Table 3.5.1 Summary of Rock Test (Detailed Design 1994, and Feasibility Study 1991)

SITE	Hole No.	Sample No.	Depth (m) From	Depth (m) To	Rock Type	Specific Gravity	Water Absorption (%)	Natural Density (gr/cm3)	Unconfined Compressive Strength (kgf/cm2)	Static Elastic Modulus (kgf/cm2)	Tensile Strength (kgf/cm2)	Poisson Ratio	Swelling Pressure (kgf/cm2)	Slaking Durability (%)	Content of Clay Mineral
Daule Peripa-	DP93-1	1	21.3	21.8	Fine SS.	2.758	46.2	1.79	49	12,300	13.0	0.11	0.00	87.0	**Sm/I
La Esperanza	-2	1	23.3	23.7	Md.	2.704	41.5	1.82	103	12,600	6.5	0.20	6.50	-	Sm/I
Diversion Tunnel	-3	1	22.0	22.5	Sandy Md.	2.695	46.9	1.86	60	21,100	14.0	0.25	1.20	73.0	Sm/I
La Esperanza-	SR93-3	1	20.3	20.7	Sandy Md.	2.736	36.5	2.07	63	22,600	16.0	0.21	1.70	79.0	Sm/
Poza Honda	-4	1	33.0	33.5	"	2.768	39.2	2.04	64	12,800	15.0	0.18	0.50	86.0	Sm/I
Transbasin	*B -3	1	39.5	40.0	"	-	24.0	2.00	45	-	-	-	-	-	
(Diversion Tunnel)	* -4	1	39.5	40.0	"	-	22.0	2.10	73	-	-	-	-	-	
	MG93-1	1	24.1	24.5	Muddy SS.	2.608	32.8	2.06	38	7,700	11.0	0.22	0.40	68.0	Sm/I
Poza Honda-	93-3	1	24.2	24.5	"	2.735	39.7	2.00	6	1,900	2.0	0.20	0.20	0.4	Sm/I
Mancha Grande	93-2	1	36.5	37.0	Sandy Md.	2.661	34.9	2.07	80	6,100	12.0	0.21	0.20	12.0	Sm/I
Diversion Tunnel	*B -5	1	21.0	21.5	"	-	21.0	1.90	47	-	-	-	-	-	
	*	2	29.5	30.0	"	-	-	-	46	-	-	-	-	-	
	*B -6	1	28.0	28.5	"	-	30.0	2.00	33	-	-	-	-	-	
La Esperanza-Poza	SR93-1	1	48.3	48.9	Muddy SS.	2.726	4.4	2.00	92	37,500	18.0	0.24	0.26	77.0	Sm/I
Honda Transbasin	2	1	18.3	18.8	Fine SS.	2.657	34.8	2.10	129	56,000	29.0	0.19	0.08	95.0	Sm/I
(Pumping Station	*B -1	1	29.5	29.9	"	-	22.0	1.90	71	-	-	-	-	-	
Head Tank	SR93-5	1	8.7	9.7	Sandy Md.	2.733	39.0	2.00	134	16,500	21.0	0.16	0.10	68.4	Sm/I
Substation)															

Note: * Examination in the Feasibility Study, 1991.
** Sm/I: Smectite (Montmorillonite)/Illite complex

Table 3.5.2 : **Summary of Rock Test (Damle-Peripa-La Esperanza Diversion Tunnel, in the year 1986)**

Hole No.	Sample No.	Depth (m)		Rock Type	Unconfined Compressive Strength (kgf/cm2)	Static Elastic Modulus (kgf/cm2)	Poisson Ratio	Triaxial Shear Test		Swelling Expansion (kgf/cm2)	CaCO3 Content (%)
		From	To					C (kgf/cm2)	ϕ		
Co-1	1	16.55	16.85	Mudstone							
	2	24.65	25.15	"	23	4,500	0.29			0.54	
	3	26.70	26.90	"	45	5,960	0.40	6	48		0.45
Co-2	1	16.30	16.65	"	14	3,500					
	4	35.85	36.05	"	57	12,500	0.38	15	21		
LE-2	3	29.70	30.00	"	28	5,000	0.33				
	5	40.50	40.75	"	65	9,583	0.17				
CO-2	2	25.00	25.20	Sandstone	100	30,000	0.30			0.63	
	3	30.00	30.45	"	53	17,454	0.29			0.39	
LE-2	1	20.50	20.80	"	40	6,666	0.20				
	2	26.70	27.00	"	55	5,750	0.22				6.45
	4	36.70	37.00	"				18	27		
	6	43.20	43.50	"	76	20,000	0.28				
LE-3	1	8.10	8.40	"				18	37		
	2	15.45	15.75	"	17	2,000	0.13				0.45
	3	17.95	18.25	"	63	17,100	0.38				
	4	38.37	38.50	"	144	26,000	0.17				
LE-4	1	60.00	60.30	"	31	5,647	0.05				
	2	68.00	68.30	"	80	22,857	0.50			0.26	0.45
	3	73.60	73.90	"	31	6,300	0.27			0.17	
	4	83.00	85.50	"	18	2,352	0.21				
ME-1	1	20.95	21.25	"	28	4,516	0.03				
	2	25.30	25.60	"	42	2,816	0.03				
	3	17.80	18.10	"	136	10,000	0.06				
	4	18.65	18.95	"	58	4,838	0.15				
	5	23.00	23.30	"	45	1,461	0.46				
ME-2	1	11.80	12.25	"	60	4,109	0.32				
	2	16.30	16.60	"	76	7,207	0.29				
	3	24.15	24.47	"	63	5,084	0.10				
ME-3	1	10.20	10.50	"	61	4,071	0.15				
	2	11.20	11.50	"	90	106,681	0.50				
	3	19.00	19.25	"	53	16,580	0.30				4.05
ME-4	1	12.60	13.00	"	44	4,891	0.04				

Table 3.5.3 Summary of Soil Mechanical Test

SECTOR / LOCATION	CALICATA N° / TEST PIT N°	MUESTRA N° / SAMPLE N°	PROFUNDIDAD / DEPTH	HUMEDAD NATURAL / NATURAL MOISTURE	GRAVEDAD ESPECIFICA / SPECIFIC GRAVITY	GRANULOMETRIA (TAMIZ E HIDROMETRO) / GRAIN SIZE ANALYSIS (SIEVE AND HIDROMETER)			LIMITES DE ATTERBERG / ATTERBERG LIMITS			CLASIFICACION / CLASIFICATION	PESO UNITARIO / UNIT WEIGHT		COMPRESION UNIAXIAL / UNIAXIAL COMPRESSION	ENSAYO TRIAXIAL / TRIAXIAL TEST		CONSOLIDACION / CONSOLIDATION			COMPACTACION PROCTOR / PROCTOR COMPACTION		HINCHAMIENTO / SWELLING		ENCOGIMIENTO / SHRINKAGE			PIN - HOLE / PIN - HOLE	OBSERVACIONES / REMARKS
				W %	C-s gr/cm3	#4 %	#200 %	2/M %	WL %	WP %	IP %	SUCS USCS	HUM gr/cm3	SATUR gr/cm3	qu Kg/cm2	C' Kg/cm2	ø' deg	Pp Kg/cm2	Cc	Cv mm2/min	γmax gr/cm3	Wopt %	P Kg/cm2	V %	Wo %	Lc %	Vc %		
CANAL ABIERTO / OPEN CHANNEL	C-10	M-1	0.50-1.40	31.2	2.768	100	96.0	21	59.0	37.0	22.0	MH	1.54	1.683	1.82	0.90	20°	0.55	0.125	4.046	1.07	44.4	0.20	0.00	59.70	16.53	42.5	NDI	DISTURBADA / DISTURBED
		M-2	2.00-3.00	34.3	2.727	100	98.7	18	55.0	37.0	18.0	MH	1.538	-	-	-	-	-	-	-	-	-	0.40	0.00	62.75	12.98	47.88	ND2	" "
	C-11	M-1	0.55-2.00	37.7	2.606	100	86.9	20	80	54	26	MH	1.558	1.659	1.70	0.70	16°	0.46	0.136	2.62	1.07	45.6	1.25	0.00	57.87	15.80	42.09	NDI	" "
	C-12	M-1	0.60-1.60	32.2	2.679	100	90	14	61	43	18	MH	1.58	1.708	-	-	-	-	-	-	1.13	41.60	1.60	0.00	58.62	25.19	35.15	ND2	" "
		M-2	2.00-3.60	41.6	2.683	100	89	16	71	48	23	MH	1.54	1.684	2.18	0.85	20°	1.05	0.126	4.752	1.09	42.60	1.60	0.00	63.70	21.53	41.19	N D2	" "
	C-13	M-1	0.80-2.00	35.7	2.743	100	97	53	92	47	45	MH	1.566	1.750	2.53	1.00	26°	0.95	0.16	1.92	1.18	36.30	1.35	0.00	90.56	21.12	57.33	NDI	" "
		M-2	2.00-3.50	33.3	2.622	100	99	8.0	78	42	36	MH	-	-	-	-	-	-	-	-	-	-	-	-	61.30	21.99	40.11	NDI	" "
	C-14	M-1	0.90-1.90	31.9	2.598	100	76	19	78	43	35	MH	1.518	1.714	-	-	-	-	-	-	1.16	37.8	0.60	0.00	60.55	32.95	28.24	NDI	" "
		M-2	1.90-3.50	39.7	2.565	100	94	18	78	44	34	MH	1.523	1.708	1.01	1.60	14°	0.72	0.145	5.494	1.16	40.2	0.10	0.00	62.96	31.07	31.17	NDI	" "
	C-15	M-1	0.40-1.00	27.5	2.658	100	76	48	91	39	52	CH	1.399	1.661	1.09	0.70	22°	0.80	0.439	1.531	1.06	34.6	1.50	0.00	86.51	14.75	57.08	NDI	" "
		M-2	1.20-1.60	32.4	2.698	100	98	18	90	44	46	MH	1.400	-	-	-	-	-	-	-	-	-	1.60	0.00	83.36	12.33	57.74	NDI	" "
	C-16	M-1	0.85-1.80	30.1	2.636	100	78	28	62	36	26	MH	1.627	1.794	-	-	-	-	-	-	1.28	32.8	0.75	0.00	53.67	17.39	38.72	NDI	" "
		M-2	2.00-3.50	32.7	2.456	100	95	30	63	34	29	MH	1.642	1.759	1.88	0.70	12°	0.75	0.107	13.91	1.28	31.8	1.65	0.00	55.13	15.40	41.82	NDI	" "
	C-17	M-1	0.40-1.60	23.3	2.623	100	95	30	71	41	30	MH	1.498	1.718	1.66	1.50	11°	0.80	0.243	10.58	1.16	32.3	1.15	0.00	62.52	16.02	44.96	NDI	" "
		M-2	2.00-3.00	28.6	2.680	100	99	43	73	44	29	MH	1.496	-	-	-	-	-	-	-	-	-	1.10	0.00	59.85	18.35	42.47	ND2	" "
	C-18	M-1	0.30-1.60	21.7	2.726	100	95	24	65	35	30	MH	1.528	1.753	2.40	1.20	22°	0.70	0.335	6.224	1.19	34.6	1.30	0.00	67.48	18.28	46.14	NDI	" "
		M-2	2.00-3.50	25.5	2.715	100	95	28	64	36	28	MH	1.527	1.707	-	-	-	-	-	-	1.12	41.6	1.50	0.00	71.44	11.55	53.59	ND2	" "
	C-19	M-1	1.00-1.70	24.3	2.698	100	99	30	45	22	23	CL	1.423	1.831	-	-	-	-	-	-	1.32	29.6	0.30	0.00	48.37	13.83	39.02	NDI	" "
		M-2	1.70-3.60	23.5	2.607	100	58	20	40	21	19	CL	1.423	1.857	2.56	1.65	10°	0.65	0.098	2.443	1.39	30.2	0.30	0.00	44.35	18.28	31.00	NDI	" "
LINEA DE TRANSMISION / TRANSMISSION LINE	C-20	M-1	0.35-1.10	25.7	2.649	100	80	39	49	31	18	ML	1.541	1.728	3.00	1.80	10°	0.75	0.106	7.81	1.17	37.8	0.15	0.00	60.27	19.36	40.73	NDI	" "
	C-21	M-1	0.40-1.00	18.7	2.673	100	50	16	44	28	16	ML	1.668	1.826	0.83	0.40	20°	0.74	0.134	6.18	1.32	31.00	1.10	0.00	42.23	19.99	26.61	NDI	" "
		M-2	1.00-2.15	26.7	2.579	100	88	8	40	22	18	CL	1.670	-	-	-	-	-	-	-	-	-	0.26	0.00	39.31	19.17	25.00	NDI	" "
	C-22	M-1	0.60-0.90	39.64	2.832	100		50	106	58	48	CH	1.673	1.750	13.18	1.10	26°	0.40	0.18	2.597	1.16	38.00	2.49	0.00	95.04	18.09	42.25	NDI	INDISTURBADA / UNDISTURBED
		M-2	1.00-2.35	27.3	2.658	100	49	15	60	29	31	SC	1.660	-	-	-	-	-	-	-	-	-	1.25	0.00	60.22	19.89	39.94	NDI	DISTURBADA / DISTURBED
	C-23	M-1	1.20-1.50	44.03	2.878	-	-	65	114	51	63	CH	1.719	1.757	8.38	2.60	14°	0.60	0.18	2.575	1.16	46.00	1.36	0.00	106.90	27.26	44.25	NDI	INDISTURBADA / UNDISTURBED
		M-2	2.00-2.80	37.7	2.733	100	98	50	74	30	44	CH	1.67	-	-	-	-	-	-	-	-	-	0.75	0.00	77.44	20.27	49.19	NDI	DISTURBADA / DISTURBED
	C-24	M-1	1.50-1.80	41.57	2.803	-	-	53	87	44	43	CH	1.655	1.843	1.97	0.80	14°	0.5	0.15	2.404	1.31	36.00	0.51	0.00	204.98	24.87	44.00	NDI	INDISTURBADA / UNDISTURBED
		M-2	2.50-4.00	57.7	2.681	100	90	33	64	32	32	MH	1.66	-	-	-	-	-	-	-	-	-	0.76	0.00	64.32	16.36	44.57	ND2	DISTURBADA / DISTURBED

PESO UNITARIO TOMADO EN CONDICIONES DE COMPACTACION / UNIT WEIGHT TAKED IN COMPACTION CONDITIONS

Cv. TOMADO ENTRE 4.00 Y 5.00 Kg/cm^2/ Cv.TAKED BETWEN 4.00 AND 5.00 Kg/cm.^{2} CONSOLIDATION

Table 3.6.1 Existing Water Quality Parameters in the Reservoirs

Parameter	Unit	Daule Peripa	La Esperanza	Poza Honda
Total Coliforms	MPN/100ml	2,400	2,400	144
Fecal Coliforms	MPN/100ml	+	+	+
BOD	mg/l	13.95	8.53	10.56
Dissolved Oxygen	mg/l	1.86	6.98	5.85
PH	unit	7.43	7.4	7.7
Chlorides	mg/l	19.17	21.67	17.33
Fluorides	mg/l	0.0	0.0	0.0
Color	units	5.00	10.80	6.67
Turbidity	units	12.33	31.67	11.67
Total Dis. Sol.	mg/l	107.60	228.97	211.19
Total Hardness	mg/l	71.33	177.83	111.50
Borum-Total	mg/l	-	-	-
Manganese-Total	mg/l	0.0	0.0	0.0
Iron as Fe	mg/l	0.54	0.38	0.24
Sodium	mg/l	11.30	32.83	23.50
Sulphate	mg/l	0.0	29.00	14.33
Nitrates	mg/l	1.02	1.25	1.19
Cadmium	mg/l	0.0	0.0	0.0
Calcium	mg/l	14.38	46.17	28.67
Potassium	mg/l	0.0	0.66	2.00
Magnesium	mg/l	8.82	15.50	8.00
Conductivity	Umohs/cm	149.50	516.66	335.37

- Data from water quality analysis and original laboratory report JICA/CRM-1994.

Table 3.6.2 Estimation of Water Quality of la Esperanza and Poza Honda Dams

Item	Discharge (MCM/y)	Water Quality and Load BOD	COD	T-N	T-P
A. La Esperanza Dam					
1) QO(v. from Daule-Peripa)	336				
2) CO (w.q. from Daule Peripa) (mg/l)		13.95	29.25	1.76	0.16
3) LO=QO x CO (t/y)		4,687	9,828	591	54
4) Q1 (inflow to La Esperanza)	391				
5) C1 (w.q. of inflow w.) (mg/l)		8.53	13.46	2.63	0.21
6) L1=Q1 x C1 (t/y)		3,335	5,263	1,028	82
7) C2=(LO+L1)/(QO + Q1) (mg/l) (w.q. of La Esperanza)		11.03	20.76	2.23	0.19
B. Poza Honda Dam					
1) Q3(v. from La Esperanza)	213				
2) C2 (w.q. from La Esperanza) (mg/l)		11.03	20.76	2.23	0.19
3) L3=Q3 x C2 (t/y)		2,349	4,422	475	40.5
4) Q4 (inflow to Poza Honda)	102				
5) C4 (w.q. of inflow w.) (mg/l)		10.56	18.42	2.30	0.20
6) L4=Q4 x C4 (t/y)		1,077	1,879	235	20.40
7) C5=(L3+L4)/(Q3 + Q4) (mg/l) (w.q. of Poza Honda)		10.88	20.00	2.25	0.19

Source: JICA Study Team

Table 3.6.3 Existing and Future River Flow Conditions in the Study Area
- without dilution flow -

	Chone R.						Portoviejo R.					
	(1) River Mouth		(2) Chone Upstream		(3) Carrizal river		(4) Porto'jo downstream		(5) Portoviejo upstream		(6) Chico River	
	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future
I. C. A. (km2)	2,267	2,267	755	755	1,166	1,166	2,060	2,060	1,190	1,190	585	585
II. Discharge (MCM)												
a)Rainy season												
Jan	99.67	99.67	36.54	36.54	61.63	71.93	59.34	63.04	36.23	42.83	17.87	22.42
Feb	220.81	220.81	83.87	83.87	135.30	138.42	94.70	98.62	62.34	68.31	31.29	33.91
Mar	305.52	344.61	101.93	101.93	199.68	252.43	119.71	144.27	80.37	107.73	38.77	44.31
Apr	283.16	322.49	79.81	79.81	179.65	241.54	104.95	129.21	64.96	95.07	32.53	42.47
May	202.85	242.18	33.78	33.78	117.86	190.26	57.55	112.40	44.59	74.71	25.19	40.37
Jun	136.23	136.23	19.22	19.22	77.92	101.32	72.03	76.99	32.13	40.26	18.67	27.50
Sub total	1,248.24	1,365.99	355.15	355.15	772.04	995.90	538.28	624.53	320.62	429.01	164.32	210.98
monthly m	208.04	227.67	59.19	59.19	128.67	165.98	89.71	104.09	53.44	71.50	27.39	35.16
b)Dry seaon												
Jul	90.49	98.76	10.51	10.51	54.53	83.55	61.14	66.76	26.72	36.37	15.32	28.15
Aug	56.87	65.14	5.77	5.77	33.86	69.12	51.08	57.67	21.43	33.62	11.80	27.53
Sep	35.57	43.85	3.36	3.36	20.47	65.40	43.55	52.36	18.54	34.29	10.07	30.36
Oct	21.67	84.42	2.11	2.11	11.59	53.40	37.12	45.48	15.45	29.93	8.31	26.94
Nov	16.72	79.68	2.80	2.80	8.61	41.68	32.40	38.99	13.84	27.27	7.23	21.86
Dec	21.04	83.16	5.72	5.72	11.42	32.95	31.70	36.21	14.64	22.51	7.35	16.18
Sub total	242.36	455.01	30.27	30.27	140.48	346.10	256.99	297.47	110.62	181.99	60.08	151.02
monthly m	40.39	75.84	5.05	5.05	23.41	57.68	42.83	49.58	18.44	30.33	10.01	25.17
Total	1,490.67	1,821.00	385.42	385.42	912.52	1,342.00	795.27	922.00	431.24	611.00	224.39	362.00
monthly m	124.22	151.75	32.12	32.12	76.04	111.83	66.27	76.83	35.94	50.92	18.70	30.17

source: JICA Study Team
(1) Simbocal (St-6)
(2) H. Saida (St-5)
(3) Bachillero (St-4)
(4) Dario Guevara (St-16)
(5) Portoviejo (St-14)
(6) Río Chico (St-11)

Table 3.6.4 Existing and Future River Flow Conditions in the Study Area
- with dilution flow -

	Chone R.						Portoviejo R.					
	(1) River Mouth		(2) Chone Upstream		(3) Carrizal river		(4) Portoviejo downstream		(5) Portoviejo upstream		(6) Chico River	
	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future
I. C. A. (km2)	2,267	2,267	755	755	1,166	1,166	2,060	2,060	1,190	1,190	585	585
II. Discharge (MCM)												
a)Rainy season												
Jan	99.67	99.67	36.54	36.54	61.63	75.40	59.34	70.94	36.23	46.47	17.87	22.82
Feb	220.81	220.81	83.87	83.87	135.30	139.50	94.70	107.00	62.34	71.60	31.29	34.14
Mar	305.52	344.61	101.93	101.93	199.68	257.07	119.71	160.12	80.37	115.18	38.77	44.82
Apr	283.16	322.49	79.81	79.81	179.65	249.64	104.95	143.27	64.96	100.11	32.53	43.33
May	202.85	242.18	33.78	33.78	117.86	201.71	87.55	127.20	44.59	81.57	25.19	41.69
Jun	136.23	136.23	19.22	19.22	77.92	109.42	72.03	87.57	32.13	44.74	18.67	28.27
Sub total	1,248.24	1,365.99	355.15	355.15	772.04	1,032.74	538.28	696.10	320.62	459.67	164.32	215.07
monthly m	208.04	227.67	59.19	59.19	128.67	172.12	89.71	116.02	53.44	76.61	27.39	35.85
b)Dry season												
Jul	90.49	102.97	10.51	10.51	54.53	93.59	61.14	78.77	26.72	41.69	15.32	29.27
Aug	56.87	69.36	5.77	5.77	33.86	81.32	51.08	71.73	21.43	40.34	11.80	28.90
Sep	35.57	48.37	3.36	3.36	20.47	80.95	43.55	71.16	18.54	42.97	10.07	32.12
Oct	21.67	116.39	2.11	2.11	11.59	67.87	37.12	63.34	15.45	37.91	8.31	28.56
Nov	16.72	111.13	2.80	2.80	8.61	53.13	32.40	53.05	13.84	31.57	7.23	23.13
Dec	21.04	114.80	5.72	5.72	11.42	40.40	31.70	45.85	14.64	26.85	7.35	16.95
Sub total	242.36	563.01	30.27	30.27	140.48	417.26	256.99	383.9	110.62	221.33	60.08	158.93
monthly m	40.39	93.84	5.05	5.05	23.41	69.54	42.83	63.98	18.44	36.89	10.01	26.49
Total	1,490.60	1,929.00	385.42	385.42	912.52	1,450.00	795.27	1,080.00	431.24	681.00	224.40	374.00
monthly m	124.22	160.75	32.12	32.12	76.04	120.83	66.27	90.00	35.94	56.75	18.70	31.17

source: JICA Study Team
(1) Simbocal (St-6)
(2) H. Saida (St-5)
(3) Bachillero (St-4)
(4) Dario Guevara (St-16)
(5) Portoviejo (St-14)
(6) R°o Chico (St-11)

Table 3.7.1 Allocation of CRM's Workforce

Category	Permanent Professional/ Administrative	Worker/Labor		Contract		TOTAL
		Permanent	Temporary	Skilled	Unskilled	
CRM (Headquarters)	213	314	211	5	-	743
Poza Honda	39	175	59	1	-	274
Chone	18	44	16	1	3	82
La Estancilla	20	51	20	-	-	91
PHIMA	11	1	3	5	-	20
PFI	4	-	-	-	-	4
Other Agencies	4	14	7	0	0	25
Total	309	599	316	12	3	1,239

Source: CRM, Informacion Basica, March 1993.

Table 3.7.2 CRM's Receipt and Expenditure

(Unit: S/.million)

Item	Year					
	1987	1988	1989	1990	1991	1992
A. Receipt						
1. Actual Current Tributary	634	980	3,391	2,963	4,267	5,538
2. Actual Current Non-Tributary	2	33	77	20	33	70
3. Current Transfer	959	553	806	1,162	1,602	1,321
4. Capital Transfer	115	1,178	1,011	829	3,212	6,942
5. Finance Accounts	1,199	46	80	3	1,850	108
6. Balance in Banks and Petty Cash	30	27	3	118	198	770
Total	2,939	2,817	5,368	5,095	11,162	14,749
B. Expenditures						
1. Remunerations	284	450	715	976	1,785	2,978
2. Services	293	675	1,009	344	704	1,396
3. Consumables and Materials	30	143	376	373	585	672
4. Office Furniture	47	44	157	109	175	334
5. Acquisition of Real Estate and Livestock Property	2	2	-	9	45	89
6. Construction and Other Investments	1,642	535	1,946	1,373	5,176	6,530
7. Amortization and Loans	389	604	421	746	463	522
8. Current Transfer	227	290	545	762	1,215	2,016
9. Global Budget	47	91	119	181	-	-
Total	2,961	2,834	5,288	4,873	10,148	14,537

Source: CRM, "Liquidaciones anuales de los presupuestos del CRM"

Table 4.1.1 Design Values of Base Rock (Daule-Peripa~La Esperanza and La Esperanza~ Poza Honda Diversion Tunnels)

		Case A-1	Case A-2	Case A-3	Case A-4
1.	Overburden (m)	60	140	250	320
2.	Elastic Modulus E (kgf/cm^2)	10,000	20,000	20,000	22,000
3.	Cohesion C (kgf/cm^2)	2.5	5.0	5.0	5.0
4.	Internal Friction Angle (degree)	35	40	40	40
5.	Unit Weight (t/m^3)	1.7	1.8	1.8	1.8
6.	Poisson's Ratio	0.25	0.2	0.2	0.2
7.	Creep				
	α	0.50	0.5	0.5	0.5
	β (5 days loading)	0.016	0.033	0.033	0.036
8.	Initional Stress				
	a) Vertical σy (t/m^2)	1/ 102	2/ 252	3/ 450	4/ 576
	b) Horizontal σx (t/m^2)	1/ 71	2/ 176	3/ 315	4/ 403

1/ $\sigma y = 1.7\ t/m^3 \times 60\ m = 102\ t/m^2$

1/ $\sigma x = \lambda \cdot \sigma y = 0.7 \times 102\ t/m^2 = 71\ t/m^2$

2/ $\sigma y = 1.8\ t/m^3 \times 140\ m = 252\ t/m^2$

2/ $\sigma x = \lambda \cdot \sigma y = 0.7 \times 252\ t/m^2 = 176\ t/m^2$

3/ $\sigma y = 1.8\ t/m^3 \times 250\ m = 450\ t/m^2$

3/ $\sigma x = \lambda \cdot \sigma y = 0.7 \times 450\ t/m^2 = 315\ t/m^2$

4/ $\sigma y = 1.8\ t/m^3 \times 320\ m = 576\ t/m^2$

4/ $\sigma x = \lambda \cdot \sigma y = 0.7 \times 576\ t/m^2 = 403\ t/m^2$

Table 4.1.2 Design Values of Base Rock
(Poza Honda ~ Mancha Grande Diversion Tunnel)

		Case B-1	Case B-2
1.	Overburden (m)	60	300
2.	Elastic Modulus E (kgf/cm^2)	10,000	20,000
3.	Cohesion C (kgf/cm^2)	2.0	5.0
4.	Internal Friction Angle (degree)	30	40
5.	Unit Weight (t/m^3)	1.8	2.0
6.	Poisson's Ratio	0.25	0.2
7.	Creep		
	α	0.50	0.5
	β (5 days loading)	0.016	0.033
8.	Initional Stress		
	a) Vertical σy (t/m^2)	1/ 108	2/ 600
	b) Horizontal σx (t/m^2)	1/ 76	2/ 420

1/ $\sigma y = 1.8\ t/m^3 \times 60\ m = 108\ t/m^2$

$\sigma x = \sigma x = \lambda \cdot \sigma y = 0.7 \times 108 = 76\ t/m^2$

2/ $\sigma y = 2.0\ t/m^3 \times 300\ m = 600\ t/m^2$

$\sigma x = \sigma x = \lambda \cdot \sigma y = 0.7 \times 600\ t/m^2 = 420\ t/m^2$

Table 4.1.3 Summary of Structural Analysis Results on primary lining (1/2)

CASE A-1 (t = 10 cm)

Elapsed time from tunneling	Shotcrete			Judgment	Rock Bolt	Judgment
	N (ton)	M (tm)	s (kgf/cm^2)		Tensile Force (ton)	
Immediately after	33.9	0.030	35.7	satisfied	3.4	satisfied
1 month after	46.5	0.043	49.1	satisfied	4.3	satisfied
2 months after	57.5	0.054	60.8	satisfied	4.8	satisfied
3 months after	64.4	0.062	68.1	satisfied	5.2	satisfied
6 months after	72.8	0.071	77.0	satisfied	5.5	satisfied
12 month after	75.3	0.073	79.7	satisfied	5.6	satisfied

CASE A-2 (t = 10 cm)

Elapsed time from tunneling	Shotcrete			Judgment	Rock Bolt	Judgment
	N (ton)	M (tm)	s (kgf/cm^2)		Tensile Force (ton)	
Immediately after	46.7	0.094	52.3	satisfied	4.9	satisfied
1 month after	83.6	0.049	86.5	satisfied	7.6	satisfied
2 months after	103.4	0.061	107.1	satisfied	8.5	satisfied
3 months after	110.8	0.066	114.7	satisfied	8.8	satisfied
6 months after	114.9	0.069	119.0	satisfied	9.0	satisfied
12 month after	115.1	0.069	119.2	satisfied	9.0	satisfied

CASE A-3 (t = 10 cm)

Elapsed time from tunneling	Shotcrete			Judgment	Rock Bolt	Judgment
	N (ton)	M (tm)	s (kgf/cm^2)		tensile Force (ton)	
Immediately after	83.4	0.167	93.4	satisfied	8.8	satisfied
1 month after	149.2	0.088	154.5	satisfied	13.6	satisfied
2 months after	184.6	0.110	191.2	satisfied	15.2	satisfied
3 months after	197.8	0.118	204.9	satisfied	15.8	satisfied
6 months after	205.2	0.123	212.5	unsatisfied	16.1	satisfied
12 month after	205.6	0.123	212.9	unsatisfied	16.1	satisfied

Remark. N: Axial force
M: Bending moment
s: Compressive stress
Allowable stress: sa = 210 kgf/cm^2 (shotcrete)
Tensile Strength = 17.6 ton (rock bolt)

Table 4.1.3 Summary of Structural Analysis Results on primary lining (2/2)

CASE A-4 (t = 15 cm)

Elapsed time from tunneling	Shotcrete			Judgment	Rock Bolt	Judgment
	N (ton)	M (tm)	s (kgf/cm^2)		Tensile Force (ton)	
Immediately after	130.0	0.673	104.6	satisfied	9.9	satisfied
1 month after	210.2	1.140	170.6	satisfied	15.4	satisfied
2 months after	293.1	0.373	205.4	satisfied	16.9	satisfied
3 months after	310.4	0.398	217.6	unsatisfied	17.5	satisfied
6 months after	318.9	0.411	223.6	unsatisfied	17.7	unsatisfied
12 month after	319.3	0.411	223.8	unsatisfied	17.7	unsatisfied

CASE B-1 (t = 10 cm)

Elapsed time from tunneling	Shotcrete			Judgment	Rock Bolt	Judgment
	N (ton)	M (tm)	s (kgf/cm^2)		Tensile Force (ton)	
Immediately after	27.6	0.108	34.0	satisfied	3.0	satisfied
1 month after	42.8	0.069	46.9	satisfied	3.8	satisfied
2 months after	52.0	0.093	57.6	satisfied	4.2	satisfied
3 months after	50.1	0.239	64.5	satisfied	4.5	satisfied
6 months after	56.4	0.280	73.2	satisfied	4.8	satisfied
12 month after	58.3	0.292	75.8	satisfied	4.9	satisfied

CASE B-2 (t = 15 m)

Elapsed time from tunneling	Shotcrete			Judgment	Rock Bolt	Judgment
	N (ton)	M (tm)	s (kgf/cm^2)		Tensile Force (ton)	
Immediately after	129.6	0.763	106.8	satisfied	9.7	satisfied
1 month after	240.2	0.338	169.2	satisfied	14.6	satisfied
2 months after	288.2	0.470	204.7	satisfied	16.0	satisfied
3 months after	306.1	0.519	217.9	unsatisfied	16.6	satisfied
6 months after	316.1	0.546	225.3	unsatisfied	16.9	satisfied
12 month after	316.6	0.548	225.7	unsatisfied	16.9	satisfied

Remark. N: Axial force
M: Bending moment
s: Compressive stress
Allowable stress : sa = 210 kgf/cm^2 (shotcrete)
: Tensile strength = 17.6 ton (rock bolt)

Table 4.1.4 Maximum Compressive, Maximum Tensile and Maximum Shear Stress acting on the Lining Concrete.

Case of Analysis	Maximum Compressive Stress (kgf/cm^2)	Judgment	Maximum Tensile Stress (kgf/cm^2)	Judgment	Maximum Shear Stress (kgf/cm^2)		Judgment
					Limited Part	Average in Section	
Case A-1	16.9	satisfied	0.8	satisfied	8.1	6.5	satisfied
Case A-2	13.2	satisfied	0.3	satisfied	6.4	5.3	satisfied
Case A-3	19.6	satisfied	0.5	satisfied	9.5	8.4	satisfied
Case A-4	19.5	satisfied	0.4	satisfied	9.4	8.4	satisfied
Case B-1	14.7	satisfied	1.2	satisfied	7.0	5.1	satisfied
Case B-2	20.1	satisfied	0.7	satisfied	9.6	8.0	satisfied

Table 4.7.1 Operation and Maintenance Cost Except Energy Cost for Pumping

1. Personnel Cost

	Nos.	Months	Monthly Rate (US$)	Amount (1,000 US$)
Senior Staff	4	12	2,000	96
Professional Staff				
Conguillo	6	12	1,000	72
Severino	10	12	1,000	120
Poza Honda	6	12	1,000	72
Supporting Staff				
Conguillo	10	12	300	36
Severino	20	12	300	72
Poza Honda	10	12	300	36
Total-1				504

2. O&M Equipment & Tools

	Amount
Purchase (Depreciation base)	100
Operation	20
Maintenance	20
Materials	20
Total-2	160

3. Vehicles

	Nos.	Months	Rate	Amount
Purchase (Depreciation)	10	12	400	48
Running	10	12	500	60
Total-3				108

4. Office Running Cost

	Months	Monthly Cost	Amount
Severino	12	2,000	24
Conguillo & Poza Honda	24	1,000	24
Total-4			48
TOTAL (1 + 2 + 3 + 4)			820

Table 4.7.2 Energy Cost for Pumping at Demand Level of 2020

Average Water Volume to be pumped: 207 MCM/year

Normal pumping discharge Q = 16 m^3/s

Annual operation hours:

$$\frac{207,000,000}{16 \times 3,600} = 3,594 \text{ hrs/year}$$

Average pumping head: 60 m

Average pumping power requirement

P = nrQH = 13 x 16 x 60 = 12,480 kW

Average pumping energy:

E = p x (Operation hours) = 12,480 x 3,594

= 44.85 Gwh

Assumed power rate: US$ 0.06/kWh

Annual energy cost

44.85 Gwh x US$ 0.06/kW = US$ 2.69 million

FIGURES

FIGURE 2.3.1

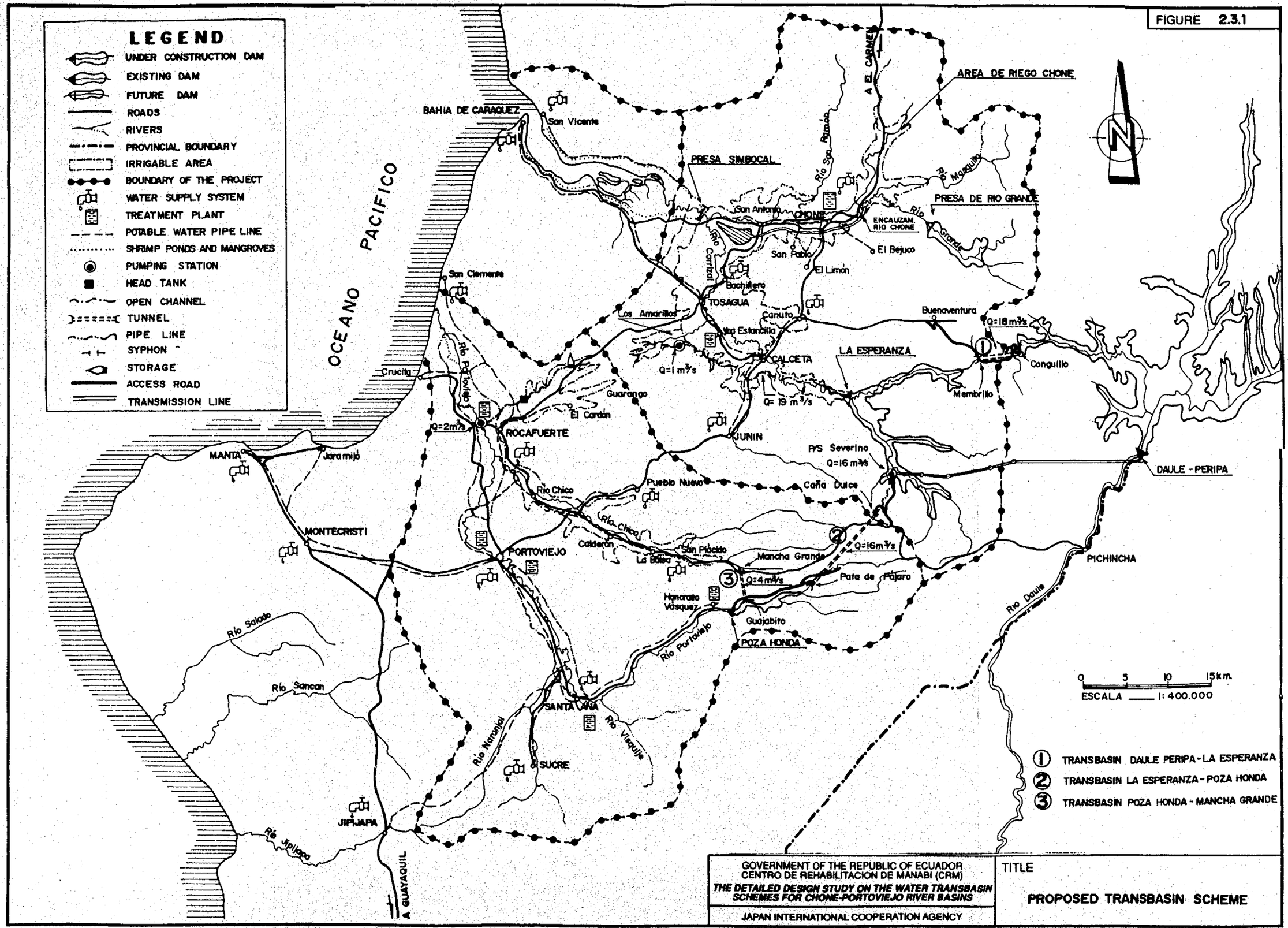
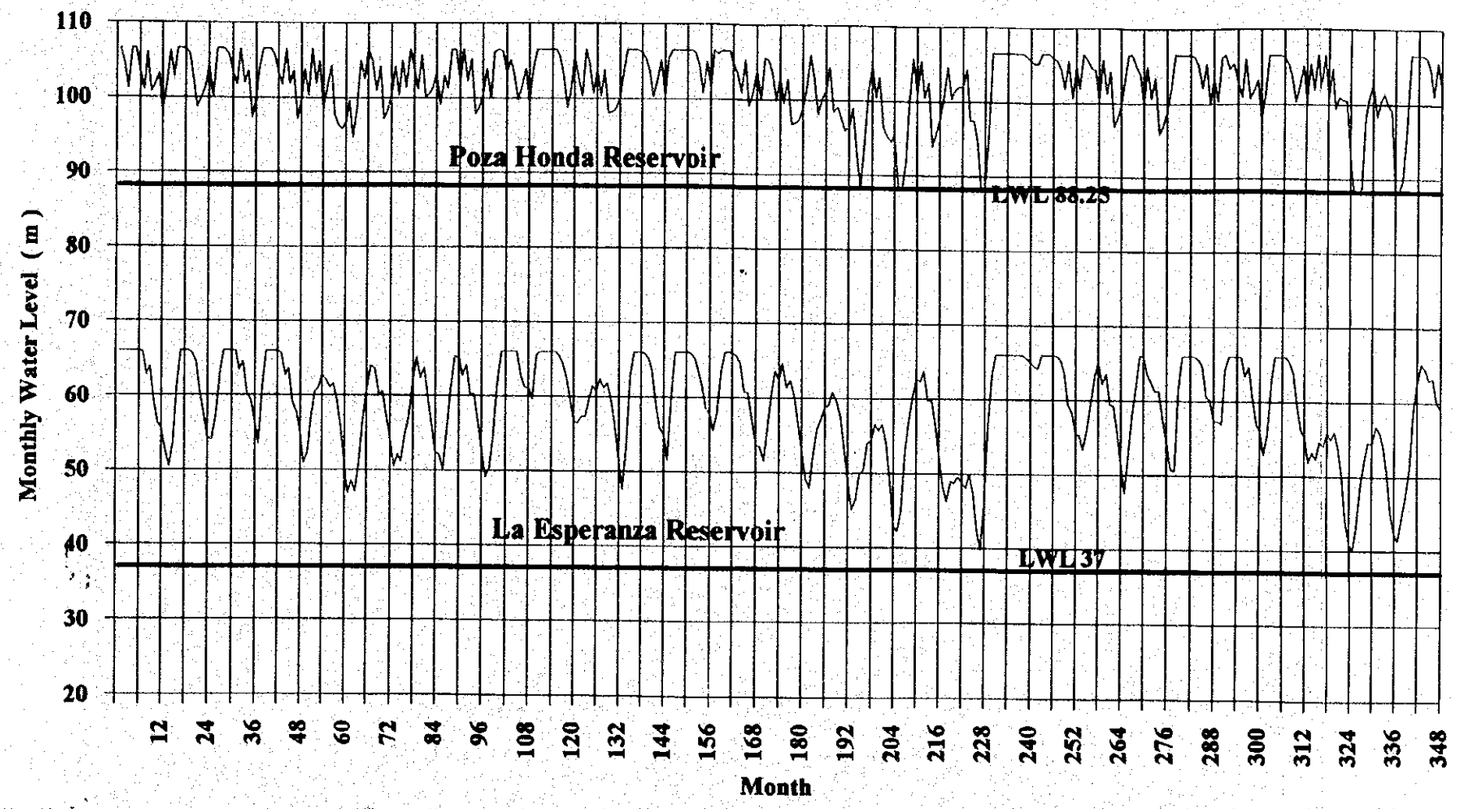
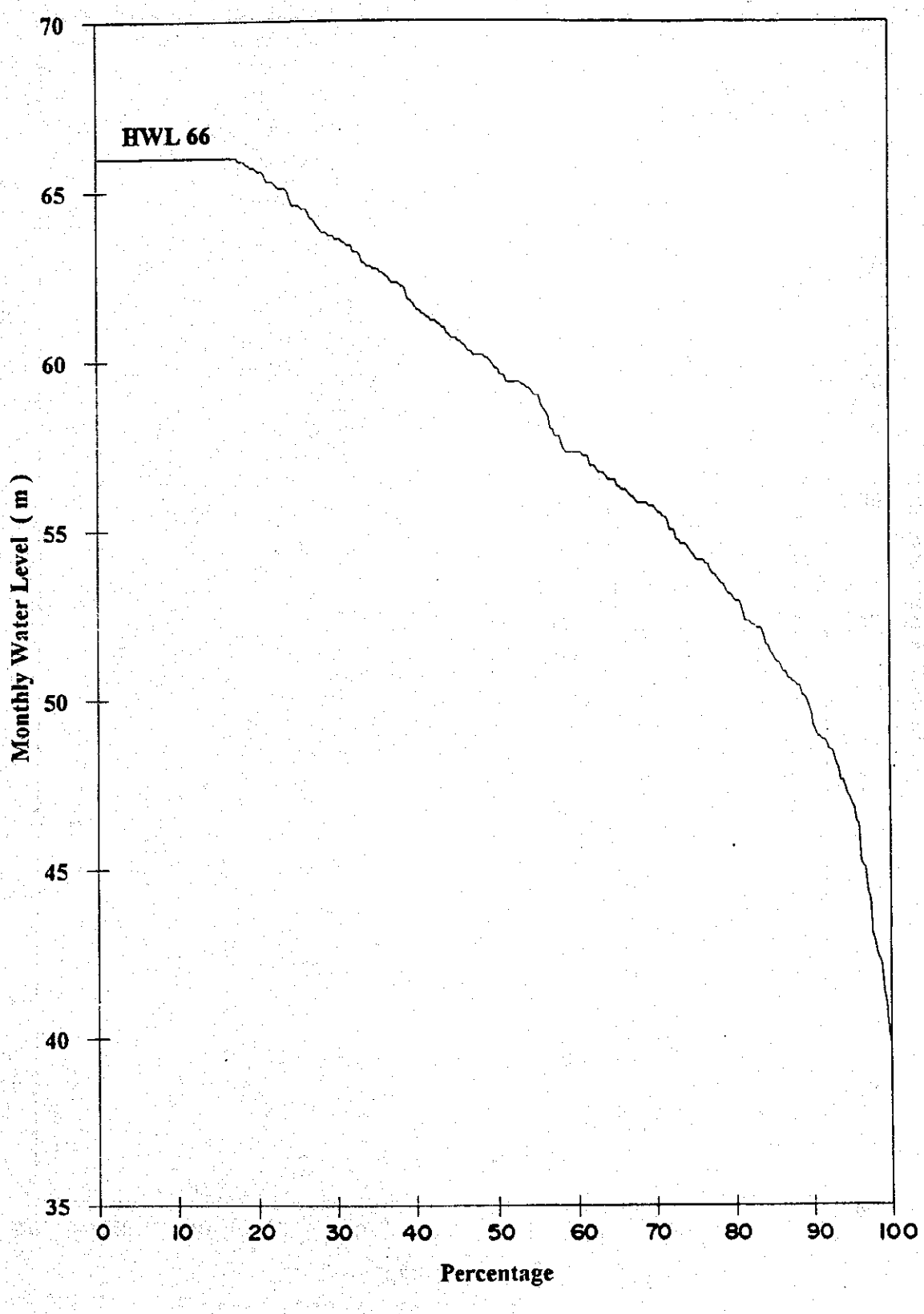

LEGEND
UNDER CONSTRUCTION DAM
EXISTING DAM
FUTURE DAM
ROADS
RIVERS
PROVINCIAL BOUNDARY
IRRIGABLE AREA
BOUNDARY OF THE PROJECT
WATER SUPPLY SYSTEM
TREATMENT PLANT
POTABLE WATER PIPE LINE
SHRIMP PONDS AND MANGROVES
PUMPING STATION
HEAD TANK
OPEN CHANNEL
TUNNEL
PIPE LINE
SYPHON
STORAGE
ACCESS ROAD
TRANSMISSION LINE
OCEANO PACIFICO
BAHIA DE CARAQUEZ
San Vicente
PRESA SIMBOCAL
Río San Pablo
A EL CARMEN
AREA DE RIEGO CHONE
Río Mosquito
PRESA DE RIO GRANDE
Río Grande
ENCAUZAM. RIO CHONE
CHONE
San Antonio
Río Carrizal
San Pablo
El Bejuco
El Limón
San Clemente
Bachillero
TOSAGUA
Los Amarillos
Canuto
Buenaventura
Q=18 m³/s
Hda Estancilla
CALCETA
LA ESPERANZA
Río Portoviejo
Crucita
Q=1 m³/s
Guarango
El Cardón
Q= 19 m³/s
Membrillo
Conguillo
Q=2m³/s
ROCAFUERTE
JUNIN
P/S Severino
Q=16 m³/s
DAULE - PERIPA
MANTA
Jaramijó
Río Chico
Pueblo Nuevo
Caña Dulce
MONTECRISTI
PORTOVIEJO
Calderón
La Bilsa
San Plácido
Río Chico
Mancha Grande
Q=16m³/s
PICHINCHA
Pata de Pájaro
Q=4m³/s
Hcnrato Vásquez
Guajabito
POZA HONDA
Río Daule
Río Salado
Río Portoviejo
Río Sancan
SANTA ANA
Río Naranjal
Río Viejulle
SUCRE
JIPIJAPA
Río Jipijapa
A GUAYAQUIL
0 5 10 15km.
ESCALA 1: 400.000
① TRANSBASIN DAULE PERIPA-LA ESPERANZA
② TRANSBASIN LA ESPERANZA-POZA HONDA
③ TRANSBASIN POZA HONDA-MANCHA GRANDE
GOVERNMENT OF THE REPUBLIC OF ECUADOR
CENTRO DE REHABILITACION DE MANABI (CRM)
THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS
JAPAN INTERNATIONAL COOPERATION AGENCY
TITLE
PROPOSED TRANSBASIN SCHEME

FIGURE 2.3.2



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*	TITLE **RESERVOIR OPERATION CURVES, LA ESPERANZA AND POZA HONDA RESERVOIRS TRANSBASIN DISCHARGE, Q=16m³/s**
JAPAN INTERNATIONAL COOPERATION AGENCY	

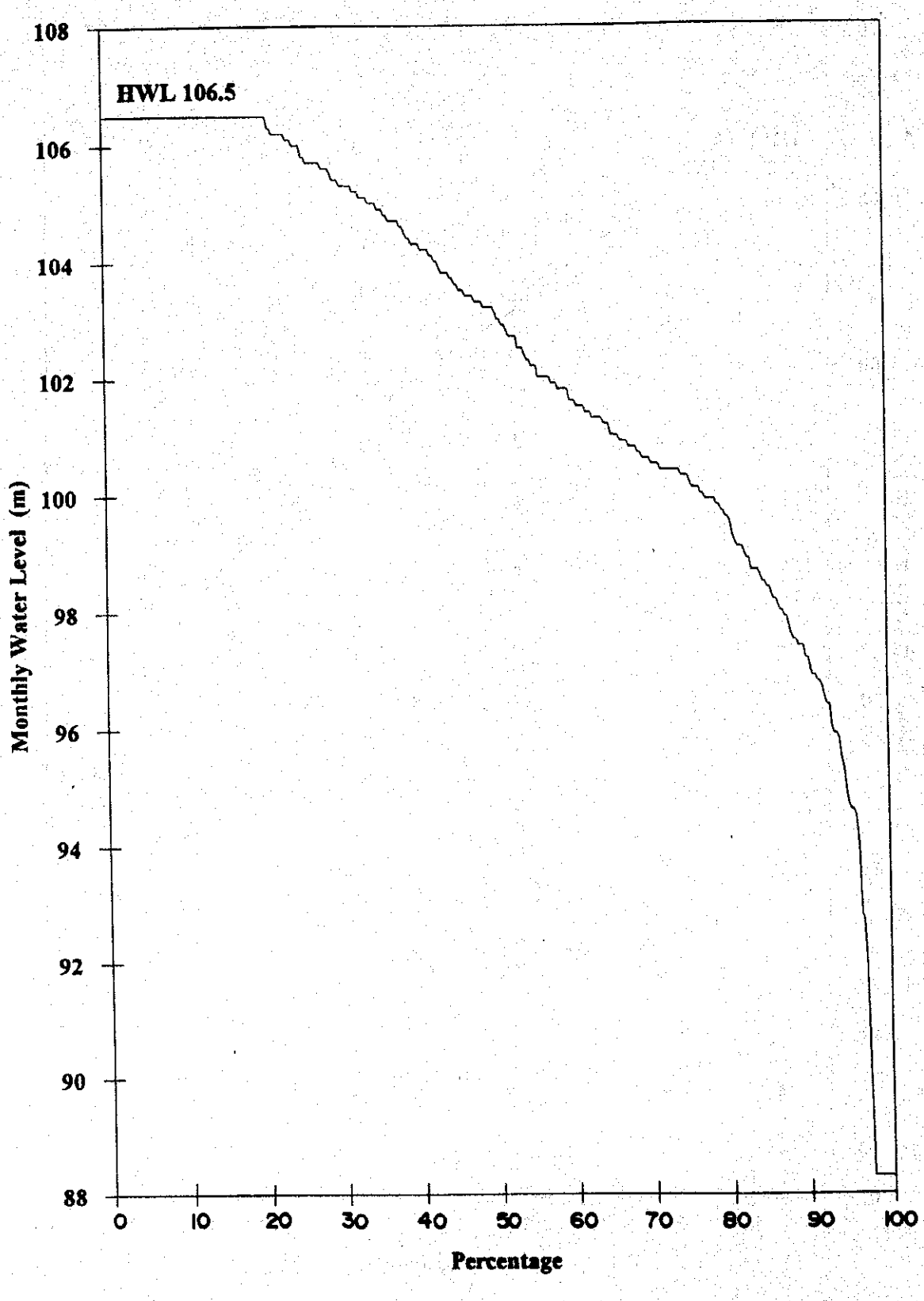
FIGURE 2.3.3



GOVERNMENT OF THE REPUBLIC OF ECUADOR
CENTRO DE REHABILITACION DE MANABI (CRM)
THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS
JAPAN INTERNATIONAL COOPERATION AGENCY

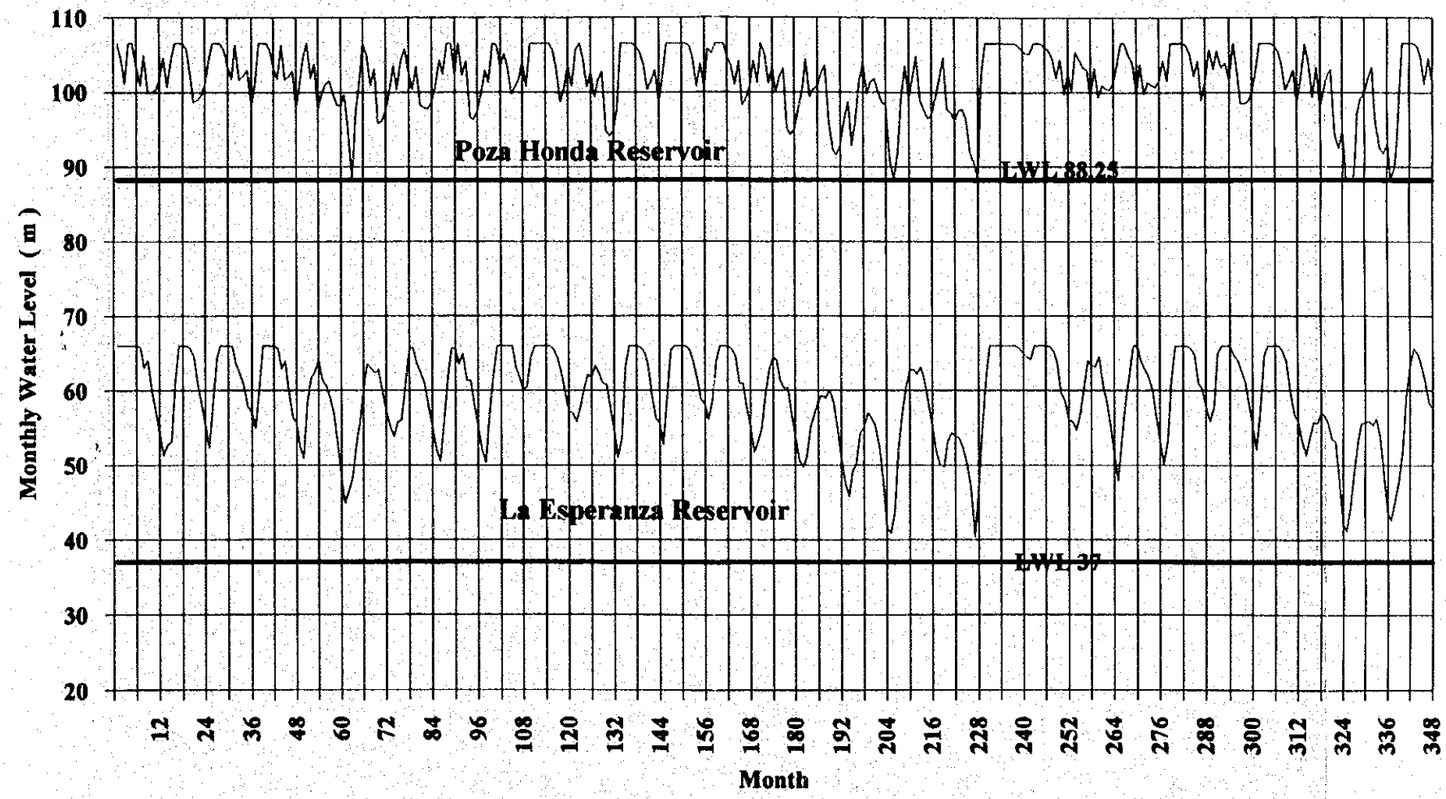
TITLE
DURATION CURVE OF RWL (LA ESPERANZA)
TRANSBASIN DISCHARGE, Q = 16 m³/s

FIGURE 2.3.4



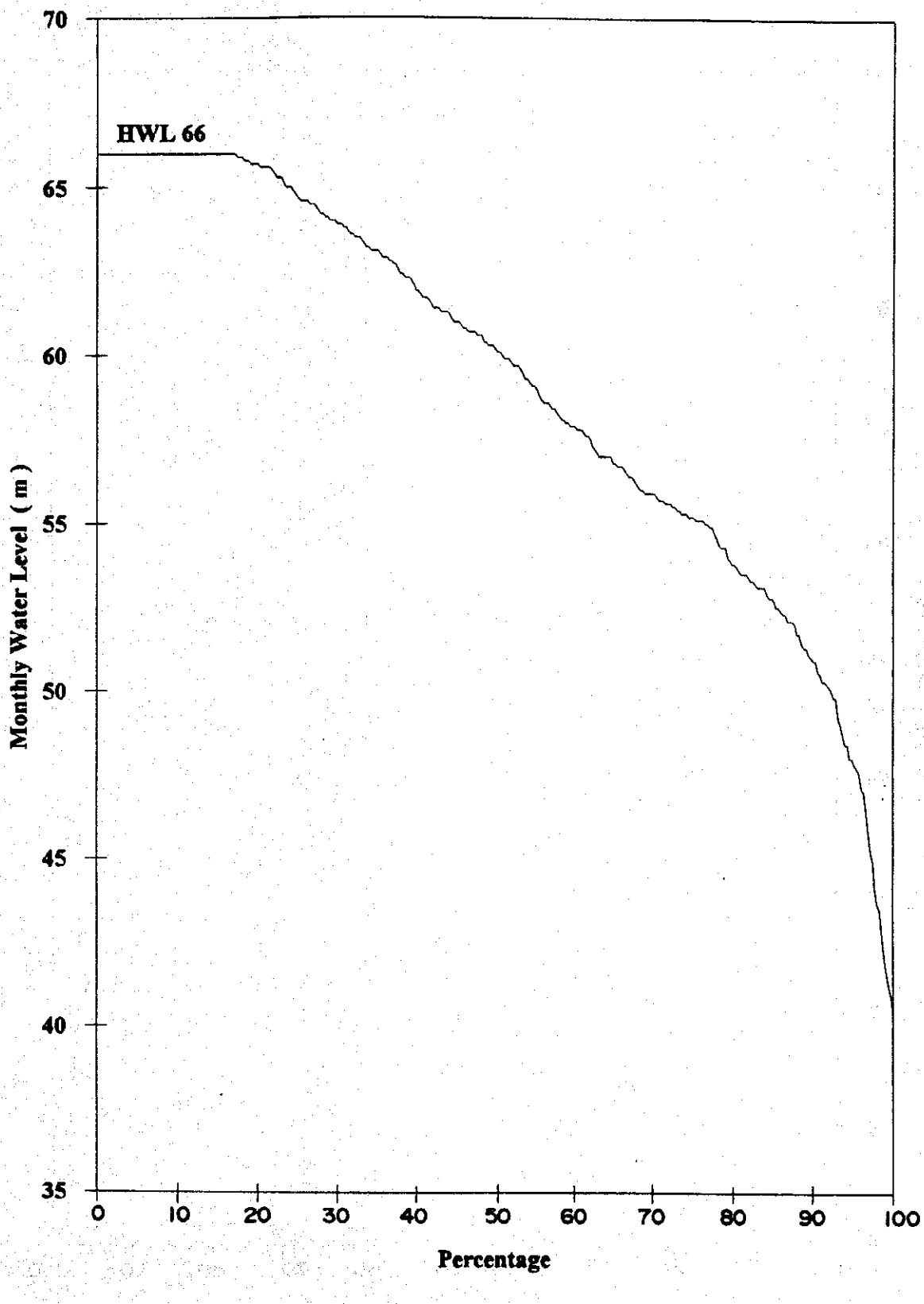
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **DURATION CURVE OF HWL (POZA HONDA) TRANSBASIN DISCHARGE, Q= 16 m³/s**

FIGURE 2.3.5



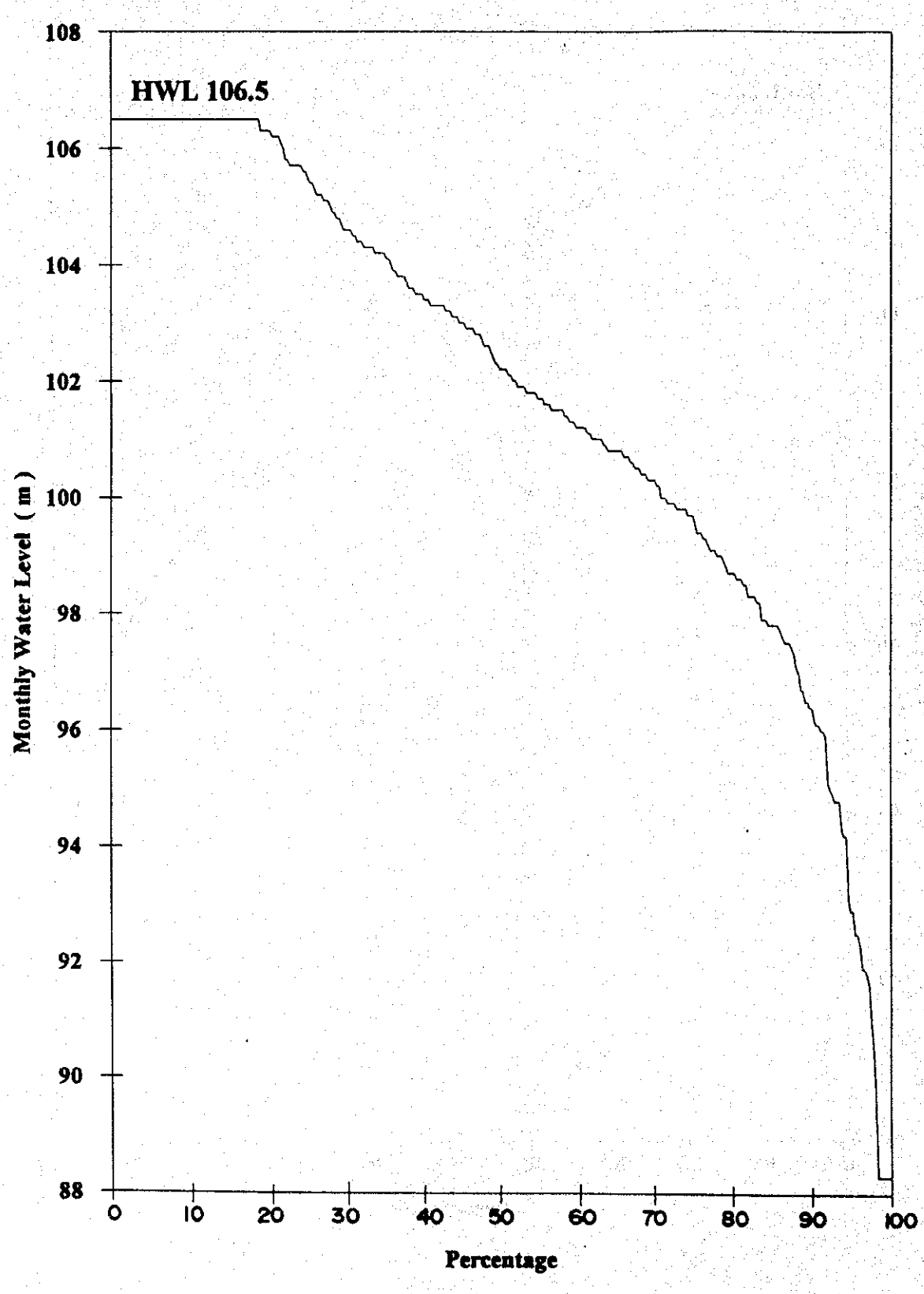
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **RESERVOIR OPERATION CURVES, LA ESPERANZA AND POZAHONDA RESERVOIRS TRANSBASIN DISCHARGE, Q=14 m³/s**

FIGURE 2.3.6



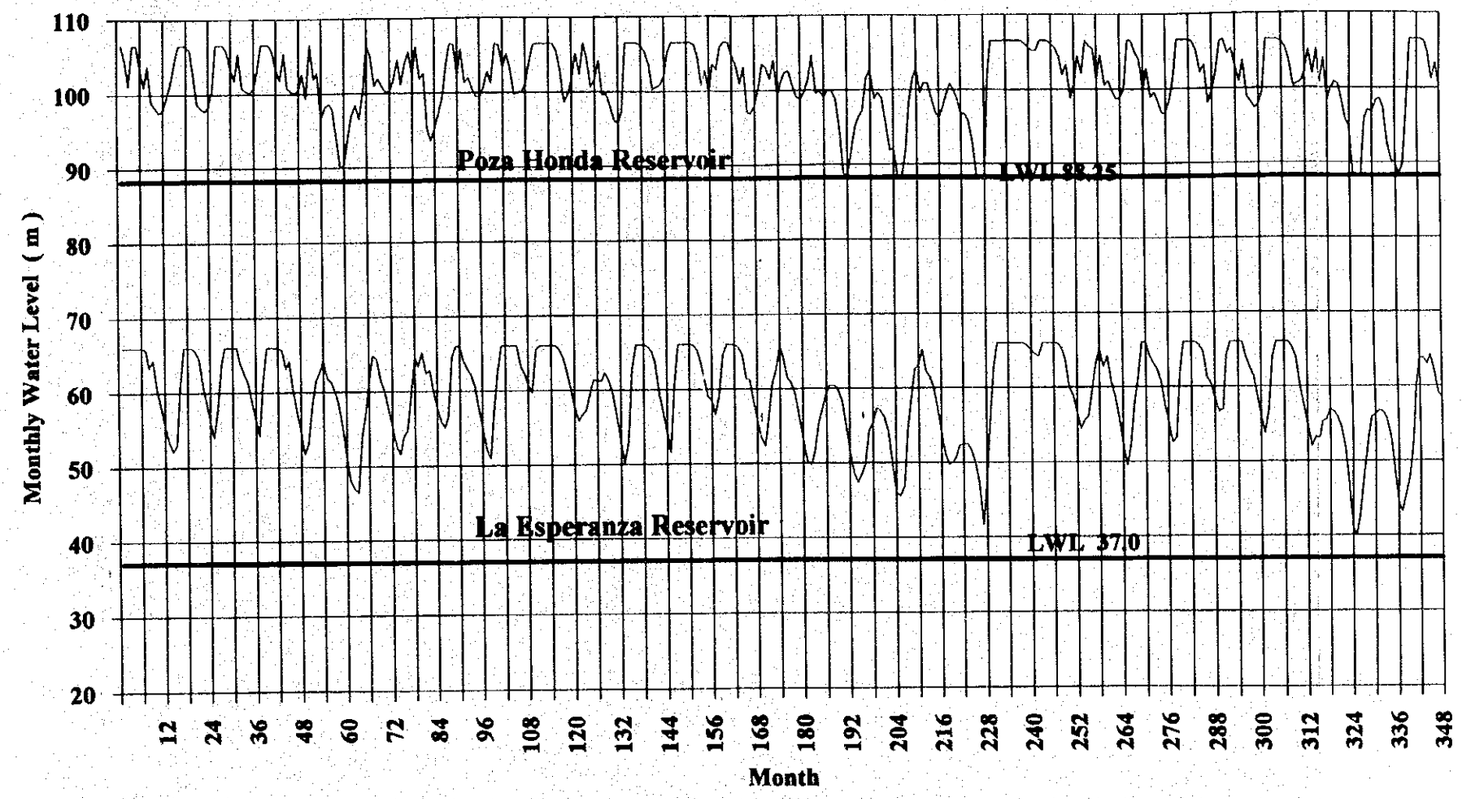
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE DURATION CURVE OF RWL (LA ESPERANZA) TRANSBASIN DISCHARGE, Q=14 m³/s

FIGURE 2.3.7



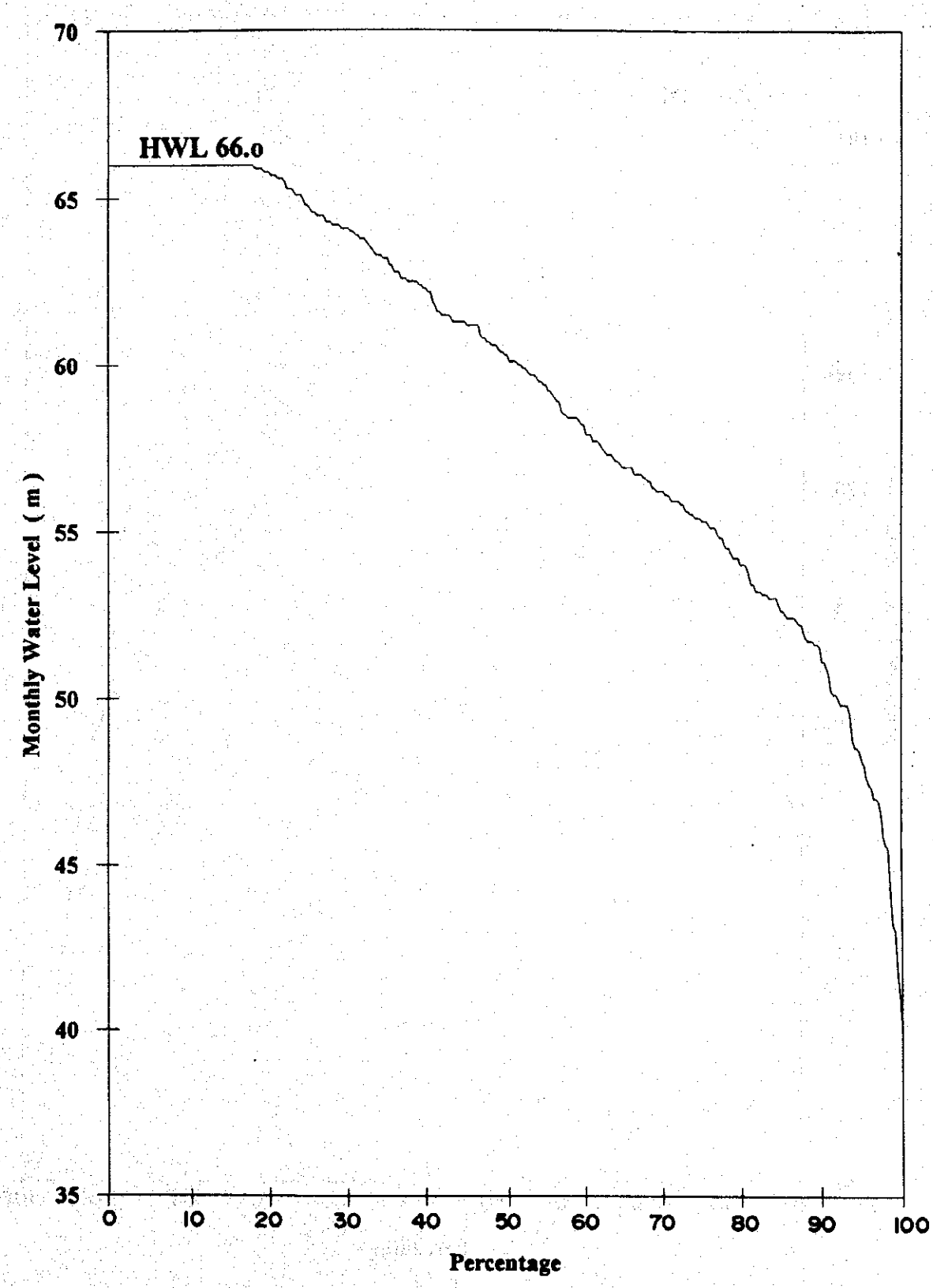
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **DURATION CURVE OF RWL (POZA HONDA) TRANSBASIN DISCHARGE, Q= 14 m³/s**

FIGURE 2.3.8



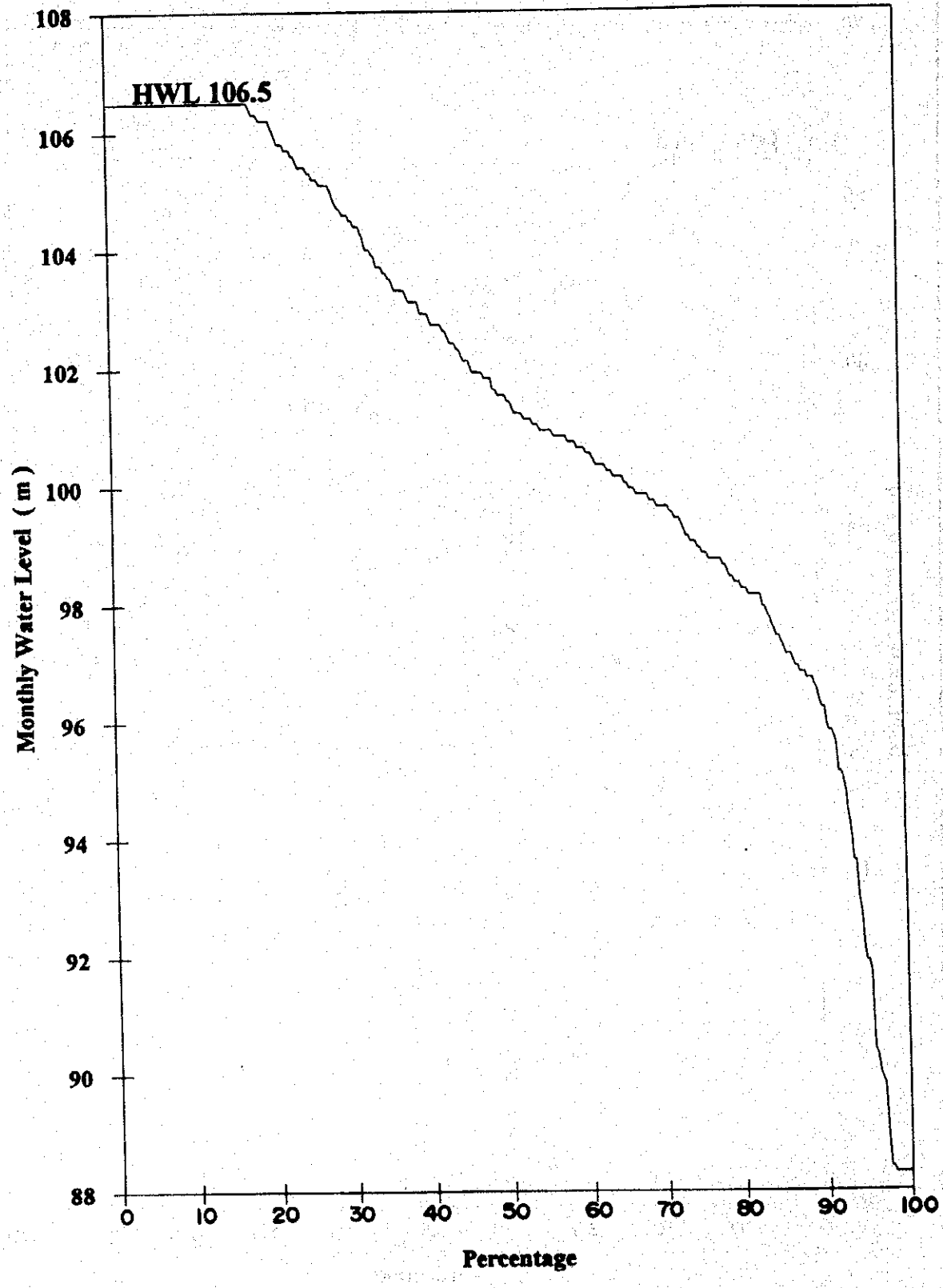
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **RESERVOIR OPERATION CURVES** **LA ESPERANZA AND POZA HONDA RESERVOIRS** **TRANSBASIN DISCHARGE, Q = 12 m^3/s**

FIGURE 2.3.9



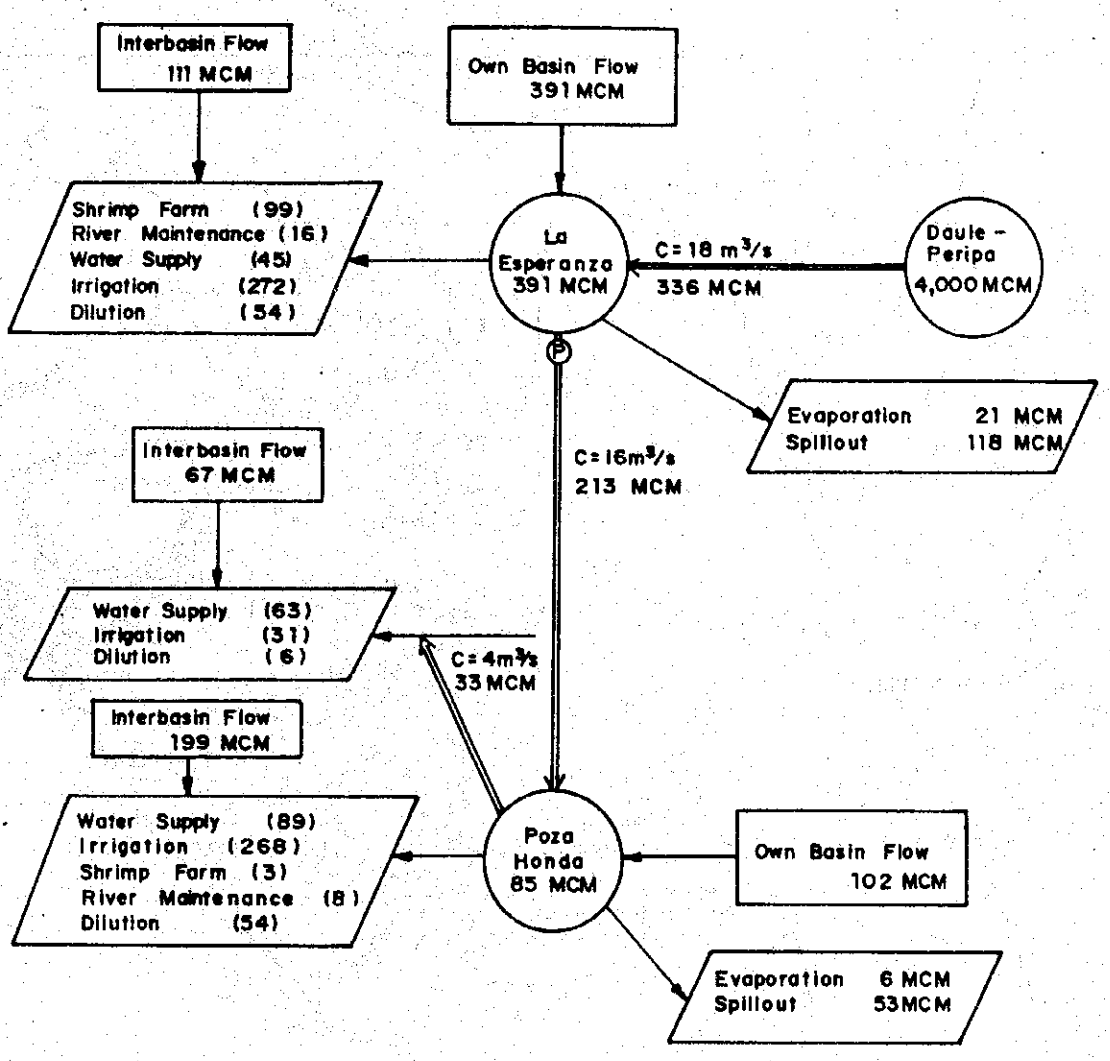
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **DURATION CURVE OF RWL (LA ESPERANZA) TRANSBASIN DISCHARGE, Q=12 m³/s**

FIGURE 2.3.10



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRIM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **DURATION CURVE OF RWL (POZA HONDA) TRANSBASIN DISCHARGE, Q = 12 m³/s**

FIGURE 2.3.11



Legend :

- Reservoir / Effective reservoir capacity
- Own basin flow and interbasin flow
- Transbasin
- Movement of water
- Water demand or loss
- Ⓟ Pumping station
- Figures in parenthesis ; Water demand in MCM/year
- C : Transbasin capacity

GOVERNMENT OF THE REPUBLIC OF ECUADOR
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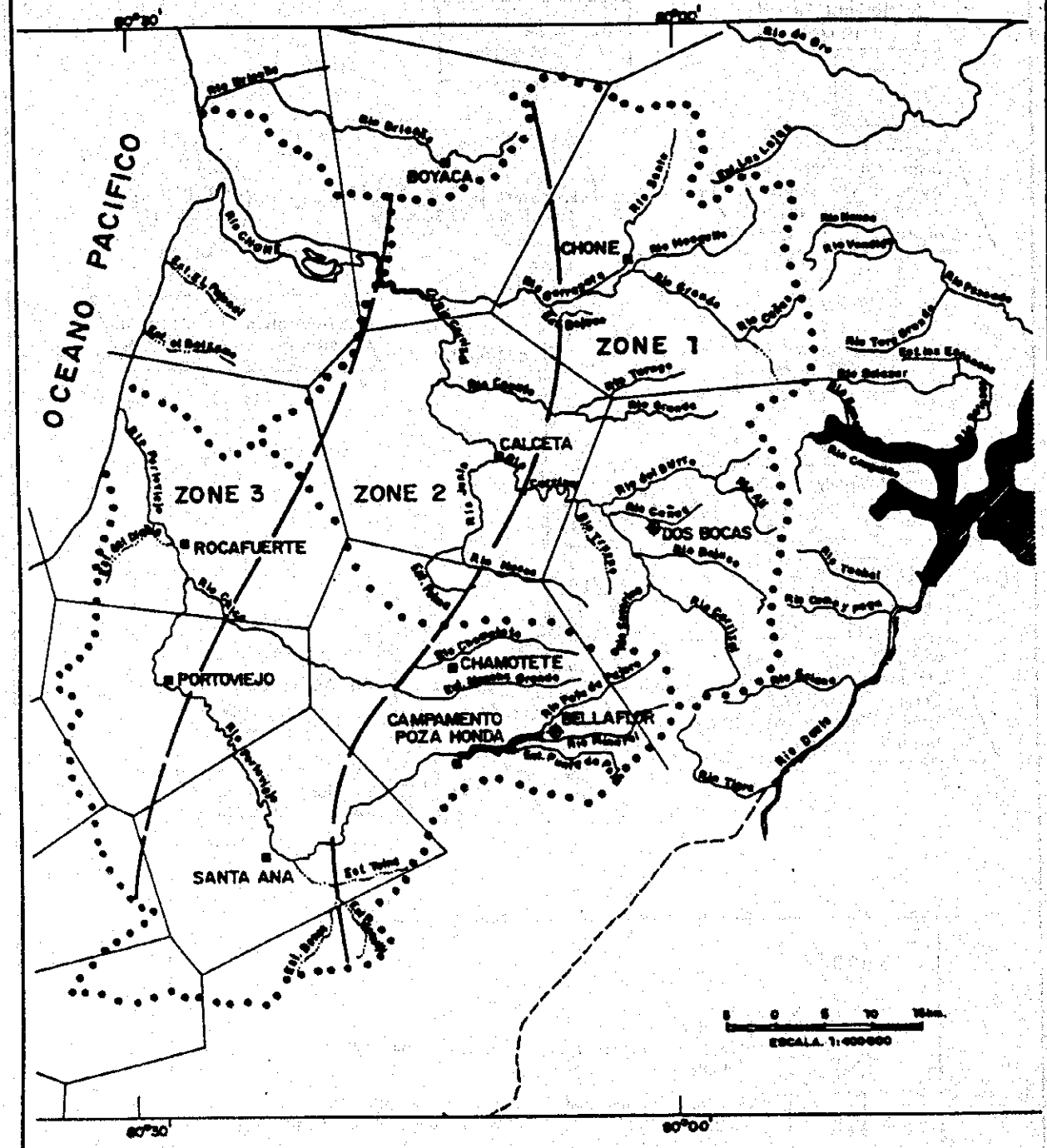
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE

SCHEMATIC WATER BALANCE

FIGURE 3.2.1

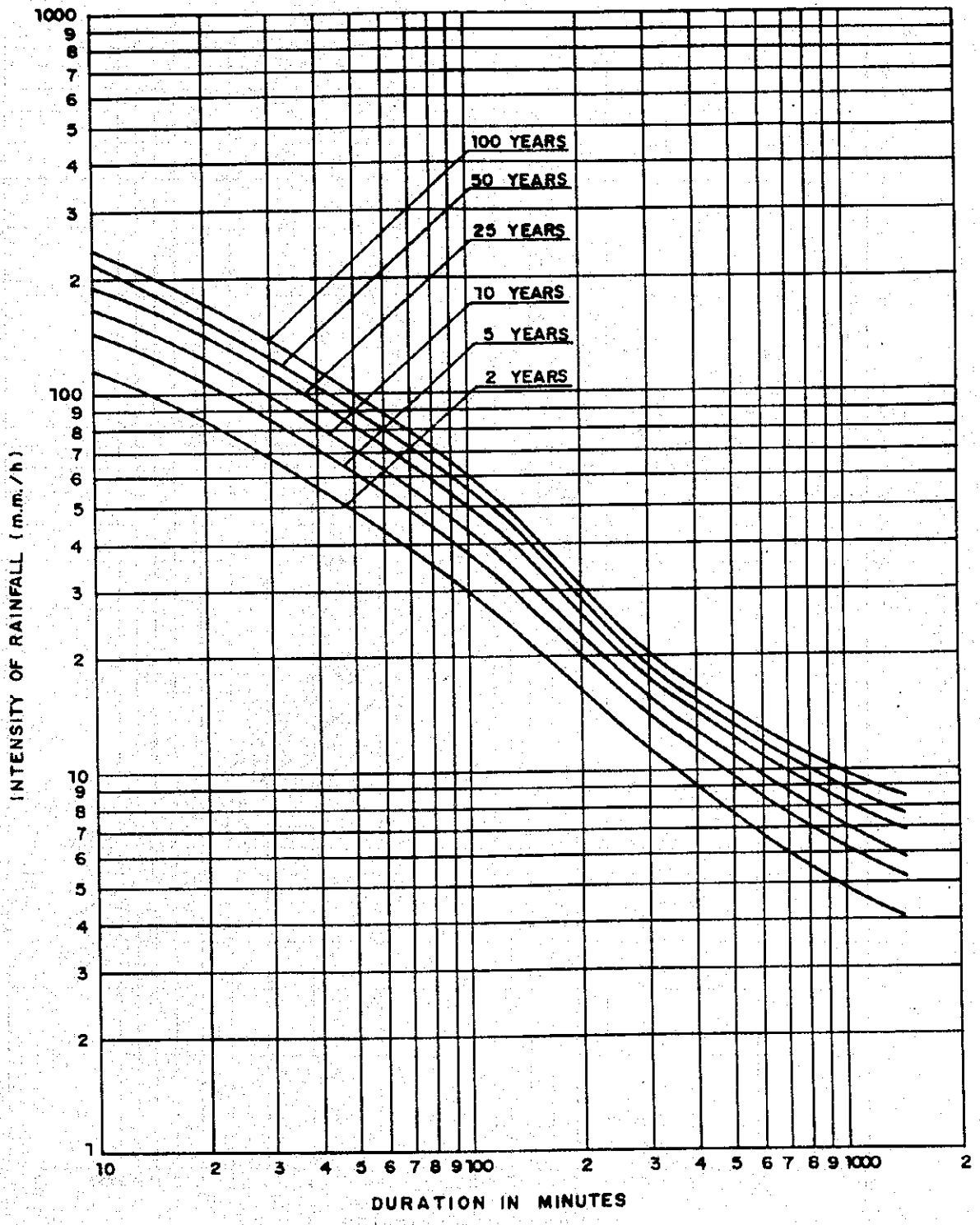


GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Location of Meteorological Stations and Zoing of Rainfall Intensity

FIGURE 3.2.2

INTENSITY OF RAINFALL-DURATION-FREQUENCY CURVES

ZONE 1

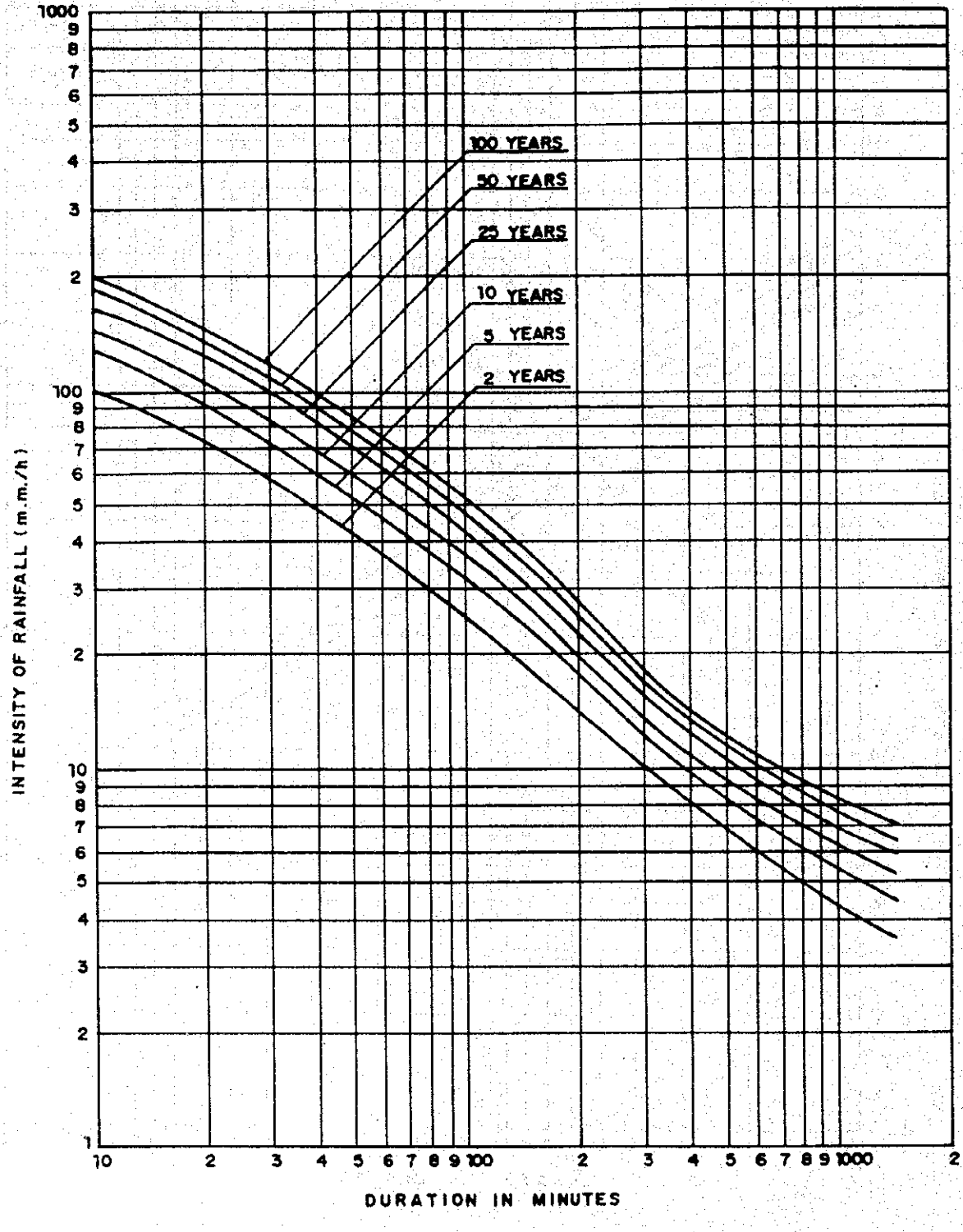


GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Intensity of Rainfall-Duration-Frequency Curves Zone 1

FIGURE 3.2.3

INTENSITY OF RAINFALL-DURATION-FREQUENCY CURVES

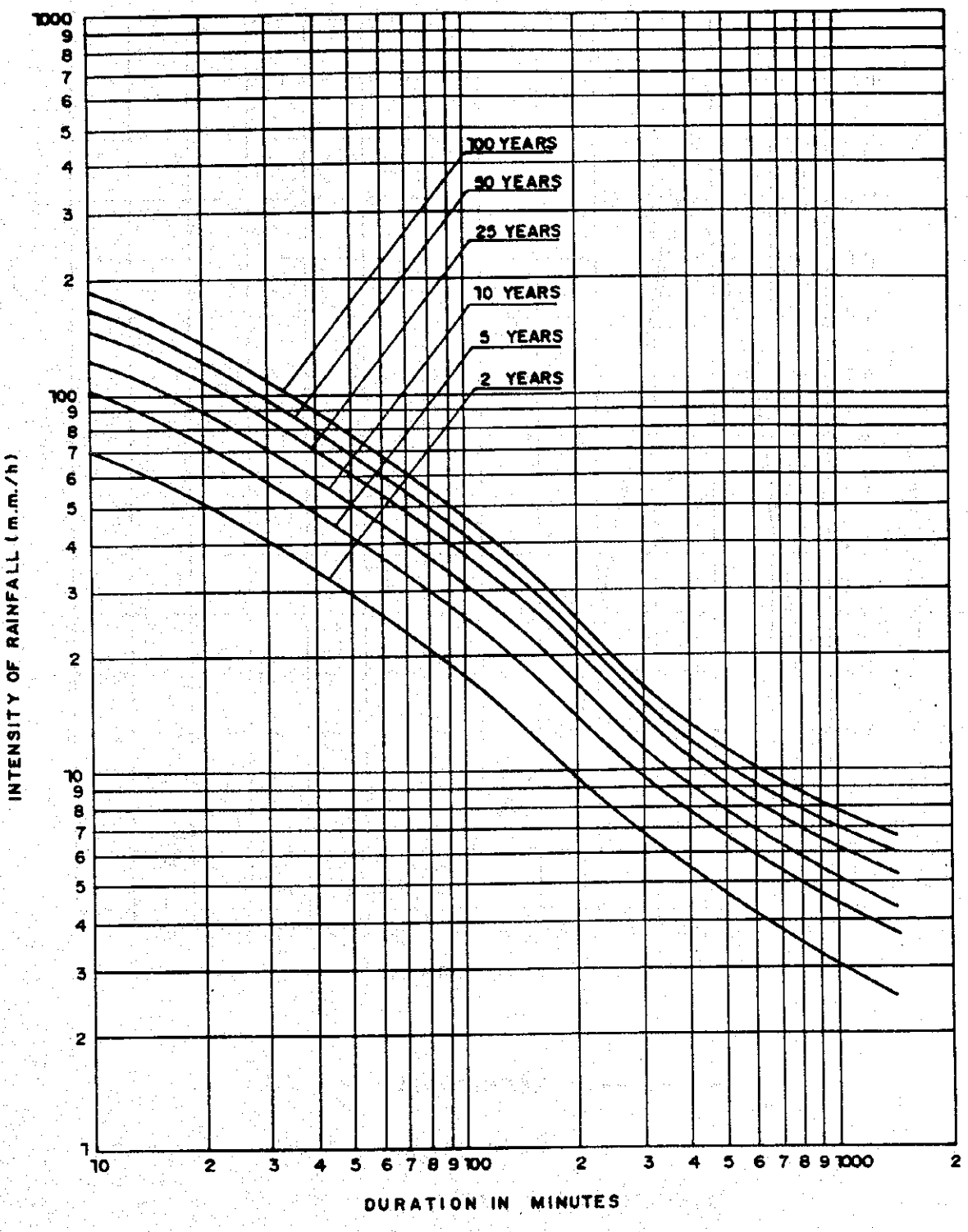
ZONE 2



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Intensity of Rainfall-Duration-Frequency Curves Zone 2

FIGURE 3.2.4

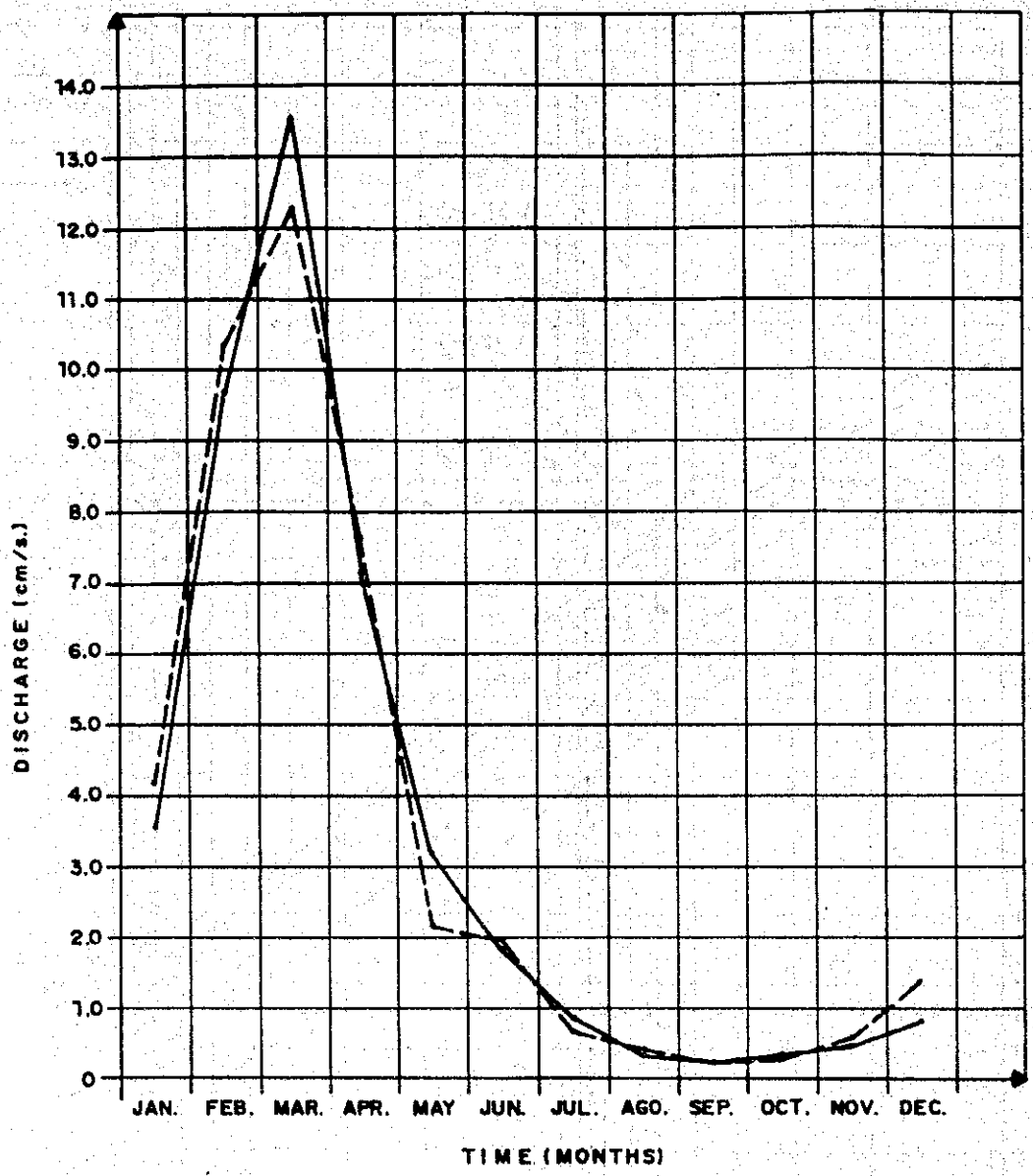
INTENSITY OF RAINFALL - DURATION - FREQUENCY CURVES
ZONE 3



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Intensity of Rainfall-Duration-Frequency Curves Zone 3

FIGURE 3.2.5

STATION: RIO GRANDE A.J. MOSQUITO



——— REGISTERED

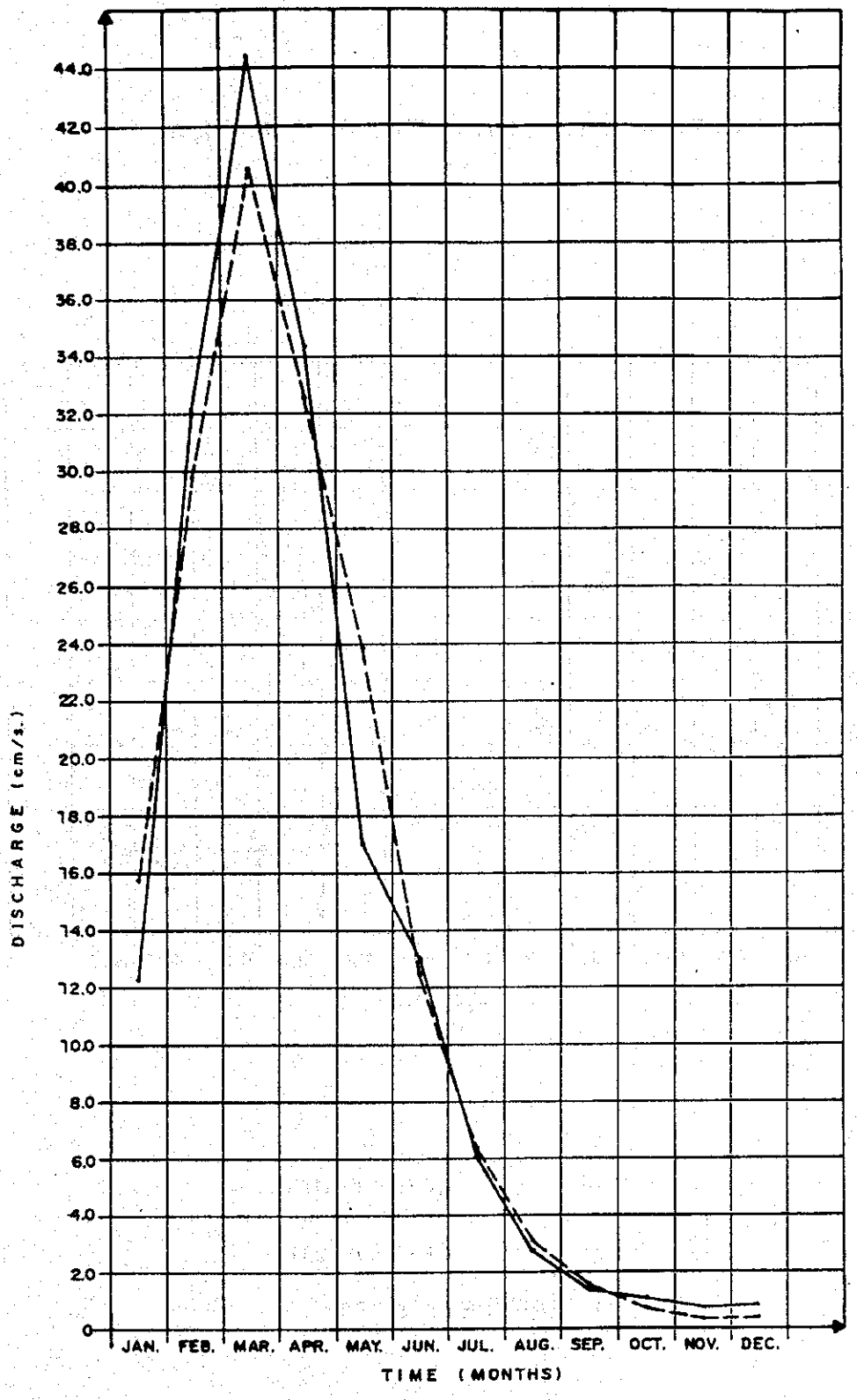
– – – – – SIMULATED

DIFFERENCE = 0.47 %

GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Fitting of Model, Grande River at A.J. Mosquito Station

FIGURE 3.2.6

STATION : RIO CARRIZAL EN CALCETA



——— REGISTERED

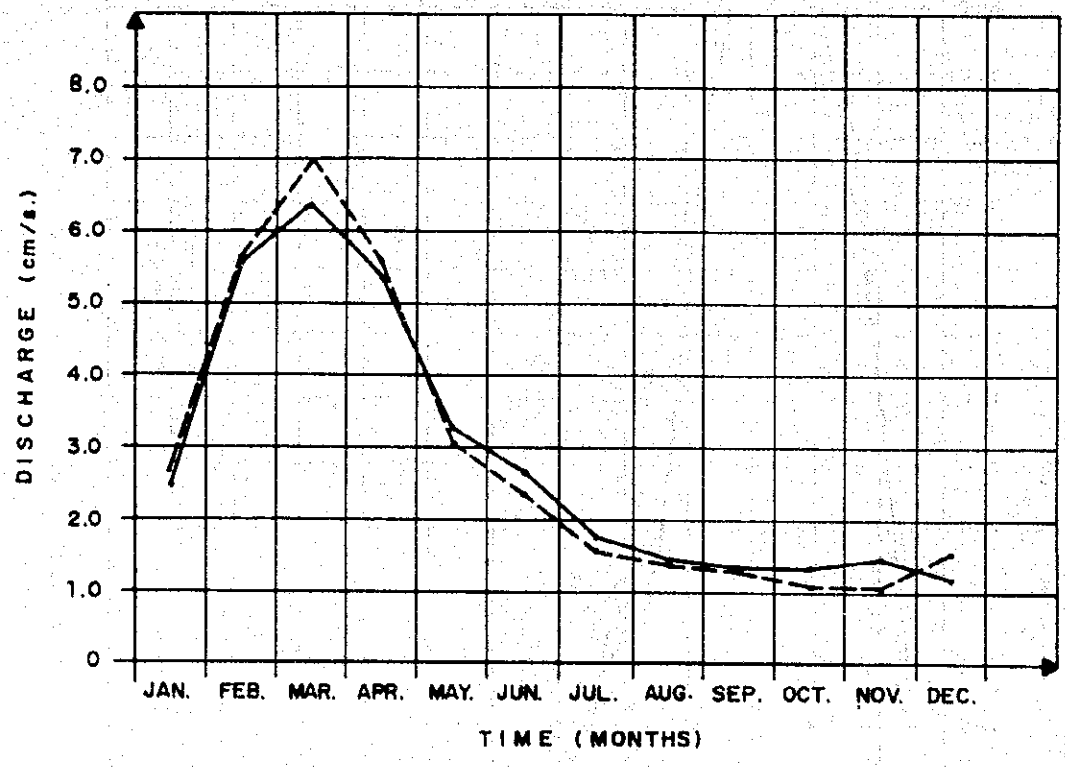
– – – – – SIMULATED

DIFFERENCE = 0.26 %

GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Fitting of Model, Carrizal River at Calceta Station

FIGURE 3.2.7

STATION: RIO CHICO EN ALAJUELA



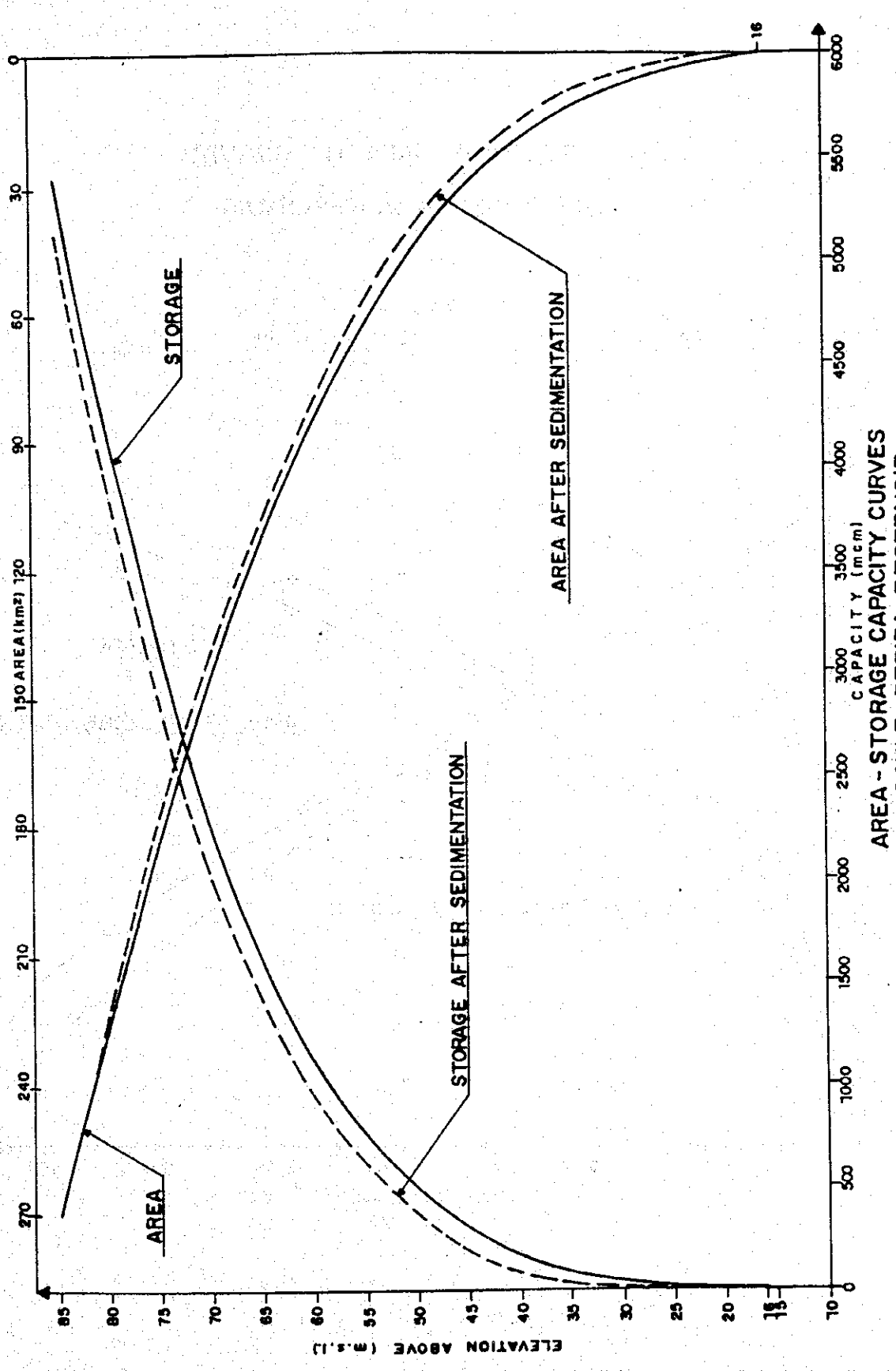
——— REGISTERED

– – – – – SIMULATED

DIFFERENCE = 0.17 %

GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Fitting of Model, Chico River at Alajuela Station

FIGURE 3.3.1

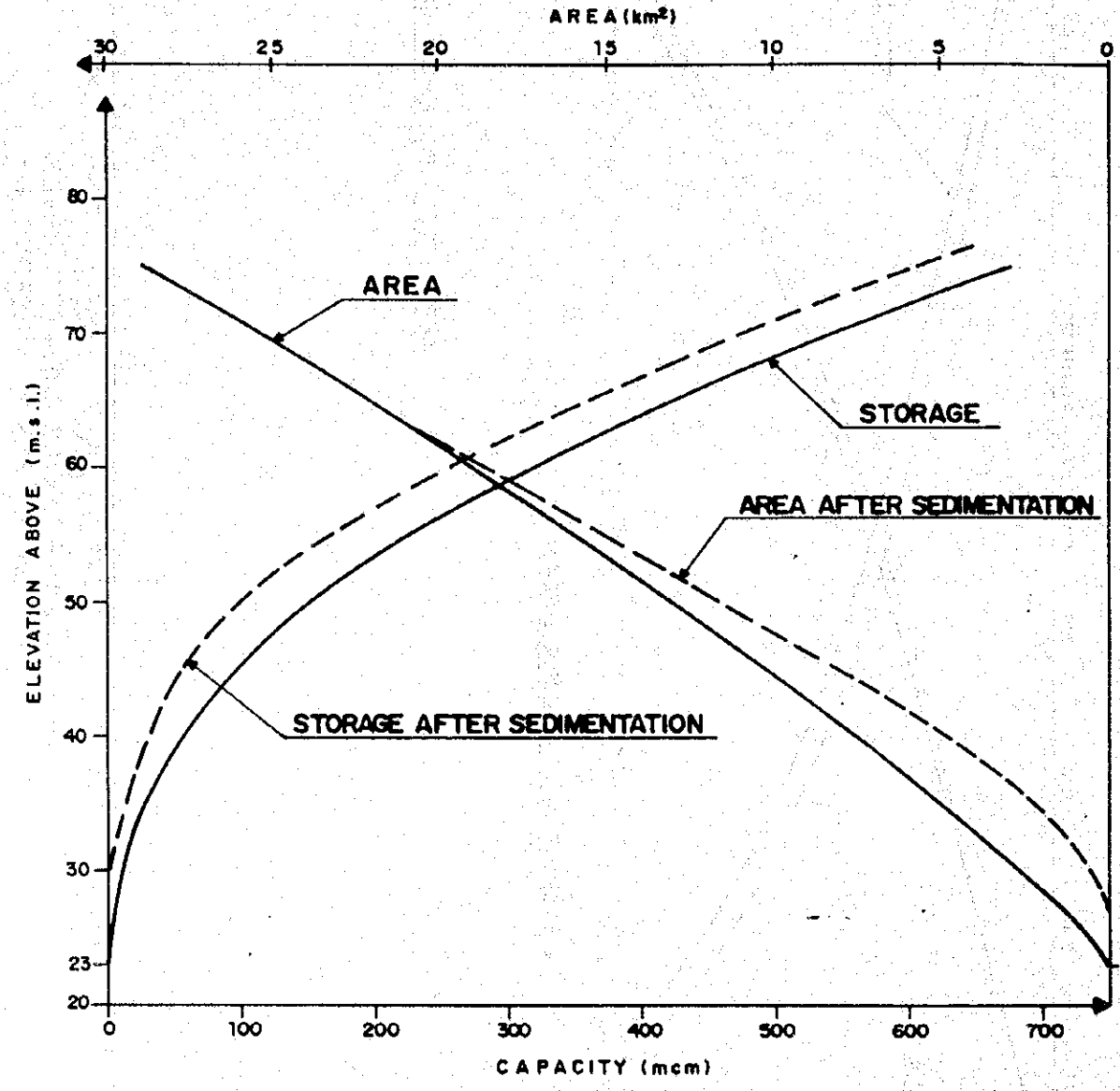


GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Area-Storage Capacity Curves, Daule-Peripa Reservoir

FIGURE 3.3.2

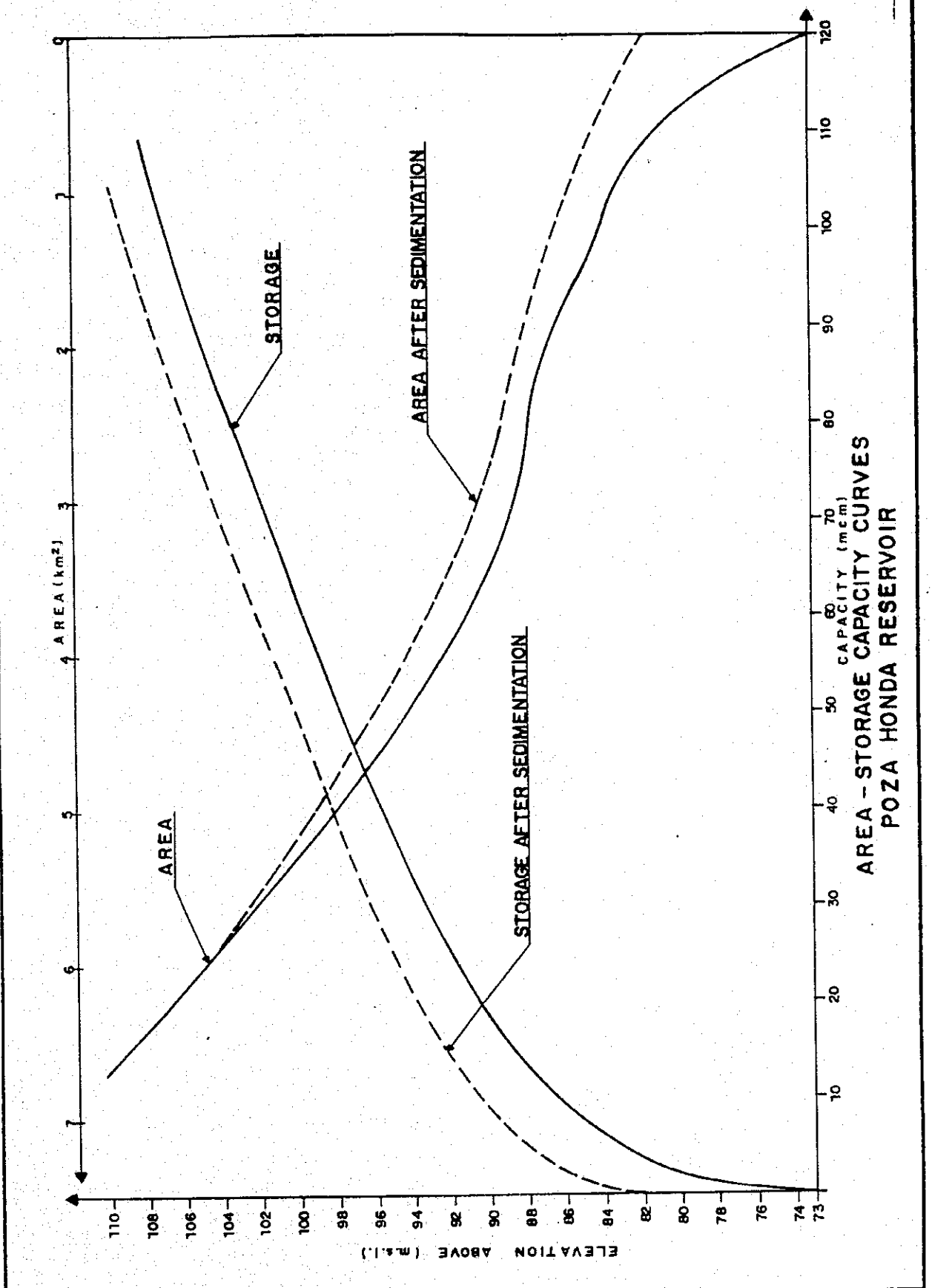
AREA - STORAGE CAPACITY CURVES

LA ESPERANZA RESERVOIR



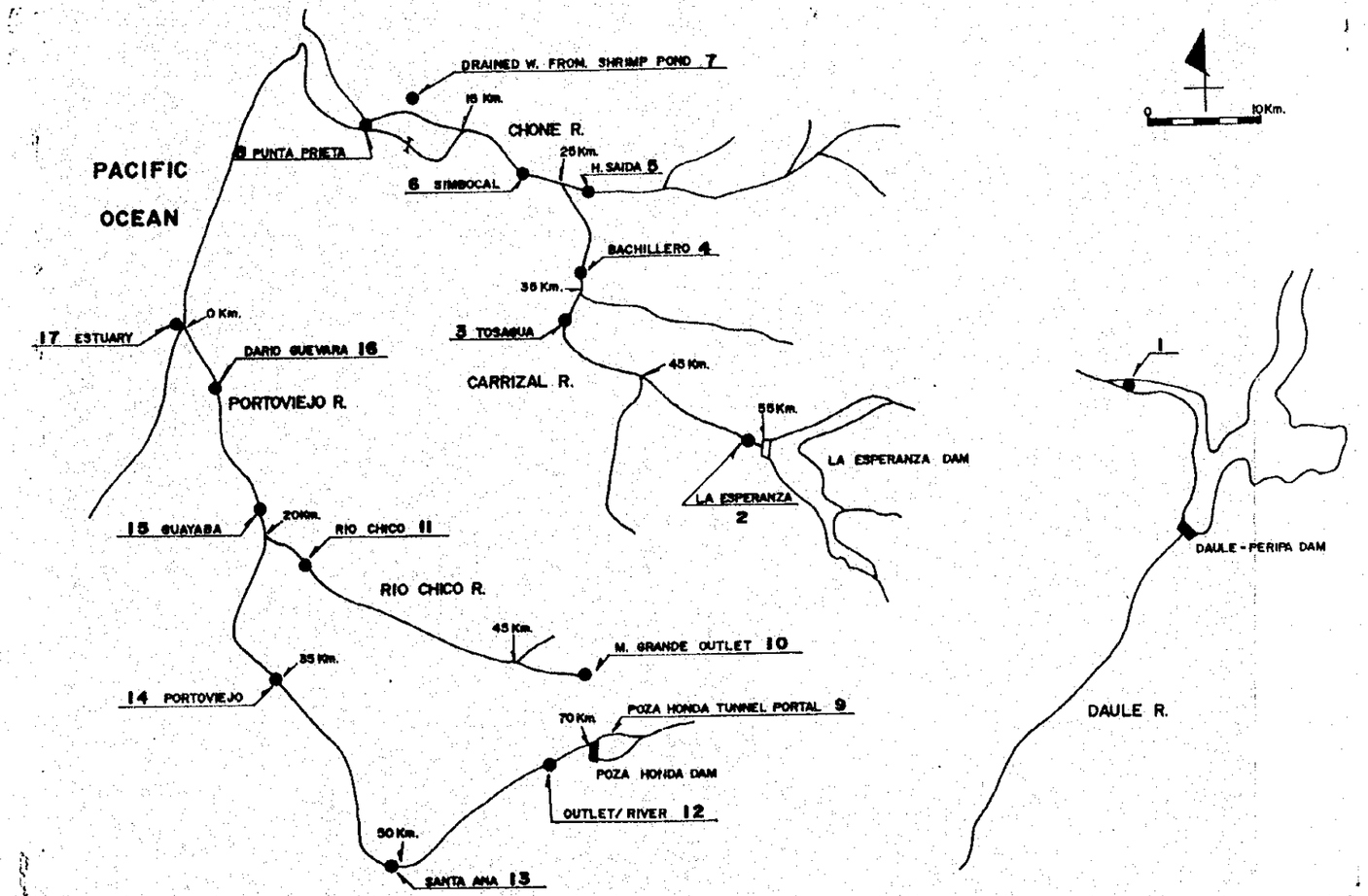
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Area-Storage Capacity Curves, La Esperanza Reservoir

FIGURE 3.3.3



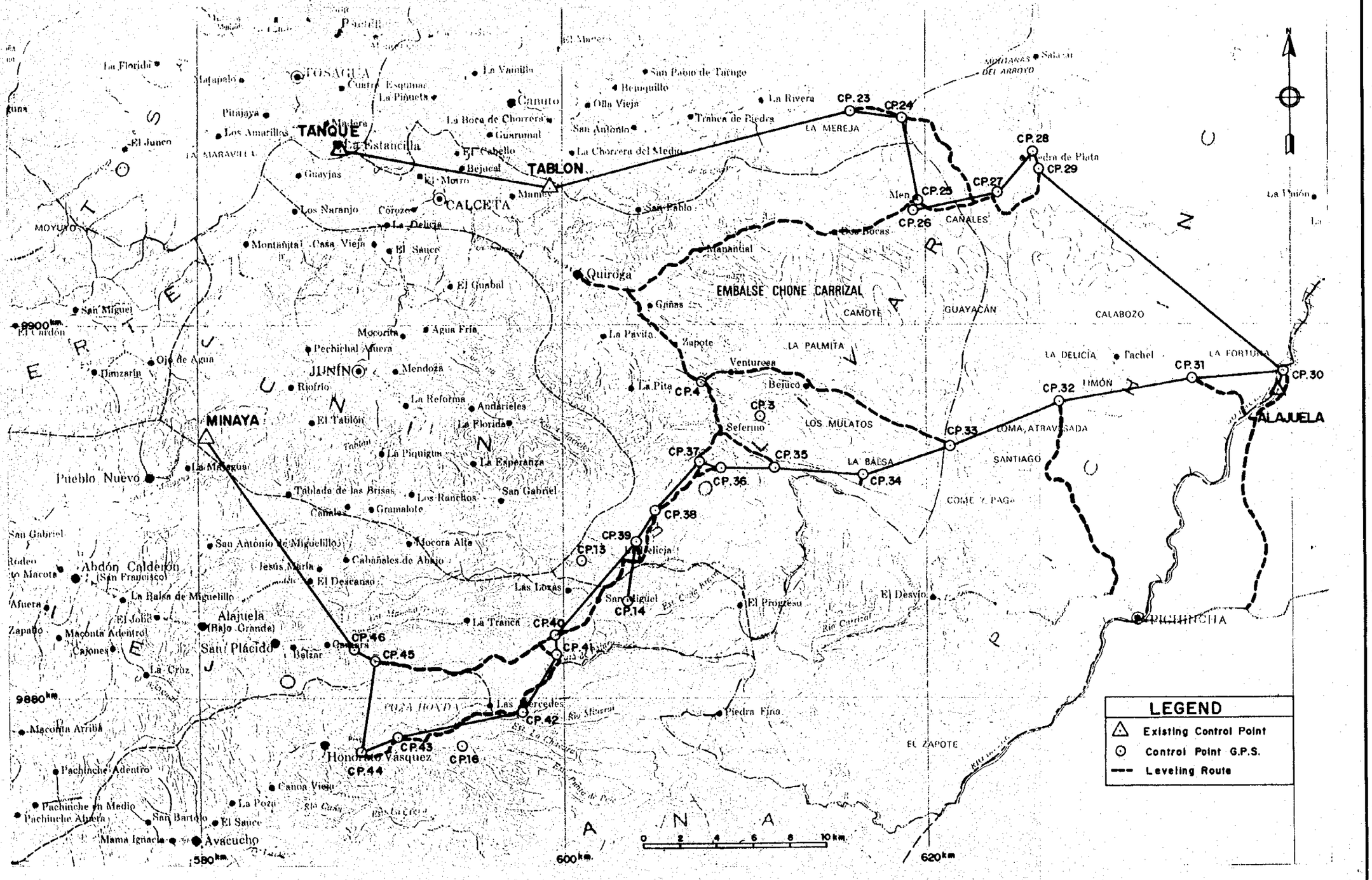
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Area-Storage Capacity Curves, Poza Honda Reservoir

FIGURE 3.3.4



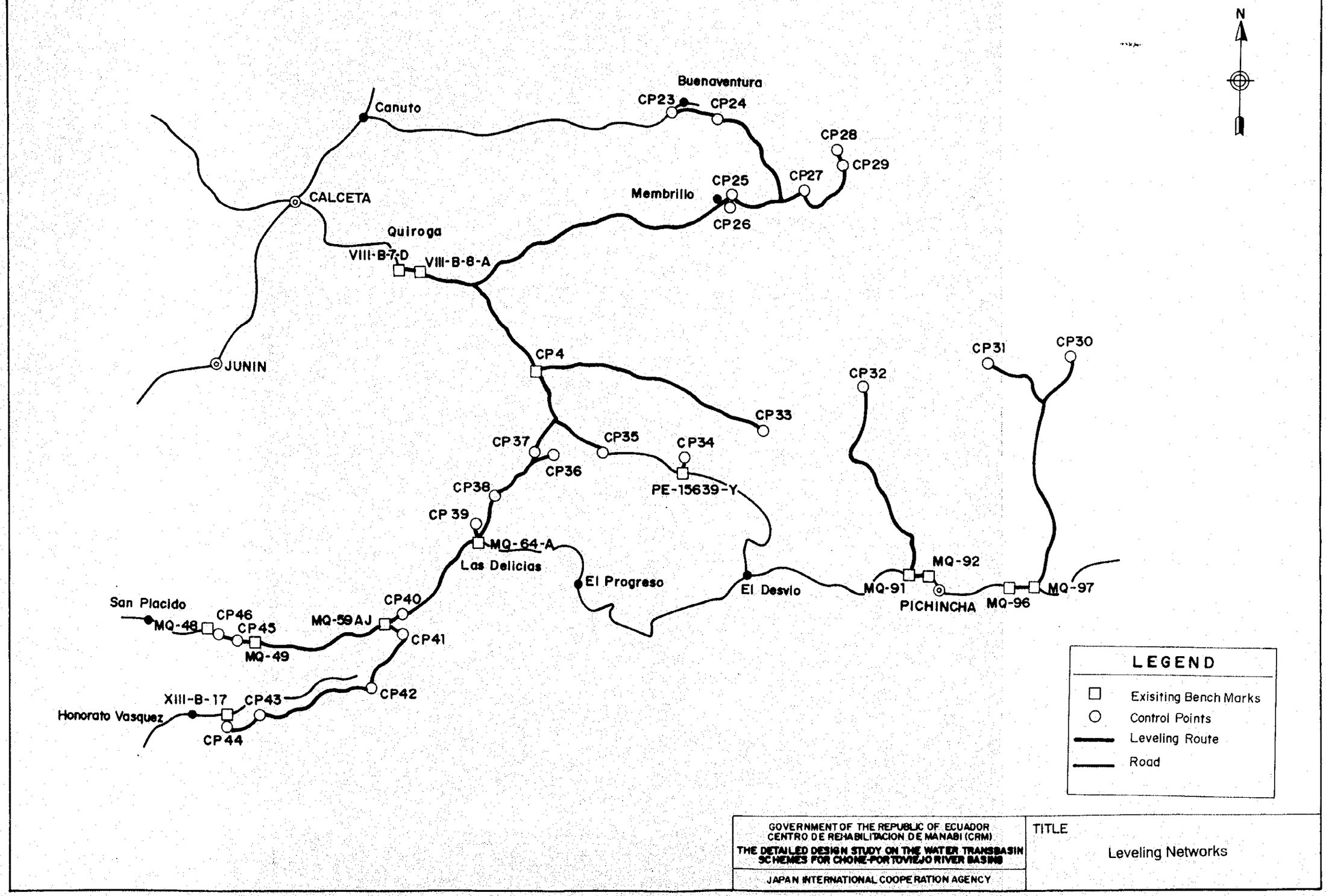
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **LOCATION OF WATER QUALITY SURVEY STATIONS 1993 - 1994**

FIGURE 3.4.1



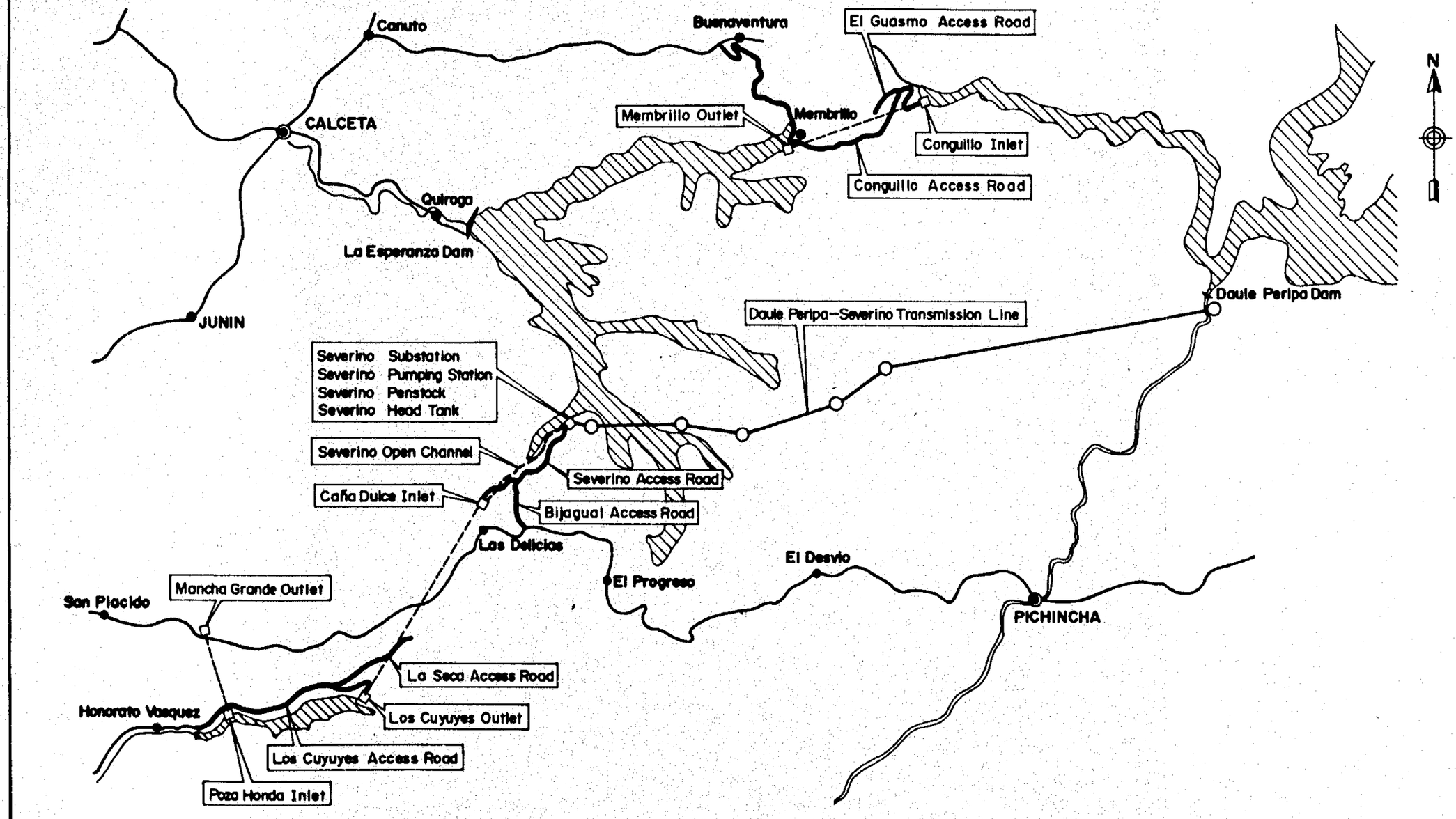
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRIM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Control Point Networks

FIGURE 3.4.2



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Leveling Networks

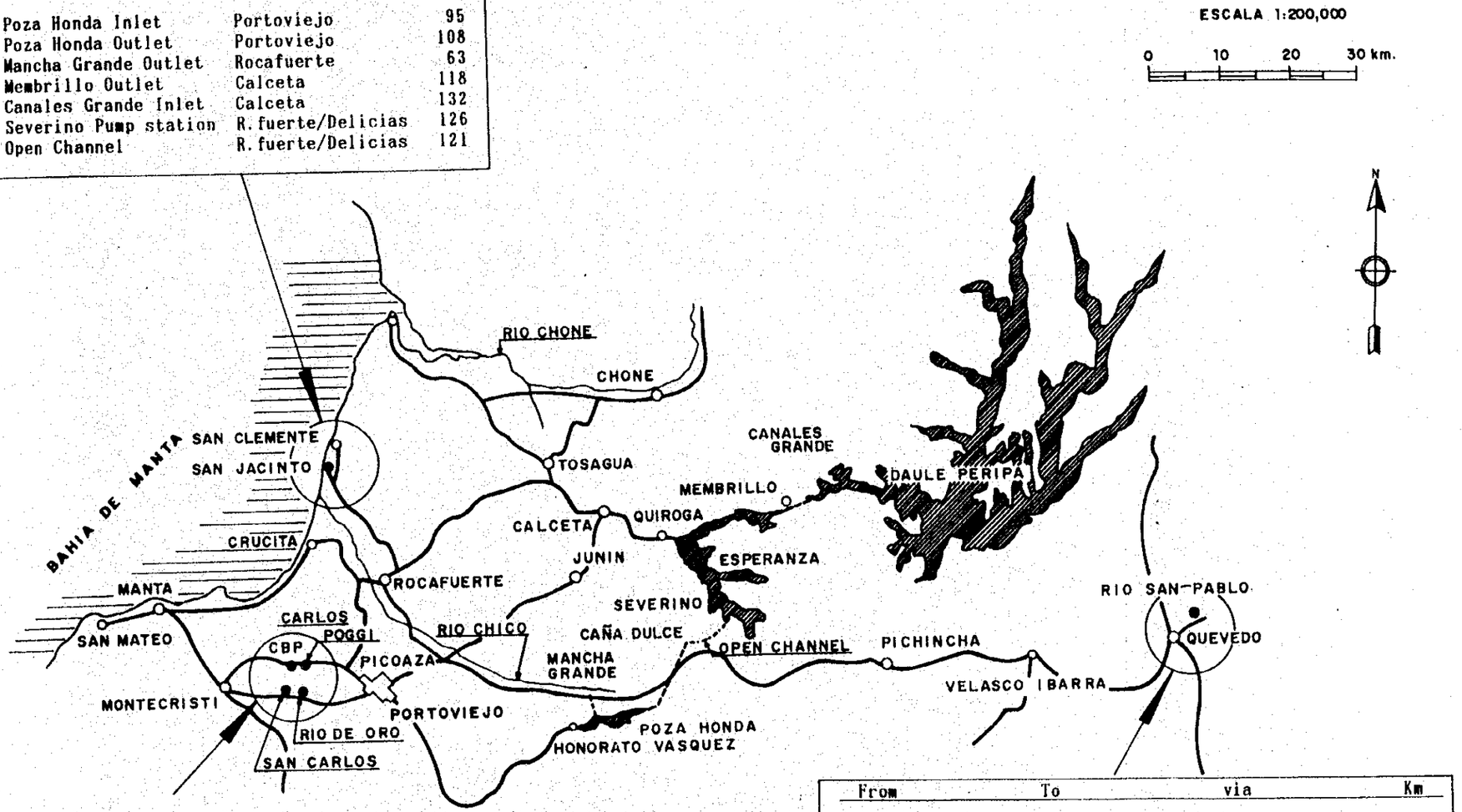
FIGURE 3.4.3



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Location Map of Access Road, Transmission Line and Structural Sites

FIGURE 3.5.1

From	To	via	Km
San Jacinto	Poza Honda Inlet	Portoviejo	95
	Poza Honda Outlet	Portoviejo	108
(Sea Sand)	Mancha Grande Outlet	Rocafuerte	63
	Membrillo Outlet	Calceta	118
	Canales Grande Inlet	Calceta	132
	Severino Pump station	R. fuerte/Delicias	126
	Open Channel	R. fuerte/Delicias	121



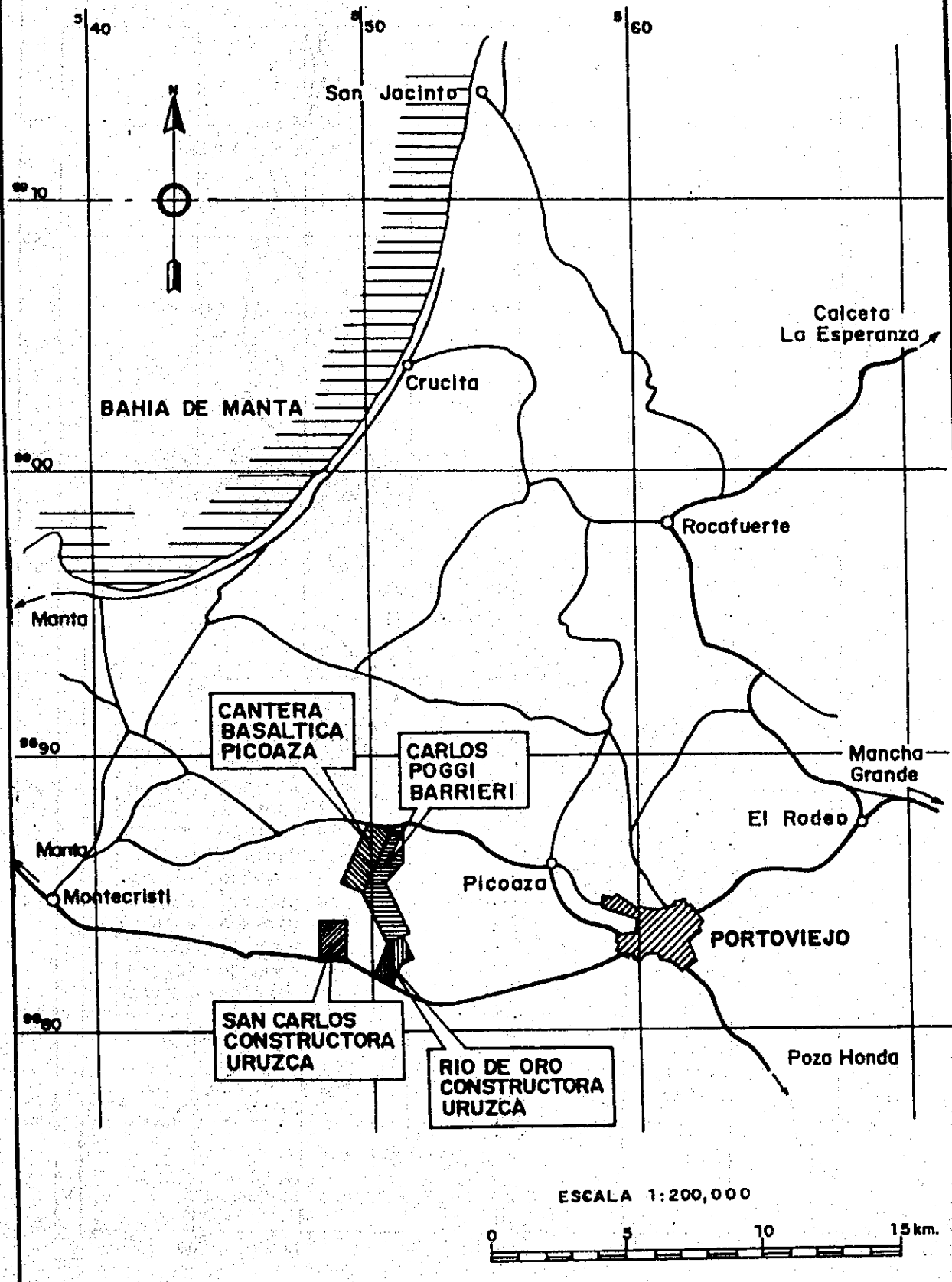
From	To	via	Km
CBP/C. Poggi	Poza Honda Inlet	Portoviejo	72
S. Carlos	Poza Honda Outlet	Portoviejo	59
	Mancha Grande Outlet	Rodeo	47
(Quarry)	Membrillo Outlet	R. fuerte/Calceta	104
	Canales Grande Inlet	R. fuerte/Calceta	107
	Severino P. Station	Rodeo/Delicias	79
	Open Channel	Rodeo/Delicias	74

From	To	via	Km
Quevedo	Poza Honda Inlet	Portoviejo	185
R.S. Pablo	Poza Honda Outlet	Portoviejo	193
	Mancha Grande Outlet	Pichincha	110
(River Sand)	Membrillo Outlet	Rocafuerte/Calceta	223
	Canales Grande Inlet	Rocafuerte/Calceta	237
	Severino Pump station	Delicias	95
	Open Channel	Delicias	100

GOVERNMENT OF THE REPUBLIC OF ECUADOR
CENTRO DE REHABILITACION DE MANABI (CRM)
THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS
JAPAN INTERNATIONAL COOPERATION AGENCY

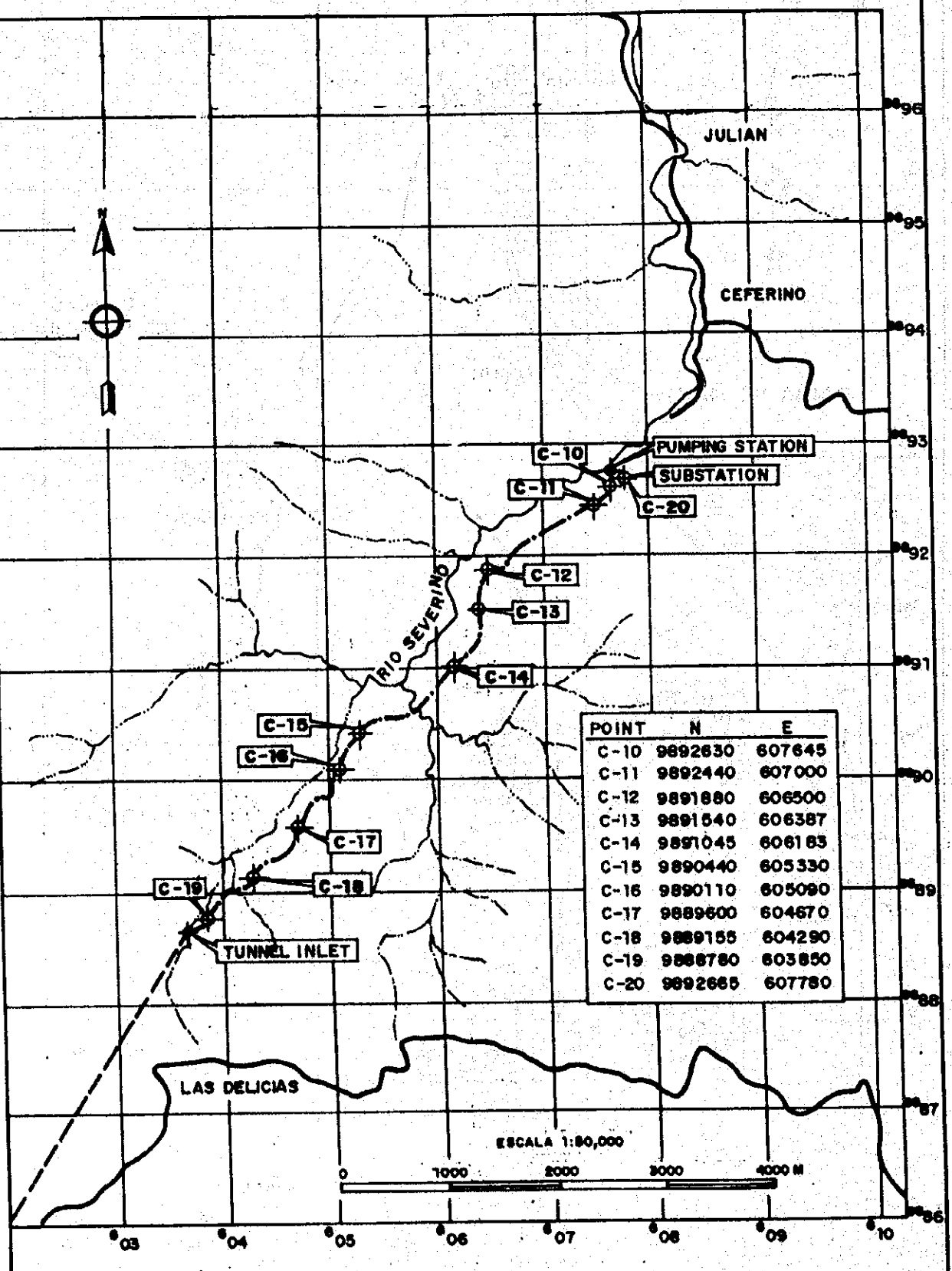
TITLE
TRANSPORT DISTANCE FOR CONCRETE AGGREGATE

FIGURE 3.5.2



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE LOCATION MAP FOR PICOAZA QUARRY AREA

FIGURE 3.5.3

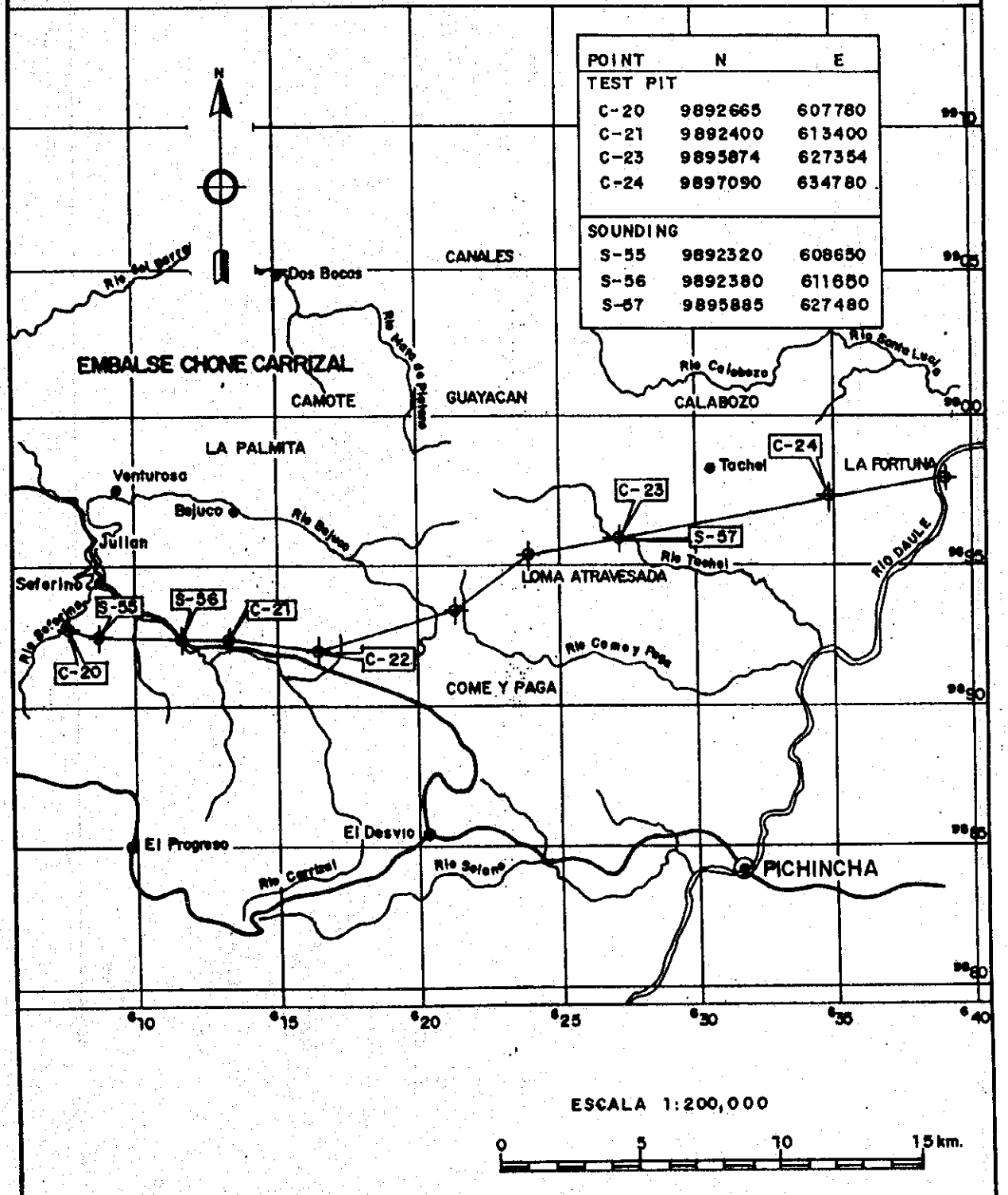


POINT	N	E
C-10	9892630	607645
C-11	9892440	607000
C-12	9891880	606500
C-13	9891540	606387
C-14	9891045	606165
C-15	9890440	605330
C-16	9890110	605090
C-17	9889600	604670
C-18	9889155	604290
C-19	9888780	603850
C-20	9892665	607780

GOVERNMENT OF THE REPUBLIC OF ECUADOR
CENTRO DE REHABILITACION DE MANABI (CRM)
THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS
JAPAN INTERNATIONAL COOPERATION AGENCY

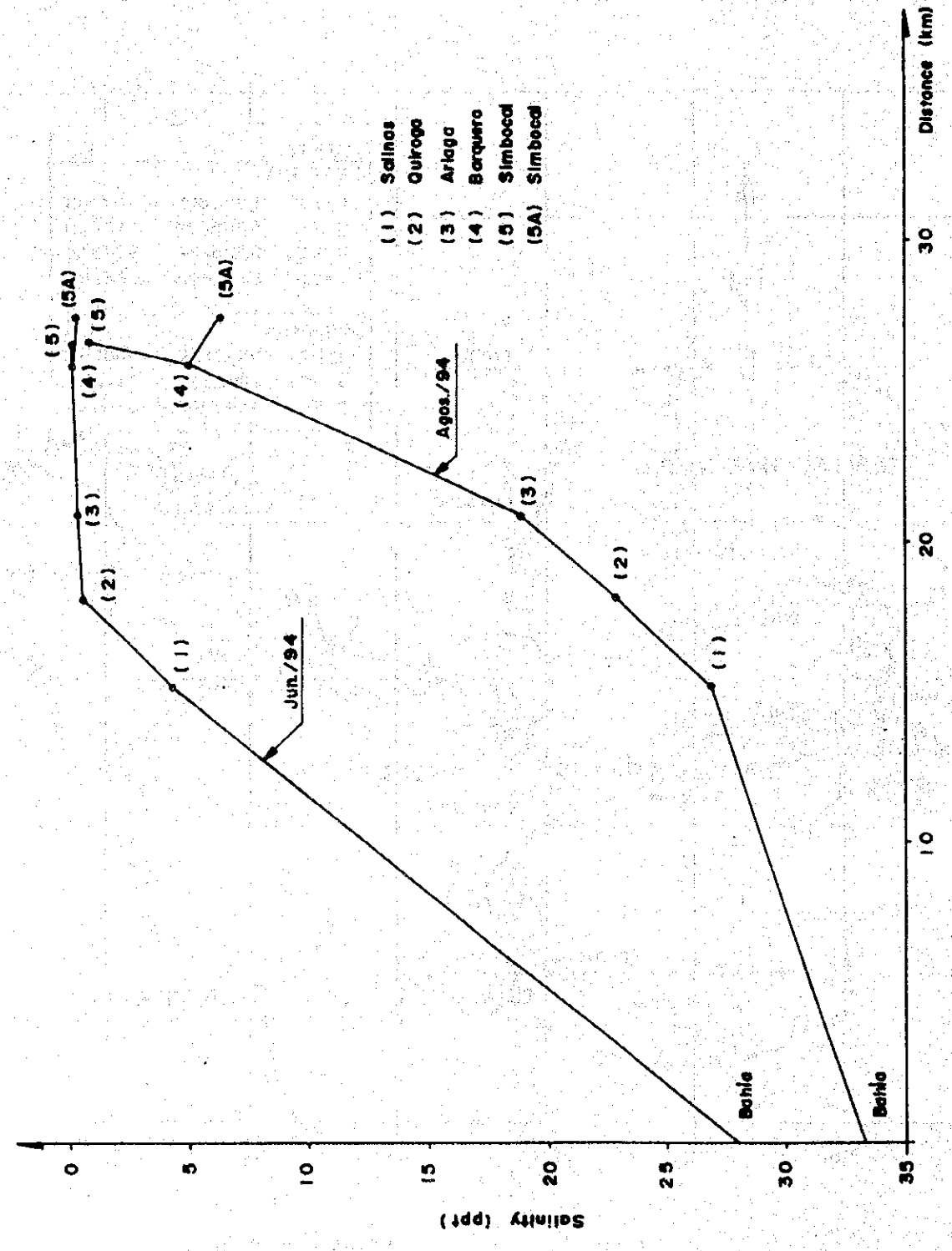
TITLE
LOCATION MAP OF TEST PITS FOR OPEN CHANNEL

FIGURE 3.5.4



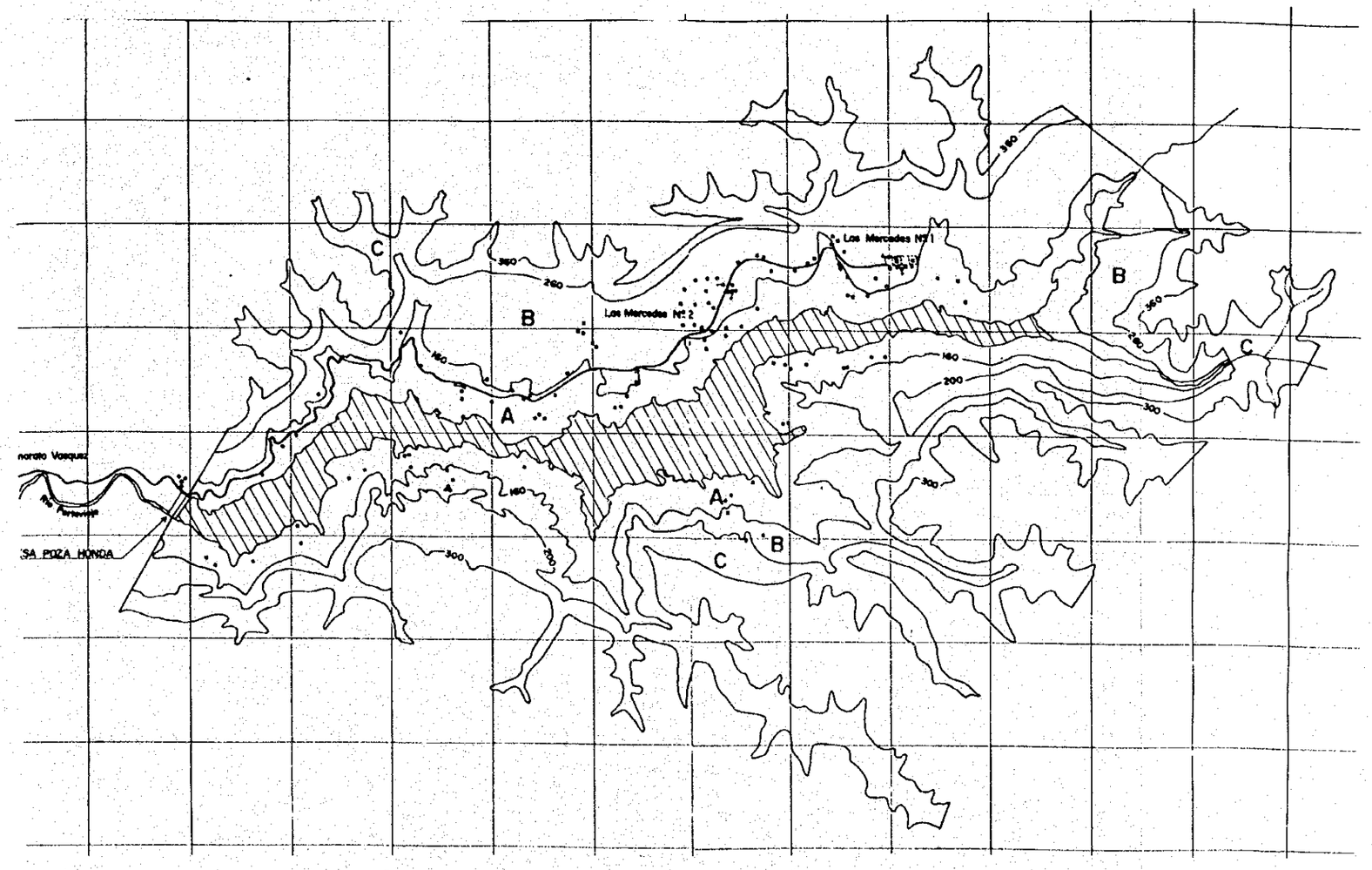
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRIM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE LOCATION MAP OF TEST PITS AND SOUNDING FOR TOWER FOUNDATION OF TRANSMISSION LINE

FIGURE 3.6.1

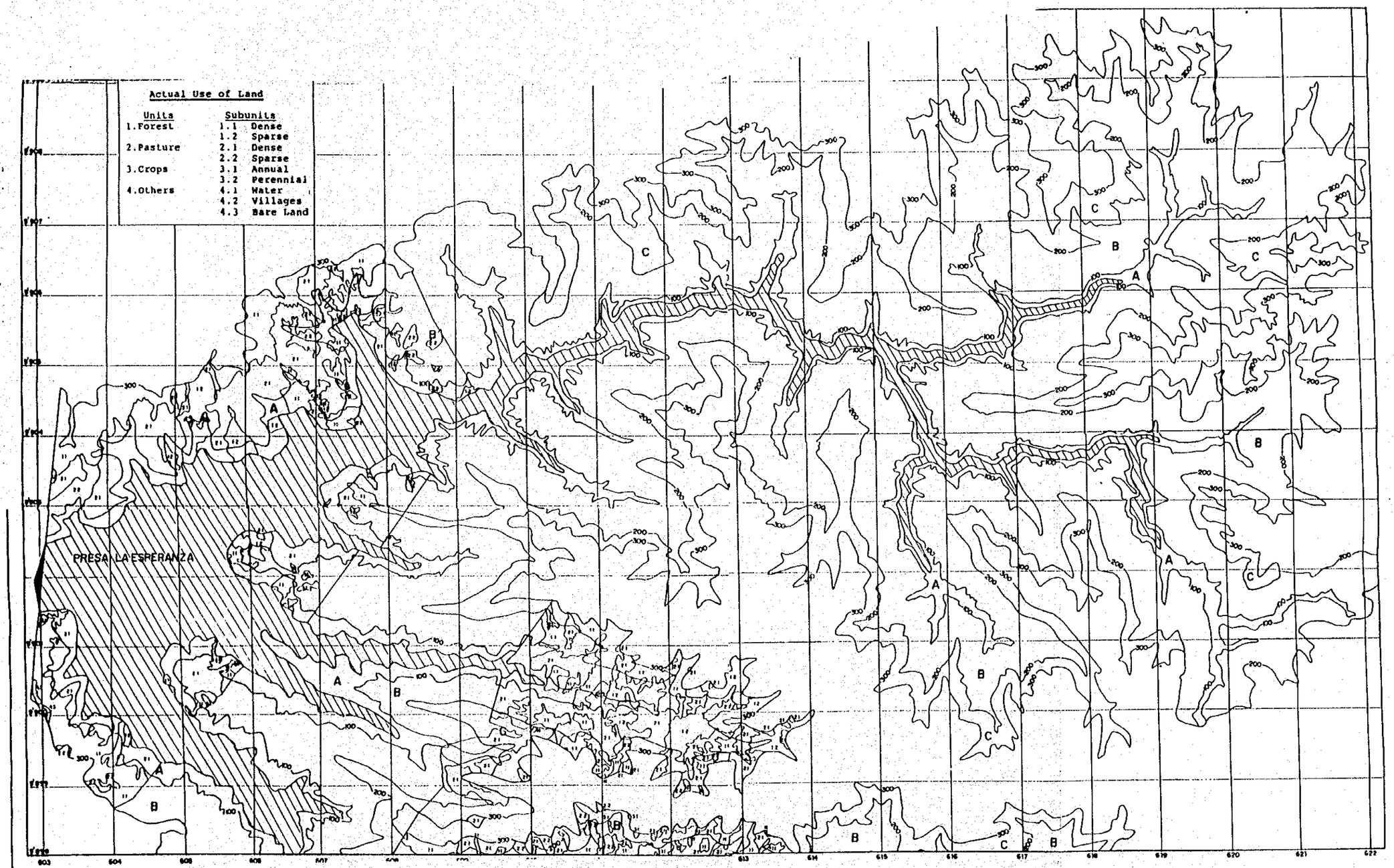


GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE LONGITUDINAL VARIATION OF SALINITY CONTENT - AVERAGE

FIGURE 3.6.2

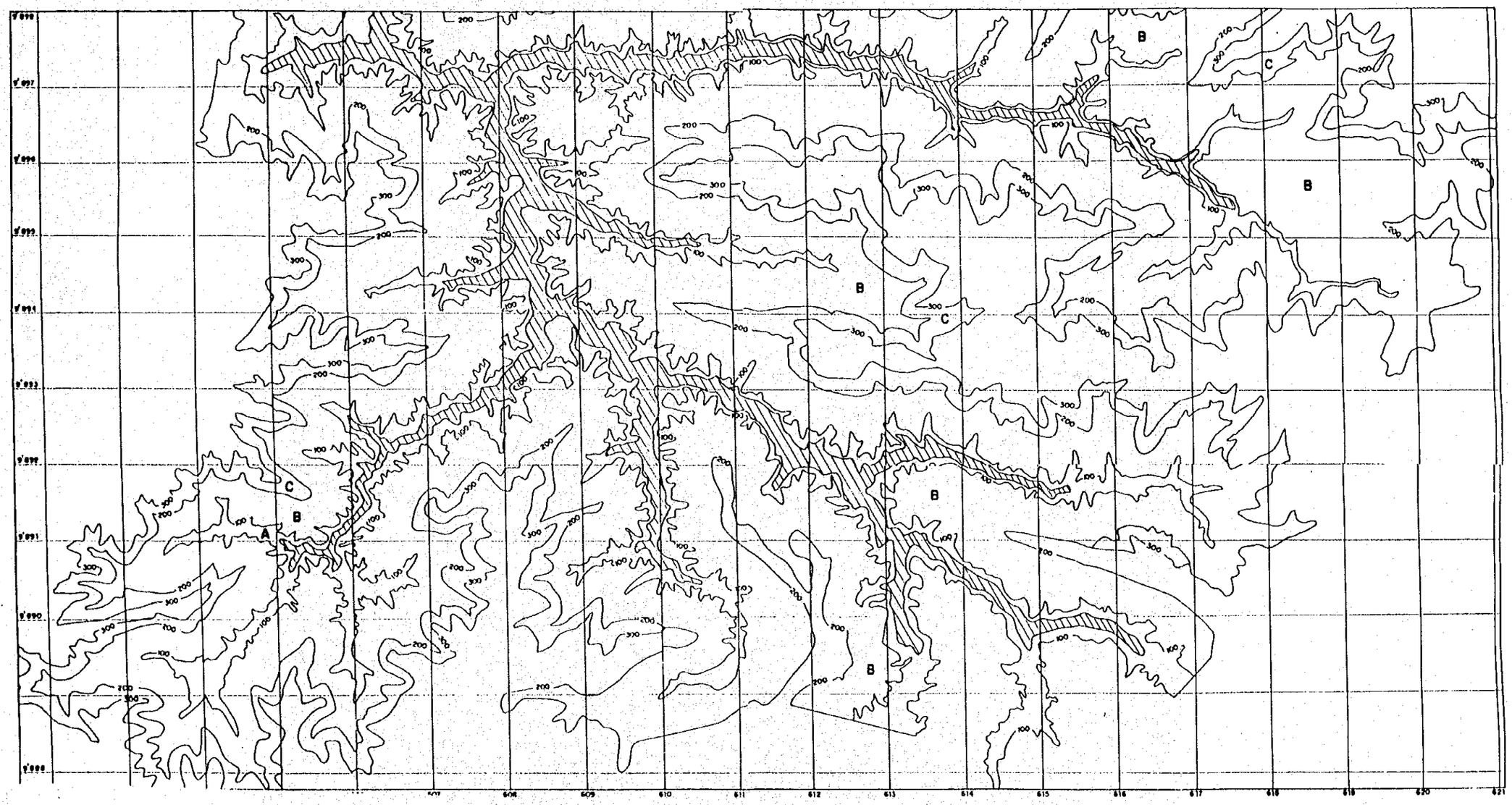


GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Conservation and Special Management Zone Poza Honda Reservoir, Delimination of Protection



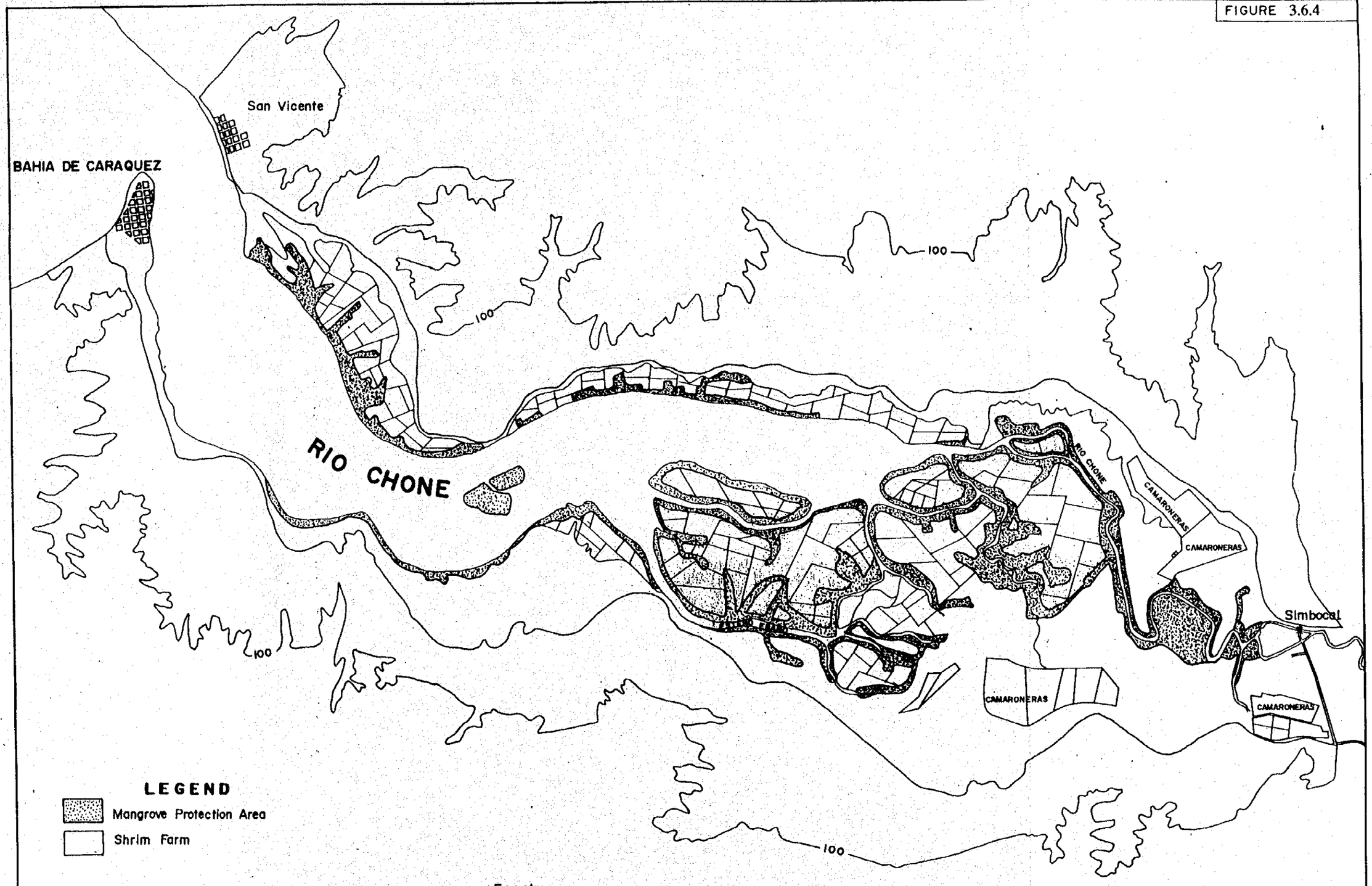
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Conservation and Special Management Zone La Esperanza Reservoir, Delimination of Protection (1/2)

FIGURE 3.6.3(2/2)



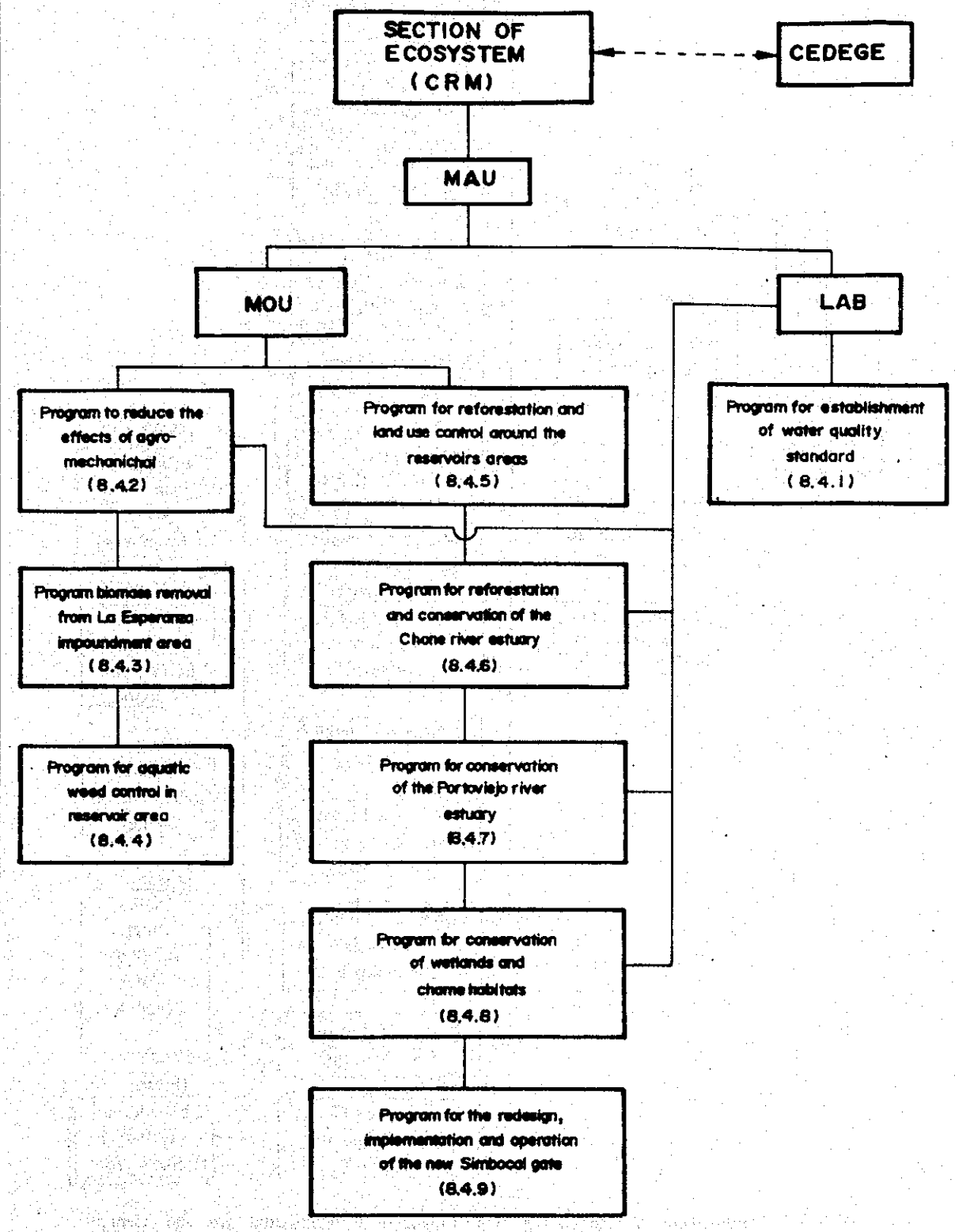
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Conservation and Special Management Zone La Esperanza Reservoir, Delimination of Protection (2/2)

FIGURE 3.6.4



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE CHONE RIVER ESTUARY, DELIMITATION OF PROTECTION AND CONSERVATION AREAS

FIGURE 3.6.5



GOVERNMENT OF THE REPUBLIC OF ECUADOR
CENTRO DE REHABILITACION DE MANABI (CRM)
THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
STRUCTURAL ORGANIZATION OF EMMP UNIT