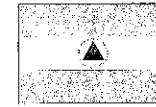


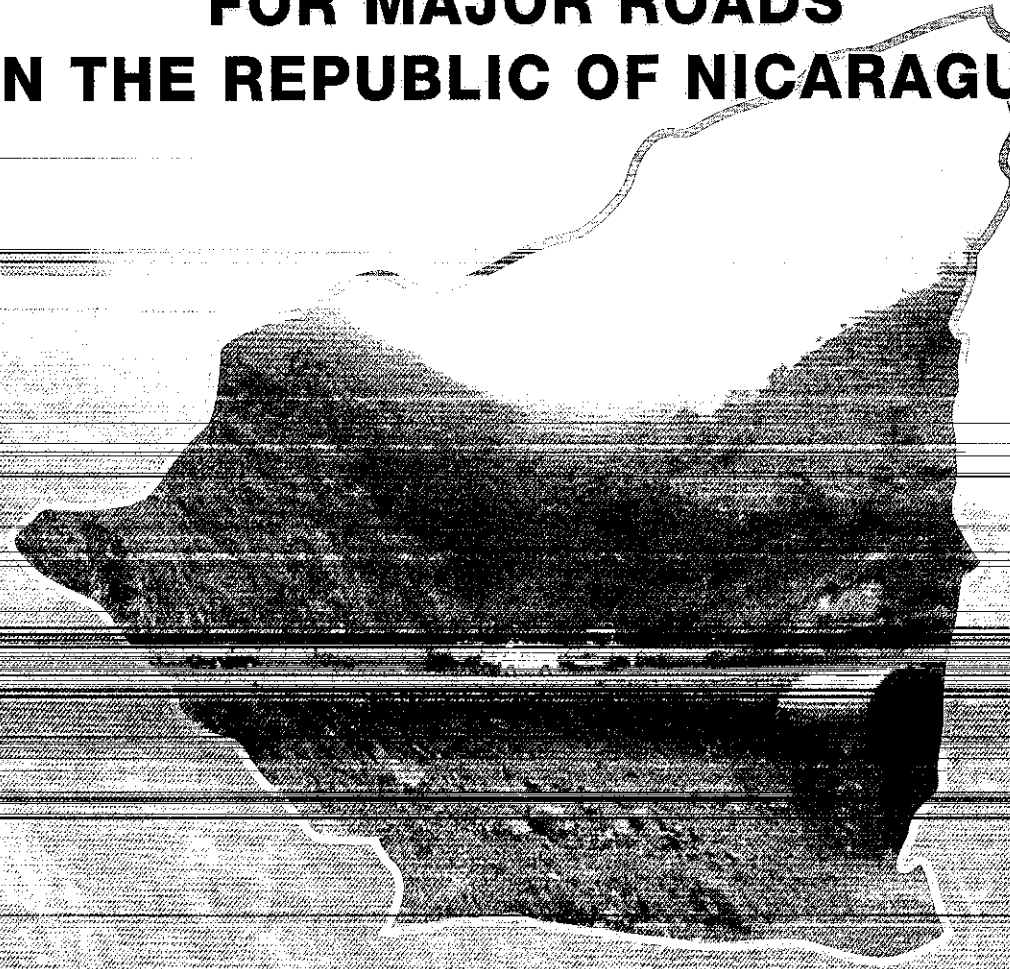
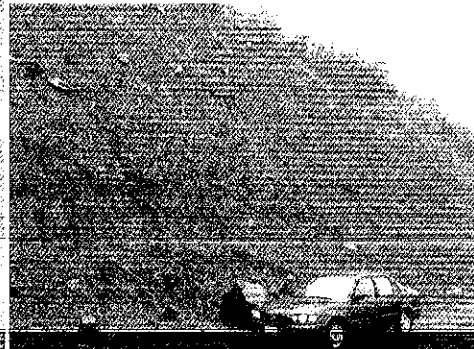


JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)



MINISTRY OF TRANSPORT AND
INFRASTRUCTURE
REPUBLIC OF NICARAGUA

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

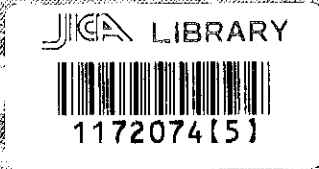


FINAL REPORT

Volume 4 of 5

DRAWINGS

January 2003



Oriental Consultants Company Limited



Japan Engineering Consultants Company Limited

SSF
JR
03-12



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 A: FEASIBILITY STUDY >

January 2003



Oriental Consultants Company Limited



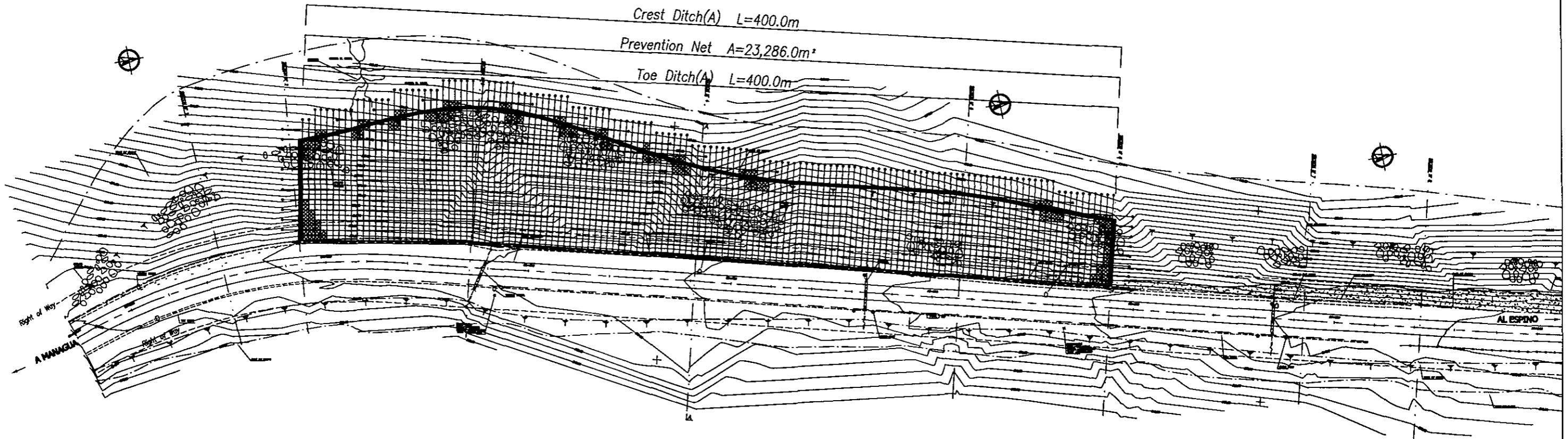
Japan Engineering Consultants Company Limited



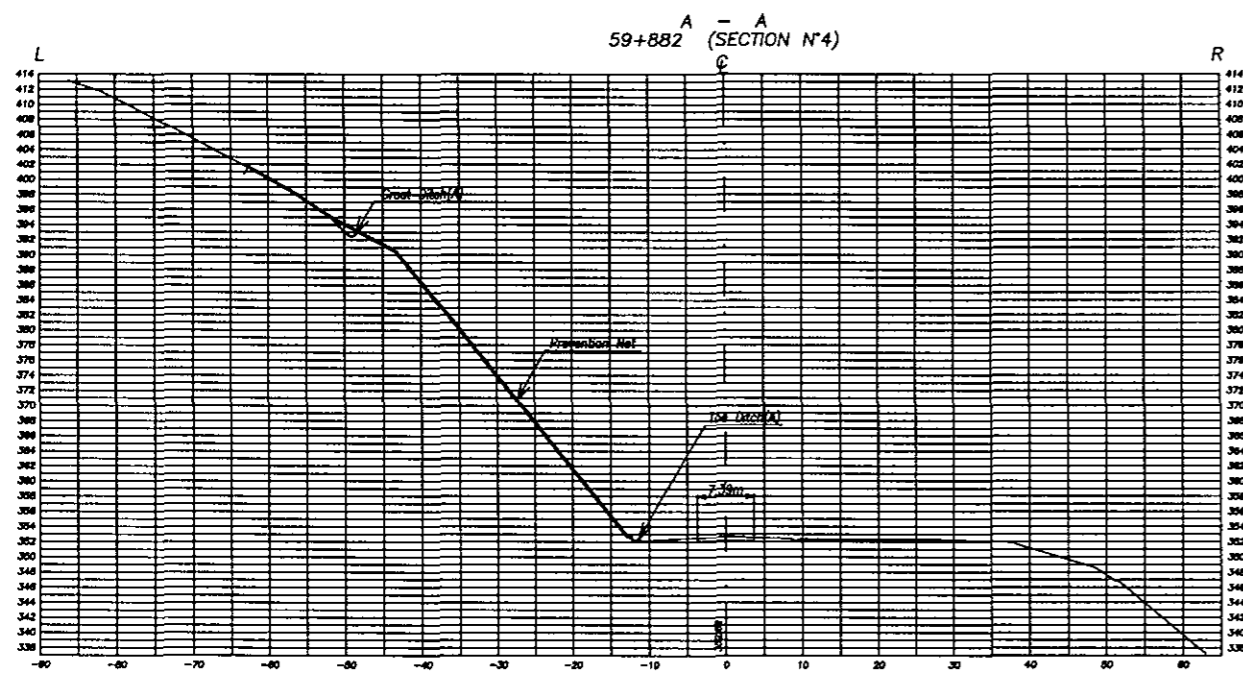
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DRAWING LIST

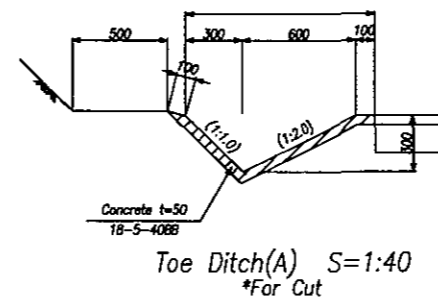
General Drawings						Standard Drawings		
Root No,	Title of Drawings	No,	Root No,	Title of Drawings	No,	Title of Drawings	No,	
NIC 1	N001A290	1	NIC 3	N003B400	15	Typical Cross Section of Slops	35	
	N001A280	2		N003B370	16	General Layout of Prevention Net	36	
	Junquillal	3		El Guayacan	17—18	General Layout of Shotcrete	37	
	San Nicolas	4		N003B320	19	General Layout of Concrete Cribwork	38	
	Las Chanillas	5		N003C240/N003B230	20	General Layout of Simple Dam	39	
	San Ranon	6		N003E170	21	General Layout of Drainage Work	40	
	N001A240	7		N003C150	22	General Layout of Protection for Scouring	41	
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	Inali	12—13	N026B140		27			
	Tapacali	14	N026A150		28			
				N026B160	29			
			San Juan de Dios	30				
			Papalon	31—32				
			Solis	33—34				



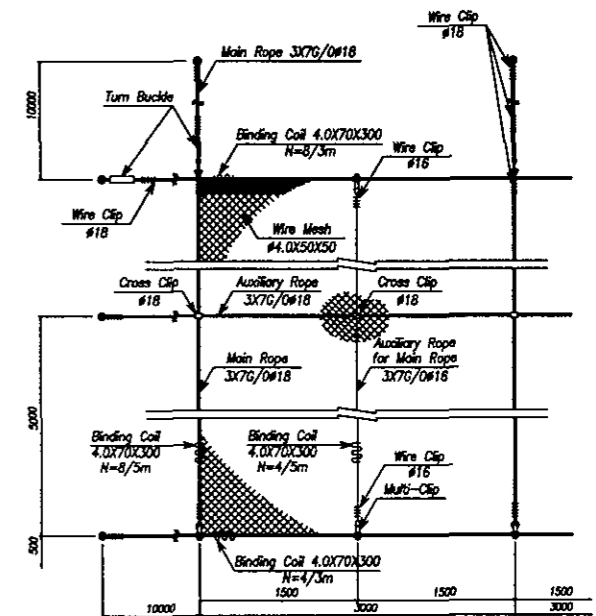
Plan S=1:2000



Cross Section S=1:1000



Crest Ditch(A) S=1:40



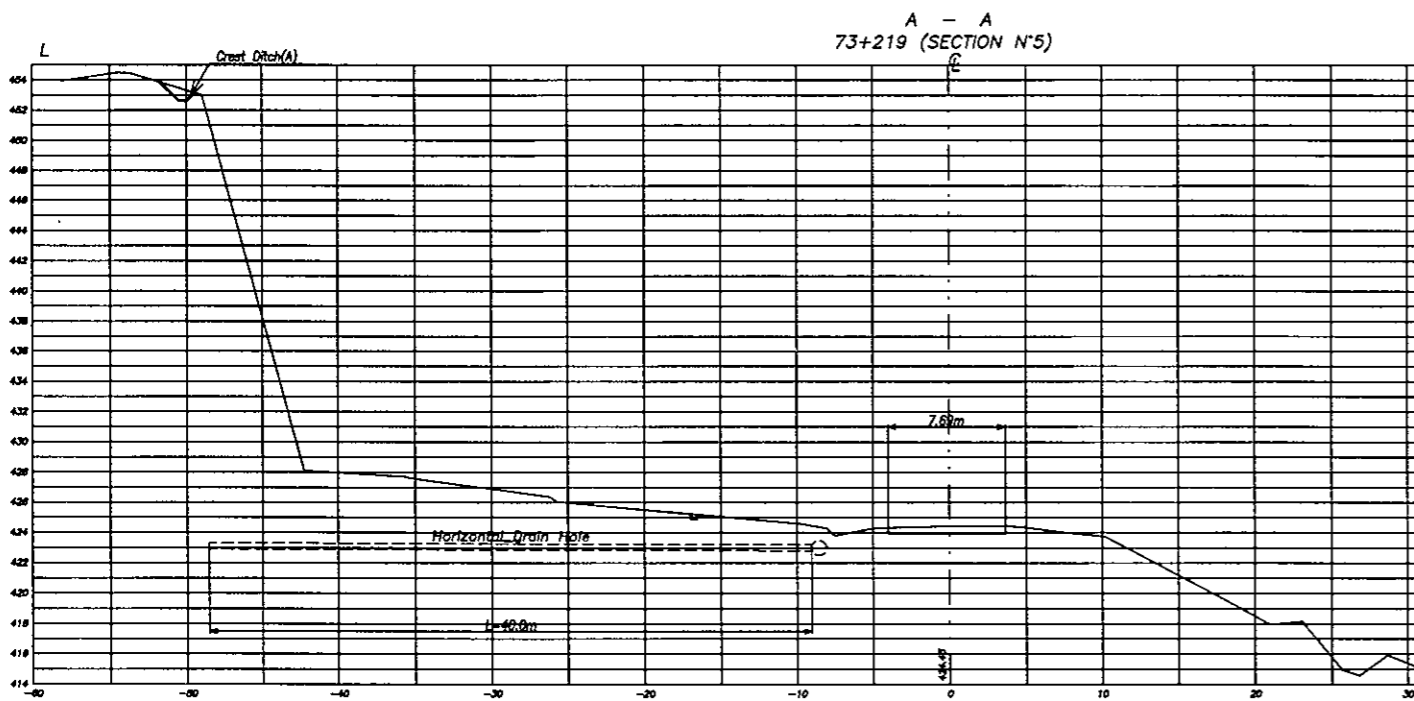
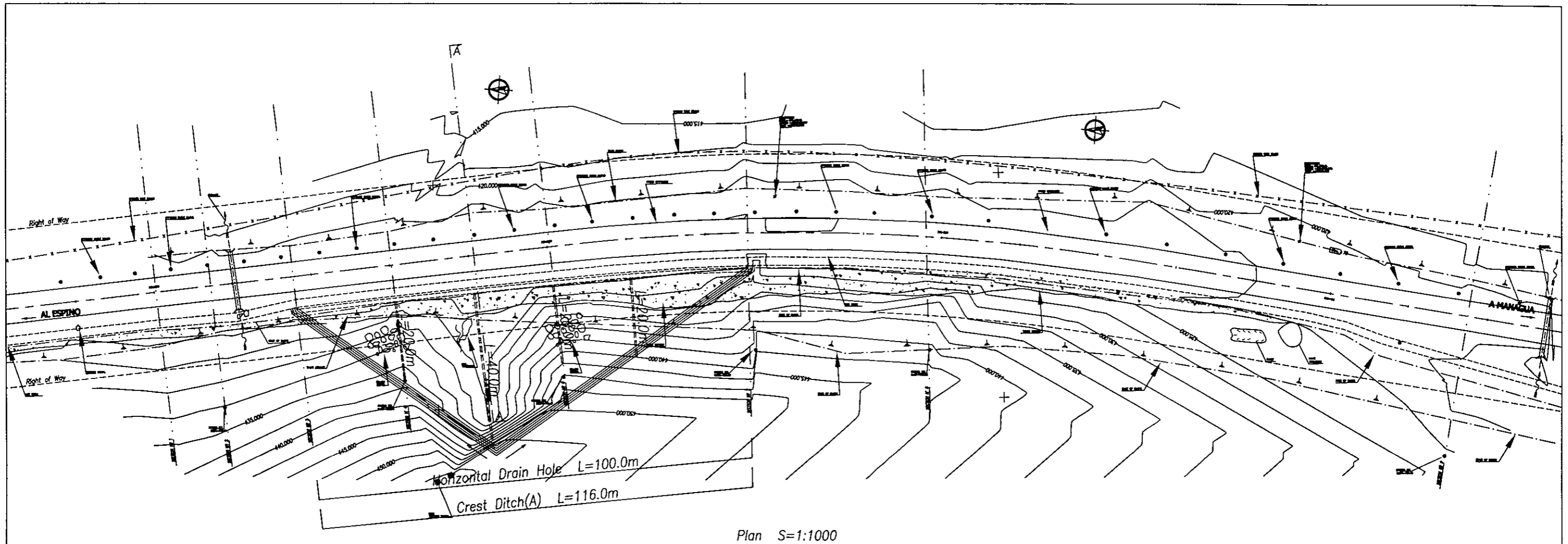
General Layout of Prevention Net S=Non Scale

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

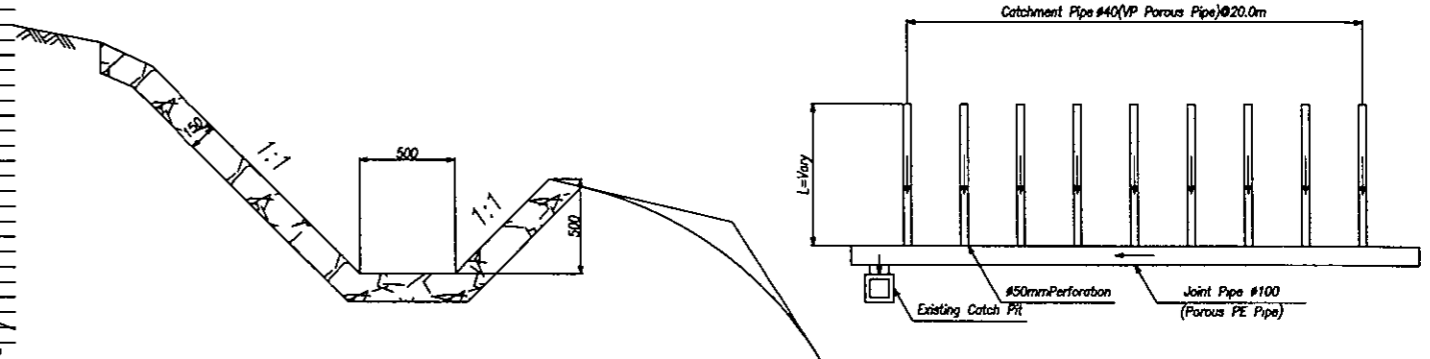
CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
SECCIONES TRANSVERSALES
UBICACION: KM 60+900 CARRETERA MANAGUA - EL ESPINO
SITIO: N001A290

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

CALCULO:	DBUJO:	HOJA N°
LEVANTO:	FECHA:	1
RESPONSABLE TECNICO:	ESCALA:	44
	Illustration	



Cross Section S=1:500



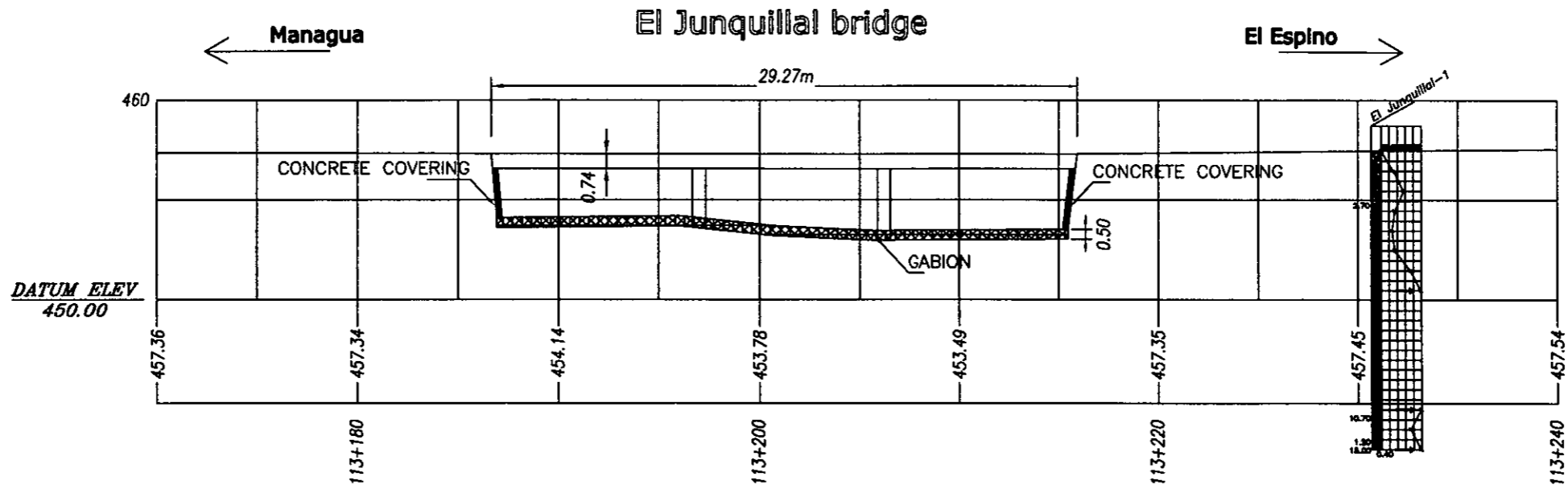
ORIENTAL CONSULTANTS CO., LTD.
JAPAN ENGINEERING CONSULTANTS
CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
SECCIONES TRANSVERSALES
UBICACION: KM 73+200 CARRETERA MANAGUA - EL ESPINO
SITIO: N001A280

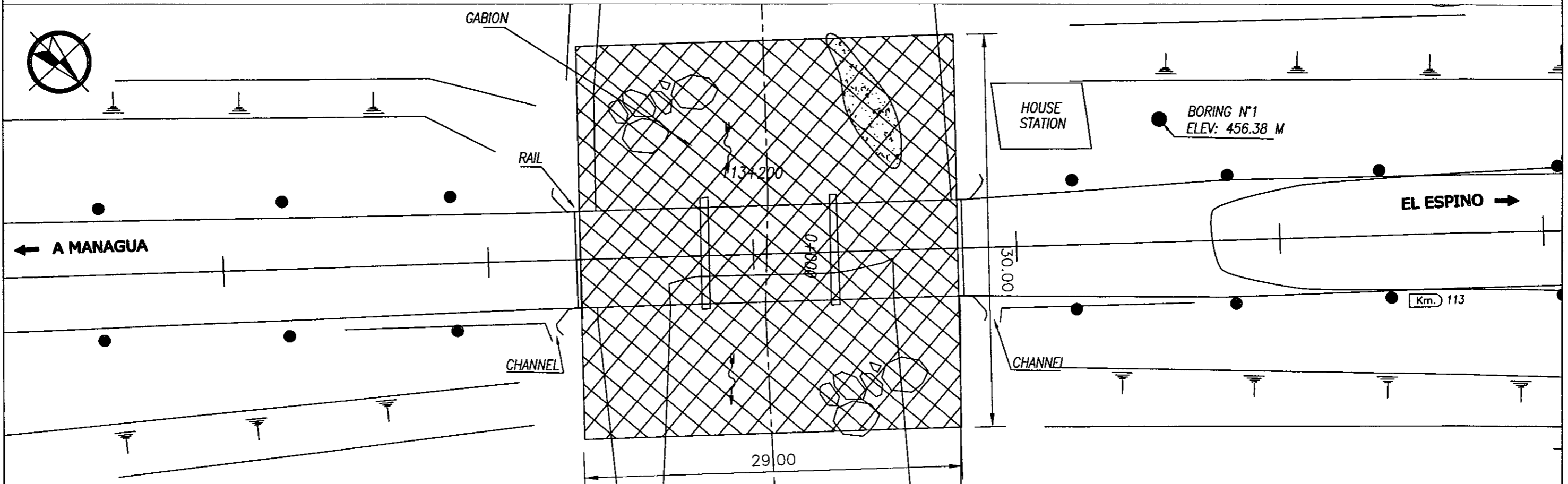
PROYECTO:

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

CALCULO:	DIBUJO:	HOJA N°
LEVANTO:	FECHA: November 2002	2
RESPONSABLE TECNICO:	ESCALA: Illustration	44



CROSS SECTION ALONG CENTER LINE OF HIGHWAY
SCALE HOR: 1:300 ; VER: 1:300



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

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
 SECCIONES TRANSVERSALES

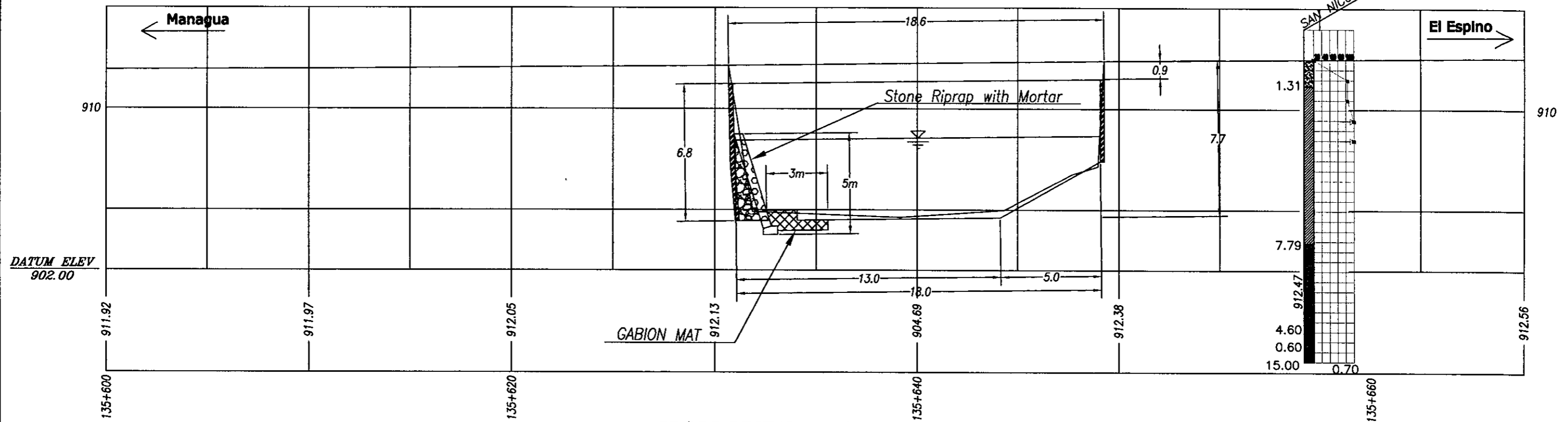
UBICACION: KM 113+190 CARRETERA MANAGUA - EL ESPINO

SITIO: PUENTE JUNQUILLAL (NIC 1)

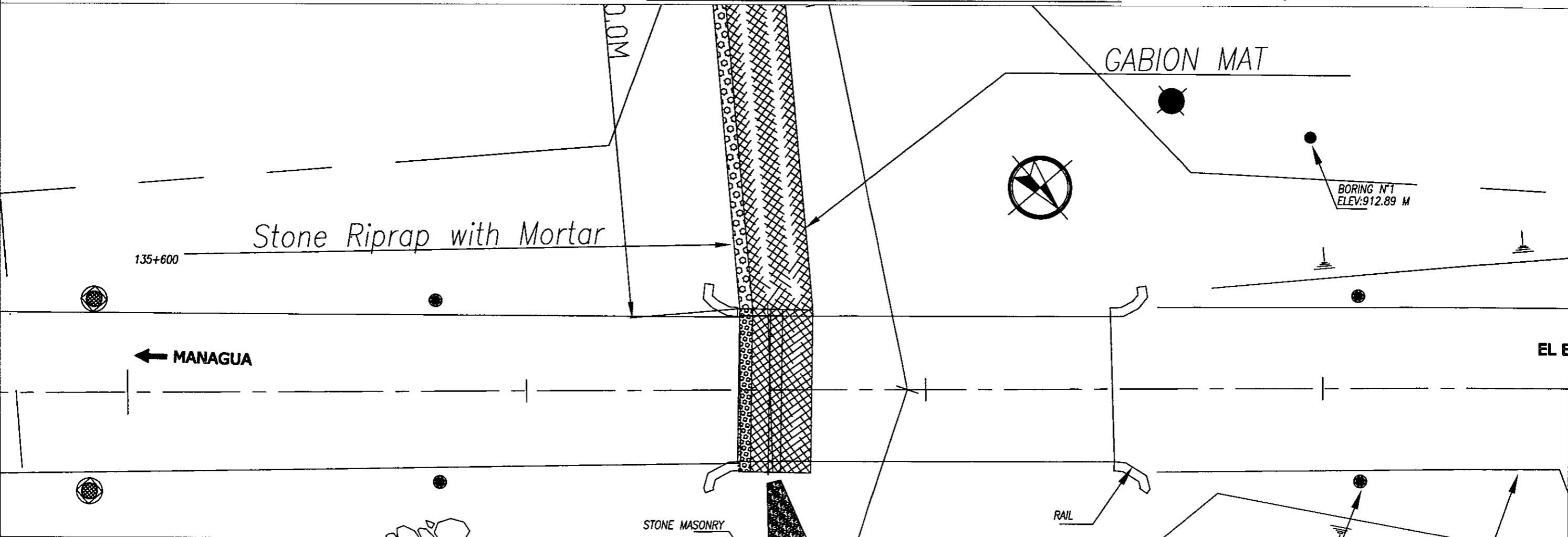
PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS
 IN THE REPUBLIC OF NICARAGUA

CALCULO:	D. Quintana F.	DIBUJO:	D. Quintana F.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:		3
RESPONSABLE TECNICO:		ESCALA:	1 : 300	44

San Nicolas bridge



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



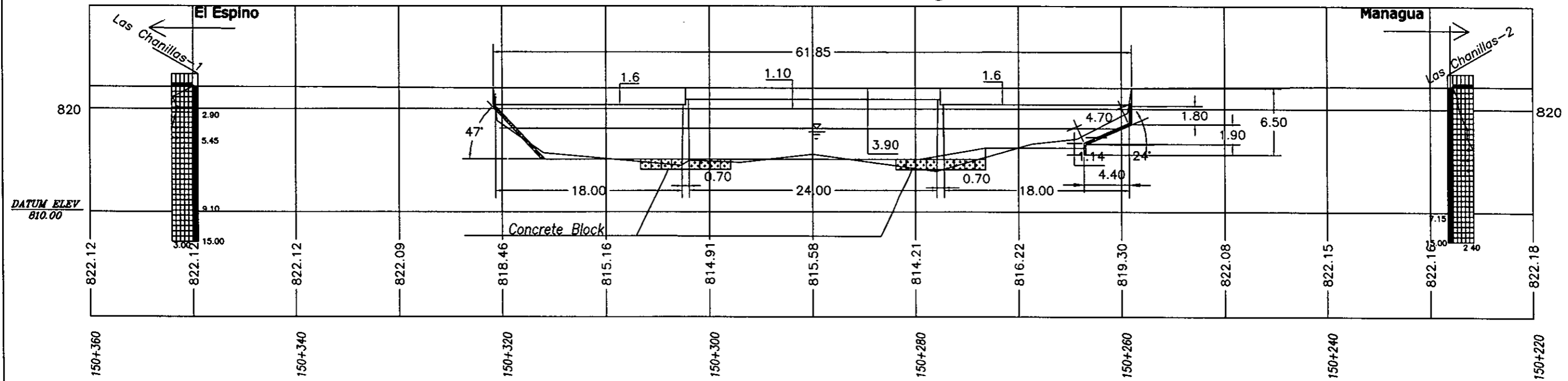
ORIENTAL CONSULTANTS CO., LTD.
JAPAN ENGINEERING CONSULTANTS
CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 135+640 CARRETERA MANAGUA - EL ESPINO
SITIO:	PUENTE SAN NICOLAS (NIC 1)

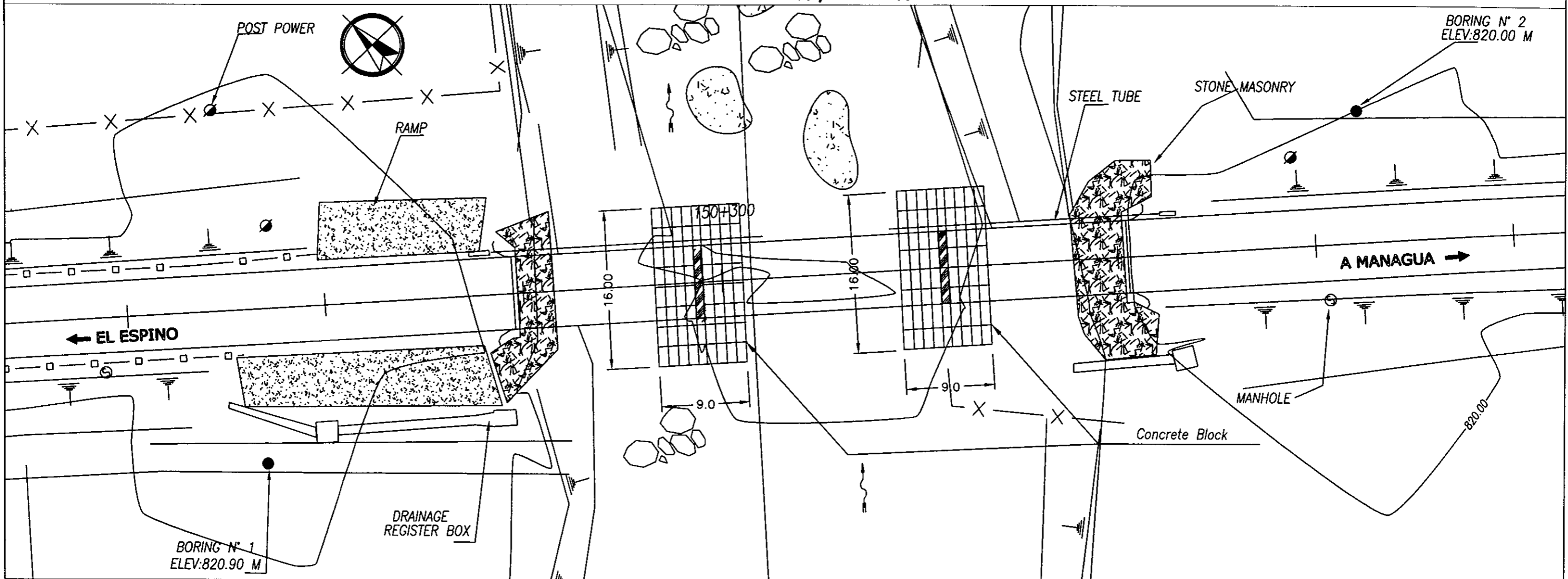
PROYECTO:	STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA
-----------	--

CALCULO:	MYRIAM MACHADO C.	DESAJO:	MYRIAM MACHADO C.	HOJA N°	4
LEVANTO:	Mauricio Méndez	FECHA:			
RESPONSABLE TECNICO:		ESCALA:	1 : 200		44

Las Chanillas bridge



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



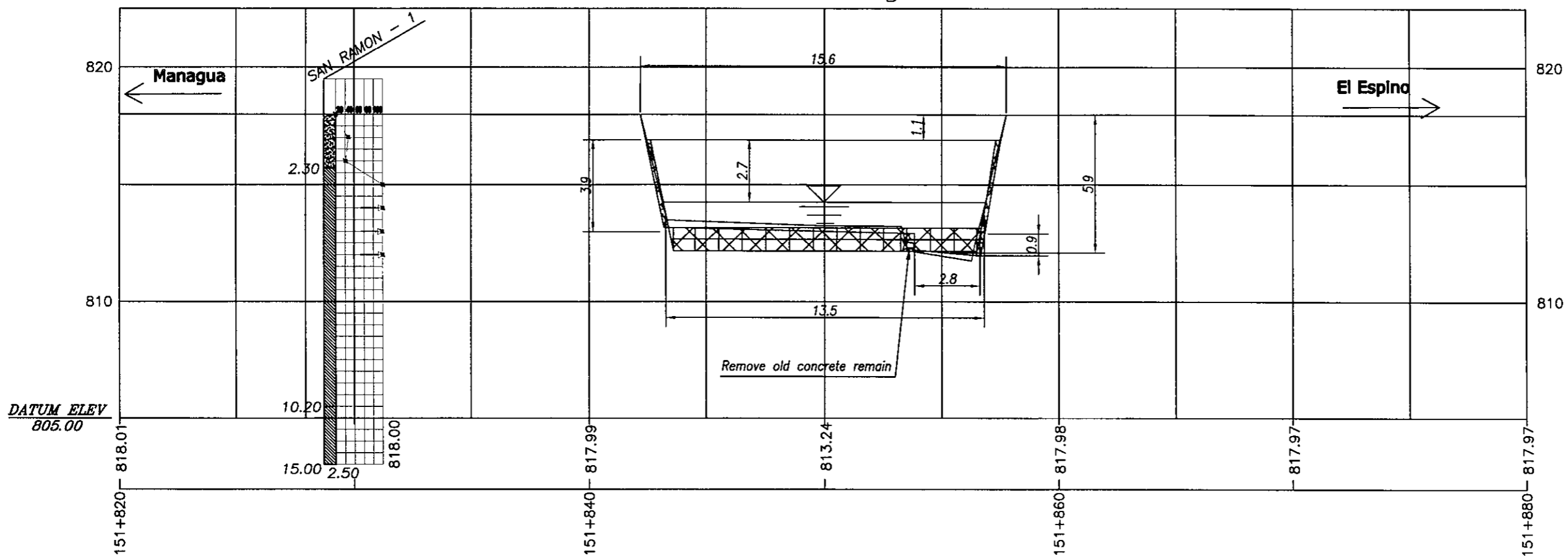
ORIENTAL CONSULTANTS CO., LTD.
 JAPAN ENGINEERING CONSULTANTS
 CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 150+330 CARRETERA MANAGUA - EL ESPINO
SITO:	PUENTE LAS CHANILLAS (NIC-1)

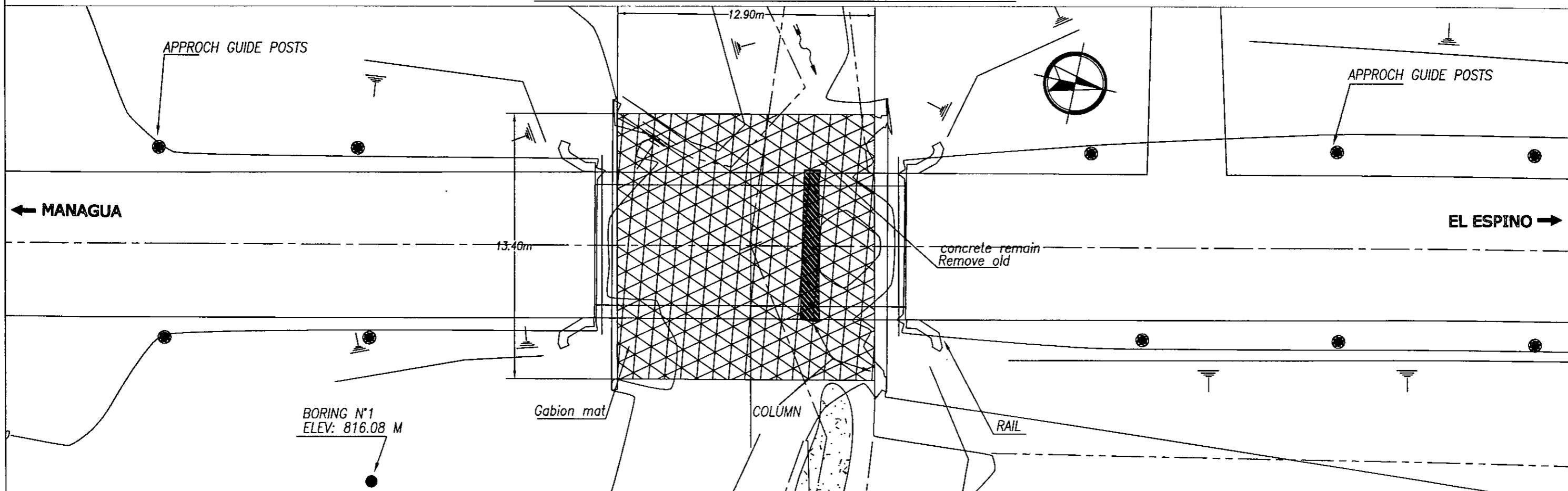
PROYECTO:
**STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS
 IN THE REPUBLIC OF NICARAGUA**

CALCULO:	Dr. Rivera, C.	DIBUJO:	Dr. Rivera, C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:		5
RESPONSABLE TECNICO:		ESCALA:	1:400	44

San Ramon bridge



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



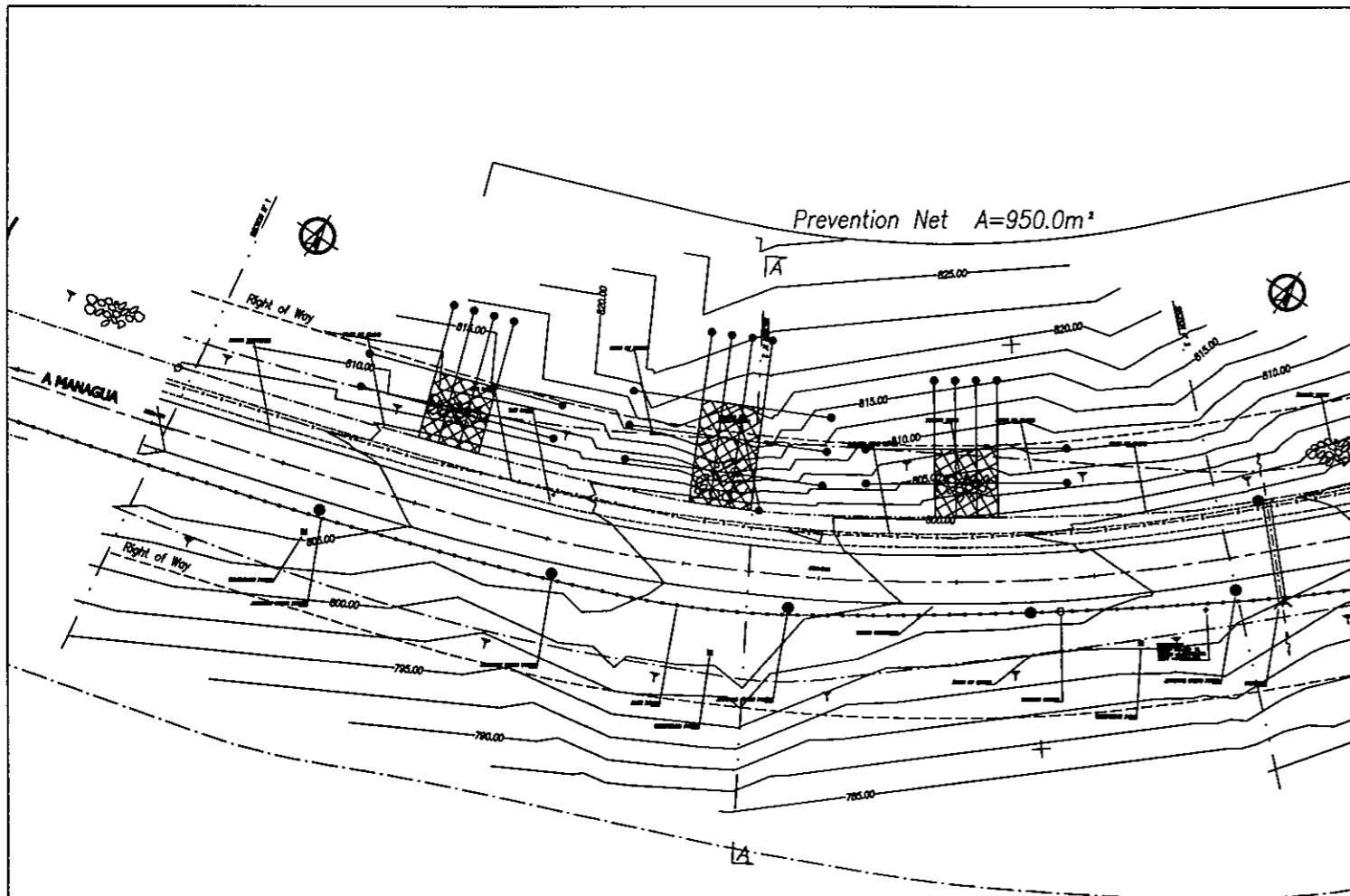
ORIENTAL CONSULTANTS CO., LTD.
JAPAN ENGINEERING CONSULTANTS
CO., LTD.

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 151+850 CARRETERA MANAGUA - EL ESPINO
SITIO:	PUENTE SAN RAMON (NIC 1)

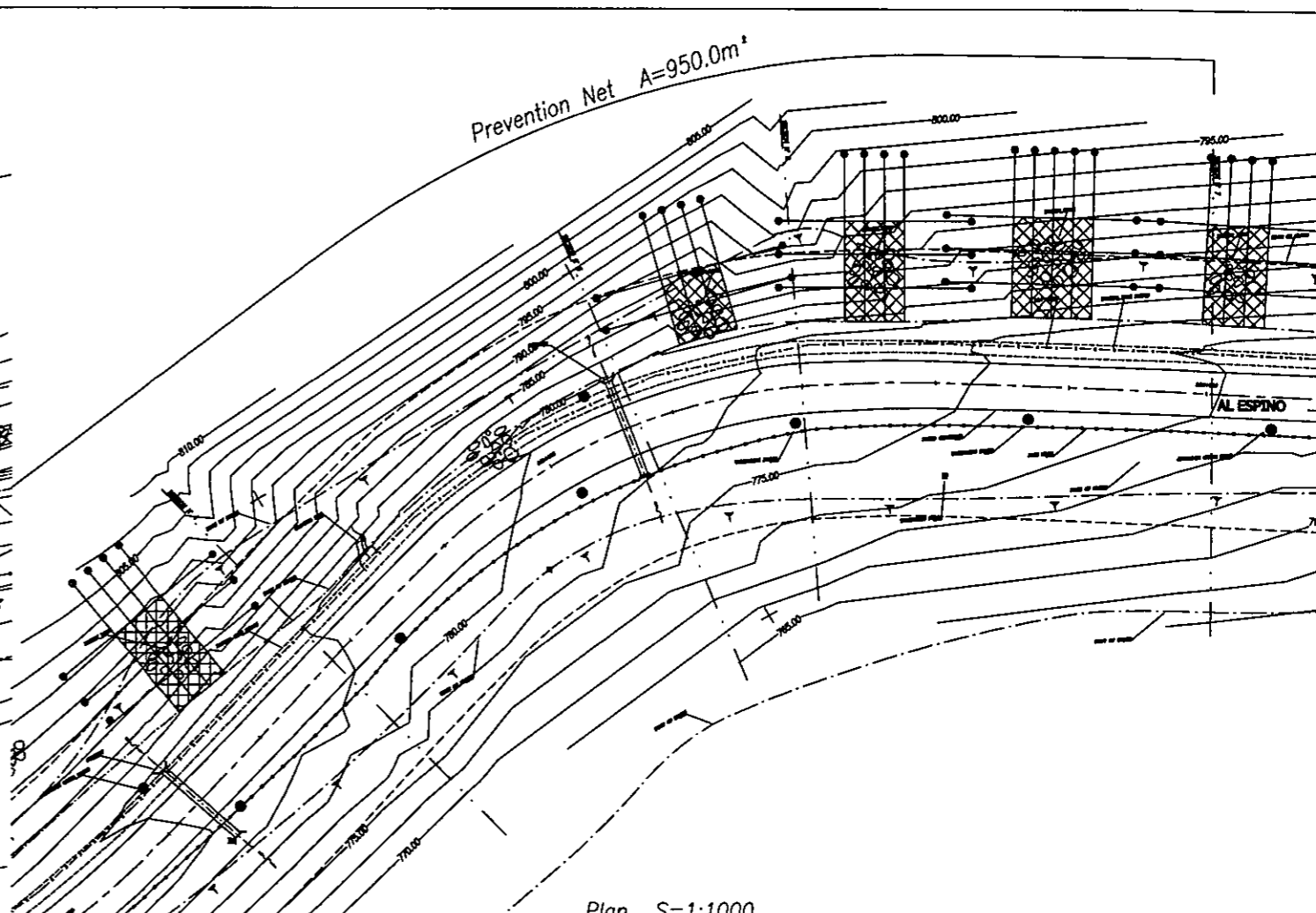
PROYECTO:

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

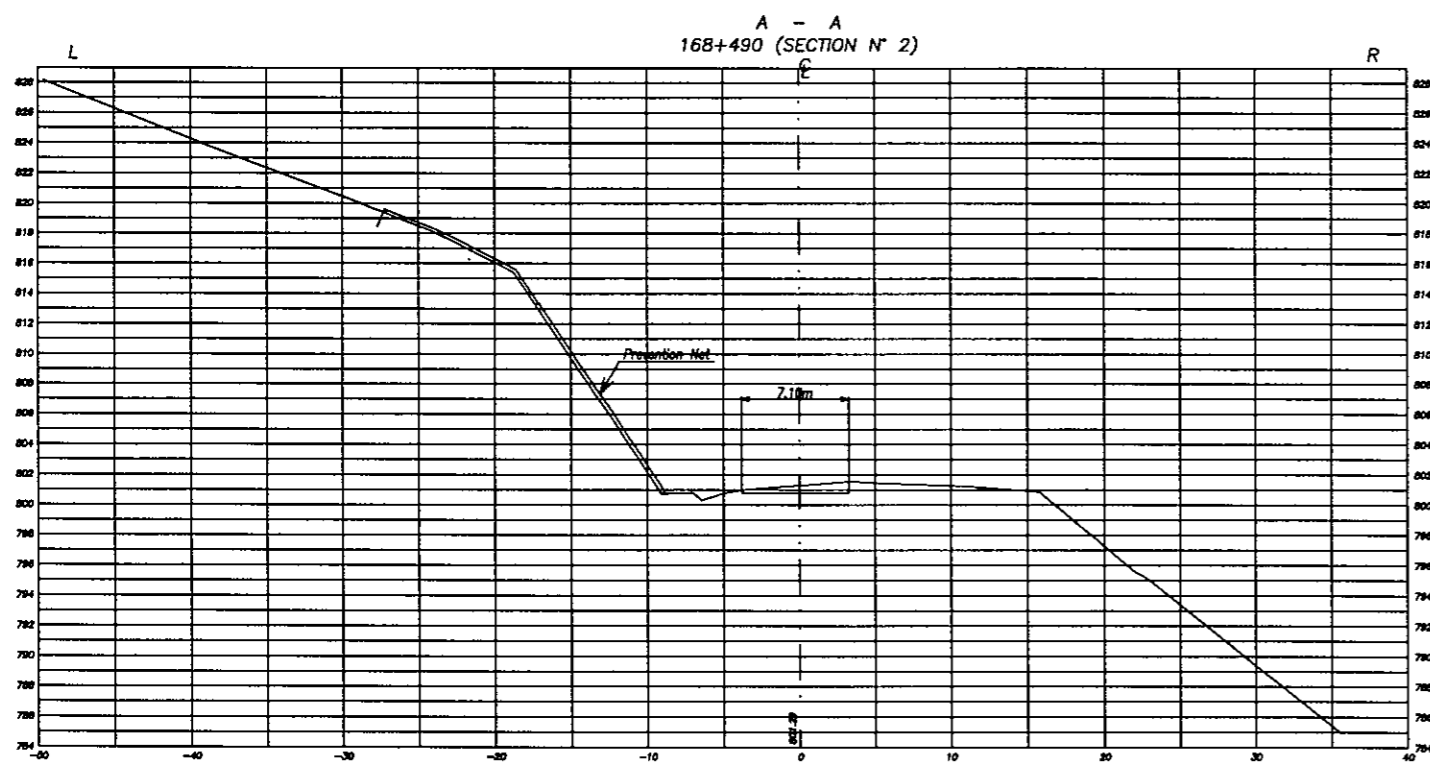
CALCULO:	MYRIAM MACHADO C.	DIBUJO:	MYRIAM MACHADO C.	HOJA N°
LEVANTO:	Mauricio Minedez	FECHA:		6
RESPONSABLE TECNICO:		ESCALA:	1 : 200	44



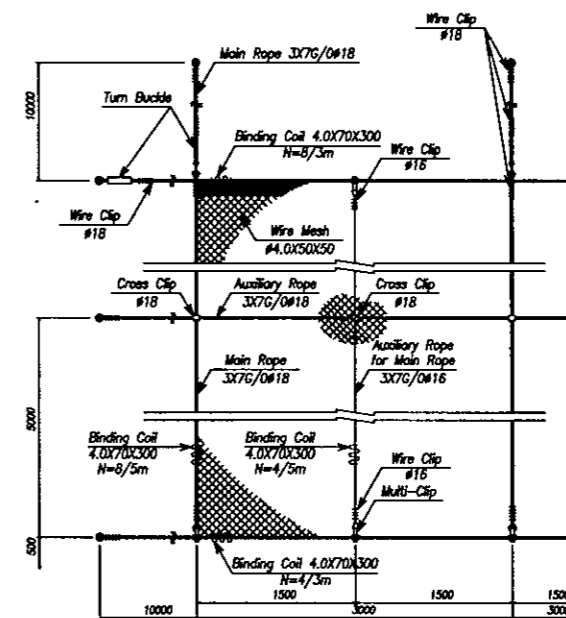
Plan S=1:1000



Plan S=1:1000



Cross Section S=1:500



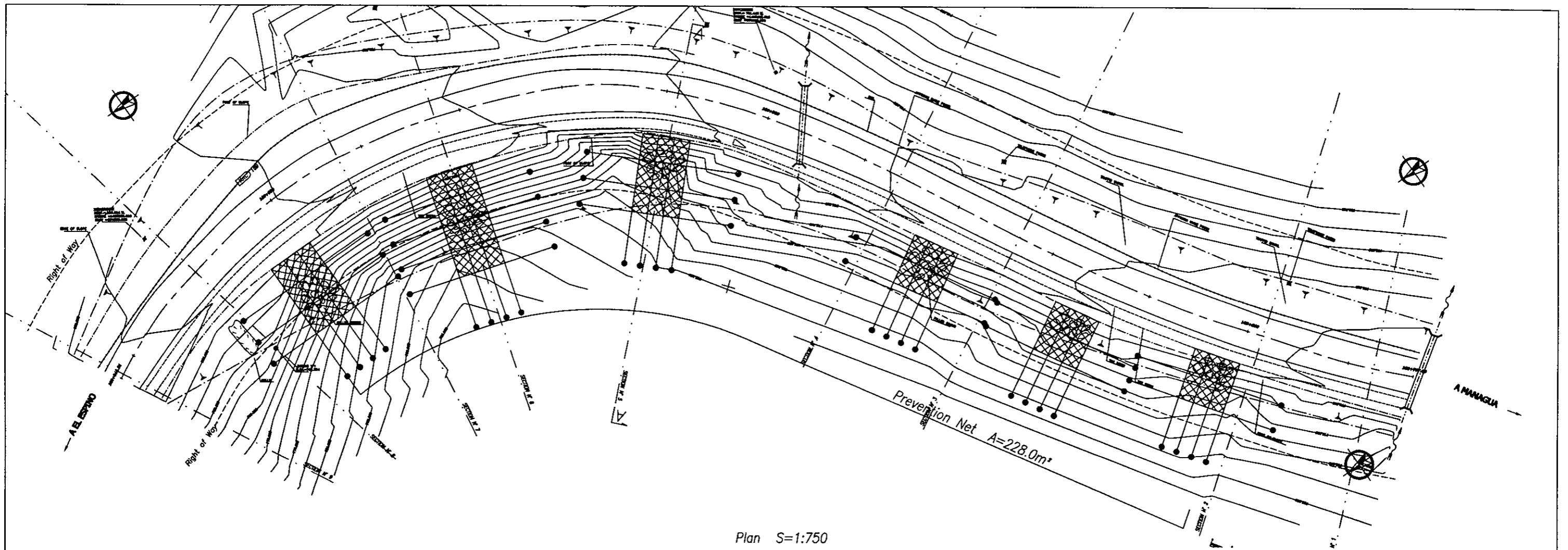
General Layout of Prevention Net S=Non Scale

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

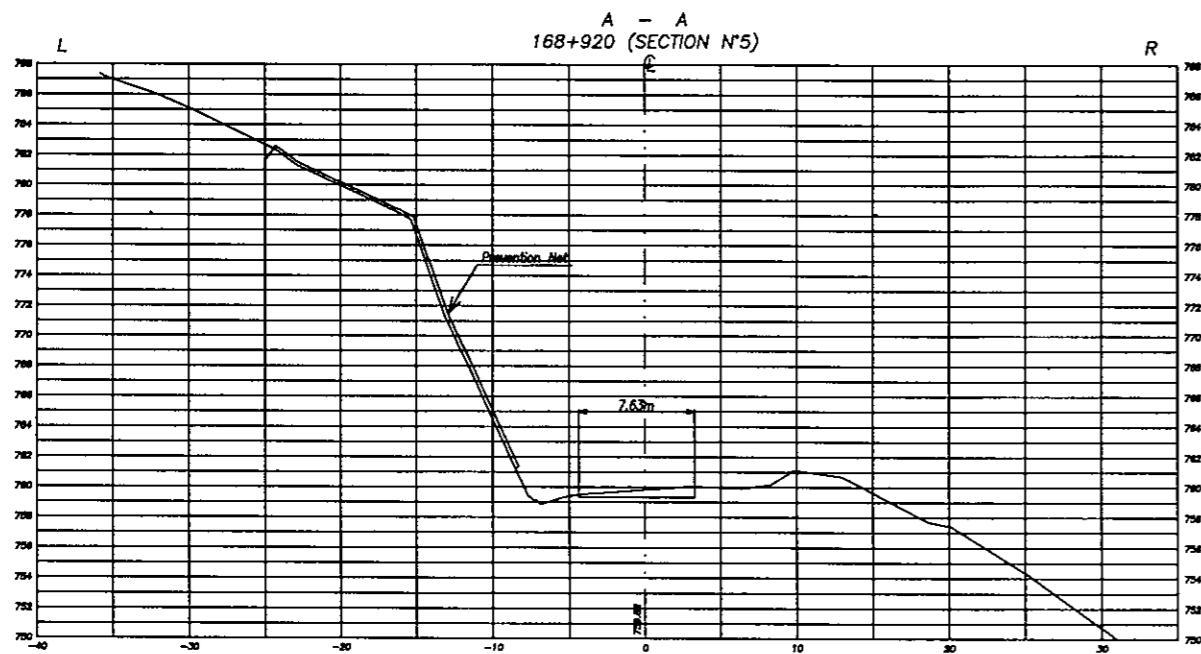
CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 168+400 CARRETERA MANAGUA - EL ESPINO
SITIO:	N001A240

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

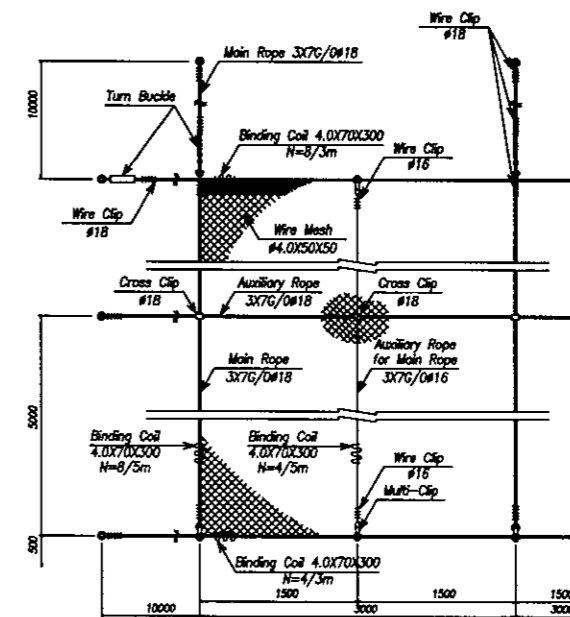
CALCULO:	DIBUJO:	HOJA N°
LEVANTO:	FECHA:	7
RESPONSABLE TECNICO:	ESCALA:	44
	Illustration	



Plan S=1:750



Cross Section S=1:500



General Layout of Prevention Net S=Non Scale

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

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:

LEVANTO:

RESPONSABLE
TECNICO:

DEBUIR:

FECHA:

ESCALA:

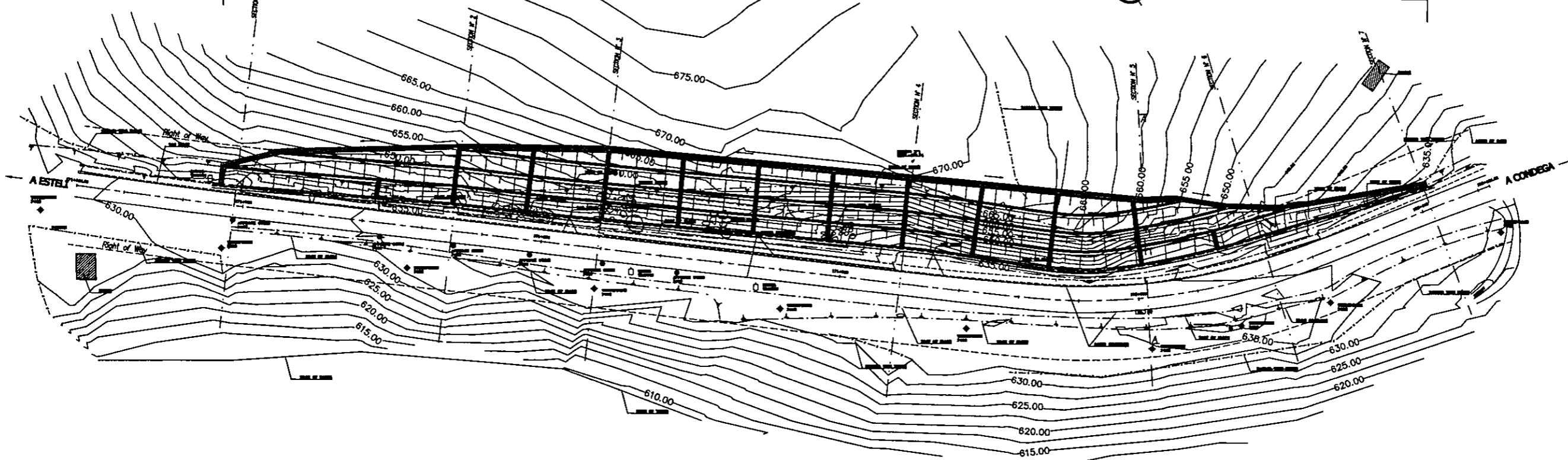
HOJA N°
8
November 2002
Illustration
44

Crest Ditch(A) L=426.0m

Berm Ditch(A) L=1065.0m

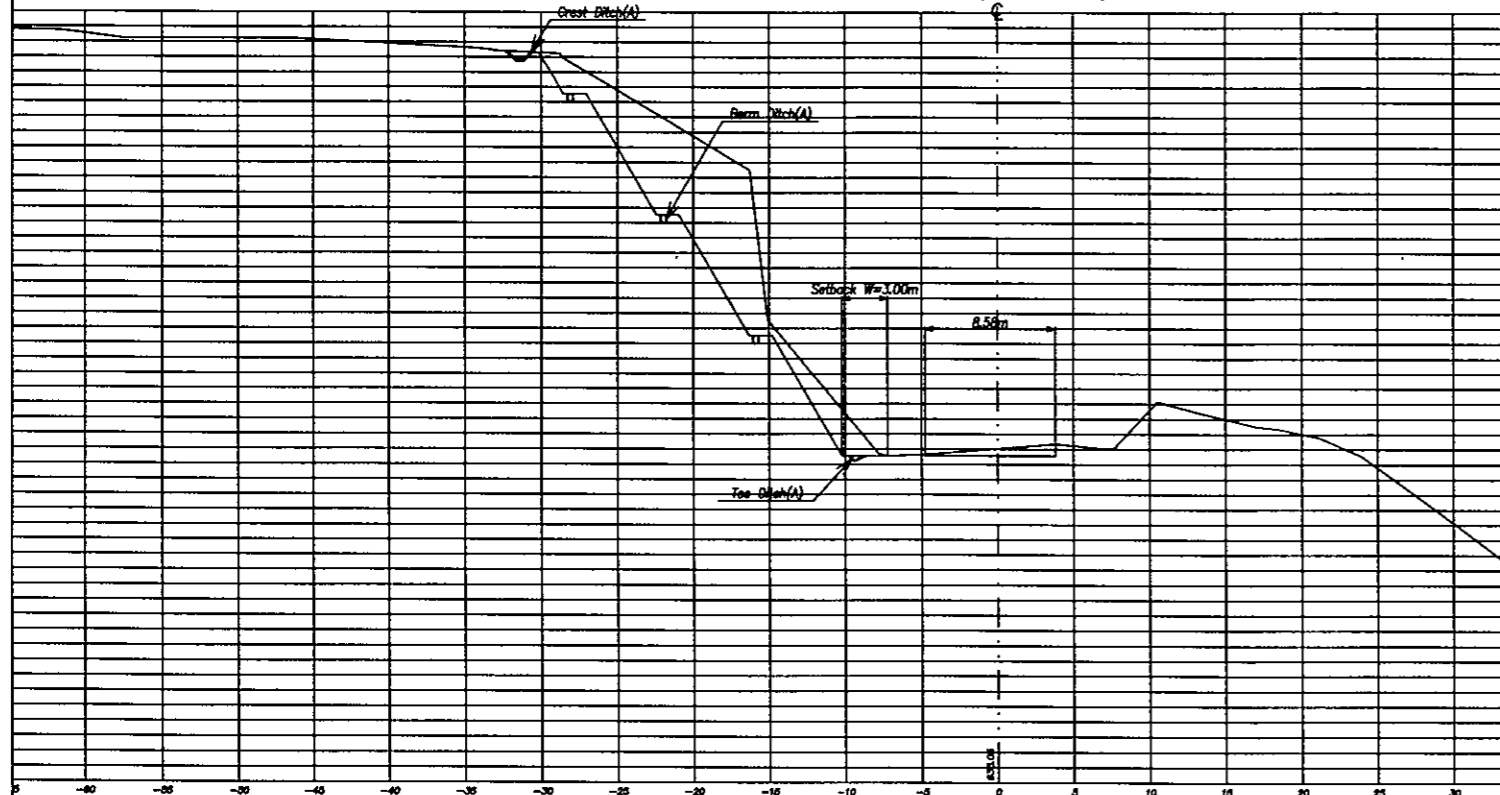
Vertical Ditch L=364.0m

Toe Ditch(A) L=426.0m

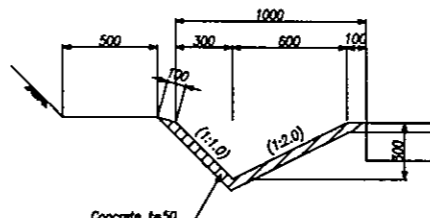


Plan S=1:1500

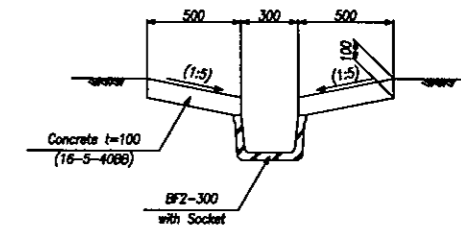
A - A
172+003 (SECTION N°5)



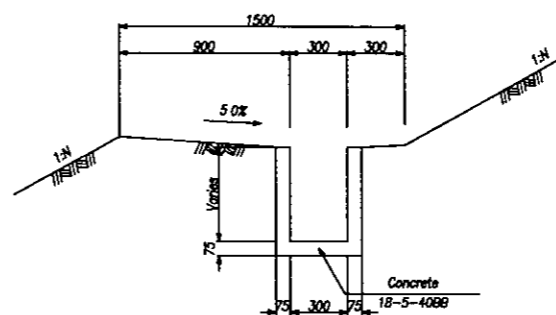
Cross Section S=1:500



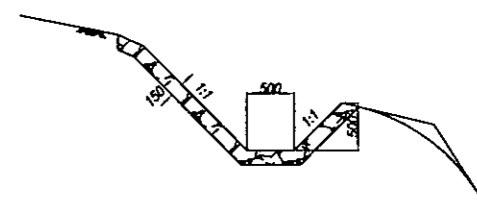
Toe Ditch(A) S=1:40
*For Cut



Vertical Ditch S=1:40



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



Crest Ditch(A) S=1:80

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

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
SECCIONES TRANSVERSALES
UBICACION: KM 171+643.95 CARRETERA MANAGUA - EL ESPINO
SITE: N001B170

PROYECTO:

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

CALCULO:

LEVANTO:

RESPONSABLE
TECNICO:

DESAJO:

FECHA:

ESCALA:

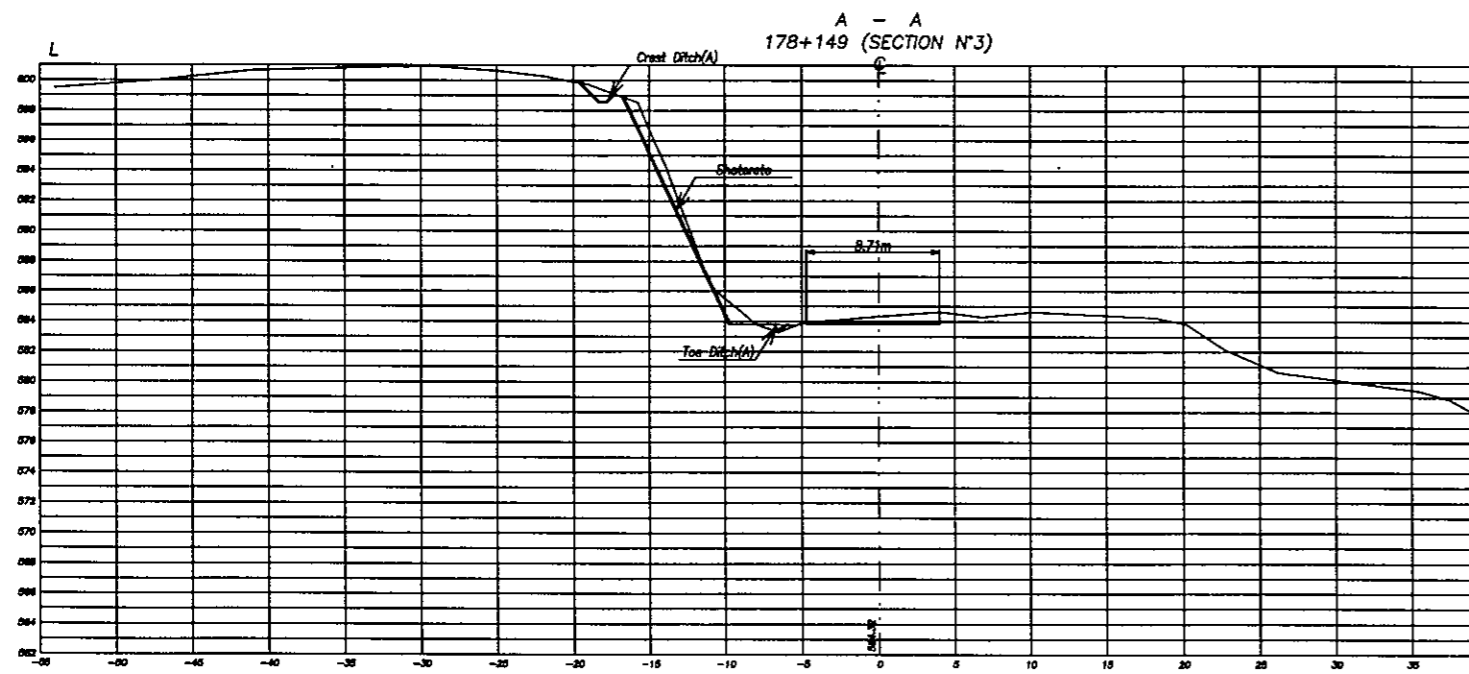
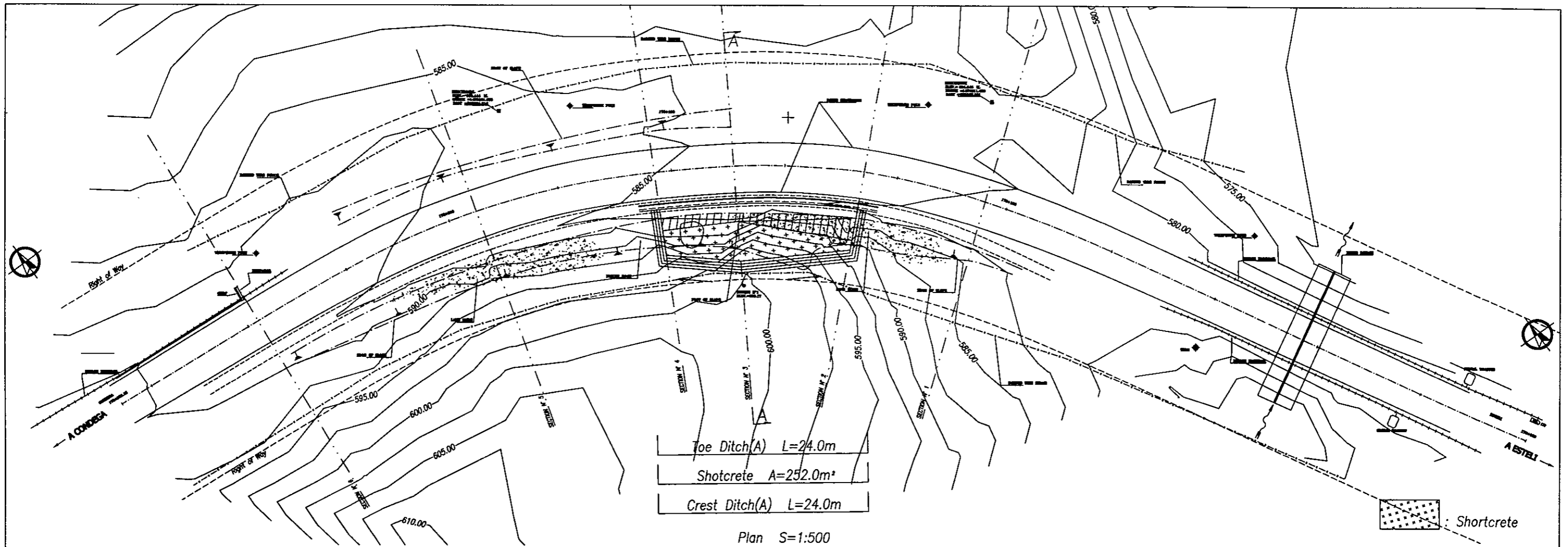
HOJA N°

9

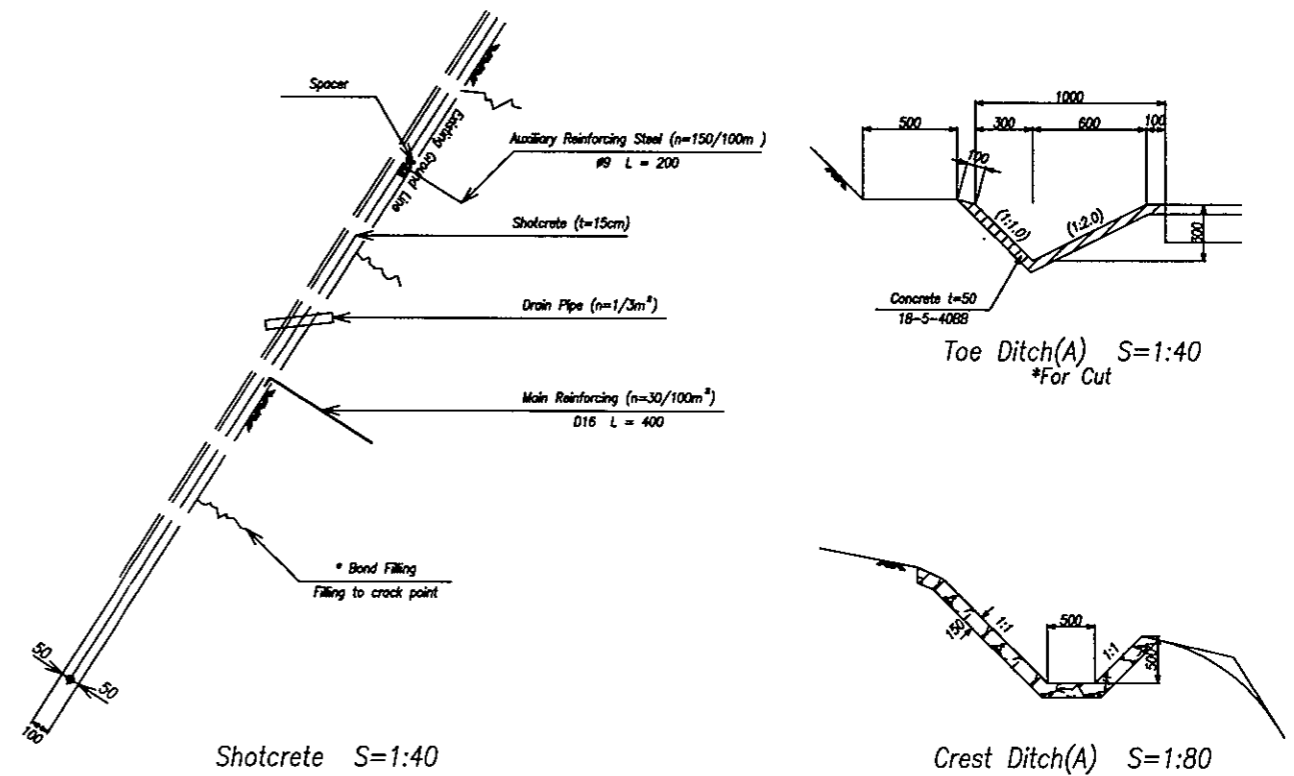
44

November 2002

Illustration



Cross Section S=1:500



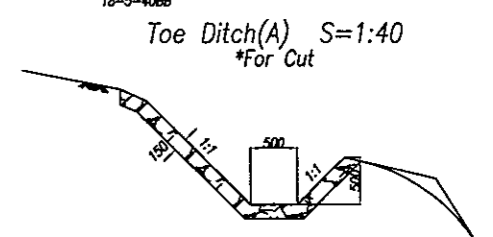
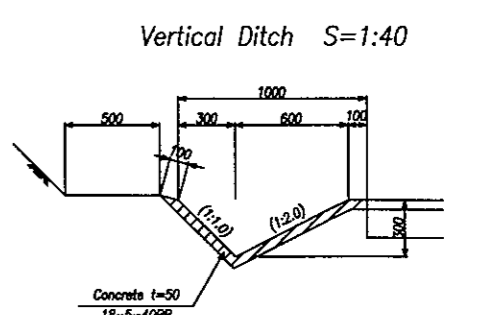
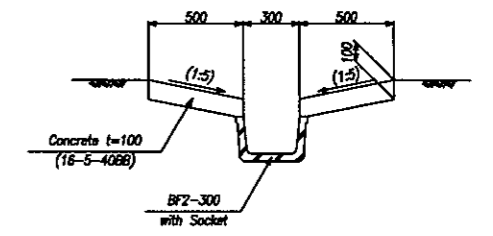
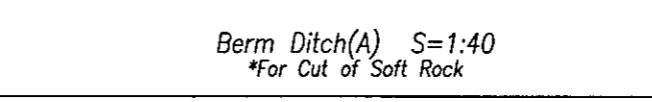
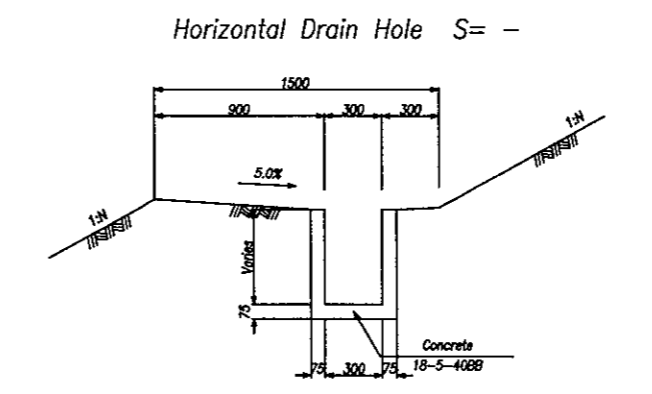
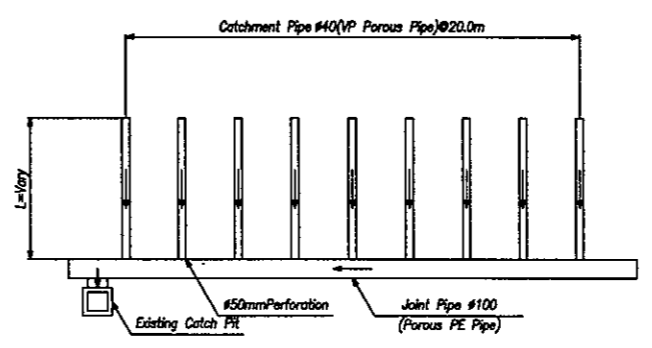
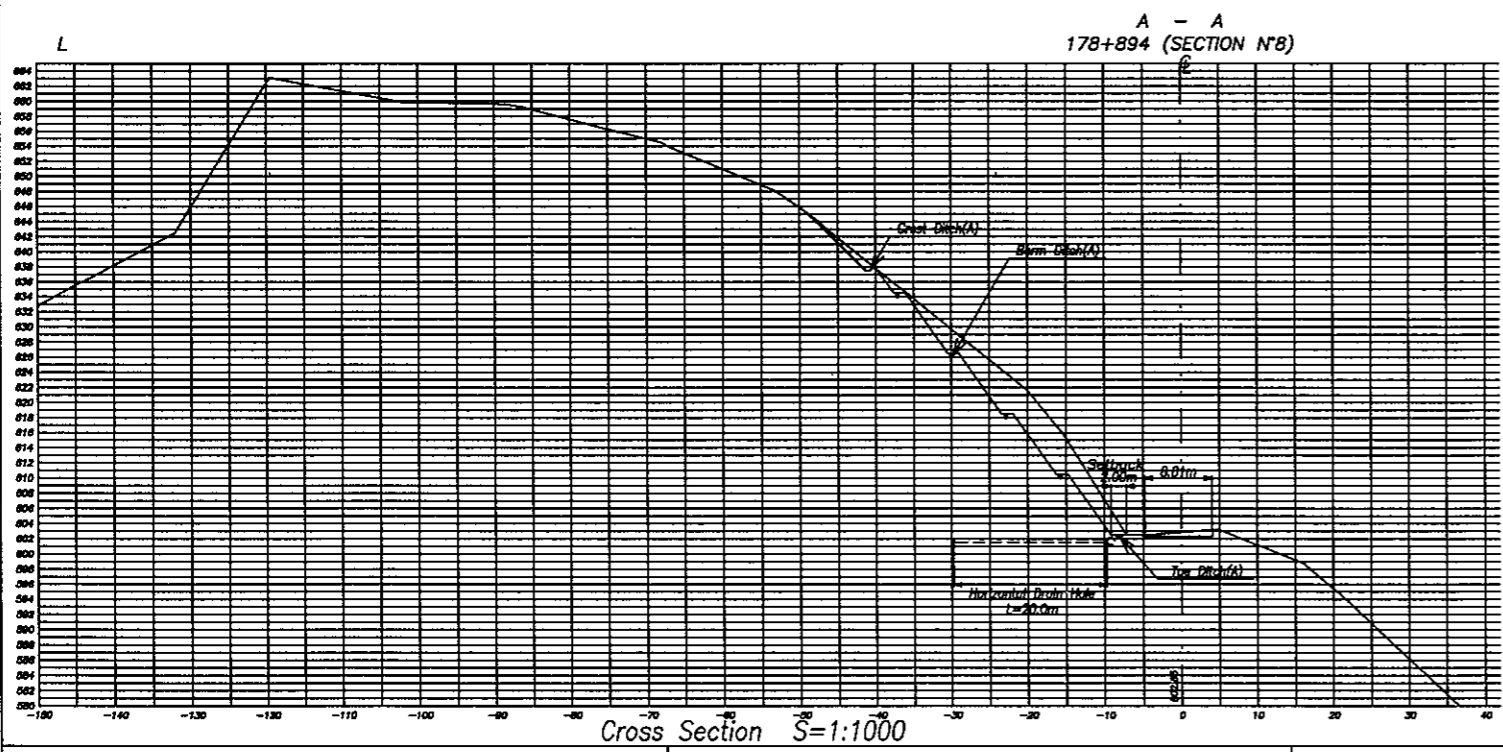
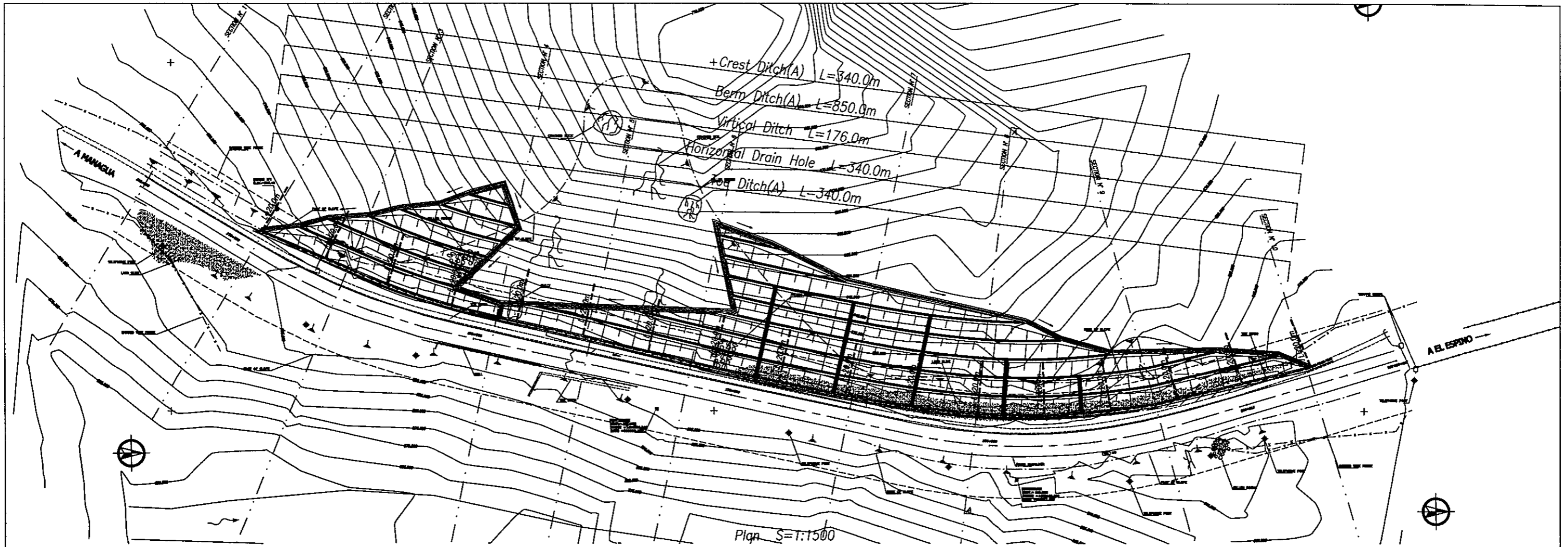
ORIENTAL CONSULTANTS CO., LTD.
 JAPAN ENGINEERING CONSULTANTS
 CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
 SECCIONES TRANSVERSALES
 UBICACION: KM 178+000 CARRETERA MANAGUA - EL ESPINO
 SITIO: N001B150

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

CALCULO:	DIBUJO:	HOJA N°
LEVANTO:	FECHA:	10
RESPONSABLE TECNICO:	ESCALA:	44

November 2002
 Illustration

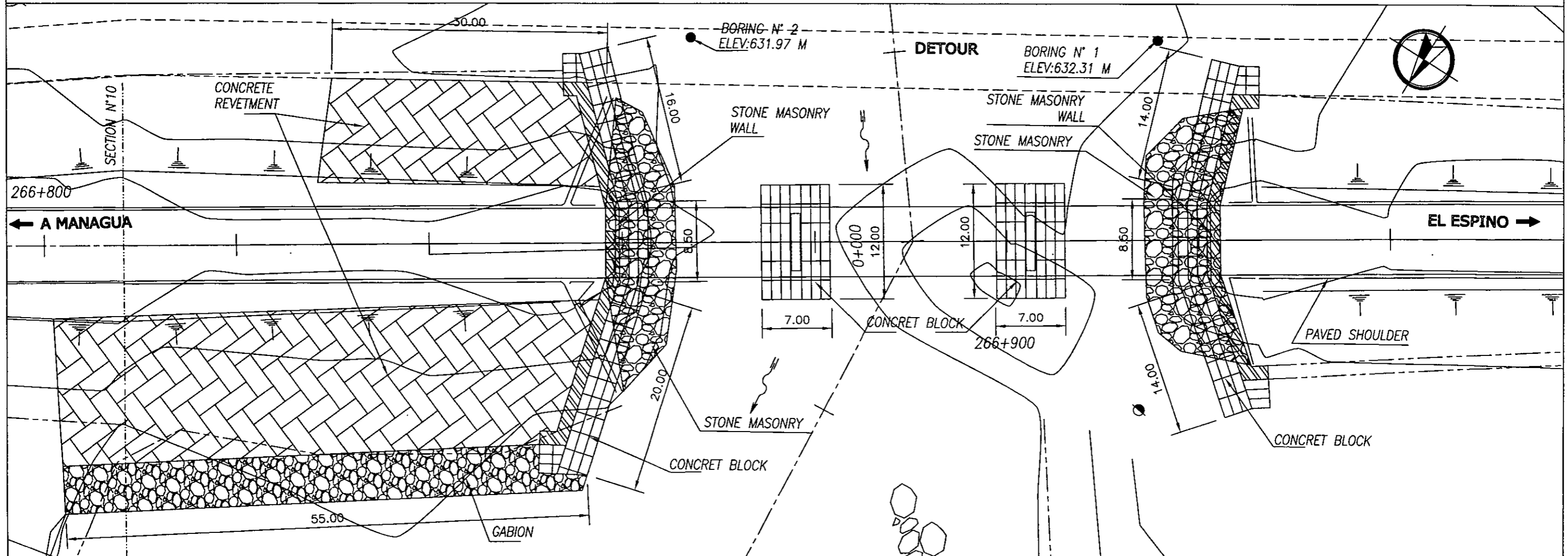
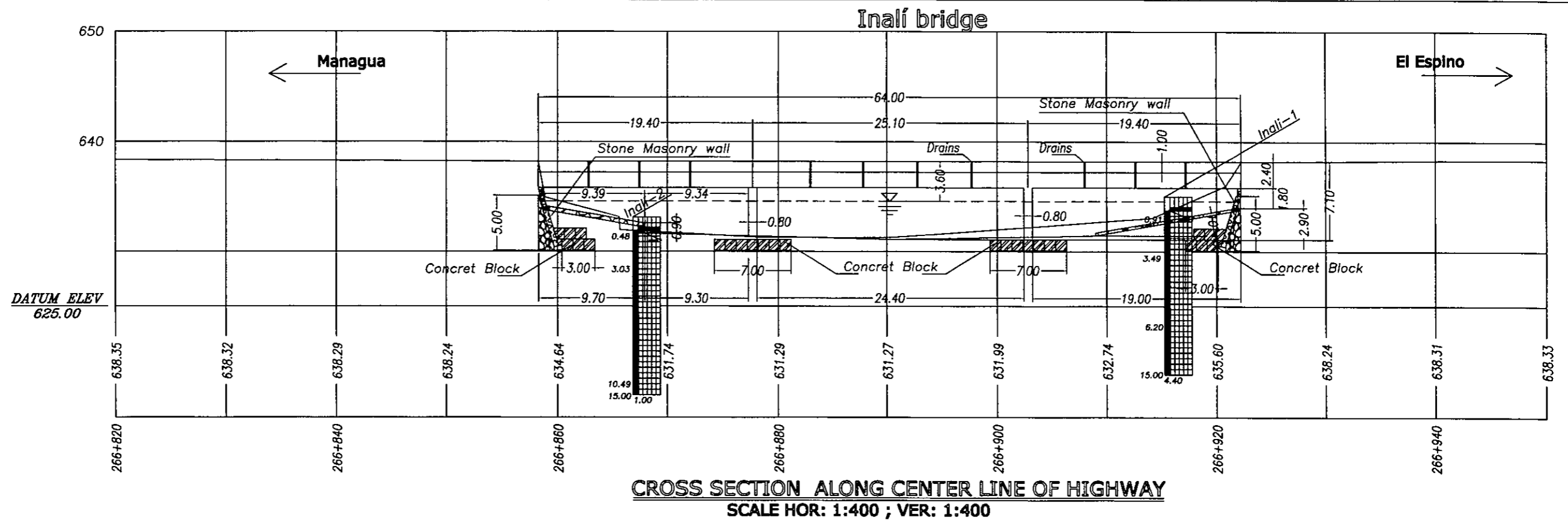


ORIENTAL CONSULTANTS CO., LTD.
JAPAN ENGINEERING CONSULTANTS
CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION: KM 176+200 CARRETERA MANAGUA - EL ESPINO
SITIO: N001B120

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

CALCULO:	DIBUJO:	HOJA N°
LEVANTO:	FECHA: November 2002	11
RESPONSABLE TECNICO:	ESCALA: Illustration	44



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

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
SECCIONES TRANSVERSALES
UBICACION: KM 226+890 CARRETERA MANAGUA - EL ESPINO
SITIO: PUENTE INALI (NBC 1)

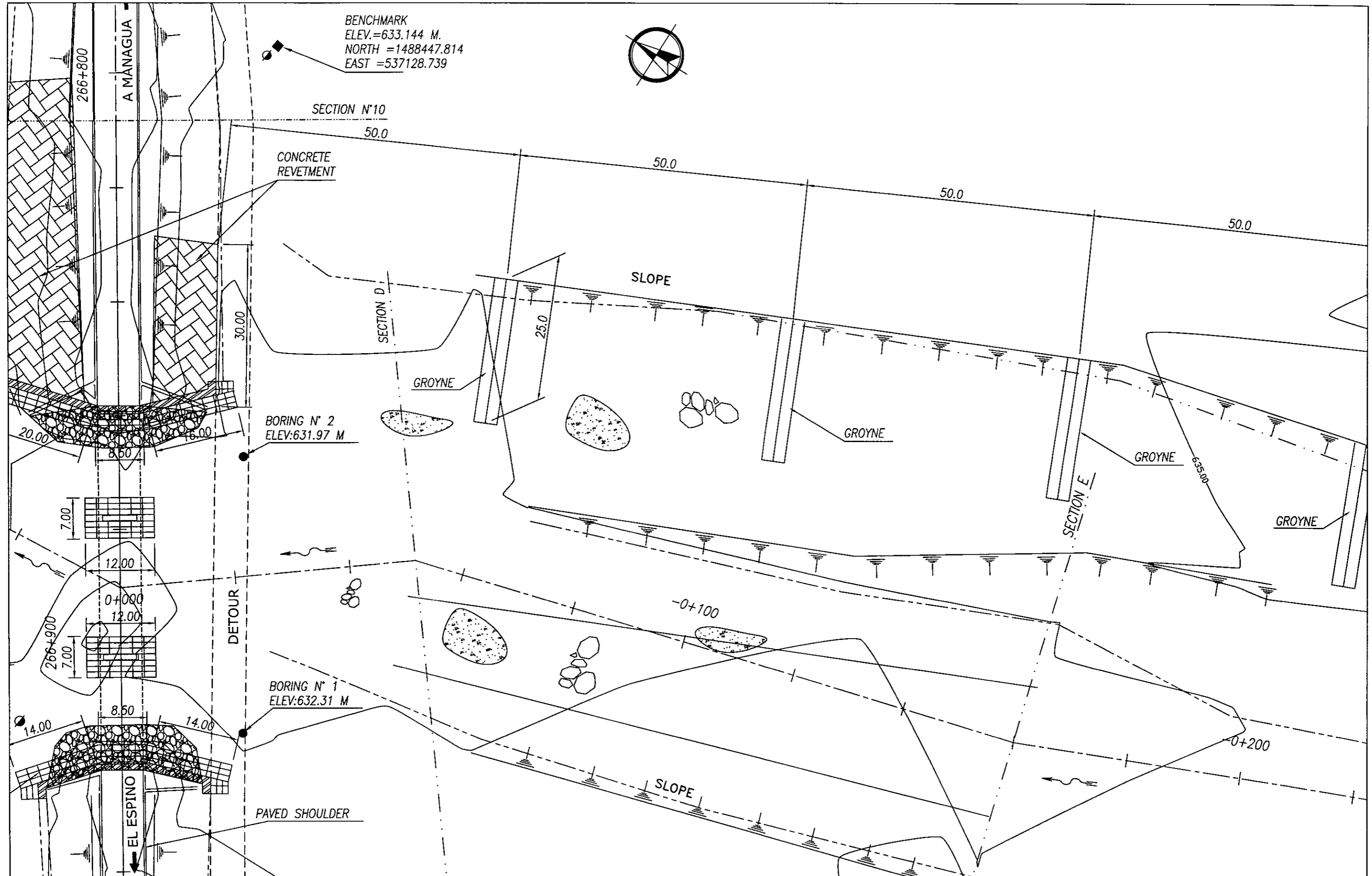
PROYECTO:

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

CALCULO: D. Quintana F.
LEVANTO: Mauricio Méndez
RESPONSABLE TECNICO:

DEBUIO: D. Quintana F.
FECHA:
ESCALA: 1: 400

HOJA N°
12
44



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

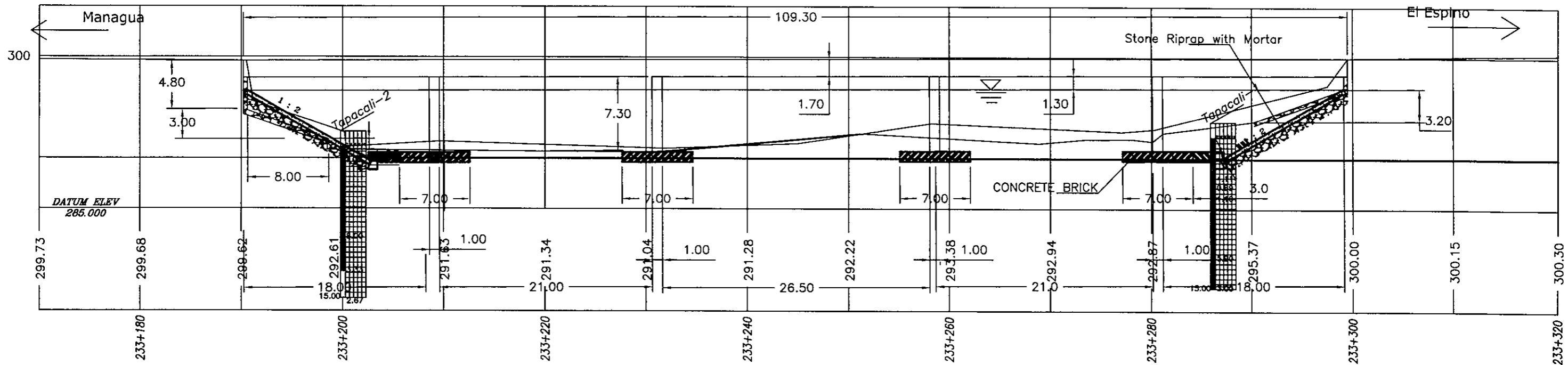
CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 226+890 CARRETERA MANAGUA - EL ESPINO
SITIO:	PUENTE INALI (NIC 1)

PROYECTO:

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

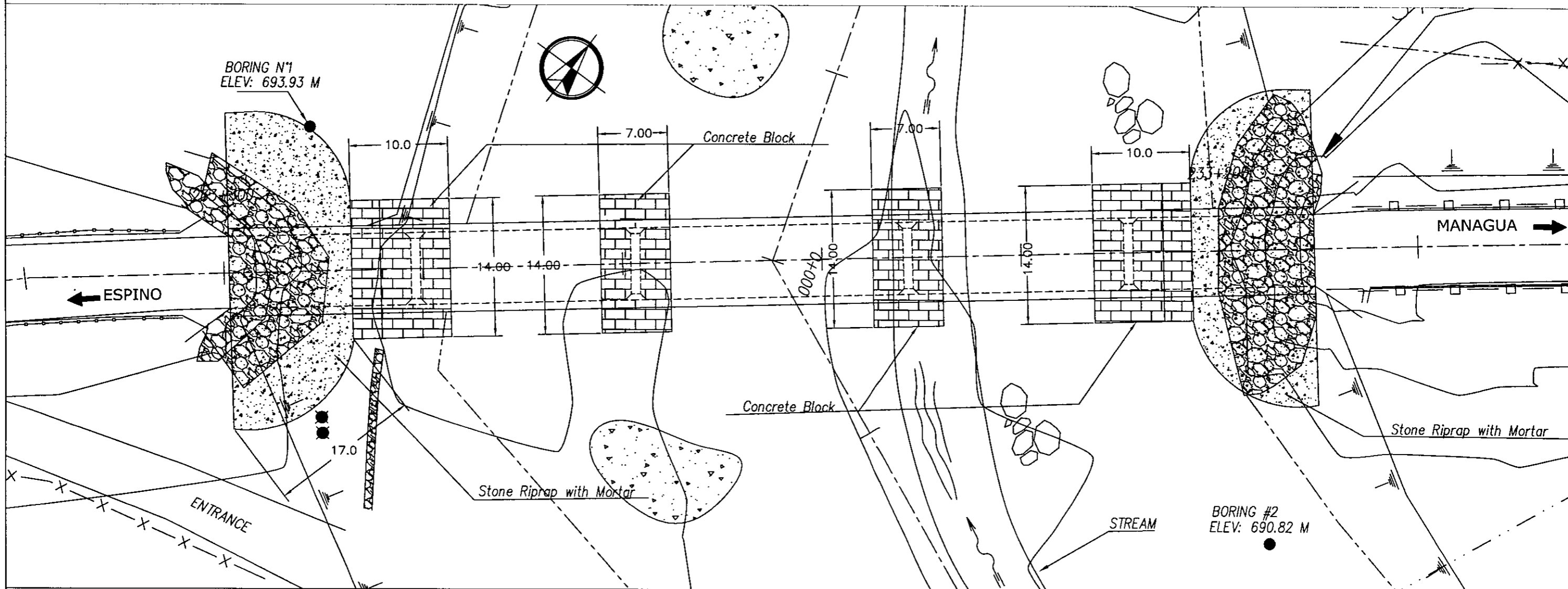
CALCULO:	D. Quintana F.	DELLADO:	D. Quintana F.	HOJA N°
LEVANTO:	Maurilio Méndez	FECHA:		13
RESPONSABLE TECNICO:		ESCALA:	1 : 600	44

Tapacali bridge



CROSS SECTION ALONG CENTER LINE OF HIGHWAY

SCALE HOR: 1:400 ; VER: 1:400

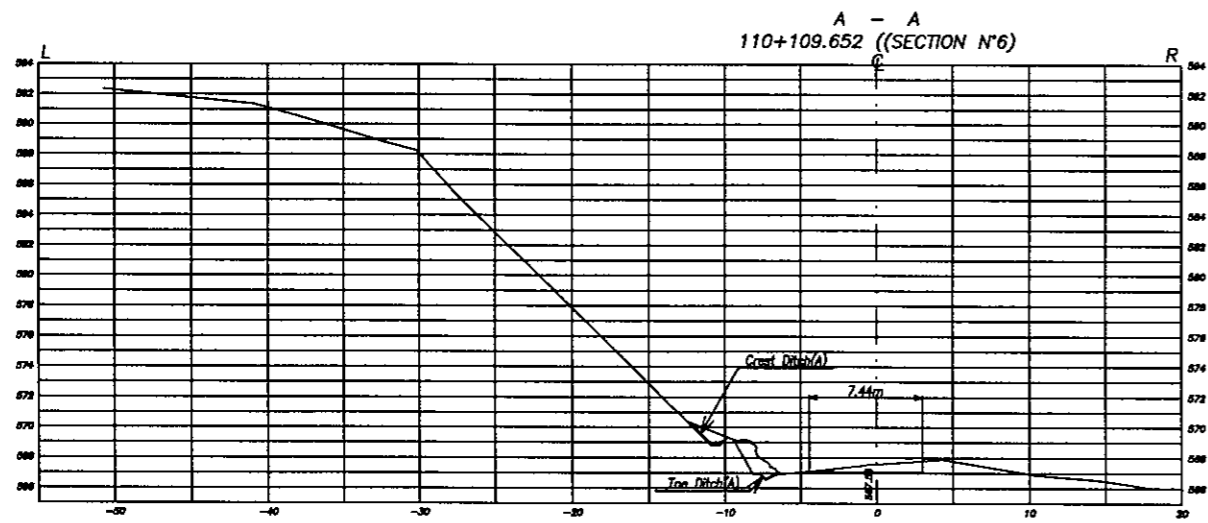
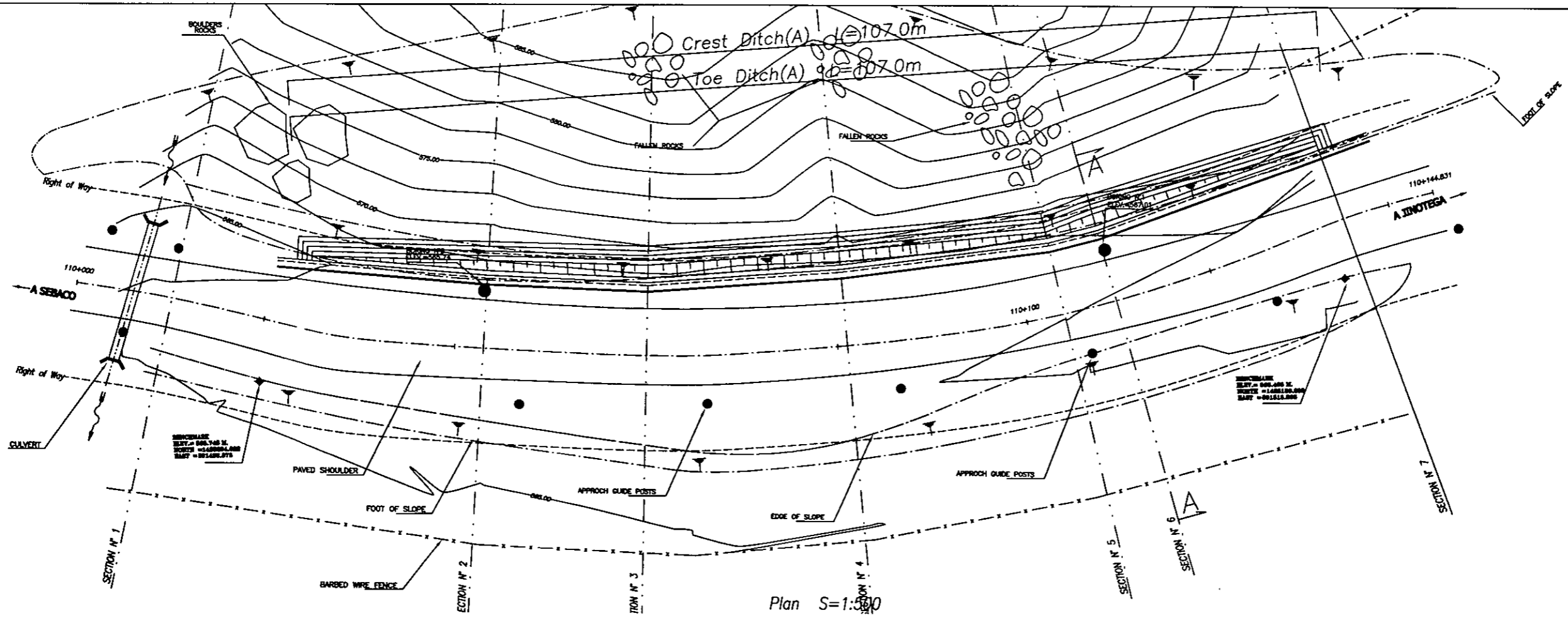


ORIENTAL CONSULTANTS CO., LTD.
JAPAN ENGINEERING CONSULTANTS
CO., LTD.

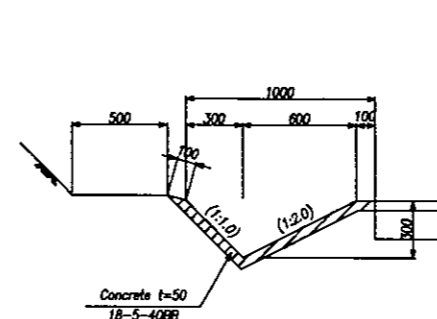
CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO
UBICACION:	KM 233+245 CARRETERA MANAGUA - EL ESPINO
SITIO:	PUENTE TAPACALI (NIC 1)

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

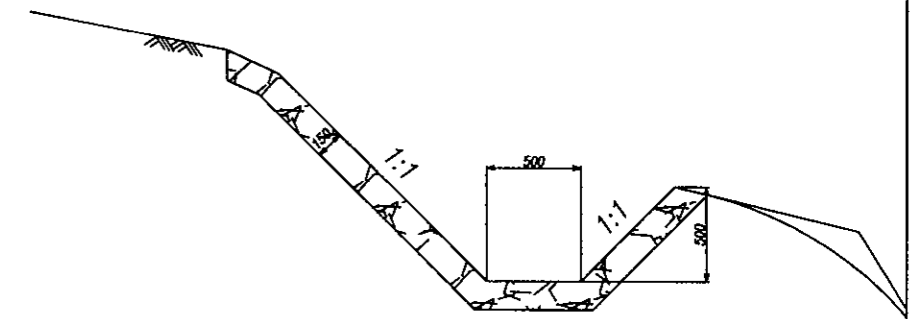
CALCULO:	Ch. Rivera, C.	DIBUJO:	Ch. Rivera, C.	HOJA N°
LEVANTO:	Mauricio Méndez	FECHA:		14
RESPONSABLE TECNICO:		ESCALA:	1 : 200	44



Cross Section S=1:500



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



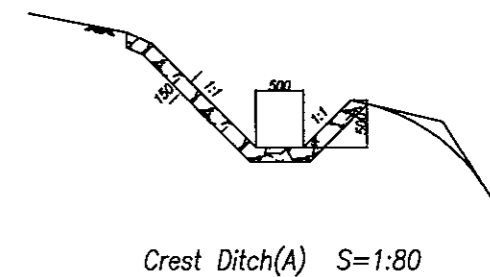
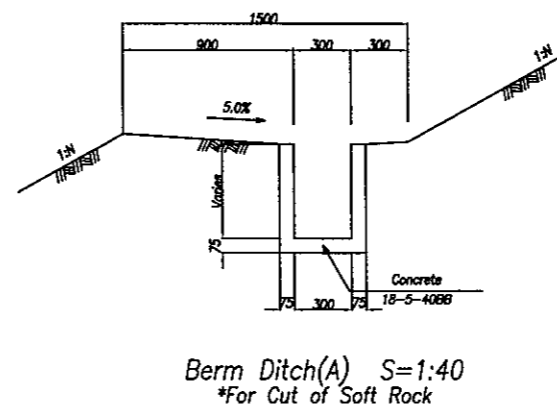
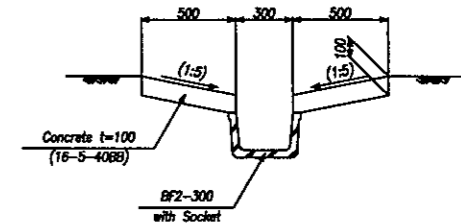
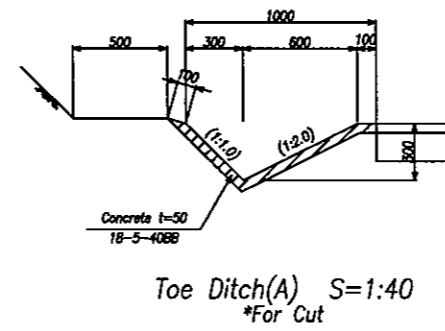
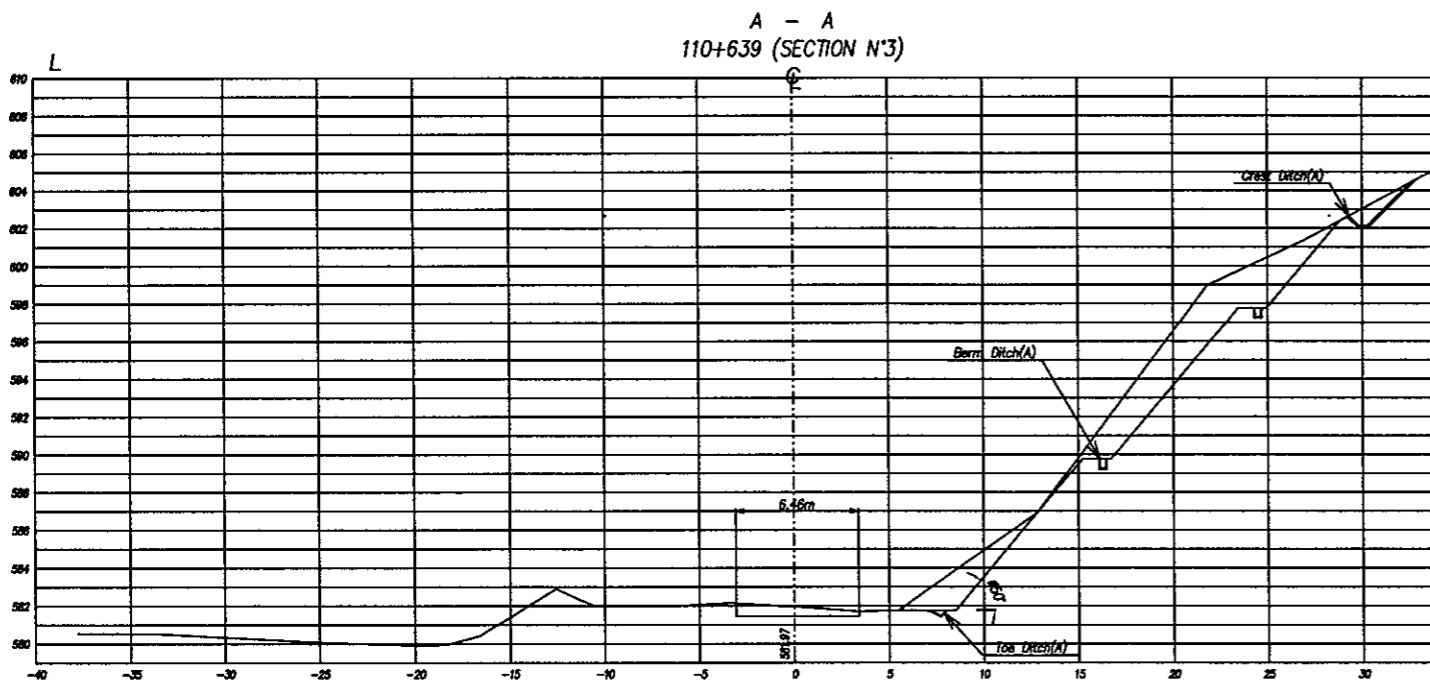
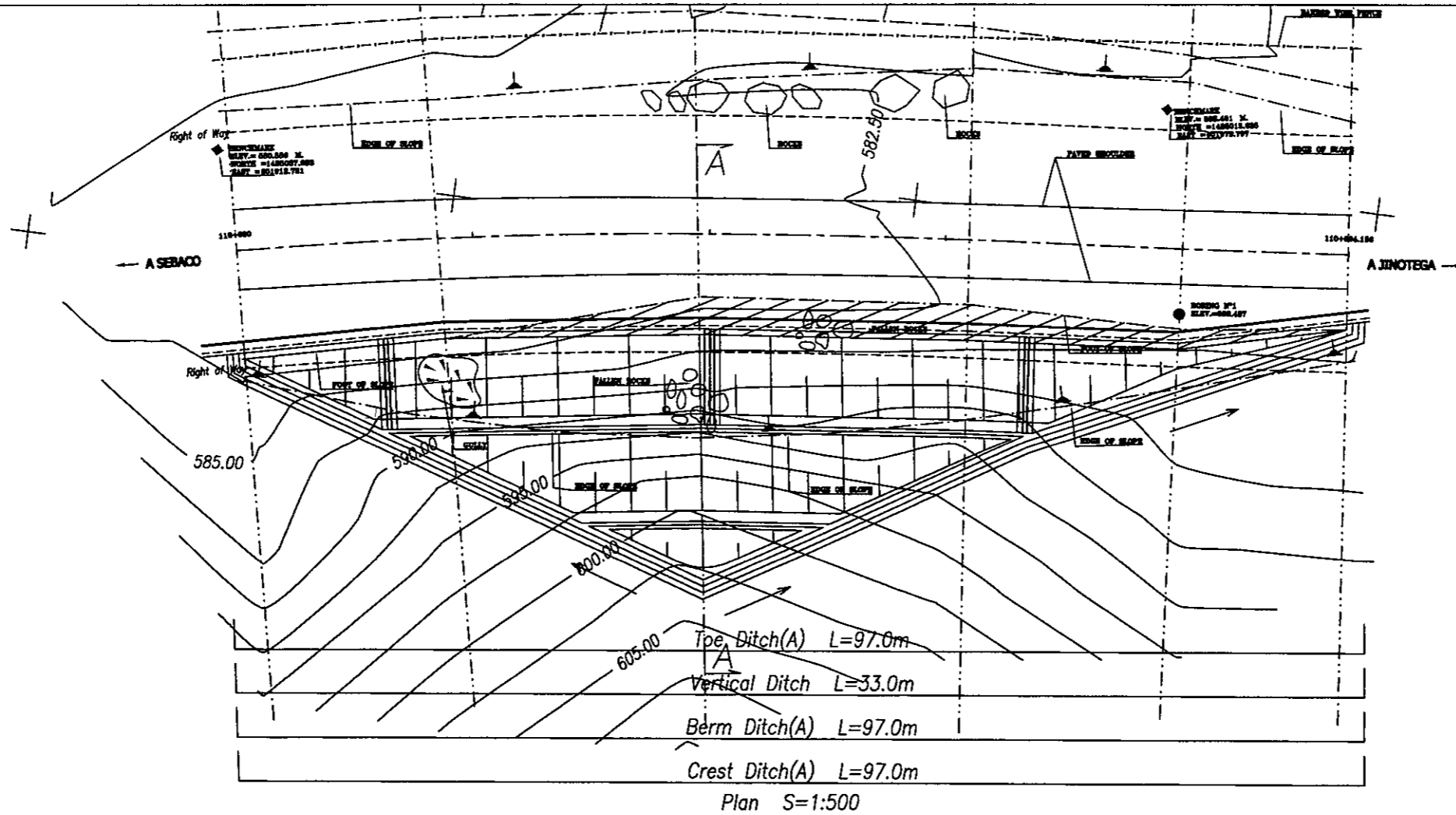
Crest Ditch(A) S=1:40

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

CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 110+000 CARRETERA SEBACO - JINOTEGA
SITIO:	N0038400

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

CALCULO:	DIBUJO:	HOJA N°
LEVANTO :	FECHA:	15
RESPONSABLE TECNICO :	ESCALA	44
	Illustration	



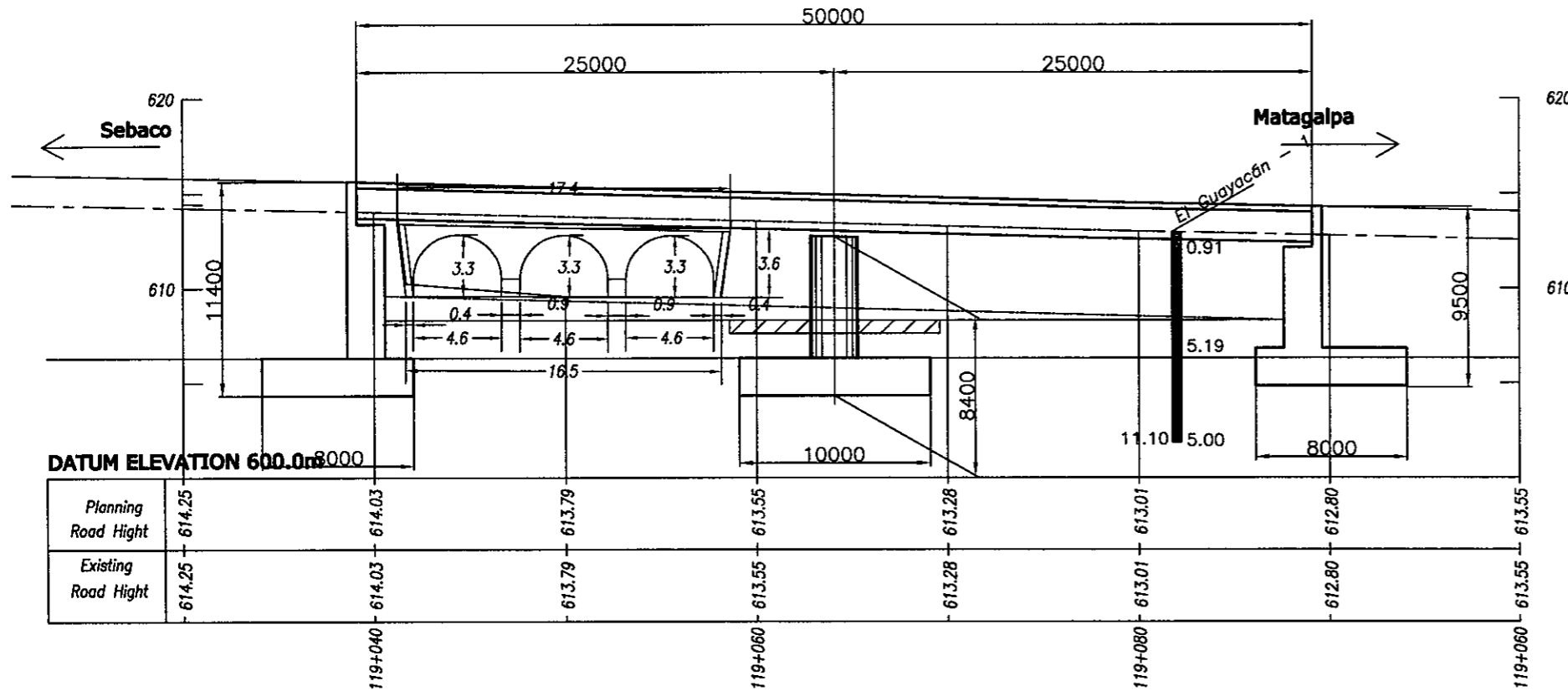
ORIENTAL CONSULTANTS CO., LTD.
JAPAN ENGINEERING CONSULTANTS
CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION: KM 119+050 CARRETERA SEBACO - JINOTEGA
SITE: ND038370

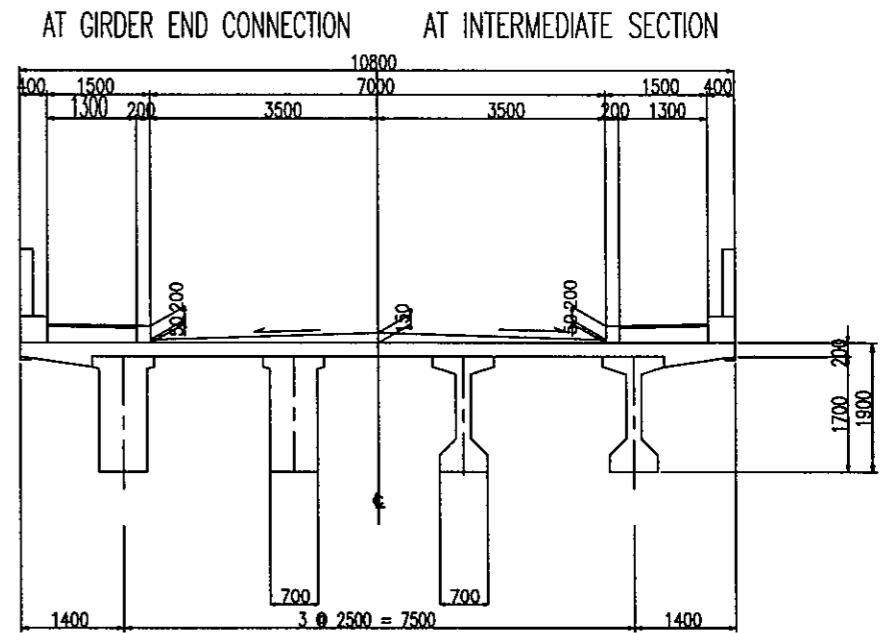
PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA

CALCULO: LEVANTO: RESPONSABLE TECNICO:
DIBUJO: FECHA: November 2002 ESCALA: Illustration
HORA N°: 16
44

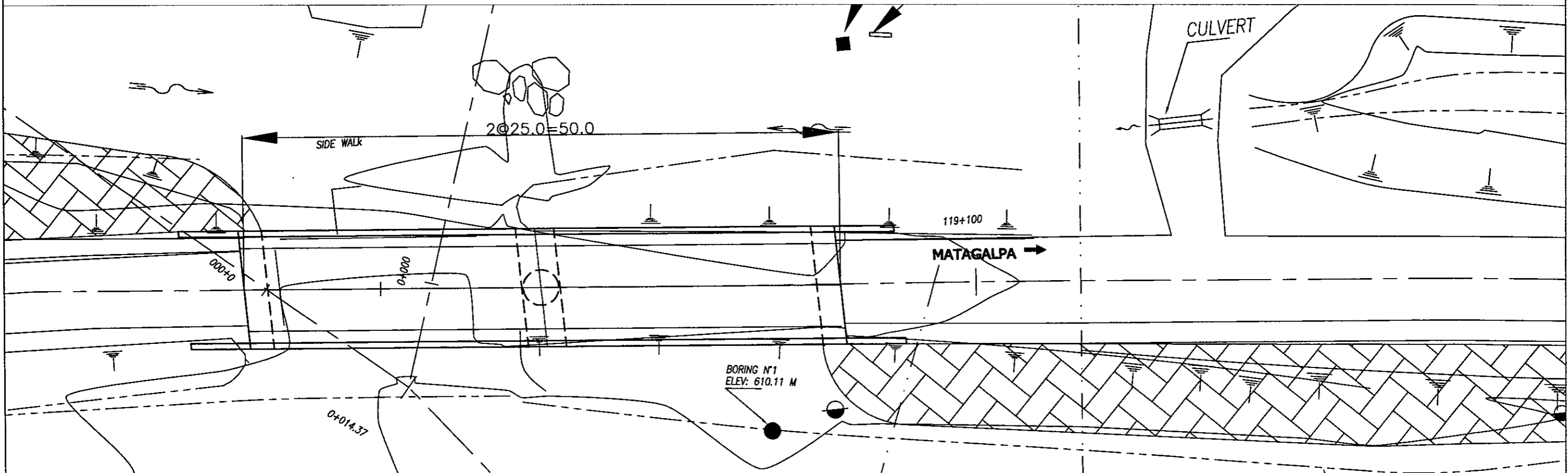
EL GUAYACAN BRIDGE



CROSS SECTION ALONG CENTER LINE OF HIGHWAY



CROSS SECTION



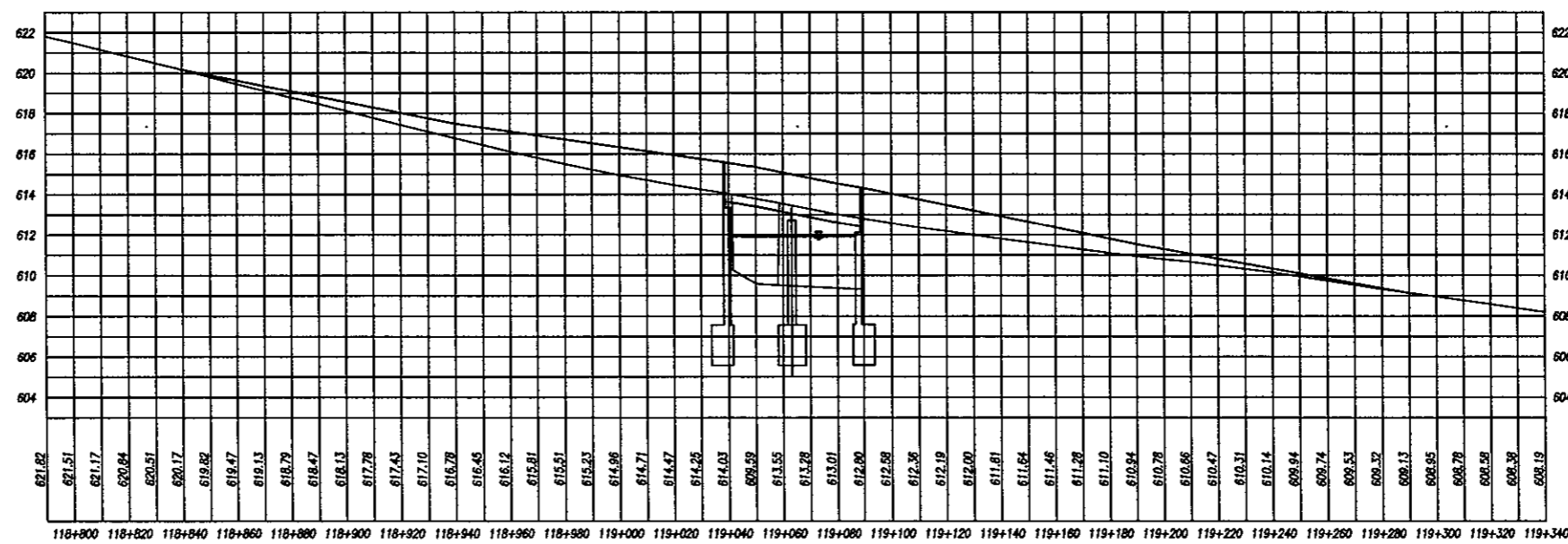
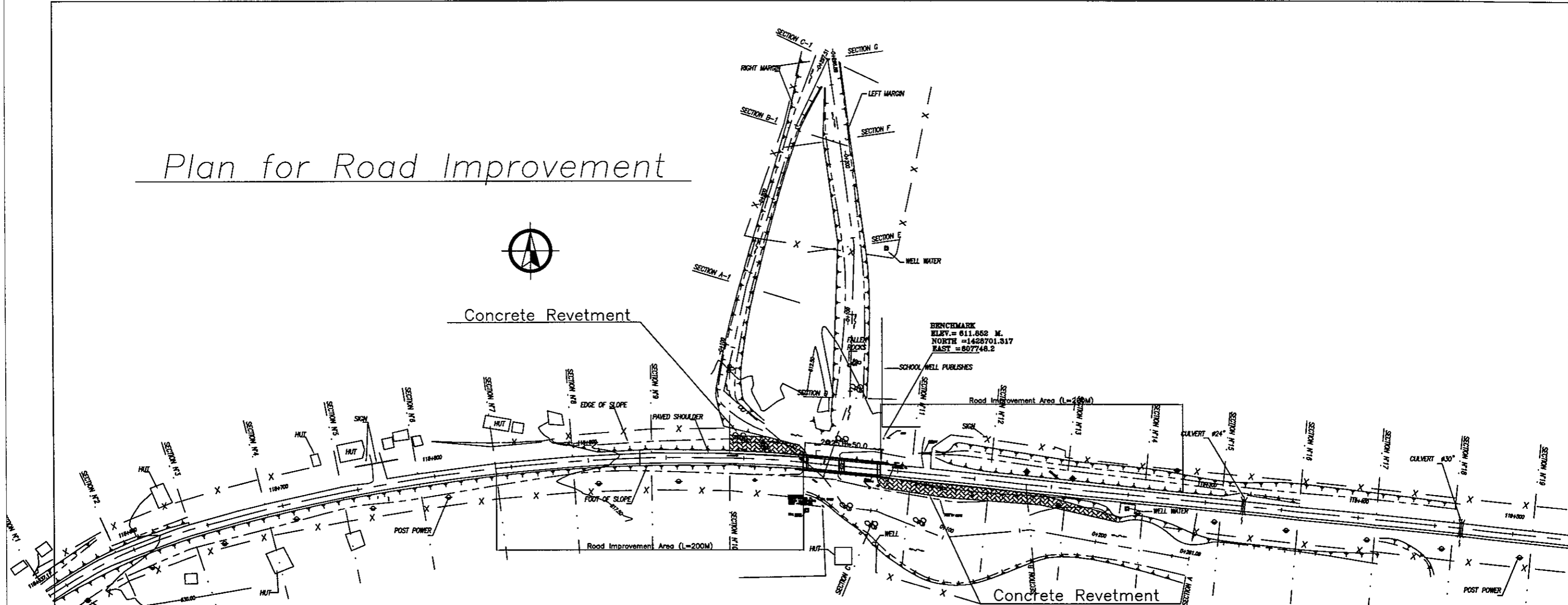
ORIENTAL CONSULTANTS CO., LTD.
 JAPAN ENGINEERING CONSULTANTS
 CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
 UBICACION: KM 119+050 CARRETERA SEBACO - JINOTEGA
 SITIO: PUENTE EL GUAYACAN (NIC - 3)

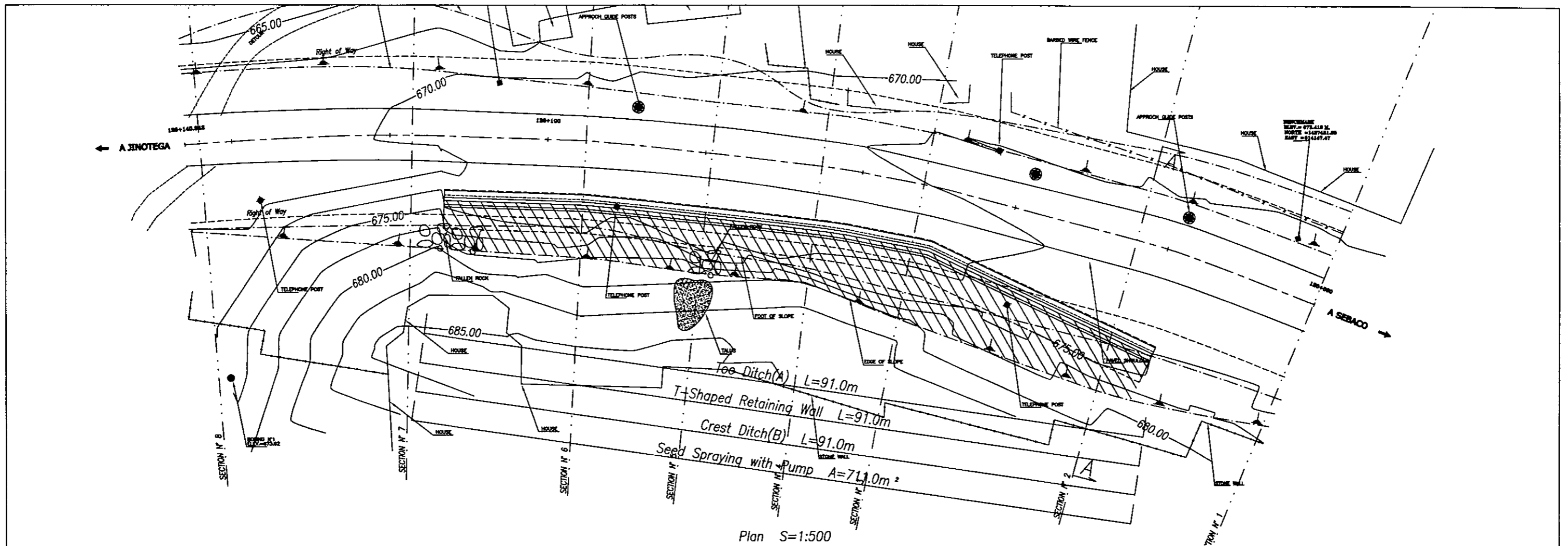
PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS
 IN THE REPUBLIC OF NICARAGUA

CALCULO : MYRIAM MACHADO C.	DIBUJO : MYRIAM MACHADO C.	HOJA N°
LEVANTO : Mauricio Méndez	FECHA :	17
RESPONSABLE TECNICO :	ESCALA	1 : 300

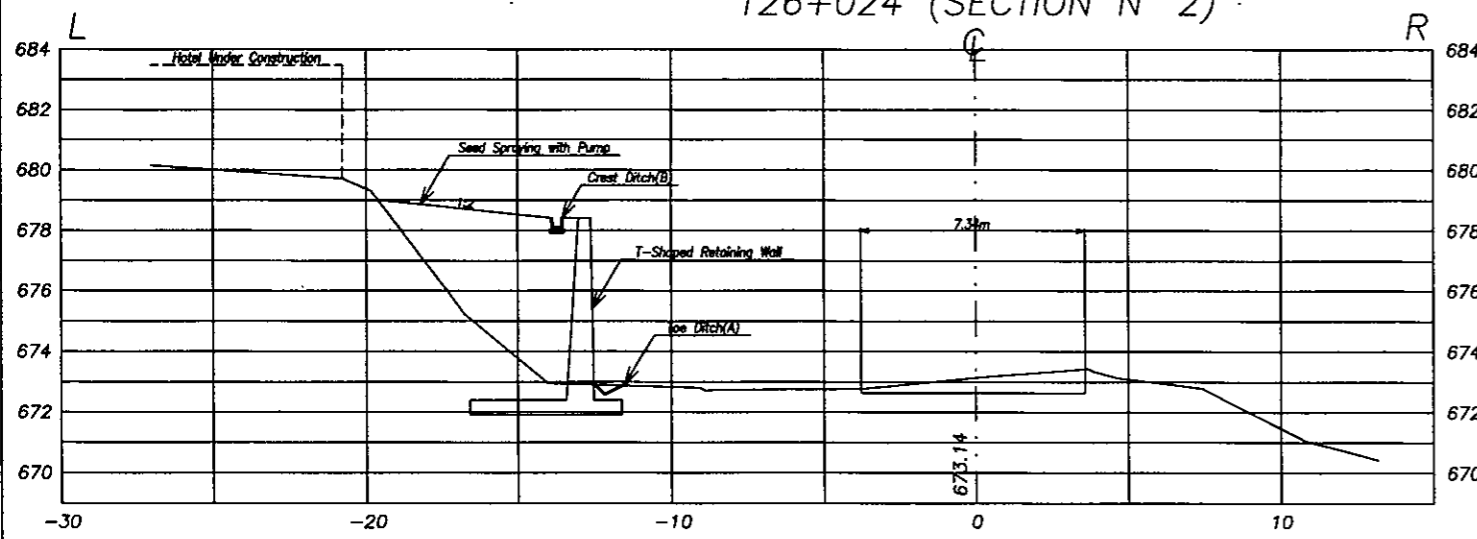
Plan for Road Improvement



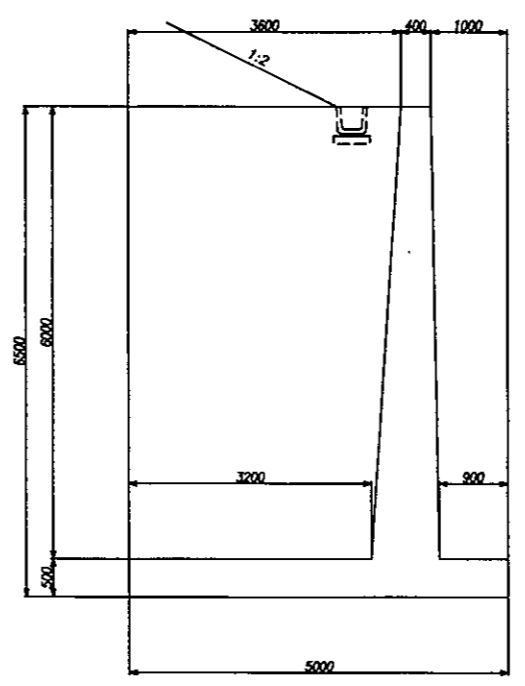
ORIENTAL CONSULTANTS CO., LTD. JAPAN ENGINEERING CONSULTANTS CO., LTD.	CONTENIDO: LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES	PROYECTO: STUDY OF VULNERABILITY REDUCTION FOR MAJOR ROADS IN THE REPUBLIC OF NICARAGUA	CALCULO:	DIBUJO:	HOJA N°
	UBICACION: KM 126+000 CARRETERA SEBACO - JINOTEGA	RESPONSABLE TECNICO:	LEVANTO:	FECHA: November 2002	18
	SITIO: N0038320		ESCALA: Illustration	44	



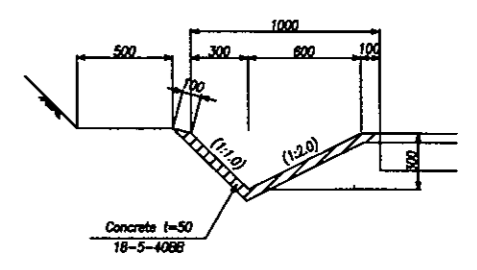
A - A
126+024 (SECTION N° 2)



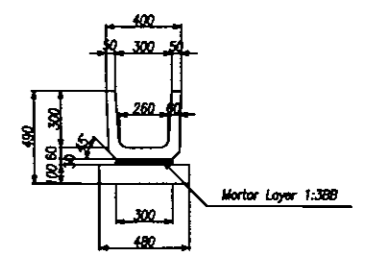
Cross Section S=1:250



T-Shaped Retaining Wall S=1:100



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



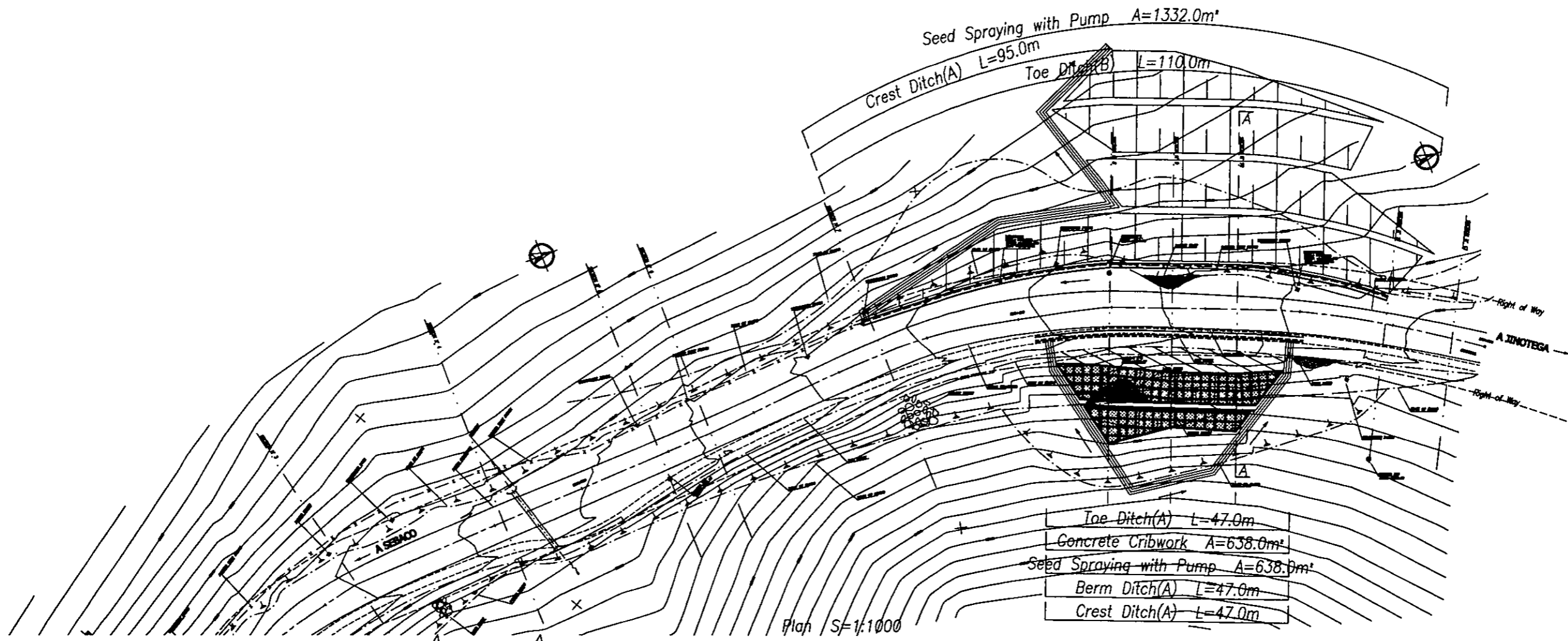
Crest Ditch(B) S=1:40

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

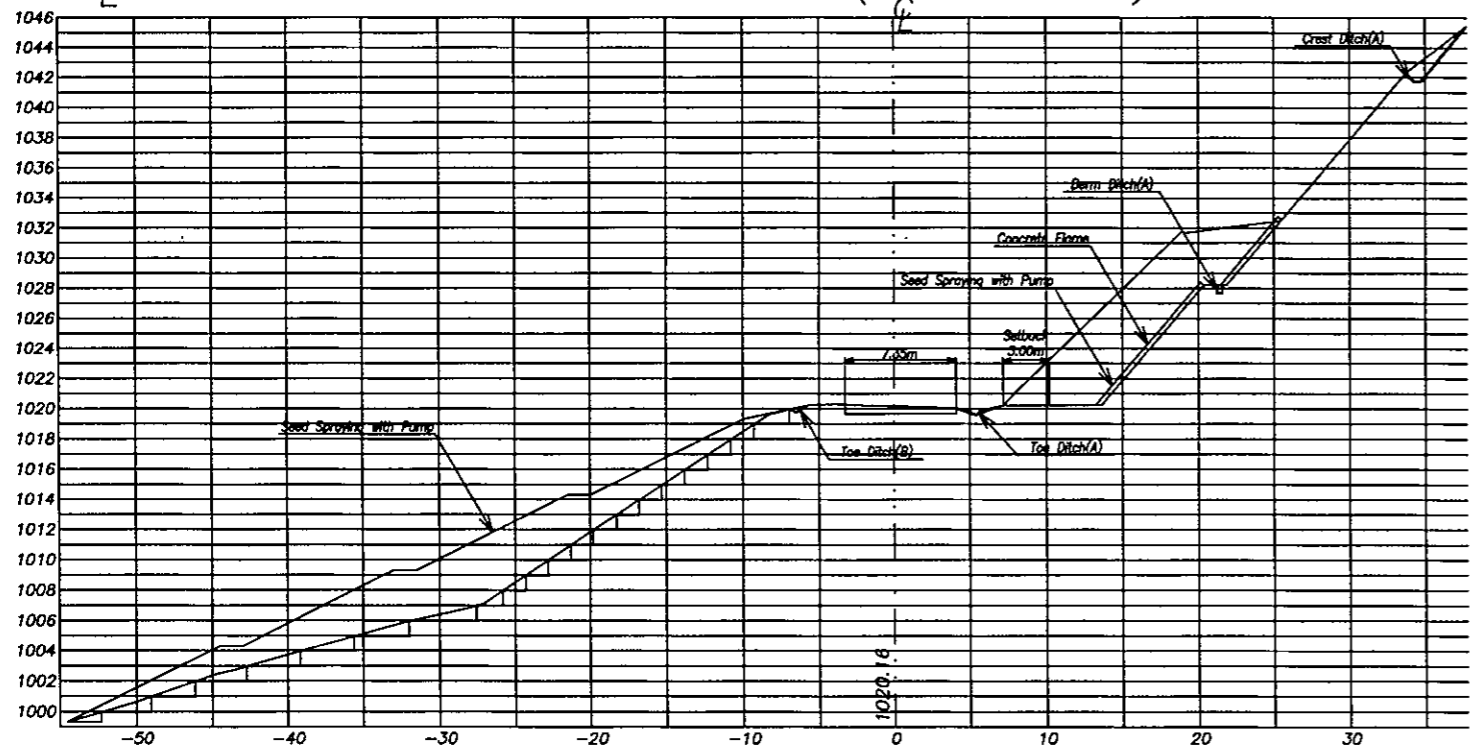
CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
SECCIONES TRANSVERSALES
UBICACION: KM 126+000 CARRETERA SEBACO - JINOTEGA
SITE: N0038320

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

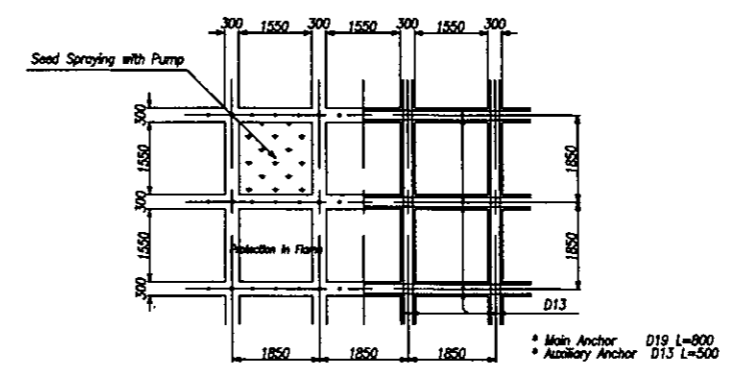
CALCULO:	DIBUJO:	Hoja N°
LEVANTO:	FECHA:	19
RESPONSABLE TECNICO:	ESCALA:	44
	Illustration	



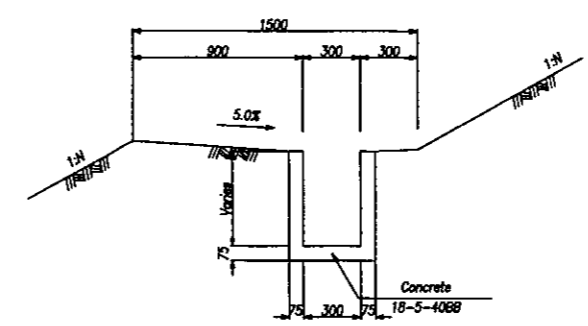
135+433 (SECTION N°9)



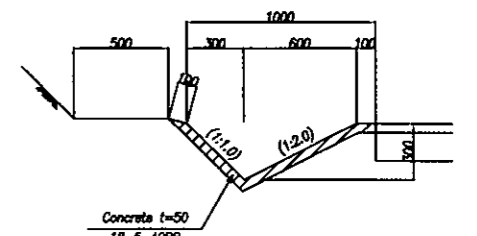
Cross Section S=1:500



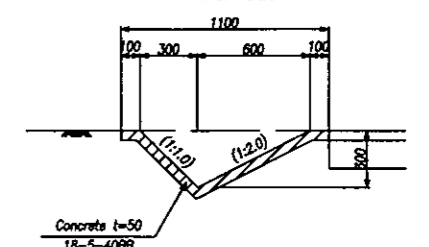
Concrete Cribwork S=1:160



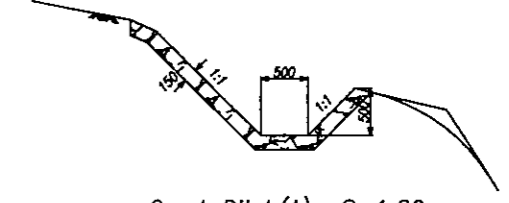
Berm Ditch(A) S=1:40
*For Cut of Soft Rock



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



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



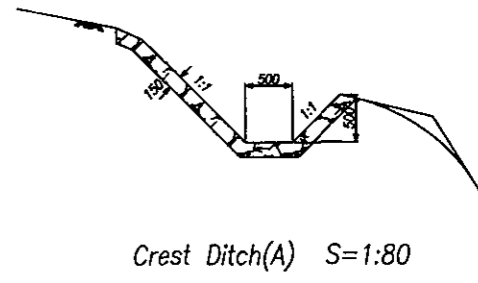
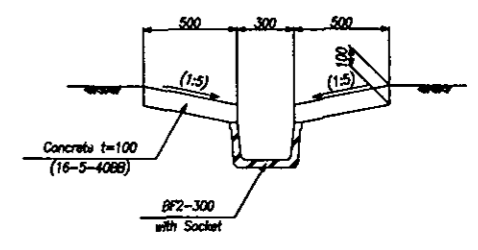
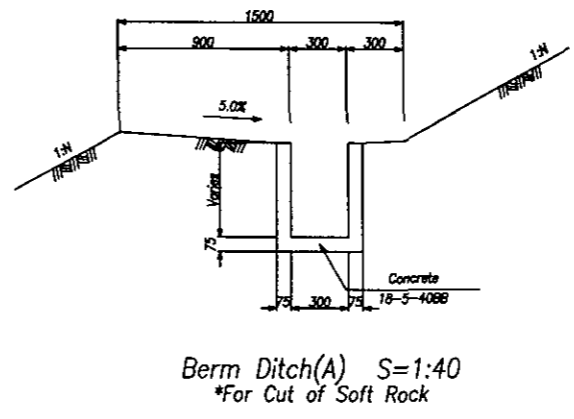
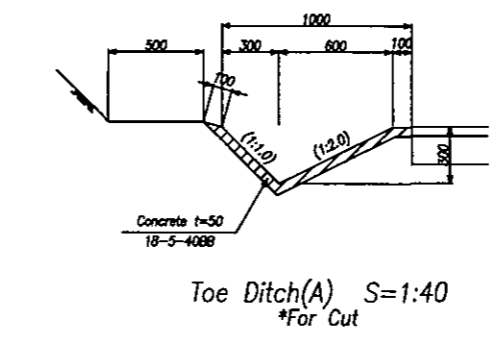
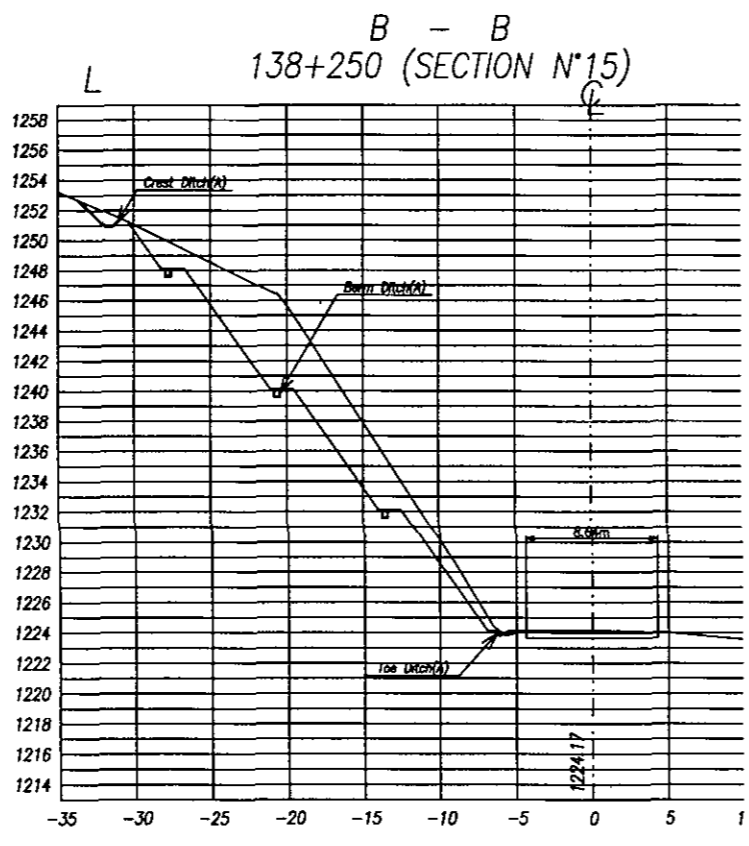
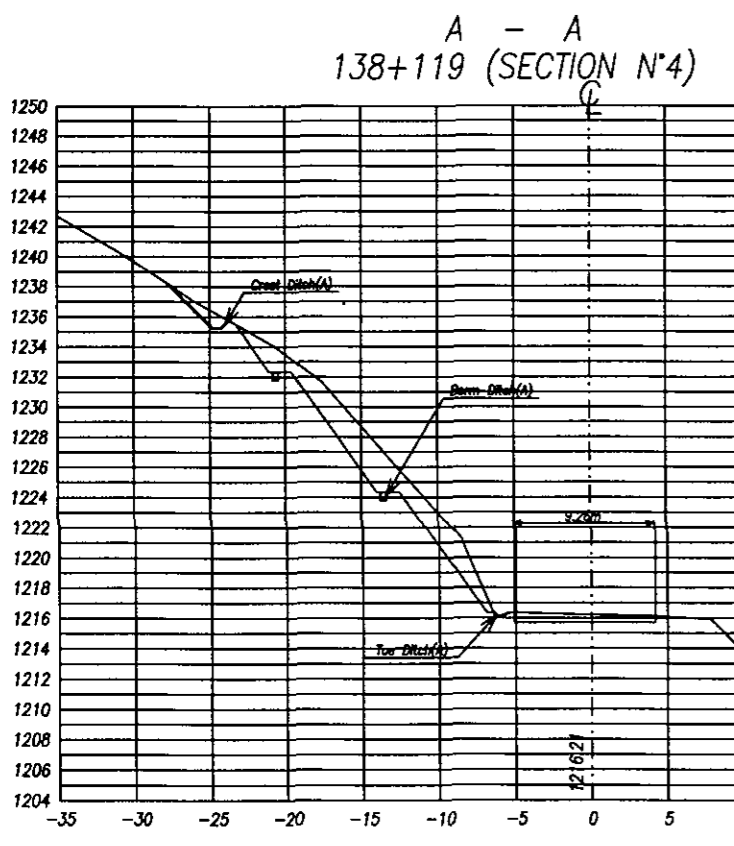
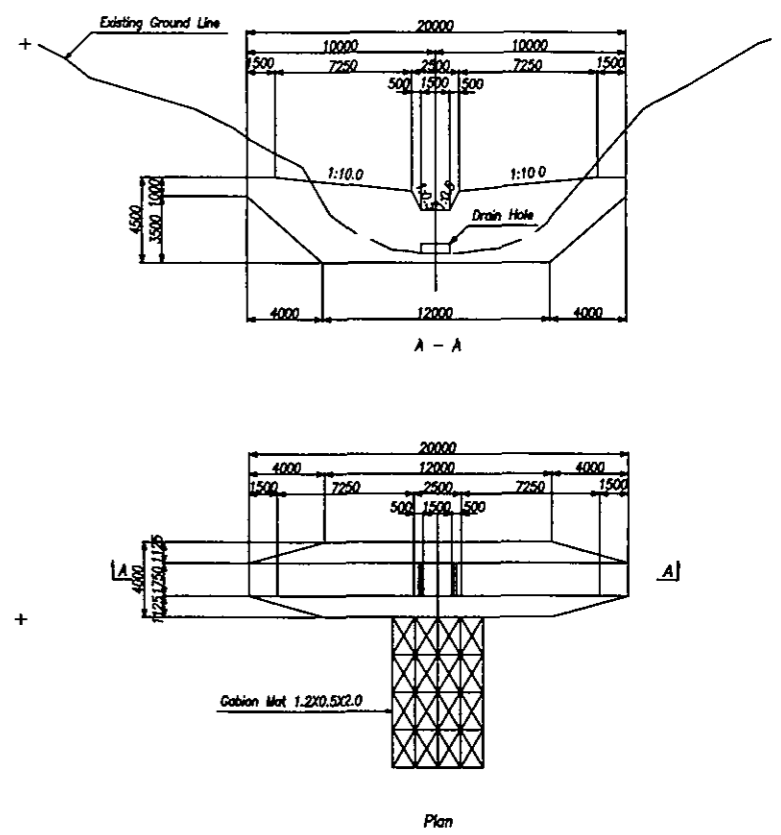
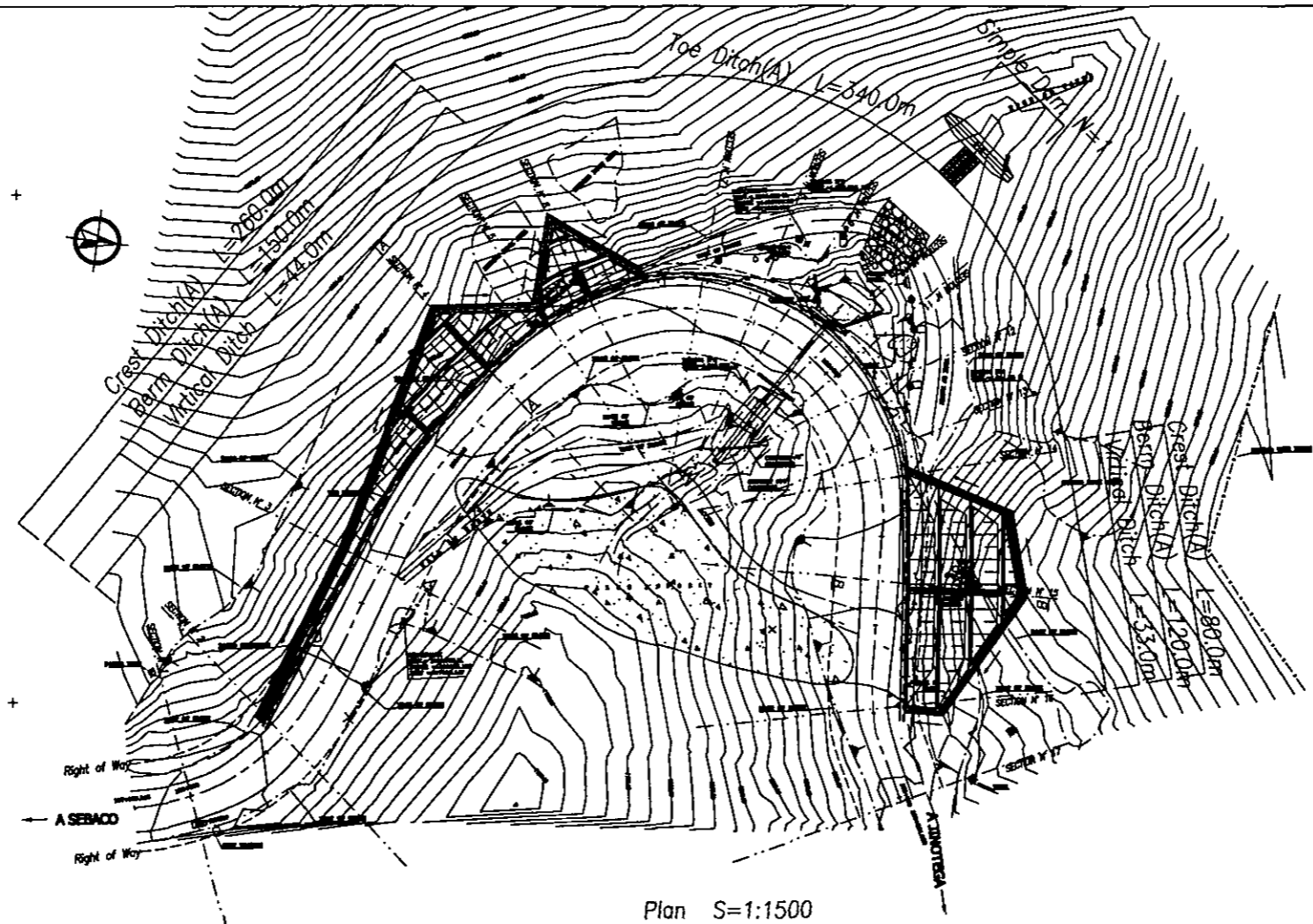
Crest Ditch(A) S=1:80

ORIENTAL CONSULTANTS CO., LTD.
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CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION: KM 135+000 CARRETERA SEBACO - JINOTEGA
SITE: N003C230/N003B240

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

CALCULO:	DIBUJO:	HORA N°:
LEVANTO:	FECHA: November 2002	20
RESPONSABLE TECNICO:	ESCALA: Illustration	44



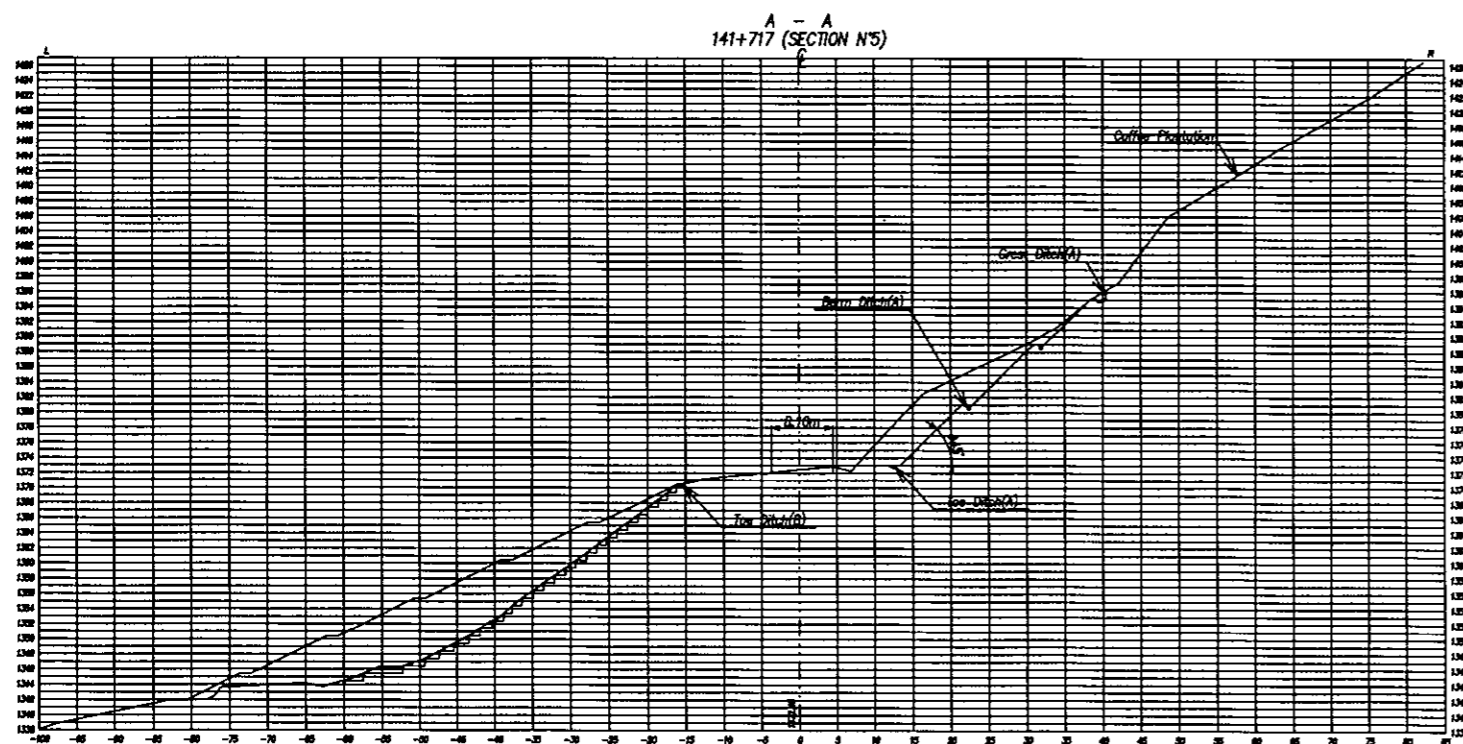
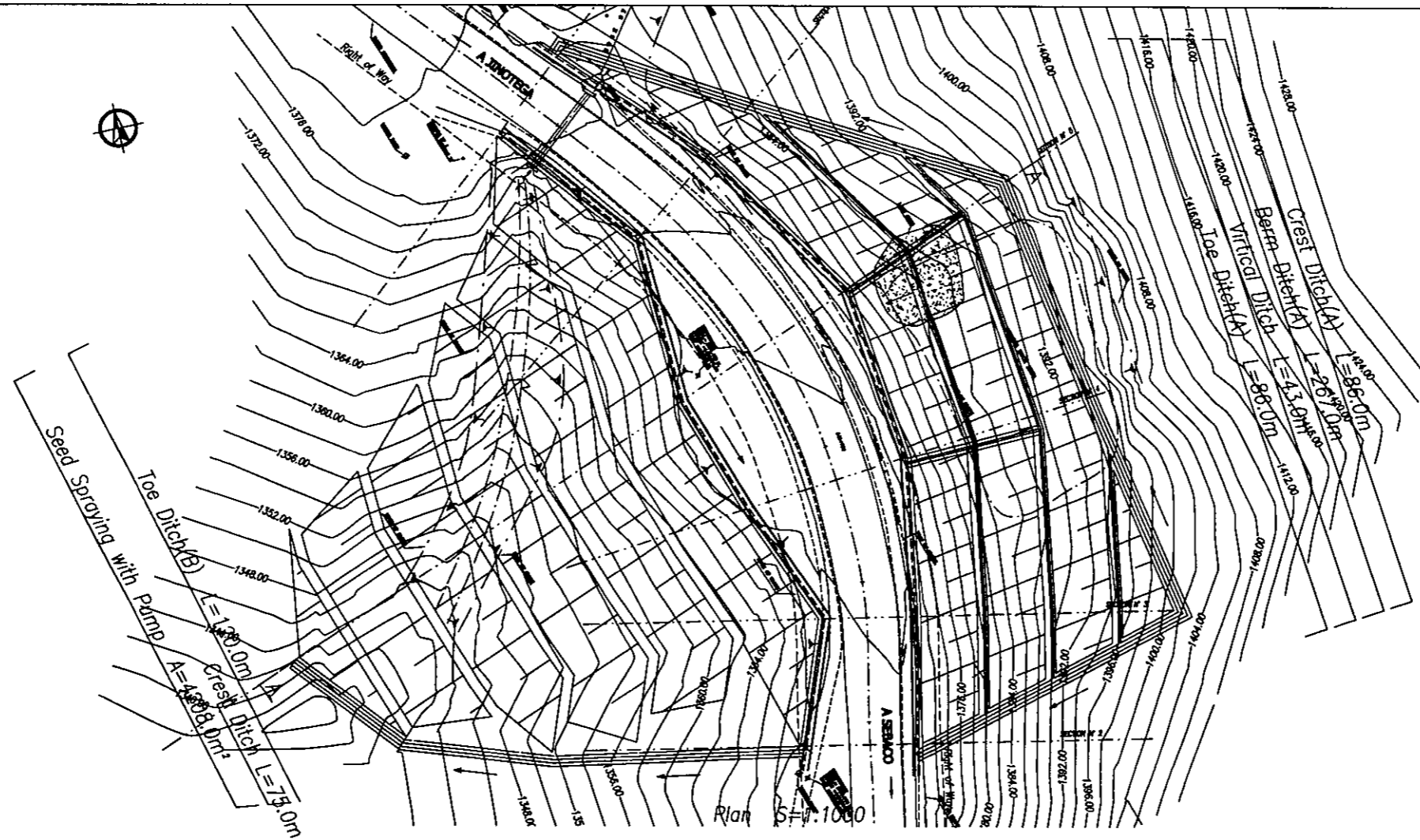
Cross Section S=1:500

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

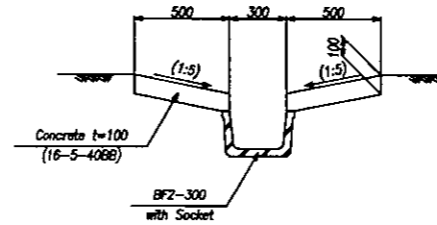
CONTENIDO:	LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
UBICACION:	KM 138+000 CARRETERA SEBACO - JINOTEGA
SITIO:	N003E170

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

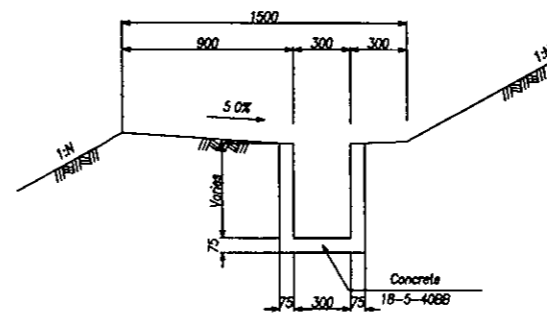
CALCULO:	DIBUJO:	HOJA N°
LEVANTO :	FECHA:	21
RESPONSABLE TECNICO :	ESCALA:	44
	Illustration	



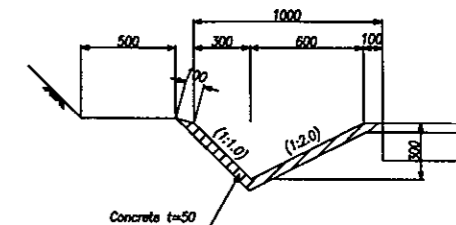
Cross Section S=1:1000



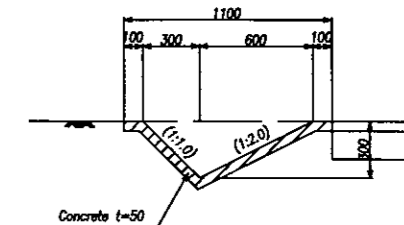
Vertical Ditch S=1:40



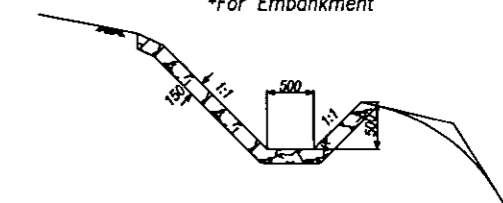
Berm Ditch(A) S=1:40
*For Cut of Soft Rock



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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CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO
SECCIONES TRANSVERSALES
UBICACION: KM 141+600 CARRETERA SEBACO - JINOTEGA
SITIO: N003CL50

PROYECTO:

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

CALCULO:

LEVANTO:

RESPONSABLE
TECNICO:

DELUJO:

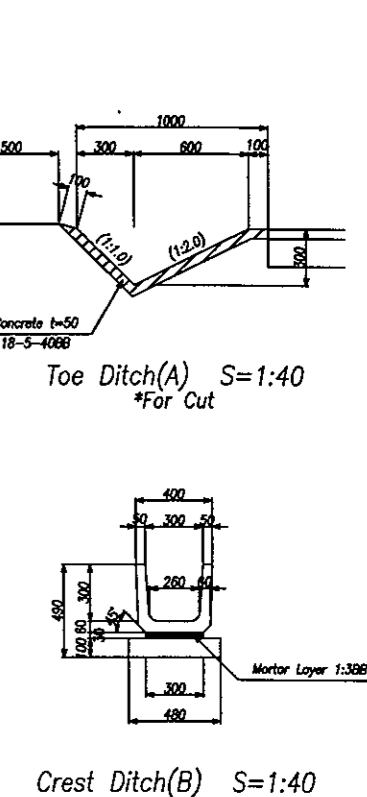
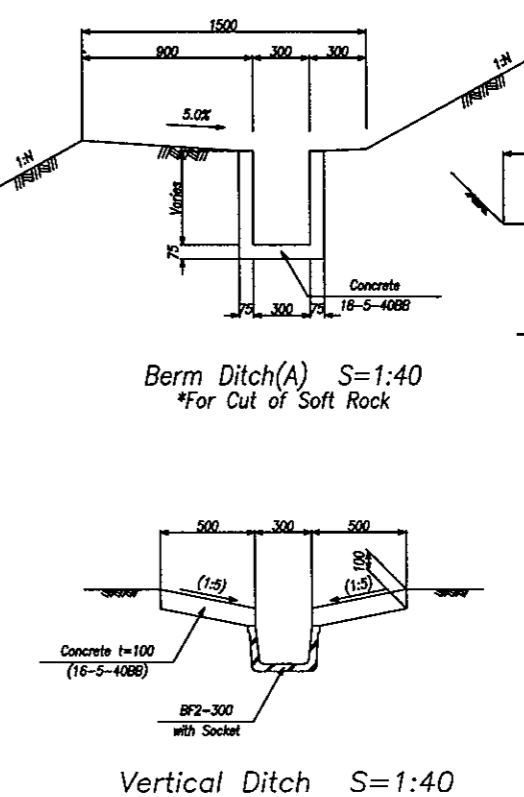
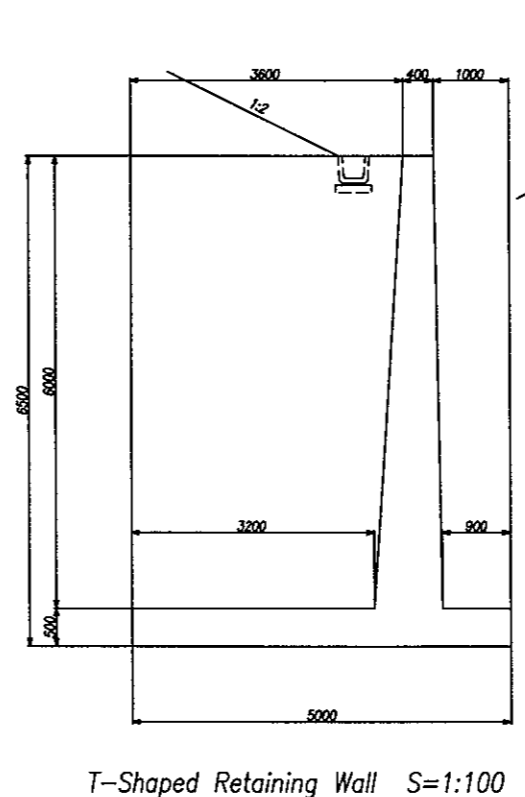
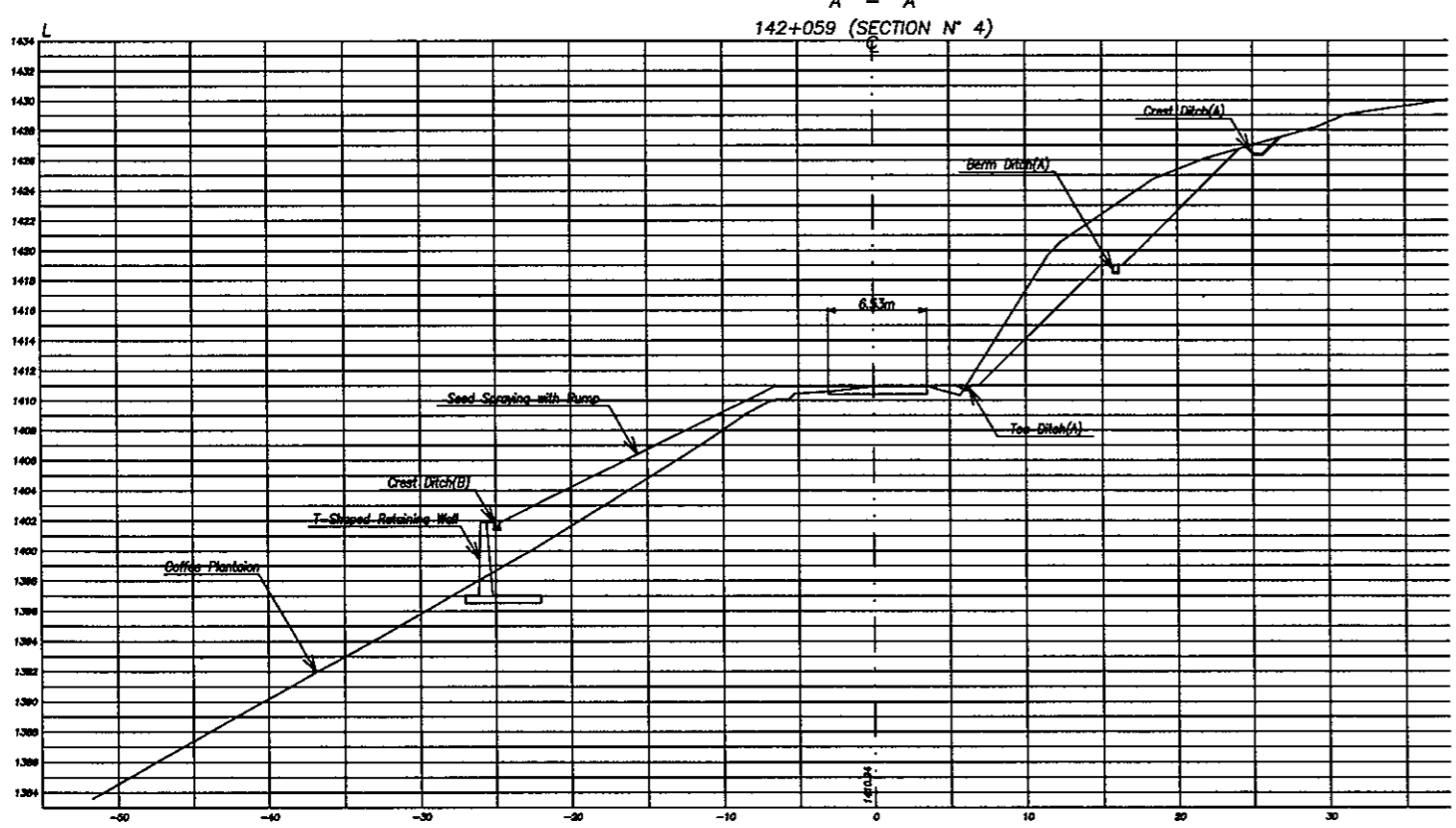
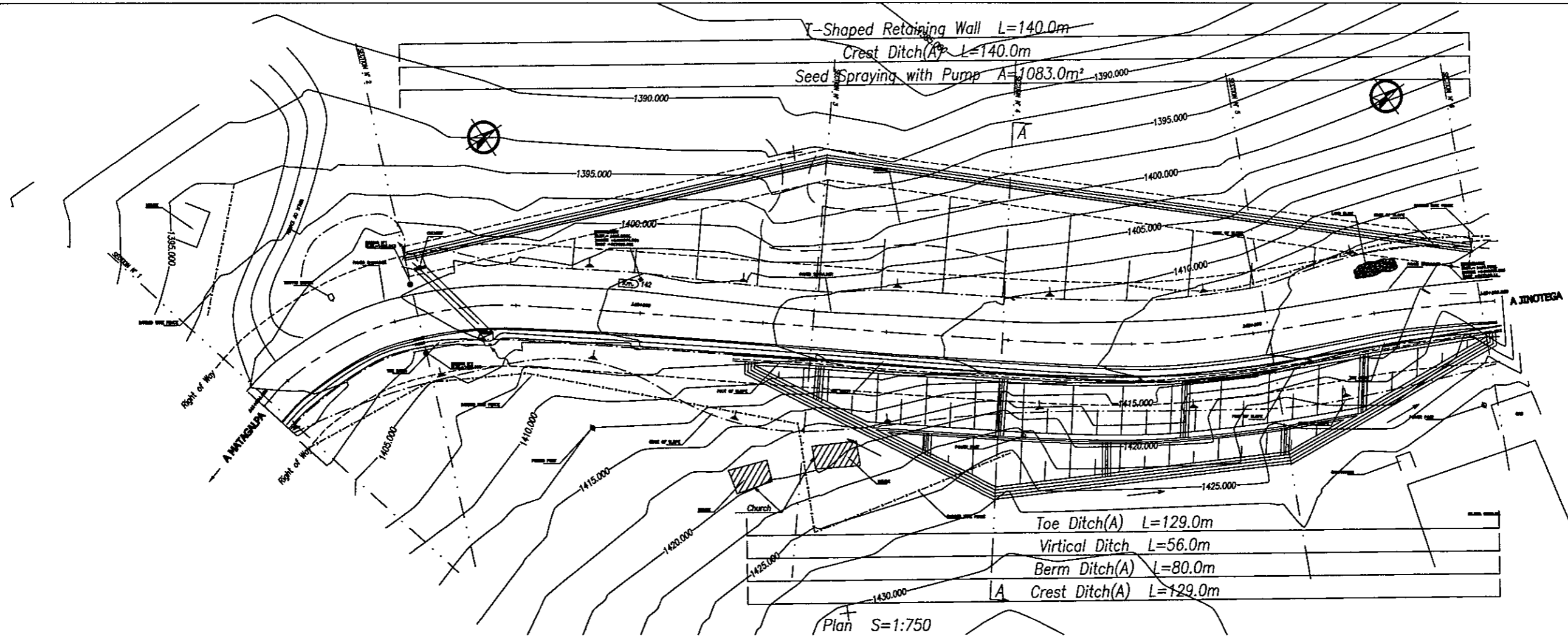
FECHA:

ESCALA:

HOJA N°

22

44



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 CO., LTD.

CONTENIDO: LEVANTAMIENTO TOPOGRAFICO SECCIONES TRANSVERSALES
 UBICACION: KM 142+330 CARRETERA SEBACO - JINOTEGA
 SITIO: N003C140

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

CALCULO:	DIBUJO:	HORA N°
LEVANTO:	FECHA: November 2002	23
RESPONSABLE TECNICO:	ESCALA: Illustration	44