

Cuadro 4.2.1 DESCRIPCION DE DATOS METEOROHIDROLOGICOS
 Table 4.2.1 DESCRIPTION OF METEORO-HYDROLOGICAL DATA

I. Meteorological Stations and Data Available

Station name	Observation period	Meteorological data						
		Daily/monthly Rainfall	Temperature	Relative Humidity	Wind Velocity	Evaporation	Sun Shine Hour	
Siguatepeque	1956 - 1988	D/M	M	M	M	M	M	
El Tarado	1958 - 1971	M	M	-	-	-	-	
Flores	1945 - 1988	D/M	M	M	M	M	M	
Lamani	1956 - 1979	D/M	-	-	-	-	-	
El Coyolar	1958 - 1988	D/M	M	M	-	M	-	
Comayagua	1943 - 1974	D/M	D	-	-	-	-	
El Horno	1965 - 1976	M	-	-	-	-	-	
Villa de San Antonio	1955 - 1958	M	M	-	-	-	-	
Playitas	1965 - 1988	D/M	M	M	M	M	M	
Las Botijas	1965 - 1988	D/M	-	-	-	-	-	
San Jose de Pane	1969 - 1971	M	-	-	-	-	-	
La Laguna	1965 - 1988	D/M	-	-	-	-	-	
La Mora	1970 - 1988	D/M	-	-	-	-	-	
Zambrano	1968 - 1988	D/M	-	-	-	-	-	
Lepaterque	1969 - 1988	D/M	-	-	-	-	-	
Santa Clara	1967 - 1988	D/M	M	M	-	M	-	
La Paz	1943 - 1956	D/M	-	-	-	-	-	
Ajuerique	1965 - 1967	D/M	-	-	-	-	-	

Remarks 1. Intermittent data D : Daily data - : No data
 M : Monthly data

II. Hydrological Stations and Data Collected

Station name	Observation period	Daily/Monthly
		Runoff data
Humaya en Las Higueras	1967 - 1988	D / M
Humaya en La Encantada	1967 - 1988	D / M

Remarks 1. Intermittent data D : Daily data
 M : Monthly data

Cuadro 4.2.2 CARACTERISTICAS METEOROLOGICAS EN EL AREA DE ESTUDIO
 Table 4.2.2 METEOROLOGICAL FEATURES IN THE STUDY AREA

A. Monthly Mean Temperature (°C)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Siguatopeque (1953-1988)	18	19	21	23	23	22	22	22	22	21	19	18	21
Flores (1958-1988)	22	23	25	26	26	25	25	25	25	24	23	23	24

B. Monthly Evaporation and Potential Evapotranspiration (mm)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Siguatopeque (1972-1988)													
pan	98	116	158	169	158	131	147	135	112	100	86	88	1498
potential	67	81	111	118	111	92	103	95	78	70	60	62	1049
Flores (1974-1988)													
pan	161	183	240	221	182	144	153	154	128	131	123	139	1960
potential	113	128	168	155	127	101	107	108	89	92	86	97	1372

C. Monthly Mean Relative Humidity (%)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Siguatopeque (1972-1988)	79	75	69	67	72	77	76	78	81	83	83	82	77
Flores (1974-1988)	60	56	52	53	59	67	64	64	68	69	67	63	62

D. Monthly Mean Wind Velocity (m/s)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Siguatopeque (1980-1988)	1.4	1.9	2.0	2.1	2.0	1.3	1.7	1.8	1.2	1.4	1.5	1.5	1.7
Flores (1984-1988)	5.3	4.2	4.6	3.6	2.8	2.0	3.0	2.4	1.8	3.5	3.4	3.8	3.4

E. Monthly Sunshine Hour (hours)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Ave.
Siguatopeque (1972-1988)	187	191	234	208	183	188	206	214	168	152	155	167	188
Flores (1974-1988)	215	233	265	199	212	175	185	205	176	190	196	208	205

Cuadro 4.2.3 RESULTADO DE LA MEDICION DE ESCORRENTIA
 Table 4.2.3 RESULT OF RUNOFF MEASUREMENT

Point No.	River Name	Discharge (cms)									
		1988									
		Mar.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	1989
											Jan.
R-1	Qda.JARIN	LT. 0.01	-	-							
*R-2	Qda.TENGUAJE	LT. 0.01	LT. 0.01	0.27	0.09	1.00		0.45	0.12	0.09	0.07
R-3	Qda.LAS CANAS	0.00	LT. 0.01	0.30							
R-4	Qda.OLANCICA	0.06	0.05	0.05							
*R-5	Rio CANQUIGUE	0.12	0.16	3.00	0.68	1.96		2.74	1.29	0.15	0.75
R-6	Rio TEPANGUARA	0.01	-	-							
R-7	"	0.00	-	-							
*R-8	"	LT. 0.01	LT. 0.01	1.23	0.83			1.91	0.07	0.00	0.04
R-9	Rio CANQUIGUE	0.00	0.00	-							
R-10	Rio HUMUYA	existing station									
R-11	Rio YARUMELA	0.09	-	-							
R-12	Rio TUJACA	0.20	0.02	-							
R-13	"	0.00	LT. 0.01	-							
R-14	Rio SAN JOSE	0.60	MT. 0.6	1.00							
R-15	Qda.SANLA	0.01	LT. 0.01	0.10							
R-16	Qda.GUALCOQUITA	0.01	LT. 0.01	0.10							
R-17	Qda.MARAGUA	LT. 0.01	LT. 0.01	MT. 1.0							
R-18	Qda.LOS COYOTES	0.00	LT. 0.01	-							
R-19	Rio GRANDE	0.20	MT. 0.2	5.00							
R-20	Rio CHOCO	0.00	0.00	0.07							
R-21	Rio LAMANI	LT. 0.01	0.05	0.10							
R-22	Rio CHOCO	0.03	-	-							
R-23	Qda.AGUA SALADA	0.00	-	-							
R-24	Rio HUMUYA	0.15	-	5.00							
*R-25	"	0.20	0.18	2.50	0.30	1.70		1.82	1.03	0.31	0.51
R-26	Qda.OLANCICA	0.00	-	-							
R-27	Rio SAN JOSE	-	0.60	-							
R-28	Qda.MARAGUA	-	0.10	-							
R-29	Rio GRANDE	-	0.20	-							
R-30	Rio MOLOA	-	0.05	1.20							
R-31	Rio CHINCHINGUAR	-	0.03	0.80							
R-32	Rio CANJE	0.00	0.00	-							
R-33	Qda.MARAGUA	-	0.10	-							
R-34	Qda.CANITO	0.00	0.00	-							
R-35	Qda.MOLINO	0.00	0.00	-							
R-36	Qda.HIRA	0.00	0.00	-							
R-37	Rio CANCE	0.00	0.00	0.30							
R-38	Qda.CANGUARITA	0.00	0.00	0.40							
R-39	Qda.SICAGUARA	0.00	0.00	0.50							
R-40	Qda.JARIN	0.00	0.00	-							
R-41	Qda.TENGUAJE	0.00	0.00	-							
R-42	Qda.SECA	0.00	0.00	-							
R-43	Rio SELGUAPA										
R-44	Rio SELGUAPA										
R-45	Rio GRANDE										

Remarks LT. : Less than MT. : More than

* : Monthly measurement point

Cuadro 4.2.4 (1) AREA REAL MENSUAL DE CULTIVOS Y USO DEL AGUA EN 1987 (1/3)
 Table 4.2.4 (1) MONTHLY ACTUAL CROPPING AREA AND WATER USE IN 1987 (1/3)

1. Irrigation system : Flores
 --- Cropping area (ha) ---

Crops	Resistere area	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Tomato	238	167.5	162.90	182.0	160.8	64.2	18.4	4.0	8.2	23.8	25.9	85.6	
Maize	529	140.0	144.40	203.7	329.5	167.1	58.3	1.2	30.8	32.9	32.4	99.4	
Fruits	4	36.6	17.50	50.4	44.1	22.9	2.2	0.0	0.0	0.0	0.0	24.3	
Tabacco	40	35.0	13.30	5.1	4.0	0.0	0.0	0.0	0.0	1.9	11.0	40.4	
Beans	76	31.3	13.00	40.6	20.1	0.0	0.0	0.0	0.2	0.7	7.0	15.6	
Rice	513	28.5	31.00	21.7	29.2	53.7	221.9	206.7	589.2	664.1	590.1	512.2	
Pasture	0	18.4	54.60	57.6	46.7	27.1	0.0	0.0	0.0	0.0	5.1	41.8	
Vegetables	0	12.1	15.40	46.2	17.3	1.6	0.2	0.0	0.0	0.0	0.0	0.0	
Peppers	20	8.9	21.90	17.3	20.3	9.3	1.9	0.0	2.1	5.6	4.0	23.8	
Onion	71	5.1	8.40	0.0	11.7	4.2	0.0	0.0	0.0	0.0	0.0	0.0	
Cucumber	9	4.7	6.70	0.0	0.0	0.0	0.5	1.2	0.0	0.0	1.6	6.1	No Data
Tapioca	0	4.4	7.00	3.7	3.7	0.0	0.0	0.0	0.0	0.0	0.0	7.2	
Papaw	4	3.5	4.90	0.0	0.0	0.0	2.2	0.0	1.2	6.5	1.6	14.7	
Watermelon	1	3.3	3.00	0.0	4.2	0.0	0.0	0.0	0.0	0.0	4.2	16.8	
Sorghum	22	1.9	0.70	12.6	2.8	6.5	0.0	6.3	0.0	0.0	2.3	7.5	
Coffee	56	1.4	72.80	27.3	28.0	0.7	0.7	0.0	0.0	0.0	0.0	52.5	
Livestock	0	0.2	3.10	7.0	13.5	23.3	10.3	0.7	0.0	0.0	0.0	14.5	
Sugar cane	0	0.0	3.30	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Squash	1	0.0	0.00	0.0	1.6	2.1	0.0	0.0	0.0	0.0	0.0	0.0	
Cabbage	0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.40	
Avocado	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Lemon	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Guava	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total	1603	502.8	583.9	679.6	737.5	382.7	316.6	220.1	631.7	735.5	685.3	963.6	

--- Water use (x 1000 m**3) ---

Crops	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Tomato	287.2	279.20	312.0	275.6	110.0	31.6	6.8	14.0	40.8	44.4	145.8	
Maize	240.0	247.60	349.2	564.8	286.4	100.0	2.0	52.8	56.4	55.6	170.4	
Fruits	62.8	30.00	86.4	75.6	39.2	4.0	0.0	0.0	0.0	0.0	41.6	
Tabacco	60.0	22.80	8.8	6.8	0.0	0.0	0.0	0.0	3.2	18.8	69.2	
Beans	53.6	22.40	69.6	34.4	0.0	0.0	0.0	0.4	1.2	12.0	26.8	
Rice	48.8	53.20	37.2	50.0	92.0	380.4	354.4	1010.0	1138.4	1011.6	878.0	
Pasture	31.6	93.60	98.8	80.0	46.4	0.0	0.0	0.0	0.0	8.8	71.6	
Vegetables	20.8	26.40	79.2	29.6	2.8	0.4	0.0	0.0	0.0	0.0	0.0	
Peppers	15.2	37.60	29.6	34.8	16.0	3.2	0.0	3.6	9.6	6.8	40.8	
Onion	8.8	8.40	0.0	20.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0	
Cucumber	8.0	11.60	0.0	0.0	0.0	0.8	2.0	0.0	0.0	2.8	10.4	No Data
Tapioca	7.6	12.00	6.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0	12.4	
Papaw	6.0	8.40	0.0	0.0	0.0	4.0	0.0	2.0	11.2	2.8	25.2	
Watermelon	5.6	5.20	0.0	7.2	0.0	0.0	0.0	0.0	0.0	7.2	28.8	
Sorghum	3.2	1.20	21.6	4.8	11.2	0.0	10.8	0.0	0.0	4.0	12.8	
Coffee	2.4	124.80	46.8	48.0	1.2	1.2	0.0	0.0	0.0	0.0	90.0	
Livestock	0.8	4.80	12.0	23.2	40.0	17.6	1.2	0.0	0.0	0.0	24.8	
Sugar cane	0.0	5.60	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Squash	0.0	0.00	0.0	2.8	3.6	0.0	0.0	0.0	0.0	0.0	0.0	
Cabbage	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	
Total	862.4	994.8	1165.2	1264.0	656.0	543.2	377.2	1082.8	1260.8	1174.8	1652.0	

Cuadro 4.2.4 (2) AREA REAL MENSUAL DE CULTIVOS Y USO DEL AGUA EN 1987 (2/3)
 Table 4.2.4 (2) MONTHLY ACTUAL CROPPING AREA AND WATER USE IN 1987 (2/3)

11. Irrigation system : San Sebastian

--- Cropping area (ha) ---

Crops	Resistere area	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Tomato	49	62.3	52.7	53.5	33.3	35.9	30.8	9.1	32.0	46.4	49.0		
Rice	42	42.5	42.5	42.6	42.5	43.2	42.5	42.5	91.5	88.4	66.0		
Malze	69	41.5	37.1	48.3	54.6	28.0	22.4	0.9	9.1	11.2	10.3		
Watermelon	0	2.1	3.3	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Tobacco	0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Pasture	0	1.1	4.0	0.0	1.4	1.6	0.0	0.0	0.0	0.0	0.0		No Data
Fruite	0	0.7	1.1	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0		
Peppers	0	0.5	0.4	0.0	0.5	0.7	0.2	0.6	0.2	0.2	0.7		
Onion	0	0.0	0.0	1.4	5.3	4.9	1.4	0.0	0.0	0.0	0.0		
Cabbage	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7		
Beans	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.2		
Cucumber	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0		
Coffee	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Soy bean	42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total	231	151.8	141.1	152.5	138.0	114.5	97.3	53.1	133.7	146.2	126.9		

--- Water use (x 1000 m**3) ---

Crops	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Tomato	149.2	120.4	115.6	76.0	82.0	70.4	22.4	73.2	106.0	112.0		
Rice	97.2	97.2	97.2	97.2	98.8	97.2	97.2	209.2	202.0	150.8		
Malze	94.8	84.8	110.4	124.8	64.0	51.2	0.2	20.8	25.6	23.6		
Watermelon	4.8	7.6	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Tobacco	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Pasture	2.4	9.2	0.0	3.2	3.6	0.0	0.0	0.0	0.0	0.0		No Data
Fruites	1.6	2.4	0.4	0.8	0.4	0.0	0.0	0.0	0.0	0.0		
Peppers	1.2	0.8	0.0	1.2	1.6	0.4	0.4	0.4	0.4	1.6		
Onion	0.0	0.0	3.2	12.0	11.2	3.2	0.0	0.0	0.0	0.0		
Cabbage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6		
Beans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.4		
Cucumber	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0		
Total	353.6	322.4	342.0	315.2	261.6	222.4	120.2	305.6	334.0	290.0		

Cuadro 4.2.4 (3) AREA REAL MENSUAL DE CULTIVOS Y USO DEL AGUA EN 1987 (3/3)
 Table 4.2.4 (3) MONTHLY ACTUAL CROPPING AREA AND WATER USE IN 1987 (3/3)

III. Irrigation system : Selguapa

--- Cropping area (ha) ---

Crops	Resistere area	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Onion	104	317.8	298.3	350.3	281.0	186.8	95.0	22.3					
Maize	902	309.0	309.3	348.0	333.3	193.8	102.5	11.0					
Tomato	208	132.2	131.0	139.8	143.3	142.8	64.8	24.5					
Watermelon	14	28.8	26.0	20.5	11.3	0.8	0.0	0.0					
Pasture	0	21.0	31.5	17.3	9.3	3.0	11.3	14.5					
Maize & Bean	0	16.5	30.8	21.5	13.5	0.0	0.0	0.0					
Cucumber	58	13.5	47.8	61.0	53.3	25.5	13.3	6.3					
Beans	261	10.3	17.5	31.8	8.5	12.5	0.0	0.0					
Coffee	480	9.8	5.5	9.8	8.8	3.5	0.5	0.0					
Livestoc	0	9.3	19.3	19.3	16.3	10.0	3.8	0.0			No Data		
Sugar cane	0	8.5	4.5	5.3	7.0	4.0	3.0	0.0					
Peppers	3	7.5	4.3	2.3	2.5	0.0	2.0	0.5					
Yaploca	14	5.3	4.0	4.5	4.5	2.5	0.8	0.0					
Papaw	0	4.3	6.5	3.3	7.5	7.3	0.0	0.0					
Sorghum	0	2.8	1.5	1.5	2.8	2.3	7.0	0.5					
Fruits	0	2.3	10.3	8.3	6.8	2.5	5.3	0.0					
Cabbage	0	0.8	0.0	1.8	1.0	2.3	0.5	0.0					
Squash	0	0.5	0.0	0.0	0.0	0.0	0.0	0.0					
Maize&Yaploca	0	0.0	0.5	0.5	0.0	0.0	0.0	0.0					
Rice	91	0.0	0.0	0.0	0.0	0.0	22.0	55.5					
Vegitabl	22.00	0.0	0.0	0.0	0.0	0.8	0.0	0.0					
Total	2157	900.2	948.6	1046.8	910.7	600.4	331.8	135.1					

--- Water use (x 1000 m**3) ---

Crops	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
Onion	508.4	477.2	560.4	449.6	298.8	152.0	35.6					
Maize	494.4	494.8	556.8	333.2	310.0	164.0	17.6					
Tomato	211.2	209.6	223.6	229.2	228.4	103.6	39.2					
Watermelon	46.0	41.6	32.8	18.0	1.2	0.0	0.0					
Pasture	33.6	50.4	27.6	14.8	4.8	18.0	23.2					
Maize & Bean	26.4	49.2	34.4	21.6	0.0	0.0	0.0					
Cucumber	21.6	76.4	97.6	85.2	40.8	21.2	10.0					
Beans	16.4	28.0	50.8	13.6	20.0	0.0	0.0					
Coffee	15.6	8.8	15.6	14.0	5.6	0.8	0.0					
Livestock	14.8	30.8	30.8	26.0	16.0	6.0	0.0			No Data		
Sugar cane	13.6	7.2	8.4	11.2	6.4	4.8	0.0					
Peppers	12.0	6.8	3.6	4.0	0.0	3.2	0.8					
Yaploca	8.4	6.4	7.2	7.2	4.0	1.2	0.0					
Papaw	6.8	10.4	5.2	12.0	11.6	0.0	0.0					
Sorghum	4.4	2.4	2.4	4.4	3.6	11.2	0.8					
Fruits	3.6	16.4	13.2	10.8	4.0	8.4	0.0					
Cabbage	1.2	0.0	2.8	1.6	2.0	0.8	0.0					
Squash	0.8	0.0	0.0	0.0	0.0	0.0	0.0					
Maize & Yaploca	0.0	0.8	0.8	0.0	0.0	0.0	0.0					
Vegetables	0.0	0.0	0.0	0.0	1.2	0.0	0.0					
Rice	0.0	0.0	0.0	0.0	0.0	35.2	88.8					
Total	1439.2	1517.2	1674.0	1256.4	958.4	530.4	216.0					

Cuadro 4.2.5 RESULTADO DEL ESTUDIO DE ESCORRENTIA MEDIANTE LA SIMULACION DE MODELO EN TANQUE
 Table 4.2.5 RESULT OF RUNOFF STUDY BY THE TANK MODEL SIMULATION

unit : MCM

Month	Las Higueras															
	1972			1983			1986			1988						
	OBS.	CALC.	OBS.	CALC.	OBS.	CALC.	OBS.	CALC.	OBS.	CALC.	OBS.	CALC.				
1	4.92	5.48	3.19	5.32	3.59	5.45	2.73	5.16	11.81	13.42	10.07	7.45	2.65	10.56	8.81	7.46
2	3.96	5.40	5.41	4.86	3.16	4.80	2.58	4.80	9.45	9.46	6.49	5.74	8.70	7.06	8.17	5.95
3	3.73	5.40	6.01	5.24	3.35	5.28	2.66	5.09	8.19	7.31	7.67	6.33	7.70	6.40	7.38	6.34
4	5.48	7.40	5.82	14.40	5.72	5.08	2.96	17.88	9.87	12.10	7.93	13.77	7.13	6.14	7.14	16.24
5	16.08	66.35	4.64	15.00	5.02	69.45	3.61	59.95	14.64	50.66	4.95	21.41	8.91	73.12	8.74	63.26
6	104.03	42.97	3.40	259.79	5.95	67.34	62.12	231.42	36.01	101.18	31.43	370.66	23.77	104.72	88.24	392.73
7	10.31	6.24	0.51	39.62	3.65	7.62	0.51	157.49	12.27	23.30	37.72	55.08	17.50	19.55	99.31	273.01
8	13.99	5.68	1.39	151.83	5.72	18.41	95.60	204.19	18.01	14.46	25.48	87.08	21.16	27.14	135.25	317.55
9	9.26	33.75	1.61	102.13	15.66	76.46	181.19	161.37	29.74	74.18	112.50	268.80	49.17	141.08	247.90	329.23
10	9.15	34.87	1.47	0.84	15.86	64.75	54.81	54.59	35.82	65.86	102.49	243.11	39.01	87.21	102.29	172.54
11	6.84	6.14	2.00	32.79	7.64	13.34	17.71	6.80	16.73	9.30	46.81	72.99	29.15	35.70	37.51	27.85
12	3.88	5.23	1.66	7.27	5.38	5.20	9.74	5.36	8.09	6.35	20.15	26.03	14.43	9.13	24.01	23.30

Note
 OBS. : Observed monthly runoff volume
 calc. : Calculated monthly runoff volume

Cuadro 4.2.6 COMPARACION ENTRE LA ESCORRENTIA OBSERVADA Y LA CALCULADA
 Table 4.2.6 COMPARISON BETWEEN OBSERVED AND CALCULATED RUNOFF

Year : 1988

Tenguaje (c.a.=20.0 km ²)		Ranchitos (c.a.=42.3 km ²)		Chilicares (c.a.=62.3 km ²)		Humuya (c.a.=207.4 km ²)	
date	obsvd. (cms)	date	obsvd. (cms)	date	obsvd. (cms)	date	obsvd. (cms)
	calcltd. (cms)		calcltd. (cms)		calcltd. (cms)		calcltd. (cms)
3/15	LT.0.01	3/15	0.12	3/18	LT.0.01	3/18	0.20
5/19	LT.0.01	5/25	0.16	5/25	LT.0.01	5/25	0.18
6/24	0.27	6/24	3.00	6/24	1.23	6/24	2.50
7/	0.09	7/	0.68	7/	0.83	7/	0.30
8/	1.00	9/	1.96	8/	1.771	9/	1.70
10/	0.45	10/	2.74	10/	1.91	10/	1.82
11/	0.12	11/	1.29	11/	0.07	11/	1.03
12/	0.09	12/	0.15	12/	0.00	12/	0.31

note : Runoff measurement from Mar. to Jun. was carried out by JICA study team.
 Runoff measurement from Jul. to Dec. was carried out by MPH counterpart.

Cuadro 4.2.7 BALANCE DE AGUA SUPERFICIAL Y SUBTERRANEA
 MEDIANTE SIMULACION DE MODELO EN TANQUE
 Table 4.2.7 SURFACE AND GROUND WATER BALANCE BY TANK MODEL SIMULATION
 (Estimation of G/W potential in whole basin.)

Year	(1)	(2)	(3)	Ground Water Recharge Volume				(5)*	G/W ratio to rainfall (%)
	Rainfall (mm)	Runoff (mm)	Evaporation (mm)	(4) Total (mm)	phreatic (m3/day)	confined (mm)	(2)+(3)+(4) (mm)		
1967	1398.4	762.6	629.6	17.4	98120	8.7	8.7	1409.7	1.2
1968	1266.9	573.0	670.4	17.6	99087	8.8	8.8	1261.0	1.4
1969	2205.9	1434.4	702.5	17.9	100966	9.0	9.0	2154.9	0.8
1970	1282.7	594.8	670.8	18.3	103149	9.2	9.2	1284.0	1.4
1971	1297.0	656.9	624.5	18.4	103543	9.2	9.2	1299.8	1.4
1972	771.1	201.3	601.1	18.4	103419	9.2	9.2	820.8	2.4
1973	1240.9	556.5	660.4	18.1	101810	9.0	9.0	1235.0	1.5
1974	1316.6	590.3	706.5	18.3	102710	9.1	9.1	1315.1	1.4
1975	1142.7	547.2	584.2	18.3	102845	9.1	9.1	1149.7	1.6
1976	1661.6	908.7	734.7	18.5	104004	9.2	9.2	1662.0	1.1
1977	1273.7	555.6	716.4	18.4	103734	9.2	9.2	1290.5	1.4
1978	1346.7	529.5	799.7	18.4	103723	9.2	9.2	1347.7	1.4
1979	1166.6	389.9	761.6	18.5	104116	9.3	9.3	1170.0	1.6
1980	1220.9	550.2	660.9	18.6	104600	9.3	9.3	1229.7	1.5
1981	1473.5	723.3	716.1	18.7	104926	9.3	9.3	1458.1	1.3
1982	1015.4	392.4	630.1	18.8	105534	9.4	9.4	1041.2	1.8
1983	1287.7	557.0	698.6	18.7	105118	9.3	9.3	1274.2	1.5
1984	1419.5	736.2	655.4	19.0	106963	9.5	9.5	1410.6	1.3
1985	1031.8	353.9	679.4	19.0	106884	9.5	9.5	1052.3	1.8
1986	882.5	267.6	632.5	18.8	105939	9.4	9.4	918.9	2.1
1987	1004.9	373.6	628.6	18.7	104949	9.3	9.3	1020.9	1.9
1988	1552.9	772.0	742.8	18.8	105489	9.4	9.4	1533.6	1.2
Ave.	1284.5	592.1	677.6	18.4	103710	9.2	9.2	1288.2	1.5

* Deficit between (1) and (5) is supplied from the storage of the previous year and the surplus is added to the storage.

Cuadro 5.2.1 PROYECCION DE POBLACION DE LOS MUNICIPIOS EN EL AREA DE ESTUDIO
 Table 5.2.1 MUNICIPALITIES POPULATION PROJECTION IN THE STUDY AREA

Municipality	Year							
	1961	1974	1988	1990	1995	2000	1961	2000
1. Comayagua Rural	19,055 9,528	30,760 14,819	59,534 23,118	65,386 24,621	79,552 28,821	96,787 33,737	3.8 3.5	4.0 3.2
2. Ajuterique	3,132	5,126	6,803	7,078	7,815	8,628	3.9	2.0
3. Humuya	581	601	1,371	1,460	1,612	1,780	0.3	2.0
4. Lamani	2,844	2,850	3,572	3,687	3,992	4,322	0.0	1.6
5. Lejamani	1,455	2,127	3,123	3,300	3,789	4,350	3.0	2.8
6. San Sebastian	1,269	1,527	1,506	1,506	1,583	1,664	1.4	1.0
7. Villa de San Antonio	4,408	6,169	11,429	12,480	15,184	18,474	2.6	4.0
8. La Paz	8,876	11,775	19,900	21,441	25,836	31,132	2.2	3.8
9. Cane	1,164	1,370	1,937	2,035	2,247	2,481	1.3	2.0
Total	42,784	62,305	109,175	118,373	141,610	169,618	2.9	3.6

Cuadro 5.2.2 (1) PROYECCION DE LA POBLACION RURAL EN EL AREA DE ESTUDIO (1/2)
 Table 5.2.2 (1) RURAL POPULATION PROJECTION IN THE STUDY AREA (1/2)

Municipality	Year									
	1988	1990	1991	1992	1993	1994	1995	1996	1997	1998
	e(%)	e(%)	e(%)	e(%)	e(%)	e(%)	e(%)	e(%)	e(%)	e(%)
1. Comayagua (Total)	(59,534)	(65,386)	(68,001)	(70,721)	(73,550)	(76,492)	(79,552)			
Rural	23,118	24,621	25,409	26,222	27,061	27,927	28,821	36.5		36.2
2. Ajuterique (Total)	(6,803)	(7,078)	(7,220)	(7,364)	(7,511)	(7,662)	(7,815)			
Rural	3,137	3,255	3,320	3,387	3,455	3,524	3,595	46.0		46.0
3. Humaya (Total)	(1,371)	(1,460)	(1,489)	(1,519)	(1,549)	(1,580)	(1,612)			
Rural	1,371	1,460	1,489	1,519	1,549	1,580	1,612	100.0		100.0
4. Lamani (Total)	(3,572)	(3,687)	(3,746)	(3,806)	(3,867)	(3,929)	(3,992)			
Rural	3,572	3,687	3,746	3,806	3,867	3,929	3,992	100.0		100.0
5. Lejamani (Total)	(3,123)	(3,300)	(3,392)	(3,488)	(3,585)	(3,686)	(3,789)			
Rural	326	330	340	349	360	370	380	10.0		10.0
6. San Sebastian (Total)	(1,506)	(1,506)	(1,521)	(1,536)	(1,552)	(1,567)	(1,583)			
Rural	1,506	1,506	1,521	1,536	1,552	1,567	1,583	100.0		100.0
7. Villa de San Anto. (Total)	(11,429)	(12,480)	(12,979)	(13,498)	(14,038)	(14,600)	(15,184)			
Rural	5,683	6,240	6,489	6,749	7,017	7,299	7,590	50.0		50.0
8. La Paz (Total)	(19,900)	(21,441)	(22,256)	(23,101)	(23,979)	(24,890)	(25,836)			
Rural	8,935	9,434	9,793	10,165	10,551	10,952	11,368	44.0		44.0
9. Cane (Total)	(1,937)	(2,035)	(2,076)	(2,117)	(2,160)	(2,203)	(2,247)			
Rural	1,937	2,035	2,076	2,117	2,160	2,203	2,247	100.0		100.0
Total Municipal.	(109,175)	(118,373)	(122,681)	(127,152)	(131,792)	(136,610)	(141,610)			
Rural	49,585	52,568	54,183	55,850	57,572	59,351	61,188	43.4		43.2

Cuadro 5.2.2 (2) PROYECCION DE LA POBLACION RURAL EN EL AREA DE ESTUDIO (2/2)
 Table 5.2.2 (2) RURAL POPULATION PROJECTION IN THE STUDY AREA (2/2)

Municipality	Year			
	1996	1997	1998	2000
	e(%)	e(%)	e(%)	e(%)
1. Comayagua (Total)	(82,734)	(86,043)	(89,485)	(96,787)
Rural	29,743 36.0	30,695 35.7	31,677 35.4	33,737 34.9
2. Ajuterique (Total)	(7,971)	(8,131)	(8,293)	(8,628)
Rural	3,667 46.0	3,740 46.0	3,815 46.0	3,969 46.0
3. Humuya (Total)	(1,644)	(1,677)	(1,711)	(1,780)
Rural	1,644 100.0	1,677 100.0	1,711 100.0	1,780 100.0
4. Lamani (Total)	(4,056)	(4,121)	(4,187)	(4,322)
Rural	4,056 100.0	4,121 100.0	4,187 100.0	4,322 100.0
5. Lejamani (Total)	(3,895)	(4,004)	(4,116)	(4,350)
Rural	390 10.0	401 10.0	413 10.0	435 10.0
6. San Sebastian (Total)	(1,599)	(1,615)	(1,631)	(1,664)
Rural	1,599 100.0	1,615 100.0	1,631 100.0	1,664 100.0
7. Villa de San Anto. (Total)	(15,791)	(16,423)	(17,080)	(18,474)
Rural	7,895 50.0	8,211 50.0	8,539 50.0	9,237 50.0
8. La Paz (Total)	(26,818)	(27,837)	(28,894)	(31,132)
Rural	11,528 43.0	11,966 43.0	12,420 43.0	13,075 42.0
9. Cane (Total)	(2,292)	(2,338)	(2,385)	(2,481)
Rural	2,292 100.0	2,338 100.0	2,385 100.0	2,481 100.0
Total (Total)	(146,801)	(152,189)	(157,782)	(169,618)
Municipal. Rural	62,814 42.8	64,764 42.6	66,778 42.3	70,700 41.7

Cuadro 5.2.3 POBLACION ATENDIDA PREVISTA PARA EL SISTEMA DE SUMINISTRO DE AGUA RURAL EN EL AREA DE ESTUDIO

Table 5.2.3 PROJECTED SERVED POPULATION FOR RURAL WATER SUPPLY SYSTEM IN STUDY AREA

Year	Projected Rural Population Total	Projected Served Population (%)
1988	49,585	10,000 ^{1/} (approx.) (17)
1990	52,568	(10,000)
1993	57,572	51,800 (90)
1996	62,814	56,500 (90)
2000	70,700	63,600 (90)

Note: ^{1/} Ref. Table 1.2.1 PRESENT WATER SUPPLIES IN STUDY AREA

Cuadro 5.2.4 DEMANDAS DE AGUA ACTUALES Y FUTURAS

Table 5.2.4 PRESENT AND FUTURE WATER DEMANDS

Year	Served Population	Water Demands (m ³ /d)	Water consumption per capita (l/d)
1989/1990	10,000	(250*)	(25)
1993	51,800	2,590	50
1996	56,500	4,520	80
2000	63,600	6,360	100

Note: * Potential demand supposing 25 LPCD

Cuadro 5.3.1 (1) AREA PLANIFICADA Y TIPO DE SISTEMA DE
SUMINISTRO DE AGUA RURAL (1/2)

Table 5.3.1 (1) PLANNED AREA AND TYPE OF RURAL WATER SUPPLY SYSTEM (1/2)

No.	Community	No. of Households	Popula- tion	Type and No. of system		Dimension & Nos. of Production Wells			
				1st Stage	2nd Stage	4"x50m	4"x100m	6"x50m	6"x100m
<< Comayagua >>>									
1.	Cacaguapa	74	425	I * 15	---	15	-	-	-
2.	El Roblito	66	434	I * 15	---	15	-	-	-
3.	Los Empates & El Tamboral	40	218	---	I * 10	10	-	-	-
4.	El Motatal	31	182	---	III * 1	-	-	1	-
5.	El Sauce	90	375	III * 1, I * 1	---	1	-	1	-
6.	Piedras Azules			III * 1, I * 1	---	1	-	1	-
7.	Palo Pintado	161	955	III * 1	III * 1	-	-	2	-
8.	Valle de Angeles	145	720	III * 2, I * 2	II * 1	2	-	3	-
9.	Escuela Normal & El Pajonal	4	31	I * 2	---	2	-	-	-
10.	Mata de Cana	27	263	---	III * 1	-	-	1	-
11.	La Zarcita	218	965	III * 1	---	-	-	1	-
12.	Grupo Benito Cadena	12	84	I * 1	---	1	-	-	-
13.	Ojo de Agua	97	497	III * 1, I * 2	II * 2	2	-	3	-
14.	Puente Selguapa, El Pajonal No.1 & El Porvenir	84	503	III * 1, I * 2	---	2	-	1	-
15.	El Taladro	56	368	---	III * 1	-	-	1	-
16.	Jarin & Asenta- miento Barrio	28	193	III * 1, I * 2	---	2	-	1	-
17.	La Jaguita	55	405	III * 1, I * 1	---	1	-	1	-
18.	El Paraiso	35	204	III * 1, I * 1	---	1	-	1	-
19.	Col. Nueva Espe- ranze & Capiro	70	446	III * 2, I * 2	---	2	-	2	-
20.	San Isidro & the suburbs of Comayagua			---	III * 4	-	-	4	-
Not Specified Area in Comayagua				---	I * 10	10	-	-	-
Total (Comayagua)				I * 47	I * 20	67	-	-	-
				II * 0	II * 3	-	-	3	-
				III * 13	III * 8	-	-	21	-

Cuadro 5.3.1 (2) AREA PLANIFICADA Y TIPO DE SISTEMA DE
SUMINISTRO DE AGUA RURAL (2/2)

Table 5.3.1 (2) PLANNED AREA AND TYPE OF RURAL WATER SUPPLY SYSTEM (2/2)

No.	Community	No. of Households	Popula- tion	Type and No. of system		Dimension & Nos. of Production Wells			
				1st Stage	2nd Stage	4"x50m	4"x100m	6"x50m	6"x100m
<<< La Paz >>>									
21.	Las Cascabeles	24	153	I * 1	III * 1	1	-	1	-
22.	Lo de Reina	29	208	I * 1	III * 1	1	-	1	-
23.	Playitas			III * 1, I * 4	II * 3	4	-	4	-
24.	Las Liconas	86	298	---	II * 2	-	-	2	-
25.	Las Pozos, Los Capantillos & Las Paredos	22	221	III * 1, I * 1	---	1	-	1	-
26.	Pacon & El Sifon	46	258	III * 1, I * 2	---	2	-	1	-
27.	Camino Nuevo	46	141	---	III * 1	-	-	1	-
28.	San Jose	44	227	III * 1	---	-	-	-	1
29.	Las Mercedes & El Varillal	111	519	III * 1	---	-	-	1	-
30.	Humuya	91	400	III * 1	---	-	-	-	1
31.	La Vajilla			---	III * 1	-	-	1	-
32.	Agua Salada			---	III * 1	-	-	-	1
33.	Los Pintores & Choco	326	1749	III * 2, I * 2	III * 1	-	2	-	3
34.	Lamani			---	III * 1	-	-	-	1
35.	El Paraiso	40	176	III * 1, I * 2	---	-	2	-	1
36.	El Sonzapote	7	50	---	II * 1	-	-	-	1
37.	El Mesetas	7	29	---	II * 1	-	-	-	1
Total (La paz)				I * 13	I * 0	9	4	-	-
				II * 0	II * 7	-	-	5	2
				III * 9	III * 7	-	-	8	8
Total									
Ground Total		I * 80	I * 60	I * 20	76	4	-	-	-
		II * 10	II * 0	II * 10	-	-	8	2	-
		III * 37	III * 22	III * 15	-	-	29	8	-
Total						76	4	37	10

Cuadro 5.4.1.1 DESCLOSE DEL COSTO DE CONSTRUCCION
 Table 5.4.1.1 BREAKDOWN OF CONSTRUCTION COST

Unit: Lps 10³

Item	1st Stage		2nd Stage		Total of 1st & 2nd Stage	
	FC	LC total	FC	LC total	FC	LC total
Direct Construction Cost						
Well Drilling	7,996	876	2,496	681	10,492	1,557
Pipe & facility installation	4,112	4,545	3,497	3,301	7,609	7,846
Work shop & Mainte. Equip.	992	0	183	0	1,175	0
<u>sub-total</u>	<u>13,100</u>	<u>5,421</u>	<u>6,176</u>	<u>3,982</u>	<u>19,276</u>	<u>9,403</u>
Engineering & Administration	1,619	268	1,382	235	3,001	503
Physical Contingency	2,208	853	1,133	632	3,341	1,485
<u>Total</u>	<u>16,927</u>	<u>6,542</u>	<u>8,691</u>	<u>4,849</u>	<u>25,618</u>	<u>11,391</u>
Price Contingency	4,232	2,177	6,390	4,163	10,622	6,340
<u>Grand Total</u>	<u>21,159</u>	<u>8,719</u>	<u>15,081</u>	<u>9,012</u>	<u>36,240</u>	<u>17,731</u>
						<u>53,972</u>

Cuadro 5.4.2 PROGRAMA DE DESEMBOLSOS ANUALES
Table 5.4.2 ANNUAL DISBURSEMENT SCHEDULE

I. 1st Stage

Unit: Lps 10³

Item	Total		1990		1991		1992		1993	
	FC	LC	FC	LC	FC	LC	FC	LC	FC	LC
Direct Construction Cost	13,100	5,421	0	0	10,361	1,355	1,826	2,711	913	1,355
Engineering & Administration	1,619	268	277	29	335	60	671	119	336	60
sub-total	14,719	5,688	277	29	10,696	1,415	2,497	2,830	1,249	1,415
Physical Contingency	2,208	853	41	4	1,605	212	375	425	187	212
Total	16,927	6,542	318	33	12,301	1,627	2,872	3,255	1,436	1,627
Price Contingency	4,232	2,177	32	3	2,583	342	951	1,077	666	755
Ground Total	21,159	8,719	350	36	14,884	1,969	3,823	4,332	2,102	2,382

II. 2nd Stage

Unit: Lps 10³

Item	Total		1990		1991		1992	
	FC	LC	FC	LC	FC	LC	FC	LC
Direct Construction Cost	6,176	3,982	3,506	0	1,335	1,991	1,335	1,991
Engineering & Administration	1,382	235	276	29	553	103	553	103
sub-total	7,558	4,216	3,782	29	1,888	2,094	1,888	2,094
Physical Contingency	1,133	632	567	4	283	314	283	314
Total	8,691	4,849	4,349	33	2,171	2,408	2,171	2,408
Price Contingency	6,390	4,163	2,655	20	1,675	1,858	2,060	2,285
Ground Total	15,081	9,012	7,004	53	3,846	4,266	4,231	4,693

Cuadro 5.4.3 COSTOS DE OPERACION Y MANTENIMIENTO
Table 5.4.3 OPERATION AND MAINTENANCE COST

Year in Order	Year	O&M Cost		Replacement Cost	Residual Value of Equipment	Total
		Facilities and others	Supporting Vehicles			
1	1990	0	0	0	0	0
2	1991	0	0	0	0	0
3	1992	113	0	0	0	113
4	1993	241	0	0	0	241
5	1994	315	0	0	0	315
6	1995	315	0	0	0	315
7	1996	419	0	0	(1,056)	419
8	1997	524	0	0	0	524
9	1998	524	90	0	0	614
10	1999	524	90	0	0	614
11	2000	524	90	0	0	614
12	2001	524	90	0	0	614
13	2002	524	90	0	0	614
14	2003	524	90	0	0	614
15	2004	524	90	0	0	614
16	2005	524	90	0	0	614
17	2006	449	90	839	0	1,378
18	2007	449	90	1,057	0	1,596
19	2008	449	90	97	0	636
20	2009	524	90	0	0	614
21	2010	512	90	999	0	1,601
22	2011	512	90	842	0	1,444
23	2012	524	90	0	0	614
24	2013	524	90	0	0	614
25	2014	524	90	0	0	614
26	2015	524	90	0	0	614
27	2016	524	90	0	0	614
28	2017	524	90	0	0	614
29	2018	524	90	0	0	614
30	2019	524	90	0	0	614

Cuadro 5.5.1 CASOS DE ENFERMEDADES TRANSMITIDAS POR VECTOR AGUA Y POBLACION SIN AGUA O SANEAMIENTO SEGUROS EN PAISES EN VIAS DE DESARROLLO, 1985

Table 5.5.1 WATER BORNE DISEASE CASES AND POPULATION WITHOUT SAFE WATER AND SAFE SANITATION IN DEVELOPING COUNTRIES IN 1985

Countries	Water borne disease cases per 100,000	Population without safe water(%)	Population without safe sanitation(%)
Honduras	4,462	55	72
Mexico	6,566	30	51
Peru	900	48	53
Chile	186	14	15
Guatemala	672	42	46
El Salvador	10,250	39	46
Paraguay	1,146	78	51
Costa Rica	8	7	5
Guyana	634	18	90
Madagascar	6,900	69	87
Angola	3,607	69	81
Burkina Faso	5,007	36	88
Rwanda	2,872	51	44
Lesatho	31	65	85
Guinea Bissau	3,500	79	79
Cape Verde	5,070	37	82
Sao Tome & Pricipe	6,000	86	98
Burma	968	73	76
Sri Lanka	1,024	60	56
Hangary	7	1	0
Portugal	13	42	48
Pakistan	315	57	81
Morocco	11	42	64
Afghanistan	2,214	80	99
Yemen Arab Republic	3,784	65	92
Tunisia	60	30	48
Philippines	785	48	33
Malaysia	410	17	26
Papua New Guinea	2,724	75	57
Tonga	3,015	5	0
Tuvalu	4,520	0	25

Source : The International Drinking Water Supply and Sanitation Decade, Review of Mid-Decade Progress (as at December 1985), WHO

Cuadro 5.5.2 FLUJO ANUAL DE COSTOS Y BENEFICIOS ECONOMICOS
Table 5.5.2 ANNUAL FLOW OF ECONOMIC COST AND BENEFIT

Unit: 10³ Lps.

Year	Economic Cost			Economic Benefit
	Construction cost	OMR cost	Total	
1. 1990	345	0	345	0
2. 1991	13,644	0	13,644	0
3. 1992	5,559	95	5,654	992
4. 1993	2,779	206	2,985	2,151
5. 1994	4,376	269	4,645	2,809
6. 1995	4,158	269	4,427	2,809
7. 1996	4,158	357	4,515	4,288 *1
8. 1997	0	447	447	4,083
9. 1998	0	524	524	4,083
.
.
.
16. 2005	0	524	524	4,083
17. 2006	0	1,299	1,299	4,083
18. 2007	0	1,517	1,517	4,083
19. 2008	0	557	557	4,083
20. 2009	0	524	524	4,083
21. 2010	0	1,513	1,513	4,083
22. 2011	0	1,356	1,356	4,083
23. 2012	0	524	524	4,083
.
.
.
30. 2019	0	524	524	4,083

Note: *1 includes residual value of Lps. 1,056 thousand

Cuadro 6.2.1 COMPONENTE DE INSTALACIONES DE SUMINISTRO DE AGUA
Table 6.2.1 COMPONENT OF WATER SUPPLY FACILITIES

Component	Unit	Quantity		Total
		1st. stage	2nd. stage	
1. D 4" Deep well, equipped with sylinder type head pump				
Type I D 4" * 50 m	unit	56	20	76
D 4" * 100 m	unit	4	0	4
total		60	20	80
2. D 6" Deep well, equipped with electric motor pump				
Type II D 6" * 50 m	unit	0	8	8
D 6" * 100 m	unit	0	2	2
Type III D 6" * 50 m	unit	17	12	29
D 6" * 100 m	unit	5	3	8
total		22	25	47
3. Elevated FRP water tank V 20 m ³ , H 8 m, with suppoting strucrure	unit	22	7	29
4. FRP water tank V 8 m ³ , H 3 m	unit	32	43	75
5. Public bath house	unit	54	50	104
6. Public stand pipe	unit	100	50	150
7. Distribution pipes				
D 80 mm	m	14,200	8,400	22,600
D 40 mm	m	24,500	10,500	35,000
Miscellaneous works	lot	1	1	2

Figuras

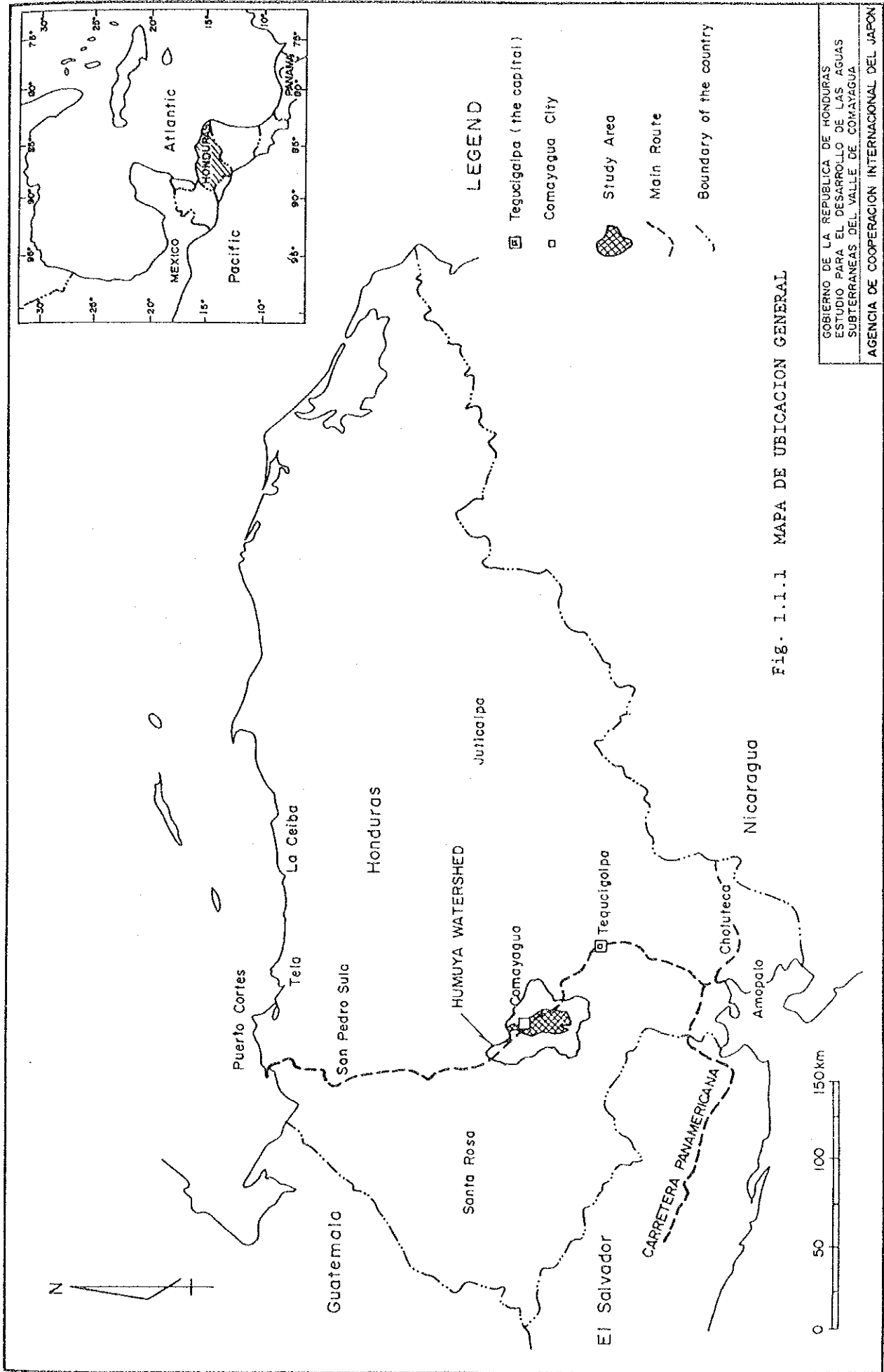


Fig. 1.1.1 MAPA DE UBICACION GENERAL

Gobierno de la Republica de Honduras
 Estudio para el desarrollo de las aguas
 subterranas del valle de Comayagua
 Agencia de Cooperacion Internacional del Japon

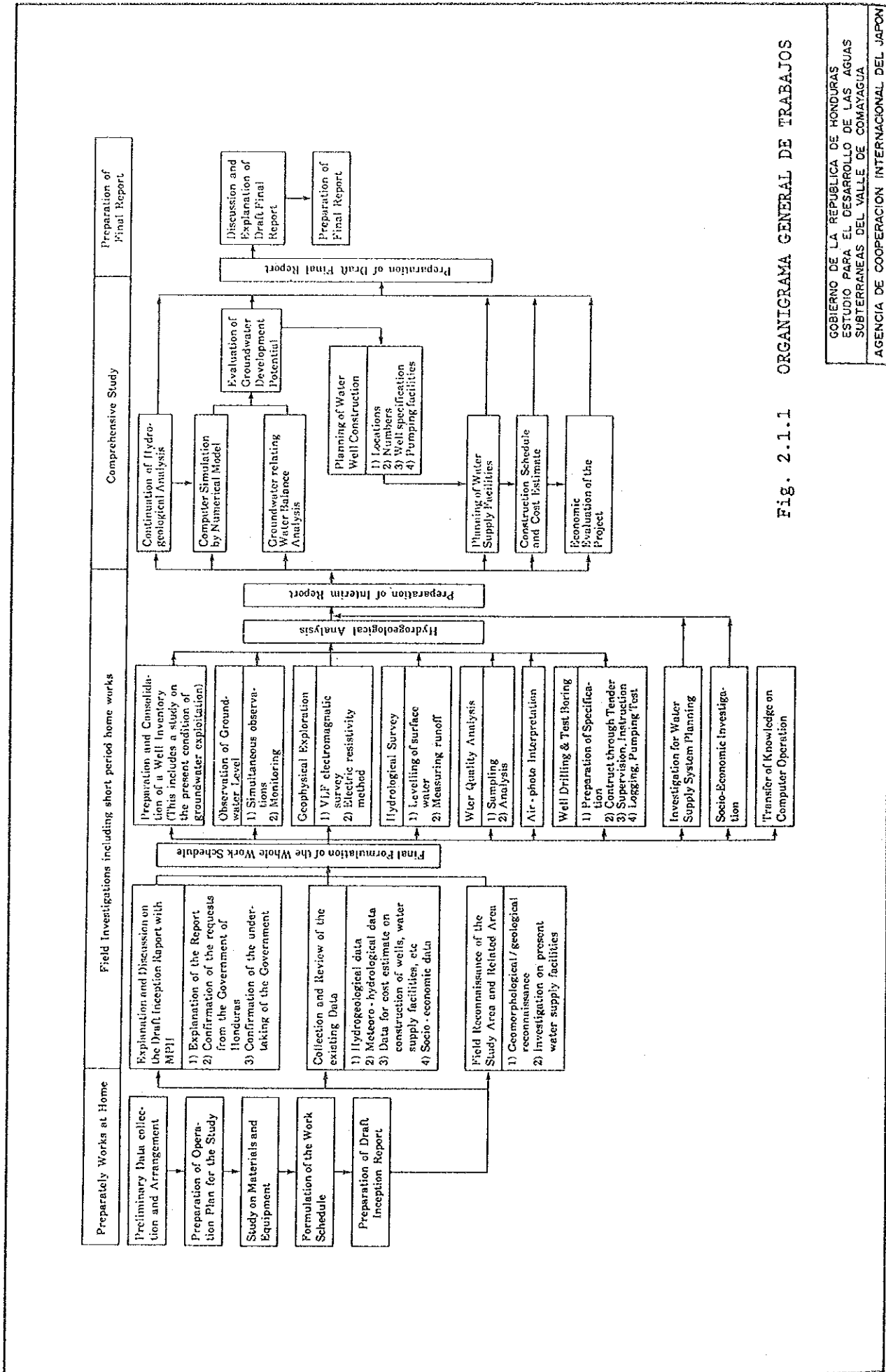
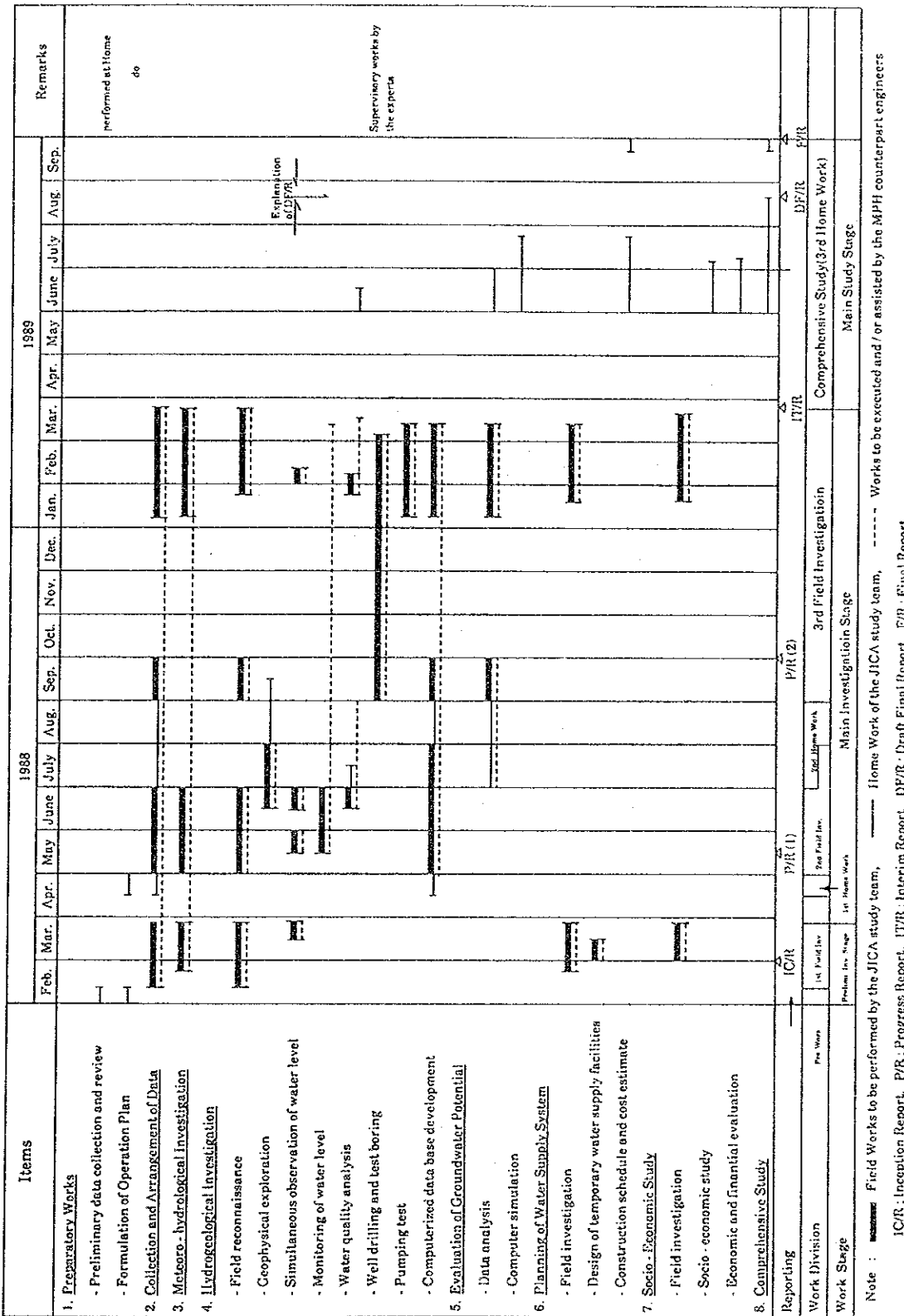


Fig. 2.1.1.1 ORGANIGRAMA GENERAL DE TRABAJOS

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DETAILED WORK SCHEDULE



Note : **ICR** : Inception Report, **P/R** : Progress Report, **IT/R** : Interim Report, **DP/R** : Draft Final Report, **F/R** : Final Report
ICR : Inception Report, **P/R** : Progress Report, **IT/R** : Interim Report, **DP/R** : Draft Final Report, **F/R** : Final Report
 --- Field Works to be performed by the JICA study team, --- Home Work of the JICA study team, - - - - - Works to be executed and / or assisted by the MPH counterpart engineers

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Fig. 2.1.2 PROGRAMA DE TRABAJOS DETALLADO

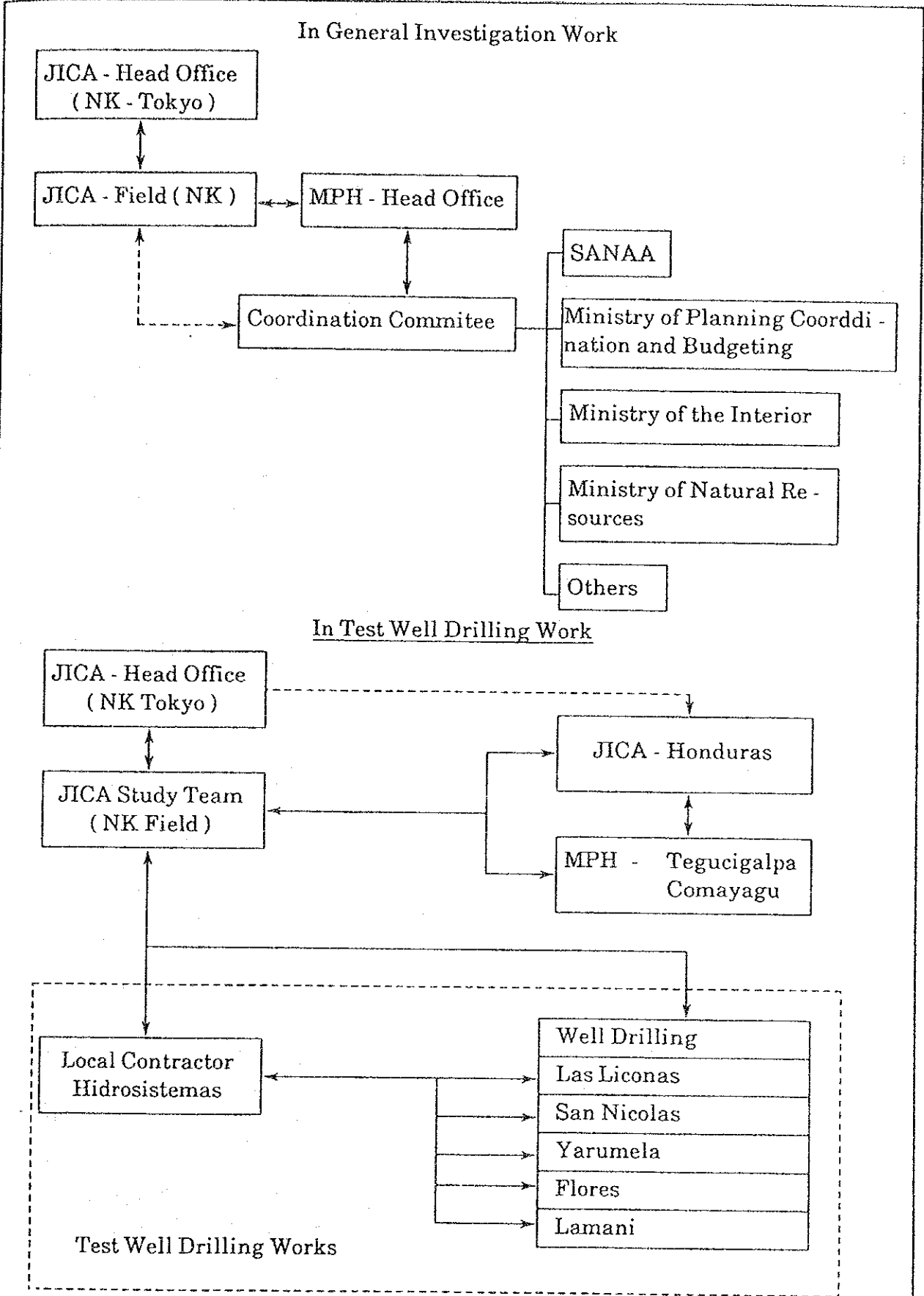
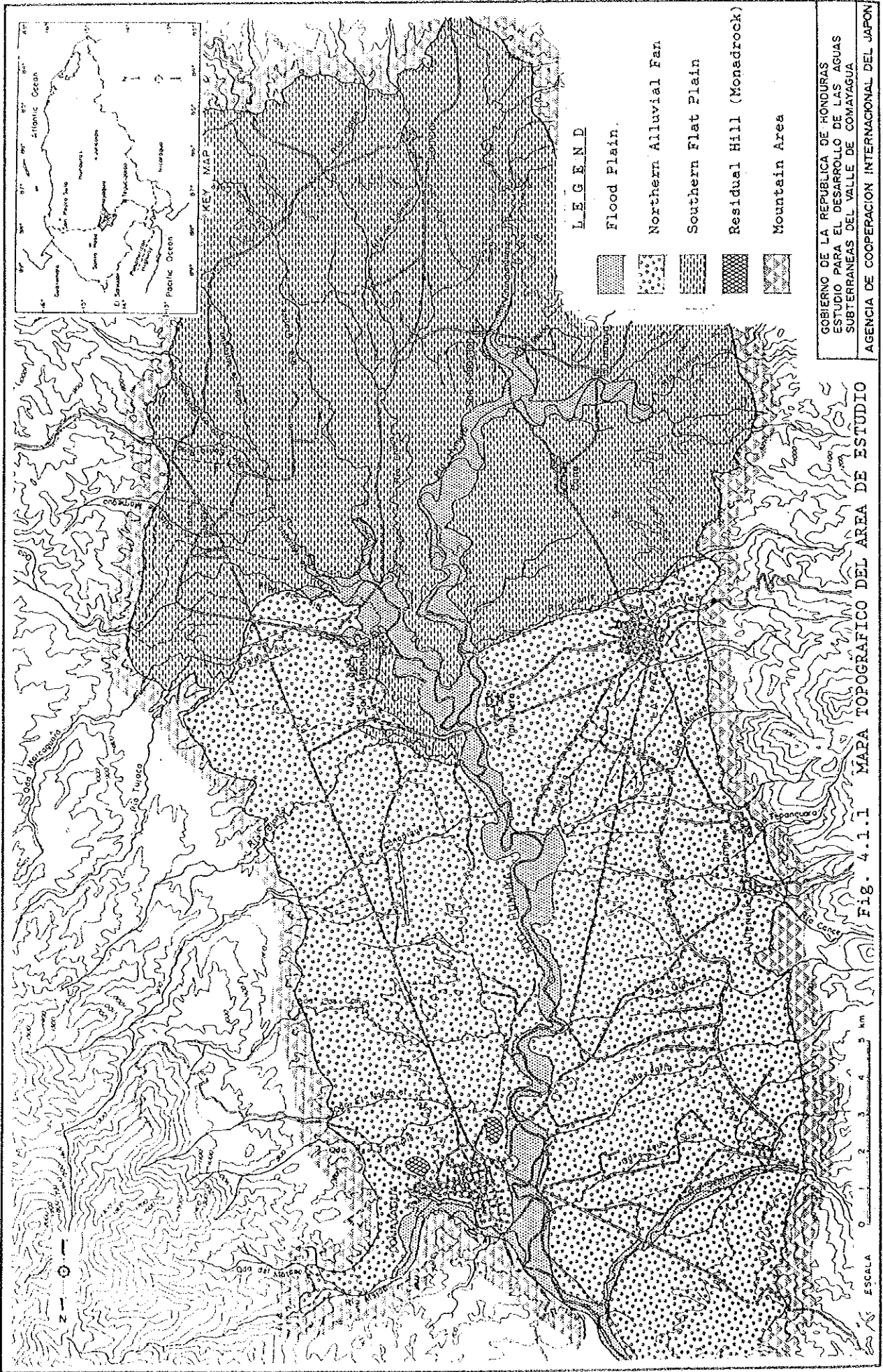
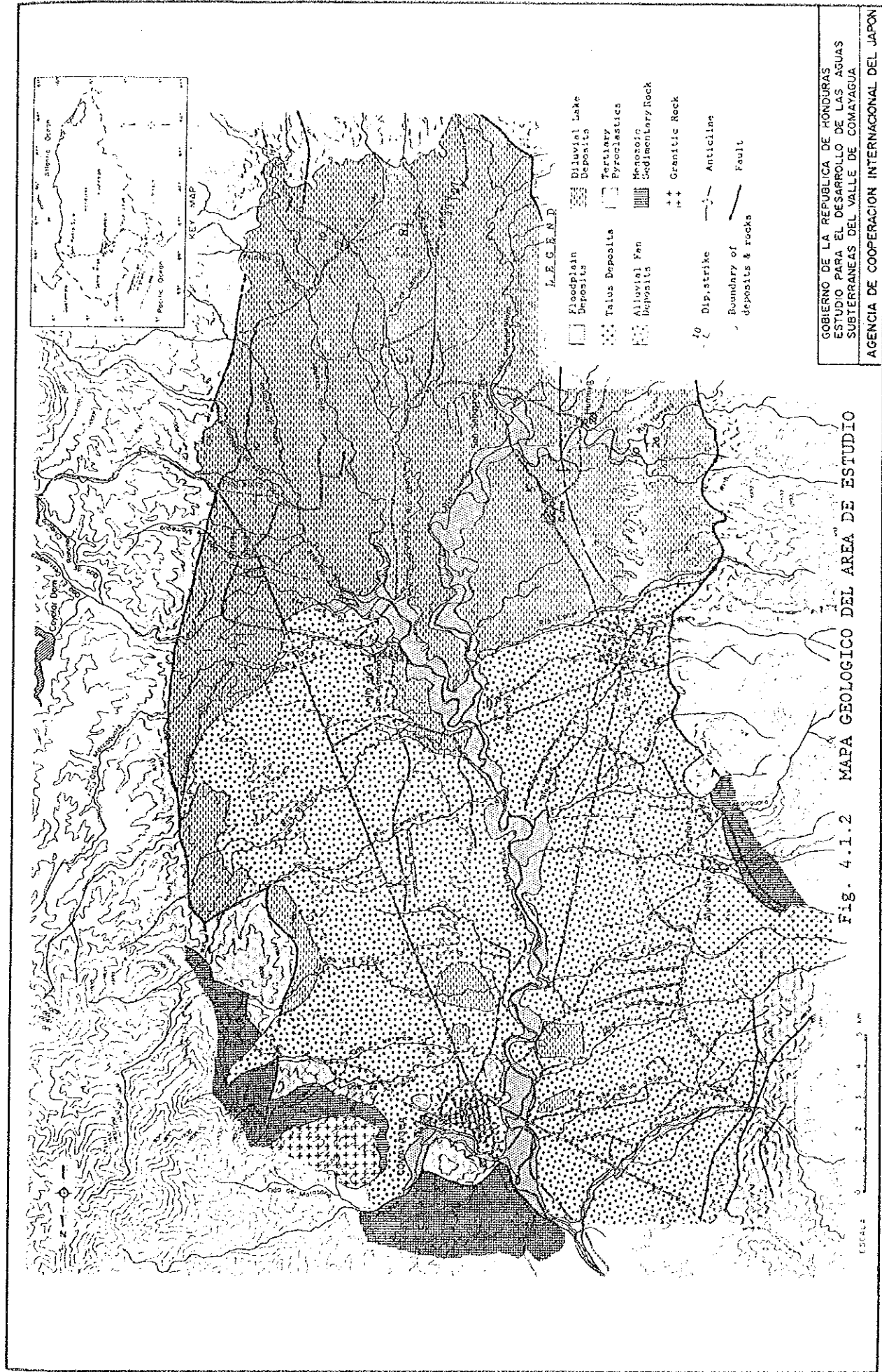


Fig. 2.1.4 ORGANIZACION DEL PROYECTO

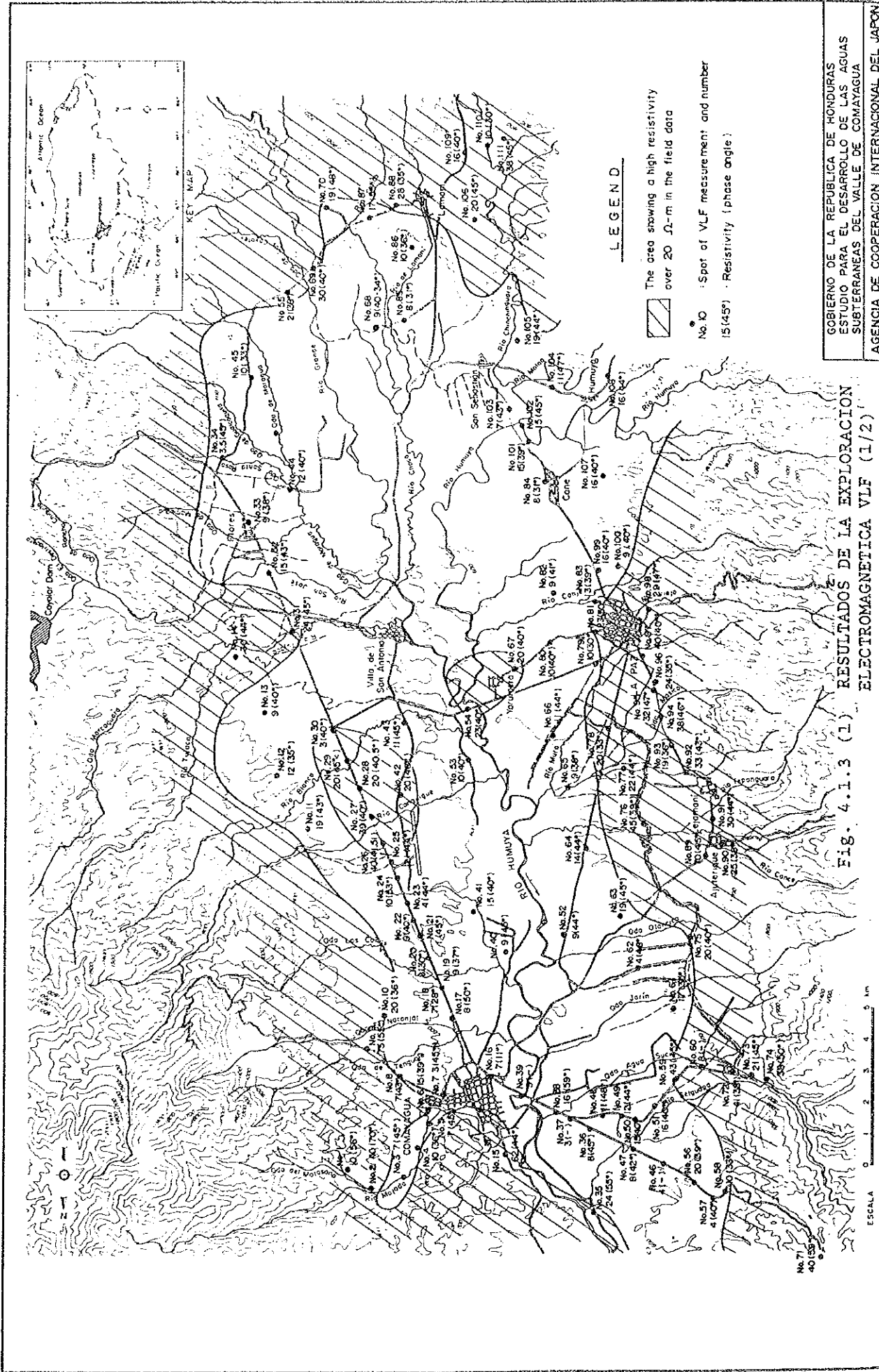
Gobierno de la Republica de Honduras
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 SUBTERRANEAS DEL VALLE DE COMAYAGUA
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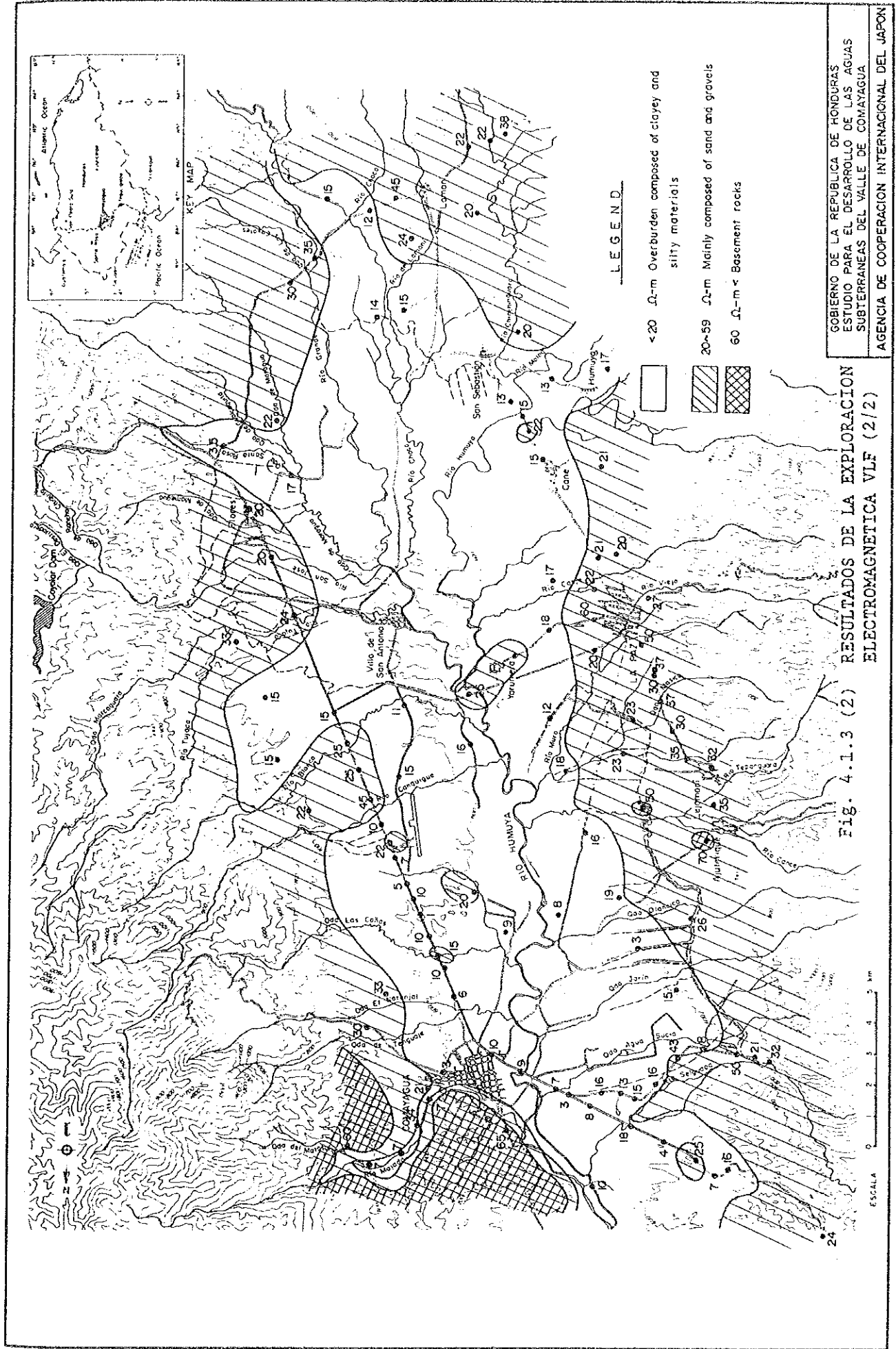


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Fig. 4.1.2 MAPA GEOLOGICO DEL AREA DE ESTUDIO

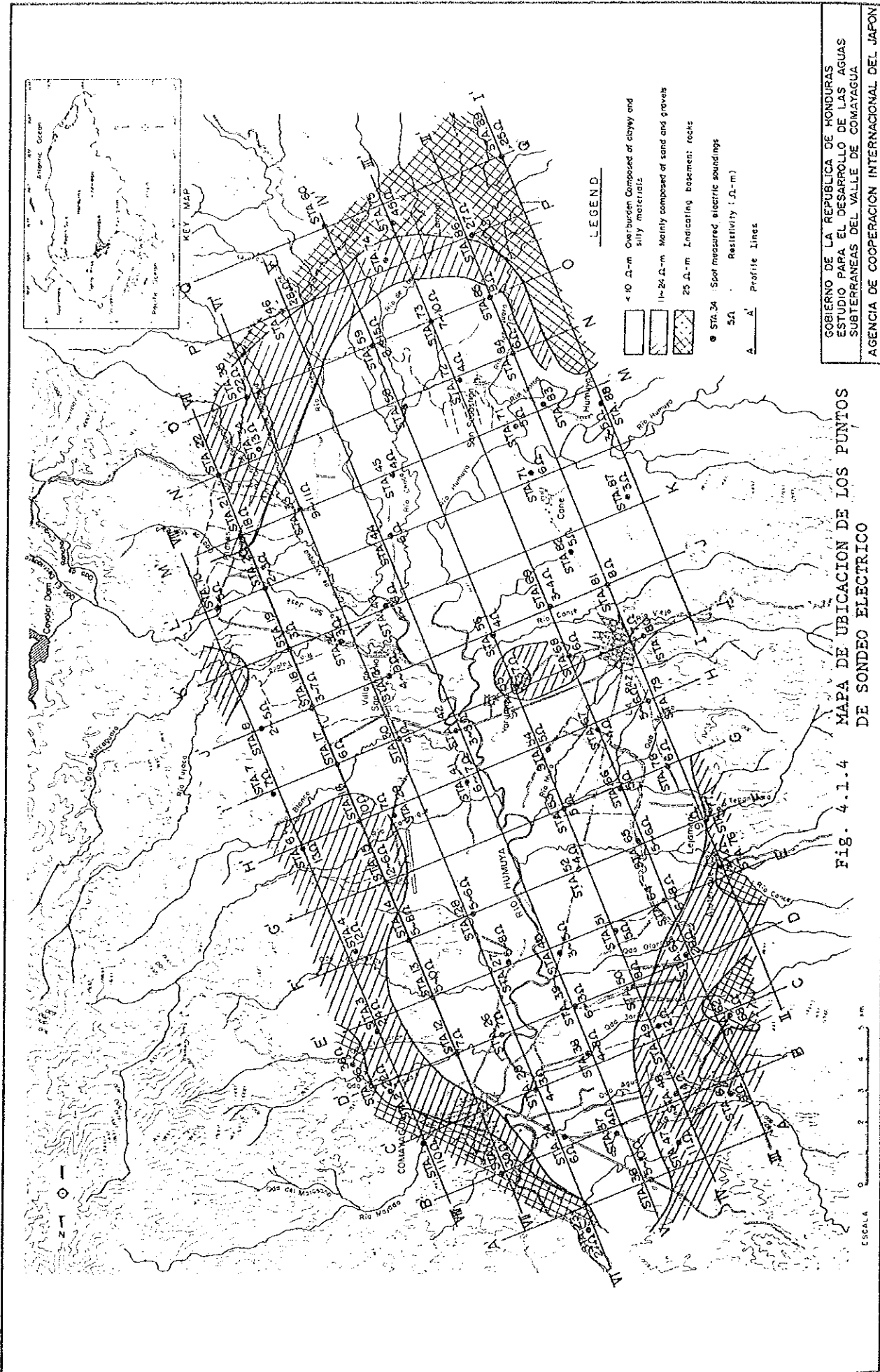


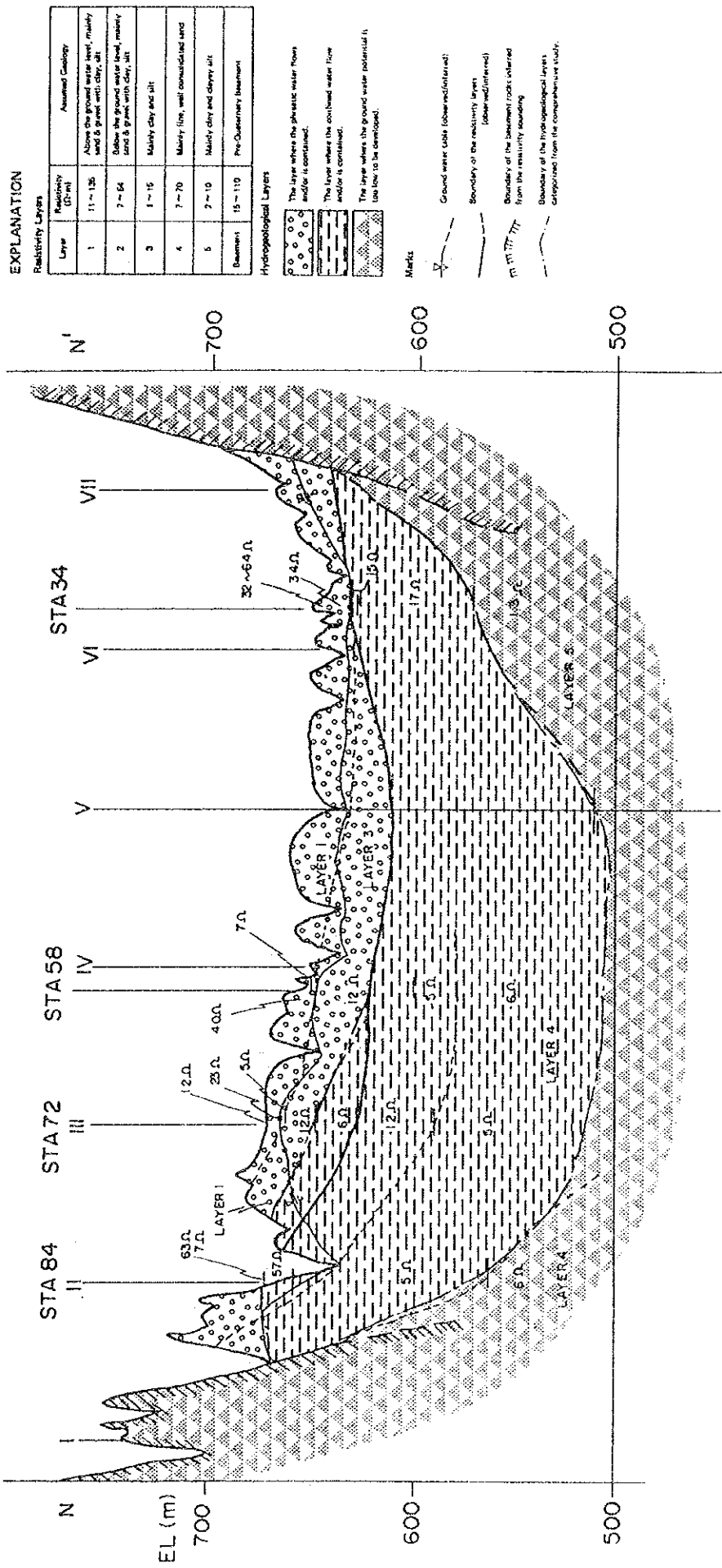
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Fig. 4.1.3 (2) RESULTADOS DE LA EXPLORACION
 ELECTROMAGNETICA VLF (2/2)





Horizontal SCALE
0 5 km

Fig. 4.1.5 PERFIL DE RESISTIVIDAD (3/4)

EXPLANATION

Resistivity Layers		
Layer	Resistivity (Ω-m)	Assumed Geology
1	11 ~ 130	Above the ground water level, mainly sand & gravel with clay, silt
2	7 ~ 64	Below the ground water level, mainly sand & gravel with clay, silt
3	1 ~ 15	Mainly clay and silt
4	7 ~ 70	Mainly fine, well consolidated sand
5	7 ~ 10	Mainly clay and clayey silt
Basement	15 ~ 110	Pre-Quaternary basement

Hydrogeological Layers

- The layer where the phreatic water flows and/or is contained.
- The layer where the confined water flow and/or is contained.
- The layer where the ground water potential is too low to be developed.
- Ground water table (observed/interred)
- Boundary of the resistivity layer (observed/interred)
- Boundary of the basement rock inferred from the resistivity boundary
- Boundary of the hydrogeological layer extrapolated from the comprehensive study.

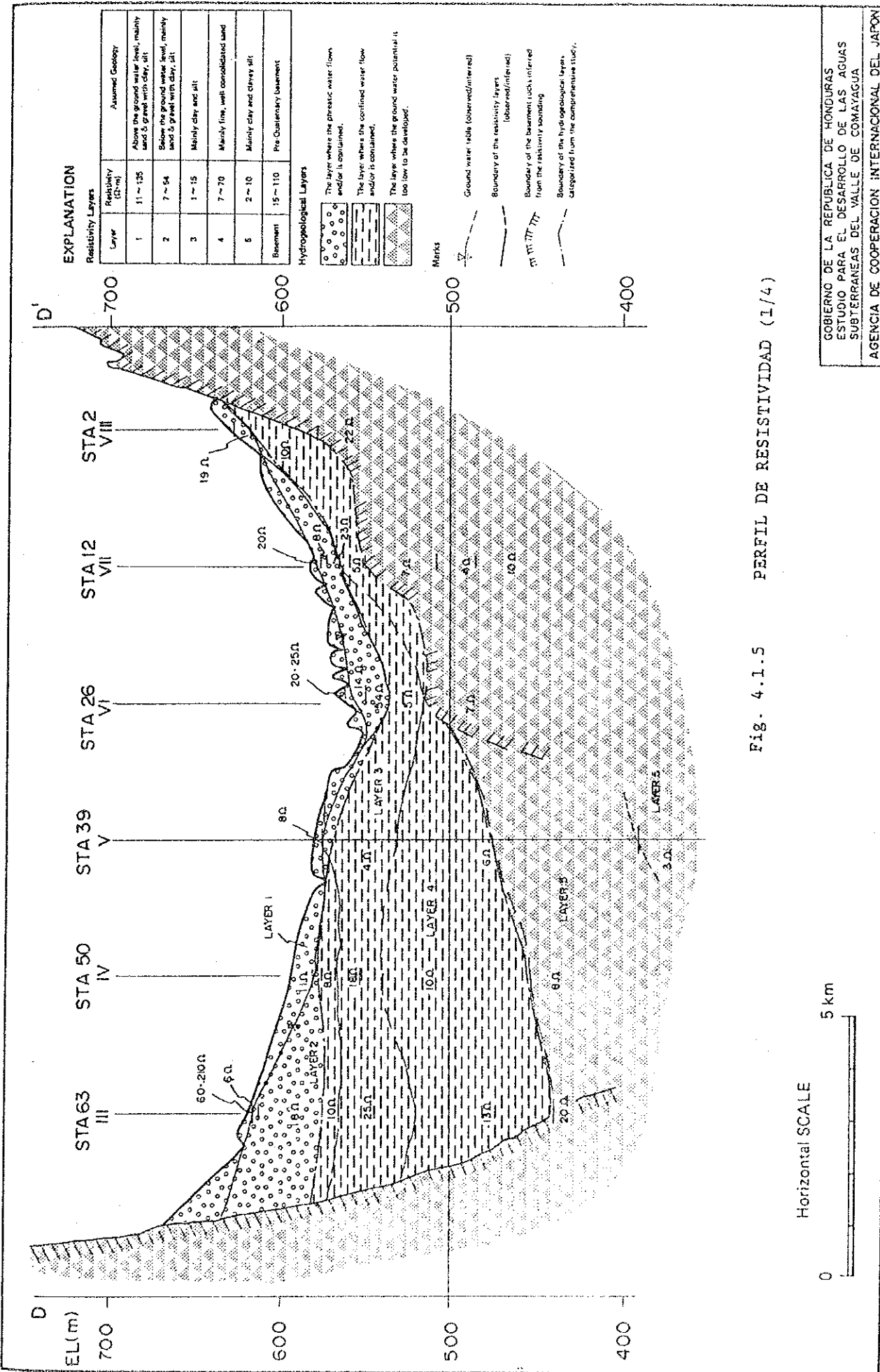


Fig. 4.1.5 PERFIL DE RESISTIVIDAD (1/4)

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SUBTERRANEAS DEL VALLE DE COMAYAGUA
AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

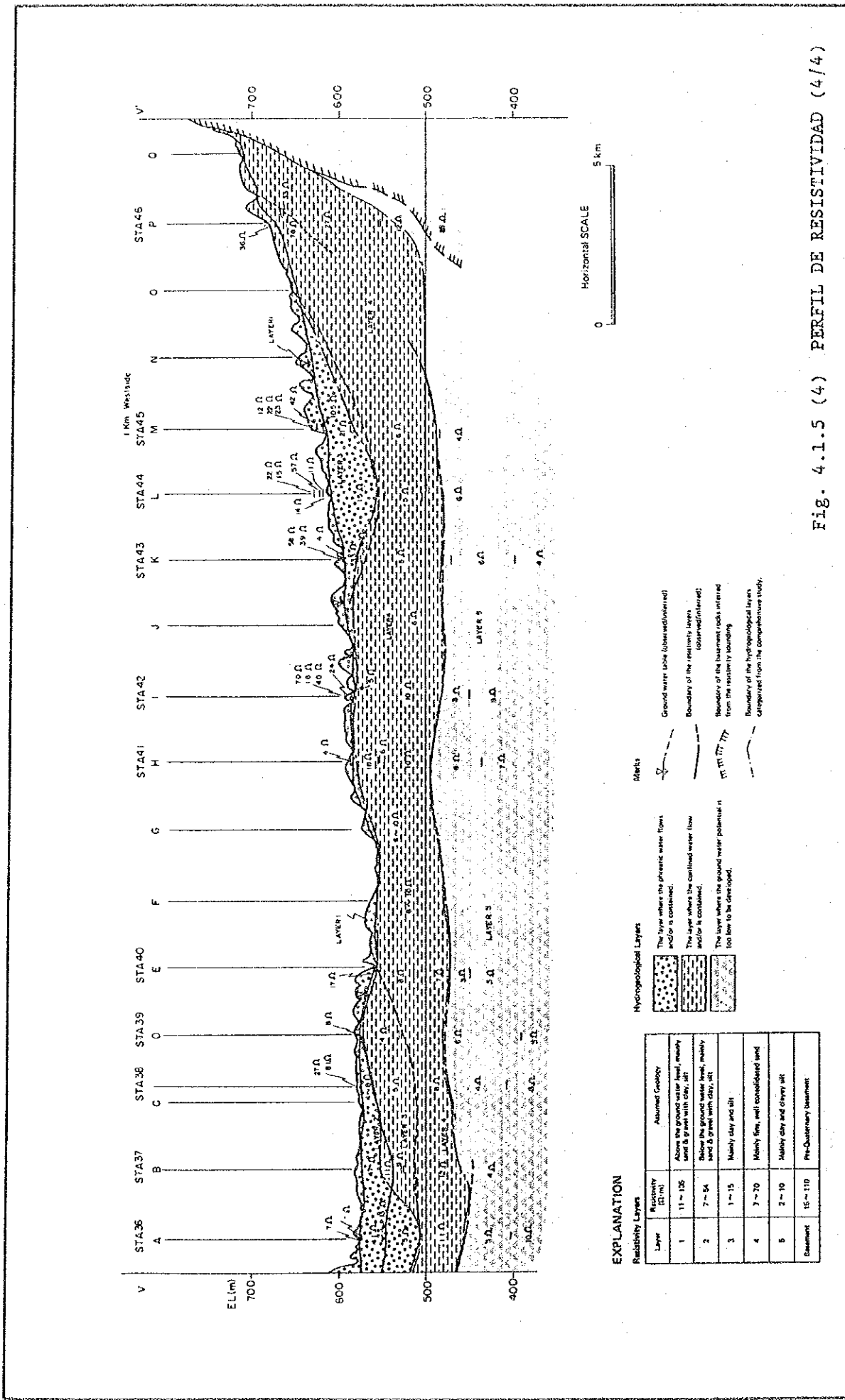


Fig. 4.1.5 (4) PERFIL DE RESISTIVIDAD (4/4)

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 ESTUDIO PARA EL DESARROLLO DE LAS AGUAS
 SUBTERRANEAS DEL VALLE DE COMAYAGUA
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EXPLANATION

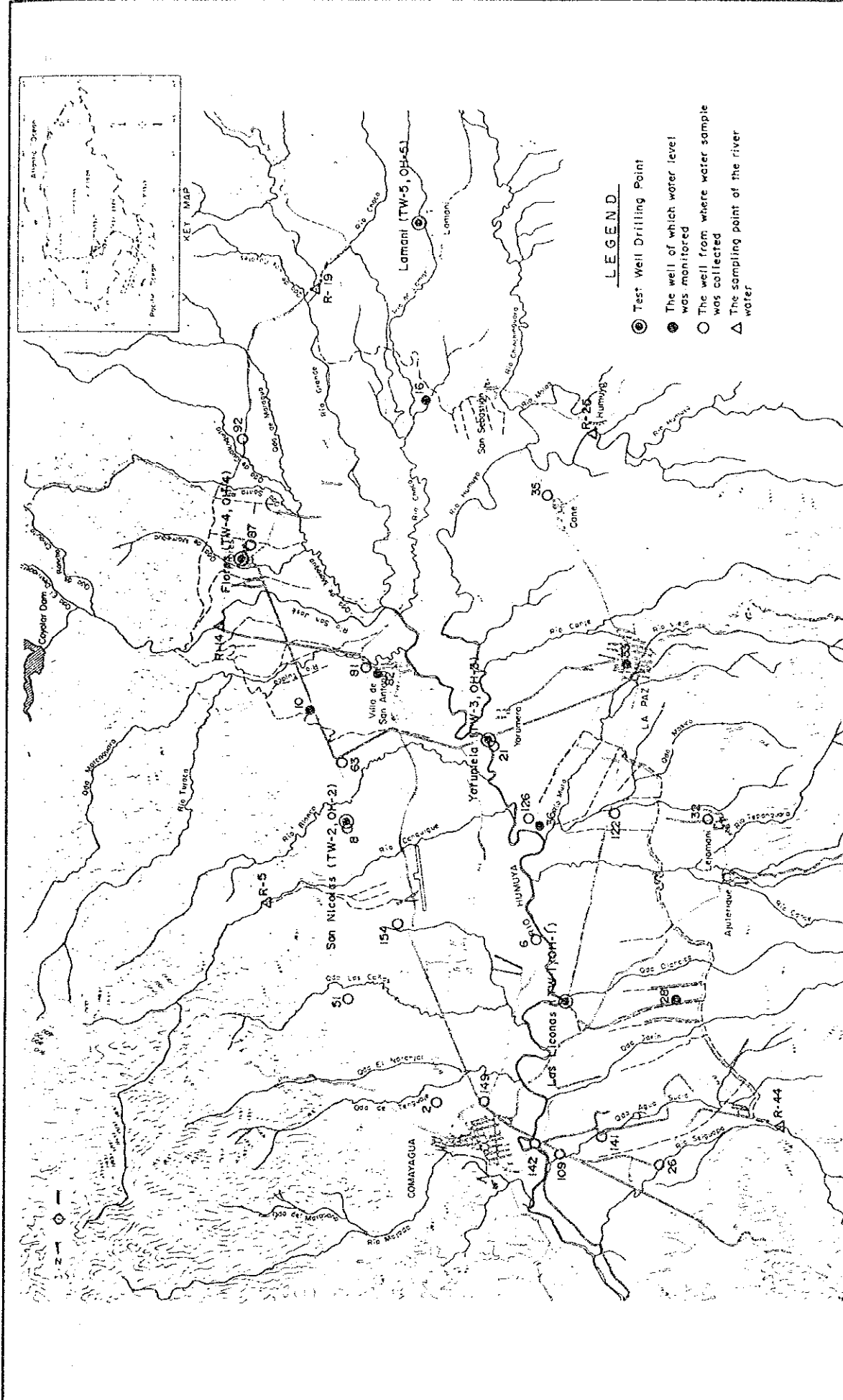
Layer	Resistivity (Ω.m)	Assumed Geology
1	11 ~ 15	Above the ground water level, mainly sand & gravel with clay silt
2	7 ~ 54	Below the ground water level, mainly sand & gravel with clay silt
3	1 ~ 15	Mainly clay and silt
4	7 ~ 20	Mainly firm, well consolidated sand
5	2 ~ 10	Mainly clay and clayey silt
Basement	15 ~ 110	Pre-Quaternary basement

Hydrological Layers

- The layer where the phreatic water flows and/or is contained.
- The layer where the confined water flow and/or is contained.
- The layer where the ground water potential is 100 feet to be developed.

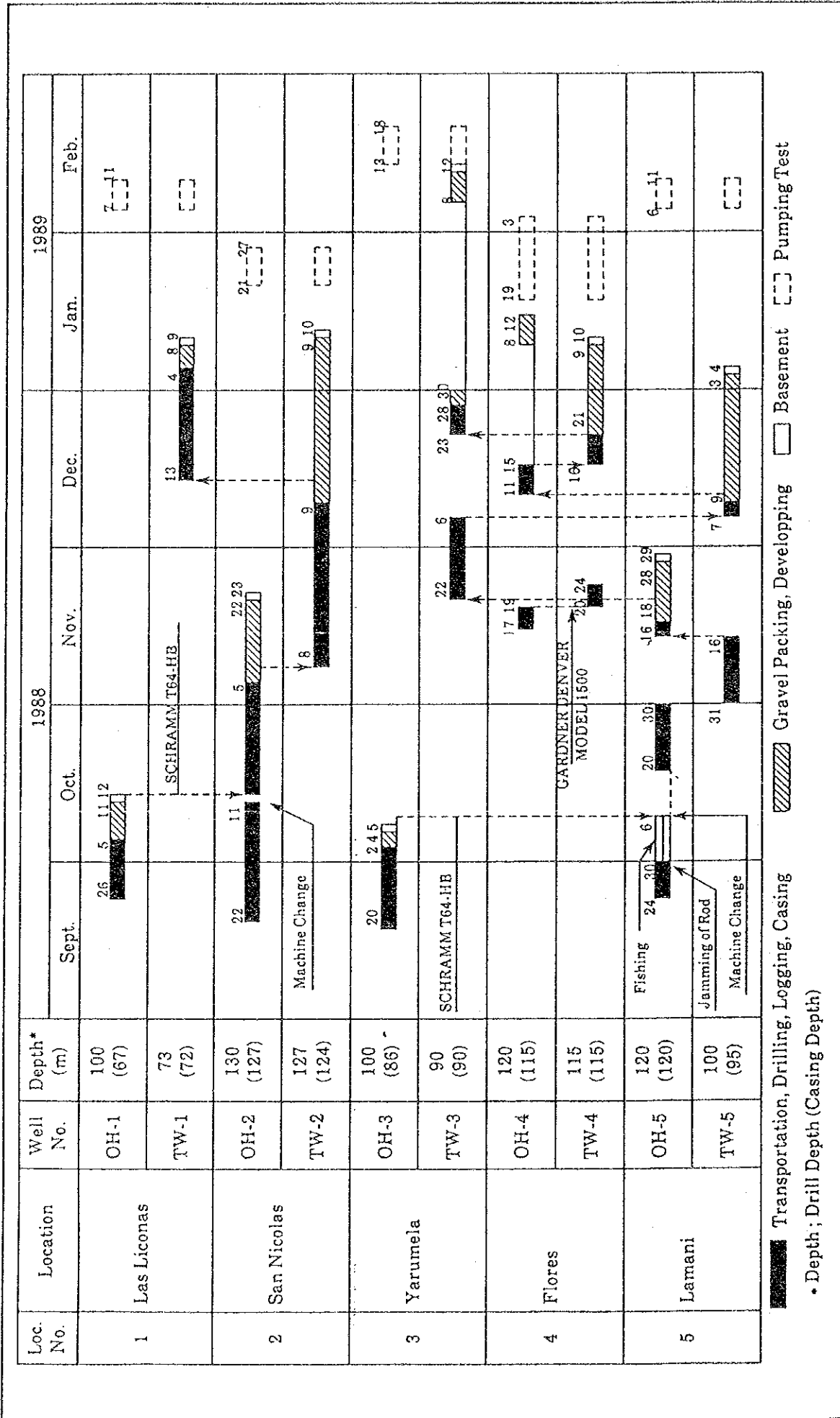
Marks

- Ground water table (observed/inferred)
- Boundary of the resistivity layers (observed/inferred)
- Boundary of the basement rocks inferred from the resistivity sounding
- Boundary of the hydrogeological layers designated from the comprehensive study.



MAPA DE SITUACION DE LAS INVESTIGACIONES DE CAMPO

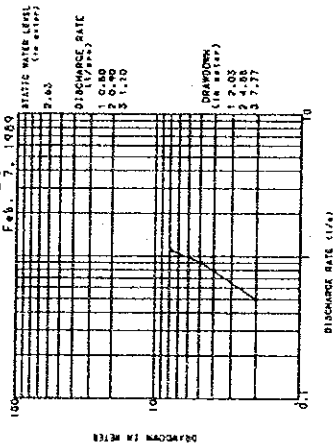
FIG. 4.1.6



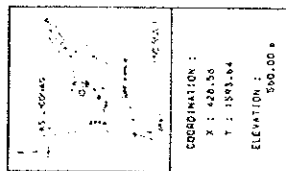
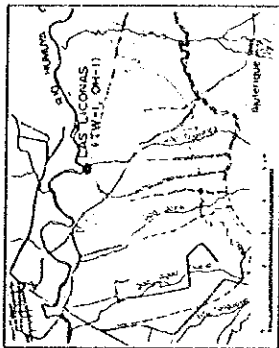
GOBIERNO DE LA REPUBLICA DE HONDURAS
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Fig. 4.1.7 PROGRAMA DE TRABAJO DE LA PERFORACION DEL POZO DE PRUEBA

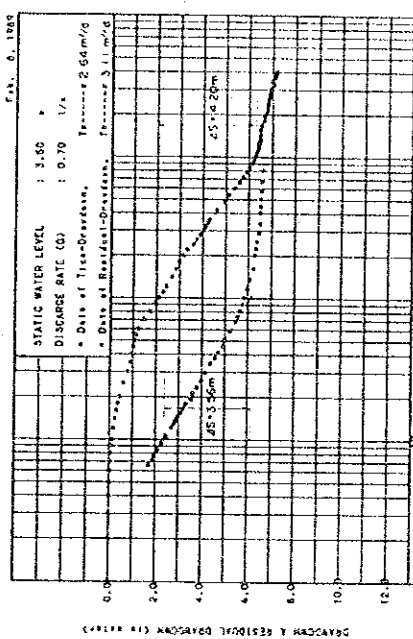
STEP DRAWDOWN TEST



LOCATION MAP

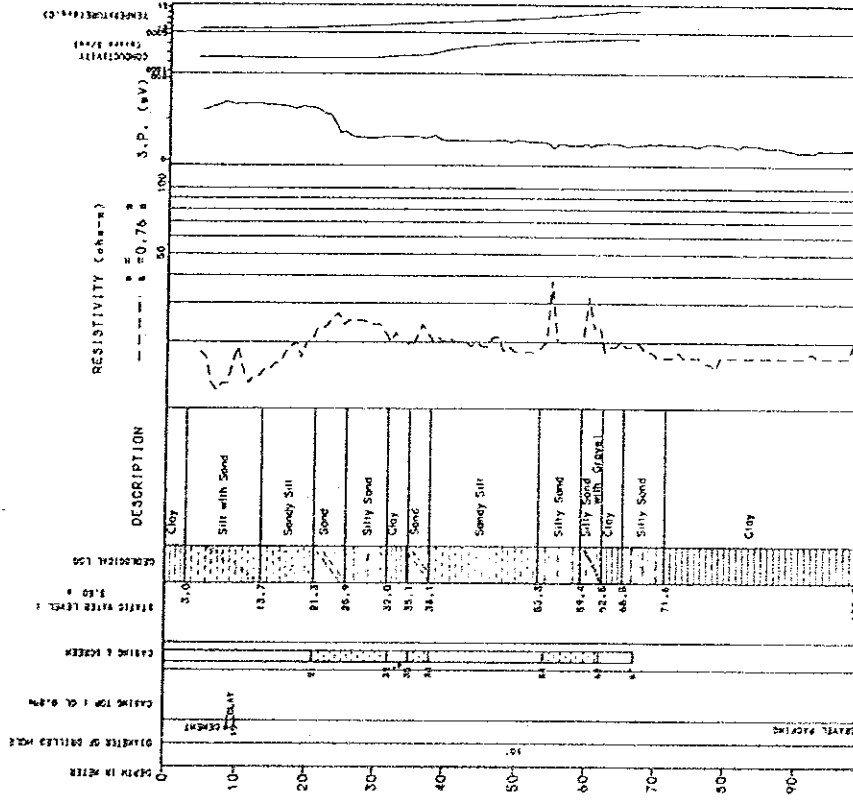


TIME DRAWDOWN GRAPH 4 RESIDUAL DRAWDOWN GRAPH

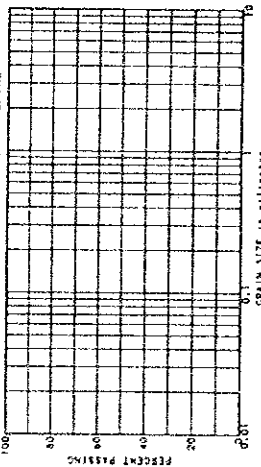


WATER QUALITY

TEST	RESULT
PH	7.5
TEMPERATURE	26.5°C
TOTAL SOLIDS	150 mg/l
CHLORIDE	10 mg/l
SULFATE	5 mg/l
CALCIUM	100 mg/l
MAGNESIUM	50 mg/l
IRON	0.5 mg/l
COPPER	0.1 mg/l
ZINC	0.05 mg/l
LEAD	0.01 mg/l
CADMIUM	0.005 mg/l
AMMONIUM	0.5 mg/l
NITRATE	10 mg/l
PERMANGANATE	5 mg/l
FLUORIDE	0.5 mg/l
PHOSPHATE	0.1 mg/l
SILICA	10 mg/l
DISSOLVED SILICA	5 mg/l
DISSOLVED FLUORIDE	0.1 mg/l
DISSOLVED PHOSPHATE	0.01 mg/l
DISSOLVED SILICA	5 mg/l
DISSOLVED FLUORIDE	0.1 mg/l
DISSOLVED PHOSPHATE	0.01 mg/l



GRAIN SIZE ANALYSIS OF AQUIFER MATERIAL



LEGEND

- Gravel
- Sand
- Silt
- Clay
- Silty Sand
- Sandy Silt
- with Gravel
- with Sand
- with Silt
- with Clay

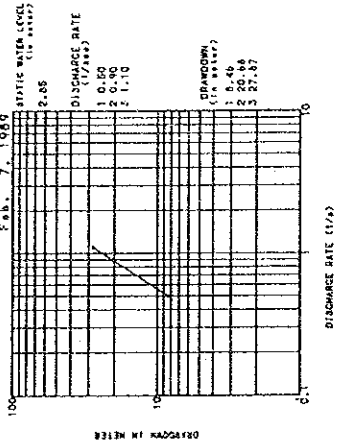
Fig. 4.1.8 (1) RESULTADO DE PERFORACION DE POZOS (1/10)

- Las Liconas OH-01 -

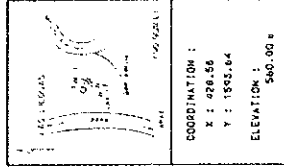
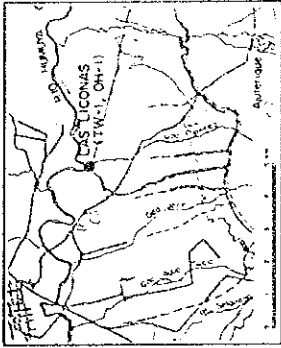
GOBIERNO DE LA REPUBLICA DE HONDURAS
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SUBTERRANEAS DEL VALLE DE COMAYAGUA

AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

STEP DRAWDOWN TEST
Feb. 7, 1969



LOCATION MAP



WATER QUALITY

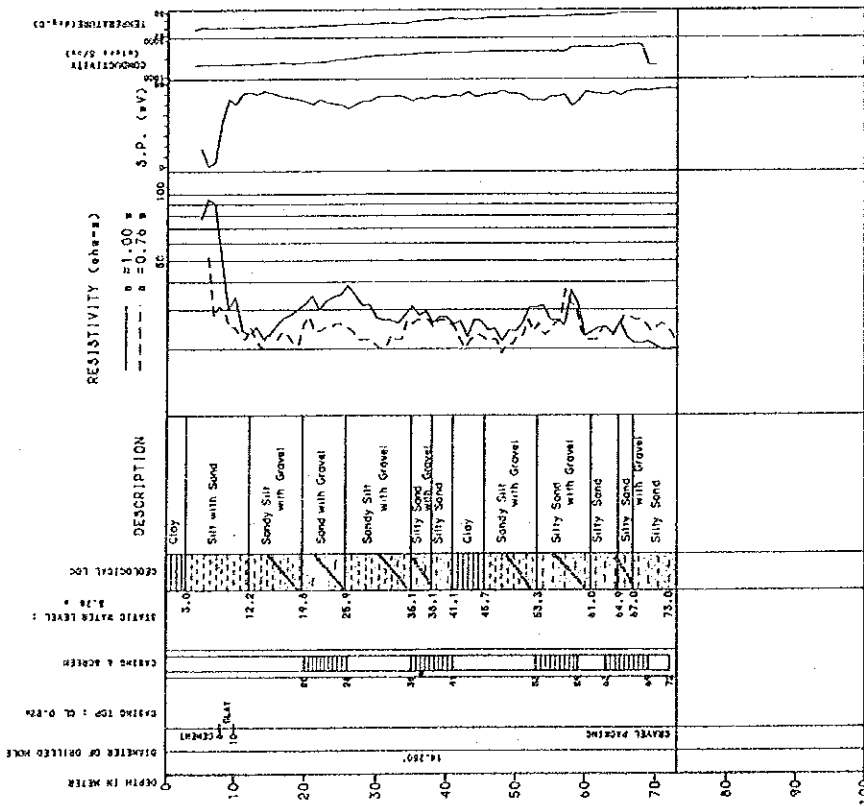
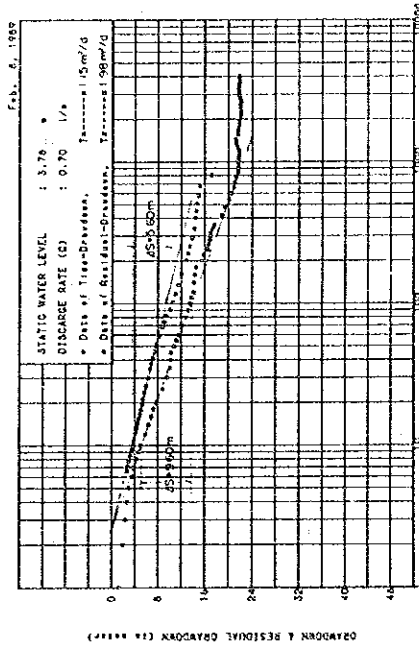
IN-SITU TEST

Temp (air/water) : 30.5
EC (air/water) : 1600
pH :
Hardness :
LABORATORY TEST

T.D.S.
Mg : 10.0
Ca : 14.0
K : 240.0
Cl : 50.0
SO₄ : 50.0
Fe : 1.0
Mn : 0.5

(CONCENTRATIONS ARE EXPRESSED IN mg/l)

TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH
Feb. 8, 1969



GRAIN SIZE ANALYSIS OF AQUIFER MATERIAL

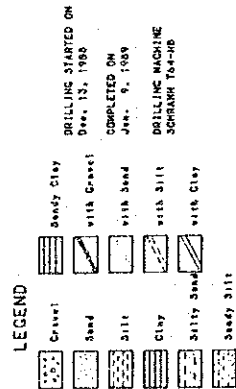
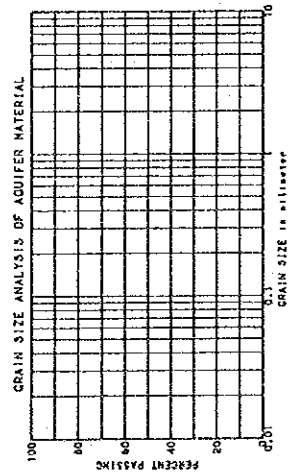


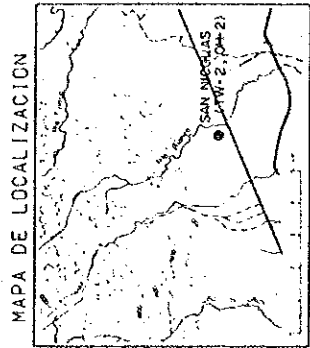
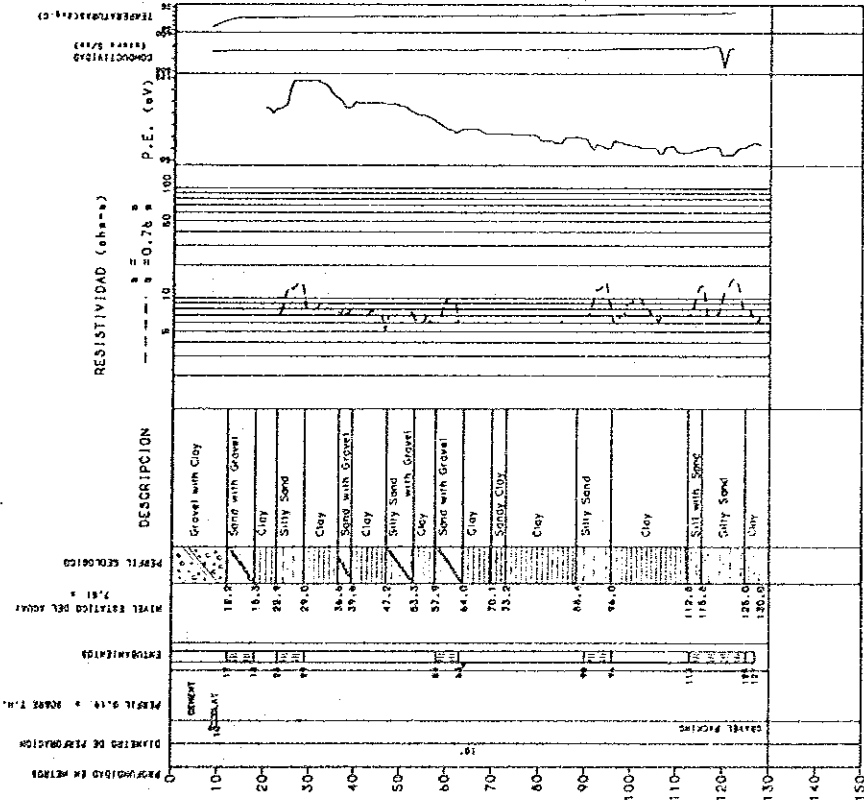
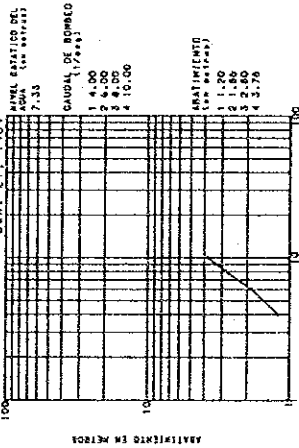
Fig. 4.1.8 (2) RESULTADO DE PERFORACION DE POZOS (2/10)

- Las Liconas TW-01 -

GOBIERNO DE LA REPUBLICA DE HONDURAS
ESTUDIO PARA EL DESARROLLO DE LAS AGUAS SUBTERRANEAS DEL VALLE DE COMAYAGUA

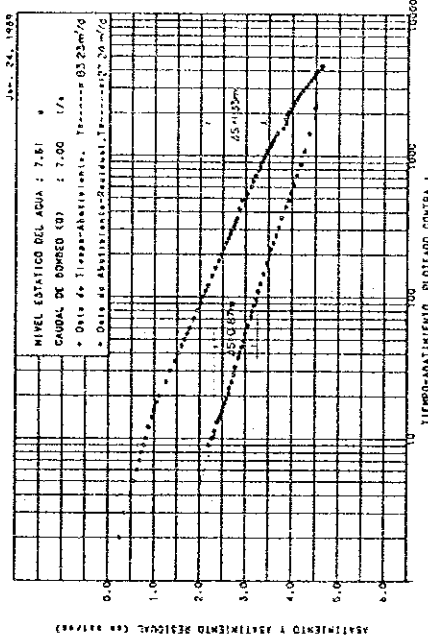
AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

PRUEBA DE CAUDALES ESCALONADOS
Jan. 21, 1969

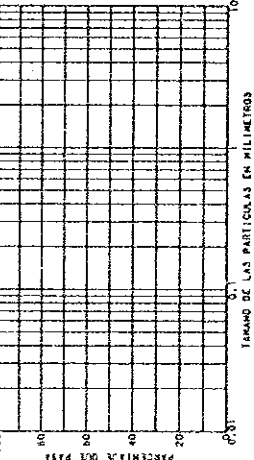


COORDINADAS :
X : 435.59
Y : 1558.16
ELEVACION : 980.00 m

GRAFICA DE TIEMPO-ABATIMIENTO Y ABATIMIENTO-RESIDUAL



ANALISIS GRANULOMETRICO DE MATERIALES DE ACUIFEROS



- LEYENDA
- Gravel
 - Sand
 - Silt
 - Clay
 - Silty Sand
 - Sandy Silt
 - Sandy Clay
 - Silt with Gravel
 - Silt with Sand
 - Silt with Silt
 - Silt with Clay
 - Sand with Gravel
 - Sand with Sand
 - Sand with Silt
 - Sand with Clay

CALIDAD DEL AGUA

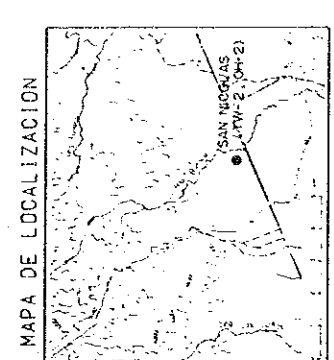
ANALISIS EN EL CAMPO	
Temperatura (°C)	
EC (conductividad)	
pH	
ANALISIS EN LABORATORIO	
T.S.S	
Dureza	
Ca	
Mg	
Cl	
NO3	
Fe	

Fig. 4.1.8 (3) RESULTADO DE PERFORACION DE POZOS (3/10)

- San Nicolas OH-02 -

GOBIERNO DE LA REPUBLICA DE HONDURAS
ESTUDIO PARA EL DESARROLLO DE LAS AGUAS
SUBTERRANEAS DEL VALLE DE COMAYAGUA

AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

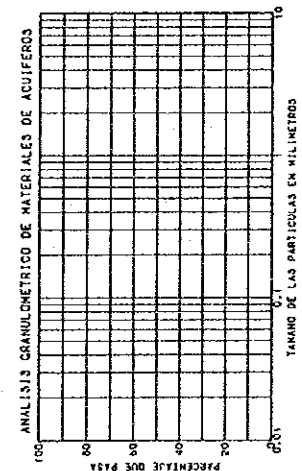
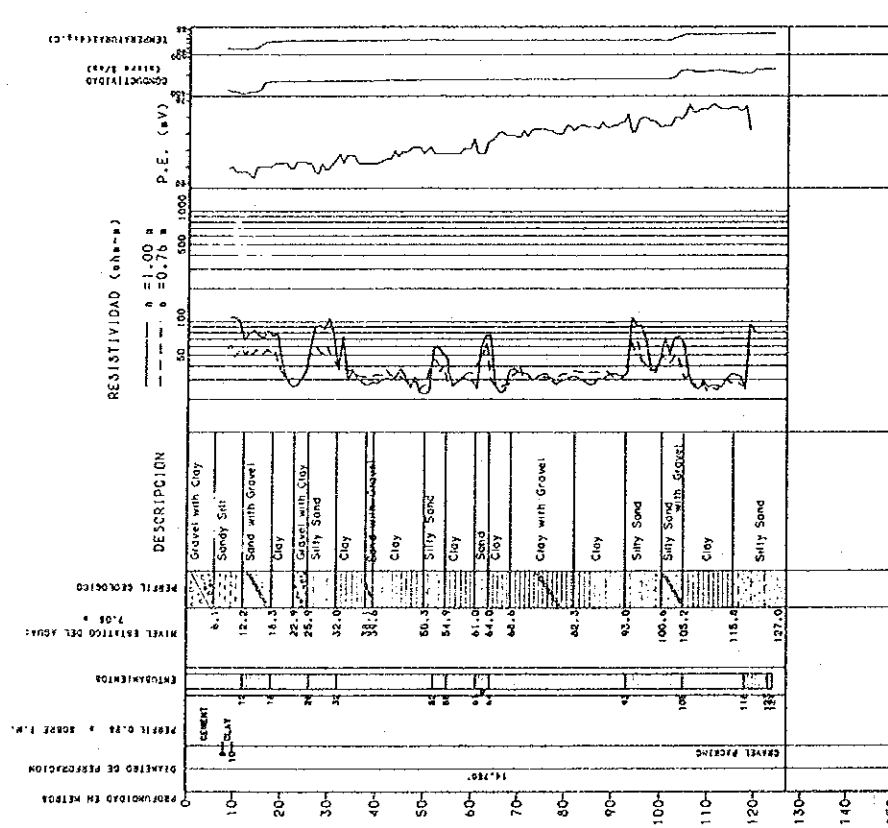
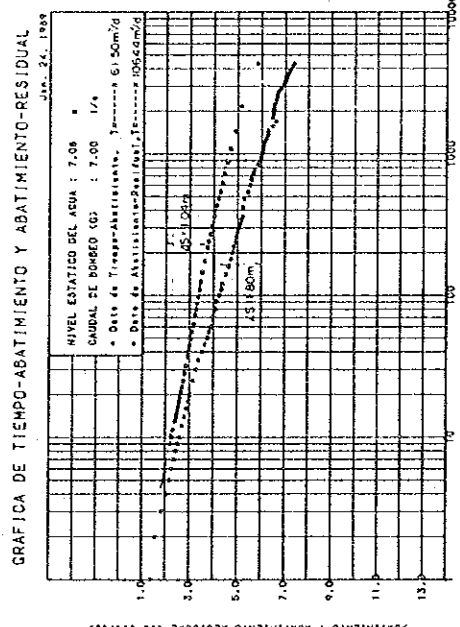
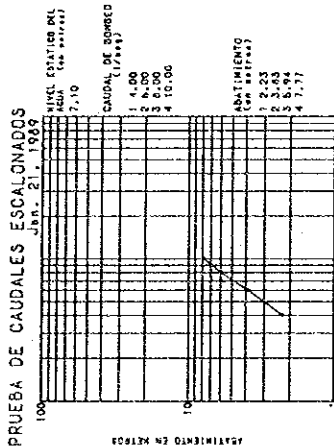


COORDINADAS :
 X : 435.84
 Y : 1548.16
 ELEVACION : 600.00 +

CALIDAD DEL AGUA

ANALISIS EN EL CAMPO	
Temperatura (°C)	30.0
EC (microhm/cm)	400
PH	7.0
ANALISIS DE LABORATORIO	
Gravimetric	174.0
Ca	89.2
Mg	15.0
Cl	3.2
SO ₄	20.0
NO ₃	0.0
Fe	0.0

CLASIFICACION SEGUN ESTANDAR INTERNACIONAL EN mg/l



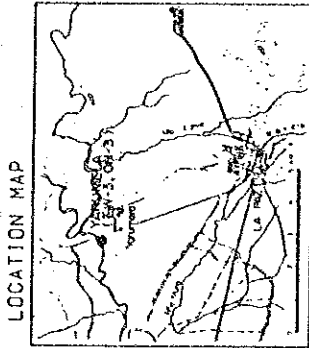
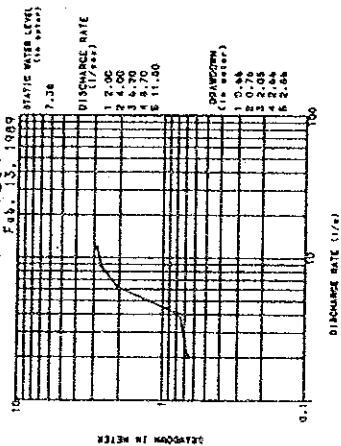
- LEYENDA
- Gravel
 - Sand
 - Silt
 - Clay
 - Silty Sand
 - Sandy Silt
 - Sandy Clay
 - Silt with Gravel
 - Silt with Sand
 - Silt with Silt
 - Silt with Clay
- LA PERFORACION SE INICIO EL: Mar. 8, 1968
- SE COMPLETO EL: Jan. 10, 1969
- MADQUINA DE PERFORACION: SCHIMANI T&H-88

Fig. 4.1.8 (4) RESULTADO DE PERFORACION DE POZOS (4/10)

- San Nicolas TW-02 -

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 AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

STEP DRAWDOWN TEST



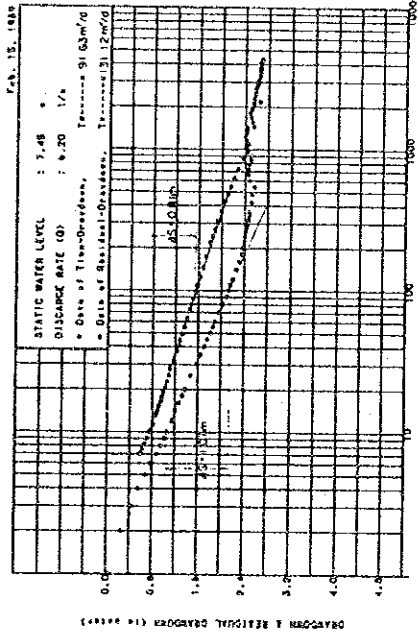
COORDINATION :

X : 430.84

Y : 1585.56

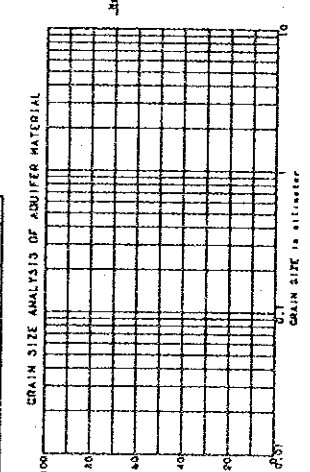
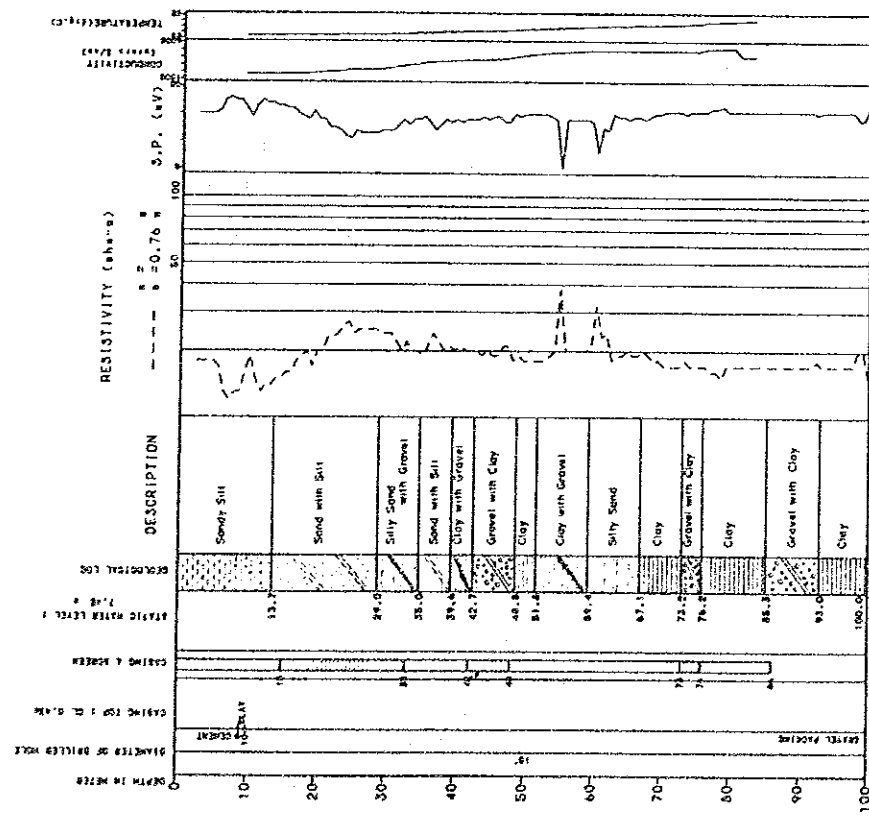
ELEVATION : 585.00 m

TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH



WATER QUALITY

TEST	Result
TEMPERATURE	24
PH	8
CHLORIDE	100
SULFATE	100
TOTAL SOLIDS	100
COLOUR	100
ODOUR	100
TURBIDITY	100



LEGEND

- Gravel
- Sand
- Silt
- Clay
- Silty Sand
- Sandy Silt

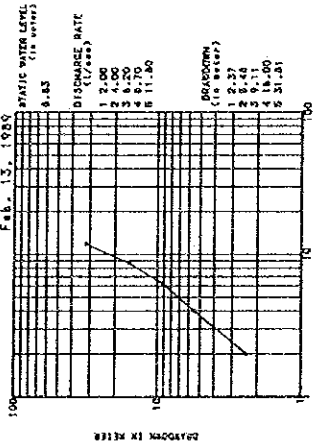
Drilling started on Sep. 20, 1968. Completed on Oct. 5, 1968. Drilling machine SOBARANI T&H-100.

Fig. 4.1.8 (5) RESULTADO DE PERFORACION DE POZOS (5/10)

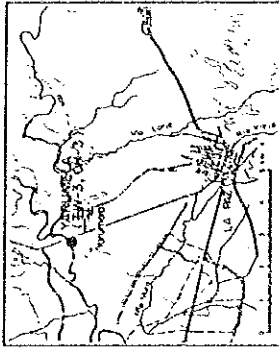
- Yarumela OH-03 -

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ESTUDIO PARA EL DESARROLLO DE LAS AGUAS SUBTERRANEAS DEL VALLE DE COMAYAGUA
AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

STEP DRAWDOWN TEST

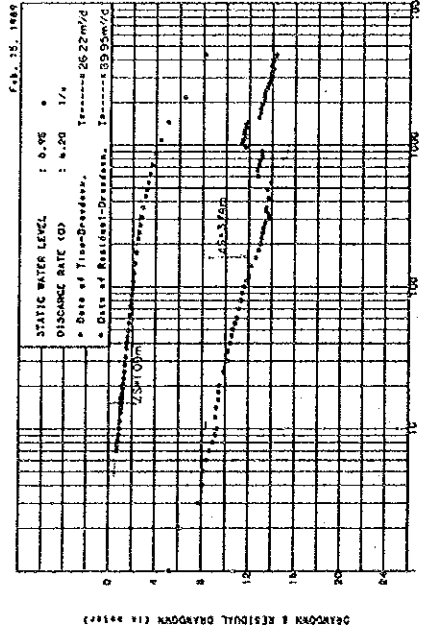


LOCATION MAP



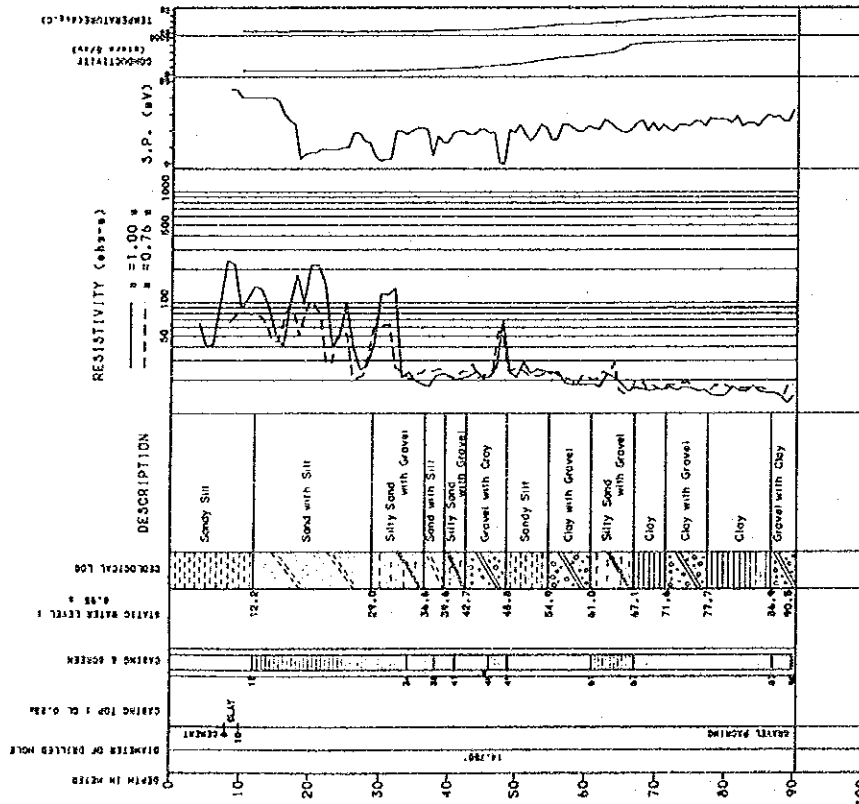
COORDINATION :	X : 430.94
	Y : 1585.54
ELEVATION :	846.00 m

TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH

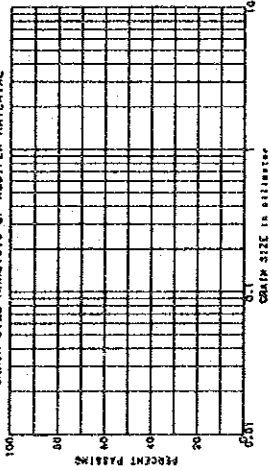


WATER QUALITY

PHYSICO TEST	
Temp. (temp. C)	24.0
EC. (microhm/cm)	180
PH	7.8
LABORATORY TEST	
T. S. S.	100 mg/l
Ca	100 mg/l
Mg	130 mg/l
Cl	44.0 mg/l
SO ₄	304 mg/l
Fe	0.2 mg/l



GRAIN SIZE ANALYSIS OF AQUIFER MATERIAL



LEGEND

Gravel	Sandy Clay	Drilling started on
Sand	with Gravel	Nov. 22, 1968
Silt	with Sand	Completed on
Clay	with Silt	Feb. 12, 1968
Silty Sand	with Clay	Drilling machine
Sandy Silt		SOBRAR 164-88

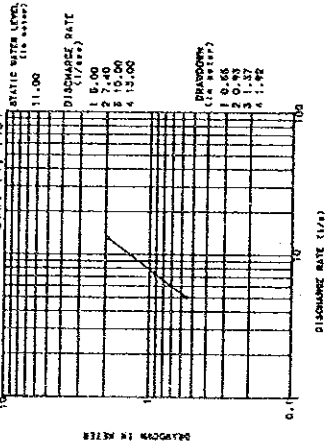
Fig. 4.1.3 (6) RESULTADO DE PERFORACION DE POZOS (6/10)

- Yarumela TW-03 -

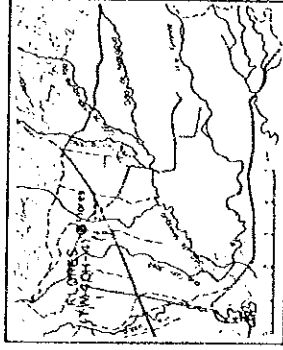
GOBIERNO DE LA REPUBLICA DE HONDURAS
ESTUDIO PARA EL DESARROLLO DE LAS AGUAS
SUBTERRANEAS DEL VALLE DE COMAYAGUA

AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

STEP DRAWDOWN TEST
Jan. 16, 1969



LOCATION MAP



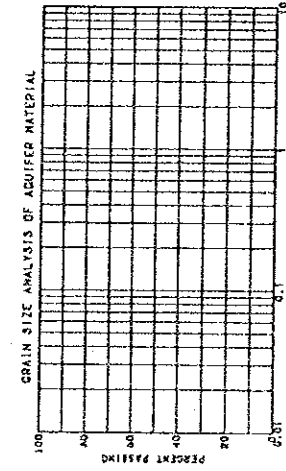
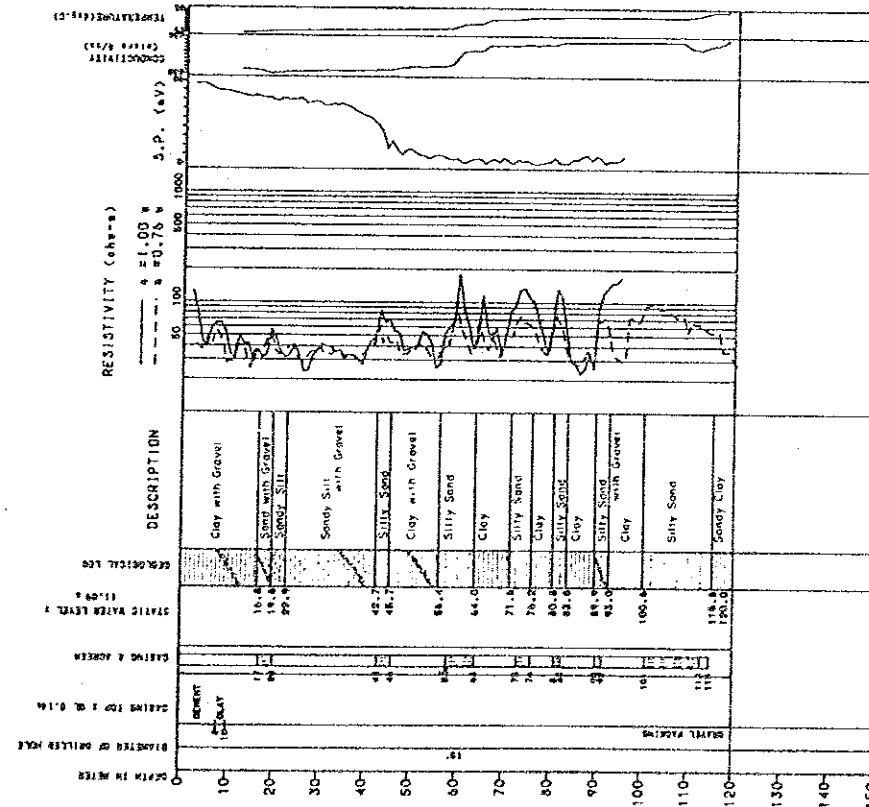
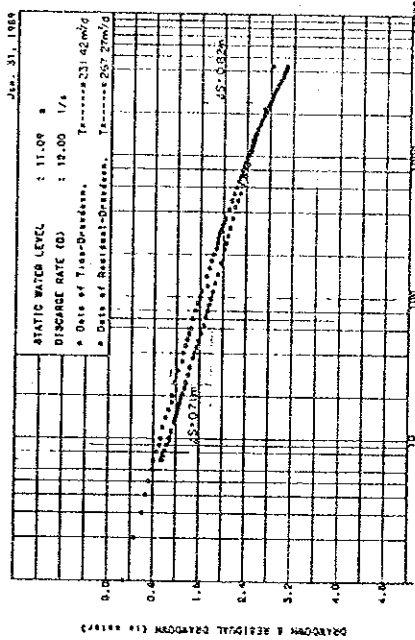
COORDINATION:
X : 408.81
Y : 1860.14
ELEVATION : 435.00 m

WATER QUALITY

IN-SITU TEST	LABORATORY TEST
Temp (C/F) : 27	PH : 7.5
EC (microhm/cm) : 100	Hardness : 100
PHI : 0.01	Ca : 0.0
LABORATORY TEST	Mg : 0.0
T.D.S : 0.0	CO ₂ : 0.0
CHLORIDE : 0.0	Fe : 0.0
SO ₄ : 0.0	Mn : 0.0
NO ₃ : 0.0	NH ₄ : 0.0
PO ₄ : 0.0	

CONCENTRATIONS ARE EXPRESSED IN mg/l

TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH
Jan. 31, 1969



LEGEND

- Gravel
- Sand
- Silt
- Clay
- Silty Sand
- Steady Silt

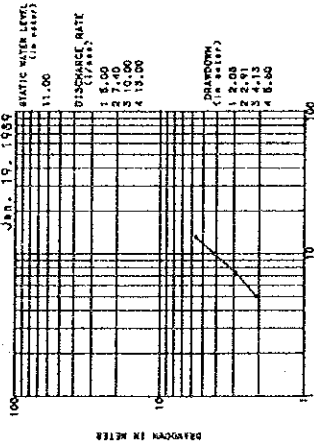
DRILLING STARTED ON: Nov. 17, 1968
COMPLETED ON: Jan. 13, 1969
DRILLING MACHINE: CAROMER REVERER MODEL 1600

Fig. 4.1.8 (7) RESULTADO DE PERFORACION DE POZOS (7/10)

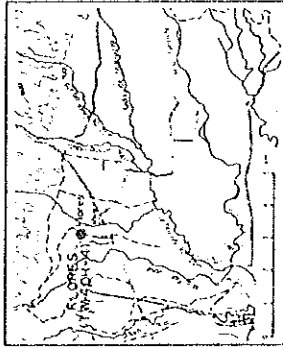
- Flores OH-04 -

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ESTUDIO PARA EL DESARROLLO DE LAS AGUAS SUBTERRANEAS DEL VALLE DE CONAYAGUA
AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

STEP DRAWDOWN TEST
Jan. 19, 1969

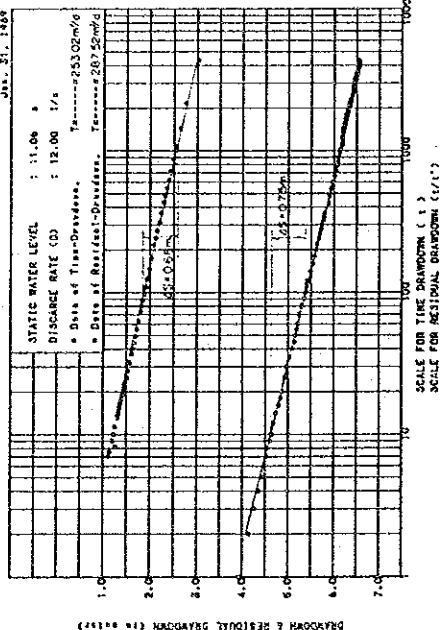


LOCATION MAP



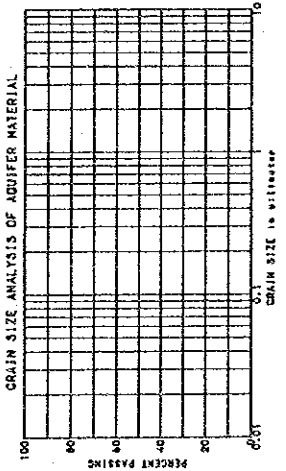
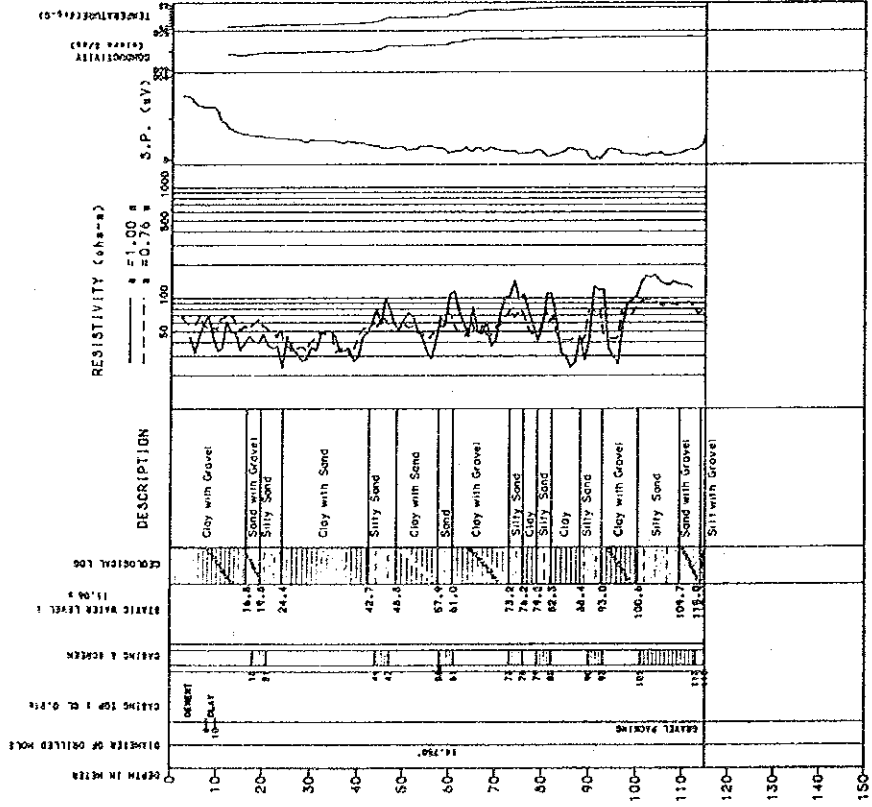
COORDINATION:
X : 438.61
Y : 1560.14
ELEVATION : 635.00 m

TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH
Jan. 21, 1969



WATER QUALITY

IN-SITU TEST
Temp. (deg. C) : 27.0
EC. (micro/mho/cm) : 400
PH :
LABORATORY TEST
T.S.S.
Manganese
Copper
Ca
Mg
Fe
CO₂
NO₃
NH₄
SO₄
CL

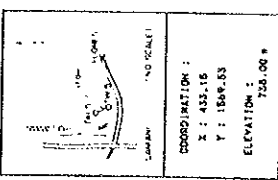
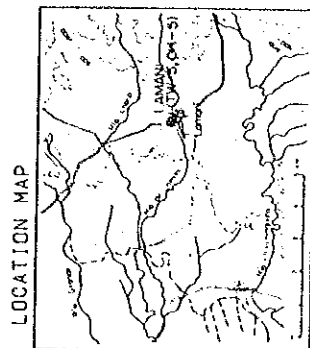
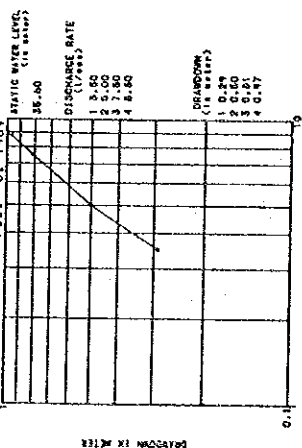


- LEGEND**
- Gravel
 - Sand
 - Silt
 - Clay
 - Silty Sand
 - Shaly Clay
 - Clay with Gravel
 - Sand with Gravel
 - Silt with Sand
 - Clay with Silt
 - Silty Sand with Clay
 - Shaly Silt

Fig. 4.1.8 (8) RESULTADO DE PERFORACION DE POZOS (8/10)
- Flores TW-04 -

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AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

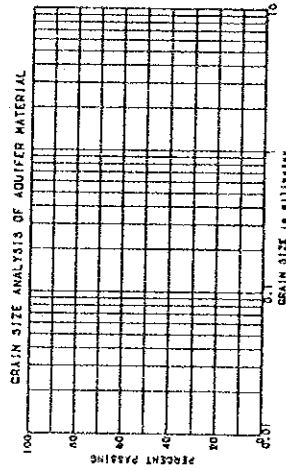
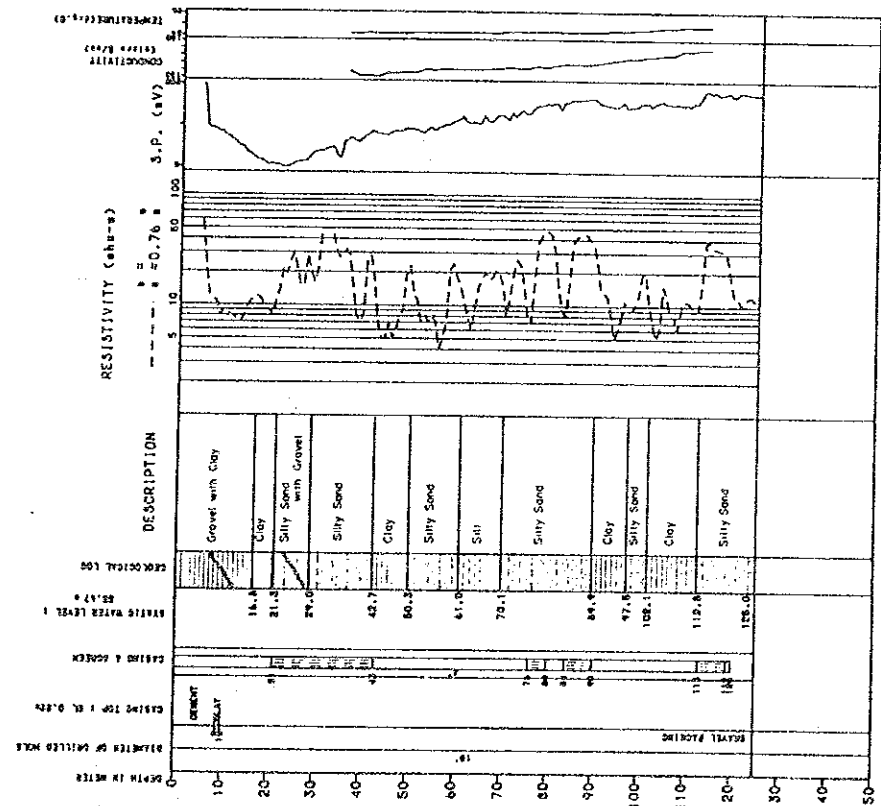
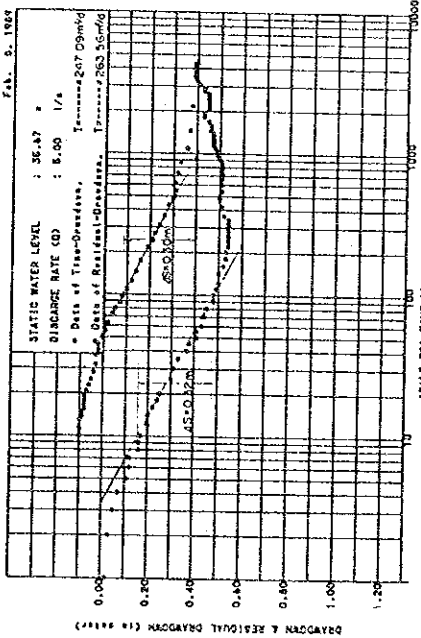
STEP DRAWDOWN TEST
Feb. 6, 1969



WATER QUALITY

IN-SITU TEST	
Temp (°C)	1
Electrical Resist	Right
pH	Right
LABORATORY TEST	
T.D.B	None
Hardness	None
CaCO3	None
Cl	None
SO4	None
NO3	None
CO3	None
Fe	None

TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH
Feb. 9, 1969



LEGEND

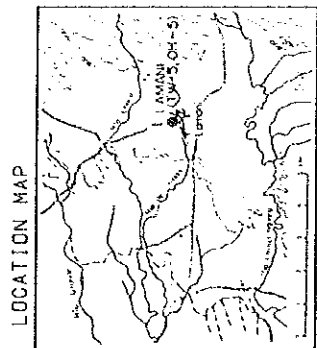
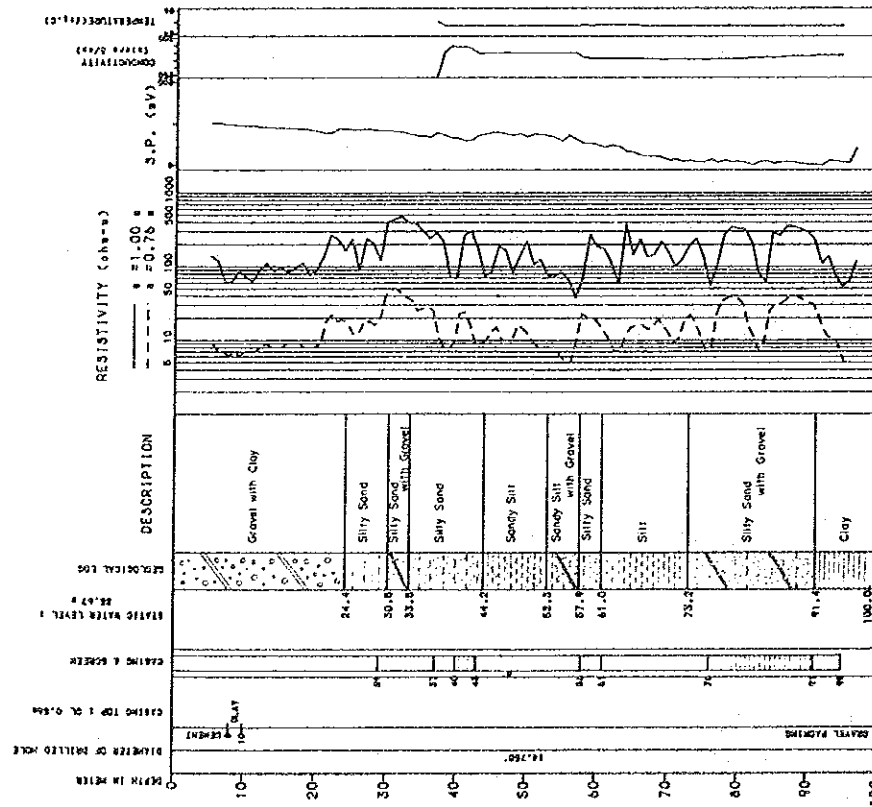
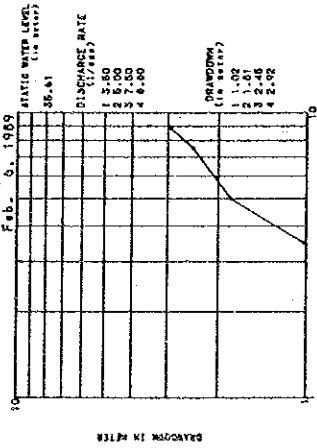
Gravel	Sandy Clay	Drilling started on
Sand	with Gravel	Apr. 24, 1969
Silt	with Sand	Completed on
Clay	with Silt	Nov. 29, 1969
Silty Sand	with Clay	Drilling Machine
Sandy Silt		SORDAM TSC-10

Fig. 4.1.8 (9) RESULTADO DE PERFORACION DE POZOS (9/10)

- Lamani OH-05 -

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SUBTERRANEAS DEL VALLE DE COMAYAGUA
AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

STEP DRAWDOWN TEST
Feb. 6, 1969



COORDINATION :
X : 432.15
Y : 1649.63

ELEVATION :
736.00 m

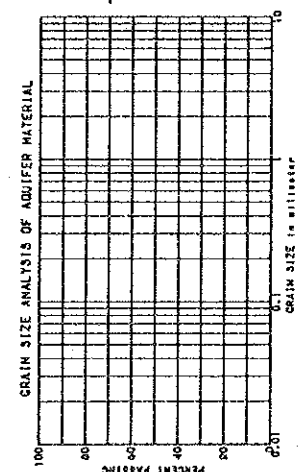
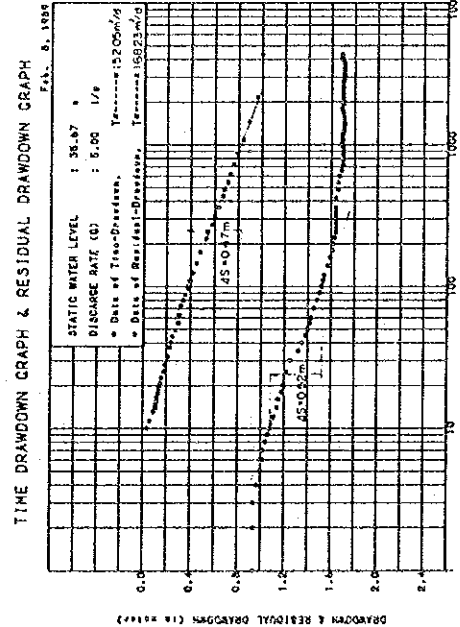
WATER QUALITY

IN-3770 TEST
Temperature: No. 0
Electrical/val: 200
pH: 8.00
Specific Gravity: 1.000

LABORATORY TEST

TDS	10.0
Hardness	10.0
Ca	4.9
Mg	5.1
Na	72.0
K	2.0
Cl	45.0
SO ₄	80.4
NO ₃	0.0
Fe	< 0.1
Mn	< 0.1

CONCENTRATIONS ARE EXPRESSED IN mg/l

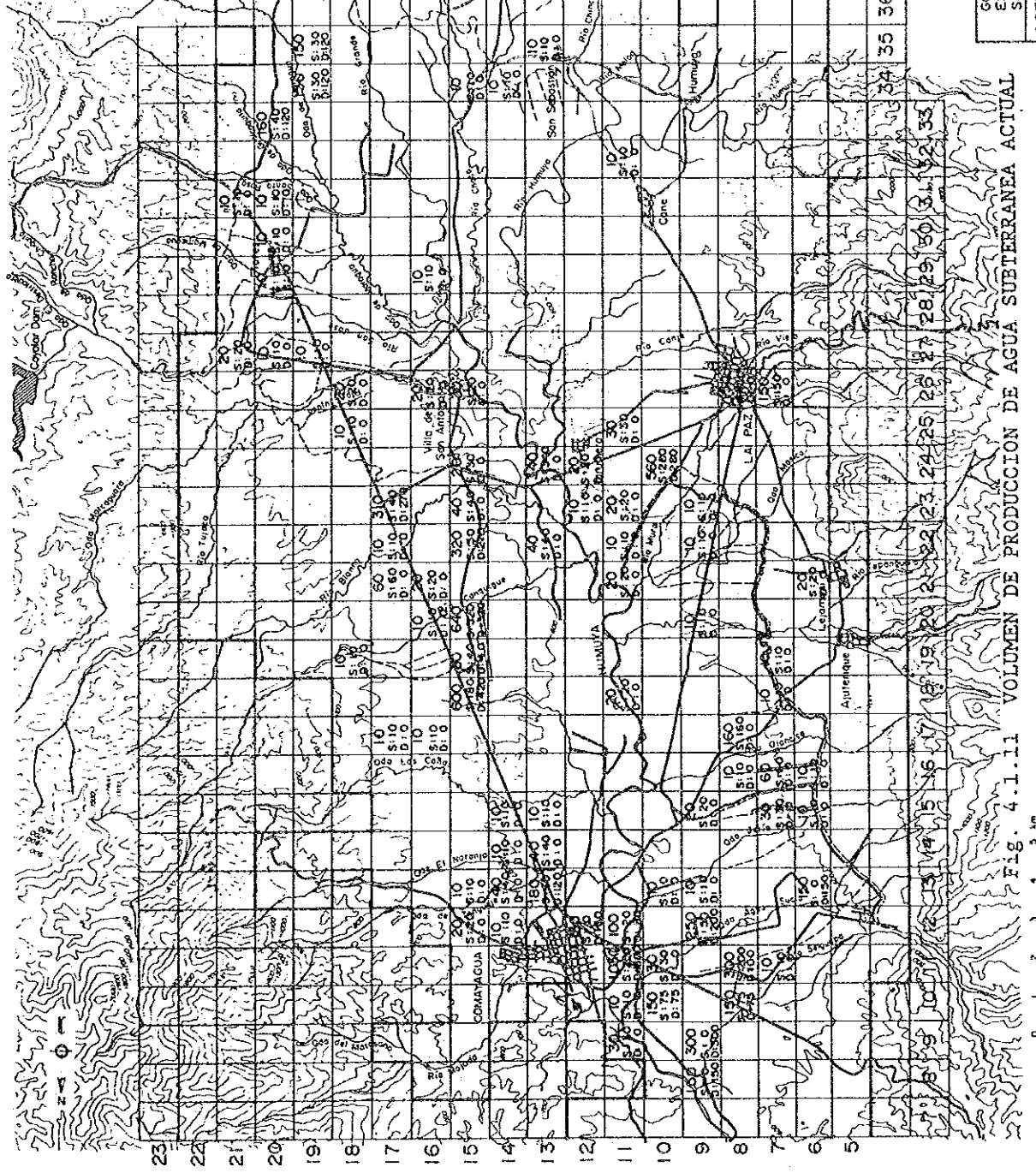
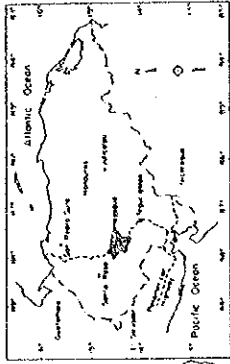


- LEGEND**
- Gravel
 - Sand
 - Silt
 - Clay
 - Silty Sand
 - Sandy Silt
 - Sandy Clay
 - Silt Gravel
 - Sand Gravel
 - Silt Sand
 - Silt Silt
 - Silt Clay
 - Sandy Silt
- DRILLING STARTED ON Oct. 31, 1968
COMPLETED ON Jan. 4, 1969
DRILLING MACHINE SCHRAMM TAM-95

Fig. 4.1.8 (10) RESULTADO DE PERFORACION DE POZOS (10/10)

- Lamani TW-05 -

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SUBTERRANEAS DEL VALLE DE COMAYAGUA
AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

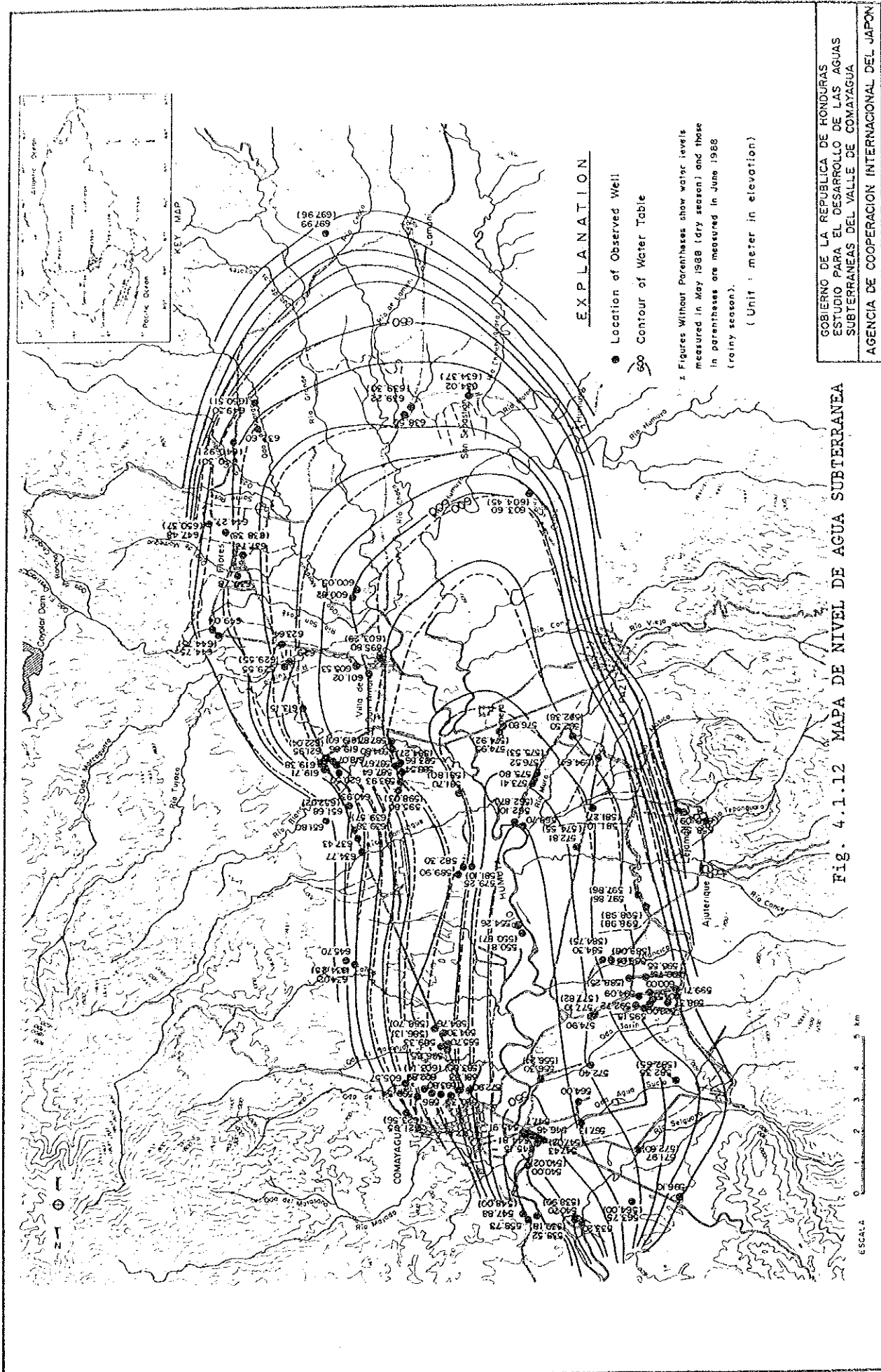


Total	7,490 m ³ /day
Phreatic GW	3,556 m ³ /day
Confined GW	4,160 m ³ /day

23	24	25	26	27	28	29	30	31	32	33
19	20	21	22	23	24	25	26	27	28	29
15	16	17	18	19	20	21	22	23	24	25
11	12	13	14	15	16	17	18	19	20	21
7	8	9	10	11	12	13	14	15	16	17
3	4	5	6	7	8	9	10	11	12	13
34	35	36	37	38	39	40	41	42	43	

Fig. 4.1.11 VOLUMEN DE PRODUCCION DE AGUA SUBTERRANEA ACTUAL

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 SUBTERRANEAS DEL VALLE DE COMAYAGUA
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 SUBTERRANEAS DEL VALLE DE COMAYAGUA
 AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

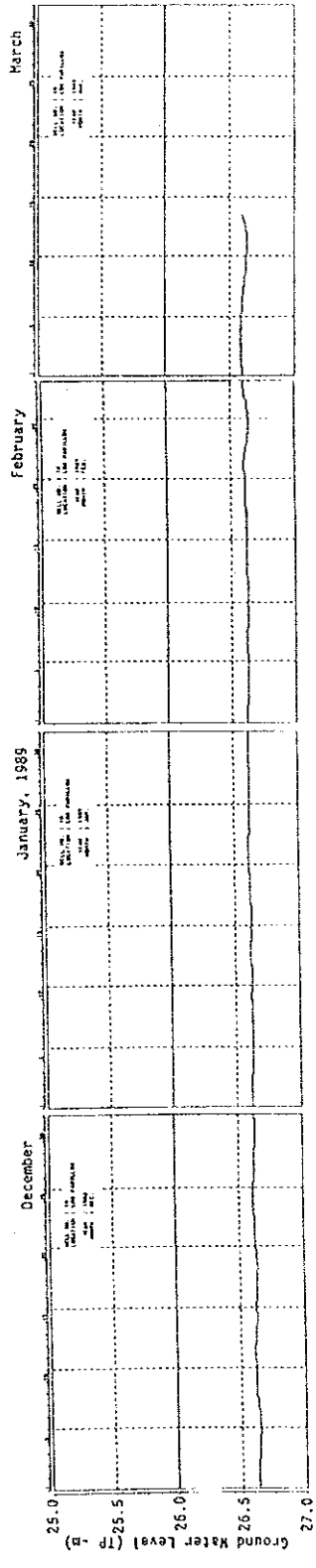
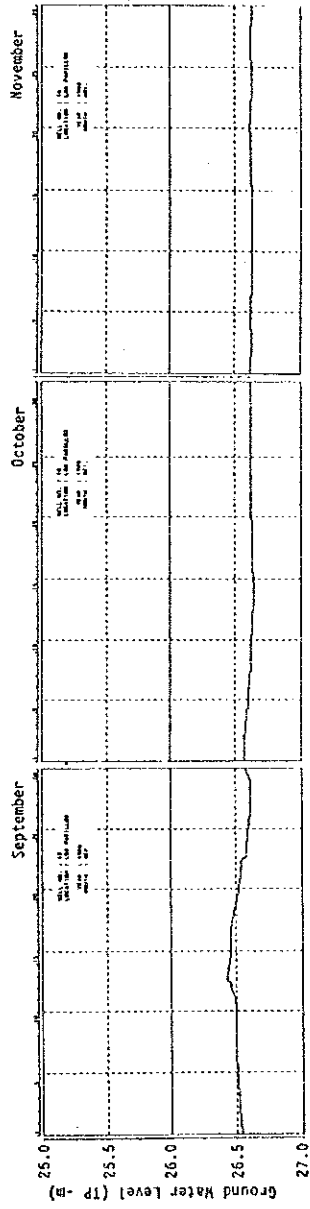
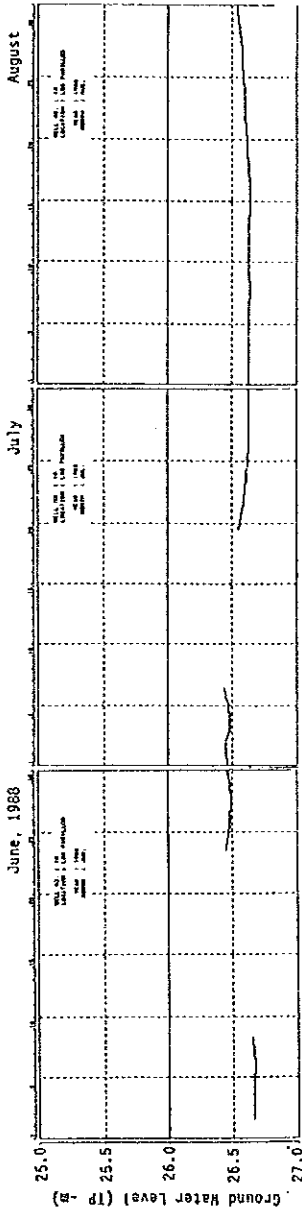


Fig. 4.1.13 (1) HIDROGRAFO DE POZO EXISTENTE (1/6)
- LOS PALILLOS : NO. DE POZO 10 -

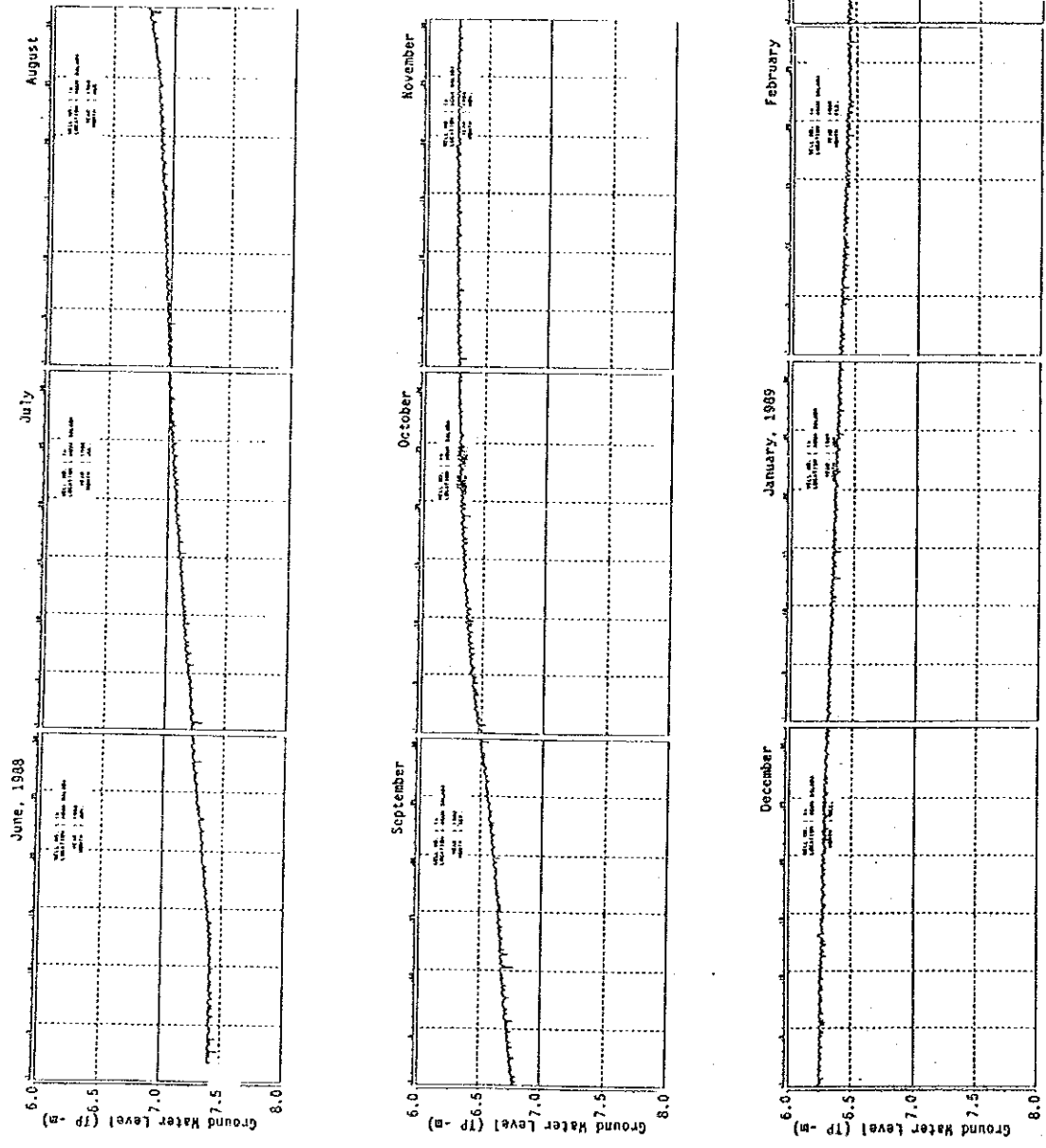


Fig. 4.1.13 (2) HIDROGRAFO DE POZO EXISTENTE (2/6)
 - AGUA SALADA : NO. DE POZO 16 -

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 SUBTERRANEAS DEL VALLE DE COMAYAGUA
 AGENCIA DE COOPERACION INTERNACIONAL DEL JAPON

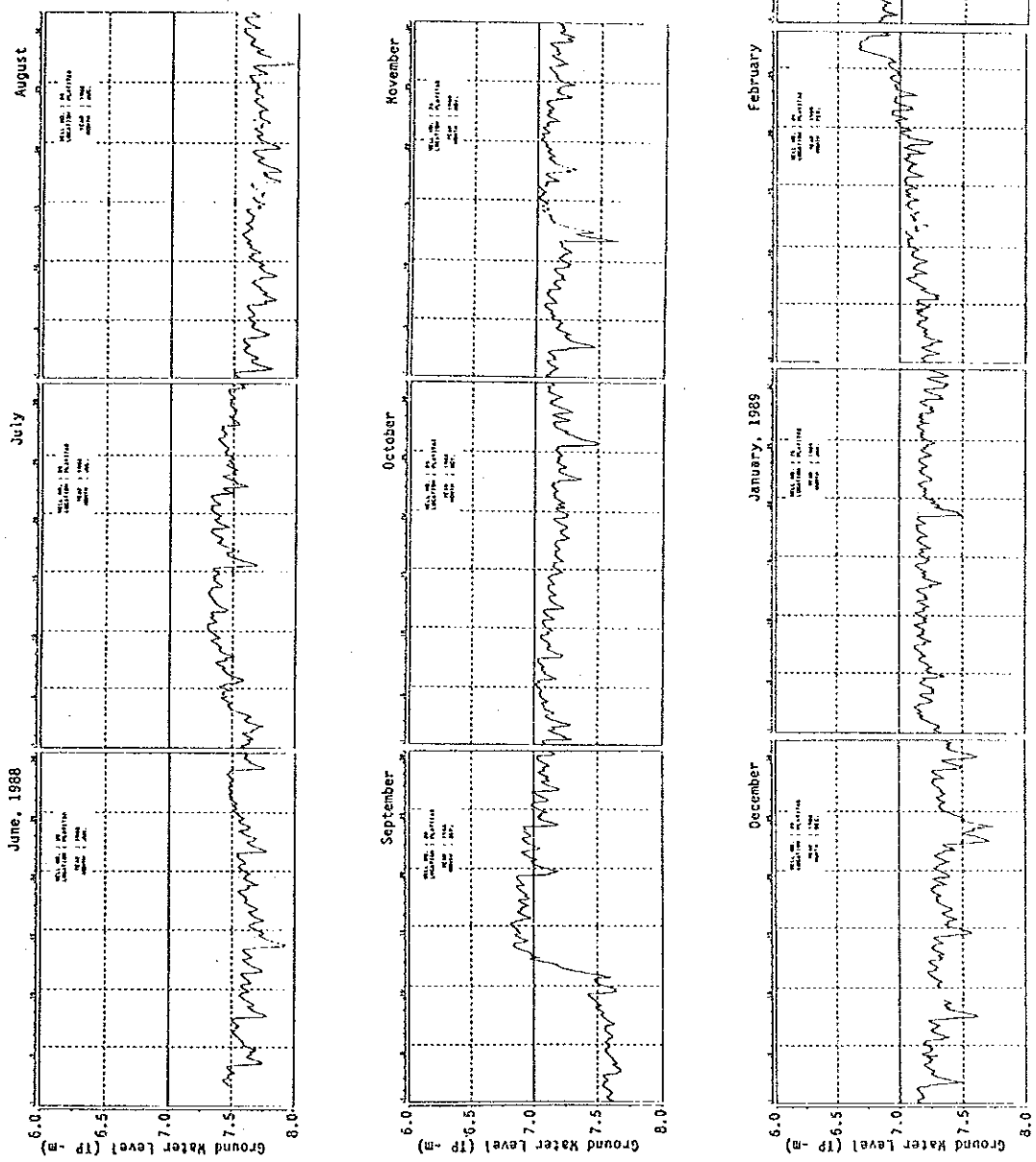


Fig. 4.1.13 (3) HIDROGRAFO DE POZO EXISTENTE (3/6)
 - PLAYITAS : NO. DE POZO 28 -

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 SUBTERRANEAS DEL VALLE DE COMAYAGUA
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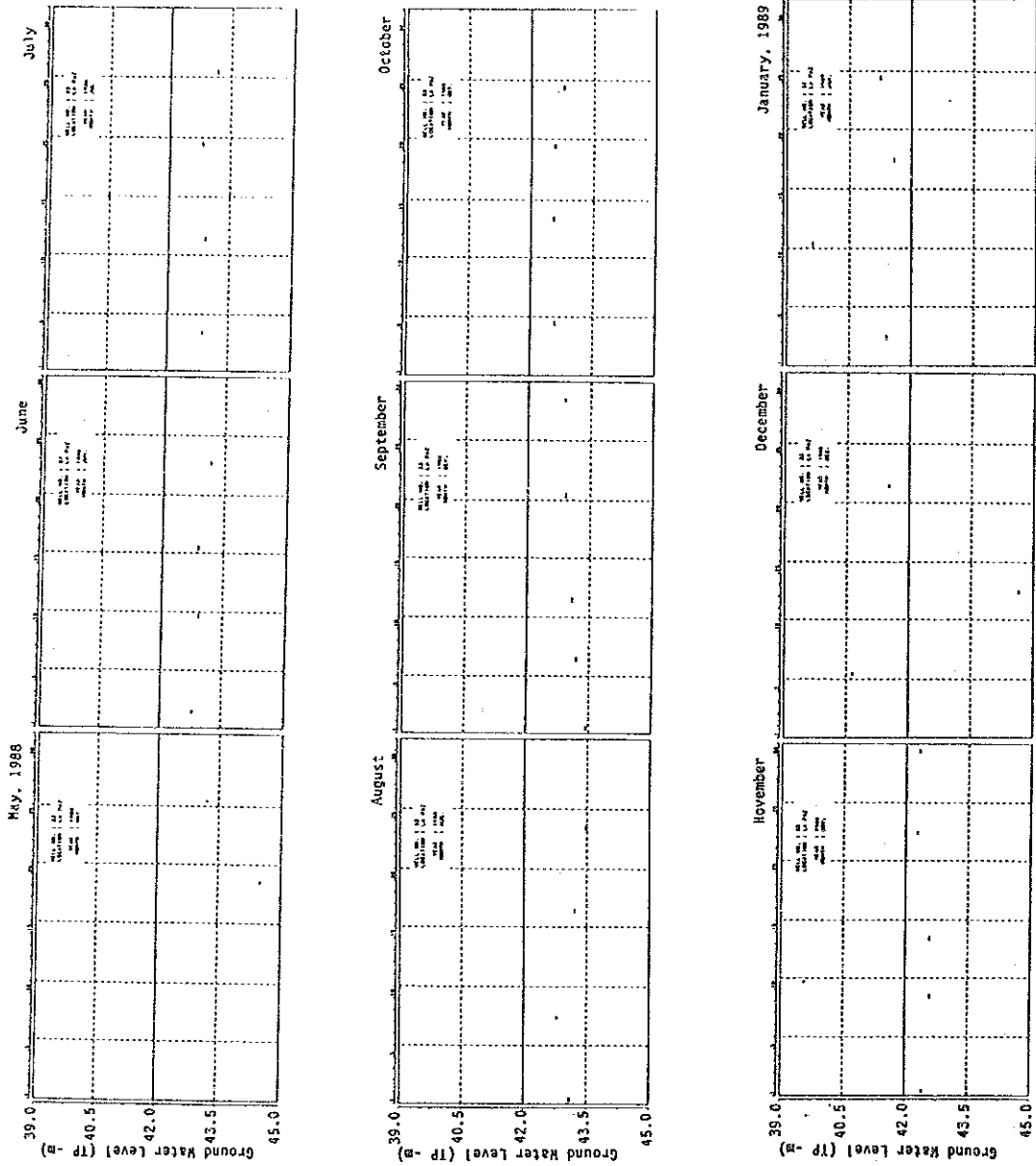


Fig. 4.1.13 (4) HIDROGRAFO DE POZO EXISTENTE (4/6)

- LA PAZ : NO. DE POZO 33 -

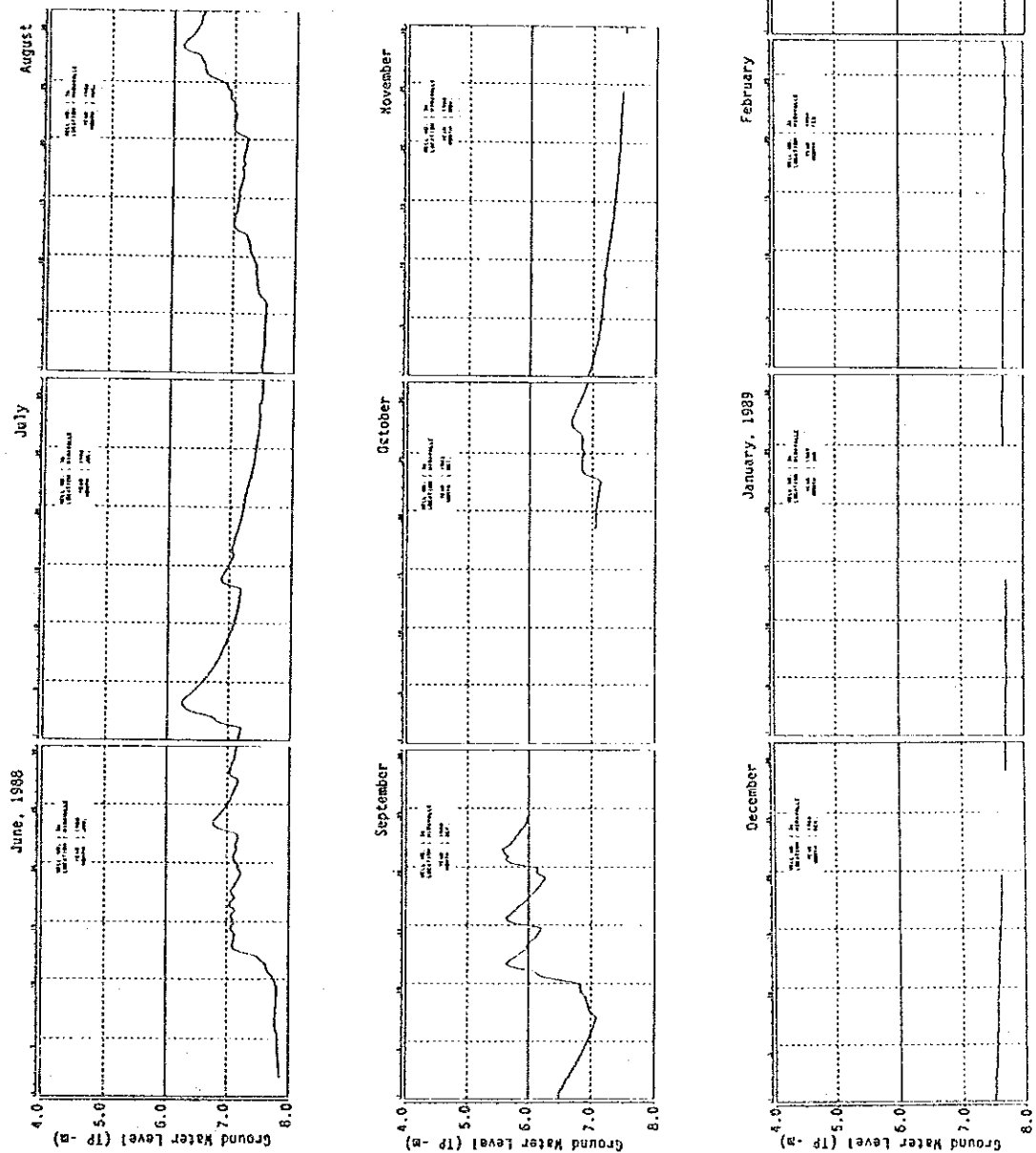


Fig. 4.1.13 (5) HIDROGRAFO DE POZO EXISTENTE (5/6)
 - MIRAVALLE : NO. DE POZO 36 -

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 Agencia de Cooperación Internacional del Japon

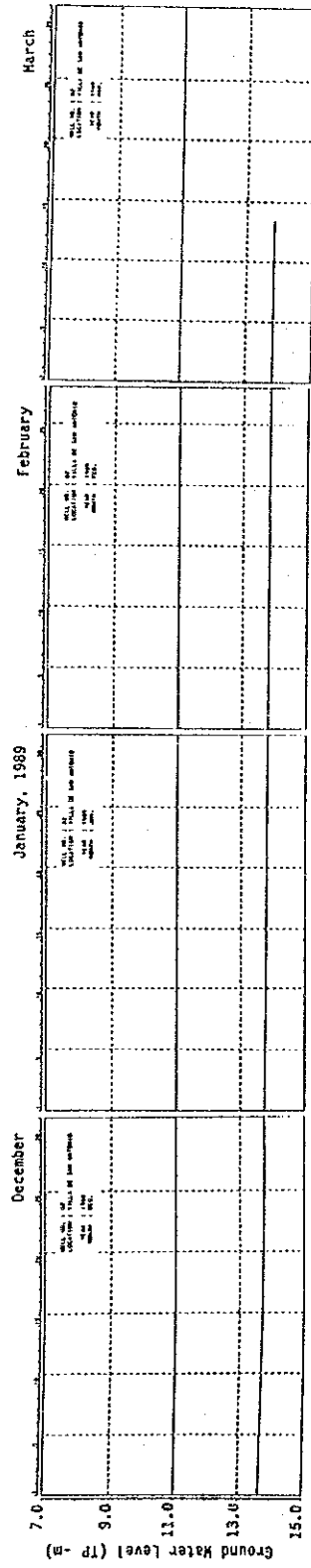
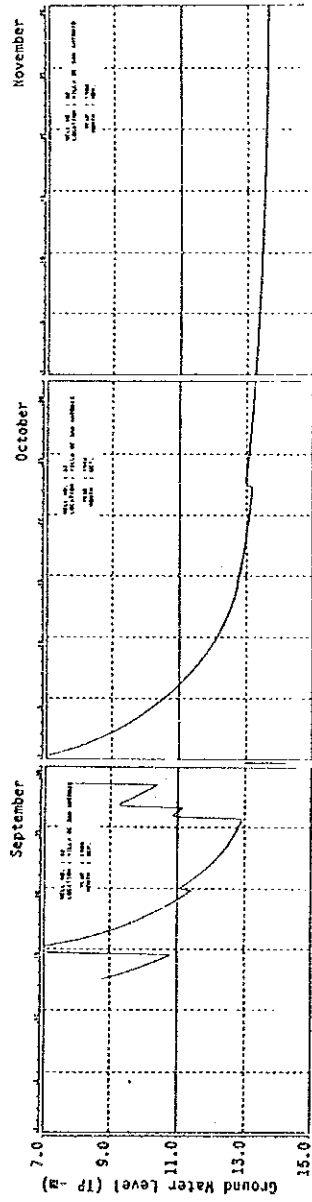
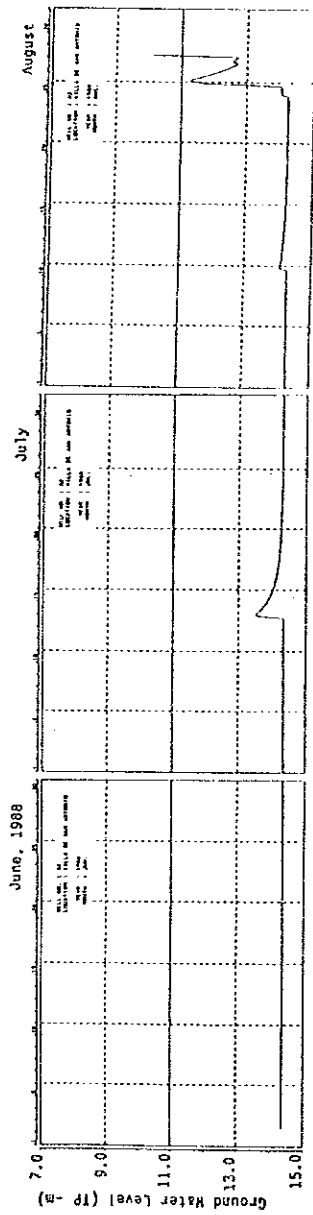


Fig. 4.1.13 (6) HIDROGRAFO DE POZO EXISTENTE (6/5)
- VILLA DE SAN ANTONIO: NO. DE POZO 82 -

