# REPÚBLICA DEL PARAGUAY

## MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES

# LLAMADO MOPC N°  / 2012

## AD REFERENDUM A LA REPROGRAMACION PRESUPUESTARIA

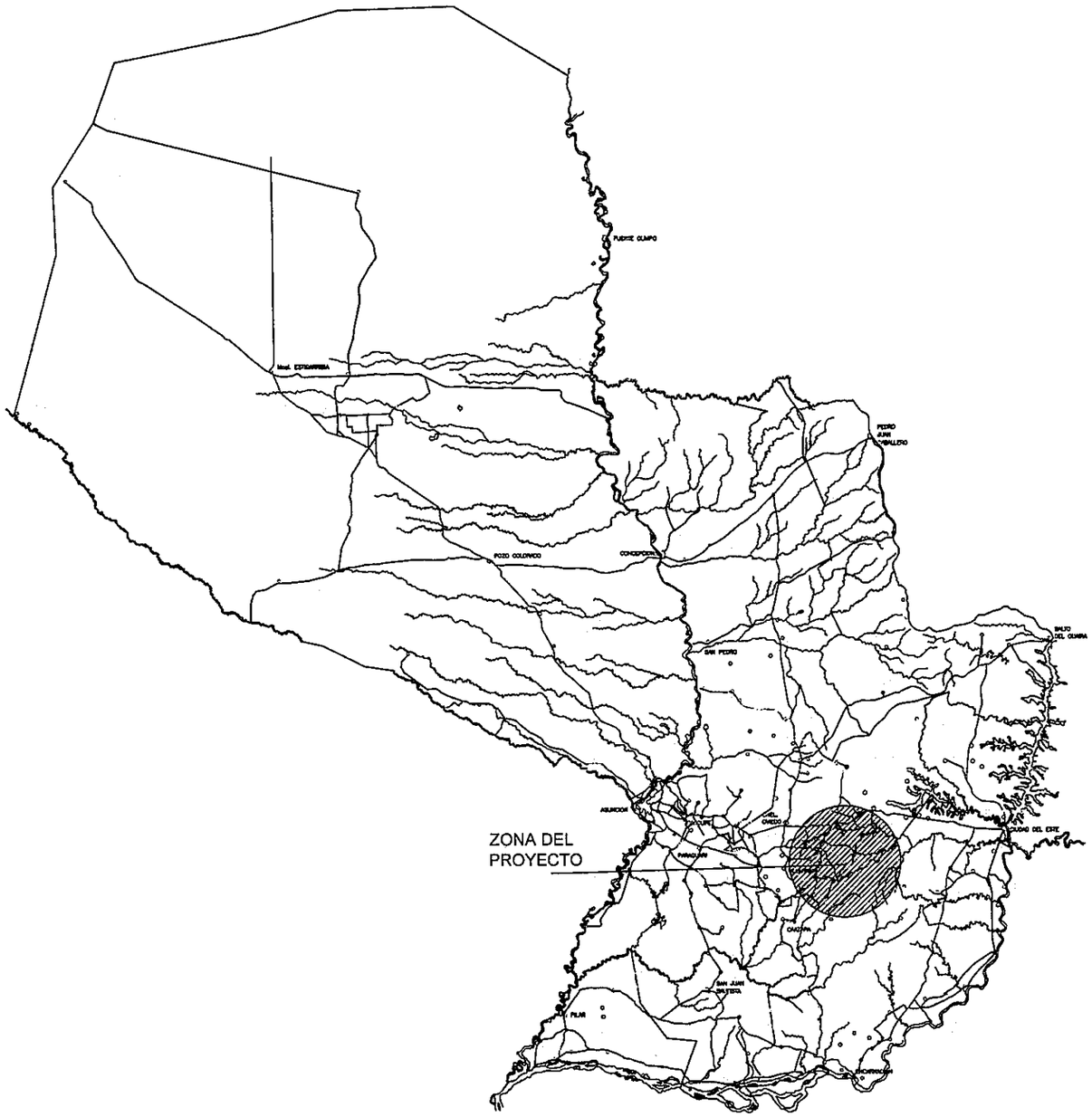
## LICITACIÓN PÚBLICA NACIONAL DE FIRMAS CONSTRUCTORAS ESPECIALIZADAS EN OBRAS VIALES PARA LA CONSTRUCCION DE PAVIMENTO TIPO EMPEDRADO EN VARIOS TRAMOS CAMINEROS EN LA REGION ORIENTAL

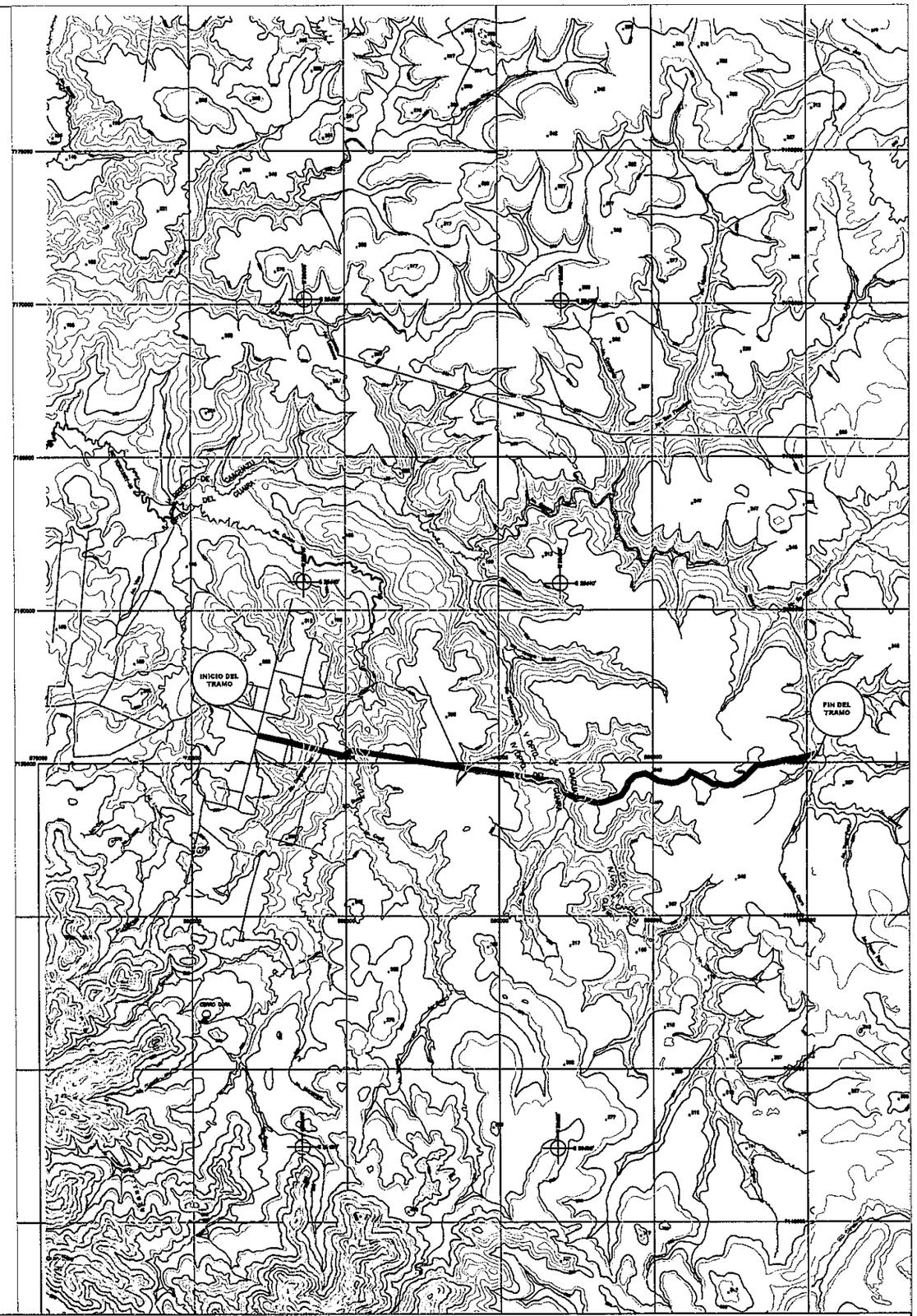
# ANEXO
# PLANOS DE OBRA

OBRA 2: COLONIA INDEPENDENCIA – PASO YOBAI.

**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. |

Consultor Representante Legal
CONSILPAR S.A.

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

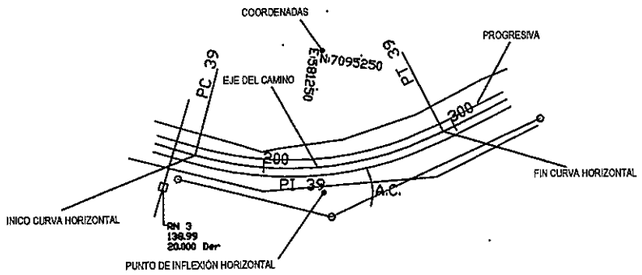
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

PLANTA UBICACION

1 MUO

## 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 |

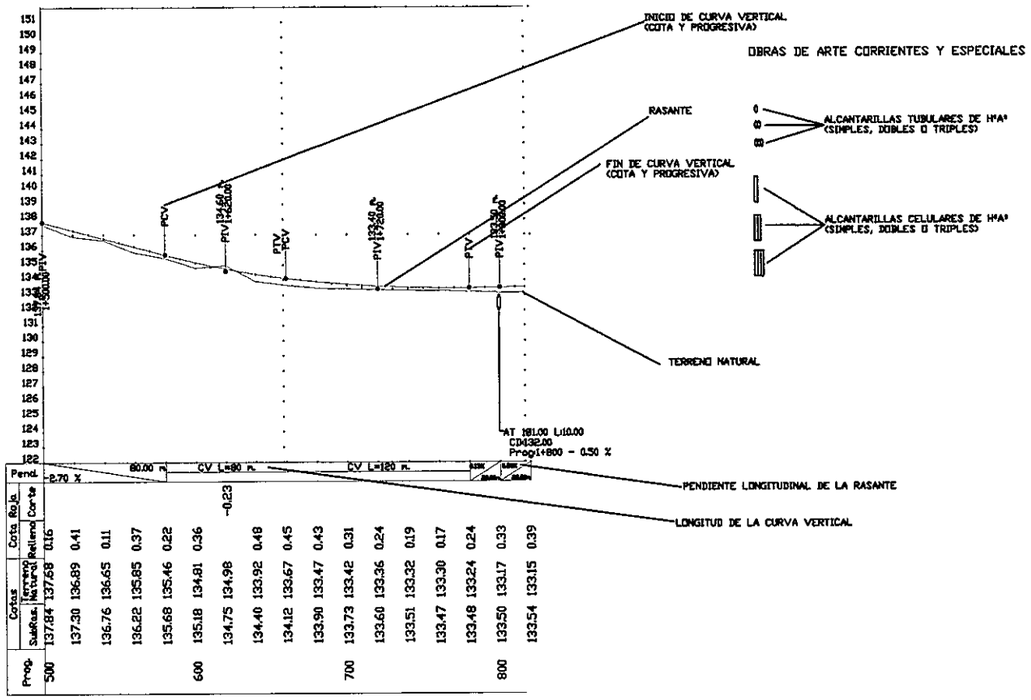
## CONVENCIONES DE ALTIMETRÍA

### PERFIL LONGITUDINAL DEL PROYECTO

CUADRO DE DATOS DE REFERENCIAS DE NIVEL

CUADRO DE RN

| RN N° | Progresiva | Dist. al | E.I.d | 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 | 7101297.93 |
| RN 6 | 3+000 | 20.00 | D | 124.553 | 566103.17 | 7101155.91 |




OBRAS DE ARTE CORRIENTES Y ESPECIALES




| Prog. | Cotas Subras. | Cotas Terreno Natural | Cotas Relleno | Cotas Corte | Cota Roja |
|---|---|---|---|---|---|
| 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 H°A° | ALCANTARILLA TUVULAR DE HORMIGÓN ARMADO |
| AC H°A° | 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. |

Consultor: Dr. Raúl E. Montiel C. Representante Legal

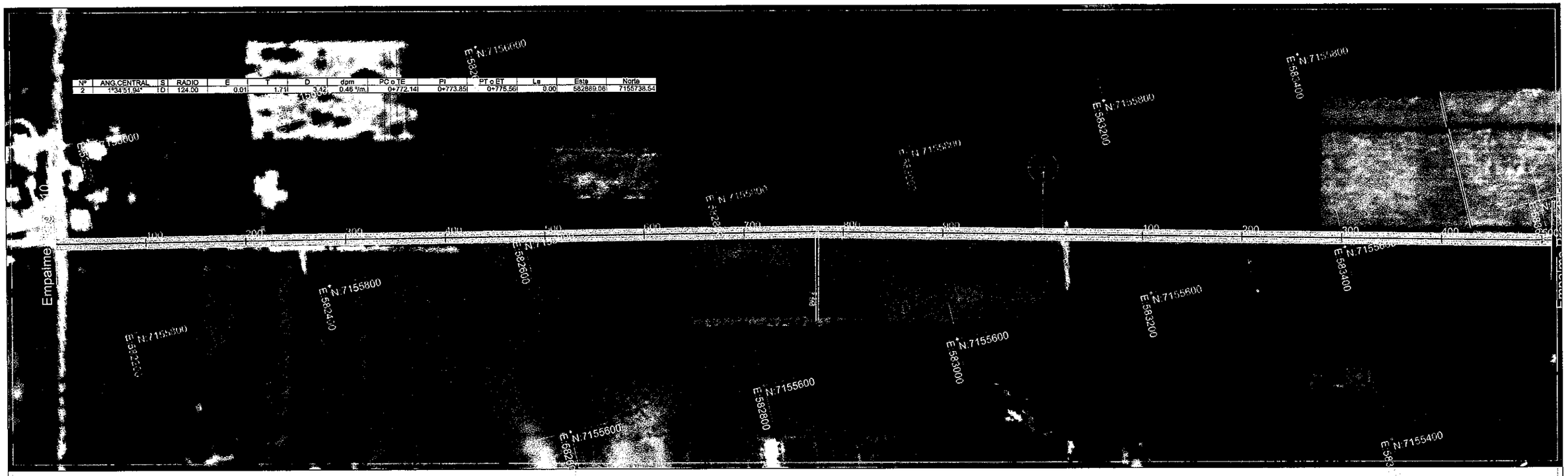
REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS
PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

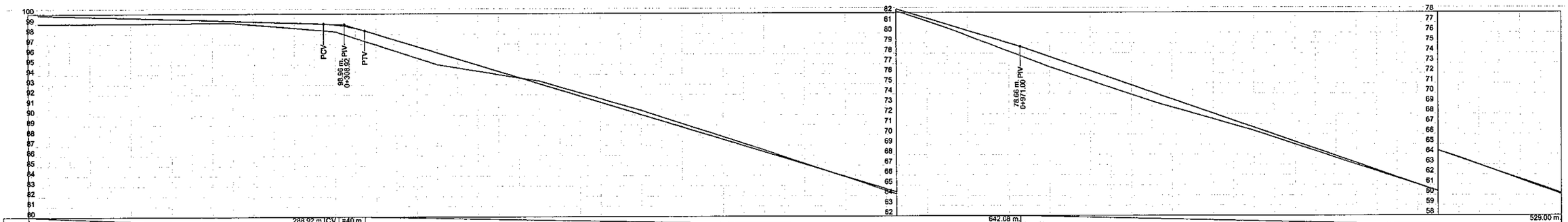
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

CONVENCIONES Y ABREVIATURAS

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 1°34'51.94" | D | 124.00 | 0.01 | 1.71 | 3.42 | 0.46 °/m. | 0+772.14 | 0+773.85 | 0+775.56 | 0.00 | 582889.08 | 7155738.54 |




| Prog. | Cotas Rasante | Cotas Terreno Natural | Cotas Rojas Relleno | Cotas Rojas Corte |
|---|---|---|---|---|
| 0+000 | 99.77 | 99.05 | 0.72 | |
| 100 | 99.61 | 99.05 | 0.56 | |
| 200 | 99.46 | 99.08 | 0.38 | |
| 300 | 99.30 | 99.11 | 0.19 | |
| 400 | 99.14 | 98.68 | 0.46 | |
| 500 | 98.94 | 98.25 | 0.69 | |
| 600 | 97.70 | 96.62 | 1.07 | |
| 700 | 96.16 | 94.99 | 1.17 | |
| 800 | 94.63 | 94.18 | 0.46 | |
| 900 | 93.10 | 93.36 | | -0.26 |
| 1+000 | 91.56 | 91.91 | | -0.34 |
| 100 | 90.03 | 90.45 | | -0.42 |
| 200 | 88.50 | 88.82 | | -0.32 |
| 300 | 86.97 | 87.19 | | -0.23 |
| 400 | 85.43 | 85.53 | | -0.09 |
| 500 | 83.90 | 83.86 | 0.04 | |
| 600 | 82.37 | 82.17 | 0.19 | |
| 700 | 80.83 | 80.48 | 0.35 | |
| 800 | 79.30 | 78.56 | 0.74 | |
| 900 | 77.65 | 76.64 | 1.00 | |
| 1+000 | 75.90 | 74.94 | 0.96 | |
| 100 | 74.15 | 73.25 | 0.91 | |
| 200 | 72.41 | 71.80 | 0.61 | |
| 300 | 70.66 | 70.35 | 0.32 | |
| 400 | 68.92 | 68.68 | 0.24 | |
| 500 | 67.17 | 67.02 | 0.16 | |
| | 65.43 | 65.37 | 0.05 | |
| | 63.68 | 63.73 | | -0.05 |
| | 61.94 | 61.89 | 0.05 | |
| | 60.13 | 60.05 | 0.08 | |

## PARAMETROS TECNICOS

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

Consultora Paraguaya
Ing. Raúl E. Montiel C.
Ingeniero Civil
Registro Nº 3
CONSORCIO
CONSULPAR S.A. - GECLAPAR S.A.

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

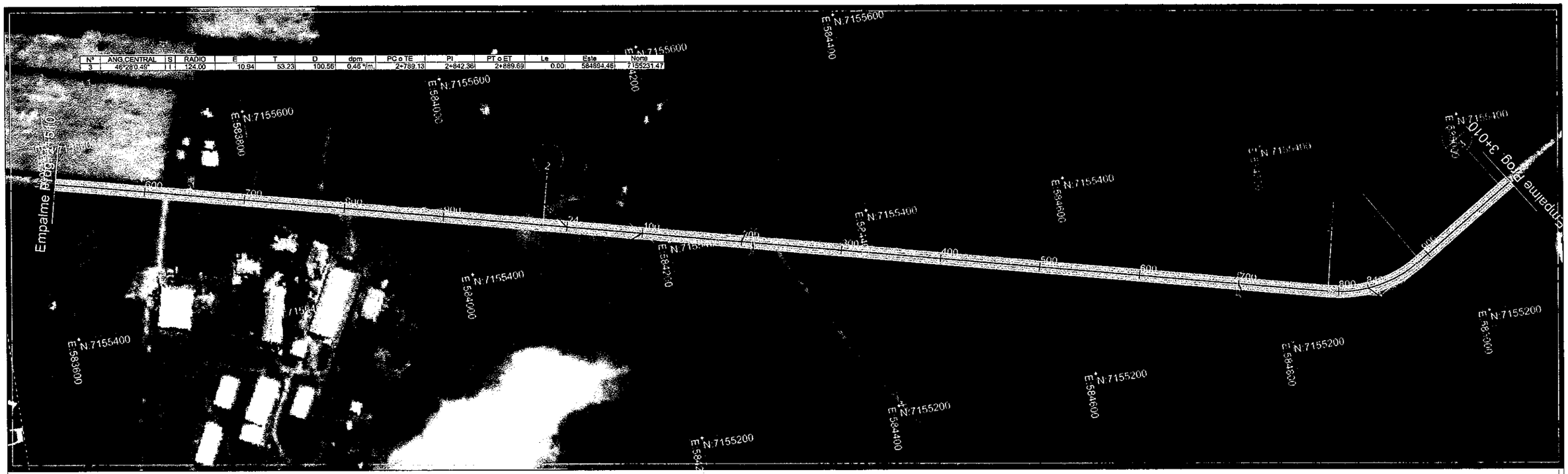
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

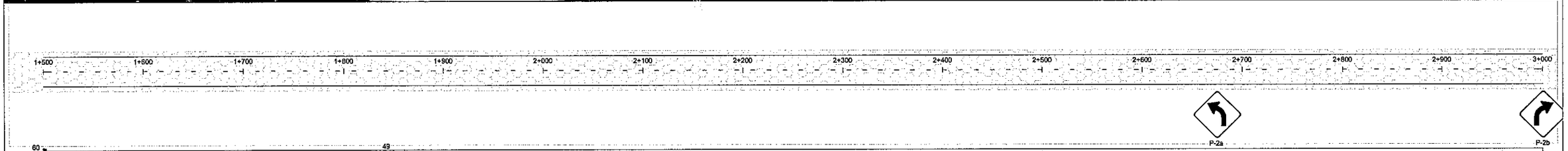
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

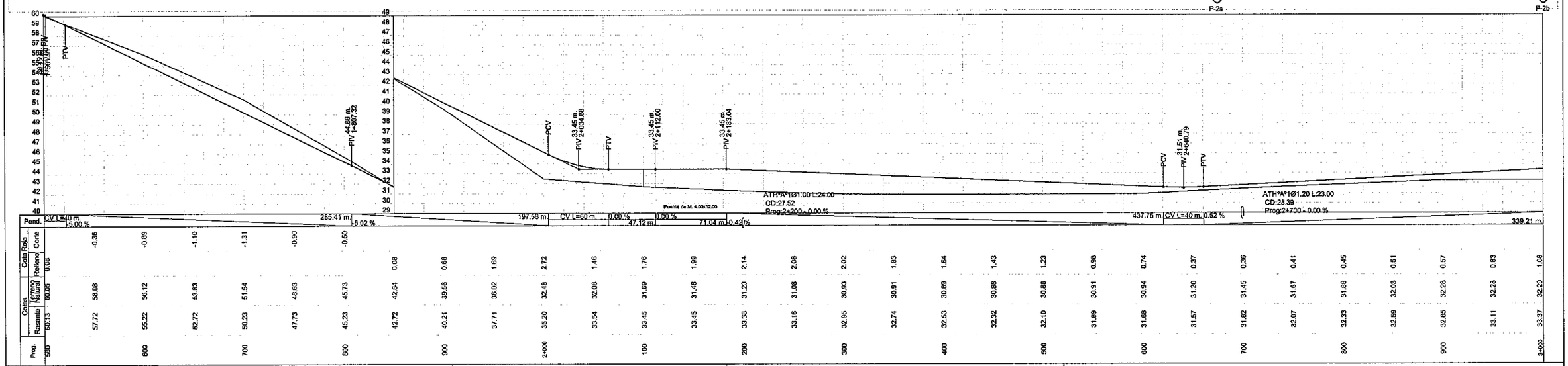
| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 0+000 - 1+500 | H = 1:2000<br>V = 1:200 | 1 |

3 tres

| N° | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 46°28'0.45" | I | 124.00 | 10.94 | 53.23 | 100.56 | 0.46 °/m. | 2+789.13 | 2+842.36 | 2+889.69 | 0.00 | 584894.46 | 7155231.47 |




## 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 Caminos del Paraguay S.A. — Raúl E. Campiel C. — Consorcio

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DIRECCION DE VIALIDAD

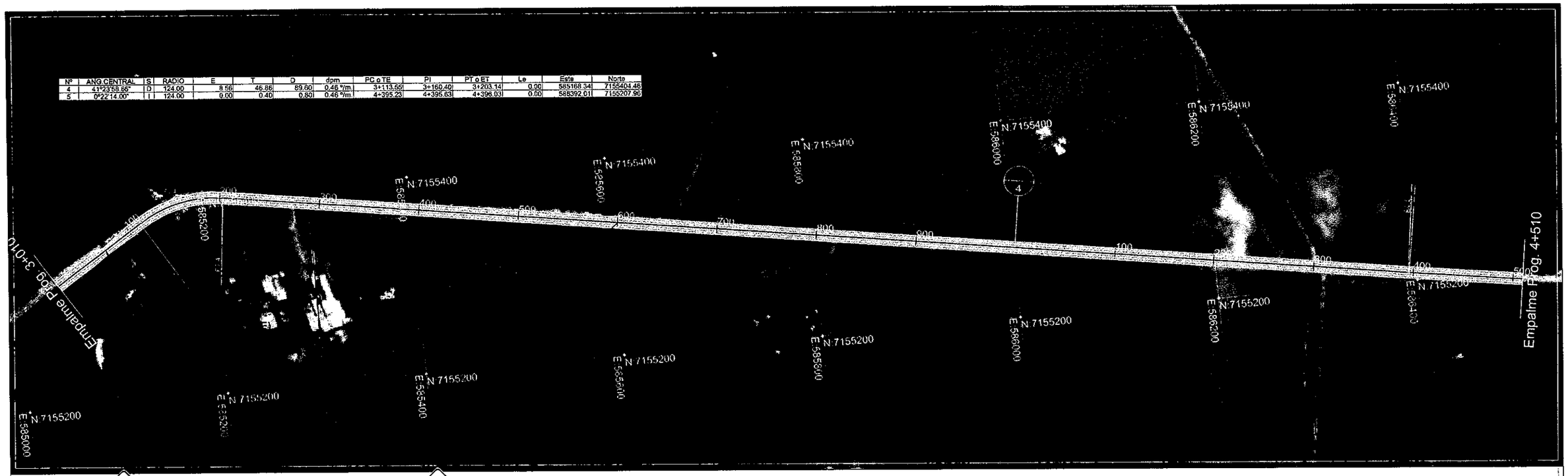
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

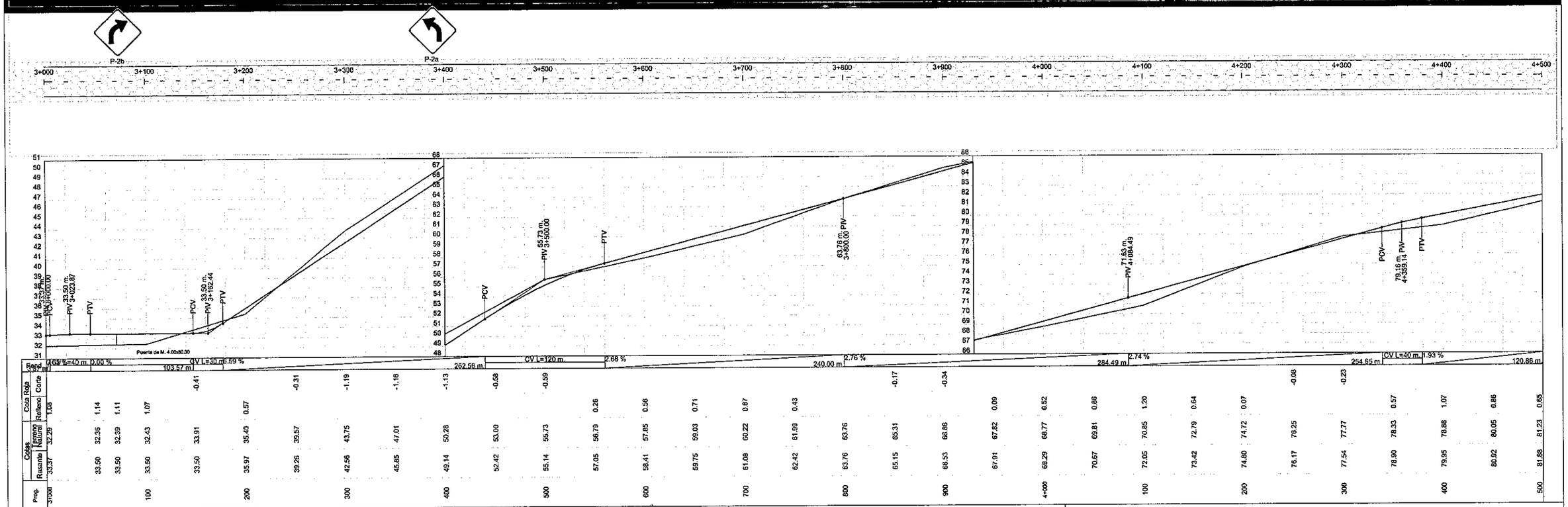
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA N° |
|---|---|---|
| Prog: 1+500 - 3+000 | H = 1:2000<br>V = 1:200 | 2 |

4 cuatro

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 41°23'58.65" | D | 124.00 | 8.56 | 46.86 | 89.60 | 0.46 °/m. | 3+113.55 | 3+160.40 | 3+203.14 | 0.00 | 585168.34 | 7155404.46 |
| 5 | 0°22'14.00" | I | 124.00 | 0.00 | 0.40 | 0.80 | 0.46 °/m. | 4+395.23 | 4+395.63 | 4+396.03 | 0.00 | 586392.01 | 7155207.96 |




## 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 CEI - Montiel S.A.
Ing. Raúl Montiel
Representante Legal

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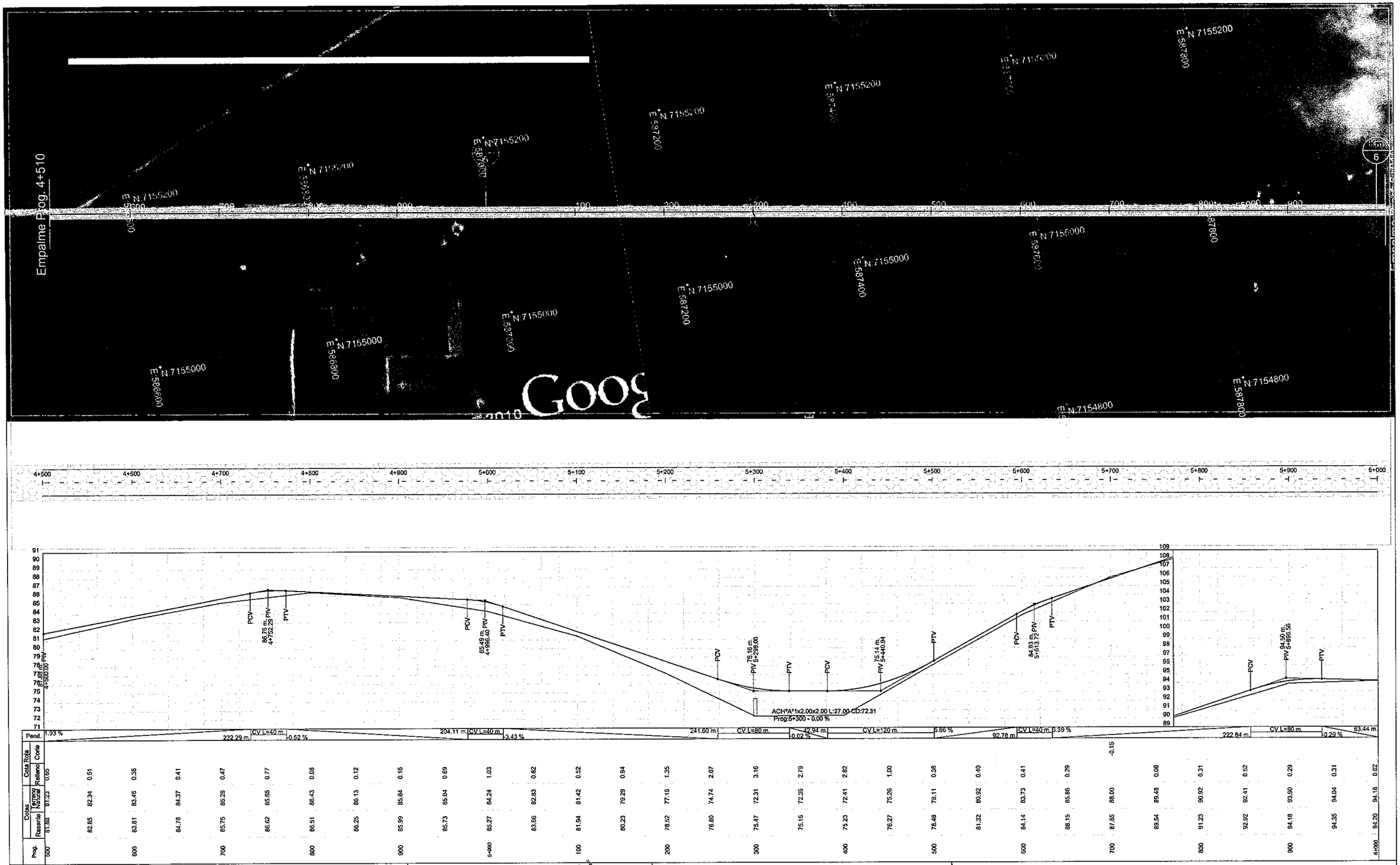
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 3+000 - 4+500 | H = 1:2000<br>V = 1:200 | 3 |




## 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 Consulpar - Geotecnia
Ing. Raúl A. Montiel V.
Representante Legal
CONSORCIO CONSULPAR - GEOTECNIA

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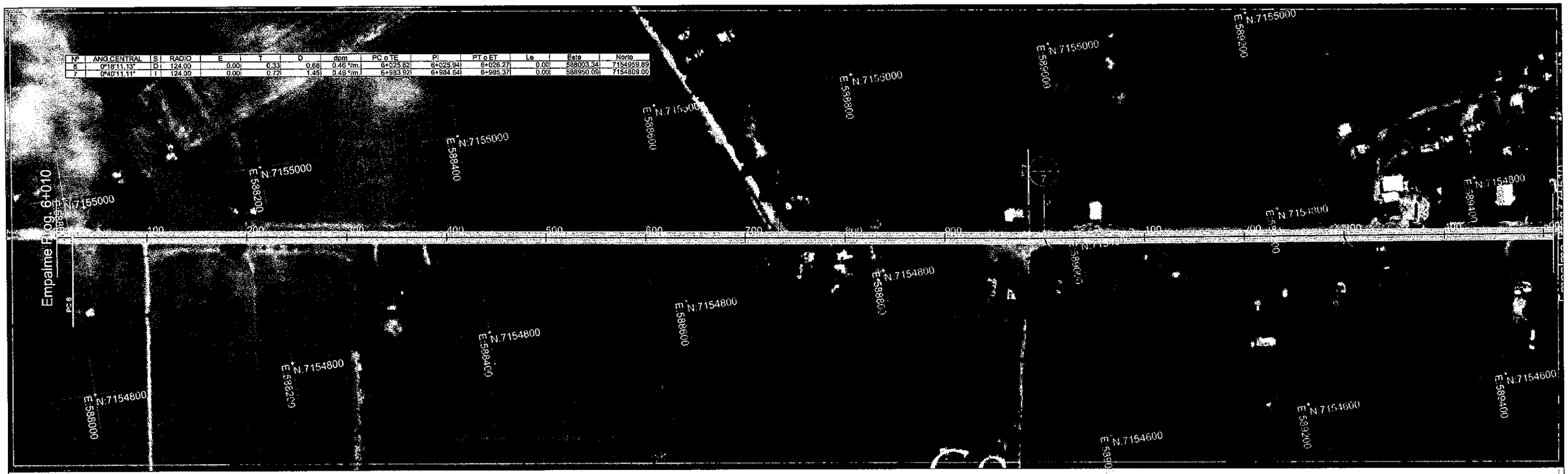
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

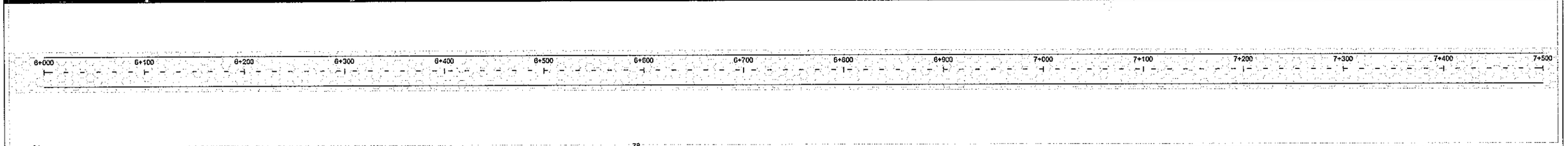
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

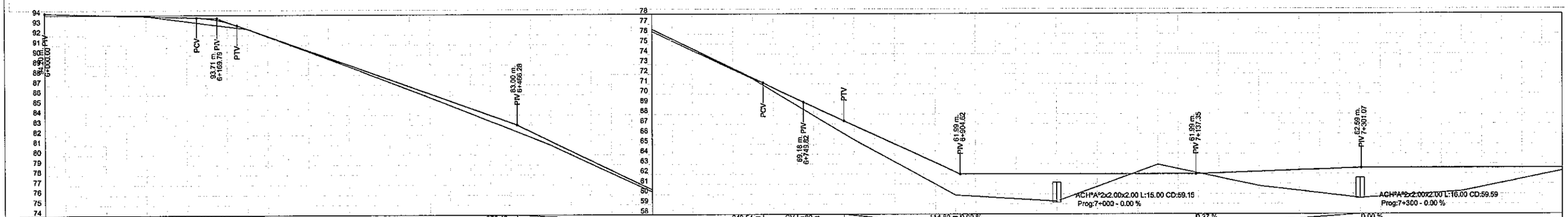
| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 4+500 - 6+000 | H = 1:2000<br>V = 1:200 | 4 |

6
Seis

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 0°18'11.13" | D | 124.00 | 0.00 | 0.33 | 0.66 | 0.46 °/m. | 6+025.62 | 6+025.94 | 6+026.27 | 0.00 | 588003.34 | 7154959.89 |
| 7 | 0°40'11.11" | I | 124.00 | 0.00 | 0.72 | 1.45 | 0.46 °/m. | 6+983.92 | 6+984.64 | 6+985.37 | 0.00 | 588950.09 | 7154809.00 |




| Prog. | Cotas Roja Corte | Cotas Roja Relleno | Cotas Natural | Cotas Rasante | Cotas Rojas |
|---|---|---|---|---|---|
| 6+000 | | 0.02 | 94.18 | 94.20 | |
| | | 0.00 | 94.05 | 94.05 | 94.05 |
| 100 | -0.01 | | 93.92 | 93.91 | 93.91 |
| | | 0.50 | 93.26 | 93.76 | 93.76 |
| 200 | | 0.01 | 92.61 | 92.61 | 92.61 |
| | | 0.08 | 90.73 | 90.81 | 90.81 |
| 300 | | 0.15 | 88.85 | 89.00 | 89.00 |
| | | 0.29 | 86.90 | 87.20 | 87.20 |
| 400 | | 0.44 | 84.95 | 85.39 | 85.39 |
| | | 0.62 | 82.97 | 83.59 | 83.59 |
| 500 | | 0.38 | 80.97 | 81.36 | 81.36 |
| | | 0.30 | 78.62 | 78.92 | 78.92 |
| 600 | | 0.21 | 76.28 | 76.48 | 76.48 |
| | | 0.15 | 73.90 | 74.05 | 74.05 |
| 700 | | 0.09 | 71.52 | 71.61 | 71.61 |
| | | 0.73 | 68.47 | 69.20 | 69.20 |
| 800 | | 1.44 | 65.42 | 66.85 | 66.85 |
| | | 1.87 | 62.66 | 64.53 | 64.53 |
| 900 | | 2.31 | 59.90 | 62.21 | 62.21 |
| | | 2.41 | 59.58 | 61.99 | 61.99 |
| 7+000 | | 2.73 | 59.27 | 61.99 | 61.99 |
| | | 0.69 | 61.10 | 61.99 | 61.99 |
| 100 | -0.94 | | 62.93 | 61.99 | 61.99 |
| | | 0.18 | 61.85 | 62.04 | 62.04 |
| 200 | | 1.43 | 60.79 | 62.22 | 62.22 |
| | | 2.21 | 60.19 | 62.41 | 62.41 |
| 300 | | 3.00 | 59.59 | 62.59 | 62.59 |
| | | 2.67 | 59.93 | 62.59 | 62.59 |
| 400 | | 2.33 | 60.26 | 62.59 | 62.59 |
| | | 1.31 | 61.28 | 62.59 | 62.59 |
| 500 | | 0.29 | 62.30 | 62.59 | 62.59 |

## 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 Montiel
Representante Legal
CONSULPAR S.A.

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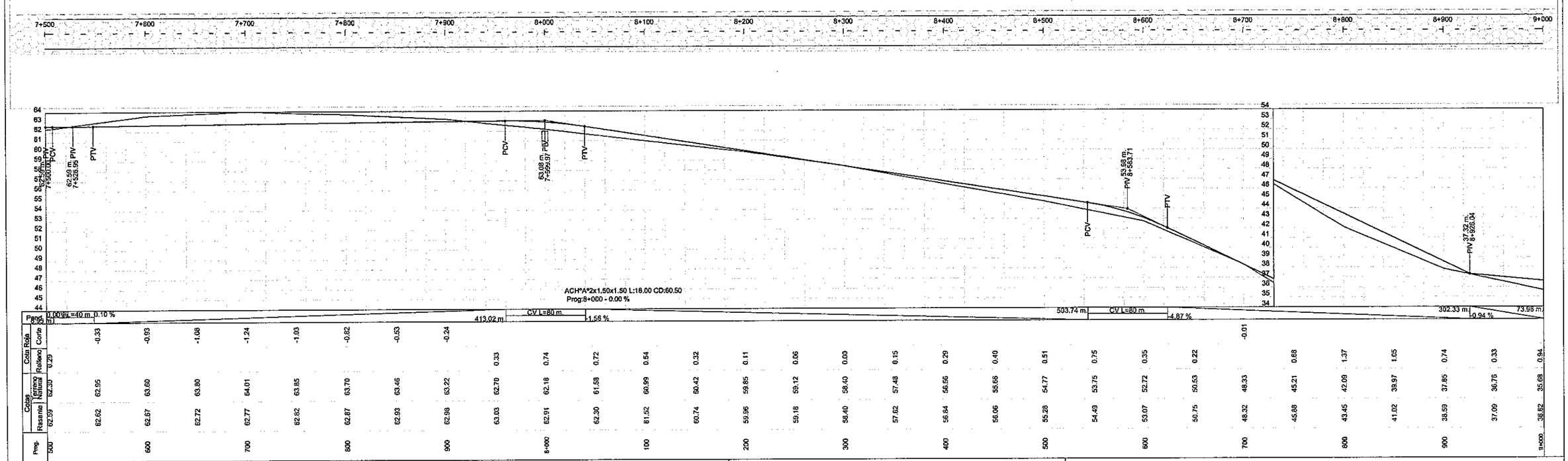
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 6+000 - 7+500 | H = 1:2000<br>V = 1:200 | 5 |

siete

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 6°22'45.21" | D | 124.00 | 0.00 | 0.41 | 0.82 | 0.46 °/m | 8+262.62 | 8+263.03 | 8+263.44 | 0.00 | 590214.81 | 7154622.57 |




| Prog. | Rasante | Cotas Terreno Natural | Relleno | Cota Rás. Corte |
|---|---|---|---|---|
| 500 | 62.59 | 62.30 | 0.29 | |
| | 62.62 | 62.95 | | -0.33 |
| 600 | 62.67 | 63.60 | | -0.93 |
| | 62.72 | 63.80 | | -1.08 |
| 700 | 62.77 | 64.01 | | -1.24 |
| | 62.82 | 63.85 | | -1.03 |
| 800 | 62.87 | 63.70 | | -0.82 |
| | 62.93 | 63.46 | | -0.53 |
| 900 | 62.99 | 63.22 | | -0.24 |
| | 63.03 | 62.70 | 0.33 | |
| 8+000 | 62.91 | 62.18 | 0.74 | |
| | 62.30 | 61.58 | 0.72 | |
| 100 | 61.52 | 60.99 | 0.54 | |
| | 60.74 | 60.42 | 0.32 | |
| 200 | 59.96 | 59.85 | 0.11 | |
| | 59.18 | 59.12 | 0.06 | |
| 300 | 58.40 | 58.40 | 0.00 | |
| | 57.62 | 57.48 | 0.15 | |
| 400 | 56.84 | 56.55 | 0.29 | |
| | 56.06 | 55.66 | 0.40 | |
| 500 | 55.28 | 54.77 | 0.51 | |
| | 54.49 | 53.75 | 0.75 | |
| 600 | 53.07 | 52.72 | 0.35 | |
| | 50.75 | 50.53 | 0.22 | |
| 700 | 48.32 | 48.33 | | -0.01 |
| | 45.88 | 45.21 | 0.68 | |
| 800 | 43.45 | 42.09 | 1.37 | |
| | 41.02 | 39.97 | 1.05 | |
| 900 | 38.59 | 37.85 | 0.74 | |
| | 37.09 | 36.76 | 0.33 | |
| 9+000 | 36.62 | 35.68 | 0.94 | |

## 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 CONSULPAR - GEOLATINA
Ing. Raúl Molinas
Representante Legal
CONSULPAR S.A. - GEOLATINA S.A.

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

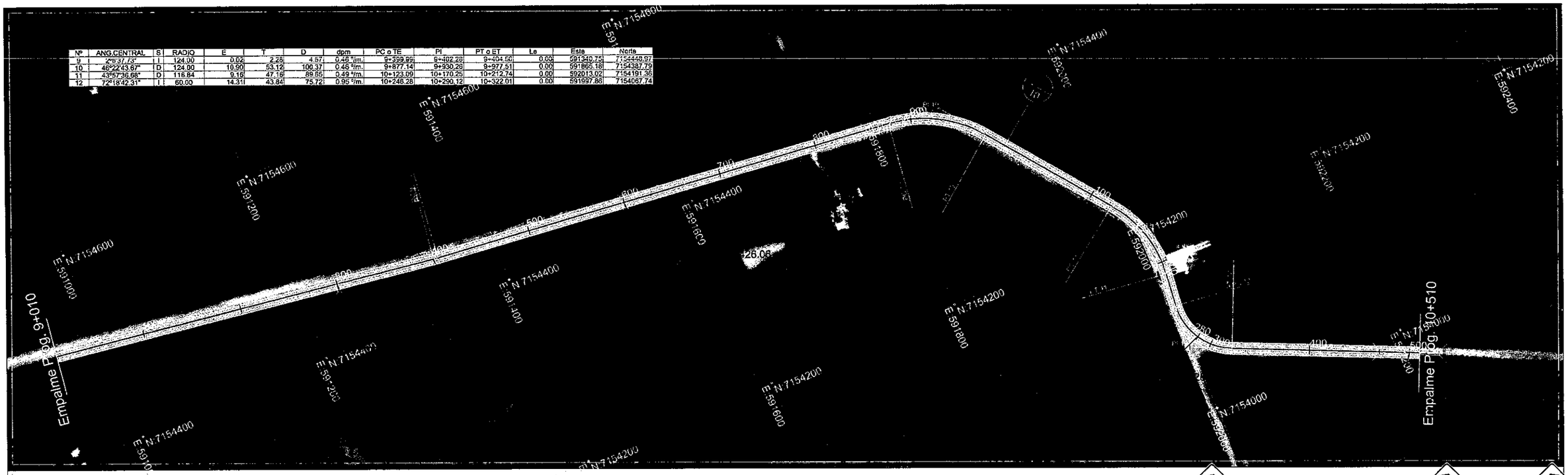
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

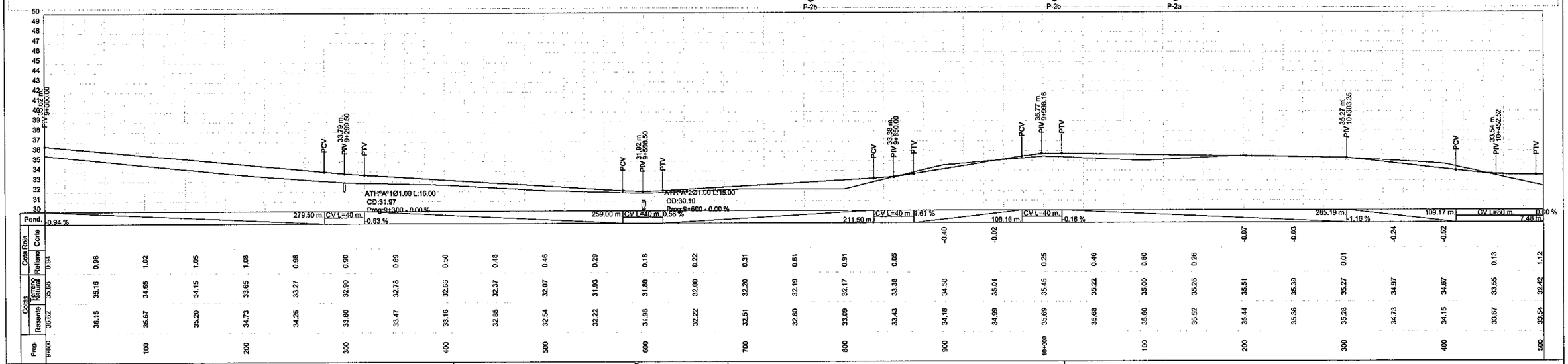
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 7+500 - 9+000 | H = 1:2000<br>V = 1:200 | 6 |

8

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 2°6'37.73" | I | 124.00 | 0.02 | 2.25 | 4.57 | 0.46 °/m. | 9+399.99 | 9+402.28 | 9+404.56 | 0.00 | 591240.73 | 7154449.97 |
| 10 | 46°22'43.67" | D | 124.00 | 10.90 | 53.12 | 100.37 | 0.46 °/m. | 9+877.14 | 9+930.28 | 9+977.51 | 0.00 | 591865.18 | 7154387.79 |
| 11 | 43°57'36.68" | D | 116.84 | 9.16 | 47.18 | 89.65 | 0.49 °/m. | 10+123.09 | 10+170.25 | 10+212.74 | 0.00 | 592013.02 | 7154191.36 |
| 12 | 72°18'42.31" | I | 60.00 | 14.31 | 43.84 | 75.72 | 0.95 °/m. | 10+246.28 | 10+290.12 | 10+322.01 | 0.00 | 591997.86 | 7154067.74 |




## 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. |

REPUBLICA DEL PARAGUAY
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PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

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TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 9+000 - 10+500 | H = 1:2000<br>V = 1:200 | 7 |

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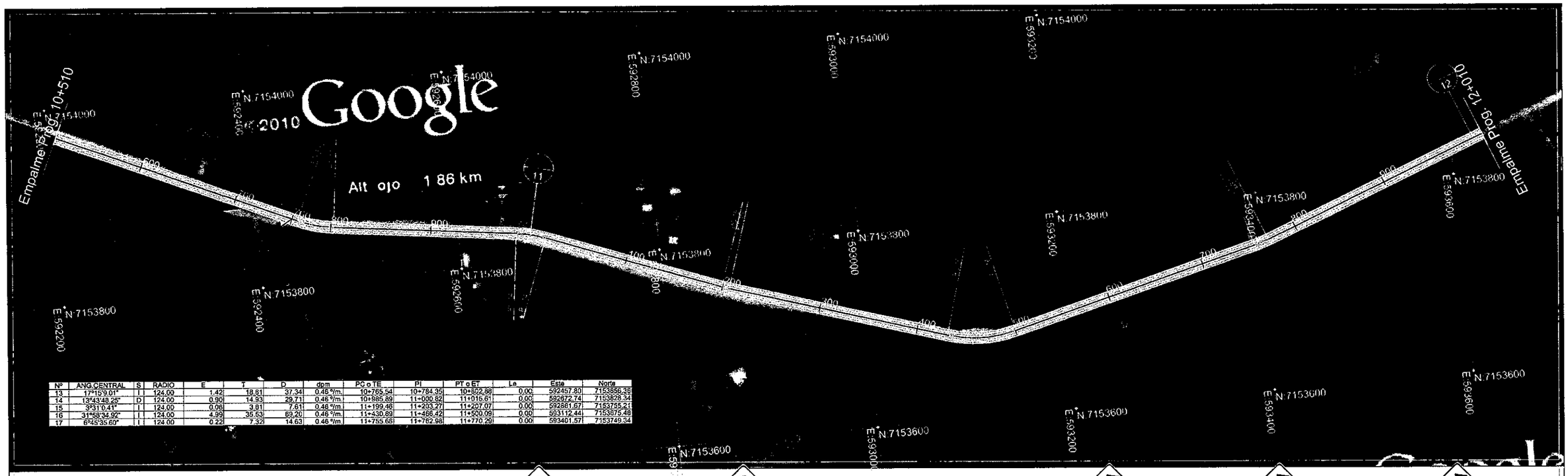
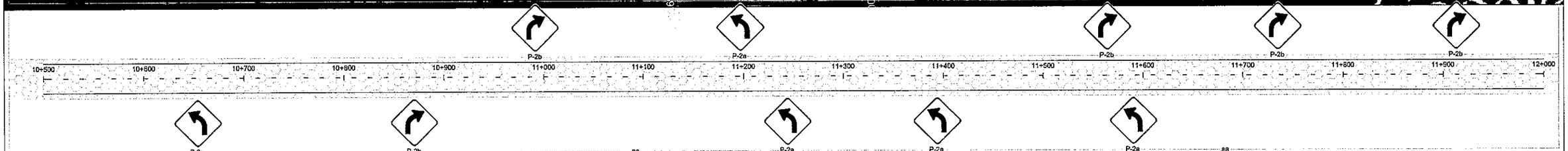
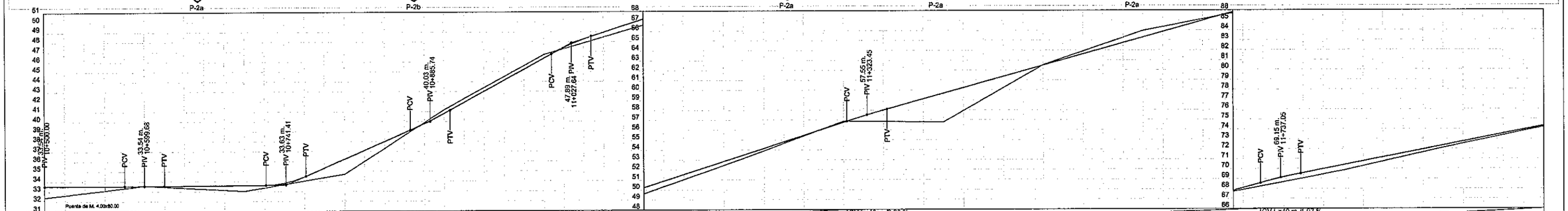



| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 17°15'9.01" | I | 124.00 | 1.42 | 18.81 | 37.34 | 0.46 °/m. | 10+765.54 | 10+784.35 | 10+802.88 | 0.00 | 592457.80 | 7153856.36 |
| 14 | 13°43'48.25" | D | 124.00 | 0.90 | 14.93 | 29.71 | 0.46 °/m. | 10+985.89 | 11+000.82 | 11+016.61 | 0.00 | 592672.74 | 7153828.34 |
| 15 | 9°31'0.41" | I | 124.00 | 0.06 | 3.81 | 7.61 | 0.46 °/m. | 11+199.46 | 11+203.27 | 11+207.07 | 0.00 | 592881.67 | 7153755.21 |
| 16 | 31°58'34.92" | I | 124.00 | 4.99 | 35.53 | 69.20 | 0.46 °/m. | 11+430.89 | 11+466.42 | 11+500.09 | 0.00 | 593112.44 | 7153675.48 |
| 17 | 6°45'35.60" | I | 124.00 | 0.22 | 7.32 | 14.63 | 0.46 °/m. | 11+755.66 | 11+762.98 | 11+770.29 | 0.00 | 593401.57 | 7153749.34 |




| Pend. | 0.00 % | CV L=40 m. | 0.07 % | CV L=40 m. | 4.43 % | CV L=40 m. | 5.54 % | CV L=40 m. | 3.26 % | CV L=40 m. | 2.80 % | CV L=40 m. | 1.97 % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 79.88 m. | | 101.73 m. | | 104.33 m. | | 101.90 m. | | 255.81 m. | | 373.60 m. | | 242.95 m. |

| Prog. | Rasante | Terreno Natural | Relleno | Corte | Cota Roja |
|---|---|---|---|---|---|
| 500 | 33.54 | 32.42 | 1.12 | | |
| | 33.54 | 33.00 | 0.54 | | |
| 600 | 33.54 | 33.58 | | -0.03 | |
| | 33.57 | 33.30 | 0.27 | | |
| 700 | 33.61 | 33.03 | 0.57 | | |
| | 34.09 | 33.88 | 0.21 | | |
| 800 | 36.23 | 34.72 | 1.51 | | |
| | 36.44 | 37.96 | 0.49 | | |
| 900 | 40.82 | 41.19 | | -0.37 | |
| | 43.59 | 43.96 | | -0.37 | |
| 11+000 | 46.36 | 46.72 | | -0.36 | |
| | 49.62 | 48.17 | 0.44 | | |
| 100 | 50.25 | 49.63 | 0.62 | | |
| | 51.88 | 51.40 | 0.48 | | |
| 200 | 53.51 | 53.18 | 0.34 | | |
| | 55.15 | 55.04 | 0.11 | | |
| 300 | 58.78 | 56.90 | | -0.12 | |
| | 58.29 | 58.84 | 1.45 | | |
| 400 | 59.69 | 56.79 | 2.91 | | |
| | 61.09 | 59.66 | 1.43 | | |
| 500 | 62.50 | 62.54 | | -0.04 | |
| | 63.90 | 64.25 | | -0.35 | |
| 600 | 65.30 | 65.96 | | -0.66 | |
| | 66.70 | 66.93 | | -0.23 | |
| 700 | 68.11 | 67.91 | 0.20 | | |
| | 69.40 | 68.88 | 0.52 | | |
| 800 | 70.39 | 69.84 | 0.55 | | |
| | 71.37 | 70.98 | 0.39 | | |
| 900 | 72.36 | 72.12 | 0.24 | | |
| | 73.34 | 73.17 | 0.17 | | |
| 12+000 | 74.33 | 74.22 | 0.11 | | |

## 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 CONSULPAR GEOLATINA
Ing. Raúl A. Monteiro
Consultor de Campo

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: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 10+500 - 12+000 | H = 1:2000<br>V = 1:200 | 8 |

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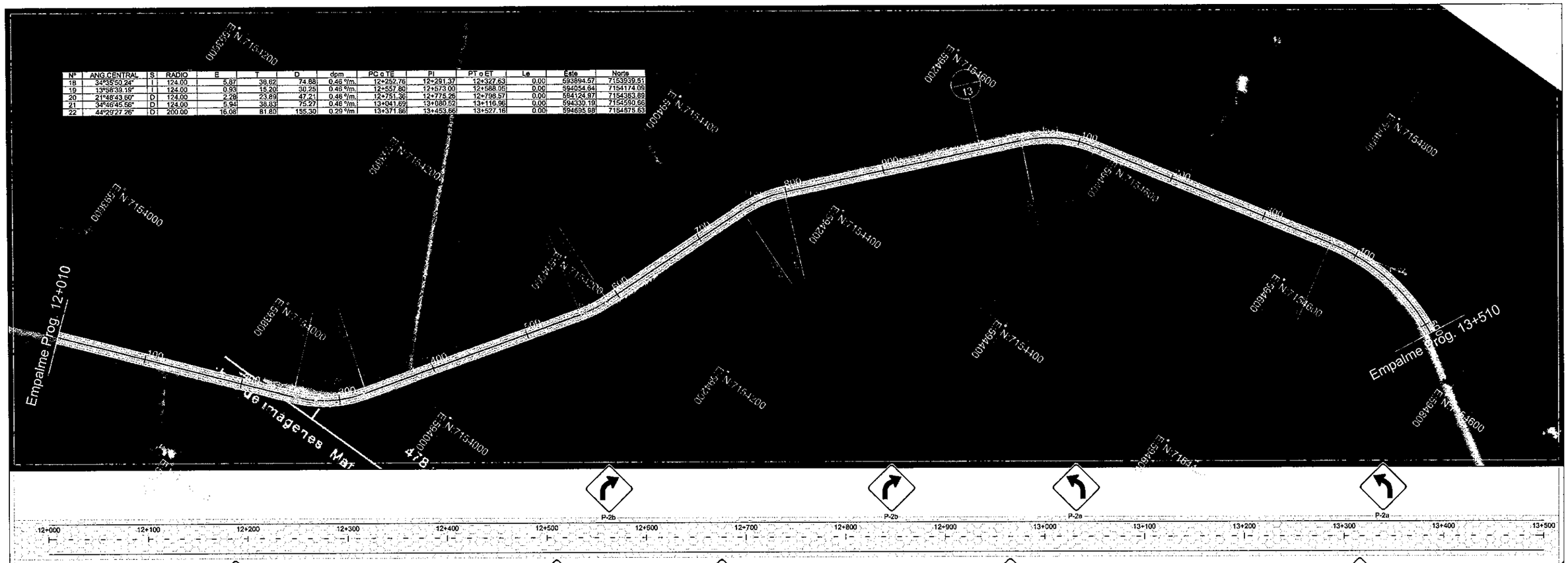
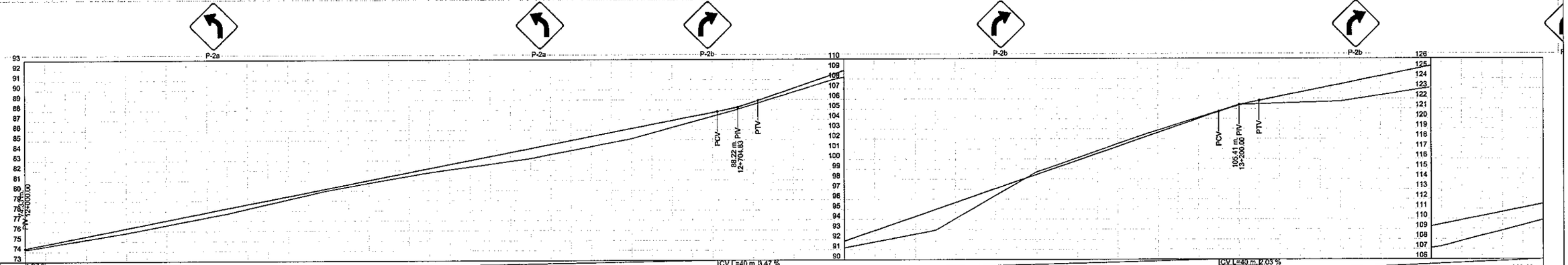
| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | 34°35'50.24" | I | 124.00 | 5.87 | 38.62 | 74.88 | 0.46 °/m. | 12+252.76 | 12+291.37 | 12+327.63 | 0.00 | 593894.57 | 7153939.51 |
| 19 | 13°58'39.15" | I | 124.00 | 0.93 | 15.20 | 30.25 | 0.46 °/m. | 12+557.80 | 12+573.00 | 12+588.05 | 0.00 | 594054.64 | 7154174.09 |
| 20 | 21°48'43.60" | D | 124.00 | 2.28 | 23.89 | 47.21 | 0.46 °/m. | 12+751.36 | 12+775.26 | 12+798.57 | 0.00 | 594124.97 | 7154563.86 |
| 21 | 34°56'45.56" | D | 124.00 | 5.94 | 38.83 | 75.27 | 0.46 °/m. | 13+041.69 | 13+080.52 | 13+116.96 | 0.00 | 594330.19 | 7154590.66 |
| 22 | 44°29'27.26" | D | 200.00 | 16.08 | 81.80 | 155.30 | 0.29 °/m | 13+371.86 | 13+453.66 | 13+527.16 | 0.00 | 594695.98 | 7154875.63 |




| Prog. | Rasante | Terreno Natural | Relleno | Corte |
|---|---|---|---|---|
| 12+000 | 74.33 | 74.22 | 0.11 | |
| | 75.31 | 75.03 | 0.28 | |
| 100 | 76.30 | 75.84 | 0.46 | |
| | 77.28 | 76.80 | 0.49 | |
| 200 | 78.27 | 77.75 | 0.52 | |
| | 79.26 | 78.91 | 0.35 | |
| 300 | 80.24 | 80.06 | 0.18 | |
| | 81.23 | 80.93 | 0.30 | |
| 400 | 82.21 | 81.80 | 0.41 | |
| | 83.20 | 82.49 | 0.70 | |
| 500 | 84.18 | 83.18 | 1.00 | |
| | 85.17 | 84.16 | 1.00 | |
| 600 | 86.15 | 85.14 | 1.01 | |
| | 87.14 | 86.52 | 0.62 | |
| 700 | 88.17 | 87.90 | 0.27 | |
| | 89.79 | 89.45 | 0.34 | |
| 800 | 91.52 | 91.00 | 0.52 | |
| | 93.26 | 91.96 | 1.30 | |
| 900 | 94.99 | 92.93 | 2.07 | |
| | 96.73 | 95.82 | 0.91 | |
| 13+000 | 98.46 | 98.71 | -0.24 | |
| | 100.20 | 100.46 | -0.26 | |
| 100 | 101.94 | 102.22 | -0.28 | |
| | 103.67 | 103.81 | -0.14 | |
| 200 | 105.33 | 105.41 | -0.07 | |
| | 106.42 | 105.57 | 0.86 | |
| 300 | 107.44 | 105.73 | 1.71 | |
| | 108.46 | 106.50 | 1.95 | |
| 400 | 109.47 | 107.28 | 2.19 | |
| | 110.49 | 108.59 | 1.90 | |
| 500 | 111.51 | 109.90 | 1.61 | |

## 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

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: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 12+000 - 13+500 | H = 1:2000<br>V = 1:200 | 9 |

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

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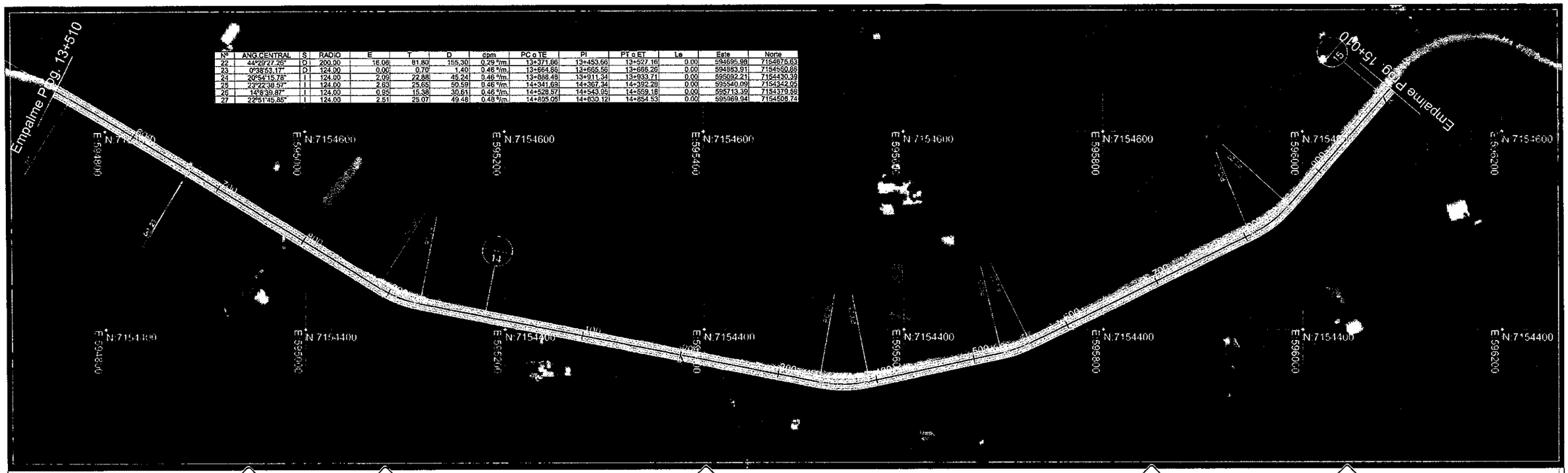
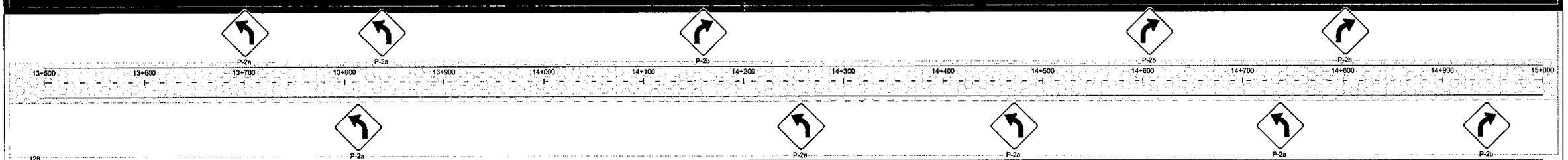
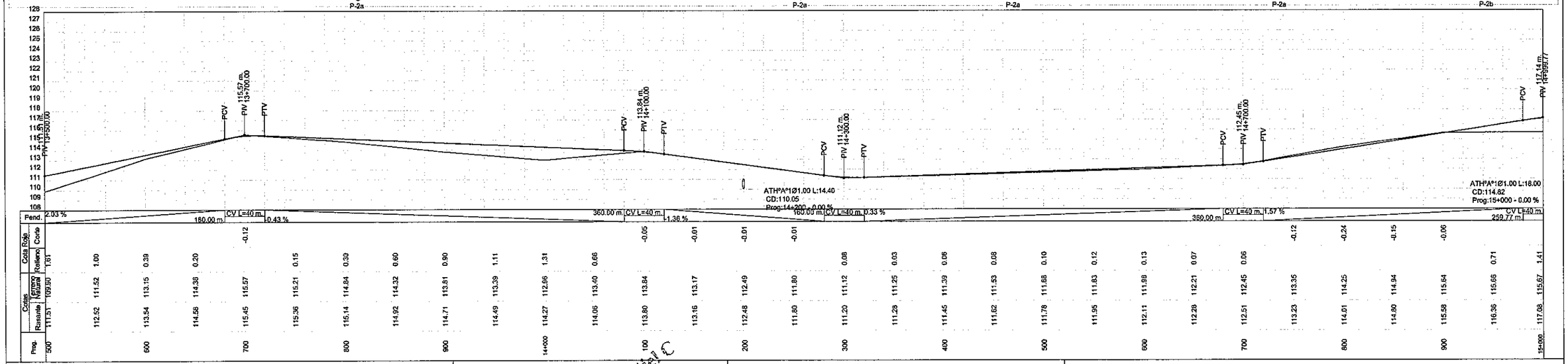
| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 44°29'27.26" | D | 200.00 | 16.08 | 81.80 | 155.30 | 0.29 °/m. | 13+371.86 | 13+453.66 | 13+527.16 | 0.00 | 594695.98 | 7154675.63 |
| 23 | 0°38'53.17" | D | 124.00 | 0.00 | 0.70 | 1.40 | 0.46 °/m. | 13+664.86 | 13+665.56 | 13+666.26 | 0.00 | 594863.91 | 7154550.88 |
| 24 | 20°54'15.78" | I | 124.00 | 2.09 | 22.88 | 45.24 | 0.46 °/m. | 13+888.49 | 13+911.34 | 13+933.71 | 0.00 | 595092.21 | 7154430.39 |
| 25 | 23°22'38.57" | I | 124.00 | 2.63 | 25.65 | 50.59 | 0.46 °/m. | 14+341.69 | 14+367.34 | 14+392.29 | 0.00 | 595540.09 | 7154342.09 |
| 26 | 14°8'39.87" | I | 124.00 | 0.85 | 15.38 | 30.61 | 0.46 °/m. | 14+528.57 | 14+543.95 | 14+559.18 | 0.00 | 595713.39 | 7154379.59 |
| 27 | 22°51'45.85" | I | 124.00 | 2.51 | 25.07 | 49.48 | 0.48 °/m. | 14+805.05 | 14+830.12 | 14+854.53 | 0.00 | 595969.94 | 7154506.74 |




## 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
Ing. Civil L. Montiel C.
Representante Legal
CONSORCIO CONSULPAR - CONSULMAR

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: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 13+500 - 15+000 | H = 1:2000<br>V = 1:200 | 10 |

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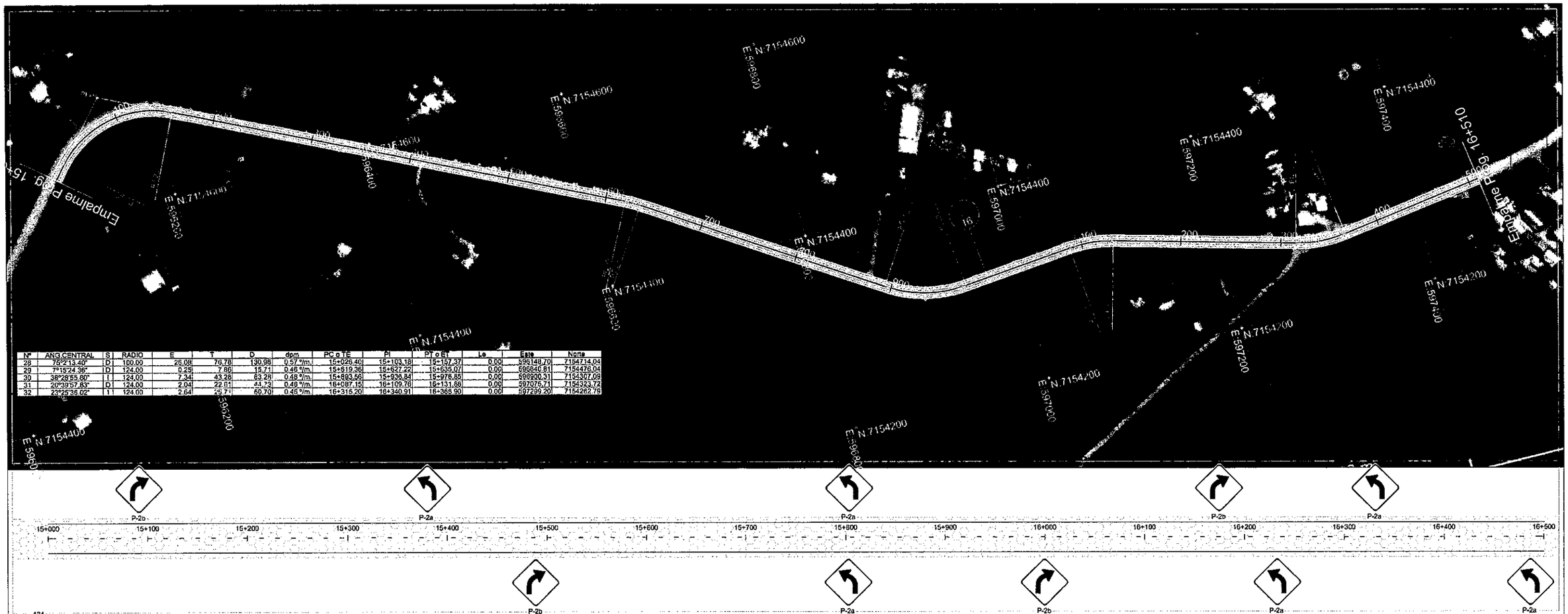
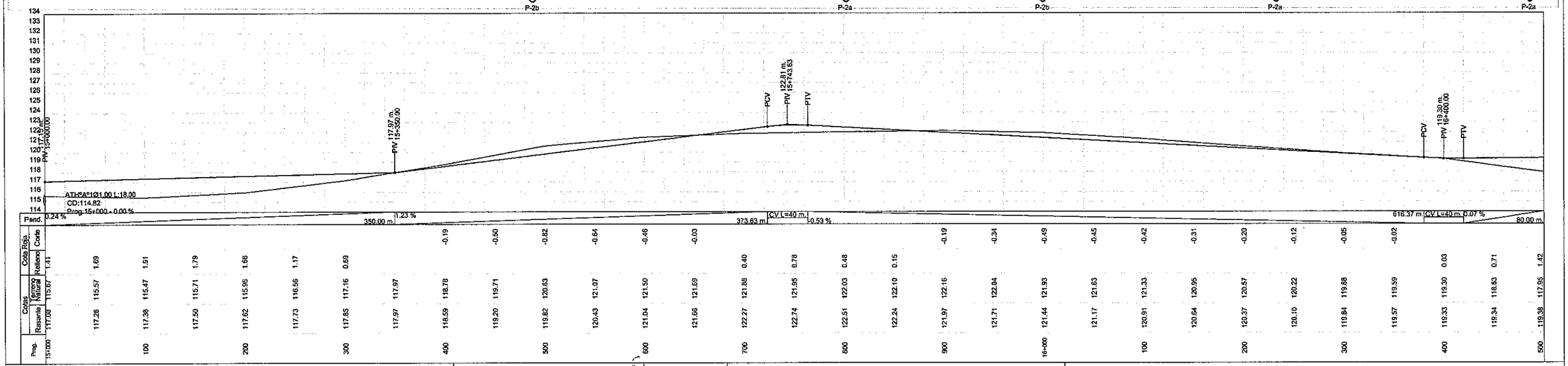



| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | 76°21'13.40" | D | 100.00 | 26.08 | 76.78 | 130.98 | 0.57 °/m. | 15+026.40 | 15+103.18 | 15+157.37 | 0.00 | 596148.70 | 7154714.04 |
| 29 | 7°15'24.36" | D | 124.00 | 0.25 | 7.86 | 15.71 | 0.46 °/m. | 15+619.36 | 15+627.22 | 15+635.07 | 0.00 | 596640.81 | 7154476.04 |
| 30 | 38°28'55.80" | I | 124.00 | 7.34 | 43.28 | 83.28 | 0.48 °/m. | 15+893.56 | 15+936.84 | 15+976.85 | 0.00 | 596900.31 | 7154307.09 |
| 31 | 20°39'57.83" | D | 124.00 | 2.04 | 22.91 | 44.73 | 0.48 °/m. | 16+087.15 | 16+109.76 | 16+131.88 | 0.00 | 597075.71 | 7154323.72 |
| 32 | 23°25'36.02" | I | 124.00 | 2.64 | 25.71 | 50.70 | 0.45 °/m. | 16+315.20 | 16+340.91 | 16+365.90 | 0.00 | 597289.20 | 7154282.78 |




## 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 Montiel C. Ingeniería C.A. — Consorcio Consulpar S.A.

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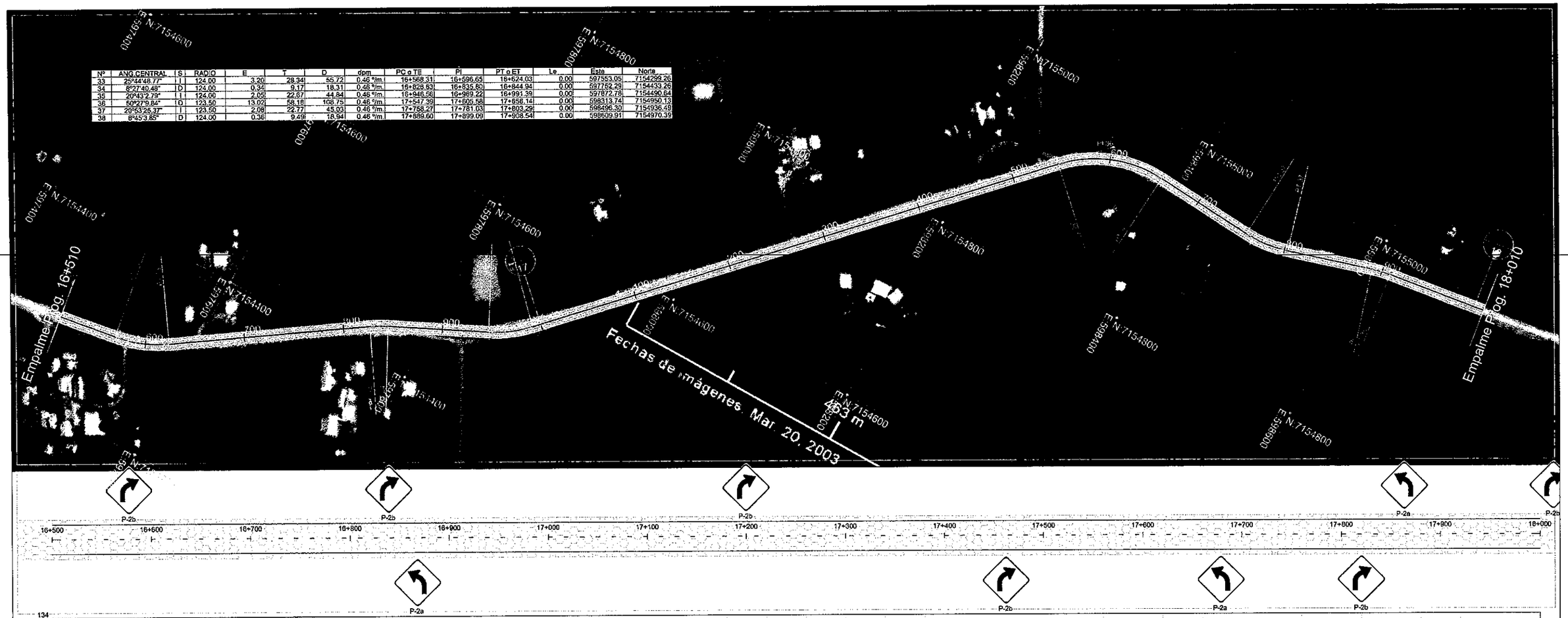
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

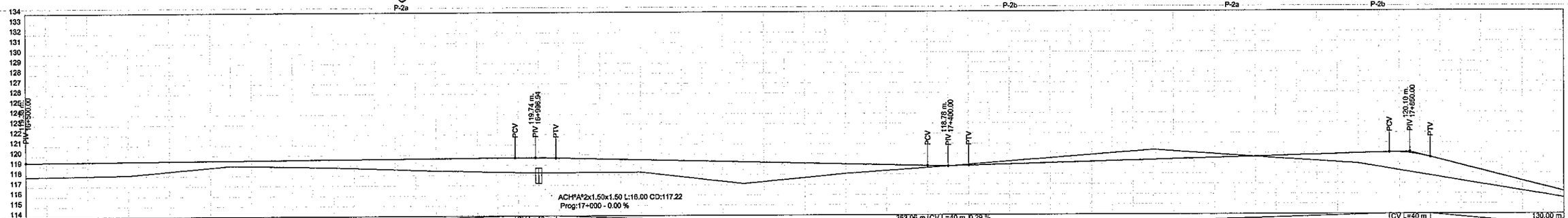
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 15+000 - 16+500 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 25°44'48.77" | I | 124.00 | 3.20 | 28.34 | 55.72 | 0.46 °/m. | 16+568.31 | 16+596.65 | 16+624.03 | 0.00 | 597553.05 | 7154299.26 |
| 34 | 8°27'40.48" | D | 124.00 | 0.34 | 9.17 | 18.31 | 0.46 °/m. | 16+826.53 | 16+835.69 | 16+844.94 | 0.00 | 597752.29 | 7154433.26 |
| 35 | 20°45'2.79" | I | 124.00 | 2.05 | 22.57 | 44.84 | 0.46 °/m. | 16+946.56 | 16+969.22 | 16+991.39 | 0.00 | 597872.78 | 7154490.84 |
| 36 | 50°27'9.84" | D | 123.50 | 13.02 | 58.18 | 108.75 | 0.46 °/m. | 17+547.39 | 17+605.58 | 17+656.14 | 0.00 | 598313.74 | 7154950.13 |
| 37 | 20°53'25.37" | I | 123.50 | 2.08 | 22.77 | 45.03 | 0.46 °/m. | 17+758.27 | 17+781.03 | 17+803.29 | 0.00 | 598496.30 | 7154936.49 |
| 38 | 8°45'3.85" | D | 124.00 | 0.36 | 9.49 | 18.94 | 0.46 °/m. | 17+889.60 | 17+899.09 | 17+908.54 | 0.00 | 598609.91 | 7154970.39 |




| Prog. | Rasante | Terreno | Corte | Relleno | Cota Roja |
|---|---|---|---|---|---|
| 500 | 119.35 | 117.95 | | 1.42 | |
| | 119.41 | 118.03 | 1.38 | | |
| 600 | 119.45 | 118.11 | 1.34 | | |
| | 119.49 | 118.56 | 0.92 | | |
| 700 | 119.52 | 119.02 | 0.51 | | |
| | 119.56 | 118.92 | 0.64 | | |
| 800 | 119.60 | 118.82 | 0.78 | | |
| | 119.63 | 118.94 | 0.69 | | |
| 900 | 119.67 | 118.46 | 1.21 | | |
| | 119.71 | 118.35 | 1.36 | | |
| 17+000 | 119.73 | 118.24 | 1.49 | | |
| | 119.62 | 118.26 | 1.36 | | |
| 100 | 119.50 | 118.28 | 1.21 | | |
| | 119.38 | 117.70 | 1.68 | | |
| 200 | 119.26 | 117.12 | 2.14 | | |
| | 119.14 | 117.60 | 1.54 | | |
| 300 | 119.02 | 118.08 | 0.94 | | |
| | 118.90 | 118.43 | 0.47 | | |
| 400 | 118.81 | 118.78 | 0.03 | | |
| | 118.53 | 119.17 | | | -0.24 |
| 500 | 119.07 | 119.56 | | | -0.49 |
| | 119.22 | 119.95 | | | -0.73 |
| 600 | 119.37 | 120.34 | | | -0.97 |
| | 119.51 | 119.99 | | | -0.48 |
| 700 | 119.66 | 119.64 | 0.02 | | |
| | 119.81 | 119.30 | 0.51 | | |
| 800 | 119.95 | 118.95 | 1.00 | | |
| | 119.95 | 118.10 | 1.86 | | |
| 900 | 118.80 | 117.25 | 1.55 | | |
| | 117.49 | 116.41 | 1.08 | | |
| 18+000 | 116.19 | 115.57 | 0.62 | | |

## 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. |

Consultor: Consultora Paraguaya CONSULPAR S.A. — GEOLATINA S.A. — CONSORCIO CONSULPAR S.A. - GEOLATINA S.A.

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

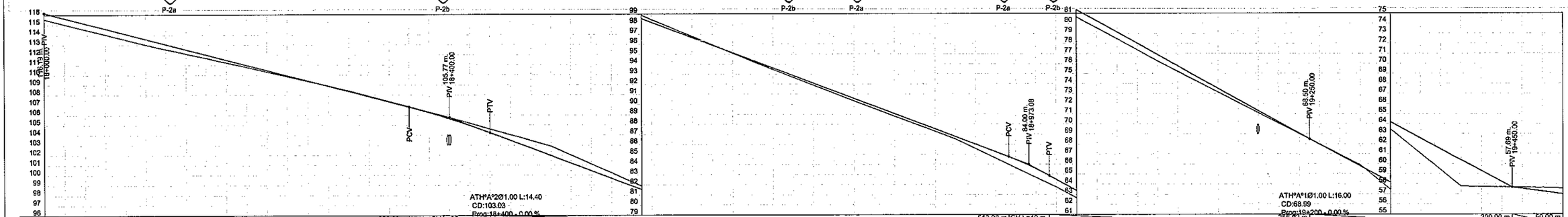
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 16+500 - 18+000 | H = 1:2000<br>V = 1:200 | 12 |

14

| Nº | ANG.CENTRAL | S | RADIO | E | T | D | dpm | PC o TE | PI | PT o ET | Le | Este | Norte |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39 | 8°8'37.59" | I | 124.00 | 0.31 | 8.83 | 17.62 | 0.46 °/m. | 18+198.82 | 18+207.65 | 18+216.45 | 0.00 | 598915.61 | 7155012.63 |
| 40 | 8°21'8.97" | D | 124.00 | 0.33 | 9.05 | 18.08 | 0.46 °/m. | 18+532.16 | 18+541.21 | 18+550.24 | 0.00 | 599236.26 | 7155104.63 |
| 41 | 10°28'44.89" | D | 124.00 | 0.52 | 11.37 | 22.69 | 0.46 °/m. | 18+838.56 | 18+847.93 | 18+859.24 | 0.00 | 599540.28 | 7155145.50 |
| 42 | 24°40'8.78" | I | 109.12 | 2.58 | 23.66 | 46.98 | 0.53 °/m. | 18+968.31 | 18+990.17 | 19+013.30 | 0.00 | 599682.41 | 7155138.50 |
| 43 | 4°43'5.65" | D | 109.12 | 0.09 | 4.50 | 8.99 | 0.53 °/m. | 19+157.04 | 19+161.54 | 19+166.03 | 0.00 | 599842.15 | 7155202.54 |
| 44 | 1°27'54.25" | D | 124.00 | 0.01 | 1.59 | 3.17 | 0.45 °/m. | 19+288.72 | 19+290.30 | 19+291.89 | 0.00 | 599965.21 | 7155240.47 |




| Prog. | Rasante | Terreno Natural | Relleno | Corte | Pend. |
|---|---|---|---|---|---|
| 18+000 | 116.19 | 115.57 | 0.62 | | 2.61 % |
| | 114.89 | 114.30 | 0.59 | | |
| 100 | 113.59 | 113.03 | 0.56 | | |
| | 112.28 | 111.91 | 0.37 | | |
| 200 | 110.98 | 110.80 | 0.19 | | |
| | 109.68 | 109.62 | 0.06 | | |
| 300 | 108.38 | 108.44 | | -0.06 | |
| | 107.07 | 107.11 | | -0.03 | |
| 400 | 105.65 | 105.77 | | -0.12 | |
| | 103.87 | 104.34 | | -0.47 | |
| 500 | 101.97 | 102.91 | | -0.94 | |
| | 100.07 | 100.68 | | -0.61 | |
| 600 | 98.17 | 98.45 | | -0.28 | |
| | 96.27 | 96.36 | | -0.08 | |
| 700 | 94.38 | 94.26 | 0.12 | | |
| | 92.48 | 92.29 | 0.18 | | |
| 800 | 90.58 | 90.33 | 0.25 | | |
| | 88.68 | 88.44 | 0.24 | | |
| 900 | 86.78 | 86.54 | 0.24 | | |
| | 84.88 | 84.14 | 0.74 | | |
| 19+000 | 82.50 | 81.75 | 0.75 | | |
| | 79.70 | 79.01 | 0.69 | | |
| 100 | 76.90 | 76.27 | 0.63 | | |
| | 74.10 | 73.69 | 0.41 | | |
| 200 | 71.30 | 71.10 | 0.20 | | |
| | 68.50 | 68.50 | | -0.10 | |
| 300 | 65.80 | 65.90 | | | |
| | 63.09 | 61.84 | 1.25 | | |
| 400 | 60.39 | 57.78 | 2.61 | | |
| | 57.69 | 57.69 | | | |
| 500 | 57.00 | 57.69 | | -0.59 | |

## 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. |

Consultores
Representante Legal
CONSORCIO CONSULCAR S.A. - GEOLATINA S.A.

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DIRECCION DE VIALIDAD

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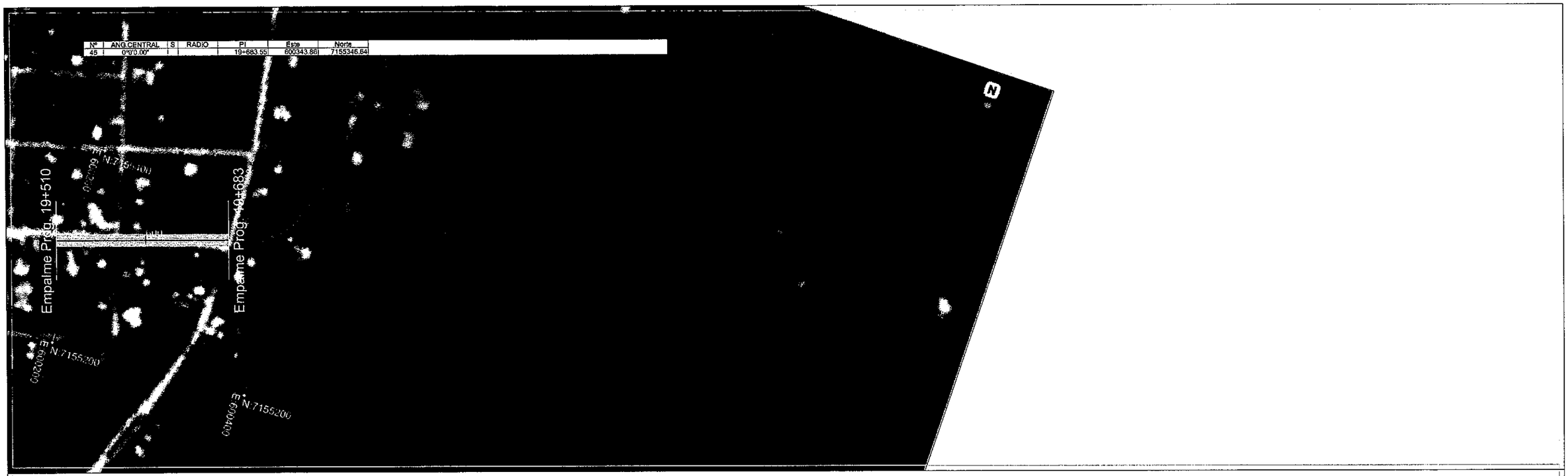
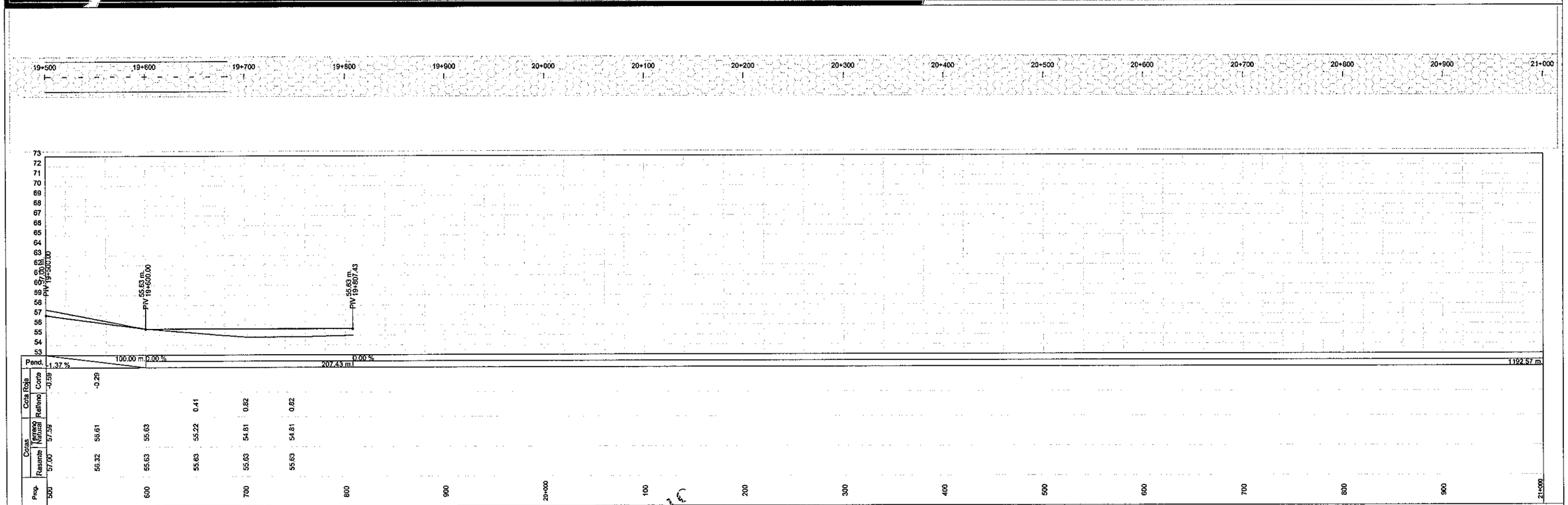
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 18+000 - 19+500 | H = 1:2000<br>V = 1:200 | 13 |

| Nº | ANG.CENTRAL | S | RADIO | PI | Este | Norte |
|---|---|---|---|---|---|---|
| 45 | 0°0'0.00" | I | | 19+683.55 | 600343.88 | 7155346.84 |




## 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 CONSULPAR S.A. - GEOLATINA S.A.

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TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

| PLANIALTIMETRIA | ESCALA | LAMINA Nº |
|---|---|---|
| Prog: 19+500 - 19+684 | H = 1:2000<br>V = 1:200 | 14 |

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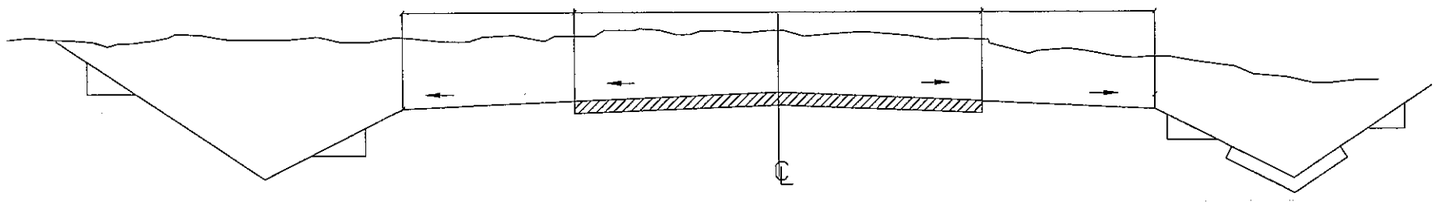
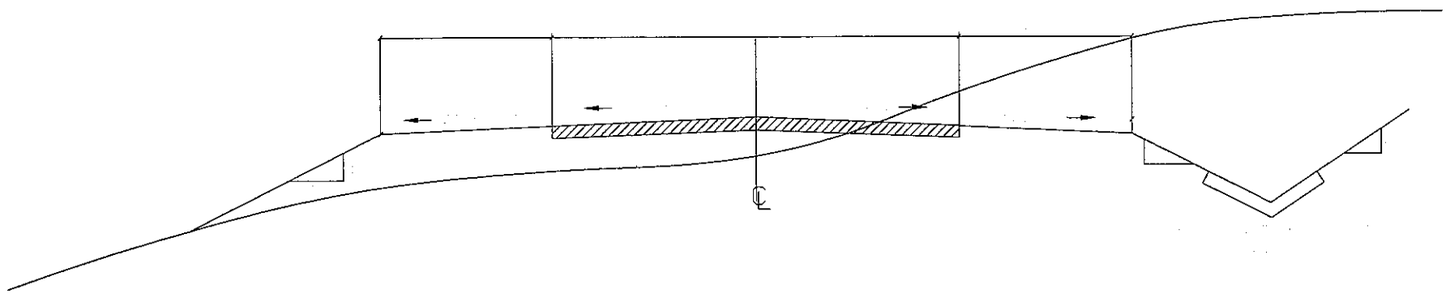
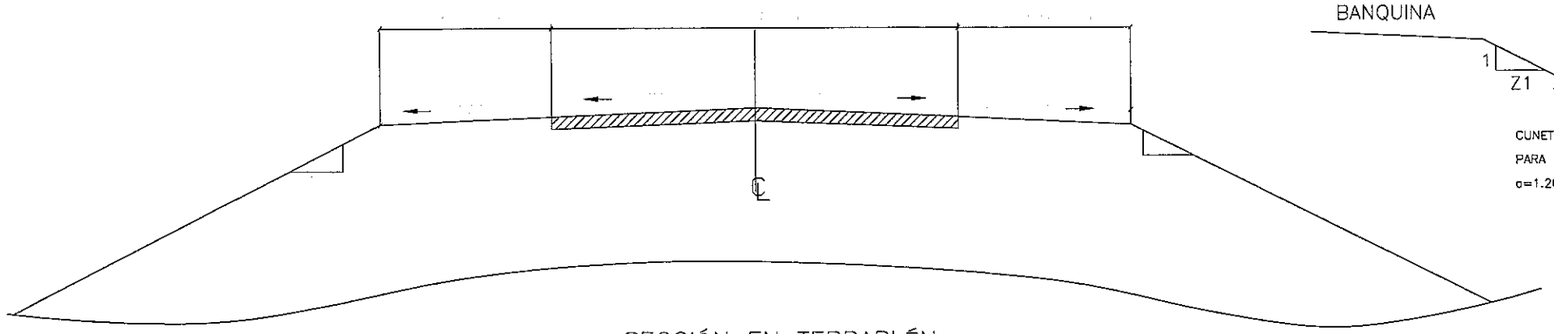


SECCIÓN EN DESMONTE

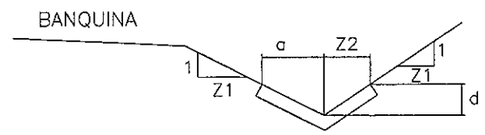


SECCIÓN EN MEDIA LADERA



SECCIÓN EN TERRAPLÉN

SECCIÓN TIPICA DE CUNETA TRIANGULAR




CUNETA REVESTIDA DE HORMIGON
PARA PEND. MAYORES DE 2%
a=1.20m D=0.50m Z1=4.00m Z2=1.00m

| 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 Consultora Paraguaya CONSULPAR S.A. Dr. Raúl Montiel C. Representante Legal CONSORCIO CONSULPAR S.A.

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TRAMO: COLONIA INDEPENDENCIA - PASO JOVAI

SECCION TIPO

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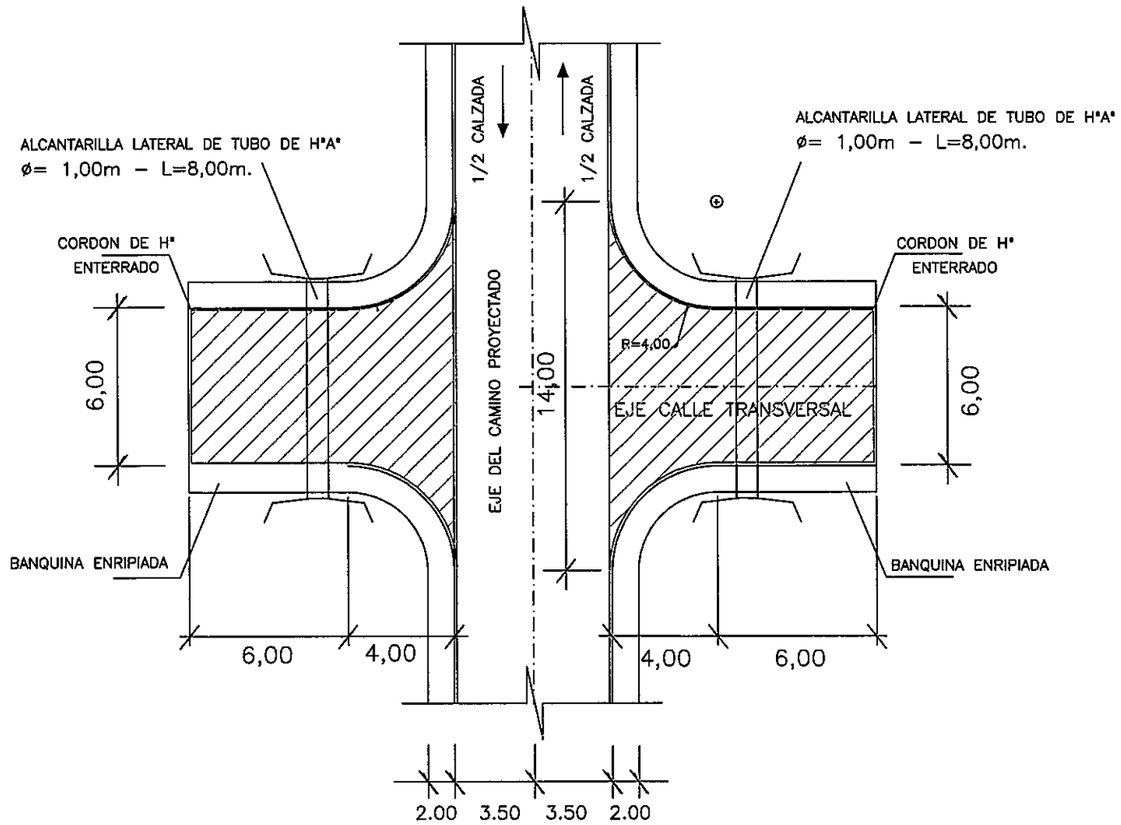


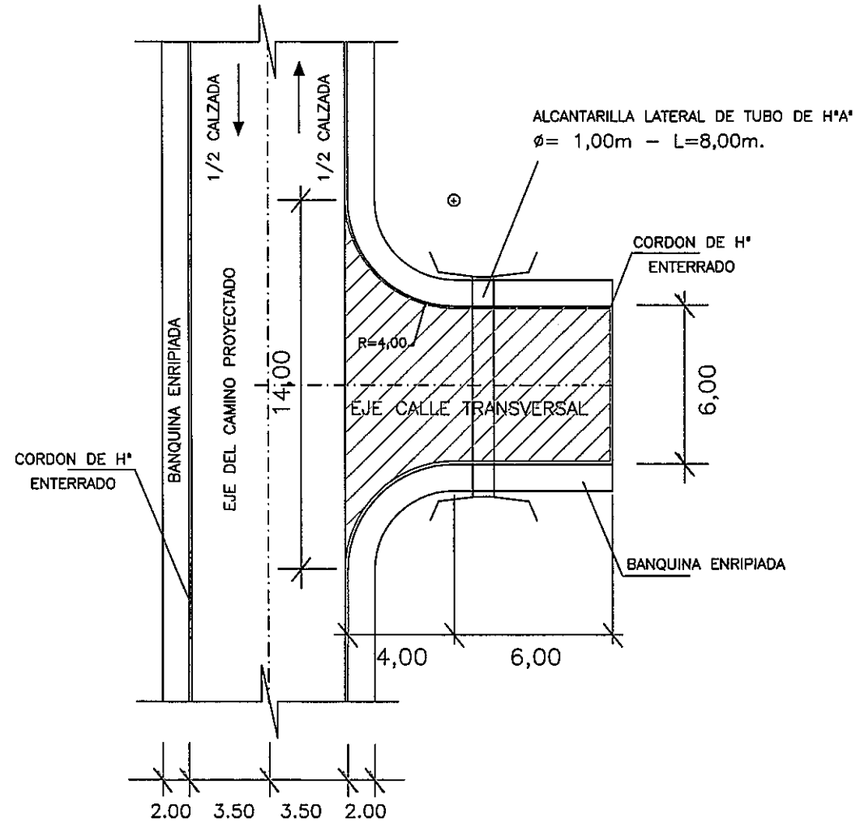


# EMPALME CALLE TRANSVERSAL
# PAVIMENTO TIPO EMPEDRADO

| 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. |

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

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

SECCION TIPO

# 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 | 660 | 240 | 460 | 680 |
| B | cm. | 230 | 230 | 230 | 230 | 230 | 230 | 240 | 230 | 230 | 240 | 240 | 240 |
| C | cm. | 260 | 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

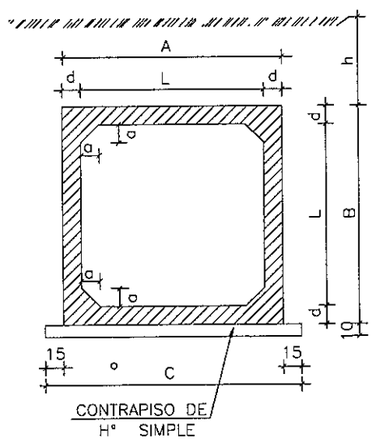
| SECCION L=250 | | 0 ≤ h ≤ 100 | | | 100 ≤ h ≤ 250 | | | 250 ≤ h ≤ 500 | | | 500 ≤ h ≤ 750 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fs ≥ MPa | | 0.10 | 0.21 | 0.21 | 0.11 | 0.21 | 0.21 | 0.16 | 0.23 | 0.23 | 0.21 | 0.28 | 0.28 |
| MEDIDAS | UNID. | SIMPLE | DOBLE | TRIPLE | 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

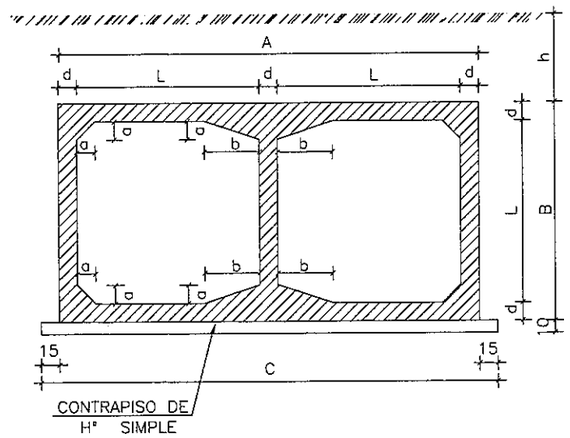
| SECCION L=250 | | 0 ≤ h ≤ 100 | | | 100 ≤ h ≤ 250 | | | 250 ≤ h ≤ 500 | | | 500 ≤ h ≤ 750 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fs ≥ MPa | | 0.12 | 0.21 | 0.21 | 0.12 | 0.21 | 0.21 | 0.17 | 0.23 | 0.23 | 0.22 | 0.28 | 0.29 |
| MEDIDAS | UNID. | SIMPLE | DOBLE | TRIPLE | 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

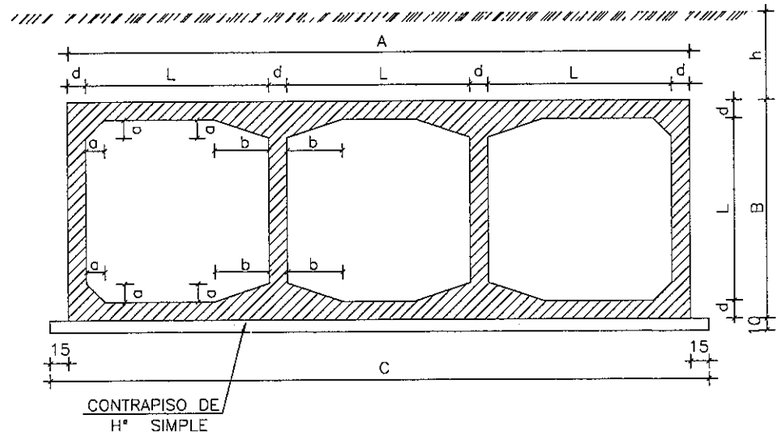
ALCANTARILLA SIMPLE



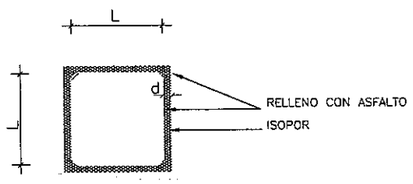

ALCANTARILLA DOBLE



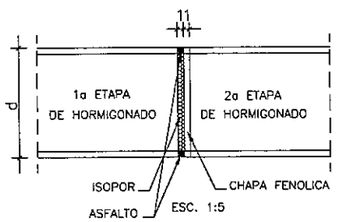

ALCANTARILLA TRIPLE




# 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. |

Ing. Raúl L. Montiel C.
Consorcio Consulpins S.A. - Ecoplanos S.A.
CONSORCIO CONSULPINS S.A. - ECOPLANOS

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

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

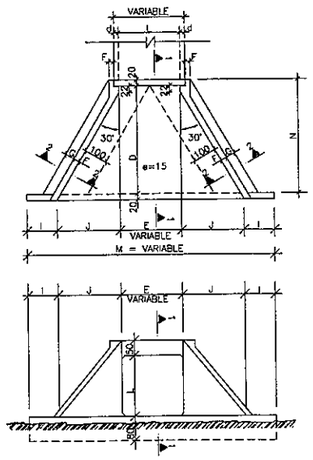
ALCANTARILLA CELULAR

19
Alizaqueveve

# CABECERAS NORMALES PARA ALCANTARILLAS CELULARES

## ALCANTARILLA SIMPLE

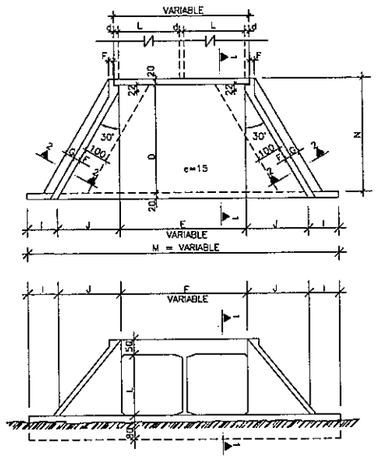
PLANTA - ESC.: 1:100




VISTA FRONTAL - ESC.: 1:100

## ALCANTARILLA DOBLE

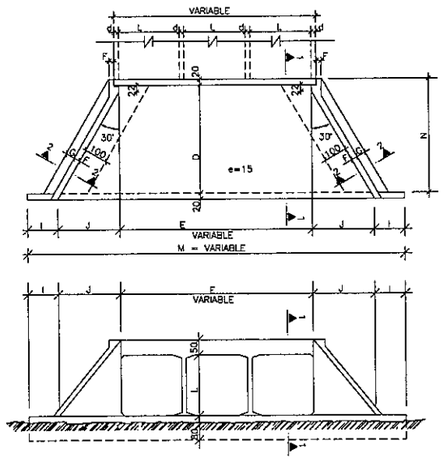
PLANTA - ESC.: 1:100




VISTA FRONTAL - ESC.: 1:100

## ALCANTARILLA TRIPLE

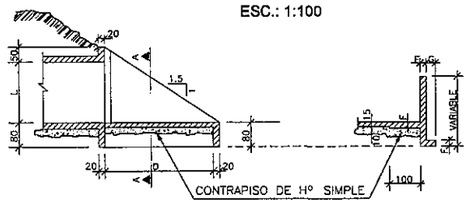
PLANTA - ESC.: 1:100

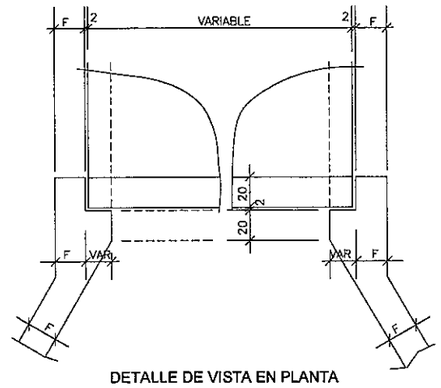



VISTA FRONTAL - ESC.: 1:100

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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ALCANTARILLA CELULAR

CONSORCIO
CONSULPAR S.A. - CEDLATINA S.A.

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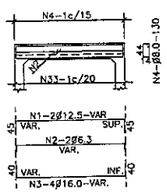
## ALCANTARILLA CELULAR SIMPLE

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

L=300 (2x)

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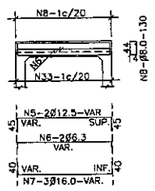
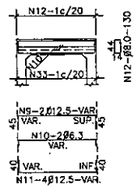
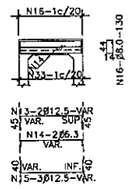



L=200 (2x)

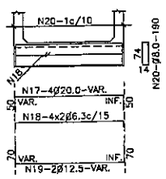



L=150 (2x)




### VIGAS DE BORDE DE LA LOSA INFERIOR

L=300 (2x)

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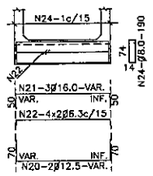
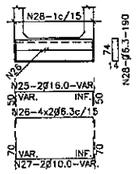
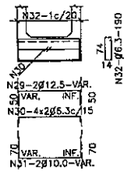


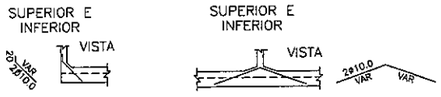

L=200 (2x)




L=150 (2x)




MENSULA




VIGA DE BORDE SUPERIOR

CORTE

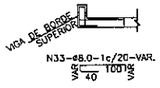


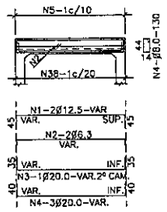

TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR SIMPLE

| 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. |

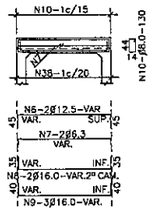
## ALCANTARILLA CELULAR SIMPLE

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

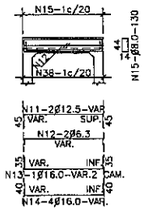
L=300 (2x)



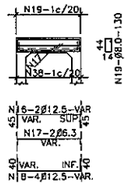

L=250 (2x)




L=200 (2x)

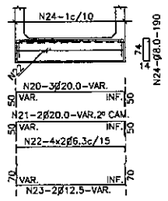



L=150 (2x)

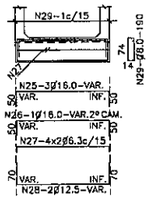



### VIGAS DE BORDE DE LA LOSA INFERIOR – OC = 30° A 45°

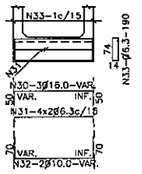
L=300 (2x)



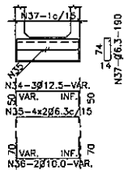

L=250 (2x)



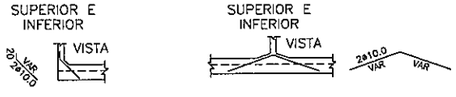

L=200 (2x)




L=150 (2x)




MENSULA




VIGA DE BORDE SUPERIOR

CORTE

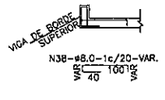



TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR SIMPLE

| 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 | 16 | 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. |

Consorcio CONSULPAR S.A. GEOLATINA S.A.

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TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

ALCANTARILLA CELULAR

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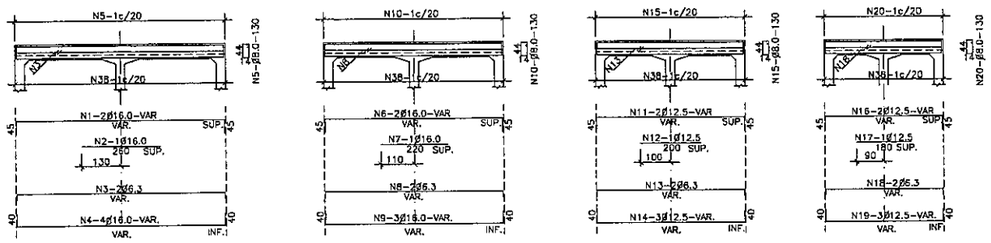
vcontinuo

## ALCANTARILLA CELULAR DOBLE

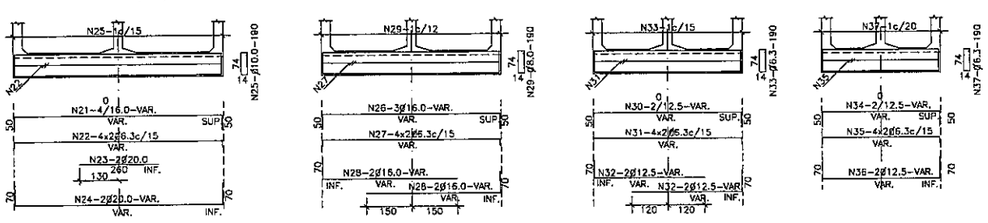
### VIGAS DE BORDE DE LA LOSA SUPERIOR – ∝ = 0° A 15°

L=300 (2x) L=250 (2x) L=200 (2x) L=150 (2x)



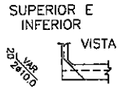
### VIGAS DE BORDE DE LA LOSA INFERIOR – ∝ =0° A 15°

L=300 (2x) L=250 (2x) L=200 (2x) L=150 (2x)

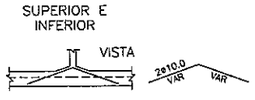


MENSULA

SUPERIOR E INFERIOR




SUPERIOR E INFERIOR




VIGA DE BORDE SUPERIOR

CORTE

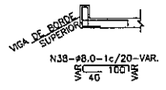


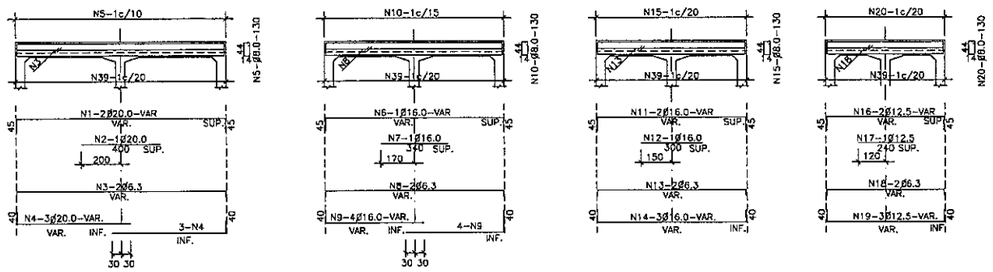
TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR DOBLE

| 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

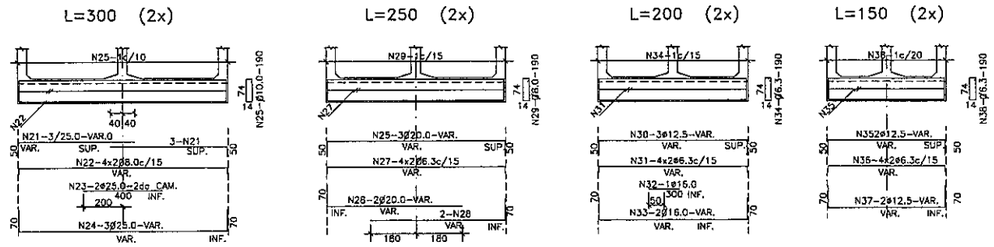
### VIGAS DE BORDE DE LA LOSA SUPERIOR – ∝ = 30° A 45°

L=300 (2x) L=250 (2x) L=200 (2x) L=150 (2x)



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

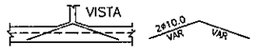
L=300 (2x) L=250 (2x) L=200 (2x) L=150 (2x)



MENSULA

SUPERIOR E INFERIOR

SUPERIOR E INFERIOR




VIGA DE BORDE SUPERIOR

CORTE

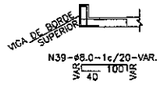


TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR DOBLE

| 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. |

Consorcio Caminos Independencia — Consorcio Caminos Independencia S.A.

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

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

ALCANTARILLA CELULAR

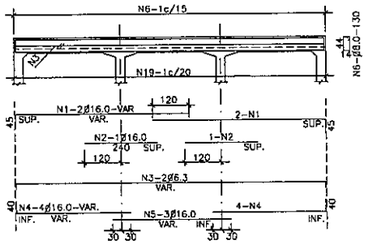
22

# ALCANTARILLA CELULAR TRIPLE

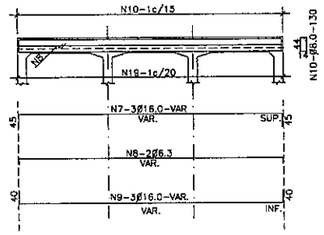
## VIGAS DE BORDE DE LA LOSA SUPERIOR – α = 0° A 15°

ESCALA 1:100

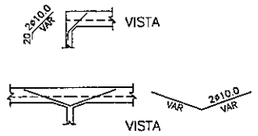
L=300 (2x)




L=250 (2x)

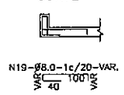



MENSULAS

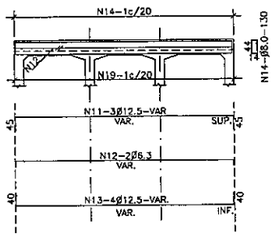



VIGA DE BORDE SUPERIOR

CORTE




L=200 (2x)




L=150 (2x)

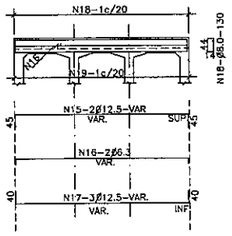


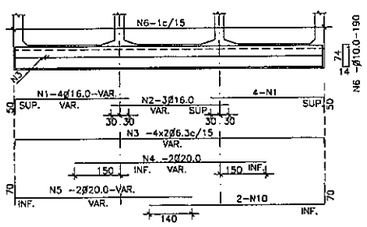

TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR – CELULAR TRIPLE

| 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. |

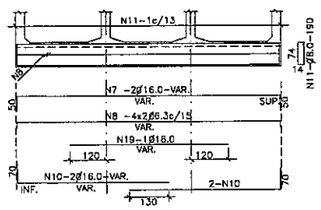
## VIGAS DE BORDE DE LA LOSA INFERIOR – α = 0° A 15°

ESCALA 1:100

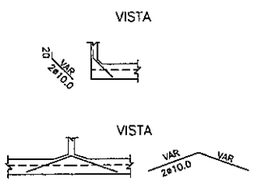
L=300 (2x)



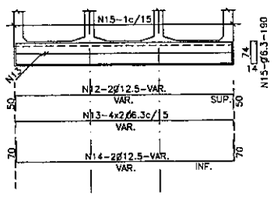

L=250 (2x)




MENSULAS




L=200 (2x)




L=150 (2x)

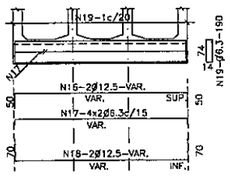
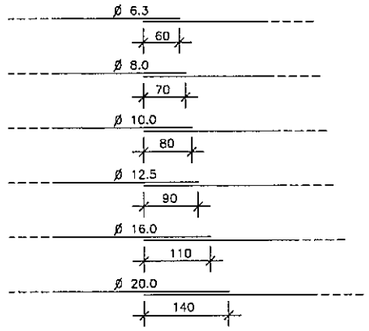



TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA INFERIOR – CELULAR TRIPLE

| 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 |

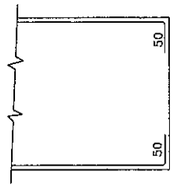
## NOTAS Y DETALLES COMPLEMENTARIOS

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

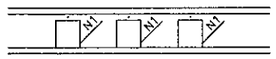


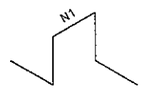

COLOCAR LOS EMPALMES EN PUNTOS ALTERNADOS

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

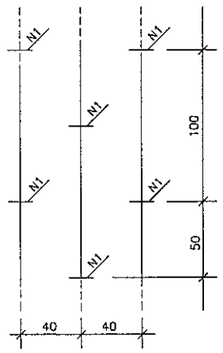



SOPORTE PARA APOYO DE LA ARMADURA
SUPERIOR EN LAS LOSAS
ESCALA 1:20

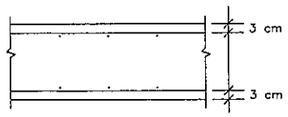



ESTA ARMADURA NO ESTA
COMPUTADA EN LOS
RESUMENES DE HIERRO




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. |

Consultores

CONSORCIO CONSULDES S.A.

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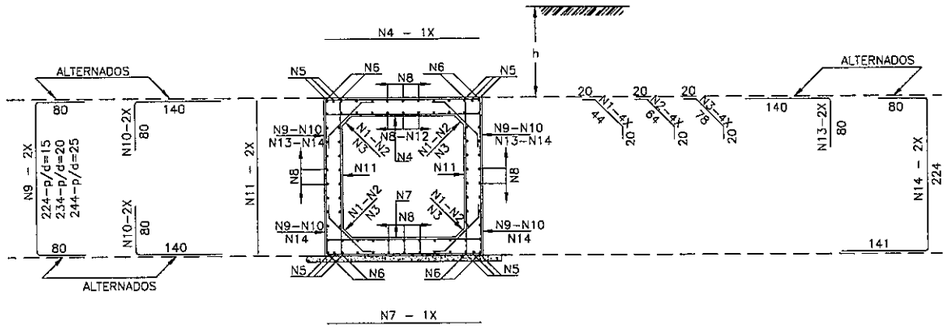
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

ALCANTARILLA CELULAR

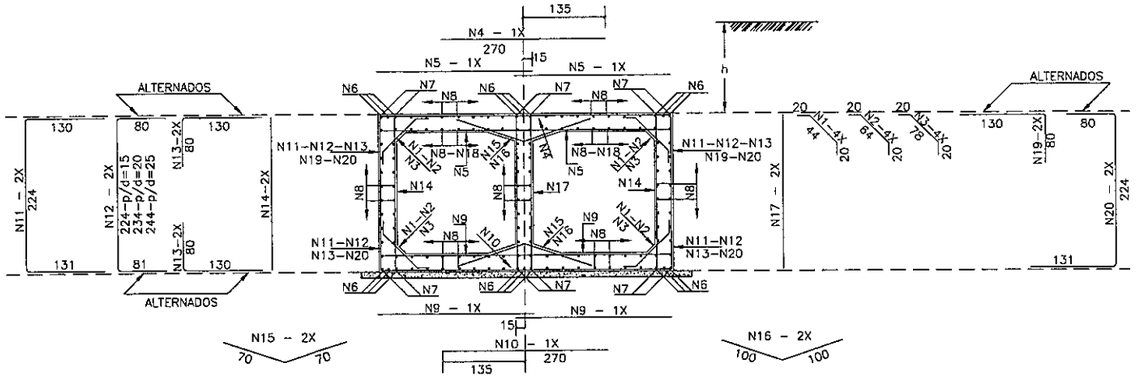
B3
veintitres

# ALCANTARILLAS CELULARES DE 2.00 x 2.00

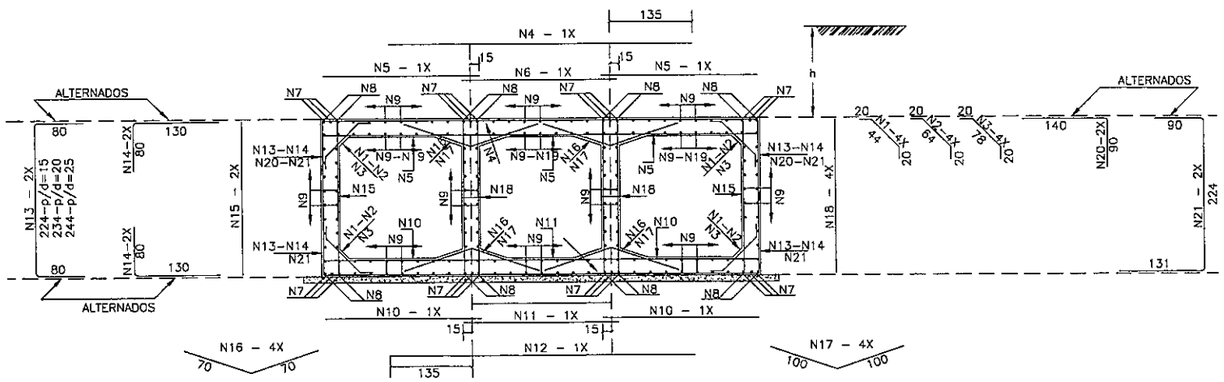
## SECCION TRANSVERSAL SIMPLE




## SECCION TRANSVERSAL DOBLE




## SECCION TRANSVERSAL TRIPLE




## TABLAS DE ARMADURAS POR METRO DE GALERIA

### 0 ⩽ h ⩽ 100 — $\bar{f}s \geqslant 0.09$ 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 — $\bar{f}s \geqslant 0.10$ 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 — $\bar{f}s \geqslant 0.15$ 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 — $\bar{f}s \geqslant 0.20$ 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 — $\bar{f}s \geqslant 0.13$ 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 — $\bar{f}s \geqslant 0.15$ 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 — $\bar{f}s \geqslant 0.23$ 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 — $\bar{f}s \geqslant 0.26$ 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 — $\bar{f}s \geqslant 0.12$ 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 — $\bar{f}s \geqslant 0.14$ 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 — $\bar{f}s \geqslant 0.21$ 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 — $\bar{f}s \geqslant 0.21$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 104 | c/20cm |
| 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. |

Consultor: CONSULPAR S.A.

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

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

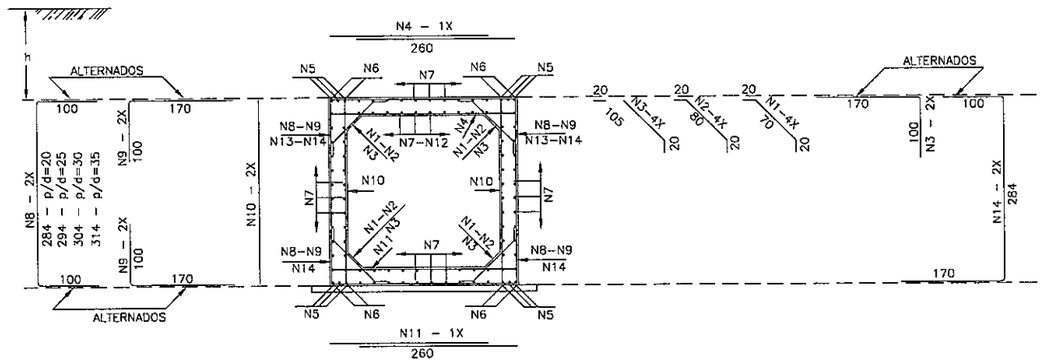
REVISION Y ACTUALIZACION DE PROYECTOS DE VARIOS TRAMOS DE LA RED VIAL NACIONAL

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

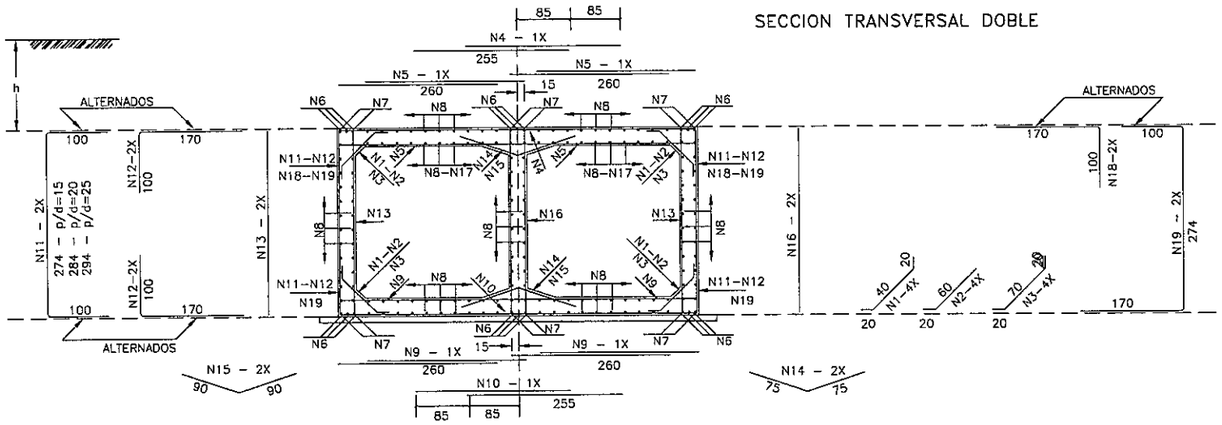
ALCANTARILLA CELULAR

# ALCANTARILLAS CELULARES DE 2.50 x 2.50

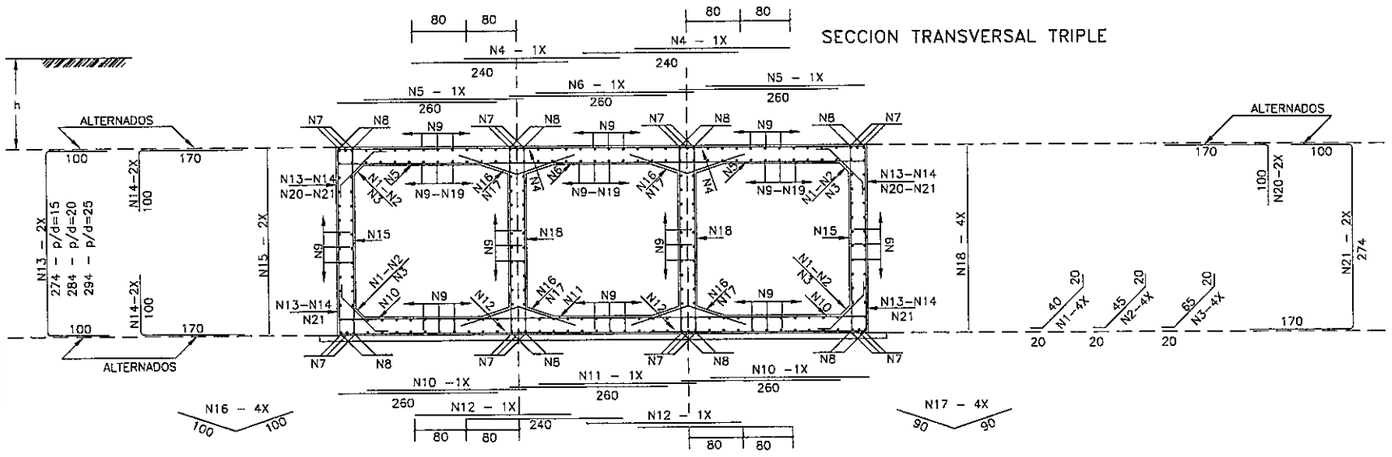
## SECCION TRANSVERSAL SIMPLE




## SECCION TRANSVERSAL DOBLE




## SECCION TRANSVERSAL TRIPLE




## TABLAS DE ARMADURAS POR METRO DE GALERIA

### 0 ≤ h ≤ 100 — $\bar{f}s \geq 0.10$ 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 — $\bar{f}s \geq 0.11$ 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 — $\bar{f}s \geq 0.16$ 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 — $\bar{f}s \geq 0.21$ MPa

| No. | Ø | C | LONG. | SEP. |
|---|---|---|---|---|
| 1 | — | — | — | — |
| 2 | 6.3 | 20 | 120 | c/20cm |
| 3 | 16.0 | 7 | 260 | c/14cm |
| 4 | 15.0 | 12 | CORR. | |
| 5 | — | — | — | — |
| 6 | 6.3 | 96 | CORR. | c/20cm |
| 7 | 12.5 | 8 | 494 | c/28cm |
| 8 | 12.5 | 16 | 270 | c/28cm |
| 9 | 6.3 | 20 | 295 | c/10cm |
| 10 | 16.0 | 7 | 260 | c/13cm |
| 11 | — | — | — | — |
| 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 |

### 0 ≤ h ≤ 100 — $\bar{f}s \geq 0.21$ 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 — $\bar{f}s \geq 0.21$ 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 — $\bar{f}s \geq 0.23$ 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 — $\bar{f}s \geq 0.28$ 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 |

### 0 ≤ h ≤ 100 — $\bar{f}s \geq 0.21$ 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 — $\bar{f}s \geq 0.21$ 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 — $\bar{f}s \geq 0.23$ 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 — $\bar{f}s \geq 0.28$ 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. |

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

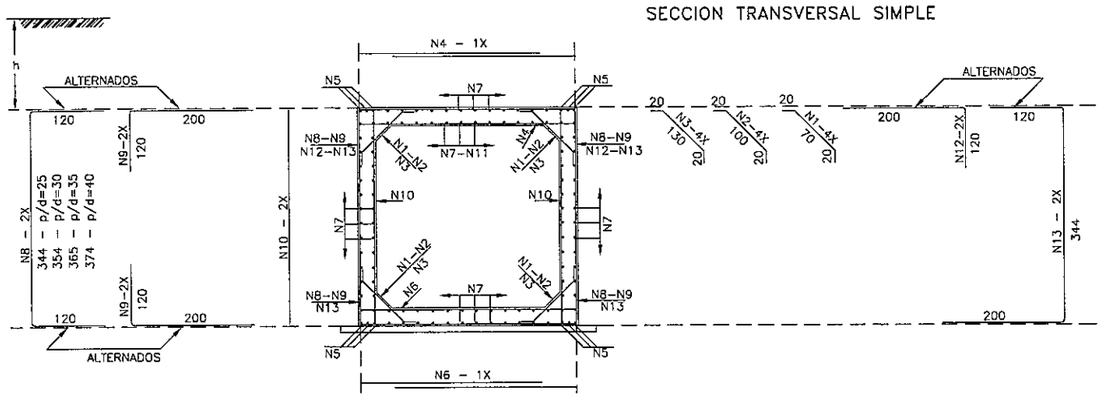
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

ALCANTARILLA CELULAR

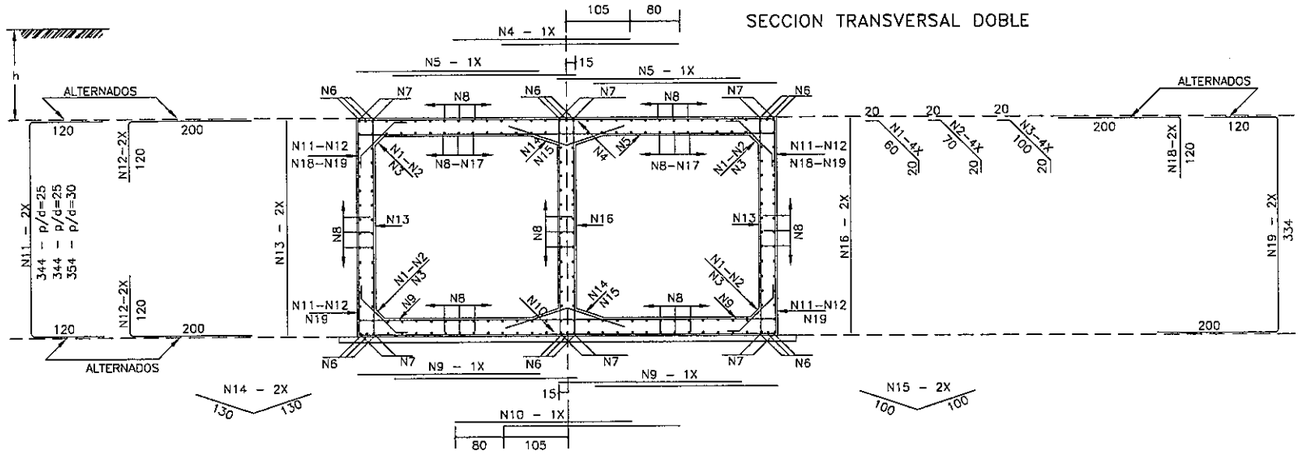
28
veintiocho

# ALCANTARILLAS CELULARES DE 3.00 x 3.00

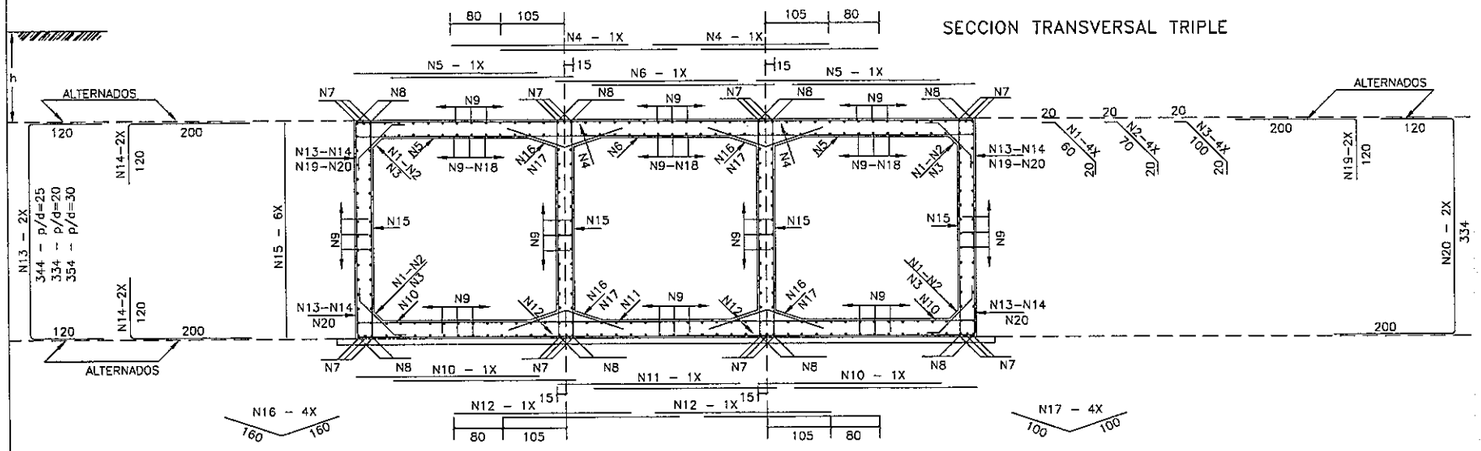
## SECCION TRANSVERSAL SIMPLE




## SECCION TRANSVERSAL DOBLE




## SECCION TRANSVERSAL TRIPLE




## TABLAS DE ARMADURAS POR METRO DE GALERIA

### 0 ≤ h ≤ 100 — $\bar{f}s \geq 0.12$ 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 — $\bar{f}s \geq 0.12$ 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 — $\bar{f}s \geq 0.17$ 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 — $\bar{f}s \geq 0.22$ 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 |

### 0 ≤ h ≤ 100 — $\bar{f}s \geq 0.21$ 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/10cm |
| 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 — $\bar{f}s \geq 0.21$ 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 — $\bar{f}s \geq 0.23$ 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 — $\bar{f}s \geq 0.23$ 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 |

### 0 ≤ h ≤ 100 — $\bar{f}s \geq 0.21$ 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 — $\bar{f}s \geq 0.21$ 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 — $\bar{f}s \geq 0.23$ 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 | 6 | 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 — $\bar{f}s \geq 0.29$ 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. |

Consorcio CONSULPAR S.A. GEOLATINA

CONSORCIO CONSULPAR S.A. - GEOLATINA

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

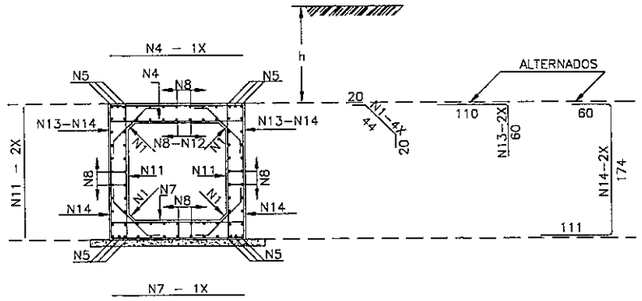
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

ALCANTARILLA CELULAR

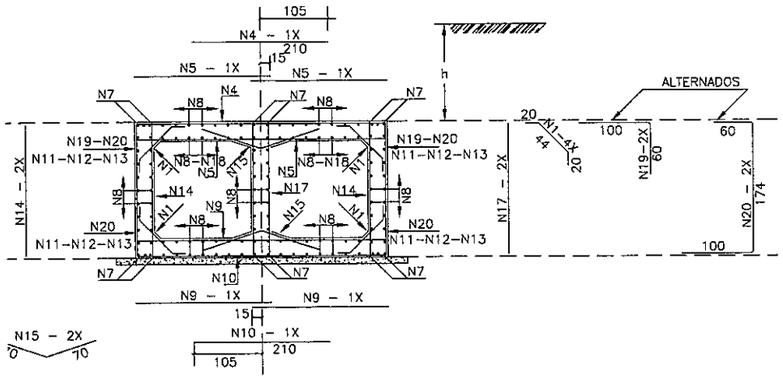
26 veintiseis

# ALCANTARILLAS CELULARES DE 1.50 x 1.50

## SECCION TRANSVERSAL SIMPLE




## SECCION TRANSVERSAL DOBLE




## SECCION TRANSVERSAL TRIPLE

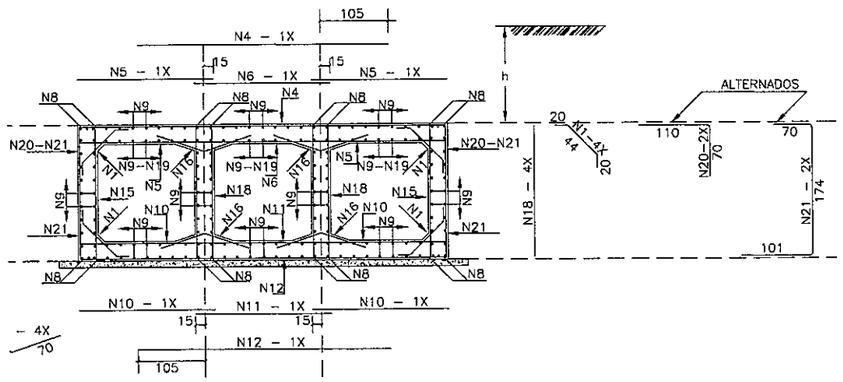



TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 1.50x1.50

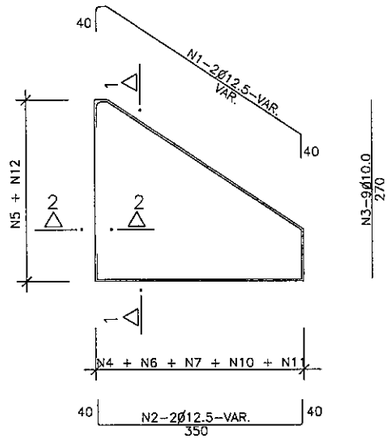
| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 12.5 | 12.5 | 10.0 | 8.0 | 6.3 | 8.0 | 6.3 | 6.3 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 12.5 | 12.5 | 6.3 | 6.3 |
| C | 8 | 8 | 36 | — | — | — | — | — | — | — | — | — | — | 4 | 4 | 12 | — |
| ONG. | 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 – $\alpha = 0° - 15° - 30° - 45°$

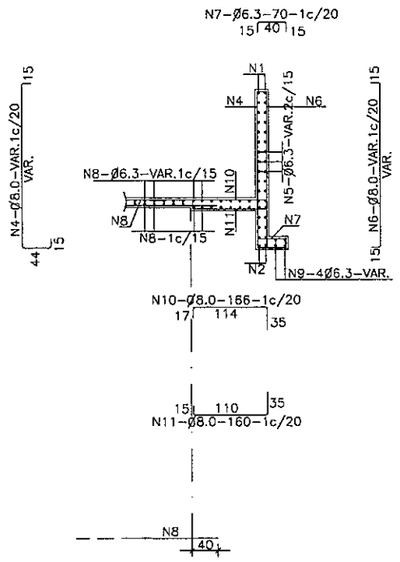
### VISTA (4x)

ESC. 1:50



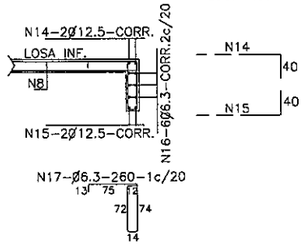

### CORTE 1–1 (4x)

ESC. 1:50



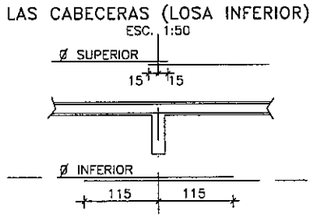

### CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)

ESC. 1:50



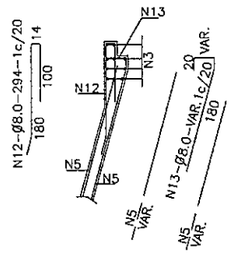

### EMPALME DE LAS ALCANTARILLAS CON LAS CABECERAS (LOSA INFERIOR)

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

$\bar{f}s \geqslant 0.09$ 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 |

$\bar{f}s \geqslant 0.13$ 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 |

$\bar{f}s \geqslant 0.12$ 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 | 160 | 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

| | |
|---|---|
| AD DIRECTRIZ : | 40 A 60 KM/H |
| IA DE VISIBILIDAD DE PARADA: | 60 M. |
| NIMO HORIZONTAL: | 60 M. |
| IA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Consorcio Consulpar S.A. – Geolat 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

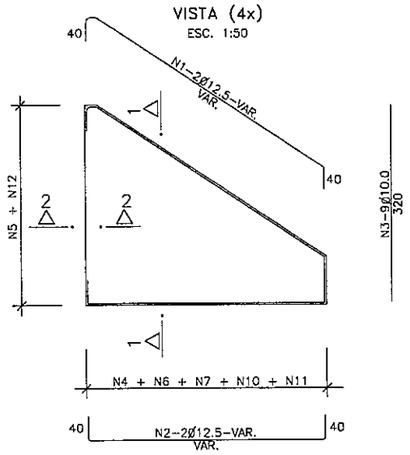
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

ALCANTARILLA CELULAR

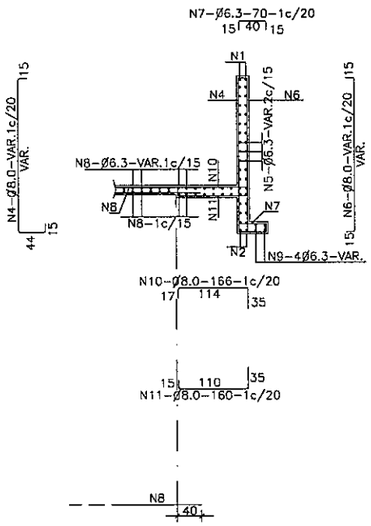
27 veintisiete

## ARMADURAS DE CABECERAS
## ALCANTARILLA CELULAR DE 2.00 x 2.00 – α=0°–15°–30°–45°

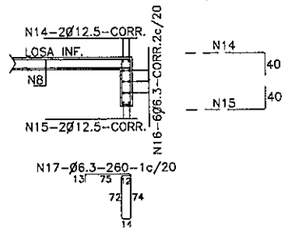
VISTA (4x)
ESC. 1:50



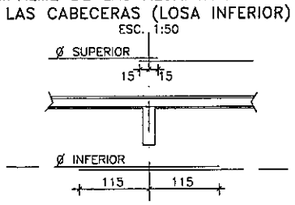

CORTE 1–1 (4x)
ESC. 1:50



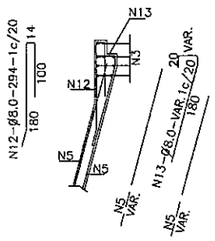

CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50




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

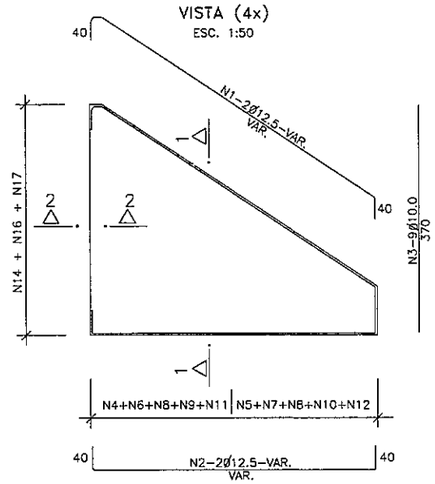
| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ø | 12.5 | 12.5 | 10.0 | 8.0 | 6.3 | 8.0 | 6.3 | 6.3 | 6.3 | 8.0 | 8.0 | 8.0 | 8.0 | 12.5 | 12.5 | 6.3 | 6.3 |
| C | 8 | 8 | 36 | — | — | — | — | — | 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 – α=0°

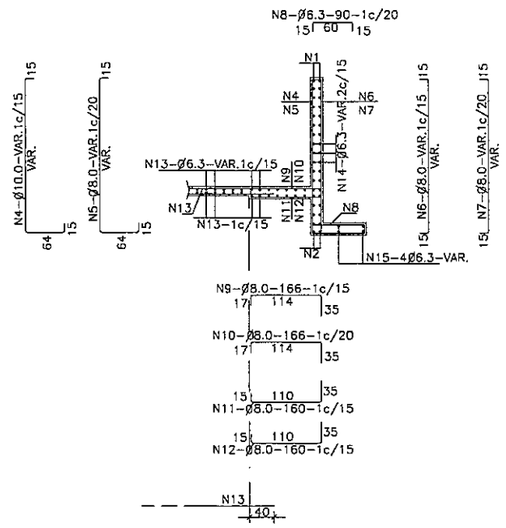
| Ø | 2.00 x 2.00 | | |
|---|---|---|---|
| TIPO | SIMPLE | DOBLE | TRIPLE |
| 6.3 | 531 | 701 | 865 |
| 8.0 | 420 | 450 | 514 |
| 10.0 | 115 | 122 | 172 |
| 12.5 | 187 | 281 | 368 |
| 16.0 | 22 | — | — |
| 20.0 | — | — | — |
| TOTAL | 1.275 Kg | 1.554 Kg | 1.919 Kg |

## ARMADURAS DE CABECERAS
## ALCANTARILLA CELULAR DE 2.50 x 2.50 – α=0°–15°–30°–45°

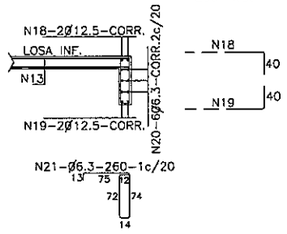
VISTA (4x)
ESC. 1:50



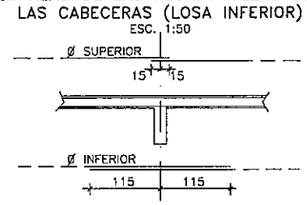

CORTE 1–1 (4x)
ESC. 1:50



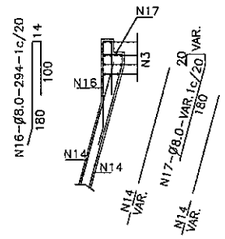

CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50




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 – α=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. |

Consultado: Ing. Raúl L. Montiel C. Consultor Ambiental Especialista

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

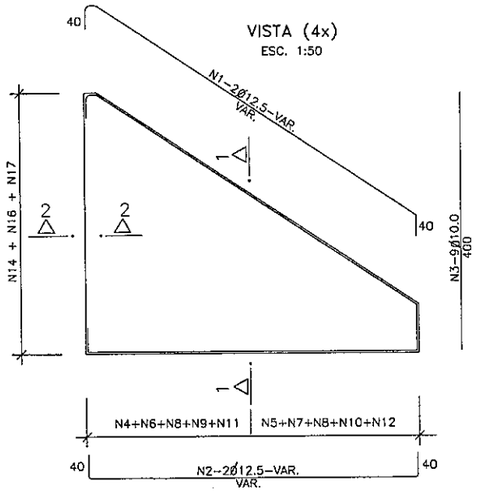
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

28 ALCANTARILLA CELULAR

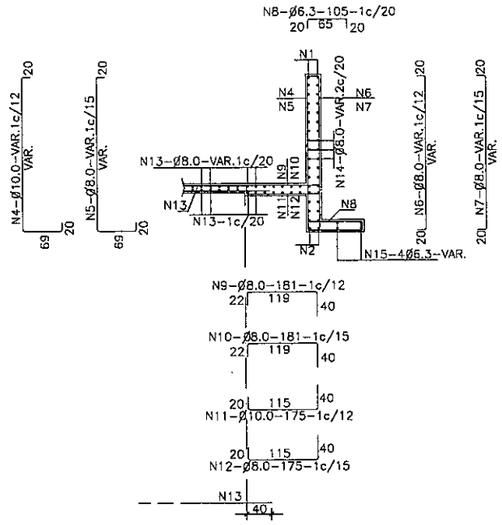
veintiocho

# ARMADURAS DE CABECERAS – ALCANTARILLA CELULAR DE 3.00 x 3.00 – $\alpha$=0°–15°–30°–45°

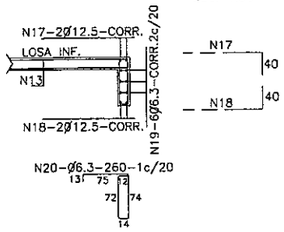
VISTA (4x)
ESC. 1:50




CORTE 1–1 (4x)
ESC. 1:50



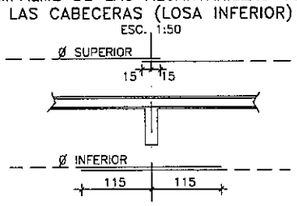

CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50



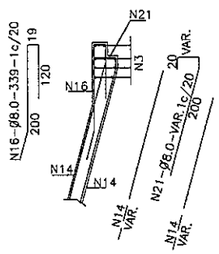

NOTAS

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




## 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 | 259 | 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 |

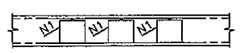
ALCANTARILLA TRIPLE

| 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 |

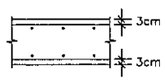
TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 3.00x3.00

| 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 | 35 | — | — | — | — | — | — | — | — | — | — | 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. |

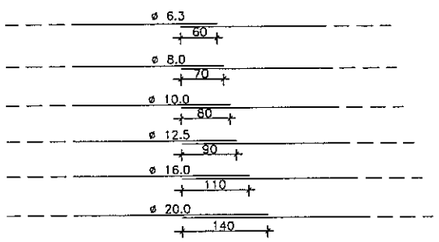
## SOPORTE PARA APOYO DE LA ARMADURA SUPERIOR EN LAS LOSAS




## RECUBRIMIENTO

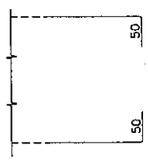


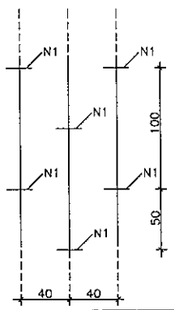

## EMPALME DE LAS VARILLAS CORRIDAS (CUANDO SEA NECESARIO)




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. |

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

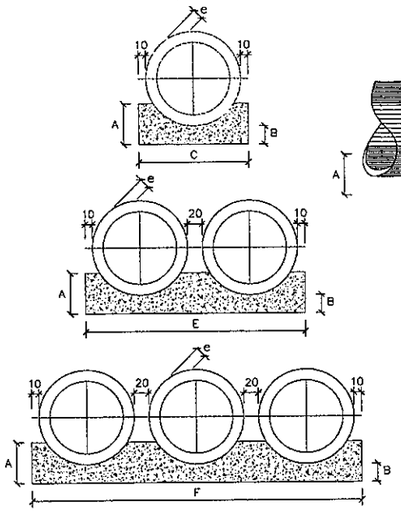
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

29 ALCANTARILLA CELULAR

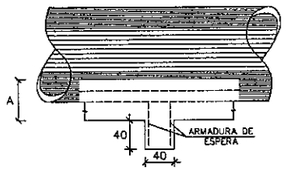
Cuatrocientos

# 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

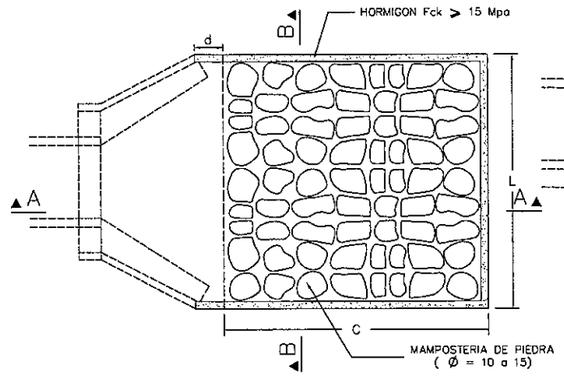
| DIAMETRO (cm.) | SIMPLE HORMIGON (m3) | SIMPLE ARMADURA (kg.) | DOBLE HORMIGON (m3) | DOBLE ARMADURA (kg.) | TRIPLE HORMIGON (m3) | TRIPLE ARMADURA (kg.) |
|---|---|---|---|---|---|---|

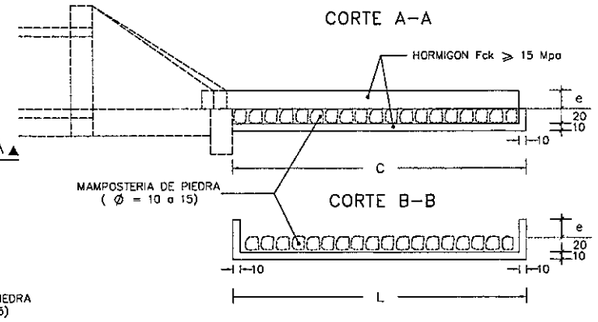
CANTIDADES POR METRO LINEAL DE LECHO

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

OBSERVACIONES:

# DISIPADORES DE ENERGIA
## APLICABLES A SALIDAS DE ALCANTARILLAS

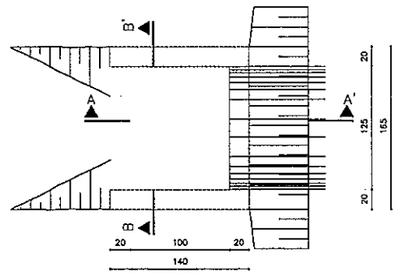



DIMENSIONES Y CONSUMOS MEDIOS POR UNIDAD DE DISIPADOR

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

PLANTA

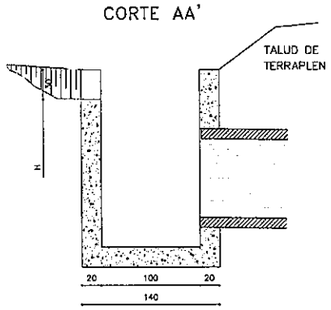



CANTIDADES UNITARIAS

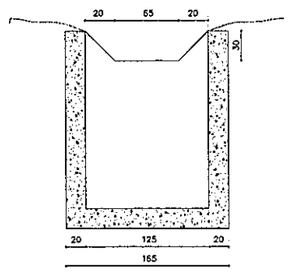
| HORMIGON Fck≥15Mpa (m3) | ENCOFRADO (m2) | EXCAVACION (m3) | RELLENO (m3) |
|---|---|---|---|

# CAJA COLECTORA TALVEG-CCT
ESC. 1:25

CORTE AA'




CORTE BB'




# TABLAS DE ARMADURAS (POR METRO DE TUBO)

TUBOS TIPO CA - 1 (ABNT)

| ENCOFRADO | ARMADURAS |
|---|---|

TUBOS TIPO CA - 2 (ABNT)

| ENCOFRADO | ARMADURAS |
|---|---|

TUBOS TIPO CA - 3 (ABNT)

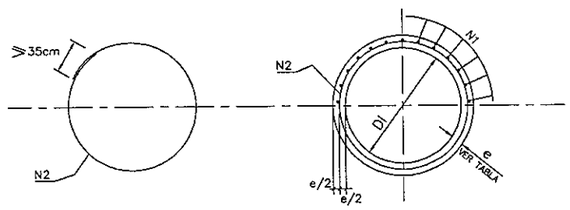
| ENCOFRADO | ARMADURAS |
|---|---|

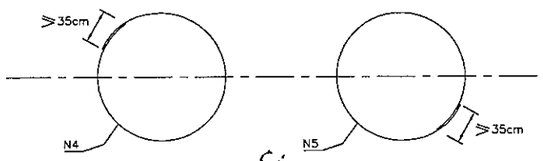
MATERIALES PARA TUBO

H° fck 240 kg/cm2
Varilla AP-420 DN

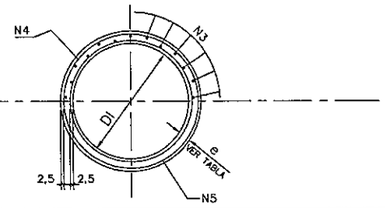
CA - 1 (ALTURA DE TERRAPLÉN) 1,00 a 3,50 m
CA - 2 (ALTURA DE TERRAPLEN) 3,50 a 5,00 m
CA - 3 (ALTURA DE TERRAPLEN) 5,00 a 7,00 m.

CORTE TRANSVERSAL




CORTE TRANSVERSAL




## PARAMETROS TECNICOS

| | |
|---|---|
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| DISTANCIA DE VISIBILIDAD DE SOBREPASO: | 60 M. |

Consorcio: Consultora Paraguaya C.A. Mobil C. CONSULPAR

CONSORCIO CONSULPAR S.A. - GEOCONSULT

REPUBLICA DEL PARAGUAY
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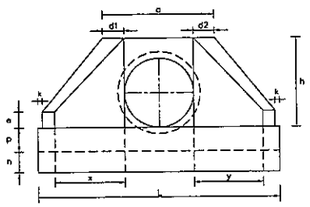
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI



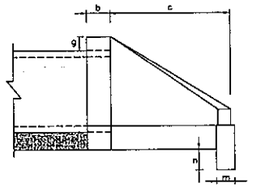
ALCANTARILLA TUBULAR

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

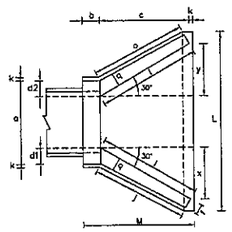
VISTA FRONTAL



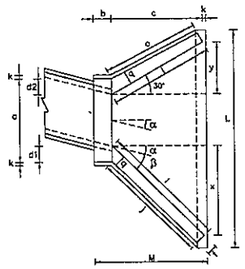

VISTA LATERAL




PLANTA NORMAL




PLANTA OBLICUA




### DIMENSIONES Y CONSUMOS MEDIOS POR UNIDAD

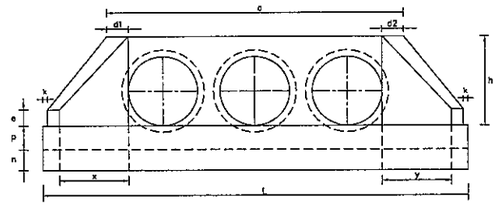
| OBL. α | β | a | b | c | d1 | d2 | e | f | g | h | i | j | k | l | m | n | o | p | q | x | y | L | M | ENCOFRADO m2 | HORMIGON m3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALCANTARILLA TUBULAR SIMPLE D = 60 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 3,186 |
| 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 | 3,587 |
| 15 | 30 | 177 | 30 | 165 | 42 | 31 | 25 | 20 | 30 | 142 | 233 | 203 | 10 | 171 | 30 | 40 | 163 | 37 | 30 | 165 | 44 | 366 | 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 | 499 | 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:

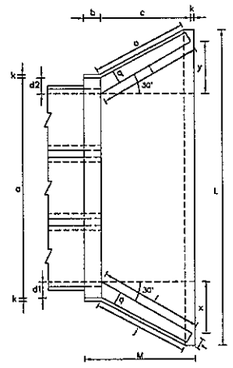
- DIMENSIONES EN CENTIMETROS.
- UTILIZAR HORMIGON CICLOPEO TIPO CLASE C15
- UTILIZAR PREFERENTEMENTE BOCAS NORMALES.

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

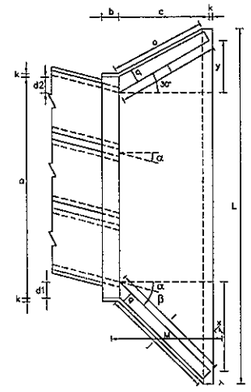
VISTA FRONTAL




PLANTA NORMAL

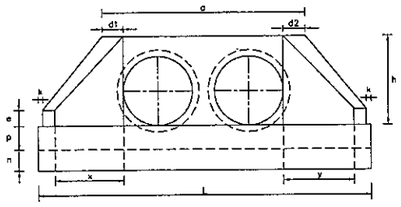



PLANTA OBLICUA

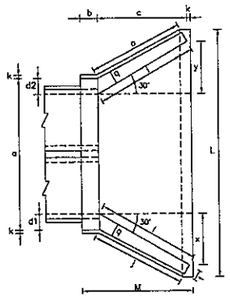



## ALCANTARILLA TUBULAR DOBLE DE HORMIGON
## BOCAS NORMALES Y OBLICUAS (TIPO N.T.)

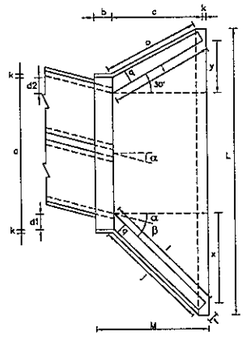
VISTA FRONTAL




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 | 28,94 | 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 | 8,269 |
| 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 | 760 | 320 | 44,09 | 15,912 |
| 30 | 25 | 522 | 50 | 260 | 70 | 50 | 35 | 30 | 30 | 194 | 453 | 396 | 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 | 27,59 | 6,942 |
| 30 | 25 | 535 | 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 | 965 | 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. |

Cons. Ing. Raúl E. Montiel C.
CONSULPAR S.A. CONSULTORES PARAGUAYOS
CONSORCIO CONSULPAR S.A. - CONSULATINA S.A.

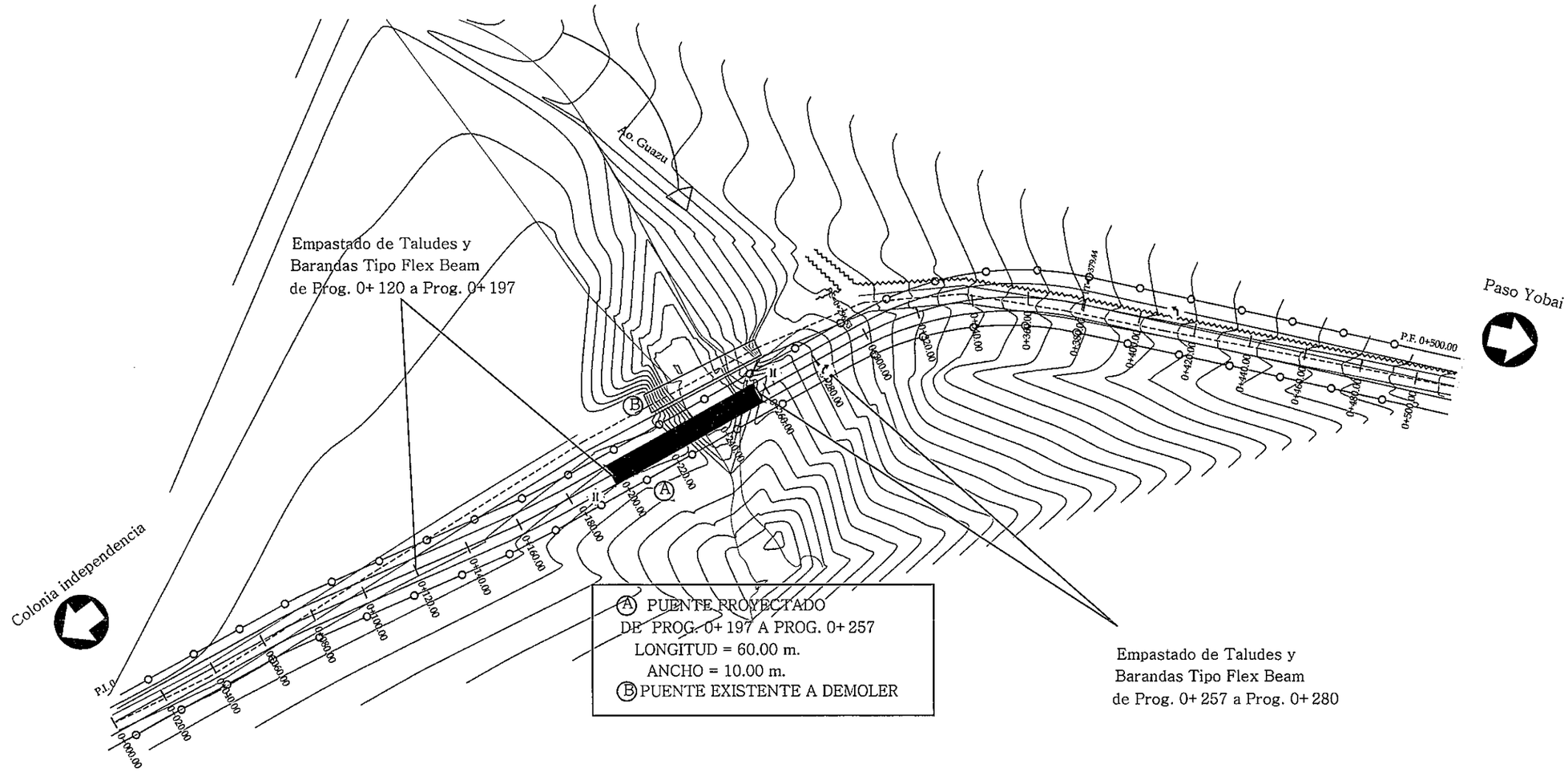
REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS
PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

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

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

31 ALCANTARILLA TUBULAR

Treinta y uno




Ⓐ PUENTE PROYECTADO
DE PROG. 0+ 197 A PROG. 0+ 257
LONGITUD = 60.00 m.
ANCHO = 10.00 m.
Ⓑ PUENTE EXISTENTE A DEMOLER

REFERENCIAS

- LIM. PROPIEDADES
- EJE - CALZADA PROYECTO
- CAMINO AUXILIAR
- PUENTE
- CURVA
- PUENTE ACTUAL
- 20 m. FRANJA DOMINIO NUEVA

Ing. Raúl L. Montiel C.
Contraparte Legal
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

# CIA - GRIMAUX

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

| CONTENIDO: | PUENTE Nº 48<br>LONG.: 60 MTS. |
|---|---|
| PLANIMETRIA | AO GUAZU<br>COL. INDEPENDENCIA - PASO YOBAI |

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

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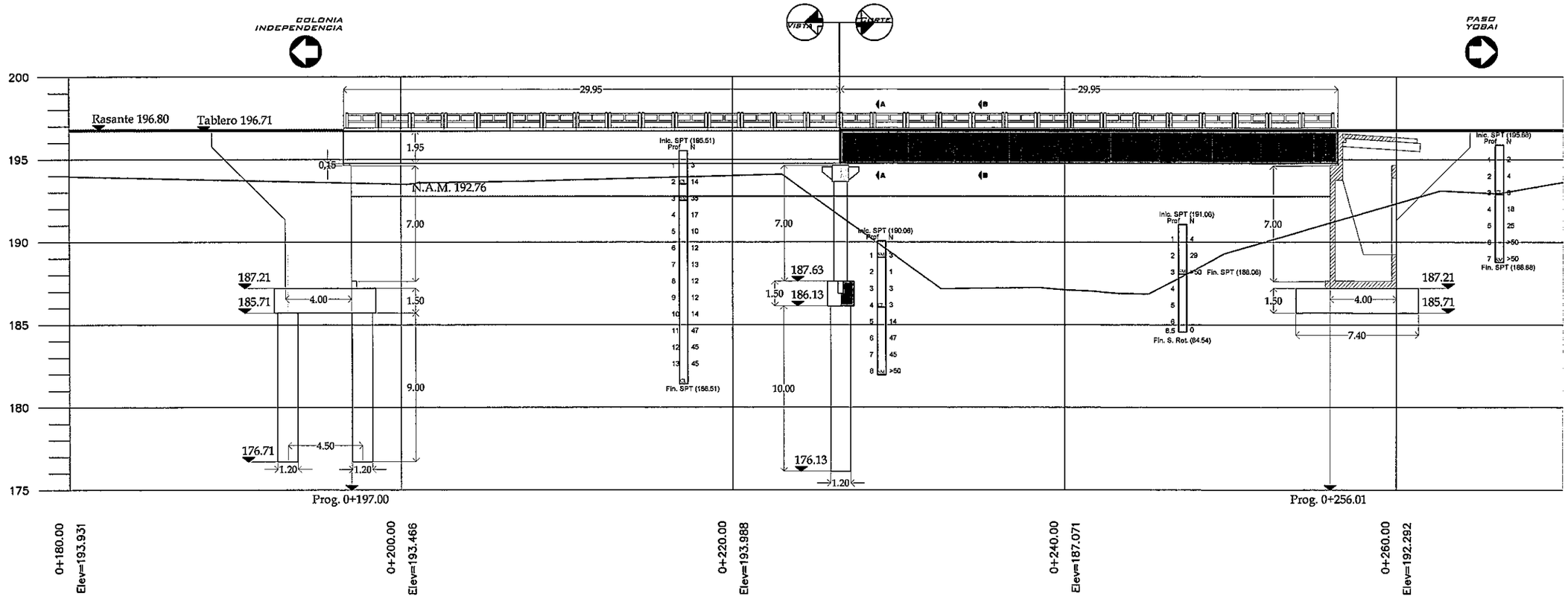
treinta y dos

# SECCION LONGITUDINAL




**Notas:**

1- Las dimensiones estan en metros, salvo indicacion en contrario.
2- Resistencia de los materiales.
Resistencia especificada del Hormigon: 25MPa.
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

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CONSORCIO
CONSULTORA A - ARGENTINA S.A.

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treinta y tres

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DISEÑO FINAL

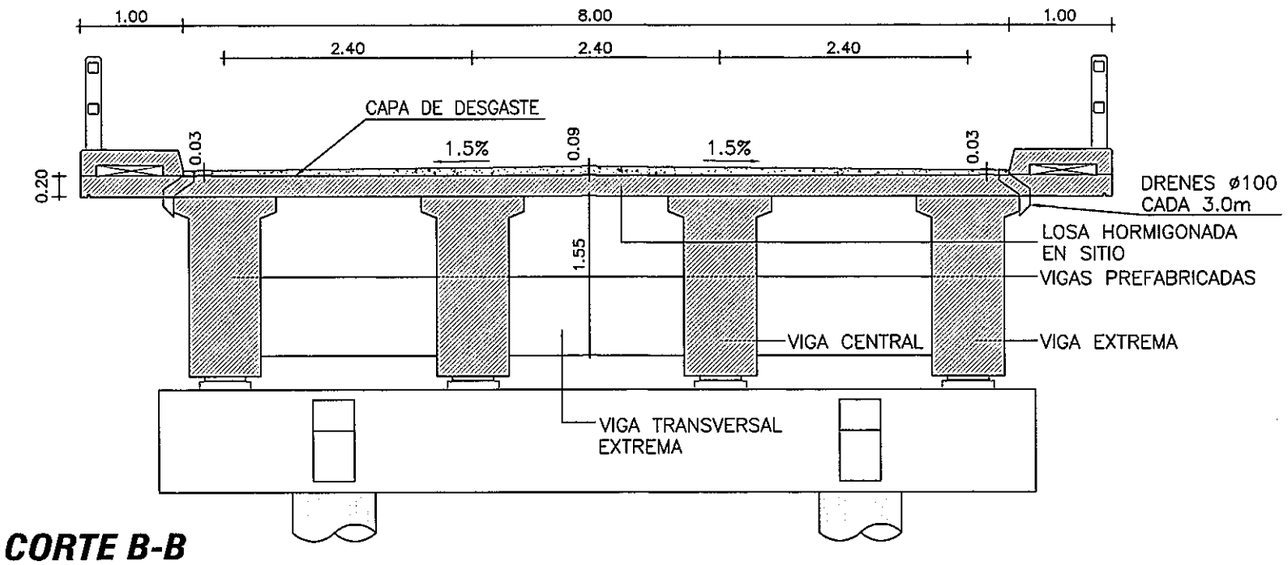
CONTENIDO:
-Seccion Longitudinal

PUENTE Nº 48
LONGITUD 60 MTS.
Aº GUAZU
COL. INDEPENDENCIA-P. YOBAI

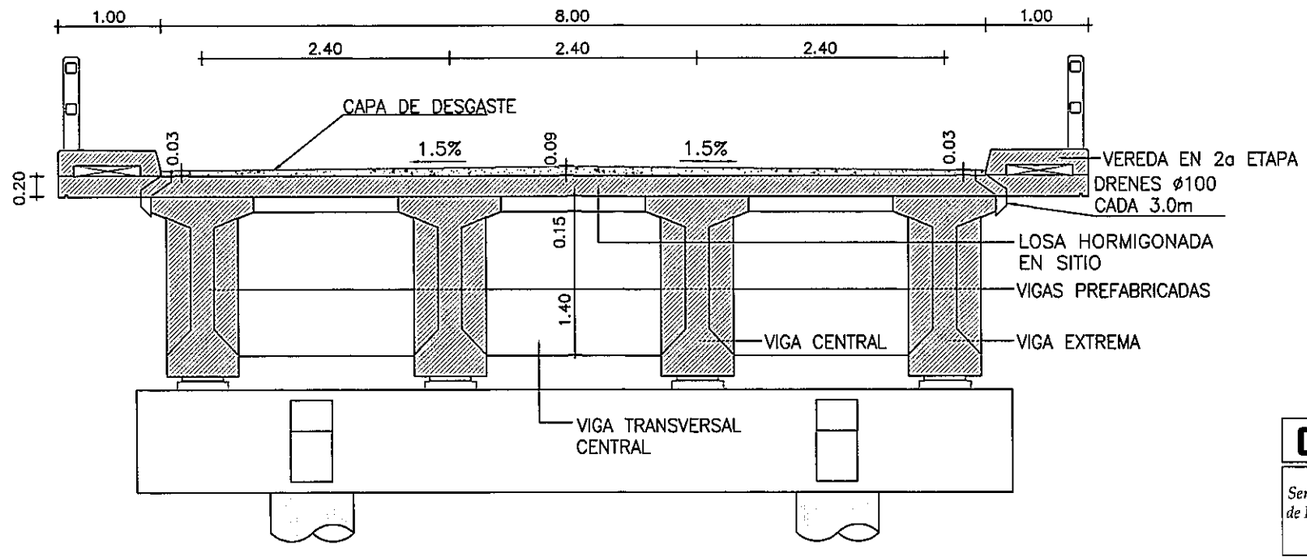
MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES
Presidencia de la República del Paraguay
BID

# SECCION TRANSVERSAL

## CORTE A-A




## CORTE B-B

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treinta y cuatro

**CIA - GRIMAUX**

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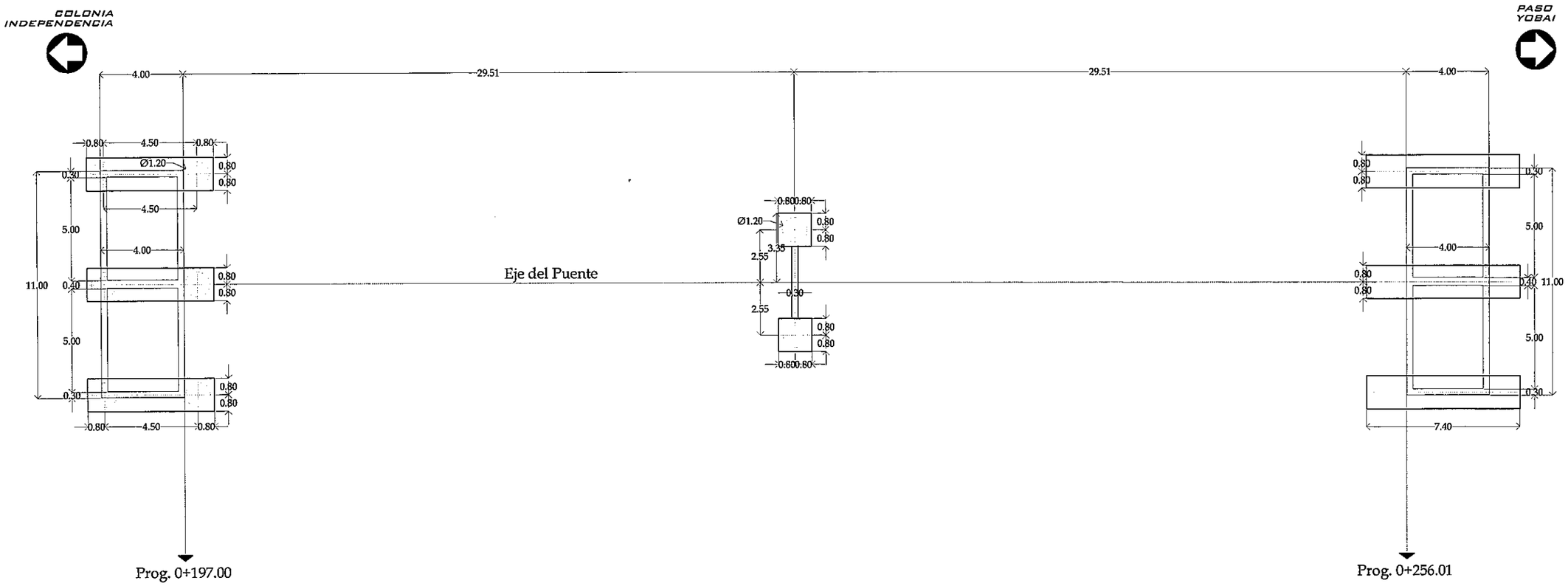
DISEÑO FINAL

| CONTENIDO: | PUENTE Nº 48<br>LONGITUD 60 MTS. |
|---|---|
| -Seccion Transversal | Aº GUAZU<br>COL. INDEPENDENCIA-P. YOSAI |

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

# PLANTA DE FUNDACIONES

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treinta y cinco

## CIA - GRIMAUX

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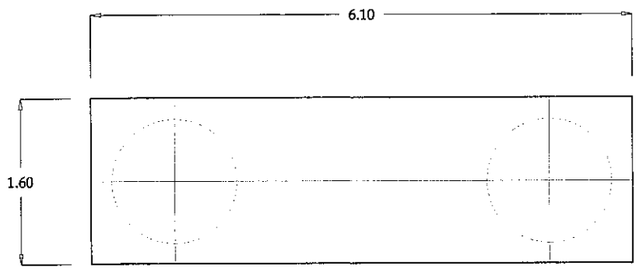
DISEÑO FINAL

| CONTENIDO: | PUENTE Nº 48<br>LONGITUD 60 MTS. |
|---|---|
| -Planta de Fundaciones | Aº GUAZU<br>COL. INDEPENDENCIA-P. YOBAI |

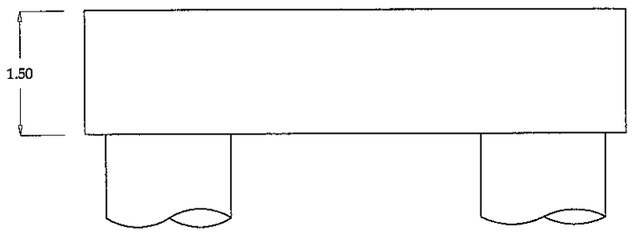
MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

# Estribo Col. Independencia

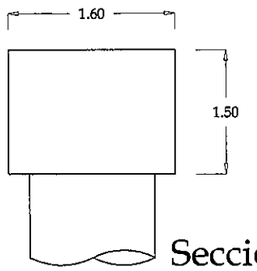
## Detalle Cabezal



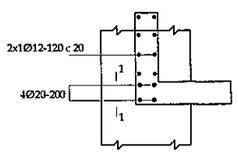

Planta



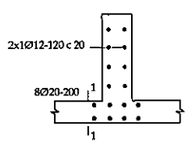

Seccion Longitudinal



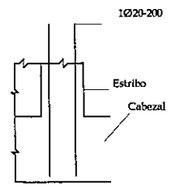

Seccion Transversal




Detalle 1 (x4)



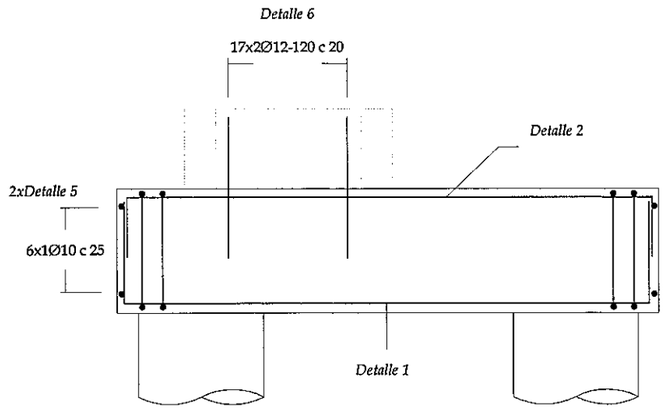

Detalle 2 (x2)

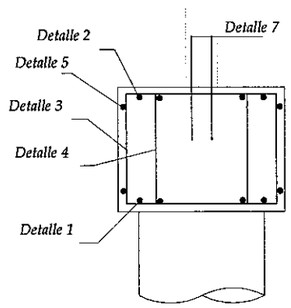



Seccion 1-1

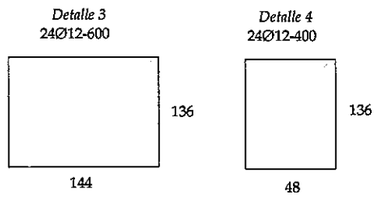
Detalle Tipico union Estribo/Cabezal

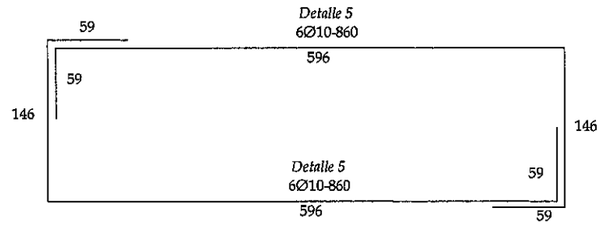
## Armadura Cabezal

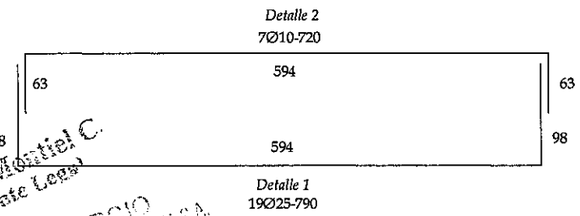


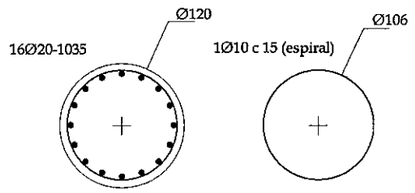

Detalle Armadura

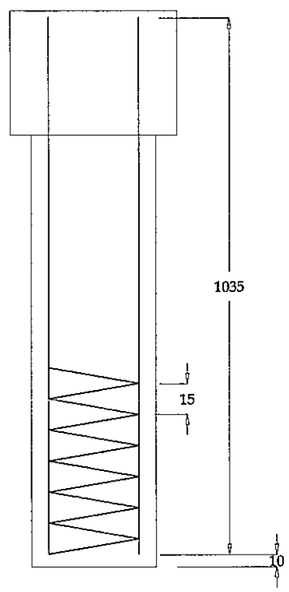



## Pilote




**CIA - GRIMAUX**

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

**DISEÑO FINAL**

| CONTENIDO: | PUENTE Nº 48<br>LONGITUD 60 MTS. |
|---|---|
| -Detalle Cabezal, Armadura<br>-Pilote, Armadura | Aº GUAZU<br>COL. INDEPENDENCIA-P. YOBAI |

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

Ing. Raúl L. Montiel C.
Consultante Local

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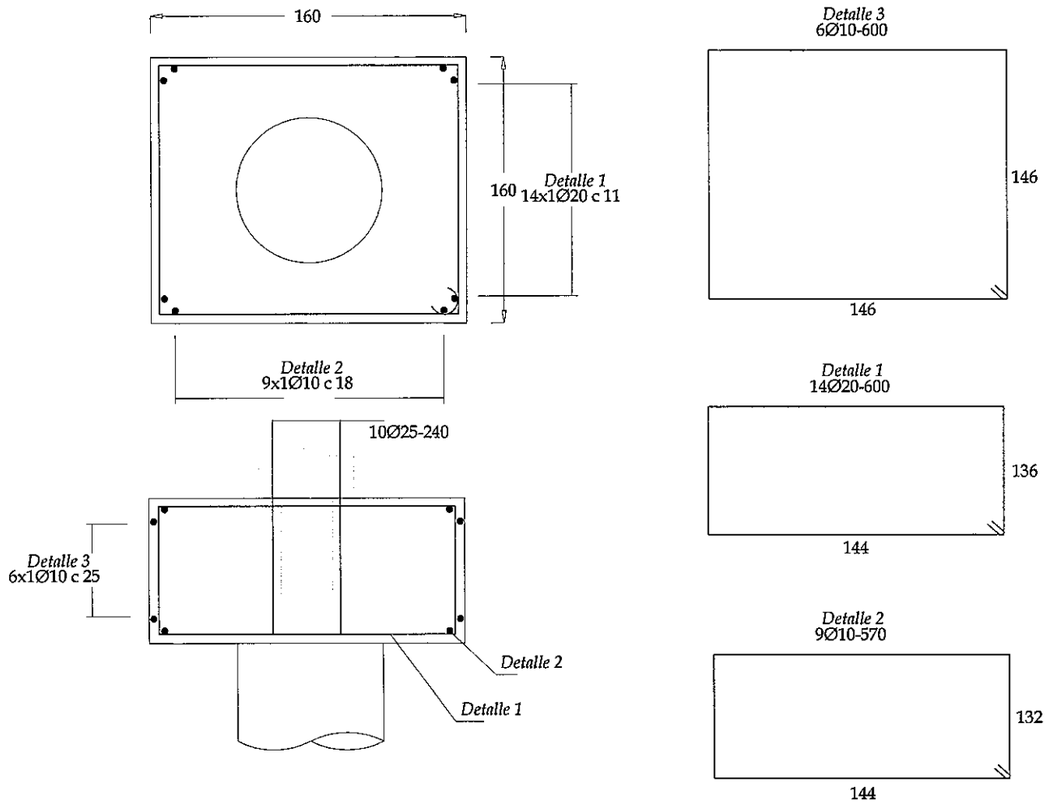
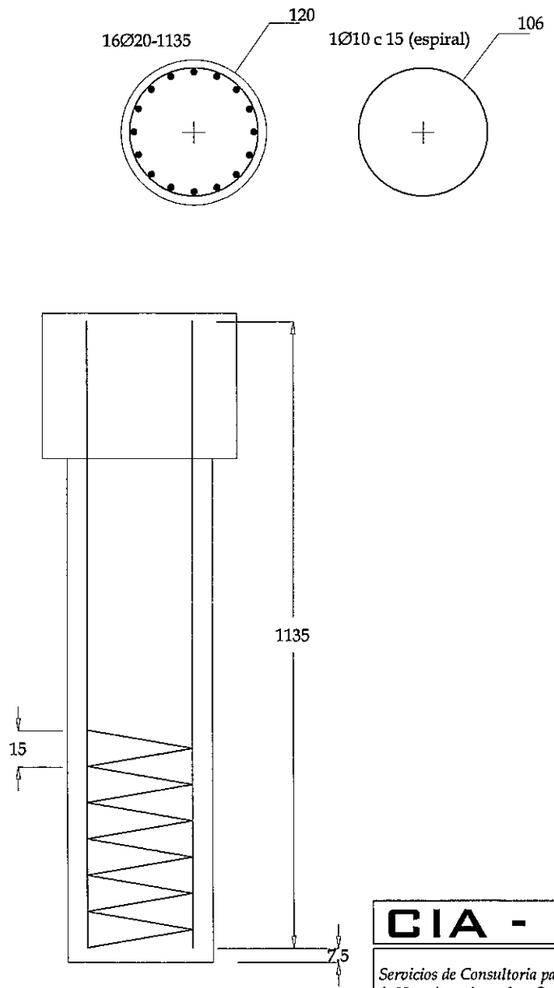
Treinta y seis

# Pila
# Detalle Cabezal




# Pilote




Ing. Raúl L. Montiel C.
Representante Legal
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

**CIA - GRIMAUX**

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

CONTENIDO:
-Pila, Detalle Cabezal, Armadura
-Pilote, Armadura

PUENTE Nº 48
LONGITUD 60 MTS.

Aº GUAZU
COL. INDEPENDENCIA-P. YOBAI

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES
Presidencia de la República del Paraguay
BID

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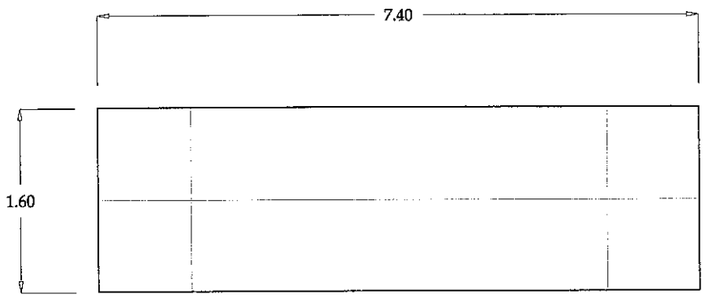
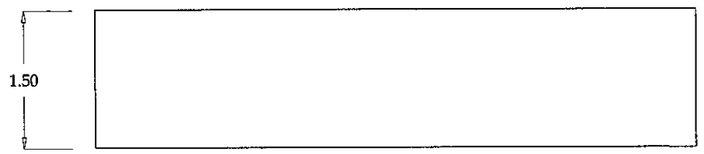
treinta y siete

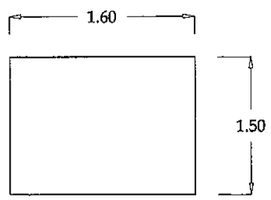
# Detalle Zapata



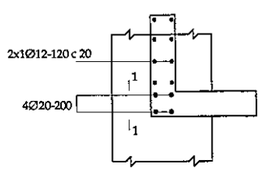

## Planta



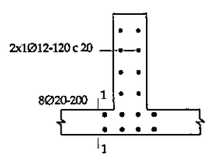

## Seccion Longitudinal



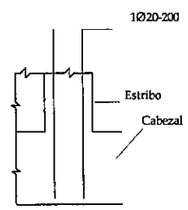

## Seccion Transversal




Detalle 1 (x4)



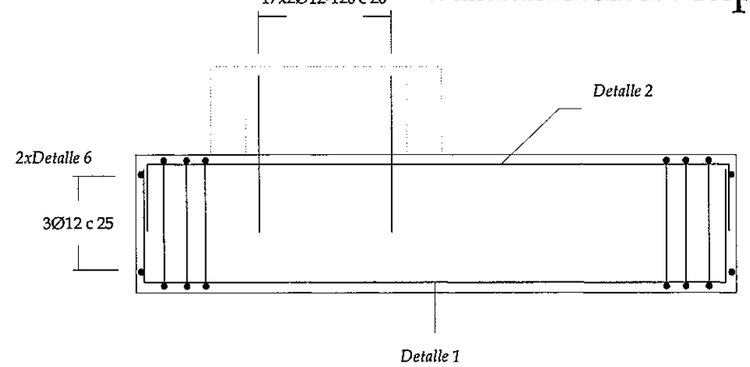

Detalle 2 (x2)

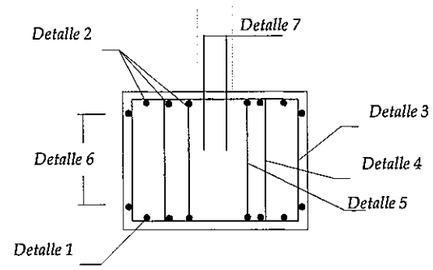



Seccion 1-1

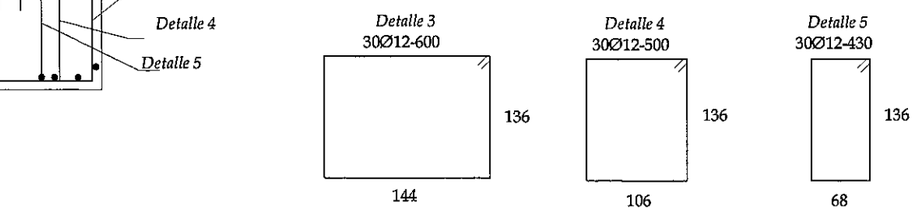
## Detalle Tipico union Estribo/Cabezal

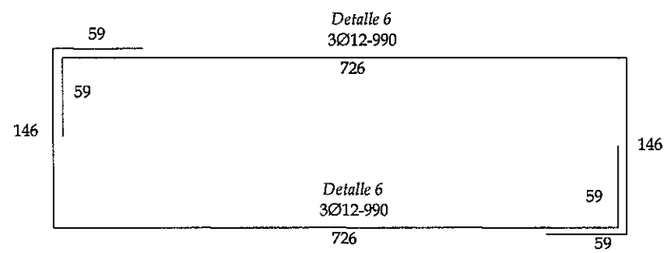
# Armadura Zapata

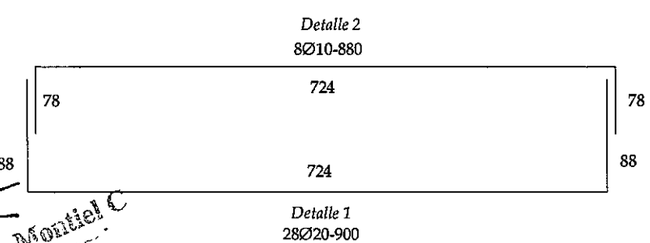



## Detalle Armadura




Ing. Raúl L. Montiel C.
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

28

**CIA - GRIMAUX**

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

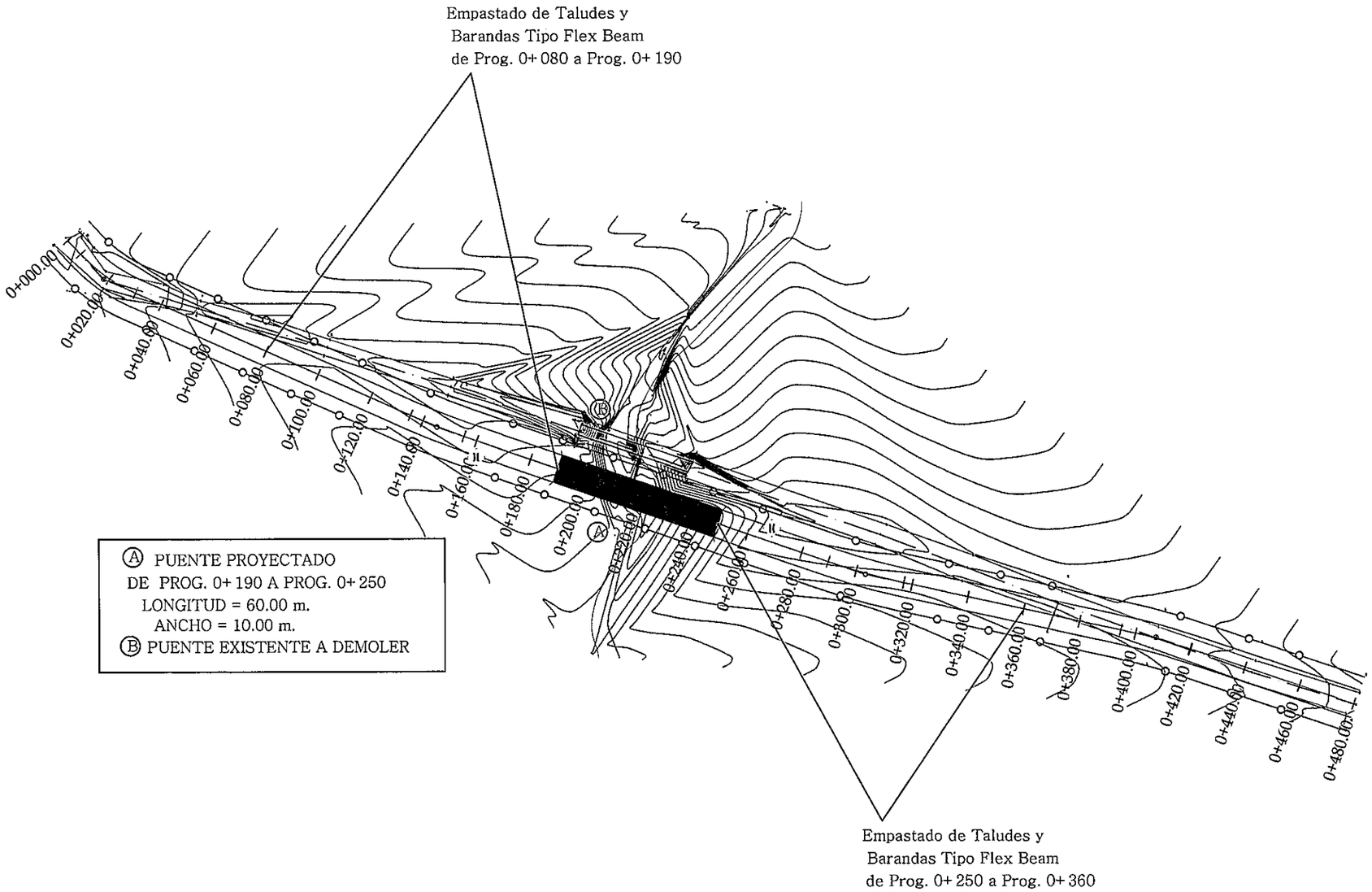
DISEÑO FINAL

CONTENIDO:
-Detalle Zapata
, Armadura

PUENTE Nº 48
LONGITUD 60 MTS.
Aº GUAZU
COL. INDEPENDENCIA-P. YOBAI

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

ciento y ocho




REFERENCIAS

- LIM. PROPIEDADES
- EJE - CALZADA PROYECTO
- CAMINO AUXILIAR
- PUENTE
- CURVA
- PUENTE ACTUAL
- 20 m. FRANJA DOMINIO NUEVA

Ing. Raúl L. Montiel C.
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

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*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

| CONTENIDO: | PUENTE Nº 49<br>LONG.: 60 MTS. |
|---|---|
| PLANIMETRIA | RIO TEBICUARYMI<br>COL. INDEPENDENCIA - PASO YOBAI |

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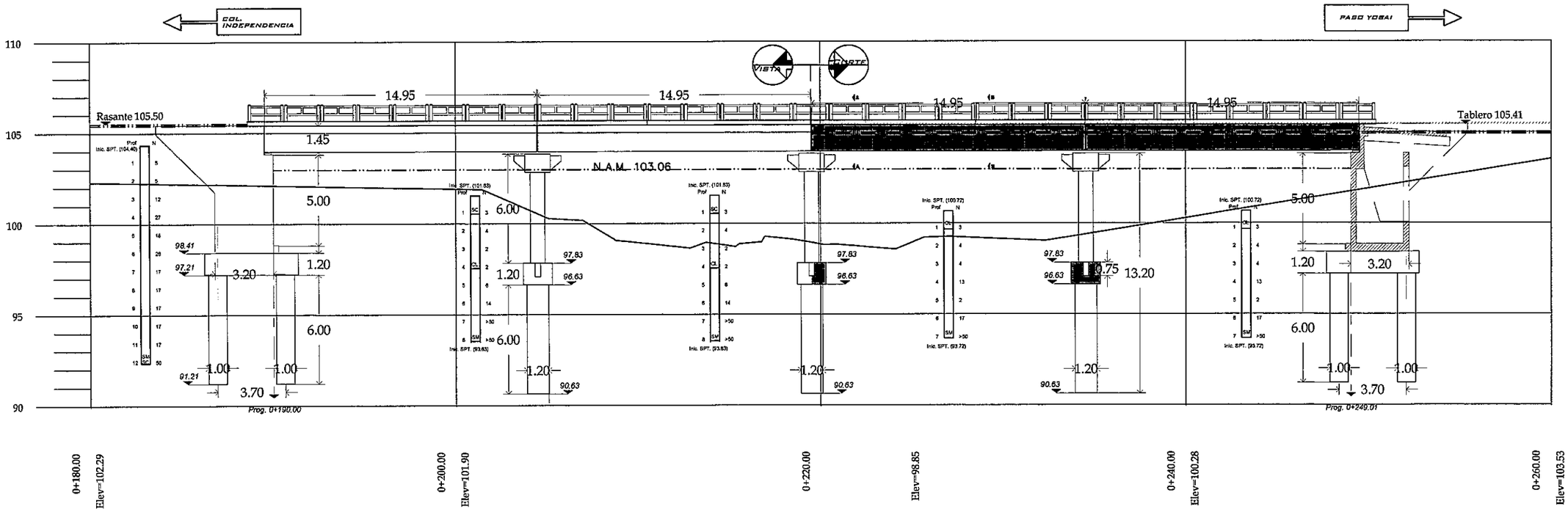
39

treinta y nueve

# SECCION LONGITUDINAL




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 en sello de Hormigon 1;3;6 de 0.10 m de espesor

Ing. Miguel L. Montiel C.
Representante Legal
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

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DISEÑO FINAL

CONTENIDO:
-Seccion Longitudinal

PUENTE Nº 49
LONGITUD 60 MTS.
RIO TEBICUARYMI
COL. INDEPENDENCIA - PASO YOBAI

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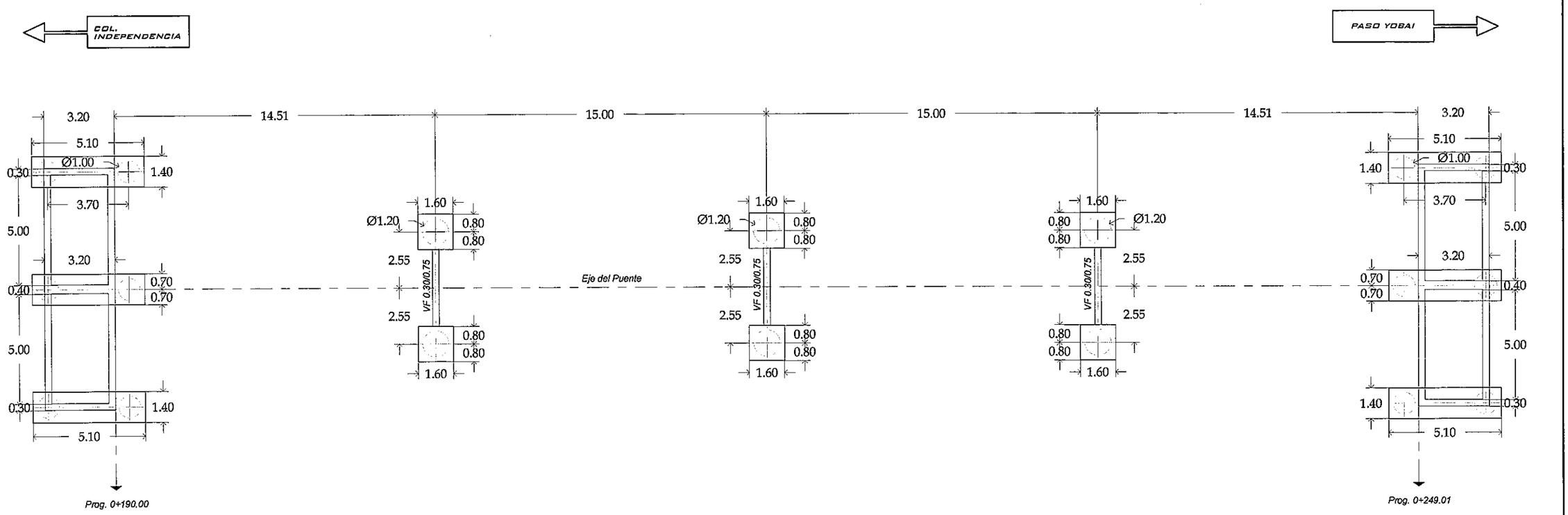
40

Cuarenta

# PLANTA DE FUNDACIONES




# CIA - GRIMAUX

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

| CONTENIDO: | PUENTE Nº 49<br>LONGITUD 60 MTS. |
|---|---|
| -Planta de Fundaciones | RIO TEBICUARYMI<br>COL. INDEPENDENCIA - PASO YOBAI |

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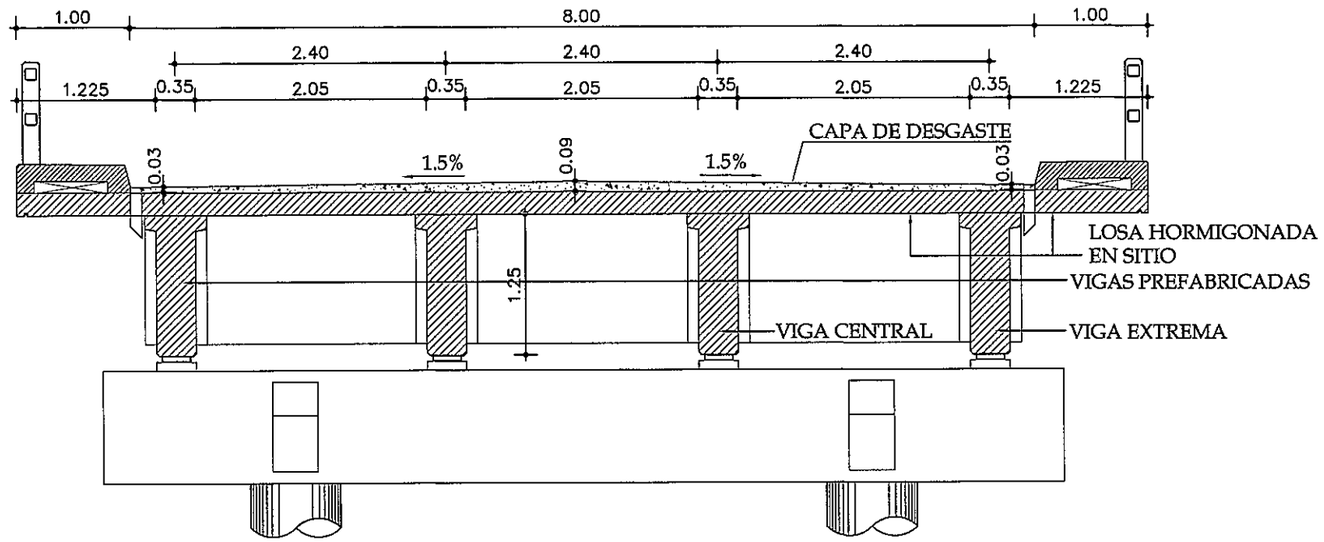
Raúl L. Montiel C.
Jefe Fiscal
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

Cuarenta y uno

# SECCION TRANSVERSAL

## CORTE A - A

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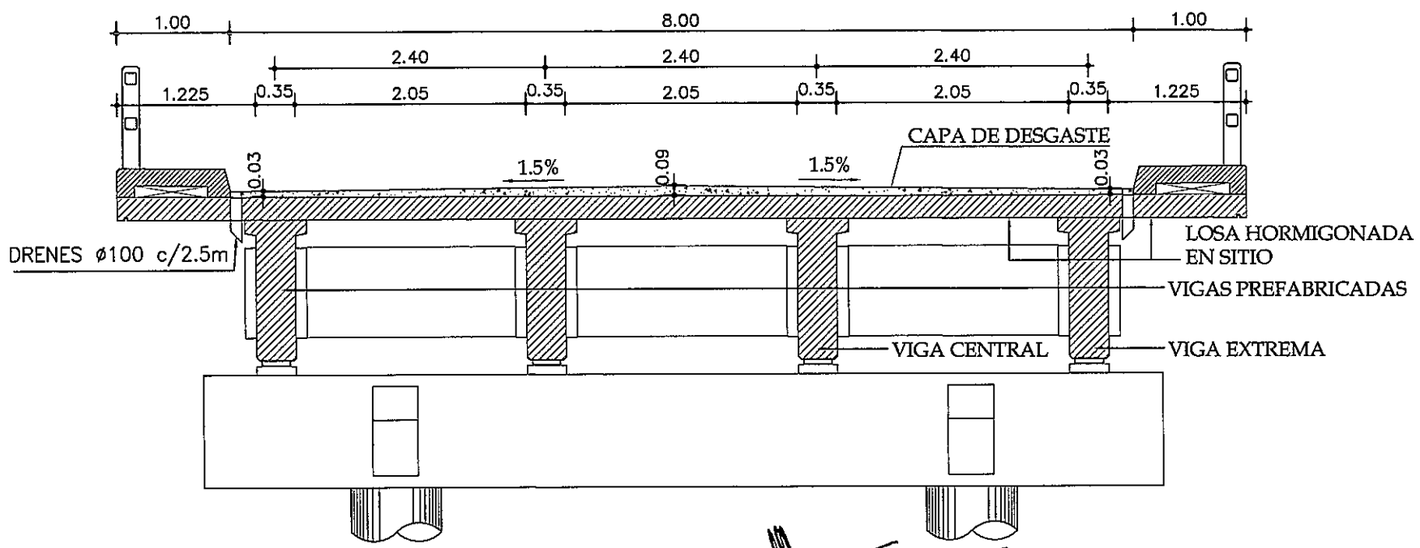


Ing. Raúl L. Montiel C.
Representante Legal
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

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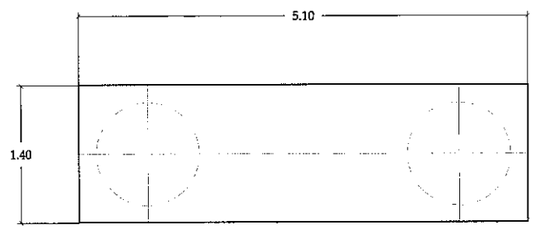
*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

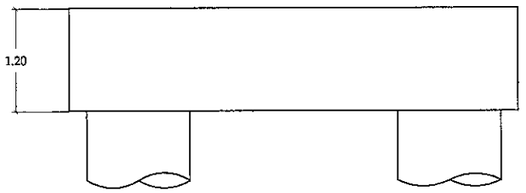
| CONTENIDO: | PUENTE Nº 49<br>LONGITUD 60 MTS. |
|---|---|
| -Seccion Transversal | RIO TEBICUARYMI<br>COL. INDEPENDENCIA - PASO YOBAI |

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES — Presidencia de la República del Paraguay — BID

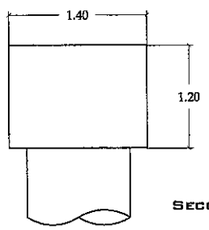
## Detalle Cabezal




Planta

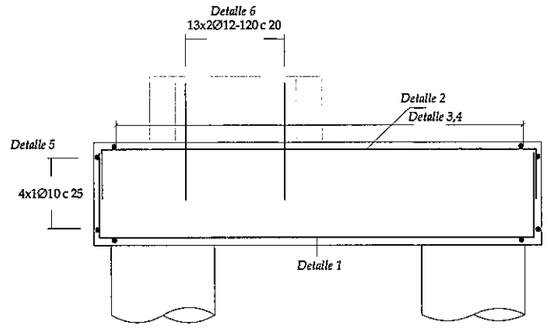



Seccion Longitudinal

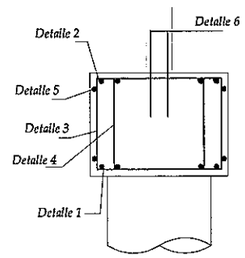



Seccion Transversal

## Armadura Cabezal

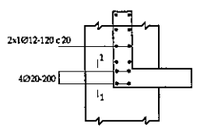



Seccion Longitudinal

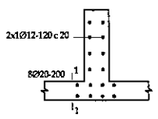



Seccion Transversal

### Detalle tipico union Estribo/Cabezal




Detalle 1 (x4)

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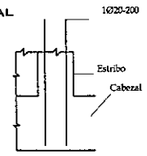
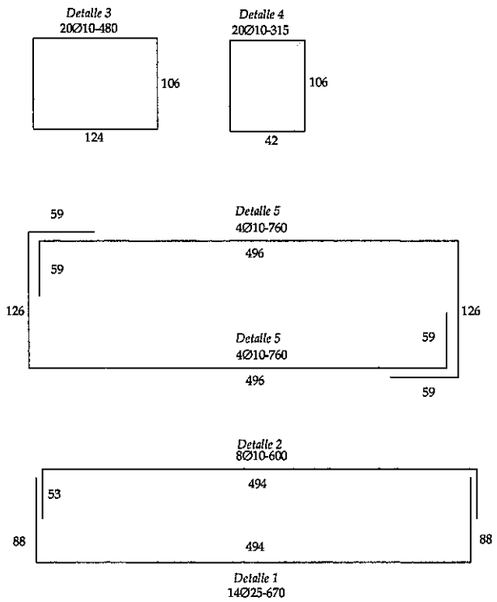



Seccion 1-1

## Detalle Armaduras

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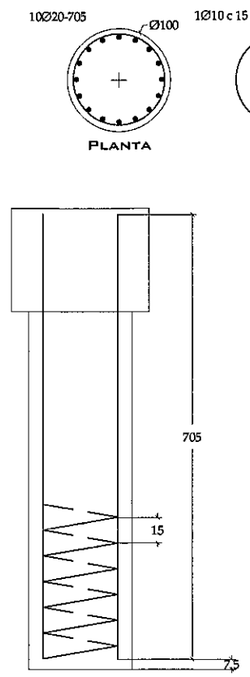


Planta

Estribo

Lic. Raúl L. Montiel C.
Contratista Local
CONSULPAR S.A. - GEOLATINA S.A.

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*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

**DISEÑO FINAL**

**Contenido:**

-Detalle Cabezal, Armadura
-Pilote, Armadura

**Puente Nº 49**
**Longitud 60 mts.**

**Rio Tebicuarymi**
Col. Independencia - Paso Yobai

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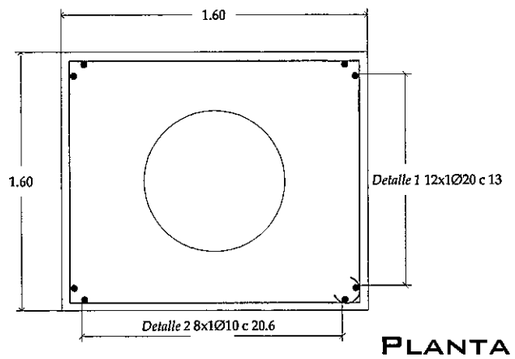
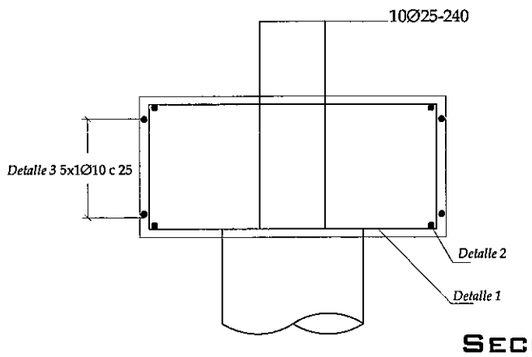
Cuarenta y tres

# PILA

## DETALLE CABEZAL

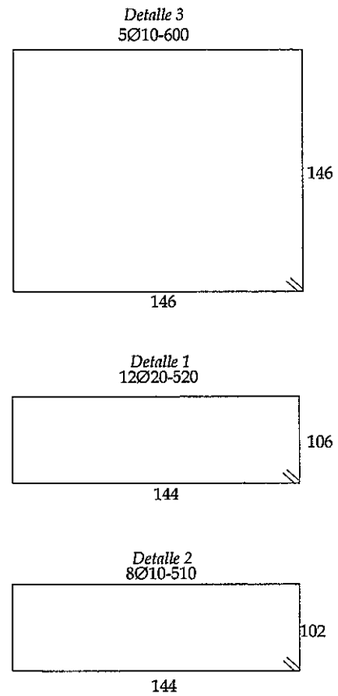



PLANTA

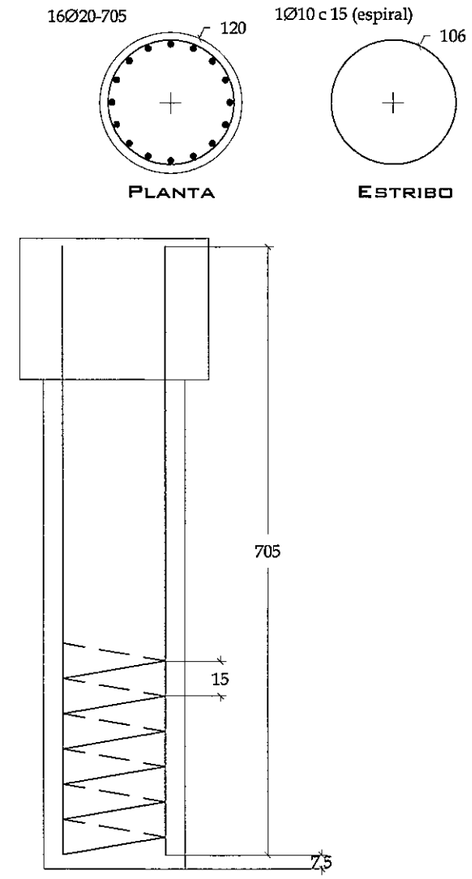



SECCION

## ARMADURA CABEZAL




## ARMADURA PILOTES




PLANTA

ESTRIBO

Ral L. Montiel C.

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

4c

cuarenta y cuatro

# CIA - GRIMAUX

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

CONTENIDO:
-Pila, Detalle Cabezal, Armadura
-Pilote, Armadura

PUENTE Nº 49
LONGITUD 60 MTS.

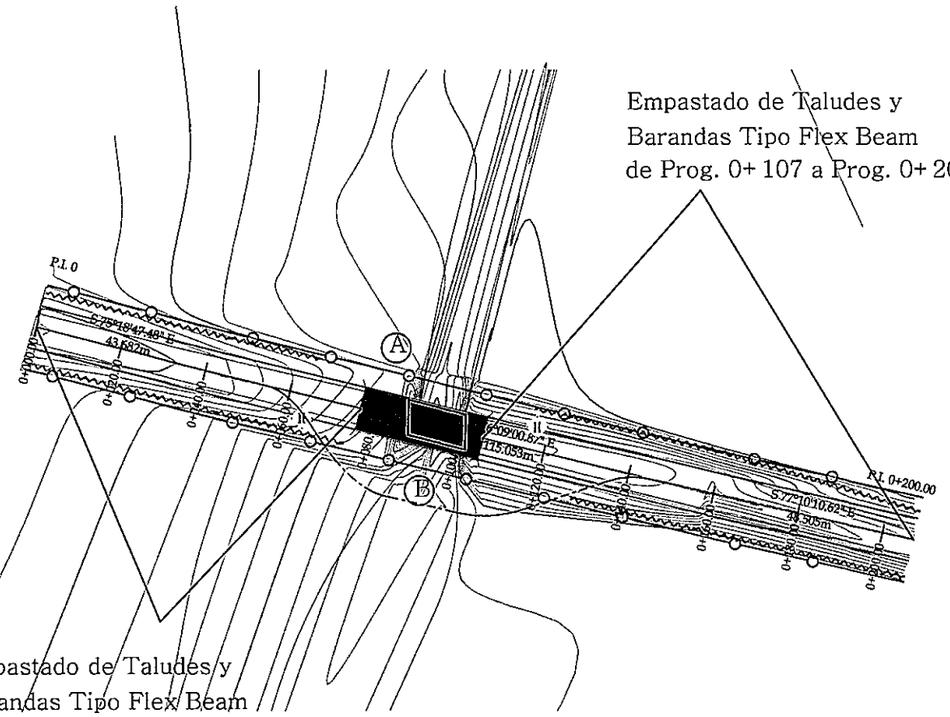
RIO TEBICUARYMI
COL. INDEPENDENCIA - PASO YOBAI

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay

BID

Colonia independencia

Paso Yobai




Empastado de Taludes y
Barandas Tipo Flex Beam
de Prog. 0+ 107 a Prog. 0+ 207

Ⓐ PUENTE PROYECTADO
DE PROG. 0+ 076 A PROG. 0+ 106
LONGITUD = 30.00 m.
ANCHO = 10.00 m.
Ⓑ PUENTE EXISTENTE A DEMOLER

Empastado de Taludes y
Barandas Tipo Flex Beam
de Prog. 0+ 000 a Prog. 0+ 077

REFERENCIAS

LIM. PROPIEDADES
EJE - CALZADA PROYECTO
CAMINO AUXILIAR
PUENTE
CURVA
PUENTE ACTUAL
20 m. FRANJA DOMINIO NUEVA

Ing. Raúl L. Montiel C.
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

# CIA - GRIMAUX

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

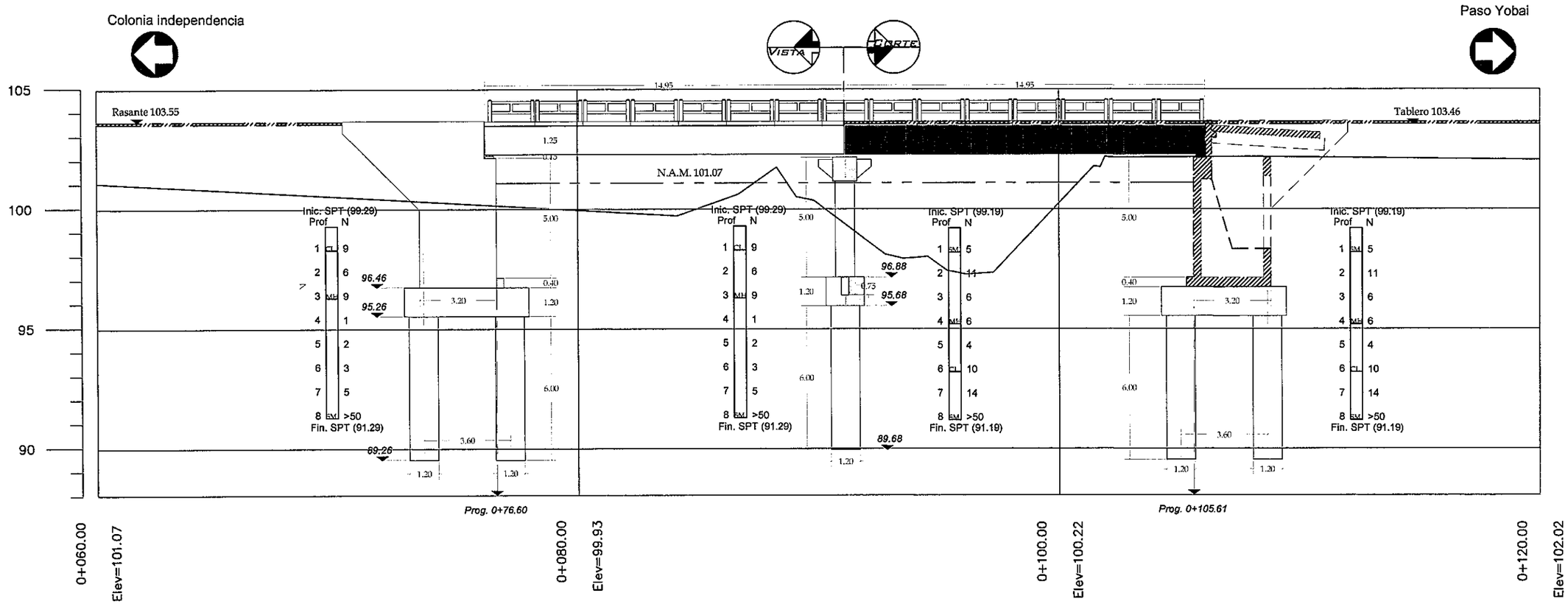
CONTENIDO:
PLANIMETRIA

PUENTE Nº 52
LONG.: 30 MTS

AO DESGRACIACUE
COL. INDEPENDENCIA - PASO YOBAI

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES
Presidencia de la República del Paraguay
BID

# SECCION LONGITUDINAL




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

Ing. Raúl L. Montiel C.
Gerente Legal
CONSORCIO
CONSULPAS S.A. - GEOLATINA S.A.

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Quarenta y seis

**CIA - GRIMAUX**

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

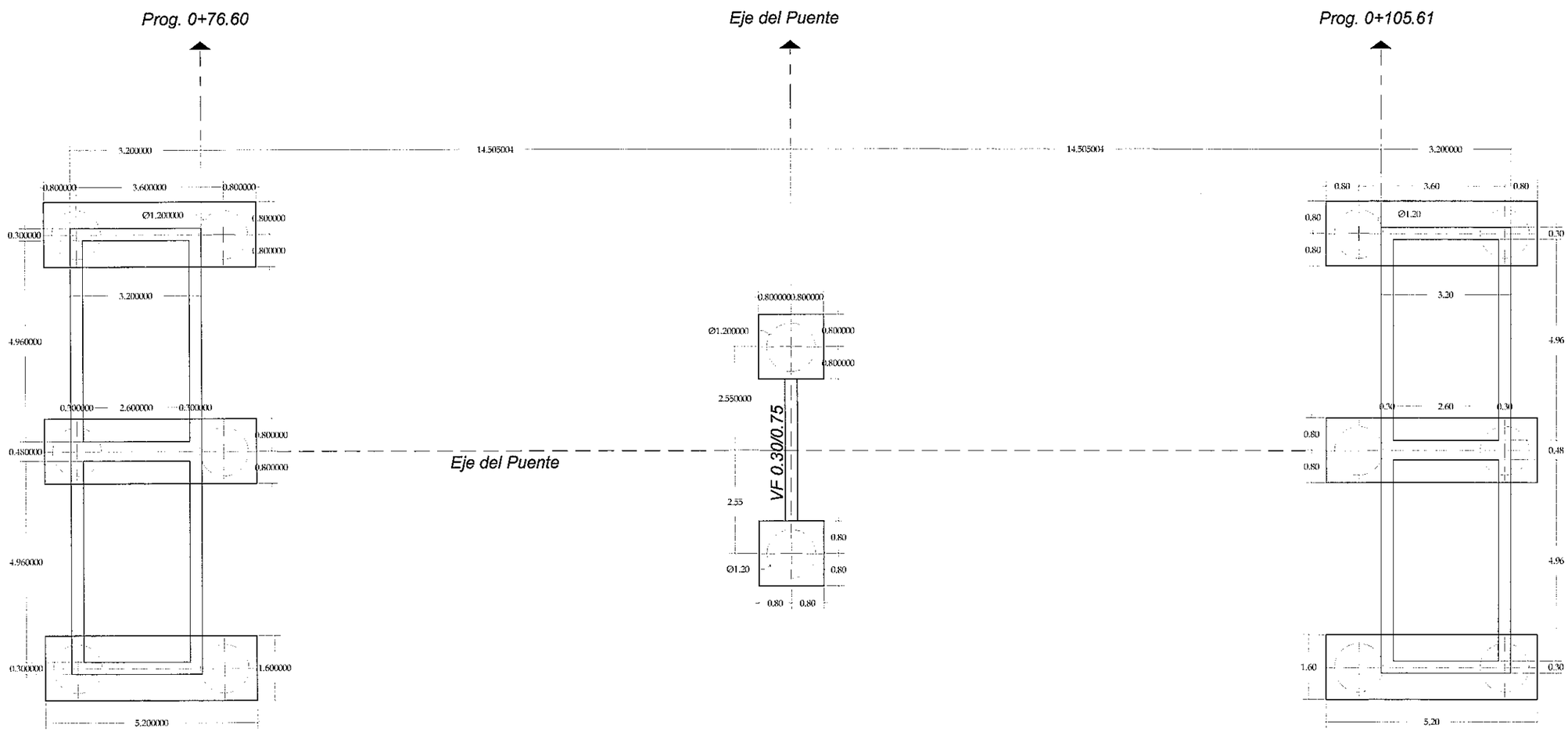
CONTENIDO:
-Seccion Longitudinal

PUENTE Nº 52
LONGITUD 30 MTS.

AO. DESGRACIACUE
COL. INDEPENDENCIA-PASO YOBAI

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

# PLANTA DE FUNDACIONES




## CIA - GRIMAUX

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

CONTENIDO:
-Planta de Fundaciones

PUENTE Nº 52
LONGITUD 30 MTS.

AO. DESGRACIACUE
COL. INDEPENDENCIA-PASO YOBAI

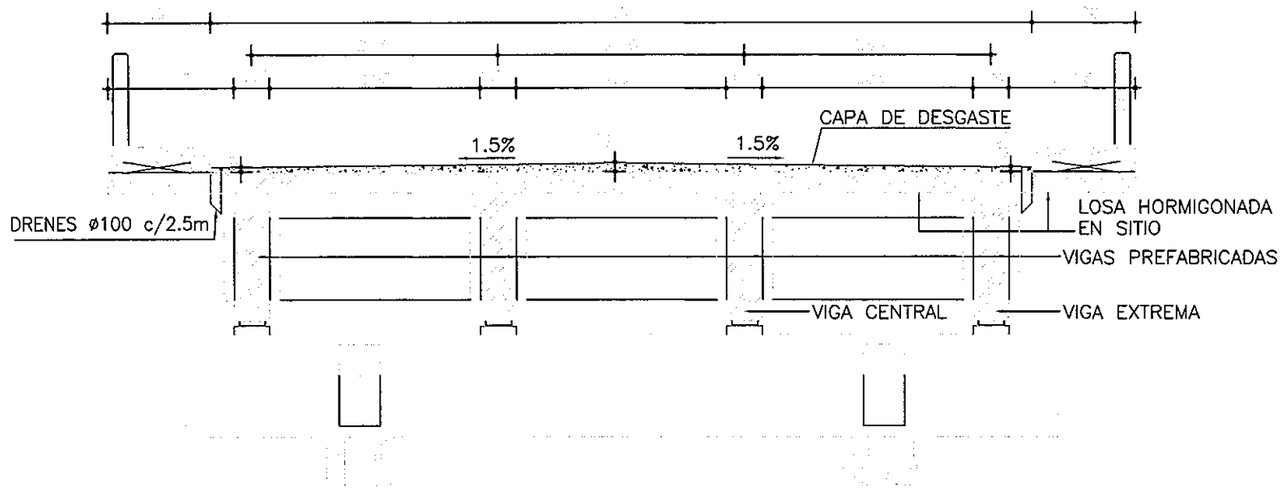
MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

Ing. Raúl L. Montiel C.

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

47
Cuarenta y siete

# SECCION TRANSVERSAL




Ing. Raúl L. Montiel C.
Gerente Local

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

**CIA - GRIMAUX**

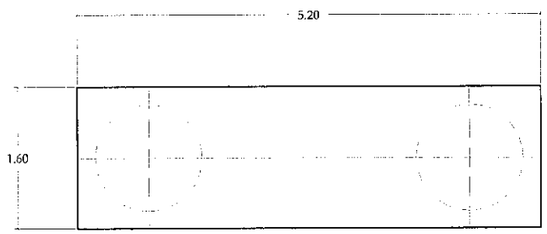
*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

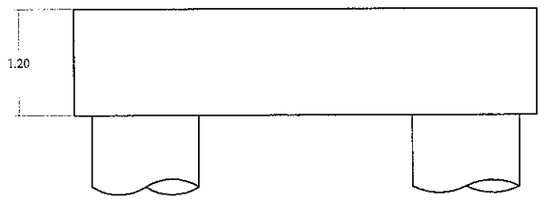
| CONTENIDO: | PUENTE Nº 52<br>LONGITUD 30 MTS. |
|---|---|
| -Seccion Transversal | AD. DESGRACIACUE<br>COL. INDEPENDENCIA-PASO YOBAI |

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

## Detalle Cabezal




Planta

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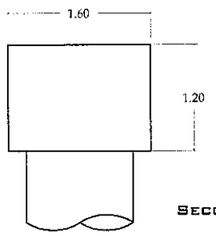
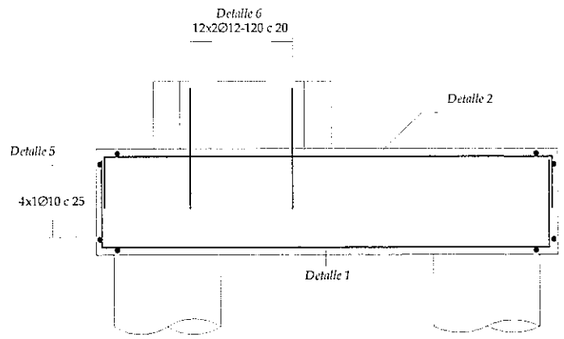



Seccion Transversal

## Armadura Cabezal

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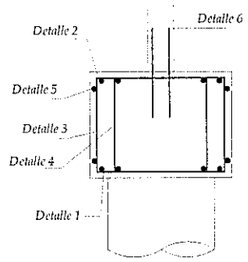
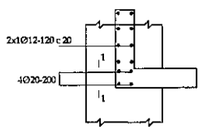
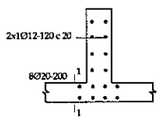



Seccion Transversal

### Detalle tipico union Estribo/Cabezal




Detalle 1 (x4)

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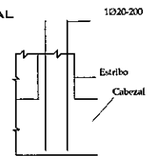
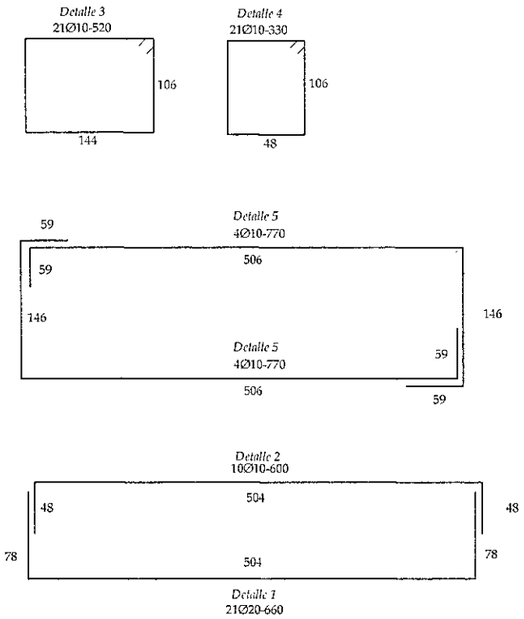
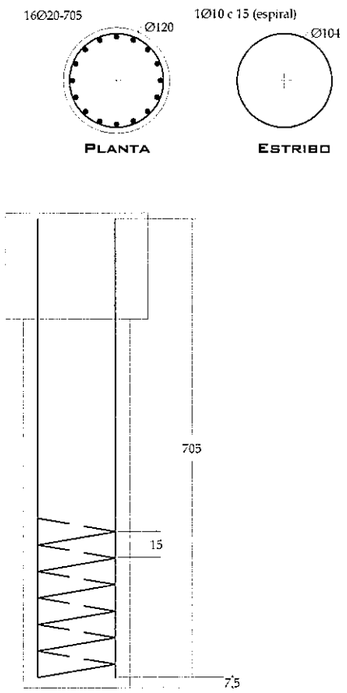



Seccion 1-1

## Detalle Armaduras




## Armadura Pilotes




Planta

Estribo

# CIA - GRIMAUX

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

**DISEÑO FINAL**

**Contenido:**
-Pila, Detalle Cabezal, Armadura
-Pilote, Armadura

**Puente Nº 52**
**Longitud 30 mts.**

**Ao. Desgraciacue**
Col. Independencia-Paso Yobai

MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

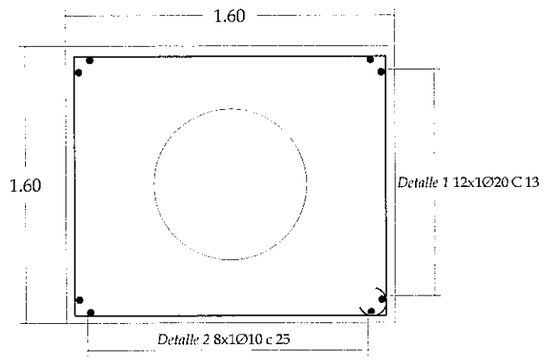
Ing. Raúl L. Montiel C
Representante Legal
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

K9

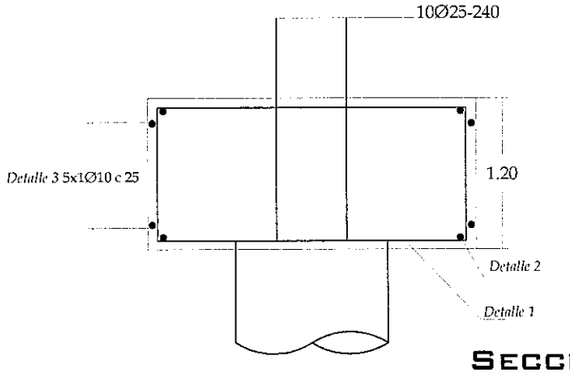
Cuarenta y nueve

# PILA

## DETALLE CABEZAL

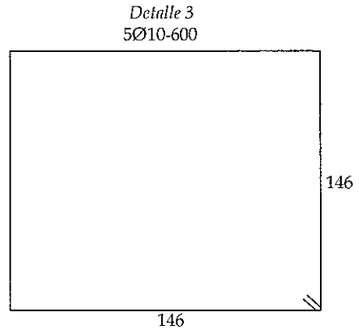


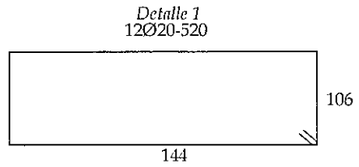

PLANTA

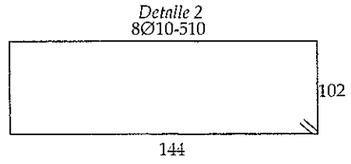



SECCION

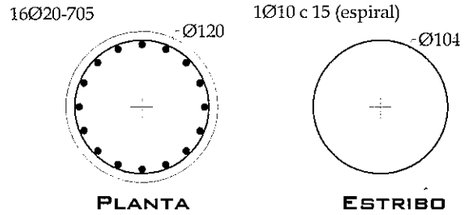
## ARMADURA CABEZAL

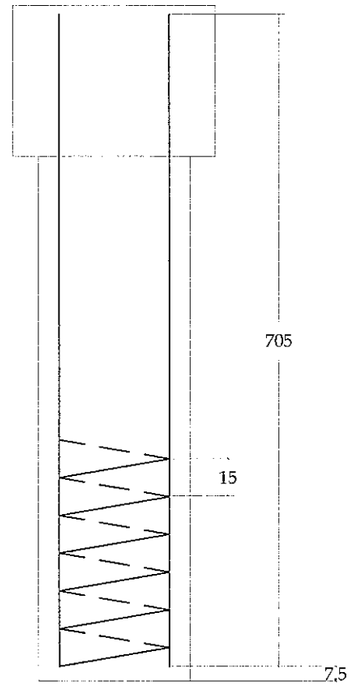



## ARMADURA PILOTES




Lic. Raúl L. Montiel C
Representante Legal
CONSORCIO
CONSULPAR S.A. - GEOLATINA S.A.

# CIA - GRIMAUX

*Servicios de Consultoria para la elaboracion del Diseño Final de Puentes de Hormigon Armado a Construir en varios Departamentos de la Region Oriental del Paraguay*

DISEÑO FINAL

CONTENIDO:
- -Detalle Cabezal
- -Armadura Cabezal
- -Pilote, Armadura

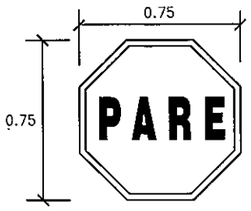
PUENTE Nº 52
LONGITUD 30 MTS.

AD. DESGRACIACUE
COL. INDEPENDENCIA-PASO YOBAI

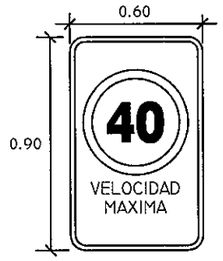
MINISTERIO DE OBRAS PÚBLICAS Y COMUNICACIONES | Presidencia de la República del Paraguay | BID

Giucuento

## SEÑALES REGLAMENTARIAS

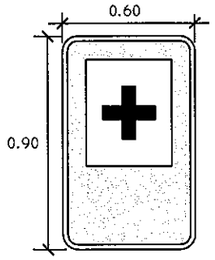



R-1




R-2

## SEÑALES DE SERVICIOS

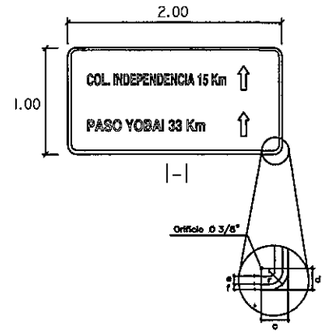



SA- 1

## SEÑAL EDUCATIVA

E-1

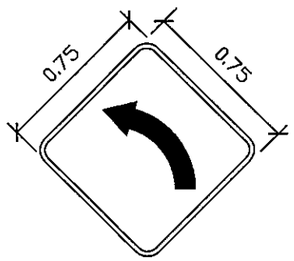
## SEÑALES INFORMATIVAS



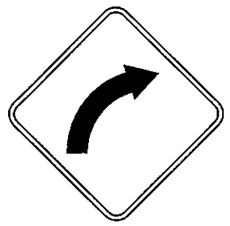

I-1

| 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 |

## SEÑALES DE ADVERTENCIA

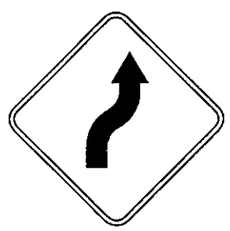



A-1



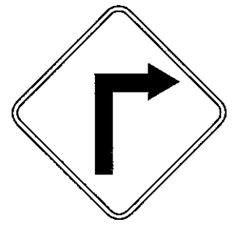
A-2

A-3

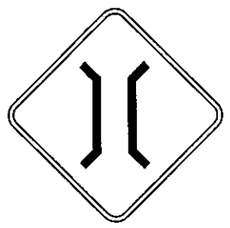


A-4

A-5



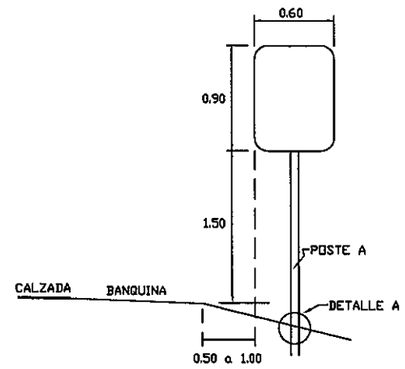
A-6

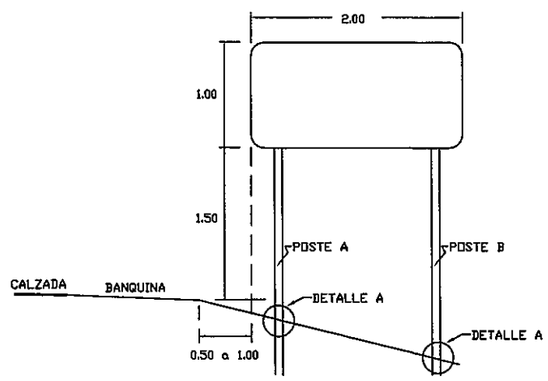


A-7

A-8

A-9

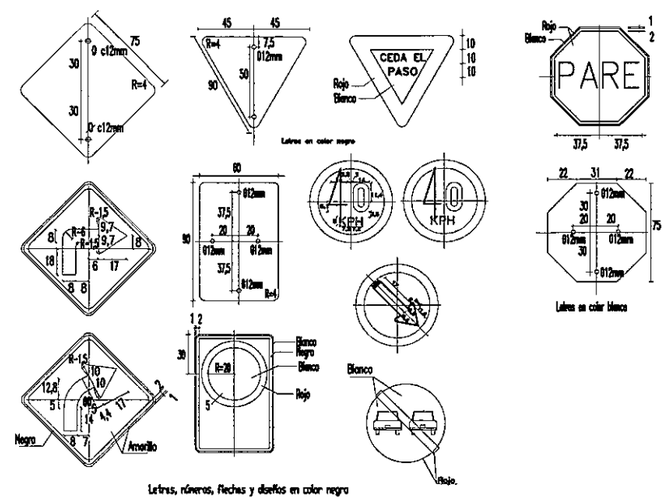


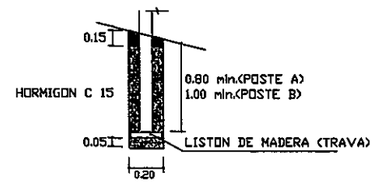

VISTA FRONTAL

## DETALLE DE CARTELES

Dimensiones en "cm"




VISTA FRONTAL




DETALLE A

OBSERVACION:
LAS MEDIDAS DE LOS CARTELES EN m.
LAS MEDIDAS DE LOS DETALLES EN cm.

## PARAMETROS TECNICOS

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

Consorcio:

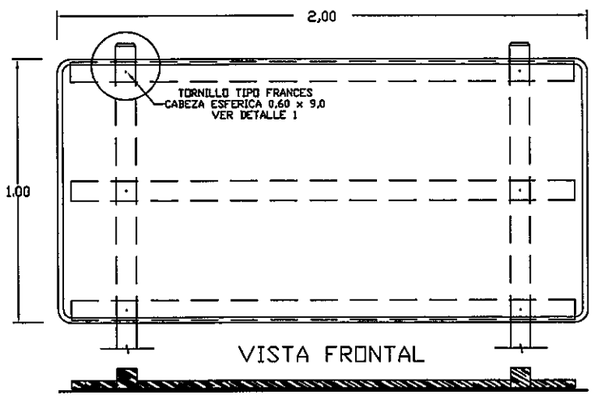
CONSORCIO CONSULPAR S.A. - GEOLATINA

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

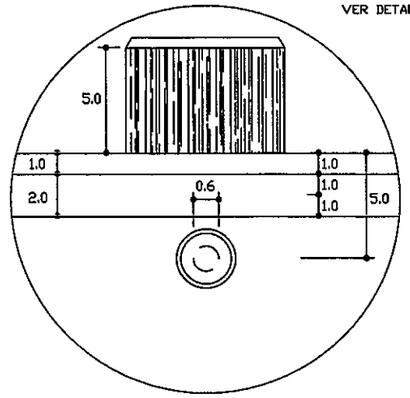
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

Cincuenta y uno

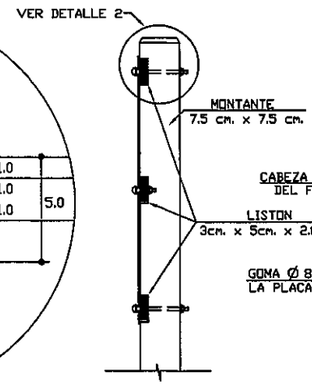



VISTA FRONTAL

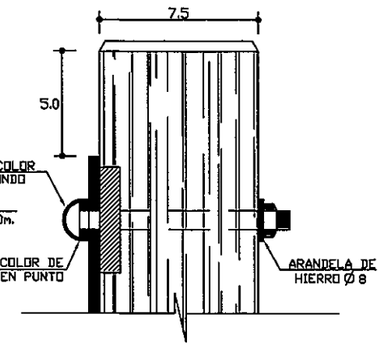
PLANTA



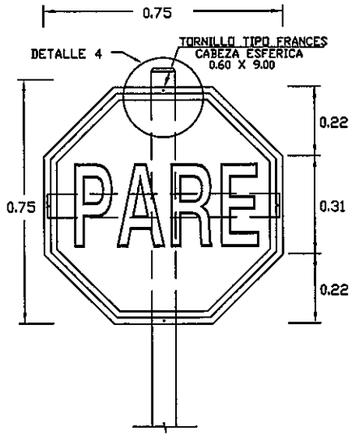

DETALLE 1



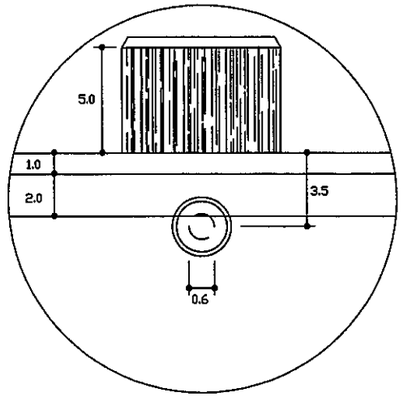

VISTA LATERAL



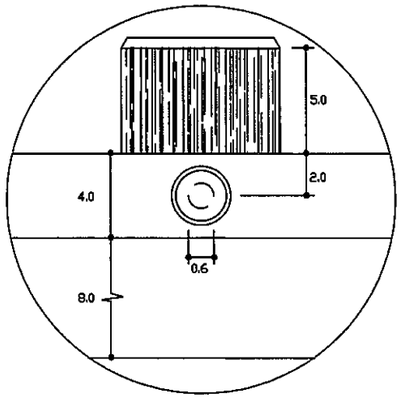

DETALLE 2



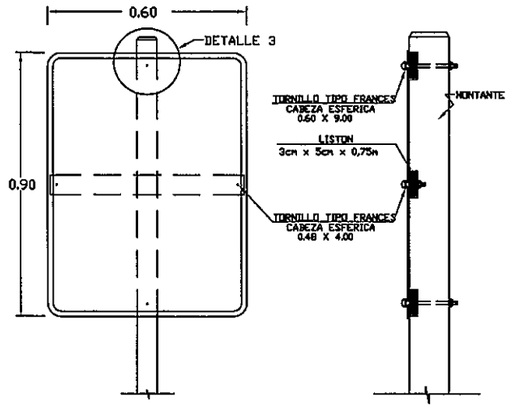

VISTA FRONTAL




DETALLE 3

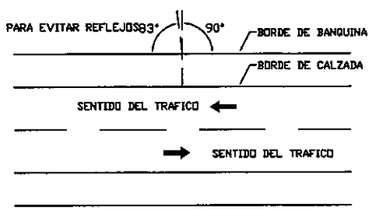



DETALLE 4

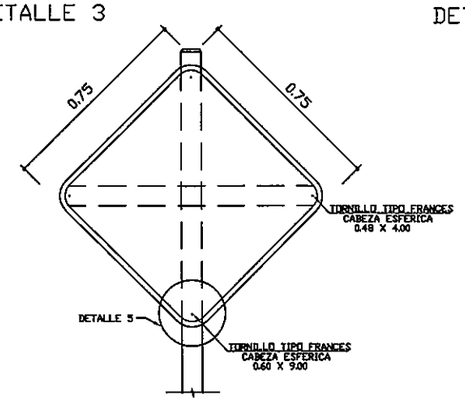



VISTA FRONTAL

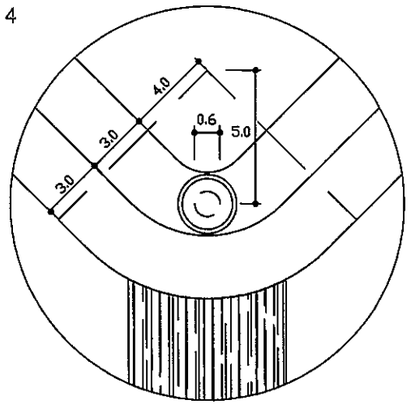
VISTA LATERAL



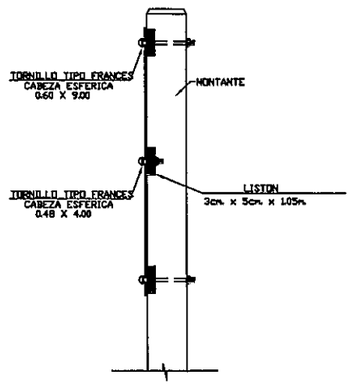

PLANTA DE UBICACION




VISTA FRONTAL




DETALLE 5




VISTA LATERAL

## 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 - CONSULTINA 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

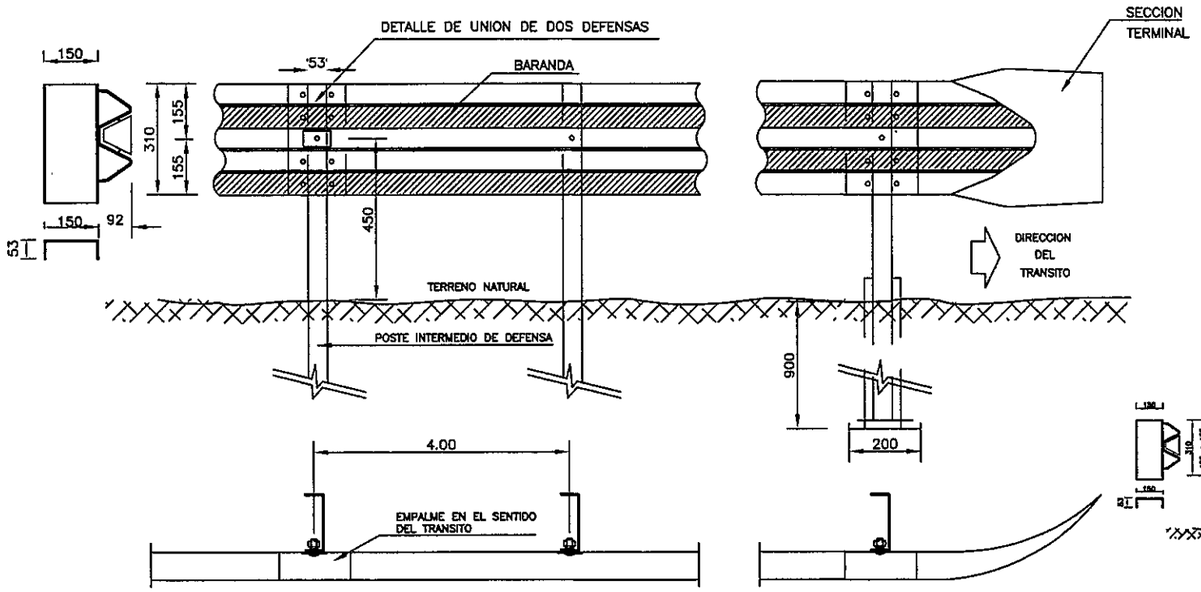
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

52

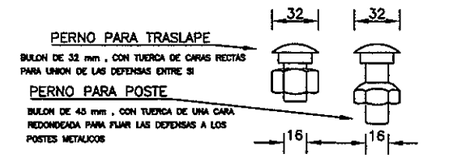
SECCION TIPO

Cincuenta y dos

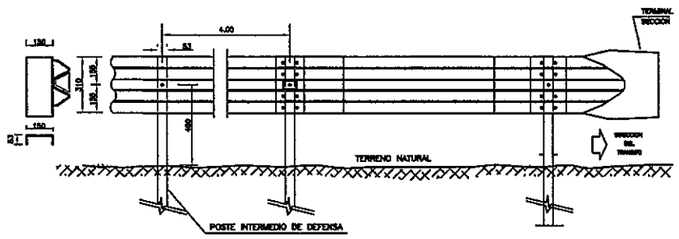
## DEFENSA METALICA

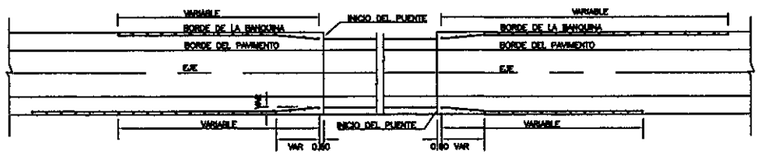


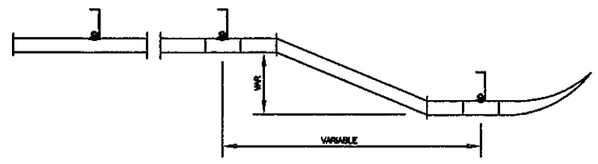

INSTALACION EN TERRAPLENES ALTOS



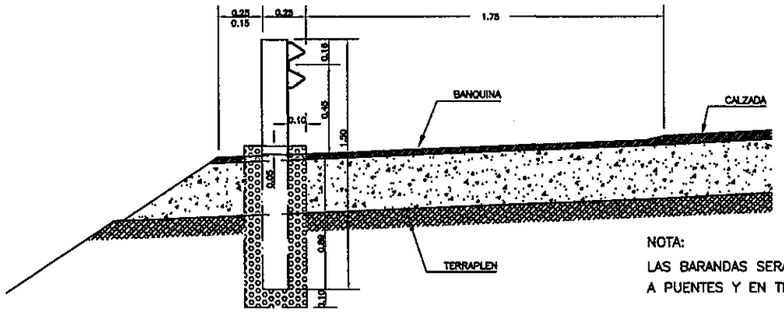

DETALLE DE TUERCA Y BULON




INSTALACION EN PUENTES




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

### PARAMETROS TECNICOS

| | |
|---|---|
| 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 CONSUPAR S.A. - GEOLATIN S.A.

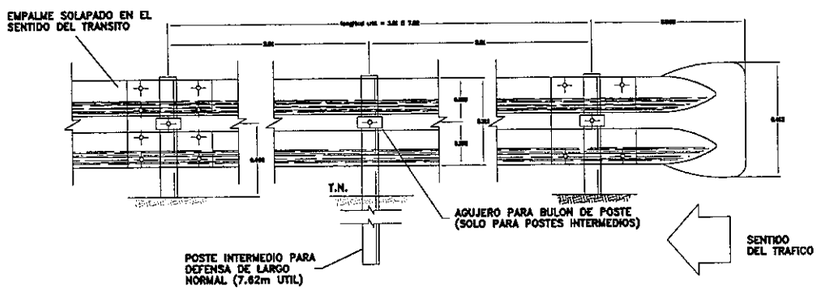
REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS PUBLICAS Y COMUNICACIONES
DIRECCION DE VIALIDAD

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

TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

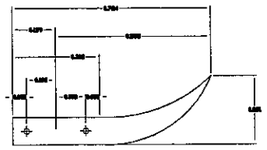
53 SECCION TIPO

Cincuenta y tres

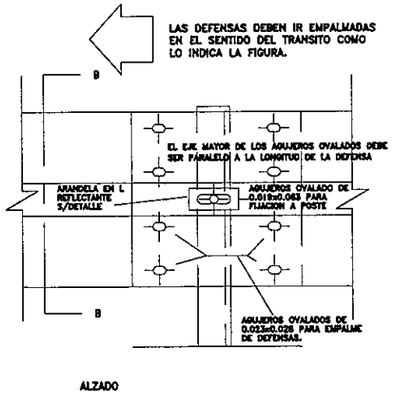



## DETALLE ALA TERMINAL COMUN

EMPALME EN EL SENTIDO DEL TRANSITO

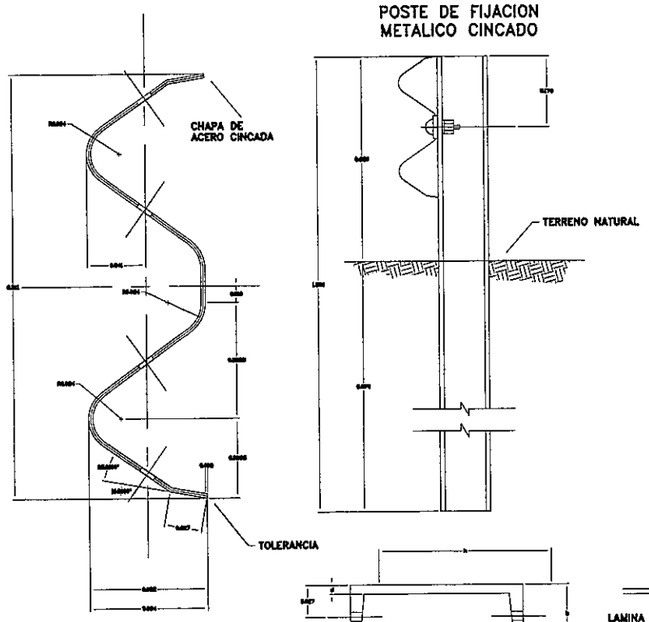


## DETALLE EMPALME DE LAS DEFENSAS Y FIJACION A POSTE METALICO




ALZADO

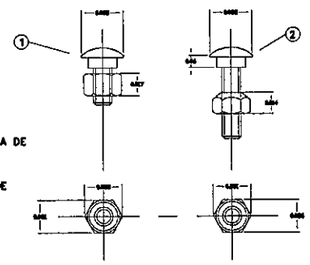
## POSTE DE FIJACION METALICO CINCADO



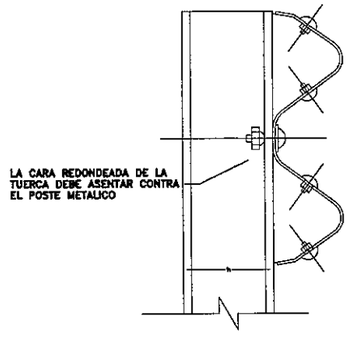

SECCION TRANSVERSAL

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

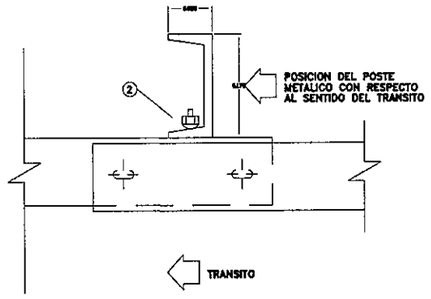
② BULON DE 0.045mm LONG. CON TUERCA DE UNA CARA REDONDEADA PARA FIJAR LAS DEFENSAS A LOS POSTES METALICOS.



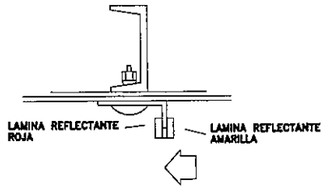
## DETALLE TUERCA Y BULON




SECCION B–B




PLANTA




## DETALLE DE ARANDELA REFLECTANTE

| TIPO | DIMENSIONES | | | | PESO |
|---|---|---|---|---|---|
| | h | b | d | t | Kg/m. |
| LIVIANO | 152.4 | 48.77 | 3.08 | 6.71 | 12.2 |
| PESADO | 177.8 | 53.06 | 5.33 | 9.53 | 14.8 |

| DIMENSIONES DE LAS DEFENSAS METALICAS | | | | |
|---|---|---|---|---|
| CLASE | CALIBRE | AREA DE SECCION TRANSVERS. cm² | PESO DE LA DEFENSA DE | |
| | | | 3.81m | 7.62m |
| | | | Kg | Kg |
| A | 12(2.6mm) | 12.84 | 42.3 | 79.7 |
| B | 10(3.2mm) | 16.52 | 46.7 | 86.8 |

## 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 46.00m PODRAN ADAPTARSE DIRECTAMENTE EN OBRA AL SER INSTALADAS.

LAS DE RADIO MENOR DEBEN SER PROVISTAS CURVADAS PREVIAMENTE.

## 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:

Ing. Raúl L. Modena C. Representante Legal CONSORCIO CONSULPAR S.A. - GEOLATINA S.R.L.

REPUBLICA DEL PARAGUAY
VICE MINISTERIO DE OBRAS PUBLICAS Y COMUNICACIONES
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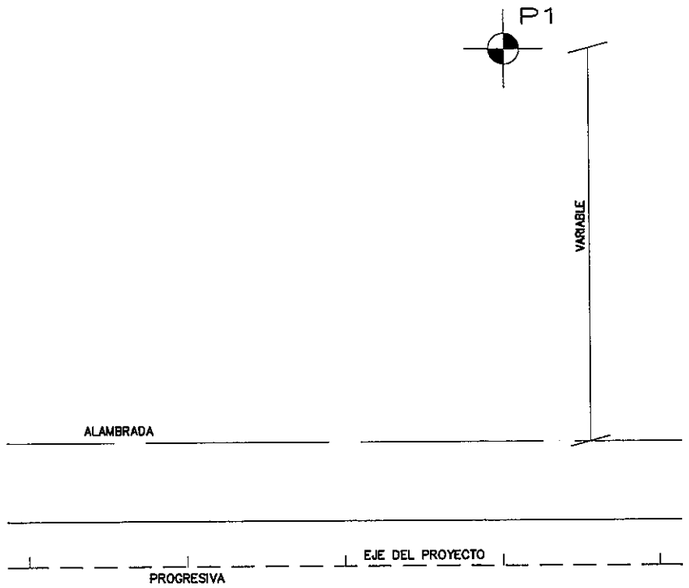
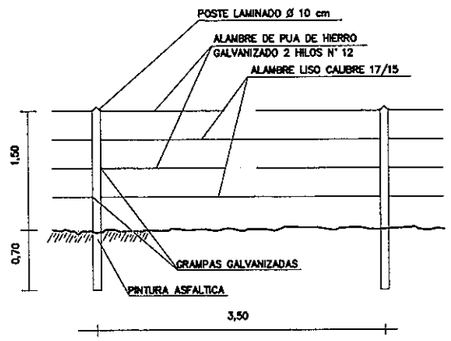
TRAMO: COLONIA INDEPENDENCIA - PASO YOBAI

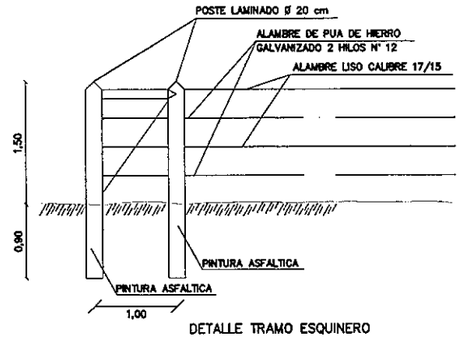
T4 BARANDAS DE DEFENSA TIPO FLEX BEAM

Sin escala y costo

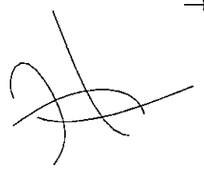


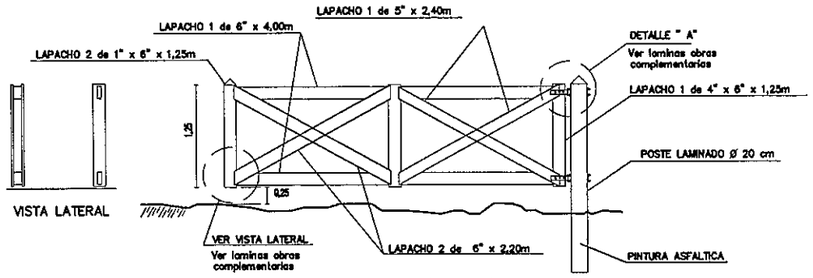

DETALLE TRAMO INTERMEDIO




DETALLE TRAMO ESQUINERO



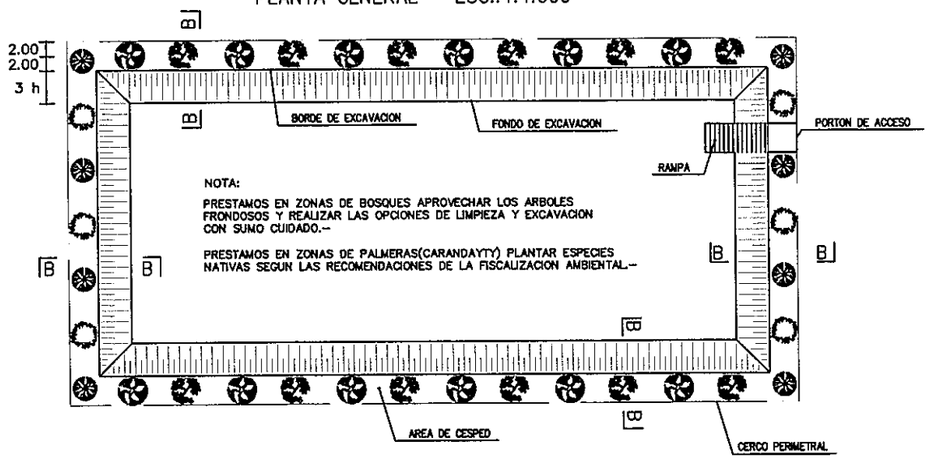
ATADURA PARA ALAMBRE



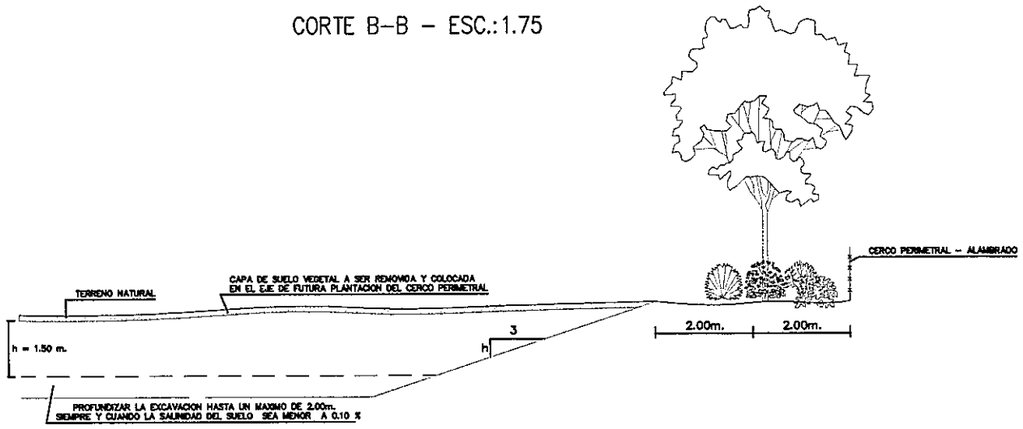

DETALLE PORTON DE ACCESO

## PROTECCION DE PRESTAMO

PLANTA GENERAL – ESC.:1:1.000




CORTE B–B – ESC.:1.75




### PARAMETROS TECNICOS

| | |
|---|---|
| VELOCIDAD DIRECTRIZ : | 40 A 60 Km/H |
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Consorcio: CONSULPAR S.A.

CONSORCIO CONSULPAR S.A. - SECLAR

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PROTECCION FORESTAL

Cincuenta y cinco