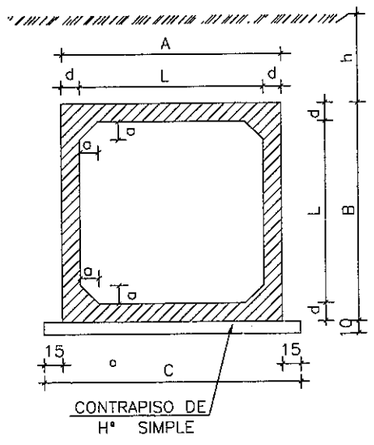
| SECCION L=250 | | 0 ⩽ h ⩽ 100 | | | 100 ⩽ h ⩽ 250 | | | 250 ⩽ h ⩽ 500 | | | 500 ⩽ h ⩽ 750 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fs ⩾ MPa | | 0.10 | 0.21 | 0.21 | 0.11 | 0.21 | 0.21 | 0.16 | 0.23 | 0.23 | 0.21 | 0.28 | 0.28 |
| MEDIDAS | UNID. | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE |
| A | cm. | 290 | 545 | 810 | 290 | 545 | 810 | 290 | 560 | 830 | 300 | 560 | 830 |
| B | cm. | 290 | 280 | 280 | 290 | 280 | 280 | 290 | 290 | 290 | 300 | 290 | 290 |
| C | cm. | 320 | 575 | 840 | 320 | 575 | 840 | 320 | 590 | 860 | 330 | 590 | 860 |
| a | cm. | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| b | cm. | — | 45 | 45 | — | 45 | 45 | — | 45 | 45 | — | 45 | 45 |
| d | cm. | 20 | 15 | 15 | 20 | 15 | 15 | 20 | 20 | 20 | 25 | 20 | 20 |
| CONTRAPISO | $m^3$ | 0.32 | 0.58 | 0.84 | 0.32 | 0.58 | 0.84 | 0.32 | 0.59 | 0.86 | 0.33 | 0.59 | 0.86 |
| ENCOFRADO | $m^2$ | 13.20 | 20.00 | 27.20 | 13.20 | 20.00 | 27.20 | 13.20 | 20.20 | 27.40 | 13.40 | 20.20 | 27.40 |
| HORMIGON | $m^3$ | 2.21 | 2.94 | 4.25 | 2.21 | 2.94 | 4.25 | 2.21 | 3.92 | 5.64 | 2.80 | 3.92 | 5.64 |

## ALCANTARILLA CELULAR DE 3.00 x 3.00

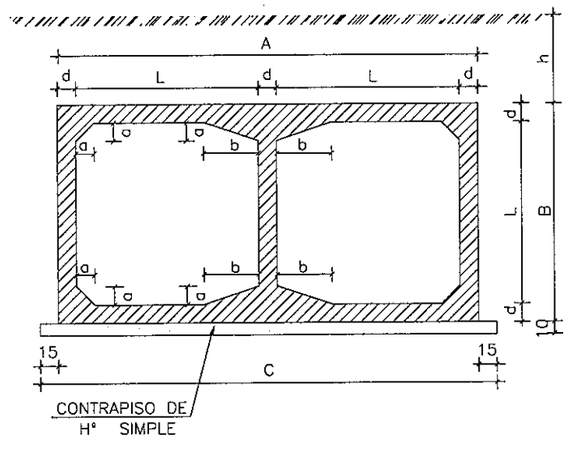
| SECCION L=250 | | 0 ⩽ h ⩽ 100 | | | 100 ⩽ h ⩽ 250 | | | 250 ⩽ h ⩽ 500 | | | 500 ⩽ h ⩽ 750 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fs ⩾ MPa | | 0.12 | 0.21 | 0.21 | 0.12 | 0.21 | 0.21 | 0.17 | 0.23 | 0.23 | 0.22 | 0.28 | 0.29 |
| MEDIDAS | UNID. | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE | SIMPLE | DOBLE | TRIPLE |
| A | cm. | 350 | 660 | 980 | 350 | 660 | 980 | 360 | 675 | 1000 | 360 | 675 | 1000 |
| B | cm. | 350 | 340 | 340 | 350 | 340 | 340 | 360 | 350 | 350 | 360 | 350 | 350 |
| C | cm. | 380 | 690 | 1010 | 380 | 690 | 1010 | 390 | 705 | 1030 | 390 | 705 | 1030 |
| a | cm. | 15 | 15 | 15 | 15 | 15 | 15 | 25 | 15 | 15 | 25 | 15 | 15 |
| b | cm. | — | 45 | 45 | — | 45 | 45 | — | 45 | 45 | — | 45 | 45 |
| d | cm. | 25 | 20 | 20 | 25 | 20 | 20 | 30 | 25 | 25 | 30 | 25 | 25 |
| CONTRAPISO | $m^3$ | 0.38 | 0.69 | 1.01 | 0.38 | 0.69 | 1.01 | 0.39 | 0.71 | 1.03 | 0.39 | 0.71 | 1.03 |
| ENCOFRADO | $m^2$ | 15.90 | 24.20 | 32.90 | 15.90 | 24.20 | 32.90 | 16.10 | 24.40 | 33.10 | 16.10 | 24.40 | 33.10 |
| HORMIGON | $m^3$ | 3.30 | 4.62 | 6.64 | 3.30 | 4.62 | 6.64 | 4.09 | 5.81 | 8.32 | 4.09 | 5.81 | 8.32 |

# DETALLE DE ENCOFRADOS

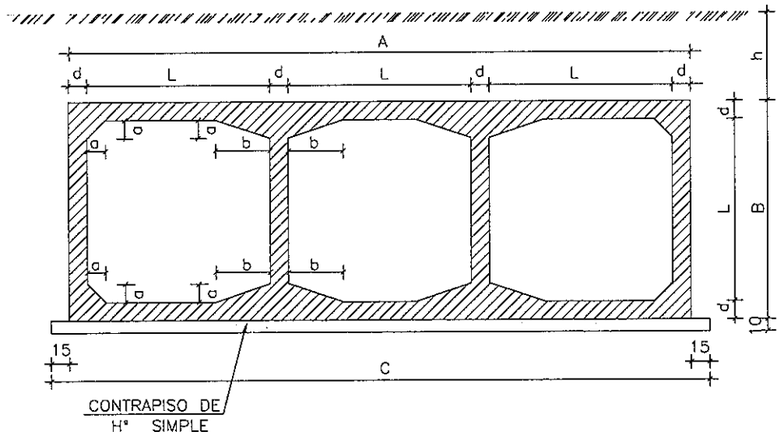
ALCANTARILLA SIMPLE



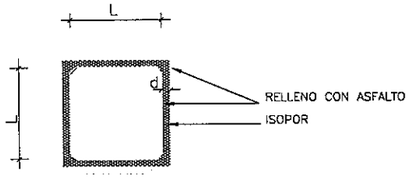

ALCANTARILLA DOBLE



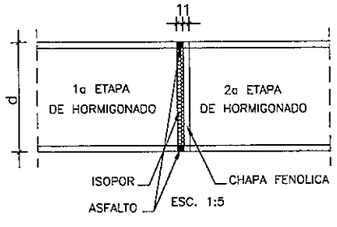

ALCANTARILLA TRIPLE




# DETALLES DE LA JUNTA DE DILATACION




ESC. 1:50




ESC. 1:5

OBSERVACIONES:

1– HORMIGON fck ⩾ 21 MPa
2– CONTRAPISO DE HORMIGON SIMPLE fck ⩾ 9 MPa

3– NOMENCLATURA: h = ALTURA DEL TERRAPLEN SOBRE LA GALERIA
fs = TENSION ADMISIBLE DEL SUELO BAJO LA GALERIA

4– REALIZAR JUNTA DE DILATACION EN ALCANTARILLAS CON LONGITUD MAYOR A 40 m.

NOTA:

DESPUES DEL HORMIGONADO DE LA 1a ETAPA DEBERAN RETIRARSE LAS CHAPAS FENOLICAS DE LA JUNTA.

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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TRAMO: ITAPE - VILLARRICA

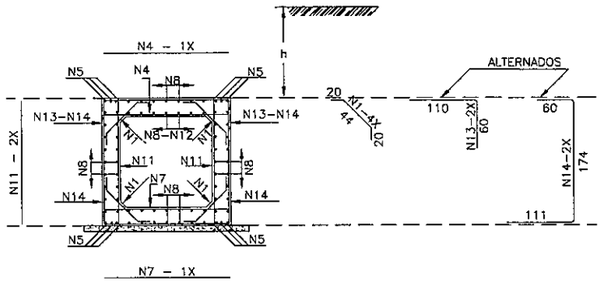
ALCANTARILLA CELULAR

CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

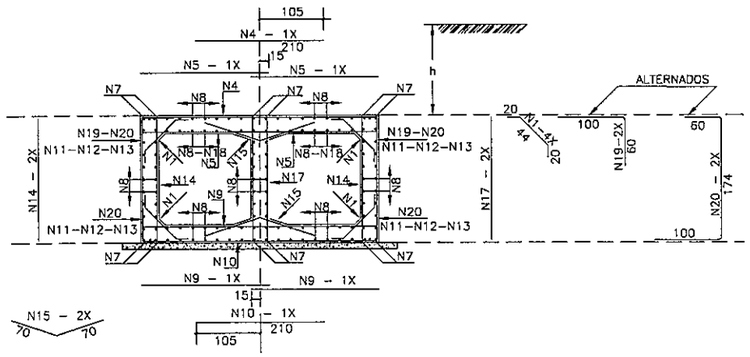
20

# ALCANTARILLAS CELULARES DE 1.50 x 1.50

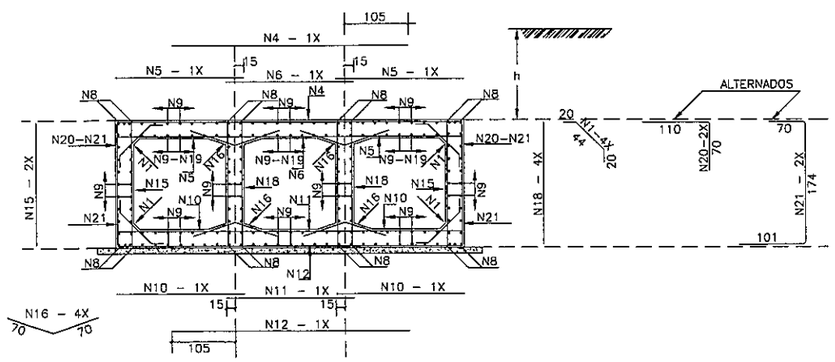
## SECCION TRANSVERSAL SIMPLE




## SECCION TRANSVERSAL DOBLE




## SECCION TRANSVERSAL TRIPLE

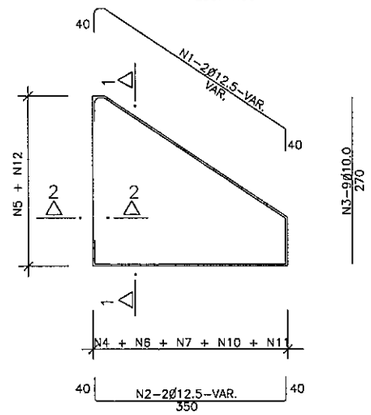



## TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 1.50x1.50

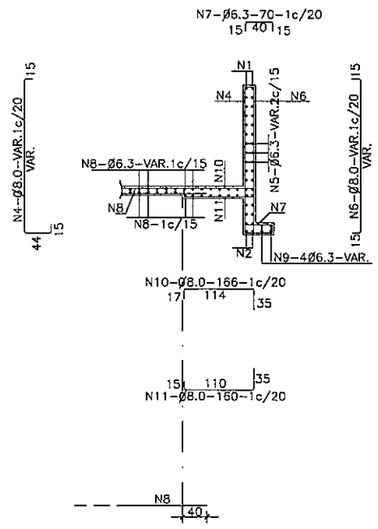
| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 12.5 | 12.5 | 10.0 | 8.0 | 6.3 | 8.0 | 6.3 | 6.3 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 12.5 | 12.5 | 6.3 | 6.3 |
| C | 8 | 8 | 36 | — | — | — | — | — | — | — | — | — | — | 4 | 4 | 12 | — |
| LONG. | 482 | 350 | 270 | VAR. | VAR. | VAR. | 70 | VAR. | 350 | 166 | 160 | 294 | VAR. | CORR. | CORR. | CORR. | 260 |

# ALCANTARILLA CELULAR DE 1.50 x 1.50
# ARMADURAS DE CABECERAS – $\alpha = 0° - 15° - 30° - 45°$

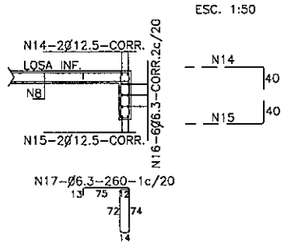
VISTA (4x)
ESC. 1:50



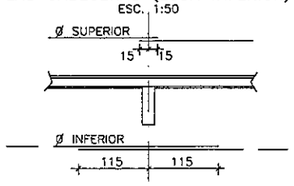

CORTE 1–1 (4x)
ESC. 1:50



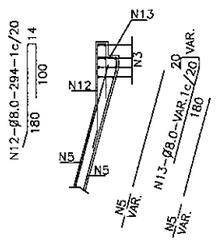

CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50




EMPALME DE LAS ALCANTARILLAS CON LAS CABECERAS (LOSA INFERIOR)
ESC. 1:50




CORTE 2–2 (4x)
ESC. 1:50




## RESUMEN DE LAS ARMADURAS PARA DOS CABECERAS – $\alpha = 0°$

| Ø | 1.50 x 1.50 | | |
|---|---|---|---|
| TIPO | SIMPLE | DOBLE | TRIPLE |
| 6.3 | 492 | 545 | 748 |
| 8.0 | 15 | 96 | 46 |
| 10.0 | 95 | 111 | 161 |
| 12.5 | 161 | 220 | 274 |
| 16.0 | — | — | — |
| 20.0 | — | — | — |
| TOTAL | 763 Kg | 972 Kg | 1.229 Kg |

NOTAS

1– LA CANTIDAD DE ARMADURAS SERA DETERMINADA POR LAS MEDIDAS REALES DEL ENCOFRADO PARA CADA TIPO DE ALCANTARILLA

2– EN LA TABLA ESTAN COMPUTADAS AMBAS CABECERAS

## TABLAS DE ARMADURAS POR METRO DE GALERIA

$\bar{f}s \geq 0.09$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 6 | 175 | c/16cm |
| 5 | 12.5 | 12 | CORR. | — |
| 6 | — | — | — | — |
| 7 | 12.5 | 6 | 175 | c/16cm |
| 8 | 6.3 | 48 | CORR. | c/20cm |
| 9 | — | — | — | — |
| 10 | — | — | — | — |
| 11 | 6.3 | 10 | 175 | c/20cm |
| 12 | 10.0 | 7 | CORR. | c/20cm |
| 13 | 12.5 | 8 | 170 | c/24cm |
| 14 | 12.5 | 8 | 344 | c/24cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 22 |
| 10.0 | 0.624 | 5 |
| 12.5 | 0.988 | 75 |
| TOTAL | | 102 Kg |

$\bar{f}s \geq 0.13$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 8 | 210 | c/12cm |
| 5 | 10.0 | 17 | 180 | c/12cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 84 | CORR. | c/20cm |
| 9 | 10.0 | 13 | 180 | c/15cm |
| 10 | 10.0 | 5 | 210 | c/20cm |
| 11 | — | — | — | — |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | 6.3 | 13 | 175 | c/15cm |
| 15 | 6.3 | 10 | 140 | c/20cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 10 | 175 | c/20cm |
| 18 | 10.0 | 16 | CORR. | c/18cm |
| 19 | 12.5 | 10 | 160 | c/20cm |
| 20 | 12.5 | 10 | 334 | c/20cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 40 |
| 10.0 | 0.624 | 51 |
| 12.5 | 0.988 | 79 |
| TOTAL | | 170 Kg |

$\bar{f}s \geq 0.12$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 7 | 375 | c/15cm |
| 5 | 12.5 | 10 | 180 | c/20cm |
| 6 | 12.5 | 5 | 180 | c/20cm |
| 7 | — | — | — | — |
| 8 | 12.5 | 16 | CORR. | — |
| 9 | 6.3 | 115 | CORR. | c/20cm |
| 10 | 8.0 | 20 | 180 | c/10cm |
| 11 | 8.0 | 9 | 180 | c/11cm |
| 12 | 8.0 | 8 | 375 | c/13cm |
| 13 | — | — | — | — |
| 14 | — | — | — | — |
| 15 | 6.3 | 13 | 175 | c/15cm |
| 16 | 6.3 | 20 | 140 | c/20cm |
| 17 | — | — | — | — |
| 18 | 6.3 | 27 | 175 | c/15cm |
| 19 | 8.0 | 33 | CORR. | c/13cm |
| 20 | 12.5 | 10 | 180 | c/20cm |
| 21 | 12.5 | 10 | 345 | c/20cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 61 |
| 8.0 | 0.393 | 47 |
| 12.5 | 0.988 | 122 |
| TOTAL | | 230 Kg |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 Km/h |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 m. |
| RADIO MINIMO HORIZONTAL: | 60 m. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 m. |

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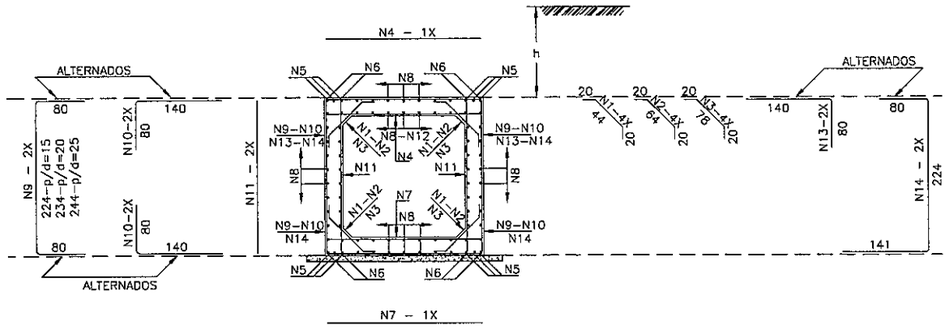
TRAMO: ITAPE - VILLARRICA

ALCANTARILLA CELULAR

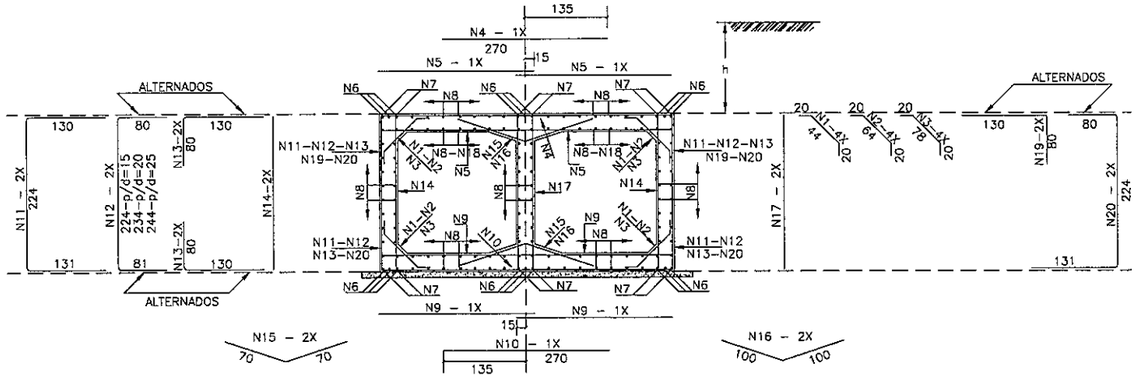
21

# ALCANTARILLAS CELULARES DE 2.00 x 2.00

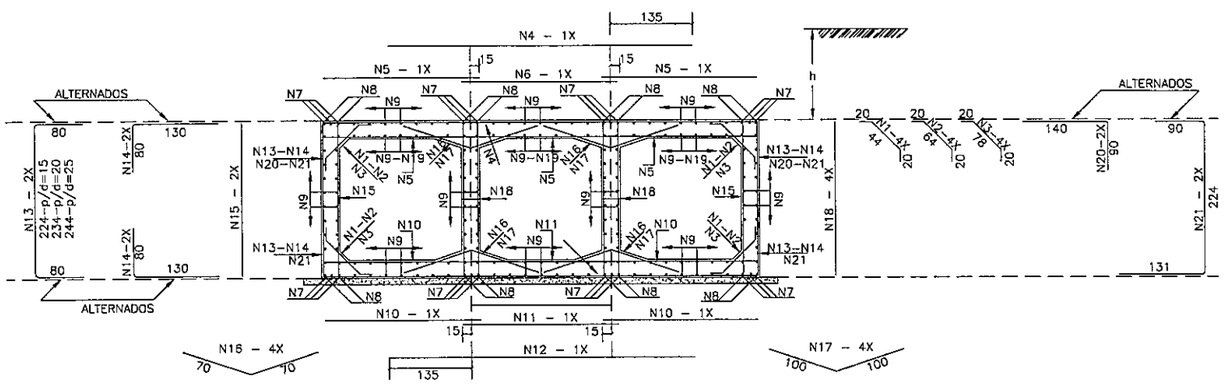
## SECCION TRANSVERSAL SIMPLE




## SECCION TRANSVERSAL DOBLE




## SECCION TRANSVERSAL TRIPLE




## TABLAS DE ARMADURAS POR METRO DE GALERIA

**0 ⩽ h ⩽ 100 — $\bar{f}s \geq 0.09$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 6 | 225 | c/16cm |
| 5 | 12.5 | 12 | CORR. | — |
| 6 | — | — | — | — |
| 7 | 12.5 | 6 | 225 | c/16cm |
| 8 | 6.3 | 63 | CORR. | c/20cm |
| 9 | — | — | — | — |
| 10 | — | — | — | — |
| 11 | 6.3 | 10 | 225 | c/20cm |
| 12 | 10.0 | 9 | CORR. | c/20cm |
| 13 | 12.5 | 8 | 220 | c/24cm |
| 14 | 12.5 | 8 | 445 | c/24cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 27 |
| 10.0 | 0.624 | 6 |
| 12.5 | 0.988 | 93 |
| TOTAL | | 126 Kg |

**100 ⩽ h ⩽ 250 — $\bar{f}s \geq 0.10$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 8 | 225 | c/13cm |
| 5 | — | — | — | — |
| 6 | 16.0 | 8 | CORR. | — |
| 7 | 10.0 | 9 | 225 | c/11cm |
| 8 | 6.3 | 72 | CORR. | c/20cm |
| 9 | 10.0 | 6 | 385 | c/34cm |
| 10 | 10.0 | 12 | 220 | c/34cm |
| 11 | 6.3 | 10 | 225 | c/20cm |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 29 |
| 10.0 | 0.624 | 55 |
| 16.0 | 1,570 | 14 |
| TOTAL | | 98 Kg |

**250 ⩽ h ⩽ 500 — $\bar{f}s \geq 0.15$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 104 | c/20cm |
| 3 | — | — | — | — |
| 4 | 10.0 | 10 | 235 | c/10cm |
| 5 | — | — | — | — |
| 6 | 16.0 | 8 | CORR. | — |
| 7 | 10.0 | 10 | 235 | c/10cm |
| 8 | 6.3 | 72 | CORR. | c/20cm |
| 9 | 10.0 | 7 | 395 | c/30cm |
| 10 | 10.0 | 13 | 220 | c/30cm |
| 11 | 6.3 | 13 | 235 | c/15cm |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 32 |
| 10.0 | 0.624 | 65 |
| 16.0 | 1.570 | 14 |
| TOTAL | | 111 Kg |

**500 ⩽ h ⩽ 750 — $\bar{f}s \geq 0.20$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 104 | c/20cm |
| 3 | — | — | — | — |
| 4 | 12.5 | 9 | 235 | c/11cm |
| 5 | — | — | — | — |
| 6 | 16.0 | 8 | CORR. | — |
| 7 | 12.5 | 10 | 235 | c/10cm |
| 8 | 6.3 | 72 | CORR. | c/20cm |
| 9 | 12.5 | 7 | 395 | c/30cm |
| 10 | 12.5 | 13 | 220 | c/30cm |
| 11 | 6.3 | 13 | 235 | c/15cm |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 32 |
| 12.5 | 0.988 | 100 |
| 16.0 | 1.570 | 14 |
| TOTAL | | 146 Kg |

**0 ⩽ h ⩽ 100 — $\bar{f}s \geq 0.13$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 8 | 270 | c/12cm |
| 5 | 10.0 | 17 | 230 | c/12cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 108 | CORR. | c/20cm |
| 9 | 10.0 | 13 | 230 | c/15cm |
| 10 | 10.0 | 5 | 270 | c/20cm |
| 11 | — | — | — | — |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | 6.3 | 13 | 225 | c/15cm |
| 15 | 6.3 | 10 | 140 | c/20cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 10 | 225 | c/20cm |
| 18 | 10.0 | 20 | CORR. | c/18cm |
| 19 | 12.5 | 10 | 210 | c/20cm |
| 20 | 12.5 | 10 | 435 | c/20cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 50 |
| 10.0 | 0.624 | 65 |
| 12.5 | 0.988 | 99 |
| TOTAL | | 214 Kg |

**100 ⩽ h ⩽ 250 — $\bar{f}s \geq 0.15$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 6 | 270 | c/18cm |
| 5 | 10.0 | 13 | 230 | c/16cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 126 | CORR. | c/20cm |
| 9 | 10.0 | 15 | 230 | c/13cm |
| 10 | 10.0 | 7 | 270 | c/15cm |
| 11 | 10.0 | 10 | 485 | c/20cm |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | 6.3 | 13 | 225 | c/15cm |
| 15 | 6.3 | 10 | 140 | c/20cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 10 | 225 | c/20cm |
| 18 | — | — | — | — |
| 19 | — | — | — | — |
| 20 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 55 |
| 10.0 | 0.624 | 93 |
| 12.5 | 0.988 | 13 |
| TOTAL | | 161 Kg |

**250 ⩽ h ⩽ 500 — $\bar{f}s \geq 0.23$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 6 | 270 | c/16cm |
| 5 | 12.5 | 14 | 230 | c/14cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 126 | CORR. | c/20cm |
| 9 | 12.5 | 17 | 230 | c/12cm |
| 10 | 12.5 | 7 | 270 | c/15cm |
| 11 | — | — | — | — |
| 12 | 10.0 | 8 | 385 | c/26cm |
| 13 | 10.0 | 15 | 210 | c/26cm |
| 14 | 6.3 | 13 | 225 | c/15cm |
| 15 | 6.3 | 10 | 140 | c/20cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 10 | 225 | c/20cm |
| 18 | — | — | — | — |
| 19 | — | — | — | — |
| 20 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 55 |
| 10.0 | 0.624 | 39 |
| 12.5 | 0.988 | 119 |
| TOTAL | | 213 Kg |

**500 ⩽ h ⩽ 750 — $\bar{f}s \geq 0.26$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 104 | c/20cm |
| 3 | — | — | — | — |
| 4 | 12.5 | 7 | 270 | c/14cm |
| 5 | 12.5 | 14 | 240 | c/14cm |
| 6 | 12.5 | 18 | CORR. | — |
| 7 | — | — | — | — |
| 8 | 6.3 | 126 | CORR. | c/20cm |
| 9 | 12.5 | 17 | 240 | c/12cm |
| 10 | 12.5 | 8 | 270 | c/12cm |
| 11 | — | — | — | — |
| 12 | 10.0 | 8 | 395 | c/26cm |
| 13 | 10.0 | 15 | 210 | c/26cm |
| 14 | 10.0 | 8 | 235 | c/25cm |
| 15 | — | — | — | — |
| 16 | 6.3 | 10 | 200 | c/20cm |
| 17 | 10.0 | 7 | 235 | c/30cm |
| 18 | — | — | — | — |
| 19 | — | — | — | — |
| 20 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 44 |
| 10.0 | 0.624 | 62 |
| 12.5 | 0.988 | 133 |
| TOTAL | | 239 Kg |

**0 ⩽ h ⩽ 100 — $\bar{f}s \geq 0.12$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 7 | 485 | c/15cm |
| 5 | 12.5 | 10 | 230 | c/20cm |
| 6 | 12.5 | 5 | 230 | c/20cm |
| 7 | — | — | — | — |
| 8 | 12.5 | 16 | CORR. | — |
| 9 | 6.3 | 153 | CORR. | c/20cm |
| 10 | 8.0 | 20 | 230 | c/10cm |
| 11 | 8.0 | 9 | 230 | c/11cm |
| 12 | 8.0 | 8 | 485 | c/13cm |
| 13 | — | — | — | — |
| 14 | — | — | — | — |
| 15 | 6.3 | 13 | 225 | c/15cm |
| 16 | 6.3 | 20 | 140 | c/20cm |
| 17 | — | — | — | — |
| 18 | 6.3 | 27 | 225 | c/15cm |
| 19 | 8.0 | 42 | CORR. | c/13cm |
| 20 | 12.5 | 10 | 230 | c/20cm |
| 21 | 12.5 | 10 | 445 | c/20cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 75 |
| 8.0 | 0.393 | 59 |
| 12.5 | 0.988 | 152 |
| TOTAL | | 286 Kg |

**100 ⩽ h ⩽ 250 — $\bar{f}s \geq 0.14$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 6 | 485 | c/17cm |
| 5 | 10.0 | 13 | 230 | c/16cm |
| 6 | 10.0 | 5 | 230 | c/20cm |
| 7 | — | — | — | — |
| 8 | 12.5 | 16 | CORR. | — |
| 9 | 6.3 | 180 | CORR. | c/20cm |
| 10 | 10.0 | 17 | 230 | c/12cm |
| 11 | 10.0 | 7 | 230 | c/14cm |
| 12 | 10.0 | 6 | 485 | c/17cm |
| 13 | 10.0 | 6 | 385 | c/34cm |
| 14 | 10.0 | 12 | 210 | c/34cm |
| 15 | 6.3 | 13 | 225 | c/15cm |
| 16 | 6.3 | 20 | 140 | c/20cm |
| 17 | — | — | — | — |
| 18 | 6.3 | 27 | 225 | c/15cm |
| 19 | — | — | — | — |
| 20 | — | — | — | — |
| 21 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 82 |
| 10.0 | 0.624 | 127 |
| 12.5 | 0.988 | 18 |
| TOTAL | | 227 Kg |

**250 ⩽ h ⩽ 500 — $\bar{f}s \geq 0.21$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 84 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 9 | 485 | c/11cm |
| 5 | 12.5 | 15 | 230 | c/13cm |
| 6 | 12.5 | 5 | 230 | c/20cm |
| 7 | 12.5 | 24 | CORR. | — |
| 8 | — | — | — | — |
| 9 | 6.3 | 180 | CORR. | c/20cm |
| 10 | 12.5 | 18 | 230 | c/11cm |
| 11 | 12.5 | 8 | 230 | c/13cm |
| 12 | 10.0 | 9 | 485 | c/11cm |
| 13 | 10.0 | 8 | 385 | c/26cm |
| 14 | 10.0 | 15 | 210 | c/26cm |
| 15 | 6.3 | 13 | 225 | c/15cm |
| 16 | 6.3 | 20 | 140 | c/20cm |
| 17 | — | — | — | — |
| 18 | 6.3 | 27 | 225 | c/15cm |
| 19 | — | — | — | — |
| 20 | — | — | — | — |
| 21 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 82 |
| 10.0 | 0.624 | 94 |
| 12.5 | 0.988 | 131 |
| TOTAL | | 307 Kg |

**500 ⩽ h ⩽ 750 — $\bar{f}s \geq 0.21$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 8 | 490 | c/12cm |
| 5 | 12.5 | 15 | 240 | c/13cm |
| 6 | 12.5 | 6 | 240 | c/18cm |
| 7 | 12.5 | 24 | CORR. | — |
| 8 | — | — | — | — |
| 9 | 6.3 | 180 | CORR. | c/20cm |
| 10 | 12.5 | 18 | 240 | c/11cm |
| 11 | 12.5 | 7 | 240 | c/14cm |
| 12 | 10.0 | 10 | 490 | c/10cm |
| 13 | 10.0 | 7 | 395 | c/30cm |
| 14 | 10.0 | 13 | 210 | c/30cm |
| 15 | 10.0 | 7 | 235 | c/30cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 20 | 200 | c/20cm |
| 18 | 10.0 | 13 | 235 | c/30cm |
| 19 | — | — | — | — |
| 20 | — | — | — | — |
| 21 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 63 |
| 10.0 | 0.624 | 119 |
| 12.5 | 0.988 | 136 |
| TOTAL | | 318 Kg |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl A. Montiel C.
Gerente Técnico
Consorcio: CONSULPAR S.A. — GEOLATINA S.A.

CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

REPUBLICA DEL PARAGUAY
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REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

ALCANTARILLA CELULAR

22 diseños

# ALCANTARILLAS CELULARES DE 2.50 x 2.50

## SECCION TRANSVERSAL SIMPLE

## SECCION TRANSVERSAL DOBLE

## SECCION TRANSVERSAL TRIPLE

## TABLAS DE ARMADURAS POR METRO DE GALERIA

### Sección simple

**0 ≤ h ≤ 100 — $\overline{fs} \geq 0.10$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 110 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 6 | 260 | c/16cm |
| 5 | — | — | — | — |
| 6 | 16.0 | 8 | CORR. | — |
| 7 | 6.3 | 84 | CORR. | c/20cm |
| 8 | — | — | — | — |
| 9 | — | — | — | — |
| 10 | 6.3 | 16 | 285 | c/12cm |
| 11 | 12.5 | 6 | 260 | c/16cm |
| 12 | 12.5 | 10 | CORR. | c/25cm |
| 13 | 12.5 | 8 | 270 | c/26cm |
| 14 | 12.5 | 8 | 554 | c/26cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 41 |
| 12.5 | 0.988 | 107 |
| 16.0 | 1.570 | 14 |
| TOTAL | | 162 Kg |

**100 ≤ h ≤ 250 — $\overline{fs} \geq 0.11$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 110 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 9 | 260 | c/11cm |
| 5 | — | — | — | — |
| 6 | 16.0 | 8 | CORR. | — |
| 7 | 6.3 | 96 | CORR. | c/20cm |
| 8 | 10.0 | 6 | 484 | c/30cm |
| 9 | 10.0 | 16 | 270 | c/30cm |
| 10 | 6.3 | 16 | 285 | c/12cm |
| 11 | 10.0 | 10 | 260 | c/10cm |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 44 |
| 10.0 | 0.624 | 82 |
| 16.0 | 1.570 | 14 |
| TOTAL | | 140 Kg |

**250 ≤ h ≤ 500 — $\overline{fs} \geq 0.16$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 110 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 10 | 260 | c/10cm |
| 5 | — | — | — | — |
| 6 | 16.0 | 8 | CORR. | — |
| 7 | 6.3 | 96 | CORR. | c/20cm |
| 8 | 12.5 | 8 | 484 | c/30cm |
| 9 | 12.5 | 16 | 270 | c/30cm |
| 10 | 6.3 | 16 | 285 | c/12cm |
| 11 | 12.5 | 11 | 250 | c/9cm |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 44 |
| 12.5 | 0.988 | 135 |
| 16.0 | 1.570 | 14 |
| TOTAL | | 193 Kg |

**500 ≤ h ≤ 750 — $\overline{fs} \geq 0.21$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 120 | c/20cm |
| 3 | — | — | — | — |
| 4 | 16.0 | 7 | 260 | c/14cm |
| 5 | 16.0 | 12 | CORR. | |
| 6 | — | — | — | — |
| 7 | 6.3 | 96 | CORR. | c/20cm |
| 8 | 12.5 | 8 | 494 | c/28cm |
| 9 | 12.5 | 16 | 270 | c/28cm |
| 10 | 6.3 | 20 | 295 | c/10cm |
| 11 | 16.0 | 7 | 260 | c/13cm |
| 12 | — | — | — | — |
| 13 | — | — | — | — |
| 14 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 48 |
| 12.5 | 0.988 | 82 |
| 16.0 | 1.570 | 78 |
| TOTAL | | 208 Kg |

### Sección doble

**0 ≤ h ≤ 100 — $\overline{fs} \geq 0.21$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 80 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 10 | 255 | c/10cm |
| 5 | 10.0 | 20 | 260 | c/10cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 156 | CORR. | c/20cm |
| 9 | 10.0 | 14 | 260 | c/14cm |
| 10 | 10.0 | 6 | 255 | c/15cm |
| 11 | — | — | — | — |
| 12 | — | — | — | — |
| 13 | 6.3 | 9 | 275 | c/11cm |
| 14 | 6.3 | 10 | 150 | c/20cm |
| 15 | — | — | — | — |
| 16 | 6.3 | 12 | 275 | c/15cm |
| 17 | 10.0 | 16 | CORR. | c/15cm |
| 18 | 12.5 | 12 | 270 | c/16cm |
| 19 | 12.5 | 12 | 544 | c/16cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 65 |
| 10.0 | 0.624 | 76 |
| 12.5 | 0.988 | 135 |
| TOTAL | | 276 Kg |

**100 ≤ h ≤ 250 — $\overline{fs} \geq 0.21$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 30 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 6 | 255 | c/15cm |
| 5 | 10.0 | 20 | 260 | c/10cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 168 | CORR. | c/20cm |
| 9 | 10.0 | 16 | 260 | c/12cm |
| 10 | 10.0 | 6 | 255 | c/15cm |
| 11 | 10.0 | 8 | 474 | c/26cm |
| 12 | 10.0 | 16 | 270 | c/26cm |
| 13 | 10.0 | 8 | 275 | c/25cm |
| 14 | 6.3 | 10 | 150 | c/20cm |
| 15 | — | — | — | — |
| 16 | 10.0 | 8 | 275 | c/30cm |
| 17 | — | — | — | — |
| 18 | — | — | — | — |
| 19 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 55 |
| 10.0 | 0.624 | 156 |
| 12.5 | 0.988 | 13 |
| TOTAL | | 224 Kg |

**250 ≤ h ≤ 500 — $\overline{fs} \geq 0.23$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 100 | c/20cm |
| 3 | — | — | — | — |
| 4 | 12.5 | 6 | 255 | c/15cm |
| 5 | 12.5 | 14 | 260 | c/13cm |
| 6 | 12.5 | 18 | CORR. | — |
| 7 | — | — | — | — |
| 8 | 6.3 | 168 | CORR. | c/20cm |
| 9 | 12.5 | 14 | 260 | c/13cm |
| 10 | 12.5 | 6 | 255 | c/15cm |
| 11 | 10.0 | 8 | 484 | c/28cm |
| 12 | 10.0 | 16 | 270 | c/28cm |
| 13 | 10.0 | 8 | 283 | c/25cm |
| 14 | — | — | — | — |
| 15 | 6.3 | 10 | 180 | c/20cm |
| 16 | 10.0 | 8 | 285 | c/30cm |
| 17 | — | — | — | — |
| 18 | — | — | — | — |
| 19 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 57 |
| 10.0 | 0.624 | 80 |
| 12.5 | 0.988 | 122 |
| TOTAL | | 259 Kg |

**500 ≤ h ≤ 750 — $\overline{fs} \geq 0.28$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 100 | c/20cm |
| 3 | — | — | — | — |
| 4 | 16.0 | 6 | 255 | c/16cm |
| 5 | 16.0 | 14 | 260 | c/14cm |
| 6 | — | — | — | — |
| 7 | 16.0 | 12 | CORR. | — |
| 8 | 6.3 | 168 | CORR. | c/20cm |
| 9 | 16.0 | 14 | 260 | c/14cm |
| 10 | 16.0 | 6 | 255 | c/16cm |
| 11 | 12.5 | 8 | 484 | c/28cm |
| 12 | 12.5 | 16 | 270 | c/28cm |
| 13 | 6.3 | 14 | 285 | c/13cm |
| 14 | — | — | — | — |
| 15 | 6.3 | 10 | 180 | c/20cm |
| 16 | 6.3 | 12 | 285 | c/15cm |
| 17 | — | — | — | — |
| 18 | — | — | — | — |
| 19 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 75 |
| 12.5 | 0.988 | 81 |
| 16.0 | 1.570 | 183 |
| TOTAL | | 339 Kg |

### Sección triple

**0 ≤ h ≤ 100 — $\overline{fs} \geq 0.21$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 80 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 20 | 240 | c/10cm |
| 5 | 12.5 | 14 | 260 | c/14cm |
| 6 | 10.0 | 6 | 260 | c/17cm |
| 7 | — | — | — | — |
| 8 | 12.5 | 16 | CORR. | — |
| 9 | 6.3 | 204 | CORR. | c/20cm |
| 10 | 10.0 | 14 | 260 | c/14cm |
| 11 | 10.0 | 6 | 260 | c/16cm |
| 12 | 10.0 | 12 | 240 | c/15cm |
| 13 | — | — | — | — |
| 14 | — | — | — | — |
| 15 | 6.3 | 20 | 275 | c/10cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 20 | 180 | c/20cm |
| 18 | 6.3 | 20 | 275 | c/20cm |
| 19 | 10.0 | 48 | CORR. | c/15cm |
| 20 | 12.5 | 12 | 270 | c/16cm |
| 21 | 12.5 | 12 | 544 | c/16cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 98 |
| 10.0 | 0.624 | 94 |
| 12.5 | 0.988 | 198 |
| TOTAL | | 390 Kg |

**100 ≤ h ≤ 250 — $\overline{fs} \geq 0.21$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 80 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10.0 | 12 | 240 | c/15cm |
| 5 | 12.5 | 12 | 260 | c/15cm |
| 6 | 10.0 | 7 | 260 | c/13cm |
| 7 | — | — | — | — |
| 8 | 12.5 | 16 | CORR. | — |
| 9 | 6.3 | 240 | CORR. | c/20cm |
| 10 | 12.5 | 12 | 260 | c/15cm |
| 11 | 10.0 | 9 | 260 | c/11cm |
| 12 | 10.0 | 12 | 240 | c/15cm |
| 13 | 10.0 | 8 | 474 | c/25cm |
| 14 | 10.0 | 16 | 270 | c/26cm |
| 15 | 6.3 | 16 | 275 | c/12cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 20 | 180 | c/20cm |
| 18 | 6.3 | 20 | 275 | c/20cm |
| 19 | — | — | — | — |
| 20 | — | — | — | — |
| 21 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 105 |
| 10.0 | 0.624 | 113 |
| 12.5 | 0.988 | 79 |
| TOTAL | | 297 Kg |

**250 ≤ h ≤ 500 — $\overline{fs} \geq 0.23$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 85 | c/20cm |
| 3 | — | — | — | — |
| 4 | 10.0 | 20 | 240 | c/10cm |
| 5 | 12.5 | 14 | 260 | c/13cm |
| 6 | 10.0 | 8 | 260 | c/12cm |
| 7 | 12.5 | 24 | CORR. | — |
| 8 | — | — | — | — |
| 9 | 6.3 | 240 | CORR. | c/20cm |
| 10 | 12.5 | 14 | 260 | c/13cm |
| 11 | 10.0 | 10 | 260 | c/10cm |
| 12 | 10.0 | 20 | 240 | c/10cm |
| 13 | 10.0 | 8 | 484 | c/26cm |
| 14 | 10.0 | 16 | 270 | c/26cm |
| 15 | 6.3 | 14 | 285 | c/13cm |
| 16 | 6.3 | 20 | 200 | c/20cm |
| 17 | — | — | — | — |
| 18 | 6.3 | 24 | 285 | c/15cm |
| 19 | — | — | — | — |
| 20 | — | — | — | — |
| 21 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 109 |
| 10.0 | 0.624 | 141 |
| 12.5 | 0.988 | 96 |
| TOTAL | | 348 Kg |

**500 ≤ h ≤ 750 — $\overline{fs} \geq 0.28$ MPa**

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 85 | c/20cm |
| 3 | — | — | — | — |
| 4 | 12.5 | 18 | 240 | c/11cm |
| 5 | 16.0 | 14 | 260 | c/14cm |
| 6 | 12.5 | 7 | 260 | c/13cm |
| 7 | 16.0 | 24 | CORR. | — |
| 8 | — | — | — | — |
| 9 | 6.3 | 240 | CORR. | c/20cm |
| 10 | 16.0 | 12 | 260 | c/15cm |
| 11 | 12.5 | 9 | 260 | c/11cm |
| 12 | 12.5 | 18 | 240 | c/11cm |
| 13 | 12.5 | 8 | 484 | c/24cm |
| 14 | 12.5 | 16 | 270 | c/24cm |
| 15 | 6.3 | 14 | 285 | c/13cm |
| 16 | 6.3 | 20 | 200 | c/20cm |
| 17 | — | — | — | — |
| 18 | 6.3 | 24 | 285 | c/15cm |
| 19 | — | — | — | — |
| 20 | — | — | — | — |
| 21 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 109 |
| 12.5 | 0.988 | 208 |
| 16.0 | 1.570 | 148 |
| TOTAL | | 465 Kg |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Montiel
Consorcio:
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CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

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VICE MINISTERIO DE OBRAS PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

ALCANTARILLA CELULAR

223 doscientos veintitrés

# ALCANTARILLAS CELULARES DE 3.00 x 3.00

## SECCION TRANSVERSAL SIMPLE

## SECCION TRANSVERSAL DOBLE

## SECCION TRANSVERSAL TRIPLE

## TABLAS DE ARMADURAS POR METRO DE GALERIA

### Sección simple

**0 ⩽ h ⩽ 100** — $\overline{f}s \geqslant 0.12$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 110 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 6 | 310 | c/15cm |
| 5 | 16.0 | 12 | CORR. | — |
| 6 | 12.5 | 6 | 310 | c/15cm |
| 7 | 6.3 | 98 | CORR. | c/20cm |
| 8 | — | — | — | — |
| 9 | — | — | — | — |
| 10 | 6.3 | 16 | 345 | c/12cm |
| 11 | 6.3 | 29 | CORR. | c/10cm |
| 12 | 12.5 | 8 | 320 | c/24cm |
| 13 | 12.5 | 8 | 664 | c/24cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 55 |
| 12.5 | 0.988 | 115 |
| 16.0 | 1.570 | 21 |
| TOTAL | | 191 Kg |

**100 ⩽ h ⩽ 250** — $\overline{f}s \geqslant 0.12$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 110 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 6 | 310 | c/16cm |
| 5 | 16.0 | 12 | CORR. | — |
| 6 | 12.5 | 7 | 310 | c/13cm |
| 7 | 6.3 | 112 | CORR. | c/20cm |
| 8 | 12,5 | 6 | 584 | c/40cm |
| 9 | 12,5 | 12 | 320 | c/40cm |
| 10 | 6.3 | 16 | 345 | c/12cm |
| 11 | — | — | — | — |
| 12 | — | — | — | — |
| 13 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 51 |
| 12.5 | 0.988 | 113 |
| 16.0 | 1.570 | 21 |
| TOTAL | | 185 Kg |

**250 ⩽ h ⩽ 500** — $\overline{f}s \geqslant 0.17$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 8,0 | 16 | 140 | c/25cm |
| 3 | — | — | — | — |
| 4 | 12.5 | 9 | 310 | c/11cm |
| 5 | 16.0 | 12 | CORR. | — |
| 6 | 12.5 | 10 | 310 | c/10cm |
| 7 | 8,0 | 88 | CORR. | c/25cm |
| 8 | 12,5 | 8 | 594 | c/30cm |
| 9 | 12,5 | 16 | 320 | c/30cm |
| 10 | 8,0 | 10 | 355 | c/20cm |
| 11 | — | — | — | — |
| 12 | — | — | — | — |
| 13 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 8,0 | 0,393 | 61 |
| 12.5 | 0.988 | 156 |
| 16.0 | 1.570 | 21 |
| TOTAL | | 238 Kg |

**500 ⩽ h ⩽ 750** — $\overline{f}s \geqslant 0.22$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 8,0 | 16 | 140 | c/25cm |
| 3 | — | — | — | — |
| 4 | 16.0 | 8 | 310 | c/12cm |
| 5 | 16.0 | 12 | CORR. | — |
| 6 | 16.0 | 9 | 310 | c/11cm |
| 7 | 8,0 | 112 | CORR. | c/20cm |
| 8 | 12,5 | 10 | 594 | c/22cm |
| 9 | 12,5 | 20 | 320 | c/22cm |
| 10 | 8,0 | 10 | 355 | c/20cm |
| 11 | — | — | — | — |
| 12 | — | — | — | — |
| 13 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 8,0 | 0,393 | 72 |
| 12.5 | 0.988 | 122 |
| 16.0 | 1.570 | 104 |
| TOTAL | | 298 Kg |

### Sección doble

**0 ⩽ h ⩽ 100** — $\overline{f}s \geqslant 0.21$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 100 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 10 | 290 | c/10cm |
| 5 | 10.0 | 20 | 290 | c/10cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 168 | CORR. | c/20cm |
| 9 | 10.0 | 14 | 290 | c/13cm |
| 10 | 12.5 | 5 | 290 | c/20cm |
| 11 | — | — | — | — |
| 12 | — | — | — | — |
| 13 | 10.0 | 8 | 335 | c/25cm |
| 14 | — | — | — | — |
| 15 | 6.3 | 10 | 200 | c/20cm |
| 16 | 10.0 | 8 | 335 | c/30cm |
| 17 | 10.0 | 32 | CORR. | c/18cm |
| 18 | 12.5 | 10 | 320 | c/20cm |
| 19 | 12.5 | 10 | 654 | c/20cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 57 |
| 10.0 | 0.624 | 117 |
| 12.5 | 0.988 | 153 |
| TOTAL | | 327 Kg |

**100 ⩽ h ⩽ 250** — $\overline{f}s \geqslant 0.21$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 100 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 10,0 | 10 | 290 | c/11cm |
| 5 | 10.0 | 20 | 290 | c/10cm |
| 6 | — | — | — | — |
| 7 | 12.5 | 12 | CORR. | — |
| 8 | 6.3 | 196 | CORR. | c/20cm |
| 9 | 10.0 | 18 | 290 | c/11cm |
| 10 | 10,0 | 9 | 290 | c/11cm |
| 11 | 10,0 | 8 | 574 | c/28cm |
| 12 | 10,0 | 16 | 320 | c/28cm |
| 13 | 10.0 | 8 | 335 | c/25cm |
| 14 | — | — | — | — |
| 15 | 6.3 | 10 | 200 | c/20cm |
| 16 | 10.0 | 8 | 335 | c/25cm |
| 17 | — | — | — | — |
| 18 | — | — | — | — |
| 19 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 65 |
| 10.0 | 0.624 | 198 |
| 12.5 | 0.988 | 13 |
| TOTAL | | 276 Kg |

**250 ⩽ h ⩽ 500** — $\overline{f}s \geqslant 0.23$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6,3 | 20 | 110 | c/20cm |
| 3 | — | — | — | — |
| 4 | 12.5 | 5 | 290 | c/20cm |
| 5 | 12,5 | 16 | 300 | c/12cm |
| 6 | 12.5 | 18 | CORR. | — |
| 7 | — | — | — | — |
| 8 | 6.3 | 196 | CORR. | c/20cm |
| 9 | 12.5 | 14 | 290 | c/13cm |
| 10 | 12.5 | 5 | 290 | c/20cm |
| 11 | 10.0 | 6 | 584 | c/34cm |
| 12 | 10.0 | 12 | 320 | c/34cm |
| 13 | 10.0 | 10 | 345 | c/20cm |
| 14 | — | — | — | — |
| 15 | 6.3 | 10 | 200 | c/20cm |
| 16 | 10.0 | 8 | 345 | c/25cm |
| 17 | — | — | — | — |
| 18 | — | — | — | — |
| 19 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 65 |
| 10.0 | 0.624 | 85 |
| 12.5 | 0.988 | 136 |
| TOTAL | | 286 Kg |

**500 ⩽ h ⩽ 750** — $\overline{f}s \geqslant 0.23$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6,3 | 20 | 110 | c/20cm |
| 3 | — | — | — | — |
| 4 | 16.0 | 6 | 290 | c/15cm |
| 5 | 16.0 | 16 | 300 | c/12cm |
| 6 | 16.0 | 18 | CORR. | — |
| 7 | — | — | — | — |
| 8 | 6.3 | 196 | CORR. | c/20cm |
| 9 | 16.0 | 12 | 300 | c/15cm |
| 10 | 16.0 | 7 | 290 | c/14cm |
| 11 | 16.0 | 6 | 584 | c/38cm |
| 12 | 16.0 | 12 | 320 | c/38cm |
| 13 | 10.0 | 10 | 345 | c/20cm |
| 14 | — | — | — | — |
| 15 | 6.3 | 10 | 200 | c/20cm |
| 16 | 10.0 | 10 | 345 | c/20cm |
| 17 | — | — | — | — |
| 18 | — | — | — | — |
| 19 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 65 |
| 10.0 | 0.624 | 43 |
| 16.0 | 1.570 | 338 |
| TOTAL | | 446 Kg |

### Sección triple

**0 ⩽ h ⩽ 100** — $\overline{f}s \geqslant 0.21$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 100 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 20 | 290 | c/10cm |
| 5 | 12.5 | 12 | 290 | c/15cm |
| 6 | 12.5 | 6 | 280 | c/15cm |
| 7 | — | — | — | — |
| 8 | 12.5 | 16 | CORR. | — |
| 9 | 6.3 | 238 | CORR. | c/20cm |
| 10 | 8.0 | 20 | 290 | c/10cm |
| 11 | 8.0 | 10 | 280 | c/10cm |
| 12 | 8.0 | 20 | 290 | c/10cm |
| 13 | — | — | — | — |
| 14 | — | — | — | — |
| 15 | 8.0 | 30 | 335 | c/20cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 20 | 200 | c/20cm |
| 18 | 8.0 | 66 | CORR. | c/13cm |
| 19 | 12.5 | 10 | 320 | c/20cm |
| 20 | 12.5 | 10 | 654 | c/20cm |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 81 |
| 8.0 | 0.393 | 125 |
| 12.5 | 0.988 | 222 |
| TOTAL | | 428 Kg |

**100⩽ h ⩽ 250** — $\overline{f}s \geqslant 0.21$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | 6.3 | 20 | 100 | c/20cm |
| 2 | — | — | — | — |
| 3 | — | — | — | — |
| 4 | 12.5 | 10 | 290 | c/20cm |
| 5 | 12.5 | 12 | 290 | c/15cm |
| 6 | 8.0 | 10 | 280 | c/10cm |
| 7 | — | — | — | — |
| 8 | 12.5 | 16 | CORR. | — |
| 9 | 6.3 | 280 | CORR. | c/20cm |
| 10 | 12.5 | 12 | 290 | c/17cm |
| 11 | 8.0 | 10 | 280 | c/10cm |
| 12 | 12.5 | 10 | 290 | c/20cm |
| 13 | 8.0 | 12 | 574 | c/18cm |
| 14 | 8.0 | 24 | 320 | c/18cm |
| 15 | 8.0 | 36 | 335 | c/15cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 20 | 200 | c/20cm |
| 18 | — | — | — | — |
| 19 | — | — | — | — |
| 20 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 93 |
| 8.0 | 0.393 | 127 |
| 12.5 | 0.988 | 144 |
| TOTAL | | 364 Kg |

**250 ⩽ h ⩽ 500** — $\overline{f}s \geqslant 0.23$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 110 | c/20cm |
| 3 | — | — | — | — |
| 4 | 12.5 | 14 | 290 | c/13cm |
| 5 | 12.5 | 16 | 300 | c/12cm |
| 6 | 10.0 | 10 | 280 | c/10cm |
| 7 | 12.5 | 24 | CORR. | — |
| 8 | — | — | — | — |
| 9 | 6.3 | 280 | CORR. | c/20cm |
| 10 | 12.5 | 16 | 300 | c/12cm |
| 11 | 10.0 | 10 | 280 | c/10cm |
| 12 | 12.5 | 14 | 290 | c/14cm |
| 13 | 10.0 | 8 | 584 | c/24cm |
| 14 | 10.0 | 16 | 320 | c/24cm |
| 15 | 10.0 | 24 | 345 | c/25cm |
| 16 | — | — | — | — |
| 17 | 6.3 | 20 | 200 | c/20cm |
| 18 | — | — | — | — |
| 19 | — | — | — | — |
| 20 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 6.3 | 0.252 | 94 |
| 10.0 | 0.624 | 148 |
| 12.5 | 0.988 | 201 |
| TOTAL | | 443 Kg |

**500 ⩽ h ⩽ 750** — $\overline{f}s \geqslant 0.29$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 8.0 | 20 | 110 | c/20cm |
| 3 | — | — | — | — |
| 4 | 16.0 | 12 | 290 | c/15cm |
| 5 | 16.0 | 16 | 300 | c/12cm |
| 6 | 12.5 | 9 | 280 | c/11cm |
| 7 | 16.0 | 24 | CORR. | — |
| 8 | — | — | — | — |
| 9 | 8.0 | 220 | CORR. | c/25cm |
| 10 | 16.0 | 12 | 300 | c/15cm |
| 11 | 12.5 | 9 | 280 | c/11cm |
| 12 | 16.0 | 12 | 290 | c/15cm |
| 13 | 12.5 | 8 | 584 | c/24cm |
| 14 | 12.5 | 16 | 320 | c/24cm |
| 15 | 8.0 | 36 | 345 | c/15cm |
| 16 | — | — | — | — |
| 17 | 8.0 | 20 | 200 | c/20cm |
| 18 | — | — | — | — |
| 19 | — | — | — | — |
| 20 | — | — | — | — |

RESUMEN

| Ø | Kg/m | PESO(Kg) |
|---|---|---|
| 8.0 | 0.393 | 169 |
| 12.5 | 0.988 | 147 |
| 16.0 | 1.570 | 283 |
| TOTAL | | 599 Kg |

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Montiel C.
Representante Legal
Consorcio:
CONSULPAR S.A.

REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS
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REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS
TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

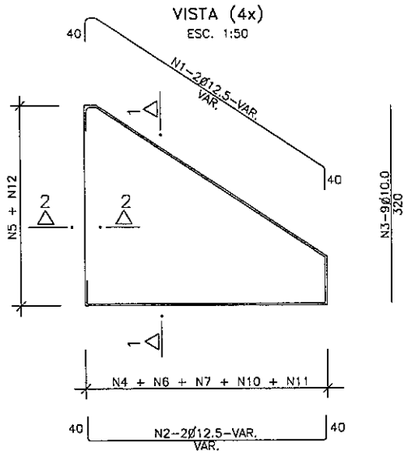
ALCANTARILLA CELULAR

CONSORCIO
CONSULPAR S.A - GEOLATINA S.A

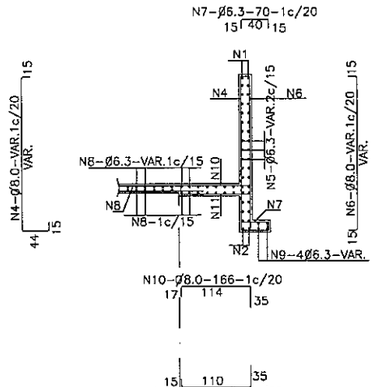
28
veintiocho

## ARMADURAS DE CABECERAS
## ALCANTARILLA CELULAR DE 2.00 x 2.00 – $\alpha$=0°–15°–30°–45°

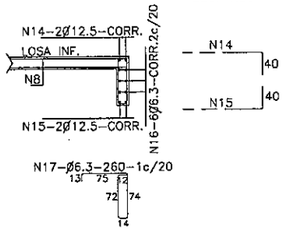
VISTA (4x)
ESC. 1:50



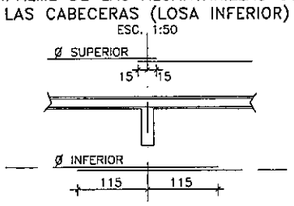

CORTE 1–1 (4x)
ESC. 1:50



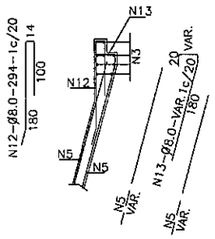

CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50




EMPALME DE LAS ALCANTARILLAS CON LAS CABECERAS (LOSA INFERIOR)
ESC. 1:50




CORTE 2–2 (4x)
ESC. 1:50




NOTAS

1– LA CANTIDAD DE ARMADURAS SERA DETERMINADA POR LAS MEDIDAS REALES DEL ENCOFRADO PARA CADA TIPO DE ALCANTARILLA

2– EN LA TABLA ESTAN COMPUTADAS AMBAS CABECERAS

TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 2.00x2.00

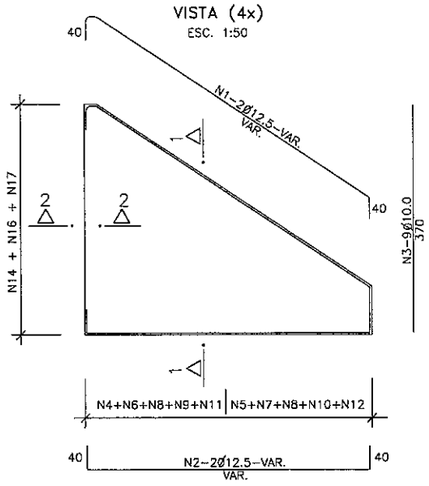
| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 12.5 | 12.5 | 10.0 | 8.0 | 6.3 | 8.0 | 6.3 | 6.3 | 6.3 | 8.0 | 8.0 | 8.0 | 8.0 | 12.5 | 12.5 | 6.3 | 6.3 |
| C | 8 | 8 | 36 | — | — | — | — | — | 16 | — | — | — | — | 4 | 4 | 12 | — |
| LONG. | VAR. | VAR. | 320 | VAR. | VAR. | VAR. | 70 | VAR. | VAR. | 166 | 160 | 294 | VAR. | CORR | CORR | CORR. | 260 |

RESUMEN DE LAS ARMADURAS PARA DOS CABECERAS – $\alpha$=0°

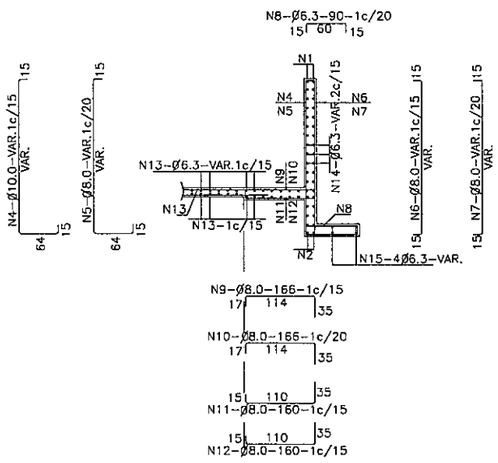
| Ø | 2.00 x 2.00 | | |
|---|---|---|---|
| TIPO | SIMPLE | DOBLE | TRIPLE |
| 6.3 | 531 | 701 | 865 |
| 8.0 | 420 | 450 | 514 |
| 10.0 | 115 | 122 | 172 |
| 12.5 | 187 | 281 | 368 |
| 16.0 | 22 | —— | —— |
| 20.0 | —— | —— | —— |
| TOTAL | 1.275 Kg | 1.554 Kg | 1.919 Kg |

## ARMADURAS DE CABECERAS
## ALCANTARILLA CELULAR DE 2.50 x 2.50 – $\alpha$=0°–15°–30°–45°

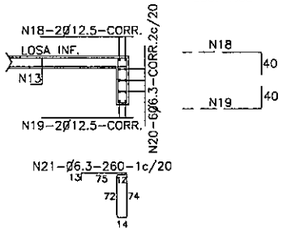
VISTA (4x)
ESC. 1:50



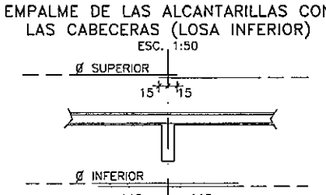

CORTE 1–1 (4x)
ESC. 1:50



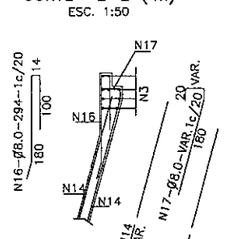

CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50




EMPALME DE LAS ALCANTARILLAS CON LAS CABECERAS (LOSA INFERIOR)
ESC. 1:50




CORTE 2–2 (4x)
ESC. 1:50




NOTAS

1– LA CANTIDAD DE ARMADURAS SERA DETERMINADA POR LAS MEDIDAS REALES DEL ENCOFRADO PARA CADA TIPO DE ALCANTARILLA

2– EN LA TABLA ESTAN COMPUTADAS AMBAS CABECERAS

TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 2.50x2.50

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 12.5 | 12.5 | 10.0 | 10.0 | 8.0 | 8.0 | 8.0 | 6.3 | 8.0 | 8.0 | 10.0 | 8.0 | 6.3 | 6.3 | 6.3 | 8.0 | 8.0 | 12.5 | 12.5 | 6.3 | 6.3 |
| C | 8 | 8 | 36 | — | — | — | — | — | — | — | — | — | — | — | 16 | — | — | 4 | 4 | 12 | — |
| LONG. | VAR. | VAR. | 370 | VAR. | VAR. | VAR. | VAR. | 90 | 166 | 166 | 160 | 160 | VAR. | VAR. | VAR. | 294 | VAR. | CORR | CORR | CORR. | 260 |

RESUMEN DE LAS ARMADURAS PARA DOS CABECERAS – $\alpha$=0°

| Ø | 2.50 x 2.50 | | |
|---|---|---|---|
| TIPO | SIMPLE | DOBLE | TRIPLE |
| 6.3 | 621 | 852 | 1.217 |
| 8.0 | 505 | 568 | 644 |
| 10.0 | 345 | 344 | 433 |
| 12.5 | 210 | 198 | 223 |
| 16.0 | 75 | 237 | 339 |
| 20.0 | —— | —— | —— |
| TOTAL | 1.756 Kg | 2.199 Kg | 2.856 Kg |

### PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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VICE MINISTERIO DE OBRAS
PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

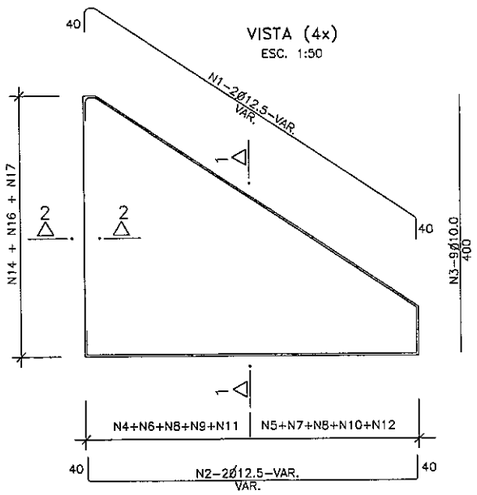
TRAMO: ITAPE - VILLARRICA

ALCANTARILLA CELULAR

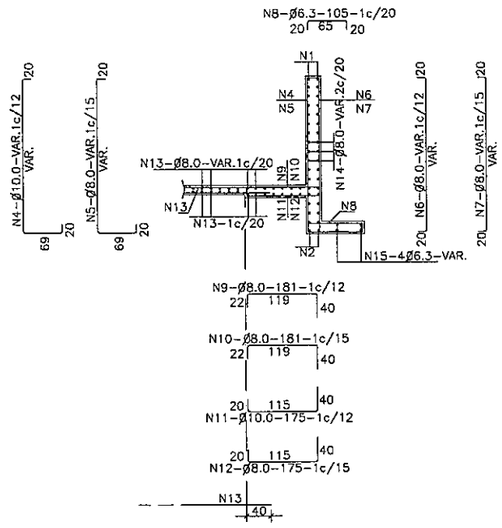
25
Item Técnico

# ARMADURAS DE CABECERAS – ALCANTARILLA CELULAR DE 3.00 x 3.00 – α=0°–15°–30°–45°

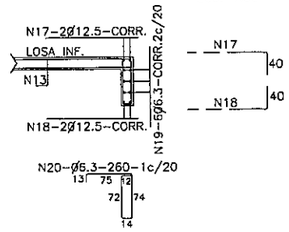
VISTA (4x)
ESC. 1:50




CORTE 1–1 (4x)
ESC. 1:50



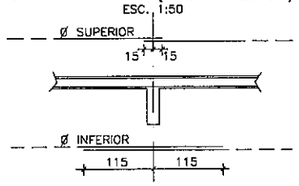

CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50




NOTAS

1– LA CANTIDAD DE ARMADURAS SERA DETERMINADA POR LAS MEDIDAS REALES DEL ENCOFRADO PARA CADA TIPO DE ALCANTARILLA
2– EN LA TABLA ESTAN COMPUTADAS AMBAS CABECERAS

EMPALME DE LAS ALCANTARILLAS CON LAS CABECERAS (LOSA INFERIOR)
ESC. 1:50




CORTE 2–2 (4x)
ESC. 1:50

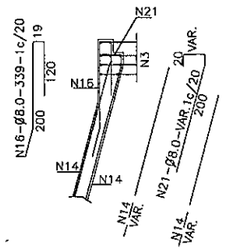



TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 3.00x3.00

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø | 12.5 | 12.5 | 10.0 | 10.0 | 8.0 | 8.0 | 8.0 | 6.3 | 8.0 | 8.0 | 10.0 | 8.0 | 8.0 | 8.0 | 6.3 | 8.0 | 12.5 | 12.5 | 6.3 | 6.3 | 8.0 |
| C | 8 | 8 | 36 | — | — | — | — | — | — | — | — | — | — | 16 | 16 | — | 4 | 4 | 12 | — | — |
| LONG. | VAR. | VAR. | 400 | VAR. | VAR. | VAR. | VAR. | 105 | 181 | 181 | 175 | 175 | VAR. | VAR. | VAR. | 339 | CORR. | CORR. | CORR. | 260 | VAR. |

## RESUMEN DE LAS ARMADURAS PARA DOS CABECERAS

ALCANTARILLA SIMPLE

| 1.50 x 1.50 | | | | | 2.00 x 2.00 | | | | | 2.50 x 2.50 | | | | | 3.00 x 3.00 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° |
| 6.3 | 492 | 541 | 570 | 765 | 6.3 | 531 | 580 | 595 | 797 | 6.3 | 621 | 700 | 829 | 1116 | 6.3 | 178 | 205 | 209 | 278 |
| 8.0 | 15 | 17 | 30 | 36 | 8.0 | 420 | 495 | 513 | 686 | 8.0 | 505 | 570 | 636 | 849 | 8.0 | 1.485 | 1646 | 1909 | 2560 |
| 10.0 | 95 | 110 | 88 | 110 | 10.0 | 115 | 130 | 100 | 127 | 10.0 | 345 | 380 | 419 | 559 | 10.0 | 560 | 610 | 575 | 770 |
| 12.5 | 161 | 185 | 201 | 258 | 12.5 | 187 | 210 | 188 | 250 | 12.5 | 210 | 235 | 234 | 308 | 12.5 | 240 | 280 | 262 | 346 |
| 16.0 | — | — | — | — | 16.0 | 22 | — | 85 | 99 | 16.0 | 75 | 90 | 124 | 146 | 16.0 | 53 | 70 | — | — |
| 20.0 | — | — | — | — | 20.0 | — | — | — | — | 20.0 | — | — | — | — | 20.0 | 88 | 100 | 224 | 264 |
| TOTAL | 763 Kg | 853 Kg | 889 Kg | 1.170 Kg | TOTAL | 1.275 Kg | 1.415 Kg | 1.481 kg | 1.959 Kg | TOTAL | 1.756 Kg | 1.975 Kg | 2.242 kg | 2.978 Kg | TOTAL | 2.604 Kg | 2.911 Kg | 3.179 kg | 4.218 Kg |

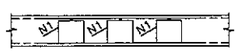
ALCANTARILLA DOBLE

| 1.50 x 1.50 | | | | | 2.00 x 2.00 | | | | | 2.50 x 2.50 | | | | | 3.00 x 3.00 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° |
| 6.3 | 545 | 605 | 692 | 914 | 6.3 | 701 | 782 | 762 | 1024 | 6.3 | 852 | 937 | 1090 | 1466 | 6.3 | 233 | 260 | 231 | 309 |
| 8.0 | 96 | 105 | 54 | 66 | 8.0 | 450 | 505 | 553 | 731 | 8.0 | 568 | 628 | 591 | 785 | 8.0 | 1891 | 2085 | 2314 | 3100 |
| 10.0 | 111 | 120 | 96 | 117 | 10.0 | 122 | 134 | 107 | 132 | 10.0 | 344 | 408 | 506 | 656 | 10.0 | 652 | 760 | 771 | 1004 |
| 12.5 | 220 | 258 | 258 | 330 | 12.5 | 281 | 310 | 224 | 296 | 12.5 | 198 | 225 | 226 | 305 | 12.5 | 229 | 249 | 260 | 351 |
| 16.0 | — | — | — | — | 16.0 | — | — | 164 | 193 | 16.0 | 237 | 260 | 162 | 190 | 16.0 | 245 | 272 | — | — |
| 20.0 | — | — | — | — | 20.0 | — | — | — | — | 20.0 | — | — | 233 | 270 | 20.0 | 102 | 120 | 246 | 291 |
| 25.0 | — | — | — | — | 25.0 | — | — | — | — | 25.0 | — | — | — | — | 25.0 | — | — | 509 | 596 |
| TOTAL | 972 Kg | 1.088 Kg | 1.100 Kg | 1.427 Kg | TOTAL | 1.554 Kg | 1.731 Kg | 1.810 kg | 2.376 Kg | TOTAL | 2.199 Kg | 2.458 Kg | 2.808 Kg | 3.672 Kg | TOTAL | 3.352 Kg | 3.746 Kg | 4.331 kg | 5.651 Kg |

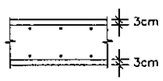
ALCANTARILLA TRIPLE

| 1.50 x 1.50 | | | | | 2.00 x 2.00 | | | | | 2.50 x 2.50 | | | | | 3.00 x 3.00 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° | ø | α=0° | α≤15° | α≤30° | α≤45° |
| 6.3 | 748 | 828 | 817 | 1093 | 6.3 | 865 | 960 | 1041 | 1398 | 6.3 | 1217 | 1338 | 1558 | 2098 | 6.3 | 273 | 300 | 271 | 364 |
| 8.0 | 46 | 52 | 81 | 98 | 8.0 | 514 | 560 | 630 | 832 | 8.0 | 644 | 710 | 657 | 867 | 8.0 | 2296 | 2525 | 3094 | 4139 |
| 10.0 | 161 | 185 | 114 | 135 | 10.0 | 172 | 196 | 125 | 150 | 10.0 | 433 | 485 | 590 | 757 | 10.0 | 746 | 835 | 883 | 1137 |
| 12.5 | 274 | 312 | 333 | 424 | 12.5 | 368 | 412 | 214 | 288 | 12.5 | 223 | 245 | 254 | 342 | 12.5 | 250 | 280 | 290 | 391 |
| 16.0 | — | — | — | — | 16.0 | — | — | 292 | 350 | 16.0 | 339 | 385 | 291 | 345 | 16.0 | 390 | 176 | — | — |
| 20.0 | — | — | — | — | 20.0 | — | — | — | — | 20.0 | — | — | 320 | 376 | 20.0 | 198 | 224 | 413 | 489 |
| 25.0 | — | — | — | — | 25.0 | — | — | — | — | 25.0 | — | — | — | — | 25.0 | — | — | 648 | 736 |
| TOTAL | 1.229 Kg | 1.377 Kg | 1.345 Kg | 1.750 Kg | TOTAL | 1.919 Kg | 2.128 Kg | 2.302 kg | 3.018 Kg | TOTAL | 2.856 Kg | 3.163 Kg | 3.670 Kg | 4.785 Kg | TOTAL | 4.153 Kg | 4.340 Kg | 5.599 kg | 7.256 Kg |

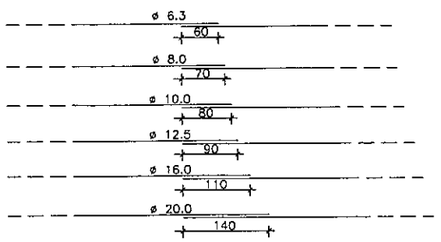
SOPORTE PARA APOYO DE LA ARMADURA SUPERIOR EN LAS LOSAS




RECUBRIMIENTO

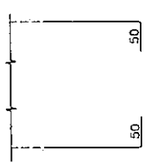


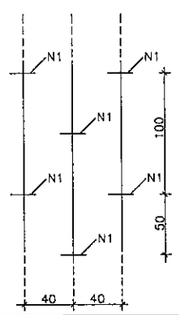

EMPALME DE LAS VARILLAS CORRIDAS (CUANDO SEA NECESARIO)




COLOCAR LOS EMPALMES EN PUNTOS ALTERNADOS

POSICION DE LA ARMADURA SUPERIOR E INFERIOR DE LAS PAREDES EN LAS EXTREMIDADES



ESTA ARMADURA NO ESTA COMPUTADA EN LOS RESUMENES DE HIERRO.

NOTAS

1– CARACTERISTICAS DEL HIERRO: ACERO C.A–50
2– ARMADURAS MEDIDAS EN CENTIMETROS.
3– CANTIDAD DE HIERROS EN CENTIMETROS.
4– RESUMEN DE HIERRO SIN DESPERDICIOS.
5– DEBERAN SER PREVISTOS DADOS DE HORMIGON PARA ASEGURAR EL RECUBRIMIENTO DE 3 cm.
6– LAS CANTIDADES Y MEDIDAS DE LAS ARMADURAS DE LAS CABECERAS SERAN DETERMINADAS POR LAS MEDIDAS REALES DEL ENCOFRADO DE CADA TIPO DE ALCANTARILLA.

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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TRAMO: ITAPE - VILLARRICA

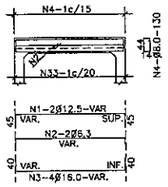
ALCANTARILLA CELULAR

26.

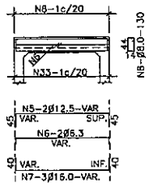
## ALCANTARILLA CELULAR SIMPLE

### VIGAS DE BORDE DE LA LOSA SUPERIOR – OC= 0° A 15°

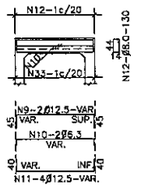
L=300 (2x)



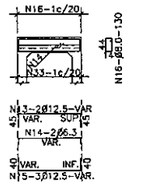

L=250 (2x)




L=200 (2x)

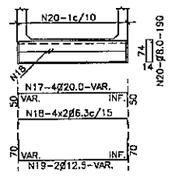



L=150 (2x)

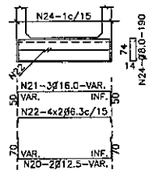



### VIGAS DE BORDE DE LA LOSA INFERIOR

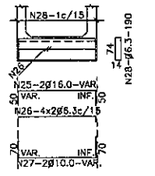
L=300 (2x)



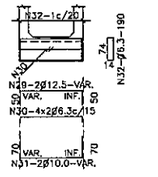

L=250 (2x)



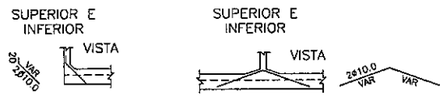

L=200 (2x)




L=150 (2x)




MENSULA




VIGA DE BORDE SUPERIOR

CORTE

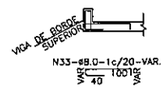


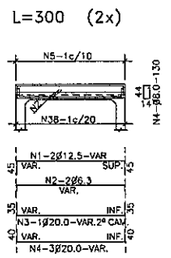

TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR SIMPLE

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 12.5 | 6.3 | 16.0 | 8.0 | 12.5 | 6.3 | 16.0 | 8.0 | 12.5 | 6.3 | 12.5 | 8.0 | 12.5 | 6.3 | 12.5 | 8.0 | 20.0 | 6.3 | 12.5 | 8.0 | 16.0 | 6.3 | 12.5 | 8.0 | 16.0 | 6.3 | 10.0 | 6.3 | 12.5 | 6.3 | 10.0 | 6.3 | 8.0 |
| C | 4 | 4 | 8 | — | 4 | 4 | 6 | — | 4 | 4 | 8 | — | 4 | 4 | 6 | — | 8 | 16 | 4 | — | 6 | 16 | 4 | — | 4 | 16 | 4 | — | 4 | 16 | 4 | — | — |
| LONG. | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. |

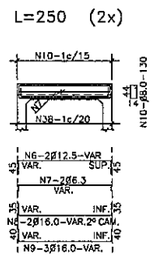
## ALCANTARILLA CELULAR SIMPLE

### VIGAS DE BORDE DE LA LOSA SUPERIOR – OC = 30° A 45°

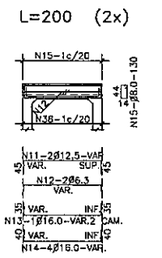
L=300 (2x)



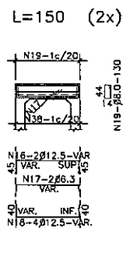

L=250 (2x)




L=200 (2x)

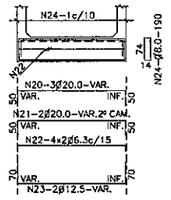



L=150 (2x)

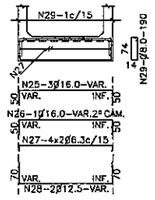



### VIGAS DE BORDE DE LA LOSA INFERIOR – OC = 30° A 45°

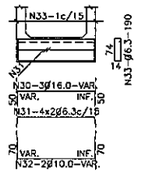
L=300 (2x)



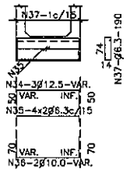

L=250 (2x)



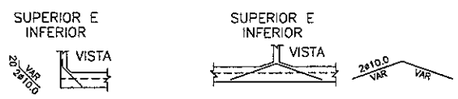

L=200 (2x)




L=150 (2x)




MENSULA




VIGA DE BORDE SUPERIOR

CORTE

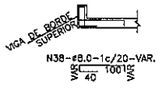



TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR SIMPLE

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 12.5 | 6.3 | 20.0 | 20.0 | 8.0 | 12.5 | 6.3 | 16.0 | 16.0 | 8.0 | 12.5 | 6.3 | 16.0 | 16.0 | 8.0 | 12.5 | 6.3 | 12.5 | 8.0 | 20.0 | 20.0 | 6.3 | 12.5 | 8.0 | 16.0 | 16.0 | 6.3 | 12.5 | 8.0 | 16.0 | 6.3 | 10.0 | 6.3 | 12.5 | 6.3 | 10.0 | 6.3 | 8.0 |
| C | 4 | 4 | 2 | 6 | — | 4 | 4 | 4 | 6 | — | 4 | 4 | 2 | 6 | — | 4 | 4 | 8 | — | 6 | 4 | 16 | 4 | — | 6 | 2 | 16 | 4 | — | 6 | 15 | 4 | — | 6 | 16 | 4 | — | — |
| LONG. | VAR. | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. |

NOTAS

1– LA CANTIDAD DE ARMADURAS SERA DETERMINADA POR LAS MEDIDAS REALES DEL ENCOFRADO PARA CADA TIPO DE ALCANTARILLA
2– EN LA TABLA ESTAN COMPUTADAS AMBAS CABECERAS
3– VER NOTAS Y COMPLEMENTOS EN LA LAMINA IV–10

### PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 Km/h |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 m. |
| RADIO MINIMO HORIZONTAL: | 60 m. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 m. |

Ing. Raúl Benítez
Gerente Técnico y Asesoría Legal
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REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

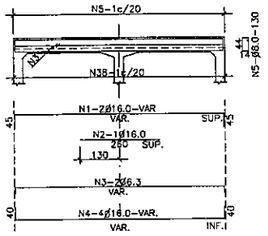
ALCANTARILLA CELULAR

E-7
Veintisiete

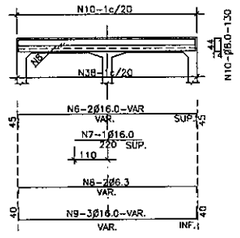
## ALCANTARILLA CELULAR DOBLE

### VIGAS DE BORDE DE LA LOSA SUPERIOR – CC = 0° A 15°

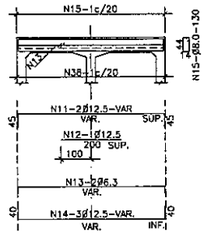
L=300 (2x)



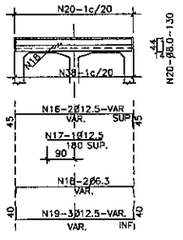

L=250 (2x)




L=200 (2x)

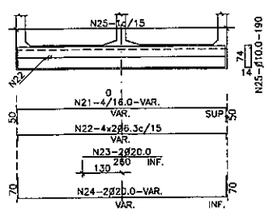



L=150 (2x)

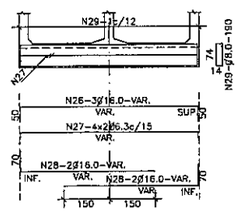



### VIGAS DE BORDE DE LA LOSA INFERIOR – CC =0° A 15°

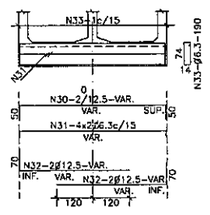
L=300 (2x)



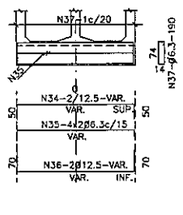

L=250 (2x)



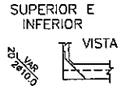

L=200 (2x)




L=150 (2x)




MENSULA



VIGA DE BORDE SUPERIOR

CORTE

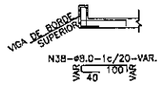


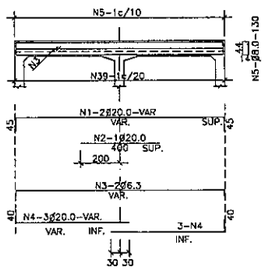

TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR DOBLE

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 16.0 | 16.0 | 6.3 | 16.0 | 8.0 | 16.0 | 16.0 | 6.3 | 16.0 | 8.0 | 12.5 | 12.5 | 6.3 | 12.5 | 8.0 | 12.5 | 12.5 | 6.3 | 12.5 | 8.0 | 16.0 | 6.3 | 20.0 | 20.0 | 10.0 | 16.0 | 6.3 | 16.0 | 8.0 | 12.5 | 6.3 | 12.5 | 6.3 | 12.5 | 6.3 | 12.5 | 6.3 | 8.0 |
| C | 4 | 2 | 4 | 8 | — | 4 | 2 | 4 | 6 | — | 4 | 2 | 4 | 6 | — | 4 | 2 | 4 | 6 | — | 8 | 16 | 4 | 4 | — | 6 | 16 | 8 | — | 4 | 16 | 8 | — | 4 | 16 | 4 | — | — |
| LONG. | VAR. | 260 | VAR. | VAR. | 130 | VAR. | 220 | VAR. | VAR. | 130 | VAR. | 200 | VAR. | VAR. | 130 | VAR. | 180 | VAR. | VAR. | 130 | VAR. | VAR. | 260 | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | |

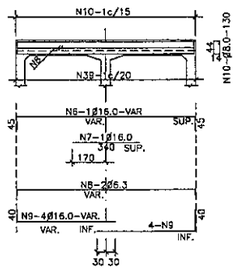
## ALCANTARILLA CELULAR DOBLE

### VIGAS DE BORDE DE LA LOSA SUPERIOR – CC = 30° A 45°

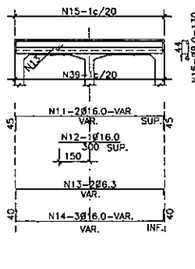
L=300 (2x)



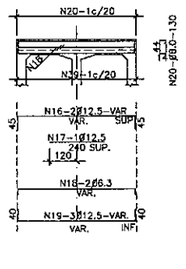

L=250 (2x)




L=200 (2x)

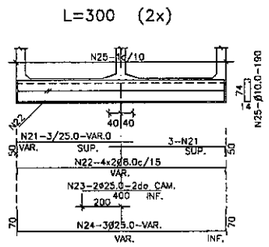



L=150 (2x)

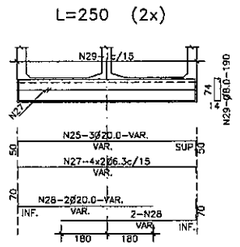



### VIGAS DE BORDE DE LA LOSA INFERIOR – CC = 30° A 45°

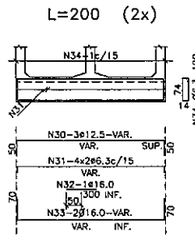
L=300 (2x)



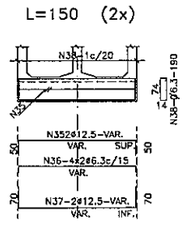

L=250 (2x)



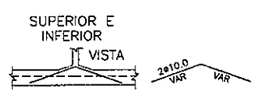

L=200 (2x)




L=150 (2x)




MENSULA




VIGA DE BORDE SUPERIOR

CORTE

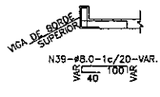



TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR DOBLE

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 20.0 | 20.0 | 6.3 | 20.0 | 8.0 | 16.0 | 16.0 | 6.3 | 16.0 | 8.0 | 16.0 | 16.0 | 6.3 | 16.0 | 8.0 | 12.5 | 12.5 | 6.3 | 12.5 | 8.0 | 25.0 | 8.0 | 25.0 | 25.0 | 10.0 | 20.0 | 6.3 | 20.0 | 10.0 | 12.5 | 6.3 | 16.0 | 16.0 | 8.0 | 12.5 | 6.3 | 12.5 | 6.3 | 8.0 |
| C | 4 | 2 | 4 | 12 | — | 4 | 2 | 4 | 16 | — | 4 | 2 | 4 | 6 | — | 4 | 2 | 4 | 6 | — | 12 | 16 | 4 | 6 | — | 6 | 16 | 8 | — | 6 | 16 | 2 | 4 | — | 4 | 16 | 4 | — | — | |
| LONG. | VAR. | 400 | VAR. | VAR. | 130 | VAR. | 340 | VAR. | VAR. | 130 | VAR. | 300 | VAR. | VAR. | 130 | VAR. | 240 | VAR. | VAR. | 130 | VAR. | VAR. | 400 | VAR. | 195 | VAR. | VAR. | VAR. | 195 | VAR. | VAR. | 300 | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | |

NOTAS

1– LA CANTIDAD DE ARMADURAS SERA DETERMINADA POR LAS MEDIDAS REALES DEL ENCOFRADO PARA CADA TIPO DE ALCANTARILLA

2– EN LA TABLA ESTAN COMPUTADAS AMBAS CABECERAS

### PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 Km/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

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REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

ALCANTARILLA CELULAR

CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

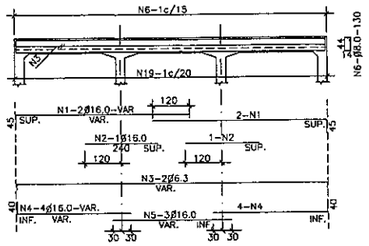
28

# ALCANTARILLA CELULAR TRIPLE

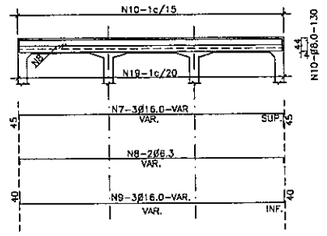
## VIGAS DE BORDE DE LA LOSA SUPERIOR – ∝= 0° A 15°

ESCALA 1:100

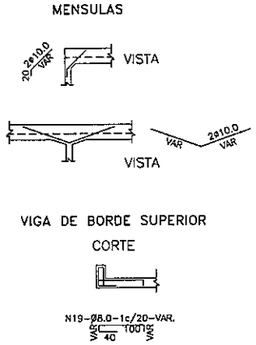
L=300 (2x)




L=250 (2x)



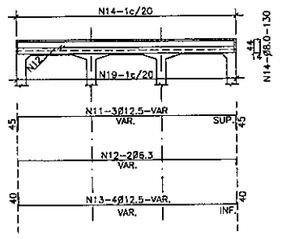

MENSULAS




VIGA DE BORDE SUPERIOR

CORTE

L=200 (2x)




L=150 (2x)

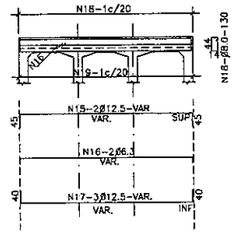


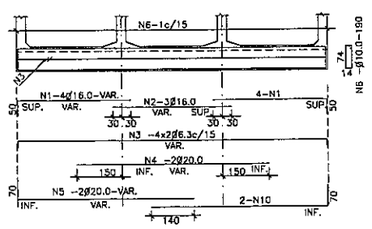

TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR – CELULAR TRIPLE

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 16.0 | 16.0 | 6.3 | 16.0 | 16.0 | 8.0 | 16.0 | 6.3 | 16.0 | 8.0 | 12.5 | 6.3 | 12.5 | 8.0 | 12.5 | 6.3 | 12.5 | 8.0 | 8.0 |
| C | 8 | 4 | 4 | 16 | 6 | — | 6 | 4 | 6 | — | 6 | 4 | 8 | — | 4 | 4 | 6 | — | — |
| LONG. | VAR. | 240 | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 130 | VAR. | VAR. | VAR. | 130 | VAR. |

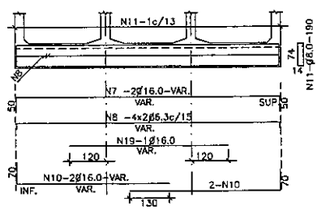
## VIGAS DE BORDE DE LA LOSA INFERIOR – ∝= 0° A 15°

ESCALA 1:100

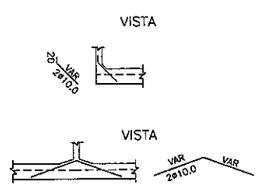
L=300 (2x)



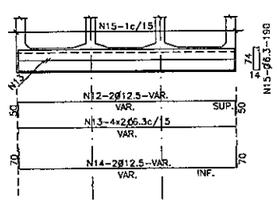

L=250 (2x)




MENSULAS




L=200 (2x)




L=150 (2x)

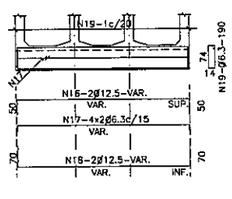
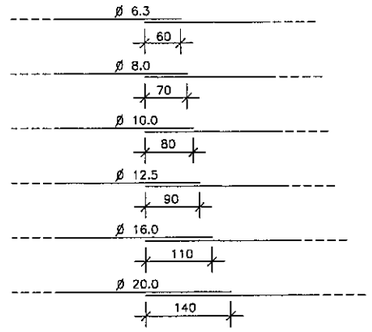



TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA INFERIOR – CELULAR TRIPLE

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 16.0 | 16.0 | 6.3 | 20 | 20 | 10.0 | 16.0 | 6.3 | 16.0 | 16.0 | 8.0 | 12.5 | 6.3 | 12.5 | 6.3 | 12.5 | 6.3 | 12.5 | 6.3 |
| C | 16 | 6 | 16 | 4 | 8 | — | 4 | 16 | 2 | 8 | — | 4 | 16 | 4 | — | 4 | 16 | 4 | — |
| LONG. | VAR. | VAR. | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR. | 190 | VAR. | VAR. | VAR | 190 |

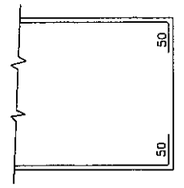
EMPALME DE LAS VARILLAS CORRIDAS
(CUANDO SEA NECESARIO)
ESCALA 1:50



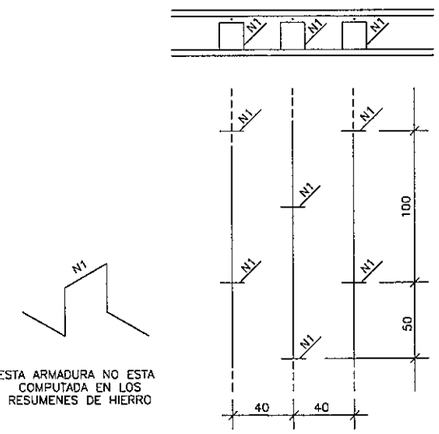

COLOCAR LOS EMPALMES EN PUNTOS ALTERNADOS

## NOTAS Y DETALLES COMPLEMENTARIOS

POSICION DE LA ARMADURA SUPERIOR E INFERIOR
DE LAS PAREDES EN LAS EXTREMIDADES
ESCALA 1:5




SOPORTE PARA APOYO DE LA ARMADURA
SUPERIOR EN LAS LOSAS
ESCALA 1:20

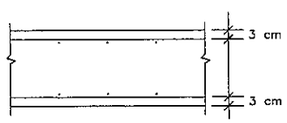






ESTA ARMADURA NO ESTA
COMPUTADA EN LOS
RESUMENES DE HIERRO

RECUBRIMIENTO
ESCALA 1:10




NOTAS

1– CARACTERISTICA DEL HIERRO: ACERO CA–50
2– ARMADURAS MEDIDAS EN CENTIMETROS
3– CANTIDAD DE HIERROS EN KILOGRAMOS
4– RESUMEN DE HIERROS SIN DESPERDICIOS
5– DEBERAN SER PREVISTOS DADOS DE HORMGON PARA ASEGURAR EL RECUBRIMIENTO DE 3 cm.
6– LA CANTIDAD Y LAS MEDIDAS DE LAS ARMADURAS DE LAS CABECERAS SERAN DETERMINADAS POR LAS MEDIDAS REALES DEL ENCOFRADO DE CADA TIPO DE ALCANTARILLA

## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Civil Mat. Nº
Consultor
CONSULPAR S.A.

CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

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REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS
TRAMOS DE LA RED VIAL NACIONAL

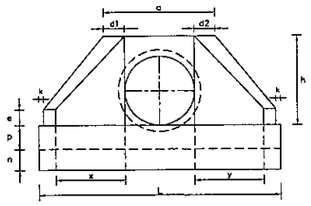
TRAMO: ITAPE - VILLARRICA

ALCANTARILLA CELULAR

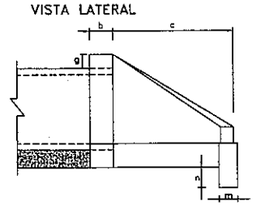
29

## ALCANTARILLA TUBULAR SIMPLE DE HORMIGON
## BOCAS NORMALES Y OBLICUAS (TIPO N.T.)

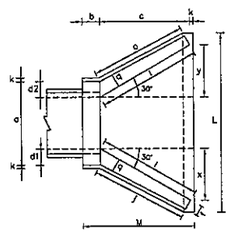
VISTA FRONTAL



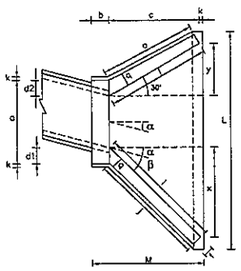
VISTA LATERAL



PLANTA NORMAL



PLANTA OBLICUA



### DIMENSIONES Y CONSUMOS MEDIOS POR UNIDAD

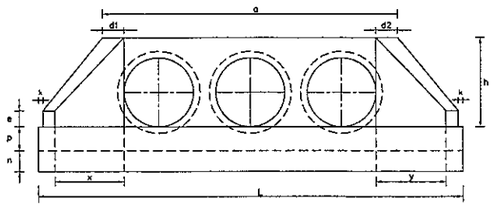
| OBL. α | β | a | b | c | d1 | d2 | e | f | g | h | i | j | k | l | m | n | o | p | q | x | y | L | M | ENCOFRADO m2 | HORMIGON m3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALCANTARILLA TUBULAR SIMPLE D = 60 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 106 | 20 | 125 | 23 | 23 | 15 | 10 | 30 | 98 | 144 | 133 | 10 | 144 | 20 | 30 | 133 | 23 | 20 | 72 | 72 | 242 | 155 | 7,45 | 1,153 |
| 15 | 30 | 111 | 20 | 125 | 28 | 21 | 15 | 10 | 30 | 98 | 177 | 157 | 10 | 129 | 20 | 30 | 124 | 23 | 20 | 125 | 33 | 257 | 155 | 7,82 | 1,218 |
| 30 | 25 | 130 | 20 | 125 | 35 | 26 | 15 | 10 | 30 | 98 | 218 | 190 | 10 | 125 | 20 | 30 | 125 | 23 | 20 | 179 | 0 | 283 | 155 | 8,71 | 1,370 |
| 45 | 20 | 168 | 20 | 125 | 47 | 36 | 15 | 10 | 30 | 98 | 296 | 253 | 10 | 129 | 20 | 30 | 135 | 23 | 20 | 268 | -33 | 353 | 155 | 10,68 | 1,722 |
| ALCANTARILLA TUBULAR SIMPLE D = 80 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 138 | 25 | 145 | 29 | 29 | 20 | 15 | 30 | 120 | 167 | 153 | 10 | 167 | 25 | 35 | 153 | 30 | 25 | 84 | 84 | 293 | 180 | 11,17 | 2,140 |
| 15 | 30 | 144 | 25 | 145 | 35 | 26 | 20 | 15 | 30 | 120 | 205 | 180 | 10 | 150 | 25 | 35 | 144 | 30 | 25 | 145 | 39 | 312 | 180 | 11,73 | 2,262 |
| 30 | 25 | 167 | 25 | 145 | 44 | 31 | 20 | 15 | 30 | 120 | 253 | 218 | 10 | 145 | 25 | 35 | 145 | 30 | 25 | 207 | 0 | 343 | 180 | 13,03 | 2,538 |
| 45 | 20 | 216 | 25 | 145 | 59 | 44 | 20 | 15 | 30 | 120 | 343 | 290 | 10 | 150 | 25 | 35 | 157 | 30 | 25 | 311 | -39 | 426 | 180 | 15,97 | 3,188 |
| ALCANTARILLA TUBULAR SIMPLE D = 100 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 170 | 30 | 165 | 35 | 35 | 25 | 20 | 30 | 142 | 191 | 174 | 10 | 191 | 30 | 40 | 174 | 37 | 30 | 95 | 95 | 345 | 205 | 15,68 | 3,567 |
| 15 | 30 | 177 | 30 | 165 | 42 | 31 | 25 | 20 | 30 | 142 | 233 | 203 | 10 | 171 | 30 | 40 | 183 | 37 | 30 | 165 | 44 | 386 | 205 | 16,41 | 3,757 |
| 30 | 25 | 203 | 30 | 165 | 52 | 36 | 25 | 20 | 30 | 142 | 288 | 245 | 10 | 165 | 30 | 40 | 165 | 37 | 30 | 236 | 0 | 403 | 205 | 18,19 | 4,205 |
| 45 | 20 | 264 | 30 | 165 | 71 | 52 | 25 | 20 | 30 | 142 | 390 | 326 | 10 | 171 | 30 | 40 | 179 | 37 | 30 | 354 | -44 | 498 | 205 | 22,30 | 5,293 |
| ALCANTARILLA TUBULAR SIMPLE D = 120 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 200 | 40 | 180 | 40 | 40 | 30 | 25 | 30 | 163 | 208 | 188 | 10 | 208 | 40 | 45 | 188 | 43 | 35 | 104 | 104 | 391 | 230 | 20,65 | 5,506 |
| 15 | 30 | 210 | 40 | 180 | 50 | 36 | 30 | 25 | 30 | 163 | 255 | 220 | 10 | 186 | 40 | 45 | 177 | 43 | 35 | 180 | 48 | 414 | 230 | 21,63 | 5,819 |
| 30 | 25 | 243 | 40 | 180 | 61 | 43 | 30 | 25 | 30 | 163 | 314 | 264 | 10 | 180 | 40 | 45 | 180 | 43 | 35 | 257 | 0 | 455 | 230 | 24,00 | 6,538 |
| 45 | 20 | 316 | 40 | 180 | 83 | 63 | 30 | 25 | 30 | 163 | 426 | 351 | 10 | 186 | 40 | 45 | 196 | 43 | 35 | 386 | -48 | 562 | 230 | 29,34 | 8,243 |
| ALCANTARILLA TUBULAR SIMPLE D = 150 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 242 | 50 | 260 | 46 | 46 | 35 | 30 | 30 | 194 | 300 | 277 | 10 | 300 | 40 | 45 | 277 | 52 | 40 | 150 | 150 | 522 | 320 | 32,54 | 10,810 |
| 15 | 30 | 253 | 50 | 260 | 57 | 41 | 35 | 30 | 30 | 194 | 368 | 328 | 10 | 269 | 40 | 45 | 258 | 52 | 40 | 260 | 70 | 555 | 320 | 34,15 | 11,431 |
| 30 | 25 | 293 | 50 | 260 | 70 | 50 | 35 | 30 | 30 | 194 | 453 | 396 | 10 | 260 | 40 | 45 | 260 | 52 | 40 | 371 | 0 | 612 | 320 | 37,95 | 12,868 |
| 45 | 20 | 382 | 50 | 260 | 95 | 75 | 35 | 30 | 30 | 194 | 615 | 530 | 10 | 269 | 40 | 45 | 280 | 52 | 40 | 558 | -70 | 762 | 320 | 46,60 | 16,303 |

OBSERVACIONES:

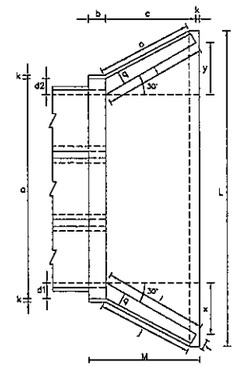
- DIMENSIONES EN CENTIMETROS.
- UTILIZAR HORMIGON CICLOPEO TIPO CLASE C15
- UTILIZAR PREFERENTEMENTE BOCAS NORMALES.

## ALCANTARILLA TUBULAR TRIPLE DE HORMIGON
## BOCAS NORMALES Y OBLICUAS (TIPO N.T.)

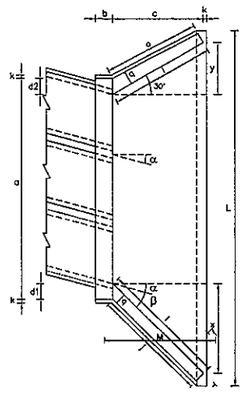
VISTA FRONTAL



PLANTA NORMAL

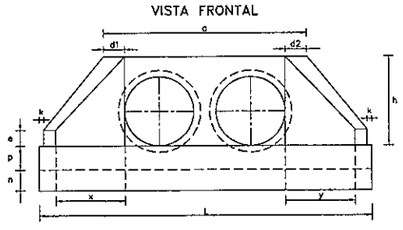


PLANTA OBLICUA

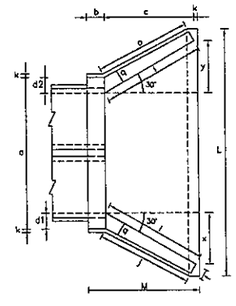


## ALCANTARILLA TUBULAR DOBLE DE HORMIGON
## BOCAS NORMALES Y OBLICUAS (TIPO N.T.)

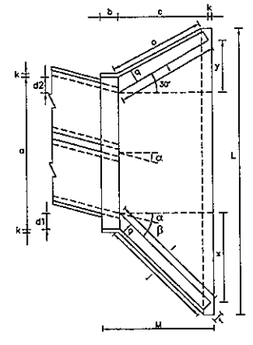
VISTA FRONTAL



PLANTA NORMAL



PLANTA OBLICUA



### DIMENSIONES Y CONSUMOS MEDIOS POR UNIDAD

| OBL. α | β | a | b | c | d1 | d2 | e | f | g | h | i | j | k | l | m | n | o | p | q | x | y | L | M | ENCOFRADO m2 | HORMIGON m3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALCANTARILLA TUBULAR DOBLE D = 100 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 314 | 30 | 165 | 35 | 35 | 30 | 20 | 30 | 142 | 191 | 174 | 10 | 191 | 30 | 40 | 174 | 37 | 30 | 95 | 95 | 489 | 205 | 21,08 | 5,106 |
| 15 | 30 | 326 | 30 | 165 | 42 | 31 | 30 | 20 | 30 | 142 | 233 | 203 | 10 | 171 | 30 | 40 | 163 | 37 | 30 | 165 | 44 | 515 | 205 | 22,00 | 5,350 |
| 30 | 25 | 370 | 30 | 165 | 52 | 36 | 30 | 20 | 30 | 142 | 288 | 245 | 10 | 165 | 30 | 40 | 165 | 37 | 30 | 236 | 0 | 569 | 205 | 24,45 | 5,987 |
| 45 | 20 | 468 | 30 | 165 | 71 | 52 | 30 | 20 | 30 | 142 | 390 | 326 | 10 | 171 | 30 | 40 | 179 | 37 | 30 | 354 | -44 | 702 | 205 | 29,94 | 7,470 |
| ALCANTARILLA TUBULAR DOBLE D = 120 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 366 | 40 | 180 | 40 | 40 | 35 | 25 | 30 | 163 | 208 | 188 | 10 | 208 | 40 | 45 | 188 | 43 | 35 | 104 | 104 | 557 | 230 | 27,75 | 7,889 |
| 15 | 30 | 382 | 40 | 180 | 50 | 36 | 35 | 25 | 30 | 163 | 255 | 220 | 10 | 186 | 40 | 45 | 177 | 43 | 35 | 180 | 48 | 586 | 230 | 28,99 | 8,289 |
| 30 | 25 | 434 | 40 | 180 | 61 | 43 | 35 | 25 | 30 | 163 | 314 | 264 | 10 | 180 | 40 | 45 | 180 | 43 | 35 | 257 | 0 | 647 | 230 | 32,17 | 9,285 |
| 45 | 20 | 550 | 40 | 180 | 83 | 63 | 35 | 25 | 30 | 163 | 426 | 351 | 10 | 186 | 40 | 45 | 196 | 43 | 35 | 386 | -48 | 797 | 230 | 39,35 | 11,607 |
| ALCANTARILLA TUBULAR DOBLE D = 150 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 440 | 50 | 260 | 46 | 46 | 35 | 30 | 30 | 194 | 300 | 277 | 10 | 300 | 40 | 45 | 277 | 52 | 40 | 150 | 150 | 720 | 320 | 42,14 | 15,138 |
| 15 | 30 | 458 | 50 | 260 | 57 | 41 | 35 | 30 | 30 | 194 | 368 | 328 | 10 | 269 | 40 | 45 | 258 | 52 | 40 | 260 | 70 | 750 | 320 | 44,09 | 15,912 |
| 30 | 25 | 522 | 50 | 260 | 70 | 50 | 35 | 30 | 30 | 194 | 453 | 395 | 10 | 260 | 40 | 45 | 260 | 52 | 40 | 371 | 0 | 841 | 320 | 49,06 | 17,876 |
| 45 | 20 | 662 | 50 | 260 | 95 | 75 | 35 | 30 | 30 | 194 | 615 | 530 | 10 | 269 | 40 | 45 | 280 | 52 | 40 | 558 | -70 | 1042 | 320 | 60,18 | 22,422 |

### DIMENSIONES Y CONSUMOS MEDIOS POR UNIDAD

| OBL. α | β | a | b | c | d1 | d2 | e | f | g | h | i | j | k | l | m | n | o | p | q | x | y | L | M | ENCOFRADO m2 | HORMIGON m3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALCANTARILLA TUBULAR TRIPLE D = 100 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 458 | 30 | 165 | 35 | 35 | 35 | 20 | 30 | 142 | 191 | 174 | 10 | 191 | 30 | 40 | 174 | 37 | 30 | 95 | 95 | 633 | 205 | 26,48 | 6,645 |
| 15 | 30 | 475 | 30 | 165 | 42 | 31 | 35 | 20 | 30 | 142 | 233 | 203 | 10 | 171 | 30 | 40 | 163 | 37 | 30 | 165 | 44 | 664 | 205 | 27,56 | 6,942 |
| 30 | 25 | 536 | 30 | 165 | 52 | 36 | 35 | 20 | 30 | 142 | 288 | 245 | 10 | 165 | 30 | 40 | 165 | 37 | 30 | 236 | 0 | 736 | 205 | 30,68 | 7,766 |
| 45 | 20 | 672 | 30 | 165 | 71 | 52 | 35 | 20 | 30 | 142 | 390 | 326 | 10 | 171 | 30 | 40 | 179 | 37 | 30 | 354 | -44 | 906 | 205 | 37,59 | 9,653 |
| ALCANTARILLA TUBULAR TRIPLE D = 120 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 532 | 40 | 180 | 40 | 40 | 40 | 25 | 30 | 163 | 208 | 188 | 10 | 208 | 40 | 45 | 188 | 43 | 35 | 104 | 104 | 723 | 230 | 34,84 | 10,272 |
| 15 | 30 | 554 | 40 | 180 | 50 | 36 | 40 | 25 | 30 | 163 | 255 | 220 | 10 | 186 | 40 | 45 | 177 | 43 | 35 | 180 | 48 | 758 | 230 | 36,35 | 10,759 |
| 30 | 25 | 626 | 40 | 180 | 61 | 43 | 40 | 25 | 30 | 163 | 314 | 264 | 10 | 180 | 40 | 45 | 180 | 43 | 35 | 257 | 0 | 838 | 230 | 40,37 | 12,037 |
| 45 | 20 | 785 | 40 | 180 | 83 | 63 | 40 | 25 | 30 | 163 | 426 | 351 | 10 | 186 | 40 | 45 | 196 | 43 | 35 | 386 | -48 | 1032 | 230 | 49,39 | 14,983 |
| ALCANTARILLA TUBULAR TRIPLE D = 150 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 30 | 638 | 50 | 260 | 46 | 46 | 40 | 30 | 30 | 194 | 300 | 277 | 10 | 300 | 40 | 45 | 277 | 52 | 40 | 150 | 150 | 918 | 320 | 52,07 | 19,516 |
| 15 | 30 | 663 | 50 | 260 | 57 | 41 | 40 | 30 | 30 | 194 | 368 | 328 | 10 | 269 | 40 | 45 | 258 | 52 | 40 | 260 | 70 | 955 | 320 | 54,37 | 20,446 |
| 30 | 25 | 750 | 50 | 260 | 70 | 50 | 40 | 30 | 30 | 194 | 453 | 396 | 10 | 260 | 40 | 45 | 260 | 52 | 40 | 371 | 0 | 1059 | 320 | 60,48 | 22,915 |
| 45 | 20 | 942 | 50 | 260 | 95 | 75 | 40 | 30 | 30 | 194 | 615 | 530 | 10 | 269 | 40 | 45 | 280 | 52 | 40 | 558 | -70 | 1322 | 320 | 74,22 | 28,616 |

### PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Medina — Consultor — CONSULPAR S.A.

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REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

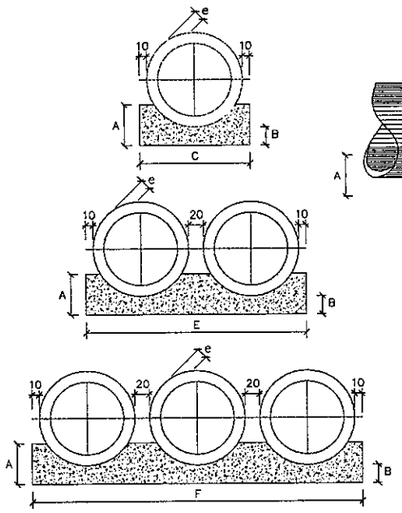
TRAMO: ITAPE - VILLARRICA

ALCANTARILLA TUBULAR

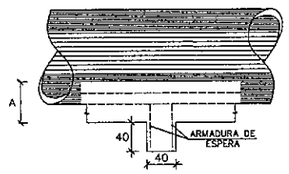
30
treinta

# LECHOS Y DIENTES PARA ASENTAMIENTO DE ALCANTARILLAS

LECHOS




VISTA LATERAL




CUADRO DE DIMENSIONES

| DIAMETRO | A | B | C | E | F | e |
|---|---|---|---|---|---|---|

CANTIDADES UNITARIAS DE LOS DIENTES

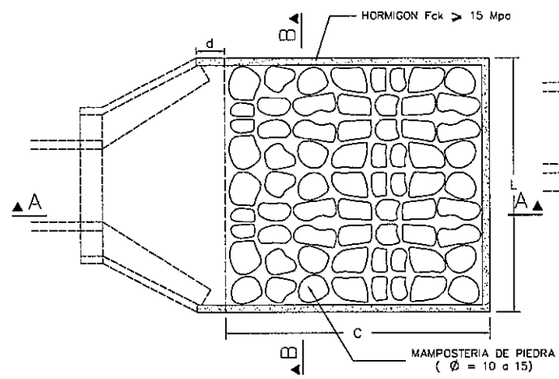
| | SIMPLE | | DOBLE | | TRIPLE | |
|---|---|---|---|---|---|---|
| DIAMETRO (cm.) | HORMIGON (m3) | ARMADURA (kg.) | HORMIGON (m3) | ARMADURA (kg.) | HORMIGON (m3) | ARMADURA (kg.) |

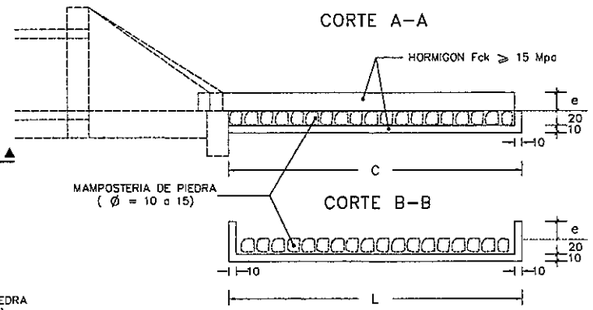
CANTIDADES POR METRO LINEAL DE LECHO

| | SIMPLE | | DOBLE | | TRIPLE | |
|---|---|---|---|---|---|---|
| DIAMETRO (cm.) | HORMIGON (m3) | ENCOFRADO (m2) | HORMIGON (m3) | ENCOFRADO (m2) | HORMIGON (m3) | ENCOFRADO (m2) |

OBSERVACIONES:

# DISIPADORES DE ENERGIA APLICABLES A SALIDAS DE ALCANTARILLAS

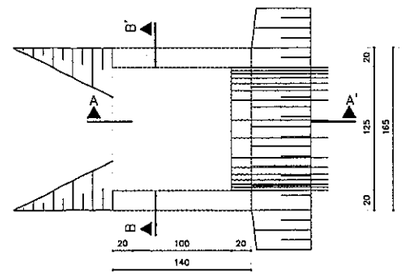



DIMENSIONES Y CONSUMOS MEDIOS POR UNIDAD DE DISIPADOR

| TIPO | ADAPTABLE EN | C | L | d | e | HORMIGON Fck≥15Mpa m3 | ENCOFRADO m2 | MAMPOST. DE PIEDRA m3 | EXCAVAC. m3 | RELLENO m3 |
|---|---|---|---|---|---|---|---|---|---|---|

PLANTA




CANTIDADES UNITARIAS

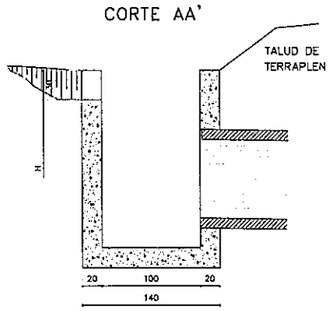
| HORMIGON Fck≥15Mpa (m3) | ENCOFRADO (m2) | EXCAVACION (m3) | RELLENO (m3) |
|---|---|---|---|

## TABLAS DE ARMADURAS (POR METRO DE TUBO)

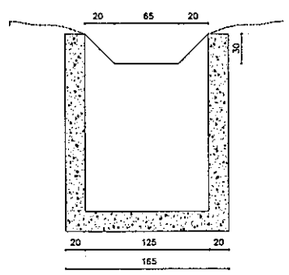
| TUBOS TIPO CA – 1 (ABNT) | | TUBOS TIPO CA – 2 (ABNT) | | TUBOS TIPO CA – 3 (ABNT) | |
|---|---|---|---|---|---|
| ENCOFRADO | ARMADURAS | ENCOFRADO | ARMADURAS | ENCOFRADO | ARMADURAS |

## CAJA COLECTORA TALVEG–CCT
ESC. 1:25

CORTE AA'




CORTE BB'

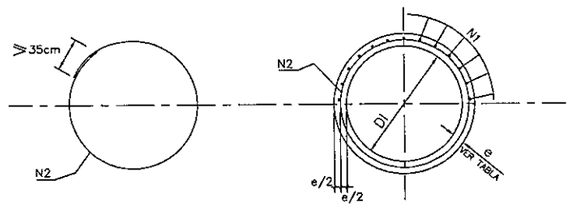



MATERIALES PARA TUBO

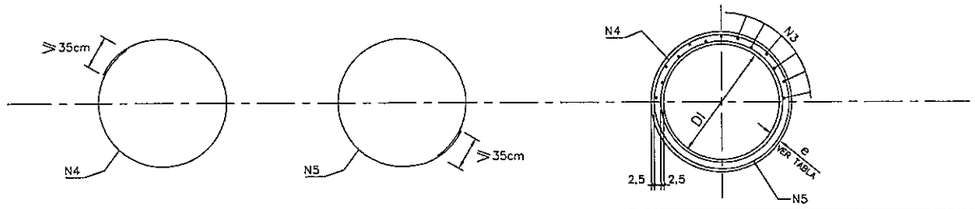
H° fck 240 kg/cm2
Varilla AP-420 DN

CA – 1 (ALTURA DE TERRAPLÉN) 1,00 a 3,50 m
CA – 2 (ALTURA DE TERRAPLEN) 3,50 a 5,00 m
CA – 3 (ALTURA DE TERRAPLEN) 5,00 a 7,00 m.

CORTE TRANSVERSAL




CORTE TRANSVERSAL




## PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
| DISTANCIA DE VISIBILIDAD DE PARADA: | 60 M. |
| RADIO MINIMO HORIZONTAL: | 60 M. |
| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Ing. Raúl L. Monge
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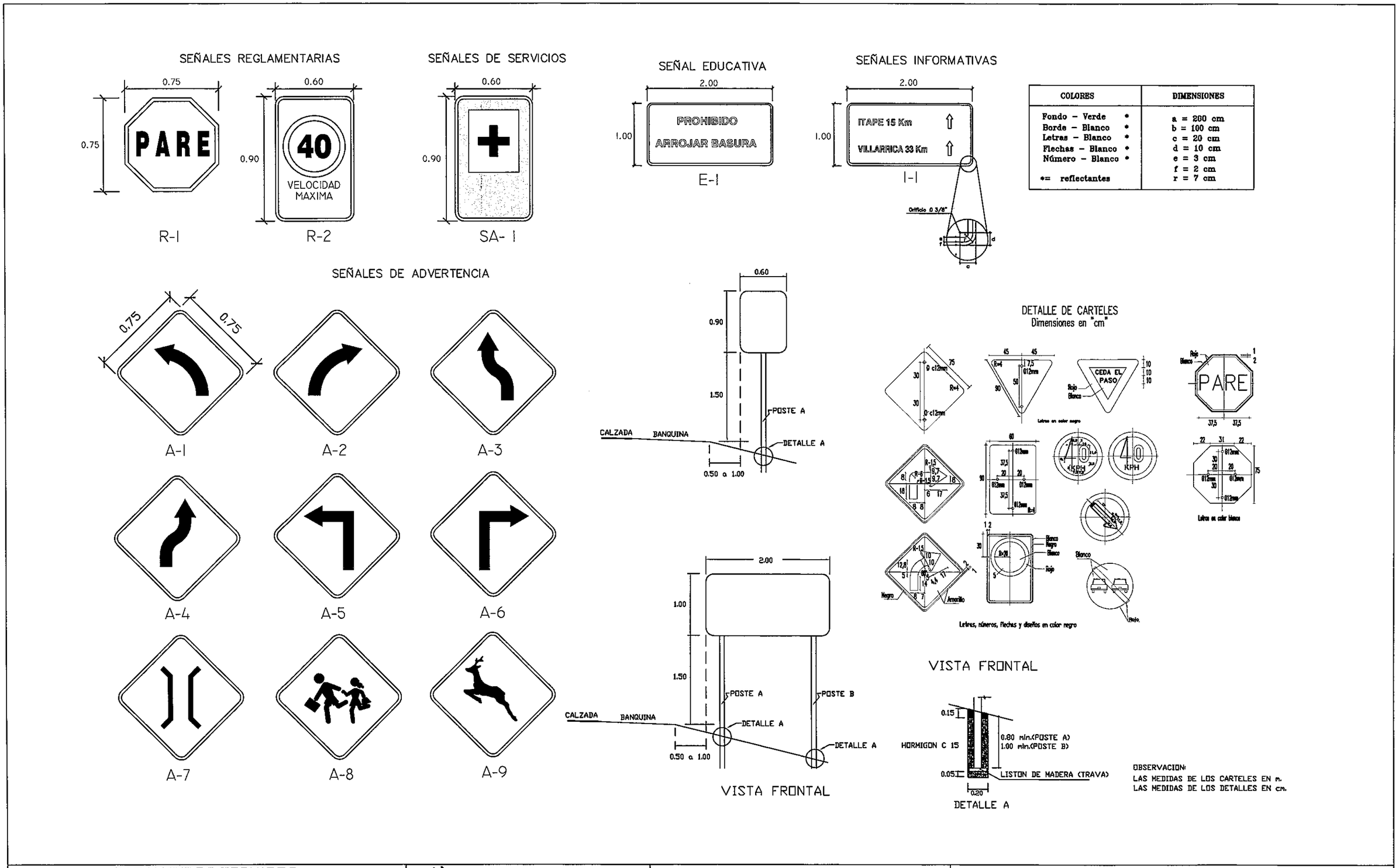
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

ALCANTARILLA TUBULAR

31
treinta y un




| COLORES | DIMENSIONES |
|---|---|
| Fondo – Verde * | a = 200 cm |
| Borde – Blanco * | b = 100 cm |
| Letras – Blanco * | c = 20 cm |
| Flechas – Blanco * | d = 10 cm |
| Número – Blanco * | e = 3 cm |
| | f = 2 cm |
| *= reflectantes | r = 7 cm |

| PARAMETROS TECNICOS | |
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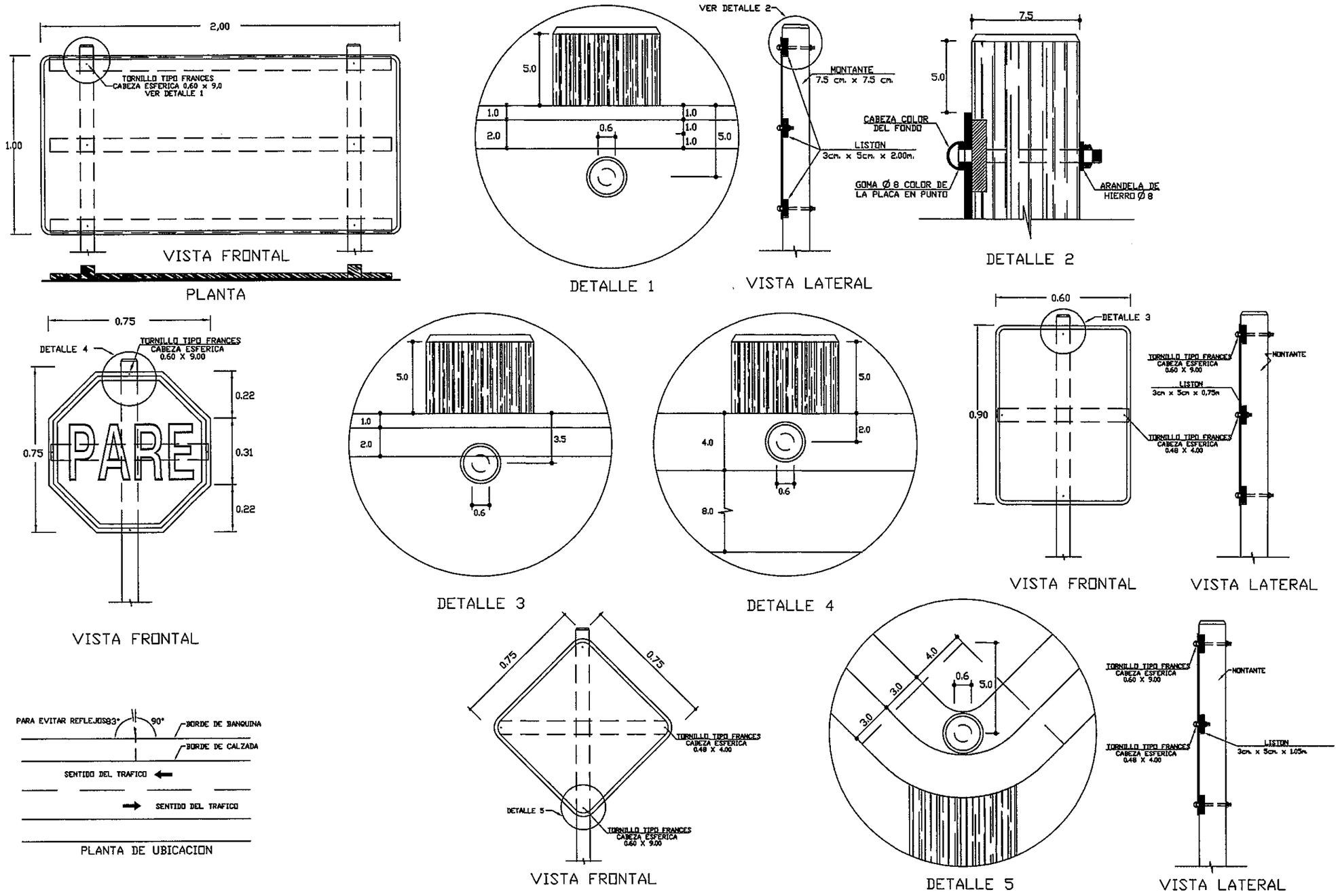
TRAMO: ITAPE - VILLARRICA

SECCION TIPO

32
treinta y dos




| PARAMETROS TECNICOS | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 KM/H |
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CONSORCIO
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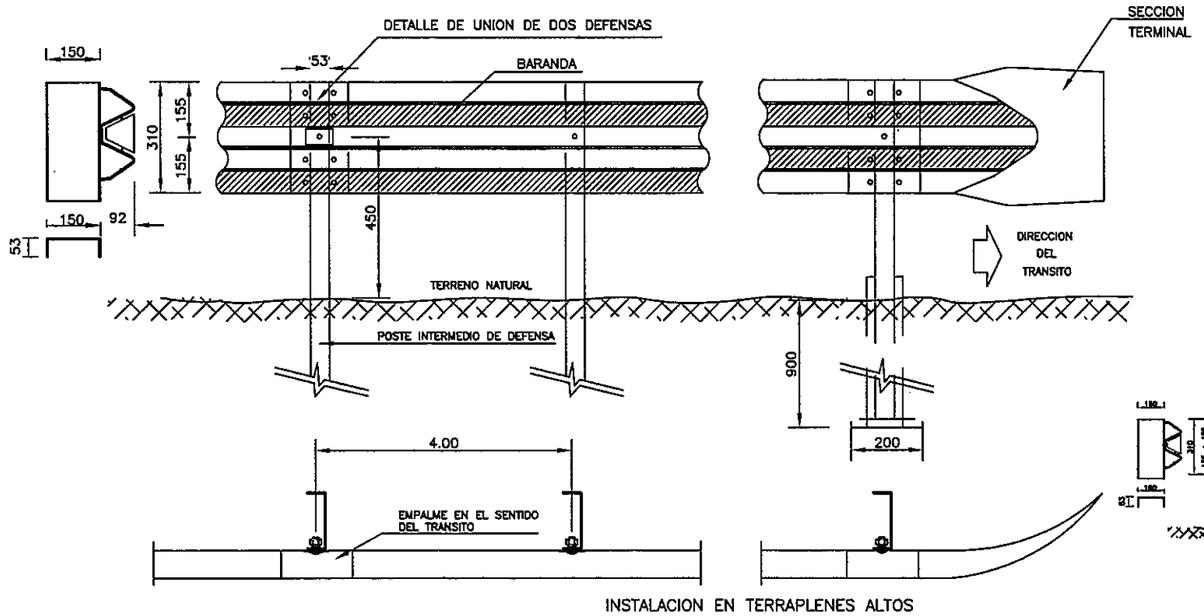
TRAMOS DE LA RED VIAL NACIONAL

TRAMO: ITAPE - VILLARRICA

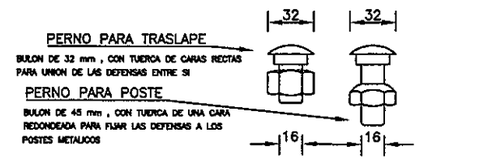
SECCION TIPO

33
treinta y tres

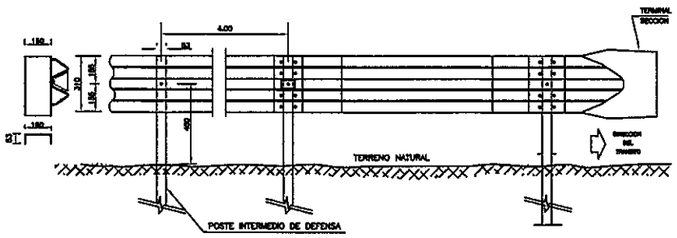
## DEFENSA METALICA

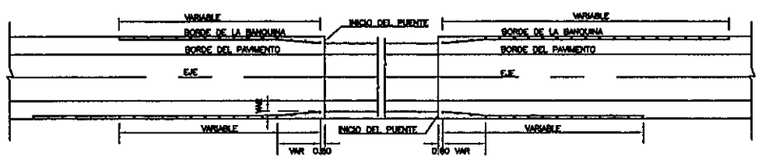


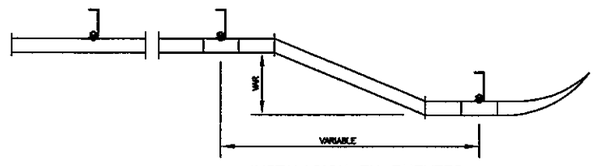

INSTALACION EN TERRAPLENES ALTOS



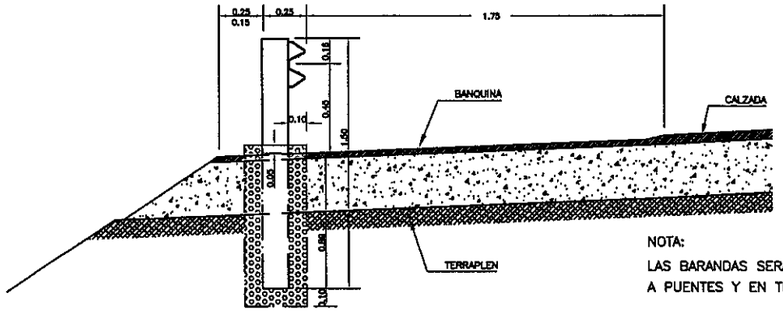

DETALLE DE TUERCA Y BULON




INSTALACION EN PUENTES




NOTA:
LAS BARANDAS SERAN INSTALADAS EN LOS ACCESOS A PUENTES Y EN TERRAPLENES ELEVADOS

### PARAMETROS TECNICOS

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|---|---|
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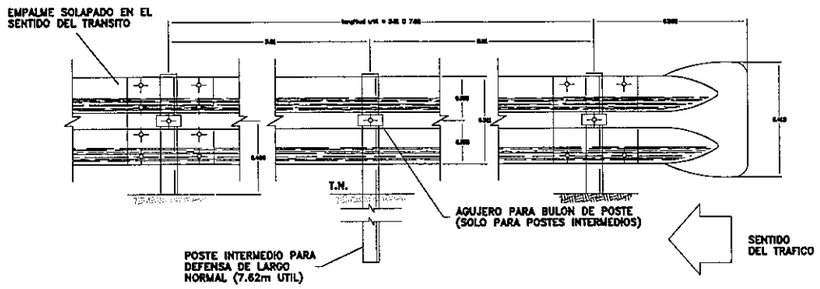
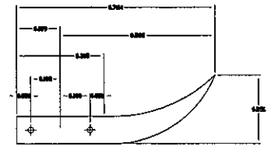
TRAMO: ITAPE - VILLARRICA

SECCION TIPO

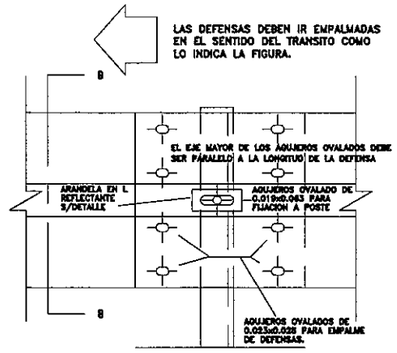



## DETALLE ALA TERMINAL COMUN

EMPALME EN EL SENTIDO DEL TRANSITO

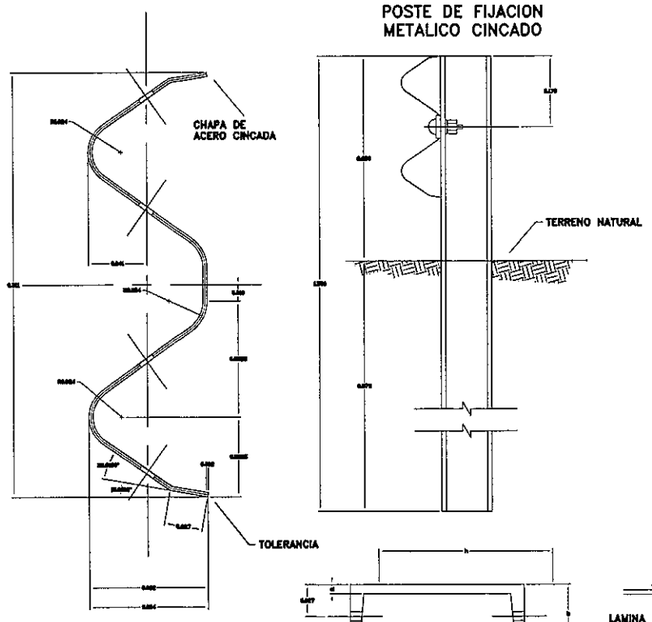


## DETALLE EMPALME DE LAS DEFENSAS Y FIJACION A POSTE METALICO




ALZADO

## POSTE DE FIJACION METALICO CINCADO

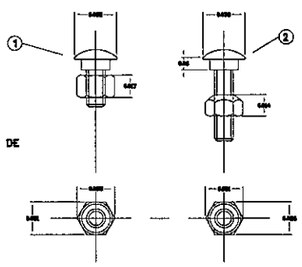



SECCION TRANSVERSAL

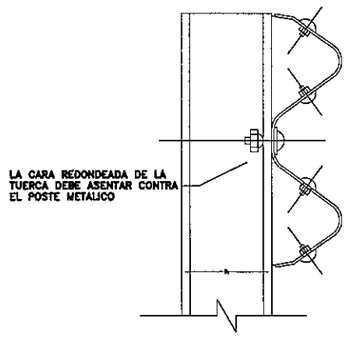
| TIPO | DIMENSIONES | | | | PESO |
|---|---|---|---|---|---|
| | h | b | d | t | Kg/m. |
| LIVIANO | 152.4 | 48.77 | 5.08 | 8.71 | 12.2 |
| PESADO | 177.8 | 53.09 | 5.33 | 9.33 | 14.6 |

① BULON DE 0.032mm DE LONG. CON TUERCA DE CARAS RECTAS CON DOBLE HENDIDURA PARA EMPALME DE LAS DEFENSAS.

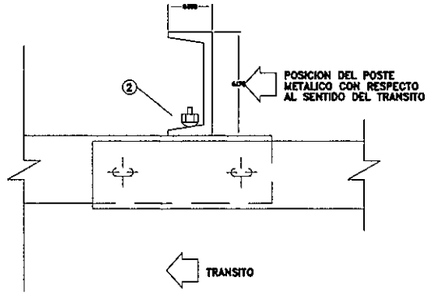
② BULON DE 0.045mm LONG. CON TUERCA DE UNA CARA REDONDEADA PARA FIJAR LAS DEFENSAS A LOS POSTES METALICOS.



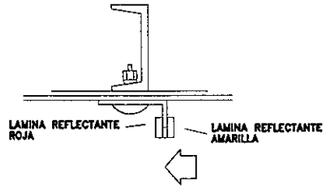

## DETALLE TUERCA Y BULON




SECCION B-B




PLANTA




## DETALLE DE ARANDELA REFLECTANTE

| DIMENSIONES DE LAS DEFENSAS METALICAS | | | | |
|---|---|---|---|---|
| CLASE | CALIBRE e | AREA DE SECCION TRANSVER. cm² | PESO DE LA DEFENSA DE 3.81m Kg | PESO DE LA DEFENSA DE 7.62m Kg |
| A | 12(2.5mm) | 12.84 | 42.3 | 76.7 |
| B | 10(3.2mm) | 16.52 | 48.7 | 95.8 |

## NOTAS:

CUANDO NO SE INDIQUE LO CONTRARIO EN EL PROYECTO LOS POSTES DE FIJACION SERAN METALICOS CINCADOS.

LAS DEFENSAS EN CURVA, CUYO RADIO SEA MAYOR DE 45.00m PODRAN ADAPTARSE DIRECTAMENTE EN OBRA AL SER INSTALADAS.

LAS DE RADIO MENOR DEBEN SER PROVISTAS CURVADAS PREVIAMENTE.

## PARAMETROS TECNICOS

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|---|---|
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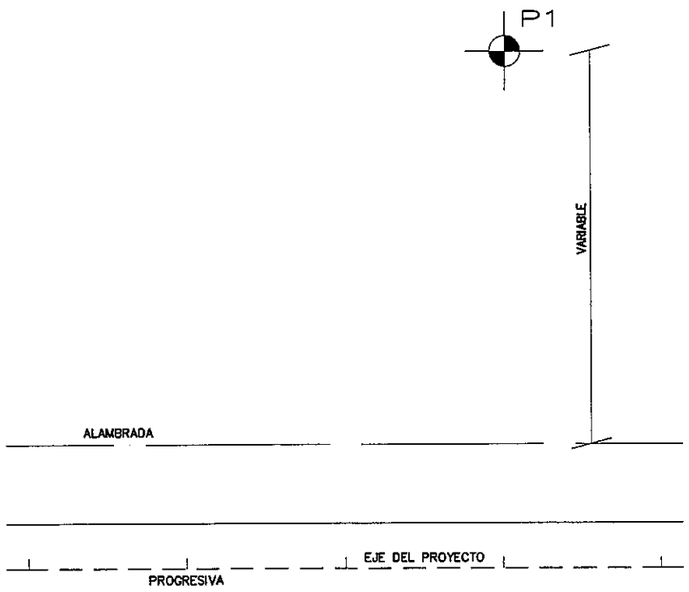
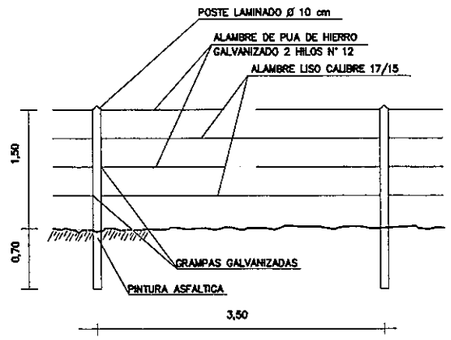
TRAMO: ITAPE - VILLARRICA

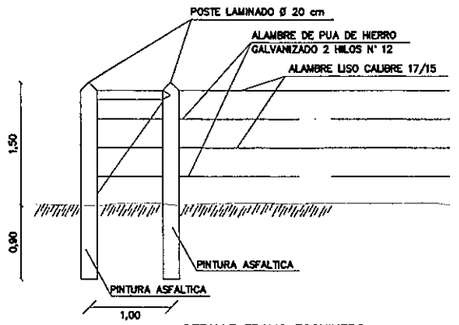
BARANDAS DE DEFENSA TIPO FLEX BEAM

35
Treinta y cinco

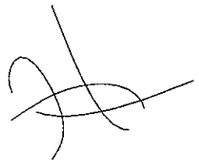


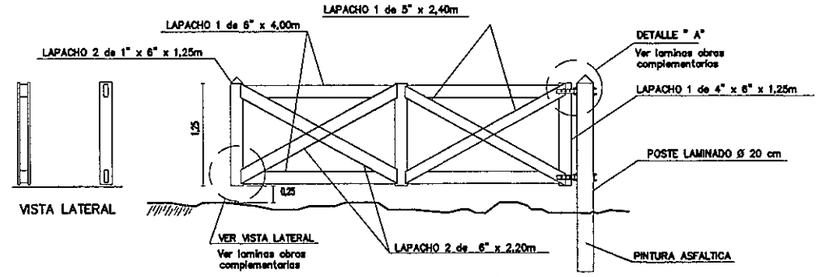

DETALLE TRAMO INTERMEDIO




DETALLE TRAMO ESQUINERO



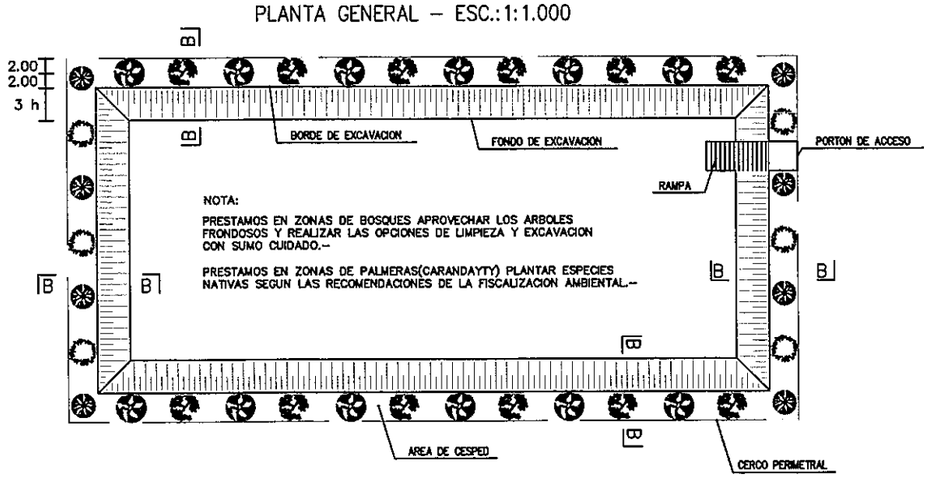
ATADURA PARA ALAMBRE



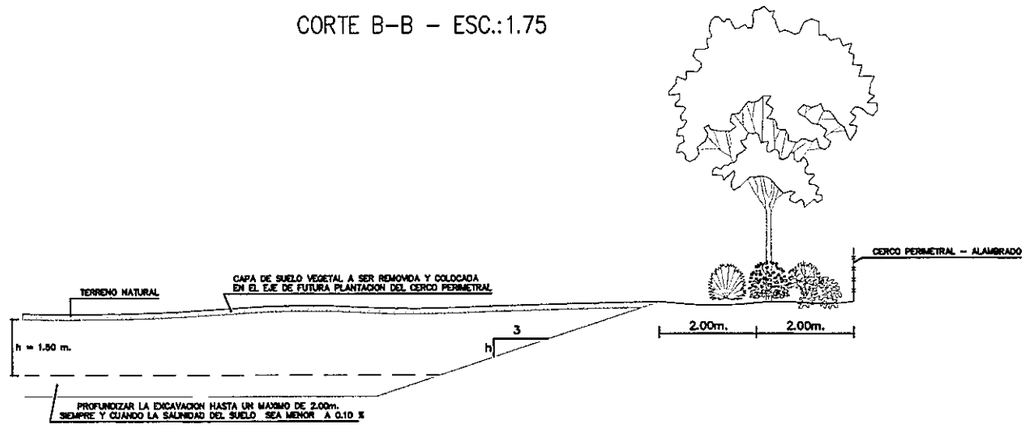

DETALLE PORTON DE ACCESO

## PROTECCION DE PRESTAMO

PLANTA GENERAL – ESC.:1:1.000




CORTE B–B – ESC.:1.75

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TRAMO: ITAPE - VILLARRICA

PROTECCION FORESTAL

CONSULPAR S.A.

36
treinta y seis

# SECCION LONGITUDINAL

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 83.12 | 83.12 | 83.12 | 83.12 | 83.12 | 83.12 | 83.12 | 83.12 | 83.12 | | |
| | | 83.120 | 83.120 | 83.120 | 80.300 | 80.183 | 78.100 | 80.458 | 83.120 | 83.120 | | |

Notas:
1-Las Dimensiones estan en metros, salvo indicacion en contrario.
2-Resistencia de los materiales.
Resistencia especificada del Hormigon: 25 MPa.
Resistencia especificada del Acero: 420 MPa.
3-Penetracion minima del Pilote en el firme: 1.00 m.
4-La longitud de las armaduras estan en centimetros y su diametro en milimetros.
5-Recubrimiento minimo 7 cm.
6-Sello: Las Fundaciones se asentaran sobre un sello de Hormigon 1;3;6 de 0.10 m de espesor.

| PARAMETROS TECNICOS | |
|---|---|
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TRAMO: ITAPE - VILLARRICA

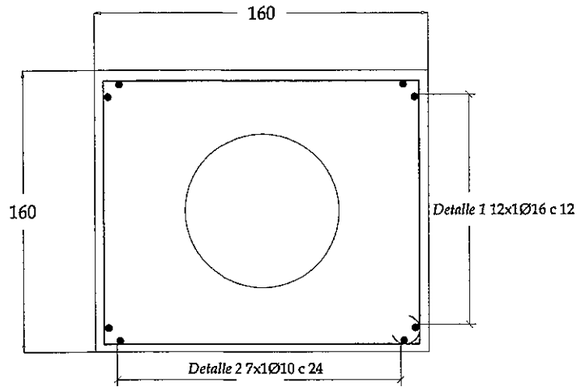
PUENTE LONG: 30 M.

-Seccion Longitudinal

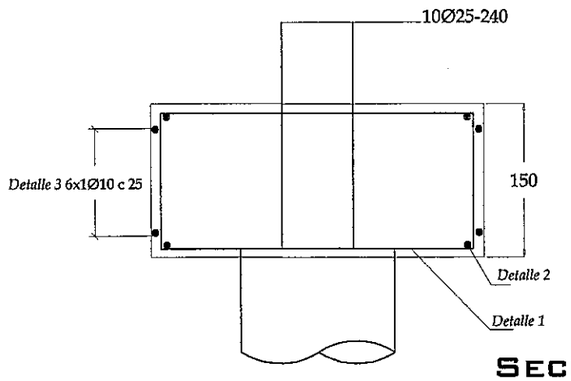
37
(TREINTA Y SIETE)

# PILA

## DETALLE CABEZAL

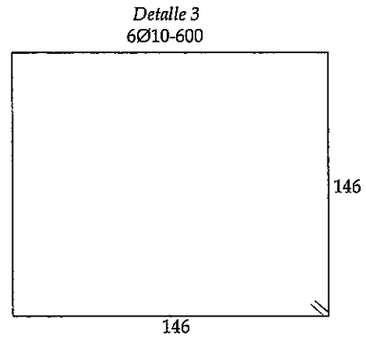


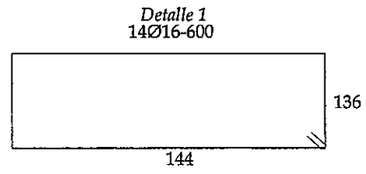

### PLANTA

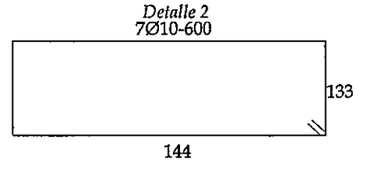



### SECCION

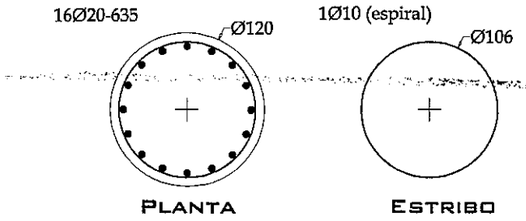
## ARMADURA CABEZAL

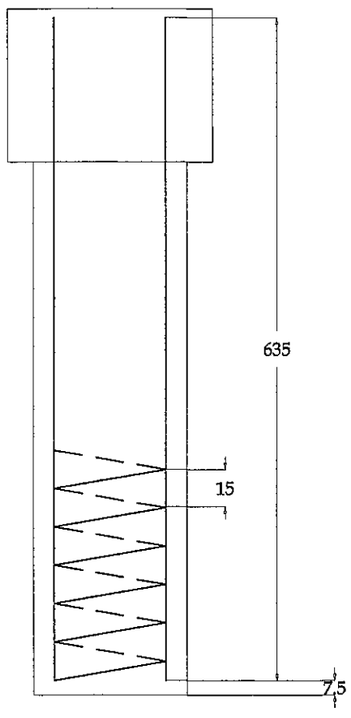



## ARMADURA PILOTES

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TRAMO: ITAPE - VILLARRICA

PUENTE LONG: 30 M. | -Armaduras

41
(CUARENTA Y UNO)