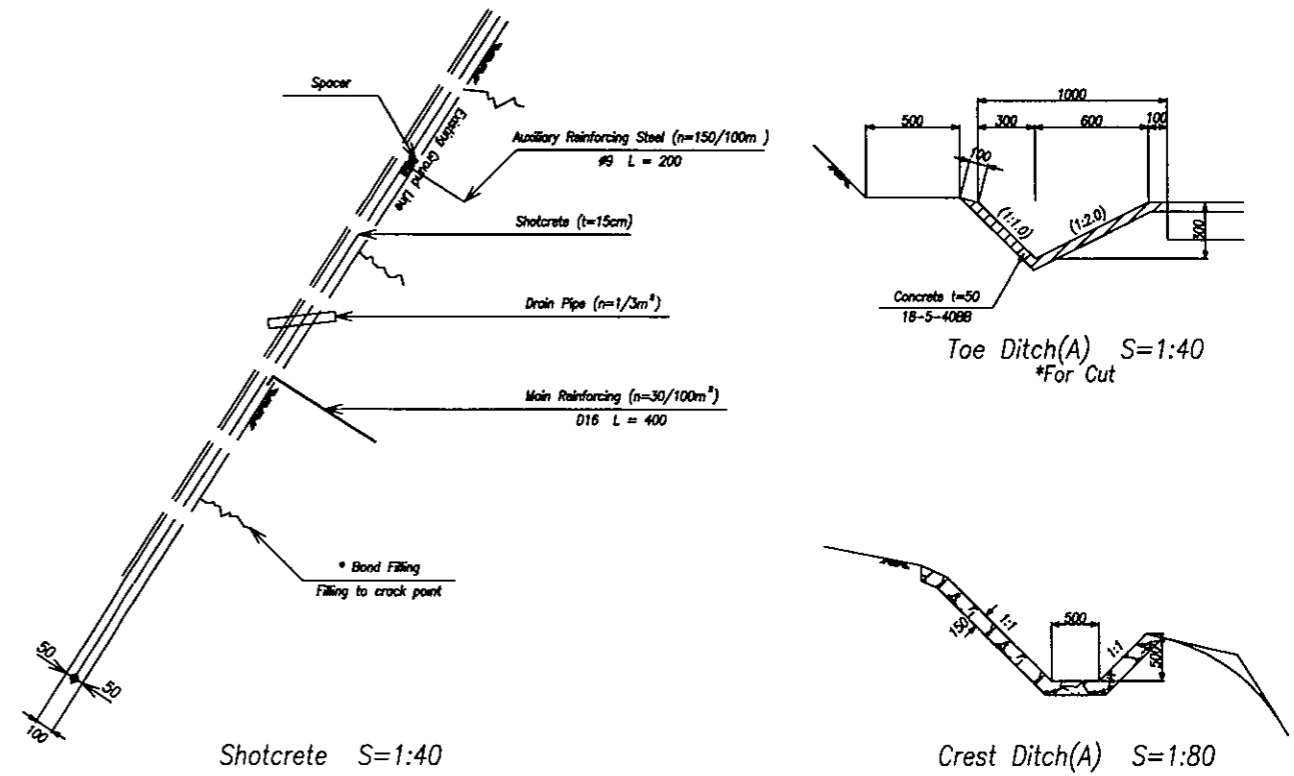
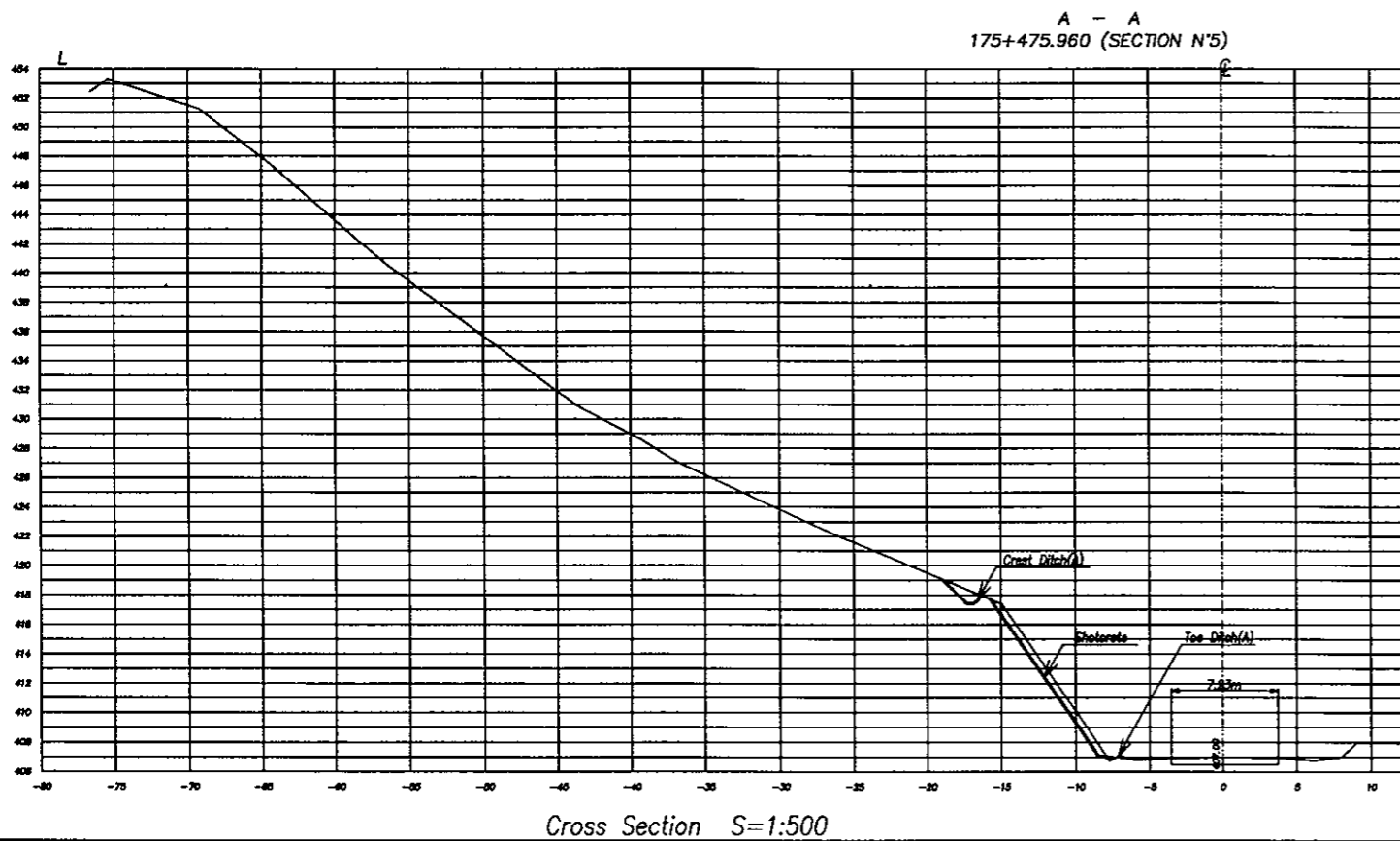
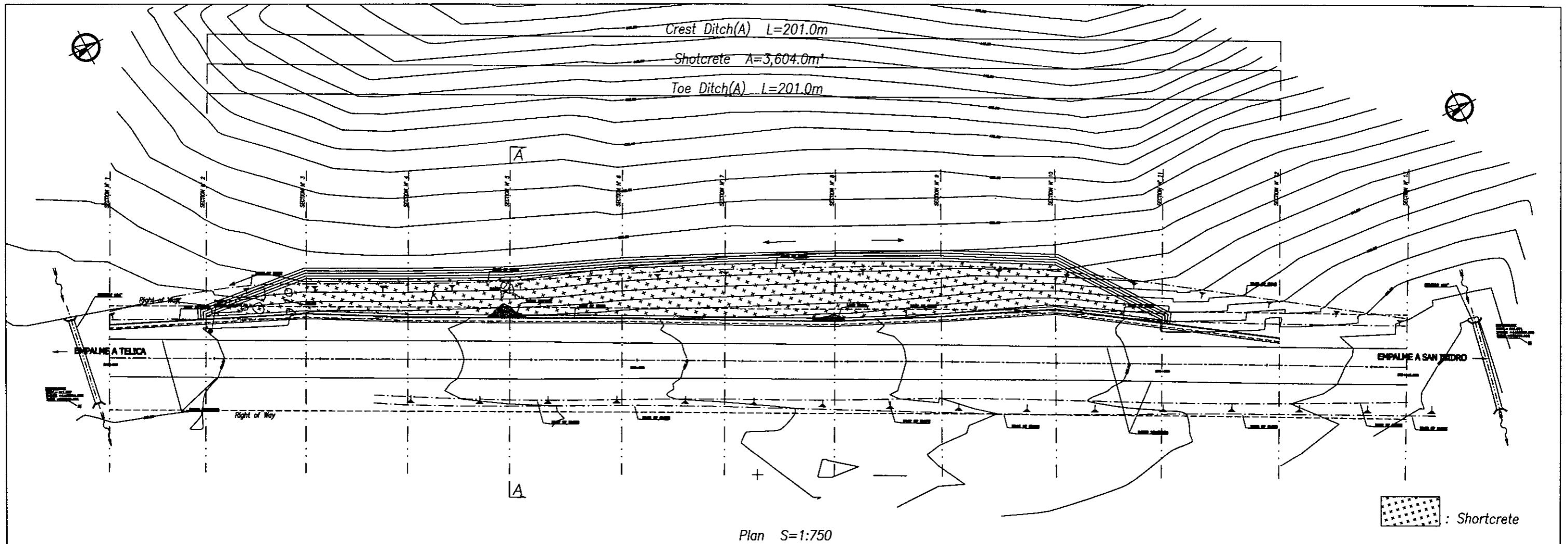


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CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES  
UBICACION: KM 154+500 CARRETERA MATAGALPA - LA DALIA  
SITIO: N005A001

PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA

CALCULO:	DEBIDO:	HOJA N°
LEVANTO:	FECHA: November 2002	24
RESPONSABLE TECNICO:	ESCALA: Illustration	44

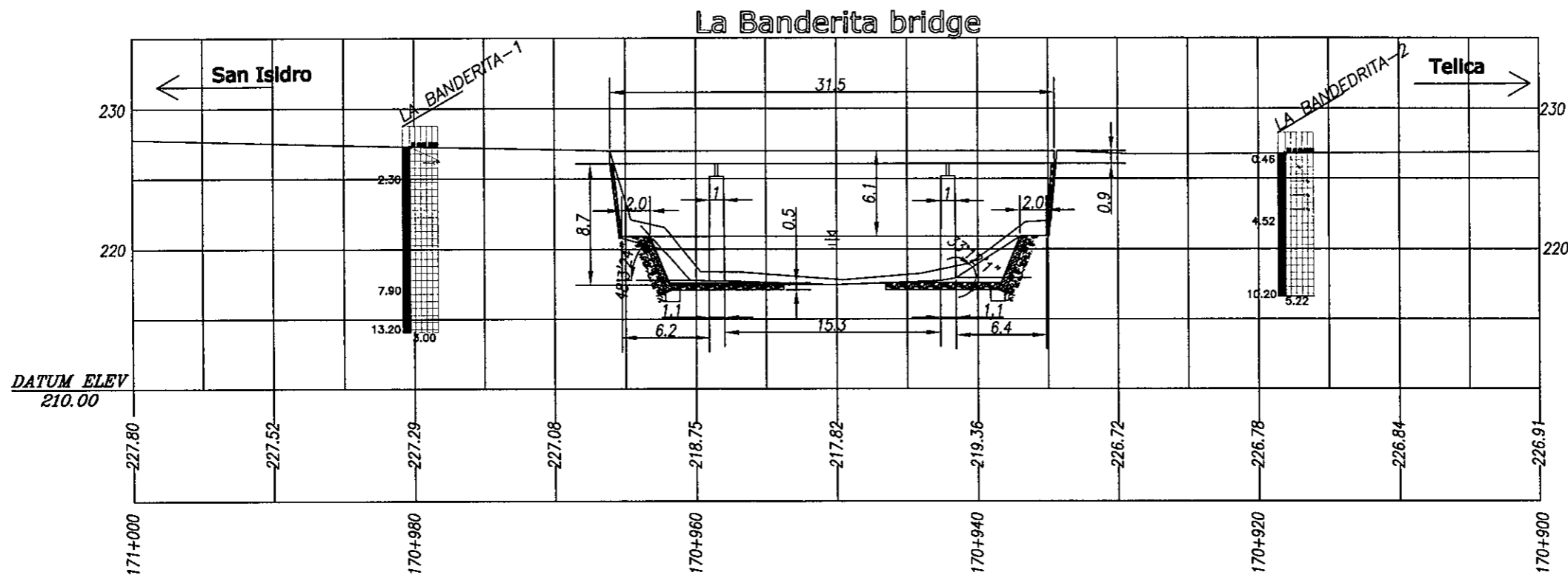


ORIENTAL CONSULTANTS CO., LTD.  
JAPAN ENGINEERING CONSULTANTS  
CO., LTD.

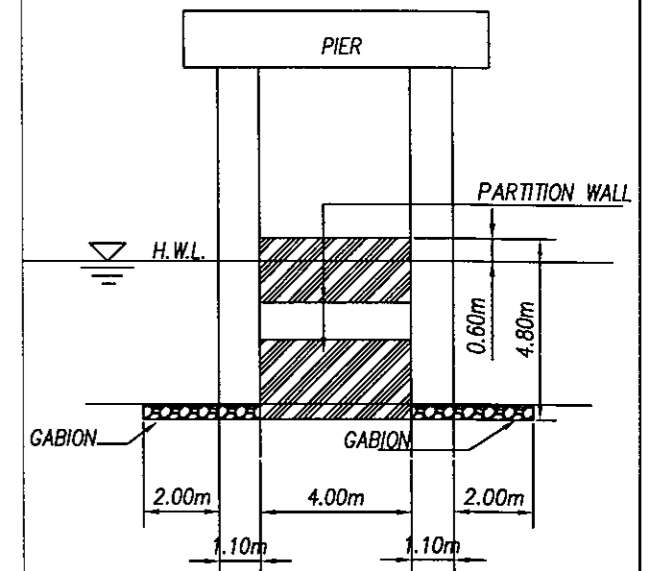
CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
SECCIONES TRANSVERSALES  
UBICACION: KM 175+450 CARRETERA TELICA - SAN ISIDRO  
SITE: N026A006

PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

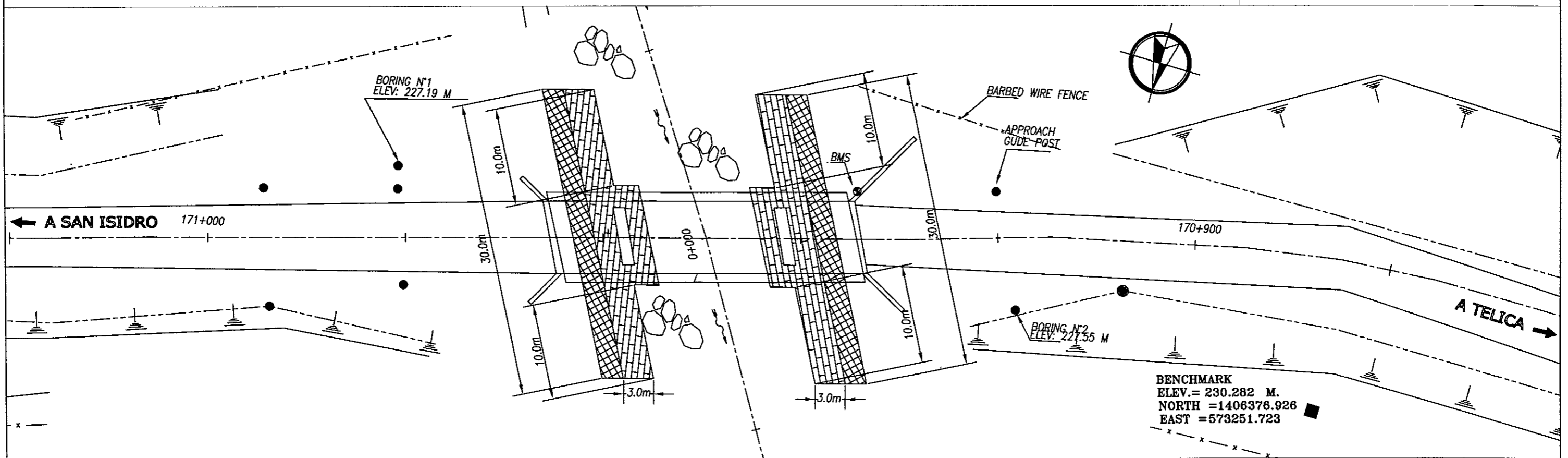
CALCULO:	DIBUJO:	HOJA N°
LEVANTO:	FECHA: November 2002	25
RESPONSABLE TECNICO:	ESCALA: Illustration	44



**CROSS SECTION ALONG CENTER LINE OF HIGHWAY**  
**SCALE HOR: 1:400 ; VER: 1:400**



**VIEW**  
**SCALE 1:200**

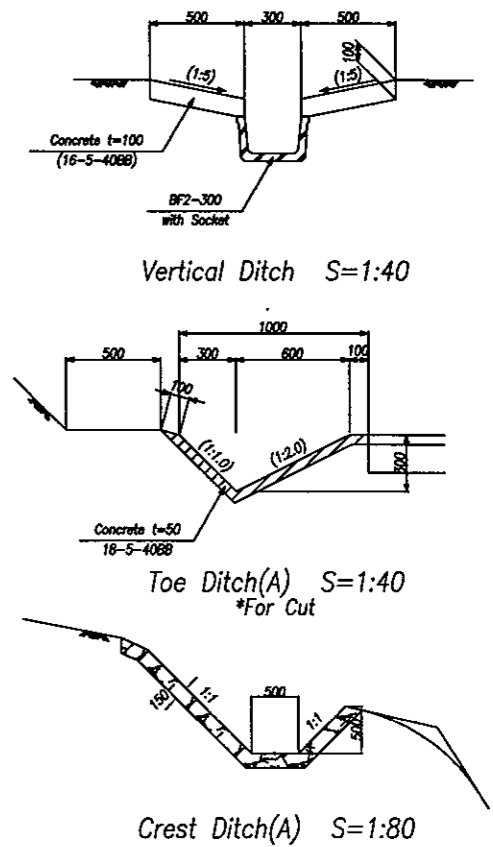
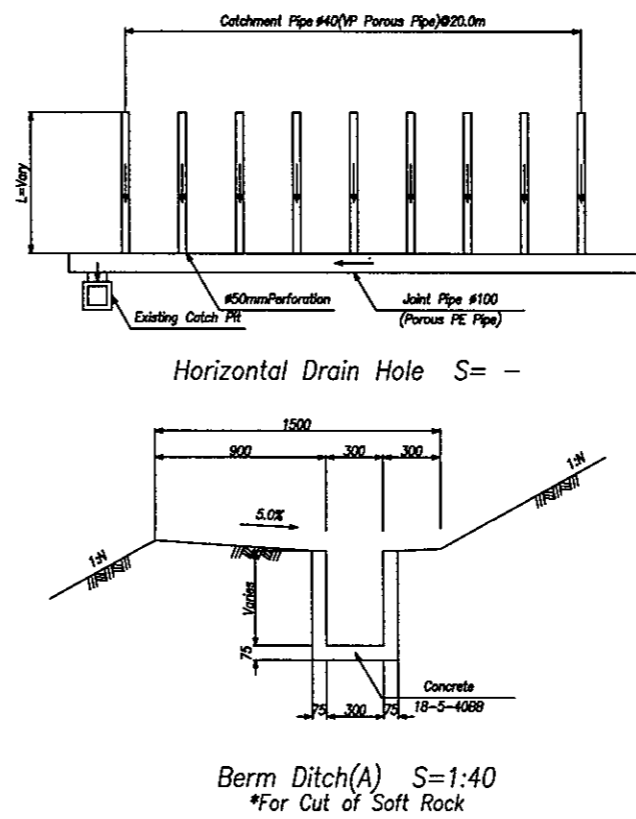
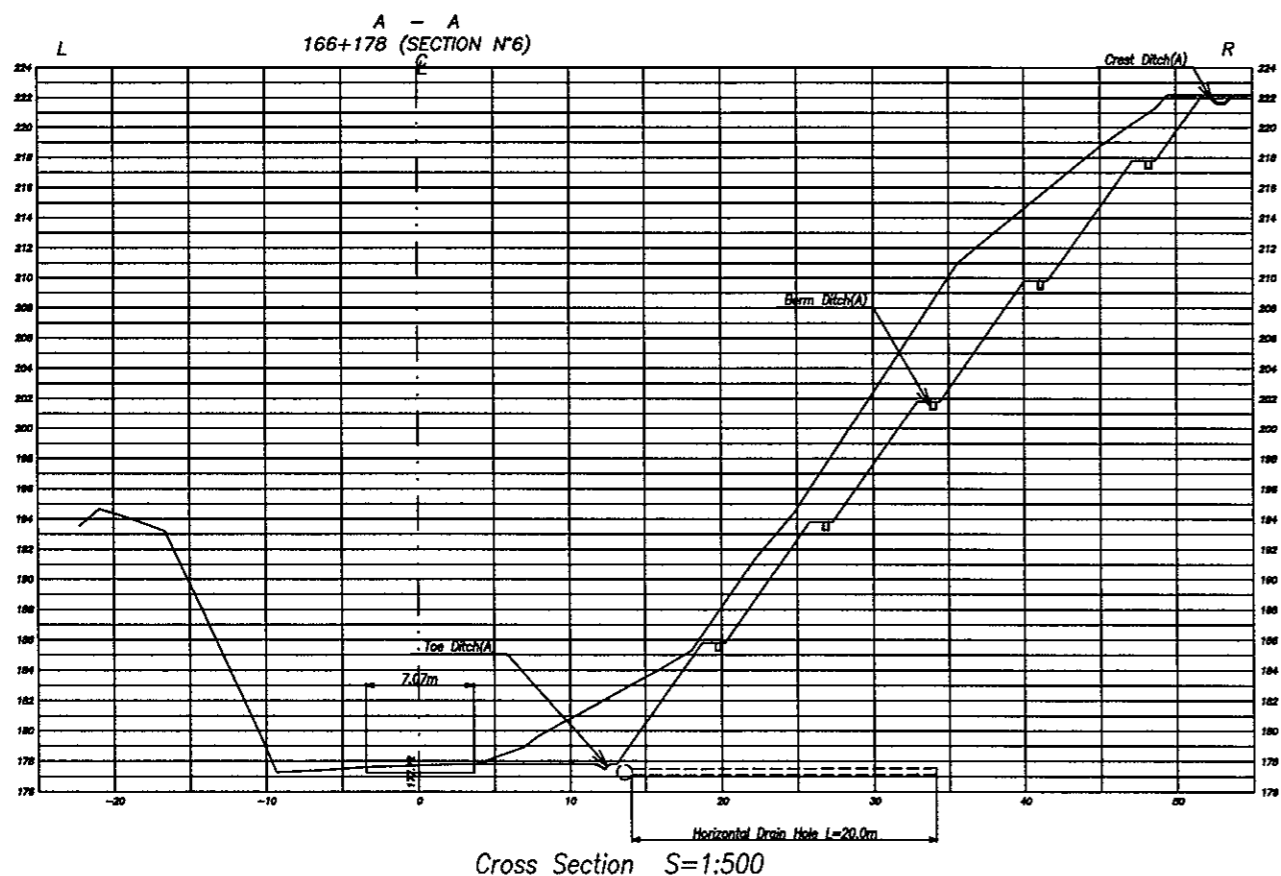
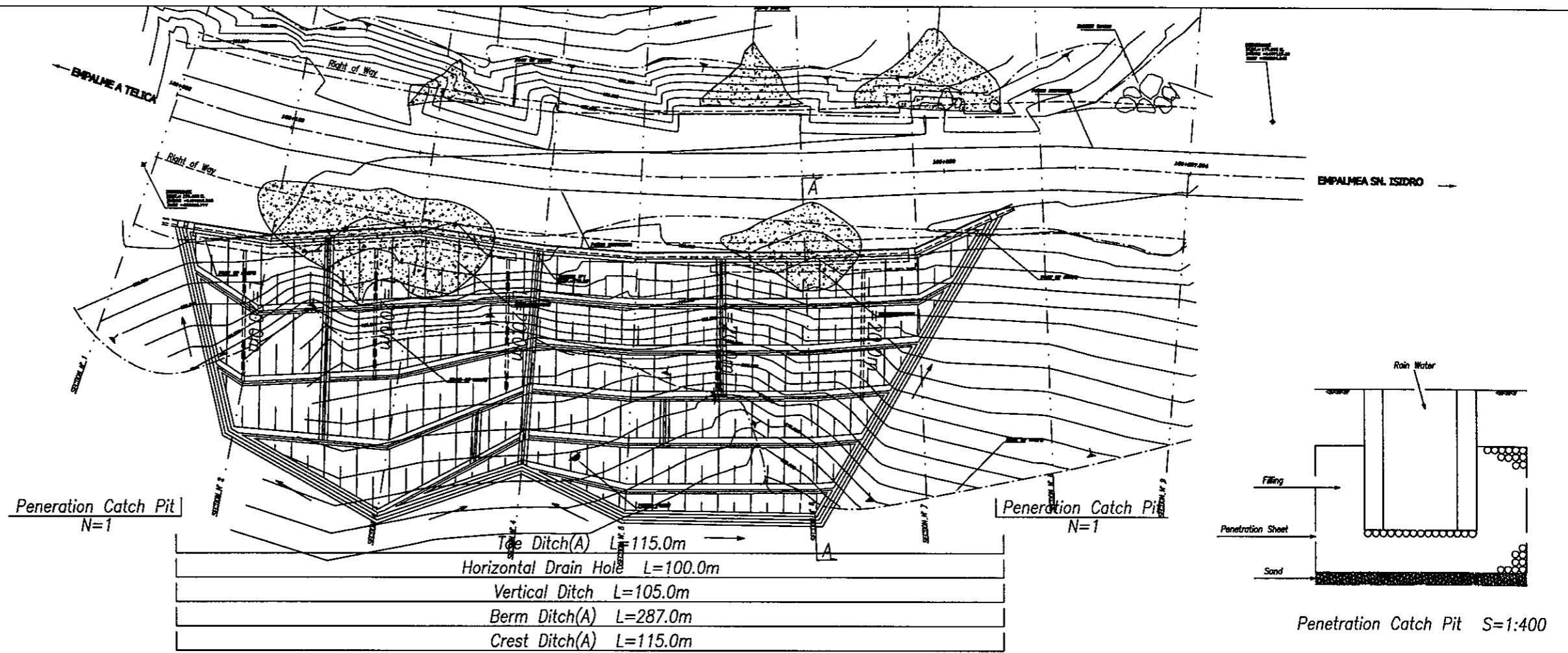


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 CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 170+952 CARRETERA TELICA - SAN ISIDRO
SITIO:	PUNTE LAS BANDERITAS (NIC 26)

PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO :	B. Zelaya	DIBUJO:	B. Zelaya	HOJA N°
LEVANTO :	Gerberto Bustamante	FECHA:		26
RESPONSABLE TECNICO :		ESCALA	1 : 400	44



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JAPAN ENGINEERING CONSULTANTS  
CO., LTD.

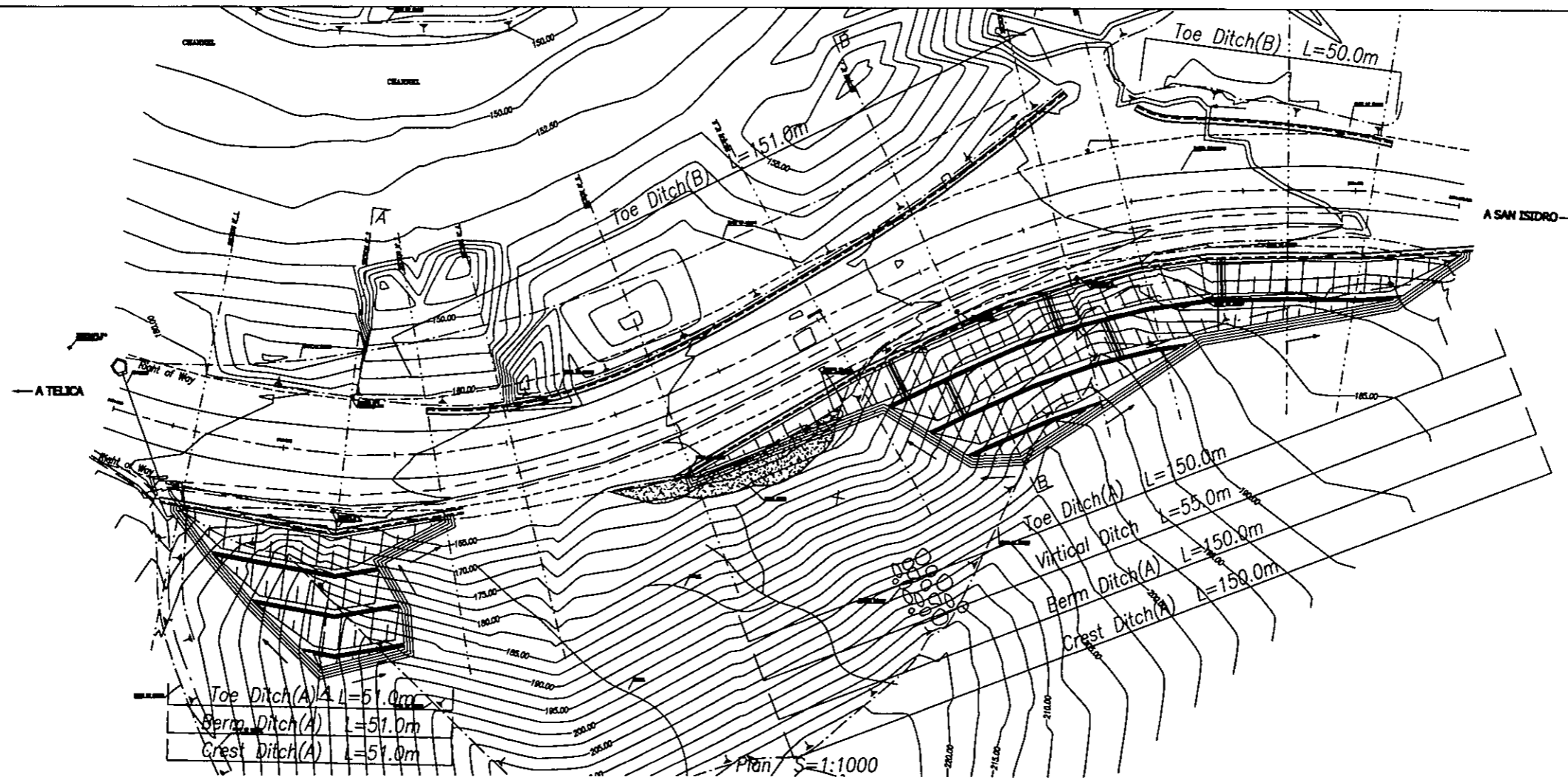
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SECCIONES TRANSVERSALES

UBICACION: KM 166+300 CARRETERA TELICA - SAN ISIDRO

SITIO: N026B140

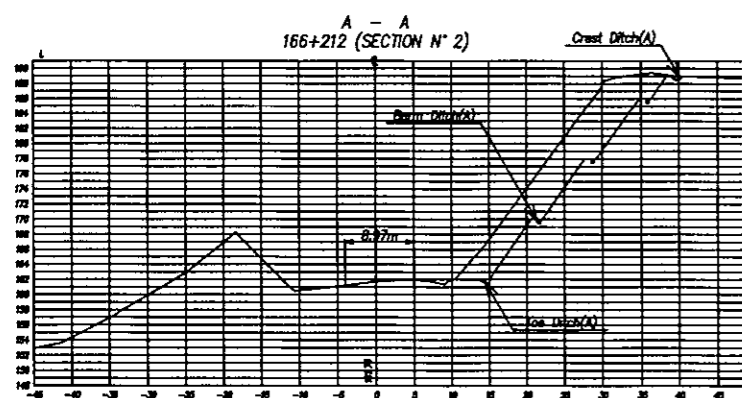
PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO:	DIBUJO:	HOJA N°
LEVANTO:	FECHA: November 2002	27
RESPONSABLE TECNICO:	ESCALA: Illustration	44

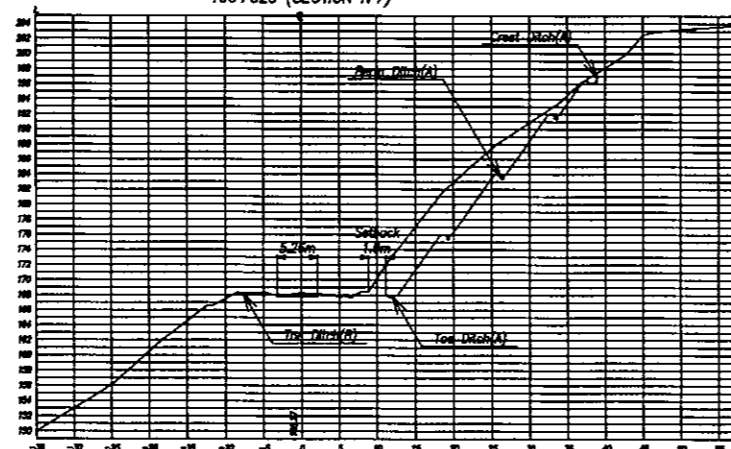


Toe Ditch(A) L=51.0m  
 Berm Ditch(A) L=51.0m  
 Crest Ditch(A) L=51.0m

Plan S=1:1000

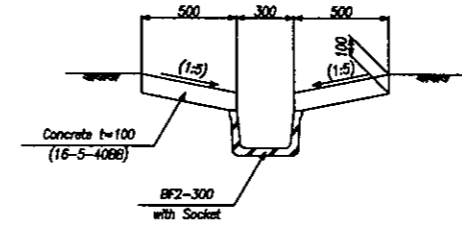


A - A  
166+212 (SECTION N° 2)

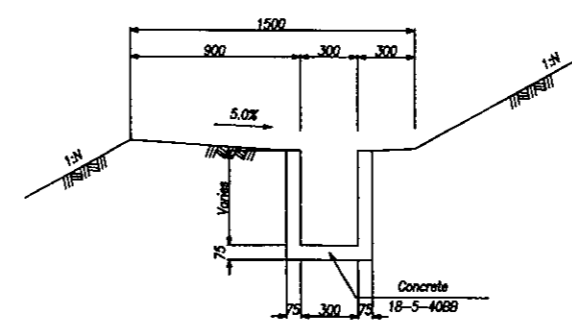


B - B  
166+323 (SECTION N° 7)

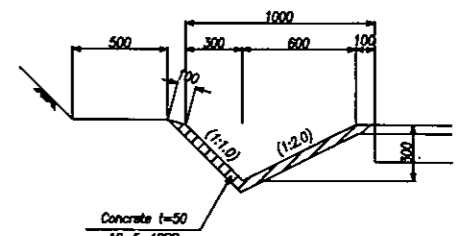
Cross Section S=1:1000



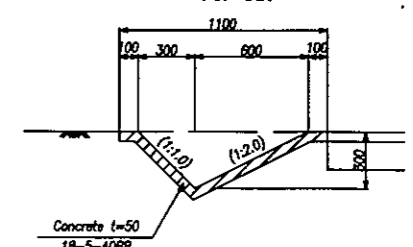
Vertical Ditch S=1:40



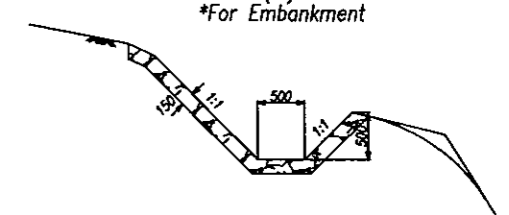
Berm Ditch(A) S=1:40  
\*For Cut of Soft Rock



Toe Ditch(A) S=1:40  
\*For Cut



Toe Ditch(B) S=1:40  
\*For Embankment



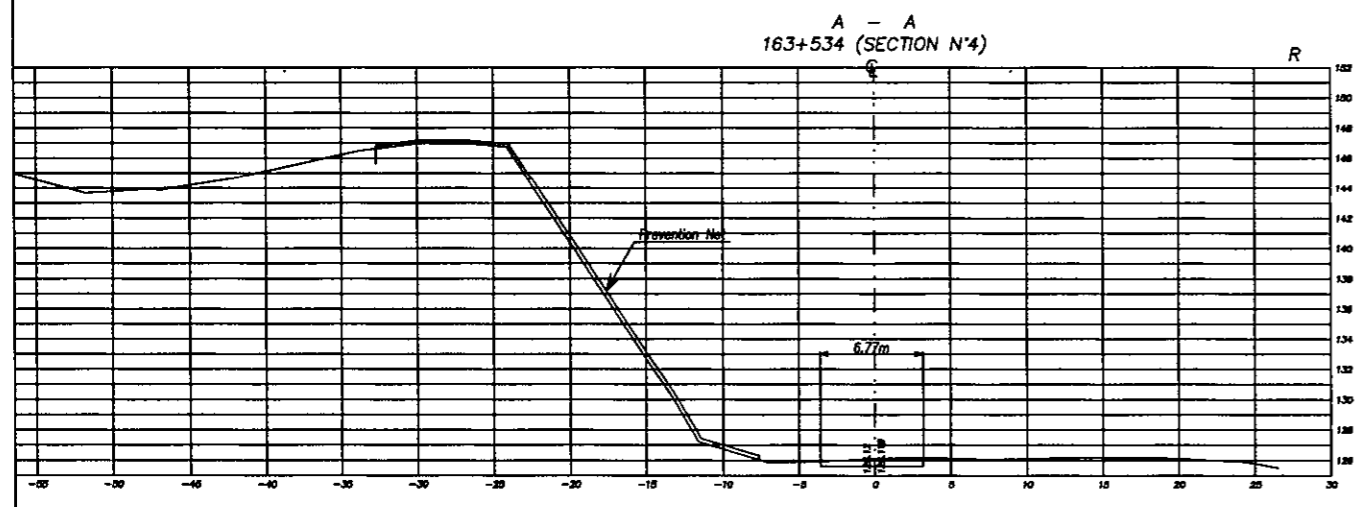
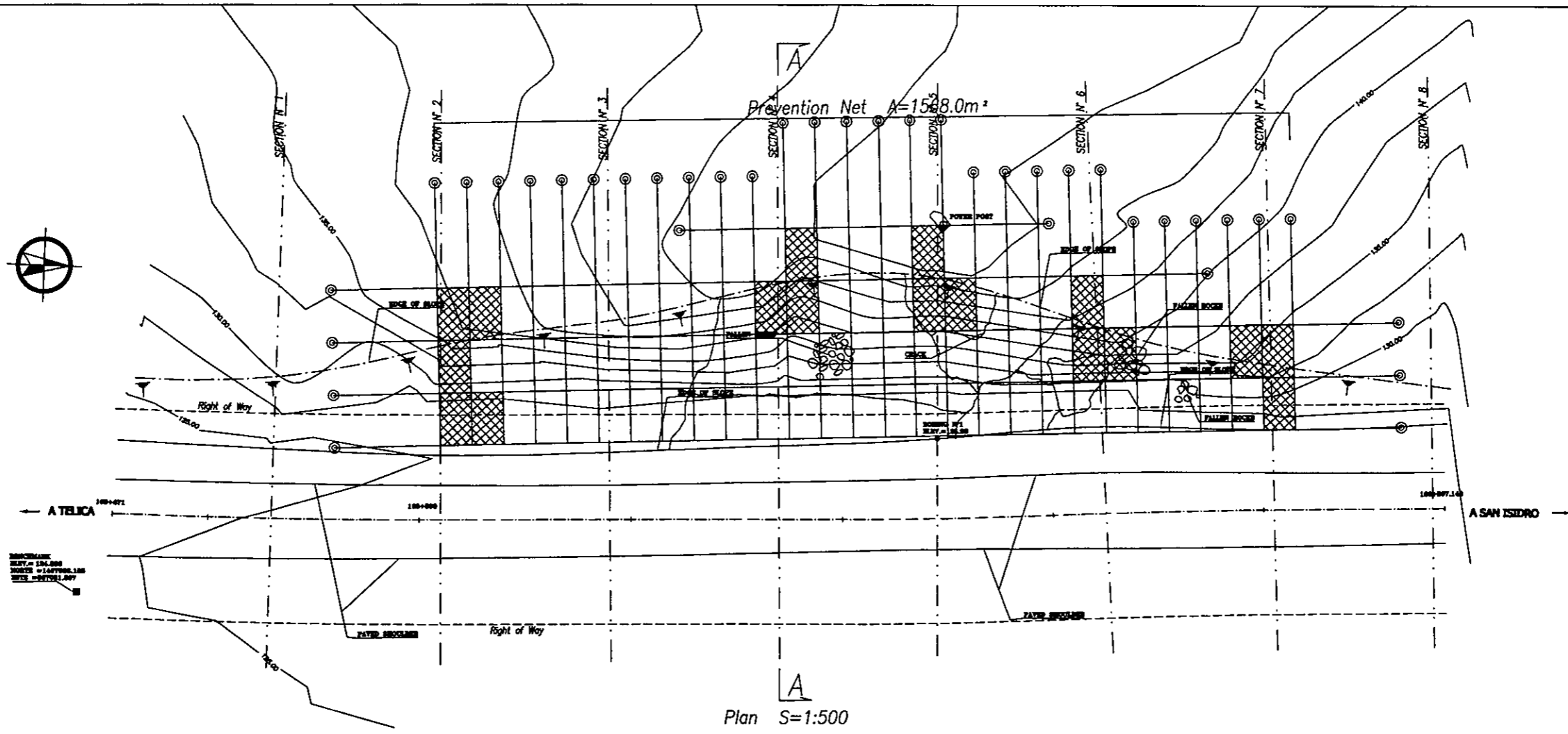
Crest Ditch(A) S=1:80

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 JAPAN ENGINEERING CONSULTANTS  
 CO., LTD.

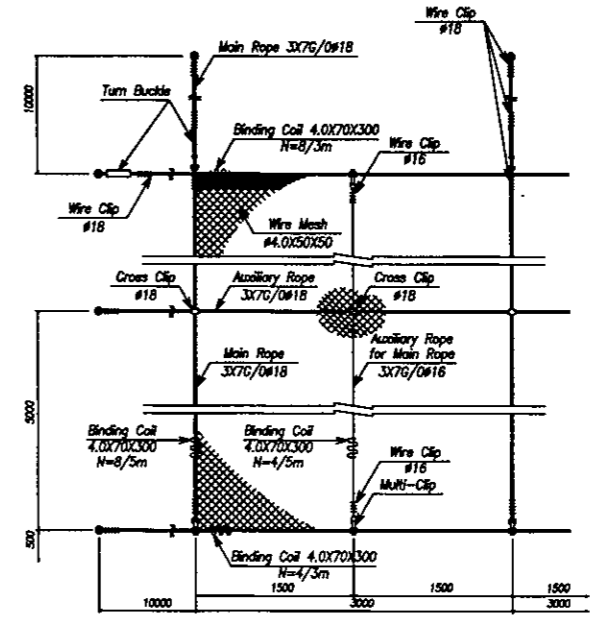
CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 166+169 CARRETERA TELICA - SAN ISIDRO
SITIO:	N026A150

PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO:	DIBUJO:	HOJA N°
LEVANTO:	FECHA:	28
RESPONSABLE TECNICO:	ESCALA:	44
	Illustration	



Cross Section S=1:500



General Layout of Prevention Net S=Non Scale

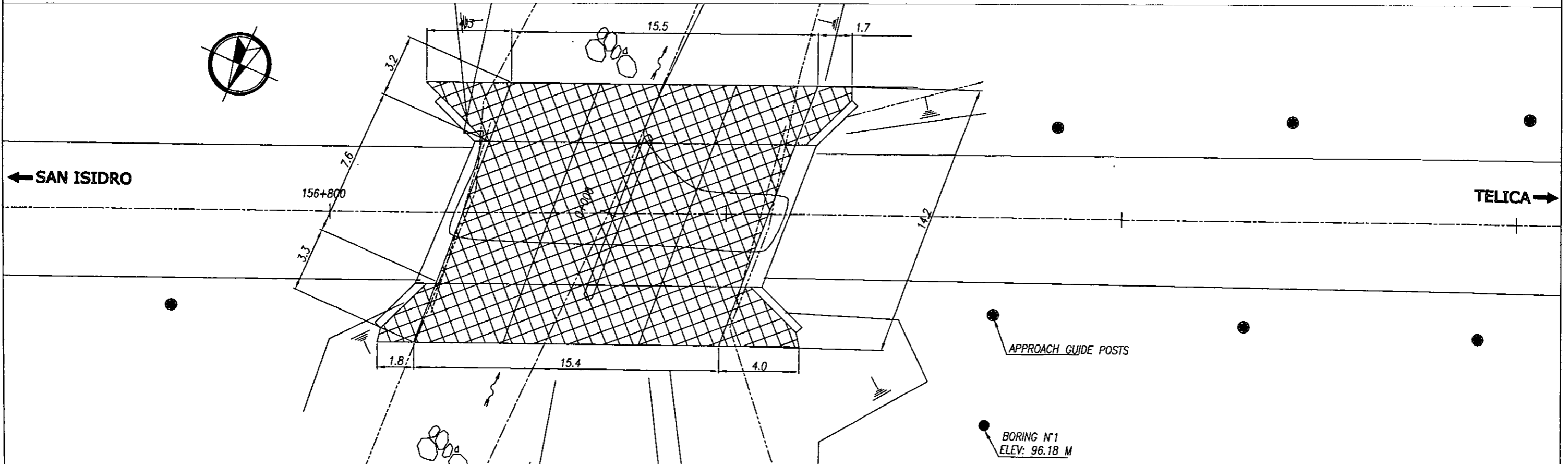
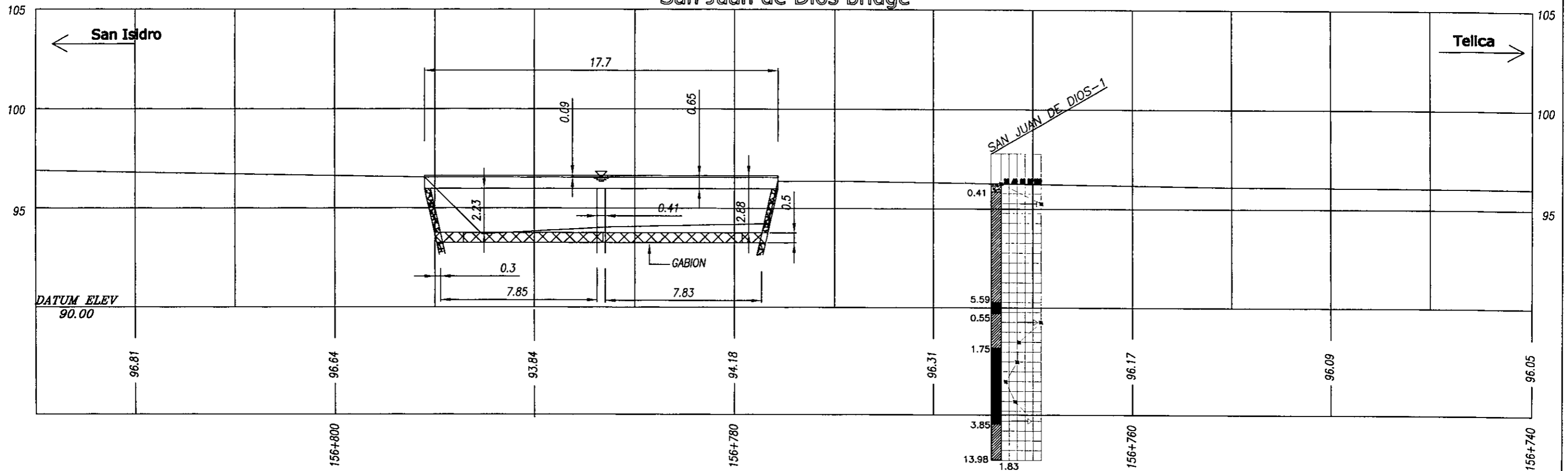
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JAPAN ENGINEERING CONSULTANTS  
CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 163+471 CARRETERA TELICA - SAN ISIDRO
SITO:	N026B160

PROYECTO:  
STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO:	DIBUJO:	HOJA N°
LEVANTO :	FECHA:	29
RESPONSABLE TECNICO :	ESCALA:	44
	Illustration	

# San Juan de Dios bridge



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CO., LTD.

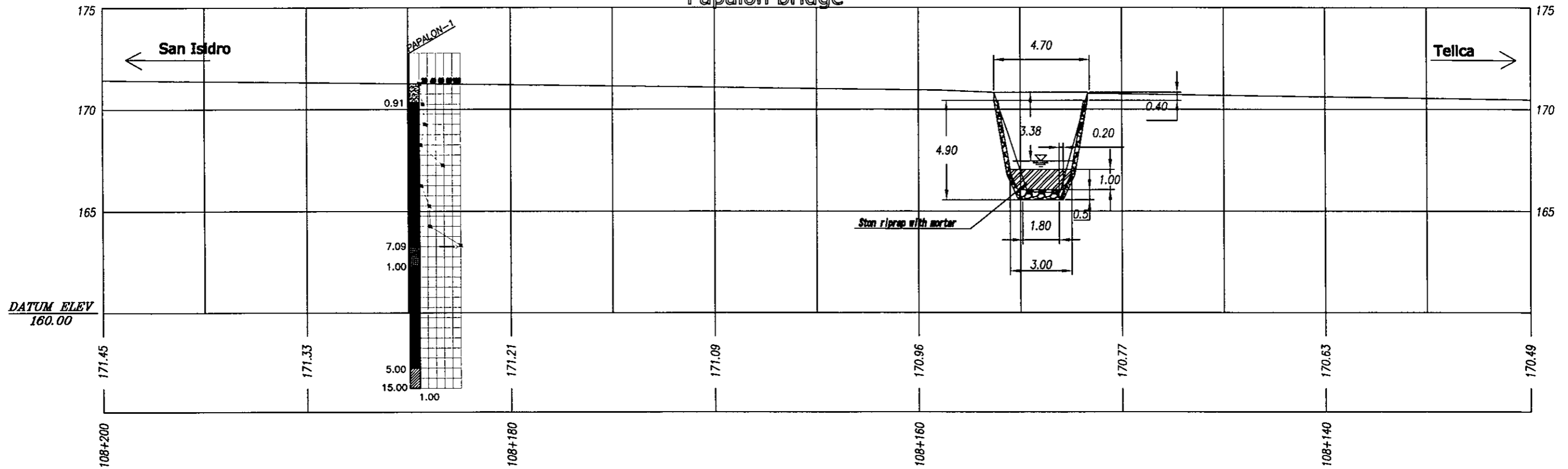
CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 156+785 CARRETERA TELICA - SAN ISIDRO
SITIO:	PUENTE SAN JUAN DE DIOS (NIC 26)

PROYECTO:

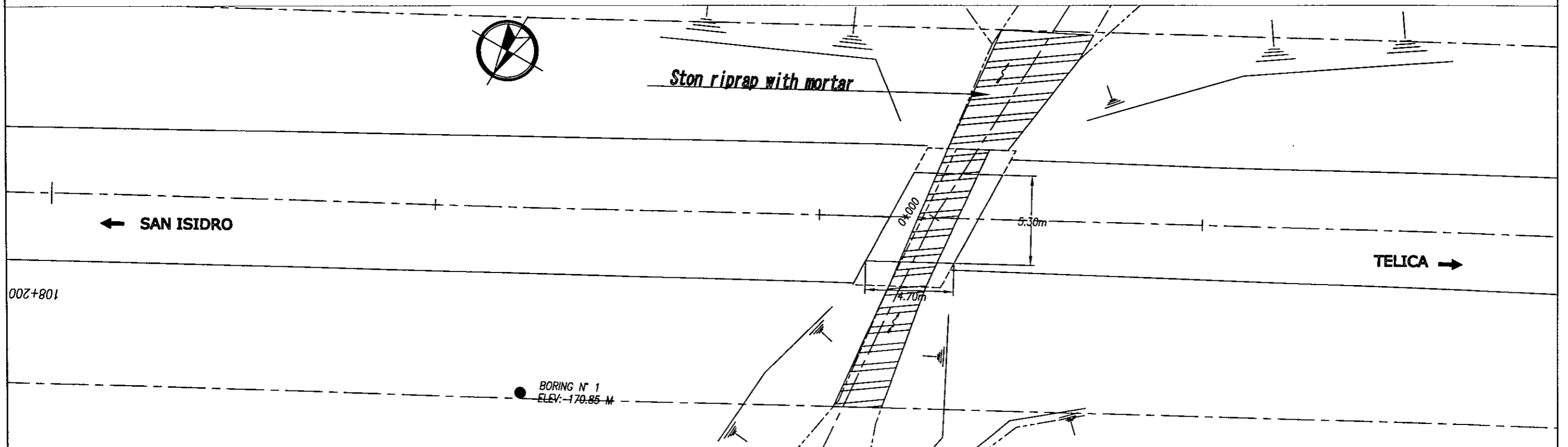
STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO :	B. Zelaya	DESENHO:	B. Zelaya	HOJA N°
LEVANTO :	Gilberto Bustamante	FECHA:		30
RESPONSABLE TECNICO :		ESCALA	1 : 200	44

Papalon bridge



**CROSS SECTION ALONG CENTER LINE OF HIGHWAY**  
 SCALE HOR: 1:200 ; VER: 1:200



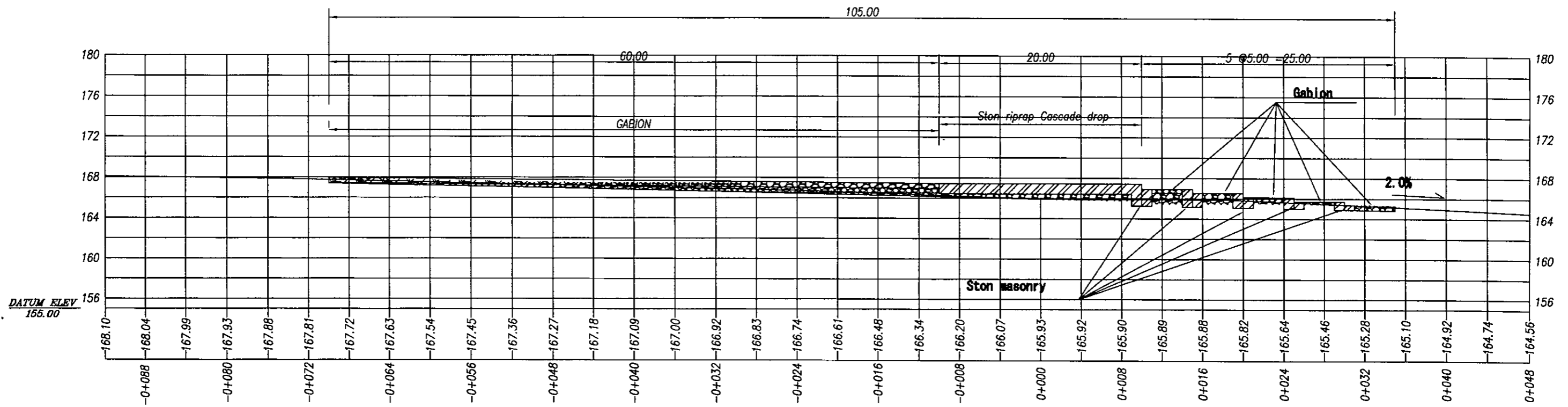
ORIENTAL CONSULTANTS CO., LTD.  
 JAPAN ENGINEERING CONSULTANTS  
 CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 108+154 CARRETERA TELICA - ISIDRO
SITO:	PUNTE PAPANON (NIC 25)

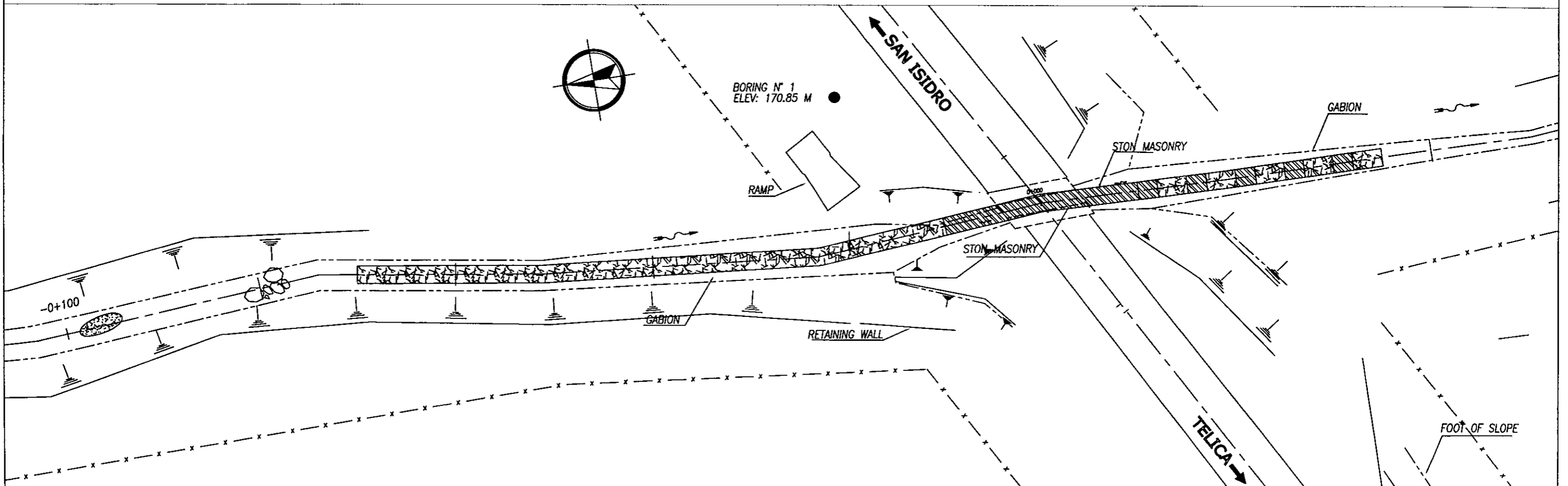
PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO:	B. Zelaya	DIBUJO:	B. Zelaya	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:		31
RESPONSABLE TECNICO:		ESCALA:	1 : 200	44





**CROSS SECTION ALONG CENTER LINE TRENCH AXIS**  
**SCALE HOR: 1:400 ; VER: 1:400**

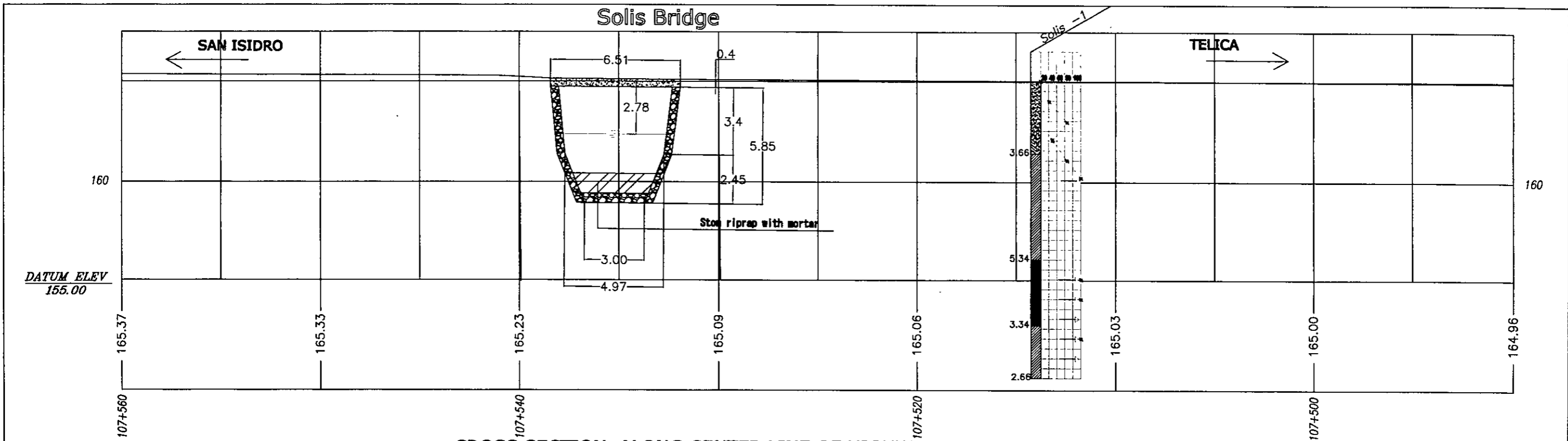


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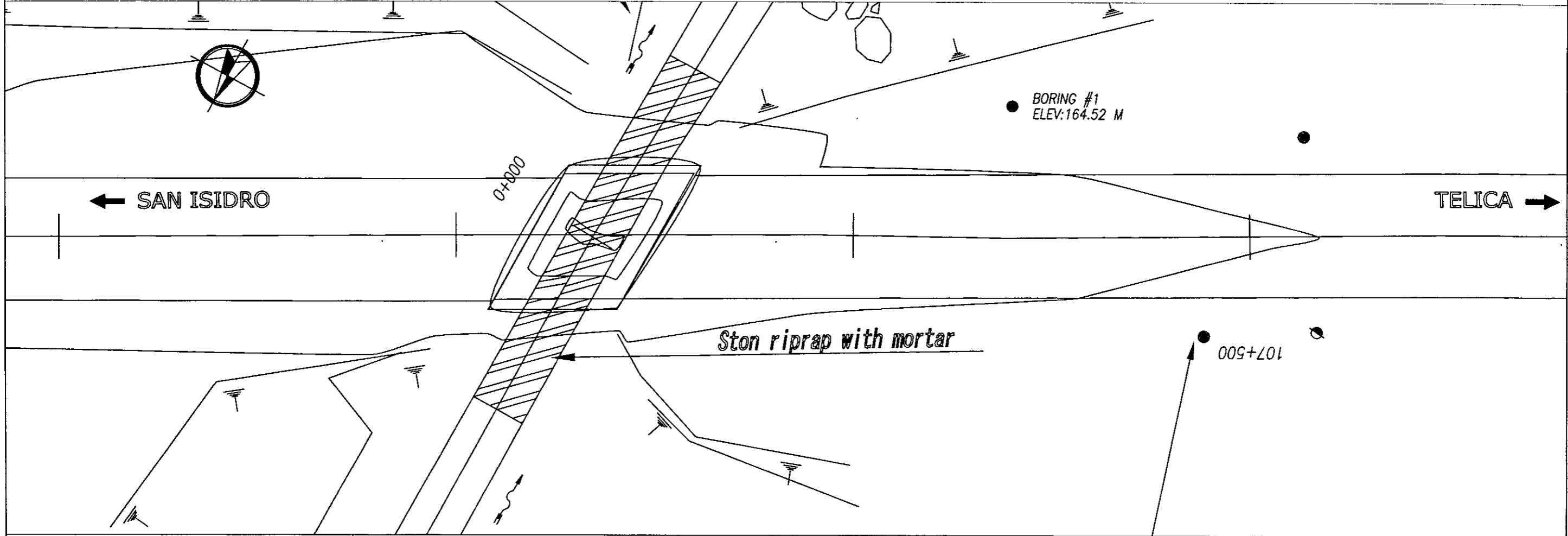
CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
 UBICACION: KM 108+154 CARRETERA TELICA - ISIDRO  
 SITIO: PUENTE PAPALON (NIC 25)

PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO:	B. Zelaya	DIBUJO:	B. Zelaya	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:		32
RESPONSABLE TECNICO:		ESCALA:	1:400	44



**CROSS SECTION ALONG CENTER LINE OF HIGHWAY**  
**SCALE HOR: 1:200 ; VER: 1:200**

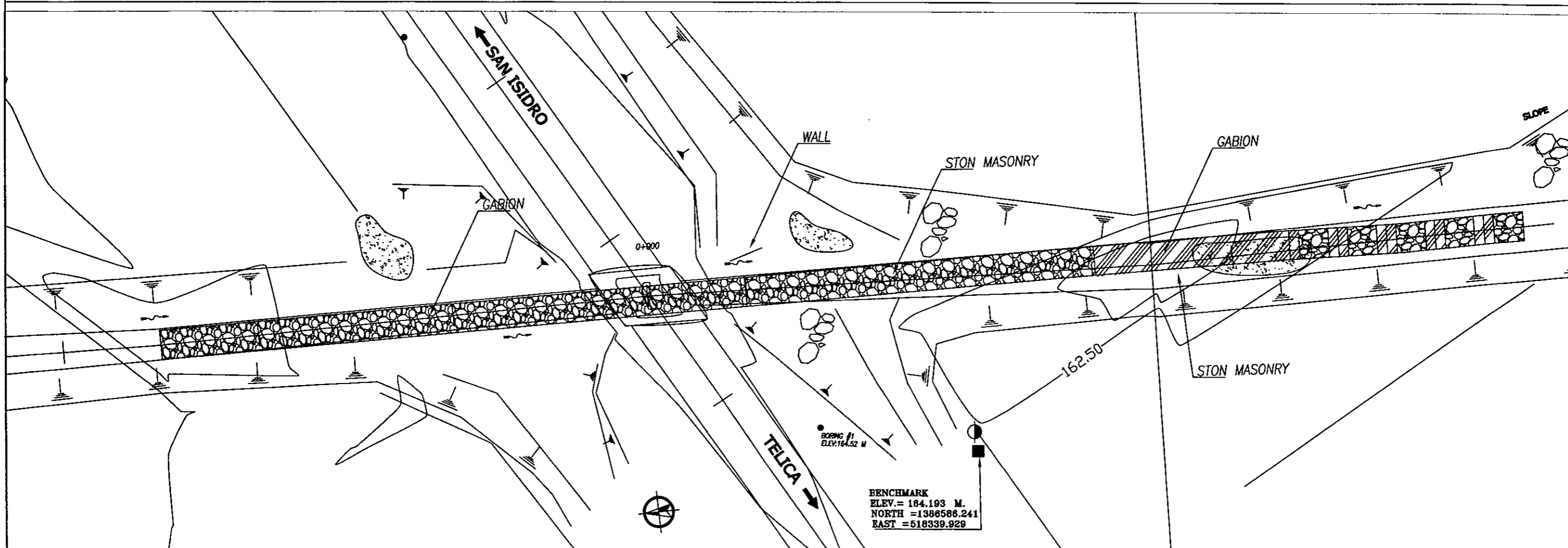
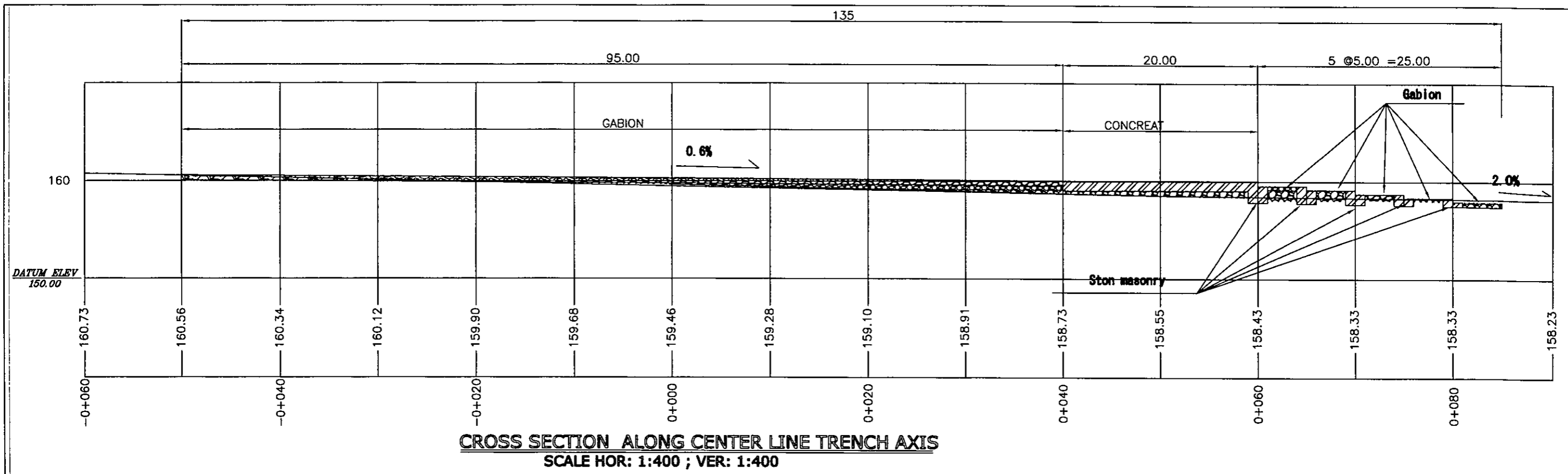


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CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 107+533 CARRETERA TELICA - SAN ISIDRO
SITIO:	PUENTE SOLIS (NIC 25)

PROYECTO:  
**STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA**

CALCULO :	Ch. Rivera. C.	DIBUJO:	Ch. Rivera. C.	HOJA N°
LEVANTO :	Mauricio Méndez	FECHA:		33
RESPONSABLE TECNICO :		ESCALA	1 : 200	44



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JAPAN ENGINEERING CONSULTANTS  
CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 107+533 CARRETERA TELICA - SAN ISIDRO
SITIO:	PUNTE SOLIS (NIC 26)

PROYECTO:  
STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO:	Ch. Rivera. C.	DIBUJO:	Ch. Rivera. C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:		34
RESPONSABLE TECNICO:		ESCALA:	1 : 400	44

# Typical Cross Section

## For Cut

Cut Slope Standard in Nicaragua

Functional Classification	Minor Collector	Major Collector	Minor Arterial	Principal Arterial	Special Arterial
Number of Lane	2	2	2	2	4
Future Average Daily Traffic (vpd)	-400	400-1,800	1,800-3,000	-3,000	Over 3,000
Side-slope	On Sound Rock	0-1/2:1	0-1/2:1	0-1/2:1	0-1/2:1
	Unknown Soil	1:1	1 1/2:1	1 1/2:1	2:1
	Well Compacted Soil	1:1	1 1/2:1	1 1/2:1	2:1
	Not Well Compacted Soil	1 1/2:1	1 1/2:1	2:1	2:1

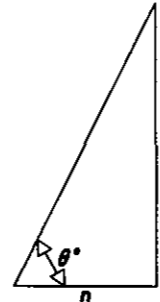
## For Embankment

Cut Slope Standard in Nicaragua

Functional Classification	Minor Collector	Major Collector	Minor Arterial	Principal Arterial	Special Arterial
Number of Lane	2	2	2	2	4
Future Average Daily Traffic (vpd)	-400	400-1,800	1,800-3,000	-3,000	Over 3,000
Side-slope	H < 1.2m	3:1	3:1	4:1	4:1
	H > 1.2m	1 1/2:1	1 1/2:1	2:1	2:1

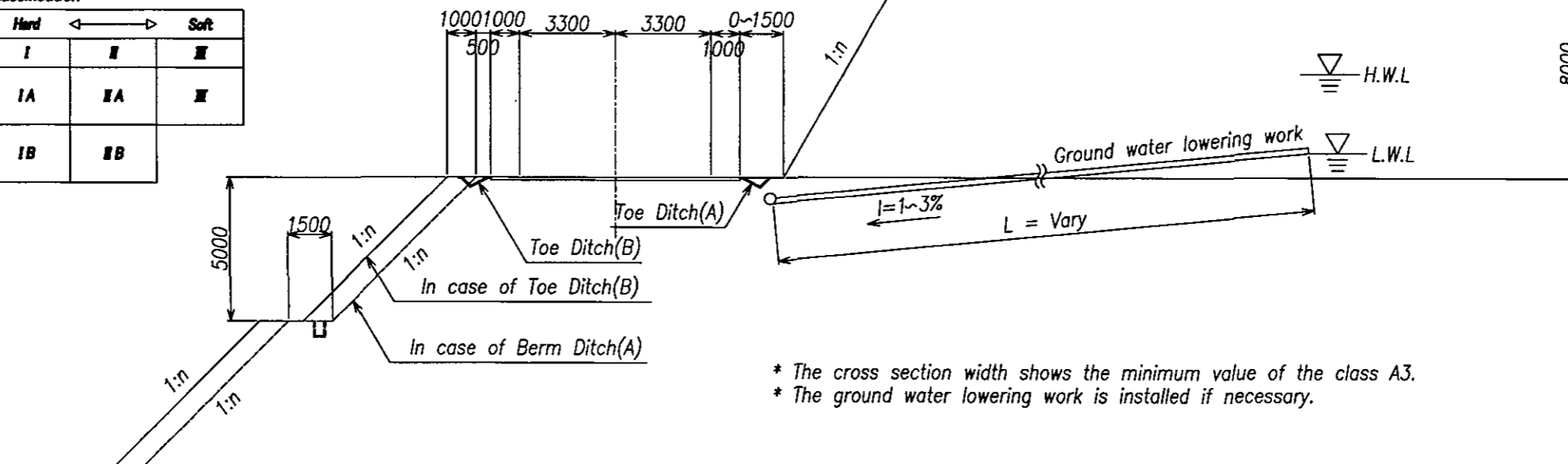
Recommendable Cut Slope Standard in Nicaragua

Classification	Height of cut (m)	Degree of Cut $\theta(^{\circ})$	$1/\tan \theta$	n	:	1		
hard rock	IB	$10 \geq H$	80	0.1763	0.2	:	1	
		$10 < H \leq 20$	80	0.1763	0.2	:	1	
		$20 < H \leq 30$	80	0.5774	0.6	:	1	
soft rock	IB	$H > 30$	80	0.5774	0.6	:	1	
		IIA	$10 \geq H$	65	0.4663	0.5	:	1
			$10 < H \leq 20$	65	0.4663	0.5	:	1
	$20 < H \leq 30$		65	0.7002	0.8	:	1	
	IIA	$H > 30$	65	0.7002	0.8	:	1	
		IIA	$10 \geq H$	60	0.5774	0.6	:	1
$10 < H \leq 20$			60	0.5774	0.6	:	1	
$20 < H \leq 30$	60		0.8391	1.0	:	1		
soil/sand	III	$H > 30$	60	0.8391	1.0	:	1	
		IIA	$10 \geq H$	55	0.7002	0.8	:	1
			$10 < H \leq 20$	55	0.7002	0.8	:	1
	$20 < H \leq 30$		45	1.0000	1.0	:	1	
	III	$H > 30$	45	1.0000	1.0	:	1	
		$10 \geq H$	45	1.0000	1.0	:	1	
$10 < H \leq 20$		40	1.1918	1.2	:	1		
	$20 < H \leq 30$	35	1.4281	1.5	:	1		
	$H > 30$	30	1.7321	1.8	:	1		



Concept for Rock Classification

Rock Quality Classification according to Hardness	Hard ← → Soft		
	I	II	III
Rock Quality Classification according to Looseing Rate			
Large	A	IA	IIA
Small	B	IB	IIB



\* The cross section width shows the minimum value of the class A3.  
 \* The ground water lowering work is installed if necessary.

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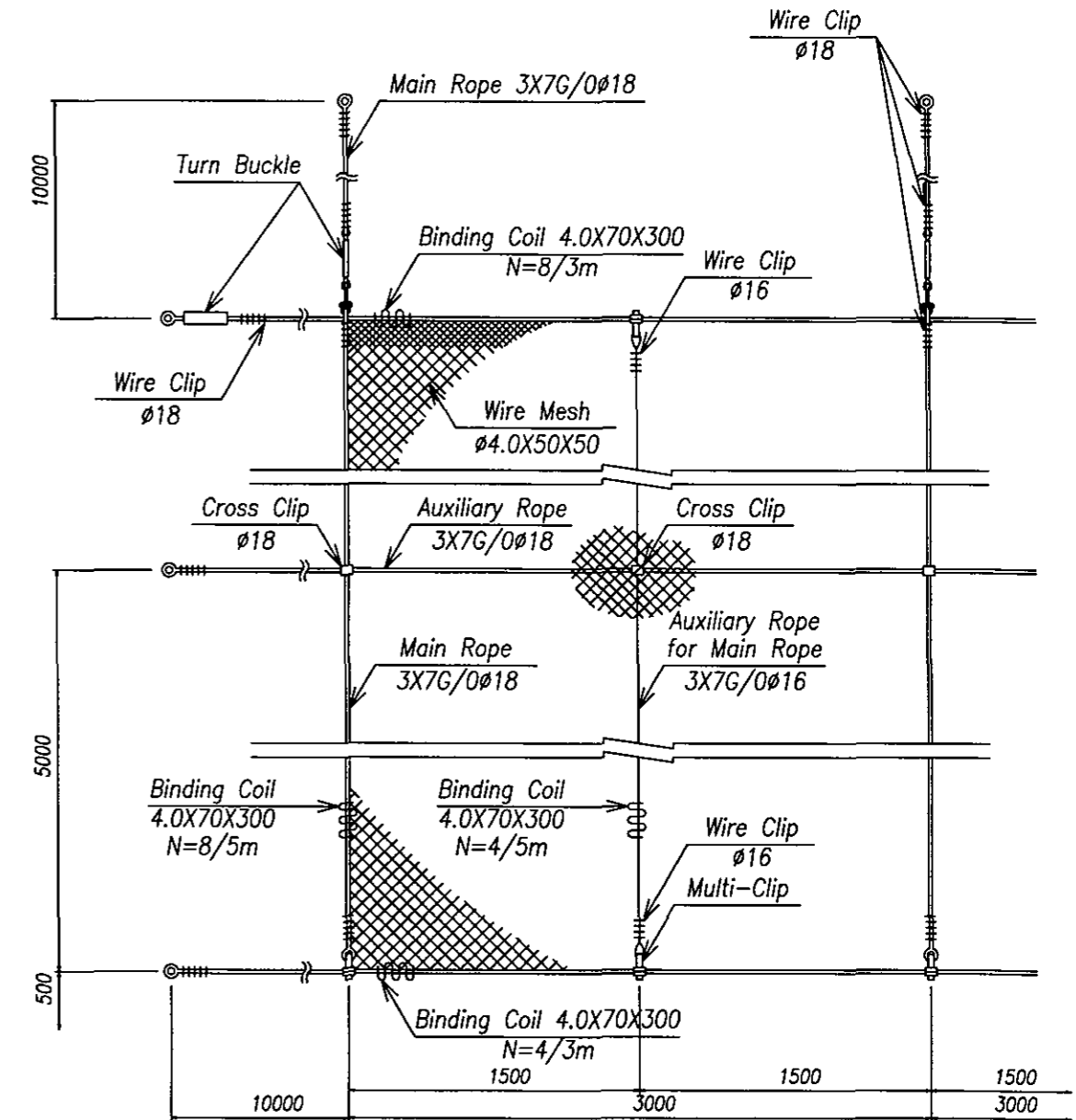
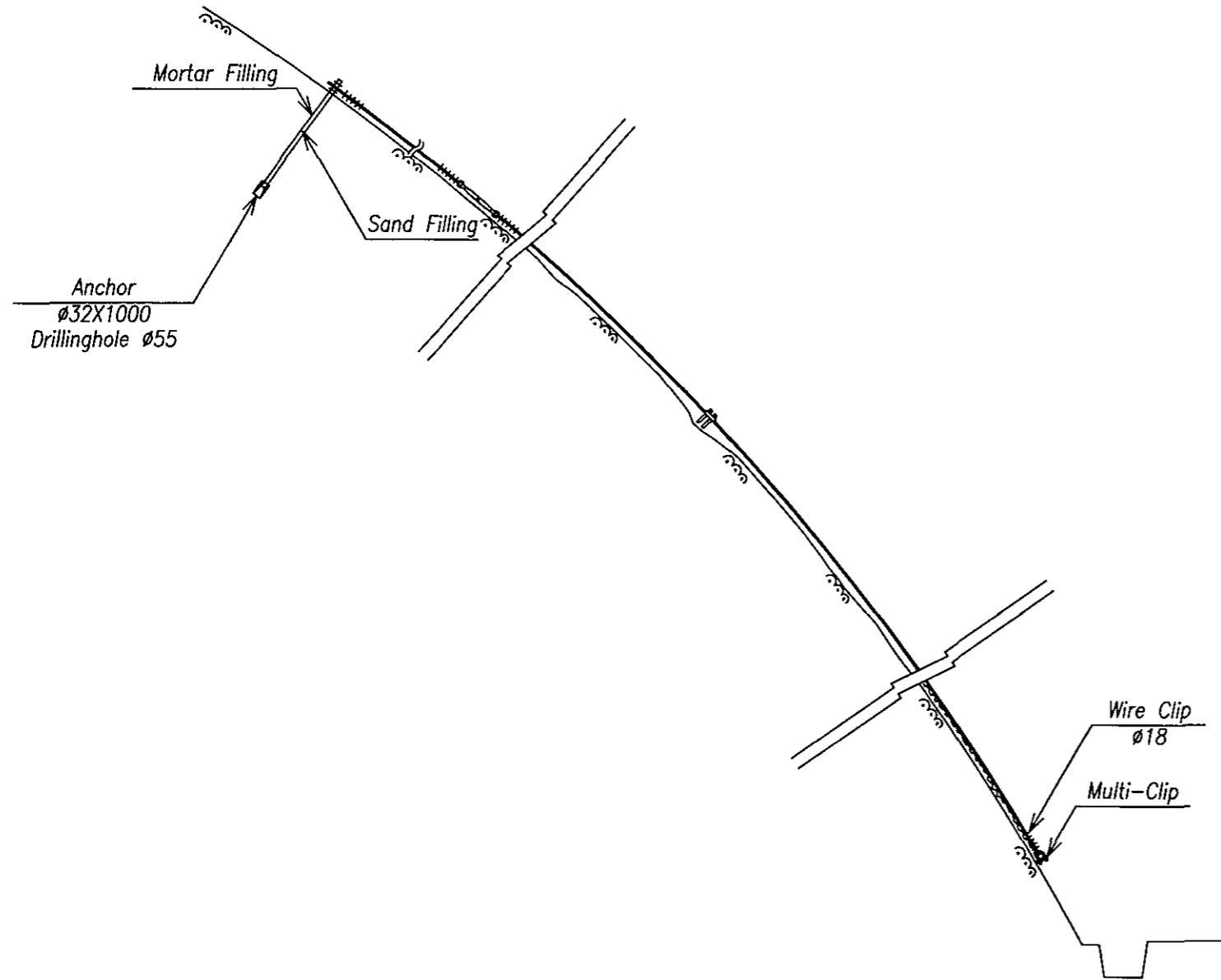
CONTENIDO:  
 UBICACION:  
 SITIO:

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO:	DEBIDO:	HOJA N°
LEVANTO:	FECHA:	35
RESPONSABLE TECNICO:	ESCALA:	44
	S = 1:200	

# General Layout of Prevention Net



ORIENTAL CONSULTANTS CO., LTD.  
 JAPAN ENGINEERING CONSULTANTS  
 CO., LTD.

CONTENIDO:  
 UBICACION:  
 SITIO:

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO:

LEVANTO :

RESPONSABLE TECNICO :

DIBUJO:

FECHA:

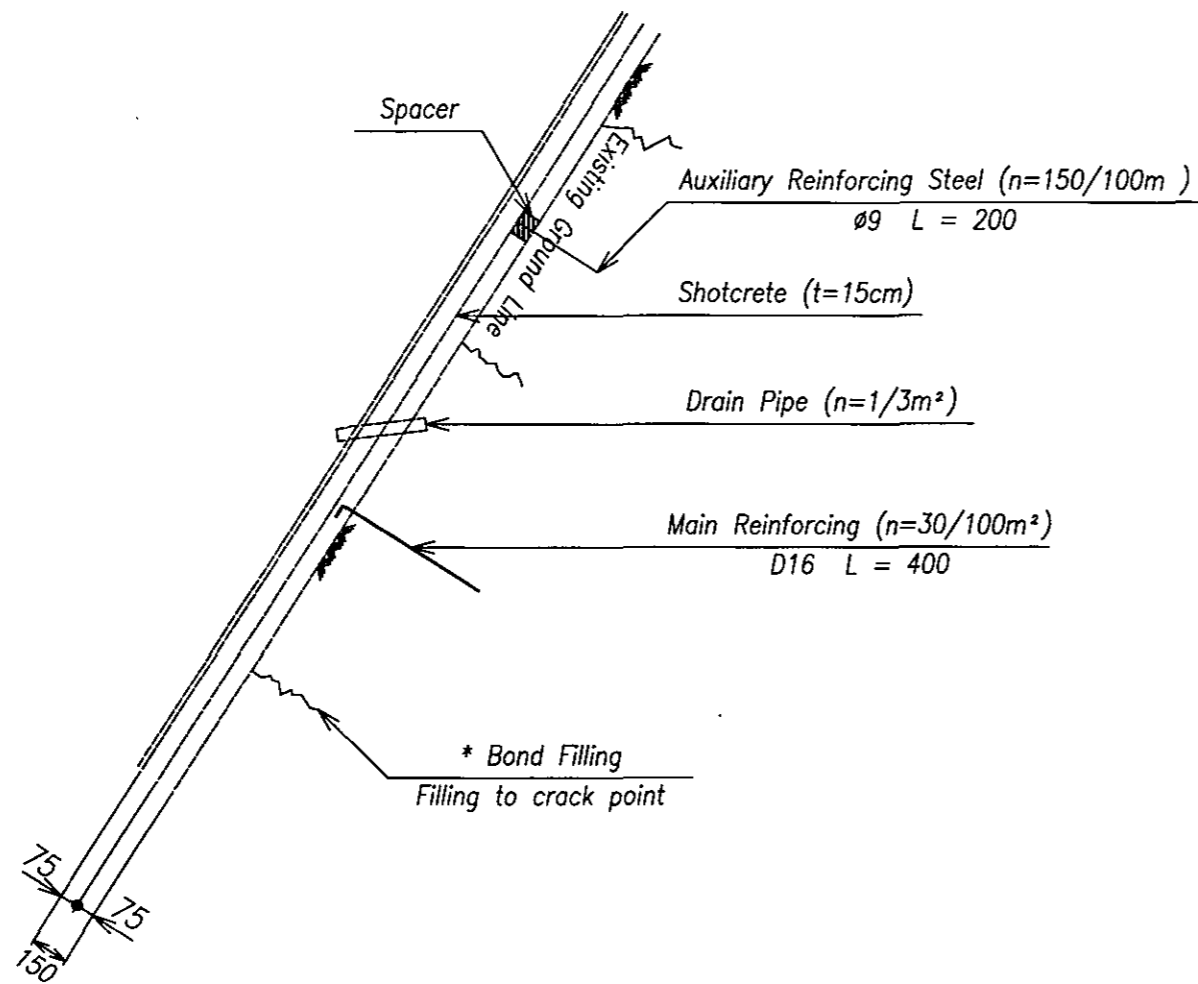
ESCALA:

NOVA N°	36
NOVA N°	44

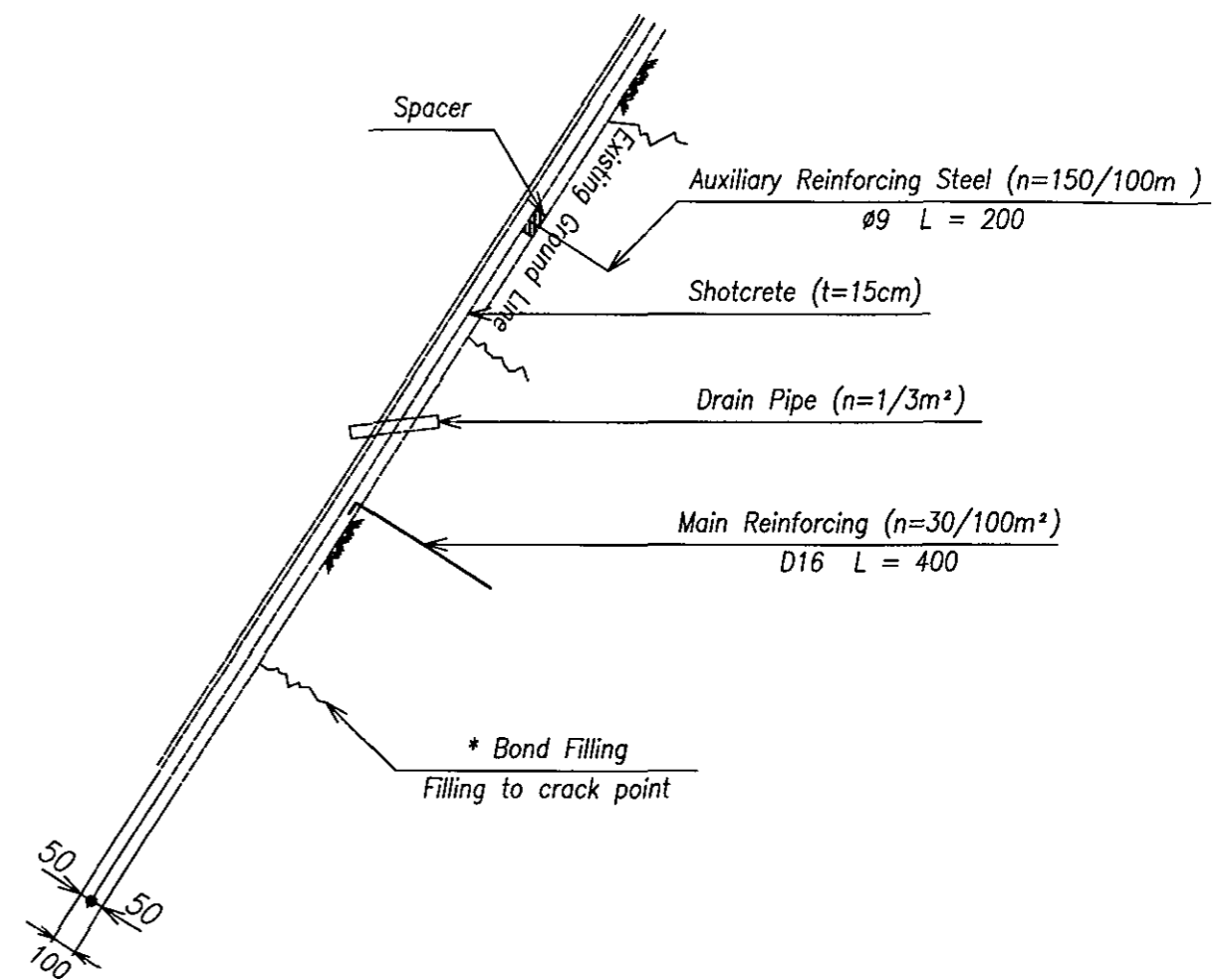
5 = 1:200

# General Layout of Shotcrete

Shotcrete(Unevenness Point)



Shotcrete(Flatness Point)



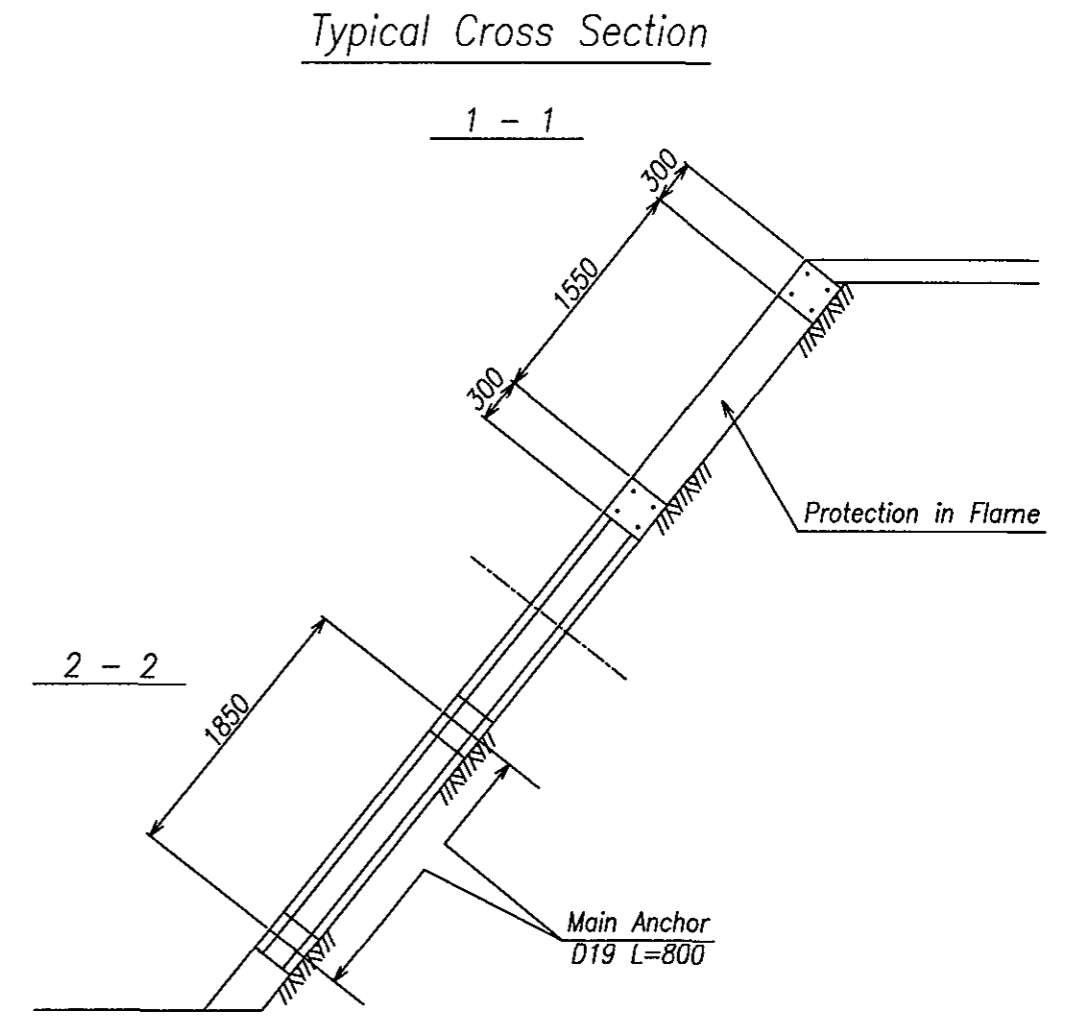
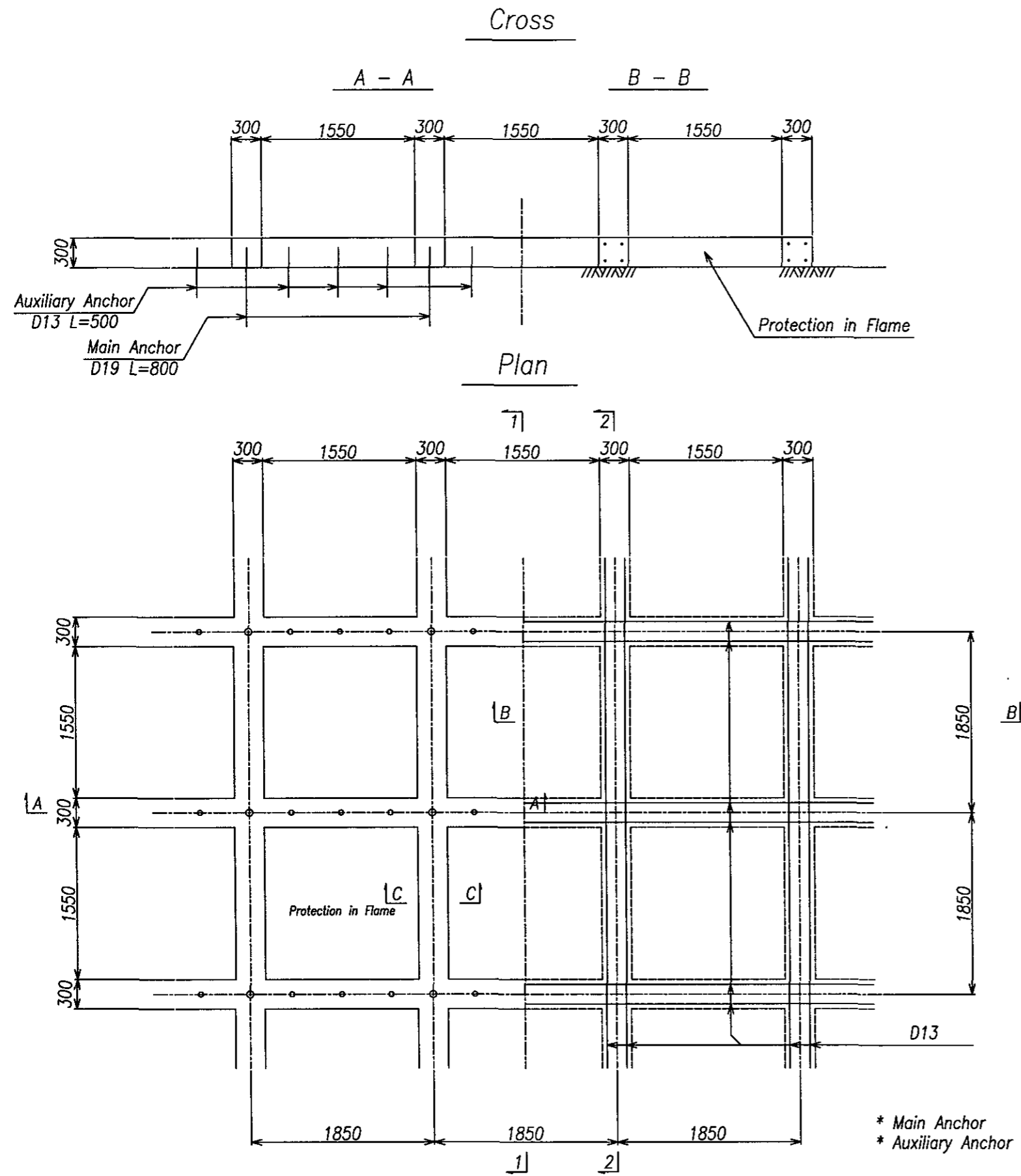
ORIENTAL CONSULTANTS CO., LTD.  
JAPAN ENGINEERING CONSULTANTS  
CO., LTD.

CONTENIDO:
UBICACION:
SITIO:

PROYECTO:	STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA
-----------	--

CALCULO:	DIBUJO:	HOJA N°
LEVANTO :	FECHA:	37
RESPONSABLE TECNICO :	ESCALA	44
	S = 1:30	

# General Layout of Concrete Cribwork



- \* Main Anchor D19 L=800
- \* Auxiliary Anchor D13 L=500

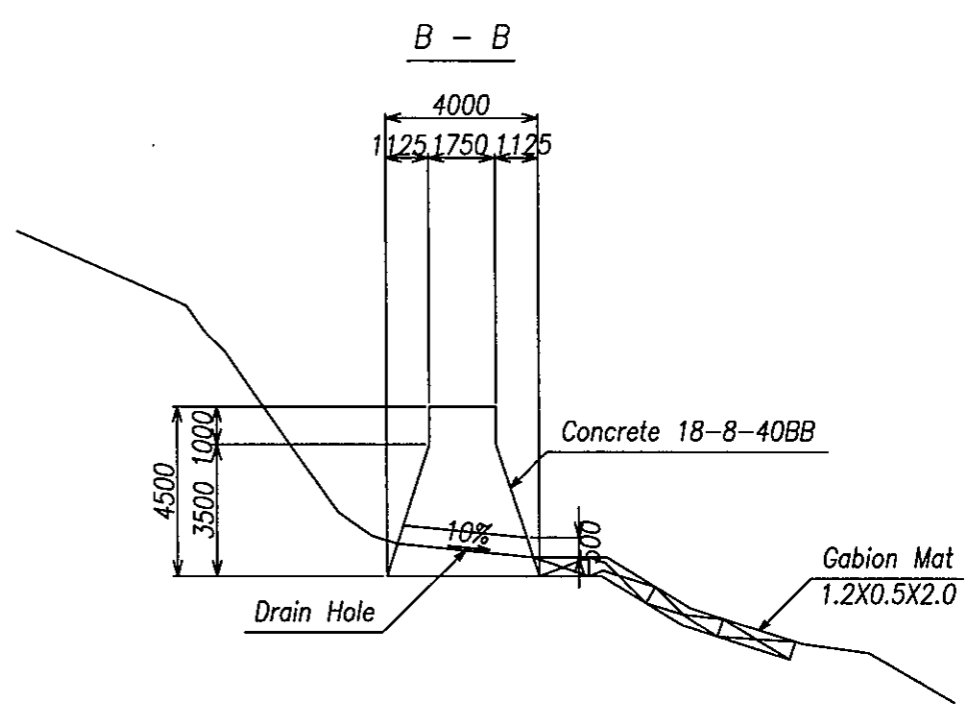
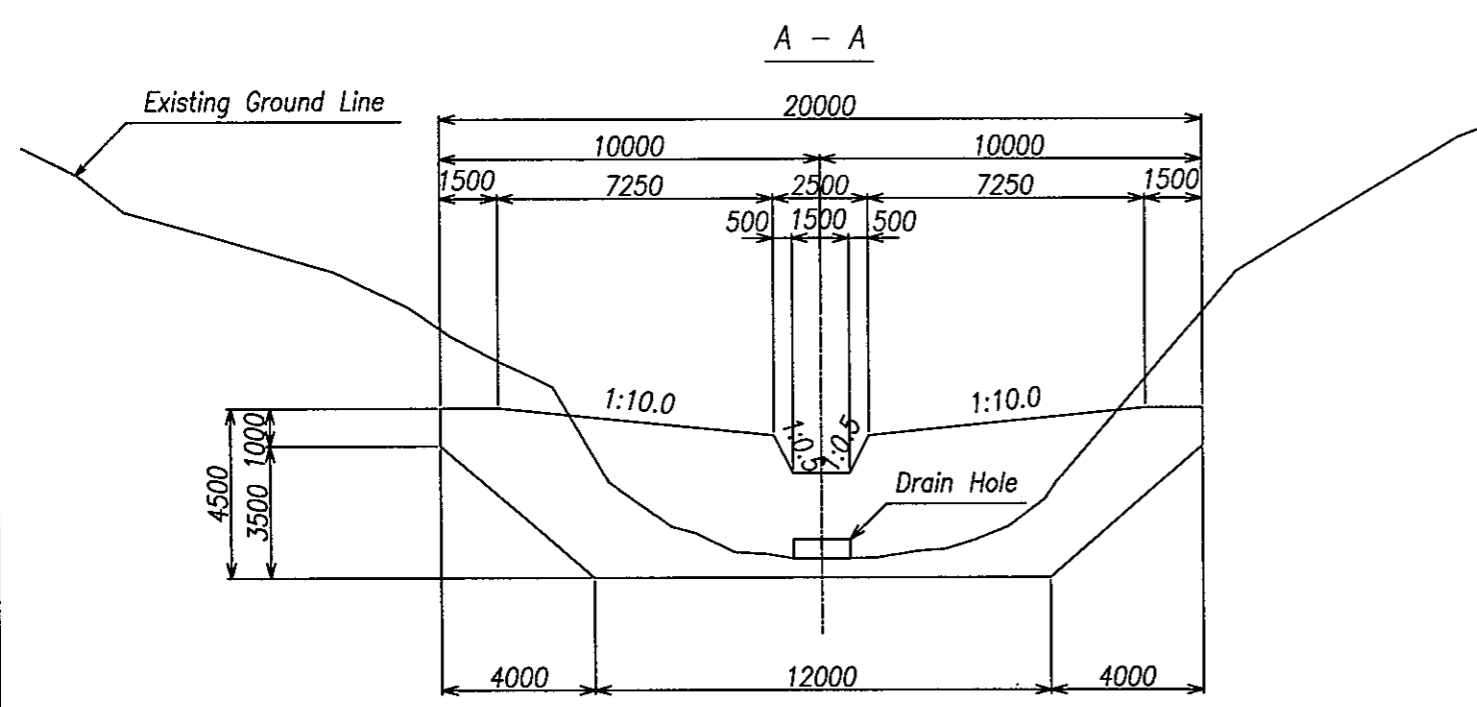
ORIENTAL CONSULTANTS CO., LTD.  
JAPAN ENGINEERING CONSULTANTS  
CO., LTD.

CONTENIDO:	
UBICACION:	
SITIO:	

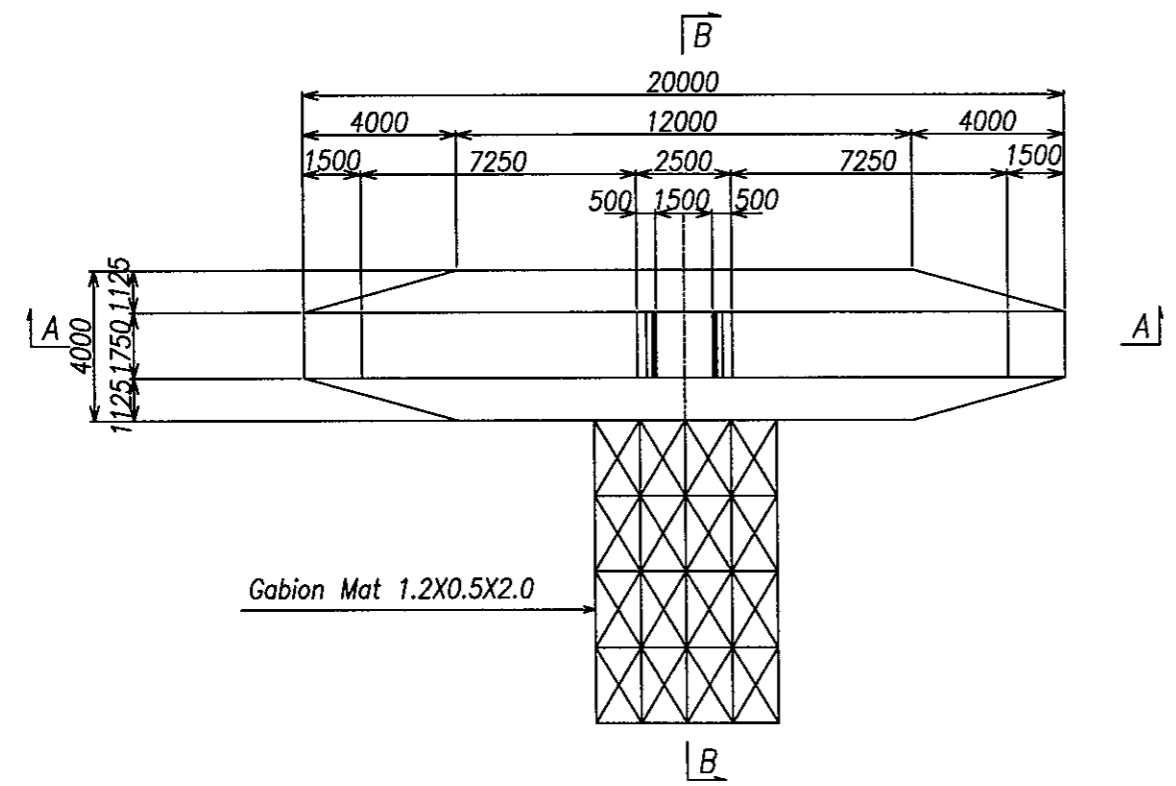
PROYECTO:	STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA
-----------	--

CALCULO:	DEBIDO:	HOJA N°
LEVANTO :	FECHA:	38
RESPONSABLE TECNICO :	ESCALA:	44
	S = 1:50	

# General Layout of Simple Dam



Plan



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CO., LTD.

CONTENIDO:
UBICACION:
SITIO:

PROYECTO:

**STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA**

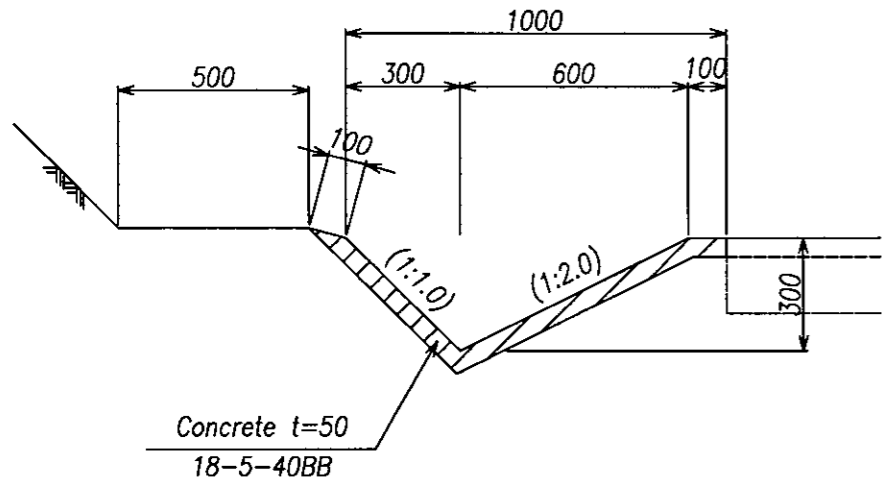
CALCULO:	DIBUJO:	HOJA N°
LEVANTO :	FECHA: November 2002	39
RESPONSABLE TECNICO :	ESCALA: Illustration	44



# General Layout of Drainage Work (1/2)

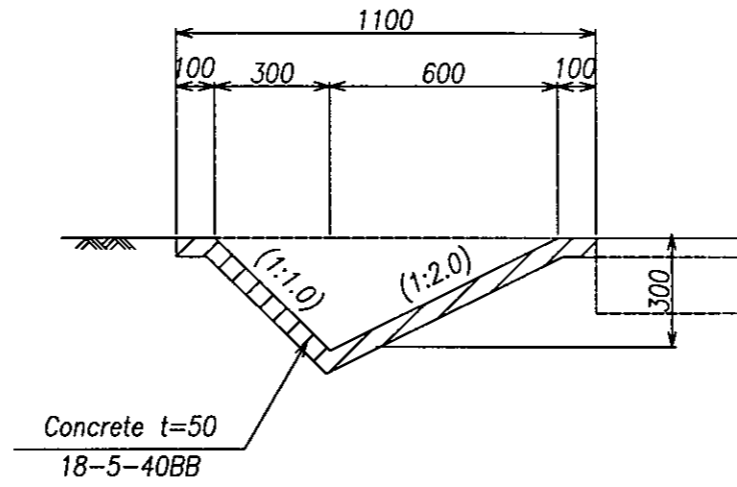
**Toe Ditch(A)**

S=1:20  
\*For Cut



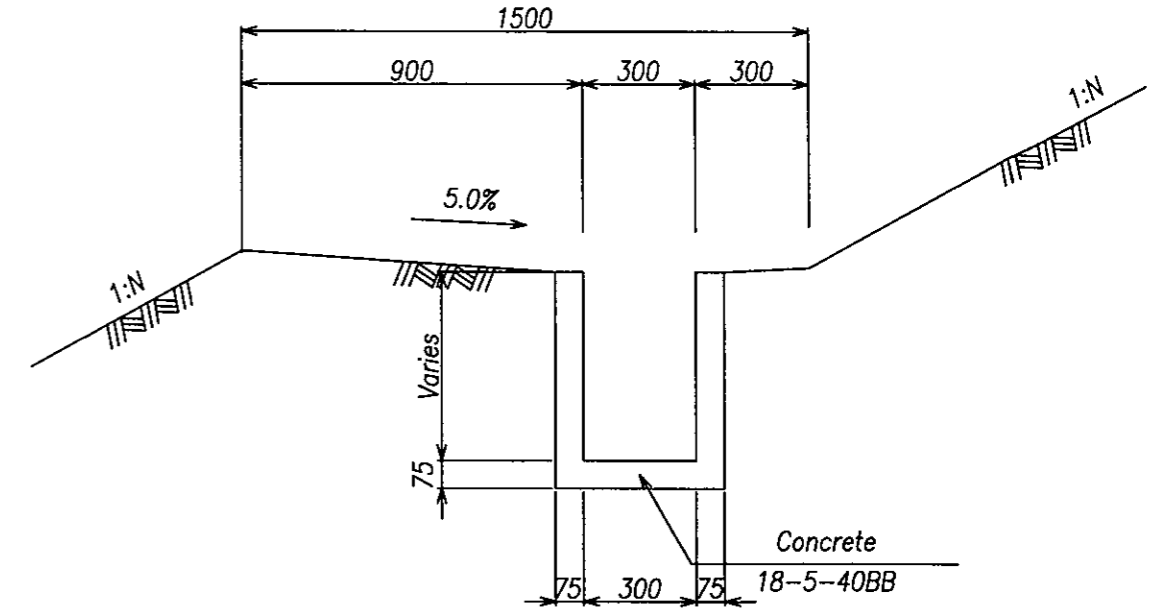
**Toe Ditch(B)**

S=1:20  
\*For Embankment



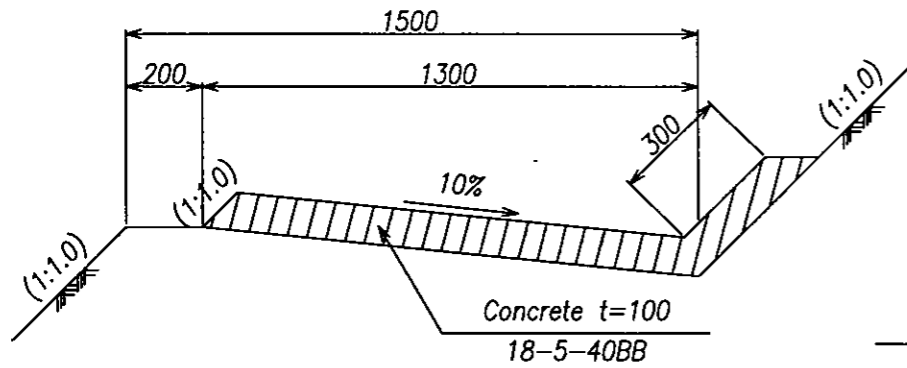
**Drainage Ditch on Berm(A)**

S=1:20  
\*For Cut of Soft Rock



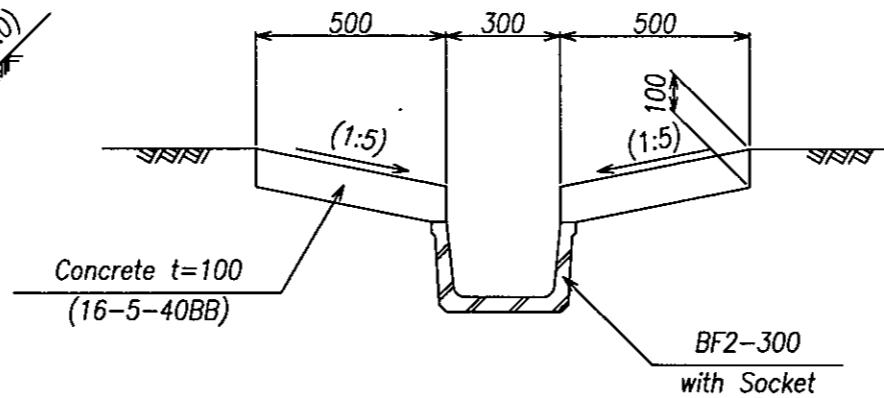
**Drainage Ditch on Berm(B)**

S=1:20  
\*For Cut for Hard Rock



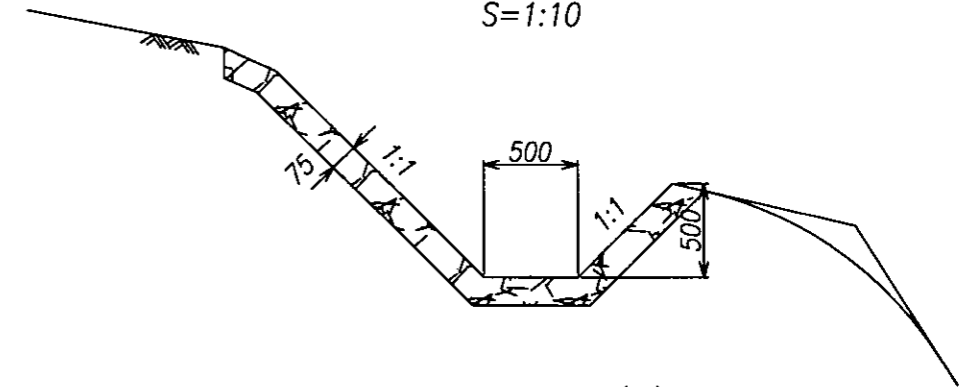
**Vertical Ditch**

S=1:20



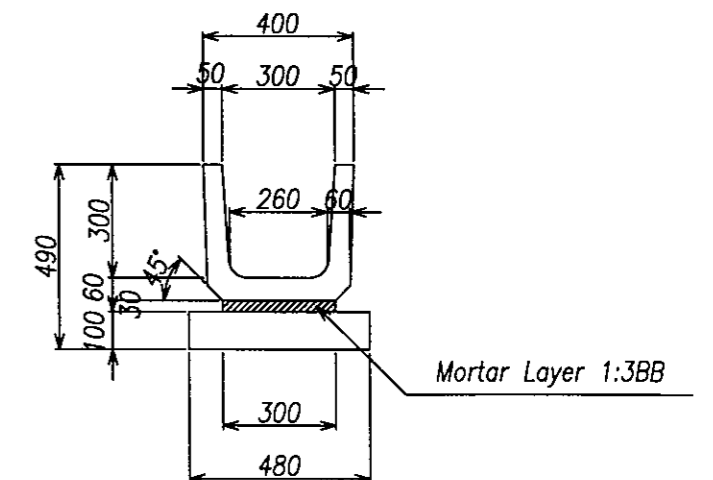
**Crest Ditch(A)**

S=1:10



**Crest Ditch(B)**

S=1:20



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CONTENIDO:	PROYECTO:
UBICACION:	
SITIO:	

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

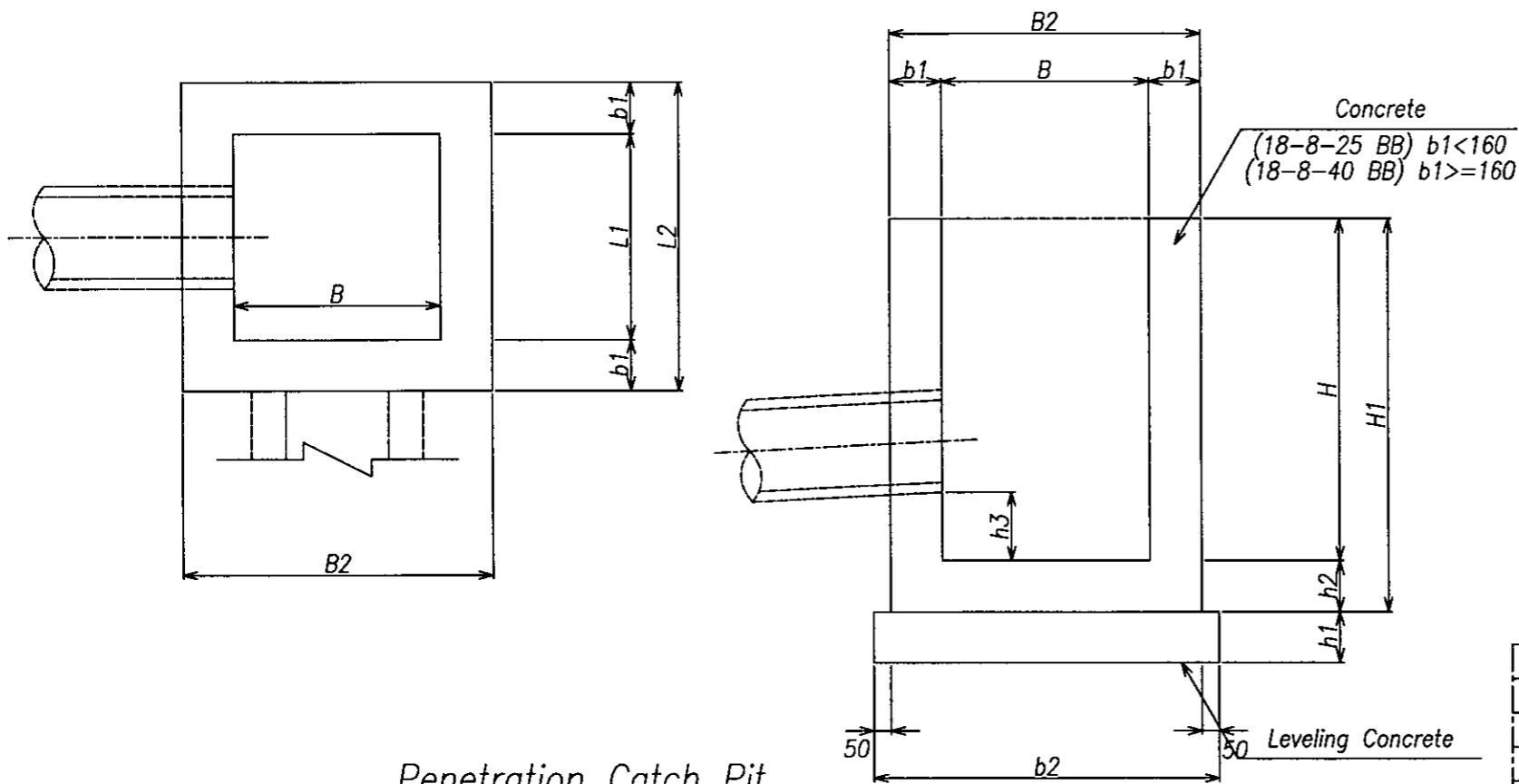
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LEVANTO:	FECHA:	40
RESPONSABLE TECNICO:	ESCALA:	44

November 2002

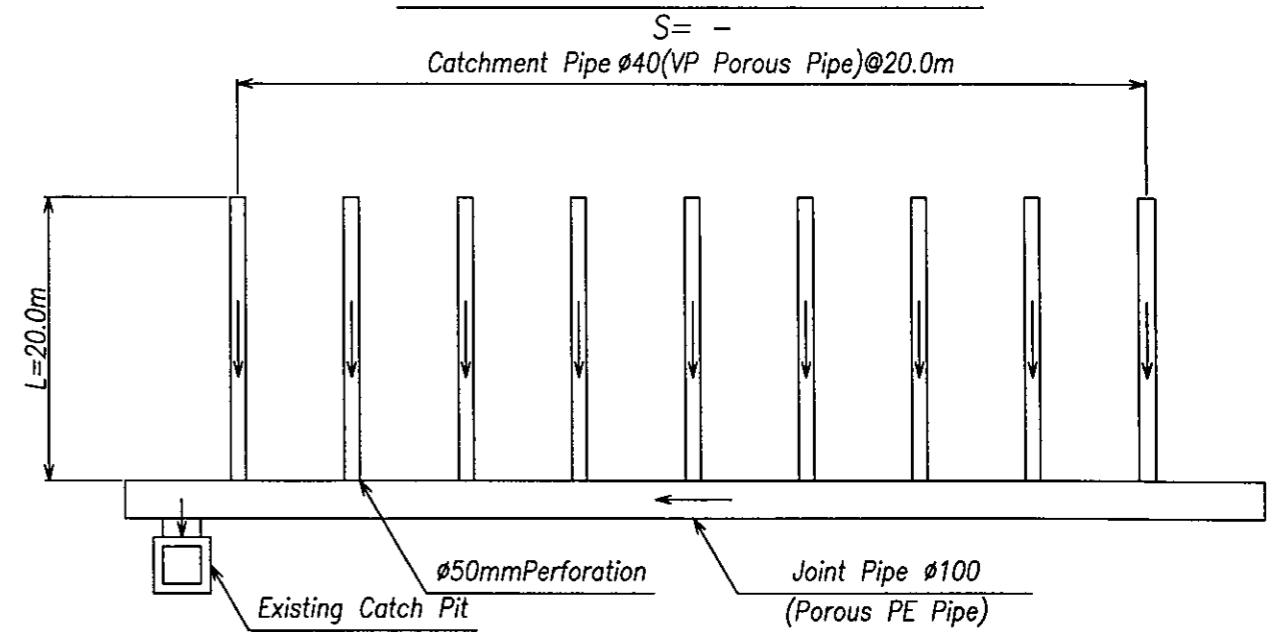
Illustration

# General Layout of Drainage Work (2/2)

Catch Pit  
S=1:20

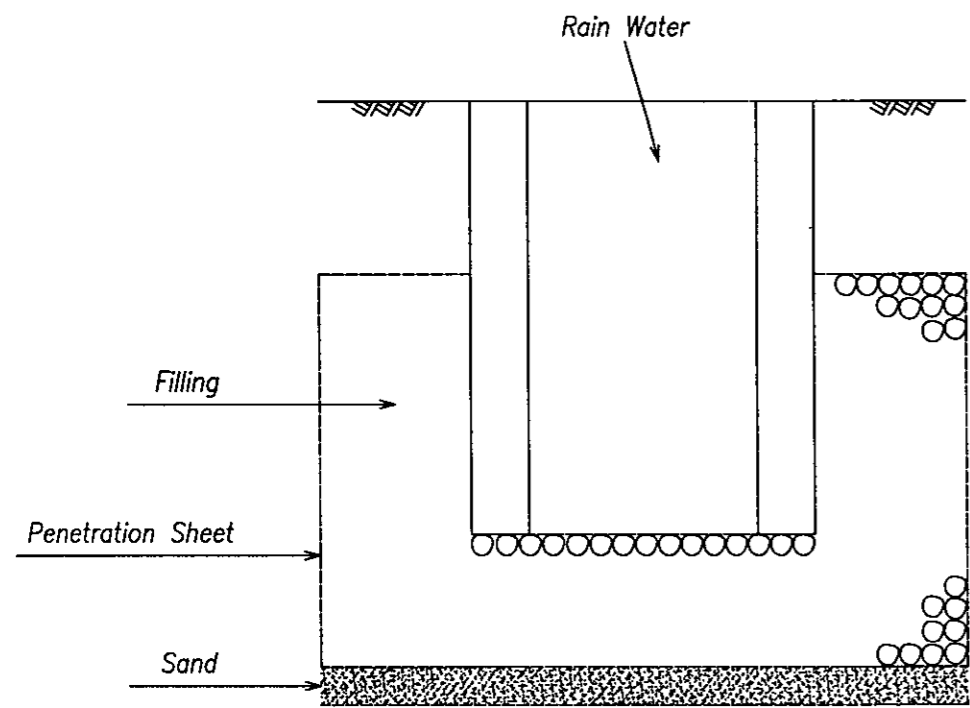


Horizontal Drain Hole

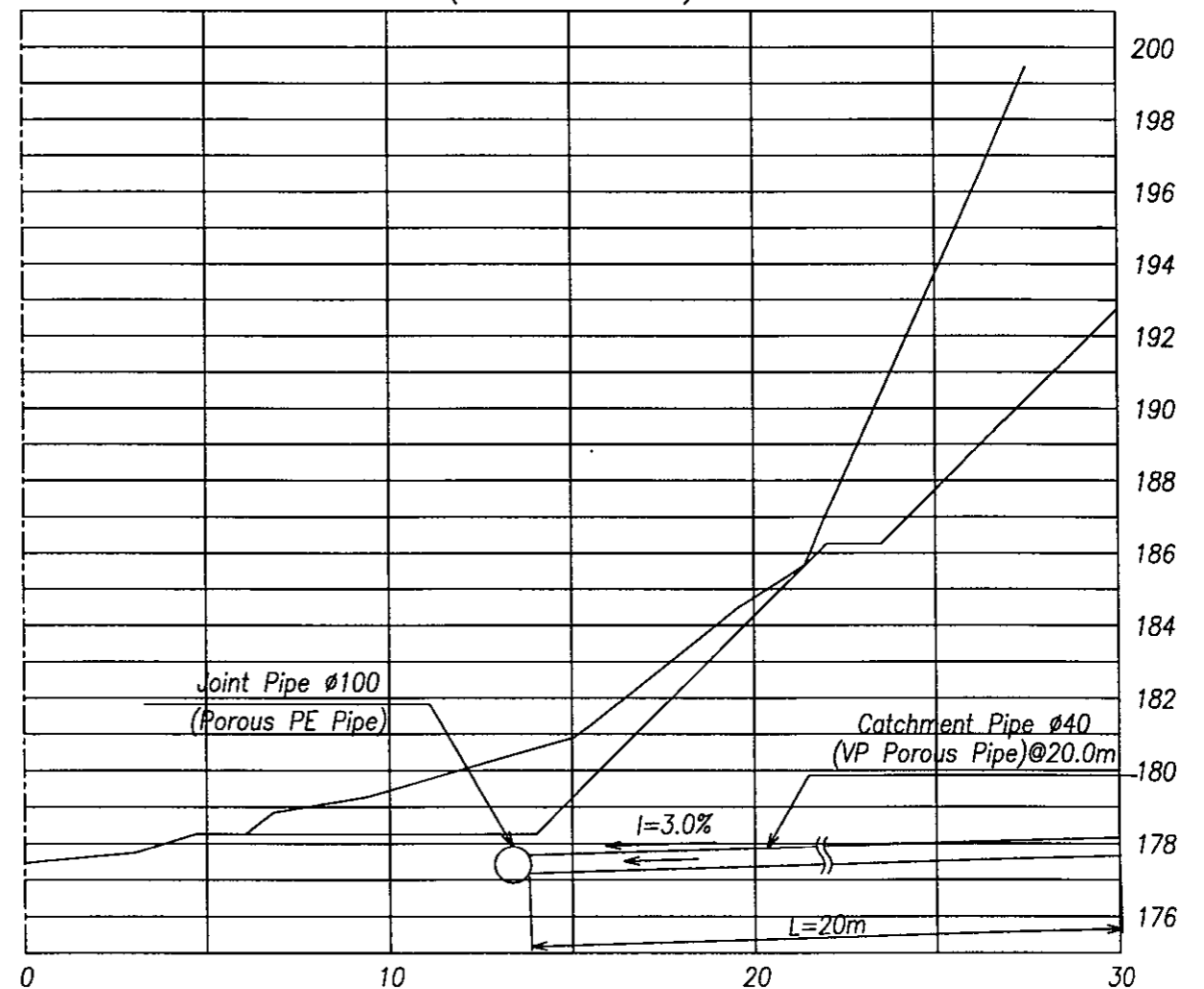


Penetration Catch Pit

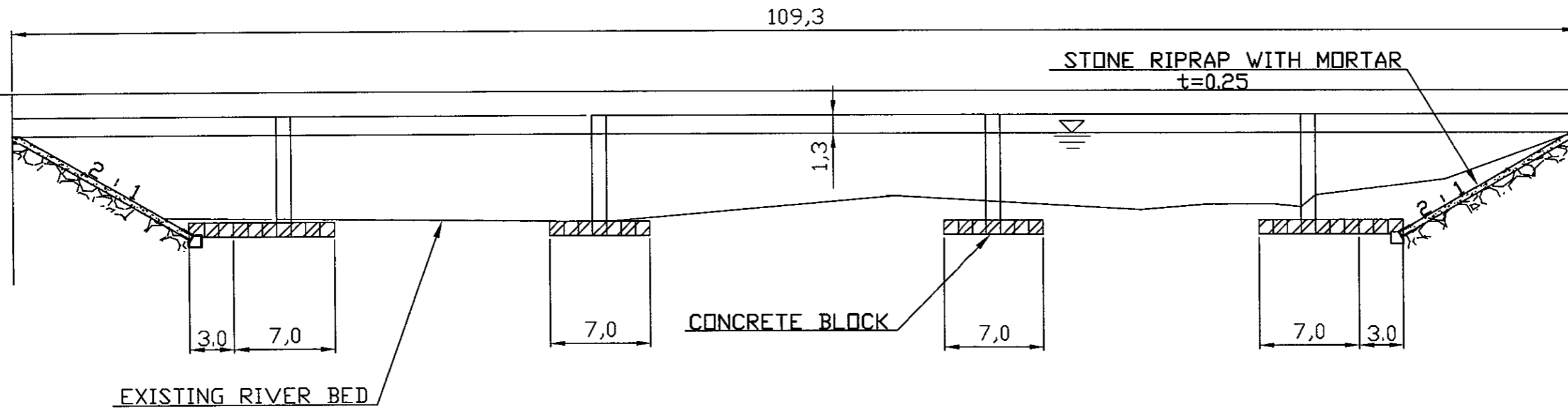
S=1:20



166+122 (SECTION N°3) S=1:10

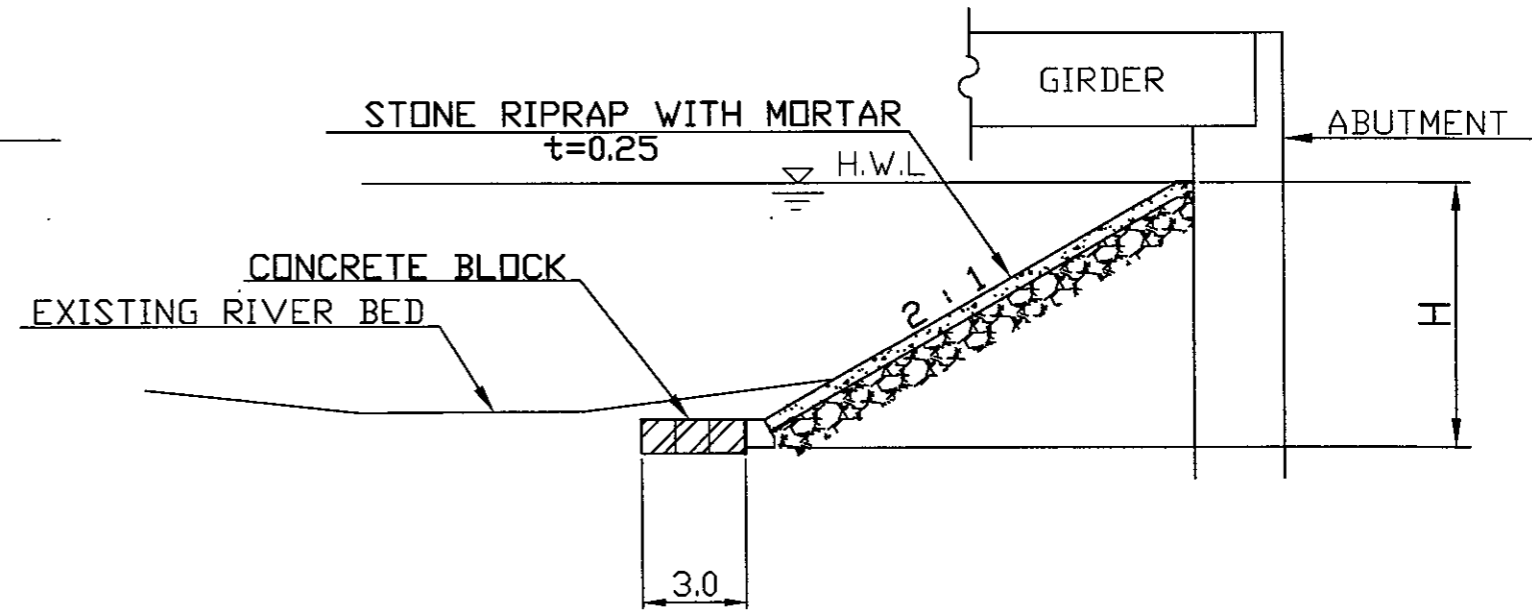
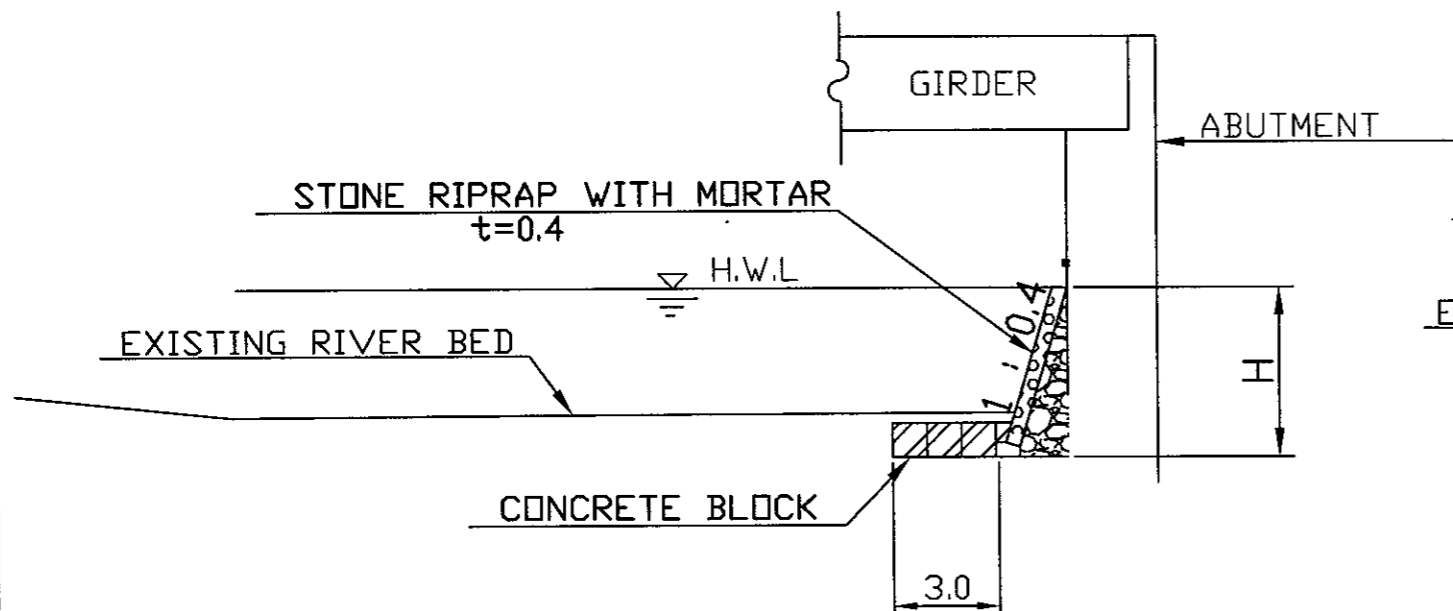


# General Layout of Protection for Scouring



$H \leq 5m$

$H > 5m$



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CONTENIDO:  
UBICACION:  
SITIO:

PROYECTO: **STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA**

CALCULO:

LEVANTO:  
RESPONSABLE  
TECNICO:

DEBUCO:  
FECHA:  
ESCALA:

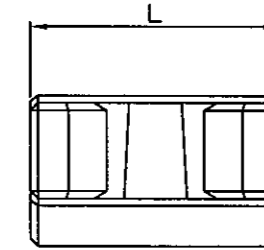
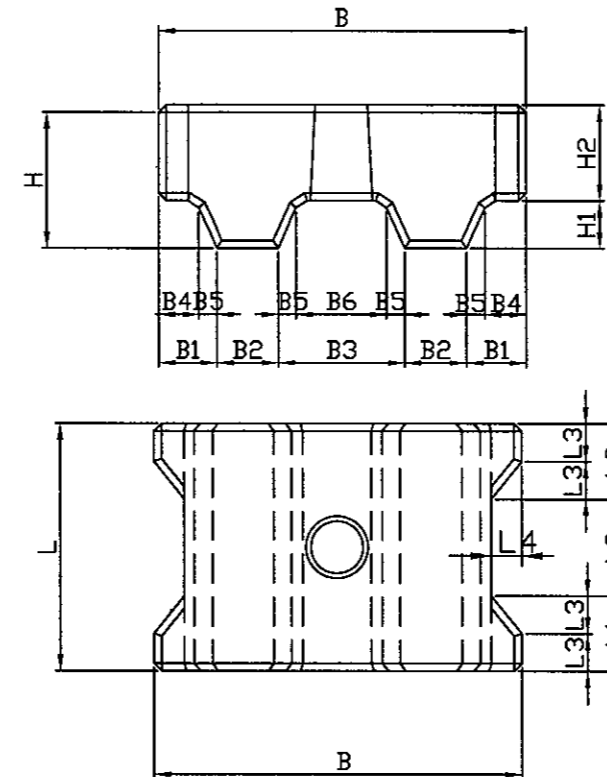
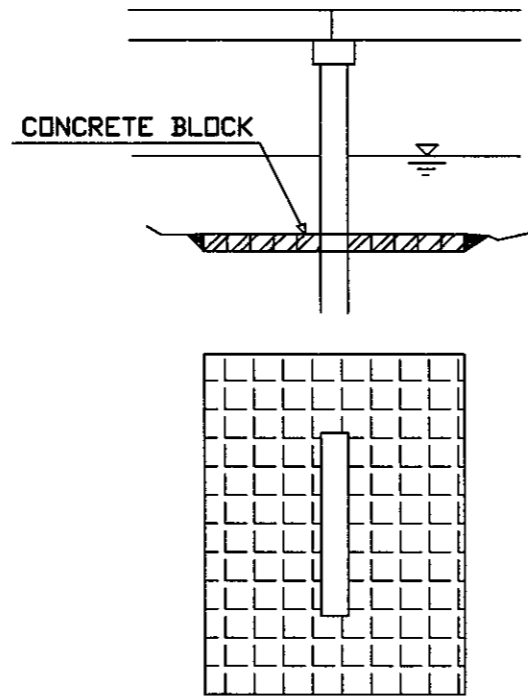
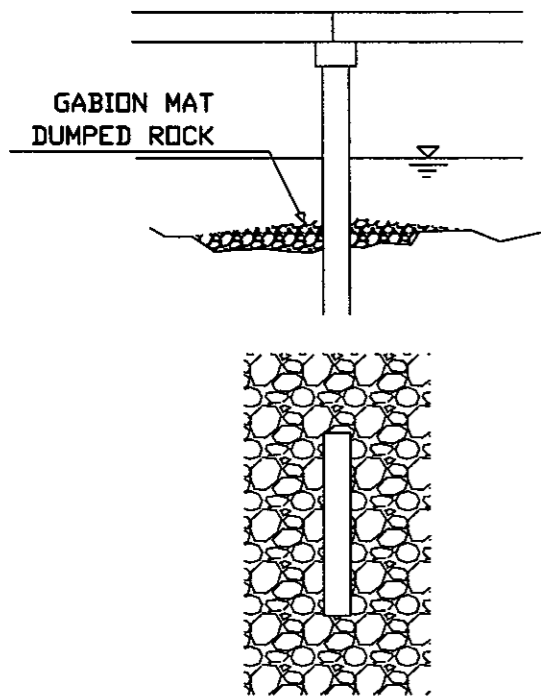
HOJA N°  
42  
44

## General Layout of Concrete bLOCK

Flow Velocity  $\leq 2$  m/sec

Flow Velocity  $\leq 2$  m/sec

Detail of Concrete Block



Size of Concrete Block

	1t	2t	3t	4t	6t
B	1250	1550	1800	1950	2250
B1	200	250	290	315	360
B2	210	260	300	325	380
B3	430	530	620	670	770
B4	125	160	180	200	235
B5	75	90	110	115	125
B6	280	350	400	440	520
L	850	1050	1210	1330	1500
L1	260	320	370	410	460
L2	330	410	470	510	580
L3	130	160	185	205	230
L4	100	130	145	160	190
H	520	650	750	820	940
H1	160	200	240	260	300
H2	360	450	510	560	640

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CONTENIDO:

UBICACION:

SITIO:

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO :

LEVANTO :

RESPONSABLE  
TECNICO :

DIBUJO:

FECHA:

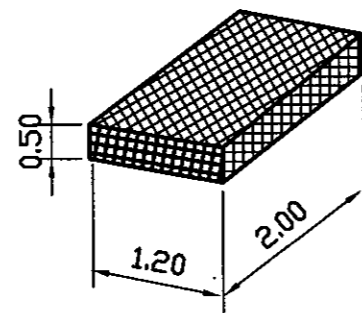
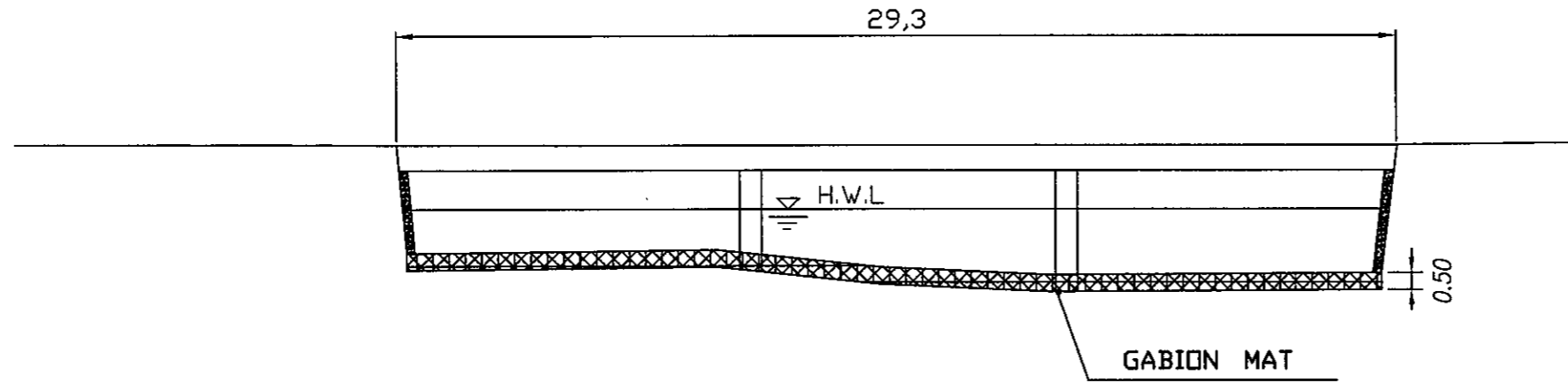
ESCALA

HOJA N°

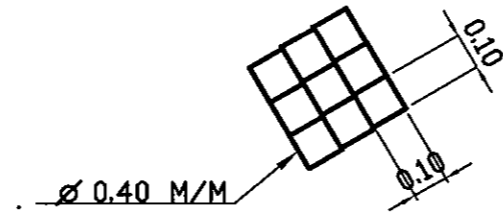
43

44

# General Layout of Gabion Mat



GABION MAT



DETAIL OF WIRE MESH

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CONTENIDO:	
UBICACION:	
SITIO:	

PROYECTO:	CALCULO:
STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA	

LEVANTO:	DIBUJO:	HORA N°
RESPONSABLE TECNICO:	FECHA:	44
	ESCALA:	44



JAPAN INTERNATIONAL  
COOPERATION AGENCY (JICA)



MINISTRY OF TRANSPORT AND  
INFRASTRUCTURE  
REPUBLIC OF NICARAGUA

**THE STUDY  
ON VULNERABILITY REDUCTION  
FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA**

**FINAL REPORT**

*Volume 4 of 5*

**DRAWINGS**

**< PART B: DISASTER CRITICAL SPOTS >**

January 2003



Oriental Consultants Company Limited

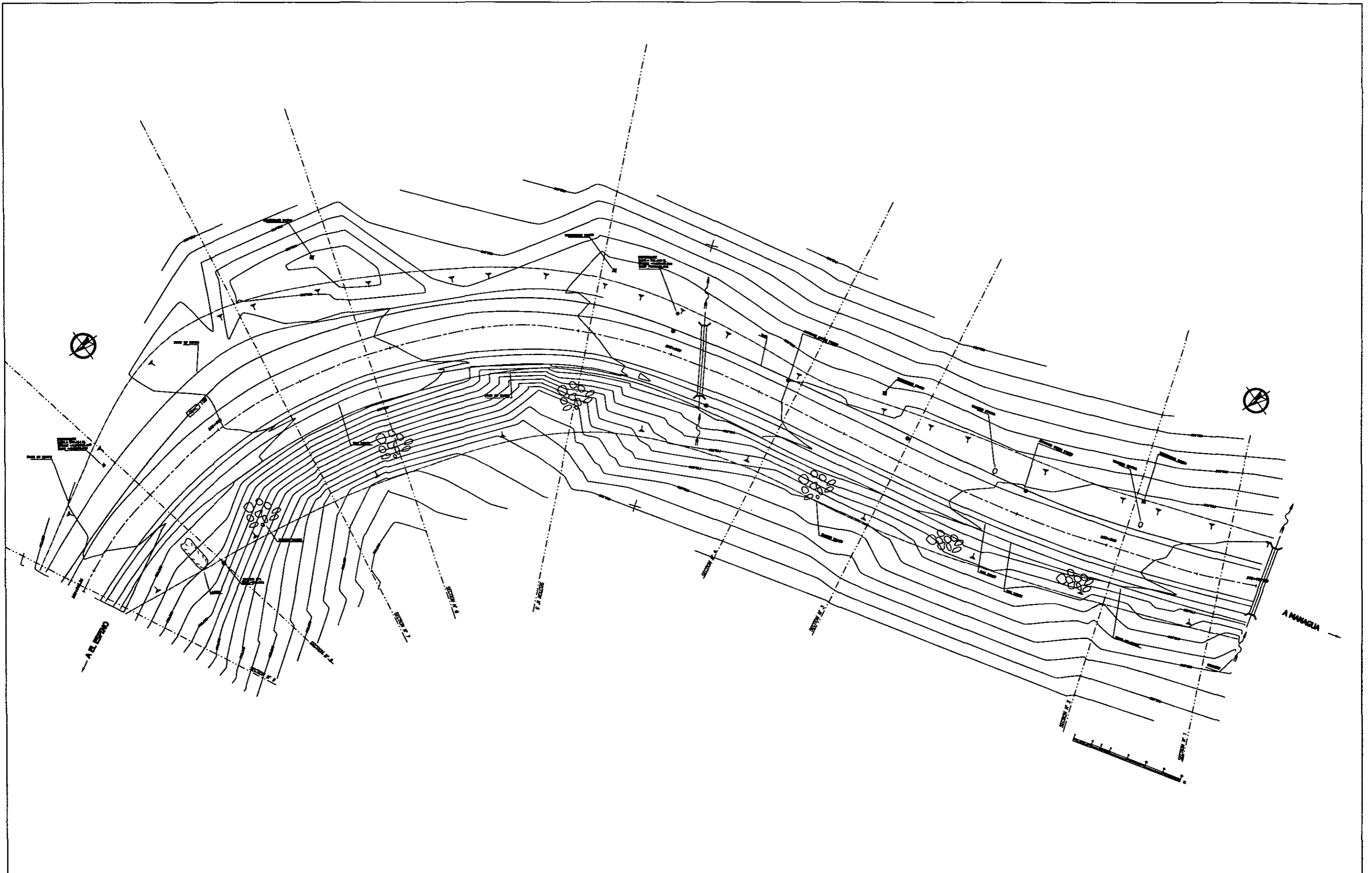


Japan Engineering Consultants Company Limited

## DRAWING LIST

Slope			
Site	Station	Root	No.
N001B230	168+600	MANAGUA - EL ESPINO	1 — 7
N001B200	169+800	MANAGUA - EL ESPINO	8 — 11
N001B190	170+700	MANAGUA - EL ESPINO	12 — 18
N001A110	187+700	MANAGUA - EL ESPINO	19 — 27
N001B100	187+300	MANAGUA - EL ESPINO	28 — 31
N001B070	204+700	MANAGUA - EL ESPINO	32 — 37
N001A050	214+700	MANAGUA - EL ESPINO	38 — 39
N001B030	232+500	MANAGUA - EL ESPINO	40 — 43
N001A020	233+700	MANAGUA - EL ESPINO	44 — 48
N001A010	235+600	MANAGUA - EL ESPINO	49 — 50
N003B420	107+000	SEBACO - JINOTEGA	51 — 57
N003B240	135+000	SEBACO - JINOTEGA	58 — 64
N003C160	173+900	SEBACO - JINOTEGA	65 — 72

Slope			
Site	Station	Root	No.
N015E060	236+016	YALAGUINA - LAS MANOS	73 — 80
N015E050	237+900	YALAGUINA - LAS MANOS	81 — 84
N015E020	238+900	YALAGUINA - LAS MANOS	85 — 93
N015E010	239+680	YALAGUINA - LAS MANOS	94 — 98
N026B210	154+848	TELICA - SAN ISIDRO	99 — 105
N026A130	166+750	TELICA - SAN ISIDRO	106 — 107
N026B110	170+350	TELICA - SAN ISIDRO	108 — 111
N026A100	170+700	TELICA - SAN ISIDRO	112 — 115
N026A040	179+000	TELICA - SAN ISIDRO	116 — 122
N026A030	180+000	TELICA - SAN ISIDRO	123 — 132
N026A020	187+000	TELICA - SAN ISIDRO	133 — 138
N026A010	187+600	TELICA - SAN ISIDRO	139 — 140



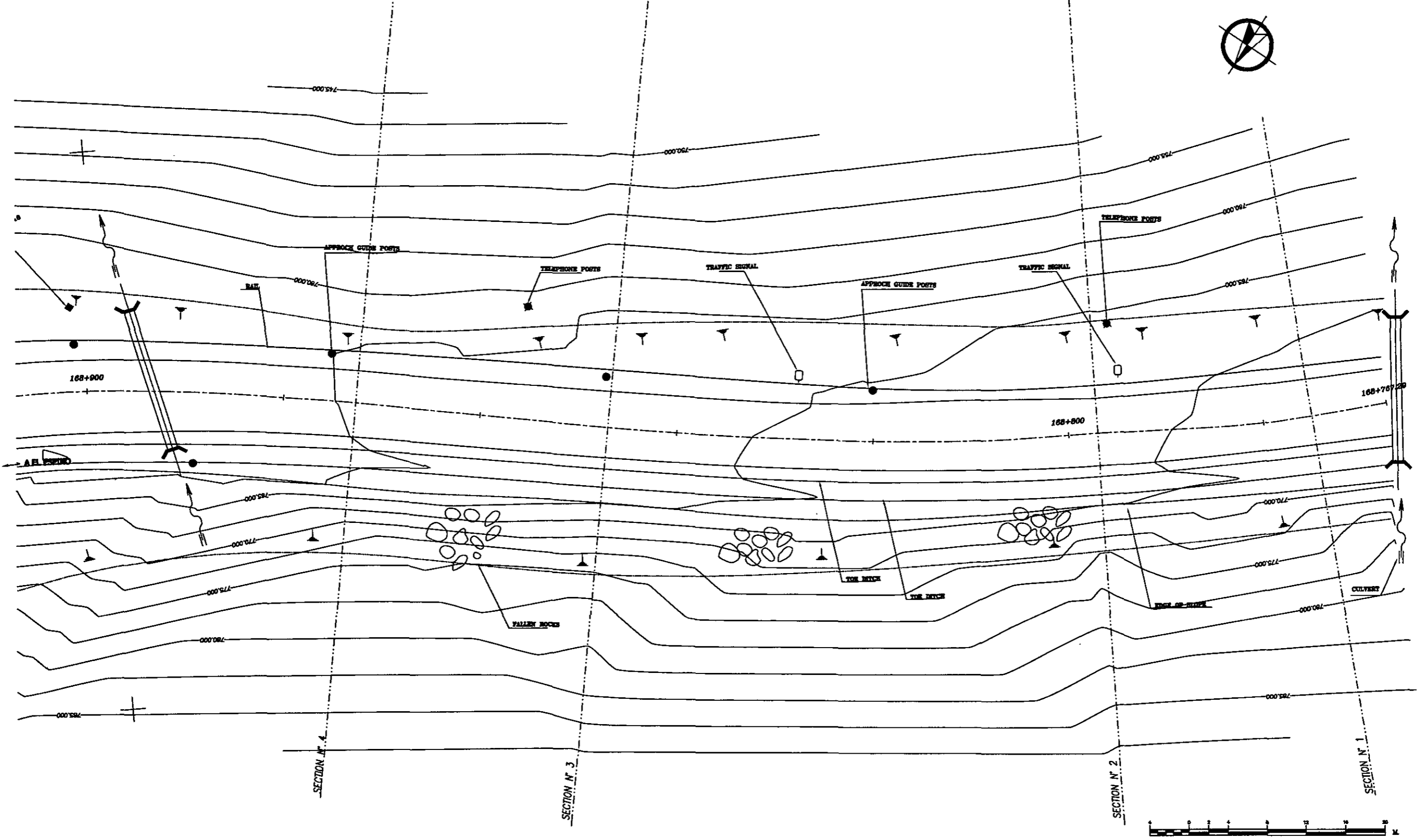
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CONTENIDO:	GENERAL VIEW
UBICACION:	KM 168+600 CARRETERA MANAGUA - EL ESPINO
SITIO:	N001B230

PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO :	Ch. Rivera C.	DELIJO:	Ch. Rivera C.	HOJA N°
LEVANTO :	MAURICIO MENDEZ V.	FECHA:	Julio 2002	1
RESPONSABLE TECNICO :	JIRO KOJIMA	SIN:	ESCALA	140



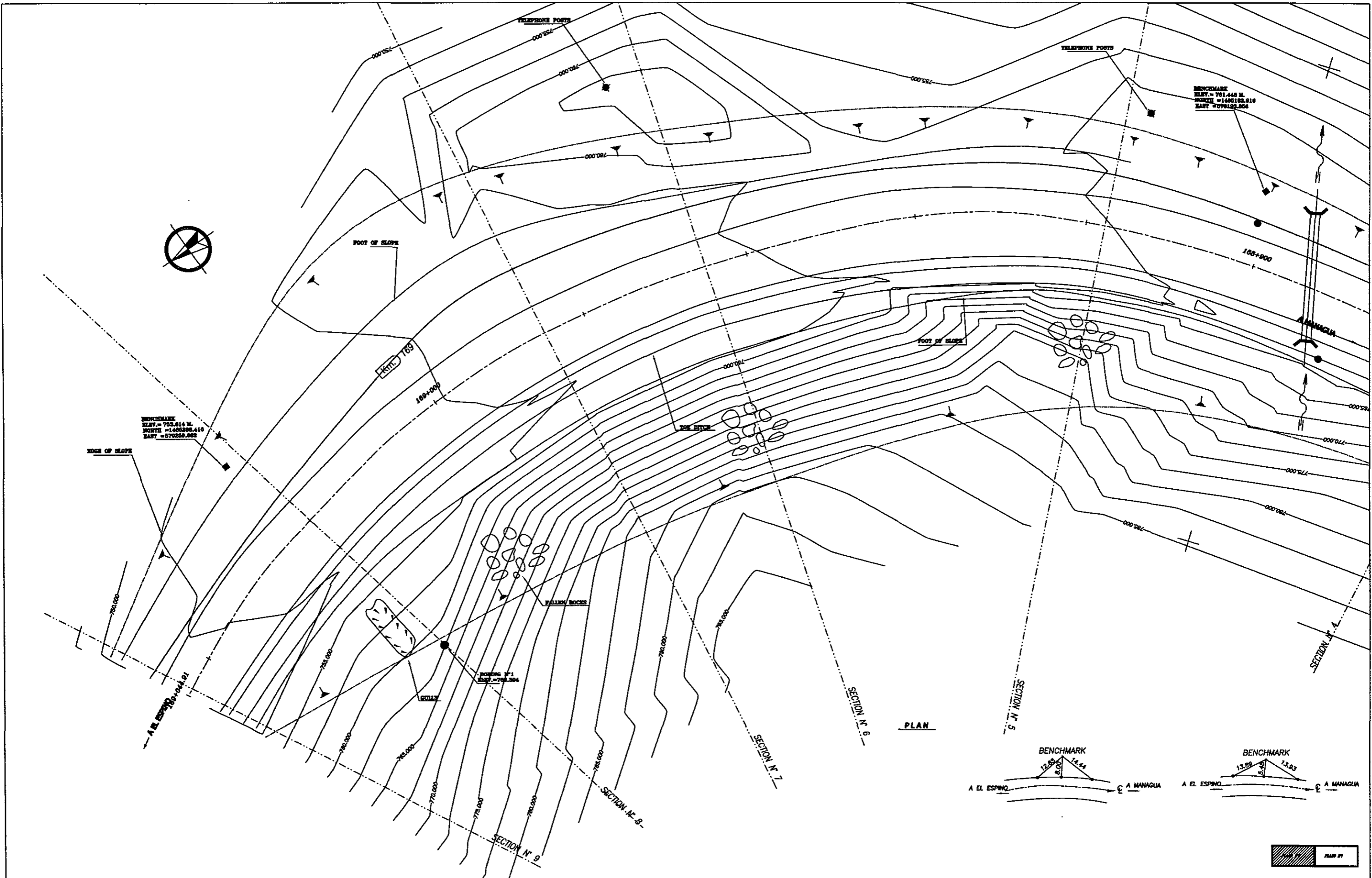


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CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
 SECCIONES TRANSVERSALES  
 UBICACION: KM 168+600 CARRETERA MANAGUA - EL ESPINO  
 SITIO: N001B230

PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO : Ch. Rivera C.	DEBIDO : Ch. Rivera C.	HOJA N° 2
LEVANTO : MAURICIO MENDEZ V.	FECHA: Julio 2002	140
RESPONSABLE TECNICO : JRO KUBIMA	ESCALA 1 : 200	

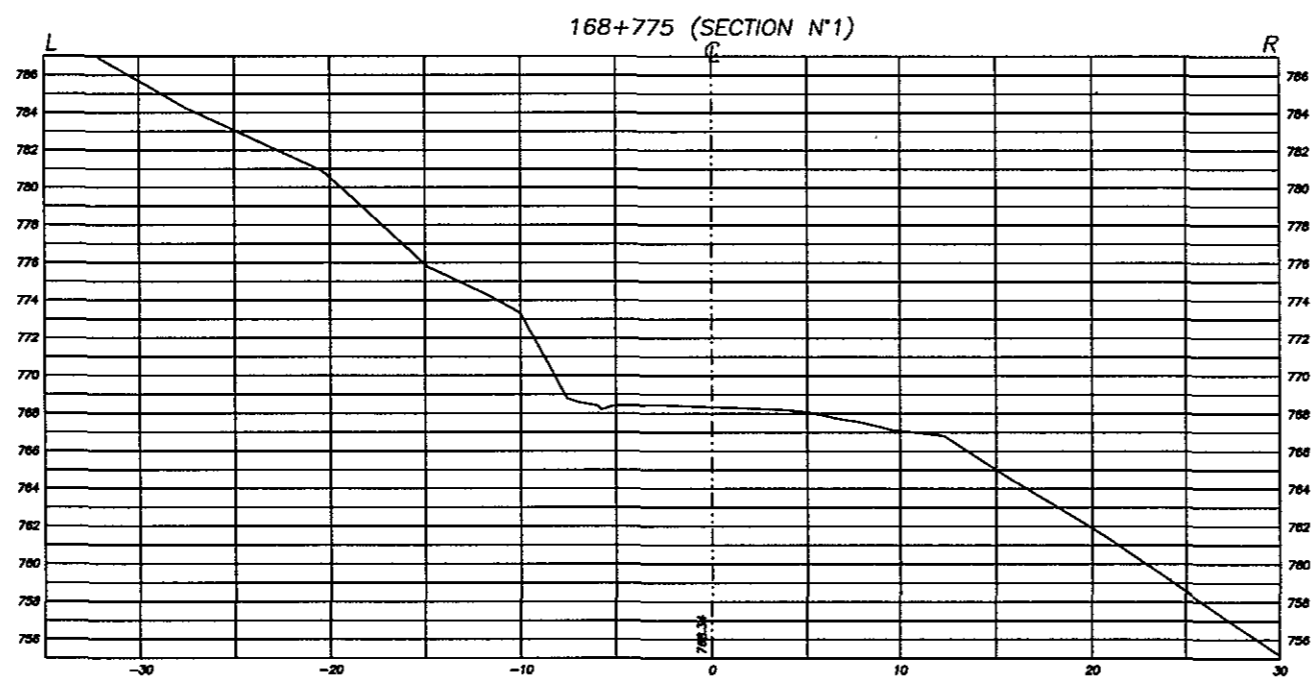
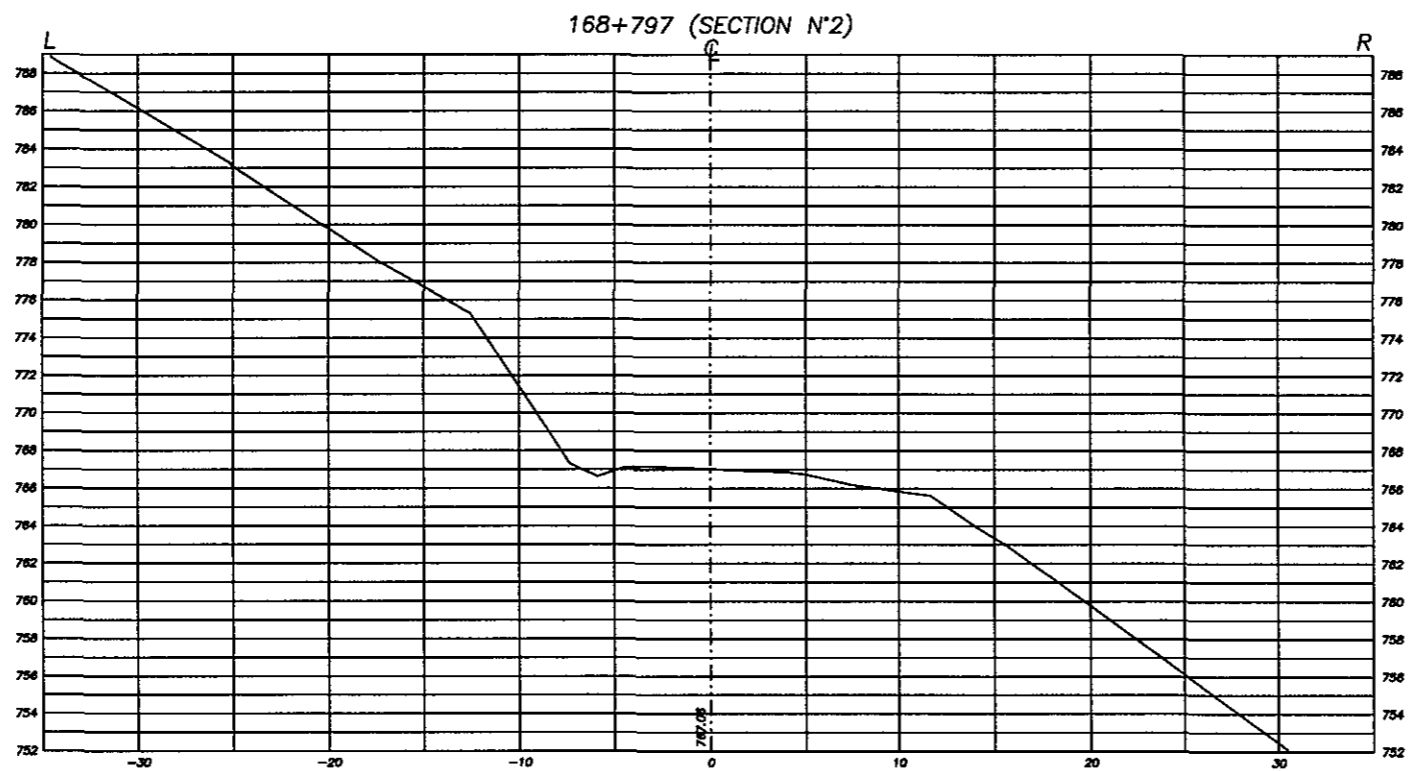


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CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
 SECCIONESA TRANSVERSALES  
 UBICACION: KM 168+600 CARRETERA MANAGUA - EL ESPINO  
 SITIO: N001B230

PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO : Ch. Rivera C.	DIBUJO: Ch. Rivera C.	HOJA N° 3
LEVANTO : MAURICO MENDEZ V.	FECHA: Julio 2002	140
RESPONSABLE TECNICO : JRO KOJIMA	ESCALA 1 : 200	



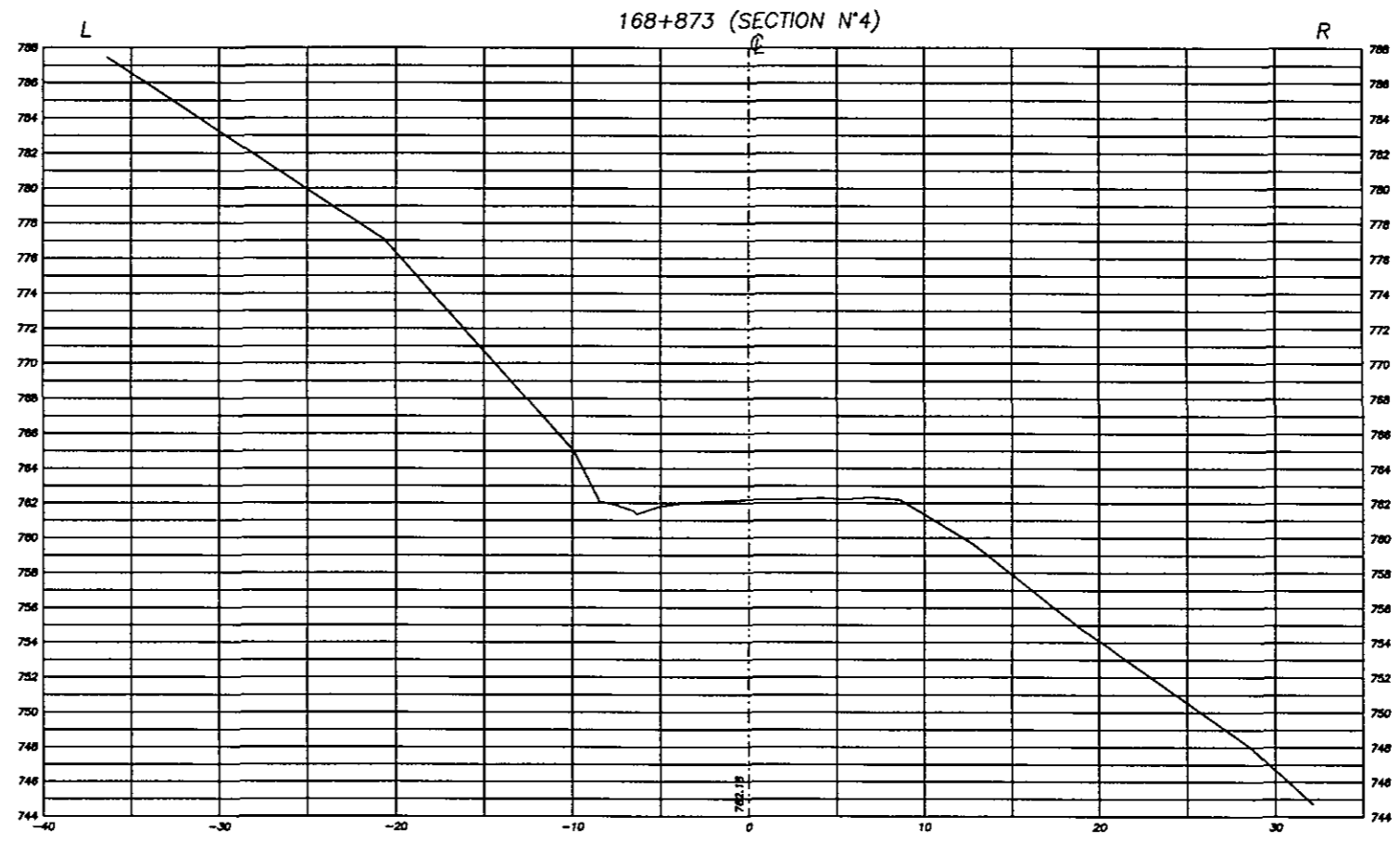
ORIENTAL CONSULTANTS CO., LTD.  
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CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 168+600 CARRETERA MANAGUA - EL ESPINO
SITIO:	N001B230

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO :	Ch. Rivas C.	DIBUJO:	Ch. Rivas C.	HOJA N°
LEVANTO :	MAURICIO MENDEZ V.	FECHA:	Julio 2002	4
RESPONSABLE TECNICO :	JIRO KOJIMA	ESCALA	1 : 200	140

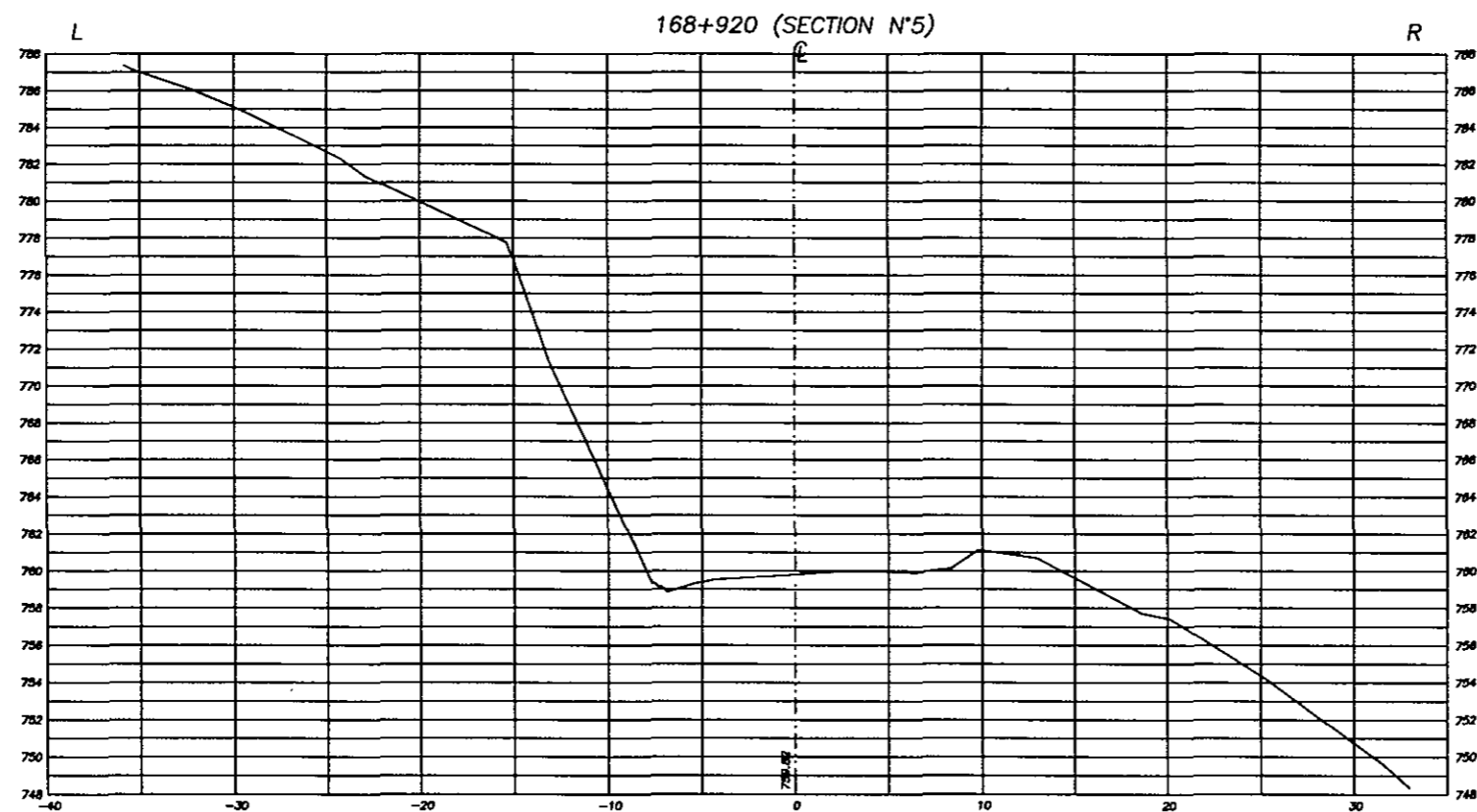
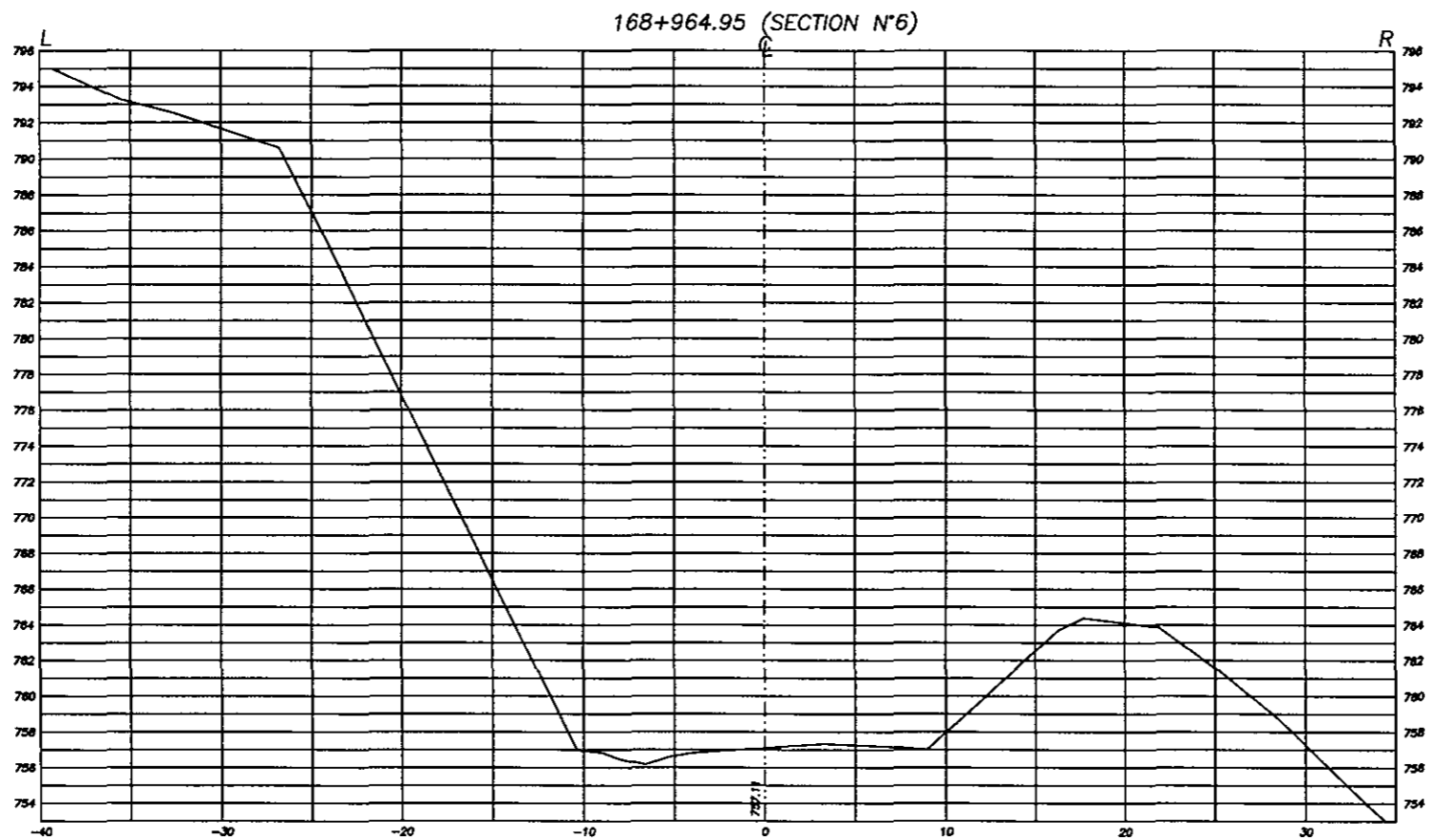


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UBICACION:	KM 168+500 CARRETERA MANAGUA - EL ESPINO
SITIO:	N001B230

PROYECTO:  
**STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA**

CALCULO:	Ch. Rivera C.	DIBUJO:	Ch. Rivera C.	HOJA N°
LEVANTO:	MAURICIO MENDEZ V.	FECHA:	Julio 2002	5
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	1 : 200	140



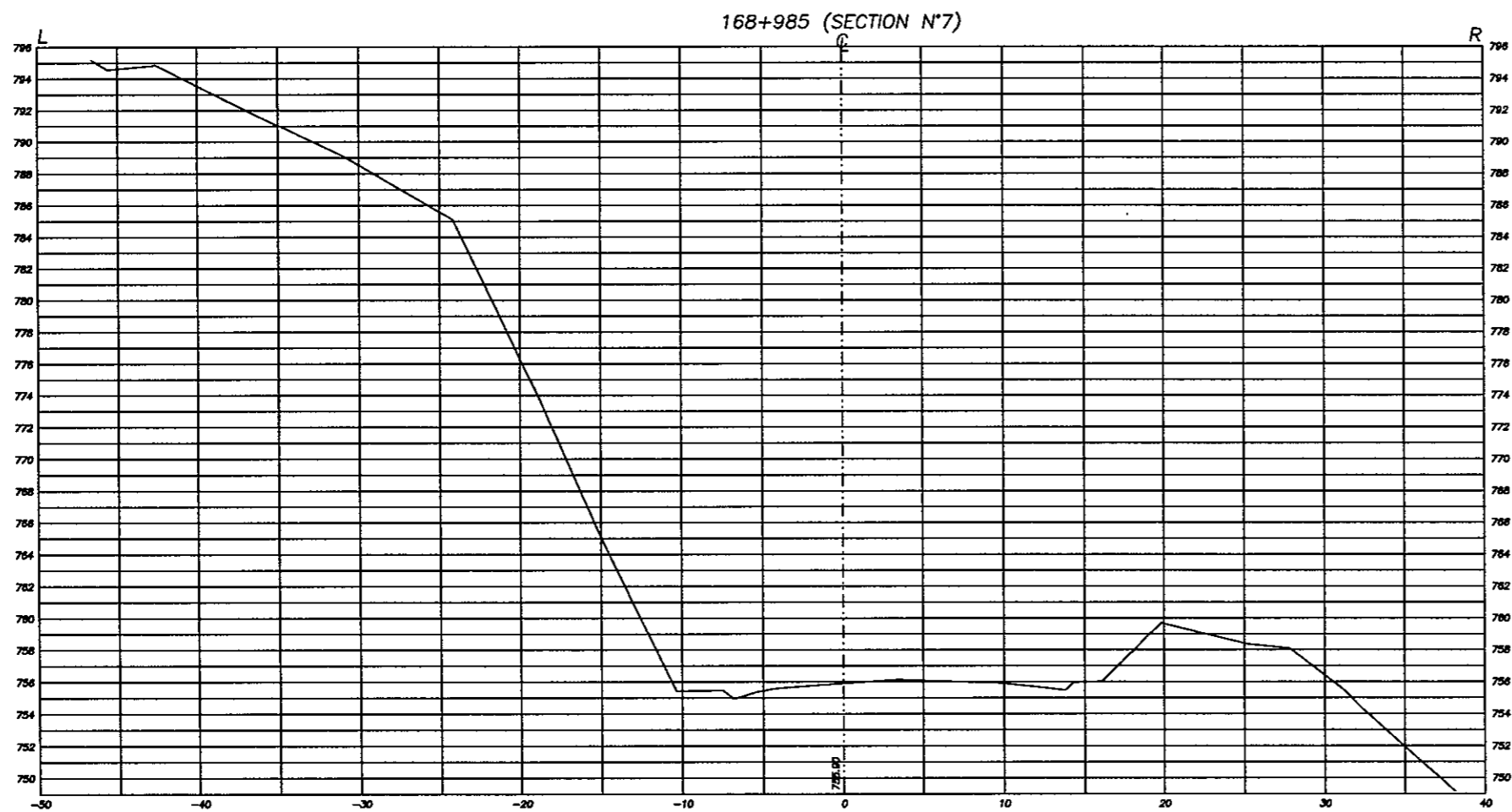
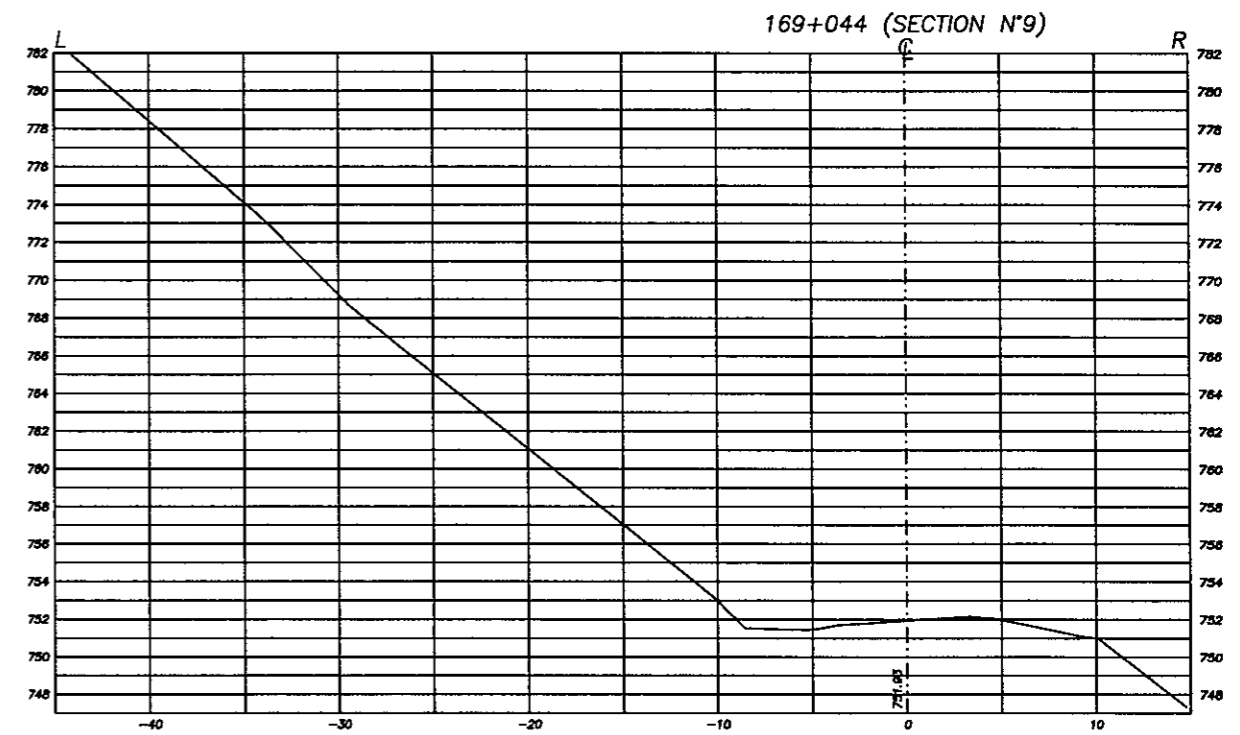
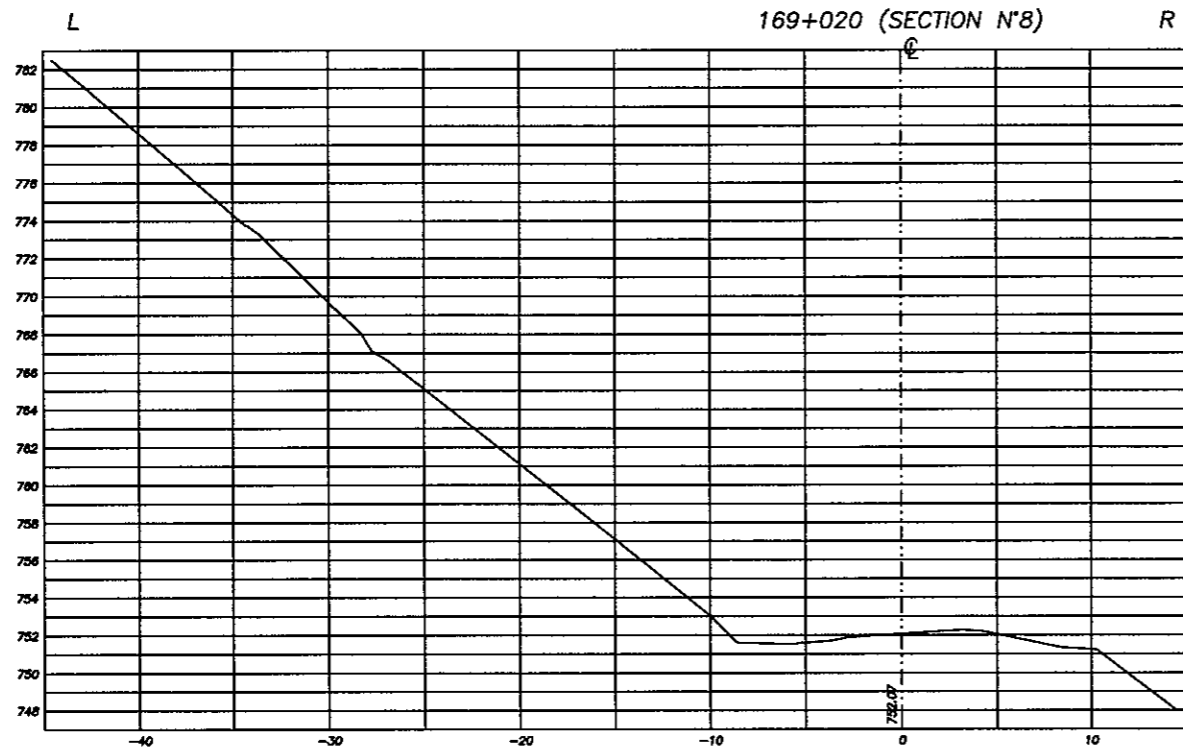
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CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
SECCIONES TRANSVERSALES  
UBICACION: KM 168+600 CARRETERA MANAGUA - EL ESPINO  
SITE: N001B230

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO:	Ch. Rivera C.	DIBUJO:	Ch. Rivera C.	HOJA N°
LEVANTO:	MAURICIO MENDEZ V.	FECHA:	Julio 2002	6
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	1 : 200	140



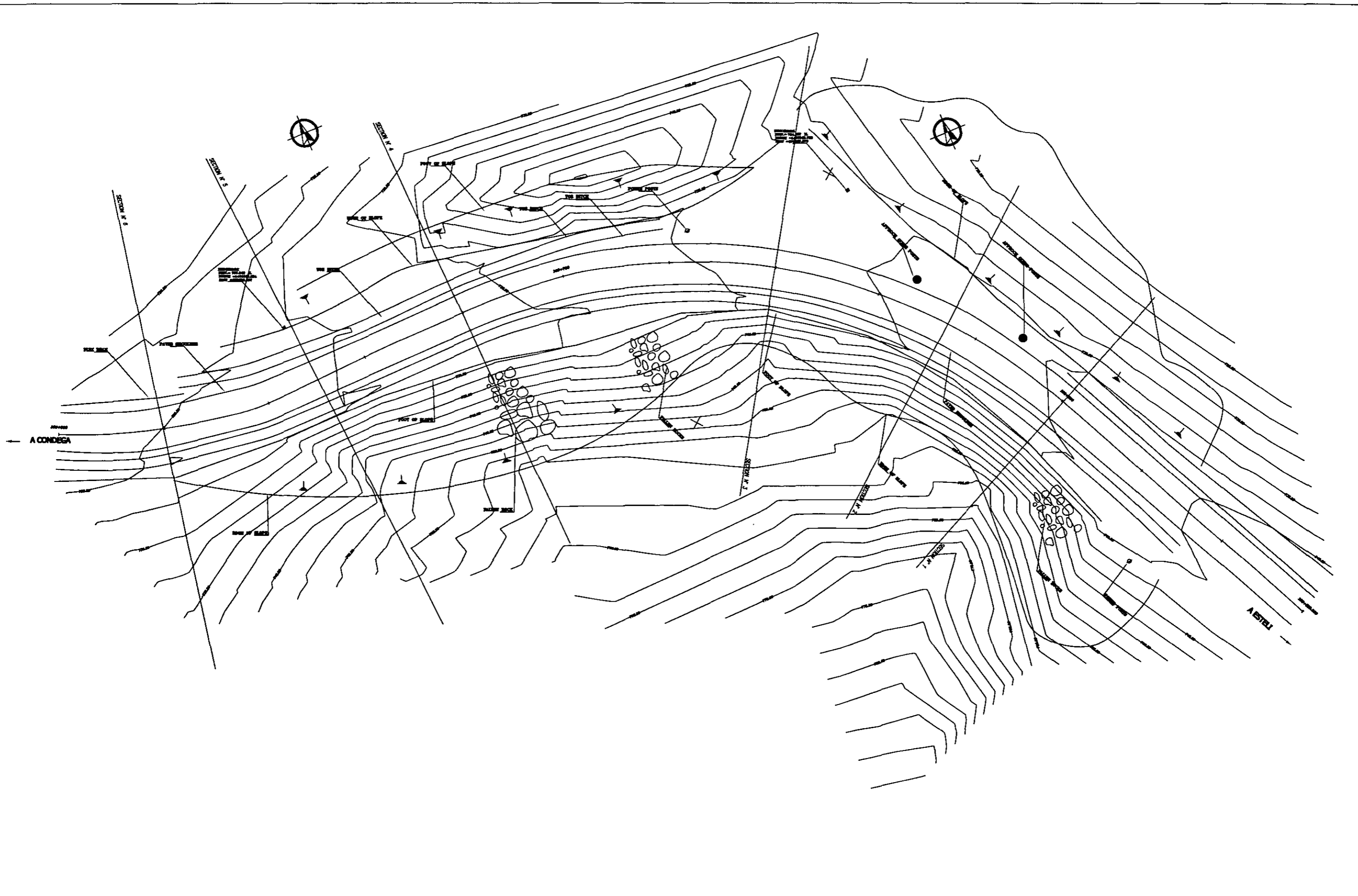
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SECCIONES TRANSVERSALES  
UBICACION: KM 168+600 CARRETERA MANAGUA - EL ESPINO  
SITIO: N001B230

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO : Ch. Rivera C.	DEBIDO: Ch. Rivera C.	HOJA N° 7 140
LEVANTO : MAURICIO MENDEZ V.	FECHA: Julio 2002	
RESPONSABLE TECNICO : JRO KOBMA	ESCALA 1 : 200	

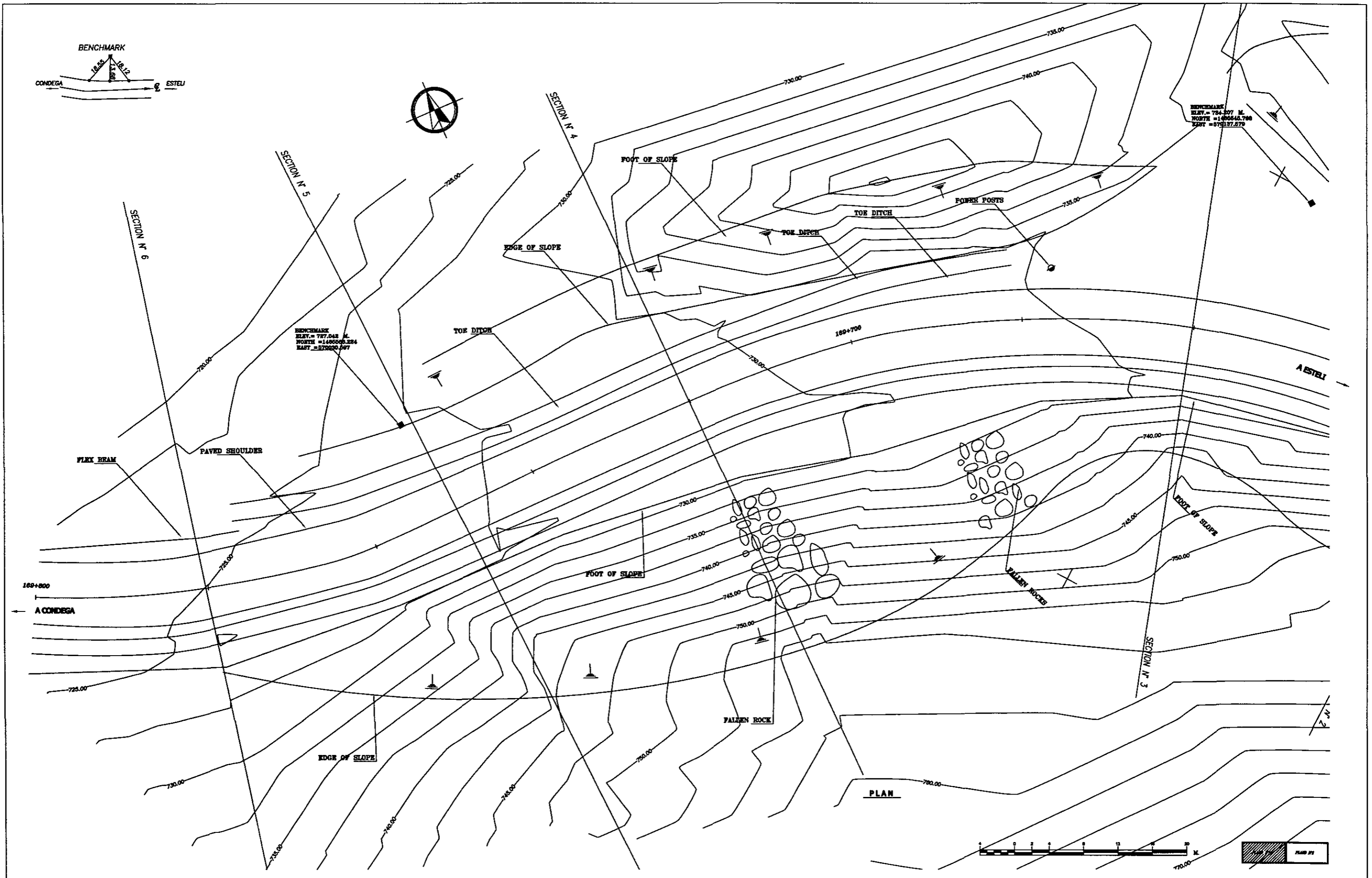


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CONTENIDO:	GENERAL VIEW
UBICACION:	KM 169+800 CARRETERA MANAGUA - EL ESPINO
SITIO:	ND01B200

PROYECTO:	STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA
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CALCULO:	Dr. Rivera C.	DIBUJO:	Dr. Rivera C.	HOJA N°	8
LEVANTO:	Mauricio Méndez	FECHA:	Julio 2002	140	
RESPONSABLE TECNICO:	JIRO KOBAMA	ESCALA:	1 : 200		



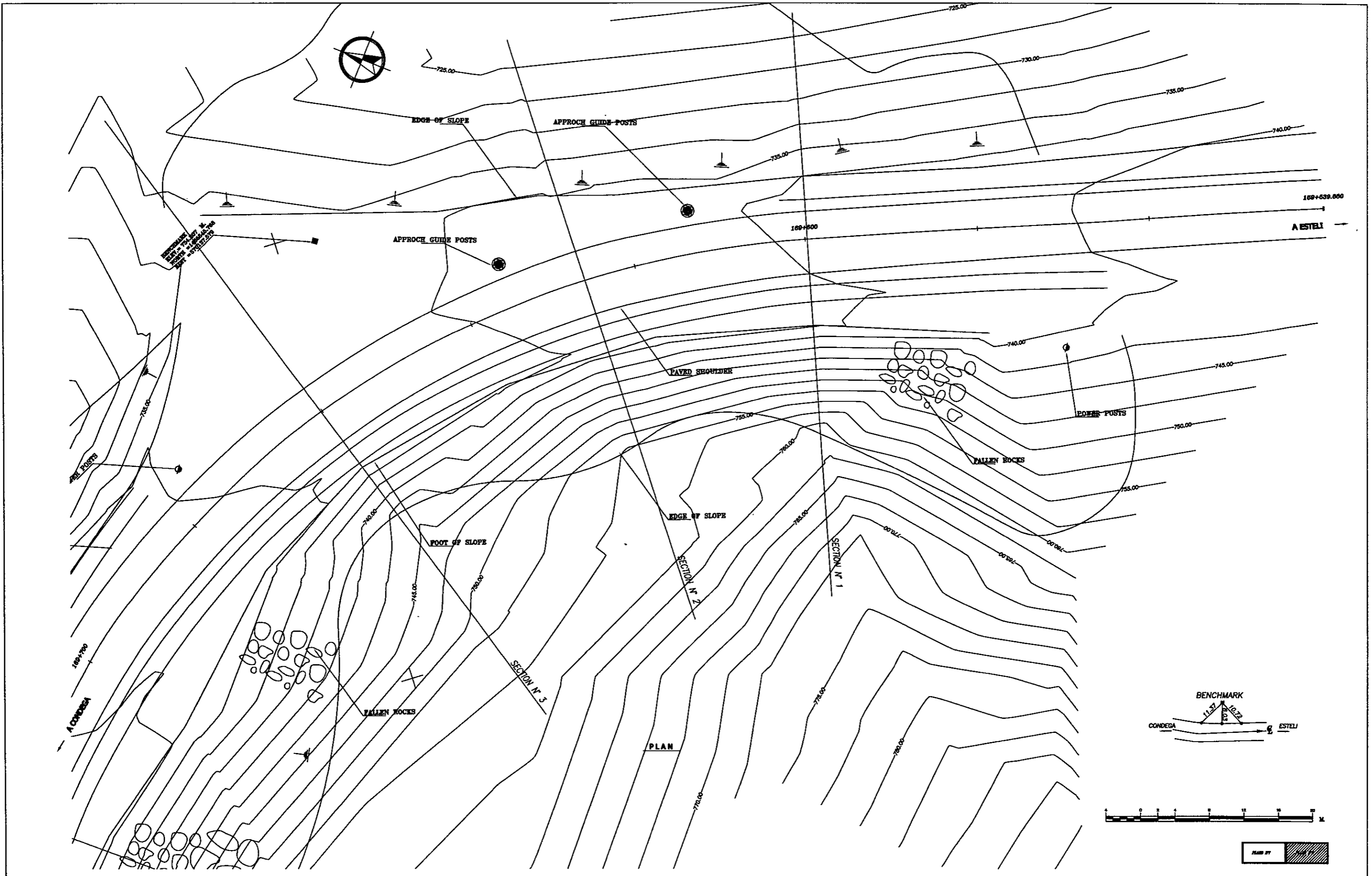
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CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
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 UBICACION: KM 169+800 CARRETERA MANAGUA - EL ESPINO  
 SITIO: N001B200

PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO:	Ch. Rivera C.	DEBANC:	Ch. Rivera C.	HOJA N°
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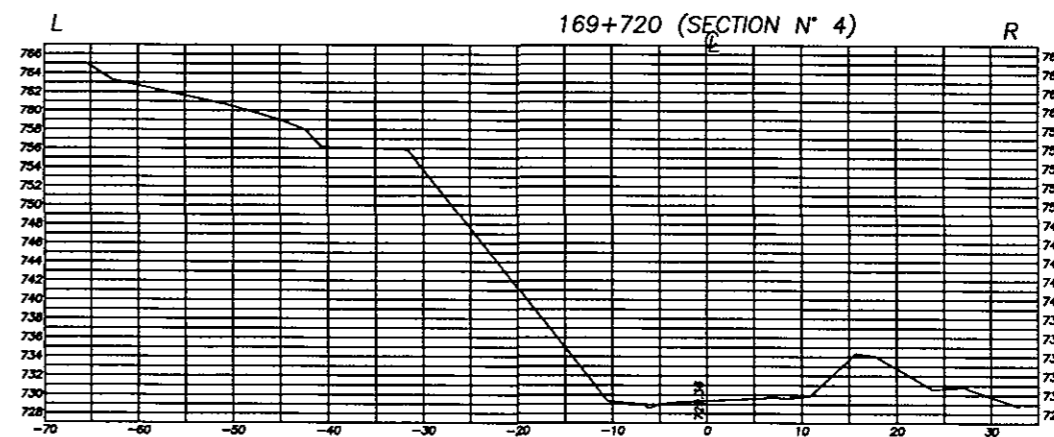
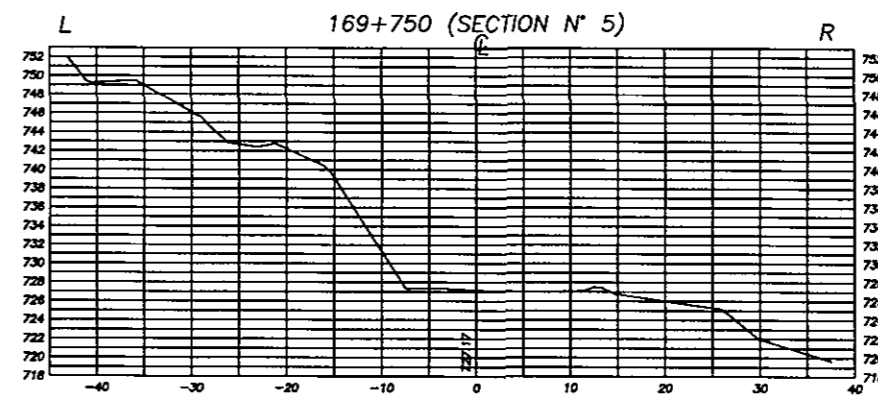
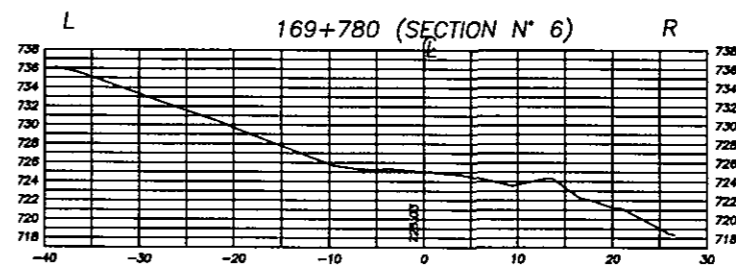
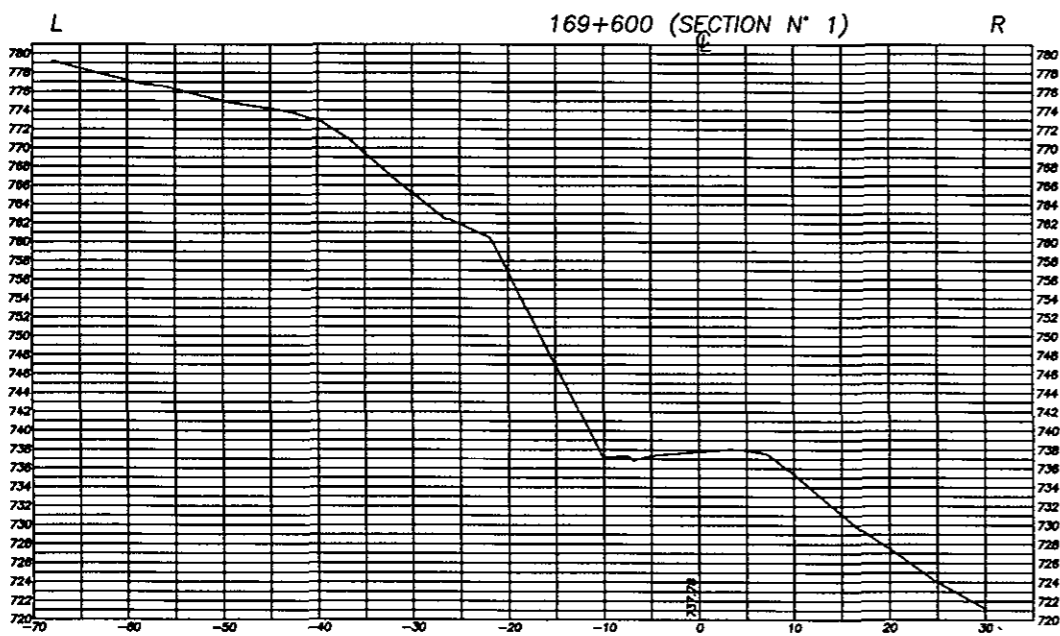
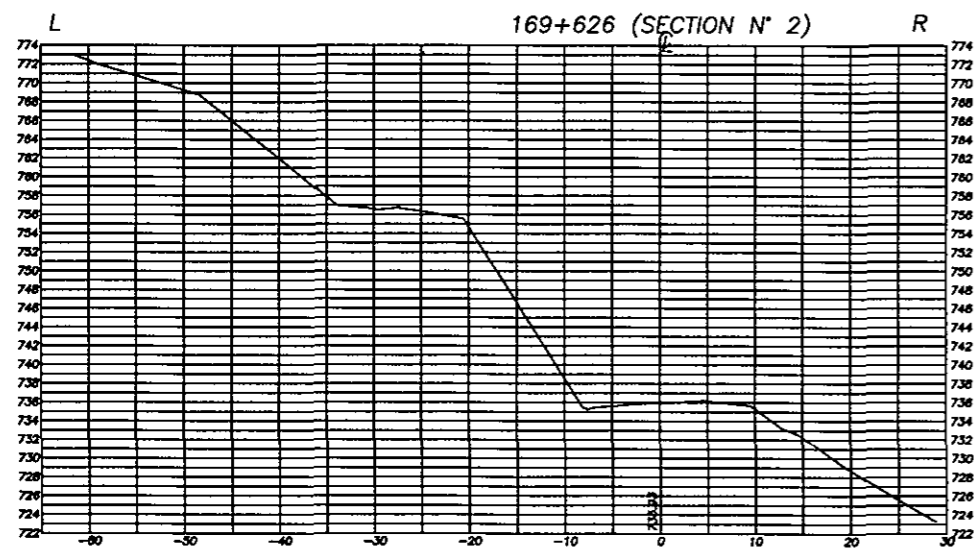
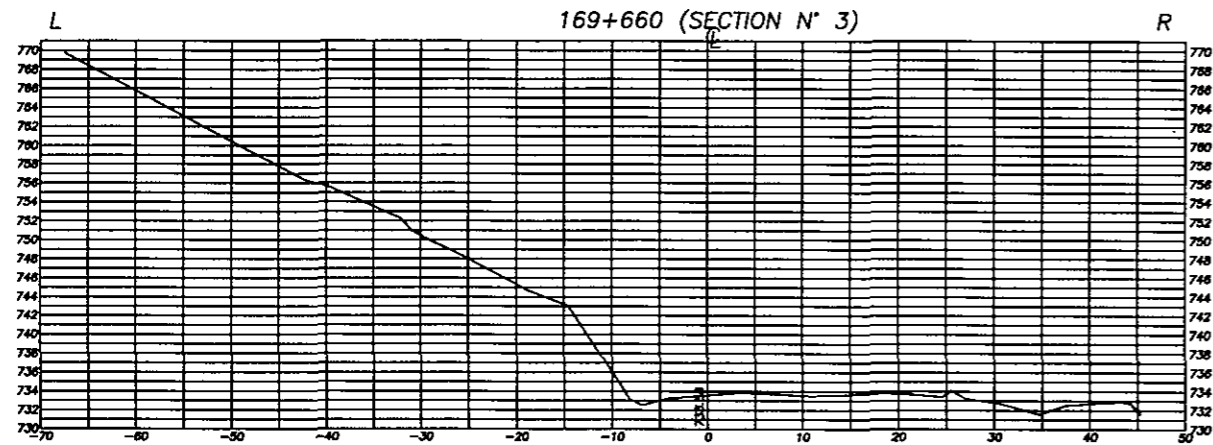
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 SECCIONES TRANSVERSALES  
 UBICACION: KM 169+800 CARRETERA MANAGUA - EL ESPINO  
 SITIO: N001B200

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO :	Ch. Rivera C.	DIBIJAO:	Ch. Rivera C.	HOJA N°
LEVANTO :	Mauricio Míndez	FECHA:	Julio 2002	10
RESPONSABLE TECNICO :	JIRO KOJIMA	ESCALA	1 : 200	140



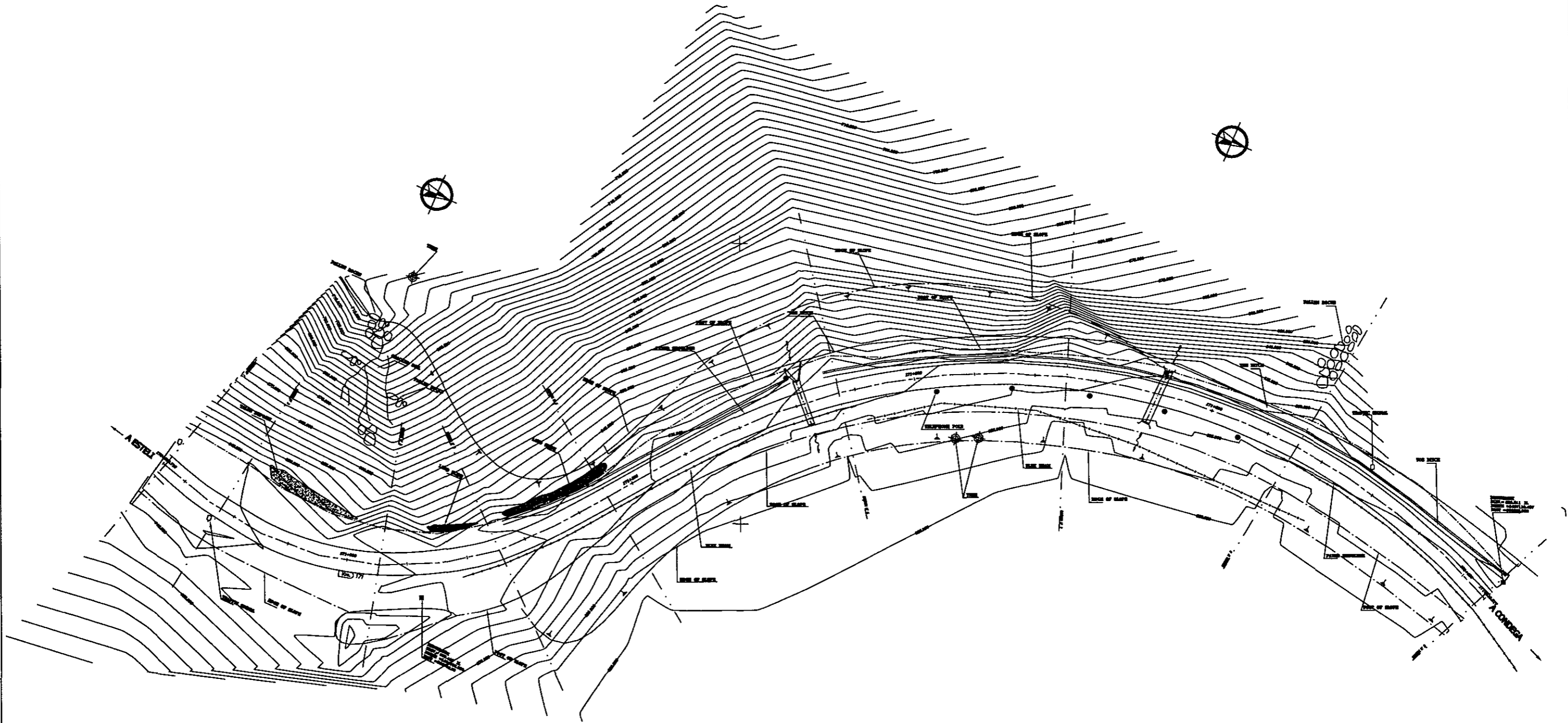
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UBICACION:	KM 169+600 CARRETERA MANAGUA - EL ESPINO
SITIO:	N001B200

PROYECTO:

STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO:	Ch. Rivera C.	DIBUJO:	Ch. Rivera C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:	Julio 2002	11
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	1 : 400	140

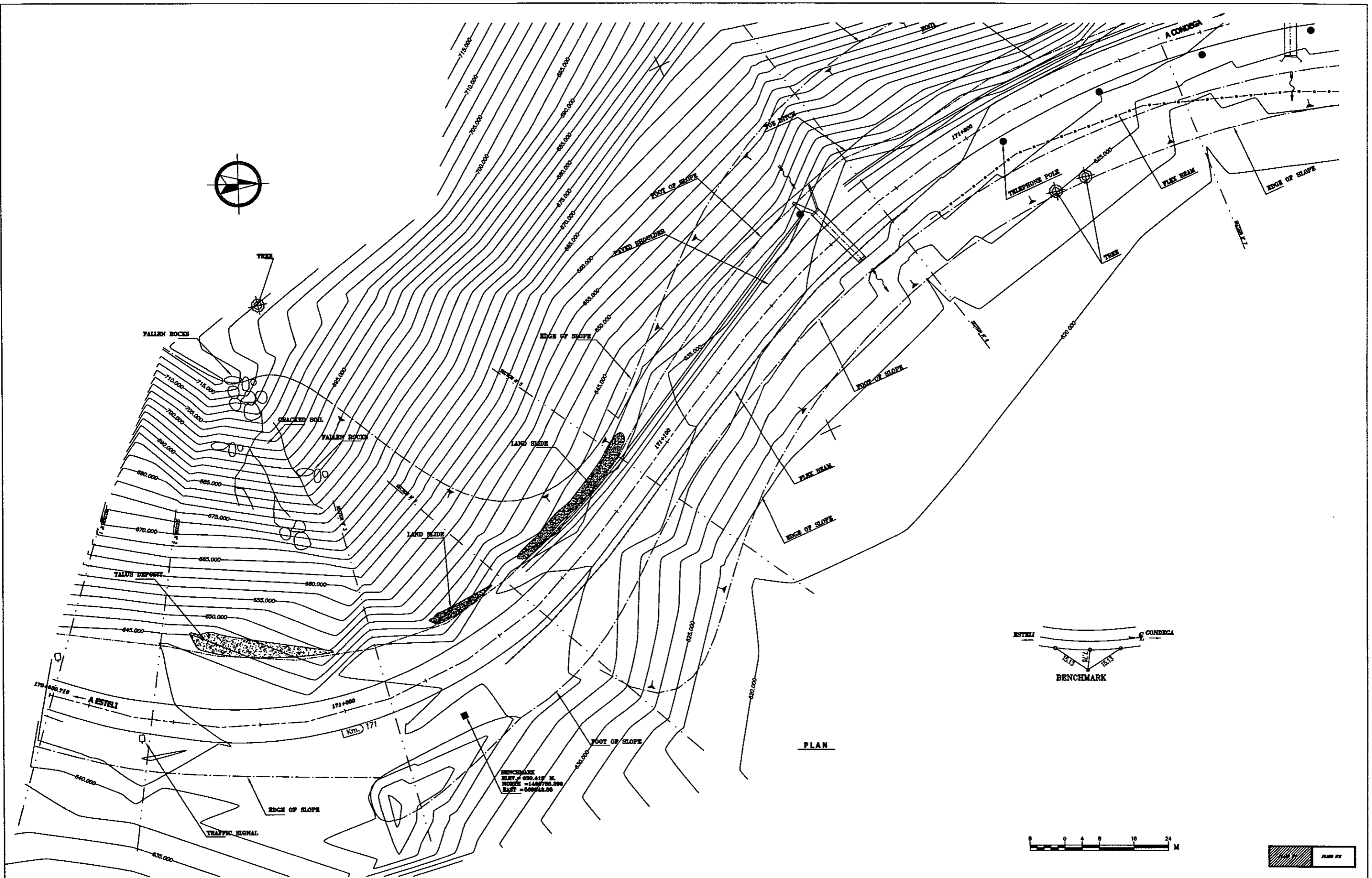


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CONTENIDO:	GENERAL VIEW
UBICACION:	KM 170+300.71 CARRETERA ESTELI-CONDEGA
SITIO:	N001R190

PROYECTO:	STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA
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CALCULO:	Ch. Rivera C.	DEBIDO:	Ch. Rivera C.	HOJA N°	12
LEVANTO:	Mauricio Méndez	FECHA:	Julio 2002		
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	SIN ESCALA		140

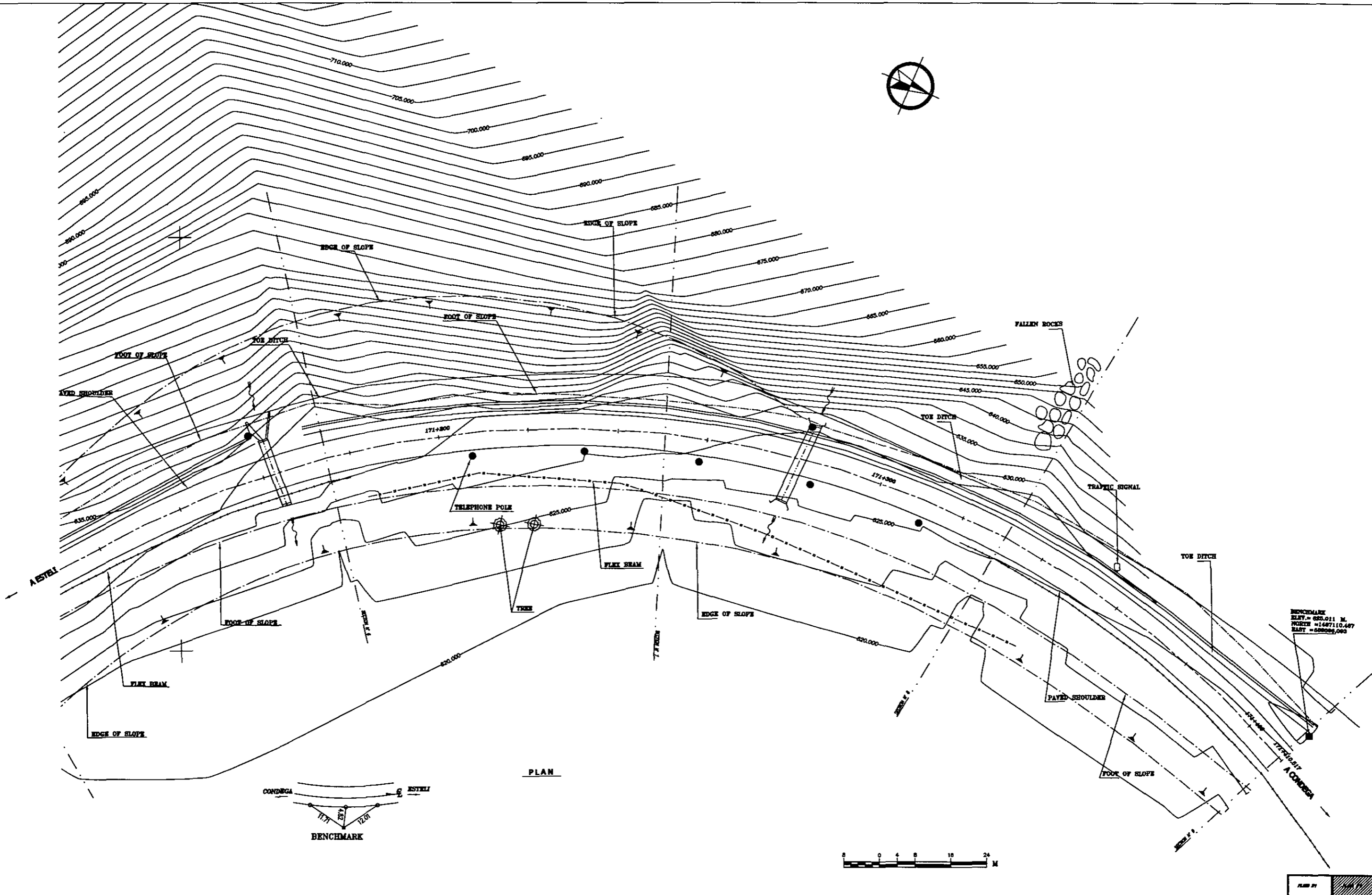


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 JAPAN ENGINEERING CONSULTANTS  
 CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRASVERSALES
UBICACION:	KM 170+930.71 CARRETERA ESTELI-CONDEGA
SITIO:	N001B190

PROYECTO:  
**STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA**

CALCULO:	Ch. Rivera C.	DEBIAO:	Ch. Rivera C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:	Julio 2002	13
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	1 : 400	140

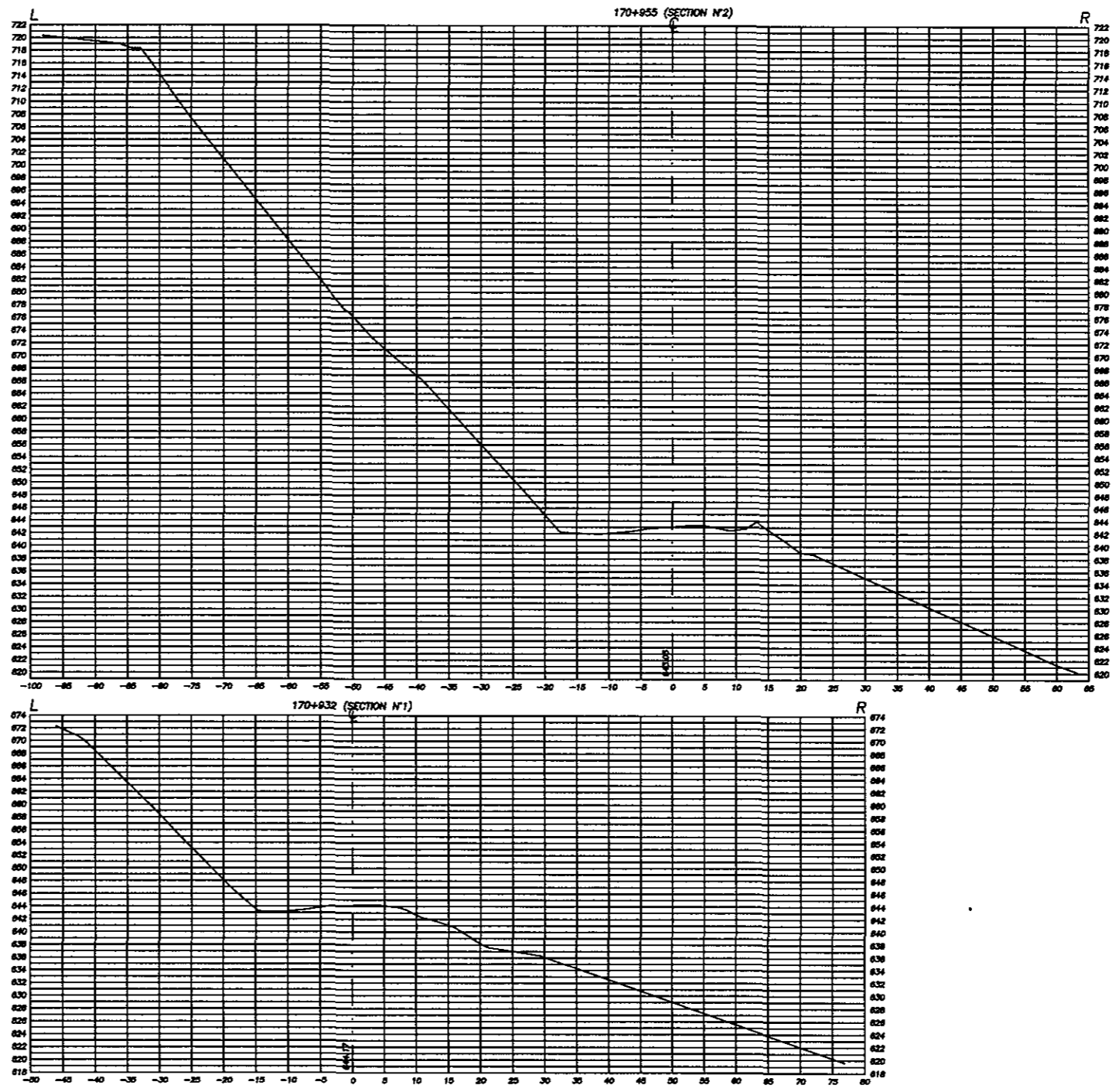


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JAPAN ENGINEERING CONSULTANTS  
CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
SECCIONES TRASVERSALES  
UBICACION: KM 170+930.71 CARRETERA ESTELI-CONDEGA  
SITO: N001B190

PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO:	Ch. Rivera C.	DIBUJO:	Ch. Rivera C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:	Julio 2002	14
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	1 : 400	140

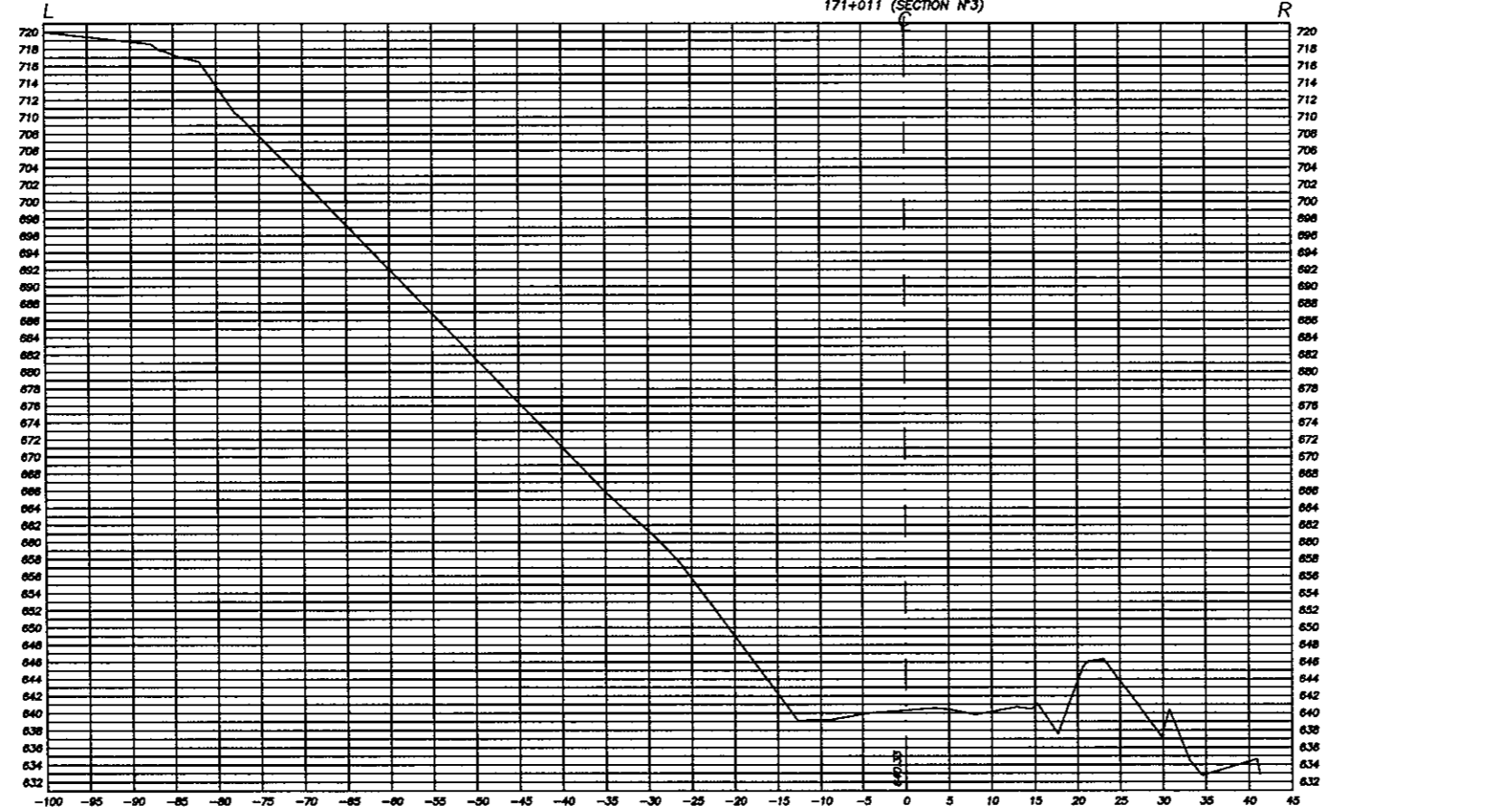
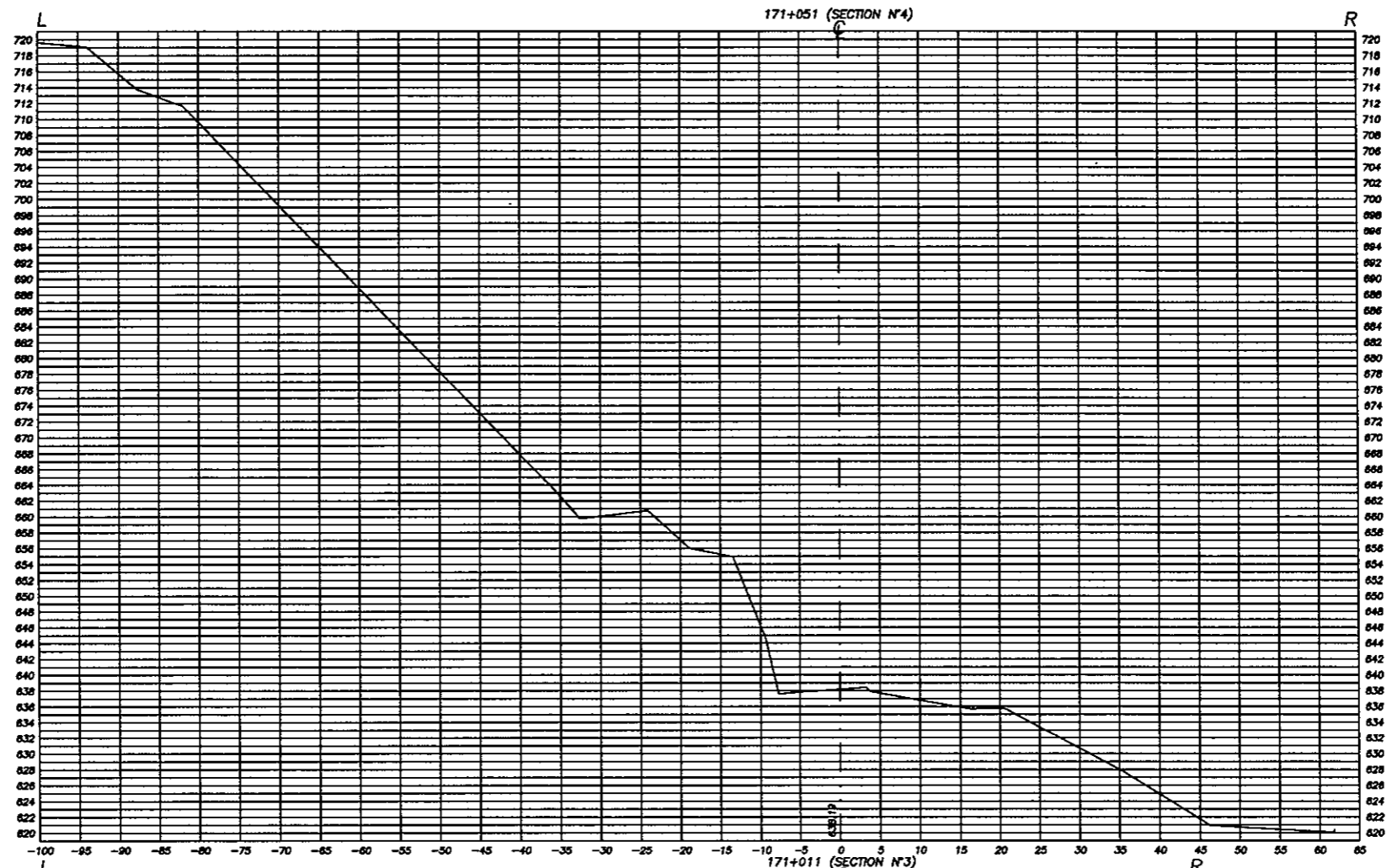


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CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRASVERSALES
UBICACION:	KM 170+930.71 CARRETERA ESTELI-CONDEGA
SITIO:	N001B190

PROYECTO:	STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA
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CALCULO :	Qh. Rivero C.	DIBUJO:	Qh. Rivero C.	HOJA N°
LEVANTO :	Mauricio Méndez	FECHA:	Julio 2002	15
RESPONSABLE TECNICO :	JIRO KOJIMA	ESCALA	1 : 400	140

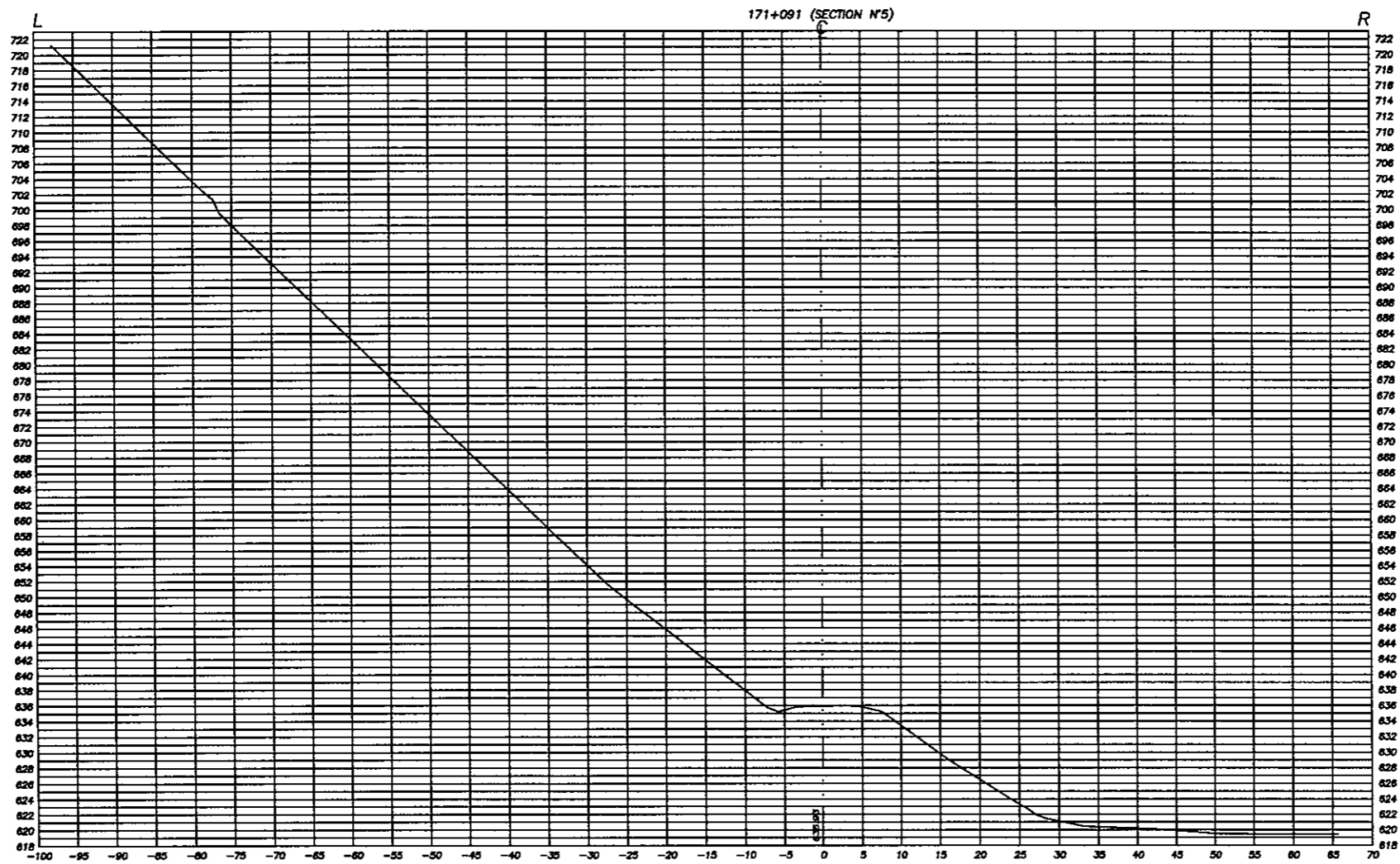


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CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRASVERSALES
UBICACION:	KM 170+930.71 CARRETERA ESTELI-CONDEGA
SITIO:	N001B190

PROYECTO:  
**STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA**

CALCULO:	Ch. Rivera C.	DEBUC:	Ch. Rivera C.	HOJA N°
LEVANTO:	Mauricio Mández	FECHA:	Julio 2002	16
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	1 : 400	140



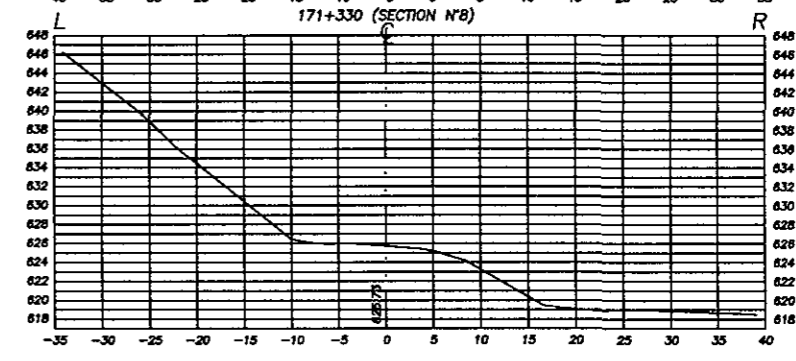
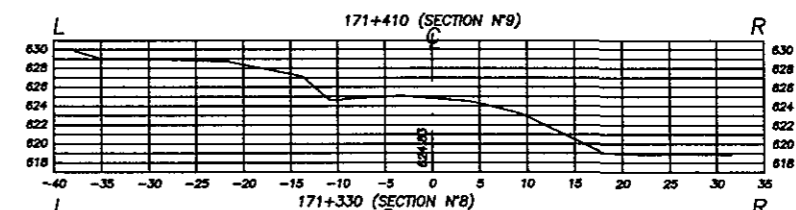
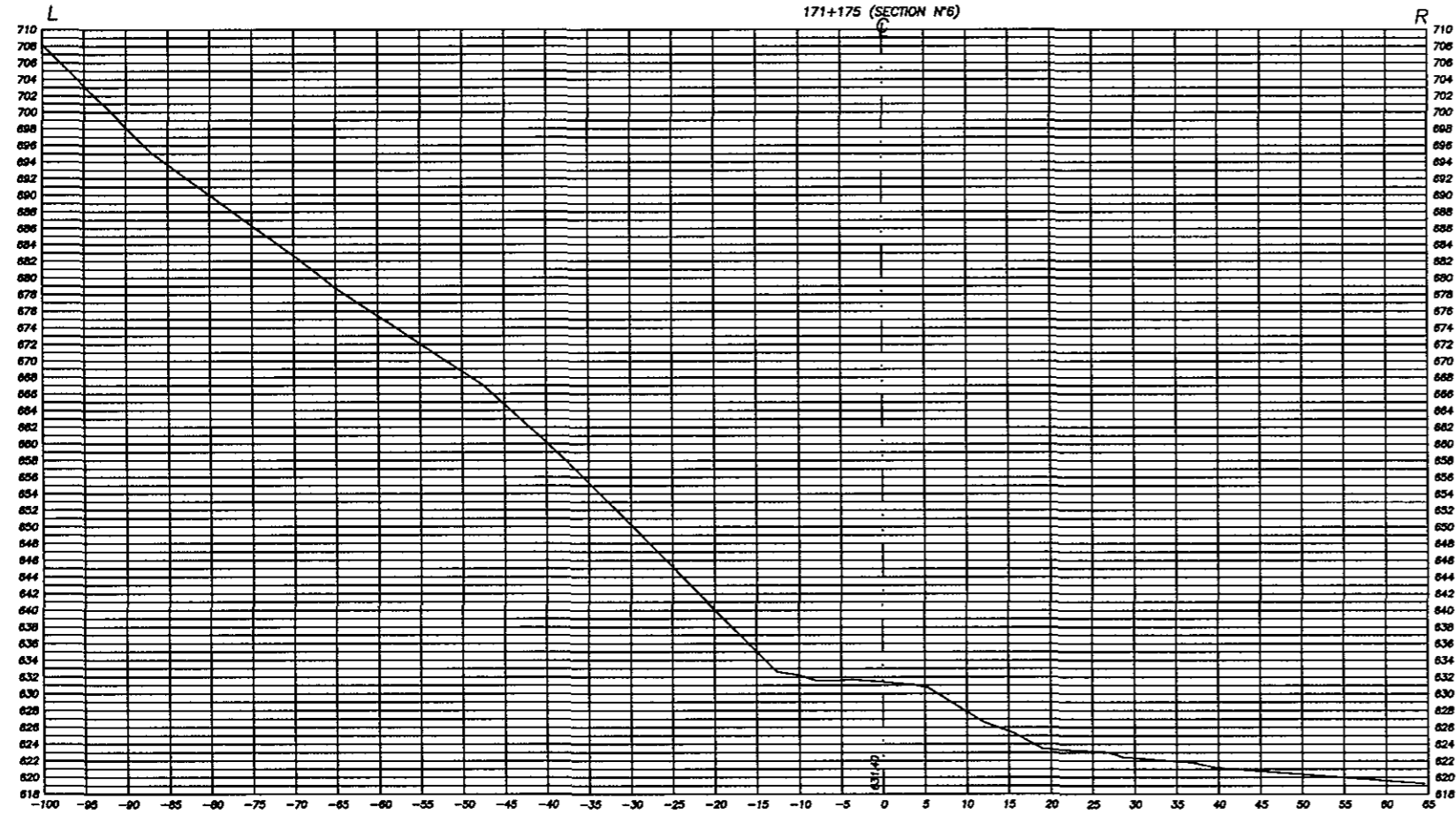
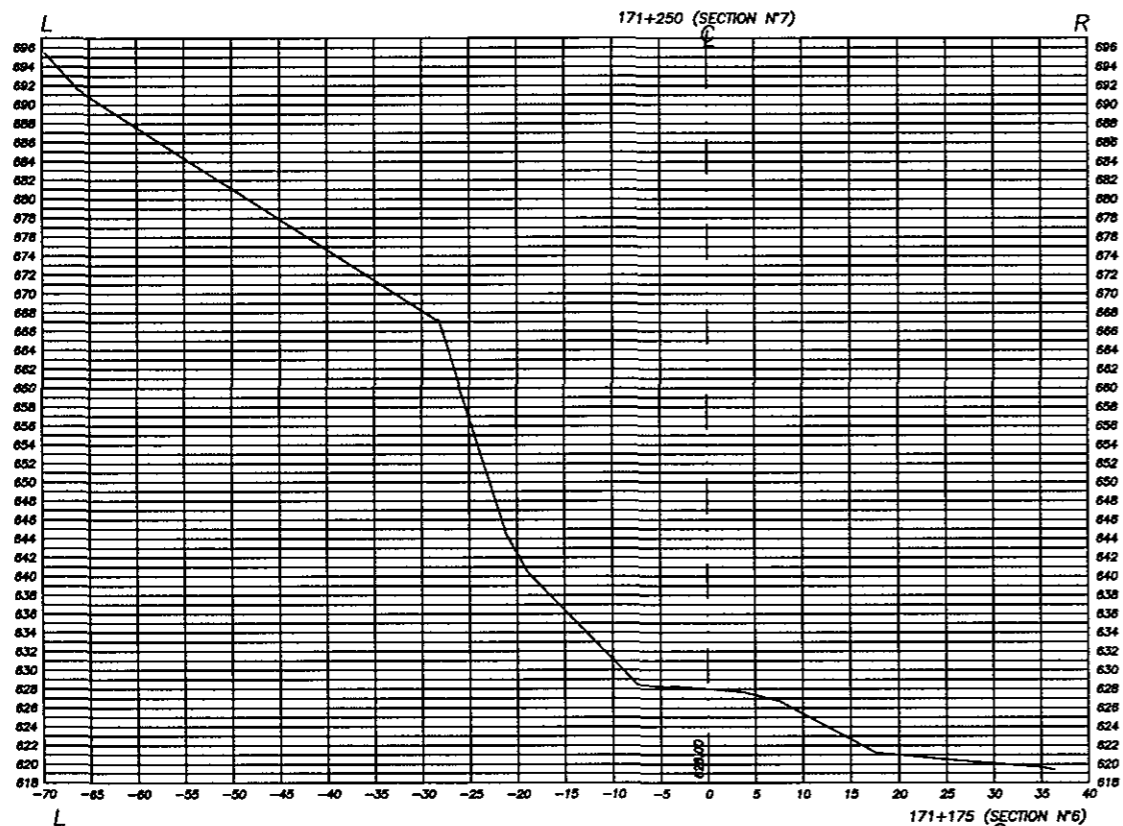
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CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRASVERSALES
UBICACION:	KM 170+930.71 CARRETERA ESTELI-CONDEGA
SITIO:	NO01B190

PROYECTO:	STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA
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CALCULO :	DR. Rivera C.	DESAJO:	DR. Rivera C.	HOJA N°
LEVANTO :	Mauricio Méndez	FECHA:	Julio 2002	17
RESPONSABLE TECNICO :	JIRO KAJIMA	ESCALA	1 : 400	140



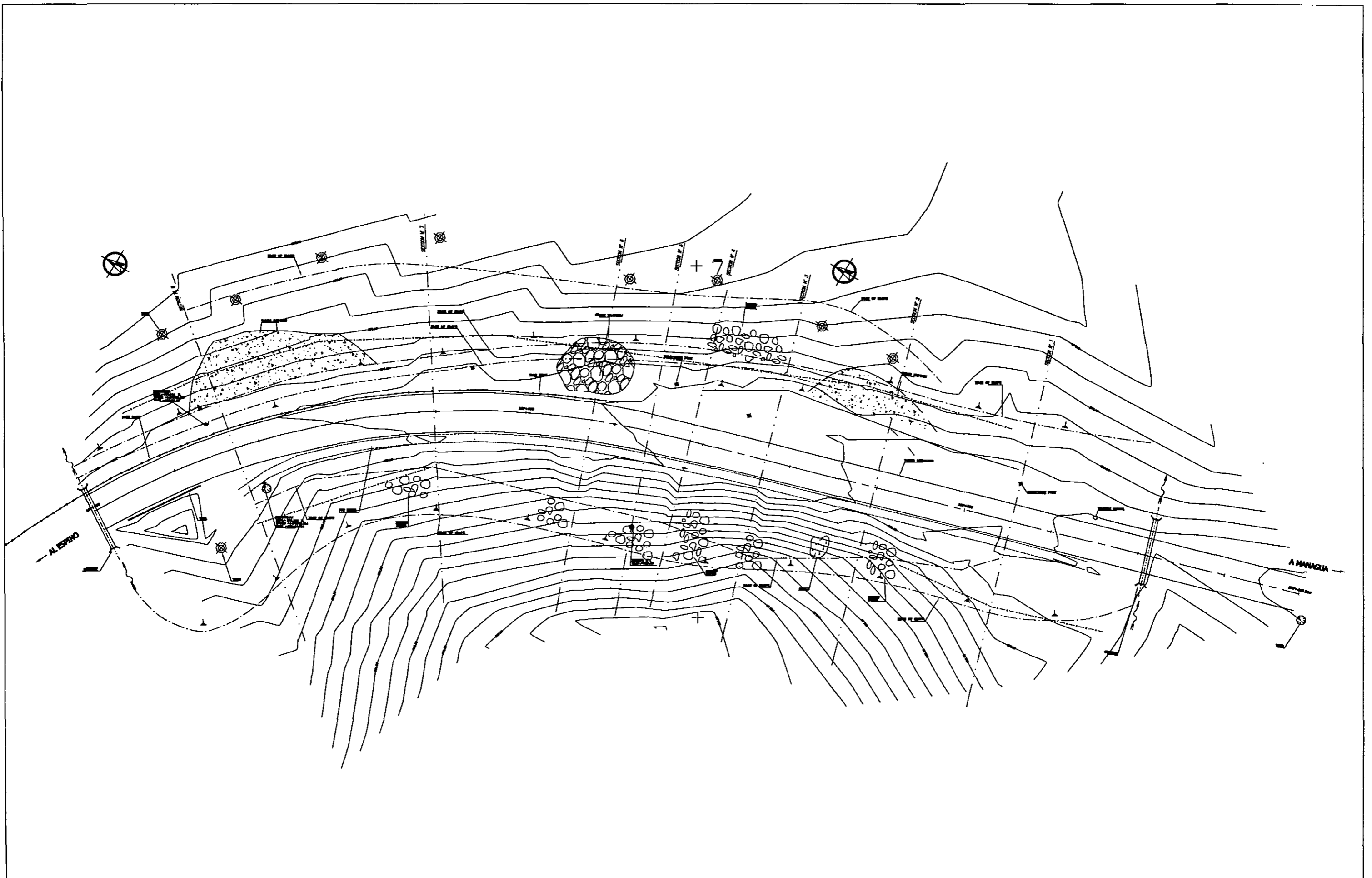


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CONTENIDO: LEVANTAMIENTO TOPOGRAFICO  
SECCIONES TRASVERSALES  
UBICACION: KM 170+930.71 CARRETERA ESTELI-CONDEGA  
SITIO: N001B190

PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
IN THE REPUBLIC OF NICARAGUA

CALCULO:	Ch. Rivera C.	DEBUIO:	Ch. Rivera C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:	Julio 2002	18
RESPONSABLE TECNICO:	JIRO KOJIMA	ESCALA:	1 : 400	140

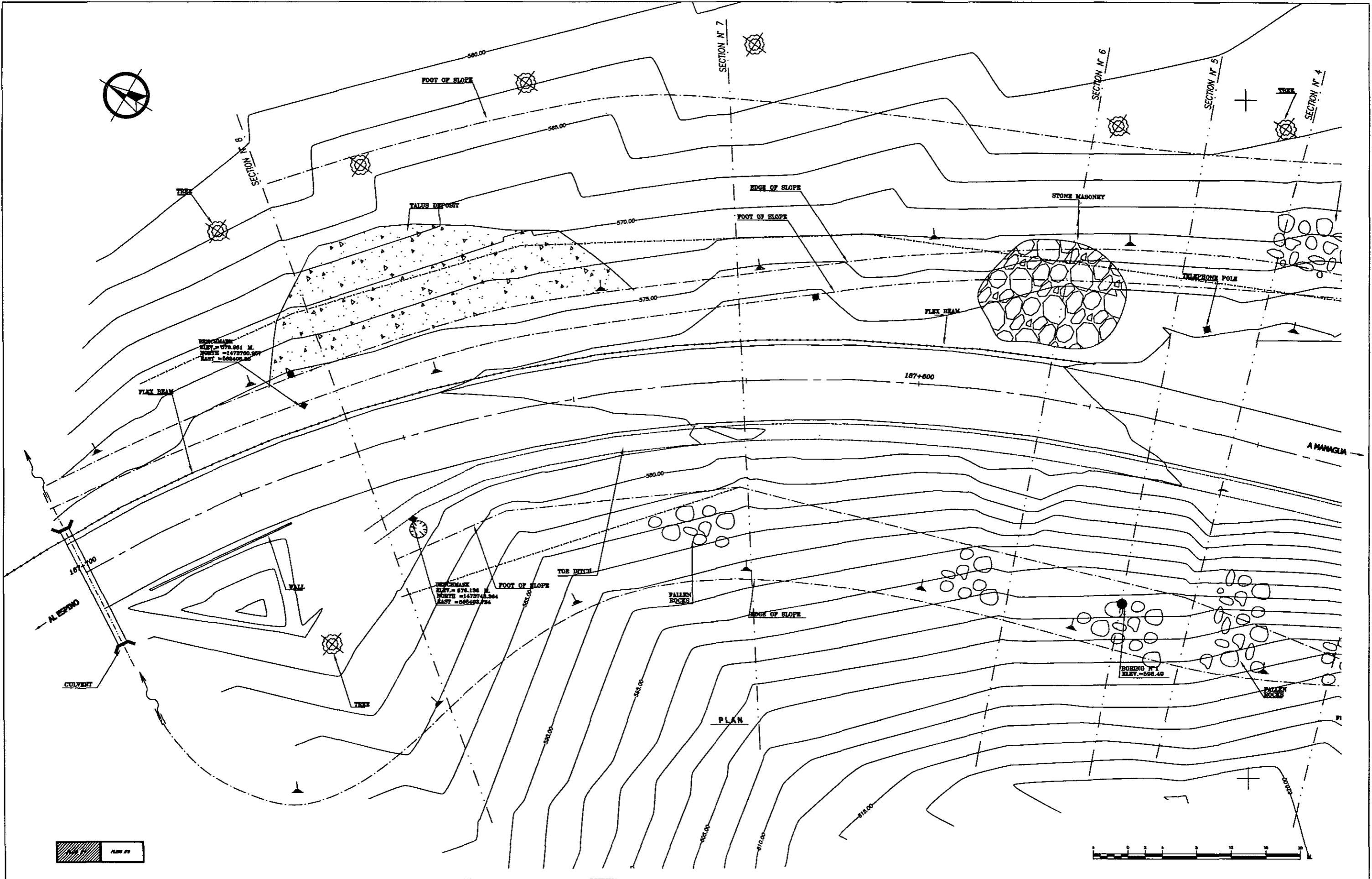


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CONTENIDO:	GENERAL VIEW
UBICACION:	KM 187+700 CARRETERA MANAGUA - EL ESPINO
SITO:	N001A110

PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO:	Ch. Rivera C.	DESAJO:	Ch. Rivera C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:	Julio 2002	19
RESPONSABLE TECNICO:	JIRO KOJIMA	SR:	ESCALA	140



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CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 187+700 CARRETERA MANAGUA - EL ESPINO
SITO:	N001A110

PROYECTO:  
 STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS  
 IN THE REPUBLIC OF NICARAGUA

CALCULO :	Ch. Rivera C.	DIBUJO:	Ch. Rivera C.	HOJA N°	20 140
LEVANTO :	Mauricio Minder	FECHA:	Julio 2002		
RESPONSABLE TECNICO :	JRO KUMIA	ESCALA:	1 : 200		