works would be beneficial to the wetland at downstream of the Rio Choloma, by controlling sediment yield and discharge and a potential source for siltation of the lagoons would be decreased.

Accordingly, it is concluded that potential direct adverse effects by the project on the valley floor, including the lagoons and the associated wetlands, is also insignificant likewise the Merendon mountain area.

There will be resettlement and compensation of those people affected by land acquisition for the project. The alignment of the river improvement plan will not require much relocation of people under the existing conditions and such relocation of people will not be very significant.

However as an indirect adverse effect, it might be anticipated, due to the enhanced land use potential of the valley floor with the project the surrounding water bodies will be polluted by increased pollution load discharge by progressing urban, industrial and agricultural development. This is a concern even under the existing conditions. The solution lies in the control of pollution load run-off by means of pollution control regulation, wastewater treatment prior to final disposal and water quality monitoring, in the form of an integrated environmental management program. The countermeasure against the water pollution will be required.

12.6.3 Project Evaluation

The project evaluation is based on effectiveness in economic, social and environmental terms. However the social and environmental adverse impacts may not be significant as stated above.

According to the economic evaluation, the proposed long term project for the Rio Choloma will be feasible from sediment control and flood mitigation related benefits. The EIRR value for the project is as high as 15.3 %. The urgent facility plan will give a higher economic efficiency, because it is planned to eliminate sediment and flood disasters from the urban area of Choloma, that is the most densely populated area in the Rio Choloma basin.

Through implementation of the project, besides the foregoing tangible direct benefits, many intangible benefits could be expected. Among them an imprint intangible benefit would be elimination of various negative intangible factors for social and economic development in and around the flooded area and enhancement of the development potential of the area.

TABLES

TABLE 12.1 PROPOSED SEDIMENT BALANCE (RIO CHOLOMA BASIN)

Drainage Basin	D.A km²	V10 1000 m³	V20 1000 m³	V30 1000 m³	V40 1000 m³	V50-Non 1000 m³	E1 1000 m³	V50-Exi 1000 m³	E2 1000 m³	E1+E2 1000 m³	V50-Pla 1000 m³	P1 %	P2 %
Rio Majaine upstream	12.91	1448.2	585.0	863.2	-	863.2	0.0	863.2	178.8	178.8	684.4	0	21
Rio del Ocotillo	13.51	1544.4	366.5	1177.9	-	1177.9	0.0	1177.9	93.0	93.0	1084.9	0	8
Remain	8.21	995.9	1744.5		-		0.0		76.8	76.8			
Rio Majaine	34.63	3988.5	2696.0	1292.5	-	1292.5	0.0	1292.5	348.6	348.6	943.9	0	27
Rio La Jutosa	20.39	2342.0	1379.9	962.1	-	962.1	20.9	941.2	260.8	281.7	680.4	2	29
Remain	16.62	1722.6	2548.9		-		0.0		655.2	655.2			
Rio Choloma	71.64	8053.1	6624.8	1428.3	142.8	1285.5	20.9	1264.6	1264.6	1285.5	0.0	2	100

Note / Nota :

Remains : Remains of drainage area / Restos en area de cuenca
D.A : Drainage area / Area de cuenca
V10 : Design sediment yield / Produccion de sedimentos de diseño
V20 : Naturally controlled sediment discharge along the river course
/ Descarga de sedimento controlada naturalmente a lo largo de los cursos del rio
V30 : Design sediment discharge / Descarga de sedimentos de diseño
V40 : Design allowable sediment discharge / Descarga de sedimentos permisible de diseño
V50-Non : Design excess discharge (Without structures) / Descarga de sedimentos exceso de diseño(Sin estructuras)
V50-Exi : Design excess discharge (Existing Conditions) / Descarga de sedimentos exceso de diseño(Condiciones existentes)
V50-Pla : Design excess discharge (Plan) / Descarga de sedimentos exceso de diseño(Propuesta)
E1 : Facilities effect (Existing Conditions) / Instalaciones efectivas (Condiciones existentes)
E2 : Facilities effect (Plan) / Instalaciones efectivas(Propuesta)
P1 : Sediment control ratio (Existing Conditions)
P2 : Sediment control ratio (Plan)

TABLE 12.2(1) PROPOSED EROSION CONTROL FACILITIES (RIO CHOLOMA BASIN)

D.N	T.F	H m	h m	L m	B1 m	B2 m	d1 m	d2 m	1/N	ALF	lc m	Vc1 m³	Vc2 m³	Vr m³	Vd m³	Ve m³
R4-1	D-1	14.0	11.5	197	50	55	2.0	2.0	28.6	0.37	658	208030	20800	80930		71790
R4-1	D-2	14.0	11.5	78	30	40	2.0	2.0	31.7	0.37	729	167690	16770	60510		54890
R4-1	D-3	14.0	11.5	76	27	35	2.0	2.0	24.0	0.37	552	111090	11110	42500		37890
R4-1	D-4	10.0	8.0	71	25	35	2.0	2.0	16.0	0.37	256	35840	3580	16900		14230
R4-1	(Sub-total)											522650	52260	200840		178800
R4-2	D-5	12.0	10.0	190	20	70	2.0	2.0	26.5	0.14	530	185500	18550	31800		45900
R4-2	D-6	14.0	11.0	84	20	50	2.0	2.0	15.0	0.14	330	90750	9080	20460		26680
R4-2	(Sub-total)											276250	27630	52260		72580
R3-5	D-7	14.0	11.0	97	10	40	2.0	2.0	15.0	0.05	330	72600	7260	13860		20430
R3-5	(Sub-total)											72600	7260	13860		20430
R5-1-1	C No1		2.5		150		2.0			0.52	200	0	0	60000		28800
R5-1-1	C No2		3.0		100		2.0			0.52	500	0	0	100000		48000
R5-1-1	(Sub-total)											0	0	160000		76800
Total	(Rio Majaine)															348610
2-30	D-8	10.0	8.0	121	20	55	2.0	2.0	14.5	0.17	232	51040	5100	12990		15880
2-30	(Sub-total)											51040	5100	12990		15880
R4-3	D-9	14.0	11.2	209	50	55	2.0	2.0	23.0	0.49	515	158680	15870	63040		48020
R4-3	D-10	14.0	11.0	123	30	40	2.0	2.0	20.0	0.49	440	96800	9680	36080		28080
R4-3	C No1		3.0		250		2.0			0.49	100			50000		25500
R4-3	C No2		3.0		250		2.0			0.49	100			50000		25500
R4-3	C No3		2.0		200		2.0			0.49	205			82000		41820
R4-3	C No4		2.0		200		2.0			0.49	95			38000		19380
R4-3	C No5		2.5		150		2.0			0.49	100			30000		15300
R4-3	C No6		2.5		150		2.0			0.49	100			30000		15300
R4-3	C No7		2.0		150		2.0			0.49	100			30000		15300
R4-3	C No8		1.5		150		2.0			0.49	70			21000		10710
R4-3	C total										870			331000		168810
R4-3	(Sub-total)											255480	25550	430120		244910
Total	(Rio La Jutosa)											306520	30650	443110		260790

TABLE 12.2 (2) PROPOSED EROSION CONTROL FACILITIES (RIO CHOLOMA BASIN)

(Continued)

D.N	T.F	H m	h m	L m	B1 m	B2 m	d1 m	d2 m	1/N	ALF	lc m	Vc1 m³	Vc2 m³	Vr m³	Vd m³	Ve m³
R5-1-2	C No.1	3.4	2.0	395	300		2.0			0.58	700			420000		176400
R5-1-2	C No.2		1.2		300		2.0			0.58	350			210000		88200
R5-1-2	C No.3		1.0		300		2.0			0.58	350			210000		88200
R5-1-2	C No.4		1.0		200		2.0			0.58	350			140000		58800
R5-1-2	C No.5		1.0		200		2.0			0.58	350			140000		58800
R5-1-2	C No.6		1.2		200		2.0			0.58	350			140000		58800
R5-1-2	C No.7	3.0	1.5	528	300		2.0			0.58	500			300000		126000
R5-1-2	C total										2950			1560000		655200
R5-1-2	TL			1325												0
R5-1-2	(Sub-total)													1560000		655200
Total (Rio Choloma)														1560000		655200

Note / Nota :

D.N : Stream order and drainage number / Orden de la corriente y número de cuenca R : Remains of drainage area / Restos en area de cuenca

T.F : Facility type / Tipo de estructuras

D : Check dam(Sabo dam) / Presa de retención C : Consolidation dam / Presa de consolidación TL : Trainning levee / Dique de guía

H : Dam height / Altura de presa

h : Effective dam height / Altura efectiva de presa

L : Dam length / Longitud de presa

B1 : Riverbed width / Ancho del lecho del rio

B2 : Average width of sedimentation area / Ancho promedio del área de sedimentación

d1 : Thickness of riverbed deposits / Espesor de sedimentos en del cauce del rio

d2 : Thickness of sediments at river bank slope / Espesor de sedimentos en la ribera del Río

1/N : Riverbed gradient / Inclinación del cauce del río

ALF : Portion of V20 at calculation point to total volume of V10 at calculation point and V30 at the upper reaches of calculation point
Porcion en los V20 en punto de calculación por totalidad volumen de V10 en punto de calculación y V30 en área de parte mas alta del río

Lc : Length of sedimentation area / Longitud de área de sedimentación(=2xNxh)

Vc1 : Sediment trap capacity / Capacidad de la trampa de sedimentos(=NxB2xH²)

Vc2 : Contorolled sediment discharge capability / Capacidad de descarga de sedimentos controlados(0.1xVc1)

Vr : Sediment discharge suppression capability / Capacidad de descarga de sedimentos represiro(=Lcx(hxd2+B1xd1))

Vd : Deposit volume / Volumen de depositos(=0.8xVc1)

Ve : Effective sedimentation capacity / Capacidad de sedimentación efectiva(=Vr(1-ALF)+Vd)

TABLE 12.3 SEDIMENT BALANCE OF URGENT FACILITIES

Basin name	D.A km²	V10 1000㎥	V20 1000㎥	V30 1000㎥	V40 1000㎥	V50-Non 1000㎥	E1 1000㎥	V50-Exi 1000㎥	E2 1000㎥	E1+E2 1000㎥	V50-Pla 1000㎥	P1 %	P2 %
Rio Majaine upstream	12.91	1448.2	585.0	863.2	-	863.2	0.0	863.2	71.8	71.8	791.4	0	8
Rio del Ocotillo	13.51	1544.4	366.5	1177.9	-	1177.9	0.0	1177.9	0.0	0.0	1177.9	0	0
Remain	8.21	995.9	1744.5		-		0.0		0.0	0.0			
Rio Majaine	34.63	3988.5	2696.0	1292.5	-	1292.5	0.0	1292.5	71.8	71.8	1220.7	0	6
Rio La Jutosa	20.39	2342.0	1379.9	962.1	-	962.1	20.9	941.2	48.0	68.9	893.2	2	7
Remain	16.62	1722.6	2548.9		-		0.0		302.4	302.4			
Rio Choloma	71.64	8053.1	6624.8	1428.3	142.8	1285.5	20.9	1264.6	422.2	433.1	842.4	2	34

Note / Nota :

Remains : Remains of drainage area / Restos en area de cuenca
D.A : Drainage area / Area de cuenca
V10 : Design sediment yield / Produccion de sedimentos de diseño
V20 : Naturally controlled sediment discharge along the river course
/ Descarga de sedimento controlada naturalmente a lo largo de los cursos del rio
V30 : Design sediment discharge / Descarga de sedimentos de diseño
V40 : Design allowable sediment discharge / Descarga de sedimentos permisible de diseño
V50-Non : Design excess discharge (Without structures) / Descarga de sedimentos exceso de diseño(Sin estructuras)
V50-Exi : Design excess discharge (Existing Conditions) / Descarga de sedimentos exceso de diseño(Condiciones existentes)
V50-Pla : Design excess discharge (Plan) / Descarga de sedimentos exceso de diseño(Propuesta)
E1 : Facilities effect (Existing Conditions) / Instalaciones efectivas (Condiciones existentes)
E2 : Facilities effect (Plan) / Instalaciones efectivas (Propuesta)
P1 : Sediment control ratio (Existing Conditions)
P2 : Sediment control ratio (Plan)

TABLE 12.4 CONSTRUCTION COST OF THE RIO CHOLOMA (F/S - LONG TERM PLAN)

Exchange Rate : US$ 1.00=Lps. 6.20=Yen 110

	Item	Unit	Quantity	Foreign Currency Unit Cost (Lps.)	Foreign Currency Amount (Lps. 1000)	Local Currency Unit Cost (Lps.)	Local Currency Amount (Lps. 1000)	Total Cost (Lps. 1000)
A	DIRECT COST							
A-1	River improvement							
	- 11.250 km to 18.815 km							
	1) Preparatory Works :10% of 2)	l.s.			4,422		2,665	7,087
	2) Main Works							
	(1) Excavation common	m3	988,400	10	9,884	1	988	10,872
	(2) Embankment	m3	476,800	23	10,966	2	954	11,920
	(3) Filling (common)	m3	130,300	22	2,867	2	261	3,128
	(4) Spoiling (common)	m3	381,300	26	9,914	2	763	10,677
	(5) Revetment(wet masonry)	10m2	44,130	221	975	1,479	6,527	7,502
	(6) Sodding	m2	139,000	0	0	8	1,112	1,112
	(7) Bed protection(gabion mat 16,800m2)	m3	3,900	84	328	72	281	609
	(8) Extension of N.Road Bridge	l.s.	90mx 26.5m	-	6,140	-	10,410	16,550
	(9) Reconst. of Railway Bridge	l.s.	160mx5.0m	-	3,150	-	5,350	8,500
	Sub-total of 2)				44,224		26,646	70,870
	3) Total of A-1				48,646		29,311	77,957
A-2	Sediment Control							
	1) Preparatory Works : 10 % of 2)	l.s.			16,288		9,890	26,178
	2) Main Works							
	2)-1 Check Dam							
	- No.1 to No.10							
	(1) Concrete Works	m3	103,540	682	70,614	418	43,280	113,894
	(2) Gabion (mat)	m3	4,645	84	390	72	334	724
	Sub-total 2)-1				71,004		43,614	114,618
	2)-2 Consolidation Works							
	- Rio Choloma : No.1 to No.7							
	- Rio Majaine : No.1 to No.2							
	- Rio La Jutosa : No.1 to No.8							
	(1) Concrete Works	m3	121,030	682	82,542	418	50,591	133,133
	(2) Gabion (mat)	m3	59,700	84	5,015	72	4,298	9,313
	(3) Embankment (Rio Choloma No.7)	m3	20,240	33	668	3	61	729
	(3) Seepage Protection (steel sheet pile)	m2	1,540	1,139	1,754	11	17	1,771
	Sub-total 2)-2				89,979		54,967	144,946
	2)-3 Training Levee (Rio Choloma)							
	(1) Embankment	m3	51,700	33	1,706	3	155	1,861
	(2) Gabion	m3	2,300	84	193	72	166	359
	Sub-total 2)-3				1,899		321	2,220
	Sub-total of 2)				162,882		98,902	261,784
	3)Total of A-2				179,170		108,792	287,962
	Total of A				227,816		138,103	365,919
B.	INDIRECT COST							
B-1	Land Aquisition	10m2	106,930	0	0	5	535	535
B-2	Administration (5% of A+(B-1))	l.s.			0		18,323	18,323
B-3	Engineering Service (10 % of A.+C.)	l.s.			27,338		16,572	43,910
	Total of B.				27,338		35,430	62,768
C.	Contingency (20% of A.)				45,563		27,621	73,184
D.	GRAND TOTAL (A. + B. + C.)				300,717		201,154	501,871

TABLE 12.5 CONSTRUCTION COST FOR ECONOMIC EVALUATION OF THE RIO CHOLOMA (F/S - 50 YEAR FLOOD FREQUENCY)

Exchange Rate : US$ 1.00=Lps. 6.20=Yen 110

	Item	Unit	Quantity	Foreign Currency		Local Currency		Total Cost
				Unit Cost (Lps.)	Amount (Lps. 1000)	Unit Cost (Lps.)	Amount (Lps. 1000)	(Lps. 1000)
A	DIRECT COST							
A-1	River Improvement							
	- 11.250 km to 16.815 km							
	1) Preparatory Works :10% of 2)	l.s.			4,422		2,665	7,087
	2) Main Works							
	(1) Excavation common	m3	988,400	10	9,884	1	988	10,872
	(2) Embankment	m3	476,800	23	10,966	2	954	11,920
	(3) Filling (common)	m3	130,300	22	2,867	2	261	3,128
	(4) Spoiling (common)	m3	381,300	26	9,914	2	763	10,677
	(5) Revetment(wet masonry)	10m2	4,413	221	975	1,479	6,527	7,502
	(6) Sodding	m2	139,000	0	0	8	1,112	1,112
	(7) Bed protection(gabion mat 16,800m2)	m3	3,900	84	328	72	281	609
	(8) Extension of N.Road Bridge	l.s.	90mx 26.5m	-	6,140	-	10,410	16,550
	(9) Reconst. of Railway Bridge	l.s.	160mx5.0m	-	3,150	-	5,350	8,500
	Sub-total of 2)				44,224		26,646	70,870
	3) Total of A-1				48,646		29,311	77,957
A-2	Sediment Control							
	1) Preparatory Works : 10 % of 2)	l.s.			10,750		6,528	17,278
	2) Main Works							
	2)-1 Check Dam							
	- No.1 to No.10							
	(1) Concrete Works	m3	68,336	682	46,605	418	28,565	75,170
	(2) Gabion (mat)	m3	3,066	84	258	72	221	479
	Sub-total 2)-1				46,863		28,786	75,649
	2)-2 Consolidation Works							
	- Rio Choloma : No.1 to No.7							
	- Rio Majaina : No.1 to No.2							
	- Rio La Jutosa : No.1 to No.6							
	(1) Concrete Works	m3	79,880	682	54,478	418	33,390	87,868
	(2) Gabion (mat)	m3	39,402	84	3,310	72	2,837	6,147
	(3) Embankment (Rio Choloma No.7)	m3	13,358	33	441	3	40	481
	(3) Seepage Protection (steel sheet pile)	m2	1,016	1,139	1,158	11	11	1,169
	Sub-total 2)-2				59,387		36,278	95,665
	2)-3 Training Levee (Rio Choloma)							
	(1) Embankment	m3	34,122	33	1,126	3	102	1,228
	(2) Gabion	m3	1,518	84	128	72	109	237
	Sub-total 2)-3				1,254		211	1,465
	Sub-total of 2)				107,504		65,275	172,779
	3)Total of A-2				118,254		71,803	190,057
	Total of A				166,900		101,114	268,014
B.	INDIRECT COST							
B-1	Land Aquisition	10m2	106,930	0	0	5	535	535
B-2	Administration (5% of A+(B-1))	l.s.			0		13,427	13,427
B-3	Engineering Service (10 % of A.+C.)	l.s.			20,028		12,134	32,162
	Total of B.				20,028		26,096	46,124
C.	Contingency (20% of A.)				33,380		20,223	53,603
D.	GRAND TOTAL (A. + B. + C.)				220,308		147,433	367,741

Note : 1) Construction cost of the river improvemnt is that for 50 year flood frequency.

2) Construction cost of the sediment control is that for 50 year flood frequency. The work quantities of the sediment control of the 50 year flood frequency are 66 % of those of the long term plan.

TABLE 12.6 DISBURSEMENT SCHEDULE OF THE RIO CHOLOMA (F/S - LONG TERM PLAN)

(LONG TERM PLAN) (UNIT:X1000 LP)

YEAR	A. TOTAL COST Long Term P.(10 Year)	B. TOTAL COST Urgent Plan (2 year)	C. = A.-B. After Urgent P.(8 Year	Year 1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003	9 2004	10 2005	After 11 Year After 2006	REMARKS
1.DIRECT COST															
TOTAL	365,919	103,337	262,582	51,669	51,668	32,823	32,823	32,823	32,823	32,823	32,823	32,823	32,823		
F/C	227,816	66,685	161,131	33,343	33,342	20,142	20,142	20,142	20,142	20,142	20,142	20,142	20,142		
L/C	138,103	36,652	101,451	18,326	18,326	12,681	12,681	12,681	12,681	12,681	12,681	12,681	12,681		
2. INDIRECT COST															
2-1 LAND ACQUISITION															
TOTAL	535	333	202	167	166	25	25	25	25	25	25	25	25		
L/C	535	333	202	167	166	25	25	25	25	25	25	25	25		
2-2 ADMINISTRATION															
TOTAL (A+B)	18,323	5,184	13,139	2,592	2,592	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642		
L/C	18,323	5,184	13,139	2,592	2,592	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642		
2-3 ENGINEERING SERVISES															
TOTAL	43,910	12,400	31,510	6,200	6,200	3,939	3,939	3,939	3,939	3,939	3,939	3,939	3,939		
F/C	27,338	8,002	19,336	4,001	4,001	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417		
L/C	16,572	4,398	12,174	2,199	2,199	1,522	1,522	1,522	1,522	1,522	1,522	1,522	1,522		
Sub-Total of 2.	62,768	17,917	44,851	8,959	8,958	5,606	5,606	5,606	5,606	5,606	5,606	5,606	5,606		
F/C	27,338	8,002	19,336	4,001	4,001	2,417	2,417	2,417	2,417	2,417	2,417	2,417	2,417		
L/C	35,430	9,915	25,515	4,958	4,957	3,189	3,189	3,189	3,189	3,189	3,189	3,189	3,189		
3.PHISICAL CONTINGENCY															
TOTAL	73,184	20,667	52,517	10,334	10,333	6,565	6,565	6,565	6,565	6,565	6,565	6,565	6,565		
F/C	45,363	13,337	32,226	6,669	6,668	4,028	4,028	4,028	4,028	4,028	4,028	4,028	4,028		
L/C	27,621	7,330	20,291	3,665	3,665	2,536	2,536	2,536	2,536	2,536	2,536	2,536	2,536		
Total(1.+2.+3.)	501,871	141,921	359,950	70,961	70,960	44,994	44,994	44,994	44,994	44,994	44,994	44,994	44,994		
F/C	300,717	88,024	212,693	44,012	44,012	26,587	26,587	26,587	26,587	26,587	26,587	26,587	26,587		
L/C	201,154	53,897	147,257	26,949	26,948	18,407	18,407	18,407	18,407	18,407	18,407	18,407	18,407		
With Price Contingency.															
F/C	371,705	97,629	274,076	48,093	49,536	30,822	31,746	32,699	33,680	34,690	35,731	36,803	37,907		x(1+.03)^(n+2)
L/C	414,337	75,324	339,013	35,869	39,455	29,645	32,609	35,870	39,457	43,403	47,743	52,517	57,769		x(1+.10)^(n+2)
Total	786,042	172,953	613,089	83,962	88,990	60,466	64,355	68,569	73,137	78,093	83,474	89,320	95,676		
4.MAINTENANCE/OPERATION															
TOTAL	4,391	1,240	3,151		620	1,240	1,634	2,028	2,422	2,816	3,210	3,604	3,998	4,391	
L/C	4,391	1,240	3,151		620	1,240	1,634	2,028	2,422	2,816	3,210	3,604	3,998	4,391	

TABLE 12.7 CONSTRUCTION COST OF THE RIO CHOLOMA (F/S - URGENT PLAN)

Exchange Rate : US$ 1.00=Lps. 6.20=Yen 110

	Item	Unit	Quantity	Foreign Currency		Local Currency		Total Cost
				Unit Cost (Lps.)	Amount (Lps. 1000)	Unit Cost (Lps.)	Amount (Lps. 1000)	(Lps. 1000)
A	DIRECT COST							
A-1	River Improvement							
	- 15.390 km to 18.815 km							
	1) Preparatory Works :10% of 2)	l.s.			2,257		1,204	3,461
	2) Main Works							
	(1) Excavation common	m3	536,500	10	5,365	1	537	5,902
	(2) Embankment	m3	134,400	23	3,091	2	269	3,360
	(3) Filling (common)	m3	96,900	22	2,132	2	194	2,326
	(4) Spoiling (common)	m3	305,200	26	7,935	2	610	8,545
	(5) Revetment(wet masonry)	10m2	30,420	221	672	1,479	4,499	5,171
	(6) Sodding	m2	49,000	0	0	8	392	392
	(7) Bed protection(gabion mat 11,400m2)	m3	2,620	84	220	72	189	409
	(8) Extension of N.Road Bridge	l.s.	-	-	0	-	0	0
	(9) Reconst. of Railway Bridge	l.s.	160mx5.0m	-	3,150	-	5,350	8,500
	Sub-total of 2)				22,565		12,040	34,605
	3) Total of A-1				24,822		13,244	38,066
A-2	Sediment Control							
	1) Preparatory Works : 10 % of 2)	l.s.			3,806		2,128	5,934
	2) Main Works							
	2)-1 No.1 Check Dam (Majaine Dam)							
	(1) Concrete Works	m3	14,370	682	9,800	418	6,007	15,807
	(2) Gabion (mat)	m3	1,120	84	94	72	81	175
	Sub-total 2)-1				9,894		6,088	15,982
	2)-2 No.9 Check Dam (Jutosa Dam)							
	(1) Concrete Works	m3	15,480	682	10,557	418	6,471	17,028
	(2) Gabion (mat)	m3	840	84	71	72	60	131
	Sub-total 2)-2				10,628		6,531	17,159
	2)-3 No.1 Consolidation Dam (Rio Choloma)							
	(1) Concrete Works	m3	10,660	682	7,270	418	4,456	11,726
	(2) Gabion (mat)	m3	2,400	84	202	72	173	375
	(3) Seepage Protection (steel sheet pile)	m2	1,540	1,139	1,754	11	17	1,771
	Sub-total 2)-3				9,226		4,646	13,872
	2)-4 No.7 Consolidation Dam (Rio Choloma)							
	(1) Concrete Works	m3	7,730	682	5,272	418	3,231	8,503
	(2) Gabion (mat)	m3	5,590	84	470	72	402	872
	(3) Embankment (Rio Choloma No.7)	m3	20,240	33	668	3	61	729
	Sub-total 2)-4				6,410		3,694	10,104
	2)-5 Training Levee (Rio Choloma)							
	(1) Embankment	m3	51,700	33	1,706	3	155	1,861
	(2) Gabion	m3	2,300	84	193	72	166	359
	Sub-total 2)-5				1,899		321	2,220
	Sub-total of 2)				38,057		21,280	59,337
	3)Total of A-2				41,863		23,408	65,271
	Total of A				66,685		36,652	103,337
B..	INDIRECT COST							
B-1	Land Aquisition	10m2	66,630	0	0	5	333	333
B-2	Administration (5% of A+(B-1))	l.s.			0		5,184	5,184
B-3	Engineering Service (10 % of (A.+C.))	l.s.			8,002		4,398	12,400
	Total of B.				8,002		9,915	17,917
C.	Phisical Contingency (20% of A.)				13,337		7,330	20,667
D.	GRAND TOTAL (A. + B. + C.)				88,024		53,897	141,921

TABLE 12.8 ANNUAL FLOW OF ECONOMIC COST AND BENEFIT ON RIO CHOLOMA
RETURN PERIOD : 50-YEAR

Unit:Thousand Lps.

Year		Economic Cost			Economic Benefit
		Const.	OM	Total	
1	1996	66,649	0	66,649	0
2	1997	66,649	584	67,233	10,811
3	1998	26,357	1,168	27,524	21,621
4	1999	26,357	1,399	27,756	25,900
5	2000	26,357	1,630	27,987	30,180
6	2001	26,357	1,861	28,218	34,459
7	2002	26,357	2,092	28,449	38,738
8	2003	26,357	2,323	28,680	43,018
9	2004	26,357	2,554	28,911	47,297
10	2005	26,357	2,785	29,142	51,576
11	2006	0	3,016	3,016	55,855
12	2007	0	3,016	3,016	55,855
13	2008	0	3,016	3,016	55,855
14	2009	0	3,016	3,016	55,855
15	2010	0	3,016	3,016	55,855
16	2011	0	3,016	3,016	55,855
17	2012	0	3,016	3,016	55,855
18	2013	0	3,016	3,016	55,855
19	2014	0	3,016	3,016	55,855
20	2015	0	3,016	3,016	55,855
21	2016	0	3,016	3,016	55,855
22	2017	0	3,016	3,016	55,855
23	2018	0	3,016	3,016	55,855
24	2019	0	3,016	3,016	55,855
25	2020	0	3,016	3,016	55,855
26	2021	0	3,016	3,016	55,855
27	2022	0	3,016	3,016	55,855
28	2023	0	3,016	3,016	55,855
29	2024	0	3,016	3,016	55,855
30	2025	0	3,016	3,016	55,855
31	2026	0	3,016	3,016	55,855
32	2027	0	3,016	3,016	55,855
33	2028	0	3,016	3,016	55,855
34	2029	0	3,016	3,016	55,855
35	2030	0	3,016	3,016	55,855
36	2031	0	3,016	3,016	55,855
37	2032	0	3,016	3,016	55,855
38	2033	0	3,016	3,016	55,855
39	2034	0	3,016	3,016	55,855
40	2035	0	3,016	3,016	55,855
41	2036	0	3,016	3,016	55,855
42	2037	0	3,016	3,016	55,855
43	2038	0	3,016	3,016	55,855
44	2039	0	3,016	3,016	55,855
45	2040	0	3,016	3,016	55,855
46	2041	0	3,016	3,016	55,855
47	2042	0	3,016	3,016	55,855
48	2043	0	3,016	3,016	55,855
49	2044	0	3,016	3,016	55,855
50	2045	0	3,016	3,016	55,855
	Total	344,152	137,054	481,206	2,537,800

FIGURES

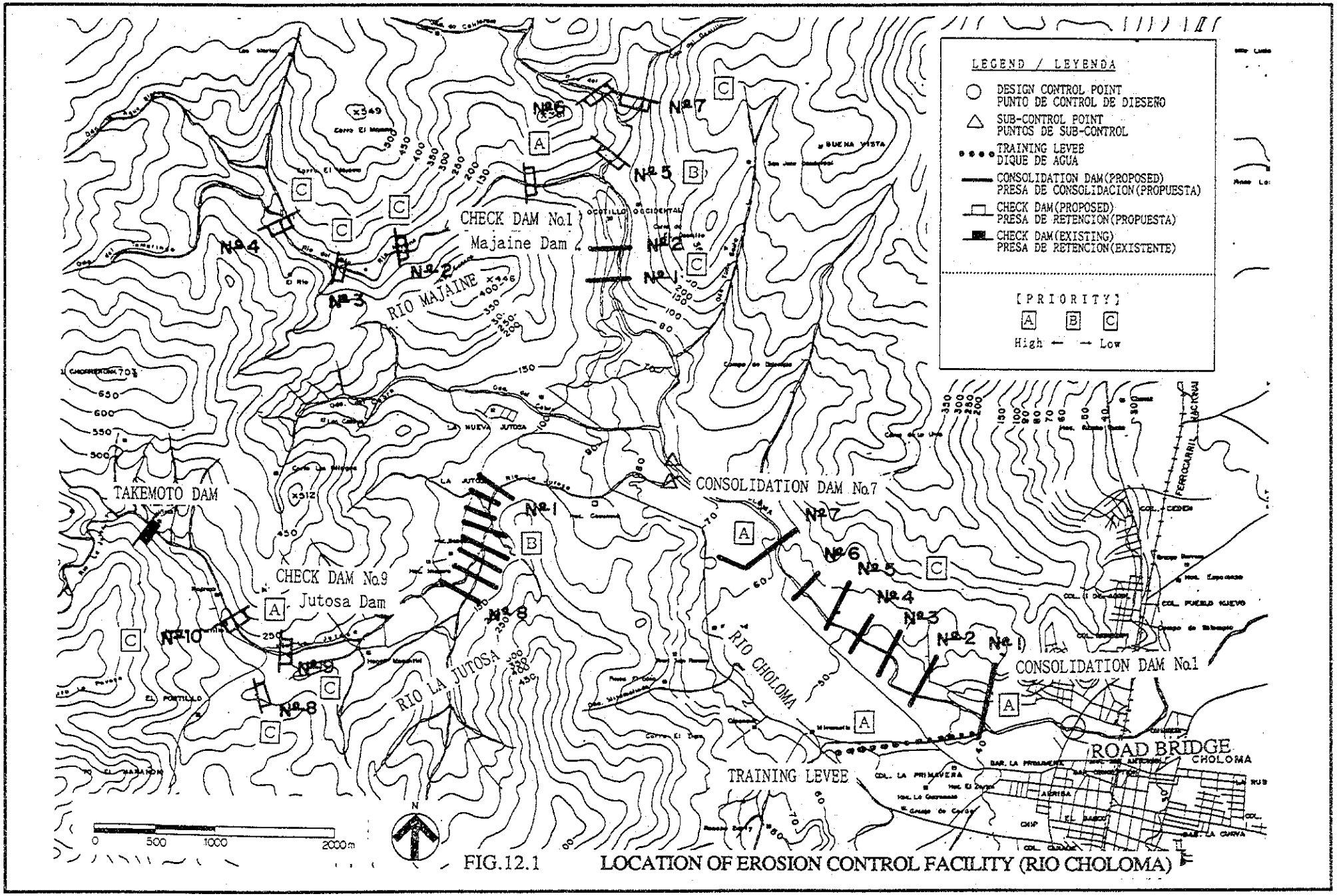
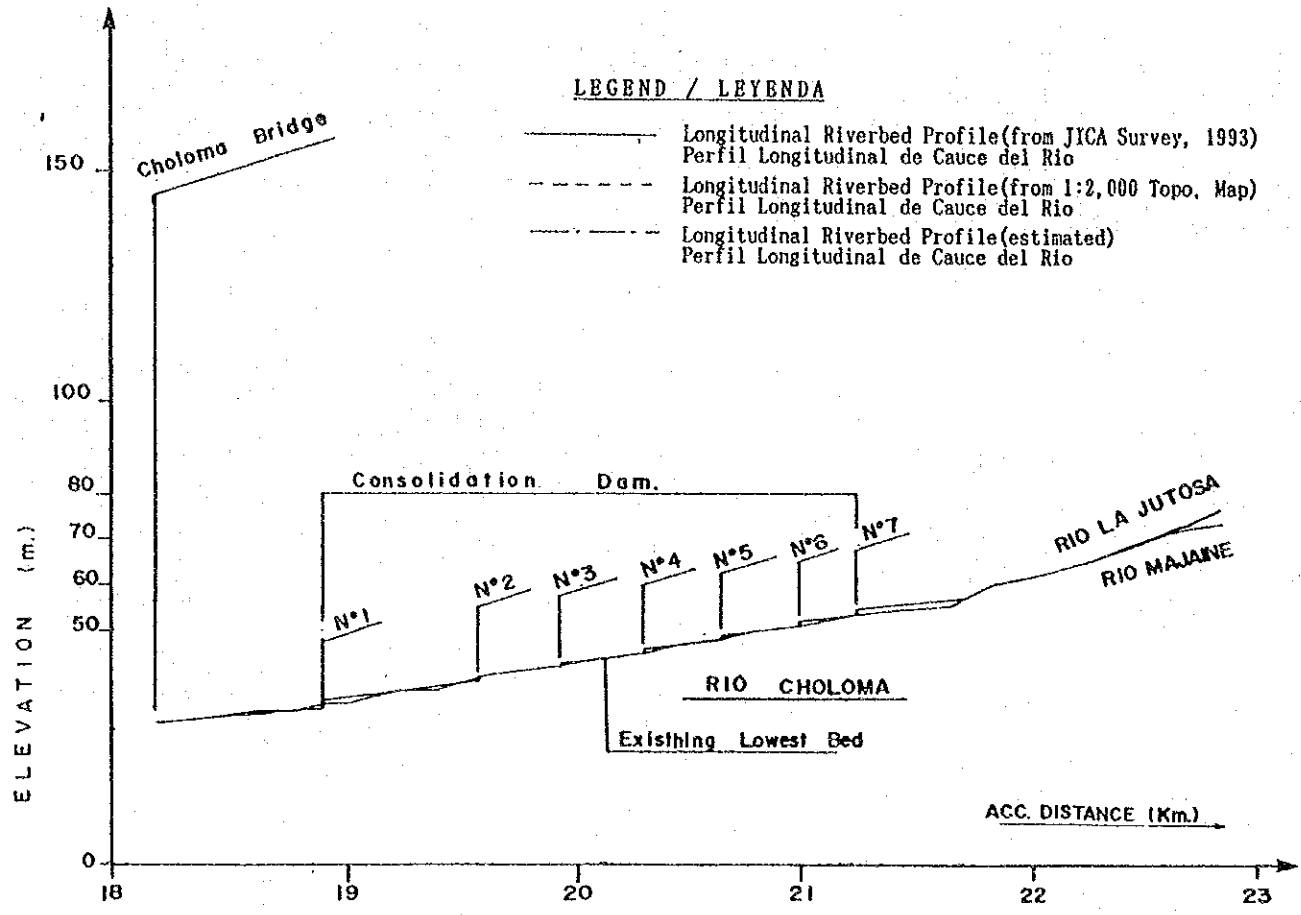


FIG.12.1 LOCATION OF EROSION CONTROL FACILITY (RIO CHOLOMA)



Section Rio La Jutosa	Design Acc. Dist. (Km.)	Lowest Bed El. Rio La Jutosa
JU-001	22.435	68.33
JU-002	22.635	72.11
JU-003	22.835	76.66

Section Rio Choloma & Majaine	Design Acc. Dist. (Km.)	Lowest Bed El. Rio Choloma & Majaine
CH-040	18.185	29.93
CH-041	18.395	31.37
CH-042	18.605	32.23
CH-043	18.815	32.76
	18.885	33.80
CH-044	18.995	34.36
CH-045	19.195	36.23
CH-046	19.415	36.62
	19.585	
CH-047	19.625	39.76
CH-048	19.825	41.50
	19.935	
CH-049	20.025	42.59
CH-050	20.235	44.04
	20.285	
CH-051	20.440	46.47
	20.635	
CH-052	20.642	47.98
CH-053	20.845	50.00
	20.985	
CH-054	21.045	51.18
CH-055	21.235	53.41
CH-056	21.435	54.18
CH-057	21.635	55.34
CH-058	21.835	60.38
CH-059	22.035	62.24
CH-060	22.235	64.67
MA-001	22.435	67.54
MA-002	22.635	71.31
MA-003	22.835	73.34

FIG.12.2 (1) DESIGN LONGITUDINAL SECTION OF EROSION CONTROL FACILITY

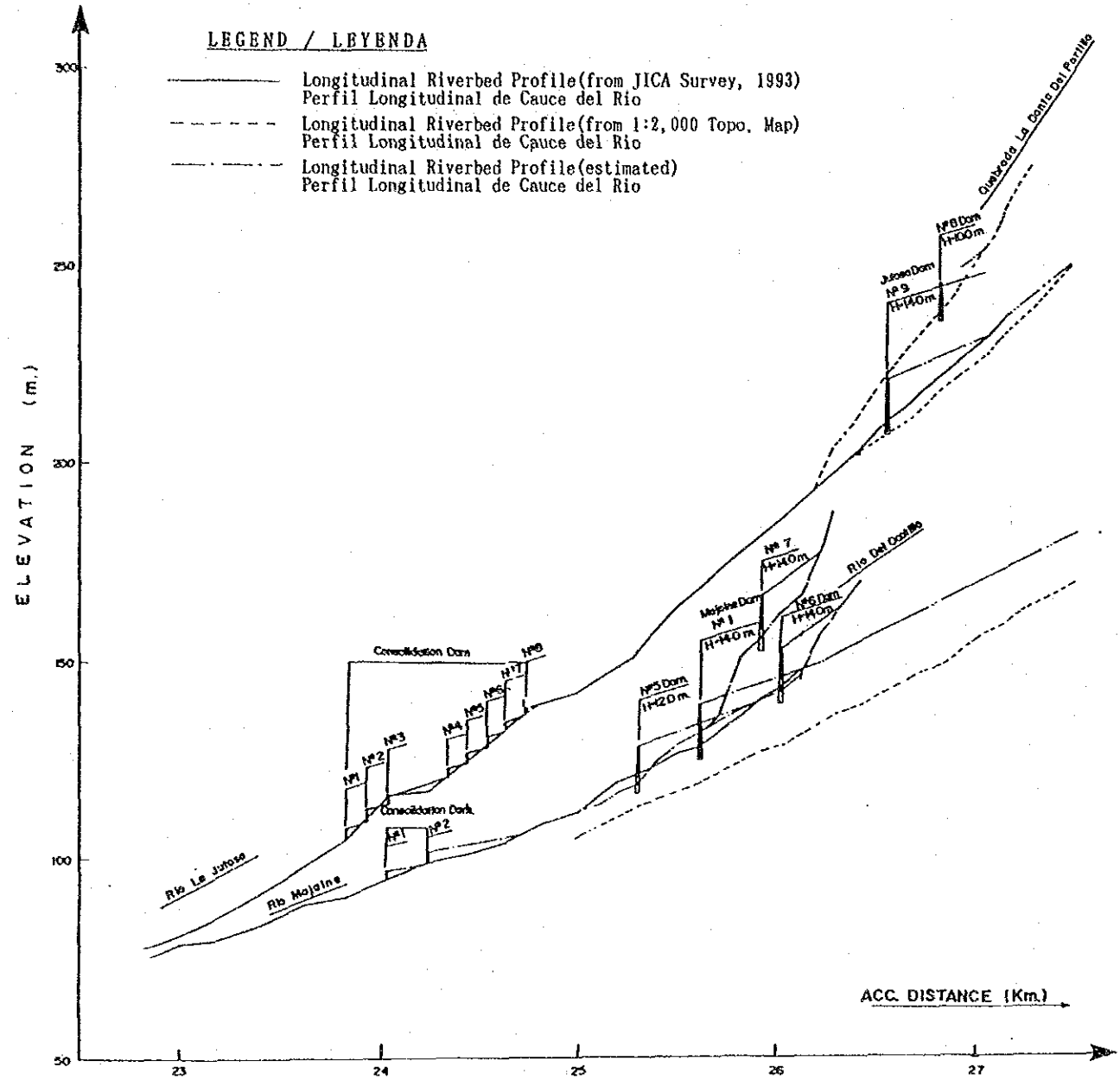
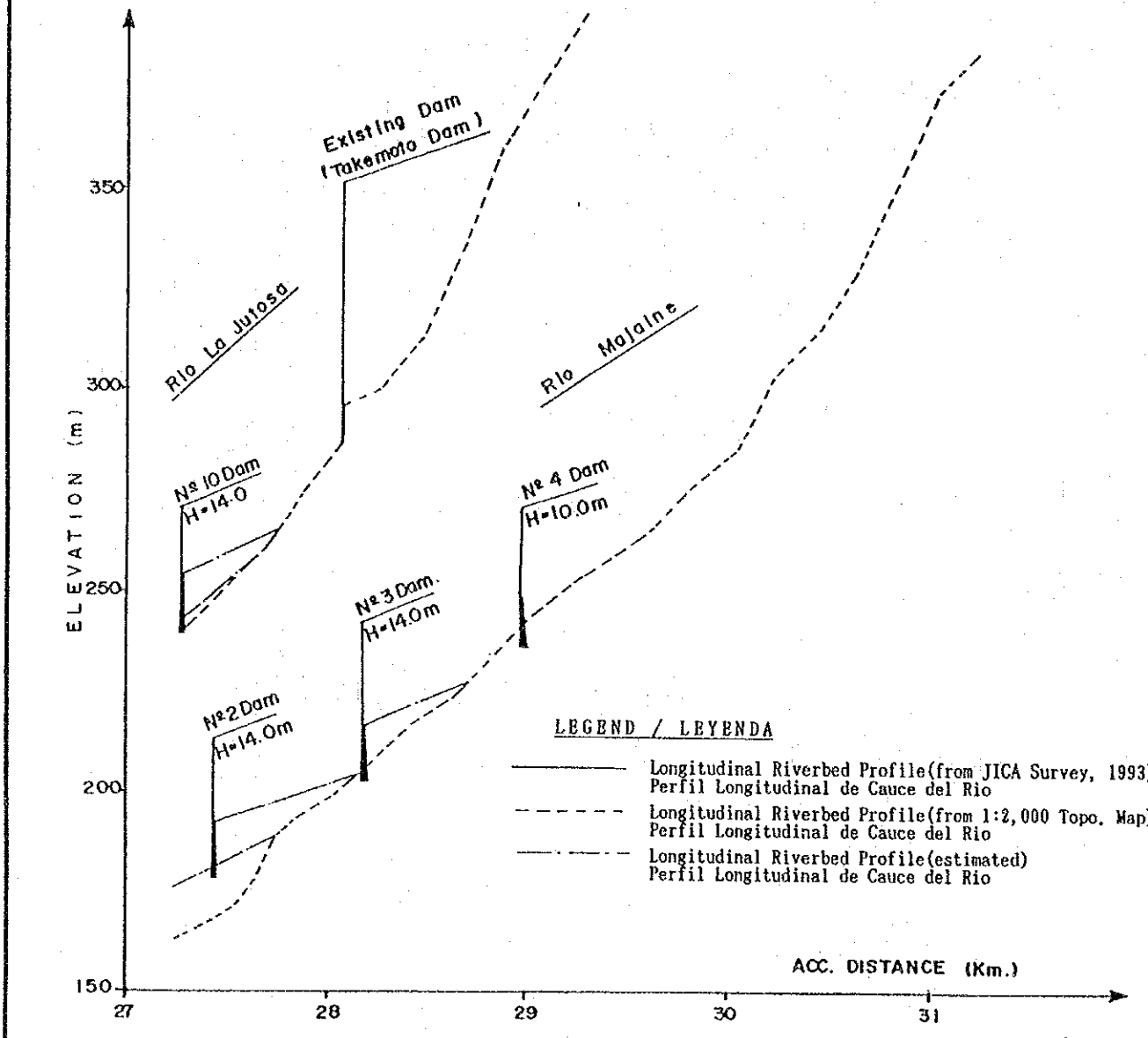
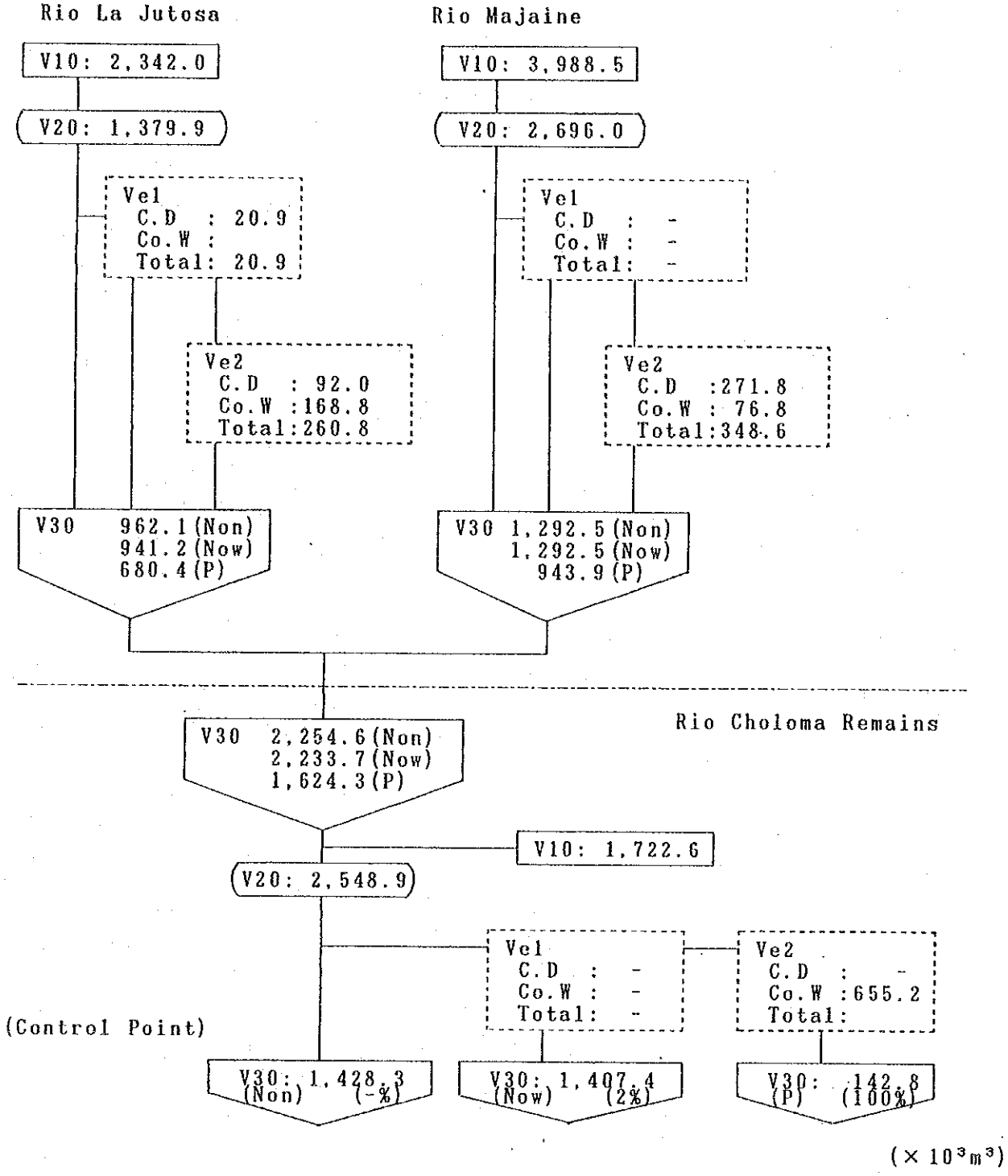


FIG.12.2 (2) DESIGN LONGITUDINAL SECTION OF EROSION CONTROL FACILITY



Section (Rio Majaine)	Design Acc.Dist (Km.) (Rio Majaine)	Lowest Bed El. (Rio Majaine)	Section (Rio La Jutosa)	Design Acc.Dist (Km.) (Rio La Jutosa)	Lowest Bed El. (Rio La Jutosa)
	27.230	(175.7)		27.270	(242.5)
	27.430	(181.0)		27.470	(251.0)
	27.630	(186.0)		27.670	(260.0)
	27.830	193.0		27.870	275.0
	28.030	198.70		28.070	287.0
	28.230	216.50		28.270	300.0
	28.630	222.80		28.470	312.0
	28.830	233.20		28.670	334.0
	29.030	243.40		28.870	360.0
	29.230	252.00		29.070	376.0
	29.430	258.70		29.270	393.0
	29.630	266.00		29.470	413.0
	29.830	276.50			
	30.030	285.00			
	30.230	304.00			
	30.430	315.00			
	30.630	330.00			
	30.850	352.00			
	31.030	374.00			
	31.230	384.00			
	31.430	401.40			
	31.630	420.00			
	31.830	448.03			

FIG.12.2 (3) DESIGN LONGITUDINAL SECTION OF EROSION CONTROL FACILITY



V10 : Design sediment yield
V20 : Naturally controlled sediment discharge along the river course
V30 : Design sediment discharge
(Non):Without facility, (Now):present conditions, (Plan):Plan
Vel : Facility effect(Existing), Ve2 : Facility effect(Plan)
C.D:Check dam, Co.W:Consolidation works
% : Sediment settlement percentage

FIG.12.3 SEDIMENT BALANCE IN THE RIO CHOLOMA BASIN

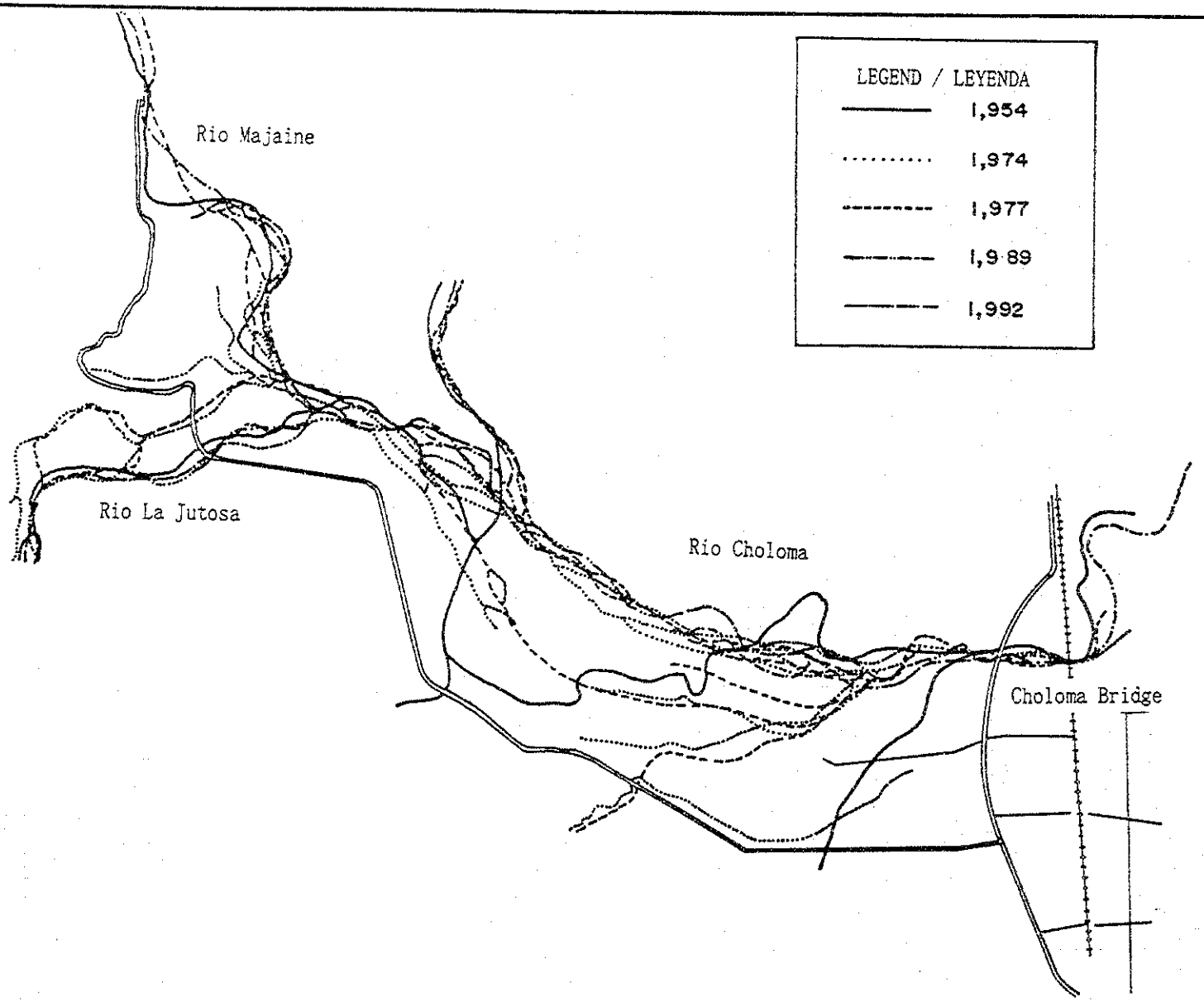


FIG.12.4 HISTORICAL MAIN STREAM COURSE IN THE RIO CHOLOMA

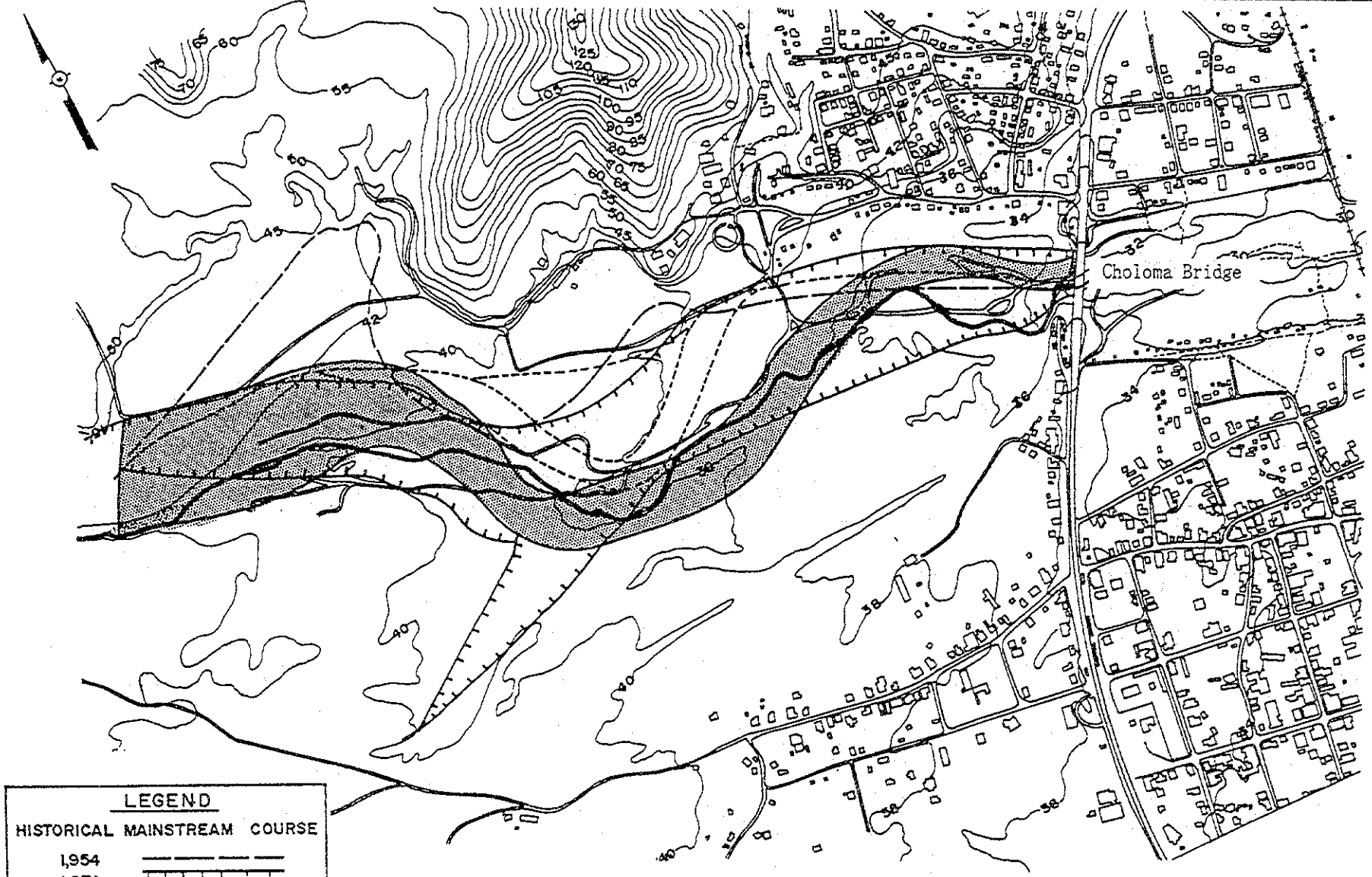


FIG.12.5 HISTORICAL MAIN STREAM COURSE
(NEARBY CONSOLIDATION DAM NO. 1)

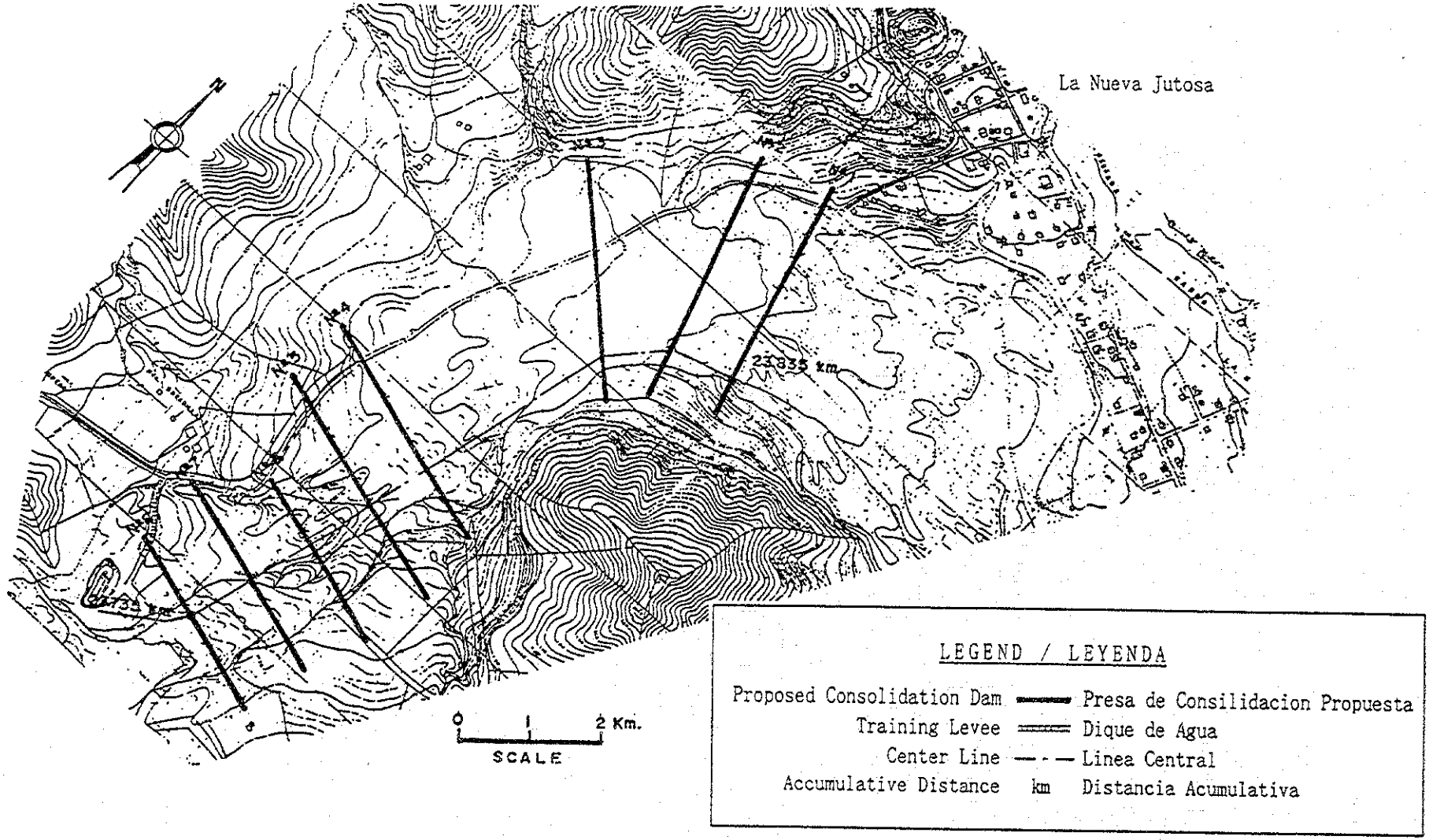


FIG.12.6 LOCATION OF CONSOLIDATION WORKS (RIO LA JUTOSA)

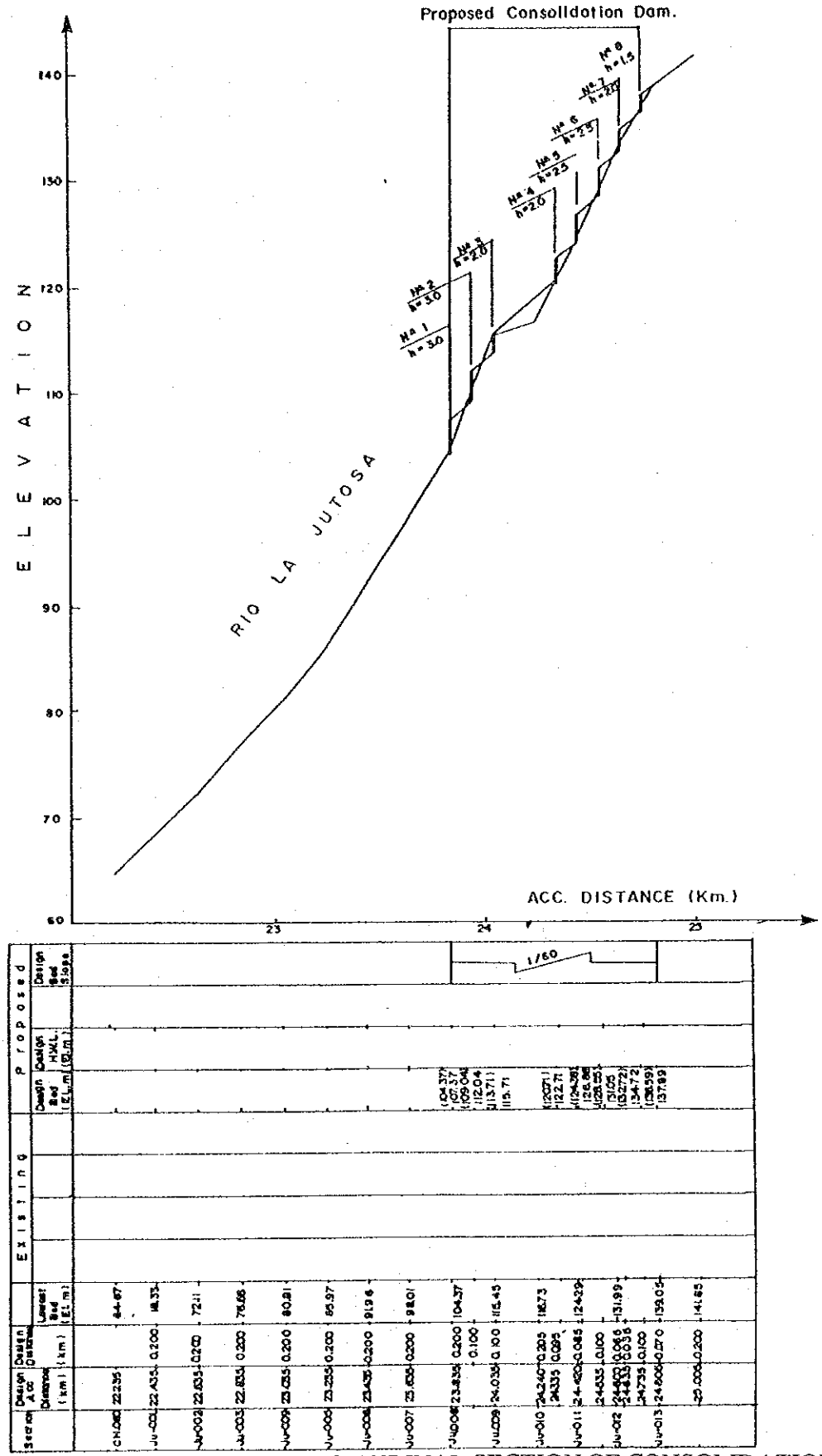


FIG.12.7 DESIGN LONGITUDINAL SECTION OF CONSOLIDATION WORKS (RIO LA JUTOSA)

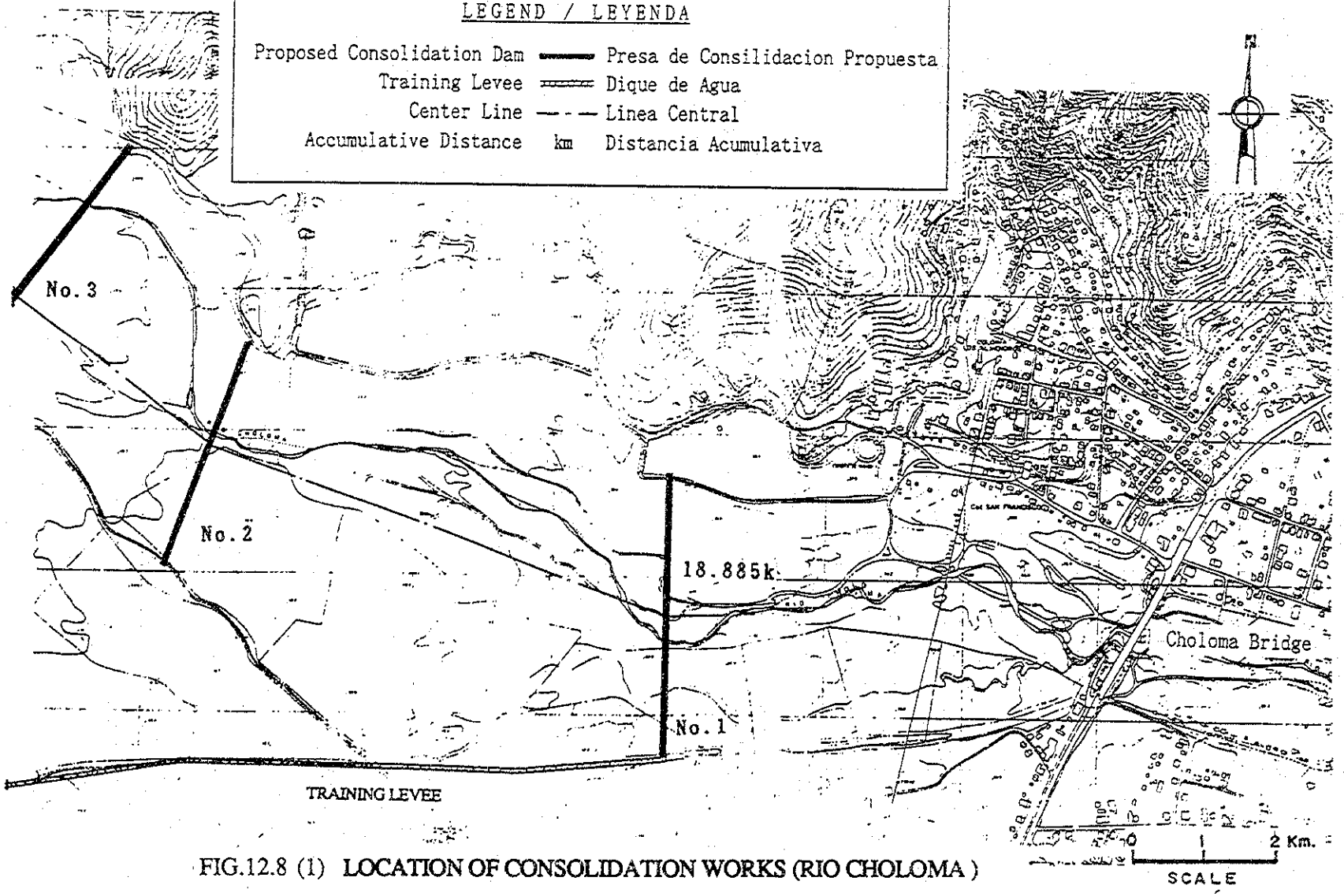


FIG.12.8 (1) LOCATION OF CONSOLIDATION WORKS (RIO CHOLOMA)

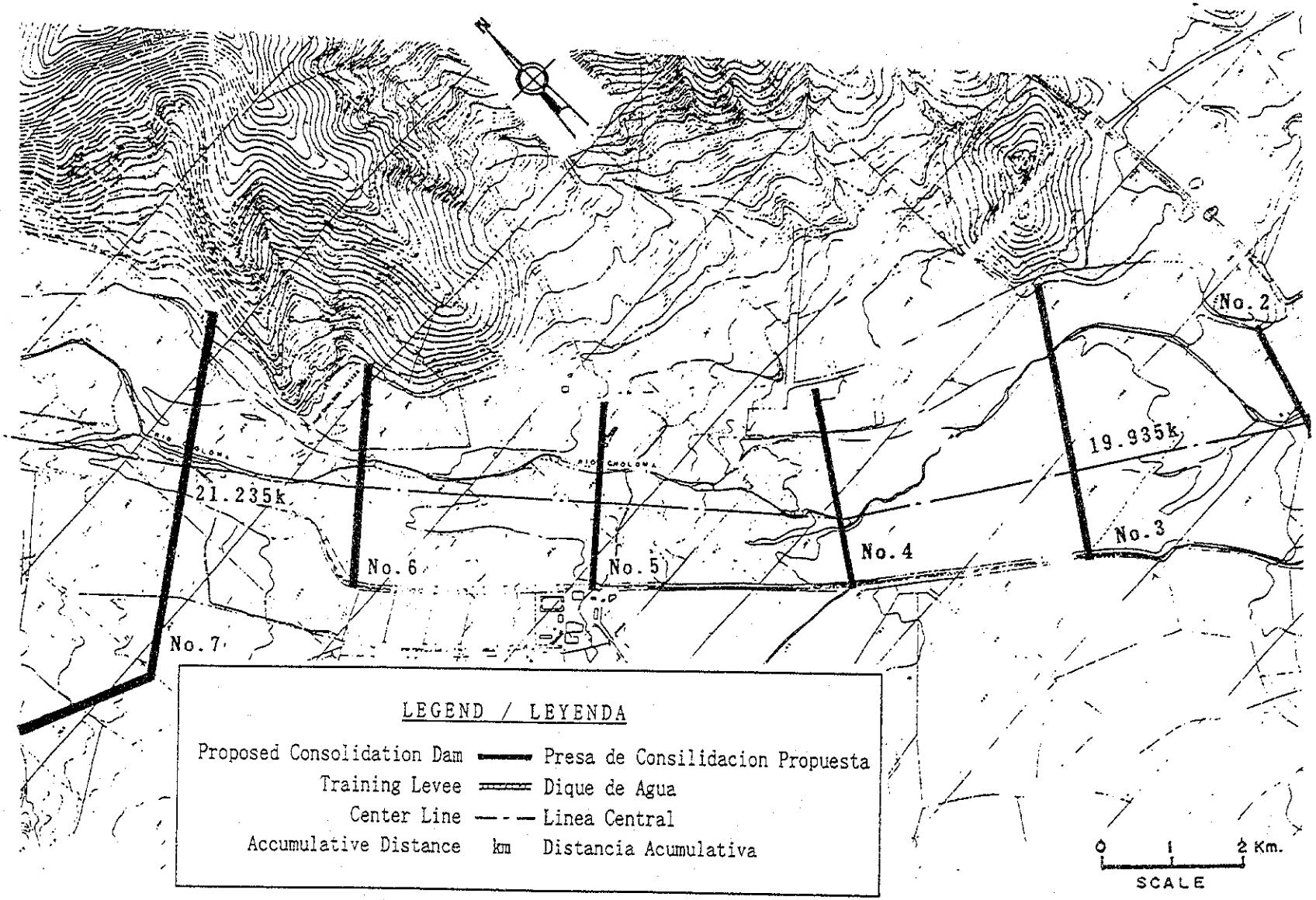


FIG.12.8 (2) LOCATION OF CONSOLIDATION WORKS (RIO CHOLOMA)

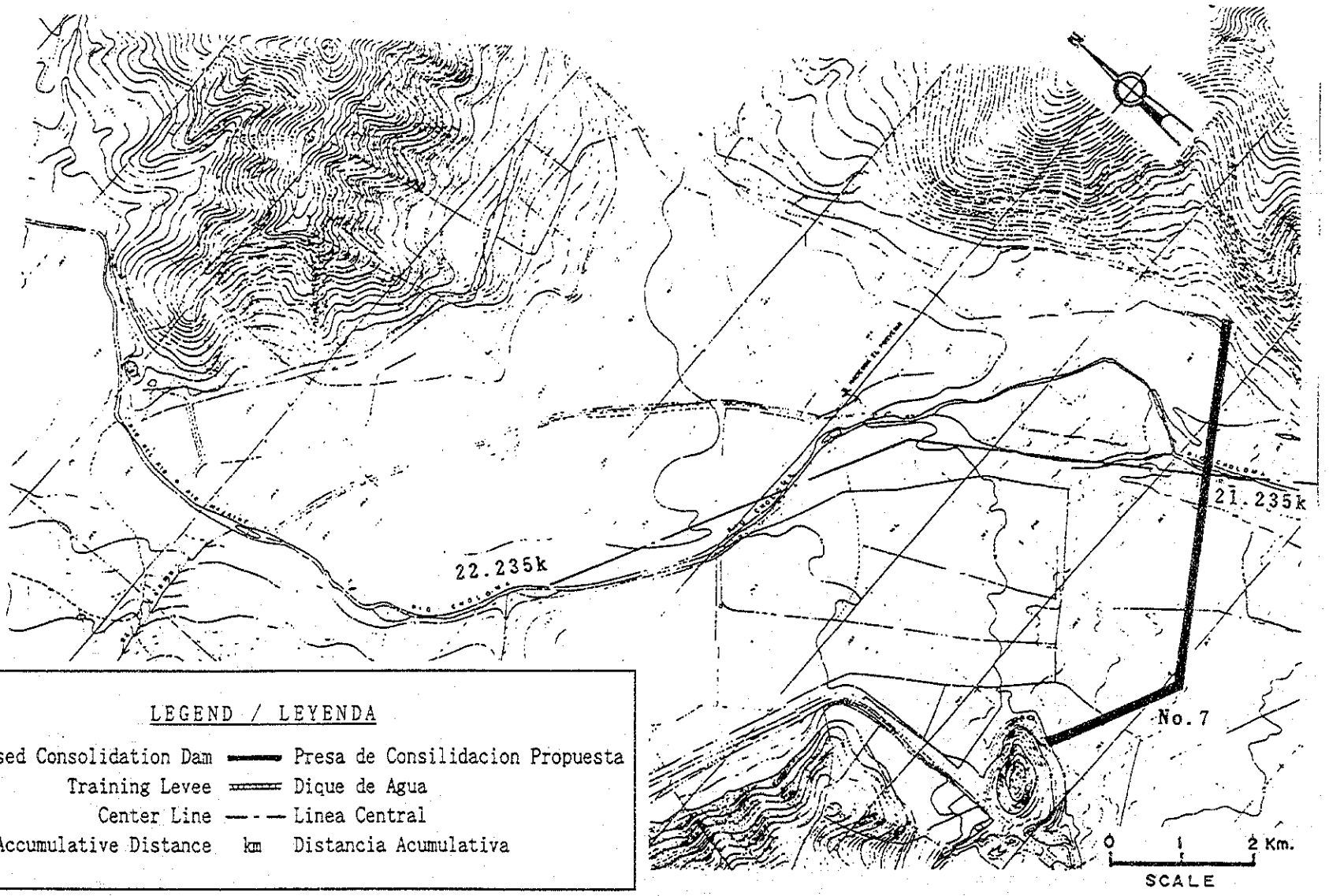


FIG.12.8 (3) LOCATION OF CONSOLIDATION WORKS (RIO CHOLOMA)

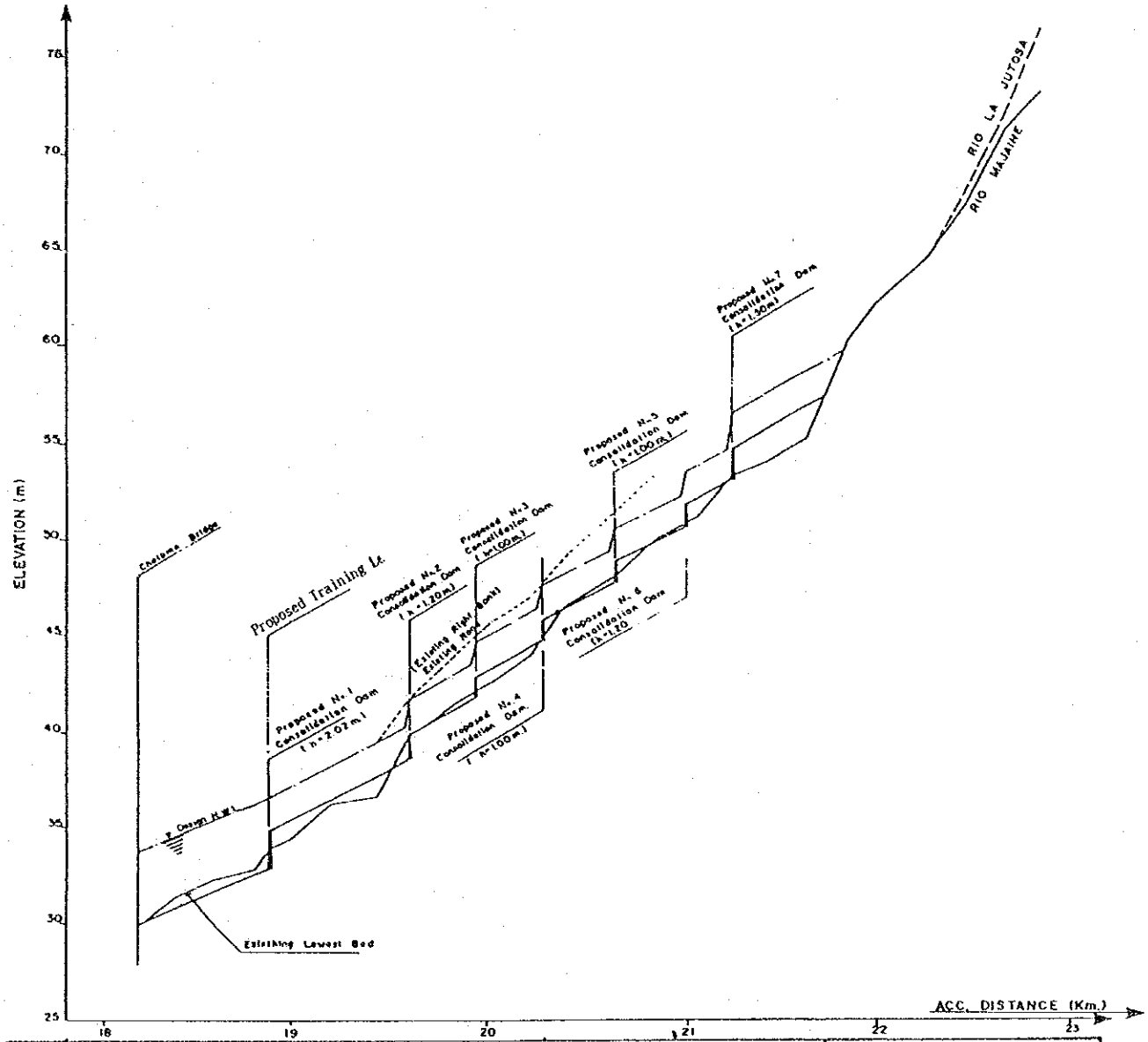


FIG.12.9 DESIGN LONGITUDINAL SECTION OF CONSOLIDATION WORKS (RIO CHOLOMA)

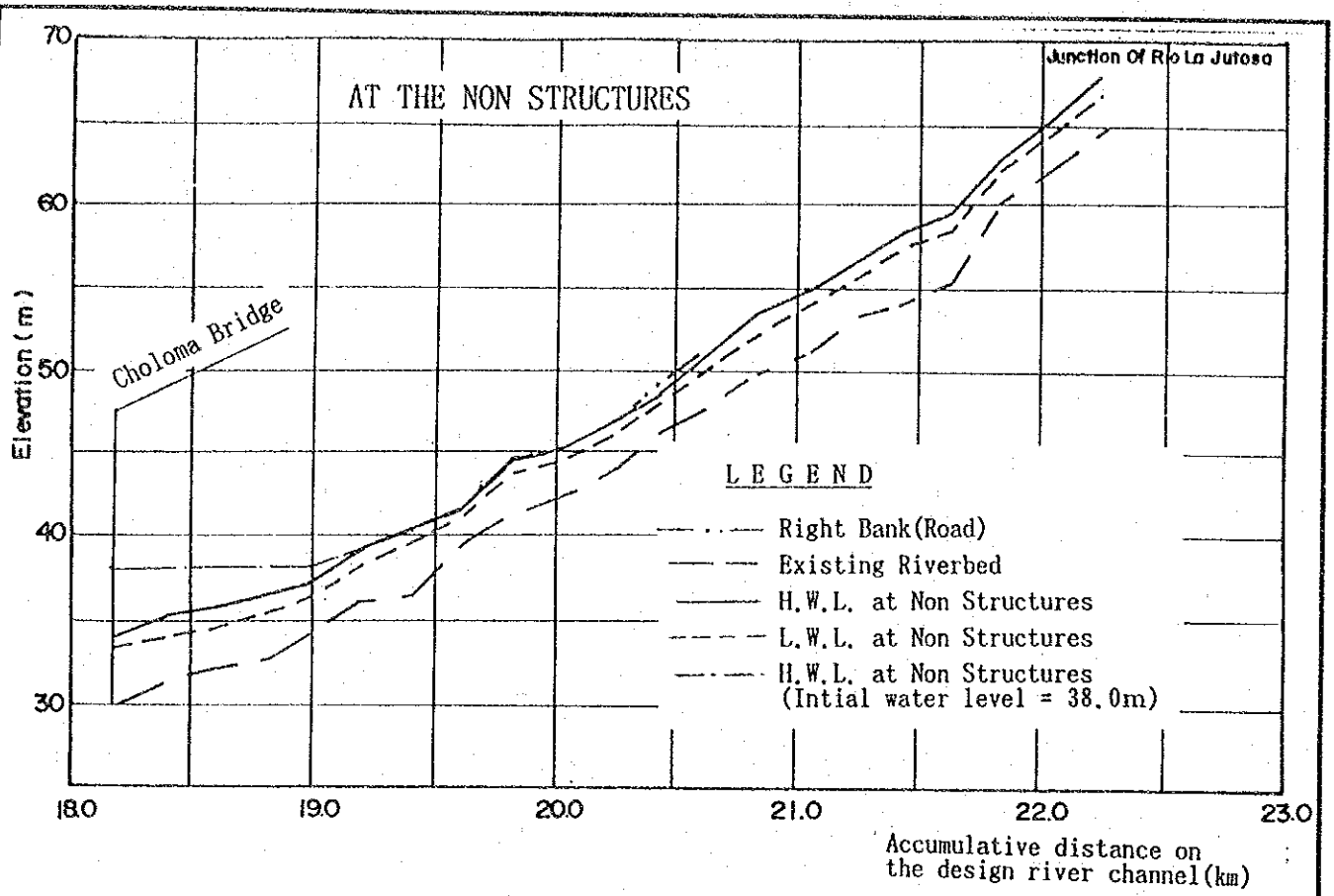


FIG. 12.10 (1) RESULTS OF NON-UNIFORM FLOW CALCULATION
- PRESENT CONDITIONS

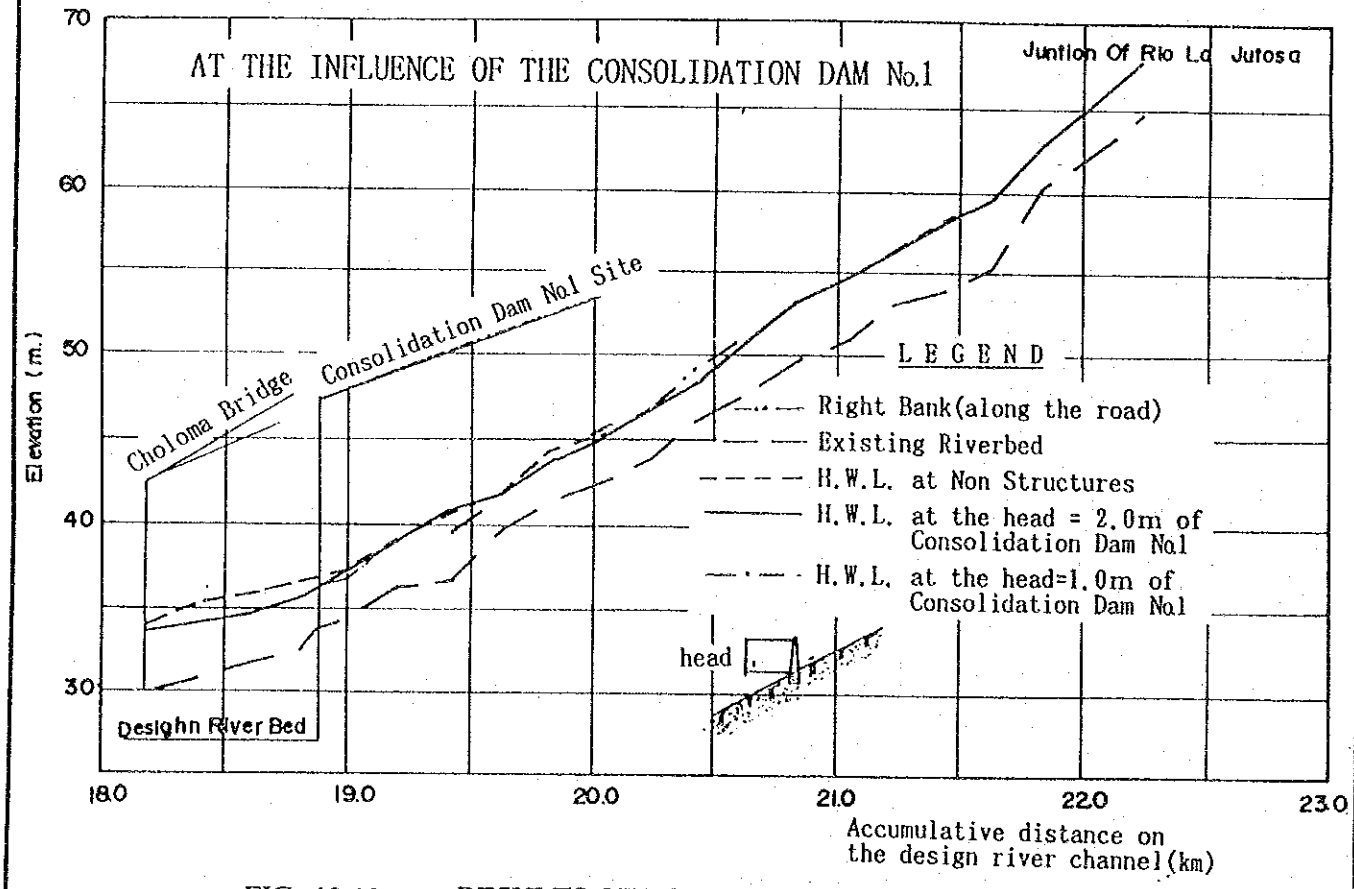


FIG. 12.10 (2) RESULTS OF NON-UNIFORM FLOW CALCULATION
- INFLUENCE OF CONSOLIDATION DAM NO. 1

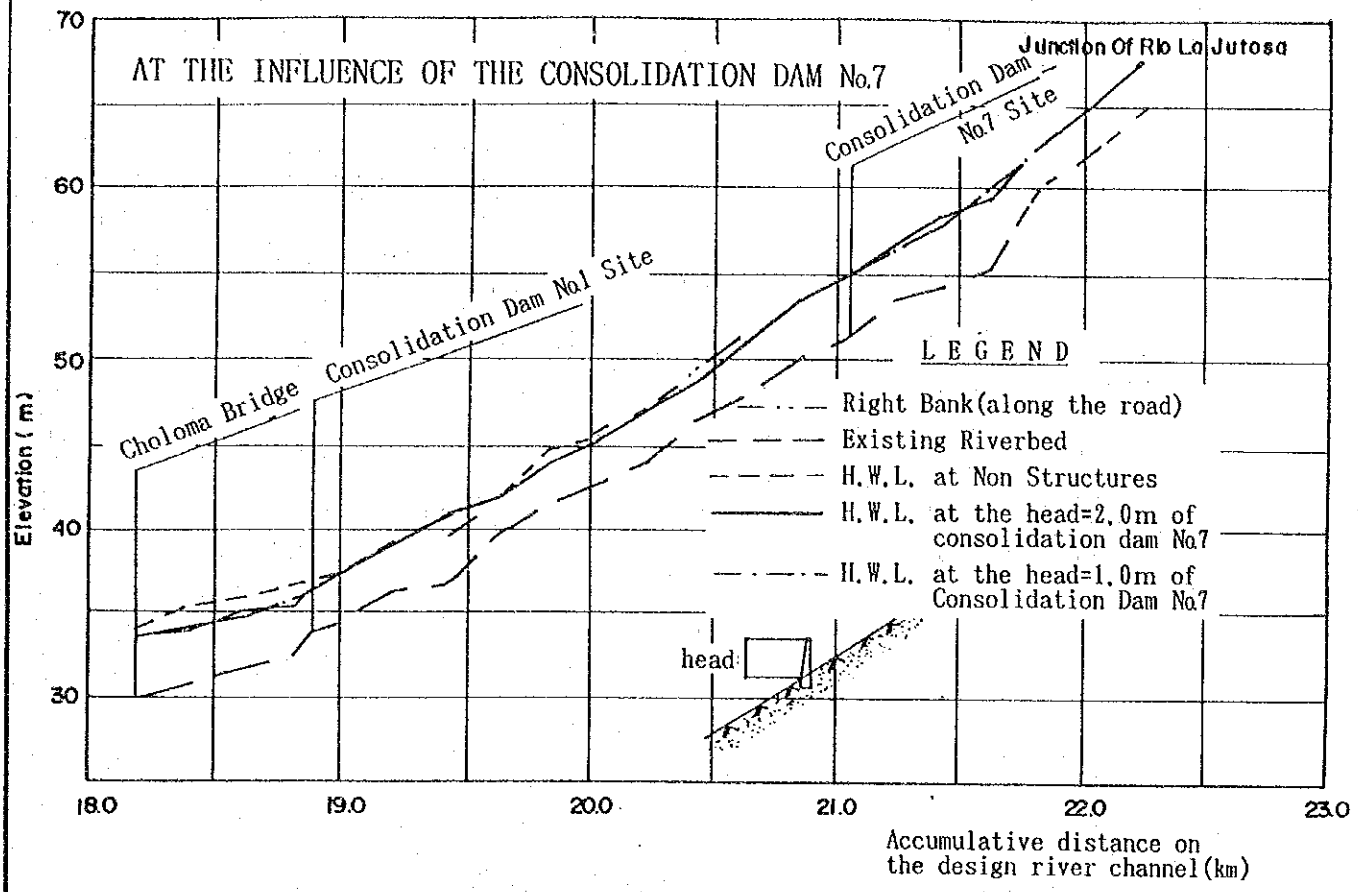


FIG. 12.10 (3) RESULTS OF NON-UNIFORM FLOW CALCULATION
- INFLUENCE OF CONSOLIDATION DAM NO. 7

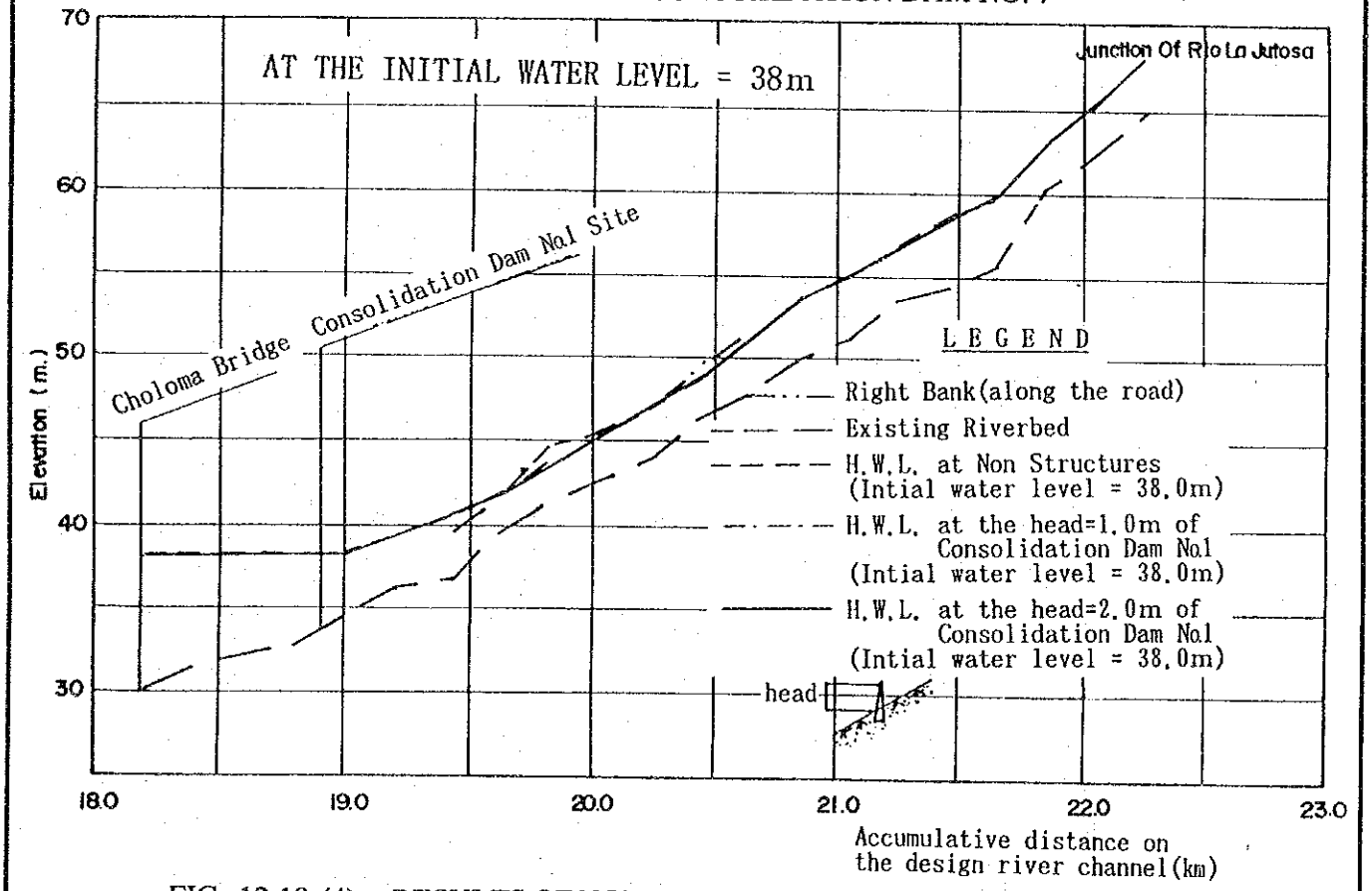
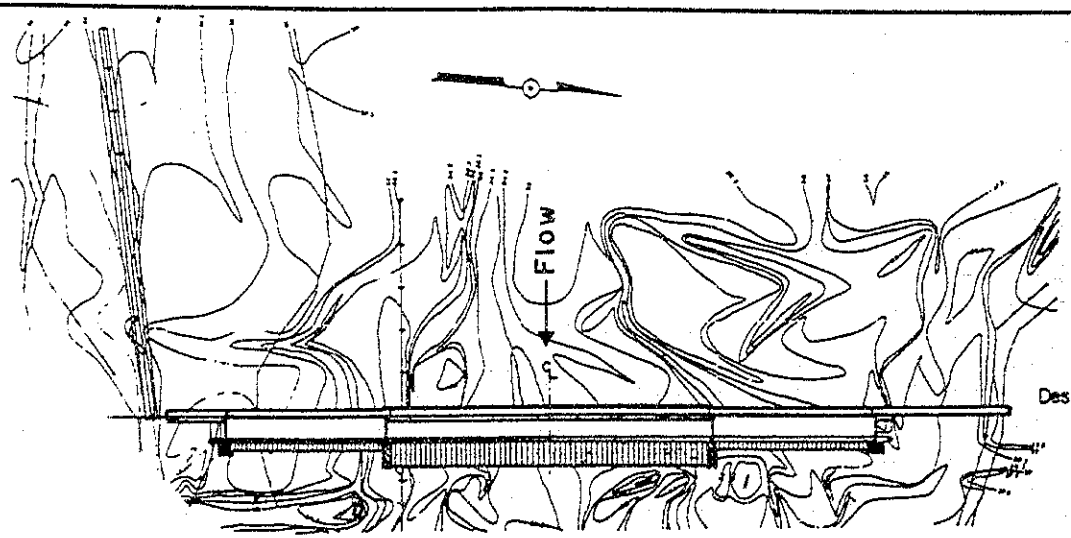
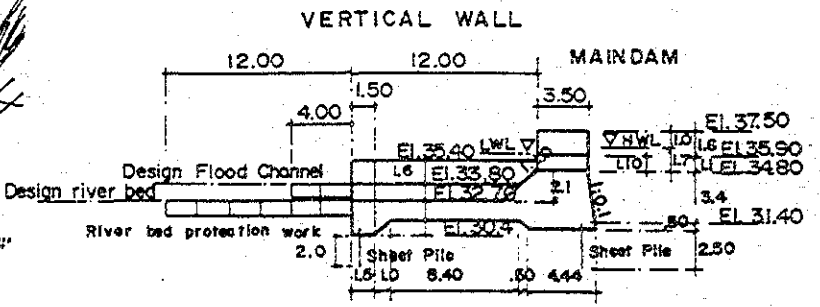


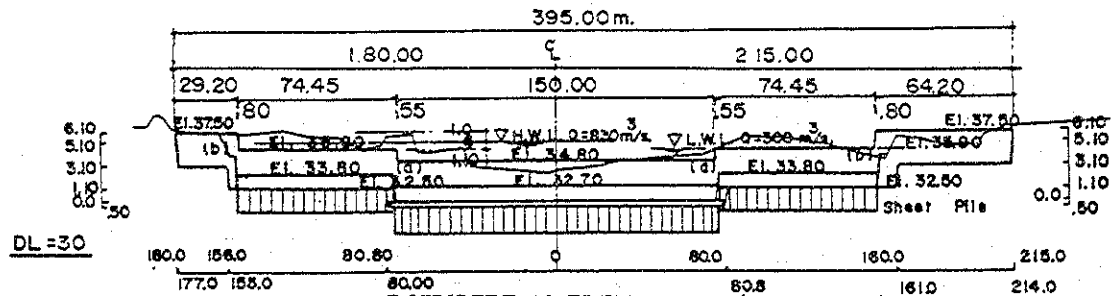
FIG. 12.10 (4) RESULTS OF NON-UNIFORM FLOW CALCULATION
- INFLUENCE OF CHOLOMA BRIDGE OCCLUSION



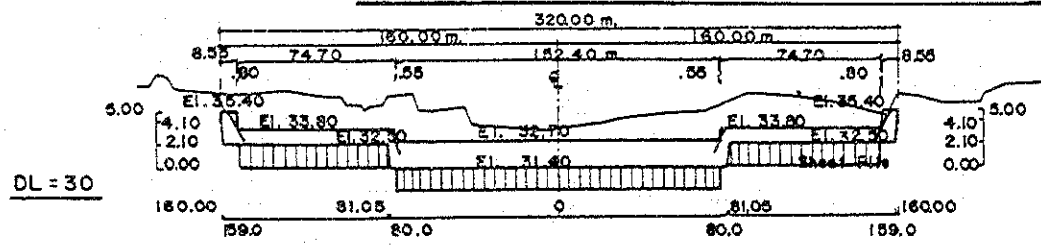
PLAN (Scale = a)



CROSS SECTION
Scale = c



DOWNSTREAM ELEVATION (Main Dam) Scale = b



DOWNSTREAM ELEVATION (Vertical Wall)
Scale = b

SIDE WALL (Scale = d)

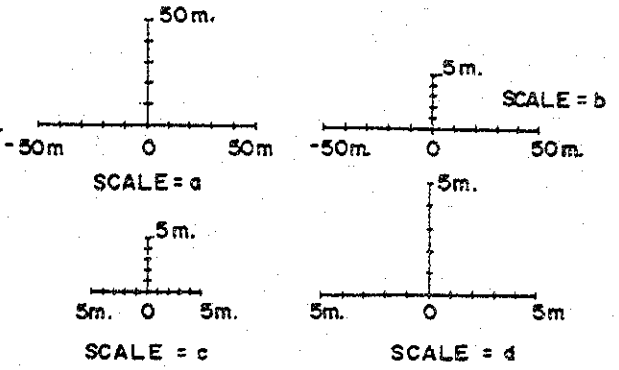


FIG. 12.11 PROPOSED CONSOLIDATION DAM NO. 1

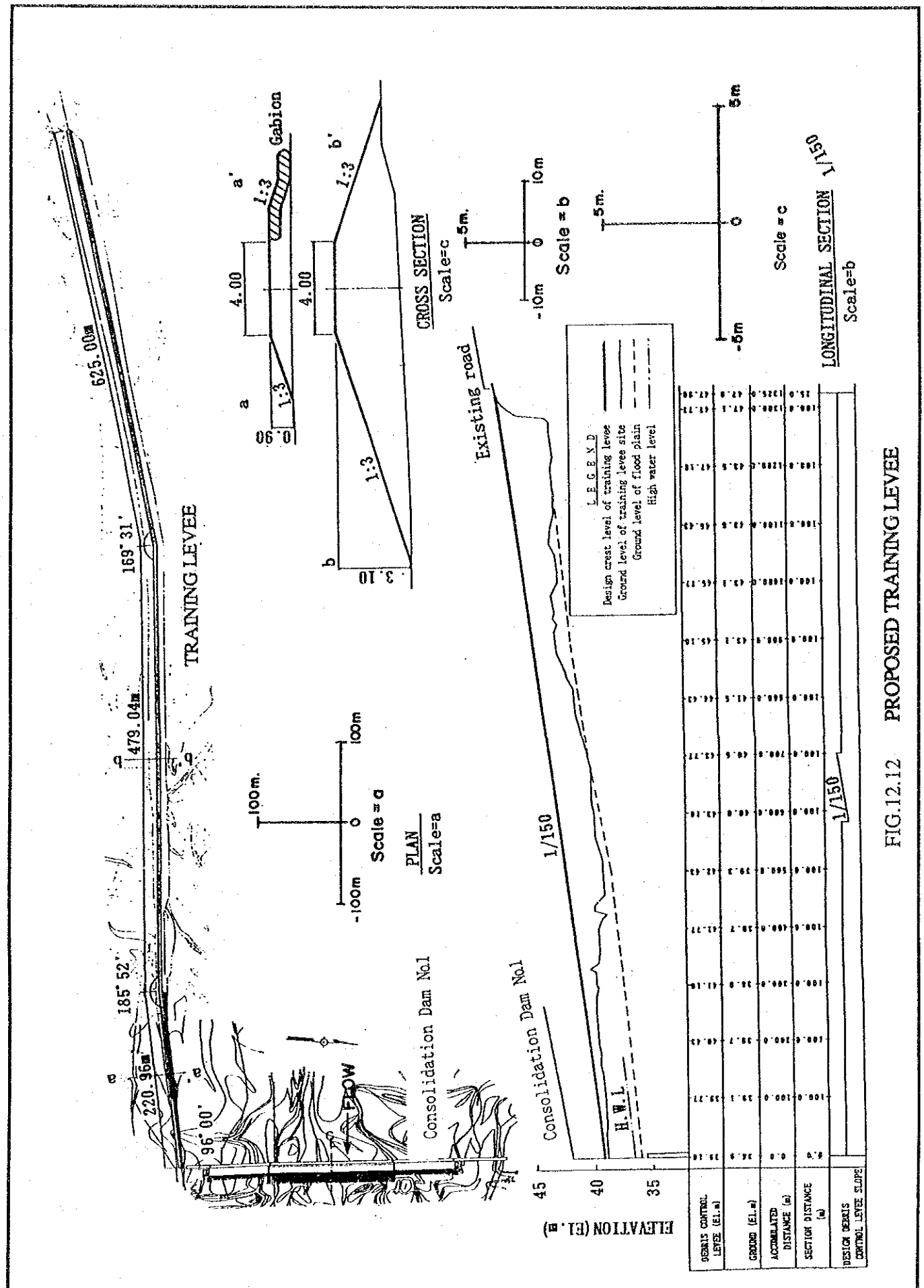
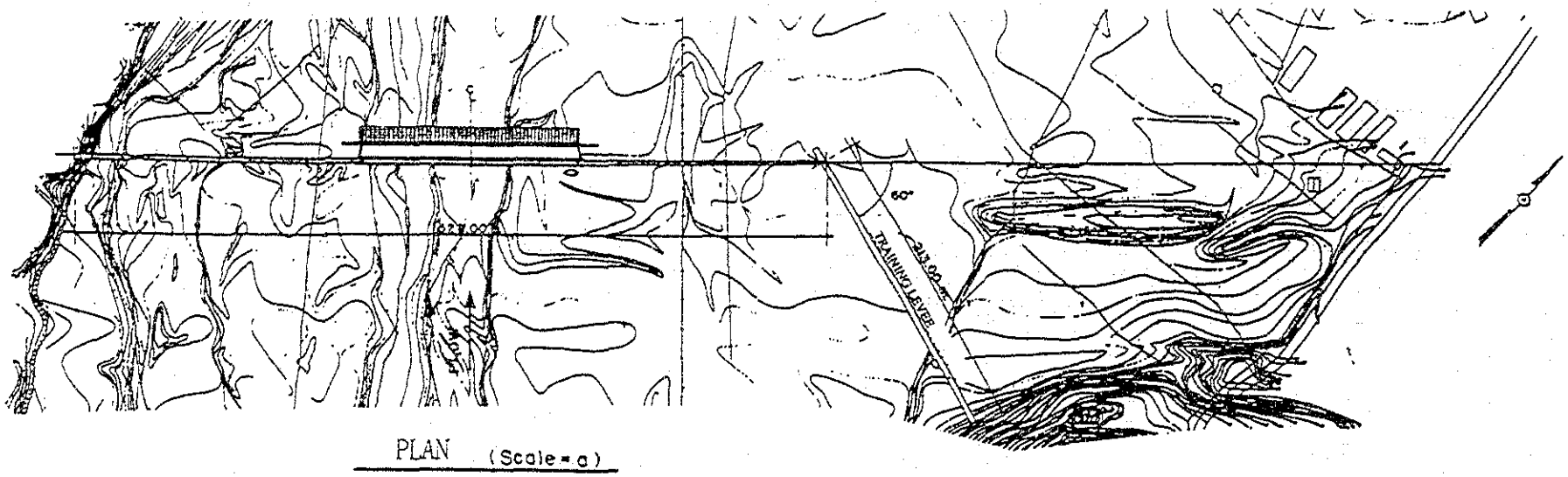
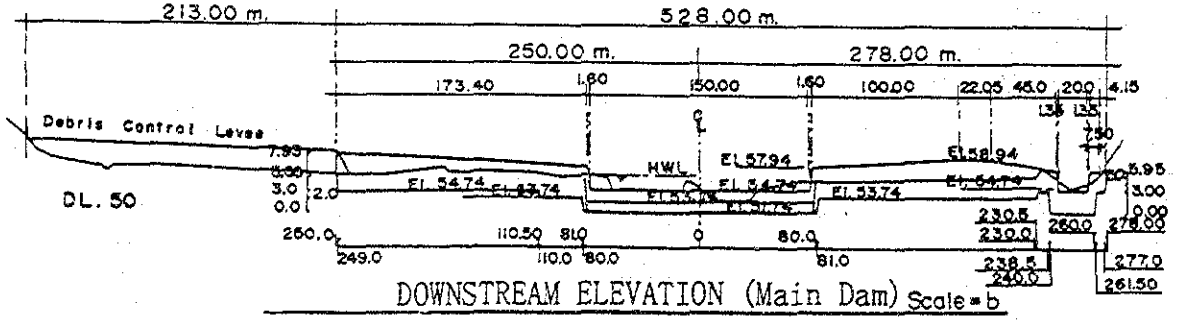


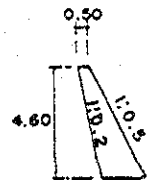
FIG.12.12 PROPOSED TRAINING LEVEE



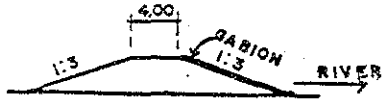
PLAN (Scale = a)



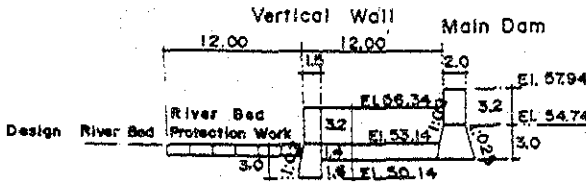
DOWNSTREAM ELEVATION (Main Dam) Scale = b



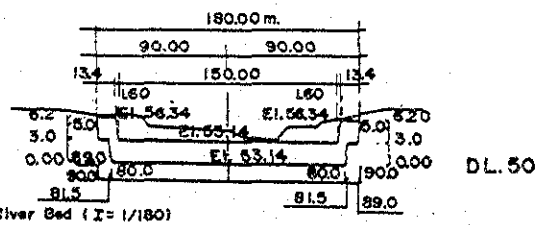
SIDE WALL (Scale = d)



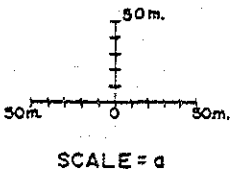
TRAINING LEVEE (Scale = d)



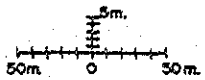
CROSS SECTION
Scale = c



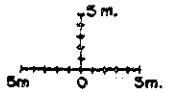
DOWNSTREAM ELEVATION (Vertical Wall)
Scale = b



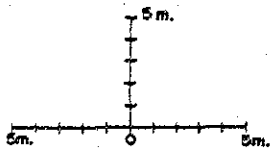
SCALE = a



SCALE = b



SCALE = c



SCALE = d

FIG.12.13 PROPOSED CONSOLIDATION DAM NO. 7

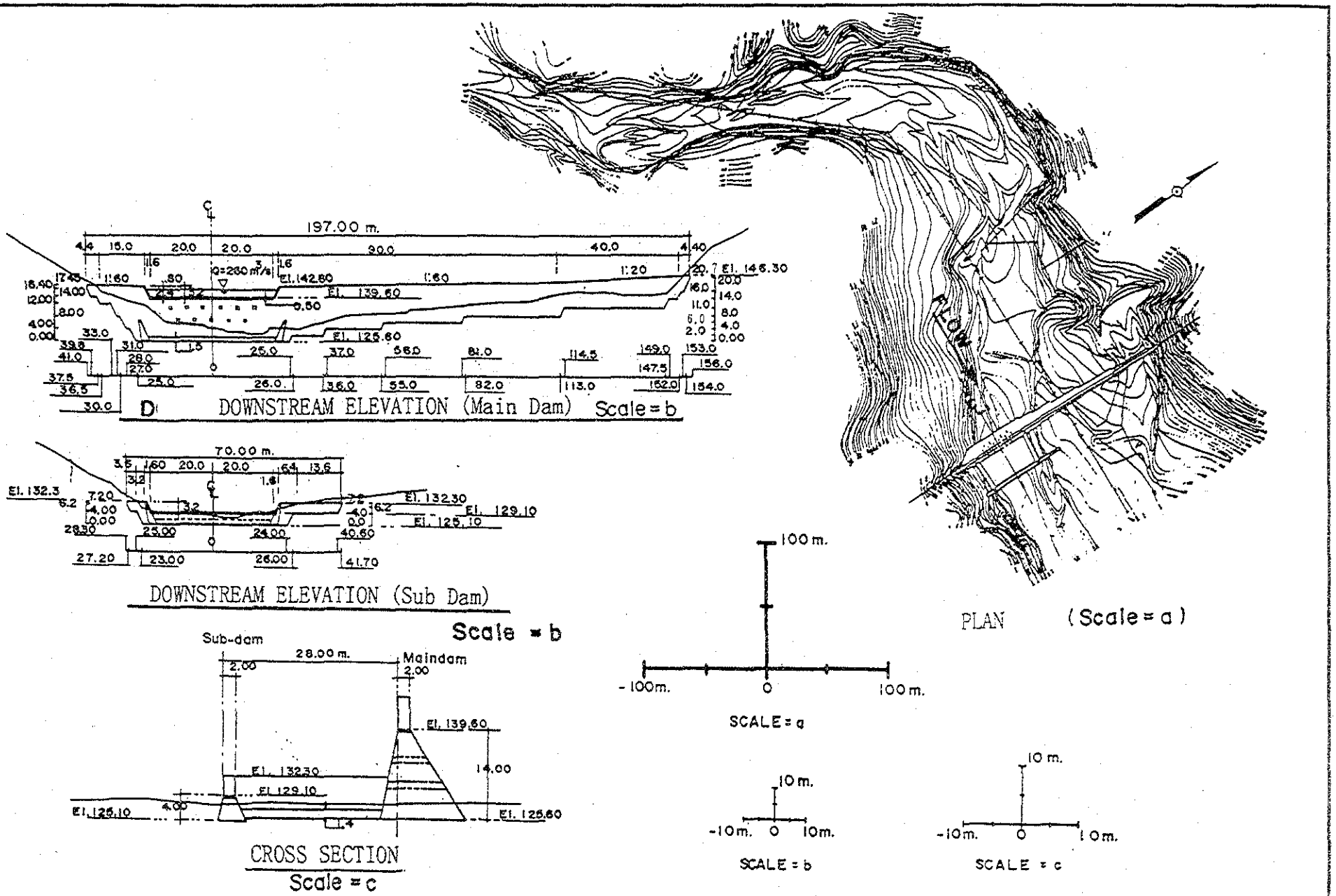


FIG.12.14 PROPOSED CHECK DAM NO. 1 (MAJAINE DAM)

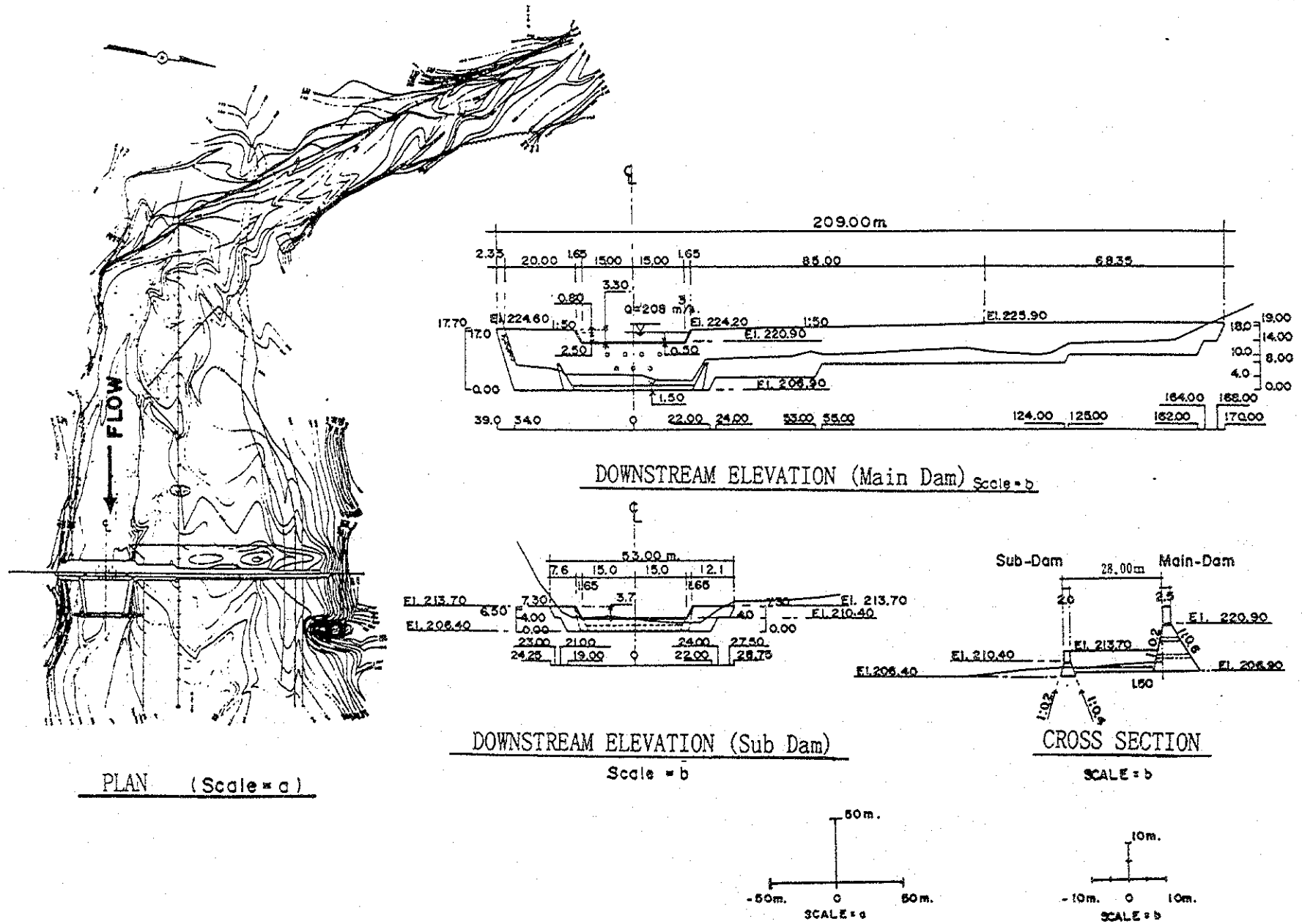


FIG.12.15 PROPOSED CHECK DAM NO. 9 (JUTOSA DAM)

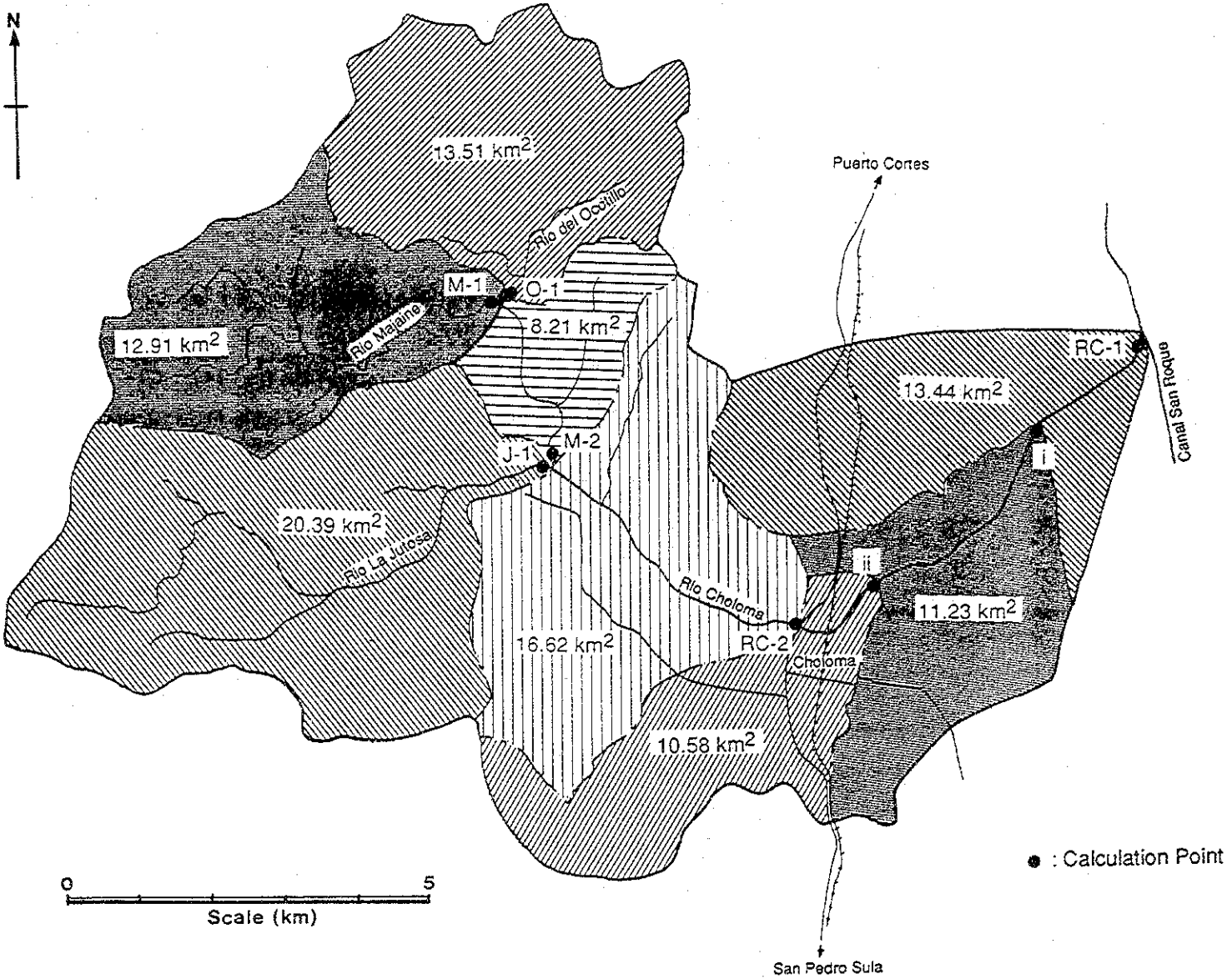


FIG.12.16 DIVISION OF THE RIO CHOLOMA BASIN

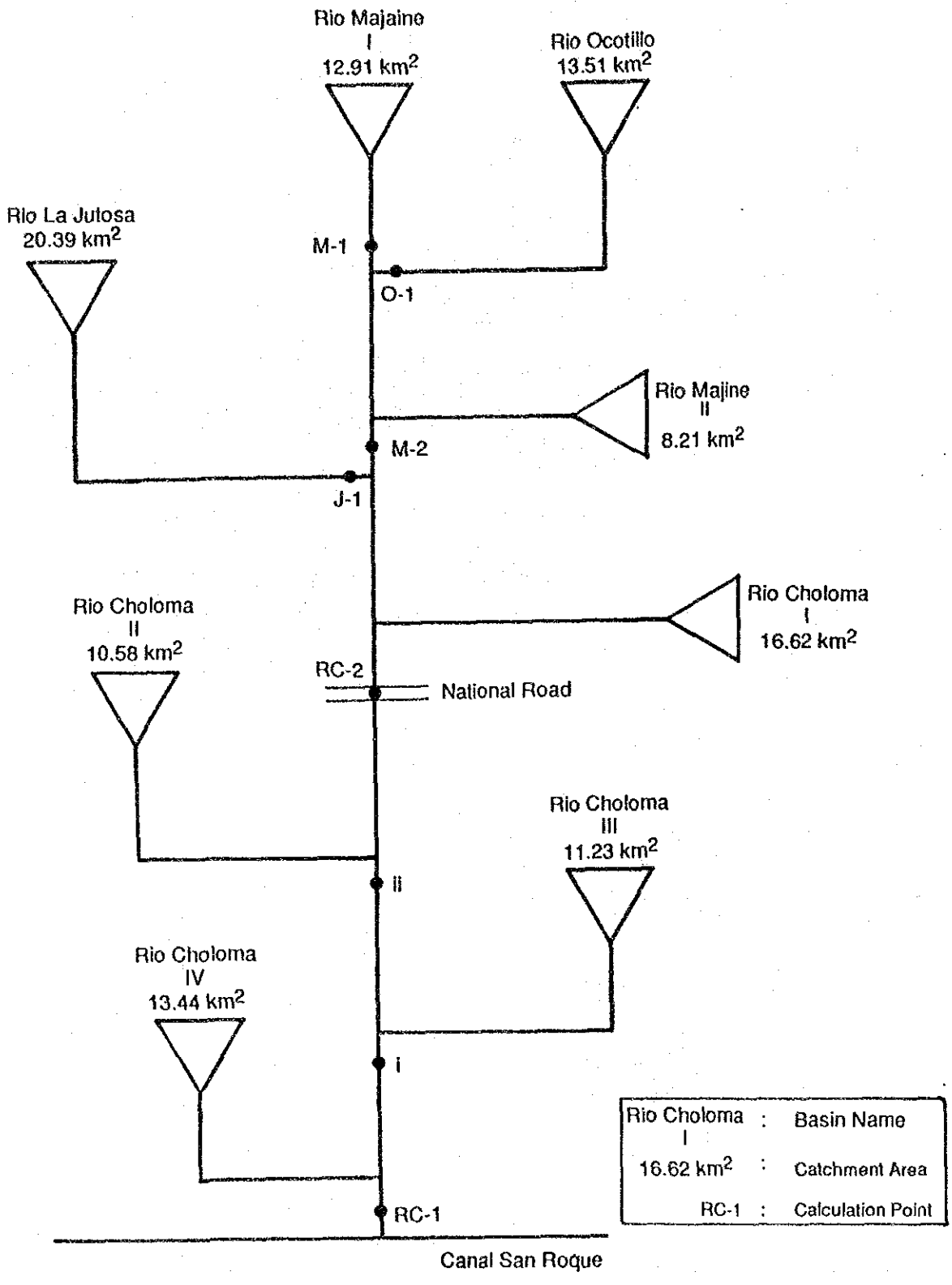


FIG.12.17 RIVER SYSTEM MODEL FOR THE RIO CHOLOMA BASIN

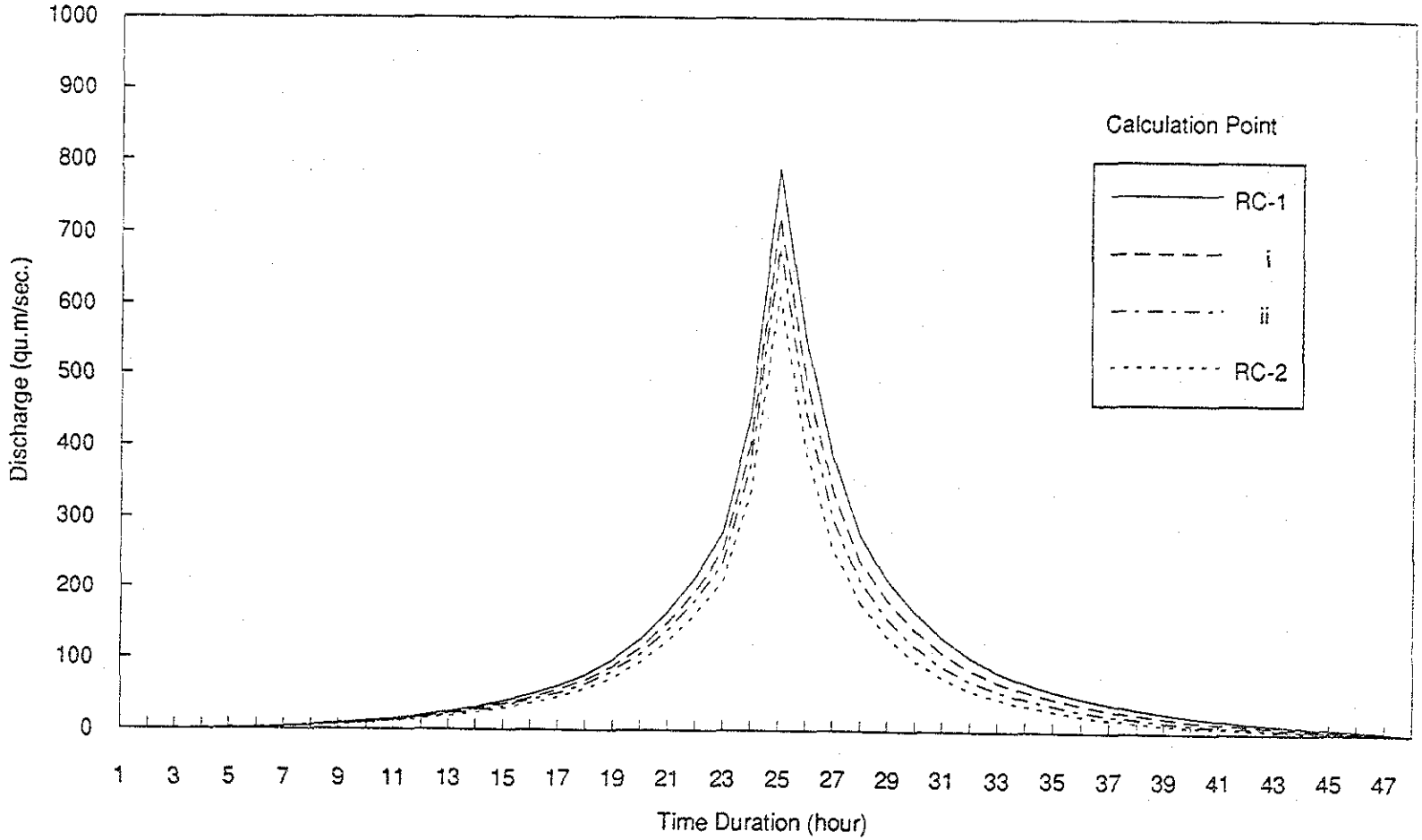


FIG.12.18 SIMULATED FLOOD HYDROGRAPH OF THE RIO CHOLOMA

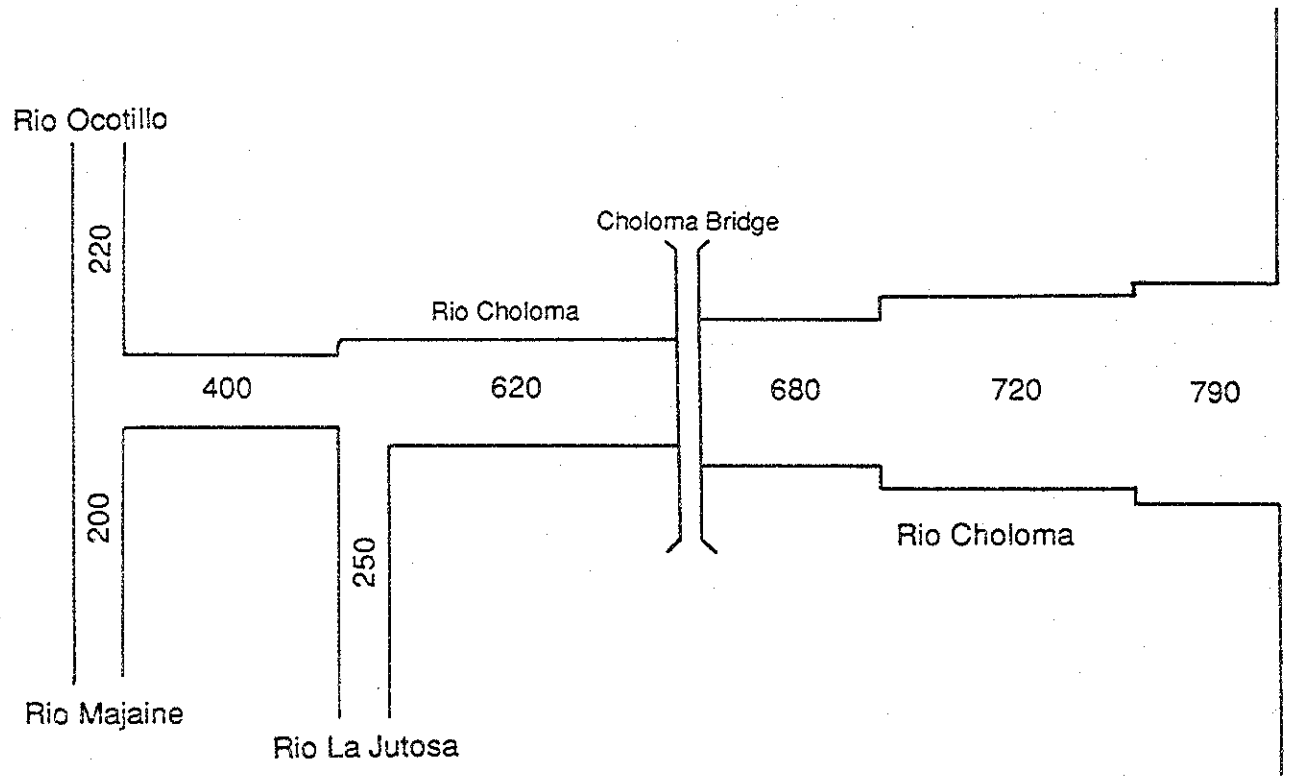
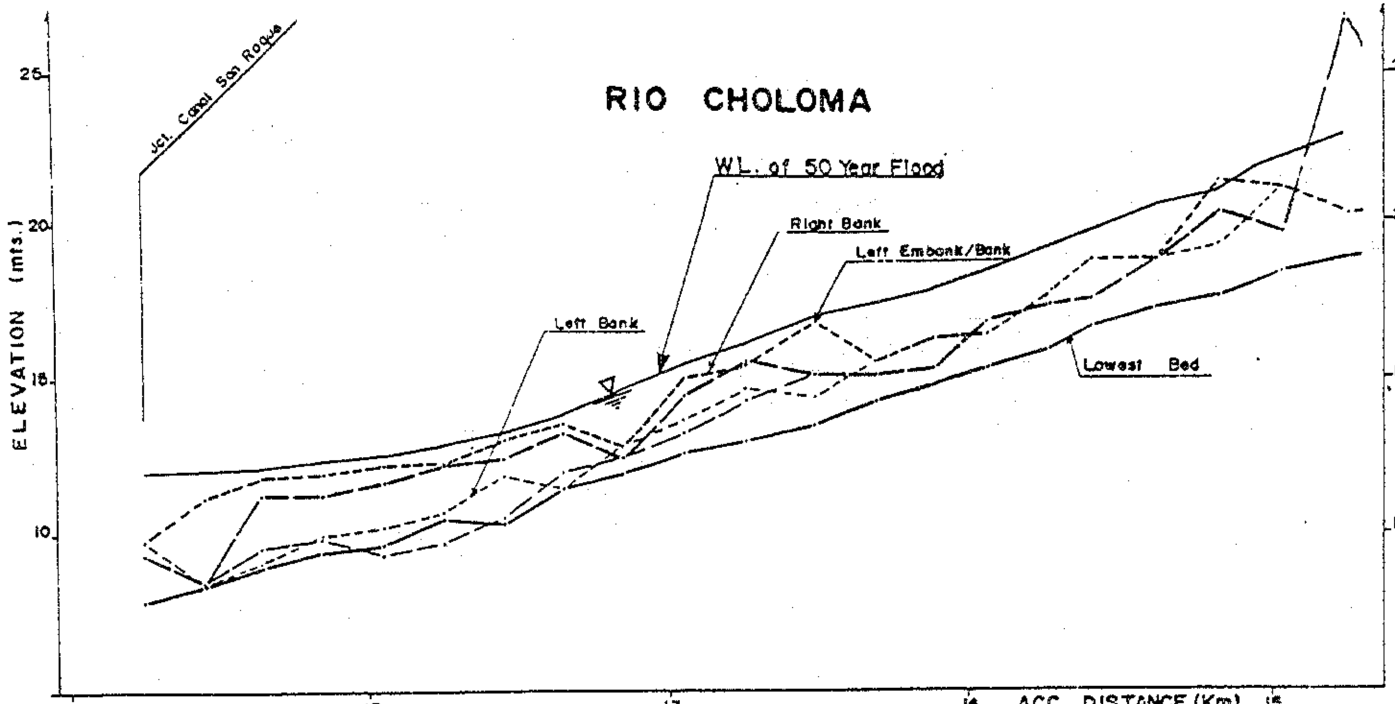
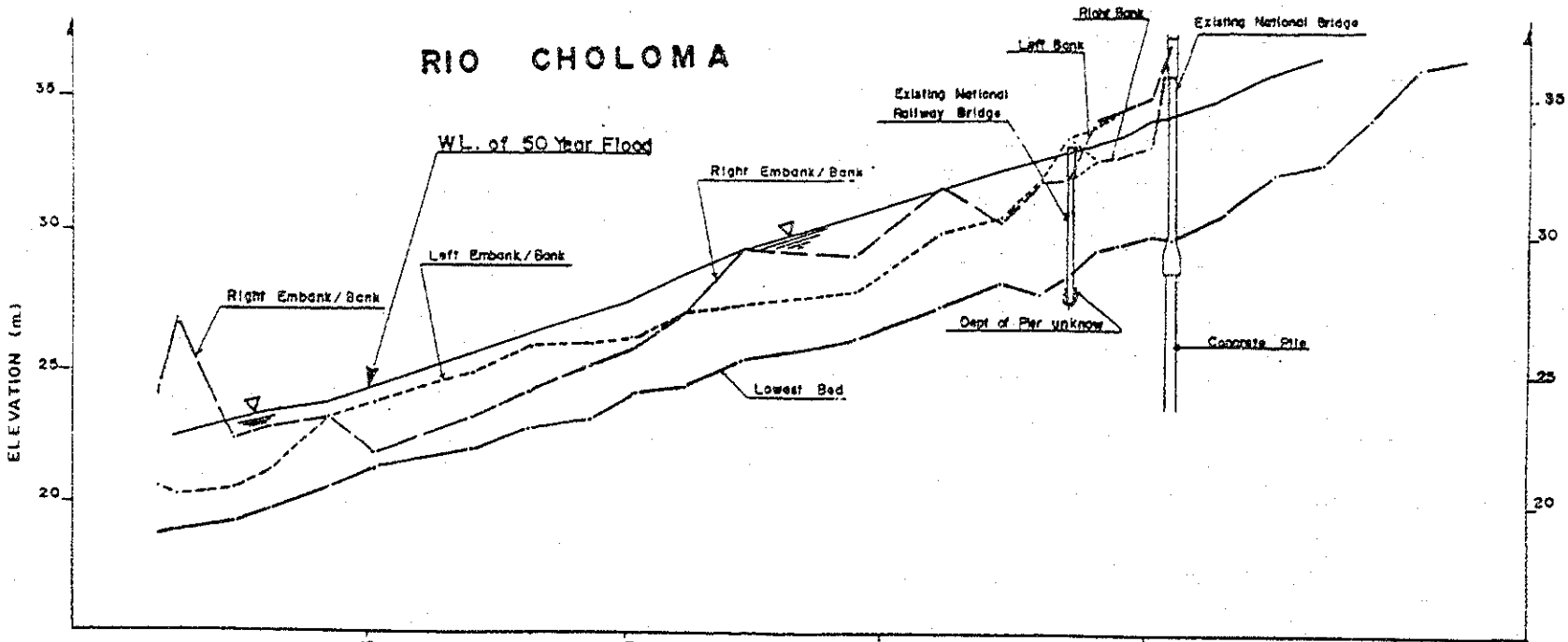


FIG.12.19 PEAK DISCHARGE DISTRIBUTION OF THE RIO CHOLOMA (50-YEAR FLOOD)



SECT.	ACC. DIST (Km)	DIST. (Km)	LOWEST BED Elev(m)	LEFT BANK Elev(m)	LEFT EMB. Elev(m)	RIGHT BANK Elev(m)	RIGHT EMB. Elev(m)
CH-001	11.250	0.000	7.80	8.70	-	9.30	-
CH-002	11.450	0.200	8.30	8.30	11.20	8.40	-
CH-003	11.650	0.200	8.90	9.00	11.90	9.50	11.30
CH-004	11.850	0.200	9.40	9.90	12.00	9.80	11.30
CH-005	12.050	0.200	9.40	10.20	12.30	9.30	11.70
CH-006	12.250	0.200	10.49	10.70	12.35	9.70	12.30
CH-007	12.450	0.200	10.30	11.90	13.10	10.50	12.50
CH-008	12.650	0.200	11.00	11.40	13.60	12.00	13.30
CH-009	12.850	0.200	12.00	12.80	14.70	12.00	-
CH-010	13.050	0.200	12.69	13.70	13.00	13.30	14.00
CH-011	13.250	0.200	13.05	14.70	13.40	14.30	13.52
CH-012	13.480	0.250	13.60	14.40	16.60	15.10	-
CH-013	13.680	0.200	14.30	16.60	-	15.10	-
CH-014	13.880	0.200	14.80	16.20	-	15.28	-
CH-015	14.070	0.230	16.30	16.38	-	16.78	-
CH-016	14.280	0.210	15.90	17.75	-	17.28	-
CH-017	14.410	0.130	16.69	18.70	-	17.48	-
CH-018	14.620	0.210	17.16	18.70	-	18.70	-
CH-019	14.820	0.200	17.50	19.15	21.30	20.30	-
CH-020	15.030	0.210	18.30	21.10	-	19.80	-
CH-021	15.250	0.220	18.74	20.20	-	24.90	-

FIG.12.20 (1) PROFILE OF THE RIO CHOLOMA (EXISTING)



SECT.	ACC. DIST (Km)	DIST. (Km)	LOWEST BED Elev.(m)	LEFT BANK Elev.(m)	LEFT EMB. Elev.(m)	RIGHT BANK Elev.(m)	RIGHT EMB. Elev.(m)
CH-021	15.830	0.220	18.74	20.10	-	23.80	-
CH-022	16.170	0.220	18.10	20.30	-	23.40	-
CH-023	16.410	0.240	18.80	21.58	-	22.90	-
CH-024	16.640	0.230	20.50	23.30	-	23.36	-
CH-025	16.820	0.180	21.30	23.50	-	21.80	-
CH-026	16.980	0.160	22.30	25.00	-	23.30	-
CH-027	17.220	0.240	22.50	26.00	-	24.93	-
CH-028	17.460	0.240	23.30	26.10	-	25.30	-
CH-029	17.630	0.170	24.30	26.32	-	26.00	-
CH-030	17.810	0.180	24.50	27.50	-	27.10	-
CH-031	17.960	0.150	25.50	27.50	-	25.00	-
CH-032	17.970	0.430	25.30	26.00	-	26.30	-
CH-033	18.310	0.340	22.02	30.10	-	31.80	-
CH-034	18.440	0.230	28.30	30.30	-	31.92	-
CH-035	18.600	0.160	27.80	32.30	-	32.00	-
CH-036	18.705	0.105	28.80	33.70	33.70	32.00	32.00
CH-037	18.806	0.101	28.50	32.90	34.40	32.60	34.30
CH-038	18.880	0.089	28.70	32.80	34.60	33.00	34.70
CH-039	19.006	0.96	29.00	33.50	36.20	33.50	36.10
CH-040	19.080	0.074	28.50	37.00	38.00	37.10	37.10
CH-041	19.280	0.200	26.60	28.80			
CH-042	19.480	0.200	26.80	28.80			
CH-043	19.680	0.200	26.70	28.70			
CH-044	19.880	0.200	26.40	28.40			
CH-045	20.080	0.200	26.20	28.20			
CH-046	20.280	0.200	26.70	28.70			

FIG.12.20 (2) PROFILE OF THE RIO CHOLOMA (EXISTING)

JICA

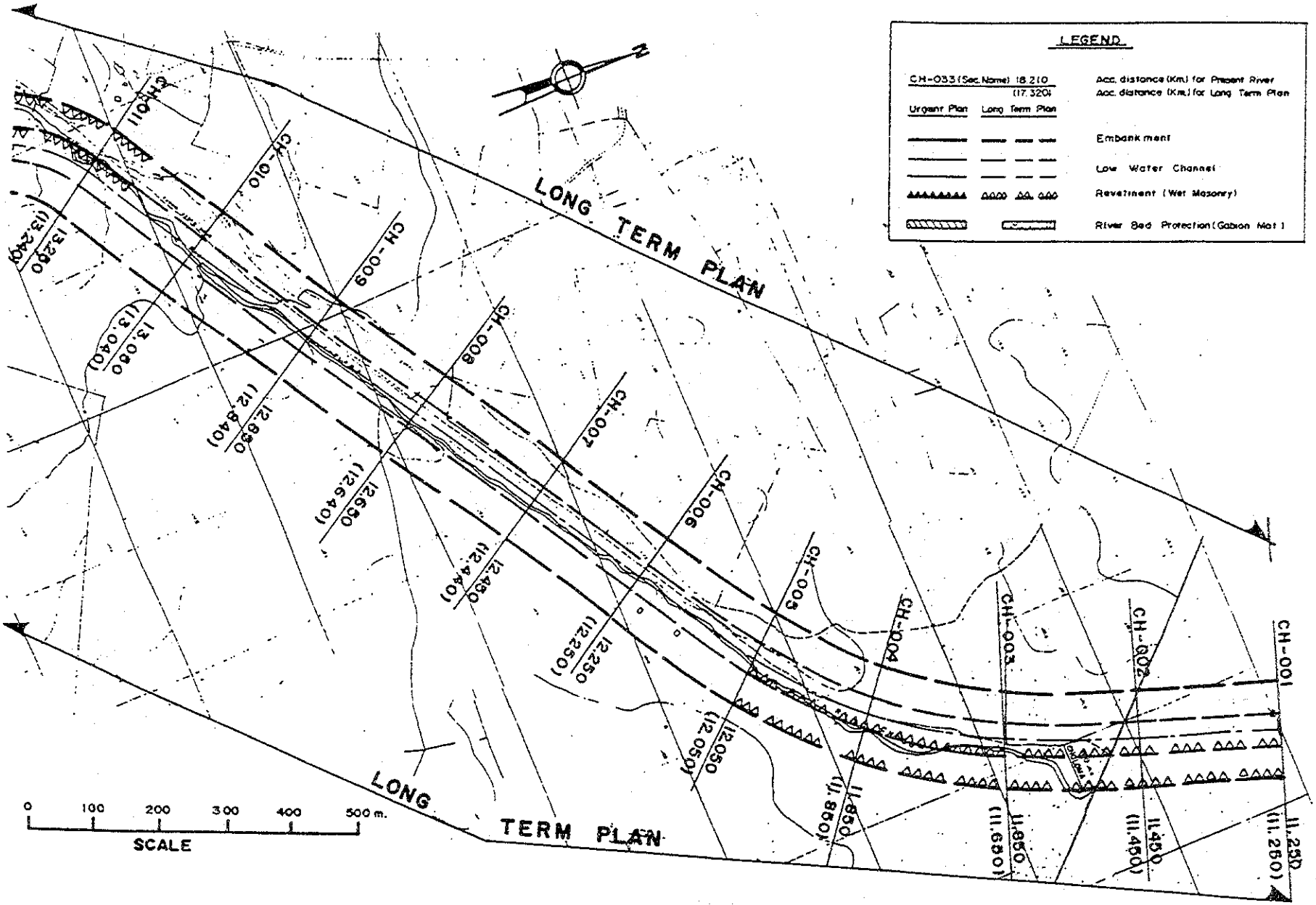


FIG.12.21 (1) PROPOSED RIVER IMPROVEMENT OF THE RIO CHLOMA

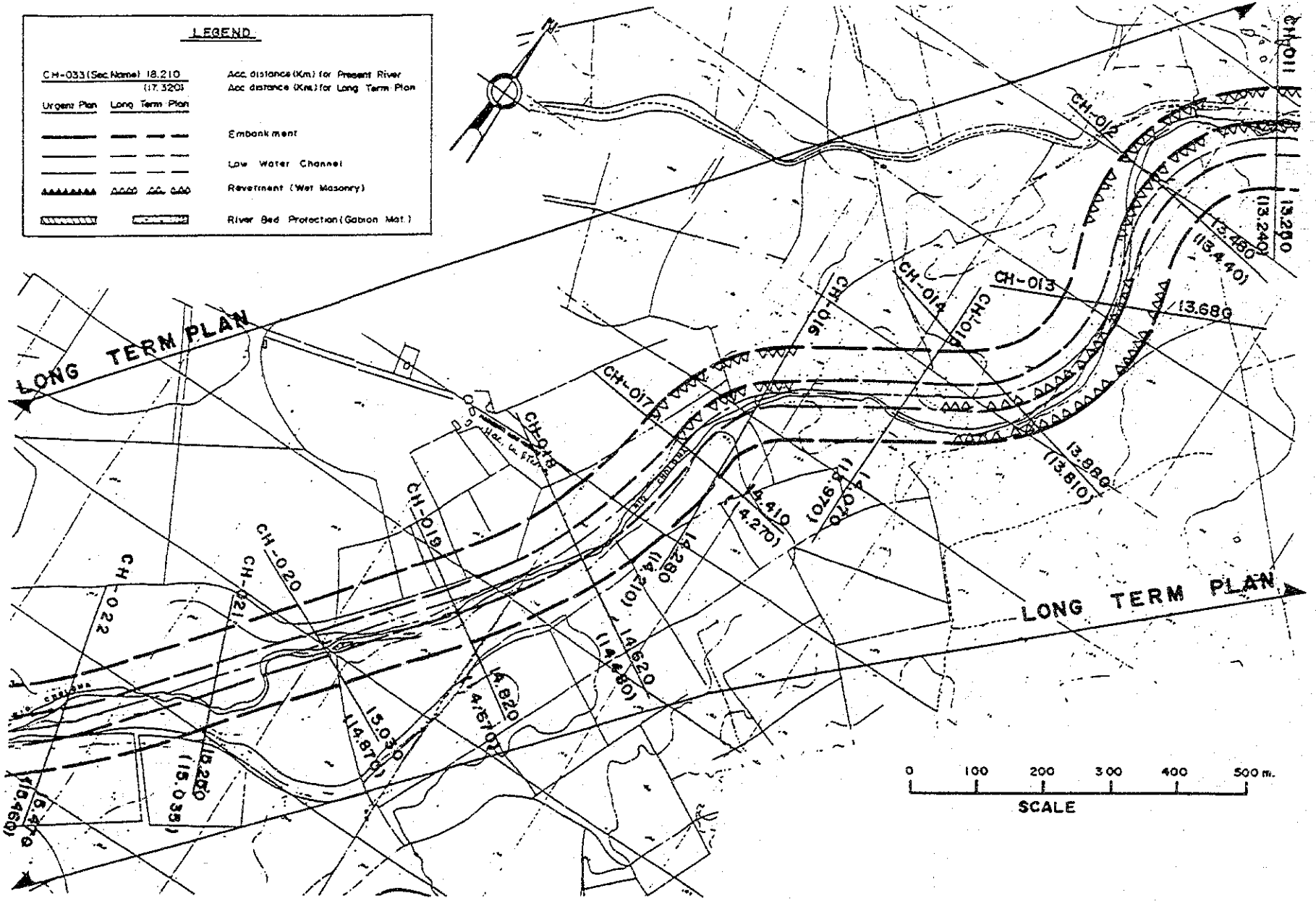


FIG.12.21 (2) PROPOSED RIVER IMPROVEMENT OF THE RIO CHOLOMA

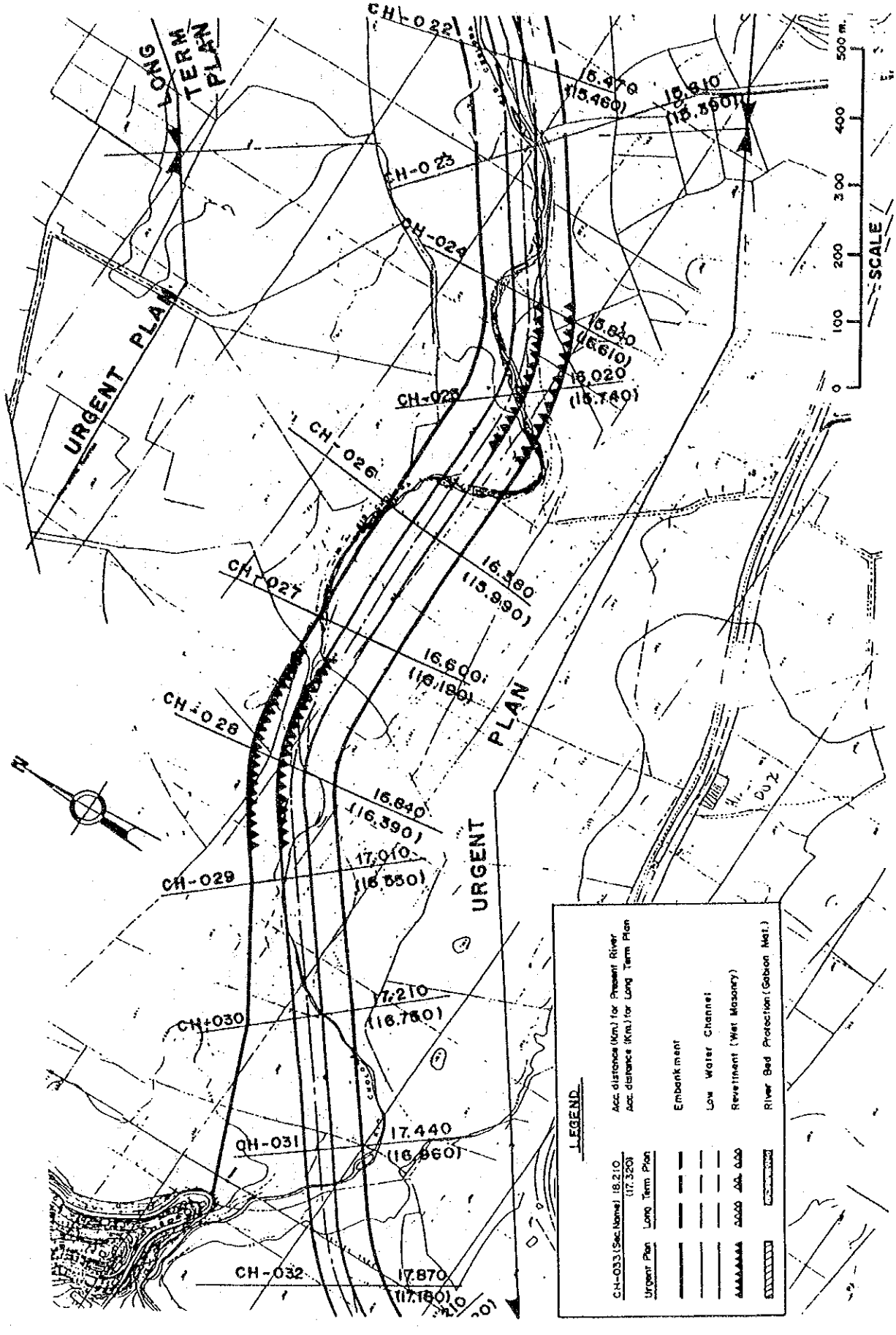


FIG.12.21 (3) PROPOSED RIVER IMPROVEMENT OF THE RIO CHOLOMA

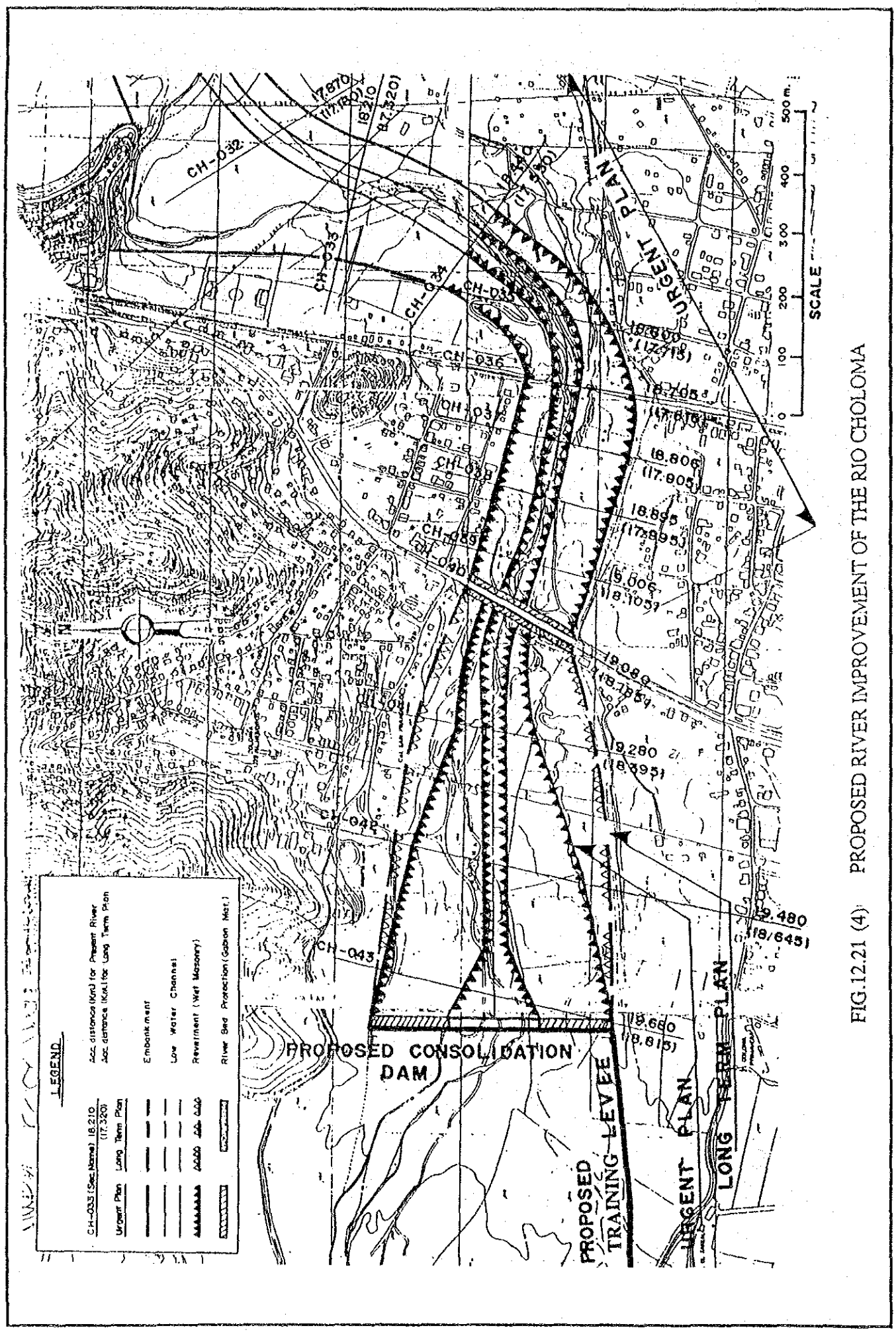
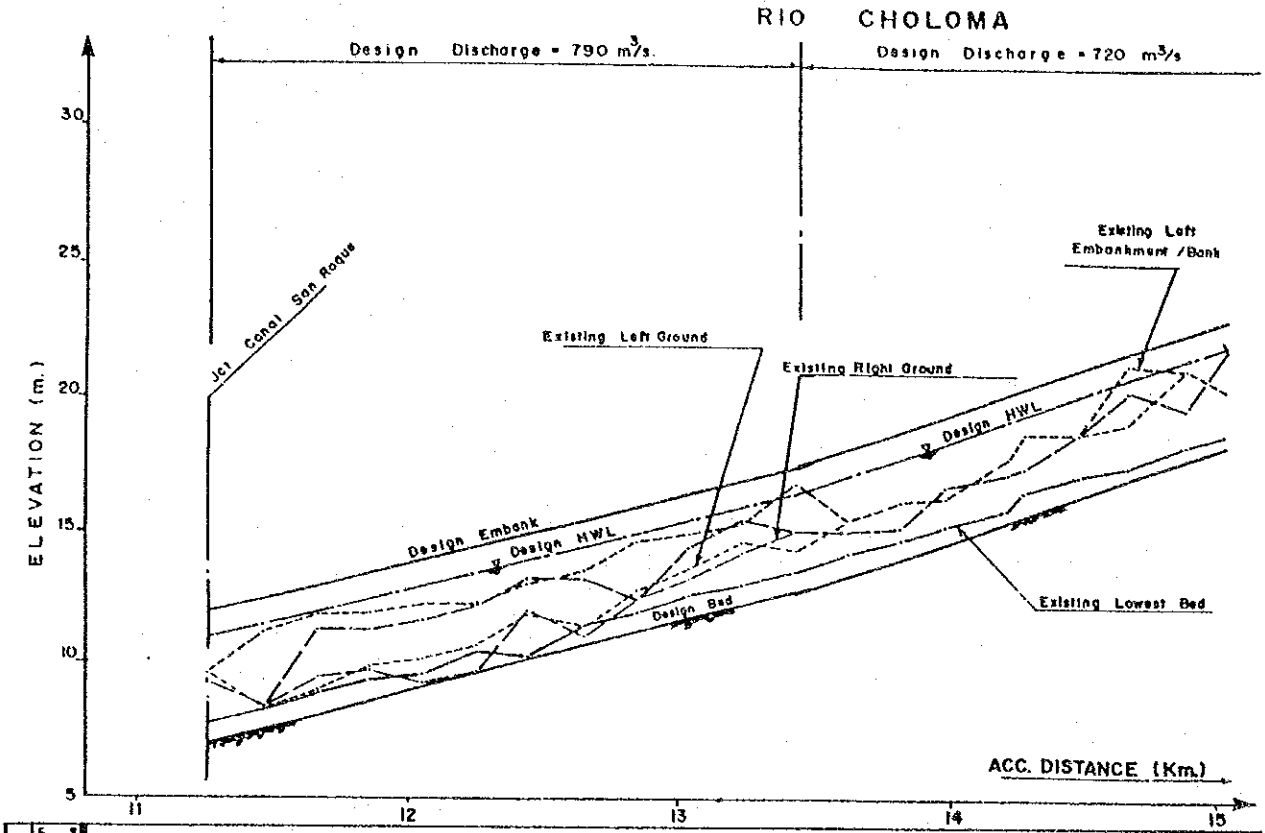
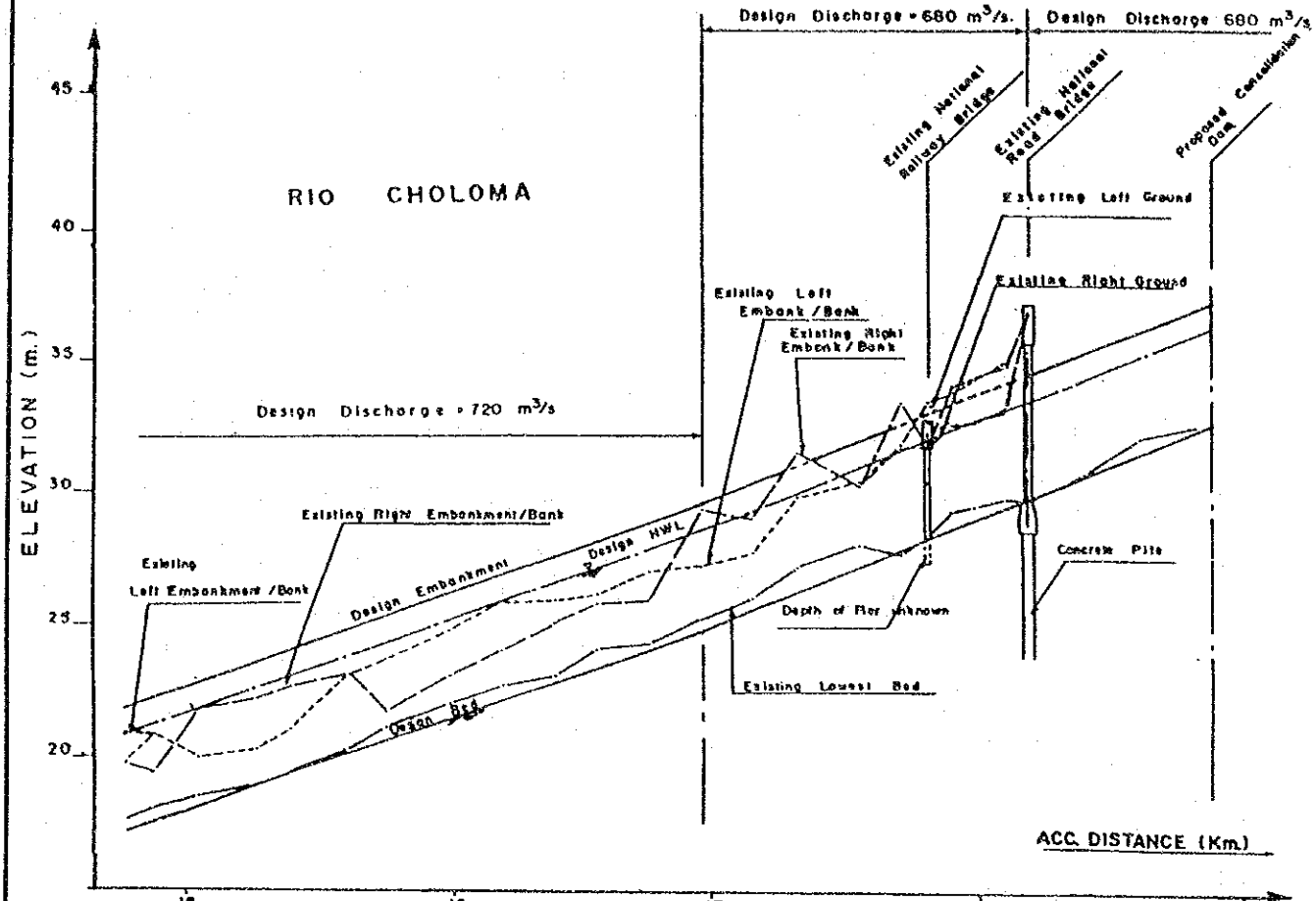


FIG.12.21 (4) PROPOSED RIVER IMPROVEMENT OF THE RIO CHOLOMA



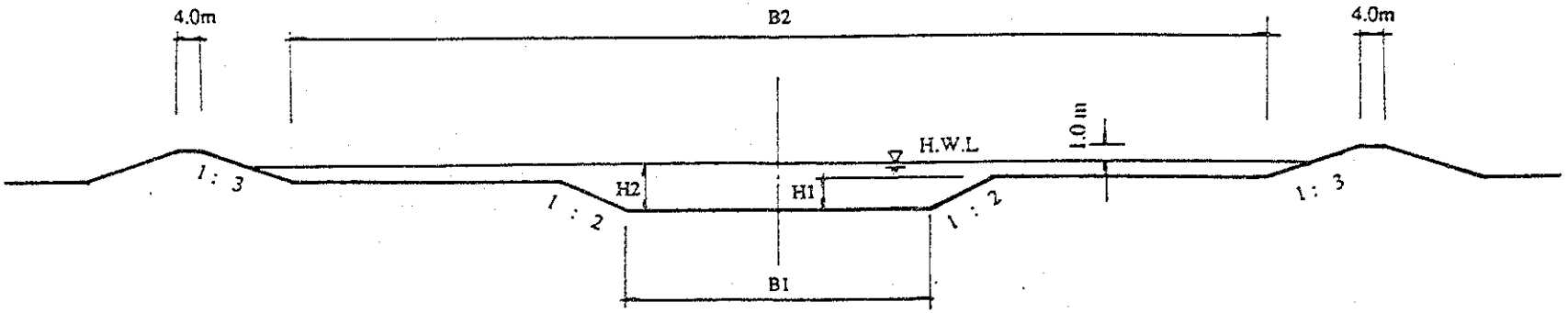
Section	Design Acc Dist. Km	Design Dist. Km	EXISTING Lowest Bed El. m	Left Ground El. m	Left Emb El. m	Right Ground El. m	Right Emb El. m	PROPOSED Design Bed El. m	Design H.W.L. El. m	Design Emb. El. m	Design Bed Slope
CH-001	11.250	0.000	7.60	9.70	-	9.30	-	7.00	11.00	12.00	
CH-002	11.450	0.200	8.30	8.30	11.20	8.40	-	7.33	11.50	12.50	
CH-003	11.650	0.200	8.80	9.00	11.90	9.50	11.30	8.06	12.00	13.00	
CH-004	11.850	0.200	9.40	9.80	12.00	9.80	11.30	8.59	12.31	13.31	
CH-005	12.050	0.200	9.60	10.20	12.30	9.30	11.70	9.12	13.01	14.01	
CH-006	12.250	0.200	10.49	10.70	12.35	9.70	12.30	9.65	13.31	14.31	
CH-007	12.440	0.190	10.30	11.90	13.10	10.50	12.30	10.15	13.99	14.99	
CH-008	12.640	0.200	11.50	11.45	13.80	12.05	13.30	10.68	14.49	15.49	
CH-009	12.840	0.200	12.00	12.90	14.70	12.50	-	11.21	14.99	15.99	
CH-010	13.040	0.200	12.69	13.70	15.00	13.30	14.30	11.74	15.50	16.50	
CH-011	13.240	0.200	13.05	14.70	15.40	14.30	15.32	12.27	16.00	17.00	
CH-012	13.440	0.200	13.60	14.40	16.85	15.10	-	12.80	16.50	17.50	
CH-013	13.630	0.190	14.30	15.50	-	15.10	-	13.46	17.16	18.16	
CH-014	13.810	0.180	14.80	16.20	-	15.25	-	14.06	17.79	18.79	
CH-015	13.970	0.160	15.30	16.25	-	14.75	-	14.64	18.35	19.35	
CH-016	14.210	0.240	15.80	17.75	-	17.25	-	15.47	19.19	20.18	
CH-017	14.270	0.060	16.38	18.70	-	17.45	-	15.83	18.40	20.40	
CH-018	14.480	0.210	17.13	18.70	-	18.70	-	16.40	20.13	21.13	
CH-019	14.670	0.190	17.50	18.15	21.30	20.30	-	17.06	20.80	21.80	
CH-020	14.875	0.205	18.30	21.10	-	19.60	-	17.77	21.51	22.51	

FIG.12.22 (1) DESIGN PROFILE OF THE RIO CHOLOMA



Section	Design Acc. Dist. Km	Design Dist. Km	EXISTING Lowest Bed El.m	EXISTING Left Ground El.m	EXISTING Left Emb. El.m	EXISTING Right Ground El.m	EXISTING Right Emb. El.m	PROPOSED Design Bed El.m	PROPOSED Design H.W.L El.m	PROPOSED Design Emb. El.m	Design Bed Slope
CH-020	14.875	0.205	18.30	21.10	—	19.80	—	17.77	21.51	22.51	
CH-021	15.035	0.160	18.74	20.20	—	22.00	—	18.33	22.07	23.07	
CH-022	15.260	0.225	19.10	20.90	—	22.40	—	19.11	22.86	23.86	
CH-023	15.390	0.130	19.60	21.25	—	22.30	—	19.56	23.31	24.31	
CH-024	15.610	0.220	20.30	23.30	—	23.35	—	20.32	24.08	25.08	
CH-025	15.740	0.130	21.30	25.90	—	21.90	—	20.77	24.54	25.54	
CH-026	15.990	0.250	22.20	23.00	—	23.30	—	21.84	25.41	26.41	
CH-027	16.190	0.200	22.90	26.00	—	24.30	—	22.33	26.11	27.11	
CH-028	16.380	0.190	23.50	26.10	—	26.30	—	23.02	26.81	27.81	
CH-029	16.550	0.160	24.30	26.30	—	26.00	—	23.58	27.37	28.37	
CH-030	16.750	0.200	24.50	27.20	—	27.10	—	24.27	28.07	29.07	
CH-031	16.960	0.210	25.30	27.30	—	29.30	—	25.00	28.80	29.80	
CH-032	17.160	0.200	26.30	28.00	—	28.30	—	25.81	29.80	30.40	
CH-033	17.320	0.160	27.50	30.10	—	31.80	—	26.48	30.24	31.24	
CH-034	17.550	0.230	28.30	30.70	—	30.50	—	27.39	31.16	32.16	
CH-035	17.715	0.165	27.90	32.10	—	32.00	33.70	28.05	31.82	32.82	
CH-036	17.815	0.100	28.60	33.70	33.70	32.00	32.00	28.66	32.22	33.22	
CH-037	17.905	0.090	28.80	32.90	34.10	32.80	34.30	28.82	32.58	33.58	
CH-038	17.995	0.090	29.10	32.90	34.60	33.00	34.70	29.18	32.94	33.94	
CH-039	18.105	0.110	30.00	33.50	36.20	33.50	38.10	29.83	33.38	34.38	
CH-040	18.185	0.080	28.90	37.00	37.00	37.10	37.10	28.95	33.70	34.70	
CH-041	18.395	0.210	30.90	—	—	—	—	30.80	34.94	35.84	
CH-042	18.605	0.210	32.30	—	—	—	—	31.90	35.38	36.38	
CH-043	18.815	0.210	32.70	—	—	—	—	32.80	36.22	37.22	
								32.75	36.60	37.60	

FIG.12.22 (2) DESIGN PROFILE OF THE RIO CHOLOMA



1. STANDARD DESIGN CROSS SECTION OF THE LONG TERM PLAN

STATION	ACC. DISTANCE (km)	B1 (m)	B2 (m)	H1 (m)	H2 (m)
CH-001 to CH-012	11.250 to 13.440	50.00	158.00	2.00	3.97 to 3.70
CH-012 to CH-019	13.440 to 14.670	40.00	138.00	2.00	3.70 to 3.74
CH-019 to CH-040	14.670 to 18.185	40.00	130.00 to 180.00	2.50	3.74 to 3.75
CH-040 to No.1 Consolid. Dam	18.185 to 18.815	40.00	180.00 to 360.00	2.50	3.75

2. STANDARD DESIGN CROSS SECTION OF THE URGENT PLAN

STATION	ACC. DISTANCE (km)	B1 (m)	B2 (m)	H1 (m)	H2 (m)
CH-023 to CH-040	15.390 to 18.185	40.00	130.00 to 180.00	2.50	3.74 to 3.75
CH-040 to No.1 Consolid. Dam	18.185 to 18.815	40.00	90.00 to 290.00	2.50	3.75

FIG.12.23 DESIGN CROSS SECTION OF THE RIO CHOLOMA

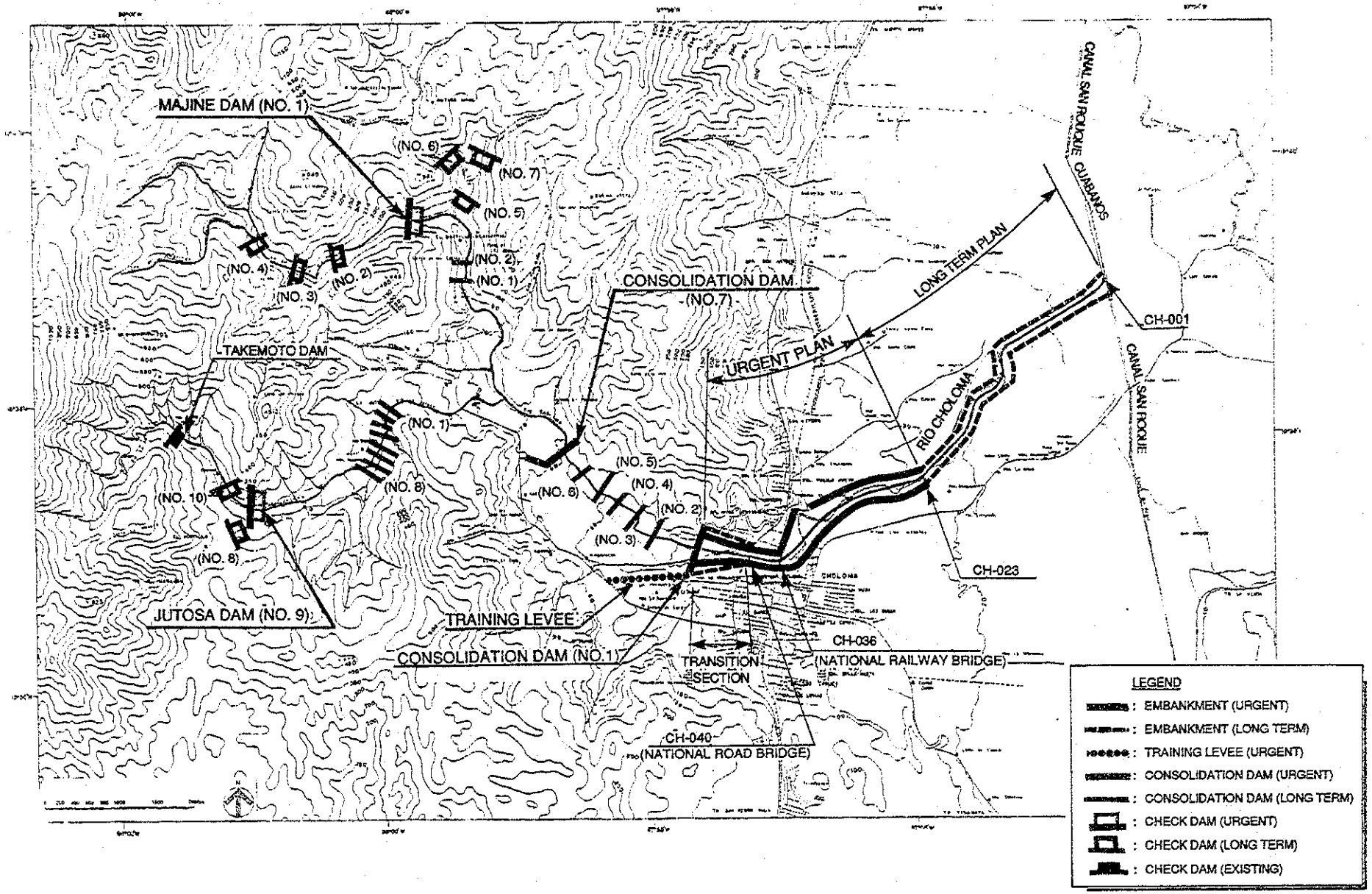


FIG.12.24 PROPOSED FACILITIES FOR THE LONG TERM PLAN AND URGENT PLAN OF THE RIO CHOLOMA

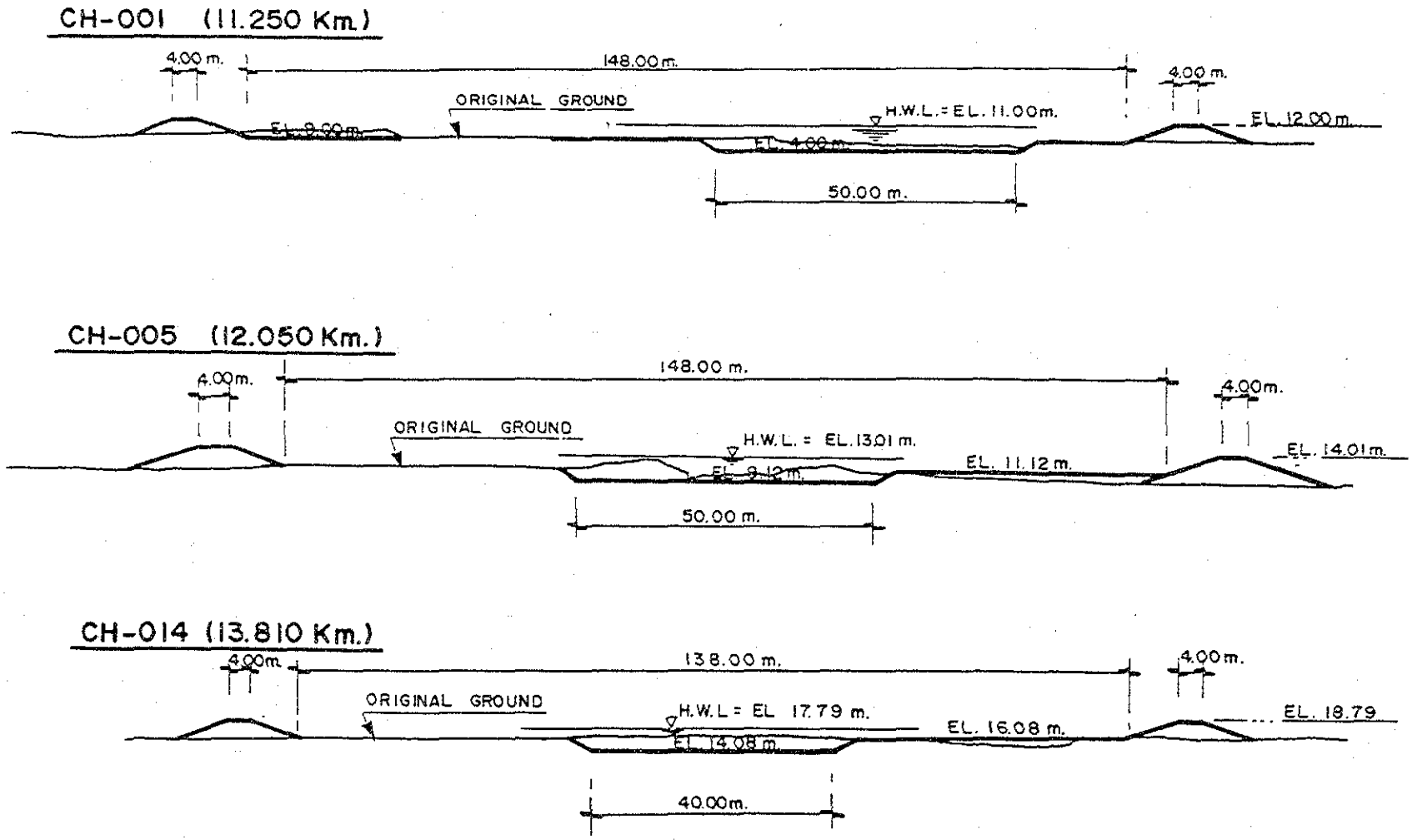
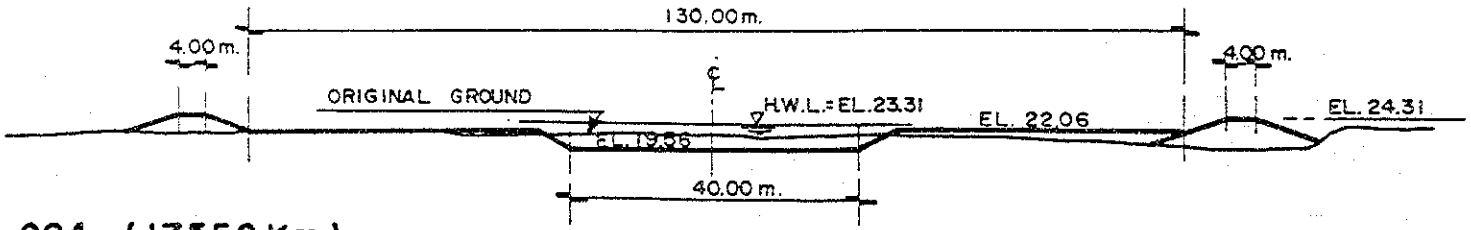
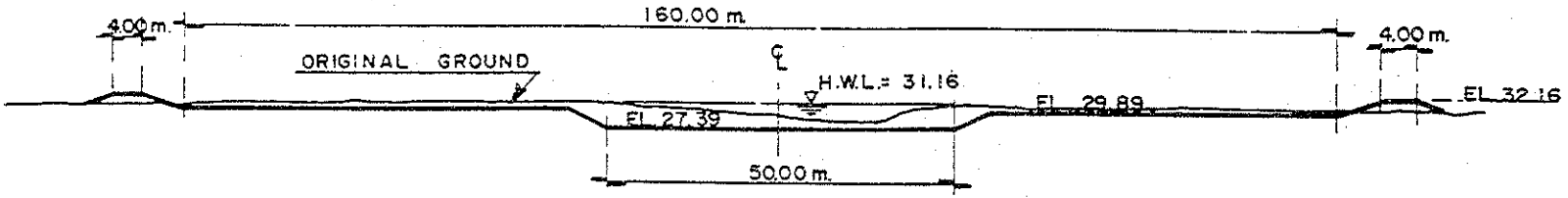


FIG.12.25 (1) DESIGN CROSS SECTION OF THE RIO CHOLOMA

CH-023 (15.390 Km.)

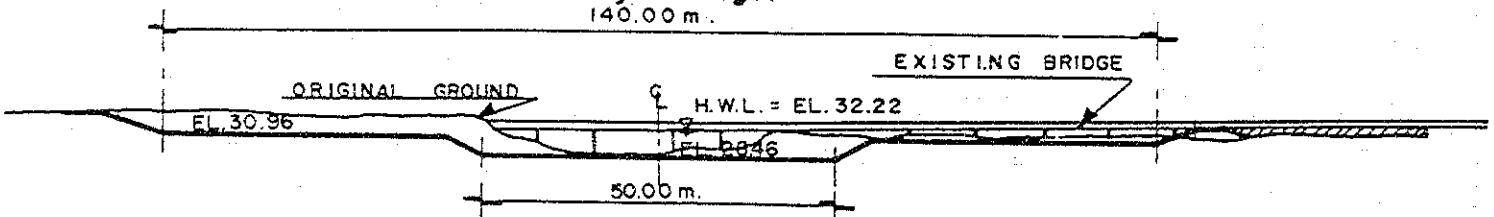


CH-024 (17.550 Km.)



Note: Design river width is wider than the typical section because of severe curve.

CH-036 (17.815 Km.: National Railway Bridge)

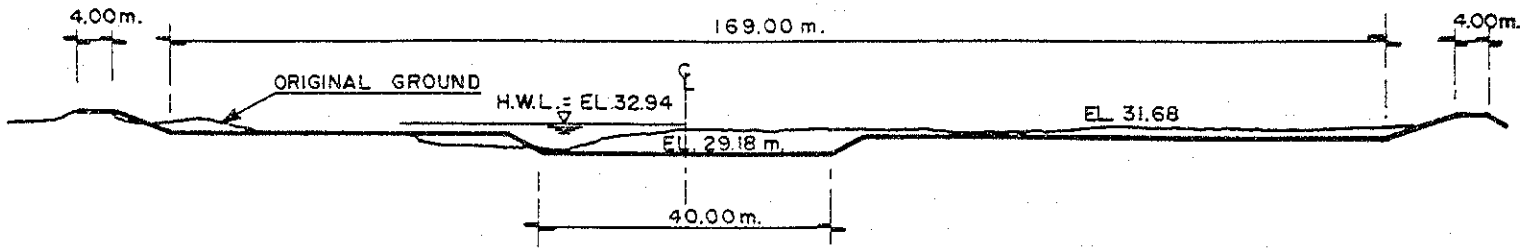


Note: 1.) Design river width is wider than the typical section because of the bridge.

2) Heightening or reconstruction of the bridge will be necessary.

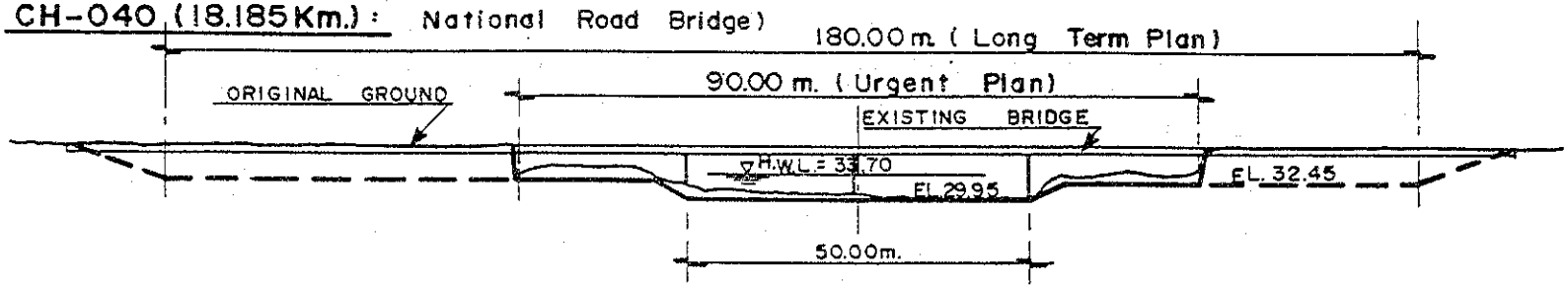
FIG.12.25 (2) DESIGN CROSS SECTION OF THE RIO CHOLOMA

CH-038 (17.795 Km.)



Note: Width of the high water channel is same as the existing width.

CH-040 (18.185Km.): National Road Bridge)



Note: 1.) Design river width is wider than the typical section because of the bridge and the existing embankments.

CH-042 (18.605 Km.)

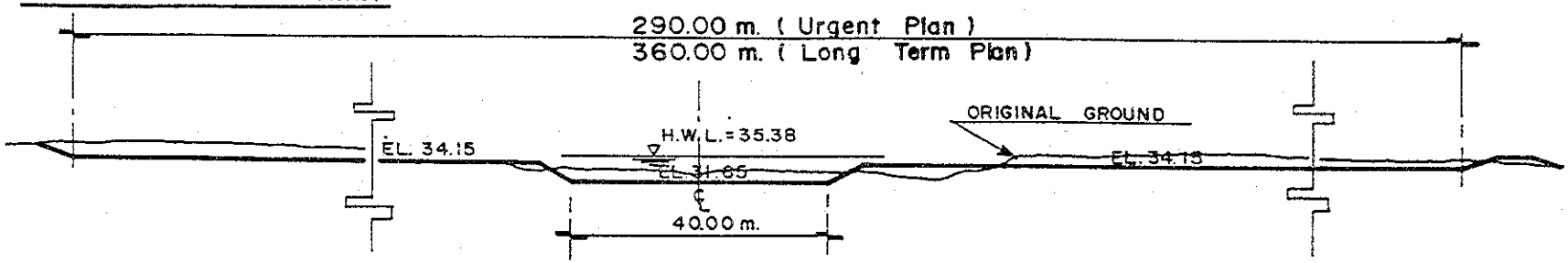


FIG.12.25 (3) DESIGN CROSS SECTION OF THE RIO CHOLOMA

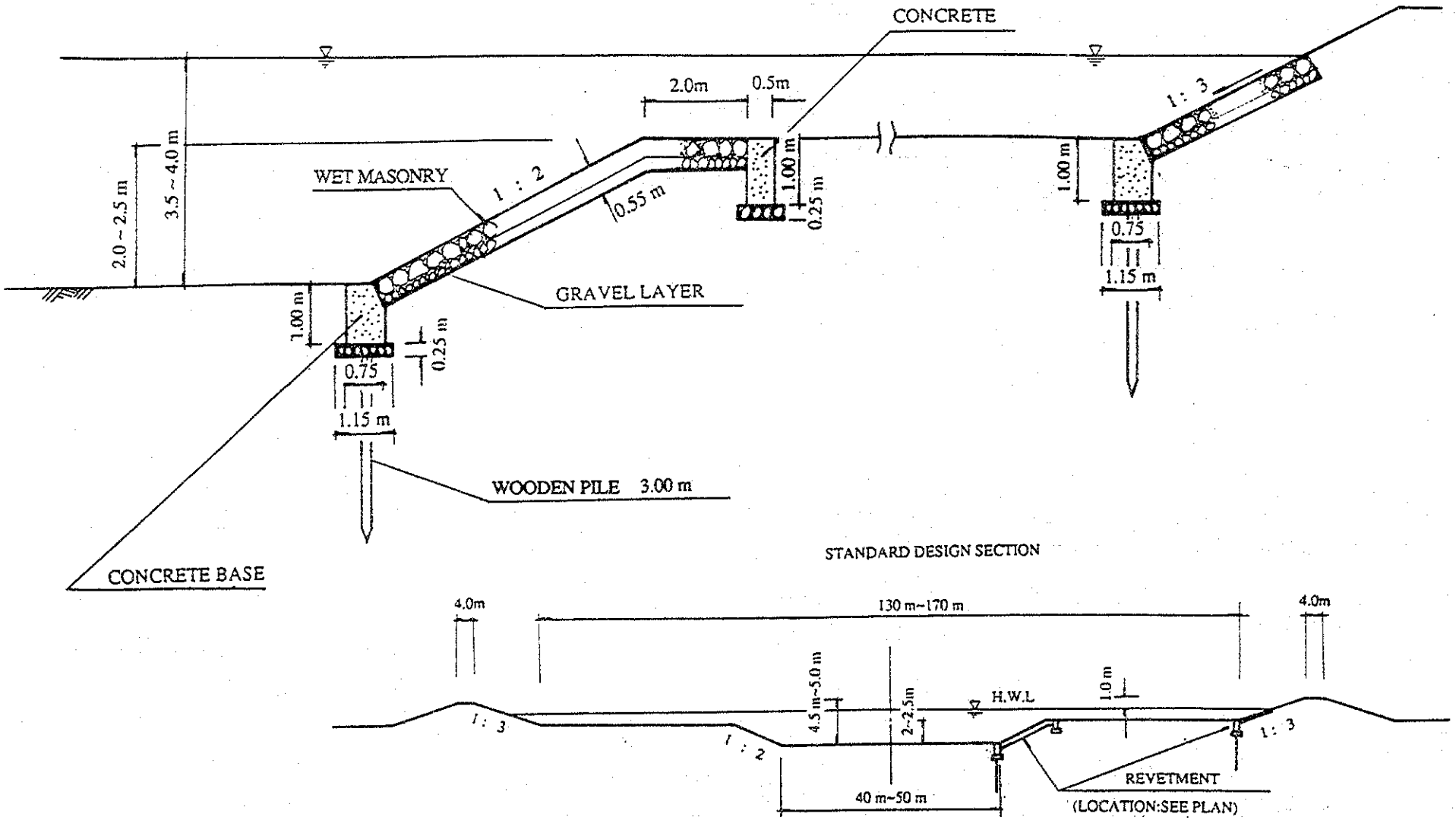
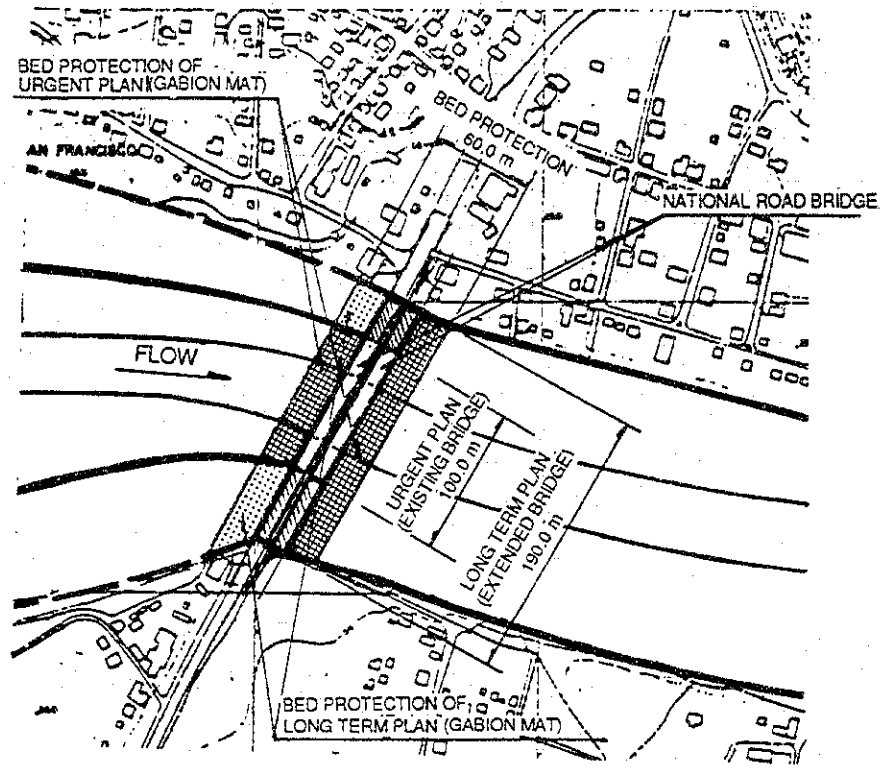
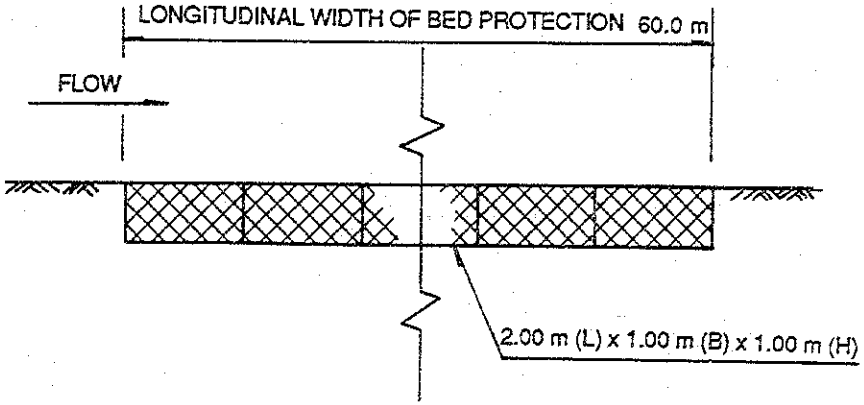


FIG.12.26 STANDARD REVETMENT SECTION (WET MASONRY WITH COBLE STONE)

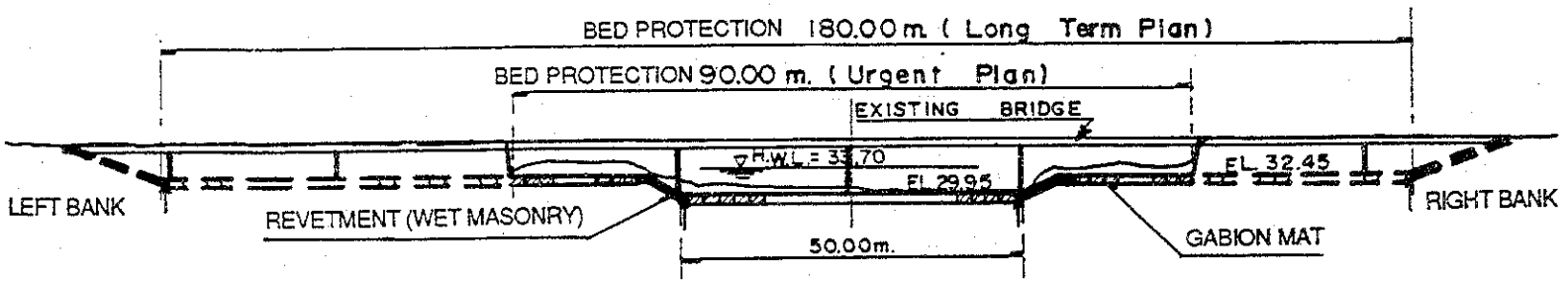
JICA



PLAN



GABION OF BED PROTECTION



CROSS SECTION

FIG.12.27 PROPOSED ROAD BRIDGE REHABILITATION WORKS

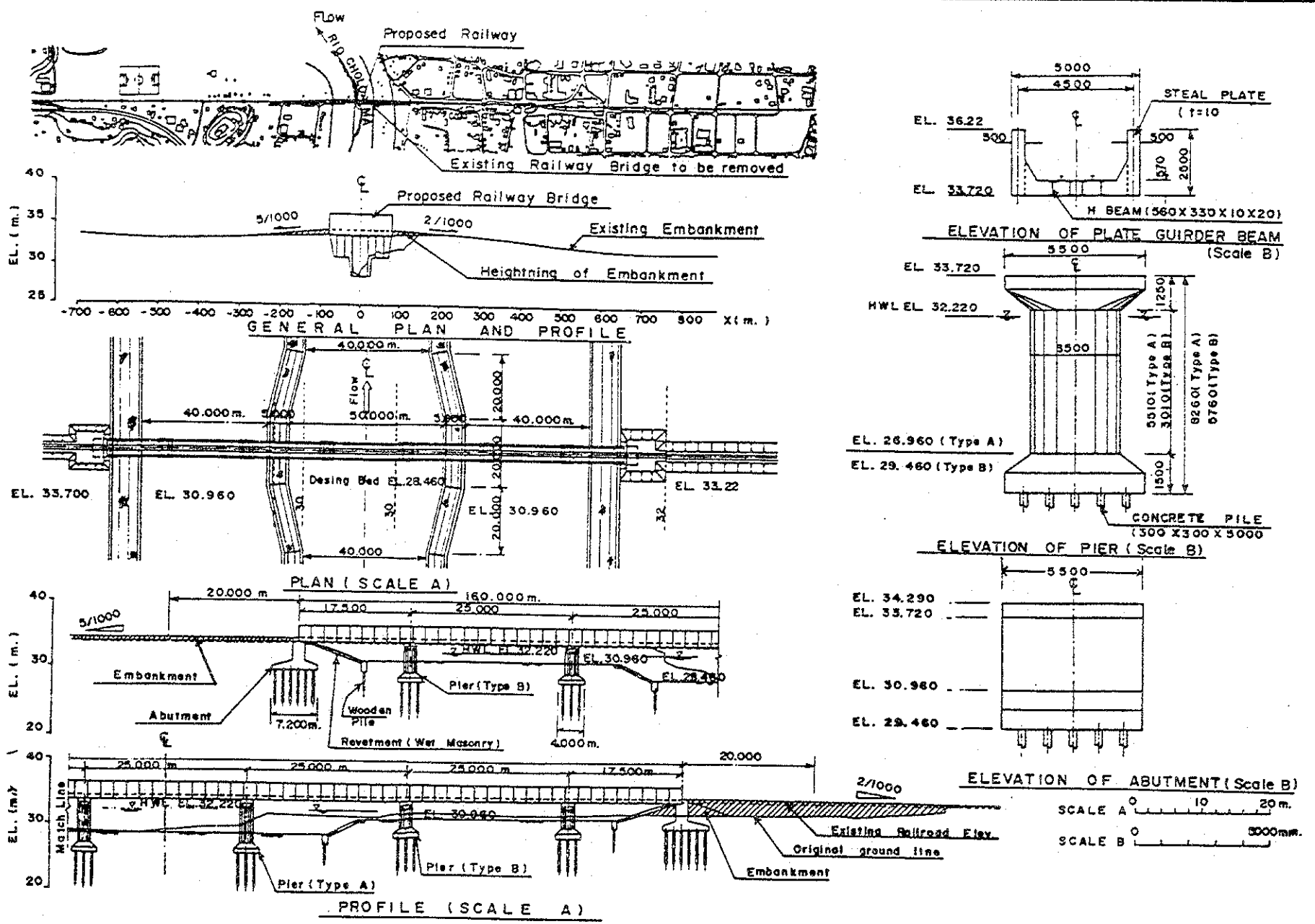
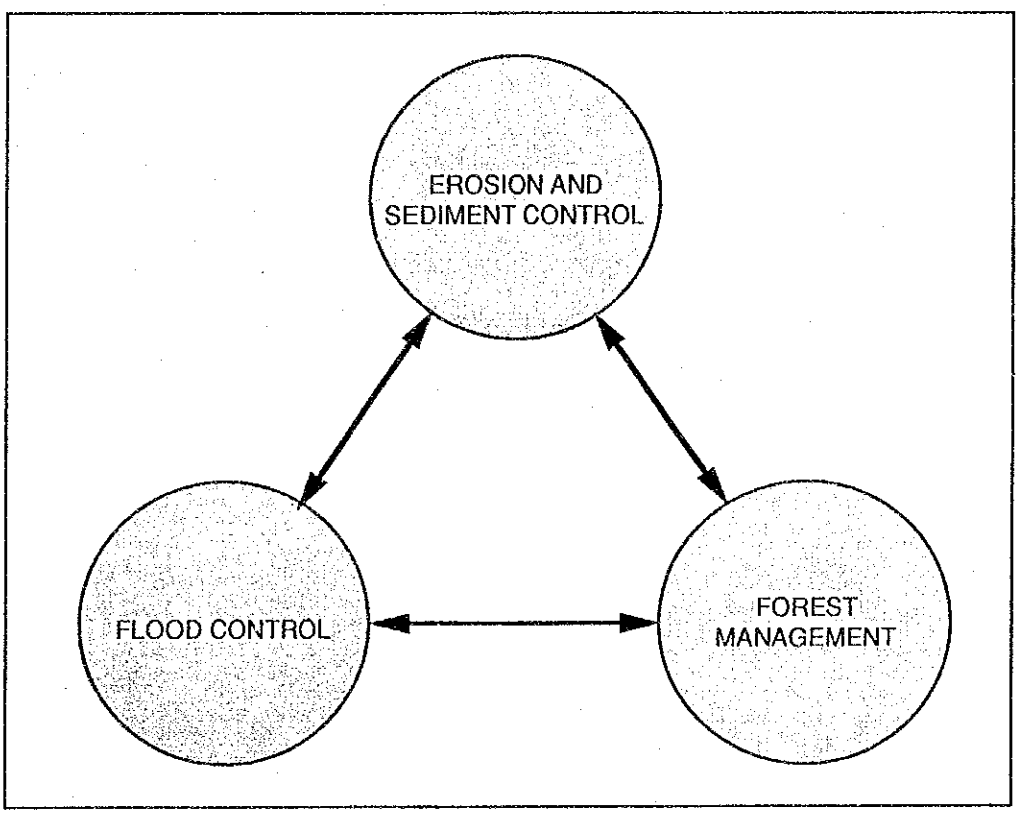


FIG.12.28 PROPOSED RAILWAY BRIDGE RECONSTRUCTION



WATERSHED MANAGEMENT

CHAPTER 13
CONCLUSION AND RECOMMENDATION

CHAPTER 13 CONCLUSION AND RECOMMENDATION

13.1 Conclusion

1) It is concluded that the facility plan proposed in the Master Plan for erosion and sediment control will be feasible in technical, economical and environmental terms. With the project the three pilot river basins will be safe from the debris and flood damages of a scale of the hurricane Fifi of 1974 that is assessed to be the most severe debris flows and floods in record. According to the economic evaluation, the EIRR values of the Rio Choloma, the Rio El Sauce and the Rio Blanco projects are 15.3 %, 14.5 % and 4.3 %. Though the EIRR value of the Rio Blanco is low, it becomes 13.0 %, when the Rio Blanco resumes its original river course and flows into the existing Rio El Sauce as proposed in the Master Plan. Due to the preliminary environmental impact assessment the adverse effects by the project are anticipated to be insignificant, because the proposed plan in itself is an environmental improvement plan aimed at disaster mitigation.

2) The urgent plan proposed in the Feasibility Study is also concluded to be feasible in technical, economical, social and environmental terms. The EIRR value of the facility plan with urgent facilities is 15.3 %. Simultaneously the proposed urgent facilities will likely have a strong social impact, because an early implementation of the urgent facilities will surely provide many socio-economically beneficial impacts of intangible that are not just limited to Choloma area. The proposed urgent facilities are composed of two check dams, consolidation works, training levee and river improvement works.

13.2 Recommendation

Recommendations from the study are summarized as follows:

1) The urgent plan proposed in the Feasibility Study for the Rio Choloma basin should be given a high priority by the Government for an early implementation.

2) Further studies on the Rio El Sauce and the Rio Blanco will be important for an early implementation. According to the project evaluation, the Rio El Sauce with the Rio Blanco project will be feasible in technical, economical, social and environmental terms. The project will have a strong social impact, because San Pedro Sula city and a part of La Lima city that have a high population density and a high socio-economic importance, are located in these two river basins.

3) Improvement of the hydrological observation net work will be a fundamental action not only for flood mitigation, but also for water resources development. Hydrological data will be basis for planning optimum countermeasures for sediment and flood damages. The numbers of rainfall and water level gauging stations are still very limited not only in the pilot river basins, but also in the Sula Valley. The hydrological gauging stations both in the Rio Chamelecon and in the Rio Ulua are necessary to be increased.

4) As a part of the non-structural measures for sediment and flood mitigation, the hazard areas from future debris flows and past floods that are prepared in the Master Plan study, should be referred by the authorities who are responsible for land management and development.

5) Improvement of the existing downstream canals of the Rio Choloma such as the Canal Copen-Higuero-Cuabanos and also that of the Rio Chamelecon will be required for elimination of flood damages from the area downstream of the Rio Choloma, because their conveyance capacities may be extremely small to meet the flood discharges expected.

6) Institutional improvement of SECOPT is recommended in the field of sediment and flood control in order to cope with sediment and flood mitigation problems in the country and proper operation and maintenance (O&M) activities will be essential for sediment and flood control facilities after implementation of facilities. Among the existing sediment and flood control facilities of the pilot rivers, there are many sites that need proper O&M activities locally.

APPENDIX A
LIST OF PARTICIPANT

APPENDIX A: LIST OF PARTICIPANT

1 JICA Advisory Committee

Mr. Hiroshi IKEYA	Chairman (from March 1993)
Mr. Hideaki KOBAYASHI	Chairman (from August 1992 to February 1993) Ministry of Construction
Mr. Kenji OSAWA	Member Ministry of Construction
Mr. Masayuki FURUKAWA	Member Ministry of Construction

2 JICA Study Team

Mr. Hajime TANAKA	Team Leader
Mr. Isao MISONO	River & Sabo Engineer
Mr. Ryo MATSUMARU	Hydrologist & Hydraulic Engineer
Mr. Takashi FURUKAWA	Sedimentology & River Structural Engineer
Mr. Hiroshi MATSUO	Flood Damage Survey Expert
Mr. Takeo NAKAMURA	Sediment Yield Analyst
Mr. Yasuo ISHIGURO	Topographic Survey Expert
Mr. Masahiro WATANABE	Erosion and Debris Control Engineer
Mr. Kenji TAKAHASHI	Erosion and Debris Control Structural Engineer
Dr. Valerio GUTIERREZ	Hillside Work Engineer
Mr. Minoru YAHATA	Construction Plan & Cost Estimate Expert
Dr. Kinichi OHNO	Socio-economist
Dr. Somasundaram JAYAMOHAN	Environmental Engineer

3 SECOPT

Ing. Mauro Membreno Tosta	Minister of SECOPT (until March 1993)
Arq. Francisco Rodrigues M	Vice Minister of SECOPT (until January 1993)
Ing. Jose Enrique Ayala N	Vice Minister of SECOPT (from February 1993)
Ing. Claudio Alcerro Diaz	General Director of DGOP (until February 1993)
Ing. Mario Alcides Moncada	General Director of DGOP (from February 1993)
Ing. Pompillo Tinoco	Manager of Hydraulics Works Department, DGOP
Ing. Martha Flores	Chief of Erosion and Sediment Control Section, DGOP (until August 1993)
Ing. Irma Morales	Chief of River and Drainage Section, DGOP
Ing. Gustavo Suazo Caballero	Chief of Erosion and Sediment Control Section, DGOP (from September 1993)
Ing. Diana Figueroa	Assistant of River and Drainage Section, DGOP
Ing. Donal Maltinez	Assistant of Laboratory and Support Section, DGOP
Ing. Claudio Calix	Engineer of Design Section of Erosion and Sediment Control, DGOP
Lic. Hector Lainez	Biologist, DGOP
Mr. Atsushi OGINO	JICA Expert Sabo Works and Flood Control

4 SECPLAN

Lic. Guadalupe Hung	Director of International Technical Cooperation

APPENDIX B
MINUTES OF MEETING

Minutes of the Meeting
for
the Master Plan Study on the Erosion and Sediment Control in the Pilot River Basin Choloma, San Pedro Sula, Cortes in the República of Honduras, on September 1st, 1992

The advisory team of Japan International Cooperation Agency, headed by Mr. Hideaki Kobayashi, and the members of the JICA Study Team on the Erosion and Sediment Control in the Pilot River Basin, Choloma, San Pedro Sula, Cortes, discussed with the officials of the Ministry of Communications Public Works and Transportation (SECOPT) on the draft inception report of the study on September 1st, 1992, in SECOPT office Tegucigalpa, Honduras. A list of the personnel who attended the discussion meeting is shown in Annex I.

The Draft Inception Report which was prepared and submitted by the JICA study team to the meeting, Mr. Hajime Tanaka, the team leader of the JICA Study Team explained, and Eng. Claudio Alcerro, General Director of Public Works (SECOPT), expressed his satisfaction to the Draft Inception Report.

During the discussion the following points were raised from SECOPT and agreed by the JICA advisory team to be transfered to the JICA headquarters:

1. SECOPT requested JICA to donate the equipment provided by JICA for the study, after the study.

2. SECOPT requested counterpart to be trained in the course of the study in Japan as counterpart training.

Eng. Mauro Membreño Tosta
Ministry of Communications
Public Works and Transportation
SECOPT

Tegucigalpa, M.D.C. september, 3 1992

小林英明

Hideaki KOBAYASHI
Chairman of the JICA
Advisory Committee

Mr. Hajime TANAKA
Team Leader of the JICA
Study Team

ANNEX I

LIST OF ATTENDANTS

SECOPT :

Eng. Claudio Alcerro Diaz	: General Director DGOP
Eng. Mario Alcides Moncada	: General Sub-Director DGOP
Eng. Pompilio Tinoco	: Manager of Hydraulics Works Department DGOP
Eng. Martha Flores	: Chief of Sabo Division DGOP
Mr. Atsushi Ogino	: JICA Expert Sabo Works and Flood Control

JICA ADVISORY COMMITTEE :

Mr. Hideaki Kobayashi	: Chairman Ministry of Construction
Mr. Kenji Osawa	: Committee Member Ministry of Construction
Mr. Masayuki Furukawa	: Commitee Member Ministry of Construction
Mr. Hiroshi Enomoto	: JICA Coordinator

JICA STUDY TEAM :

Mr. Hajime Tanaka	: Team Leader
Mr. Masahiro Watanabe	: Erosion and Debris Control Engineer
Mr. Takashi Furukawa	: Sedimentology/River Structural Engineer
Mr. Hiroshi Matsuo	: Flood Damages Survey Expert
Mr. Takeo Nakamura	: Sediment Yield Analyst
Dr. Valerio Gutiérrez	: Hillside Works Engineer

Minuta de la Reunión

para el Estudio de Plan Maestro sobre el Control de Erosion y Sedimentos en la Cuenca Piloto Choloma, San Pedro Sula, Cortes en la República de Honduras

El grupo consejero de la Agencia Internacional de Cooperacion del Japón, encabezada por el Sr. Hideaki Kobayashi, y los miembros del equipo de estudio de JICA sobre el control de Erosión y Sedimentos en la Cuenca piloto Choloma, San Pedro Sula, Cortes, discutieron con los oficiales del Ministerio de Comunicaciones, Obras Públicas y Transporte (SECOPT) sobre el borrador del reporte inicial del estudio el primero de Septiembre de 1992, en Tegucigalpa, Honduras. Una lista del personal que atendió la reunión se muestra en el Anexo I.

El Borrador del Reporte Inicial que fué preparado y sometido por el equipo de estudio de JICA en la reunión, fué explicado por el leader del equipo el Sr. Hajime Tanaka, y el Ing. Claudio Alcerro, Director General de Obras Públicas (SECOPT), expresó su satisfacción con el Borrador del Reporte Inicial.

Durante la discusion los siguientes puntos fueron llevados por la parte de SECOPT y acordado de parte del equipo asesor de ser transferidos a las oficinas principales de JICA:

1. SECOPT requirió a JICA donar el equipo provisto por JICA para el estudio, al finalizar el mismo.

2. SECOPT requirió que la contraparte sea entrenada en el transcurso del estudio en Japon como entrenamiento de contraparte.

Ing. Mauro Membreño Tosta
Ministro de Comunicaciones
Obras Públicas Y Transporte
SECOPT

小林英昭

Hideaki KOBAYASHI
Jefe del Comité Asesor
de JICA

Tegucigalpa, M.D.C. 3 de septiembre de 1992

Mr. Hajime TANAKA
Jefe del Equipo de
Estudio de JICA

MINUTES OF MEETING
FOR
THE MASTER PLAN STUDY ON THE EROSION AND SEDIMENT CONTROL IN THE PILOT RIVER BASIN, CHOLOMA, SAN PEDRO SULA, CORTES IN THE REPUBLIC OF HONDURAS,
on March 17, 1993

The Advisory Team of Japan International Cooperation Agency (JICA), headed by Mr. Hiroshi Ikeya, and the members of the JICA Study Team on the captioned project, discussed with the officials of the Ministry of Communications, Public Works and Transportation (SECOPT) on the Interim Report on March 17, 1993, in the conference room of SECOPT in Tegucigalpa, Honduras. Ing. Mario Alcides Moncada, General Director of DGOP, chaired the meeting. A list of the personnel who attended the meeting is shown in Annex.

The JICA Study Team submitted twenty (20) copies of the Interim Report (March 1993) to SECOPT on March 12, 1993. The report is briefing the result of the study from September 1992 to February 1993. Mr. Hajime Tanaka, the team leader of the JICA Study Team, explained the outline of the sediment and flood problems in the study area and the proposed measures for the master plan and also priority areas for a Feasibility Study in the phase 2.

During the meeting some observations were made on the priority sequence of proposed facilities and discussed by the participants. SECOPT expressed its satisfaction to the study and the Interim Report.

During the discussion, SECOPT has stressed the following points and the JICA Advisory Team has agreed to transfer them to the JICA headquarters. They are summarized as follows:

1. A feasibility study will be conducted on the Rio Choloma basin in the plase 2, as proposed in the Interim Report.

2. JICA is requested to hold a seminar related to the Study in Honduras at the timing of submission of the Draft Final Report.

3. SECOPT requested JICA the counterpart training in Japan also in the course of the 1993 study.

4. DGOP of SECOPT requested JICA to donate the equipment provided by JICA for study, after the study.

Ing. Mauro Membreño Tosta
Ministry of Communications, Public Works and Transportation, SECOPT

Mr. Hiroshi Ikeya
Chairman of the JICA Advisory Committee

Ing. Mario Alcides Moncada
General Director of DGOP, SECOPT.

Mr. Hajime Tanaka
Team Leader of the JICA Study Team.

Tegucigalpa, M.D.C., March 18, 1993.

ANNEX LIST OF THE PERSONNEL IN THE MEETING
on March 17, 1993

1. SECOPT:

Eng. Mario Alcides Moncada	General Director DGOP
Eng. Pompilio Tinoco	Manager of Hydraulics Works, Department DGOP
Eng. Martha Lidia Flores	Chief of Sabo Division DGOP.
Mr. Atsushi Ogino	JICA Expert, Sabo Works and Flood Control

2. JICA ADVISORY COMMITTEE:

Mr. Hiroshi Ikeya	Chairman Ministry of Construction
Mr. Masayuki Furukawa	Member Ministry of Construction.
Mr. Masato Watanabe	JICA Coordinator

3. JICA STUDY TEAM:

Mr. Hajime Tanaka	Team Leader
Mr. Isao Misono	River and Sabo Engineer.
Mr. Takashi Furukawa	Sedimentology and River Structural Engineer
Mr. Kenji Takahashi	Erosion and Debris Control Structural Engineer.

4. JICA Office in Tegucigalpa:

Eng. César A. Morales F.	General Coordinator

MINUTES OF MEETING
FOR
THE MASTER PLAN STUDY ON THE EROSION AND SEDIMENT CONTROL IN THE PILOT RIVER BASIN, CHOLOMA, SAN PEDRO SULA, CORTES IN THE REPUBLIC OF HONDURAS,
on 16 November 1993

The Study Team of Japan International Cooperation Agency (JICA) submitted the Draft Final Report for the Master Plan Study on the Erosion and Sediment Control in the Pilot River Basin, Choloma, San Pedro Sula, Cortes in the Republic of Honduras (November 1993) to Ministry of Communications, Public Works and Transportation (SECOPT) on 10 November 1993 and held a meeting on the report with officials of General Direction of Public Works (DGOP) of SECOPT in Tegucigalpa, Honduras. Mr. Hajime Tanaka, the team leader of the JICA Study Team explained the report to the officials. The list of participants is shown in Annex 1.

The Advisory Team of JICA, headed by Mr. Hiroshi Ikeya, and the members of the JICA Study Team on the captioned project, discussed with the officials of SECOPT on the report on 12 and 15 November 1993, at SECOPT. Ing. Mario Alcides Moncada, General Director of DGOP, chaired the meeting. SECOPT expressed its satisfaction to the study and the Draft Final Report, and promised to send the comments, if any, to JICA Tokyo within one month. The Study Team promised to incorporate the comments into the Final Report. The list of participants is shown in Annex 2.

During the discussion, the actual implementation of the Urgent Plan for the Rio Choloma and the Master Plan for the Rio Blanco and Rio El Sauce was stressed by SECOPT and discussed by the participants. The JICA Advisory Team recommends that the Rio Blanco and Rio El Sauce are also very important and the implementation of the proposed plan is urgent. So that SECOPT will effort to realize the implementation according to the Master Plan. The points discussed and agreed to transfer to the JICA headquarters by the JICA Advisory Team are as follows:

1. SECOPT requested JICA to support them for an early implementation of the Urgent Plan for the Rio Choloma as much as possible.

2. SECOPT requested that JICA continues to receive trainees from DGOP to Japan.

Ing. Jose Enrique Ayala N
Minister by Delegation and
Vice Minister of Public Works
(SECOPT)

Mr. Hiroshi Ikeya
Chairman of the JICA
Advisory Committee

Ing. Mario Alcides Moncada
General Director of General Direction
of Public Works (SECOPT)

Mr. Hajime Tanaka
Team Leader of the JICA
Study Team

ANNEX 1 LIST OF THE PERSONNEL IN THE MEETING
on 10 November 1993

1 SECOPT:

Eng. Mario Alcides Moncada	General Director DGOP
Eng. Irma Morales	Chief of River and Drainage Section DGOP
Eng. Rosa Maria Bonilla	Assistant of Maintenance Section, DGOP
Eng. Donal Maltinez	Assistant of Laboratory and Support Section, DGOP
Eng. Claudio Calix	Engineer of Design Section of Erosion and Sediment Control, DGOP
Mr. Atushi Ogino	JICA Expert, Sabo Works and Flood Control

2 JICA STUDY TEAM

Mr. Hajime Tanaka	Team Leader
Mr. Takashi Furukawa	Sedimentology and River Structural Engineer
Mr. Kenji Takahashi	Erosion and Debris Control Structural Engineer
Dr. Kinichi Ono	Socio-economist

ANNEX 2 LIST OF THE PERSONNEL IN THE MEETING
on 12 and 15 November 1993

1 SECOPT:

Eng. Mario Alcides Moncada	General Director DGOP
Eng. Ilma Morales	Chief of River and Drainage Section, DGOP
Mr. Atushi Ogino	JICA Expert, Sabo Works and Flood Control

2 JICA ADVISORY COMMITTEE:

Mr.Hiroshi Ikeya	Chairman Ministry of Construction,
Mr. Kenji Osawa	Member Ministry of Consruction
Mr. Masayuki Furukawa	Member Ministry of Construction,
Mr. Kiyotaka Otsuki	JICA Coordinator JICA Tokyo

3 JICA STUDY TEAM

Mr. Hajime Tanaka	Team Leader
Mr. Takashi Furukawa	Sedimentology and River Structural Engineer
Mr. Kenji Takahashi	Erosion and Debris Control Structural Engineer
Dr. Kinichi Ono	Socio-economist

APPENDIX C
LIST OF REFERENCE DATA COLLECTED

LIST OF REFERENCE DATA COLLECTED

1. ANALYSIS PRELIMINAR DE LA PRECIPITACION PRODUCIDA POR EL HURACAN "FIFI" A SU DASO POR HONDURAS, 1974

2. MONOGRAFIA DE LA CUENCA DEL RIO ULUA VOLUMEN NO.5

3. MONOGRAFIA DE LA CUENCA DEL RIO CHAMELECON VOLUMEN NO.2

4. A CLIMATIC DATA BASE FOR HONDURAN WATER RESOURCES DEVELOPMENT, GEORGE H. HARGREAVES; UTAH STATE UNIV.

5. INFORME DEL PLAN MAESTRO PARA EL DESARROLLO INTEGRAL Y CONTROL DE INUNDACIONES EN EL VALLE DE SULA; HARZA-CINSA, MARZO 1979

6. OBRAS DE PROTECTION CONTRA INUNDACIONES; SIR WILLIAM HALCROW & PARTNERS, SEPTEMBER 1975

7. INFORME RESUMIDO DE FACTIBILIDAD Y EL DISE ÑO DE LAS OBRAS HIDRAULICAS PRIORITARIAS PARA EL DESARROLLO INTEGRAL Y CONTROL DE INUNDACIONES EN EL VALLE DE SULA; COMISION DE VALLE DE SULA, NOVIEMBRE 1980

8. OBRAS DE CONTROL DE INUNDACIONES EN EL VALLE DE SULA II ETAPA, MARZO 1992

9. FRAMEWORK PLAN FOR THE DEVELOPMENT OF THE SULA VALLEY; UNITED STATES SOUTHERN COMMAND, JANUARY 1992

10. INITIAL ASSESSMENT OF WATER RESOURCES NEEDS IN THE SULA VALLEY HONDURAS CENTRAL AMERICA; UNITED STATES SOUTHERN COMMAN., SEPTEMBER 1991

11. MANUAL DE DISEÑO Y PROCEDIMIENTOS DE CONSTRUCCION DE OBRAS HIDRAULICAS; ING. CIVIL YOSHIHIRO TAKEMOTO, DICIEMBRE, 1981

12. MEMORIA ANUAL 1991; SECOPT

13. ESTUDIO DE FACTIBILIDAD ECONOMICA A PRECIOS SOMBRA PROYECTO VIAL : AUTOPISTA SAN PEDRO SULA - PUERTO CORTES 44.2 KMS, MARZO 1991

14. COHDEFOR, PROYECTO DE DESARROLLO AGROFORESIAL EN LA REGION NON-OCCIDENTAL, CUENCA DEL RIO CHOLOMA, 1990

15. CODIGO DE AGUAS, BORRADOR; SECRETARIA DE ESTADO EN EL DESPACHO DE RECURSOS NATURALES, DEC. 1990

16. TALLER SOBRE EL ANTEPROYECTO DE LEY GENERAL DE AGUAS; SECRETARIA DE ESTADO EN EL DESPACHO DE RECURSOS NATURALES, JULIO, 1992

17. PROGRAMA DE FORESTACION Y REFORESTACION ESTADO ESPAÑOL, 1986

18. TRANFERENCIA DE LA PROTECCION Y CONSERVACION DEL PARQUE NACIONAL CUSUCO Y LA ZONA DE RESERVA DE MERENDON; MUNICIPALIDAD DE SAN PEDRO SULA

19. HONDURAS EN CIFRAS, 1987-1989; BANCO CENTRAL DE HONDURAS

20. HONDURAS EN CIFRAS, 1989-1991; BANCO CENTRAL DE HONDURAS

21. ANUARIO ESTADISTICO 1989; SECPLAN

22. GRAVAMENES A LA IMPORTACION; SECRETARIA DE HACIENDA Y CREDITO PUBLICO

23. ARANCEL DE EXPORTACION; SECRETARIA DE HACIENDA Y CREDITO PUBLICO

24. INDICADORES ECONOMICOS DE CORTO PLAZO, JUNIO DE 1992; BANCO CENTRAL DE HONDURAS

25. BOLETIN ESTADISTICO, VOL. XLII, NO.3, MARZO-1992; BANCO CENTRAL DE HONDURAS

26. BOLETIN ESTADISTICO, VOL. XLII, NO.4, ABRIL-1992; BANCO CENTRAL DE HONDURAS

27. CENSO NACIONAL AGROPECUARIO 1974, SUMARIA; MINISTERIO DE ECONOMIA

28. PRONOSTICO DE COSECHA DE GRANOS BASICOS, 1987-88; SECPLAN

29. PRONOSTICO DE COSECHA DE GRANOS BASICOS, 1989-1990; SECPLAN

30. HONDURAS: PRECIO PROMEDIO DE MAQUINARIA Y EQUIPO AGRICOLA, PARTE II, 1988; SECRETARIA DE RECURSOS NATURALES

31. HONDURAS: PRECIO PROMEDIO DE MAQUINARIA Y EQUIPO AGRICOLA, PARTE II, 1989; SECRETARIA DE RECURSOS NATURALES

32. HONDURAS: PRECIO PROMEDIO DE MAQUINARIA Y EQUIPO AGRICOLA, PARTE II, 1990; SECRETARIA DE RECURSOS NATURALES

33. HONDURAS: PRECIO PROMEDIO DE MAQUINARIA Y EQUIPO AGRICOLA, PARTE II, 1991; SECRETARIA DE RECURSOS NATURALES

34. CENSO NACIONAL DE HONDURAS, CARACTERISTICAS GENERALES Y EDUCATIVAS DE LA POBLACION, ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

35. CENSO DE POBLACION Y VIVIENDA, CIUDAD DE SAN PEDRO SULA, ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

36. CENSO DE POBLACION Y VIVIENDA, CIUDAD DE TEGUCIGALPA D.C., ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

37. POBLACION Y VIVIENDA, DEPARTAMENTO DE CORTES, ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

38. POBLACION Y VIVIENDA, DEPARTAMENTO DE FRANCISCO MORAZAN, ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

39. POBLACION Y VIVIENDA, DEPARTAMENTO DE ATLANTIDA, ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

40. POBLACION Y VIVIENDA, DEPARTAMENTO DE SANTA BARBARA, ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

41. CIFRAS DEFINITIVAS, POBLACION Y VIVIENDAS EN CABECERAS MUNICIPALES Y EN ALDEAS Y CASERIOS, ABRIL-1961; SECRETARIA DE ECONOMIA Y HACIENDA

42. CENSOS DE POBLACION Y VIVIENDA LEVANTADOS EN HONDURAS DE 1791 A 1974; SECRETARIA DE ECONOMIA Y HACIENDA

43. CENSO NACIONAL DE POBLACION Y VIVIENDA 1988, POBLACION TOTAL Y NUMERO DE VIVIENDAS POR DEPARTAMENTO Y MUNICIPIO; SECPLAN

44. PRECENSO Y CENSO DE POBLACION Y VIVIENDA 1988, INFORMACION BASICA DE LOS MUNICIPIOS DE HONDURAS, TOMO XXVI; SECPLAN

45. PROYECCION DE LA POBLACION TOTAL POR DEPARTAMENTO, SEGUN GRUPOS DE EDAD, 1975-2000; SECPLAN

46. INVESTIGACION INDUSTRIAL, 1975; SECRETARIA DE ECONOMIA

47. COMERCIO EXTERIOR 1986, TOMO I; SECPLAN

48. COMERCIO EXTERIOR 1987, TOMO I; SECPLAN

49. DIRECTORIO DE ESTABLECIMIENTOS FABRILES, 1989-1990; SECPLAN

50. CUENTAS NACIONALES DE HONDURAS, 1978-1990; BANCO CENTRAL DE HONDURAS

51. COMPORTAMIENTO DE LA ECONOMIA HONDUREÑA, DURANTE 1991; BANCO CENTRAL DE HONDURAS

52. PLAN DE DESARROLLO URBANO, VOL. I SINTESIS DEL PLAN DE DESARROLLO URBANO DE SAN PEDRO SULA, 1976; HIDROSERVICE CINSA

53. CENSO NACIONAL DE POBLACION Y VIVIENDA 1988, CARACTERISTICAS GENERALES DE LA POBLACION Y DE LAS VIVIENDAS; SECPLAN

54. URGENCIAS Y ESPERANZAS 1991; SECPLAN

55. ENCUESTA PERMANENTE DE HOGARES DE PROPOSITOS MULTIPLES VOLI, SEP. 1991; SECPLAN

56. CENSO NACIONAL DE POBLACION Y VIVIENDA 1988, TOMO VII CARACTERISTICAS GENERALES DE LA POBLACION Y DE LAS VINIENDAS PORBARRIOS Y COLONIAS DE SAN PEDRO SULA; SECPLAN

57. PLAN DE DESARROLLO URBANO, VOL. VI INSTRUMENTOS NORMATIVOS ORDENANZA DE ZONIFICACION Y URBANIZACION, 1976; HIDROSERVICE CINSA

58. PLAN NACIONAL DE EMERGENCIA, 1992; COMISION PERMANENTE DE CONTINGENCIAS

59. CONOCIENDO SAN PEDRO SULA, 1992; MUNICIPALIDAD DE SAN PEDRO SULA

60. ENCUESTA PERMANENTE DE HOGARES DE PROPOSITOS MULTIPLES, VOL. I, SEP. 1990; SECPLAN

61. ENCUESTA PERMANENTE DE HOGARES DE PROPOSITOS MULTIPLES, VOL. II, SEP. 1990; SECPLAN

62. ENCUESTA PERMANENTE DE HOGARES DE PROPOSITOS MULTIPLES, VOL. III, SEP. 1990; SECPLAN

63. ENCUESTA PERMANENTE DE HOGARES DE PROPOSITOS MULTIPLES, VOL. IV, SEP. 1990; SECPLAN

64. ENCUESTA PERMANENTE DE HOGARES DE PROPOSITOS MULTIPLES, VOL. V, SEP. 1990; SECPLAN

65. STRATEGY FOR 1990-1994 INTEGRAL DEVELOPMENT, HONDURAS; SECPLAN

66. ESTUDIO PARA EL DESARROLLO DE LA TIERRA URBANA EN SAN PEDRO SULA, HONDURAS, VOL. I MAR. 1989; MUNICIPALIDAD DE SAN PEDRO SULA

67. CENSO NACIONAL DE POBLACION Y VIVIENDA 1974, TOMO I RESUMEN POR DEPARTAMENTO Y MUNICIPIO; SECRETARIA DE ECONOMIA

68. CENSO NACIONAL DE VIVIENDA 1974, TOMO II CABECERAS MUNICIPALES; SECRETARIA DE ECONOMIA

69. CENSO NACIONAL DE VIVIENDA, MARZO 1974, TOMO III SUMARIA NACIONAL; SECRETARIA DE ECONOMIA

70. COMPORTAMIENTO DE LA ECONOMIA HONDUREÑA, DURANTE EL TERCER TRIMESTRE DE 1992; BANCO CENTRAL DE HONDURAS

71. INDICADORES ECONOMICOS DE CORTO PLAZO, DICIEMBRE DE 1992; BANCO CENTRAL DE HONDURAS

72. INDICADORES ECONOMICOS DE CORTO PLAZO, ENERO DE 1993; BANCO CENTRAL DE HONDURAS

73. ANUARIO ESTADISTICO 1990; SECPLAN

74. MEMORIA ANUAL 1992; SECOPT

75. BOLETIN ESTADISTICO, VOL. XLII, NO.10 OCT.-1992; BANCO CENTRAL DE HONDURAS

76. ENCUESTA AGRICOLA NACIONAL DE PROPOSITOS MULTIPLES, EAN-1992; SECPLAN

77. ENCUESTA DE GRANOS BASICOS, AGOSTO 1991; SECPLAN

78. ENCUESTA DEGRANOS BASICOS, DICIEMBRE 1991; SECPLAN

79. INFORME DE TRANSITO, VOL.2, 1992; SECOPT