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

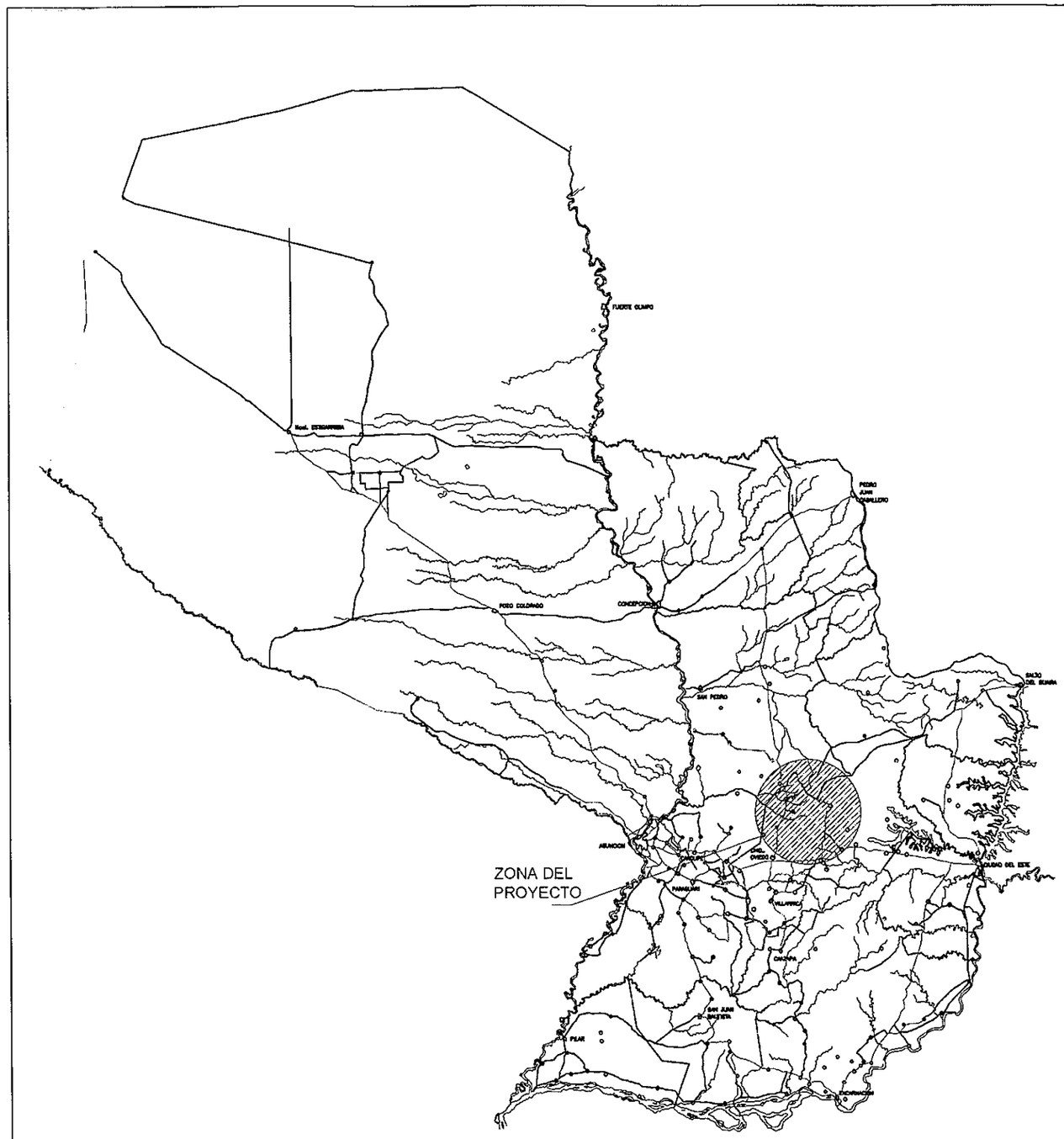
ANEXO
PLANOS DE OBRA

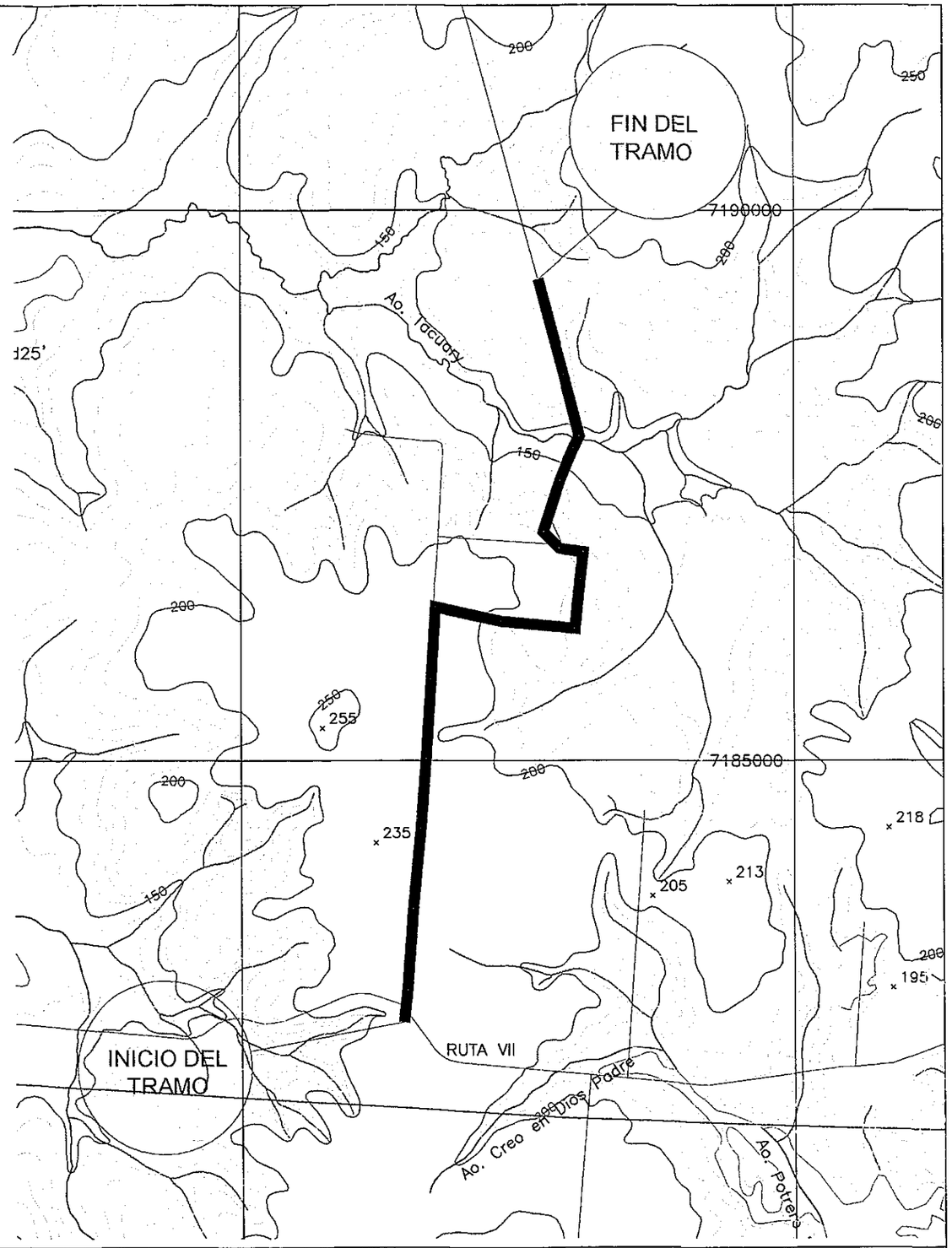
OBRA 14: EMPALME RUTA 7 (SAN ANTONIO) – A° TACUARY.

AÑO 2012

ASUNCIÓN, PARAGUAY

PLANO DE UBICACION





PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

REPÚBLICA DEL PARAGUAY

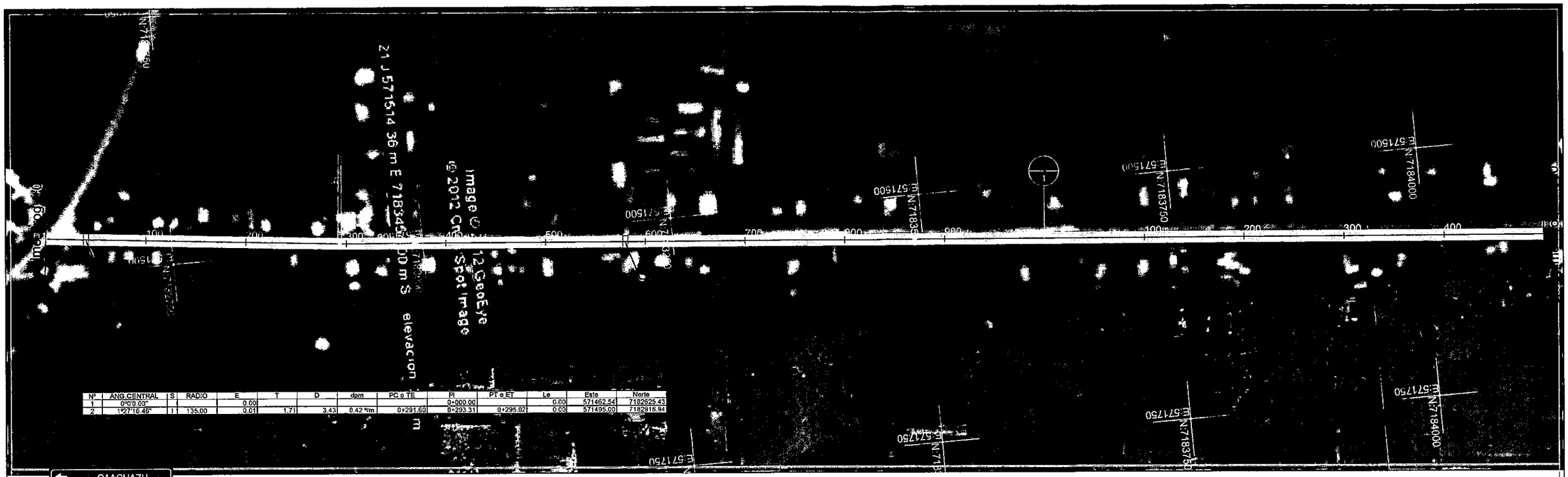
DISEÑO DE PAVIMENTACIÓN TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

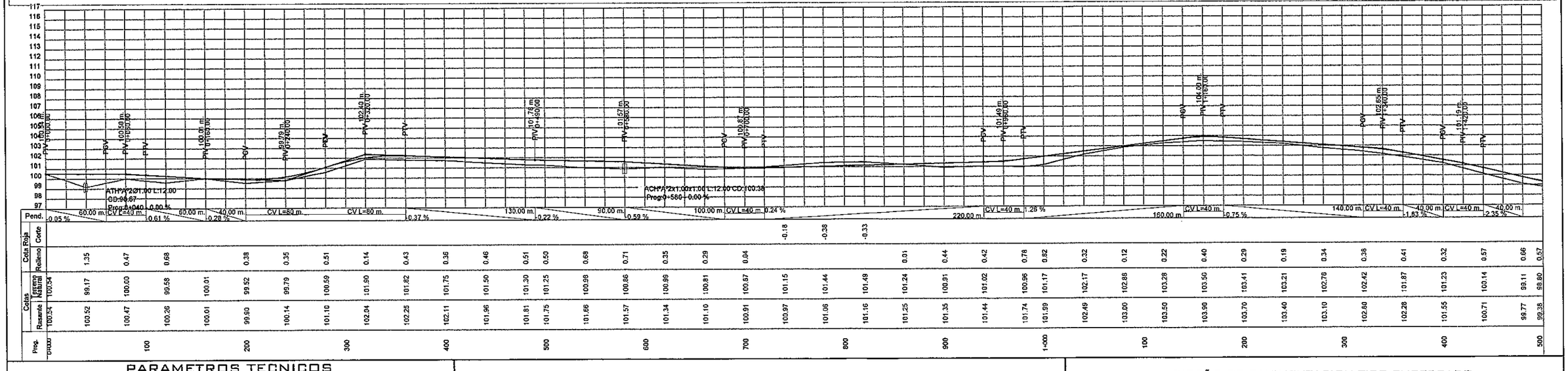
PLANO DE UBICACION

1

PLANIALTIMETRIA



Nº	ANG.CENTRAL	S	RADIO	E	T	D	dpm	PC o TE	PI	PT o ET	Le	Este	Norte
1	0°0'0.00"			0.00					0+000.00		0.00	571462.54	7182625.43
2	1°27'16.45"	I	135.00	0.01	1.71	3.43	0.42 °/m	0+291.60	0+293.31	0+295.02	0.00	571495.00	7182916.94



PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 Km/h
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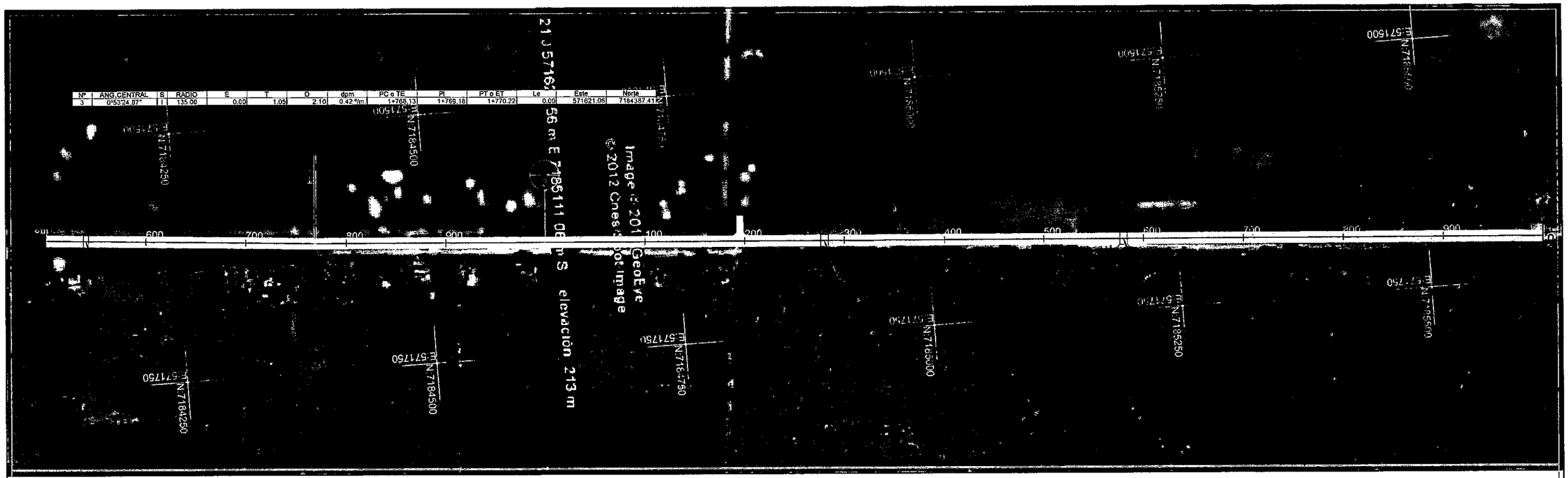
REPUBLICA DEL PARAGUAY
MUNICIPALIDAD DE R. I. 3 CORRALES

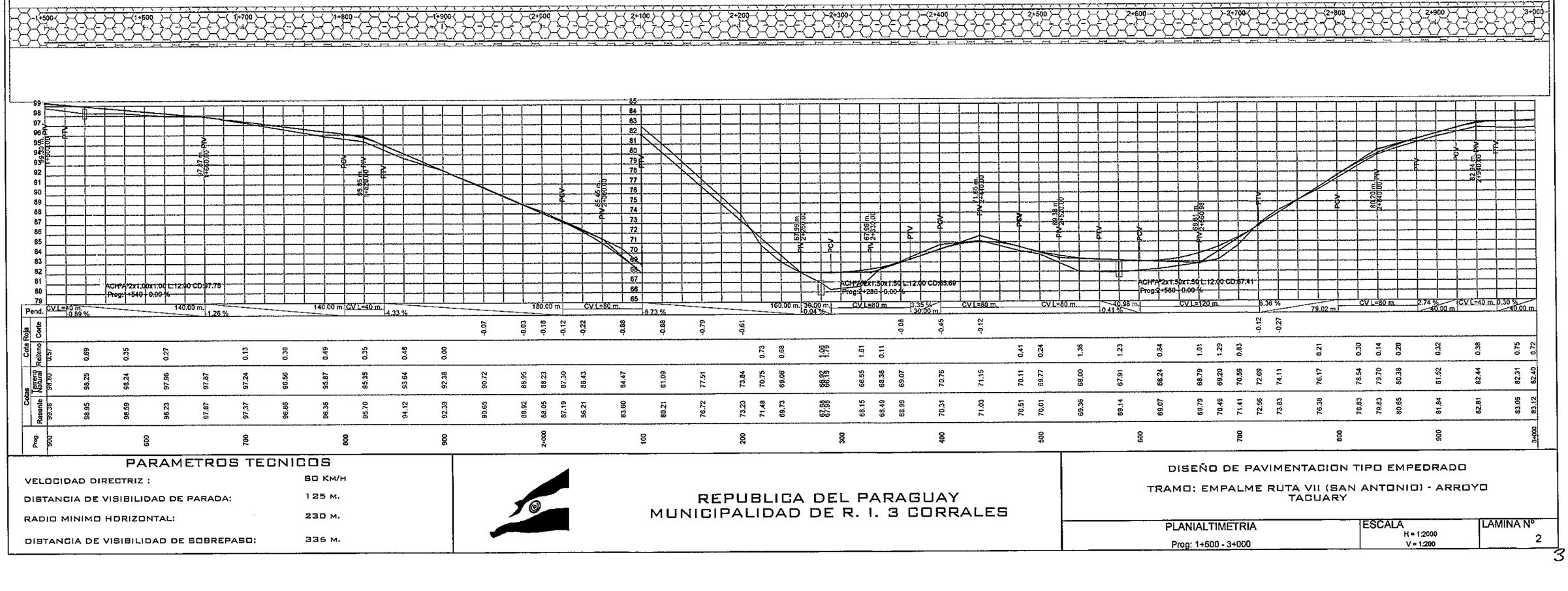
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

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



Nº	ANG.CENTRAL	S	RADIO	E	T	D	dpm	PC o TE	PI	PT o ET	Le	Este	Norte
3	0°53'24.87"	I	135.00	0.00	1.05	2.10	0.42 °/m	1+768.13	1+769.18	1+770.22	0.00	571621.08	7184387.41



PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 Km/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
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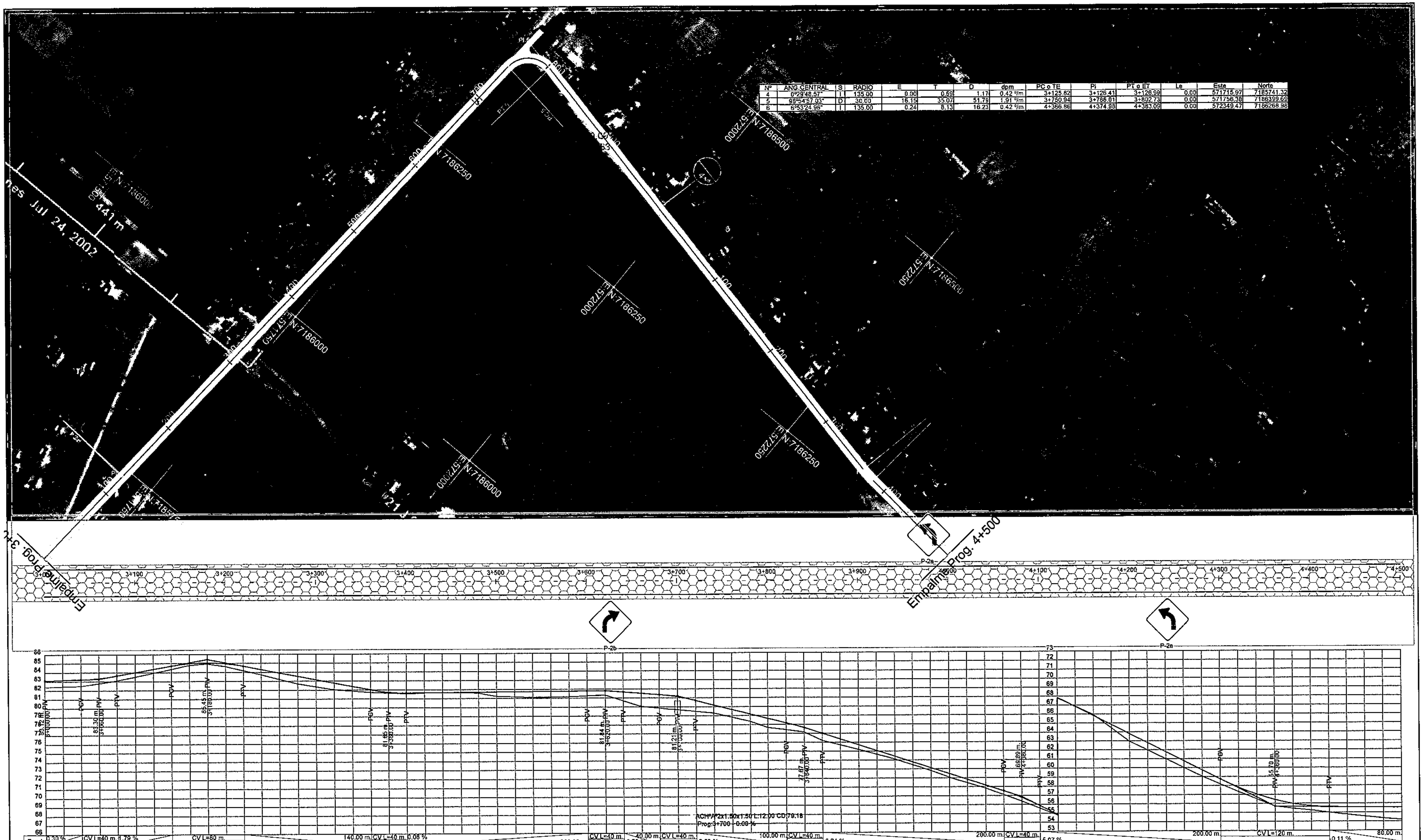
REPUBLICA DEL PARAGUAY
MUNICIPALIDAD DE R. I. 3 CORRALES

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

PLANIALTIMETRIA	ESCALA	LAMINA Nº
Prog: 1+500 - 3+000	H = 1:2000 V = 1:200	2

Nº	ANG.CENTRAL	S	RADIO	E	T	D	dpm	PC o TE	PI	PT o ET	Le	Este	Norte
4	0º29'48.57"	I	135.00	0.00	0.59	1.17	0.42 º/m.	3+125.82	3+126.41	3+126.99	0.00	571715.97	7185741.32
5	98º54'57.03"	D	30.00	16.15	35.07	51.79	1.91 º/m.	3+750.94	3+786.01	3+802.73	0.00	571756.38	7186399.69
6	6º53'24.96"	I	135.00	0.24	8.13	16.23	0.42 º/m.	4+366.86	4+374.98	4+383.09	0.00	572349.47	7186268.98



Pend.	0.30 %	40.00 m	CVL=40 m.	1.79 %	60.00 m	CVL=80 m.	-1.90 %	140.00 m.	CVL=40 m.	0.08 %	200.00 m	CVL=40 m.	40.00 m	-0.79 %	CVL=40 m.	2.53 %	100.00 m.	CVL=40 m.	-3.24 %	200.00 m.	CVL=40 m.	-5.07 %	200.00 m.	CVL=120 m.	-0.11 %	80.00 m.

Prog.	Cotas Rasante	Cotas Terreno Natural	Cota Roja Relleno	Cota Roja Corte
3+000	83.12	82.40	0.72	
	83.24	82.50	0.74	
100	83.66	83.11	0.55	
	84.37	83.94	0.44	
	85.00	84.81	0.19	
	85.08	84.95	0.13	
200	84.97	84.66	0.32	
	84.31	83.73	0.58	
300	83.55	82.71	0.84	
	82.79	82.05	0.74	
	82.03	81.73	0.30	
400	81.56	81.57	0.10	
	81.69	81.72		-0.02
	81.72	81.62	0.11	
500	81.74	81.24	0.51	
	81.77	81.13	0.65	
	81.80	81.18	0.63	
600	81.79	81.34	0.46	
	81.52	80.07	1.46	
700	81.12	79.68	1.44	
	80.19	79.32	0.88	
	79.18	78.38	0.81	
800	78.68	77.67	1.01	
	77.63	77.17	0.46	
	77.02	76.22	0.80	
900	75.72	75.20	0.53	
	74.42	74.12	0.31	
	73.13	72.82	0.31	
4+000	72.48	72.06	0.42	
	71.18	70.85	0.34	
	69.79	69.39	0.41	
100	67.86	67.80	0.06	
	65.83	65.95		-0.11
200	63.80	62.96	0.85	
	61.78	61.01	0.77	
	59.75	59.04	0.71	
300	57.80	57.33	0.48	
	56.44	55.70	0.74	
400	55.73	55.25	0.49	
	55.61	54.78	0.83	
	55.57	54.35	1.22	
500	55.54	54.20	1.35	

PARAMETROS TECNICOS

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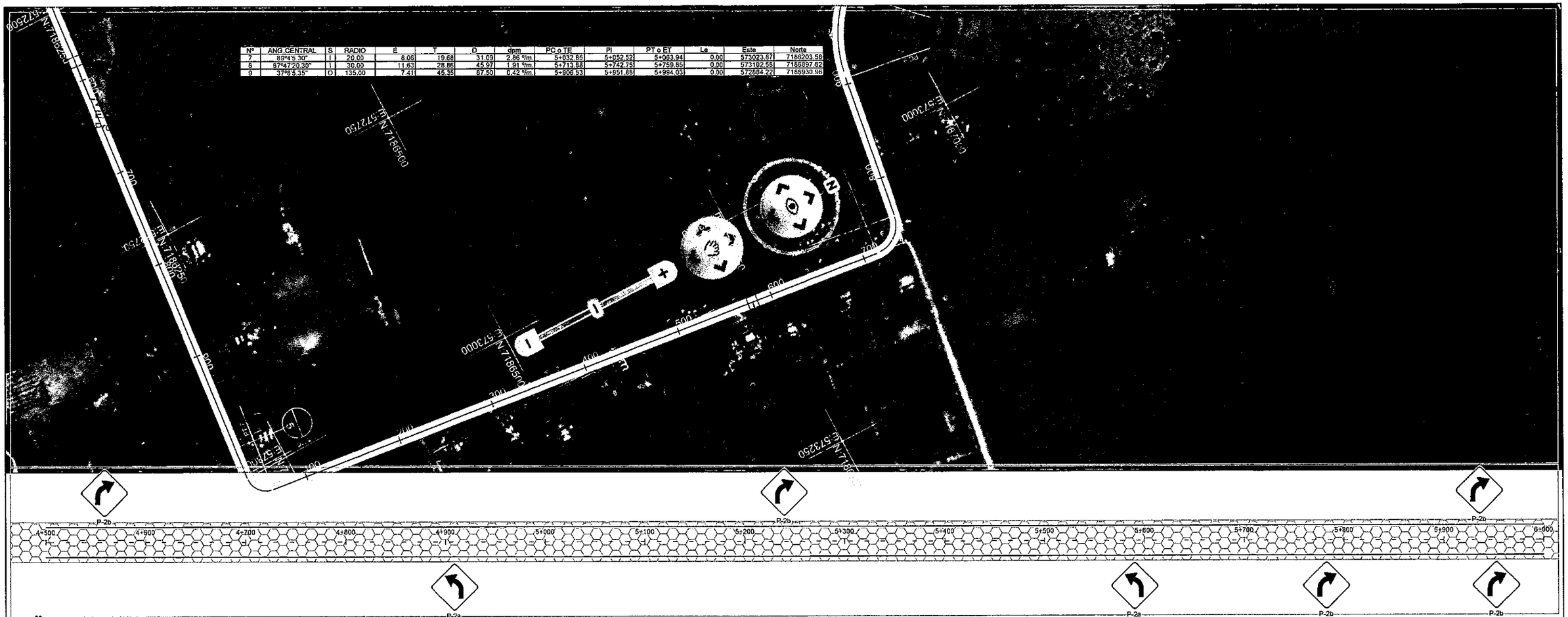
REPUBLICA DEL PARAGUAY
MUNICIPALIDAD DE R. I. 3 CORRALES

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

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

4



PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
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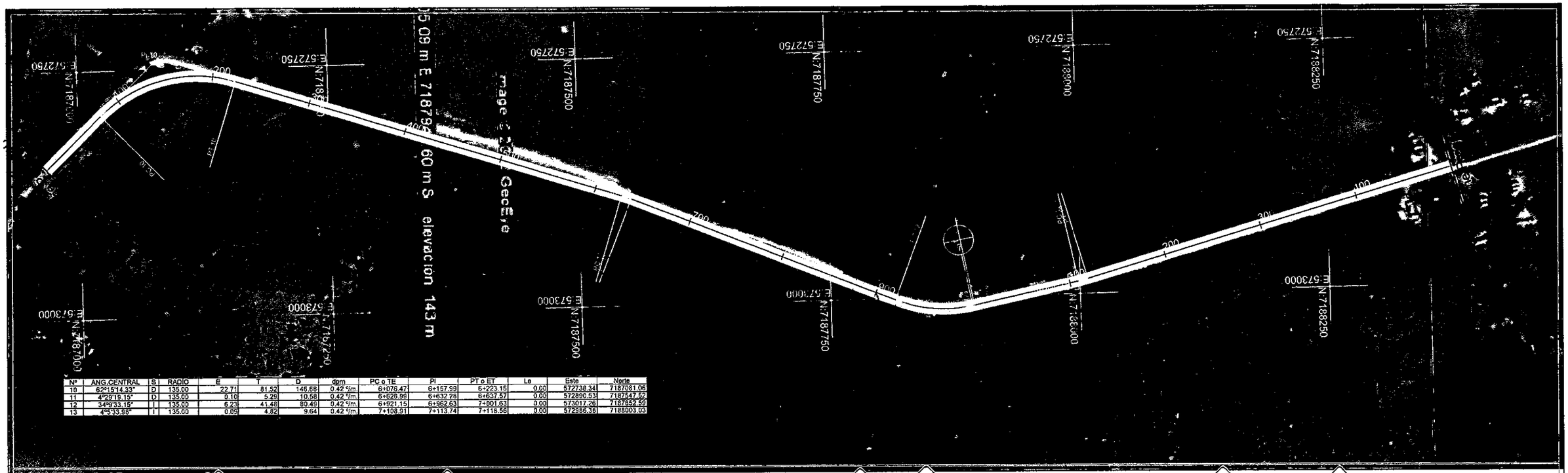
REPUBLICA DEL PARAGUAY
MUNICIPALIDAD DE R. I. 3 CORRALES

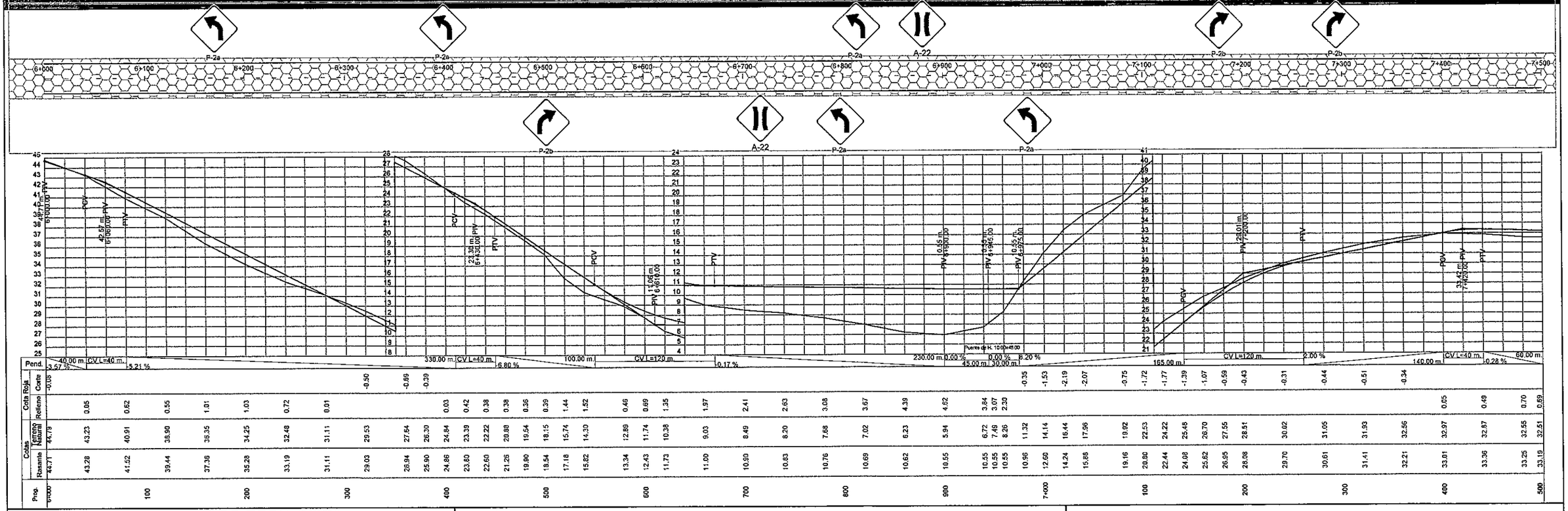
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

PLANIALTIMETRIA	ESCALA	LAMINA N°
Prog: 4+500 - 6+000	H = 1:2000 V = 1:200	4



Nº	ANG.CENTRAL	S	RADIO	E	T	D	dpm	PC o TE	PI	PT o ET	Le	Este	Norte
10	62°1'14.33"	D	135.00	22.71	81.52	146.68	0.42 °/m	6+076.47	6+157.99	6+223.15	0.00	572738.34	7187081.06
11	4°29'19.15"	D	135.00	0.10	5.28	10.58	0.42 °/m	6+628.99	6+632.28	6+637.57	0.00	572890.53	7187547.59
12	34°9'33.15"	I	135.00	6.23	41.48	80.49	0.42 °/m	6+921.15	6+962.63	7+001.63	0.00	573017.26	7187852.59
13	4°6'33.98"	I	135.00	0.09	4.82	9.64	0.42 °/m	7+108.91	7+113.74	7+118.56	0.00	572986.36	7188003.03



PARAMETROS TECNICOS

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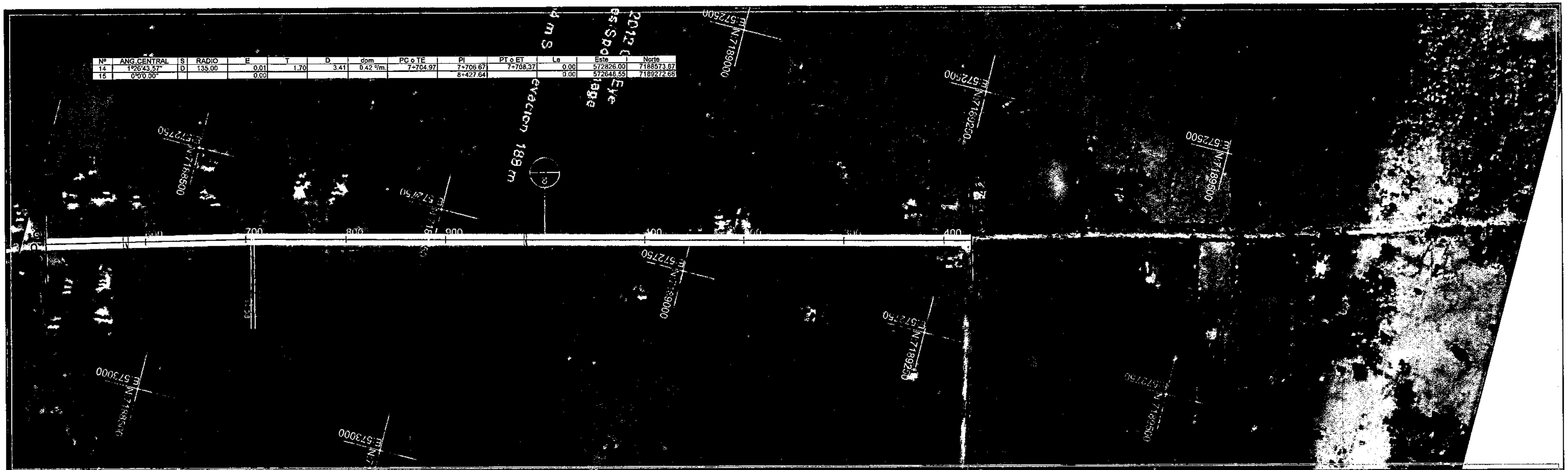
REPUBLICA DEL PARAGUAY
MUNICIPALIDAD DE R. I. 3 CORRALES

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

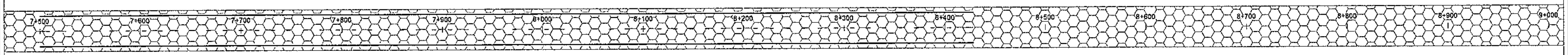
TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

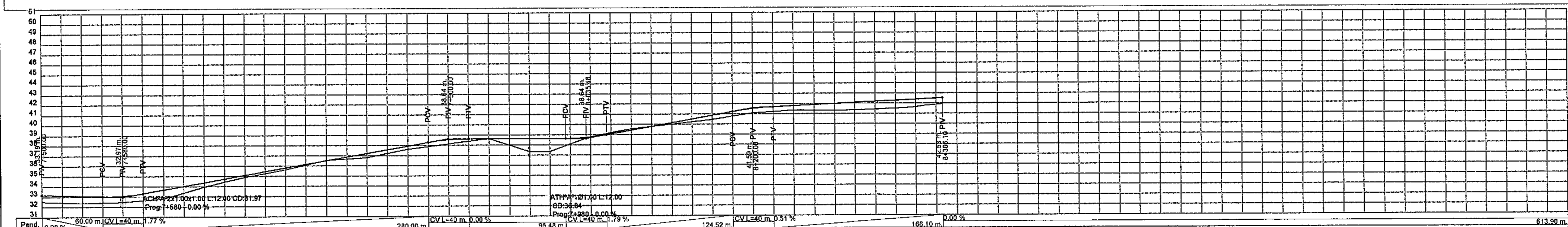
PLANIALTIMETRIA	ESCALA	LAMINA Nº
Prog: 6+000 - 7+500	H = 1:2000 V = 1:200	5

6



Nº	ANG.CENTRAL	S	RADIO	E	T	D	dpm	PC o TE	PI	PT o ET	Le	Este	Norte
14	1°26'43.57"	D	135.00	0.01	1.70	3.41	0.42 °/m.	7+704.97	7+706.67	7+708.37	0.00	572826.00	7188573.87
15	0°0'0.00"			0.00					8+427.64		0.00	572648.55	7189272.66





Cotas Rasante	Cotas Terreno Natural	Cota Roja Relleno	Cota Roja Corte
33.19	32.51	0.69	
33.08	32.36	0.73	
33.07	32.47	0.61	
33.68	32.79	0.89	
34.39	33.97	0.42	
35.10	34.91	0.19	
35.81	35.62	0.19	
36.51	36.55		-0.03
37.22	36.81	0.42	
37.93	37.63	0.31	
38.64	38.66		-0.02
38.64	37.35	1.30	
38.64	37.35	1.30	
38.77	38.81		-0.03
39.44	39.57		-0.13
40.15	40.02	0.14	
40.87	40.47	0.40	
41.52	41.09	0.44	
41.79	41.36	0.43	
41.99	41.32	0.68	
42.20	41.42	0.78	
42.40	41.84	0.77	
42.49	41.90	0.59	

Prog.: 500, 600, 700, 800, 900, 8+000, 100, 200, 300, 400, 500, 600, 700, 800, 900, 9+000

PARAMETROS TECNICOS

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REPUBLICA DEL PARAGUAY
MUNICIPALIDAD DE R. I. 3 CORRALES

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

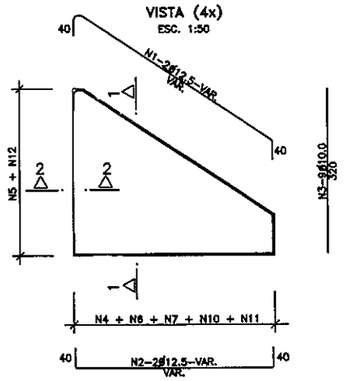
PLANIALTIMETRIA	ESCALA	LAMINA Nº
Prog: 7+500 - 8+428	H = 1:2000 V = 1:200	6

7

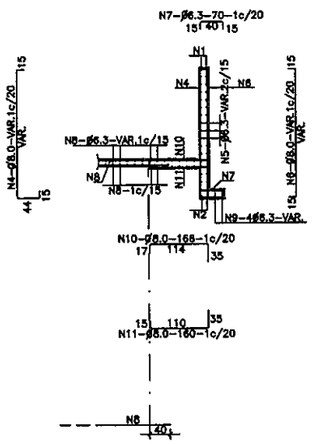
PLANOS VARIOS

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

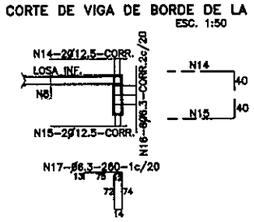
VISTA (4x)
ESC. 1:50



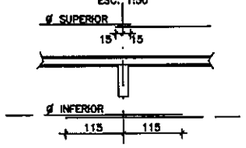
CORTE 1–1 (4x)
ESC. 1:50



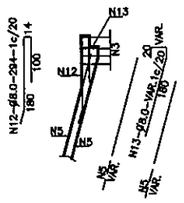
CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50



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

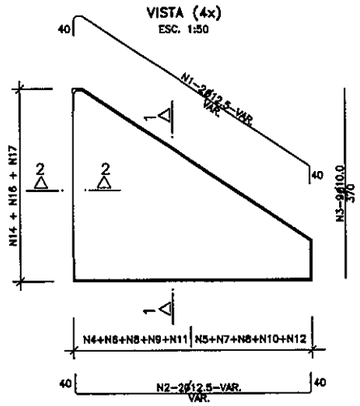
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ø	12.5	12.5	10.0	8.0	6.3	8.0	6.3	6.3	6.3	8.0	8.0	8.0	8.0	12.5	12.5	6.3	6.3
C	8	8	36	—	—	—	—	—	16	—	—	—	—	4	4	12	—
LONG.	VAR.	VAR.	320	VAR.	VAR.	VAR.	70	VAR.	VAR.	166	160	294	VAR.	CORR.	CORR.	CORR.	260

RESUMEN DE LAS ARMADURAS PARA DOS CABECERAS – α=0°

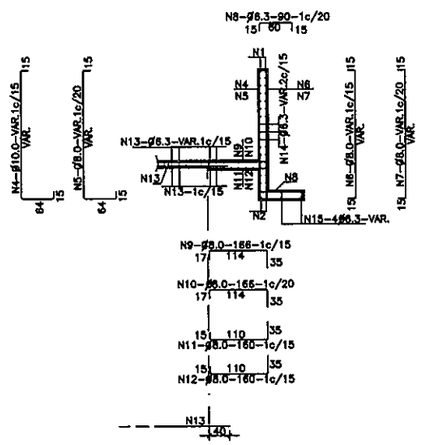
ø	2.00 x 2.00		
TIPO	SIMPLE	DOBLE	TRIPLE
6.3	531	701	865
8.0	420	450	514
10.0	115	122	172
12.5	187	281	368
16.0	22	—	—
20.0	—	—	—
TOTAL	1.275 Kg	1.554 Kg	1.919 Kg

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

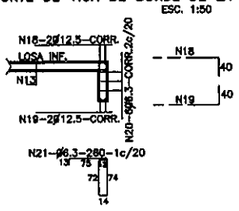
VISTA (4x)
ESC. 1:50



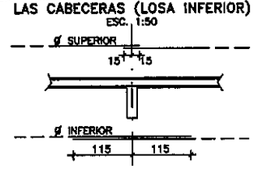
CORTE 1–1 (4x)
ESC. 1:50



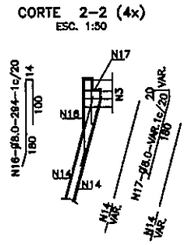
CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50



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	844
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 :	80 Km/h
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
RADIO MINIMO HORIZONTAL:	230 m.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 m.

REPÚBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

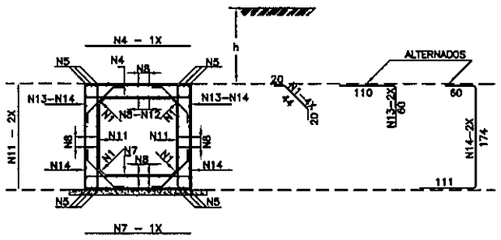
TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

ALCANTARILLAS CELULAR

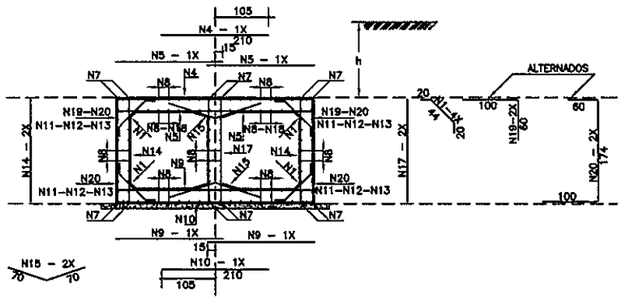
8

ALCANTARILLAS CELULARES DE 1.50 x 1.50

SECCION TRANSVERSAL SIMPLE



SECCION TRANSVERSAL DOBLE



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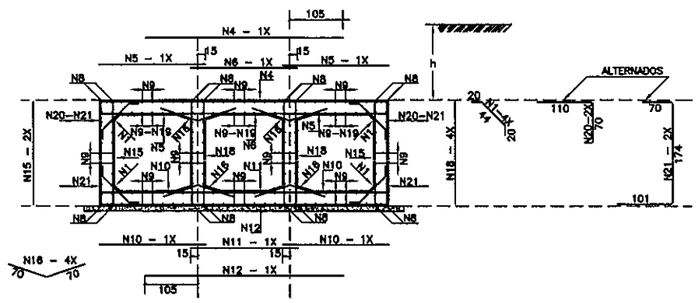
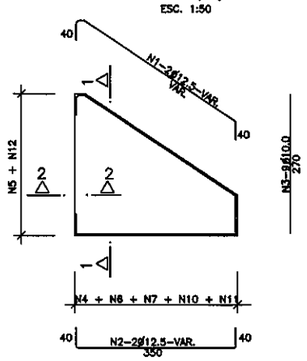


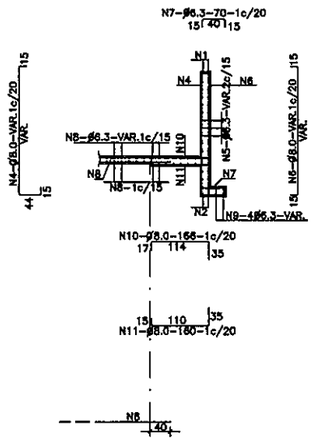
TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 1.50x1.50																	
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Ø	12.5	12.5	10.0	8.0	6.3	8.0	6.3	6.3	8.0	8.0	8.0	8.0	8.0	12.5	12.5	6.3	6.3
C	6	8	36	—	—	—	—	—	—	—	—	—	—	4	4	12	—
LONG.	482	350	270	VAR.	VAR.	VAR.	70	VAR.	350	166	160	294	VAR.	CORR.	CORR.	CORR.	280

ALCANTARILLA CELULAR DE 1.50 x 1.50
ARMADURAS DE CABECERAS – α=0°–15°–30°–45°

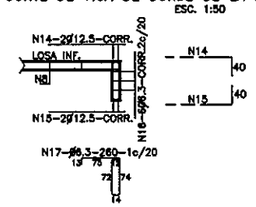
VISTA (4x)
ESC. 1:50



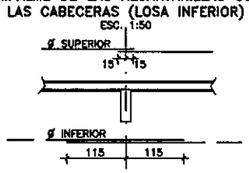
CORTE 1–1 (4x)
ESC. 1:50



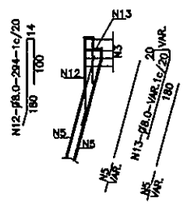
CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50



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

RESUMEN DE LAS ARMADURAS PARA DOS CABECERAS – OC=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

TABLAS DE ARMADURAS POR METRO DE GALERIA

$\bar{T}s \geq$ 0.09 MPa				
No.	Ø	C	LONG.	SEP.
1	6.3	20	84	c/20cm
2	—	—	—	—
3	—	—	—	—
4	12.5	6	175	c/15cm
5	12.5	12	CORR.	—
6	—	—	—	—
7	12.5	6	175	c/15cm
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		24	
10.0	0.624		5	
12.5	0.956		73	
TOTAL			102 Kg	

$\bar{T}s \geq$ 0.13 MPa				
No.	Ø	C	LONG.	SEP.
1	6.3	20	84	c/20cm
2	—	—	—	—
3	—	—	—	—
4	12.5	8	210	c/12cm
5	10.0	17	180	c/12cm
6	—	—	—	—
7	12.5	12	CORR.	—
8	6.3	84	CORR.	c/20cm
9	10.0	13	180	c/15cm
10	10.0	5	210	c/20cm
11	—	—	—	—
12	—	—	—	—
13	—	—	—	—
14	6.3	13	175	c/15cm
15	6.3	10	140	c/20cm
16	—	—	—	—
17	6.3	10	175	c/20cm
18	10.0	18	CORR.	c/15cm
19	12.5	10	180	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	

$\bar{T}s \geq$ 0.12 MPa				
No.	Ø	C	LONG.	SEP.
1	6.3	20	84	c/20cm
2	—	—	—	—
3	—	—	—	—
4	12.5	7	375	c/15cm
5	12.5	10	180	c/20cm
6	12.5	5	180	c/20cm
7	—	—	—	—
8	12.5	16	CORR.	—
9	6.3	113	CORR.	c/20cm
10	8.0	20	180	c/15cm
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	349	c/20cm
RESUMEN				
Ø	Kg/m		PESO(Kg)	
6.3	0.252		61	
8.0	0.393		47	
12.5	0.988		122	
TOTAL			230 Kg	

PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 Km/h
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
RADIO MINIMO HORIZONTAL:	230 m.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 m.

REPÚBLICA DEL PARAGUAY

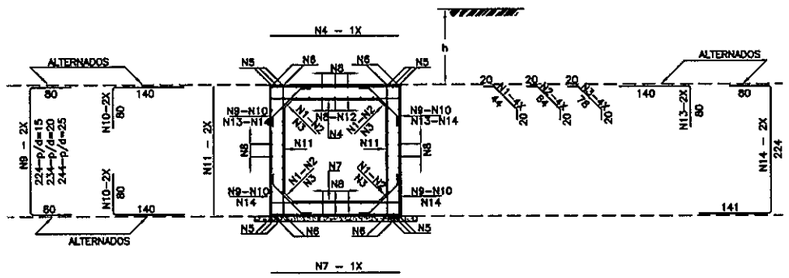
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

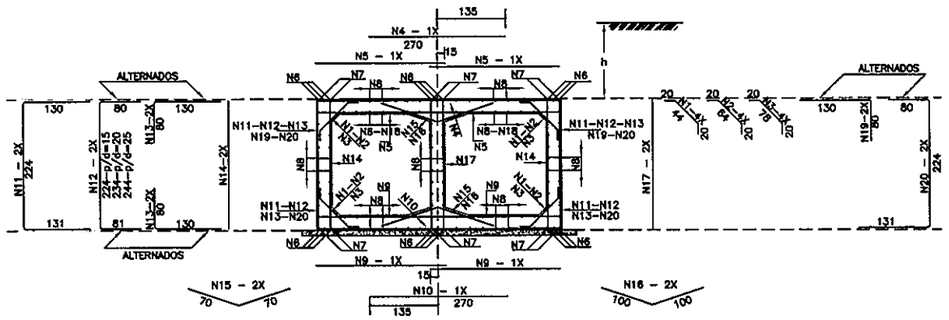
ALCANTARILLAS CELULAR

ALCANTARILLAS CELULARES DE 2.00 x 2.00

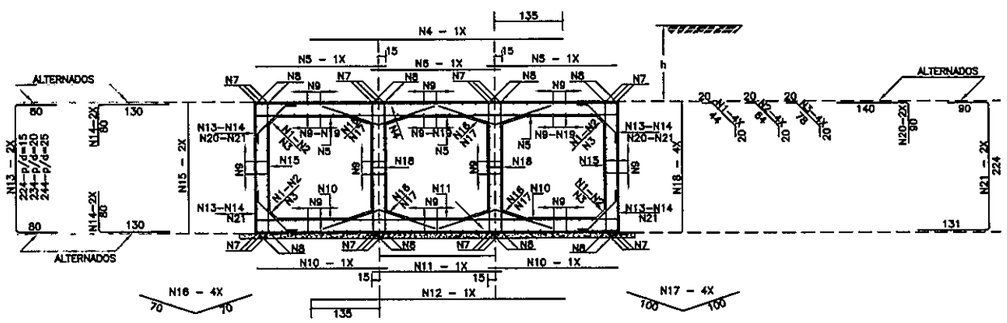
SECCION TRANSVERSAL SIMPLE



SECCION TRANSVERSAL DOBLE



SECCION TRANSVERSAL TRIPLE



TABLAS DE ARMADURAS POR METRO DE GALERIA

0 ≤ h ≤ 100					100 ≤ h ≤ 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{T}e \geq 0.09$ MPa					$\bar{T}e \geq 0.10$ MPa					$\bar{T}e \geq 0.15$ MPa					$\bar{T}e \geq 0.20$ MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	84	c/20cm	1	6.3	20	84	c/20cm	1	—	—	—	—	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	6.3	20	104	c/20cm	2	6.3	20	104	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	8	225	c/18cm	4	10.0	8	225	c/13cm	4	10.0	10	235	c/10cm	4	12.5	9	235	c/11cm
5	12.5	12	CORR.	—	5	—	—	—	—	5	—	—	—	—	5	—	—	—	—
6	—	—	—	—	6	16.0	8	CORR.	—	6	16.0	8	CORR.	—	6	16.0	8	CORR.	—
7	12.5	8	225	c/18cm	7	10.0	9	225	c/11cm	7	10.0	10	235	c/10cm	7	12.5	10	235	c/10cm
8	6.3	63	CORR.	c/20cm	8	6.3	72	CORR.	c/20cm	8	6.3	72	CORR.	c/20cm	8	6.3	72	CORR.	c/20cm
9	—	—	—	—	9	10.0	9	385	c/34cm	9	10.0	7	385	c/30cm	9	12.5	7	385	c/30cm
10	—	—	—	—	10	10.0	12	220	c/34cm	10	10.0	13	220	c/30cm	10	12.5	13	220	c/30cm
11	6.3	10	225	c/20cm	11	6.3	10	225	c/20cm	11	6.3	13	235	c/15cm	11	6.3	13	235	c/15cm
12	10.0	8	CORR.	c/20cm	12	—	—	—	—	12	—	—	—	—	12	—	—	—	—
13	12.5	8	220	c/24cm	13	—	—	—	—	13	—	—	—	—	13	—	—	—	—
14	12.5	8	445	c/24cm	14	—	—	—	—	14	—	—	—	—	14	—	—	—	—

RESUMEN			RESUMEN			RESUMEN			RESUMEN		
ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)
6.3	0.252	27	6.3	0.252	29	6.3	0.252	32	6.3	0.252	32
10.0	0.624	6	10.0	0.624	55	10.0	0.624	65	12.5	0.988	100
12.5	0.988	93	16.0	1.570	14	16.0	1.570	14	16.0	1.570	14
TOTAL		128 Kg	TOTAL		98 Kg	TOTAL		111 Kg	TOTAL		146 Kg

0 ≤ h ≤ 100					100 ≤ h ≤ 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{T}e \geq 0.13$ MPa					$\bar{T}e \geq 0.15$ MPa					$\bar{T}e \geq 0.23$ MPa					$\bar{T}e \geq 0.26$ MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	84	c/20cm	1	6.3	20	84	c/20cm	1	6.3	20	84	c/20cm	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	—	—	—	—	2	6.3	20	104	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	8	270	c/12cm	4	10.0	6	270	c/18cm	4	12.5	8	270	c/18cm	4	12.5	7	270	c/14cm
5	10.0	17	230	c/12cm	5	10.0	13	230	c/18cm	5	12.5	14	230	c/14cm	5	12.5	14	240	c/14cm
6	—	—	—	—	6	—	—	—	—	6	—	—	—	—	6	12.5	18	CORR.	—
7	12.5	12	CORR.	—	7	12.5	12	CORR.	—	7	12.5	12	CORR.	—	7	—	—	—	—
8	6.3	108	CORR.	c/20cm	8	6.3	126	CORR.	c/20cm	8	6.3	126	CORR.	c/20cm	8	6.3	126	CORR.	c/20cm
9	10.0	13	230	c/15cm	9	10.0	15	230	c/13cm	9	12.5	17	230	c/12cm	9	12.5	17	240	c/12cm
10	10.0	5	270	c/20cm	10	10.0	7	270	c/15cm	10	12.5	7	270	c/15cm	10	12.5	8	270	c/12cm
11	—	—	—	—	11	10.0	10	485	c/20cm	11	—	—	—	—	11	—	—	—	—
12	—	—	—	—	12	—	—	—	—	12	10.0	8	385	c/28cm	12	10.0	8	385	c/28cm
13	—	—	—	—	13	—	—	—	—	13	10.0	15	210	c/28cm	13	10.0	15	210	c/28cm
14	6.3	13	225	c/15cm	14	6.3	13	225	c/15cm	14	6.3	13	225	c/15cm	14	10.0	8	235	c/35cm
15	6.3	10	140	c/20cm	15	6.3	10	140	c/20cm	15	6.3	10	140	c/20cm	15	—	—	—	—
16	—	—	—	—	16	—	—	—	—	16	—	—	—	—	16	6.3	10	200	c/20cm
17	6.3	10	225	c/20cm	17	6.3	10	225	c/20cm	17	6.3	10	225	c/20cm	17	10.0	7	235	c/30cm
18	10.0	20	CORR.	c/15cm	18	—	—	—	—	18	—	—	—	—	18	—	—	—	—
19	12.5	10	210	c/20cm	19	—	—	—	—	19	—	—	—	—	19	—	—	—	—
20	12.5	10	435	c/20cm	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—

RESUMEN			RESUMEN			RESUMEN			RESUMEN		
ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)
6.3	0.252	50	6.3	0.252	55	6.3	0.252	55	6.3	0.252	44
10.0	0.624	65	10.0	0.624	93	10.0	0.624	36	10.0	0.624	62
12.5	0.988	99	12.5	0.988	13	12.5	0.988	119	12.5	0.988	133
TOTAL		214 Kg	TOTAL		161 Kg	TOTAL		213 Kg	TOTAL		239 Kg

0 ≤ h ≤ 100					100 ≤ h ≤ 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{T}e \geq 0.12$ MPa					$\bar{T}e \geq 0.14$ MPa					$\bar{T}e \geq 0.21$ MPa					$\bar{T}e \geq 0.21$ MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	84	c/20cm	1	6.3	20	84	c/20cm	1	6.3	20	84	c/20cm	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	—	—	—	—	2	6.3	20	104	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	7	485	c/15cm	4	10.0	6	485	c/17cm	4	10.0	8	485	c/11cm	4	10.0	8	490	c/12cm
5	12.5	10	230	c/20cm	5	10.0	13	230	c/18cm	5	12.5	15	230	c/13cm	5	12.5	15	240	c/13cm
6	12.5	5	230	c/20cm	6	10.0	5	230	c/20cm	6	12.5	5	230	c/20cm	6	12.5	6	240	c/18cm
7	—	—	—	—	7	—	—	—	—	7	12.5	24	CORR.	—	7	12.5	24	CORR.	—
8	12.5	16	CORR.	—	8	12.5	16	CORR.	—	8	—	—	—	—	8	—	—	—	—
9	6.3	153	CORR.	c/20cm	9	6.3	180	CORR.	c/20cm	9	6.3	180	CORR.	c/20cm	9	6.3	180	CORR.	c/20cm
10	8.0	20	230	c/10cm	10	10.0	17	230	c/11cm	10	12.5	18	230	c/11cm	10	12.5	18	240	c/11cm
11	8.0	9	230	c/11cm	11	10.0	7	230	c/14cm	11	12.5	8	230	c/13cm	11	12.5	7	240	c/14cm
12	8.0	8	485	c/13cm	12	10.0	6	485	c/17cm	12	10.0	9	485	c/11cm	12	10.0	10	490	c/10cm
13	—	—	—	—	13	10.0	8	385	c/34cm	13	10.0	8	385	c/28cm	13	10.0	7	385	c/30cm
14	—	—	—	—	14	10.0	12	210	c/34cm	14	10.0	15	210	c/28cm	14	10.0	13	210	c/30cm
15	6.3	13	225	c/15cm	15	6.3	13	225	c/15cm	15	6.3	13	225	c/15cm	15	10.0	7	235	c/30cm
16	6.3	20	140	c/20cm	16	6.3	20	140	c/20cm	16	6.3	20	140	c/20cm	16	—	—	—	—
17	—	—	—	—	17	—	—	—	—	17	—	—	—	—	17	6.3	20	200	c/20cm
18	6.3	27	225	c/15cm	18	6.3	27	225	c/15cm	18	6.3	27	225	c/15cm	18	10.0	13	235	c/30cm
19	8.0	42	CORR.	c/15cm	19	—	—	—	—	19	—	—	—	—	19	—	—	—	—
20	12.5	10	230	c/20cm	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—
21	12.5	10	445	c/20cm	21	—	—	—	—	21	—	—	—	—	21	—	—	—	—

RESUMEN			RESUMEN			RESUMEN			RESUMEN		
ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)
6.3	0.252	75	6.3	0.252	82	6.3	0.252	82	6.3	0.252	63
8.0	0.393	59	10.0	0.624	127	10.0	0.624	94	10.0	0.624	118
12.5	0.988	152	12.5	0.988	18	12.5	0.988	131	12.5	0.988	138
TOTAL		286 Kg	TOTAL		227 Kg	TOTAL		307 Kg	TOTAL		318 Kg

PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 Km/h
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
RADIO MINIMO HORIZONTAL:	230 m.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 m.

REPÚBLICA DEL PARAGUAY

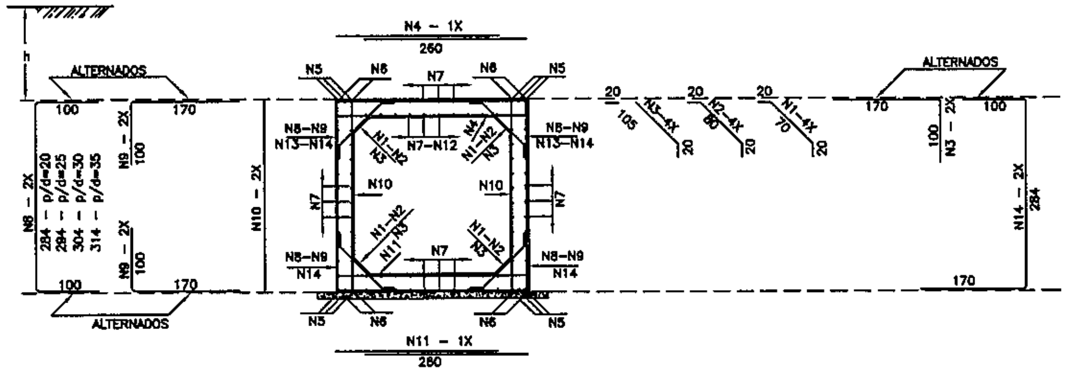
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: Empalme Ruta VII (San Antonio) - Arroyo Tacuary

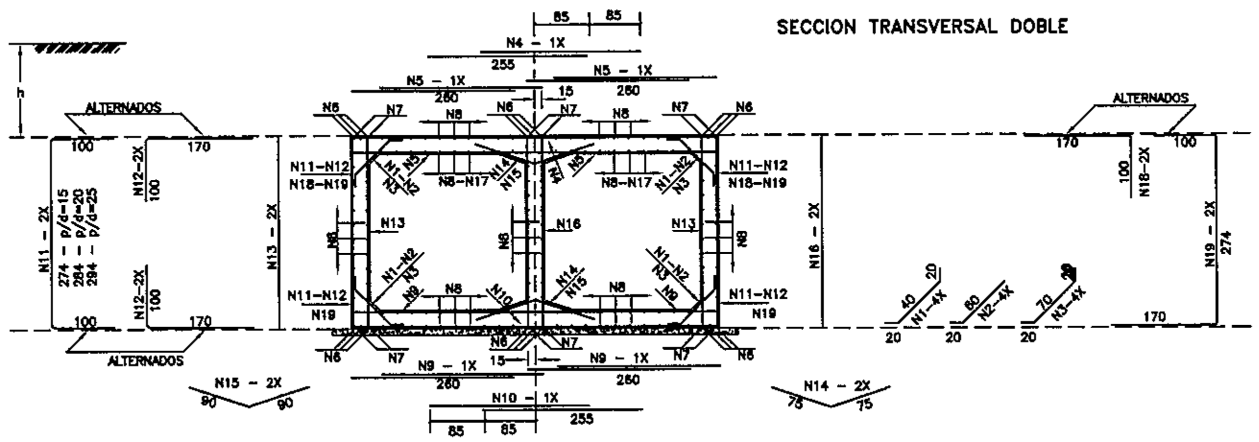
ALCANTARILLAS CELULAR

ALCANTARILLAS CELULARES DE 2.50 x 2.50

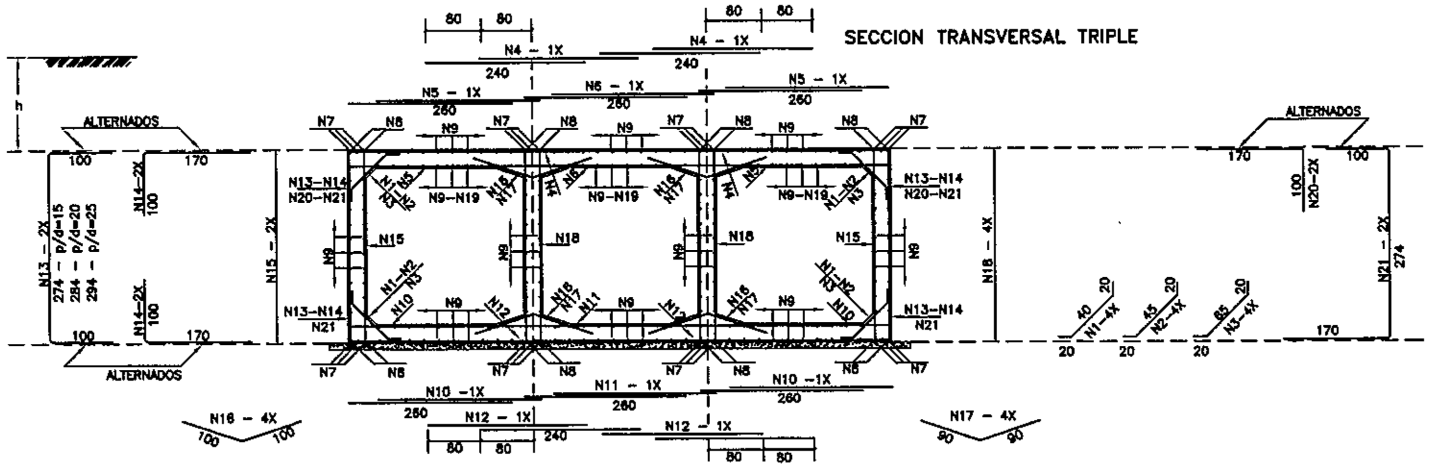
SECCION TRANSVERSAL SIMPLE



SECCION TRANSVERSAL DOBLE



SECCION TRANSVERSAL TRIPLE



TABLAS DE ARMADURAS POR METRO DE GALERIA

Sección simple

0 < h < 100					100 < h < 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{f}_s \geq$ 0.10 MPa					$\bar{f}_s \geq$ 0.11 MPa					$\bar{f}_s \geq$ 0.16 MPa					$\bar{f}_s \geq$ 0.21 MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	110	c/20cm	1	6.3	20	110	c/20cm	1	6.3	20	110	c/20cm	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	—	—	—	—	2	6.3	20	120	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	6	260	c/16cm	4	10.0	9	260	c/11cm	4	12.5	10	260	c/10cm	4	16.0	7	260	c/14cm
5	—	—	—	—	5	—	—	—	—	5	—	—	—	—	5	16.0	12	CORR.	
6	16.0	8	CORR.	—	6	16.0	8	CORR.	—	6	16.0	8	CORR.	—	6	—	—	—	—
7	6.3	84	CORR.	c/20cm	7	6.3	96	CORR.	c/20cm	7	6.3	96	CORR.	c/20cm	7	6.3	96	CORR.	c/20cm
8	—	—	—	—	8	10.0	6	484	c/30cm	8	12.5	8	484	c/30cm	8	12.5	8	484	c/28cm
9	—	—	—	—	9	10.0	16	270	c/30cm	9	12.5	16	270	c/30cm	9	12.5	16	270	c/28cm
10	6.3	16	285	c/12cm	10	6.3	16	285	c/12cm	10	6.3	16	285	c/12cm	10	6.3	20	295	c/10cm
11	12.5	6	260	c/16cm	11	10.0	10	260	c/10cm	11	12.5	11	250	c/9cm	11	16.0	7	260	c/13cm
12	12.5	10	CORR.	c/25cm	12	—	—	—	—	12	—	—	—	—	12	—	—	—	—
13	12.5	8	270	c/26cm	13	—	—	—	—	13	—	—	—	—	13	—	—	—	—
14	12.5	8	554	c/26cm	14	—	—	—	—	14	—	—	—	—	14	—	—	—	—

RESUMEN			RESUMEN			RESUMEN			RESUMEN		
ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)
6.3	0.252	41	6.3	0.252	44	6.3	0.252	44	6.3	0.252	48
12.5	0.988	107	10.0	0.624	82	12.5	0.988	135	12.5	0.988	82
16.0	1.570	14	16.0	1.570	14	16.0	1.570	14	16.0	1.570	78
TOTAL		162 Kg	TOTAL		140 Kg	TOTAL		193 Kg	TOTAL		208 Kg

Sección doble

0 < h < 100					100 < h < 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{f}_s \geq$ 0.21 MPa					$\bar{f}_s \geq$ 0.21 MPa					$\bar{f}_s \geq$ 0.23 MPa					$\bar{f}_s \geq$ 0.28 MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	80	c/20cm	1	6.3	20	30	c/20cm	1	—	—	—	—	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	6.3	20	100	c/20cm	2	6.3	20	100	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	10	255	c/10cm	4	10.0	6	255	c/15cm	4	12.5	6	255	c/15cm	4	16.0	6	255	c/16cm
5	10.0	20	260	c/10cm	5	10.0	20	260	c/10cm	5	12.5	14	260	c/13cm	5	16.0	14	260	c/14cm
6	—	—	—	—	6	—	—	—	—	6	12.5	18	CORR.	—	6	—	—	—	—
7	12.5	12	CORR.	—	7	12.5	12	CORR.	—	7	—	—	—	—	7	16.0	12	CORR.	
8	6.3	156	CORR.	c/20cm	8	6.3	168	CORR.	c/20cm	8	6.3	168	CORR.	c/20cm	8	6.3	168	CORR.	c/20cm
9	10.0	14	260	c/14cm	9	10.0	16	260	c/12cm	9	12.5	14	260	c/13cm	9	16.0	14	260	c/14cm
10	10.0	6	255	c/15cm	10	10.0	6	255	c/15cm	10	12.5	6	255	c/15cm	10	16.0	6	255	c/16cm
11	—	—	—	—	11	10.0	8	474	c/26cm	11	10.0	8	484	c/28cm	11	12.5	8	484	c/28cm
12	—	—	—	—	12	10.0	16	270	c/26cm	12	10.0	16	270	c/28cm	12	12.5	16	270	c/28cm
13	6.3	9	275	c/11cm	13	10.0	8	275	c/25cm	13	10.0	8	283	c/25cm	13	6.3	14	285	c/13cm
14	6.3	10	150	c/20cm	14	6.3	10	150	c/20cm	14	—	—	—	—	14	—	—	—	—
15	—	—	—	—	15	—	—	—	—	15	6.3	10	180	c/20cm	15	6.3	10	180	c/20cm
16	6.3	12	275	c/15cm	16	10.0	8	275	c/30cm	16	10.0	8	285	c/30cm	16	6.3	12	285	c/15cm
17	10.0	16	CORR.	c/15cm	17	—	—	—	—	17	—	—	—	—	17	—	—	—	—
18	12.5	12	270	c/16cm	18	—	—	—	—	18	—	—	—	—	18	—	—	—	—
19	12.5	12	544	c/16cm	19	—	—	—	—	19	—	—	—	—	19	—	—	—	—

RESUMEN			RESUMEN			RESUMEN			RESUMEN		
ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)
6.3	0.252	65	6.3	0.252	55	6.3	0.252	57	6.3	0.252	75
10.0	0.624	78	10.0	0.624	156	10.0	0.624	80	12.5	0.988	81
12.5	0.988	135	12.5	0.988	13	12.5	0.988	122	16.0	1.570	183
TOTAL		278 Kg	TOTAL		224 Kg	TOTAL		259 Kg	TOTAL		339 Kg

Sección triple

0 < h < 100					100 < h < 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{f}_s \geq$ 0.21 MPa					$\bar{f}_s \geq$ 0.21 MPa					$\bar{f}_s \geq$ 0.23 MPa					$\bar{f}_s \geq$ 0.28 MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	80	c/20cm	1	6.3	20	80	c/20cm	1	—	—	—	—	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	6.3	20	65	c/20cm	2	6.3	20	65	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	20	240	c/10cm	4	10.0	12	240	c/15cm	4	10.0	20	240	c/10cm	4	12.5	18	240	c/11cm
5	12.5	14	260	c/14cm	5	12.5	12	260	c/15cm	5	12.5	14	260	c/13cm	5	16.0	14	260	c/14cm
6	10.0	6	260	c/17cm	6	10.0	7	260	c/13cm	6	10.0	8	260	c/12cm	6	12.5	7	260	c/13cm
7	—	—	—	—	7	—	—	—	—	7	12.5	24	CORR.	—	7	16.0	24	CORR.	—
8	12.5	16	CORR.	—	8	12.5	16	CORR.	—	8	—	—	—	—	8	—	—	—	—
9	6.3	204	CORR.	c/20cm	9	6.3	240	CORR.	c/20cm	9	6.3	240	CORR.	c/20cm	9	6.3	240	CORR.	c/20cm
10	10.0	14	260	c/14cm	10	12.5	12	260	c/15cm	10	12.5	14	260	c/13cm	10	16.0	12	260	c/15cm
11	10.0	6	260	c/16cm	11	10.0	9	260	c/11cm	11	10.0	10	260	c/10cm	11	12.5	9	260	c/11cm
12	10.0	12	240	c/15cm	12	10.0	12	240	c/15cm	12	10.0	20	240	c/10cm	12	12.5	18	240	c/11cm
13	—	—	—	—	13	10.0	8	474	c/25cm	13	10.0	8	484	c/26cm	13	12.5	8	484	c/24cm
14	—	—	—	—	14	10.0	16	270	c/26cm	14	10.0	16	270	c/26cm	14	12.5	16	270	c/24cm
15	6.3	20	275	c/10cm	15	6.3	16	275	c/12cm	15	6.3	14	285	c/13cm	15	6.3	14	285	c/13cm
16	—	—	—	—	16	—	—	—	—	16	6.3	20	200	c/20cm	16	6.3	20	200	c/20cm
17	6.3	20	180	c/20cm	17	6.3	20	180	c/20cm	17	—	—	—	—	17	—	—	—	—
18	6.3	20	275	c/20cm	18	6.3	20	275	c/20cm	18	6.3	24	285	c/15cm	18	6.3	24	285	c/15cm
19	10.0	46	CORR.	c/15cm	19	—	—	—	—	19	—	—	—	—	19	—	—	—	—
20	12.5	12	270	c/16cm	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—
21	12.5	12	544	c/16cm	21	—	—	—	—	21	—	—	—	—	21	—	—	—	—

RESUMEN			RESUMEN			RESUMEN			RESUMEN		
ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)	ø	Kg/m	PESO(Kg)
6.3	0.252	88	6.3	0.252	105	6.3	0.252	109	6.3	0.252	109
10.0	0.624	94	10.0	0.624	113	10.0	0.624	141	12.5	0.988	208
12.5	0.988	198	12.5	0.988	79	12.5	0.988	98	16.0	1.570	148
TOTAL		390 Kg	TOTAL		297 Kg	TOTAL		348 Kg	TOTAL		465 Kg

PARAMETROS TECNICOS		REPUBLICA DEL PARAGUAY	DISEÑO DE PAVIMENTACION TIPO EMPEDRADO TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY
VELOCIDAD DIRECTRIZ :	80 KM/H		
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.		
RADIO MINIMO HORIZONTAL:	230 M.		ALCANTARILLAS CELULAR
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.		

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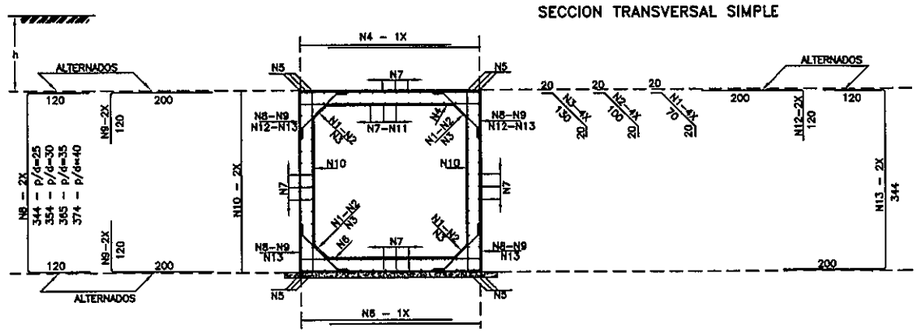
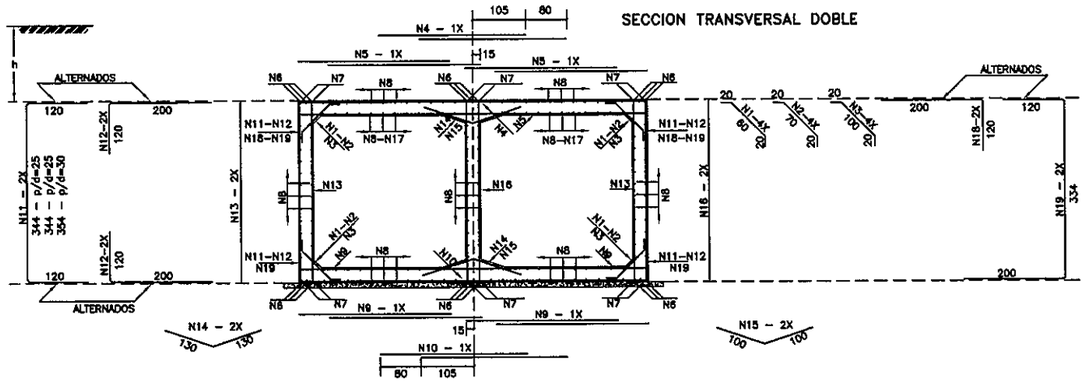
ALCANTARILLAS CELULARES DE 3.00 x 3.00

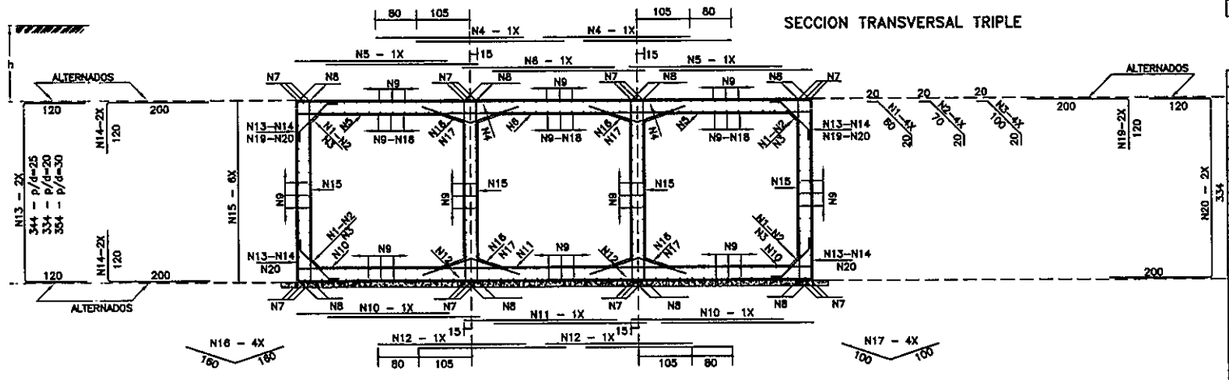
SECCION TRANSVERSAL SIMPLE



SECCION TRANSVERSAL DOBLE



SECCION TRANSVERSAL TRIPLE



TABLAS DE ARMADURAS POR METRO DE GALERIA

0 ≤ h ≤ 100					100 ≤ h ≤ 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{T}s \geq 0.12$ MPa					$\bar{T}s \geq 0.12$ MPa					$\bar{T}s \geq 0.17$ MPa					$\bar{T}s \geq 0.22$ MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	110	c/20cm	1	6.3	20	110	c/20cm	1	—	—	—	—	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	8.0	16	140	c/25cm	2	8.0	16	140	c/25cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	6	310	c/15cm	4	12.5	6	310	c/15cm	4	12.5	9	310	c/11cm	4	16.0	8	310	c/12cm
5	16.0	12	CORR.	—	5	16.0	12	CORR.	—	5	16.0	12	CORR.	—	5	16.0	12	CORR.	—
6	12.5	8	310	c/15cm	6	12.5	7	310	c/13cm	6	12.5	10	310	c/10cm	6	16.0	9	310	c/11cm
7	6.3	98	CORR.	c/20cm	7	6.3	112	CORR.	c/20cm	7	8.0	88	CORR.	c/25cm	7	8.0	112	CORR.	c/20cm
8	—	—	—	—	8	12.5	6	584	c/40cm	8	12.5	8	584	c/30cm	8	12.5	10	584	c/22cm
9	—	—	—	—	9	12.5	12	320	c/40cm	9	12.5	16	320	c/30cm	9	12.5	20	320	c/22cm
10	6.3	16	345	c/12cm	10	6.3	16	345	c/12cm	10	8.0	10	355	c/20cm	10	8.0	10	355	c/20cm
11	6.3	28	CORR.	c/10cm	11	—	—	—	—	11	—	—	—	—	11	—	—	—	—
12	12.5	8	320	c/24cm	12	—	—	—	—	12	—	—	—	—	12	—	—	—	—
13	12.5	8	584	c/24cm	13	—	—	—	—	13	—	—	—	—	13	—	—	—	—
RESUMEN					RESUMEN					RESUMEN					RESUMEN				
ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)		
6.3	0.252	55			6.3	0.252	51			8.0	0.403	41			8.0	0.403	73		
12.5	0.888	115			12.5	0.888	113			12.5	0.888	156			12.5	0.888	122		
16.0	1.570	21			16.0	1.570	21			16.0	1.570	21			16.0	1.570	104		
TOTAL		191 Kg			TOTAL		185 Kg			TOTAL		238 Kg			TOTAL		298 Kg		

0 ≤ h ≤ 100					100 ≤ h ≤ 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{T}s \geq 0.21$ MPa					$\bar{T}s \geq 0.21$ MPa					$\bar{T}s \geq 0.23$ MPa					$\bar{T}s \geq 0.23$ MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	100	c/20cm	1	6.3	20	100	c/20cm	1	—	—	—	—	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	6.3	20	110	c/20cm	2	6.3	20	110	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	3	—	—	—	—
4	12.5	10	280	c/10cm	4	10.0	10	280	c/11cm	4	12.5	5	280	c/20cm	4	16.0	8	280	c/15cm
5	10.0	20	280	c/10cm	5	10.0	20	280	c/10cm	5	12.5	16	300	c/12cm	5	16.0	16	300	c/12cm
6	—	—	—	—	6	—	—	—	—	6	12.5	16	CORR.	—	6	16.0	16	CORR.	—
7	12.5	12	CORR.	—	7	12.5	12	CORR.	—	7	—	—	—	—	7	—	—	—	—
8	6.3	168	CORR.	c/20cm	8	6.3	198	CORR.	c/20cm	8	6.3	198	CORR.	c/20cm	8	6.3	198	CORR.	c/20cm
9	10.0	14	280	c/13cm	9	10.0	10	280	c/11cm	9	12.5	12	280	c/15cm	9	16.0	12	300	c/15cm
10	12.5	5	280	c/20cm	10	10.0	9	280	c/11cm	10	12.5	5	280	c/20cm	10	16.0	7	280	c/14cm
11	—	—	—	—	11	10.0	8	574	c/28cm	11	10.0	8	584	c/34cm	11	16.0	8	584	c/36cm
12	—	—	—	—	12	10.0	16	320	c/28cm	12	10.0	12	320	c/34cm	12	16.0	12	320	c/36cm
13	10.0	8	335	c/25cm	13	10.0	8	335	c/25cm	13	10.0	10	345	c/20cm	13	10.0	10	345	c/20cm
14	—	—	—	—	14	—	—	—	—	14	—	—	—	—	14	—	—	—	—
15	6.3	10	200	c/20cm	15	6.3	10	200	c/20cm	15	6.3	10	200	c/20cm	15	6.3	10	200	c/20cm
16	10.0	8	335	c/30cm	16	10.0	8	335	c/25cm	16	10.0	8	345	c/25cm	16	10.0	10	345	c/20cm
17	10.0	32	CORR.	c/18cm	17	—	—	—	—	17	—	—	—	—	17	—	—	—	—
18	12.5	10	320	c/20cm	18	—	—	—	—	18	—	—	—	—	18	—	—	—	—
19	12.5	10	634	c/20cm	19	—	—	—	—	19	—	—	—	—	19	—	—	—	—
RESUMEN					RESUMEN					RESUMEN					RESUMEN				
ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)		
6.3	0.252	57			6.3	0.252	65			6.3	0.252	65			6.3	0.252	65		
10.0	0.624	117			10.0	0.624	198			10.0	0.624	85			10.0	0.624	43		
12.5	0.888	153			12.5	0.888	13			12.5	0.888	136			16.0	1.570	338		
TOTAL		327 Kg			TOTAL		276 Kg			TOTAL		286 Kg			TOTAL		446 Kg		

0 ≤ h ≤ 100					100 ≤ h ≤ 250					250 ≤ h ≤ 500					500 ≤ h ≤ 750				
$\bar{T}s \geq 0.21$ MPa					$\bar{T}s \geq 0.21$ MPa					$\bar{T}s \geq 0.23$ MPa					$\bar{T}s \geq 0.29$ MPa				
No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.	No.	ø	C	LONG.	SEP.
1	6.3	20	100	c/20cm	1	6.3	20	100	c/20cm	1	—	—	—	—	1	—	—	—	—
2	—	—	—	—	2	—	—	—	—	2	6.3	20	110	c/20cm	2	8.0	20	110	c/20cm
3	—	—	—	—	3	—	—	—	—	3	—	—	—	—	4	—	—	—	—
4	12.5	20	290	c/10cm	4	12.5	10	280	c/20cm	4	12.5	14	290	c/13cm	4	16.0	12	290	c/15cm
5	12.5	12	290	c/15cm	5	12.5	12	280	c/15cm	5	12.5	16	300	c/12cm	5	16.0	16	300	c/12cm
6	12.5	6	280	c/15cm	6	8.0	10	280	c/10cm	6	10.0	10	280	c/10cm	6	12.5	9	280	c/11cm
7	—	—	—	—	7	—	—	—	—	7	12.5	24	CORR.	—	7	16.0	24	CORR.	—
8	12.5	18	CORR.	—	8	12.5	18	CORR.	—	8	—	—	—	—	8	—	—	—	—
9	6.3	238	CORR.	c/20cm	9	6.3	280	CORR.	c/20cm	9	6.3	280	CORR.	c/20cm	9	8.0	220	CORR.	c/25cm
10	8.0	20	290	c/10cm	10	12.5	12	280	c/17cm	10	12.5	16	300	c/12cm	10	16.0	12	300	c/15cm
11	8.0	10	280	c/10cm	11	8.0	10	280	c/10cm	11	10.0	10	280	c/10cm	11	12.5	9	280	c/11cm
12	8.0	20	290	c/10cm	12	12.5	10	280	c/20cm	12	12.5	14	290	c/14cm	12	16.0	12	290	c/15cm
13	—	—	—	—	13	8.0	12	574	c/18cm	13	10.0	8	584	c/24cm	13	12.5	8	584	c/24cm
14	—	—	—	—	14	8.0	24	320	c/18cm	14	10.0	16	320	c/24cm	14	12.5	16	320	c/24cm
15	8.0	30	335	c/20cm	15	8.0	36	335	c/15cm	15	10.0	24	345	c/25cm	15	8.0	36	345	c/15cm
16	—	—	—	—	16	—	—	—	—	16	—	—	—	—	16	—	—	—	—
17	6.3	20	200	c/20cm	17	6.3	20	200	c/20cm	17	6.3	20	200	c/20cm	17	8.0	20	200	c/20cm
18	8.0	68	CORR.	c/13cm	18	—	—	—	—	18	—	—	—	—	18	—	—	—	—
19	12.5	10	320	c/20cm	19	—	—	—	—	19	—	—	—	—	19	—	—	—	—
20	12.5	10	634	c/20cm	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—
RESUMEN					RESUMEN					RESUMEN					RESUMEN				
ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)			ø	Kg/m	PESO(Kg)		
6.3	0.252	81			6.3	0.252	65			6.3	0.252	94			8.0	0.393	169		
8.0	0.393	98			8.0	0.393	127			10.0	0.624	148			12.5	0.888	147		
12.5	0.888	249			12.5	0.888	144			12.5	0.888	201			16.0	1.570	269		
TOTAL		428 Kg			TOTAL		384 Kg			TOTAL		443 Kg			TOTAL		589 Kg		

PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 Km/h
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
RADIO MINIMO HORIZONTAL:	230 m.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 m.

REPUBLICA DEL PARAGUAY

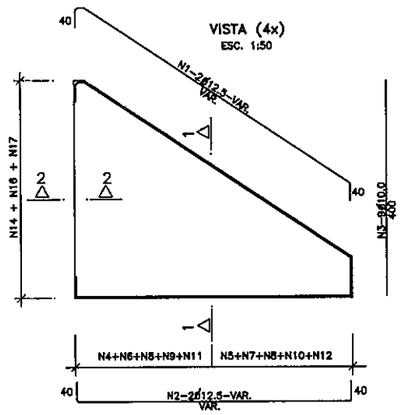
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: Empalme Ruta VII (San Antonio) - Arroyo Tacuary

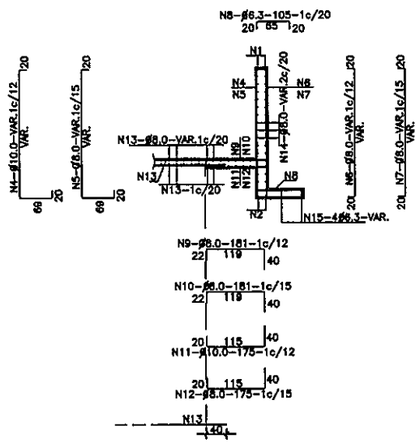
ALCANTARILLAS CELULAR

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

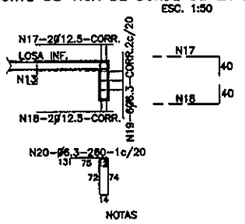
VISTA (4x)
ESC. 1:50



CORTE 1–1 (4x)
ESC. 1:50



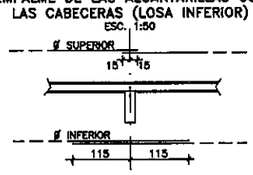
CORTE DE VIGA DE BORDE DE LA LOSA INFERIOR (2x)
ESC. 1:50



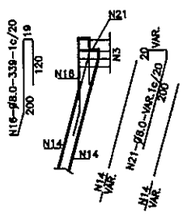
NOTAS

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

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



CORTE 2–2 (4x)
ESC. 1:50



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	284
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	782	1024		6.3	852	937	1090	1466		6.3	233	260	231	309
8.0	98	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	508	656		10.0	652	780	771	1004
12.5	220	258	258	330		12.5	281	310	224	286		12.5	198	225	226	305		12.5	229	249	280	351
16.0	—	—	—	—		16.0	—	—	164	193		16.0	237	280	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

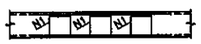
ALCANTARILLA TRIPLE

	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	885	960	1041	1398		6.3	1217	1338	1558	2098		6.3	273	300	271	364
8.0	48	52	81	98		8.0	514	560	650	832		8.0	844	710	857	857		8.0	2296	2525	3094	4139
10.0	161	185	114	135		10.0	172	198	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	268		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	178	—	—
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	3.183 Kg	3.670 Kg	4.785 Kg		TOTAL	4.153 Kg	4.340 Kg	5.599 kg	7.256 Kg

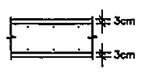
TABLA DE ARMADURAS PARA CABECERAS DE ALCANTARILLA CELULAR – 3.00x3.00

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	36	—	—	—	—	—	—	—	—	—	—	16	16	—	4	4	12	—	—
LONG.	VAR.	VAR.	400	VAR.	VAR.	VAR.	VAR.	105	181	181	175	175	VAR.	VAR.	VAR.	339	CORR.	CORR.	CORR.	260	VAR.

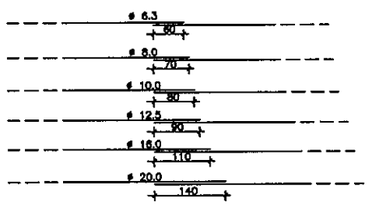
SOPORTE PARA APOYO DE LA ARMADURA SUPERIOR EN LAS LOSAS



RECUBRIMIENTO

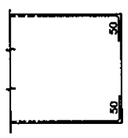


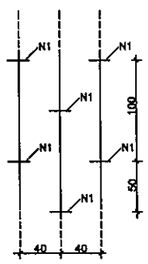
EMPALME DE LAS VARILLAS CORRIDAS (CUANDO SEA NECESARIO)



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 :	80 Km/h
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
RADIO MINIMO HORIZONTAL:	230 m.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 m.

REPUBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

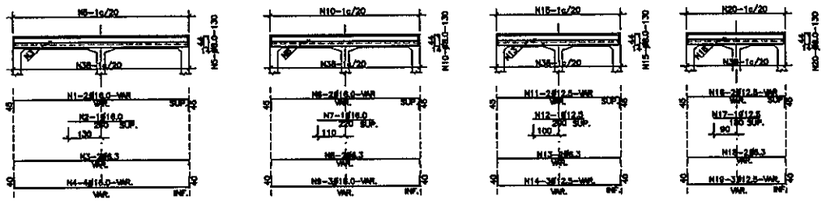
TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

ALCANTARILLAS CELULAR

ALCANTARILLA CELULAR DOBLE

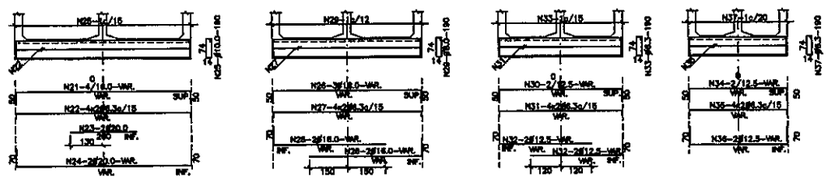
VIGAS DE BORDE DE LA LOSA SUPERIOR – CC= 0° A 15°

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

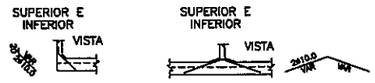


VIGAS DE BORDE DE LA LOSA INFERIOR – CC =0° A 15°

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



MENSULA



VIGA DE BORDE SUPERIOR

CORTE

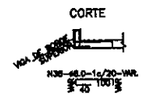
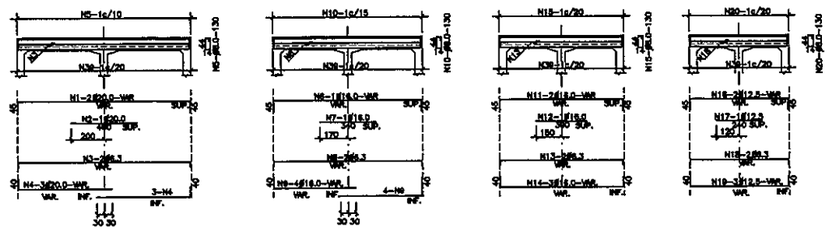


TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR DOBLE																																
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Ø	16.0	16.0	6.3	16.0	8.0	16.0	16.0	6.3	16.0	8.0	12.5	12.5	6.3	12.5	8.0	12.5	12.5	6.3	12.5	8.0	16.0	6.3	20.0	20.0	10.0	16.0	8.3	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.	VAR

ALCANTARILLA CELULAR DOBLE

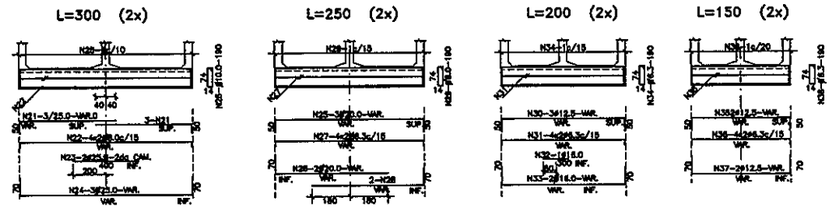
VIGAS DE BORDE DE LA LOSA SUPERIOR – CC = 30° A 45°

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

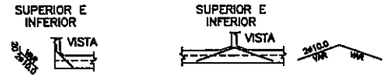


VIGAS DE BORDE DE LA LOSA INFERIOR – CC= 30° A 45°

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



MENSULA



VIGA DE BORDE SUPERIOR

CORTE

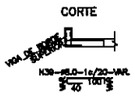


TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR DOBLE																																						
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Ø	20.0	20.0	6.3	20.0	8.0	16.0	16.0	6.3	16.0	8.0	16.0	16.0	6.3	16.0	8.0	12.5	12.5	6.3	12.5	8.0	25.0	8.0	25.0	25.0	10.0	20.0	6.3	20.0	10.0	12.5	6.3	16.0	16.0	8.0	12.5	6.3	12.5	6.3	8.0
C	4	2	4	12	—	4	2	4	16	—	4	2	4	8	—	4	2	4	8	—	12	16	4	8	—	8	16	8	—	4	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

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REPUBLICA DEL PARAGUAY

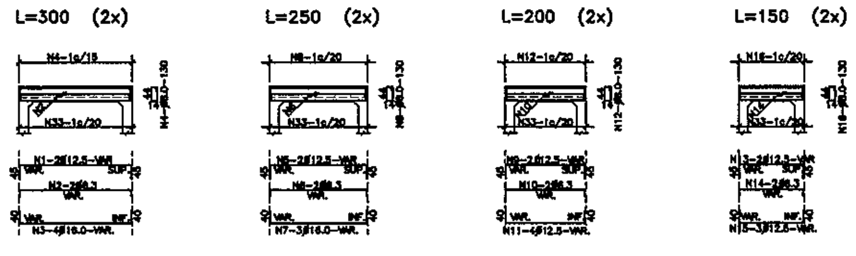
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: Empalme Ruta VII (San Antonio) - Arroyo Tacuary

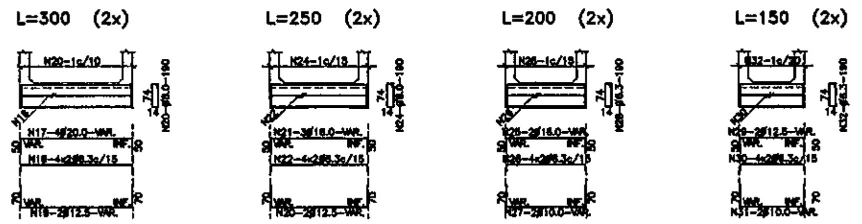
ALCANTARILLAS CELULAR

ALCANTARILLA CELULAR SIMPLE

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



VIGAS DE BORDE DE LA LOSA INFERIOR



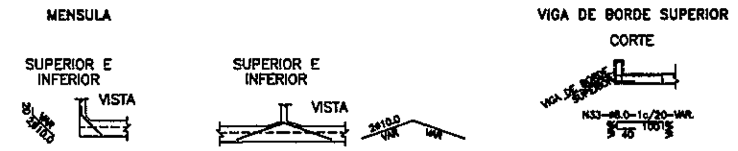
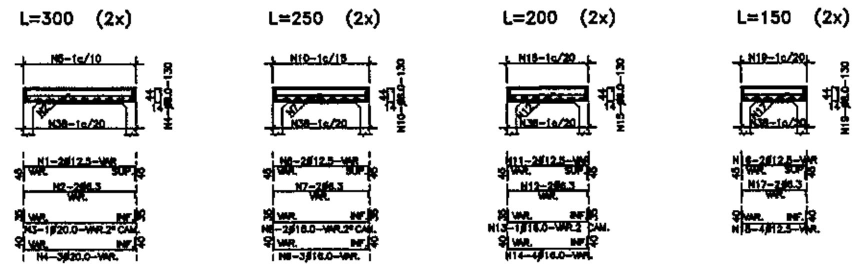


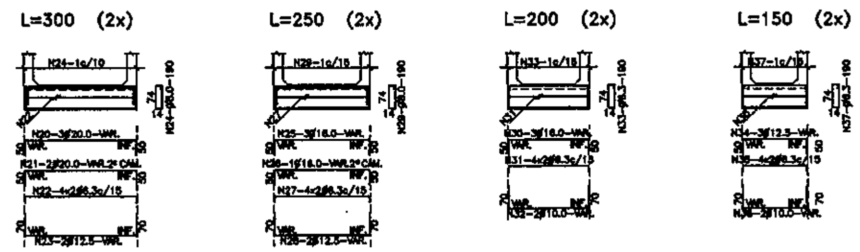
TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR SIMPLE																																	
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Ø	12.5	6.3	16.0	8.0	12.5	6.3	16.0	8.0	12.5	6.3	12.5	8.0	12.5	6.3	12.5	8.0	20.0	6.3	12.5	8.0	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	6	—	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°



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



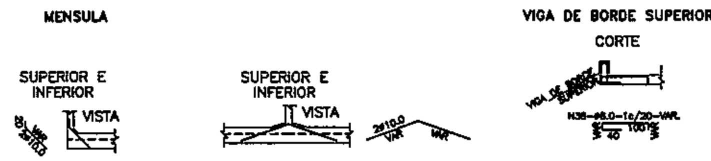


TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR E INFERIOR – CELULAR SIMPLE																																					
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Ø	12.5	6.3	20.0	20.0	8.0	12.5	6.3	16.0	16.0	8.0	12.5	6.3	16.0	16.0	8.0	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 :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

REPUBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

ALCANTARILLAS CELULAR

ALCANTARILLA CELULAR TRIPLE

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

ESCALA 1:100

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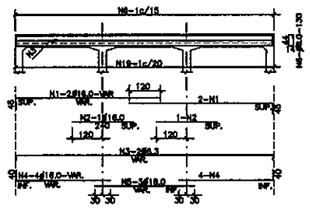

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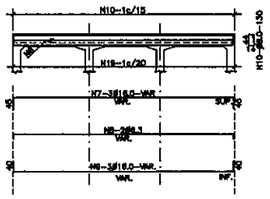
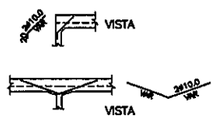
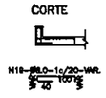


MENSULAS



VIGA DE BORDE SUPERIOR
CORTE



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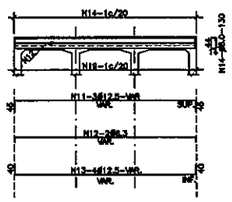

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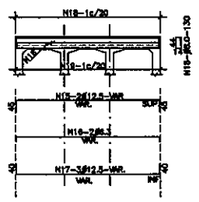


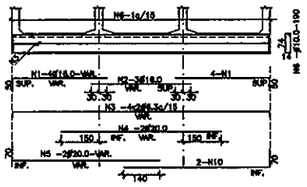
TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA SUPERIOR – CELULAR TRIPLE

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	8.3	16.0	16.0	8.0	16.0	8.3	16.0	16.0	8.0	12.5	8.3	12.5	8.0	12.5	8.3	12.5	8.0	8.0
C	8	4	4	16	8	—	8	4	8	—	8	4	8	—	4	4	8	—	—
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 – CC = 0° A 15°

ESCALA 1:100

L=300 (2x)



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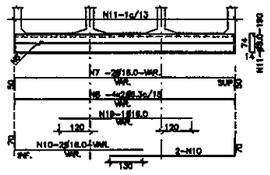

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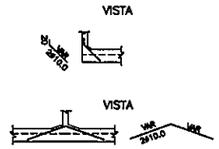

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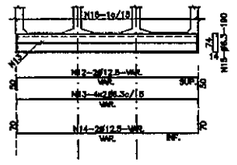

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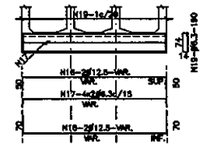
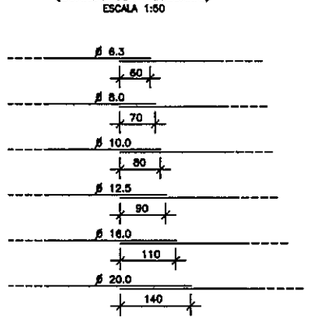


TABLA DE ARMADURAS PARA VIGAS DE BORDE DE LOSA INFERIOR – CELULAR TRIPLE

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	8.3	20	20	10.0	16.0	8.3	16.0	16.0	8.0	12.5	8.3	12.5	8.3	12.5	8.3	12.5	8.3
C	16	8	16	4	8	—	4	16	2	8	—	4	16	4	—	4	16	4	—
LONG	VAR.	VAR.	VAR.	VAR.	VAR.	190	VAR.	VAR.	VAR.	190	VAR.	VAR.	VAR.	190	VAR.	VAR.	VAR.	190

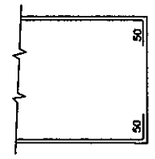
NOTAS Y DETALLES COMPLEMENTARIOS

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

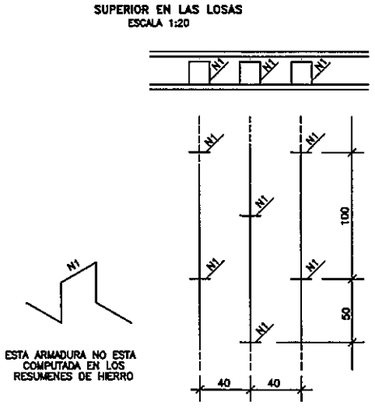


COLOCAR LOS EMPALMES EN PUNTOS ALTERNADOS

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

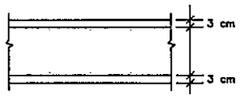


SOPORTE PARA APOYO DE LA ARMADURA
SUPERIOR EN LAS LOSAS
ESCALA 1:20



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 HORMIGON 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 :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

REPUBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

ALCANTARILLAS CELULAR

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	m³	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	m²	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	m³	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 2.50 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
d	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	m³	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	m²	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	m³	2.21	2.94	4.25	2.21	2.94	4.25	2.21	3.92	5.64	2.80	3.92	5.64

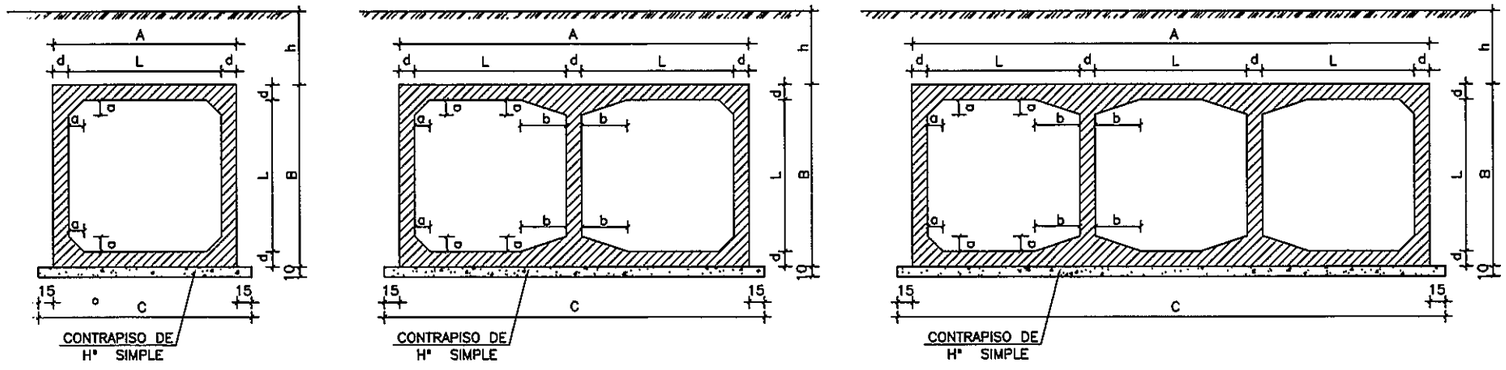
ALCANTARILLA CELULAR DE 2.00 x 2.00

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	480	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	m³	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	m²	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	m³	1.31	2.32	3.32	1.31	2.32	3.32	1.81	2.32	3.32	1.81	3.22	4.64

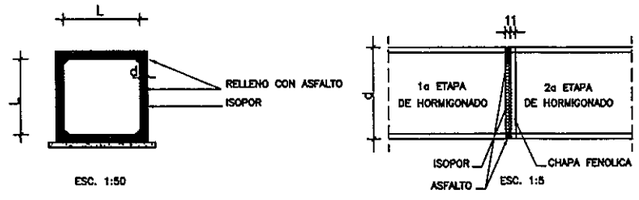
ALCANTARILLA CELULAR DE 3.00 x 3.00

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	m³	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	m²	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	m³	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



DETALLES DE LA JUNTA DE DILATACION



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 :	80 Km/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
RADIO MINIMO HORIZONTAL:	230 m.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 m.

REPUBLICA DEL PARAGUAY

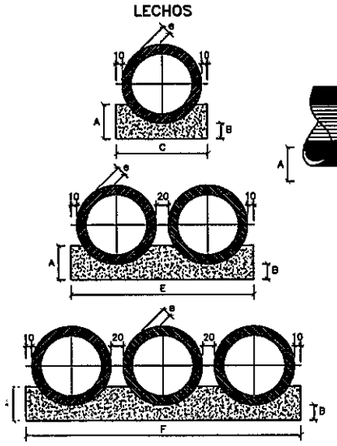
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: Empalme Ruta VII (San Antonio) - Arroyo Tacuary

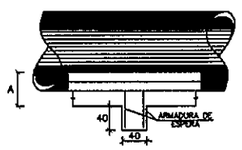
ALCANTARILLAS CELULAR

LECHOS Y DIENTES PARA ASENTAMIENTO DE ALCANTARILLAS

LECHOS



VISTA LATERAL



CUADRO DE DIMENSIONES						
DIAMETRO	A	B	C	E	F	e
60	34	15	96	–	–	8
80	45	20	120	–	–	10
100	56	25	144	288	432	12
120	67	30	186	332	489	13
150	83	36	198	396	584	14

CANTIDADES UNITARIAS DE LOS DIENTES						
	SIMPLE		DOBLE		TRIPLE	
DIAMETRO (cm.)	HORMIGON (m3)	ARMADURA (kg.)	HORMIGON (m3)	ARMADURA (kg.)	HORMIGON (m3)	ARMADURA (kg.)
60	0,154	1,006	–	–	–	–
80	0,192	1,386	–	–	–	–
100	0,230	1,812	0,461	3,624	0,691	3,780
120	0,268	1,836	0,531	3,278	0,797	4,914
150	0,317	2,759	0,634	4,599	0,950	6,439

CANTIDADES POR METRO LINEAL DE LECHO						
	SIMPLE		DOBLE		TRIPLE	
DIAMETRO (cm.)	HORMIGON (m3)	ENCOFRADO (m2)	HORMIGON (m3)	ENCOFRADO (m2)	HORMIGON (m3)	ENCOFRADO (m2)
60	0,238	0,68	–	–	–	–
80	0,386	0,90	–	–	–	–
100	0,570	1,12	1,141	1,12	1,711	1,12
120	0,785	1,34	1,570	1,34	2,355	1,34
150	1,157	1,66	2,314	1,66	3,471	1,66

OBSERVACIONES:

1- LOS DIENTES SERAN CONSTRUIDOS EN TODAS LAS ALCANTARILLAS CUYA PENDIENTE FUERE SUPERIOR AL 5% Y ESTARAN SEPARADOS DE CINCO EN CINCO METROS EN LA PROYECCION HORIZONTAL.

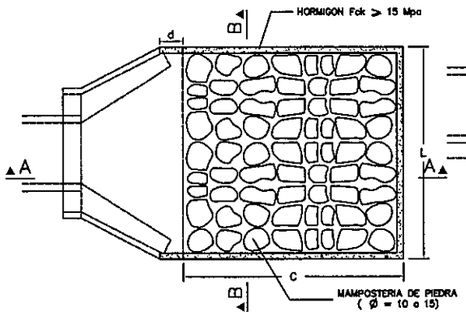
2- TODAS LAS ALCANTARILLAS SERAN CONSTRUIDAS CON LECHOS.

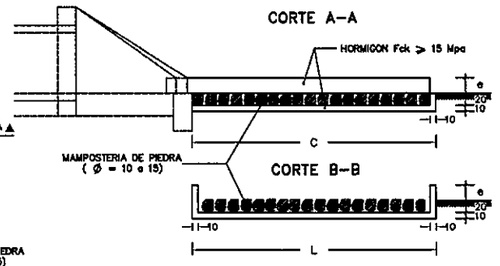
3- EN LOS DIENTES SERAN COLOCADAS ARMADURAS DE ESPERA: 2 ⌀ 10 c/100 cm. CON LONGITUD DE B + 35.

4- UTILIZAR EN LOS LECHOS HORMIGON Fck= 9 Mpa.

5- DIMENSIONES EN cm.

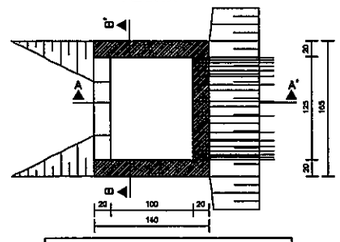
DISIPADORES DE ENERGIA APLICABLES A SALIDAS DE ALCANTARILLAS





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
III A	1 ⌀ 1,00	400	345	40	25	1,820	10,05	3,80	4,49	0,50
III B	1 ⌀ 1,20	480	391	50	30	2,445	13,03	5,23	5,04	0,60
III C	2 ⌀ 1,00	400	498	45	30	2,509	11,75	6,59	6,57	0,60
III D	2 ⌀ 1,20	480	566	50	35	3,352	14,97	7,70	8,61	0,80
III E	3 ⌀ 1,20	480	741	50	40	4,309	16,91	10,17	11,19	0,70

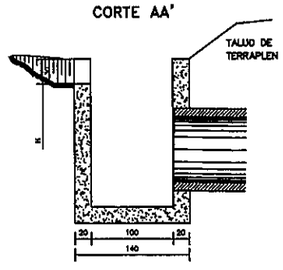
PLANTA



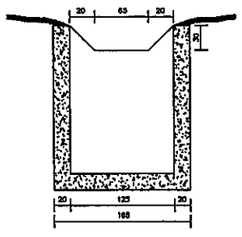
CANTIDADES UNITARIAS			
HORMIGON Fck≥15Mpa (m3)	ENCOFRADO (m2)	EXCAVACION (m3)	RELLENO (m3)
2,070	20,30	15,00	5,00

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				
DIÁMETRO cm	e (cm)	N°	ø	SEP.	C	LONG.
60	8	1	6	15	14	Corr.
		2	6	10	10	240
80	10	1	6	15	16	Corr.
		2	6	10	10	315
100	12	3	6	15	46	Corr.
		4	6	10	10	405
		5	6	10	10	365
120	13	3	6	15	56	Corr.
		4	6	10	10	475
		6	6	10	10	435
150	14	3	6	20	61	Corr.
		4	6	10	10	580
		5	6	10	10	520

TUBOS TIPO CA – 2 (ABNT)						
ENCOFRADO		ARMADURAS				
DIÁMETRO cm	e (cm)	N°	ø	SEP.	C	LONG.
60	8	1	6	15	14	Corr.
		2	6	9	11	240
80	10	1	6	20	14	Corr.
		2	6	9	11	315
100	12	3	6	20	36	Corr.
		4	6	12	8	405
		5	6	12	8	365
120	13	3	6	20	42	Corr.
		4	6	9	11	475
		5	6	9	11	435
150	14	3	6	20	61	Corr.
		4	10	9	11	580
		5	10	9	11	520

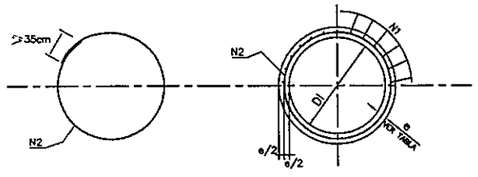
TUBOS TIPO CA – 3 (ABNT)						
ENCOFRADO		ARMADURAS				
DIÁMETRO (cm)	e (cm)	N°	ø	SEP.	C	LONG.
60	8	3	6	15	39	Corr.
		4	6	10	10	260
		5	6	10	10	240
80	10	3	6	20	38	Corr.
		4	8,0	10	10	335
		5	8,0	10	10	305
100	12	3	6	20	35	Corr.
		4	8,0	9	11	405
		5	8,0	9	11	365
120	13	3	6	20	43	Corr.
		4	10,0	9	11	475
		5	10,0	9	11	435
150	14	3	6	20	51	Corr.
		4	10,0	8	12	580
		5	10,0	8	12	520

MATERIALES PARA TUBO

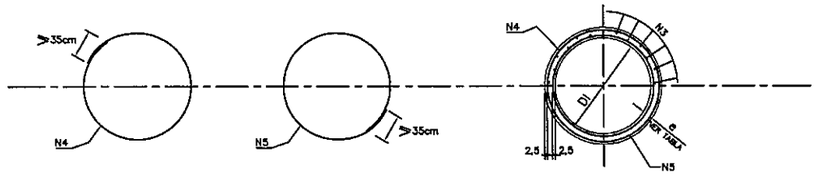
H° fck 240 kg/cm2
Varilla AP–420 DN

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

CORTE TRANSVERSAL



CORTE TRANSVERSAL



PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

REPUBLICA DEL PARAGUAY

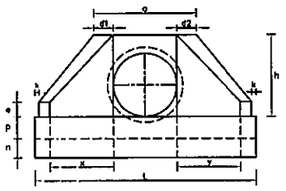
DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

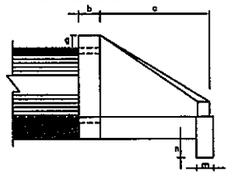
ALCANTARILLAS TUBULARES

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

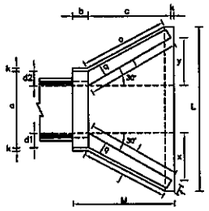
VISTA FRONTAL



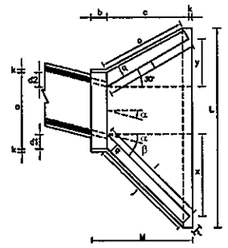
VISTA LATERAL



PLANTA NORMAL

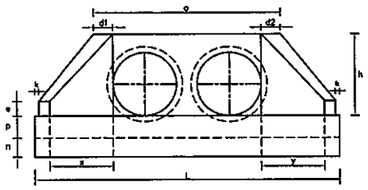


PLANTA OBLICUA

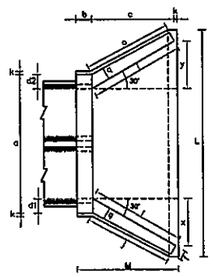


ALCANTARILLA TUBULAR DOBLE DE HORMIGON
BOCAS NORMALES Y OBLICUAS (TIPO N.T.)

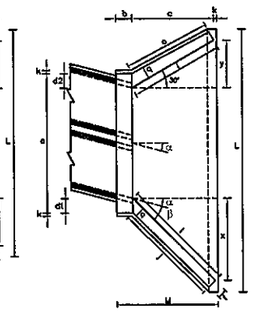
VISTA FRONTAL



PLANTA NORMAL



PLANTA OBLICUA



DIMENSIONES Y CONSUMOS MEDIOS POR UNIDAD

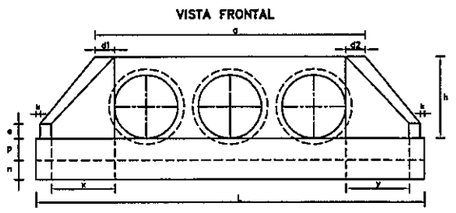
OBL. α	β	a	b	c	d1	d2	e	f	g	h	i	j	k	l	m	n	o	p	q	x	y	L	M	ENCOFRADO m2	HORMIGON m3
ALCANTARILLA TUBULAR SIMPLE D = 60																									
0	30	106	20	125	23	23	15	10	30	98	144	133	10	144	30	30	153	23	20	72	72	242	155	7.45	1.153
15	30	111	20	125	28	21	15	10	30	98	177	157	10	129	20	30	124	23	20	125	33	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	136	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	187	153	10	167	25	35	153	30	25	84	84	283	180	11.17	2.140
15	30	144	25	145	35	28	20	15	30	120	206	180	10	150	25	35	144	30	25	145	39	312	180	11.73	2.282
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	-59	428	180	15.97	3.188
ALCANTARILLA TUBULAR SIMPLE D = 100																									
0	30	170	30	163	35	35	25	20	30	142	191	174	10	191	30	40	174	37	30	95	85	345	205	15.68	3.567
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	248	10	165	30	40	165	37	30	236	0	403	205	18.19	4.206
45	20	264	30	165	71	52	25	20	30	142	390	328	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	5.508
15	30	210	40	180	50	38	30	25	30	163	255	220	10	198	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	485	230	24.00	6.538
45	20	316	40	180	83	63	30	25	30	163	428	351	10	188	40	45	198	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	256	52	40	260	70	556	320	34.15	11.431
30	25	293	50	260	70	50	35	30	30	194	453	398	10	280	40	45	280	52	40	371	0	812	320	37.65	12.868
45	20	382	50	260	93	79	35	30	30	194	615	530	10	289	40	45	280	52	40	556	-70	782	320	46.80	18.303

OBSERVACIONES:

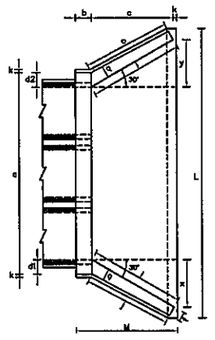
- DIMENSIONES EN CENTIMETROS.
- UTILIZAR HORMIGON CICLOPEO TIPO CLASE C15
- UTILIZAR PREFERENTEMENTE BOCAS NORMALES.

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

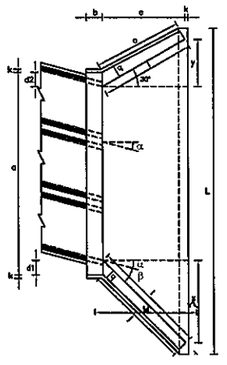
VISTA FRONTAL



PLANTA NORMAL



PLANTA OBLICUA



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	248	10	165	30	40	165	37	30	236	0	569	205	24.45	5.887
45	20	468	30	165	71	52	30	20	30	142	390	328	10	171	30	40	179	37	30	354	-44	702	205	29.94	7.479
ALCANTARILLA TUBULAR DOBLE D = 120																									
0	30	386	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	38	35	25	30	163	255	220	10	198	40	45	177	43	35	180	48	586	230	28.99	8.258
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	9.255
45	20	550	40	180	83	63	35	25	30	163	428	351	10	188	40	45	198	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	256	52	40	260	70	760	320	44.09	15.912
30	25	522	50	260	70	50	35	30	30	194	453	398	10	280	40	45	280	52	40	371	0	841	320	46.06	17.676
45	20	662	50	260	93	75	35	30	30	194	615	530	10	289	40	45	280	52	40	556	-70	1042	320	60.15	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	488	30	165	35	35	35	20	30	142	191	174	10	191	30	40	174	37	30	95	95	633	205	28.48	6.845
15	30	478	30	165	42	31	35	20	30	142	233	203	10	171	30	40	163	37	30	165	44	664	205	27.98	6.942
30	25	538	30	165	52	36	35	20	30	142	288	248	10	165	30	40	165	37	30	236	0	720	205	30.50	7.766
45	20	672	30	165	71	52	35	20	30	142	390	328	10	171	30	40	179	37	30	354	-44	908	205	37.98	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	38	40	25	30	163	255	220	10	198	40	45	177	43	35	180	48	758	230	36.35	10.758
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	765	40	180	83	63	40	25	30	163	428	351	10	188	40	45	198	43	35	386	-48	1035	230	49.39	14.883
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	916	320	52.07	19.516
15	30	863	50	260	57	41	40	30	30	194	368	328	10	269	40	45	256	52	40	260	70	985	320	56.37	20.446
30	25	750	50	260	70	50	40	30	30	194	453	398	10	280	40	45	280	52	40	371	0	1059	320	60.48	22.915
45	20	942	50	260	95	75	40	30	30	194	615	530	10	289	40	45	280	52	40	556	-70	1322	320	74.22	28.618

PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 Km/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

REPUBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

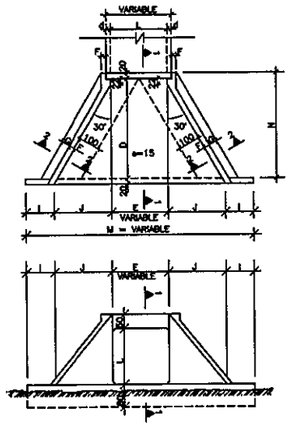
TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

ALCANTARILLAS TUBULARES

CABECERAS NORMALES PARA ALCANTARILLAS CELULARES

ALCANTARILLA SIMPLE

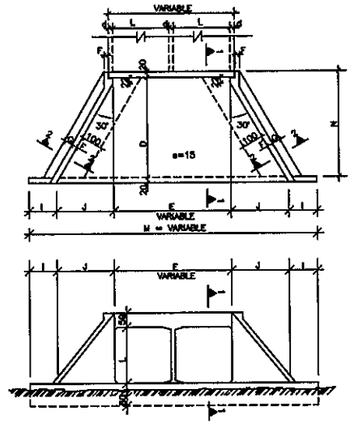
PLANTA - ESC.: 1:100



VISTA FRONTAL - ESC.: 1:100

ALCANTARILLA DOBLE

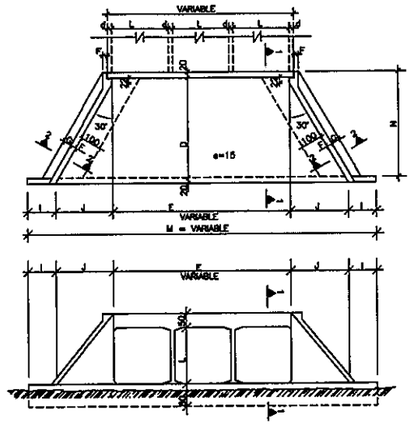
PLANTA - ESC.: 1:100



VISTA FRONTAL - ESC.: 1:100

ALCANTARILLA TRIPLE

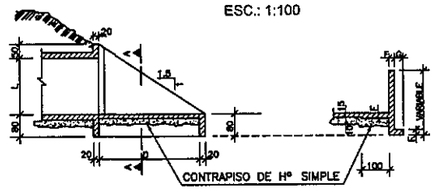
PLANTA - ESC.: 1:100

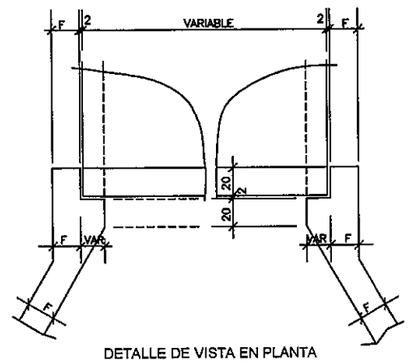


VISTA FRONTAL - ESC.: 1:100

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

MEDIDAS (cm)	ALCANTARILLA SIMPLE					
	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

DESCRIPCION	UNID	ALCANTARILLA SIMPLE					
		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

MEDIDAS (cm)	ALCANTARILLA DOBLE				
	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

DESCRIPCION	UNID	ALCANTARILLA DOBLE				
		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

MEDIDAS (cm)	ALCANTARILLA TRIPLE			
	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

DESCRIPCION	UNID	ALCANTARILLA TRIPLE			
		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	18.40	26.26	35.75	52.43

PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

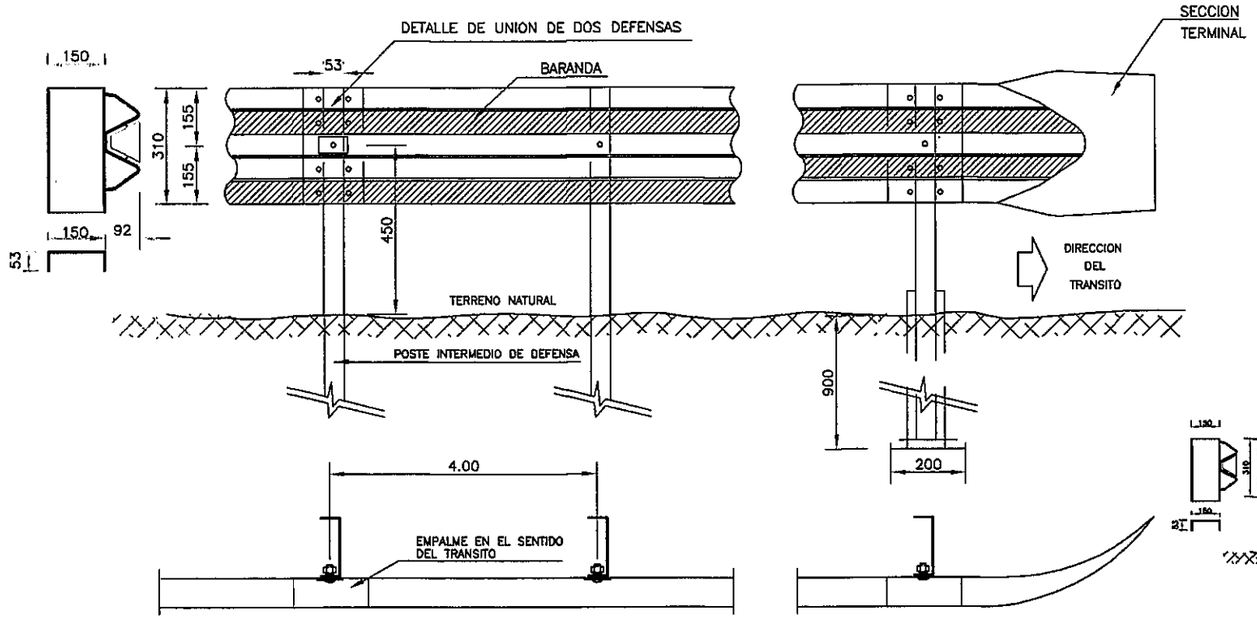
REPUBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

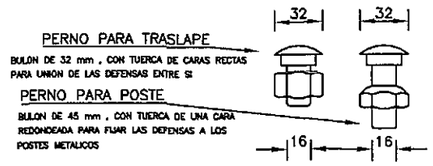
TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

ALCANTARILLAS CELULAR

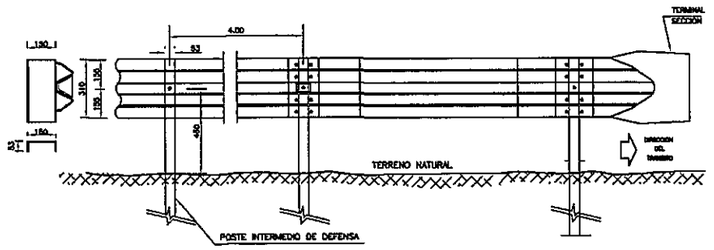
DEFENSA METALICA

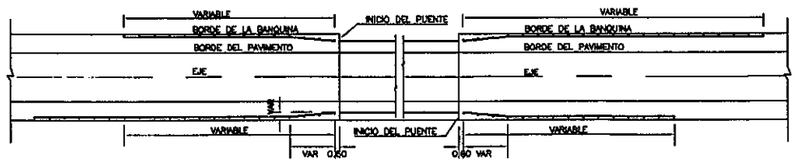


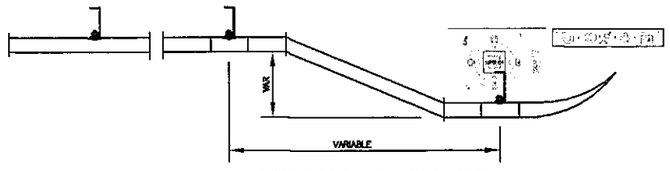
INSTALACION EN TERRAPLENES ALTOS



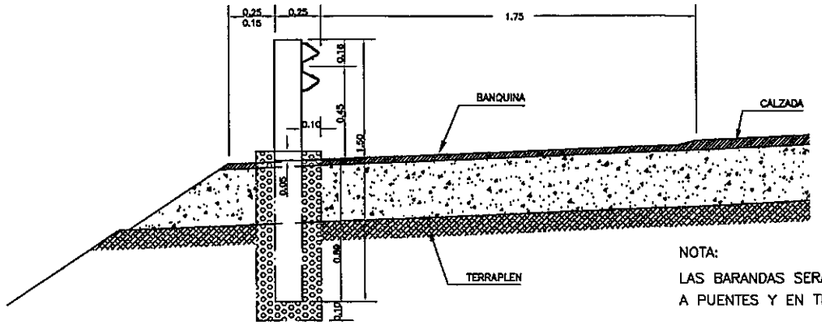
DETALLE DE TUERCA Y BULON







INSTALACION EN PUENTES



NOTA:

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

PARAMETROS TECNICOS

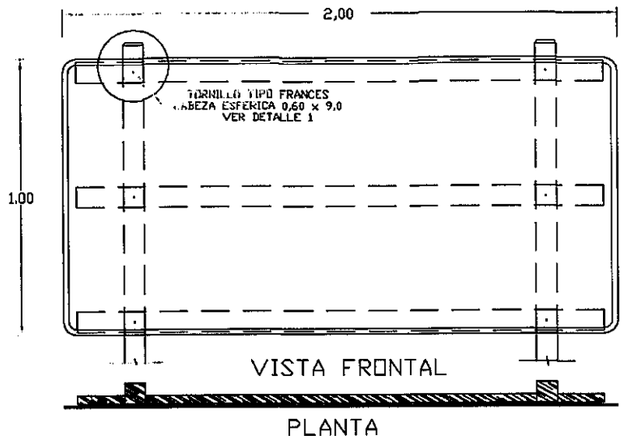
VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

REPÚBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

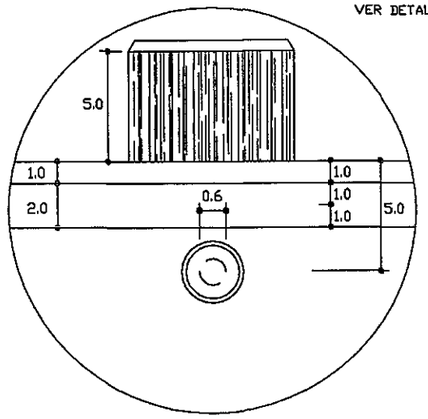
TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

BARANDA DE DEFENSA TIPO FLEX BEAM

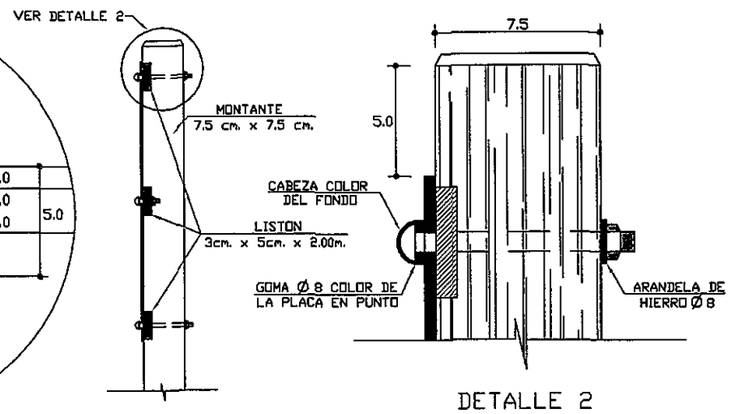


VISTA FRONTAL

PLANTA

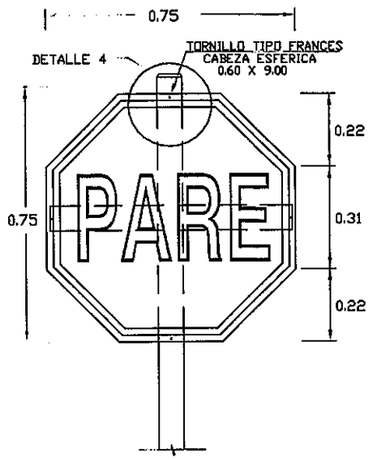


DETALLE 1



VISTA LATERAL

DETALLE 2



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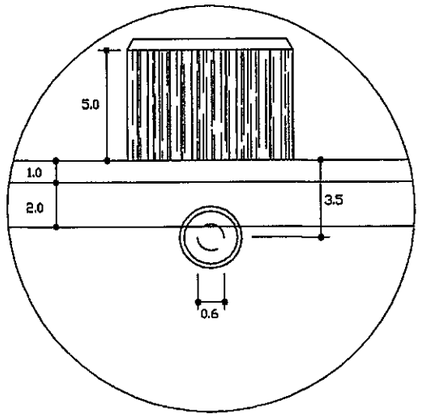
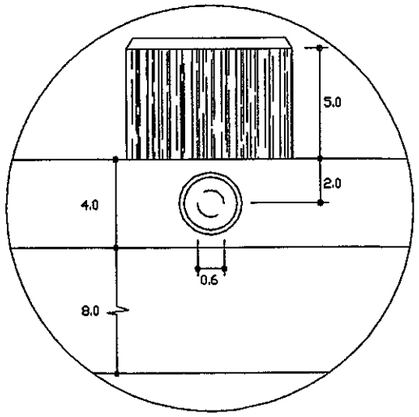
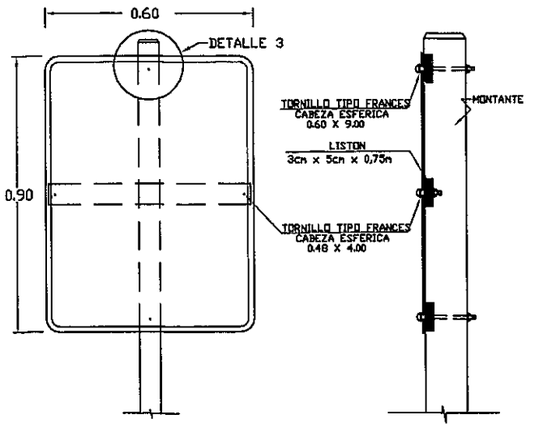




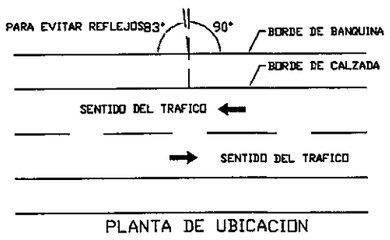
DETALLE 3

DETALLE 4

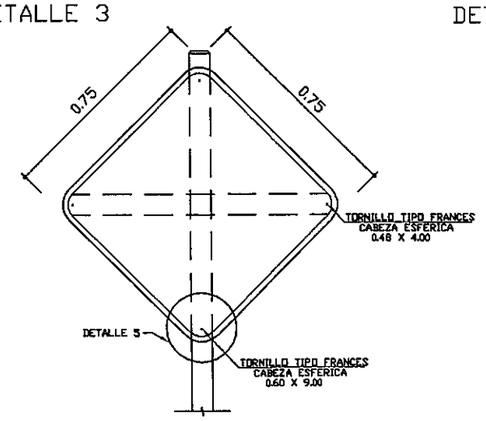


VISTA FRONTAL

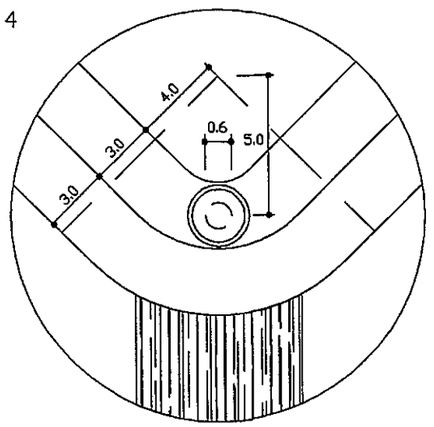
VISTA LATERAL



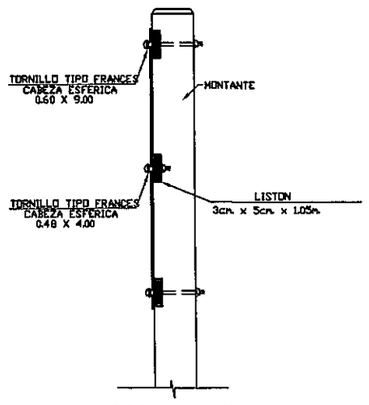
PLANTA DE UBICACION



VISTA FRONTAL



DETALLE 5



VISTA LATERAL

PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

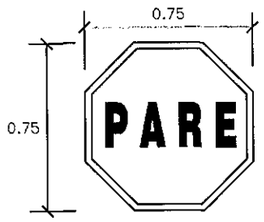
REPÚBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

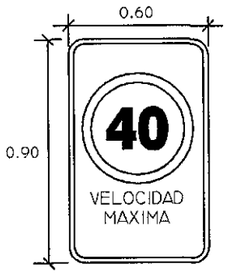
TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

SEÑALIZACION

SEÑALES REGLAMENTARIAS

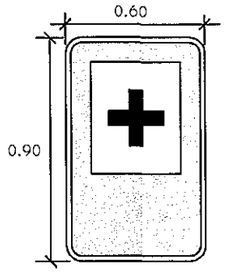


R-I



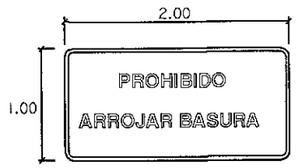
R-2

SEÑALES DE SERVICIOS



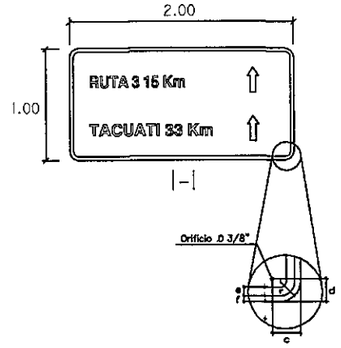
SA- I

SEÑAL EDUCATIVA



E-I

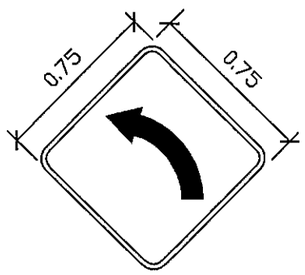
SEÑALES INFORMATIVAS



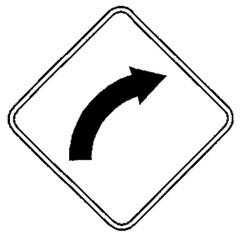
I-I

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

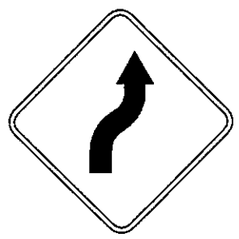


A-I



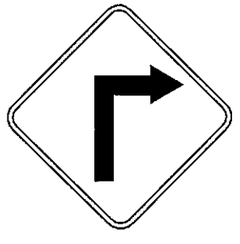
A-2

A-3

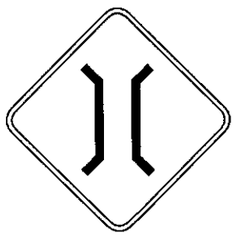


A-4

A-5



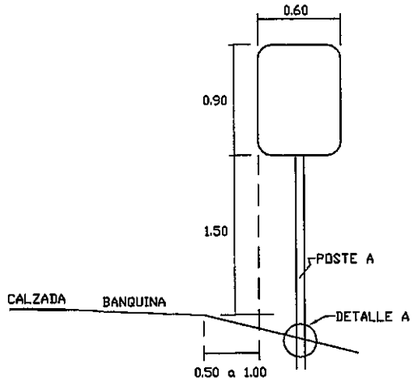
A-6

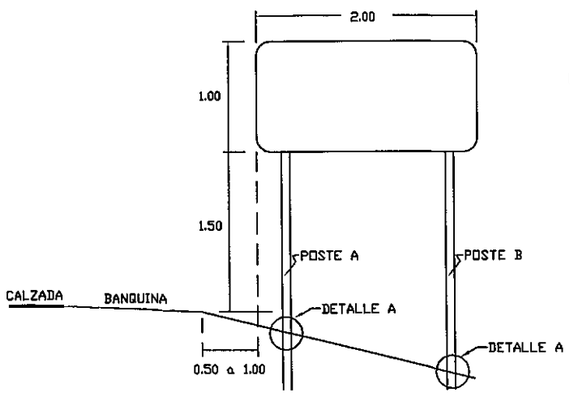


A-7

A-8

A-9

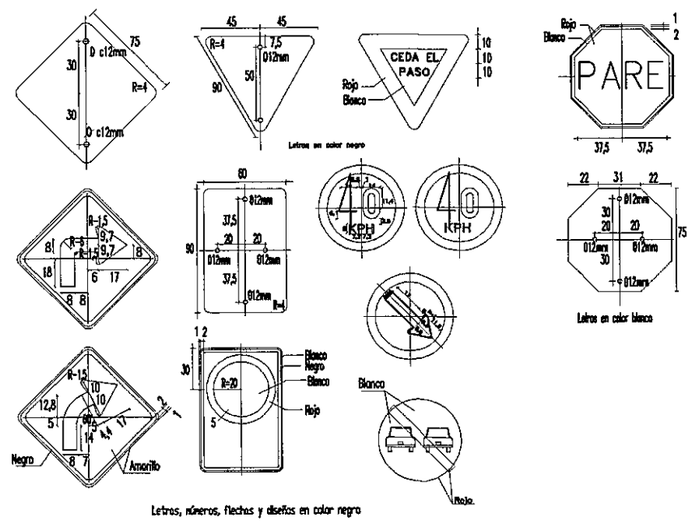




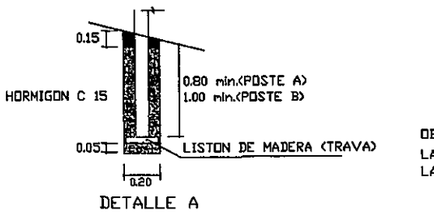
VISTA FRONTAL

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

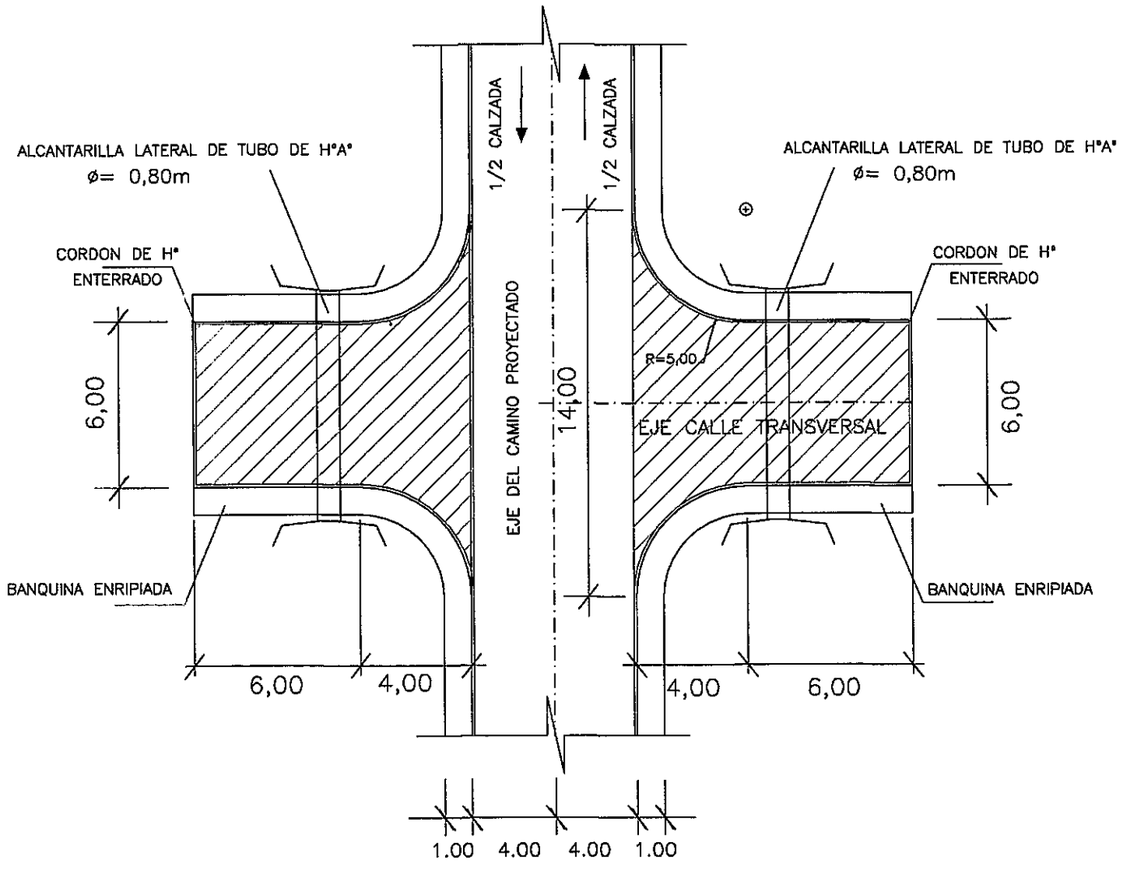
VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

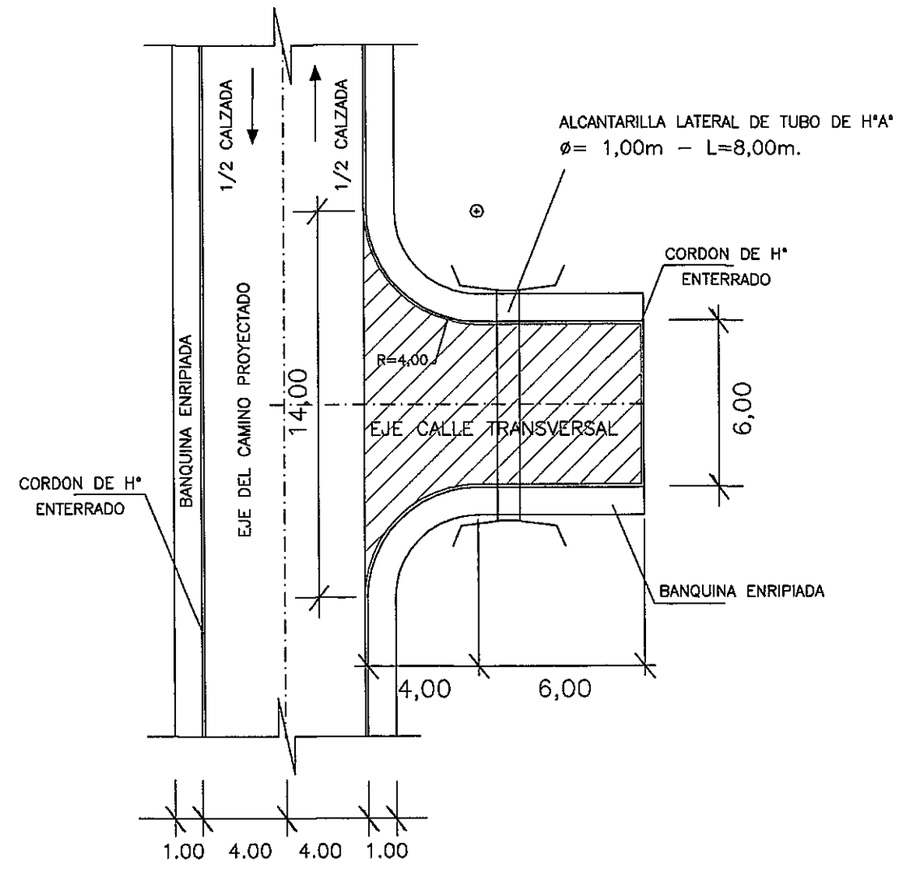
REPÚBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

SEÑALIZACION





EMPALME CALLE TRANSVERSAL
PAVIMENTO TIPO EMPEDRADO

PARAMETROS TECNICOS	
VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
RADIO MINIMO HORIZONTAL:	230 M.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 M.

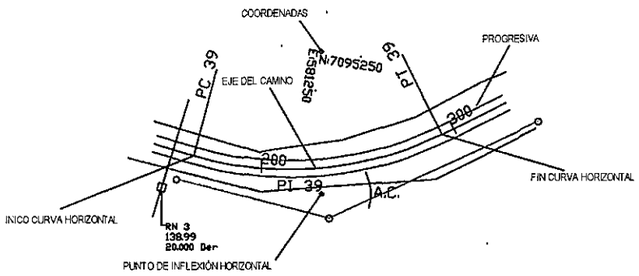
REPÚBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

ACCESOS

CONVENCIONES DE PLANIMETRÍA



CATASTRO

INDICADOR DE KILOMETRAJE

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

ABREVIATURAS:

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

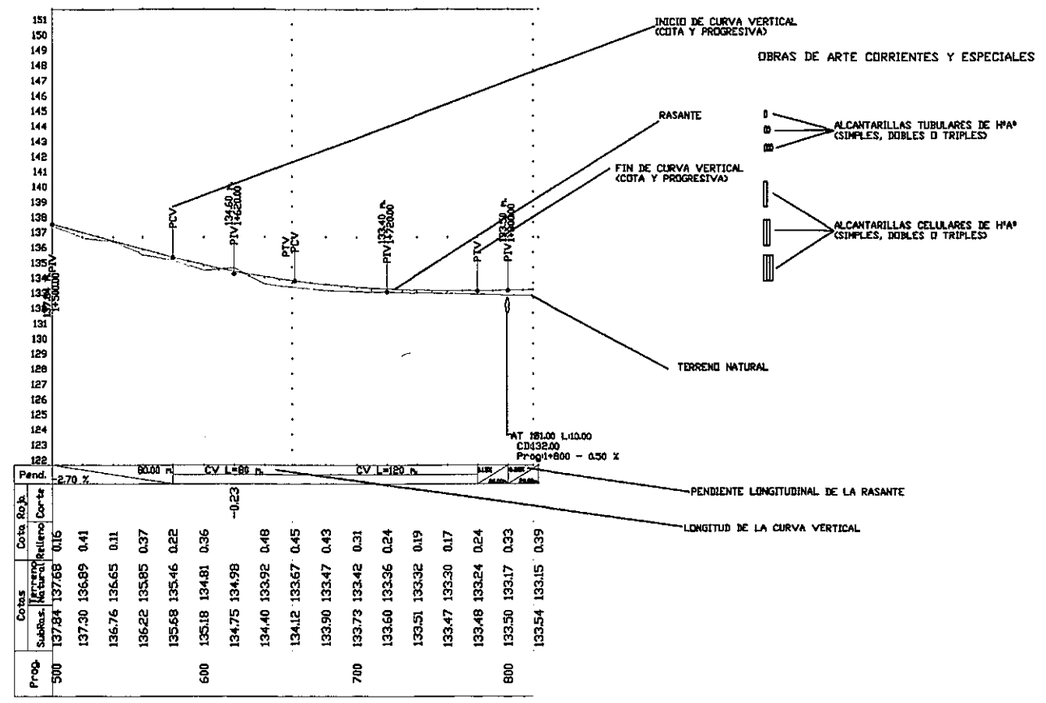
CONVENCIONES DE ALTIMETRÍA

PERFIL LONGITUDINAL DEL PROYECTO

CUADRO DE RN

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

CUADRO DE DATOS DE REFERENCIAS DE NIVEL



ESCALA HORIZONTAL

ABREVIATURAS:

PIV	PUNTO DE INFLEXIÓN VERTICAL
PCV	PUNTO DE INICIO DE CURVA VERTICAL
PTV	PUNTO DE TERMINACIÓN DE CURVA VERTICAL
L	LONGITUD DE CURVA VERTICAL
e	ORDENADA MAXIMA DE LA CURVA VERTICAL
AT HºAº	ALCANTARILLA TUVULAR DE HORMIGÓN ARMADO
AC HºAº	ALCANTARILLA CELULAR DE HORMIGON ARMADO
CD	COTA DE DESAGUE ALCANTARILLA
MD - 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
LD	LADO DERECHO

PARAMETROS TECNICOS

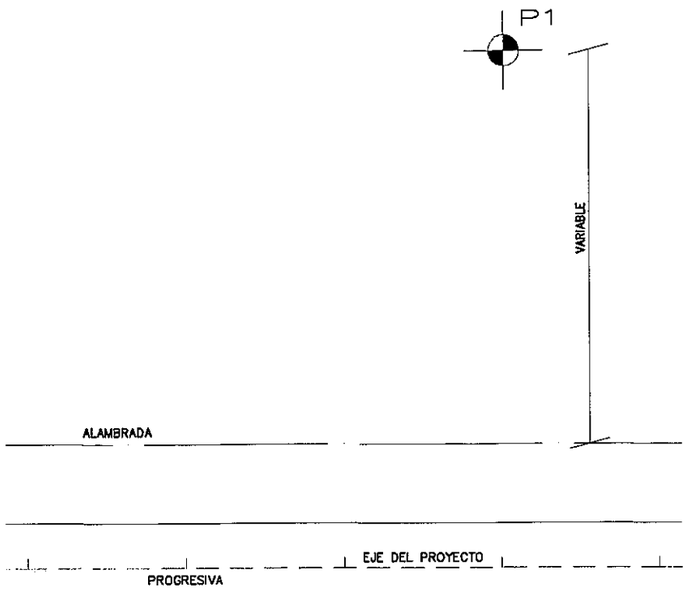
VELOCIDAD DIRECTRIZ :	80 Km/h
DISTANCIA DE VISIBILIDAD DE PARADA:	125 m.
RADIO MINIMO HORIZONTAL:	230 m.
DISTANCIA DE VISIBILIDAD DE SOBREPASO:	336 m.

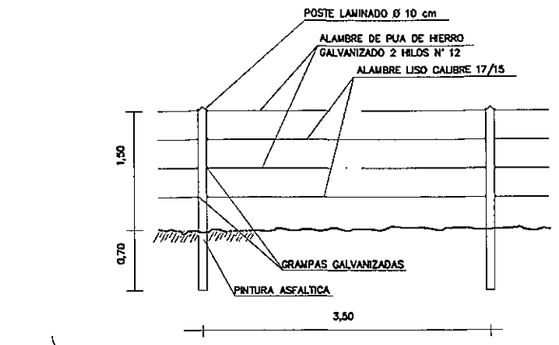
REPÚBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

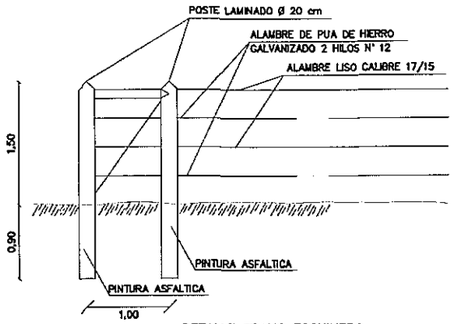
TRAMO: Empalme Ruta VII (San Antonio) - Arroyo Tacuary

CONVENCIONES Y ABREVIATURAS

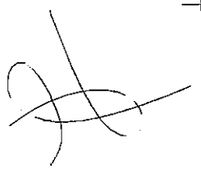




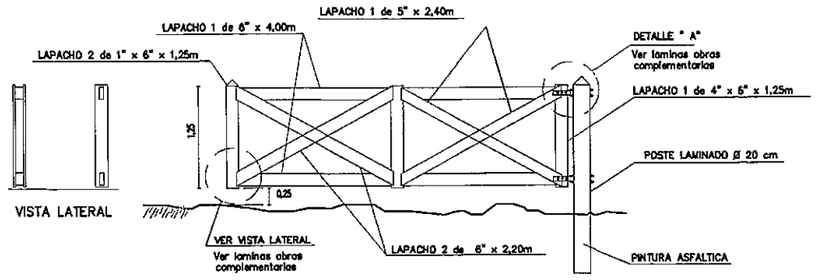
DETALLE TRAMO INTERMEDIO



DETALLE TRAMO ESQUINERO



ATADURA PARA ALAMBRE

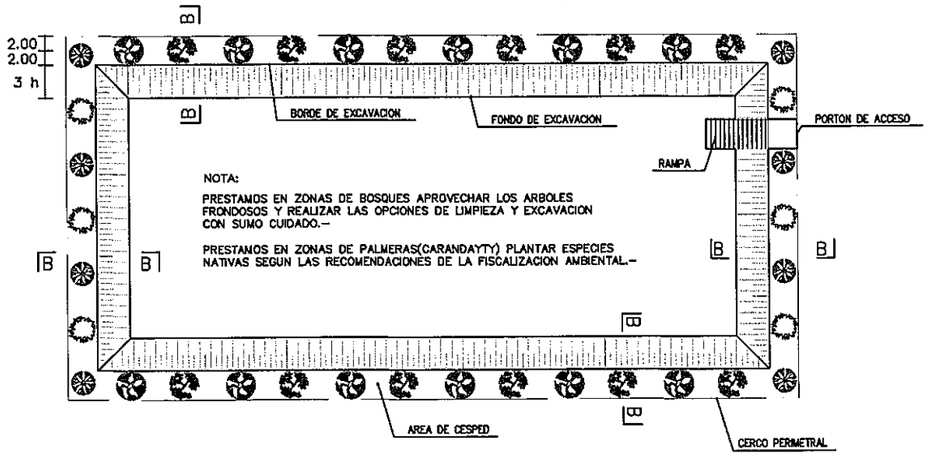


VISTA LATERAL

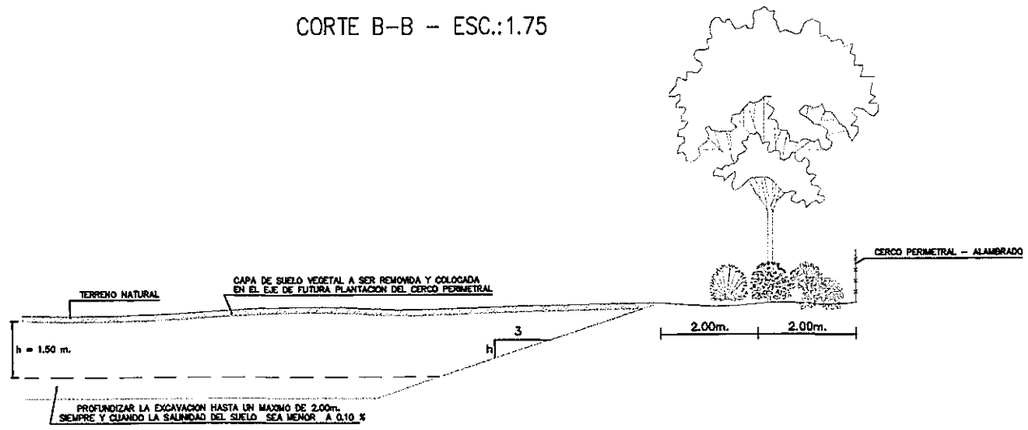
DETALLE PORTON DE ACCESO

PROTECCION DE PRESTAMO

PLANTA GENERAL – ESC.:1:1.000



CORTE B–B – ESC.:1.75



PARAMETROS TECNICOS

VELOCIDAD DIRECTRIZ :	80 KM/H
DISTANCIA DE VISIBILIDAD DE PARADA:	125 M.
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REPÚBLICA DEL PARAGUAY

DISEÑO DE PAVIMENTACION TIPO EMPEDRADO

TRAMO: EMPALME RUTA VII (SAN ANTONIO) - ARROYO TACUARY

PROTECCION FORESTAL