II HYDROLOGY

Table 2-2-1-① Hydrometry Table

River name	Date	Sectional area (m^2)	Velocity of flow (m/s)	Rate of flow (m^3/s)	Measuring a way	Measuring a position
Nangapé	Nov.17,'83	11.33	0.04	0.45	Current meter	Fig. 1
"	Dec.13, "	12.31	0.00	-	"	"
"	Jan. 9,'84	12.05	0.00	-	"	"
Verde	Nov.17,'83	7.23	0.05	0.36	"	Fig. 2
"	Dec.13,'83	5.29	0.04	0.23	"	"
"	Jan. 9,'84	4.90	0.07	0.36	"	"
Tajhyi-ty (Upper stream)	Nov.17,'83	0.77	0.28	0.22	"	Fig. 3
"	Dec.13,'83	0.86	0.31	0.27	"	"
"	Jan. 9,'84	0.81	0.30	0.24	"	"
Tajhyi-ty (Lower stream)	Nov.17,'83	3.77	0.28	1.06	"	Fig. 4
Combay (Upper stream)	Nov.17,'83	1.22	0.12	0.15	"	Fig. 5
"	Dec.13,'83	1.19	0.14	0.17	"	"
"	Jan. 9,'84	1.44	0.14	0.20	"	"
Combay (Lower stream)	Nov.17,'83	1.32	0.29	0.38	"	Fig. 6
Toro-y	Nov.17.'83	3.01	0.17	0.51	"	Fig. 7
"	Dec.13,'83	1.75	0.17	0.29	"	"
"	Jan. 9,'84	1.53	0.07	0.10	"	"
Caje Cué	Nov.17,'83	2.24	0.06	0.13	"	Fig. 8
"	Dec.19,'83	0.74	0.20	0.15	"	"
"	Jan. 9,'84	0.47	0.11	0.05	"	"
Yabebyry	Dec. 1,'83	17.60	0.14	2.55	"	Fig. 9
"	Dec.12,'83	14.88	0.15	2.16	"	"
"	Dec.19,'83	13.57	0.10	1.37	"	"
"	Jan. 9,'84	10.21	0.05	0.55	"	"

River name	Date	Sectional area (m^2)	Velocity of flow (m/s)	Rate of flow (m^3/s)	Measuring a way	Measuring a position
Atinguy (Listoro)	Nov. 22,'83	10.05	0.50	5.03	Current meter	Fig. 10
"	Dec. 5,'83	2.82	0.30	0.84	"	"
"	Dec.10,'83	0.43	0.21	0.09	"	"
"	Dec.26,'83	1.36	0.27	0.37	"	"
Inguá	Dec. 5,'83	2.05	0.01	0.03	"	Fig. 11
"	Dec.13,'83	1.37	0.00	-	"	"
"	Dec.19,'83	1.49	0.00	-	"	"
"	Jan.12,'84	1.59	0.00	-	"	"
Atinguy (Puente)	Dec. 5,'83	28.78	0.04	1.11	"	Fig. 12
"	Dec.26,'83	30.31	0.01	0.30	"	"
"	Jan. 3,'84	35.87	0.00	-	"	"
Yabebyry (LaRē)	Nov.21,'83	11.50	0.29	3.34	"	Fig. 13
"	Dec. 6,'83	5.15	0.36	1.85	"	"
"	Dec.21,'83	2.37	0.24	0.57	"	"
"	Jan.11,'84	1.11	0.07	0.08	"	"

Table 2-2-2-① Daily Water Level Chronology

Year 1983 Observation Station. Access 1-B ①

O = 74,276
O = 74,28 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				74.41	75.00	74.58	74.51	74.62	74.44	74.41	74.47	74.28	
2				74.41	74.97	74.56	74.54	74.58	74.44	74.41	74.46	74.58	
3				74.41	74.97	74.54	74.58	74.56	74.44	74.40	74.45	74.52	
4				75.44	74.85	74.53	74.57	74.55	74.43	74.40	74.44	74.50	
5				75.18	74.97	74.52	74.58	74.53	74.43	74.40	74.43	74.49	
6				75.11	74.87	74.51	74.57	74.52	74.43	74.39	74.42	74.48	
7				74.87	74.78	74.50	74.89	74.50	74.42	74.38	74.41	74.46	
8				74.70	75.09	74.49	74.81	74.49	74.41	74.38	74.45	74.44	
9				74.56	74.95	74.49	74.70	74.48	74.41	74.37	74.46	74.43	
10				74.54	75.14	74.49	74.68	74.48	74.41	74.36	74.49	74.42	
11				74.52	74.54	74.48	74.64	74.48	74.41	74.51	74.48	74.41	
12				74.47	74.83	74.51	74.61	74.47	74.41	74.48	74.47	74.40	
13				74.46	74.78	74.57	74.58	74.47	74.41	74.47	74.64	74.39	
14				74.60	74.70	74.56	74.56	74.46	74.41	74.45	74.58	-	
15				74.58	75.31	74.55	74.55	74.88	74.42	74.44	74.55	-	
16				74.56	75.46	74.55	74.77	74.88	74.48	74.42	74.52	-	
17				74.54	75.21	74.53	74.69	74.79	74.47	74.53	74.51	-	
18				75.30	74.91	74.53	74.63	74.76	74.47	74.50	74.49	-	
19				75.45	74.79	74.51	74.59	74.67	74.46	74.48	74.48	-	
20				75.15	74.73	74.51	74.57	74.61	74.45	74.46	74.48	-	
21				74.89	74.67	74.50	74.55	74.56	74.44	74.45	74.46	-	
22				74.73	74.63	74.49	74.54	74.53	74.44	74.89	74.45	-	
23				74.68	74.62	74.52	74.52	74.52	74.48	74.72	74.44	-	
24				74.91	74.60	74.58	74.62	74.50	74.46	74.60	74.42	-	
25				74.85	74.58	74.57	74.73	74.49	74.45	74.54	74.42	-	
26				74.76	74.56	74.55	74.67	74.48	74.44	74.52	74.41	-	
27				74.66	74.72	74.53	74.55	74.47	74.43	74.49	74.40	-	
28				74.57	74.82	74.52	74.88	74.46	74.42	74.48	74.39	-	
29				-	74.74	74.51	74.75	74.45	74.42	74.46	74.38	-	
30				-	74.66	74.51	74.71	74.44	74.41	74.48	74.28	-	
31					74.61		74.66	74.44		74.48		-	
Total													

Table 2-2-2-② Daily Water Level Chronology

Year 1983 Observation Station: Access 1-B ② 0 = 73.15 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				73.53	73.79	73.68	73.51	73.62	73.51	73.40	73.47	73.37	
2				73.53	73.81	73.67	73.54	73.61	73.50	73.39	73.46	73.44	
3				73.53	73.79	73.66	73.53	73.61	73.49	73.39	73.46	73.43	
4				73.65	73.78	73.65	73.52	73.60	73.49	73.39	73.45	73.42	
5				73.67	73.80	73.65	73.53	73.59	73.48	73.38	73.45	73.42	
6				73.69	73.79	73.64	73.52	73.58	73.48	73.37	73.44	73.42	
7				73.69	73.78	73.62	73.54	73.57	73.47	73.36	73.43	73.42	
8				73.69	73.79	73.61	73.54	73.57	73.47	73.36	73.46	73.40	
9				73.69	73.78	73.61	73.54	73.56	73.47	73.35	73.45	73.39	
10				73.67	73.80	73.59	73.55	73.55	73.46	73.35	73.47	73.38	
11				73.67	73.80	73.58	73.55	73.54	73.46	73.37	73.47	73.37	
12				73.67	73.79	73.59	73.55	73.53	73.46	73.37	73.46	73.36	
13				73.67	73.77	73.59	73.56	73.52	73.46	73.37	73.49	73.35	
14				73.67	73.76	73.58	73.56	73.52	73.45	73.37	73.48	73.35	
15				73.66	73.86	73.57	73.56	73.57	73.47	73.35	73.48	73.33	
16				73.65	73.90	73.57	73.57	73.57	73.47	73.35	73.47	73.32	
17				73.65	73.89	73.57	73.56	73.57	73.46	73.39	73.47	73.31	
18				73.78	73.87	73.57	73.56	73.57	73.46	73.38	73.46	73.30	
19				73.81	73.86	73.55	73.56	73.57	73.45	73.38	73.47	73.30	
20				73.81	73.85	73.54	73.55	73.57	73.45	73.37	73.46	73.30	
21				73.80	73.82	73.54	73.55	73.57	73.45	73.37	73.46	73.29	
22				73.78	73.79	73.53	73.55	73.57	73.44	73.47	73.45	73.28	
23				73.78	73.78	73.54	73.54	73.57	73.45	73.45	73.44	73.27	
24				73.78	73.76	73.54	73.57	73.56	73.45	73.44	73.43	73.26	
25				73.76	73.74	73.53	73.58	73.55	73.43	73.43	73.43	73.25	
26				73.75	73.72	73.53	73.58	73.54	73.43	73.43	73.42	73.25	
27				73.74	73.75	73.52	73.61	73.53	73.42	73.43	73.41	73.24	
28				73.73	73.74	73.52	73.61	73.52	73.42	73.43	73.40	73.23	
29					73.72	73.52	73.62	73.51	73.41	73.45	73.39	73.21	
30					73.71	73.51	73.62	73.51	73.40	73.46	73.38	73.21	
31					73.69		73.63	73.51		73.47		73.20	
Total													

Table 2-2-2-③ Daily Water Level Chronology

Year 1983 Observation Station: Access 1-B ③ 0 = 72,56 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				73.36	73.67	73.60	73.42	73.47	73.40	73.26	73.23	73.18	
2				73.36	73.69	73.59	73.42	73.47	73.40	73.25	73.23	73.20	
3				73.36	63.65	73.58	73.42	73.47	73.39	73.24	73.22	73.19	
4				73.47	73.66	73.58	73.41	73.46	73.39	73.24	73.22	73.19	
5				73.49	73.68	73.56	73.42	73.46	73.38	73.23	73.21	73.17	
6				73.51	73.67	73.56	73.41	73.46	73.38	73.23	73.21	73.17	
7				73.50	73.66	73.54	73.44	73.46	73.37	73.22	73.20	73.17	
8				73.50	73.67	73.54	73.44	73.46	73.36	73.21	73.22	73.16	
9				73.50	73.66	73.53	73.44	73.44	73.36	73.21	73.21	73.16	
10				73.49	73.69	73.52	73.44	73.44	73.35	73.21	73.22	73.15	
11				73.49	73.68	73.50	73.44	73.44	73.34	73.23	73.22	73.15	
12				73.49	73.68	73.51	73.44	73.42	73.34	73.23	73.21	73.14	
13				73.49	73.66	73.50	73.43	73.42	73.33	73.22	73.26	73.13	
14				73.50	73.65	73.50	73.43	73.42	73.33	73.21	73.26	73.13	
15				73.50	73.74	73.49	73.42	73.46	73.34	73.20	73.26	73.12	
16				73.50	73.78	73.49	73.43	73.45	73.33	73.20	73.26	73.11	
17				73.50	73.78	73.48	73.42	73.46	73.33	73.23	73.26	73.10	
18				73.58	73.76	73.48	73.42	73.46	73.32	73.22	73.26	73.10	
19				73.64	73.76	73.46	73.42	73.45	73.32	73.21	73.26	73.10	
20				73.63	73.74	73.46	73.42	73.44	73.31	73.21	73.26	73.10	
21				73.62	73.73	73.46	73.42	73.44	73.30	73.20	73.26	73.09	
22				73.61	73.71	73.46	73.41	73.44	73.30	73.27	73.25	73.09	
23				73.62	73.69	73.46	73.41	73.44	73.30	73.26	73.24	73.08	
24				73.63	73.68	73.46	73.43	73.44	73.30	73.25	73.23	73.07	
25				73.62	73.66	73.46	73.43	73.43	73.29	73.25	73.23	73.06	
26				73.57	73.65	73.44	73.44	73.43	73.28	73.24	73.22	73.05	
27				73.50	73.68	73.44	73.46	73.42	73.28	73.23	73.21	73.04	
28				73.50	73.67	73.43	73.47	73.42	73.27	73.23	73.21	73.04	
29					73.66	73.42	73.47	73.42	73.27	73.23	73.20	73.04	
30					73.64	73.42	73.47	73.41	73.26	73.23	73.19	73.02	
31					73.62		73.47	73.40		73.23		73.01	
Total													

Table 2-2-2-④ Daily Water Level Chronology

Year 1983 Observation Station Access 1-B ④ 0 = 73.03 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				72.72	72.97	72.92	72.79	72.78	72.71	72.64	72.66	72.52	
2				72.72	72.99	72.91	72.80	72.77	72.71	72.64	72.66	72.53	
3				72.72	72.93	72.89	72.79	72.77	72.71	72.63	72.65	72.52	
4				72.99	72.95	72.89	72.78	72.76	72.70	72.63	72.65	72.51	
5				72.91	73.00	72.88	72.79	72.75	72.70	72.63	72.65	72.49	
6				72.87	72.96	72.87	72.79	72.75	72.70	72.61	72.64	72.48	
7				72.83	72.94	72.87	72.85	72.74	72.70	72.59	72.63	72.47	
8				72.82	73.01	72.87	72.83	72.74	72.69	72.58	72.65	72.46	
9				72.82	73.13	72.86	72.81	72.74	72.69	72.57	72.65	72.44	
10				72.80	73.03	72.86	72.80	72.74	72.69	72.56	72.65	72.44	
11				72.79	73.00	72.85	72.80	72.74	72.68	72.63	72.65	72.43	
12				72.79	72.97	72.87	72.79	72.73	72.68	72.63	72.65	72.41	
13				72.79	72.94	72.87	72.79	72.73	72.67	72.63	72.67	72.39	
14				72.83	72.93	72.86	72.78	72.73	72.65	72.63	72.67	72.38	
15				72.82	73.05	72.85	72.78	72.79	72.70	72.61	72.67	72.36	
16				72.81	73.06	72.85	72.78	72.77	72.69	72.60	72.67	72.35	
17				72.81	73.03	72.85	72.77	72.78	72.68	72.65	72.66	72.34	
18				73.07	73.00	72.85	72.77	72.77	72.67	72.63	72.66	72.32	
19				72.97	73.00	72.84	72.76	72.76	72.67	72.63	72.66	72.32	
20				72.93	72.98	72.83	72.75	72.75	72.66	72.63	72.66	72.32	
21				72.90	72.97	72.83	72.75	72.75	72.66	72.62	72.65	72.31	
22				72.88	72.96	72.82	72.74	72.74	72.67	72.72	72.63	72.30	
23				72.87	72.96	72.84	72.74	72.74	72.67	72.70	72.63	72.30	
24				72.93	72.94	72.83	72.78	72.74	72.66	72.68	72.61	72.28	
25				72.90	72.93	72.83	72.79	72.73	72.65	72.67	72.60	72.26	
26				72.89	72.93	72.82	72.78	72.73	72.65	72.67	72.59	72.25	
27				72.88	72.98	72.82	72.83	72.72	72.65	72.66	72.57	72.23	
28				72.87	72.97	72.81	72.81	72.72	72.65	72.66	72.56	72.22	
29					72.94	72.81	72.80	72.71	72.65	72.65	72.55	72.21	
30					72.93	72.80	72.79	72.71	72.64	72.66	72.53	72.20	
31					72.93		72.79	72.71		72.66		72.19	
Total													

Table 2-2-2-⑤ Daily Water Level Chronology

Year 1983 Observation Station Access 1-B ⑤ 0 = 66.57 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				66.95	67.67	67.35	66.86	66.93	66.71	66.58	66.59		
2				66.94	67.97	67.32	66.87	66.91	66.70	66.57	66.59		
3				66.91	67.67	67.29	66.87	66.89	66.69	66.57	66.58		
4				68.07	67.63	67.25	66.85	66.87	66.69	66.57	66.58		
5				67.57	67.91	67.23	66.87	66.86	66.69	66.57	66.57		
6				67.47	67.68	67.21	66.86	66.84	66.68	-	66.57		
7				67.40	67.61	67.17	67.05	66.84	66.67	-	66.57		
8				67.33	67.85	67.13	66.99	66.83	66.67	-	66.60		
9				67.26	67.75	67.11	66.97	66.82	66.66	-	66.58		
10				67.17	68.14	67.09	66.97	66.81	66.66	-	66.65		
11				67.15	68.02	67.07	66.96	66.79	66.66	66.60	66.62		
12				67.13	67.82	67.11	66.93	66.79	66.66	66.59	66.59		
13				67.07	67.66	67.07	66.93	66.79	66.65	66.58	66.72		
14				67.25	67.57	67.04	66.91	66.78	66.64	66.57	66.72		
15				67.21	68.14	67.02	66.91	67.12	66.77	66.57	66.67		
16				67.17	68.29	67.00	66.93	66.87	66.67	66.57	66.64		
17				67.13	68.10	66.99	66.92	66.91	66.67	66.74	66.63		
18				68.57	67.87	66.99	66.90	66.87	66.66	66.61	66.60		
19				68.07	67.93	66.97	66.87	66.85	66.65	66.59	66.62		
20				67.77	67.75	66.95	66.86	66.84	66.64	66.58	66.59		
21				67.58	67.67	66.94	66.84	66.83	66.63	66.57	66.59		
22				67.44	67.60	66.93	66.84	66.82	66.63	66.79	66.57		
23				67.51	67.59	66.93	66.84	66.81	66.63	66.69	66.57		
24				67.51	67.52	66.92	66.97	66.79	66.63	66.67	66.57		
25				67.43	67.47	66.90	66.93	66.78	66.62	66.65	66.57		
26				67.37	67.41	66.89	66.92	66.77	66.62	66.63	66.57		
27				67.33	67.99	66.87	67.12	66.77	66.59	66.62	66.57		
28				67.28	67.62	66.87	67.03	66.75	66.59	66.60	66.57		
29					67.53	66.87	66.99	66.73	66.59	66.60	66.57		
30					67.45	66.87	66.97	66.72	66.58	66.59	66.57		
31					67.40		66.95	66.71		66.60			
Total													

Table 2-2-2-⑥ Daily Water Level Chronology

Year 1983 Observation Station: Ayolas ∿ San Cosme ⑥ 0 = 73,88 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov	Dec.	Total
1				73.88	-	73.89	-	73.93	-				
2				73.88	-	73.88	-	73.91	-				
3				73.88	-	-	-	73.89	-				
4				74.18	-	-	-	-	-				
5				74.18	74.20	-	-	-	-				
6				74.13	74.15	-	-	-	-				
7				74.08	74.12	-	74.00	-	-				
8				74.03	-	-	73.98	-	-				
9				73.98	74.12	-	73.94	-	-				
10				73.93	74.20	-	73.92	-	-				
11				73.88	74.16	-	73.90	-	-				
12				73.88	74.14	-	-	-	-				
13				73.93	74.10	-	-	-	-				
14				73.98	74.07	-	-	-	-				
15				73.93	-	-	-	74.07	-				
16				73.88	74.24	-	73.89	73.98	-				
17				73.88	74.13	-	-	74.02	-				
18				74.20	74.12	-	-	73.96	-				
19				74.14	74.11	-	-	73.93	-				
20				74.08	74.08	-	-	73.89	-				
21				74.05	74.05	-	-	-	-				
22				74.02	74.03	-	-	-	-				
23				74.00	74.01	-	-	-	-				
24				74.12	73.97	-	74.03	-	-				
25				74.03	73.94	-	73.98	-	-				
26				73.48	73.92	-	-	-	-				
27				73.94	74.09	-	74.05	-	-				
28					74.00	-	74.02	-	-				
29					73.98	-	73.99	-	-				
30					73.94	-	73.99		-				
31					73.90		73.95						
Total													

Table 2-2-2-⑦ Daily Water Level Chronology

Year 1983 Observation Station: Yabebyry ∿ San Ignacio ⑦ 0 = 70,11 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				-	72.23	72.08	72.05	72.01	71.95	71.92	71.96	71.87	
2				72.00	72.21	72.08	72.06	72.00	71.95	71.92	71.95	71.86	
3				72.01	72.17	72.07	72.07	72.00	71.94	71.91	71.95	71.85	
4				72.09	72.15	72.06	72.07	71.99	71.94	71.90	71.94	71.85	
5				72.14	72.17	72.06	72.06	71.99	71.93	71.89	71.94	71.85	
6				72.17	72.13	72.05	72.06	71.99	71.93	71.89	71.93	71.84	
7				72.20	72.13	72.03	72.08	71.99	71.93	71.89	71.97	71.84	
8				72.07	72.19	72.02	-	72.00	71.92	71.88	71.97	71.84	
9				72.06	72.18	72.01	-	72.00	71.92	71.88	71.96	71.83	
10				72.04	72.21	72.01	-	71.99	71.91	71.91	71.95	71.83	
11				72.04	72.23	72.01	-	71.99	71.90	71.93	71.95	71.83	
12				72.05	72.20	72.01	-	71.97	71.90	71.94	71.95	71.82	
13				72.10	72.15	72.00	71.98	71.97	71.90	71.93	71.96	71.80	
14				-	72.13	72.01	71.98	71.96	71.89	71.93	71.97	71.79	
15			72.01	72.10	72.24	72.00	72.00	71.96	71.89	71.92	71.96	71.78	
16			72.00	72.11	72.24	71.99	72.01	72.07	71.91	71.92	71.95	71.77	
17			71.96	72.06	72.23	71.99	72.01	72.07	71.92	71.95	71.94	71.76	
18			72.13	-	72.21	71.97	71.99	72.03	71.92	71.94	71.94	71.76	
19			72.11	72.29	72.19	71.96	71.98	72.02	71.91	71.93	71.96	71.76	
20			72.07	72.24	72.18	71.94	71.97	71.97	71.91	71.93	71.95	71.75	
21			72.04	72.17	72.17	71.92	71.96	71.97	71.90	71.92	71.95	71.75	
22			72.01	72.15	72.17	71.92	71.98	71.96	71.90	-	71.94	71.73	
23			71.98	72.20	72.21	71.96	71.96	71.96	71.90	71.96	71.93	71.73	
24			71.97	72.28	72.19	71.97	71.97	71.95	71.89	71.98	71.92	71.72	
25			71.96	72.28	72.15	71.98	72.01	71.94	71.89	71.97	71.91	71.70	
26			71.95	72.26	72.15	71.98	72.03	71.94	71.89	71.96	71.91	71.68	
27			71.95	72.23	72.18	71.98	72.04	71.93	71.91	71.95	71.90	71.67	
28			71.96	-	72.17	71.97	72.06	71.93	71.92	71.94	71.89	71.67	
29			71.99	72.35	72.16	71.97	72.08	71.93	71.92	71.94	71.88	71.66	
30			71.99	72.23	72.13	71.96	72.10	71.93	71.93	71.95	71.87	71.44	
31			71.98		72.09		72.10	71.92		71.96		71.62	
Total													

Table 2-2-2-⑧ Daily Water Level Chronology

Year 1983 Observation Station: Yabebyry ∿ San Ignacio ⑧ 0 = 69,51 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				-	72.02	71.94	71.73	71.85	71.72	71.74	71.82		
2				71.85	71.97	71.92	71.74	71.84	71.72	71.74	71.82		
3				71.82	71.97	71.91	71.75	71.83	71.72	71.74	71.81		
4				-	71.99	71.88	71.74	71.83	71.73	71.73	71.80		
5				72.02	-	71.86	71.73	71.86	71.73	71.72	71.79		
6				71.97	72.01	71.85	71.73	71.85	71.73	71.72	71.78		
7				71.95	72.02	71.83	71.75	71.84	71.71	71.71	71.77		
8				71.96	72.06	71.83	-	71.83	71.71	71.71	71.78		
9				71.92	72.07	71.82	-	71.82	71.71	71.70	71.77		
10				71.87	72.08	71.81	-	71.81	71.69	71.70	71.76		
11				71.86	72.08	71.79	-	71.81	71.68	71.70	71.75		
12				71.85	72.06	71.77	-	71.78	71.68	71.71	71.78		
13				71.87	72.05	71.78	71.76	71.76	71.68	71.74	71.81		
14				-	72.04	71.76	71.76	71.75	71.67	71.75	71.86		
15			71.84	71.90	72.11	71.77	71.78	-	-	71.74	71.85		
16			71.83	71.90	72.10	71.78	71.79	-	71.69	71.73	71.81		
17			-	71.91	72.12	71.79	71.80	-	71.71	71.75	71.79		
18			71.90	-	72.11	71.79	71.81	71.80	71.72	71.75	-		
19			71.89	-	72.10	71.76	71.80	71.83	71.73	71.74	71.82		
20			71.88	72.01	72.11	71.74	71.79	71.81	71.73	71.76	71.82		
21			71.86	71.97	72.16	71.74	71.77	71.79	71.72	71.79	71.81		
22			71.80	71.95	72.18	71.73	71.76	71.77	71.72	-	71.80		
23			71.77	-	72.20	71.71	71.76	71.75	71.72	71.93	71.79		
24			71.74	-	72.21	71.74	-	71.74	71.71	71.90	71.78		
25			71.74	72.02	72.16	71.75	-	71.74	71.71	71.89	71.76		
26			71.73	72.11	72.09	71.76	-	71.74	71.71	71.88	71.75		
27			71.72	72.11	72.06	71.75	71.81	71.73	71.70	71.85	71.74		
28			71.72	-	72.04	71.74	71.84	71.73	71.69	71.83	71.73		
29			71.79	-	72.01	71.73	-	71.73	71.69	71.78	71.72		
30			71.79	-	72.00	71.73	-	71.73	71.68	71.77	71.72		
31			71.78		71.95		-			71.82			
Total													

Table 2-2-2-⑨ Daily Water Level Chronology

Year 1983 Observation Station: Yabebyry ~ San Ignacio ⑨ 0 = 69,62 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				-	71.07	70.96	70.78	70.88	70.78	70.72	70.79		
2				70.85	71.06	70.95	70.79	70.86	70.77	70.72	70.79		
3				70.84	70.97	70.93	70.79	70.85	70.77	70.74	70.78		
4				-	70.95	70.92	70.78	70.83	70.77	70.74	70.78		
5				70.96	-	70.89	70.78	70.87	70.76	70.74	70.77		
6				70.95	70.98	70.89	70.79	70.86	70.76	70.74	70.77		
7				70.94	70.97	70.87	70.80	70.86	70.76	70.73	70.78		
8				70.92	70.97	70.82	-	70.85	70.75	70.73	70.79		
9				70.91	70.98	70.81	-	70.84	70.74	70.72	70.80		
10				70.87	70.97	70.82	-	70.83	70.74	70.72	70.79		
11				70.85	70.99	70.82	-	70.83	70.73	70.73	70.78		
12				70.85	70.98	70.83	-	70.82	70.73	70.75	70.81		
13				70.87	70.97	70.87	70.81	70.82	70.72	70.75	70.83		
14				-	70.99	70.86	70.82	70.81	70.72	70.74	70.85		
15			70.89	70.90	71.07	70.85	70.84	-	-	70.74	70.84		
16			70.88	70.91	71.08	70.85	70.85	-	70.73	70.72	70.83		
17			-	70.91	71.07	70.83	70.82	-	70.74	70.72	70.82		
18			70.92	-	71.05	70.82	70.82	70.87	70.74	70.75	-		
19			70.90	-	71.03	70.81	70.81	70.85	70.73	70.78	70.83		
20			70.90	71.02	71.02	70.79	70.81	70.83	70.73	70.78	70.82		
21			70.87	70.97	71.02	70.79	70.79	70.82	70.73	70.77	70.81		
22			70.84	70.94	71.01	70.78	70.78	70.81	70.72	-	-		
23			70.82	-	70.98	70.78	70.78	70.80	70.72	70.89	-		
24			70.81	-	70.98	70.79	-	70.80	70.71	70.88	-		
25			70.81	70.97	70.97	70.80	-	70.79	70.71	70.87	-		
26			70.79	71.02	70.98	70.79	-	70.78	70.71	70.85	-		
27			70.78	71.03	-	70.79	70.82	70.78	70.70	70.82	-		
28			70.78	-	-	70.78	70.84	70.78	70.70	70.79	-		
29			70.81	-	-	70.78	-	70.78	70.69	70.78	-		
30			70.82	-	-	70.78	70.86	70.78	70.69	70.79	-		
31			70.82		70.97		70.87	70.78		70.79			
Total													

Table 2-2-2- ⑩ Daily Water Level Chronology

Year 1983 Observation Station: Yabebyry ∿ San Ignacio ⑩ 0 = 69,78m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				-	71.10	70.98	70.77	70.86	70.78	70.68	70.76		
2				70.83	71.05	70.97	70.76	70.84	70.78	70.69	70.76		
3				70.84	71.05	70.96	70.78	70.83	70.77	70.71	70.75		
4				-	71.01	70.95	70.78	70.82	70.77	70.71	70.75		
5				70.96	-	70.93	70.77	70.84	70.76	70.70	70.75		
6				70.94	70.98	70.91	70.76	70.83	70.76	70.70	70.74		
7				70.93	71.03	70.87	70.79	70.83	70.76	70.71	70.76		
8				70.91	71.05	70.86	-	70.82	70.76	70.71	70.77		
9				70.89	71.05	70.86	-	70.82	70.76	70.70	70.79		
10				70.87	71.08	70.83	-	70.82	70.76	70.70	70.78		
11				70.86	71.09	70.83	-	70.81	70.75	70.71	70.78		
12				70.85	71.09	70.83	70.79	70.81	70.73	70.71	70.79		
13				70.89	71.08	70.84	70.80	70.80	70.72	70.70	70.81		
14				-	71.10	70.84	70.81	70.79	70.71	70.70	70.81		
15			70.93	70.92	71.15	70.83	70.82	-	-	70.70	70.80		
16			70.92	70.93	71.16	70.82	70.82	-	70.72	70.70	70.80		
17			-	70.94	71.08	70.80	70.81	-	70.72	70.70	70.79		
18			70.96	-	71.03	70.79	70.80	70.86	70.71	70.71	70.79		
19			70.93	-	71.01	70.79	70.80	70.85	70.71	70.71	70.78		
20			70.89	71.13	71.05	70.78	70.79	70.84	70.71	70.72	70.78		
21			70.88	71.09	71.05	70.78	70.78	70.83	70.71	70.72	70.77		
22			70.87	71.05	71.06	70.77	70.78	70.81	70.70	-	70.76		
23			70.83	-	71.07	70.77	70.78	70.81	70.70	70.80	70.75		
24			70.82	-	71.08	70.78	-	70.79	70.70	70.79	70.75		
25			70.81	71.03	71.04	70.79	-	70.78	70.70	70.79	70.74		
26			70.80	71.03	71.03	70.78	-	70.78	70.69	70.78	70.73		
27			70.80	71.08	71.03	70.77	70.81	70.78	70.69	70.78	70.72		
28			70.79	-	71.06	70.77	70.82	70.78	70.68	70.78	70.71		
29			70.80	-	71.05	70.76	-	70.68	70.68	70.77	70.70		
30			70.80	-	71.03	70.76	70.84	70.68	70.67	70.76	70.69		
31			70.79		71.02		70.85	70.68		70.76			
Total													

Table 2-2-2- ⑪ Daily Water Level Chronology

Year 1983 Observation Station: Yabebyry ∿ San Ignacio ⑪ 0 = 69,30 m

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1				70.61	-	70.78	70.53	70.66	70.65	70.37	70.48		
2				70.61	-	70.77	70.53	70.63	70.63	70.37	70.47		
3				70.61	-	70.76	70.53	70.61	70.61	70.37	70.47		
4				-	70.77	70.75	70.52	70.60	70.60	70.37	70.46		
5				70.71	-	70.71	70.51	70.60	70.59	70.36	70.45		
6				70.70	70.80	70.69	70.52	70.60	70.57	70.36	70.45		
7				70.68	70.82	70.66	70.56	70.61	70.55	70.38	70.47		
8				70.67	70.84	70.66	-	70.61	70.54	70.38	70.48		
9				70.66	70.87	70.64	-	70.60	70.53	70.37	70.48		
10				70.63	70.87	70.64	-	70.60	70.50	70.37	70.49		
11				70.63	70.88	70.64	-	70.59	70.48	70.39	70.50		
12				70.63	70.87	70.65	70.58	70.59	70.47	70.40	70.52		
13				70.65	70.86	70.65	70.58	70.58	70.46	70.41	70.53		
14				-	70.82	70.64	70.58	70.57	70.46	70.41	70.54		
15			70.66	70.70	70.88	70.63	60.59	-	-	70.40	70.54		
16			70.65	70.71	70.89	70.62	70.58	-	70.47	70.40	70.53		
17			-	70.71	70.87	70.62	70.55	-	70.49	70.42	70.53		
18			70.70	-	70.85	70.60	70.54	70.64	70.48	70.42	70.52		
19			70.66	-	70.82	70.59	70.52	70.62	70.47	70.42	70.51		
20			70.66	70.69	70.80	70.58	70.51	70.61	70.47	70.43	70.51		
21			70.65	70.65	70.79	70.56	70.51	70.60	70.47	70.43	70.50		
22			70.63	70.60	70.79	70.54	70.50	70.58	70.45	-	70.49		
23			70.61	-	70.78	70.55	70.50	70.58	70.45	70.49	70.48		
24			70.60	-	70.76	70.56	-	70.57	70.44	70.49	70.48		
25			70.60	70.62	70.75	70.54	-	70.57	70.44	70.58	70.46		
26			70.60	70.68	70.74	70.53	-	70.55	70.43	70.48	70.45		
27			70.59	70.75	70.74	70.53	70.56	70.55	70.43	70.48	70.44		
28			70.56	-	70.80	70.52	70.58	70.53	70.42	70.47	70.43		
29			70.56	-	70.81	70.52	-	70.52	70.40	70.47	70.41		
30			70.56	-	70.80	70.52	70.61	70.52	70.38	70.48	70.40		
31			70.55		70.79		70.64	70.52		70.48			
Total													

Table 2-2-2- ⑫ Daily Water Level Chronology

Year 1983 Observation Station: Atinguy River 0 = 60,83 m

Day \ Month	Jan.	Feb	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1	63.55	63.66	66.10	63.87	65.02	64.80	64.72	64.88					
2	63.57	63.69	66.08	63.80	65.23	64.88	64.65	64.76					
3	63.61	63.77	65.91	63.70	65.50	64.83	64.68	64.56					
4	63.59	63.85	65.70	64.41	65.44	64.75	64.60	64.33					
5	63.58	63.89	65.49	64.78	65.41	64.65	64.49	64.15					
6	63.57	63.92	65.31	65.07	65.40	64.58	64.43	63.97					
7	63.58	63.92	65.21	65.68	65.28	64.53	64.47	63.78					
8	63.58	63.93	65.14	65.69	65.50	64.50	64.70	63.60					
9	63.57	63.89	65.03	65.47	65.45	64.56	64.84	63.48					
10	63.58	63.86	64.88	65.16	65.83	64.60	65.04	63.38					
11	63.63	63.85	64.69	64.86	65.85	64.71	65.30	63.32					
12	63.67	63.88	64.66	64.58	65.73	64.78	65.42	63.29					
13	63.63	63.93	64.61	64.38	65.66	64.92	65.61	63.26					
14	63.63	63.97	64.56	64.16	65.54	65.01	65.59	63.19					
15	63.59	64.04	64.50	64.02	65.70	65.12	65.65	63.42					
16	63.60	64.28	64.39	63.83	65.93	65.23	65.58	63.54					
17	63.62	64.35	64.53	63.63	65.75	65.28	65.43	63.43					
18	63.62	64.43	64.73	64.21	66.04	65.27	65.25	63.41					
19	63.59	64.46	64.72	64.99	65.91	65.26	65.12	63.33					
20	63.56	64.47	64.71	65.05	65.77	65.21	65.03	63.32					
21	63.54	64.49	64.74	65.36	65.59	65.17	64.92	63.33					
22	63.53	64.57	64.81	65.52	65.46	65.10	64.78	63.43					
23	63.53	64.60	64.89	65.42	65.43	65.13	64.60	63.47					
24	63.50	64.60	64.88	65.45	65.36	65.09	64.53	63.43					
25	63.48	64.58	64.79	65.26	65.23	65.04	64.49	63.35					
26	63.52	64.69	64.65	64.98	65.07	64.97	64.28	63.21					
27	63.51	65.58	64.56	64.76	64.97	64.92	64.36	63.07					
28	63.59	65.63	64.36	64.62	64.88	64.88	64.40	62.99					
29	63.60		64.22	65.19	64.72	64.81	64.60	62.88					
30	63.62		64.07	65.24	64.67	64.75	64.79	62.82					
31	63.63		63.93		64.65		64.86	62.72					
Total													

Table 2-2-2- (13) Daily Water Level Chronology

Observation Station: Parana River (Atinguy)

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1		64.00	65.04	64.09	63.80	64.40	64.60	-	63.04				
2		64.04	64.94	64.08	64.34	64.42	64.59	-	63.03				
3		64.10	64.90	64.02	64.44	64.41	64.56	-	63.06				
4		64.14	64.84	64.03	64.41	64.36	64.50	-	63.09				
5		64.15	64.79	64.04	64.32	64.34	64.45	-	63.15				
6		64.17	64.76	64.06	64.24	64.34	64.37	63.91	63.15				
7		64.18	64.79	64.03	64.19	64.35	64.40	63.84	63.15				
8		64.17	64.82	63.99	64.30	64.40	64.47	64.14	63.15				
9		64.16	64.77	63.94	64.42	64.44	64.69	63.22	63.17				
10		64.15	64.67	63.90	64.46	64.49	64.89	63.23	63.18				
11		64.14	64.54	63.84	64.44	64.57	65.14	63.28	63.20				
12		64.14	64.51	63.84	64.48	64.68	65.39	63.44	63.24				
13		64.18	64.47	63.81	64.53	64.82	65.50	63.39	63.25				
14		64.24	64.45	63.74	64.60	64.94	65.48	63.36	63.26				
15		64.25	64.44	63.83	64.74	65.09	65.48	63.29	63.28				
16		64.34	64.43	63.81	64.74	65.21	65.44	63.22	63.29				
17		64.42	64.44	63.79	65.24	65.21	65.16	63.23	63.36				
18		64.46	64.46	63.82	64.74	65.19	64.92	63.22	63.44				
19		64.48	64.46	63.76	64.95	65.14	64.84	63.07	63.46				
20		64.49	64.49	63.82	64.45	65.09	64.88	-	63.56				
21		64.52	64.52	64.04	64.74	65.06	64.77	-	64.04				
22		64.58	64.57	64.07	64.74	65.03	64.64	-	63.76				
23		64.58	64.59	64.00	64.85	65.00	64.61	-	63.76				
24		64.57	64.54	63.99	64.89	64.99	64.52	-	63.77				
25		64.56	64.46	63.99	64.80	64.93	64.36	-	63.93				
26		64.74	64.35	64.00	64.94	64.86	64.28	-	64.05				
27		64.79	64.31	64.02	64.76	64.80	64.27	-	64.12				
28		64.94	64.26	64.10	64.68	64.75	64.25	-	64.34				
29		-	64.21	64.15	64.62	64.69	64.37	-	64.37				
30			64.17	64.19	64.55	64.65	64.44	-	64.31				
31			64.11		64.62		64.35	-					
Total													

Table 2-2-2- ⑭ Daily Water Level Chronology

Year 1983 Observation Station: Stankievic (Parana River) 0 = 62,59 m

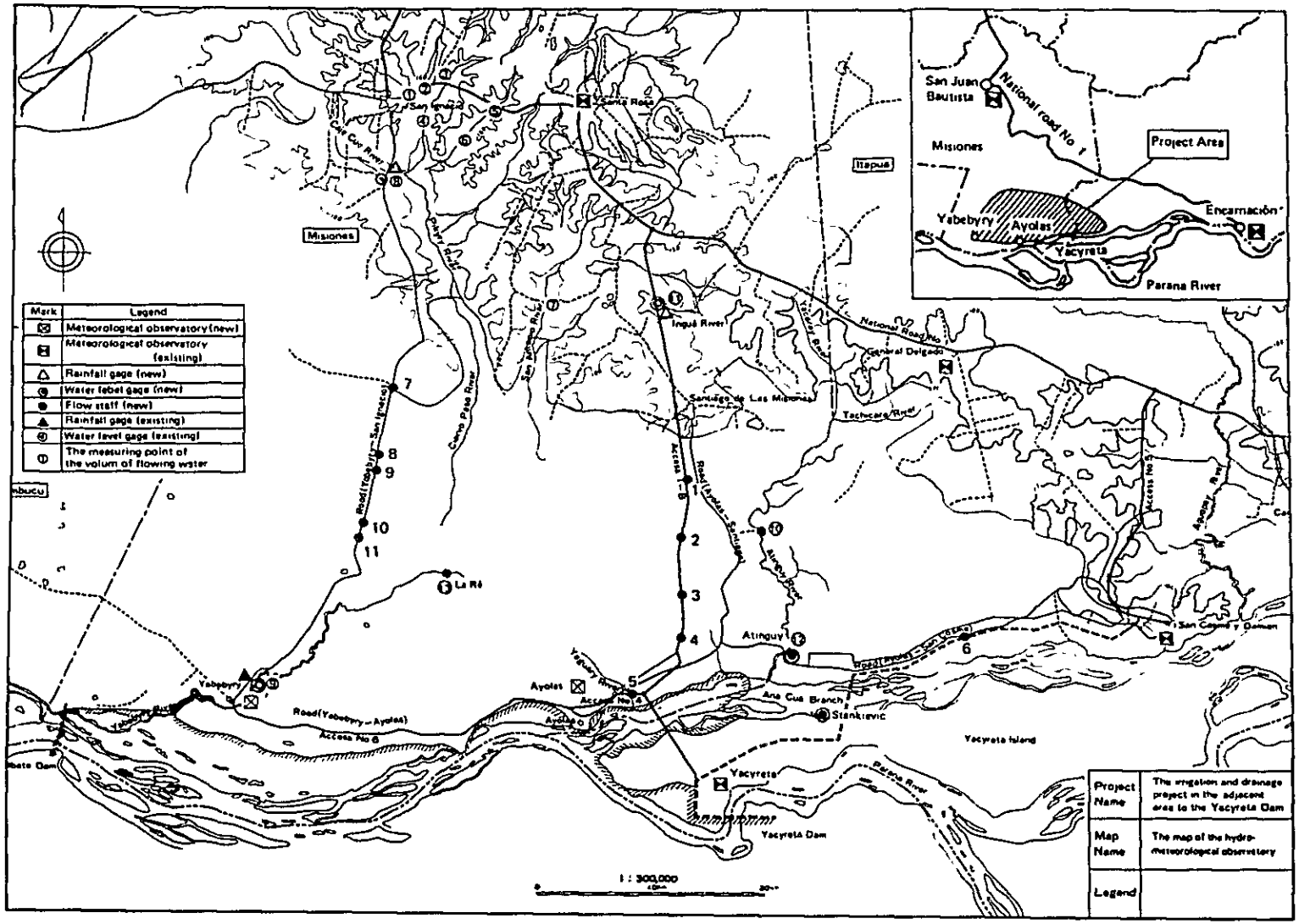
Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1		64.95	65.99	65.04	64.75	65.35	65.55	-	63.99				
2		64.99	65.89	65.03	65.29	65.37	65.54	-	63.98				
3		65.05	65.85	64.97	65.39	65.36	65.51	-	64.01				
4		65.09	65.79	64.98	65.36	65.31	65.45	-	64.04				
5		65.10	65.74	64.99	65.27	65.29	65.40	-	64.10				
6		65.12	65.71	65.01	65.19	65.29	65.32	64.86	64.10				
7		65.13	65.74	64.98	65.14	65.30	65.35	64.79	64.10				
8		65.12	65.77	64.94	65.25	65.35	65.42	65.09	64.10				
9		65.11	65.72	64.89	65.37	65.39	65.64	64.17	64.12				
10		65.10	65.62	64.85	65.41	65.44	65.84	64.18	64.13				
11		65.09	65.49	64.79	65.39	65.52	66.09	64.23	64.15				
12		65.09	65.46	64.79	65.43	65.63	66.34	64.39	64.19				
13		65.13	65.42	64.76	65.48	65.77	66.45	64.34	64.20				
14		65.19	65.40	64.69	65.55	65.89	66.43	64.31	64.21				
15		65.20	65.39	64.78	65.69	66.04	66.43	64.24	64.23				
16		65.29	65.38	64.76	65.69	66.16	66.39	64.17	64.24				
17		65.37	65.39	64.74	66.19	66.16	66.11	64.18	64.31				
18		65.41	65.41	64.77	65.69	66.14	65.87	64.17	64.39				
19		65.43	65.41	64.71	65.48	66.09	65.79	64.02	64.41				
20		65.44	65.44	64.77	65.40	66.04	65.83	-	64.51				
21		65.47	65.47	64.99	65.69	66.01	65.72	-	64.99				
22		65.53	65.52	65.02	65.69	65.98	65.59	-	64.71				
23		65.53	65.54	64.95	65.80	65.95	65.56	-	64.71				
24		65.52	65.49	64.94	65.84	65.94	65.47	-	64.72				
25		65.51	65.41	64.94	65.75	65.88	65.31	-	64.88				
26		65.69	65.30	64.95	65.59	65.81	65.23	-	65.00				
27		65.74	65.26	64.97	65.41	65.75	65.22	-	65.07				
28		65.89	65.21	65.05	65.33	65.70	65.20	-	65.29				
29			65.16	65.10	65.27	65.64	65.32	-	65.32				
30			65.12	65.14	65.20	65.60	65.39	-	65.26				
31			65.06		65.27		65.30	-					
Total													

Table 2-2-2- ⑮ Daily Water Level Chronology

Year Jul. 1981 ~ Feb. 1872

Observation Station: Atinguy River

Day \ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1	2.75	1.92						1.36	1.35	1.55	1.55	1.77	
2	2.68	1.90						1.30	1.35	1.51	1.51	1.80	
3	2.59	1.92						1.29	1.32	1.48	1.60	1.78	
4	2.48	1.92						1.30	1.30	1.47	1.57	1.86	
5	2.37	1.89						1.36	1.23	1.45	1.54	1.95	
6	2.32	1.93						1.36	1.21	1.46	1.66	2.09	
7	2.20	1.91						1.36	1.27	1.48	1.62	2.06	
8	2.15	2.06						1.38	1.30	1.49	1.60	2.06	
9	2.16	2.10						1.36	1.31	1.51	1.55	2.15	
10	2.15	2.06					1.64	1.38	1.35	1.54	1.55	2.75	
11	2.11	2.10					1.62	1.41	1.35	1.56	1.55	2.38	
12	2.10	2.27					1.58	1.46	1.30	1.61	1.56	2.38	
13	2.05	2.26					1.53	1.45	1.32	1.63	1.58	2.34	
14	2.08	2.32					1.54	1.38	1.43	1.62	1.60	2.23	
15	2.09	2.35					1.52	1.37	1.45	1.58	1.62	2.38	
16	2.09	2.37					1.52	1.36	1.46	1.53	1.62	2.36	
17	2.15	2.35					1.52	1.35	1.43	1.48	1.60	2.30	
18	2.10	2.34					1.49	1.36	1.40	1.46	1.60	2.30	
19	2.10	2.32					1.44	1.37	1.35	1.48	1.60	2.27	
20	2.10	2.50					1.43	1.37	1.36	1.48	1.56	2.25	
21	2.10	2.62					1.43	1.37	1.40	1.52	1.54	2.30	
22	2.14	2.86					1.42	1.37	1.63	1.52	1.55	2.34	
23	2.11	2.90					1.40	1.37	1.95	1.52	1.56	2.38	
24	2.05	2.78					1.38	1.32	1.96	1.49	1.52	2.39	
25	2.02	2.65					1.35	1.32	1.90	1.48	1.51	2.44	
26	2.02	2.58					1.35	1.35	1.86	1.50	1.52	2.57	
27	2.01	2.48					1.33	1.33	1.77	1.50	1.56	2.64	
28	1.95	2.36					1.33	1.31	1.66	1.48	1.68	2.66	
29	1.94						1.33	1.30	1.57	1.46	1.74	2.74	
30	1.93						1.36	1.34	1.53	1.47	1.77	2.76	
31	1.92						1.36	1.34		1.49		2.79	
Total													



Location of Meteorological Observation Stations

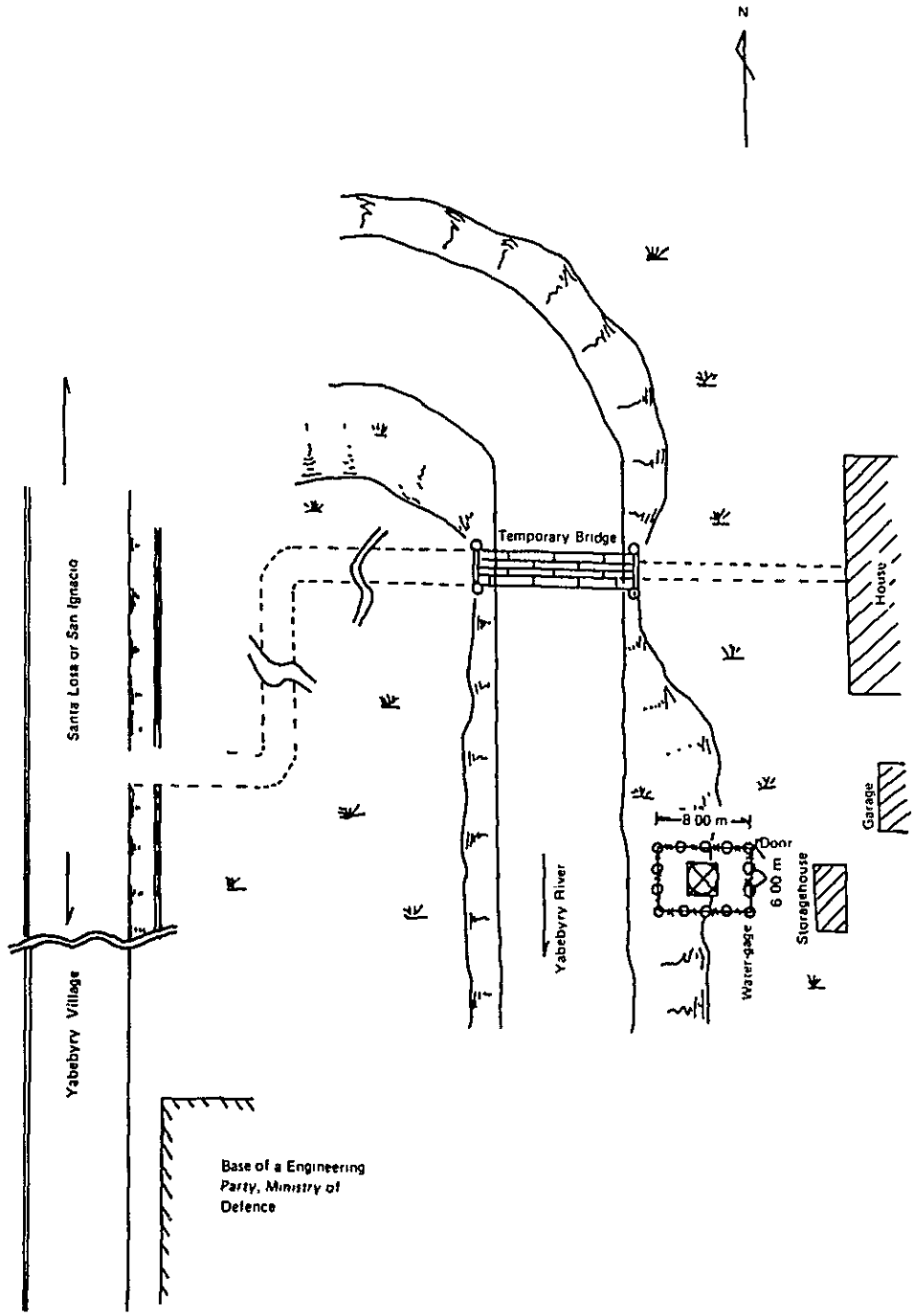


Fig. 2-1-1 Location of Water Gage Installation at the Yabebyry River

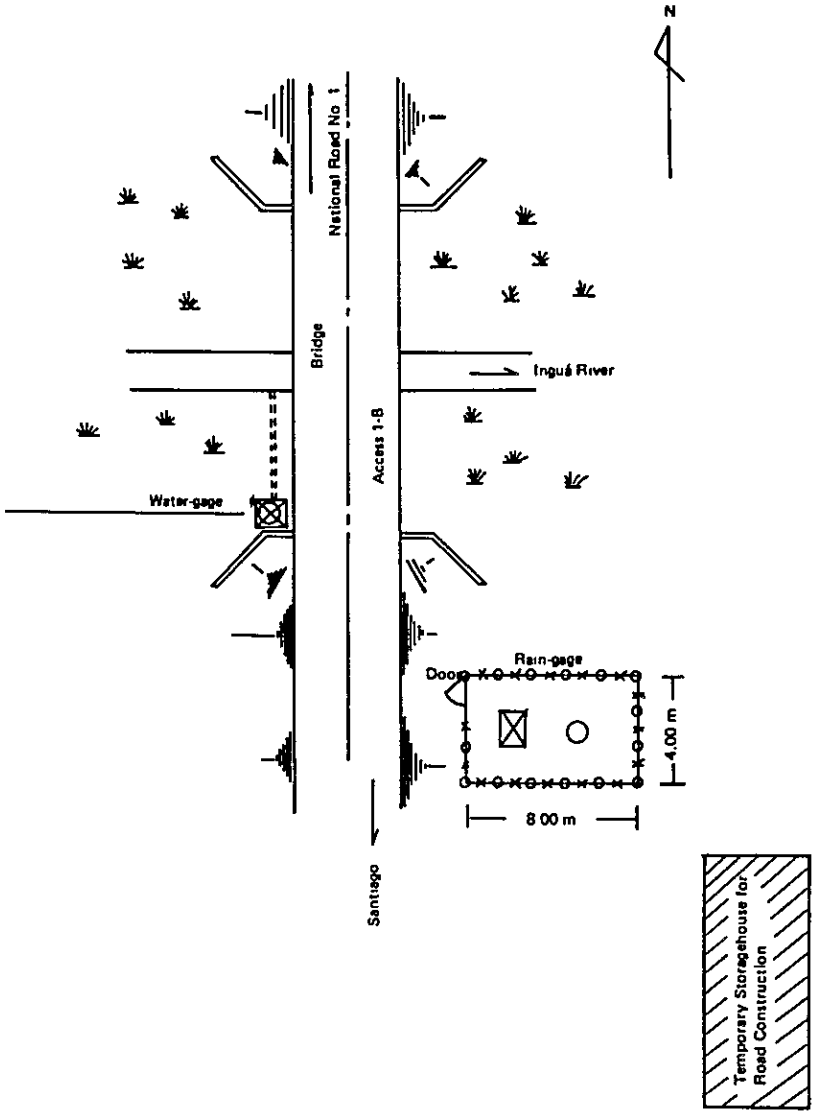


Fig. 2-1-2 Location of Water Gage Installation at the Inguá River

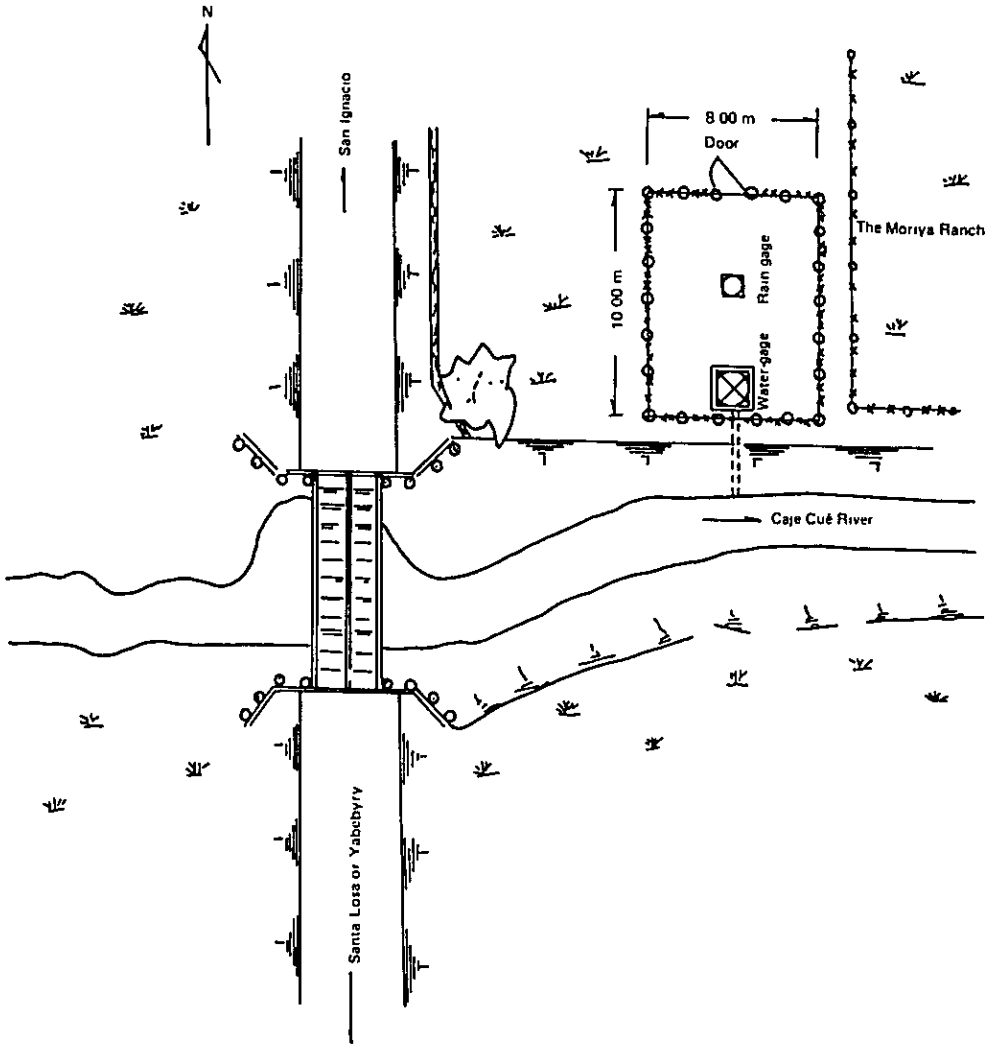


Fig. 2-1-3 Location of Water Gage Installation at the Caje Cué River

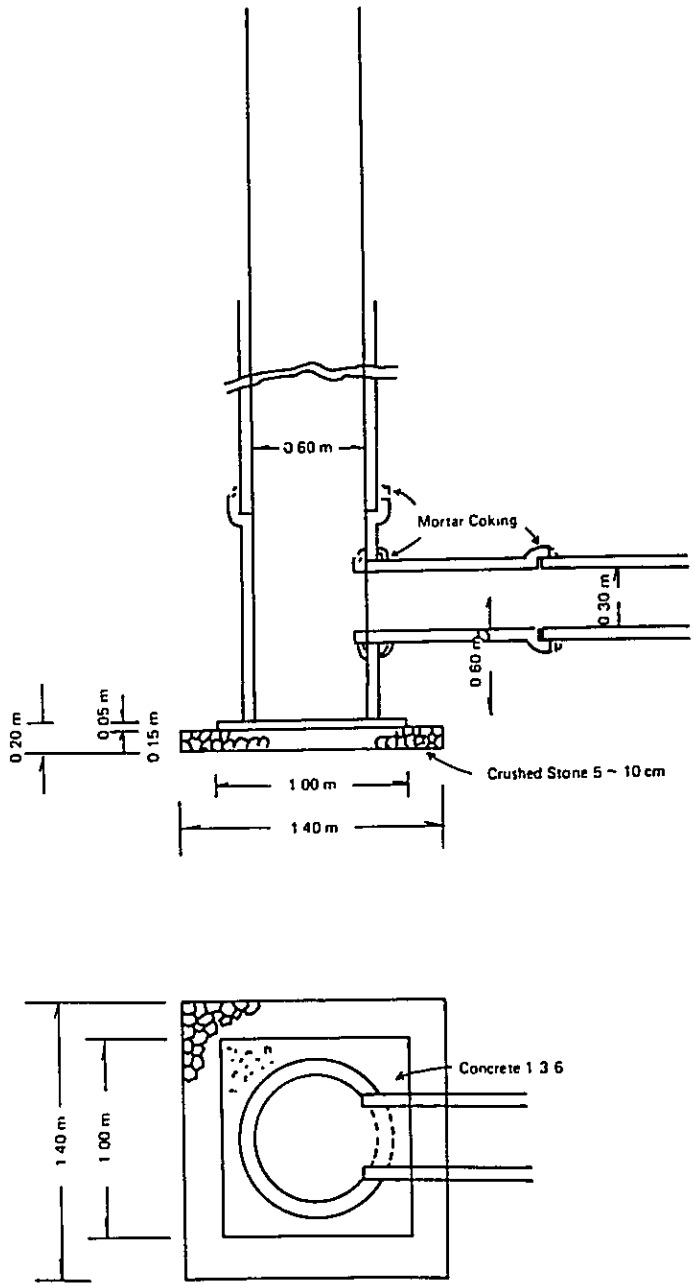


Fig. 2-1-4 Detail Drawing of Pipe Work Footing

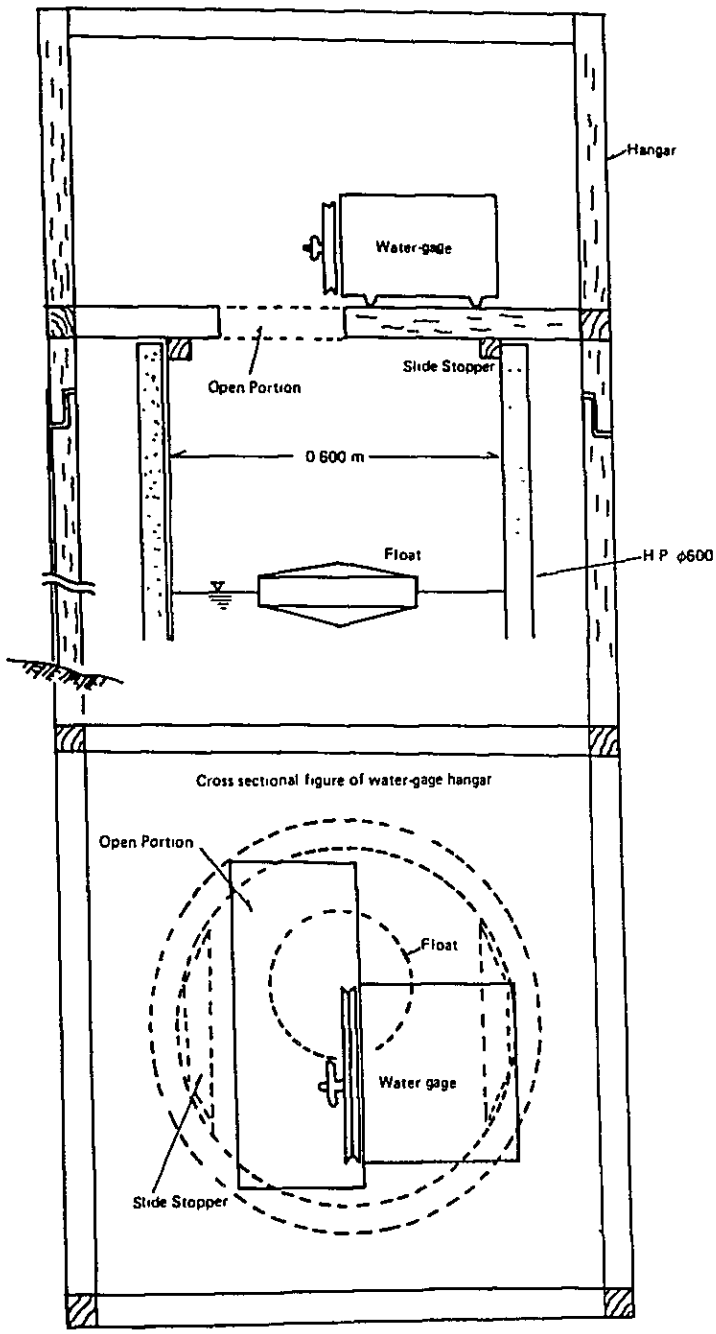


Fig. 2-1-5 Detail Drawing of Water Gage Installation

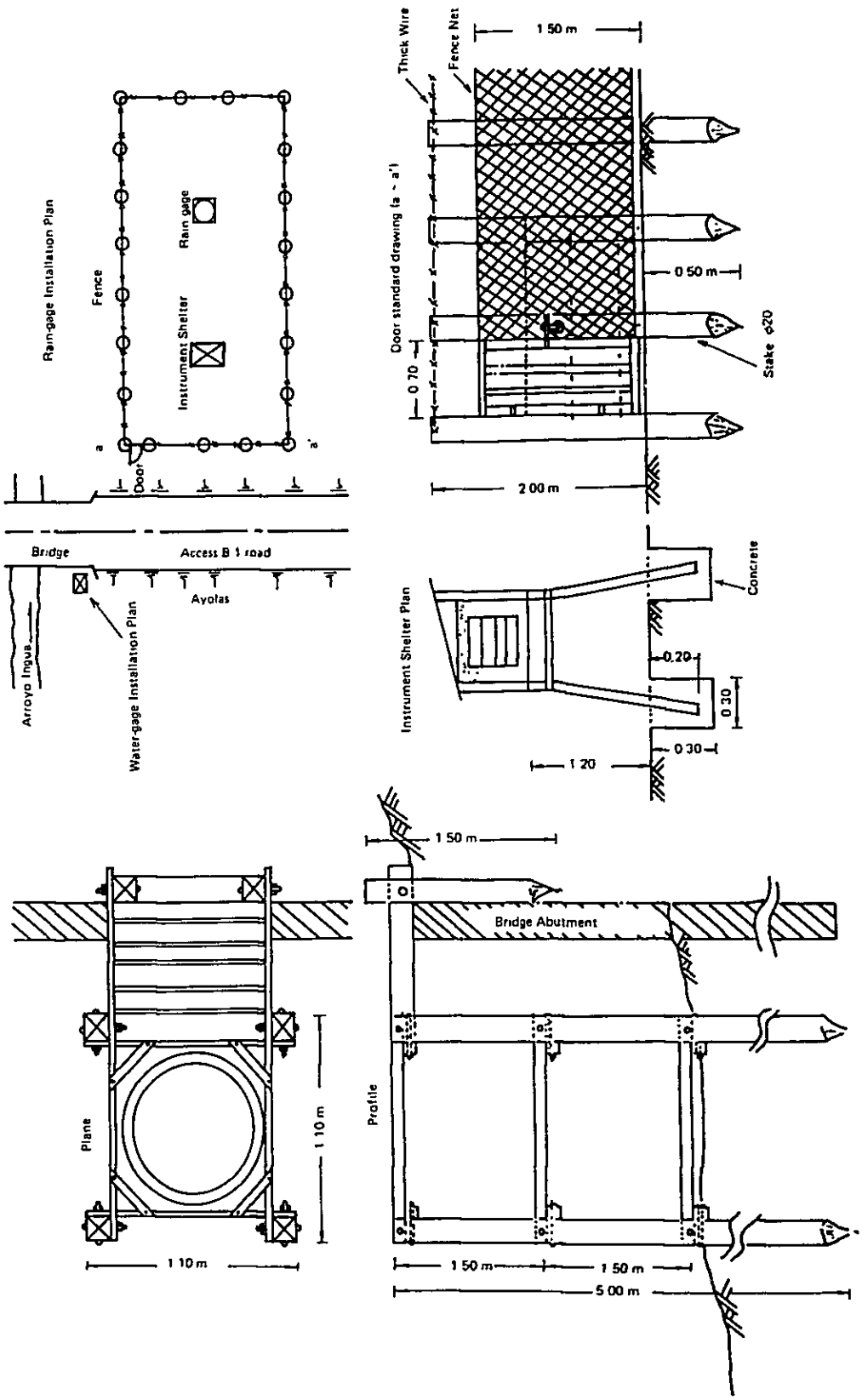


Fig. 2-1-6 Installation of Water Gage at the Inguá River

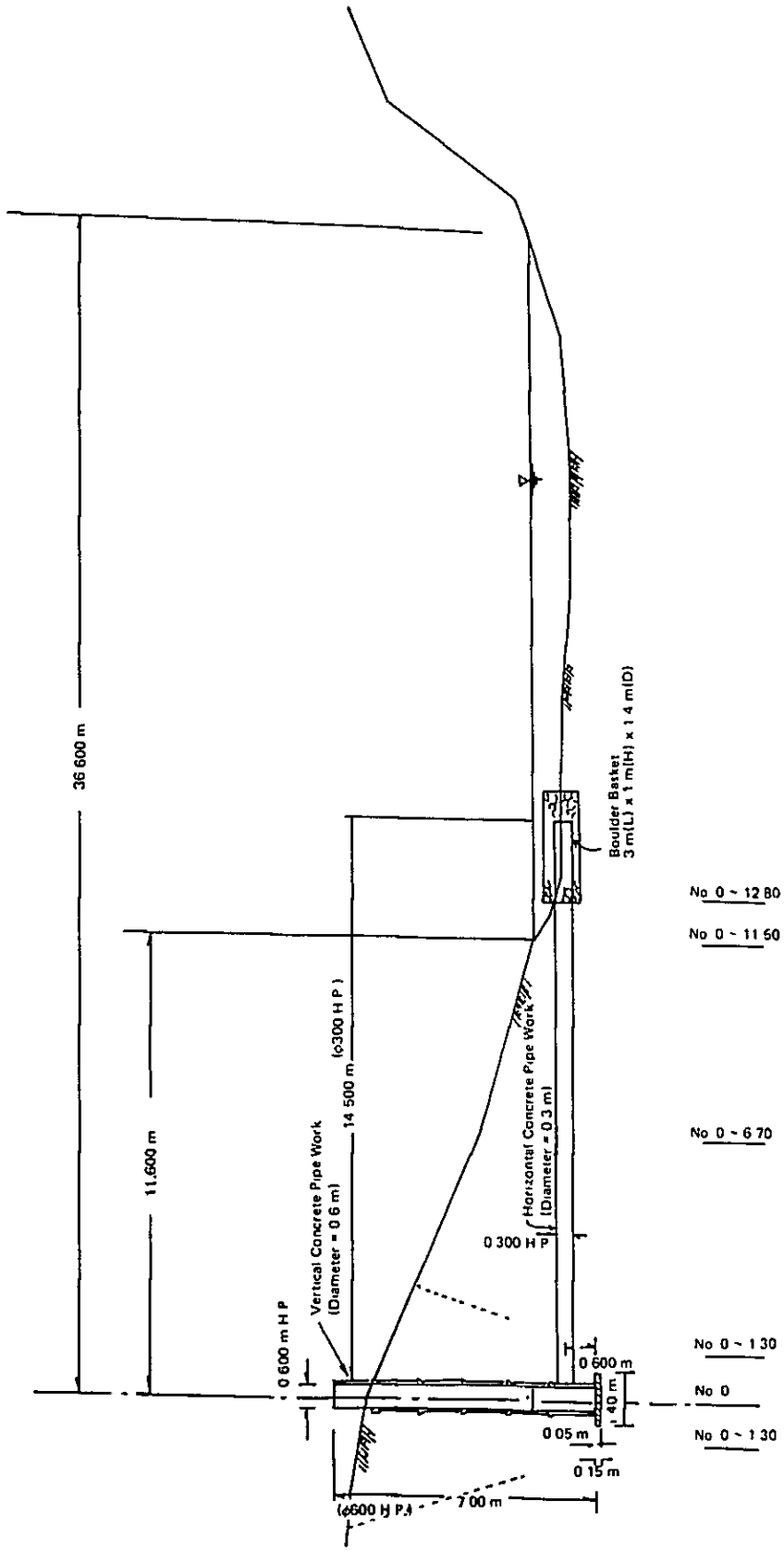


Fig. 2-1-7 Profile of Water Gage Installation at the Yabebyry River

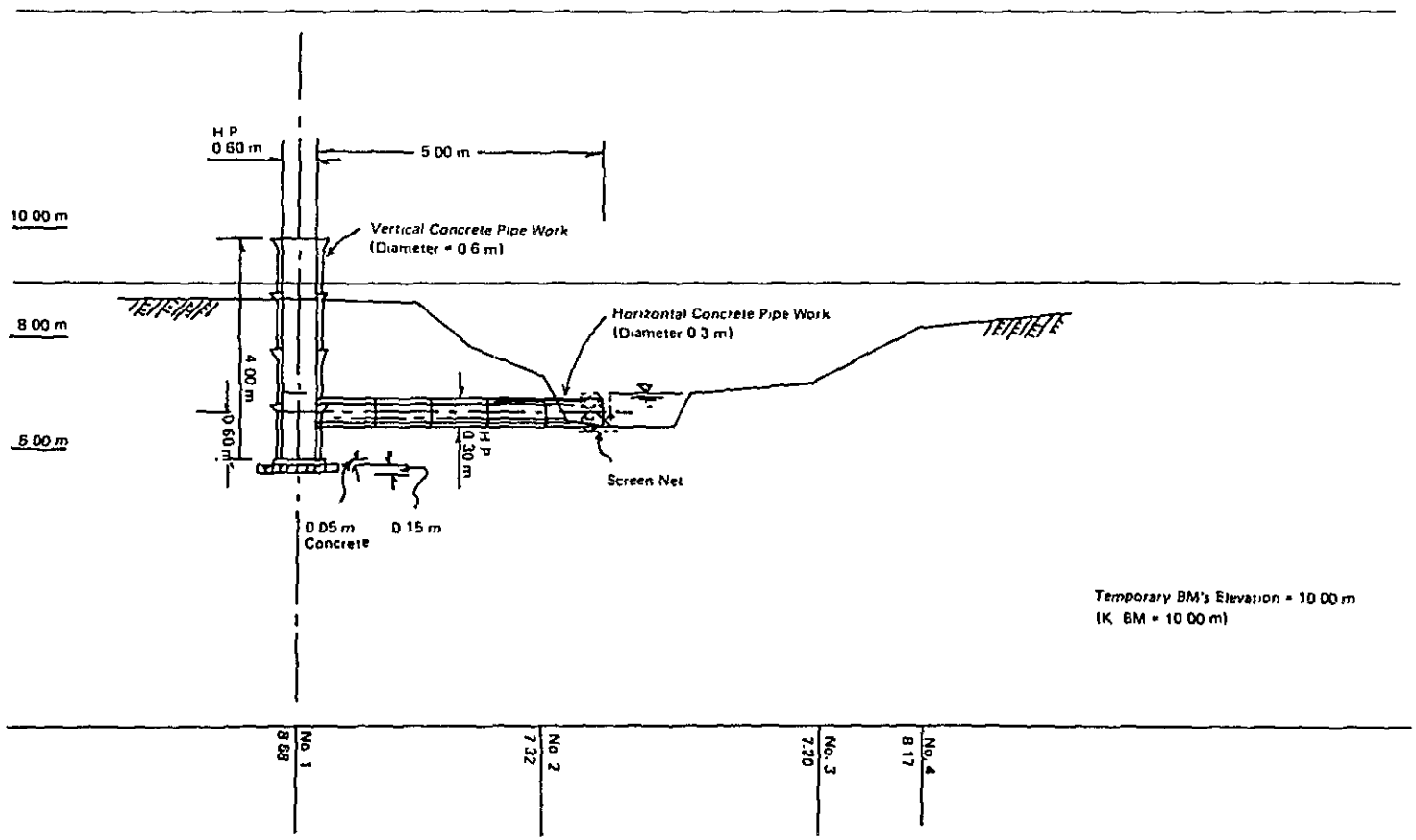


Fig. 2-1-8 Profile of Water Gage Installation at the Caje Cué River

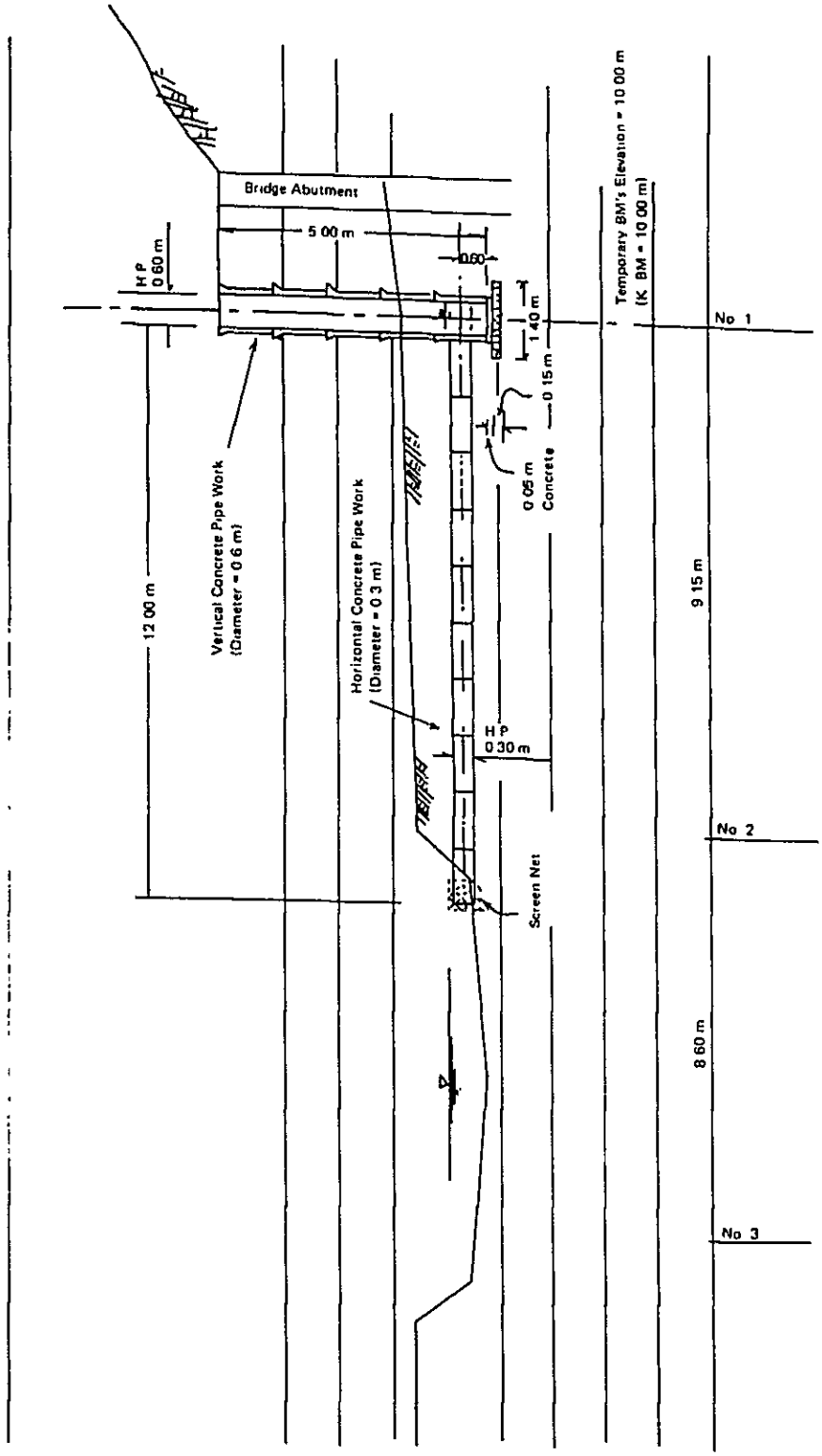


Fig. 2-1-9 Profile of Water Gage Installation at the Ingua River

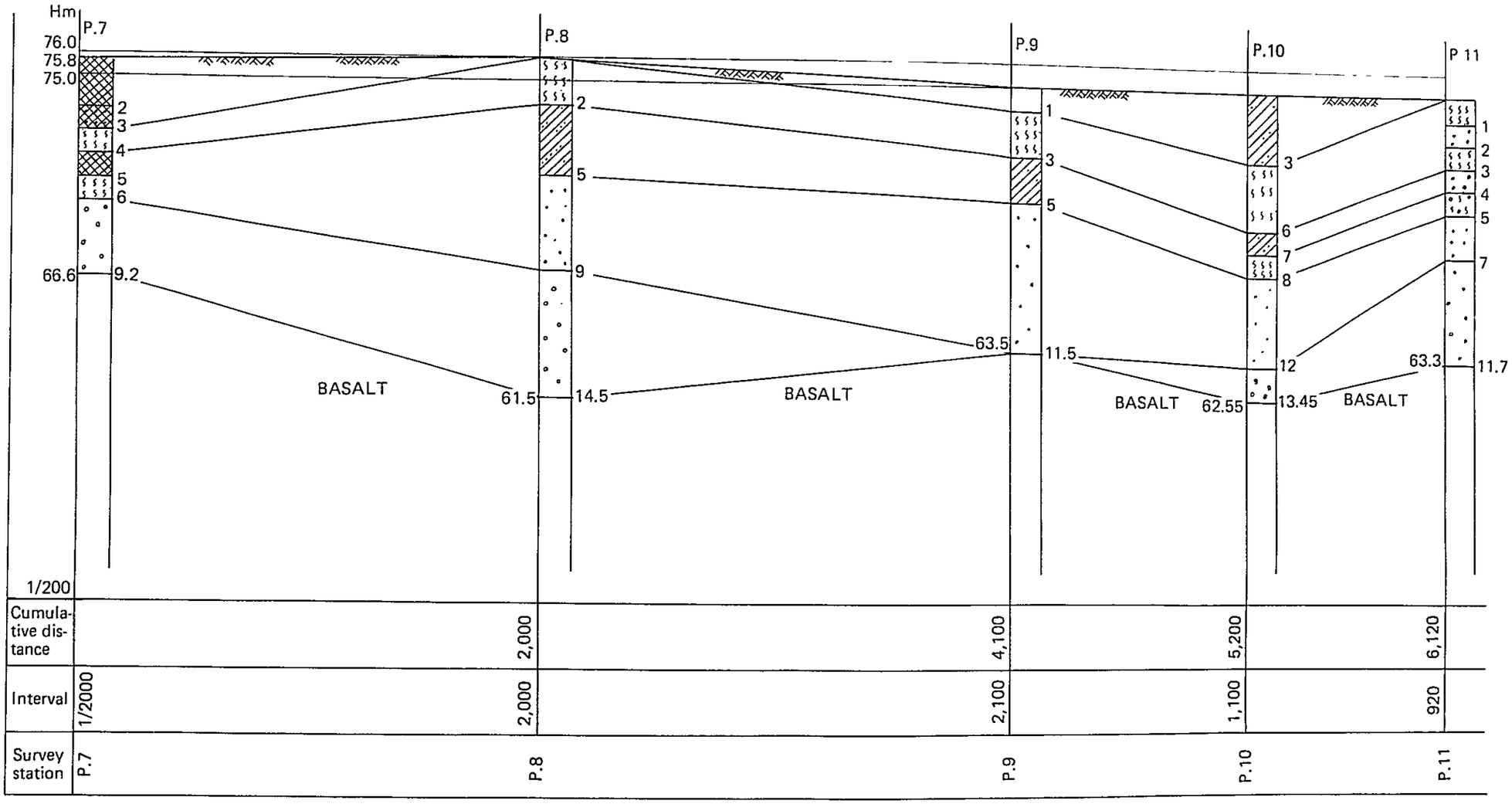
TOPOGRAPHY

Fig. 2-2-1

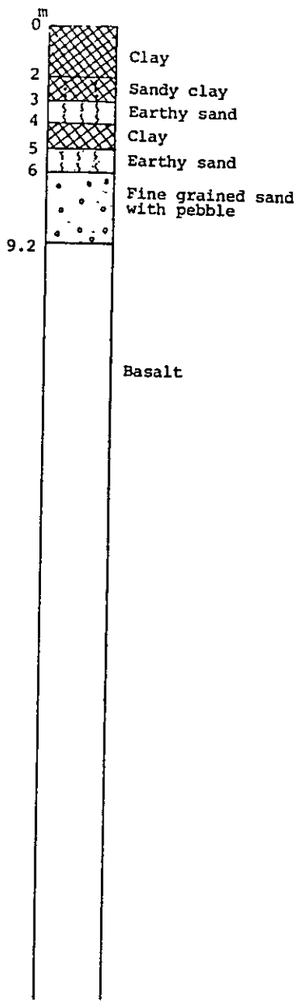
TEST PITTING POINTS AND BORING LOGS

Fiscal Year 1963

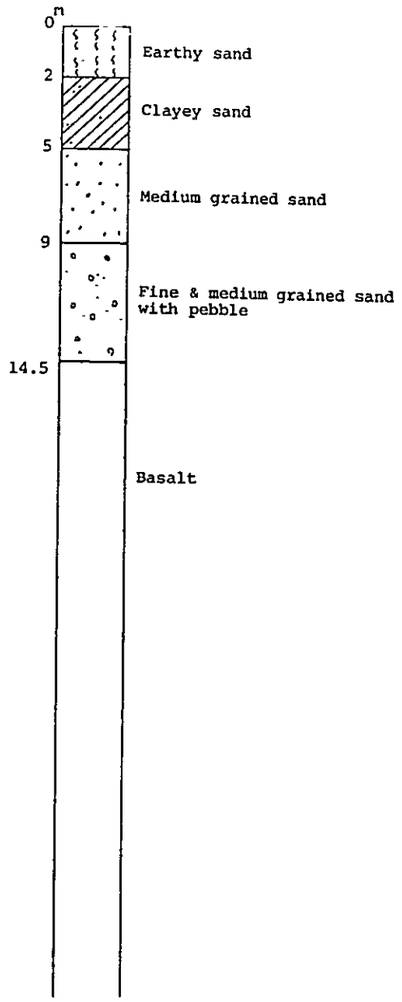
(Test Pit Number P. 1 ~ P. 32)


Hm
76.0
75.8
75.0
P.7
P.8
P.9
P.10
P 11
2
3
4
5
6
66.6
9.2
BASALT
61.5
2
5
9
14.5
BASALT
63.5
1
3
5
11.5
BASALT
62.55
3
6
7
8
12
13.45
BASALT
63.3
1
2
3
4
5
7
11.7
1/200
Cumula-tive dis-tance
2,000
4,100
5,200
6,120
Interval
1/2000
2,000
2,100
1,100
920
Survey station
P.7
P.8
P.9
P.10
P.11

P - 7



P - 8



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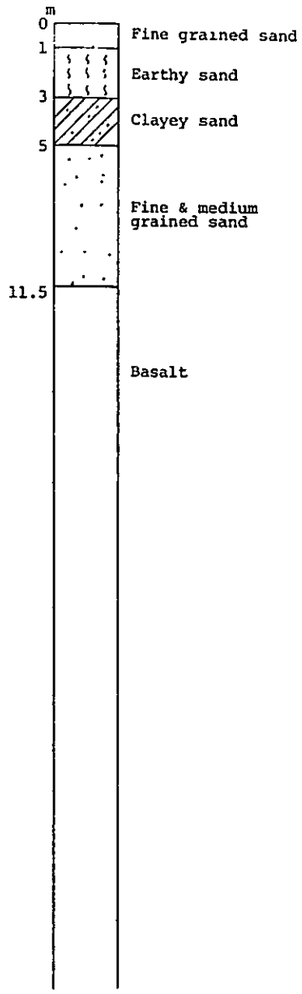
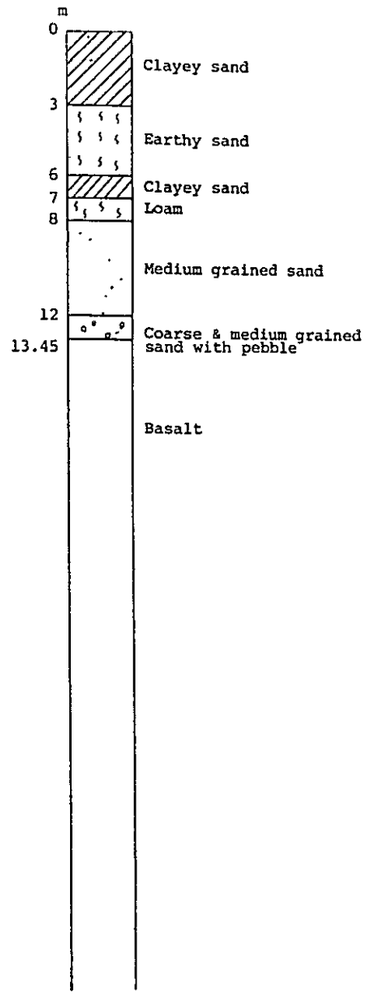
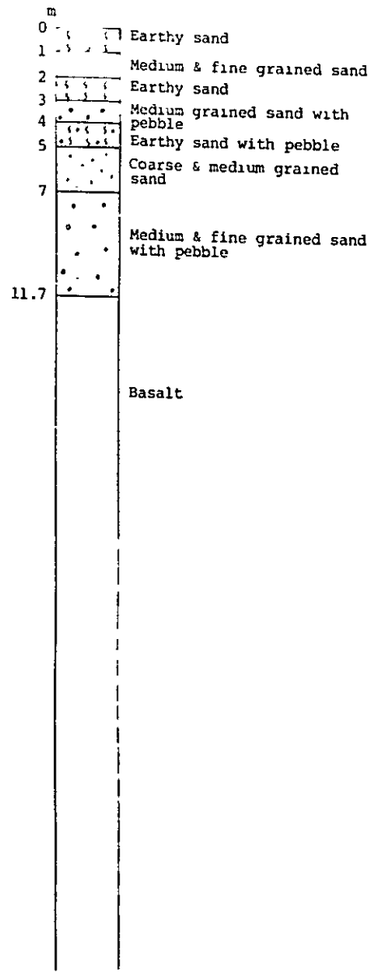
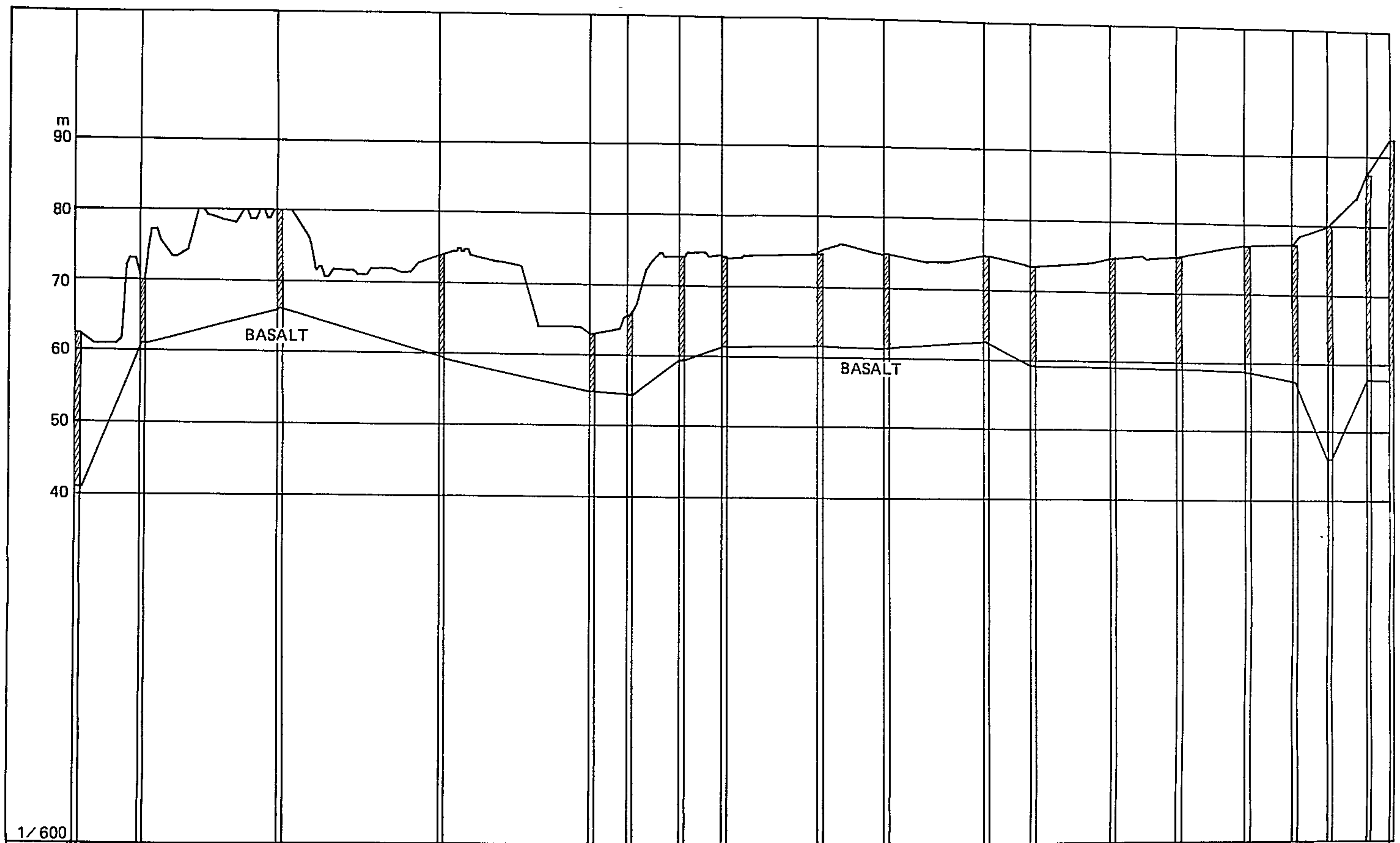


P - 10

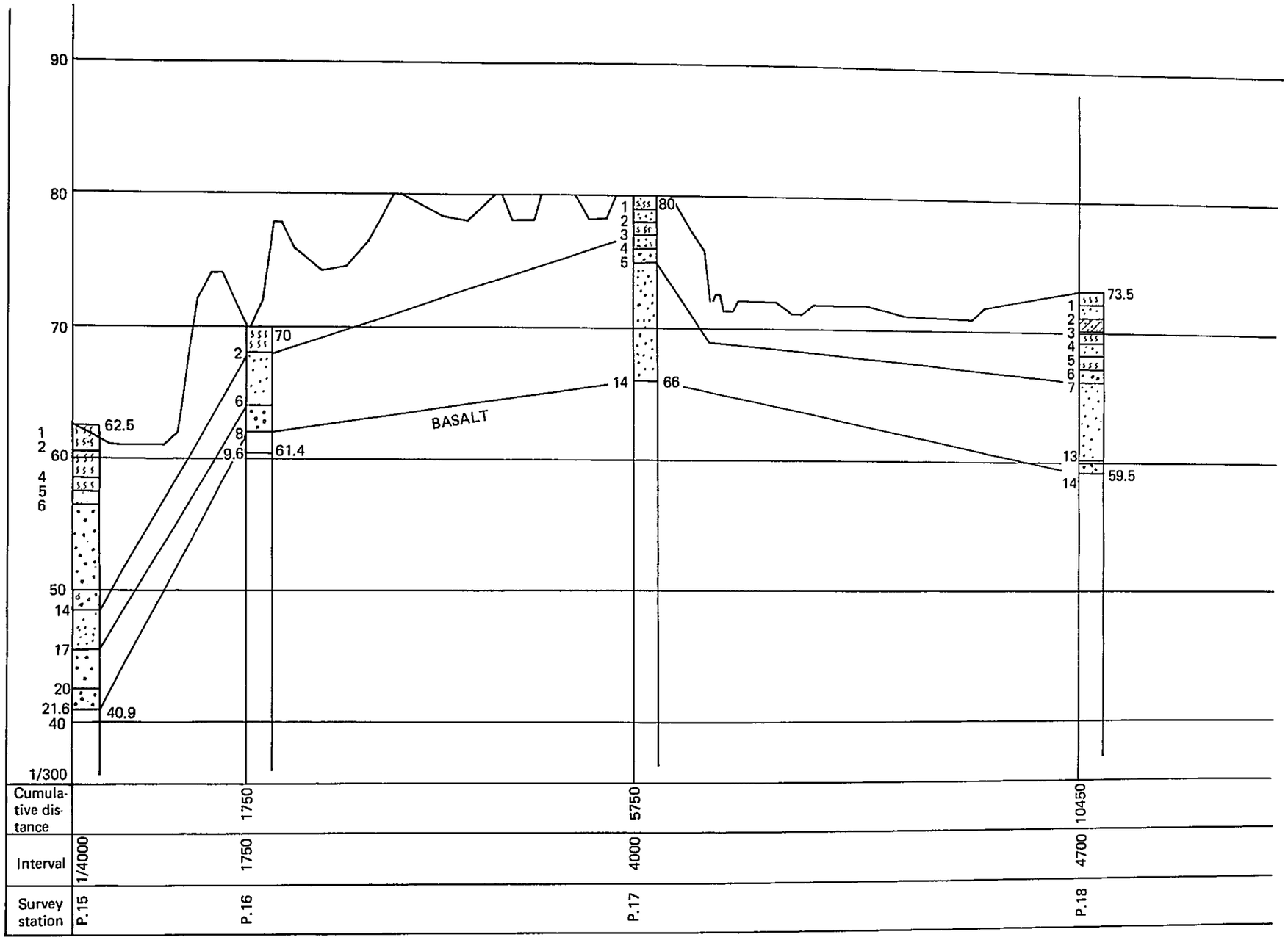


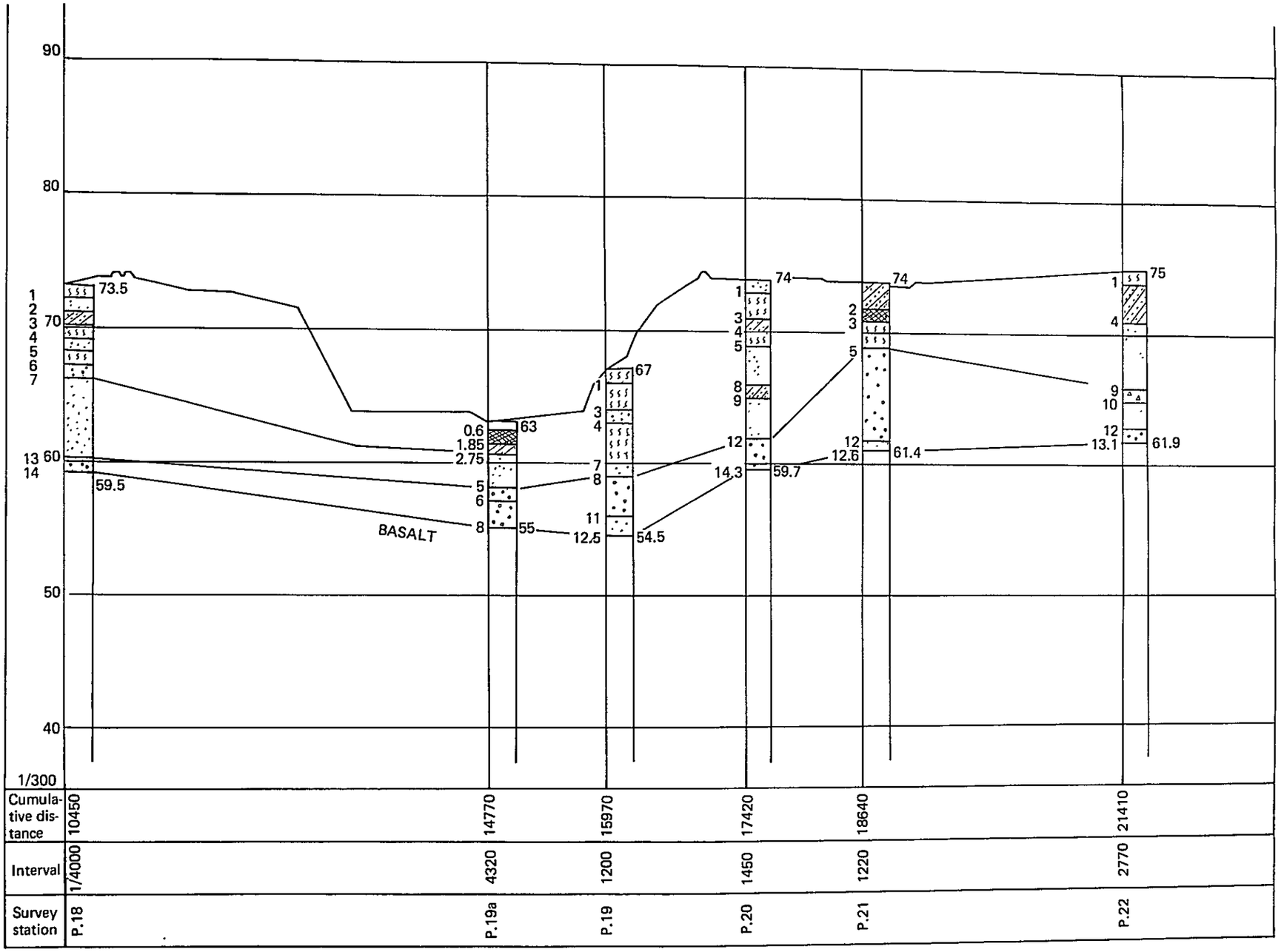
P - 11



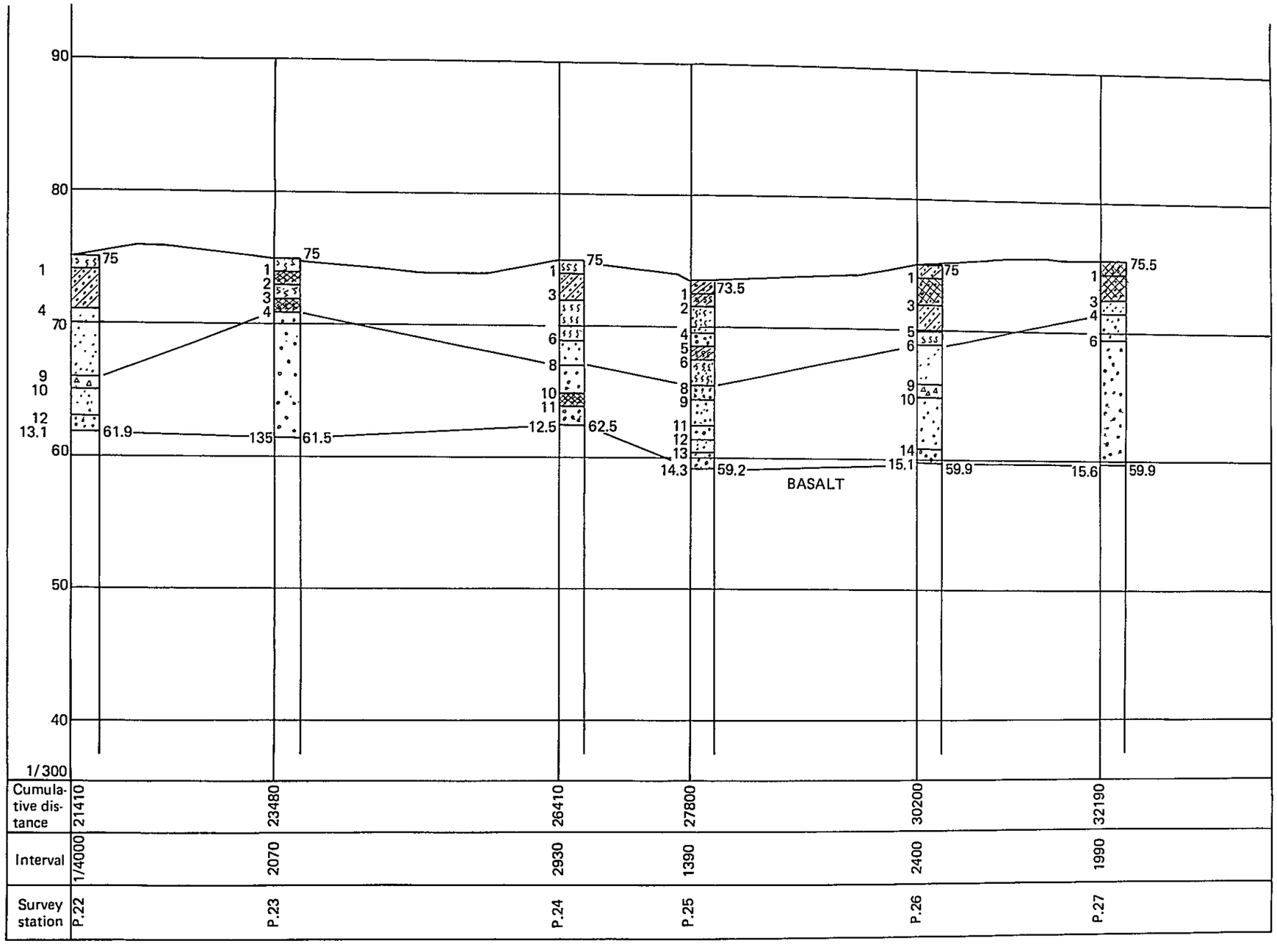


Cumulative distance	0	1750	5750	10450	14770	15970	17420	18640	26410	23480	26410	27800	30200	32190	34320	35770	36800	38000	38610
Interval	1/1200	1750	4000	4700	4320	1200	1450	1220	2770	2070	2930	1390	2400	1990	2130	1450	1030	1200	610
Survey station	P.15	P.16	P.17	P.18	P.19a	P.19	P.20	P.21	P.22	P.23	P.24	P.25	P.26	P.27	P.28	P.29	P.30	P.31	P.32

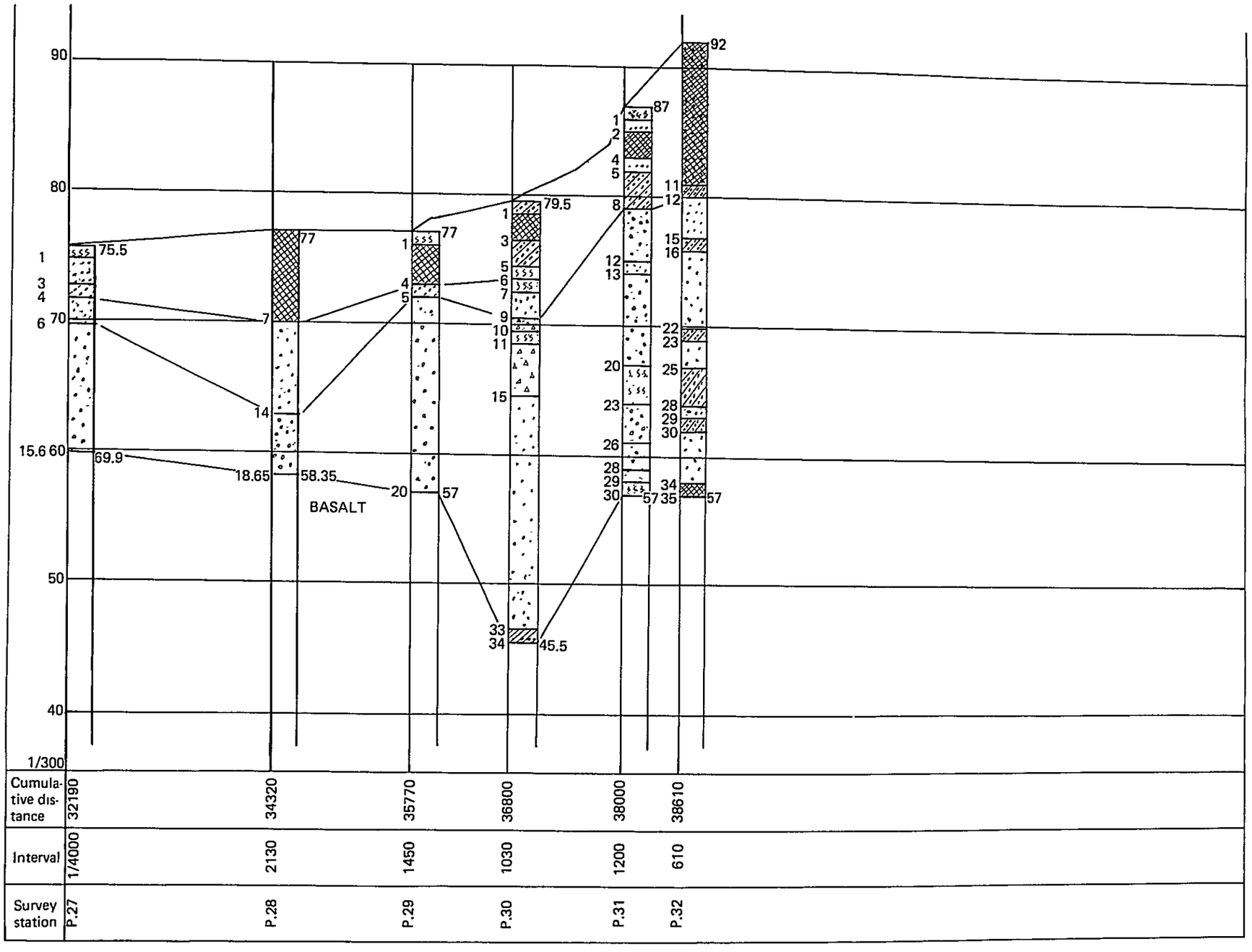

90
80
70
60
50
40
1/300
62.5
70
61.4
9.6
80
66
73.5
59.5
BASALT
14
17
20
21.6
40.9
Cumulative distance
1750
5750
10450
Interval
1/4000
1750
4000
4700
Survey station
P.15
P.16
P.17
P.18



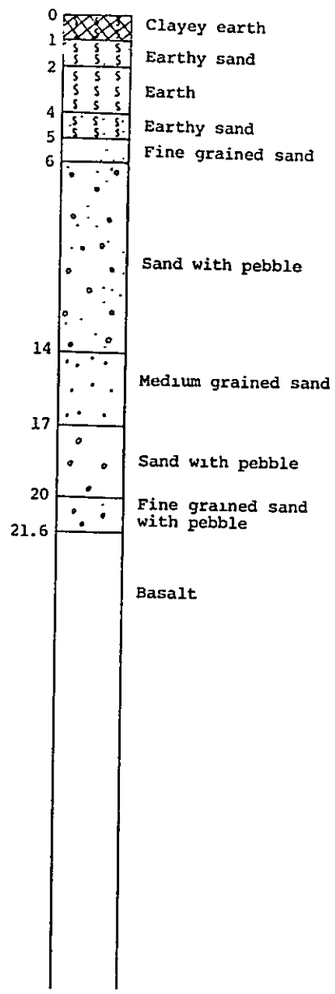
Cumulative distance	10450	14770	15970	17420	18640	21410
Interval	1/4000	4320	1200	1450	1220	2770
Survey station	P.18	P.19a	P.19	P.20	P.21	P.22



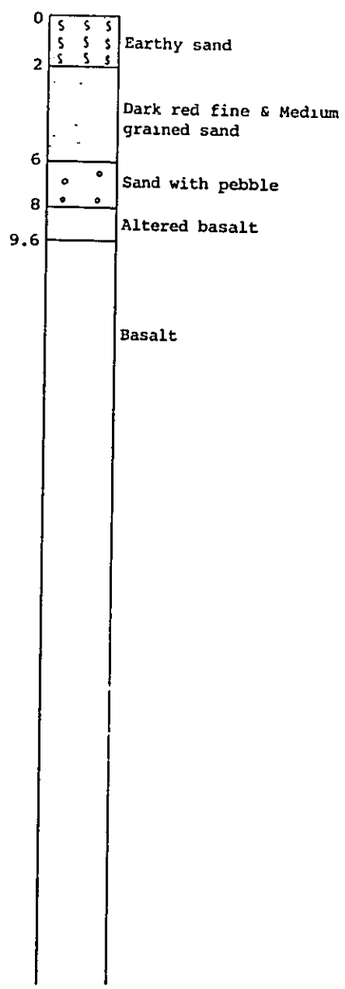
Cumulative distance	21410	23480	26410	27800	30200	32190
Interval	1/4000	2070	2930	1390	2400	1990
Survey station	P.22	P.23	P.24	P.25	P.26	P.27


90
80
50
40
1/300
75.5
77
77
79.5
87
92
70
60
69.9
18.65
58.35
20
57
BASALT
33
34
45.5
57
35
57
Cumulative distance
32190
34320
35770
36800
38000
38610
Interval
1/4000
2130
1450
1030
1200
610
Survey station
P.27
P.28
P.29
P.30
P.31
P.32

P - 15



P - 16



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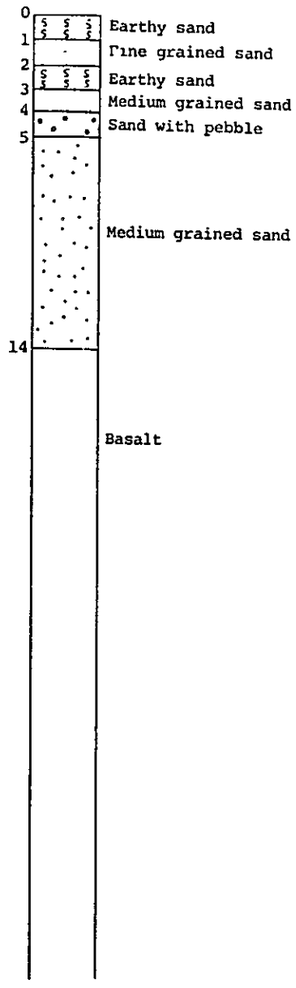

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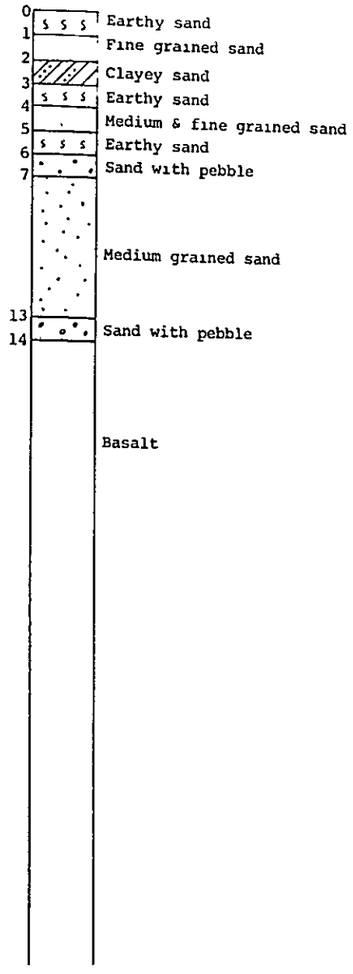

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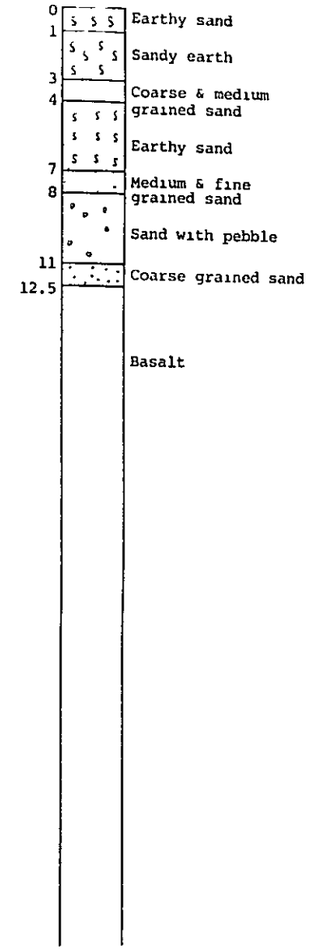

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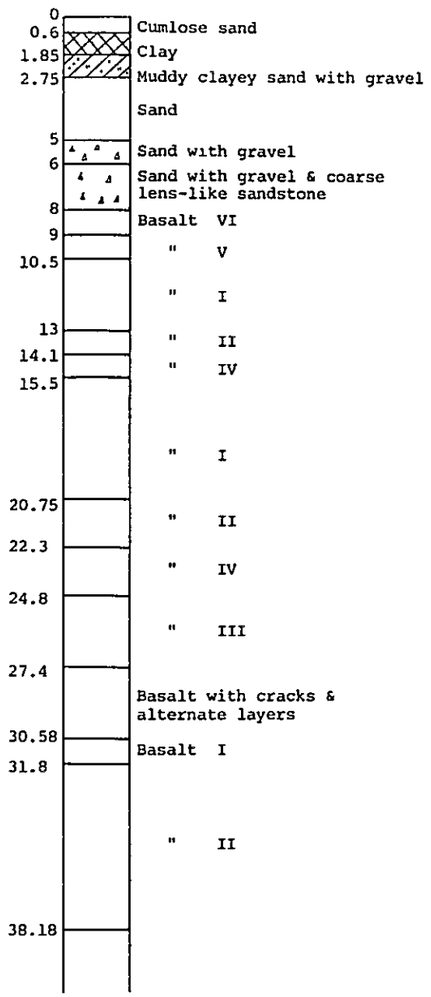

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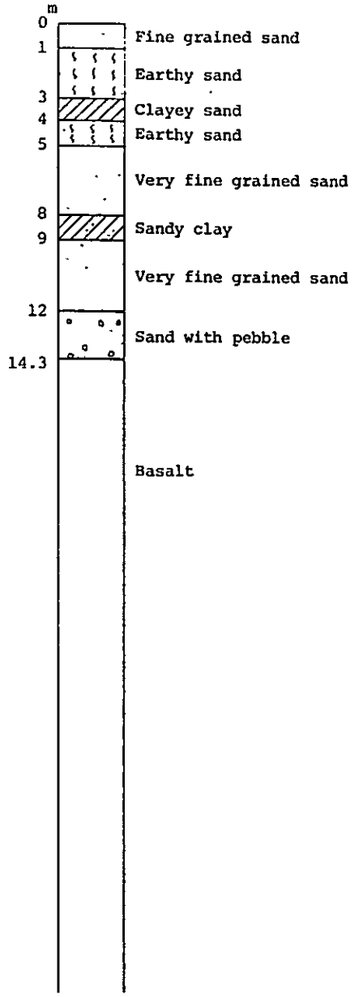

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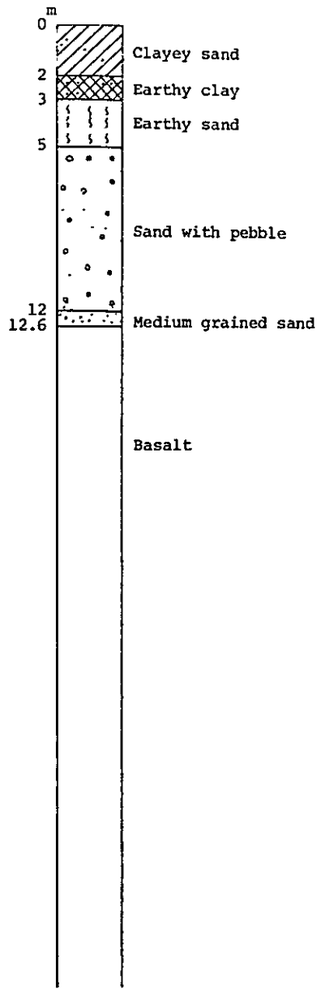
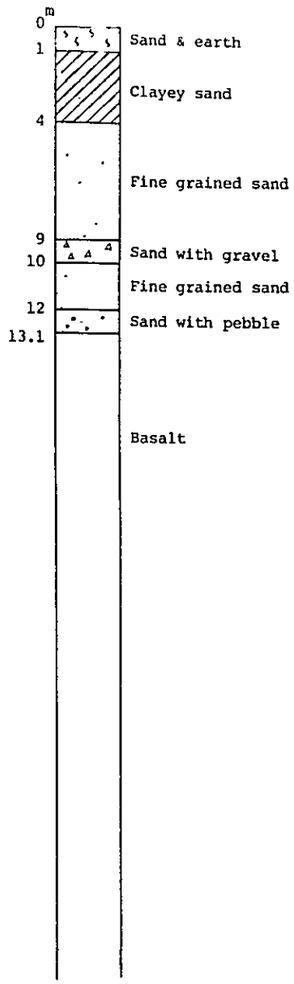
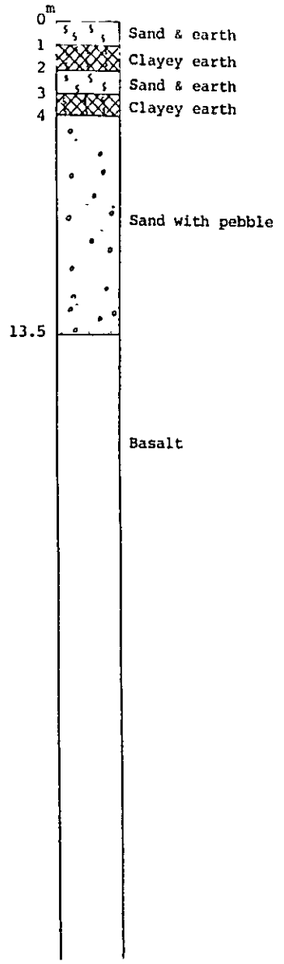


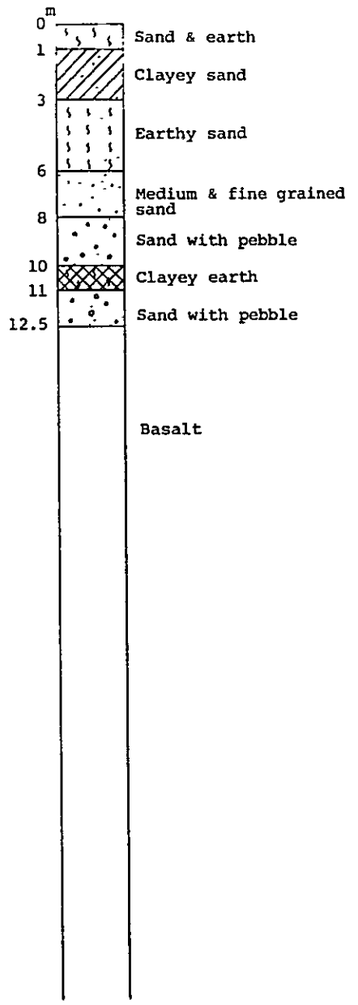
P - 22



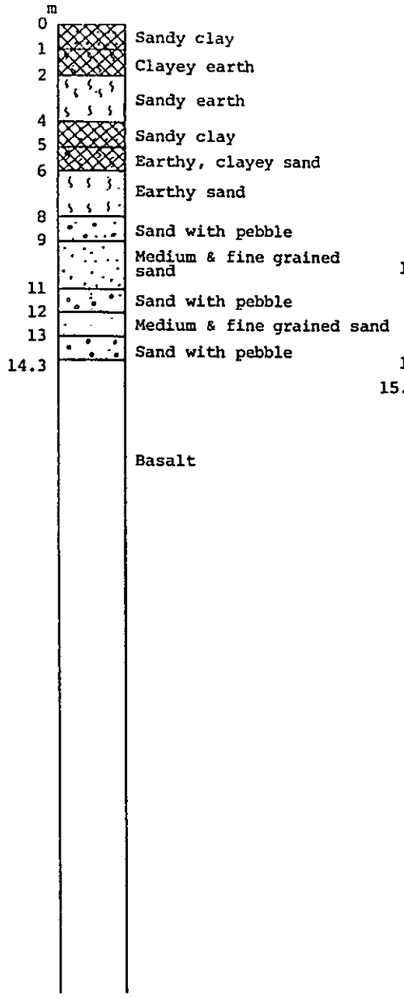
P - 23



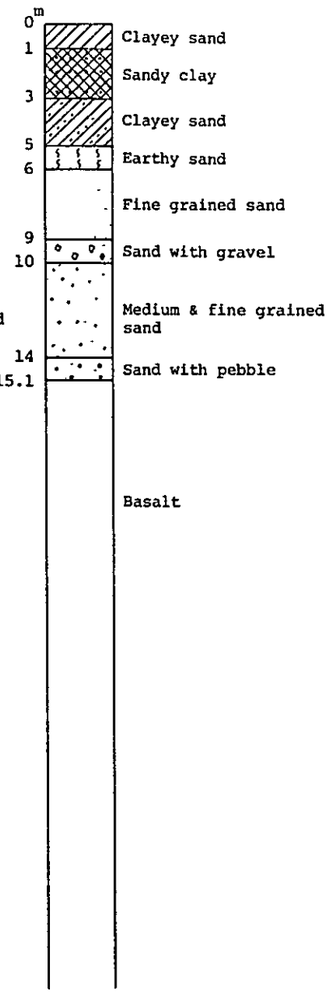
P - 24



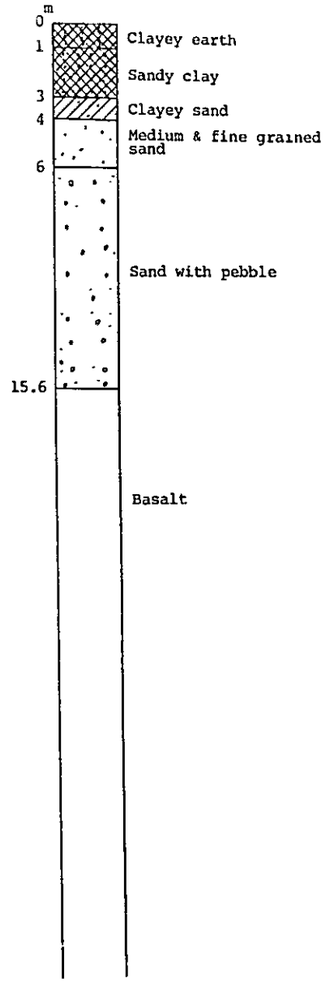
P - 25



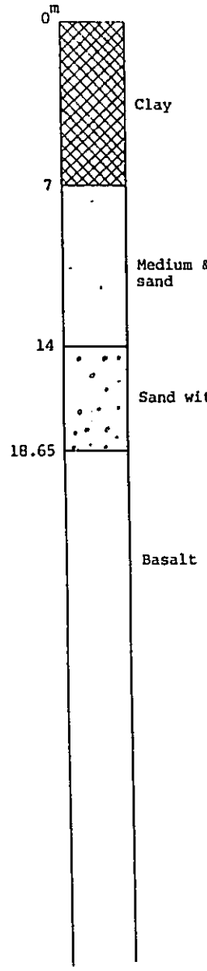
P - 26



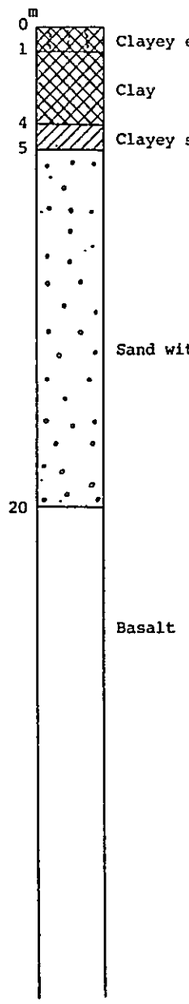
P - 27



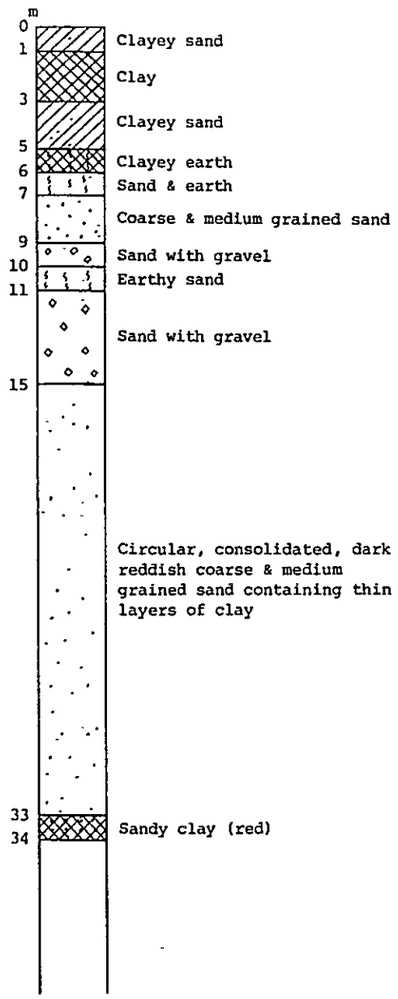
P - 28



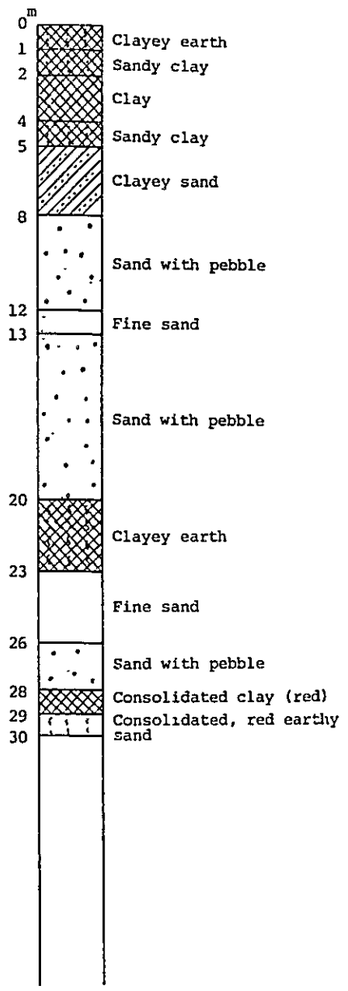
P - 29



P - 30



P - 31



P - 32

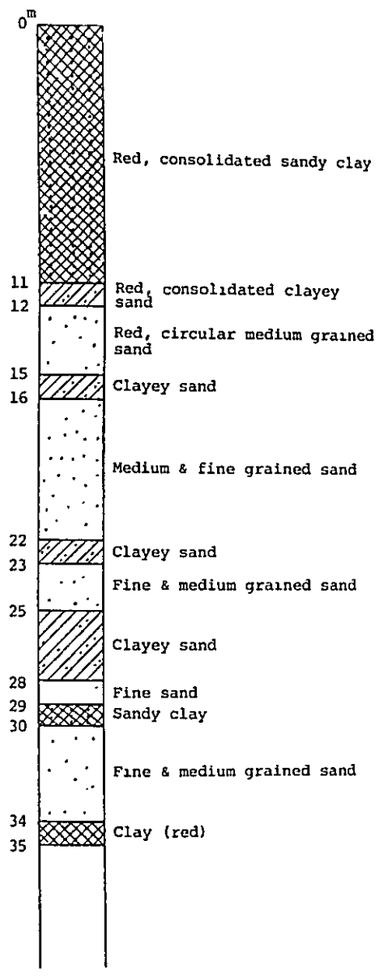
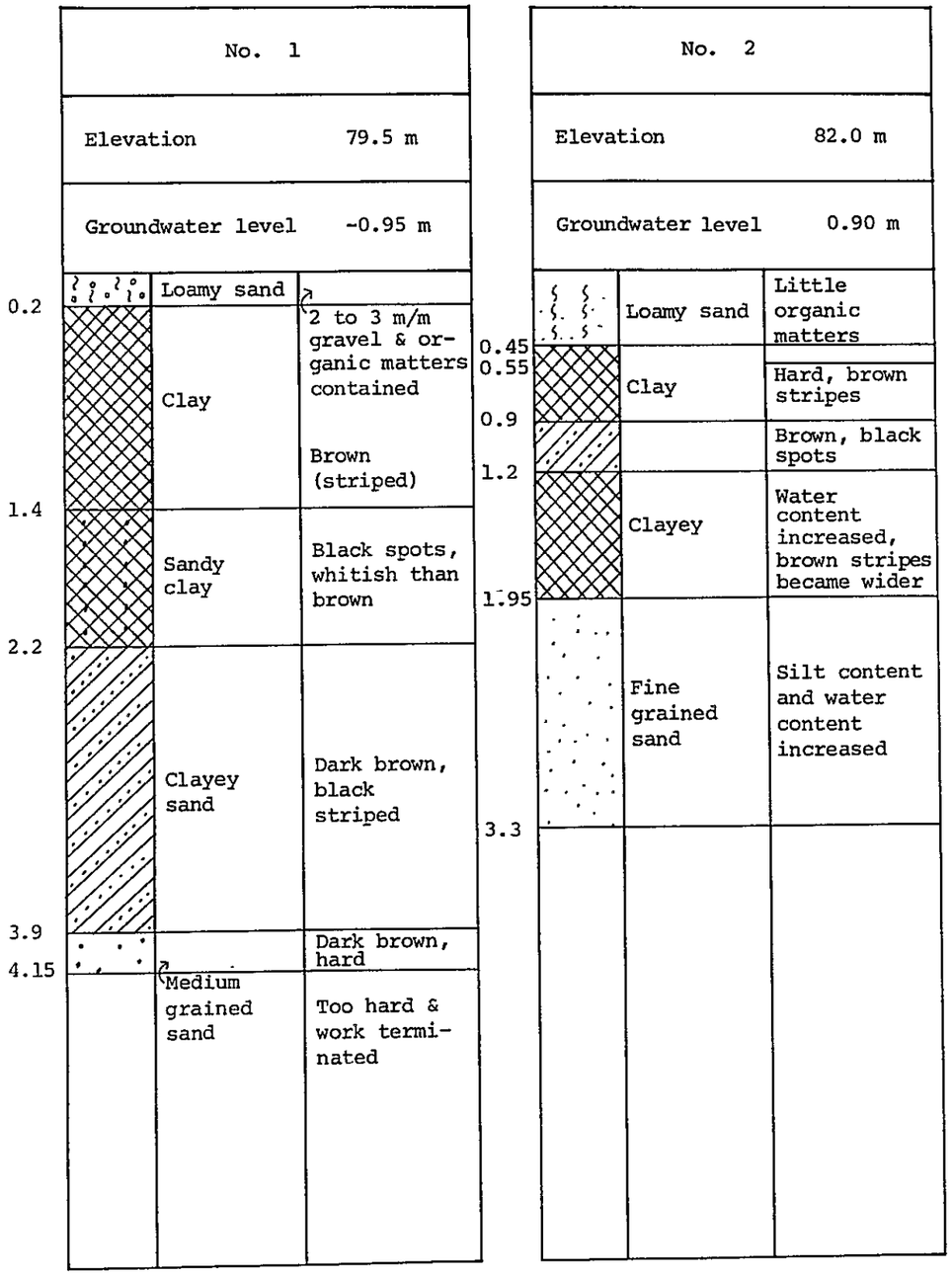


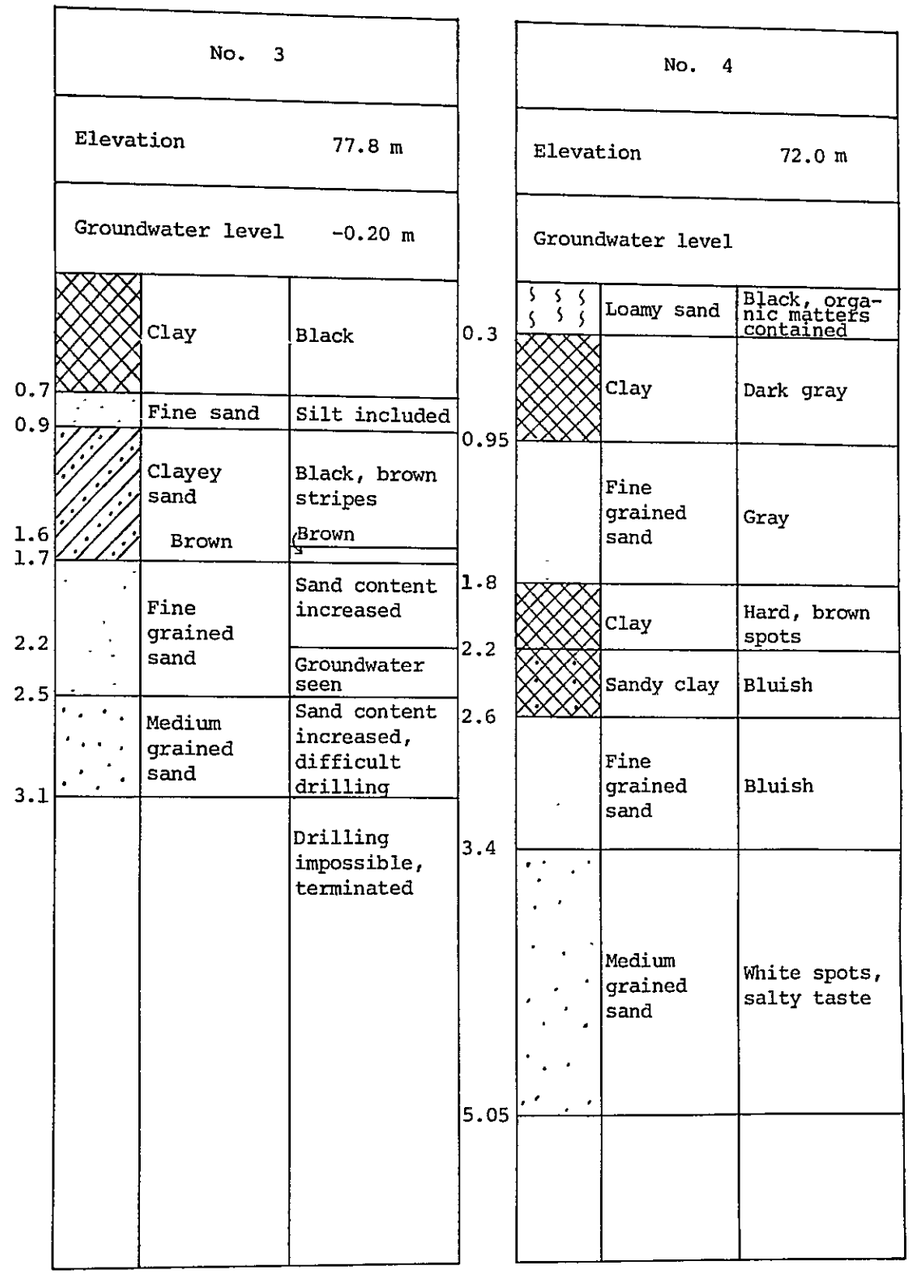
Fig. 2-2-2

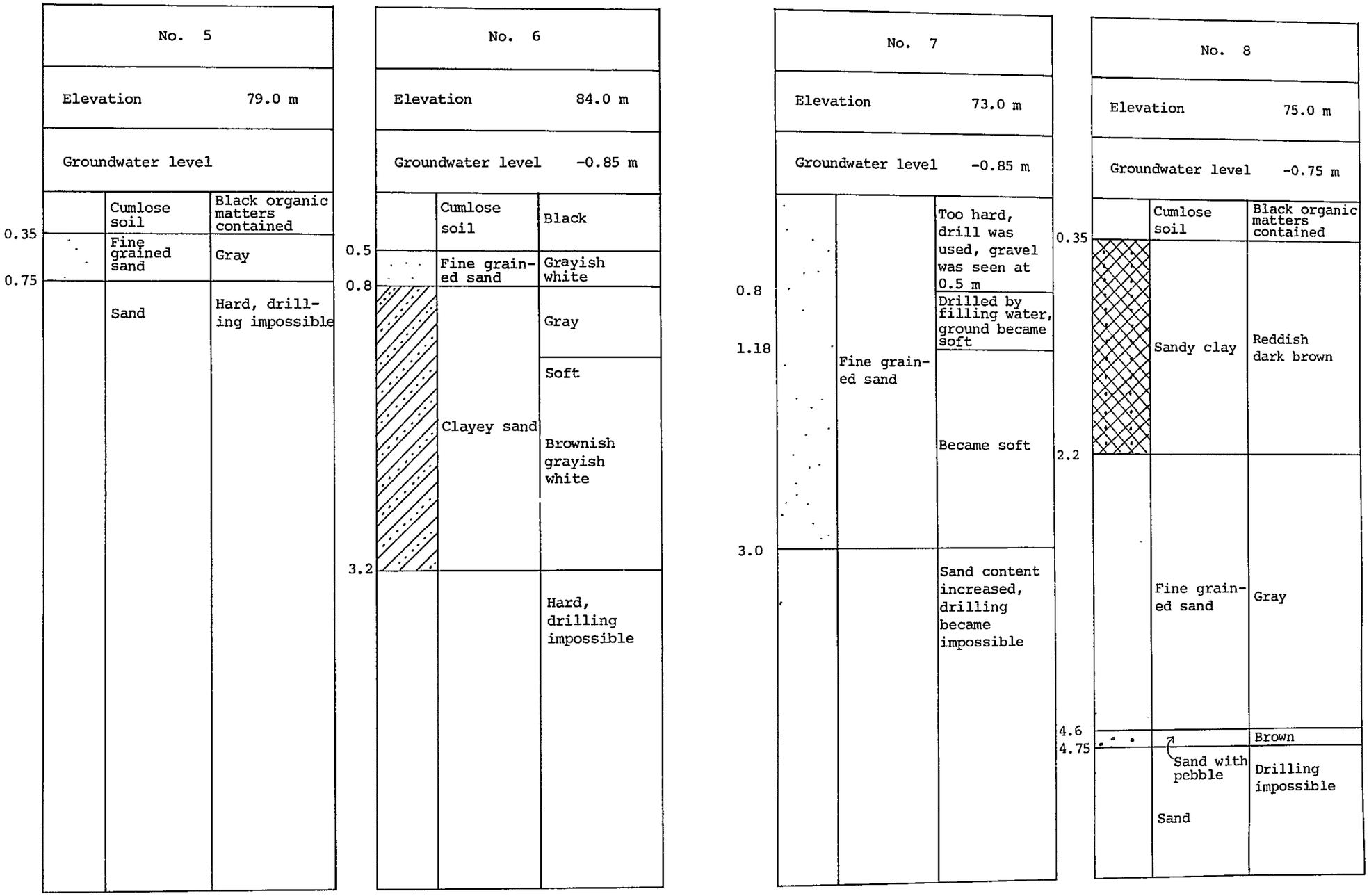
SOIL EXPLORATION BY HAND AUGER

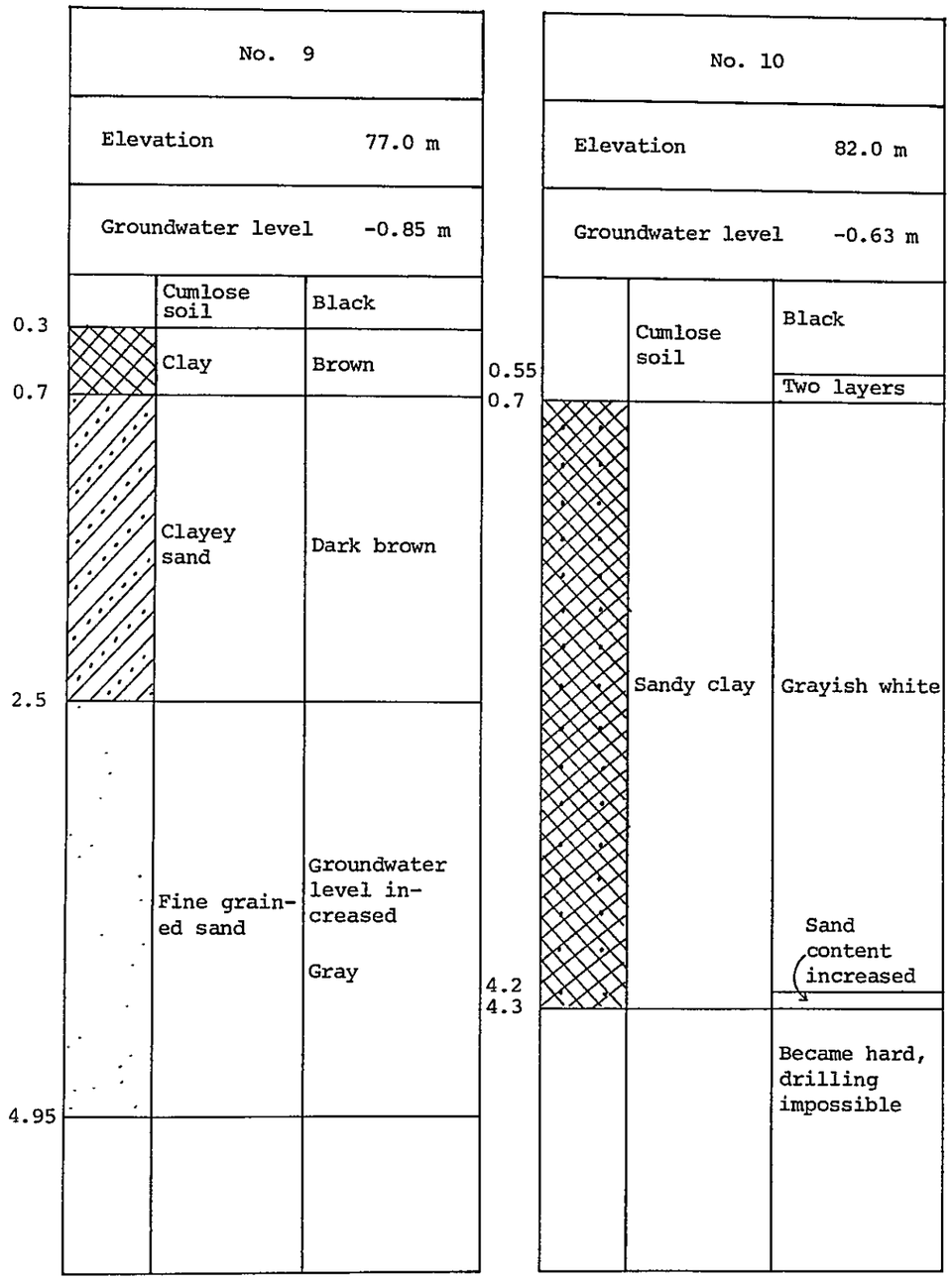
Boring Logs

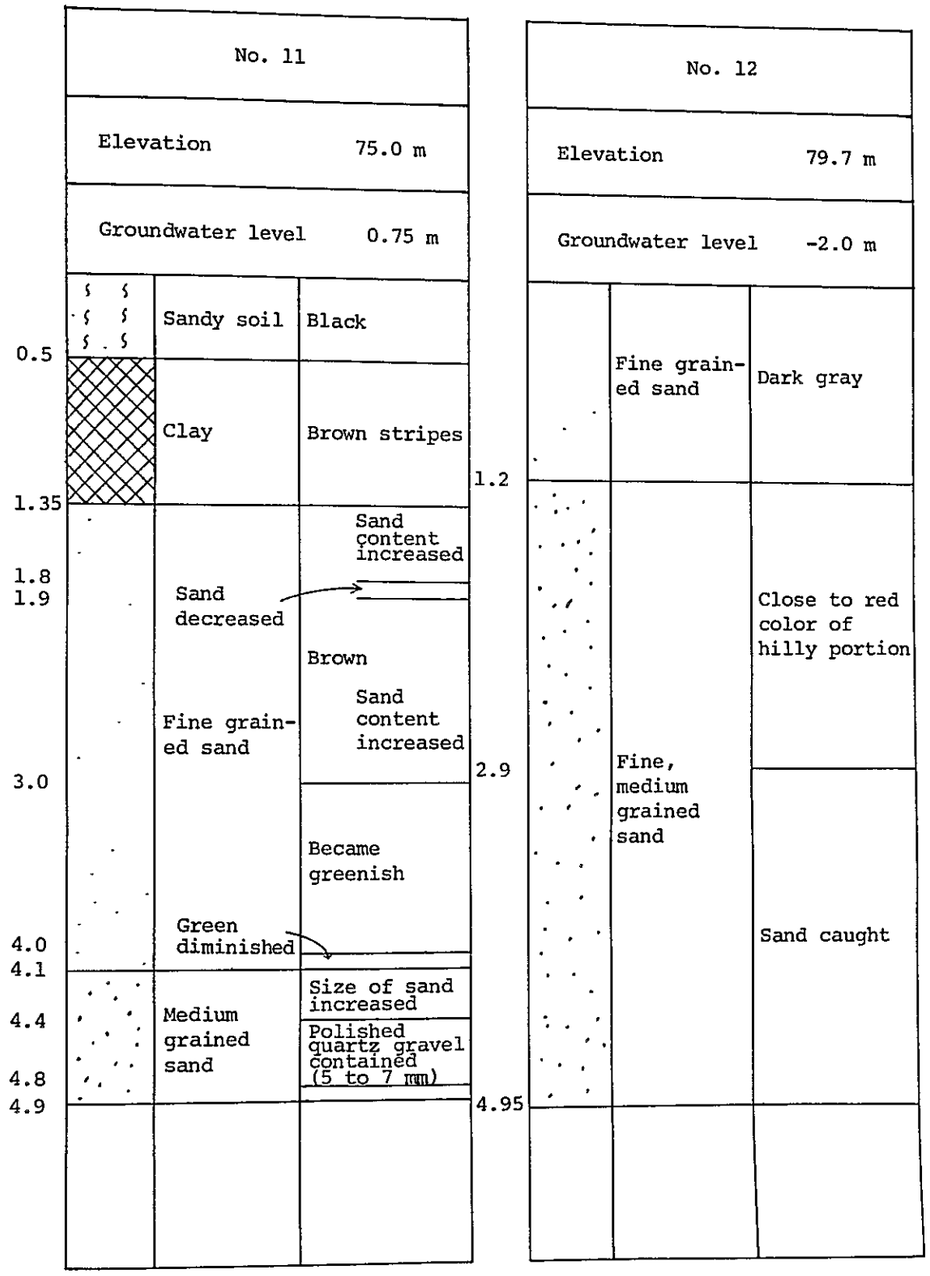
(No. 1 ~ No. 39)

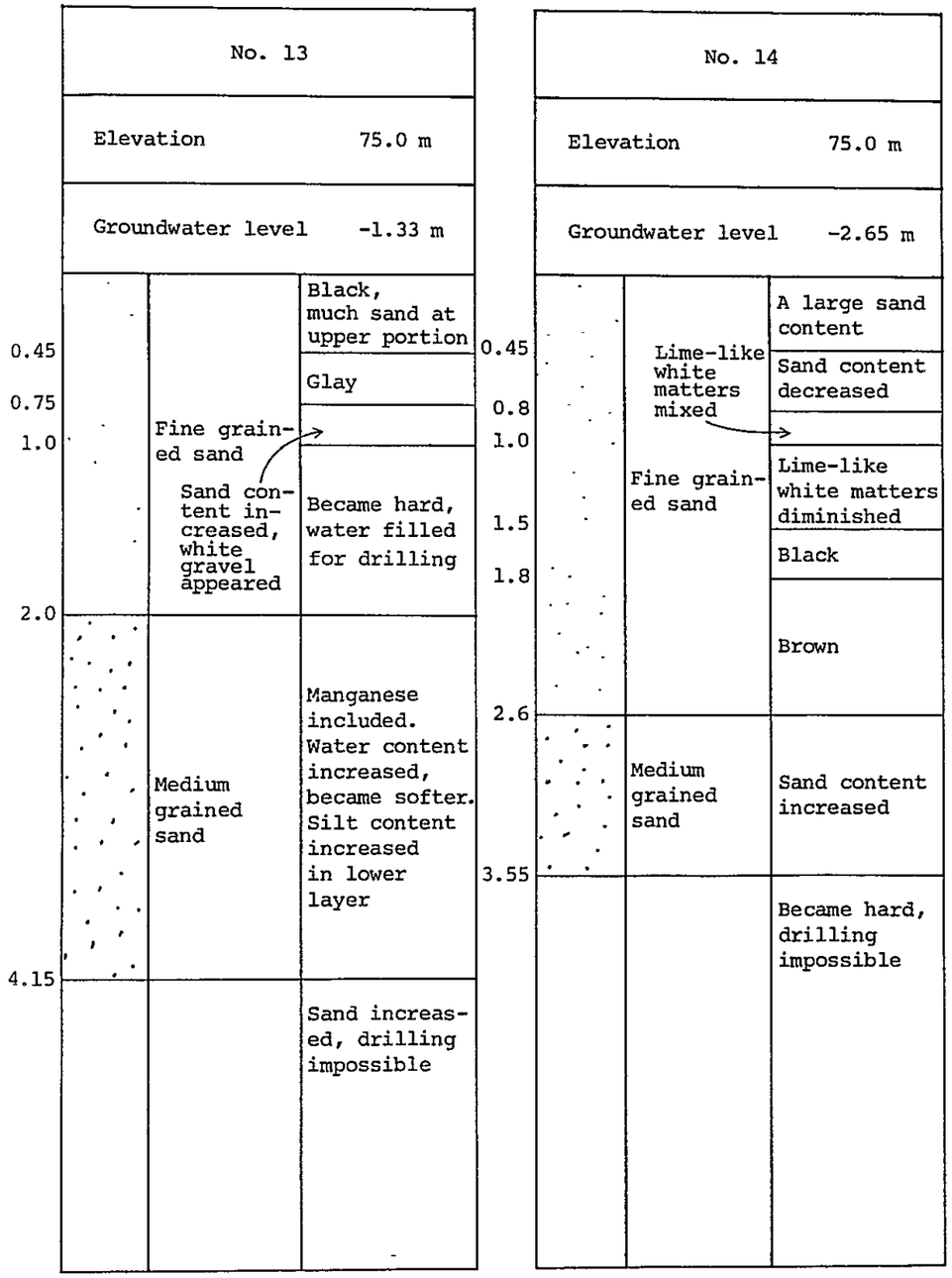

No. 1
Elevation 79.5 m
Groundwater level -0.95 m
0.2
Loamy sand
2 to 3 m/m gravel & organic matters contained
Clay
Brown (striped)
1.4
Sandy clay
Black spots, whitish than brown
2.2
Clayey sand
Dark brown, black striped
3.9
Dark brown, hard
4.15
Medium grained sand
Too hard & work terminated
No. 2
Elevation 82.0 m
Groundwater level 0.90 m
Loamy sand
Little organic matters
0.45
0.55
Clay
Hard, brown stripes
0.9
Brown, black spots
1.2
Clayey
Water content increased, brown stripes became wider
1.95
Fine grained sand
Silt content and water content increased
3.3

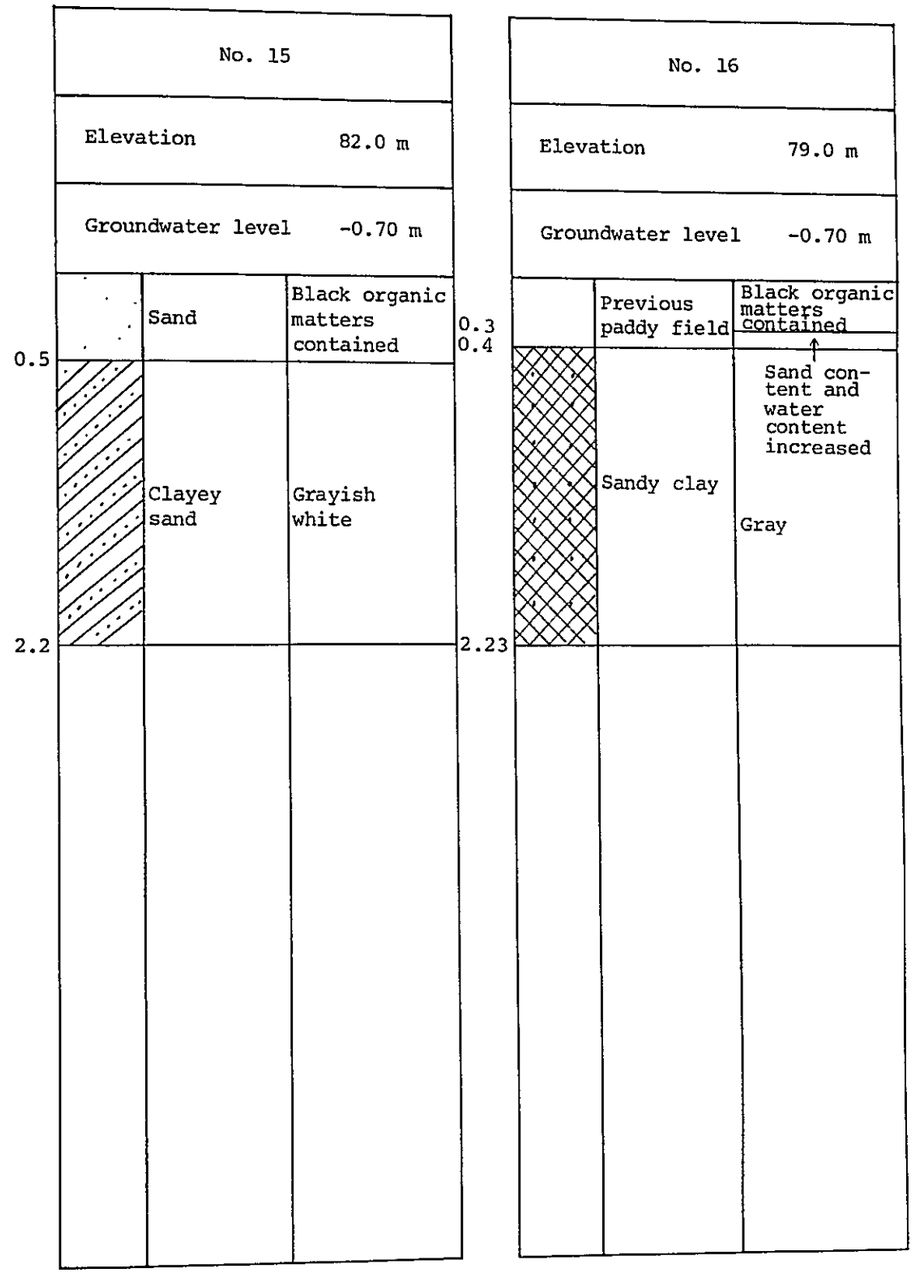

No. 3
Elevation 77.8 m
Groundwater level -0.20 m
Clay
Black
0.7
Fine sand
Silt included
0.9
Clayey sand
Black, brown stripes
Brown
1.6
1.7
Fine grained sand
Sand content increased
2.2
Groundwater seen
2.5
Medium grained sand
Sand content increased, difficult drilling
3.1
Drilling impossible, terminated
No. 4
Elevation 72.0 m
Groundwater level
Loamy sand
Black, organic matters contained
0.3
Clay
Dark gray
0.95
Fine grained sand
Gray
1.8
Clay
Hard, brown spots
2.2
Sandy clay
Bluish
2.6
Fine grained sand
Bluish
3.4
Medium grained sand
White spots, salty taste
5.05

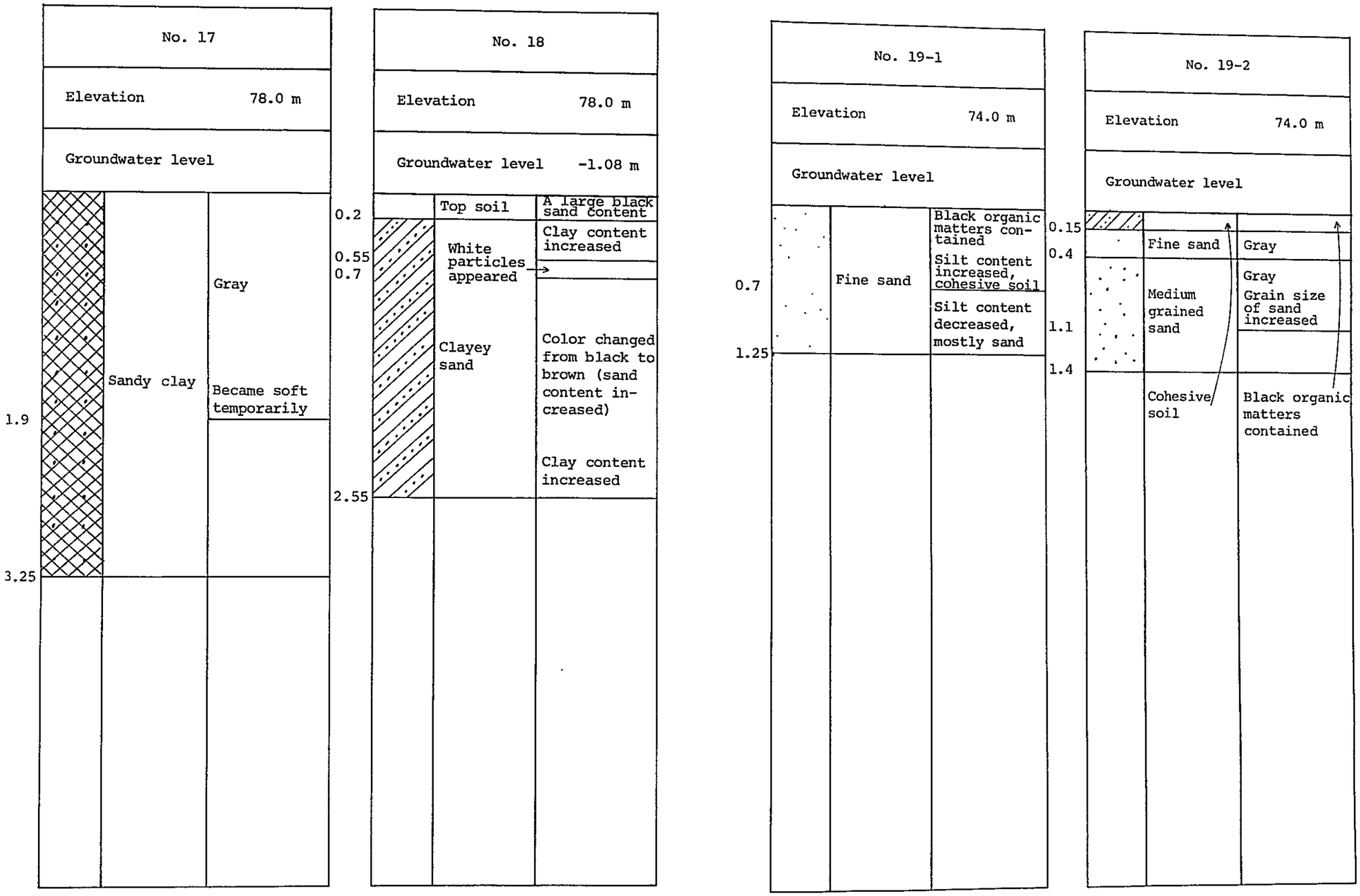

No. 5
Elevation 79.0 m
Groundwater level
Cumlose soil
Black organic matters contained
0.35
Fine grained sand
Gray
0.75
Sand
Hard, drilling impossible
No. 6
Elevation 84.0 m
Groundwater level -0.85 m
Cumlose soil
Black
0.5
Fine grained sand
Grayish white
0.8
Clayey sand
Gray
Soft
Brownish grayish white
3.2
Hard, drilling impossible
No. 7
Elevation 73.0 m
Groundwater level -0.85 m
Too hard, drill was used, gravel was seen at 0.5 m
0.8
Drilled by filling water, ground became soft
1.18
Fine grained sand
Became soft
3.0
Sand content increased, drilling became impossible
No. 8
Elevation 75.0 m
Groundwater level -0.75 m
Cumlose soil
Black organic matters contained
0.35
Sandy clay
Reddish dark brown
2.2
Fine grained sand
Gray
4.6
Brown
4.75
Sand with pebble
Drilling impossible
Sand

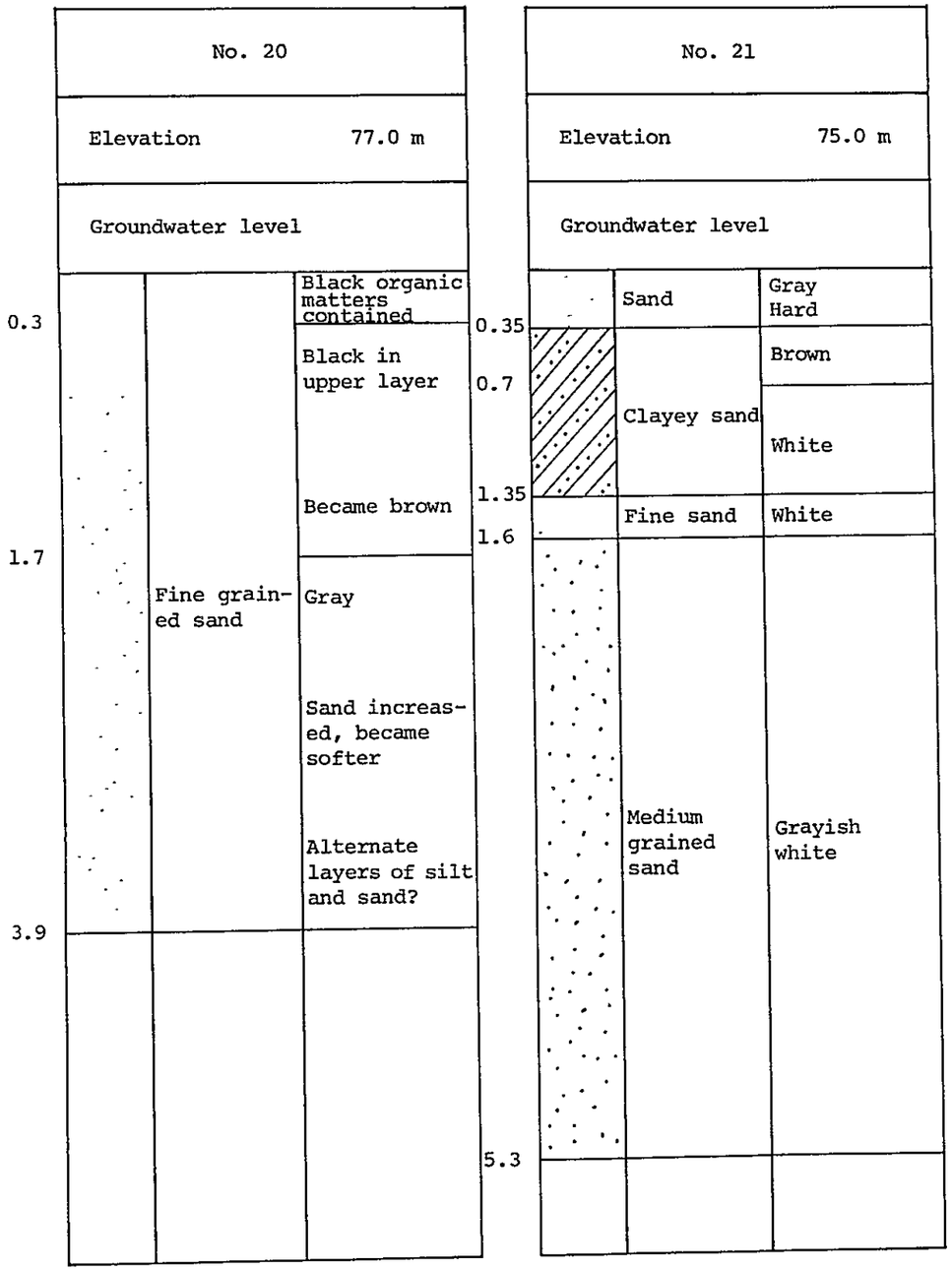

No. 9
Elevation 77.0 m
Groundwater level -0.85 m
Cumlose soil
Black
0.3
Clay
Brown
0.7
Clayey sand
Dark brown
2.5
Fine grained sand
Groundwater level increased
Gray
4.95
No. 10
Elevation 82.0 m
Groundwater level -0.63 m
Cumlose soil
Black
Two layers
0.55
0.7
Sandy clay
Grayish white
Sand content increased
4.2
4.3
Became hard, drilling impossible


No. 11
Elevation 75.0 m
Groundwater level 0.75 m
Sandy soil
Black
0.5
Clay
Brown stripes
1.35
Sand content increased
1.8
1.9
Sand decreased
Brown
Fine grained sand
Sand content increased
3.0
Became greenish
Green diminished
4.0
4.1
Size of sand increased
Medium grained sand
4.4
Polished quartz gravel contained (5 to 7 mm)
4.8
4.9
No. 12
Elevation 79.7 m
Groundwater level -2.0 m
Fine grained sand
Dark gray
1.2
Close to red color of hilly portion
Fine, medium grained sand
2.9
Sand caught
4.95

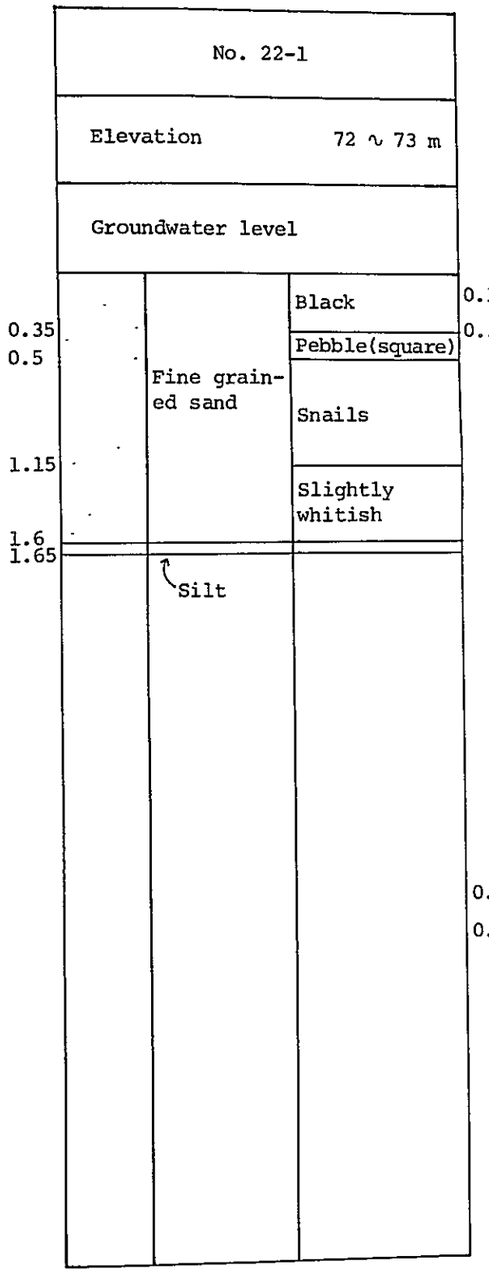

No. 13
Elevation 75.0 m
Groundwater level -1.33 m
0.45
0.75
1.0
2.0
4.15
Black, much sand at upper portion
Glay
Fine grained sand
Sand content increased, white gravel appeared
Became hard, water filled for drilling
Medium grained sand
Manganese included. Water content increased, became softer. Silt content increased in lower layer
Sand increased, drilling impossible
No. 14
Elevation 75.0 m
Groundwater level -2.65 m
0.45
0.8
1.0
1.5
1.8
2.6
3.55
A large sand content
Lime-like white matters mixed
Sand content decreased
Fine grained sand
Lime-like white matters diminished
Black
Brown
Medium grained sand
Sand content increased
Became hard, drilling impossible

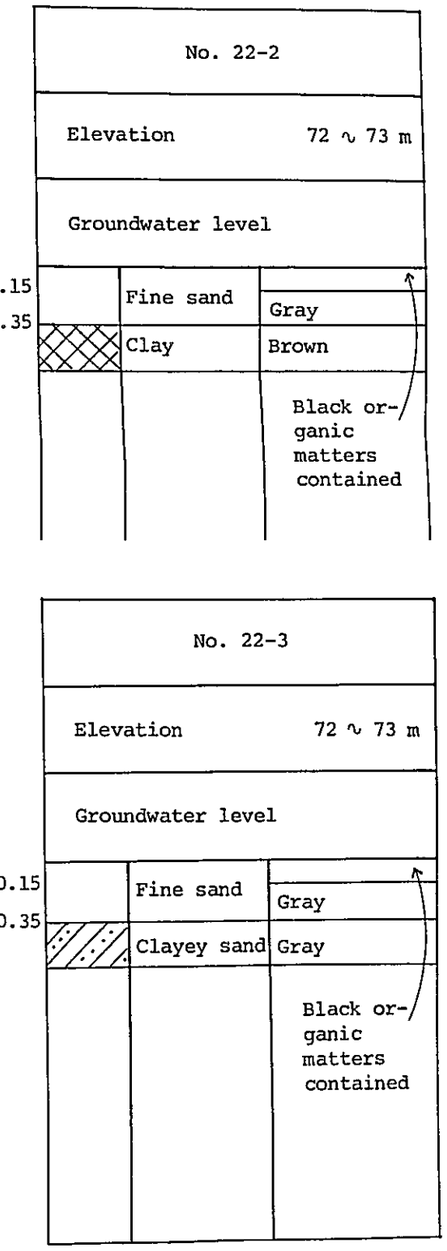

No. 15
Elevation 82.0 m
Groundwater level -0.70 m
0.5
2.2
Sand
Black organic matters contained
Clayey sand
Grayish white
No. 16
Elevation 79.0 m
Groundwater level -0.70 m
0.3
0.4
2.23
Previous paddy field
Black organic matters contained
Sand content and water content increased
Sandy clay
Gray


No. 17
Elevation 78.0 m
Groundwater level
Sandy clay
Gray
Became soft temporarily
1.9
3.25
No. 18
Elevation 78.0 m
Groundwater level -1.08 m
0.2
Top soil
A large black sand content
0.55
0.7
White particles appeared
Clay content increased
Clayey sand
Color changed from black to brown (sand content increased)
Clay content increased
2.55
No. 19-1
Elevation 74.0 m
Groundwater level
0.7
Fine sand
Black organic matters contained
Silt content increased, cohesive soil
Silt content decreased, mostly sand
1.25
No. 19-2
Elevation 74.0 m
Groundwater level
0.15
0.4
Fine sand
Gray
Gray
Grain size of sand increased
Medium grained sand
1.1
1.4
Cohesive soil
Black organic matters contained

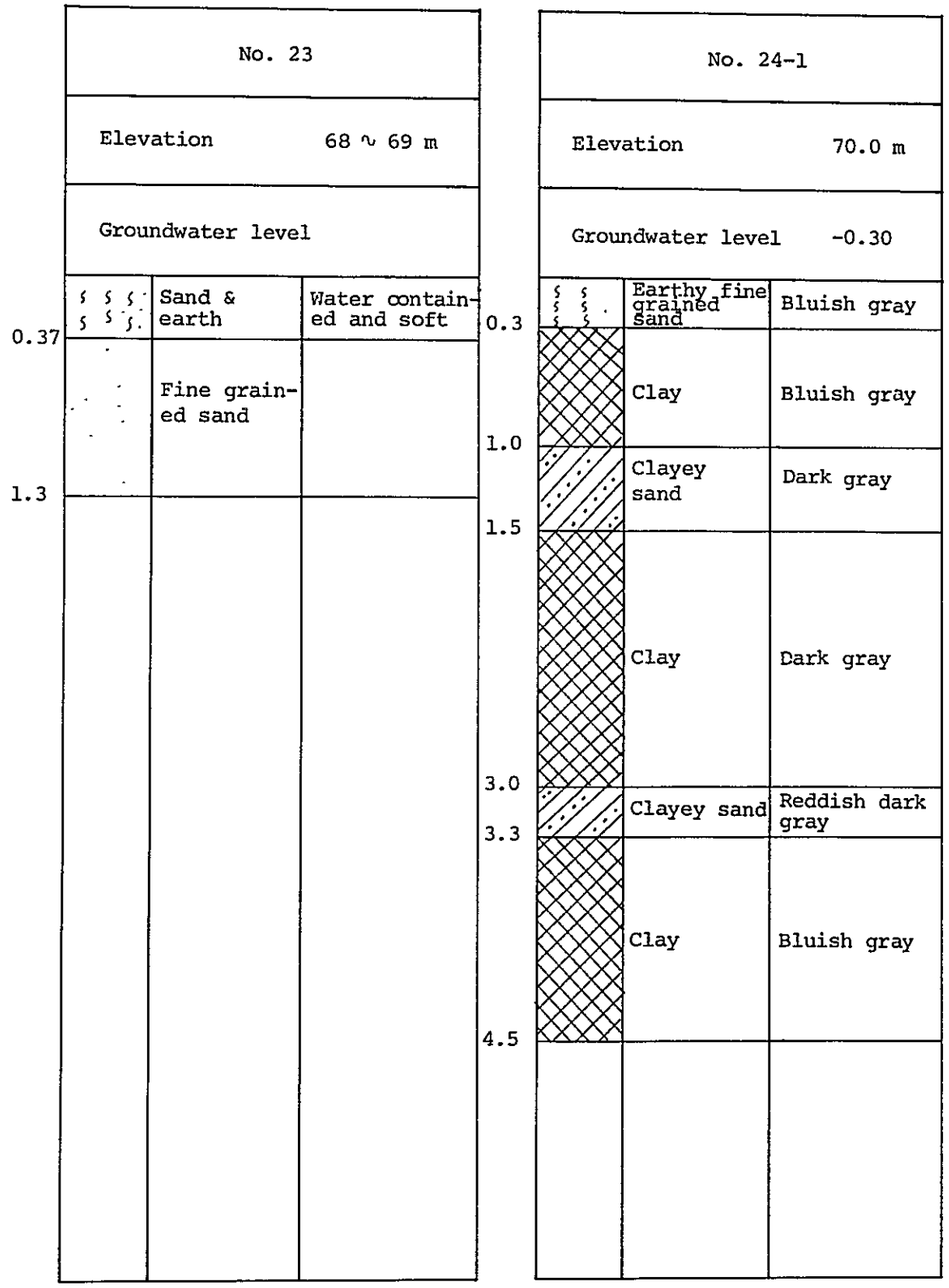

No. 20
Elevation 77.0 m
Groundwater level
0.3
1.7
3.9
Black organic matters contained
Black in upper layer
Became brown
Fine grained sand
Gray
Sand increased, became softer
Alternate layers of silt and sand?

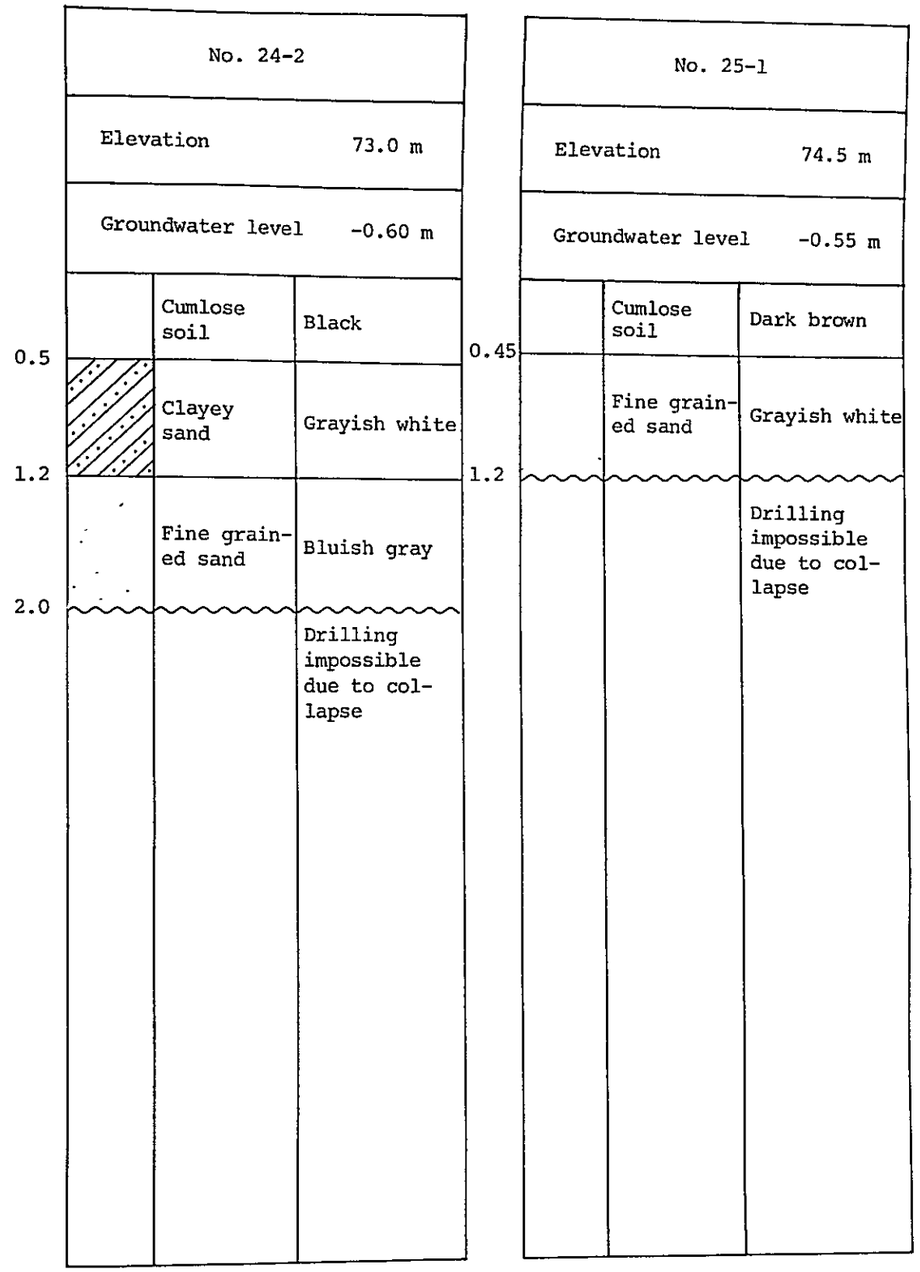
No. 21
Elevation 75.0 m
Groundwater level
0.35
0.7
1.35
1.6
5.3
Sand
Gray Hard
Clayey sand
Brown
White
Fine sand
White
Medium grained sand
Grayish white

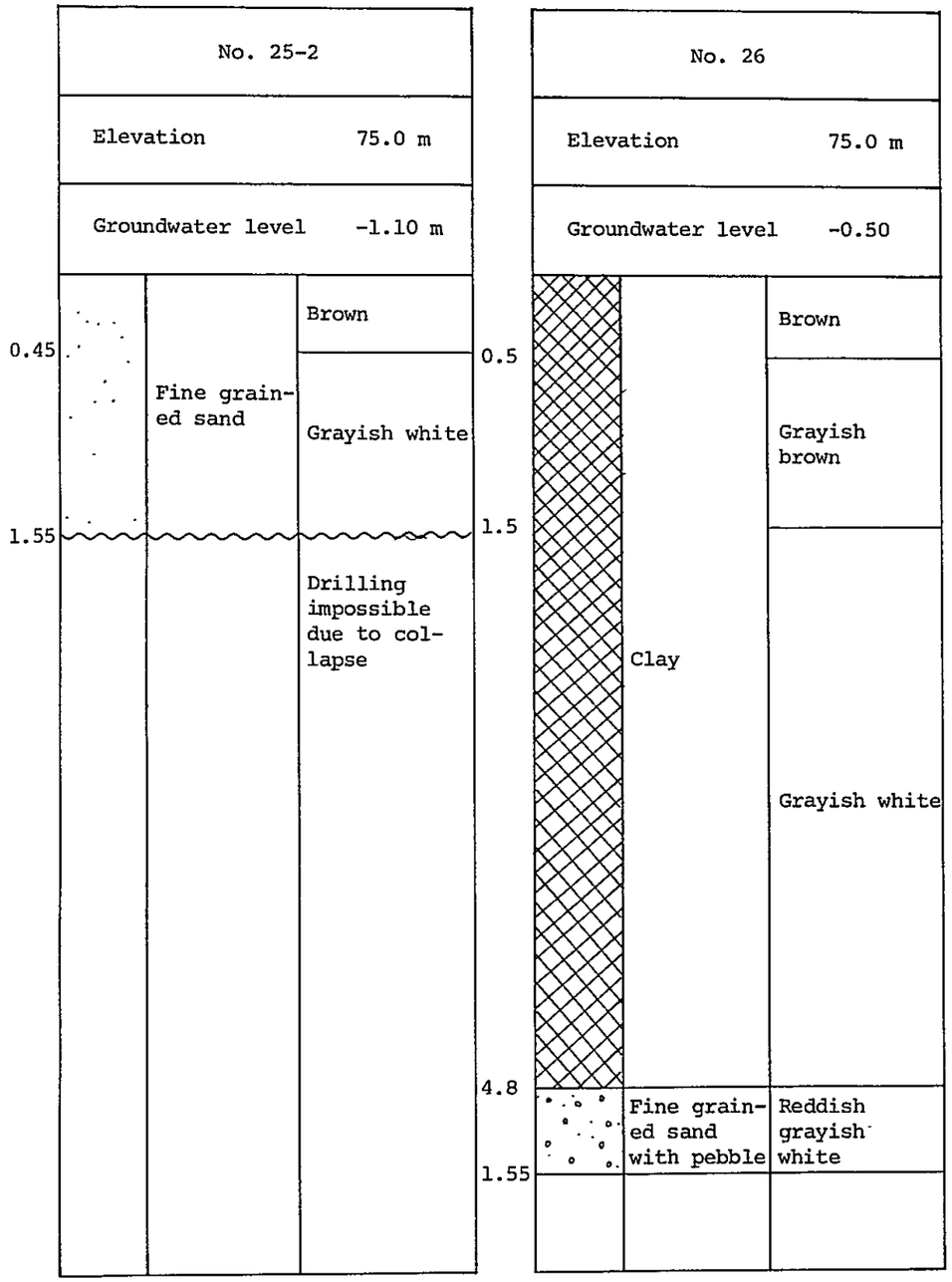

No. 22-1
Elevation 72 ∿ 73 m
Groundwater level
0.35
0.5
1.15
1.6
1.65
Black
Pebble(square)
Fine grained sand
Snails
Slightly whitish
Silt

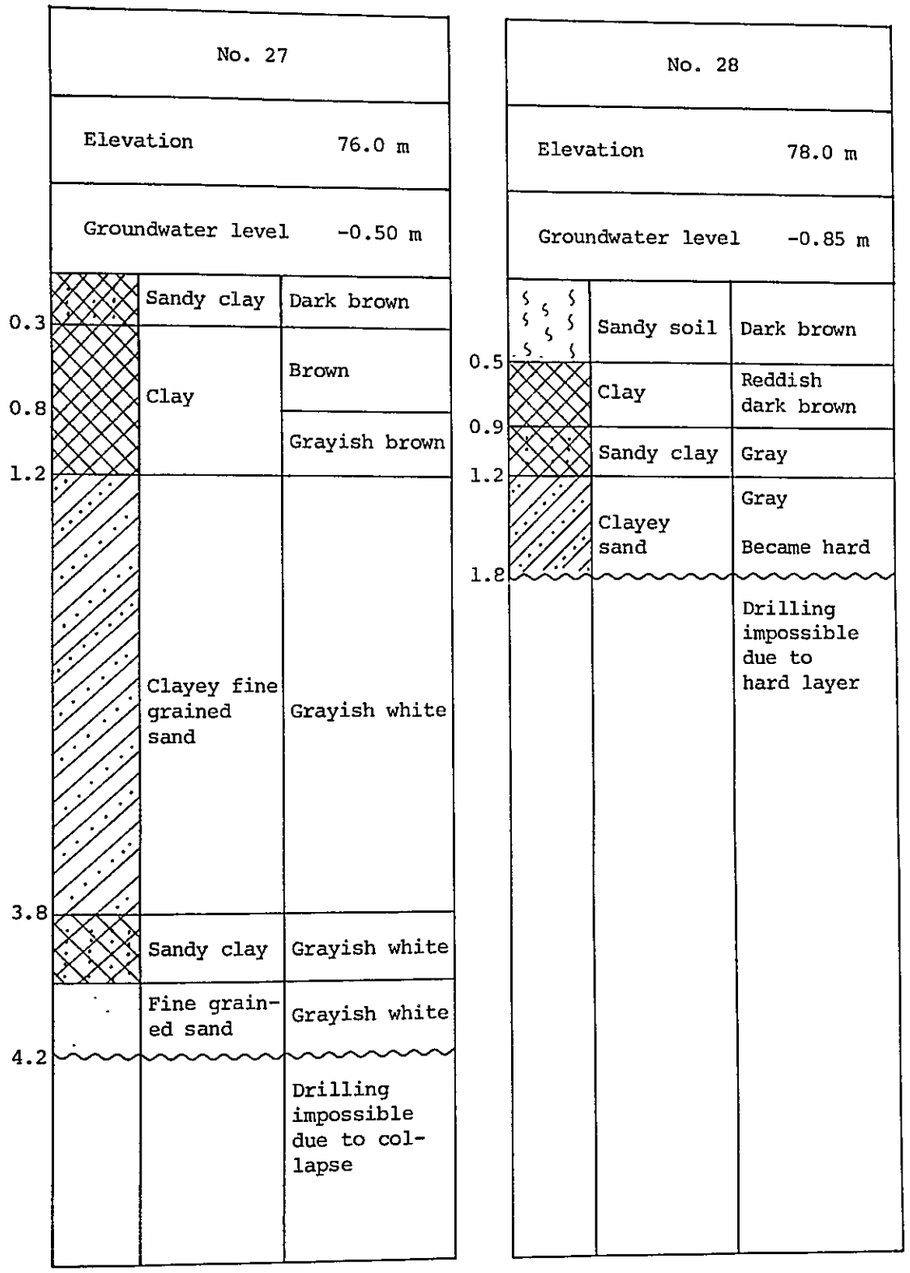

No. 22-2
Elevation 72 ∿ 73 m
Groundwater level
0.15
0.35
Fine sand
Gray
Clay
Brown
Black organic matters contained

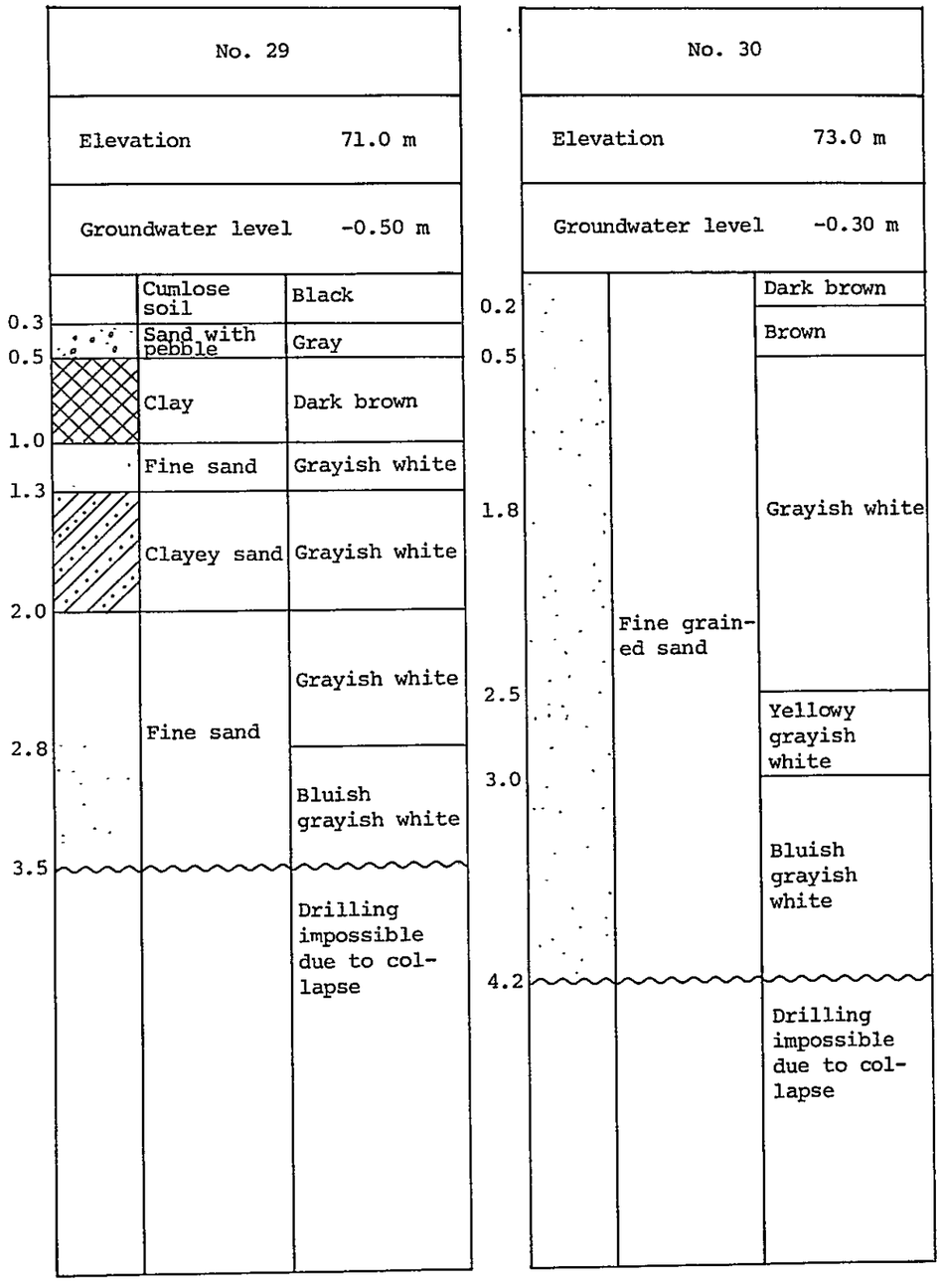
No. 22-3
Elevation 72 ∿ 73 m
Groundwater level
0.15
0.35
Fine sand
Gray
Clayey sand
Gray
Black organic matters contained

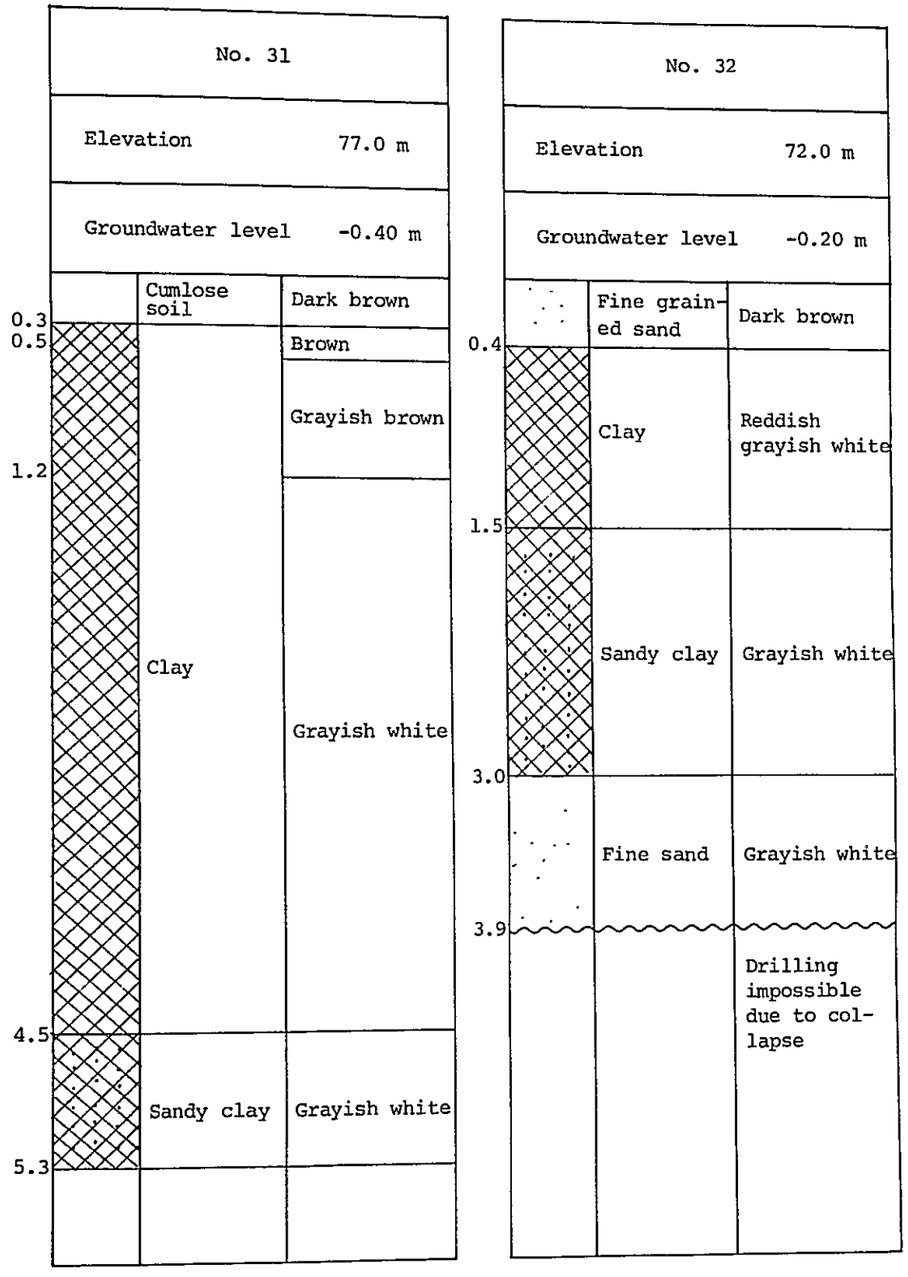

No. 23
Elevation 68 ∿ 69 m
Groundwater level
Sand & earth
Water contained and soft
0.37
Fine grained sand
1.3
No. 24-1
Elevation 70.0 m
Groundwater level -0.30
Earthy fine grained sand
Bluish gray
0.3
Clay
Bluish gray
1.0
Clayey sand
Dark gray
1.5
Clay
Dark gray
3.0
Clayey sand
Reddish dark gray
3.3
Clay
Bluish gray
4.5

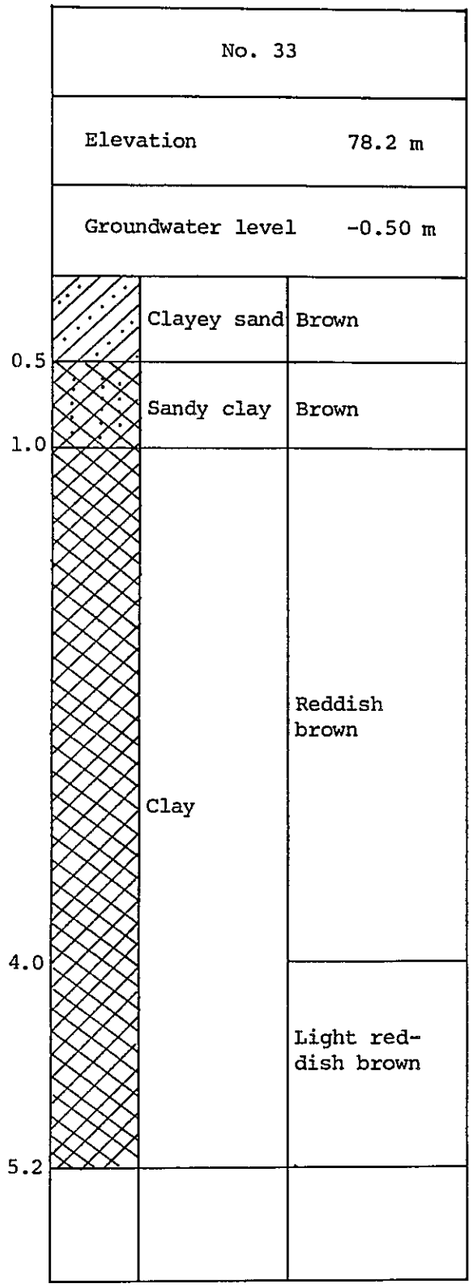

No. 24-2
Elevation 73.0 m
Groundwater level -0.60 m
Cumlose soil
Black
0.5
Clayey sand
Grayish white
1.2
Fine grained sand
Bluish gray
2.0
Drilling impossible due to collapse
No. 25-1
Elevation 74.5 m
Groundwater level -0.55 m
Cumlose soil
Dark brown
0.45
Fine grained sand
Grayish white
1.2
Drilling impossible due to collapse

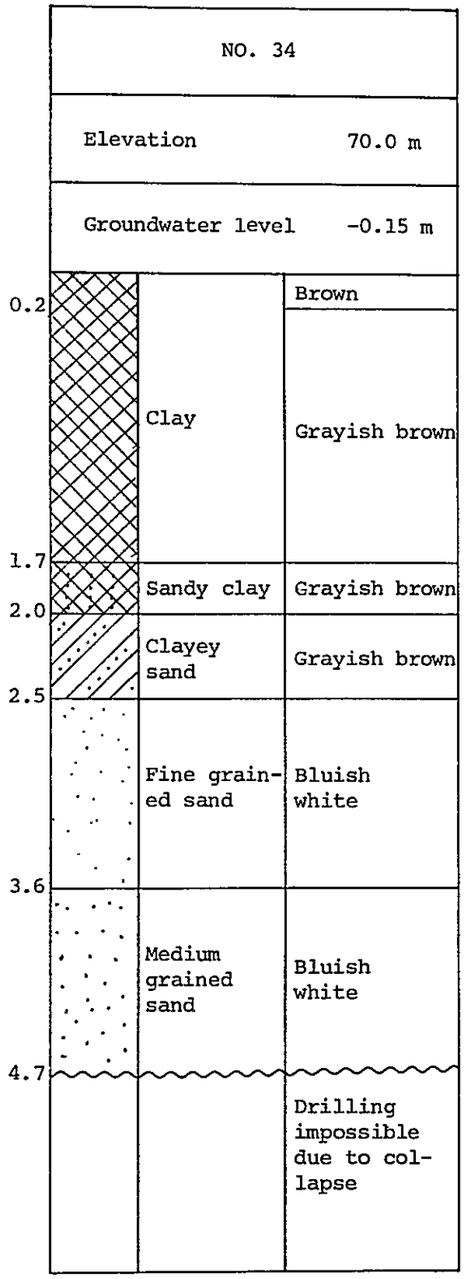

No. 25-2
Elevation 75.0 m
Groundwater level -1.10 m
0.45
Brown
Fine grained sand
Grayish white
1.55
Drilling impossible due to collapse
No. 26
Elevation 75.0 m
Groundwater level -0.50
0.5
Brown
Clay
Grayish brown
1.5
Grayish white
4.8
Fine grained sand with pebble
Reddish grayish white
1.55

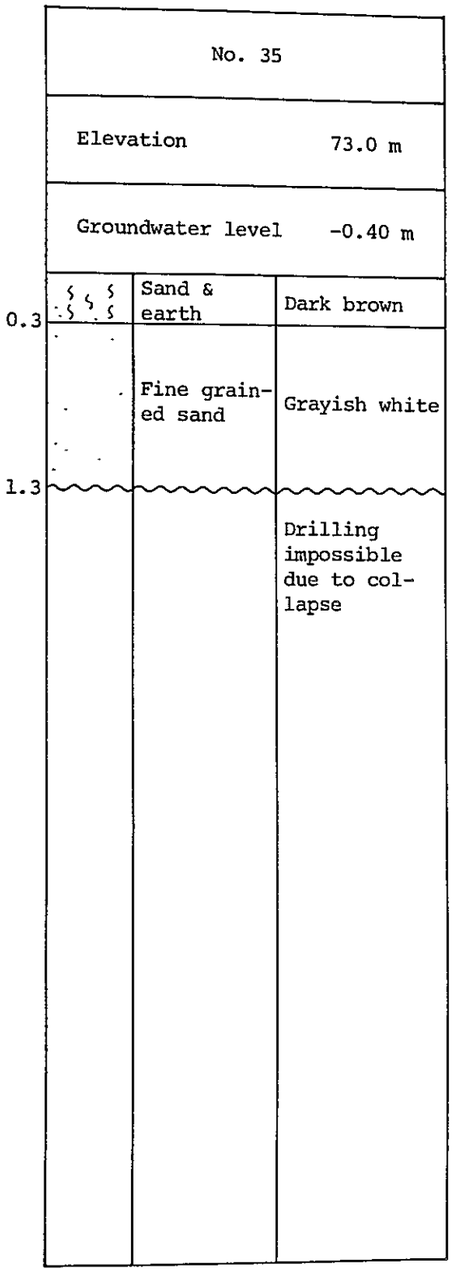

No. 27
Elevation 76.0 m
Groundwater level -0.50 m
0.3
Sandy clay
Dark brown
0.8
Clay
Brown
Grayish brown
1.2
Clayey fine grained sand
Grayish white
3.8
Sandy clay
Grayish white
Fine grained sand
Grayish white
4.2
Drilling impossible due to collapse
No. 28
Elevation 78.0 m
Groundwater level -0.85 m
Sandy soil
Dark brown
0.5
Clay
Reddish dark brown
0.9
Sandy clay
Gray
1.2
Clayey sand
Gray
Became hard
1.8
Drilling impossible due to hard layer

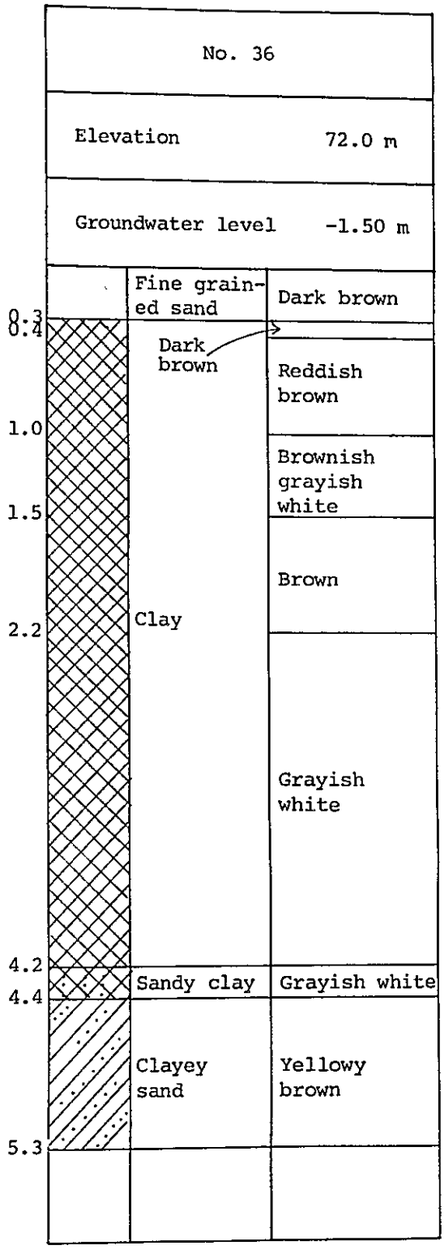

No. 29
Elevation 71.0 m
Groundwater level -0.50 m
Cumlose soil
Black
0.3
Sand with pebble
Gray
0.5
Clay
Dark brown
1.0
Fine sand
Grayish white
1.3
Clayey sand
Grayish white
2.0
Grayish white
Fine sand
2.8
Bluish grayish white
3.5
Drilling impossible due to collapse
No. 30
Elevation 73.0 m
Groundwater level -0.30 m
Dark brown
0.2
Brown
0.5
Grayish white
1.8
Fine grained sand
2.5
Yellowy grayish white
3.0
Bluish grayish white
4.2
Drilling impossible due to collapse

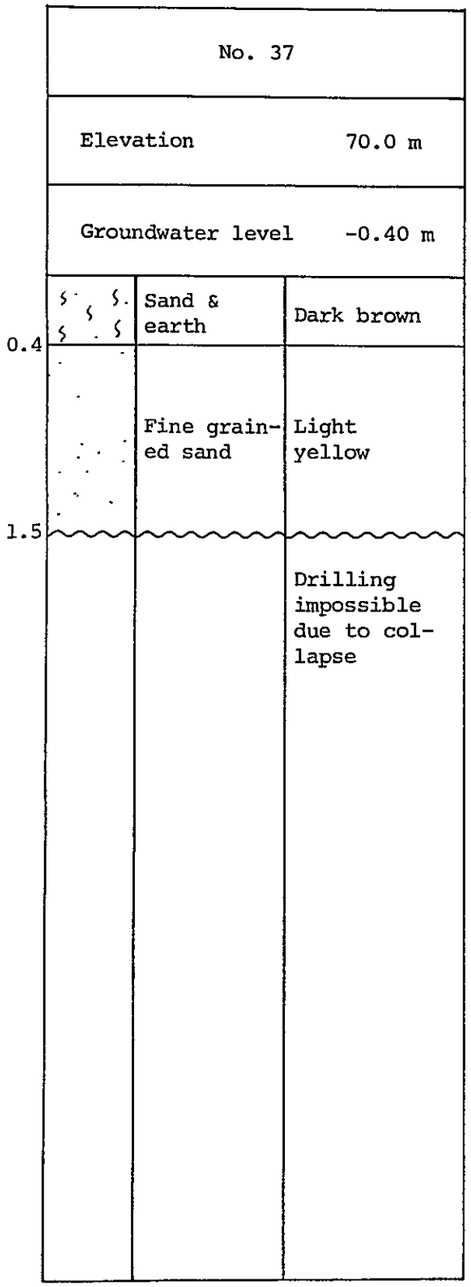

No. 31
Elevation 77.0 m
Groundwater level -0.40 m
Cumlose soil
Dark brown
0.3
0.5
Brown
Grayish brown
1.2
Clay
Grayish white
4.5
Sandy clay
Grayish white
5.3
No. 32
Elevation 72.0 m
Groundwater level -0.20 m
Fine grained sand
Dark brown
0.4
Clay
Reddish grayish white
1.5
Sandy clay
Grayish white
3.0
Fine sand
Grayish white
3.9
Drilling impossible due to collapse

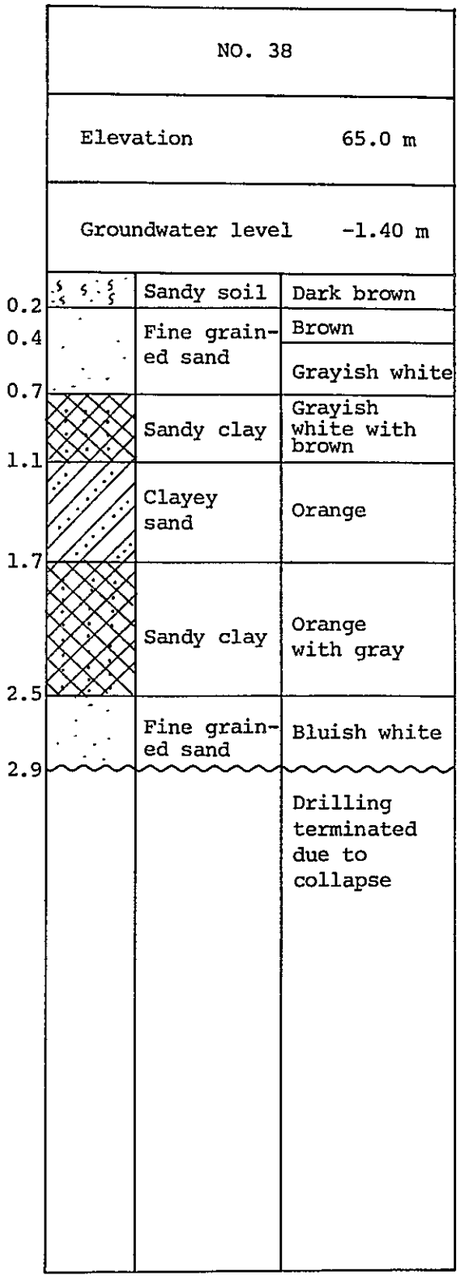

No. 33
Elevation 78.2 m
Groundwater level -0.50 m
Clayey sand
Brown
0.5
Sandy clay
Brown
1.0
Clay
Reddish brown
Light reddish brown
4.0
5.2

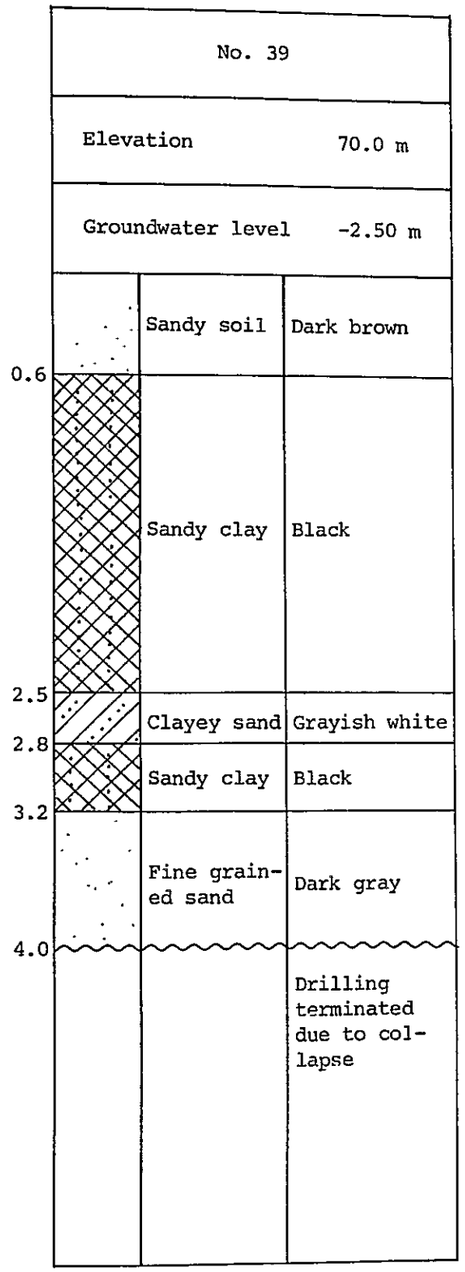

NO. 34
Elevation 70.0 m
Groundwater level -0.15 m
0.2
Clay
Brown
Grayish brown
1.7
Sandy clay
Grayish brown
2.0
Clayey sand
Grayish brown
2.5
Fine grained sand
Bluish white
3.6
Medium grained sand
Bluish white
4.7
Drilling impossible due to collapse


No. 35
Elevation 73.0 m
Groundwater level -0.40 m
0.3
Sand & earth
Dark brown
Fine grained sand
Grayish white
1.3
Drilling impossible due to collapse


No. 36
Elevation 72.0 m
Groundwater level -1.50 m
Fine grained sand
Dark brown
0.3
0.4
Dark brown
Reddish brown
1.0
Brownish grayish white
1.5
Brown
Clay
2.2
Grayish white
4.2
Sandy clay
Grayish white
4.4
Clayey sand
Yellowy brown
5.3


No. 37
Elevation 70.0 m
Groundwater level -0.40 m
Sand & earth
Dark brown
0.4
Fine grained sand
Light yellow
1.5
Drilling impossible due to collapse


NO. 38
Elevation 65.0 m
Groundwater level -1.40 m
Sandy soil
Dark brown
0.2
Fine grained sand
Brown
0.4
Grayish white
0.7
Sandy clay
Grayish white with brown
1.1
Clayey sand
Orange
1.7
Sandy clay
Orange with gray
2.5
Fine grained sand
Bluish white
2.9
Drilling terminated due to collapse


No. 39
Elevation 70.0 m
Groundwater level -2.50 m
Sandy soil
Dark brown
0.6
Sandy clay
Black
2.5
Clayey sand
Grayish white
2.8
Sandy clay
Black
3.2
Fine grained sand
Dark gray
4.0
Drilling terminated due to collapse

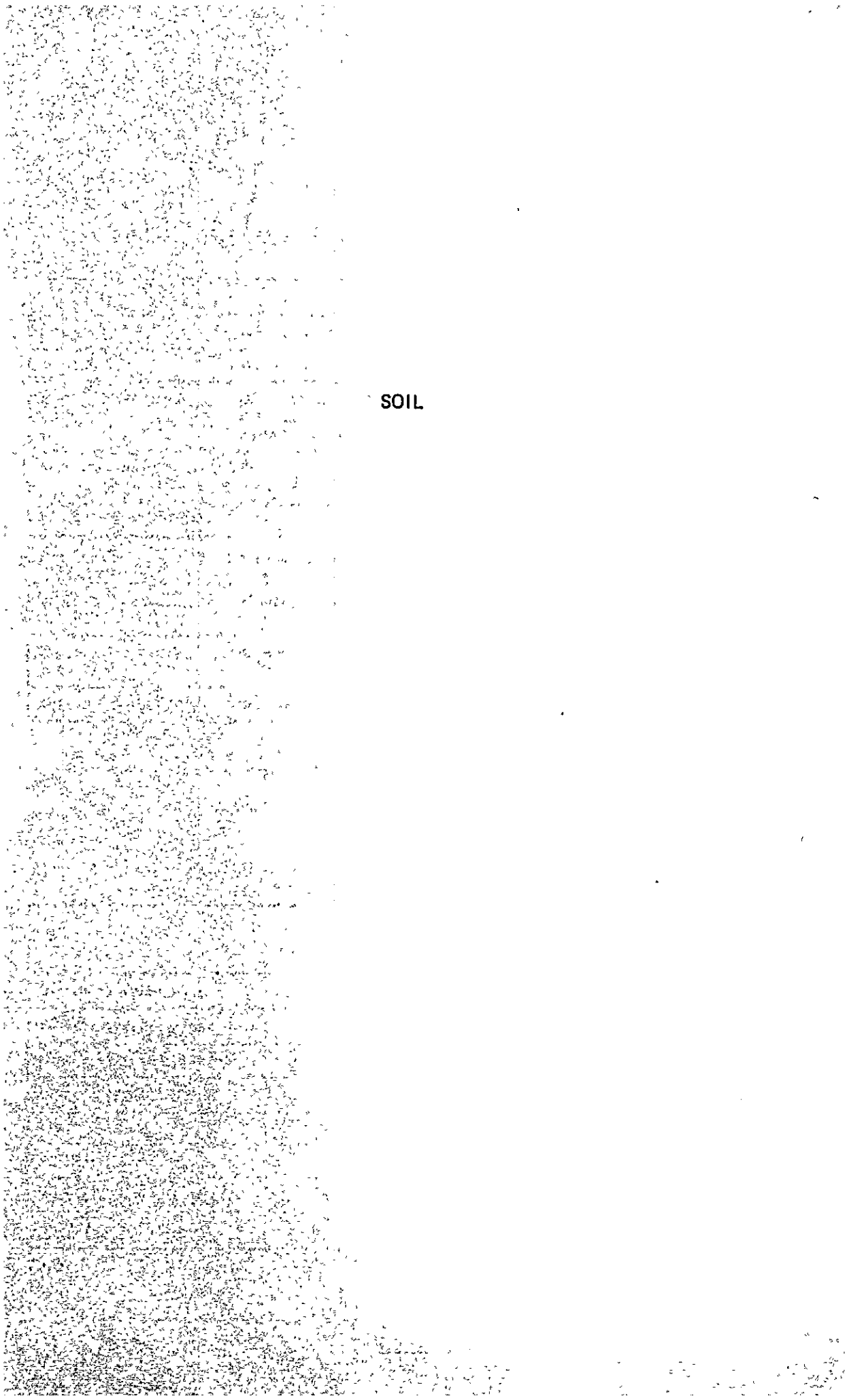

SOIL

Table 2-3-1 Physical and Chemical Soil Analysis Method

Analysis item	Analysis method
Humus	Tyurin method
pH	Glass electrode method soil: water (or Kcl) = 1 : 2.5
Exchangeable base	pH 7.0 detected by 1 norm ammonium acetate. Calcium and magnesium are measured by atomic ray absorption method, and potassium and sodium by flame method.
Base exchange capacity	pH 7.0 1 norm ammonium acetate method
Coefficient of phosphoric acid absorption	Ammonium phosphate
Effective phosphoric acid	Toruowg method
Particle size organization	Pipette method
Apparent specific gravity	Method by local bulk equipment
Buffer action curve	Neutrakization method using calcium carbonate

Note: 1. Coefficient of phosphoric acid absorption is based on 145 typical great soil group points.

2. Local apparent specific gravity is based on typical great soil group too.

Table 2-3-2 List of Survey Points

	Sectional survey	Analysis points	Analysis points by layers				
			A	B	C	D	Total
Coarse textured regosols	12	11	11	11	7	1	30
Fine texture regosols	3	3	3	3	1	-	7
Coarse textured gleysols	12	11	11	9	6	1	27
Fine texture gleysols	12	11	11	11	3	-	25
Planosols	15	15	15	15	12	2	44
Humic planosols	2	2	2	2	1		5
Acrisols	4	4	4	4	2		10
Total	60	57	57	55	32	4	148

Table 2-3-3 Results of Soil Analysis

Location		Thickness of horizon (cm)	Humus C (%)	pH		E C (mmbos /cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	P_2O_5Ab Coef	Available P. P.P.M	Soil particle			Texture	Balk density (g/cc)	Soil texture class		
				H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
1	A	0 ∿ 15	0.63	4.6	3.7	0.0	2.6	1.01	0.12	0.0	0.8	9.4	40	-	1	10.8	18.0	71.2	SL		SL	SL	Gl-c
	B	16∿ 42	0.52	4.6	3.7	0.0	3.0	1.00	0.07	0.0	1.2	7.9	52	-	2	11.6	13.6	74.8	SL		SL	SL	
	C	43∿100	0.72	4.4	3.6	0.0	3.2	1.00	0.07	0.0	1.4	9.1	47	-	1	11.6	18.0	70.4	SL		SL	SL	
2	A	0∿ 5	0.63	4.5	3.8	0.0	2.1	0.74	0.12	0.0	0.4	2.9	102	-	5	14.4	16.4	69.2	SL		SL	SL	Gl-c
	B	6∿ 26	0.57	4.7	3.8	0.0	2.7	0.80	0.09	0.0	2.2	6.6	54	-	10	14.8	14.0	71.2	SL		SL	SL	
	C	27∿ 45	0.09	5.0	4.0	0.0	3.0	0.90	0.01	0.0	0.8	12.7	31	-	4	7.6	28.0	64.4	SL		L	SL	
3	A	0∿ 35	0.57	5.6	5.1	0.0	2.6	0.73	0.06	0.3	0.1	5.2	71	-	4	20.7	11.3	68.0	SCL		SCL	SCL	Re-c
	B	36∿ 45	0.42	6.0	5.6	0.61	3.0	0.86	0.07	0.7	0.0	3.7	125	-	6	20.7	9.3	70.0	SCL		SCL	SCL	
	C	46∿100	0.35	6.5	6.0	0.81	3.2	0.98	0.07	0.8	0.0	5.4	94	-	16	22.7	11.3	66.0	SCL		SCL	SCL	
4	A	0∿ 17	0.98	4.9	3.8	0.0	2.9	0.88	0.13	0.0	1.1	5.5	71	-	1	10.8	14.0	75.2	SL		SL	SL	Re-c
	B	18∿ 40	0.44	4.9	4.0	0.0	3.0	0.89	0.08	0.0	0.6	10.4	38	-	1	16.8	32.0	51.2	L		CL	L	
	C	41∿ 60	0.44	4.7	3.9	0.0	2.4	0.79	0.11	0.0	0.4	3.9	85	-	2	15.8	23.4	60.8	SL		CL	SL	
5	A	0∿ 13	0.66	4.7	3.8	0.0	2.7	0.71	0.02	0.0	0.7	3.9	88	-	1	7.6	38.0	54.4	SL		L	SL	Re-c
	B	14∿ 24	0.47	4.7	3.8	0.0	2.8	0.93	0.09	0.0	1.0	8.7	44	-	1	13.2	19.0	68.8	SL		SL	SL	
	C	25∿100	0.19	5.1	3.7	0.0	3.1	0.92	0.12	0.0	0.9	7.0	59	-	1	22.8	24.0	53.2	SCL		CL	SCL	
7	A	0∿ 10	0.43	4.7	3.8	0.0	2.8	0.68	0.05	0.0	0.7	9.6	37	125	3	17.3	6.0	76.7		1.46	SCL	SL	
	B	11∿ 80	0.29	4.9	4.0	0.0	2.6	0.59	0.02	0.0	0.3	2.6	123		1	17.3	8.0	74.7		1.51	SCL	SL	Re-c
8	A	0∿ 20	0.74	4.5	3.4	0.0	2.8	0.91	0.06	0.0	1.8	20.4	18	-	2	26.7	39.3	34.0	L		Lic	L	Gl-c
	B	21∿ 45	0.29	5.1	3.4	0.0	2.6	0.79	0.05	0.0	4.5	9.5	36	-	1	40.7	23.3	36.0	C		Lic	C	

(Cont'd.)

Location		Thickness of horizon (cm)	Humus C (%)	pH		E C (mmhos /cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	$P_2O_5A_b$ Coef	Available P. P.P.M	Soil particle			Texture	Balk density (g/cc)	Soil texture class		
				H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
9	A	0∿ 23	1.97	4.8	3.7	0.0	2.9	0.91	0.08	0.0	1.2	22.3	17	-	2	21.6	34.0	44.4	L		CL	L	Pl-o
	B	24∿ 35	0.42	5.1	3.4	0.0	3.0	0.85	0.02	0.0	0.5	6.8	57	-	1	15.6	24.0	60.4	SL		CL	SL	
	C	36∿ 60	0.28	5.6	4.0	0.11	3.2	0.96	0.06	0.5	0.3	17.8	27	-	2	47.6	9.2	43.2	C		HC	C	
10	A	0∿ 25	0.62	5.0	3.7	0.0	2.8	0.78	0.05	0.0	0.6	8.9	41	630	2	22.9	15.3	61.8	SCL		SCL	SCL	Pl-o
	B	26∿ 42	0.14	5.4	4.2	0.0	2.2	0.66	0.02	0.0	0.2	2.4	120	-	1	16.9	15.3	67.8	SL		SCL	SL	
	C	43∿	0.13	5.8	4.4	0.61	2.4	0.74	0.02	0.5	0.0	3.4	108	-	1	16.9	13.3	69.8	SL		SCL	SL	
12	A	0∿ 30	0.38	5.3	4.2	0.0	1.9	0.65	0.08	0.0	0.0	27.9	9	620	1	24.7	20.0	55.3	SCL	1.46	CL	SCL	Re-f
	B	31∿ 70	0.29	5.1	3.5	0.0	2.2	0.73	0.04	0.0	1.0	20.4	15	-	1	28.7	14.0	57.3	SCL		SC	SCL	
13	A	0∿ 14	0.81	4.8	4.0	0.0	2.2	0.75	0.03	0.0	0.5	3.7	81	-	4	18.7	20.5	60.8	SL		CL	SL	Re-c
	B	15∿ 40	0.18	4.9	4.0	0.0	2.6	0.75	0.03	0.0	0.4	3.3	102	-	3	14.7	22.5	62.8	SL		L	SL	
	C	41∿ 65	0.32	5.2	4.1	0.0	2.3	0.63	0.03	0.0	1.2	2.0	148	-	3	16.7	24.5	58.8	SL		CL	SL	
14	A	0∿ 35	0.57	5.1	3.5	0.0	2.8	0.81	0.04	0.0	1.2	34.3	11	550	1	32.7	22.0	45.3	SCL	1.45	Lic	SCL	Re-f
	B	36∿ 65	0.37	7.4	5.7	0.15	3.2	1.30	0.06	4.0	0.0	17.6	49		1	40.7	20.0	39.3	C		Lic	C	
15	A	0∿ 17	1.83	4.5	3.7	0.0	2.2	0.69	0.14	0.0	1.4	9.4	32	-	2	9.6	19.6	70.8	SL		SL	SL	Re-c
	B	18∿ 45	0.10	4.9	3.9	0.0	2.5	0.83	0.11	0.0	0.6	5.6	61	-	1	12.8	18.0	69.2	SL		SL	SL	
	C	46∿ 70	0.42	4.6	3.7	0.0	2.6	1.03	0.01	0.0	0.0	10.2	36	-	1	9.6	11.6	78.8	SL		SL	SL	
16	A	0∿ 12	1.09	5.2	3.6	0.0	2.9	0.98	0.08	0.1	1.1	6.8	60	-	2	11.6	41.6	46.8	L		L	L	Ge-c
	B	13∿ 35	0.49	4.6	3.5	0.0	3.1	1.01	0.04	0.0	1.7	7.5	55	-	2	17.6	30.0	52.4	SL		CL	SL	
	C	36∿100	0.51	4.8	3.4	0.0	2.6	1.00	0.10	0.0	2.4	5.1	73	-	1	29.6	29.6	40.8	CL		Lic	CL	

(Cont'd.)

Location		Thickness of horizon (cm)	Humus C (%)	pH		E C (mmbos /cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	$P_2O_5A_b$ Coef	Available P. P.P.M	Soil particle			Texture	Balk density (g/cc)	Soil texture class		
				H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
18	A	0∿ 30	0.46	4.9	3.4	0.0	2.3	0.68	0.03	0.0	2.0	11.6	26	200	1	28.7	28.0	43.3	CL		Lic	CL	Ge-f
	B	31∿ 60	0.39	5.1	3.3	0.0	3.0	0.93	0.04	0.0	4.1	5.4	74	-	1	38.7	26.0	35.3	CL		Lic	CL	
19	A	0∿ 19	0.49	4.9	3.6	0.0	2.7	0.79	0.07	0.0	0.9	7.9	45	-	1	19.3	20.0	60.7	SL		CL	SL	Ge-c
	B	20∿ 65	0.32	4.7	3.6	0.0	3.1	0.75	0.04	0.0	0.9	6.4	61	-	1	21.2	28.0	50.8	L		CL	L	
	C	66∿ 85	0.46	4.9	3.3	0.0	3.0	1.00	0.09	0.0	4.0	27.3	15	-	1	32.7	10.5	56.8	SCL		SC	SCL	
20	A	0∿ 13	1.59	4.8	3.7	0.0	3.0	0.97	0.13	0.0	0.7	5.0	82	-	2	17.6	41.6	40.8	L		CL	L	Pe
	B	14∿ 52	0.32	4.7	3.5	0.0	2.7	0.91	0.08	0.0	2.2	6.4	58	-	1	19.6	30.0	50.4	L		CL	L	
	C	53∿105	0.35	5.0	3.2	0.0	3.1	1.00	0.02	0.0	7.4	15.3	27	-	1	53.6	18.0	28.4	C		HC	C	
21	A	0∿ 14	0.66	4.6	3.7	0.0	2.8	0.81	0.13	0.0	1.2	4.7	80	-	1	18.8	34.0	47.2	L		CL	L	Ge-c
	B	15∿ 37	0.64	4.7	3.6	0.0	3.0	0.80	0.02	0.0	1.6	5.0	76	-	1	13.6	32.0	54.4	SL		L	SL	
	C	38∿ 58	0.44	4.8	3.7	0.0	2.8	0.83	0.11	0.0	1.5	4.2	89	-	1	16.8	30.0	53.2	SL		CL	SL	
	D	59∿100	0.39	5.1	3.3	0.0	2.7	0.76	0.13	0.0	4.6	10.2	35	-	1	26.8	22.0	51.2	SCL		Lic	SCL	
22	A	0∿ 21	0.32	6.6	5.6	0.80	2.4	0.68	0.05	2.4	0.0	3.3	167	-	6	20.7	9.3	70.0	SCL		SCL	SCL	Re-c
23	A	0∿ 15	0.56	4.4	3.5	0.0	2.3	0.75	0.03	0.0	1.2	8.0	39	-	1	14.8	32.0	53.2	SL		L	SL	Pe
	B	16∿ 50	0.32	4.4	3.4	0.0	2.9	0.90	0.01	0.0	1.7	6.2	61	-	1	24.8	24.0	51.2	SCL		CL	SCL	
	C	51∿112	0.28	4.2	3.1	0.0	2.7	0.96	0.01	0.0	5.0	14.2	26	-	1	40.8	14.0	45.2	SC		Lic	SC	
24	A	0∿ 20	1.51	4.3	3.4	0.0	3.0	0.89	0.23	0.0	1.4	31.9	13	-	1	22.7	18.5	58.8	SCL		SCL	SCL	Ge-f
	B	21∿ 30	0.78	4.7	3.5	0.0	2.6	0.93	0.24	0.0	1.0	16.2	23	-	1	28.7	26.5	44.8	CL		Lic	CL	
25	A	0∿ 40	0.42	5.5	4.5	0.0	2.9	0.93	0.11	0.8	0.2	3.0	141	-	4	21.3	14.0	64.7	SCL		SCL	SCL	Re-c
	B	41∿100	0.21	5.0	3.8	0.0	2.0	0.63	0.09	0.0	0.4	4.9	56	-	5	19.3	12.0	68.7	SL		SCL	SL	

(Cont'd.)

Location		Thickness of horizon (cm)	Humus C (%)	pH		E C (mmhos/cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	P_2O_5 Ab Coef	Available P. P.P.M	Soil particle			Texture	Balk density (g/cc)	Soil texture class		
				H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
26	A	0∿ 25	0.77	4.4	3.4	0.0	2.8	0.80	0.06	0.0	1.4	19.3	19	-	1	26.2	28.5	45.3	L		Lic	L	Ge-f
	B	26∿ 40	0.39	4.9	3.0	0.0	2.8	0.78	0.11	0.0	8.3	40.9	9	-	1	54.2	20.5	25.3	C		HC	C	
27	A	0∿ 30	1.47	4.9	3.7	0.0	2.8	0.65	0.10	0.0	1.7	42.4	8	450	10	16.7	16.5	66.8	SL	0.61	SCL	SL	Ge-f
	B	31∿ 70	0.88	4.8	3.3	0.0	3.0	1.00	0.05	0.0	1.6	37.1	11	-	1	48.7	24.5	26.8	C		HC	C	
28	A	0∿ 7	0.84	4.5	3.5	0.0	2.4	0.73	0.06	0.0	0.8	6.2	51	-	1	22.2	16.5	61.3	SCL		SCL	SCL	Ge-f
	B	8∿ 30	0.46	4.6	3.5	0.0	2.8	0.81	0.03	0.0	0.6	3.9	93	-	1	22.2	12.5	65.3	SCL		SCL	SCL	
29	A	0∿ 5	0.38	5.2	4.2	0.0	2.4	0.78	0.05	0.0	0.2	4.9	66	-	1	18.7	16.5	64.8	SL		SCL	SL	Ac
	B	6∿ 40	0.21	5.3	4.0	0.0	2.7	0.91	0.03	0.0	0.2	4.5	81	-	1	20.7	18.5	60.8	SCL		SCL	SCL	
30	A	0∿ 13	1.41	5.0	4.3	0.0	2.9	0.95	0.33	0.0	0.0	11.9	35	-	32	13.6	41.6	44.8	L		L	L	Ge-f
	B	14∿ 52	0.47	4.7	3.6	0.0	3.0	0.90	0.10	0.0	1.0	5.2	77	-	7	14.8	26.8	58.4	SL		L	SL	
	C	53∿105	0.07	4.9	3.2	0.0	2.8	0.63	0.02	0.0	4.4	11.3	31	-	1	30.8	24.0	45.2	SCL		Lic	SCL	
31	A	0∿ 17	0.33	5.0	3.6	0.0	2.8	0.78	0.09	0.0	0.8	6.4	57	-	1	24.8	13.4	61.8	SCL		SCL	SCL	Re-c
	B	18∿ 30	0.12	4.9	3.6	0.0	3.1	0.86	0.04	0.0	1.0	6.0	67	-	1	24.8	13.4	61.8	SCL		SCL	SCL	
	C	31∿ 63	0.05	5.0	3.6	0.0	2.6	0.93	0.09	0.0	0.9	4.1	88	-	1	26.8	11.4	61.8	SCL		SC	SCL	
32	A	0∿ 17	1.31	4.5	3.5	0.0	2.7	0.78	0.11	0.0	2.1	14.4	25	-	1	21.6	43.6	34.8	L		CL	L	Pe
	B	18∿ 42	0.47	4.6	3.6	0.0	2.8	0.80	0.03	0.0	1.1	3.8	96	-	2	15.6	26.0	58.4	SL		CL	SL	
	C	43∿ 72	0.28	4.6	3.3	0.0	2.7	0.69	0.01	0.0	4.5	6.6	52	-	1	25.6	14.0	60.4	SCL		SC	SCL	
	D	73∿	0.18	4.2	3.3	0.0	2.1	0.63	0.11	0.0	3.3	4.2	68	-	1	22.8	18.0	59.2	SCL		SCL	SCL	

(Cont'd.)

Location	Thickness of horizon (cm)	Humus C (%)	pH		E C (mmhos/cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	$P_2O_5A_b$ Coef	Available P. P.P.M	Soil particle			Texture	Bulk density (g/cc)	Soil texture class		
			H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
A	0∿ 13	1.49	4.4	3.5	0.0	2.4	0.70	0.14	0.0	1.3	40.3	8	900	3	26.8	25.4	47.8	SCL		Lic	SCL	Pe
33 B	14∿ 18	0.04	4.8	3.5	0.0	2.8	0.59	0.04	0.0	0.5	32.6	11	-	1	30.8	25.4	43.8	CL		Lic	CL	
C	19∿ 90	0.19	4.7	3.2	0.0	3.0	0.78	0.09	0.0	2.1	21.4	18	-	1	44.8	11.4	43.8	C		Lic	C	
A	0∿ 13	0.58	4.3	3.4	0.0	2.4	0.75	0.08	0.0	0.9	10.9	30	400	2	30.8	19.4	49.8	SCL	1.41	Lic	SCL	Pe
34 B	14∿ 48	0.26	4.6	3.3	0.0	2.8	0.83	0.04	0.0	2.3	7.9	46	-	1	28.8	19.4	51.8	SCL	1.41	Lic	SCL	
C	49∿105	0.10	4.7	3.2	0.0	3.0	0.88	0.03	0.0	2.1	6.6	59	-	1	32.8	35.4	31.8	CL		Lic	CL	
A	0∿ 7	1.29	4.9	3.8	0.0	2.3	0.72	0.07	0.0	0.4	4.5	69	-	3	7.6	23.2	69.2	SL		SL	SL	Pe
35 B	8∿ 45	0.35	4.5	3.7	0.0	2.5	0.86	0.05	0.0	0.8	7.1	48	-	1	11.6	22.0	66.4	SL		SL	SL	
C	46∿100	0.21	4.6	3.1	0.0	1.8	0.53	0.01	0.0	5.0	15.5	15	-	1	32.8	16.0	51.2	SCL		Lic	SCL	
A	0∿ 15	0.47	5.1	4.1	0.0	2.8	0.66	0.07	0.0	0.5	10.2	35	-	2	11.6	8.0	80.4	SL		SL	SL	Ae-c
B	16∿ 43	0.60	4.9	4.1	0.0	2.5	0.68	0.05	0.0	0.5	28.4	11	-	1	11.6	8.0	80.4	SL		SL	SL	
36 C	44∿ 60	0.29	4.9	4.2	0.0	3.0	0.88	0.07	0.0	0.3	2.7	146	-	1	8.8	10.0	81.2	LS		SL	LS	
D	61∿ 93	0.34	4.5	4.2	0.0	2.2	0.73	0.01	0.0	0.3	3.3	89	-	3	4.8	20.8	74.4	LS		SL	LS	
A	0∿ 30	0.63	4.7	3.6	0.0	2.8	0.71	0.13	0.0	1.7	7.9	46	-	1	13.2	46.0	40.8	L		Sil	L	Pe
37 B	31∿ 80	0.32	5.0	3.5	0.0	2.7	0.80	0.01	0.0	2.5	6.3	56	-	1	25.6	32.0	42.4	L		Lic	L	
C	81∿100	0.46	5.0	3.4	0.0	2.9	0.86	0.05	0.0	3.0	12.9	30	-	1	19.6	30.0	50.4	L		CL	L	
A	2∿ 28	0.6	4.8	3.7	0.0	2.3	0.71	0.03	0.0	0.9	5.0	61		1	20.7	21.3	58.0	SCL		CL	SCL	Ge-c
38 B	29∿ 50	0.29	4.8	3.7	0.0	2.6	0.75	0.04	0.0	0.7	3.8	89		1	22.7	13.3	64.0	SCL		CL	SCL	

(Cont'd.)

Location		Thickness of horizon (cm)	Humus C (%)	pH		E C (mmbos /cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	P_2O_5 Ab Coef	Available P. P.P.M	Soil particle			Texture	Balk density (g/cc)	Soil texture class		
				H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
39	A	0∿ 44	1.47	4.7	3.9	0.0	2.0	0.68	0.03	0.0	1.2	4.4	62	-	1	7.6	12.0	80.4	LS		SL	LS	Ge-c
	B	45∿ 64	0.51	4.7	4.0	0.0	2.6	0.78	0.01	0.0	0.8	8.1	42	-	1	7.6	22.0	70.4	SL		SL	SL	
	C	65∿100	0.19	4.9	4.1	0.0	3.0	0.82	0.01	0.0	0.4	4.1	93	-	1	5.6	22.0	72.4	SL		SL	SL	
40	A	0∿ 25	0.69	4.8	3.4	0.0	2.6	0.78	0.06	0.0	1.3	8.0	43	-	2	20.9	25.3	53.8	SCL		CL	SCL	Ge-c
	B	26∿ 58	0.18	4.8	3.4	0.0	2.5	0.76	0.07	0.0	2.4	8.2	41	-	1	26.9	19.3	53.8	SCL		Lic	SCL	
41	A	0∿ 30	0.90	6.4	5.8	0.85	3.6	1.33	0.07	0.8	0.0	13.2	44	-	2	20.9	23.3	55.8	SCL		CL	SCL	Pe
	B	31∿ 48	0.26	6.8	6.1	1.65	3.5	1.88	0.07	1.0	0.0	19.9	47	-	1	22.9	43.3	33.8	L		CL	L	
42	A	0∿ 45	0.39	4.7	3.3	0.0	2.8	0.80	0.04	0.0	2.4	10.6	34	350	1	32.2	14.5	53.3	SCL	1.36	Lic	SCL	Pe
	B	46∿ 70	0.30	4.8	3.1	0.0	3.1	0.95	0.07	0.0	4.9	19.5	21	-	1	46.9	17.3	35.8	C		HC	C	
43	A	0∿ 10	1.52	4.6	3.7	0.0	2.5	0.74	0.03	0.0	1.0	15.0	22	-	2	11.6	16.0	72.4	SL		SL	SL	Re-c
	B	11∿ 61	0.22	4.8	3.6	0.0	2.9	0.93	0.02	0.0	1.7	4.9	79	-	1	11.6	20.0	68.4	SL		SL	SL	
	C	62∿110	0.32	5.1	3.3	0.0	2.9	0.77	0.02	0.0	4.8	10.9	34	-	1	28.8	20.0	51.2	SCL		Lic	SCL	
44	A	0∿ 30	1.09	4.4	3.6	0.0	2.9	0.86	0.07	0.0	1.3	7.0	55	-	2	13.6	52.0	34.4	SiL		SiL	SiL	Re-f
	B	31∿ 64	0.61	4.5	3.6	0.0	2.4	0.73	0.04	0.0	1.4	4.7	67	-	1	18.8	42.8	38.4	L		CL	L	
	C	65∿100	0.57	4.5	3.3	0.0	3.2	0.98	0.03	0.0	5.4	12.4	34	-	1	42.8	20.8	36.4	C		Lic	C	
45	A	0 ∿ 15	1.19	4.4	3.3	0.0	2.8	0.93	0.08	0.0	2.5	21.4	18	800	1	32.9	21.3	45.8	SCL	1.21	Lic	SCL	Pe
	B	16 ∿ 40	0.29	4.6	3.3	0.0	2.2	0.73	0.04	0.0	2.2	7.0	42	-	1	32.9	31.3	35.8	CL		Lic	CL	
46	A	0 ∿ 32	1.19	4.5	3.7	0.0	2.3	0.76	0.03	0.0	1.1	7.4	42	-	1	20.7	20.0	59.3	SCL		CL	SCL	Ge-c
47	A	0 ∿ 34	1.47	4.7	3.5	0.0	2.2	0.66	0.08	0.0	1.3	17.4	17	-	1	39.2	21.4	39.4	CL		Lic	CL	Ac
	B	35 ∿ 52	0.88	4.9	3.5	0.0	3.2	1.10	0.03	0.0	2.3	10.7	40	-	1	43.2	21.4	35.4	C		Lic	C	

(Cont'd.)

Location		Thickness of horizon (cm)	Humus C (%)	pH		E C (mmbos /cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	$P_2O_5A_b$ Coef	Available P. P.P.M	Soil particle			Texture	Balk density (g/cc)	Soil texture class		
				H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
48	A	0∿ 15	1.16	5.6	4.4	0.08	3.1	1.02	0.38	0.2	0.1	9.6	49	400	2	30.7	43.3	26.0	CL	1.46	Lic	CL	Ac
	B	16∿ 38	0.85	5.4	4.4	0.0	3.4	0.98	0.22	0.0	0.1	9.0	51	-	1	34.7	35.3	30.0	CL		Lic	CL	
	C	39∿ 95	0.39	5.7	4.6	0.0	2.9	0.89	0.35	0.4	0.2	12.3	37	-	1	47.2	23.4	29.4	C		HC	C	
49	A	0∿ 34	1.39	4.4	3.4	0.0	2.9	0.81	0.01	0.0	4.2	23.9	16	-	1	25.6	38.0	36.4	L		Lic	L	Pe
	B	35∿ 44	0.73	4.7	3.5	0.0	2.9	0.80	0.02	0.0	2.1	6.5	57	-	1	24.8	30.0	45.2	L		CL	L	
	C	45∿ 70	0.43	4.8	3.6	0.0	2.8	0.86	0.02	0.0	0.7	7.1	52	-	1	11.6	1.2	87.2	LS		LS	LS	
50	A	0∿ 8	0.84	4.6	3.5	0.0	3.0	0.84	0.07	0.0	1.7	5.1	77	-	1	29.2	37.4	33.4	CL		Lic	CL	Ge-f
	B	9∿ 26	0.29	4.5	3.5	0.0	3.2	1.00	0.04	0.0	1.7	3.8	112	-	2	31.2	29.4	39.4	CL		Lic	CL	
51	A	0∿ 23	0.04	4.6	3.6	0.0	2.8	0.80	0.06	0.0	1.0	5.0	73	-	1	18.7	26.0	55.3	SL		CL	SL	Ge-c
52	A	0∿ 5	1.19	4.6	3.5	0.0	2.9	0.65	0.10	0.0	1.2	6.6	55	-	3	28.2	22.5	49.3	SCL		Lic	SCL	Ge-f
	B	6∿ 12	0.57	4.6	3.4	0.0	2.8	0.81	0.04	0.0	2.1	9.1	40	-	1	32.2	14.5	53.3	SCL		Lic	SCL	
53	A	0∿ 31	1.15	4.6	3.5	0.0	2.8	0.90	0.07	0.0	2.1	10.4	36	-	1	17.2	42.0	40.8	L		CL	L	Pe
	B	32∿ 70	0.70	4.4	3.5	0.0	2.9	0.74	0.01	0.0	1.0	6.9	53	-	1	22.8	26.0	51.2	SCL		CL	SCL	
	C	71∿110	0.38	4.6	3.1	0.0	2.6	0.78	0.01	0.0	7.3	16.5	21	-	1	36.8	8.0	55.2	SC		SC	SC	
54	A	0∿ 28	1.23	4.6	3.6	0.0	2.7	0.83	0.05	0.0	0.8	9.1	39	-	3	33.2	41.4	25.4	CL		Lic	CL	Ge-f
	B	29∿ 40	0.74	4.7	3.5	0.0	2.9	1.30	0.02	0.0	1.2	5.4	78	-	1	31.2	41.4	27.4	CL		Lic	CL	
55	A	0∿ 17	0.99	4.5	3.6	0.0	2.8	0.93	0.11	0.0	1.0	8.6	45	-	2	13.6	16.0	70.4	SL		SL	SL	
	B	18∿ 50	0.39	4.7	3.8	0.0	2.0	0.63	0.01	0.0	0.8	7.2	37	-	2	10.8	26.0	63.2	SL		L	SL	Pe
	C	51∿ 75	0.56	4.5	3.2	0.0	2.8	0.88	0.09	0.0	8.8	14.3	26	-	1	36.8	6.0	57.2	SC		SC	SC	

(Cont'd.)

Location		Thickness of horizon (cm)	Humus C (%)	pH		E C (mmbos /cm)	Exchangeable - cations (mℓ/100g)					CEC (mℓ/100g)	Degree of base salun (%)	$P_2O_5A_b$ Coef	Available P. P.P.M	Soil particle			Texture	Balk density (g/cc)	Soil texture class		
				H_2O	Kcl		Ca	Mg	K	Na	Al					Clay (%)	Silt (%)	Sand (%)			Japan	USDA	
56	A	0∿ 12	0.74	5.3	4.2	0.0	3.1	0.85	0.08	0.0	0.1	8.9	45	680	1	26.2	28.5	45.3	L	1.66	Lic	L	Ac
	B	13∿ 50	0.46	5.2	4.3	0.0	2.6	0.93	0.08	0.0	0.0	10.7	34	-	1	26.2	34.5	39.3	L		Lic	L	
	C	51∿ 90	0.32	5.4	4.2	0.0	3.0	0.91	0.05	0.0	0.0	16.3	25	-	1	42.2	24.5	33.3	C		Lic	C	
57	A	0∿ 30	0.58	4.5	3.5	0.0	2.6	0.79	0.10	0.0	1.6	4.5	78	750	3	26.8	23.4	49.8	SCL	1.36	Lic	SCL	Pe
	B	31∿ 64	0.32	4.8	3.5	0.0	3.2	0.86	0.02	0.0	0.9	3.6	113	-	1	27.4	17.3	55.3	SCL	1.71	SC	SCL	
	C	65∿100	0.33	4.7	3.2	0.0	2.9	0.78	0.05	0.0	6.0	11.4	33	-	1	45.4	13.3	41.3	C		HC	C	
58	A	0∿ 20	2.18	4.8	4.0	0.0	2.9	0.75	0.13	0.0	0.2	22.3	17	-	2	19.6	41.2	39.2	L		CL	L	Ge-f
	B	21∿ 50	0.27	4.6	3.4	0.0	3.0	0.77	0.04	0.0	1.7	6.9	55	-	1	27.6	19.2	51.2	SCL		LC	SCL	
	C	51∿105	0.49	4.6	3.2	0.0	3.3	0.86	0.02	0.0	6.3	13.1	32	-	1	49.6	14.0	36.4	C		HC	C	
59	A	0∿ 12	1.03	4.6	3.8	0.0	2.4	0.78	0.38	0.0	0.4	36.1	10	-	8	33.4	27.3	39.3	CL		Lic	CL	Pe
	B	13∿ 30	0.21	4.6	3.6	0.0	2.8	0.73	0.20	0.0	0.4	9.1	41	-	1	31.4	25.3	43.3	CL		Lic	CL	
	C	31∿ 42	0.40	4.7	3.6	0.0	3.1	1.03	0.25	0.0	1.0	20.9	21	-	1	33.4	19.3	47.3	SCL		Lic	SCL	
	D	43∿ 80	0.69	4.2	3.2	0.0	2.4	0.73	0.08	0.0	6.0	13.5	24	-	1	39.2	10.0	50.8	SC		Lic	SC	
60	A	0∿ 20	1.36	4.7	3.4	0.0	3.0	0.89	0.08	0.0	2.2	7.9	50	-	3	31.2	28.0	40.8	CL		Lic	CL	Ge-f
	B	21∿ 55	0.60	4.6	3.3	0.0	3.0	0.86	0.06	0.0	3.8	10.6	37	-	1	31.2	26.0	42.8	CL		Lic	CL	
	C	56∿	0.32	4.5	3.2	0.0	2.9	0.81	0.07	0.0	10.6	26.0	15	-	1	51.2	16.0	32.8	C		HC	C	

Table 2-3-4 Results of Test Pitting

(No. 1)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moistuare	Cohesion	Compact-ness	pH(KCl)	Remarks
1	1	0∿ 15	SL	10YR 3/2	-	-	0.3	Dry	L	23	5.7	
	2	16∿ 42	SL	7.5YR 4/2	5%	-	0.2	Semi wet	M	22	5.5	
	3	43∿100	SL	10YR 5/2	10%	WG	0.2	Wet	M	23	5.8	
2	1	0∿ 5	SL	7.5YR 3/1	-	-	0.3	Dry	M	18	5.5	
	2	6∿ 26	SL	7.5YR 4/2	5%	-	0.8	Semi wet	M	20	5.7	
	3	26∿ 45	SL	5YR 5/3	10%	WG	0.1	Spring water at 45 cm deep	M	24	5.5	
3	1	0∿ 35	SCL	10YR 5/3	Non	Non	Exist	Dry	Non	13	7.5	
	2	36∿ 45	SCL	10YR 6/4	Non	Non	Non	Dry	Non	22	7.8	
4	1	0∿ 17	SL	7.5YR 6/3	-	-	0.3	Dry	M	21	5.5	
	2	18∿ 40	L	7.5YR 4/3	-	-	0.1	Semi wet	M	22	5.7	
	3	41∿ 60	SL	7.5YR 6/3	5%	G	0.1	Spring water at 60 cm deep	M	13	5.8	
5	1	0∿ 13	SL	7.5YR 5/2	-	-	0.8	Dry	M	15	5.0	
	2	14∿ 24	SL	10YR 5/4	-	-	0.3	Semi wet	M	21	5.3	
	3	25∿100	SCL	7.5YR 6/4	Exist	-	0.1	Wet	M	22	5.5	
6	1	0∿ 20	L	7.5YR 2/1	-	-	Contain	Wet	L	10	-	
	2	20∿ 50	SL	10YR 6/3	-	WG	-	Spring water at 40 cm deep	L	17	-	
7	1	0∿ 10	SL	10YR 5/2	Non	Non	Exist	Semi wet	Non	7	5.7	
	2	11∿ 80	SL	10YR 6/6	Non	Non	Non	Spring water at 80 cm deep	Non	13	5.0	

(Cont'd.) (No. 2)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
8	1	0∿ 20	L	10YR 4/2	Exist 5YR 6/8	Non	Exist	Wet	Non	20	4.5	
	2	21∿ 45	C	10YR 6/3	Exist 7.5YR 6/8	Non	Non	Wet	Non	13	5.0	
	3	46∿ 70		10YR 7/3	Contain 7.5YR 6/8	Non	Non	Spring water at 70 cm deep	Non	13	-	
9	1	0∿ 23	L	7.5YR 2/1	-	-	3.6	Semi wet	L	23	5.8	
	2	24∿ 35	SL	10YR 4/1	Exist	-	0.2	Wet	M	15	5.0	
	3	36∿ 60	C	10YR 3/2	Contain	G	0.1	Spring water at 70 cm deep	H	15	6.5	
10	1	0∿ 25	SCL	7.5YR 3/1	-	-	Contain	Wet	L	20	5.0	
	2	26∿ 42	SL	7.5YR 4/2	-	-	Exist	Very wet	-	8	7.0	
11	1	0∿ 19	SL	5YR 3/1	Non	Non	Contain	Wet	Non	16	5.0	
	2	20∿ 48	SL	7.5YR 3/2	Non	Non	Exist	Wet	Non	19	5.5	
	3	49∿ 73	SL	10YR 6/4	Non	Non	Non	Spring water at 73 cm deep	Non	13	7.4	
12	1	0∿ 30	SCL	7.5YR 3/2	Non	Non	Contain	Semi wet	Weak L	22	5.8	
	2	31∿ 70	SCL	7.5YR 4/4	Non	Non	Exist	Wet 64 cm	Weak L	18	4.5	
	3	71∿	HC	10YR 5/4	Non	Non	Non		Middle	-		
13	1	0∿ 14	SL	7.5YR 2/2	-	-	Contain	Dry	L	19	5.0	
	2	15∿ 40	SL	7.5YR 4/3	-	-	Exist	Semi wet	L	17	5.7	
	3	41∿ 65	SL	10YR 7/3	Exist 10YR 7/6	-	-	Wet	SL	7	5.4	

(Cont'd.)

(No. 3)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
14	1	0∿ 35	SCL	7.5YR 4/3	-		Exist	Semi wet	Middle M	26	5.0	
	2	36∿ 65	C	7.5YR 4/2	Exist 5YR 3/6	WG	Exist	Wet	Strong H	23	7.5	
	3	65∿100	HC	7.5YR 4/2	Contain 2.5YR 6/4	G	Exist	Spring water at 100 cm deep	Strong H	26	-	
15	1	0∿ 17	SL	10YR 2/1	-	-	2.4	Dry	H	22	2.4	
	2	18∿ 45	SL	10YR 3/1	-	-	0.2	Semi wet	M	20	0.2	
	3	46∿ 70	SL	10YR 7/3	-	-	0.1	Semi wet	M	18	0.1	
16	1	0∿ 12	L	7.5YR 6/2	-	-	1.7	Semi wet	M	25	5.5	
	2	13∿ 35	SL	7.5YR 5/3	-	-	0.2	Semi wet	M	26	5.0	
17	1	0∿ 10	CL	7.5YR 2/1	Non	Non	Contain	Wet	Strong	15	-	
	2	11∿ 22	CL	7.5YR 3/1	Non	Non	Contain	Wet	Strong	18	-	
	3	23∿ 50	SL	11YR 5/2	Non	G	Exist	Spring water at 50 cm deep	Middle	22	-	
18	1	0∿ 30	CL	5YR 4/2	Non	-	Contain L	Semi wet	Middle M	19	4.8	
	2	31∿ 60	CL	5YR 5/2	Exist 7.5YR 5/6	WG	Exist -	Wet	Middle M	19	5.0	
	3	61∿110	C	7.5YR 5/3	Contain 7.5YR 5/6	G	Non -	Spring water at 70 cm deep	Strong H	20	-	
19	1	0∿ 19	CL	7.5YR 4/2	Non	-	Exist	Semi wet	L	22	4.7	
	2	20∿ 65	L	7.5YR 5/3	Non	WG	Exist	Wet	L	19	4.5	
	3	65∿ 85	SCL	7.5YR 6/2	Exist 5YR 5/8	G	Non	Spring water at 85 cm deep	L	23	4.0	

(Cont'd.)

(No. 4)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
20	1	0 ∿ 13	L	7.5YR 6/2	-	-	1.8	Semi wet	L	30	5.5	
	2	14 ∿ 52	L	7.5YR 6/3	Exist	-	0.3	Semi wet	M	30	5.5	
	3	53 ∿105	C	10YR 5/2		G	0.1	Wet	M	26	5.0	
21	1	0 ∿ 14	L	10YR 5/2	-	-	0.8	Dry	L	25	5.5	
	2	15 ∿ 37	SL	7.5YR 1/4	Contain(5%)	-	0.6	Semi wet	M	25	5.0	
	3	38 ∿ 58	SL	7.5YR 6/3	Contain(10%)	WG	0.2	Semi wet	M	23	5.2	
	4	59 ∿100	SCL	10YR 6/3	Contain(20%)	G	0.3	Wet	H	18	5.3	
22	1	0 ∿ 20	SCL	10YR 3/3	Non	Non	Contain	Dry	Non	7	7.5	
	2	21 ∿ 60	SCL	10YR 5/4	Non	Non	Exist	Semi wet	Non	7	-	
	3	61 ∿110	SCL	10YR 6/6	Non	Non	Non	Semi wet	Non	7	-	
23	1	0 ∿ 15	SL	7.5YR 6/2	-	-	0.8	Semi wet	M	25	5.8	
	2	16 ∿ 50	SCL	7.5YR 4/2	-	-	0.1	Semi wet	M	22	5.8	
	3	51 ∿112	SCL	7.5YR 4/1	Contain(20%)	G	0.2	Wet	H	20	5.8	
24	1	0 ∿ 20	SCL	7.5YR 4/1	-	-	Exist L		M	19	4.5	
	2	21 ∿ 32	CL	7.5YR 4/2	-	-	-	Spring water at 32 cm deep	M	14	4.5	
25	1	0 ∿ 40	SCL	10YR 5/4	Non	Non	Exist	Semi wet	Non	9	7.0	
	2	41 ∿100	SL	10YR 6/8	Exist 7.5YR 6/8	Non	Non	Semi wet	Non	4	5.7	
26	1	0 ∿ 25	L	10YR 4/3	Exist 7.5YR 5/8	-	Contain	Dry	Middle	15	5.0	
	2	26 ∿ 40	C	10YR 5/2	Contain 7.5YR 5/8	WG	Exist	Wet	Strong	18	4.5	
	3	40 ∿ 95	C	2.5Y 6/1	Contain 2.5Y 6/8	G	Non	Very wet	Strong	20	-	

(Cont'd.)

(No. 5)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
27	1	0∿ 30	SL	10YR 2/1	-	-	H		M	19	4.5	
	2	31∿ 70	C	5YR 4/1	Contain 10YR 6/6	G	-	Spring water at 30 cm deep	H	17	4.5	
	3	71∿100	C	5YR 4/2	-	G	-		H	22	-	
28	1	0∿ 7	SCL	10YR 4/2	-	-	M	Semi wet	L	20	5.2	
	2	8∿ 30	SCL	10YR 4/2	-	-	L	Wet	L	20	5.0	
	3	31∿	SCL	10YR 6/2	Contain 7.5YR 5/8	WG	-	Spring water at 45 cm deep	L	15	-	
29	1	0∿ 5	SL	7.5YR 4/4	-	-	M	Dry	L	12	6.5	
	2	6∿ 40	SCL	5YR 5/6	-	-	-	Semi wet	L	20	5.0	
	3	41∿	SCL	7.5YR 5/6	-	-	-	Semi wet	L	13	-	
30	1	0∿ 8	L	7.5YR 5/1	-	-	1.6	Semi wet	M	24	5.5	
	2	9∿ 48	SL	7.5YR 6/1	-	WG	0.3	Wet	M	30	5.5	
	3	49∿ 90	SCL	10YR 6/1	Contain	G	0.1	Wet	H	19	5.0	
31	1	0∿ 17	SCL	7.5YR 3/2	-	-	Contain 10	Dry	L	23	5.0	
	2	18∿ 30	SCL	7.5YR 5/4	-	-	Exist 10	Dry	L	21	5.0	
	3	31∿ 63	SCL	7.5YR 6/4	Exist 7.5YR 5/8	-	-	Semi wet	L	17	5.5	
	4	64∿100	SCL	10YR 6/3	Exist 7.5YR 5/8	-	-	Semi wet	L	23		
32	1	0∿ 17	L	10YR 4/2	-	-	2.6	Dry	M	22	5.0	
	2	18∿ 42	SL	10YR 6/2	-	-	0.8	Semi wet	M	22	5.7	
	3	43∿ 72	SCL	7.5YR 7/4	Exist (5%)	WG	0.1	Wet	M	16	5.5	

(Cont'd.) (No. 6)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
33	1	0∿ 13	SCL	10YR 2/3	-	-	Contain	Dry	M	21	5.0	
	2	14∿ 18	CL	10YR 7/1	-	-	-	Dry	L	31	5.0	
	3	19∿ 90	C	10YR 3/3	Contain 10YR 6/6	5	-	Semi wet	H	18	4.5	
34	1	0∿ 13	SCL	7.5YR 4/3		-	Exist	Dry	L	26	5.0	
	2	14∿ 48	SCL	7.5YR 4/3	Exist 7.5YR 6/8	WG	Exist	Dry	L	24	5.5	
	3	49∿105	CL	7.5YR 5/2	-	G	Non	Semi wet	H	24	5.5	
35	1	0∿ 7	SL	7.5YR 7/3	-	-	0.9	Dry	M	26	5.5	
	2	8∿ 45	SL	7.5YR 7/2	-	-	0.3	Semi wet	M	27	5.5	
	3	46∿100	SCL	7.5YR 4/2	15%	WG	0.1	Semi wet	M	26	5.0	
36	1	0∿ 15	SL	10YR 5/3	-	-	0.6	Dry	L	20	5.8	
	2	16∿ 43	SL	10YR 4/3	-	-	0.4	Semi wet	L	16	5.5	
	3	44∿ 60	LS	10YR 4/6	-	-	0.1	Wet	L	13	5.6	
	4	61∿ 93	LS	7.5YR 4/6	-	-	0.1	Spring water at 93 cm deep	L	13	5.6	
37	1	0∿ 30	L	7.5YR 4/2	-	-	0.7	Dry	M	25	5.6	
	2	31∿ 80	L	7.5YR 6/1	-	-	0.1	Dry	M	23	5.7	
	3	81∿100	L	7.5YR 7/1	-	-	0.3	Dry	M	26	5.5	
38	1	0∿ 28	SL	7.5YR 4/3		-	-	Semi wet	M	26	4.8	
	2	29∿ 50	L	10YR 5/3	Exist 2.5YR 4/8	WG	-	Wet	M	20	5.0	
	3	51∿100	SCL	7.5YR 5/4	-	G	-	Wet	M	17	-	

(Cont'd.) (No. 7)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
39	1	0∿ 44	LS	10YR 4/2	-	-	0.2	Semi wet	M	16	5.8	
	2	45∿ 64	SL	10YR 5/1	-	WG	0.1	Wet	M	15	5.8	
	3	65∿100	SL	7.5YR 6/2	Contain	G	0.1	Wet	H	12	5.9	
40	1	0∿ 25	SCL	7.5YR 4/3		-	-	Dry	L	19	4.0	
	2	26∿ 58	SCL	7.5YR 5/3		-	-	Semi wet	L	16	4.5	
	3	59∿ 80	C	7.5YR 6/1	Exist 10YR 6/7	G		Spring water at 80 cm deep	M	17	-	
41	1	0∿ 30	SCL	7.5YR 2/1	-	-	Contain	Dry	M	21	9.0	
	2	31∿ 48	L	10YR 6/6	Exist 10YR 7/8	-	Non	Semi wet	H	20	9.0	
	3	49∿ 95	C	10YR 5/4	-	-	Non	Semi wet	H		-	
42	1	0∿ 45	SCL	7.5YR 5/4		Non	Non	Dry	L	27	4.5	
	2	45∿ 70	C	7.5YR 5/3	Exist 7.5YR 6/8	Non	Non	Semi wet	M	23	4.5	
43	1	0∿ 10	SL	7.5YR 6/2	-	-	0.9	Dry	L	23	5.2	
	2	11∿ 61	SL	10YR 6/3	-	-	0.2	Dry	M	19	5.5	
	3	62∿110	SCL	7.5YR 5/3	-	-	0.1	Semi wet	M	17	5.0	
44	1	0∿ 16	SiL	7.5YR 5/3	-	-	1.3	Semi wet	M	25	5.5	
	2	17∿ 55	L	10YR 5/3	-	-	0.3	Semi wet	M	25	5.5	
	3	55∿ 75	C	7.5YR 7/2	Exist	-	0.8	Wet	H	22	4.0	
45	1	0∿ 15	SCL	10YR 2/2	-	-	H	Semi wet	M	18	4.0	
	2	16∿ 40	CL	10YR 5/3	-	-	L	Wet	M	17	4.2	
	3	41∿ 90	C	2.5YR 3/1	Contain 10YR 6/8	G	-	Spring water at 70 cm deep	M	14	-	

(Cont'd.)

(No. 8)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
46	1	0 ∿ 32	SCL	7.5YR 3/2	-	-	Contain	Semi wet	L	25	4.5	
	2	33 ∿ 54	SL	7.5YR 3/2	-	-	Contain	Wet	L	17	4.5	
	3	54 ∿ 65	SL	7.5YR 5/6	-	-	Non	Spring water at 60 cm deep	L	14	-	
47	1	0 ∿ 34	CL	7.5YR 5/6	-	-	L	Semi wet	M	20	4.5	
	2	35 ∿ 52	C	5YR 4/8	-	-	-	Semi wet	H	22	4.0	
	3	53 ∿ 100	C	25YR 5/8	-	-	-	Wet	H	21	-	
48	1	0 ∿ 15	CL	5YR 4/6	-	-	M	Semi wet	M	24	6.8	
	2	16 ∿ 38	CL	5YR 5/8	-	-	-	Semi wet	M	26	7.0	
	3	39 ∿ 95	C	5YR 5/8	-	-	-	Wet	H	21	8.0	
49	1	0 ∿ 34	L	7.5YR 3/1	-	-	1.8	Wet	M	20	5.5	
	2	35 ∿ 44	L	10YR 4/2	-	-	0.6	Semi wet	M	12	5.2	
	3	45 ∿ 70	LS	7.5YR 7/2	Contain	G	0.1	Spring water at 70 cm deep	H	31	5.9	
50	1	0 ∿ 8	CL	10YR 3/2	-	-	H	Wet	M	13	4.5	
	2	9 ∿ 26	CL	10YR 4/2	Exist 7.5YR 6/8 10 R 3/6	WG	H	Very wet	H	20	4.0	
	3	27 ∿ 40	C	10YR 6/1	Contain 7.5YR 6/8 10 R 3/6	G	L	Spring water at 25 cm deep	H	16	-	
51	1	0 ∿ 23	SL	7.5YR 3/2	-	-		Semi wet	L	23	4.5	
	2	24 ∿ 45	SL	7.5YR 5/3	-	WG	-	Spring water at 40 cm deep	L	11	7.0	

(Cont'd.)

(No. 9)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
52	1	0∿ 5	SCL	7.5YR 4/3	Exist 5YR 5/8	-	M	Semi wet	M	15	4.0	
	2	6∿ 10	SCL	7.5YR 4/4	Exist 5YR 5/8	-	M	Wet	M	16	4.4	
	3	13∿ 45	C	10YR 5/2	Exist 5YR 5/8	WG	L	Spring water at 45 cm deep	H	20	-	
53	1	0∿ 31	L	10YR 2/1	-	-	1.9		H	24	5.5	
	2	32∿ 70	SCL	10YR 7/1	Contain	G	0.1	Semi wet	H	28	6.0	
	3	71∿110	SC	10YR 5/1	Contain	G	0.1	Spring water at 120 cm deep	M	21	4.5	
54	1	0∿ 28	CL	7.5YR 4/2	Non	-	H	Semi wet	H	19	5.5	
	2	29∿ 40	CL	10YR 5/2	Non	WG	M	Wet	H	13	4.5	
	3	41∿	C	10YR 6/3	Contain 7.5YR 5/8	G	L	Spring water at 50 cm deep	H	15	-	
55	1	0∿ 17	SL	10YR 6/1	-	-	1.6	Dry	M	16	5.2	
	2	18∿ 50	SL	10YR 4/2	Exist	-	0.1	Semi wet	M	13	5.8	
	3	51∿ 75	SC	10YR 5/2	Exist	WG	0.4	Spring water at 75 cm deep	M	19	5.5	
56	1	0∿ 12	L	5YR 4/3	-	-	M	Dry	L	18	5.5	
	2	13∿ 50	L	5YR 6/8	-	-	-	Dry	L	25	6.4	
	3	51∿ 90	C	2.5YR 4/6	-	-	-	Semi wet	M	25	6.5	
57	1	0∿ 30	SCL	10YR 3/3	-	-	M	Dry	L	25	5.0	
	2	31∿ 61	SCL	10YR 6/3	-	-	L	Dry	-	23	5.0	
	3	65∿100	C	7.5YR 5/2	Contain 5YR 6/8	WG	-	Wet	M	23	4.5	

(Cont'd.) (No. 10)

Point number	Horizon	Depth	Soil texture	Soil color	Mottling	Gley	Humus	Moisture	Cohesion	Compact-ness	pH(KCl)	Remarks
58	1	0∿ 20	L	10YR 2/1	-	-	4.1	Semi wet	M	20	5.7	
	2	21∿ 50	SCL	7.5YR 6/2	-	WG	0.1	Wet	M	23	5.2	
	3	51∿105	C	10YR 5/2	15	G	0.1	Wet	H	16	5.5	
59	1	0∿ 12	CL	7.5YR 4/3	-	-	M	Dry	L	25	5.8	
	2	13∿ 30	CL	7.5YR 5/2	-	-	L	Semi wet	L	26	5.0	
	3	31∿ 42	SCL	7.5YR 6/2	-	WG	-	Semi wet	L	28	5.0	
	4	43∿ 80	SCL	7.5YR 4/2	Contain 7.5YR 6/8	G	-	Dry	H	23	4.5	
60	1	0∿ 20	CL	7.5YR 5/3	-	-	M	Dry	M	27	4.8	
	2	21∿ 55	CL	7.5YR 5/3	-	G	L	Wet	M	20	4.5	
	3	56∿	C	7.5YR 5/2	Contain 10 R 5/8	G	-	Spring water at 85 cm deep	H	22	5.0	

IRRIGATION

Table 2-4-1 Selected Mean Water Quality Parameters

Parameter	Posadas/Encarnacion	ITA-IBATE
Temperature (° C)	25.0	26.0
Turbidity (J.T.U.)	26.1	40.0
Color (APHA Units)	19.2	18.0
PH	7.5	7.4
Total Residue (mg/ℓ)	119.3	120.0
Calcium (mg/ℓ)	5.9	6.0
Sulphates (mg/ℓ)	3.6	2.0
Phosphates (mg/ℓ)	<0.03	<0.03
Nitrates (mg/ℓ)	0.24	0.24
Dissolved Oxygen (mg/ℓ)	8.8	8.2
% Saturation	98.0	96.0
Biochemical Oxygen Demand (mg/ℓ)	1.3	1.2
Iron	0.14	0.15
Coliform Bacteria (MPN/100 mℓ)	29∿1500	200∿1500

References: Projecto Yacyreta Ampliacion De Los Informes A Los Bancos Impacto Ambiental Del Projecto Volumen 2 Enero 1978

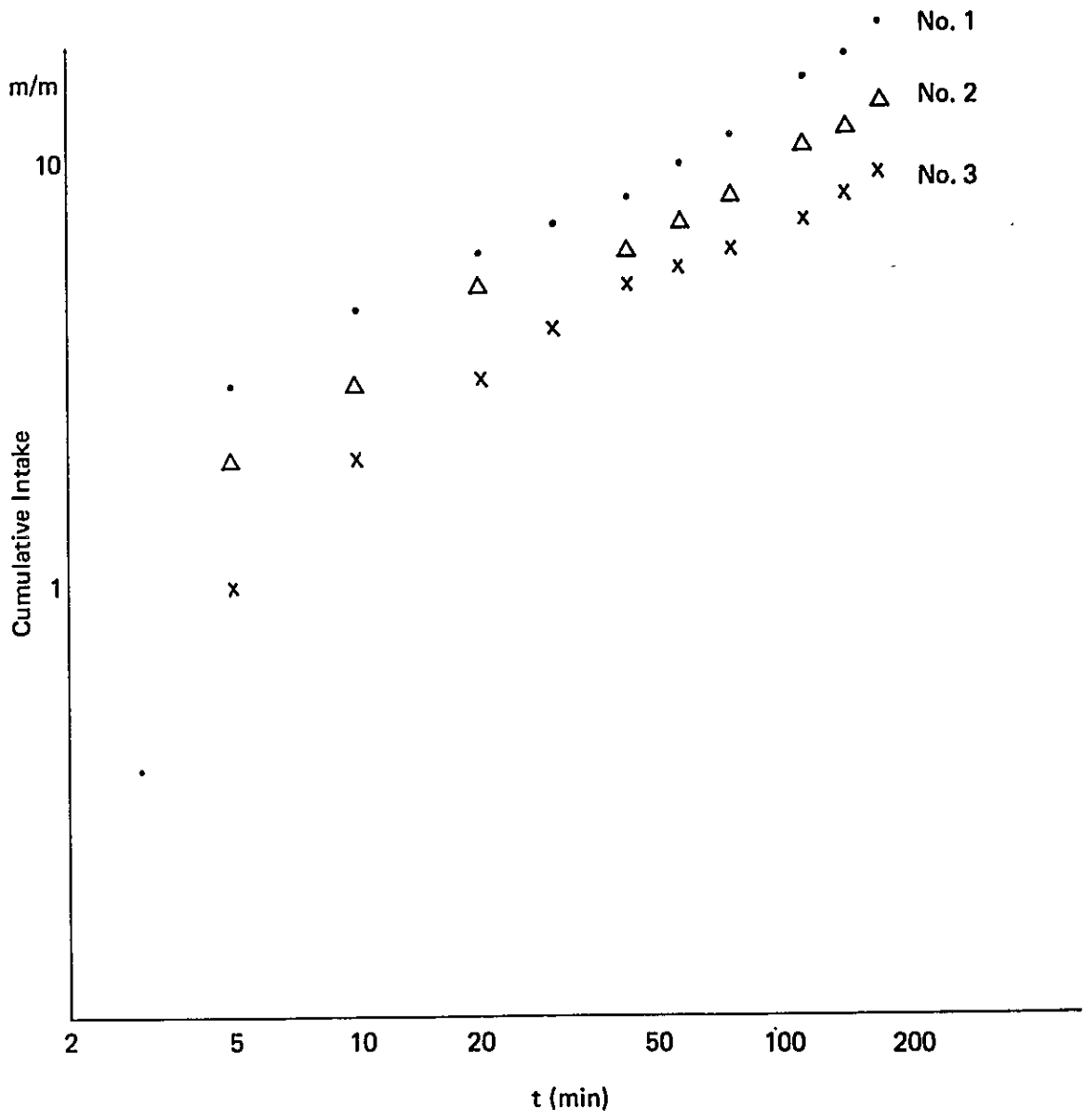


Fig. 2-4-1 Intake Rate Study

No. ① Ea. Bolf Paddy field before seeding

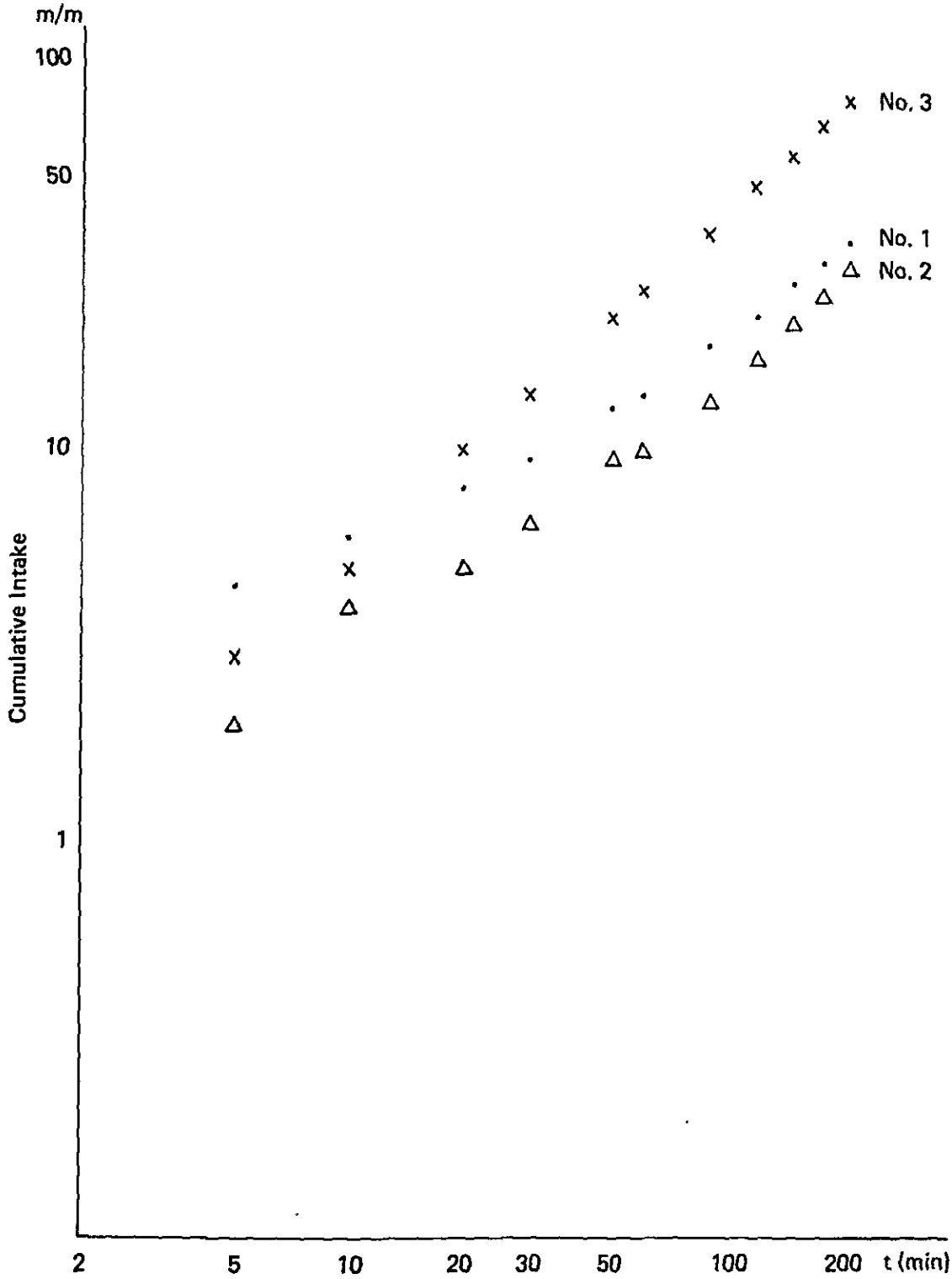


Fig. 2-4-1 Intake Rate Study

No. ② Ea. Bolf Paddy field nor cultivated this year

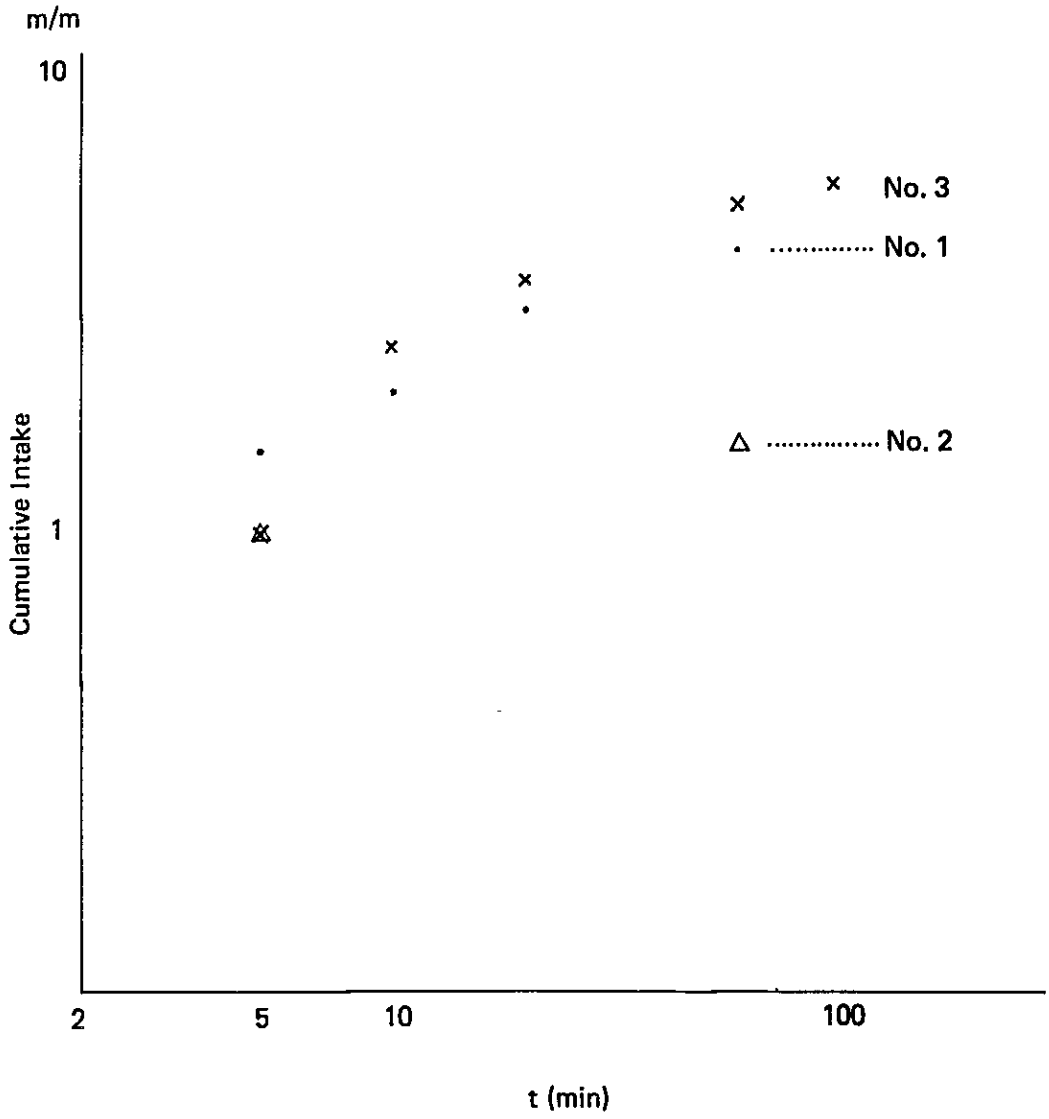


Fig. 2-4-1 Intake Rate Study
No. ③ Ea. Sarendy Swamp

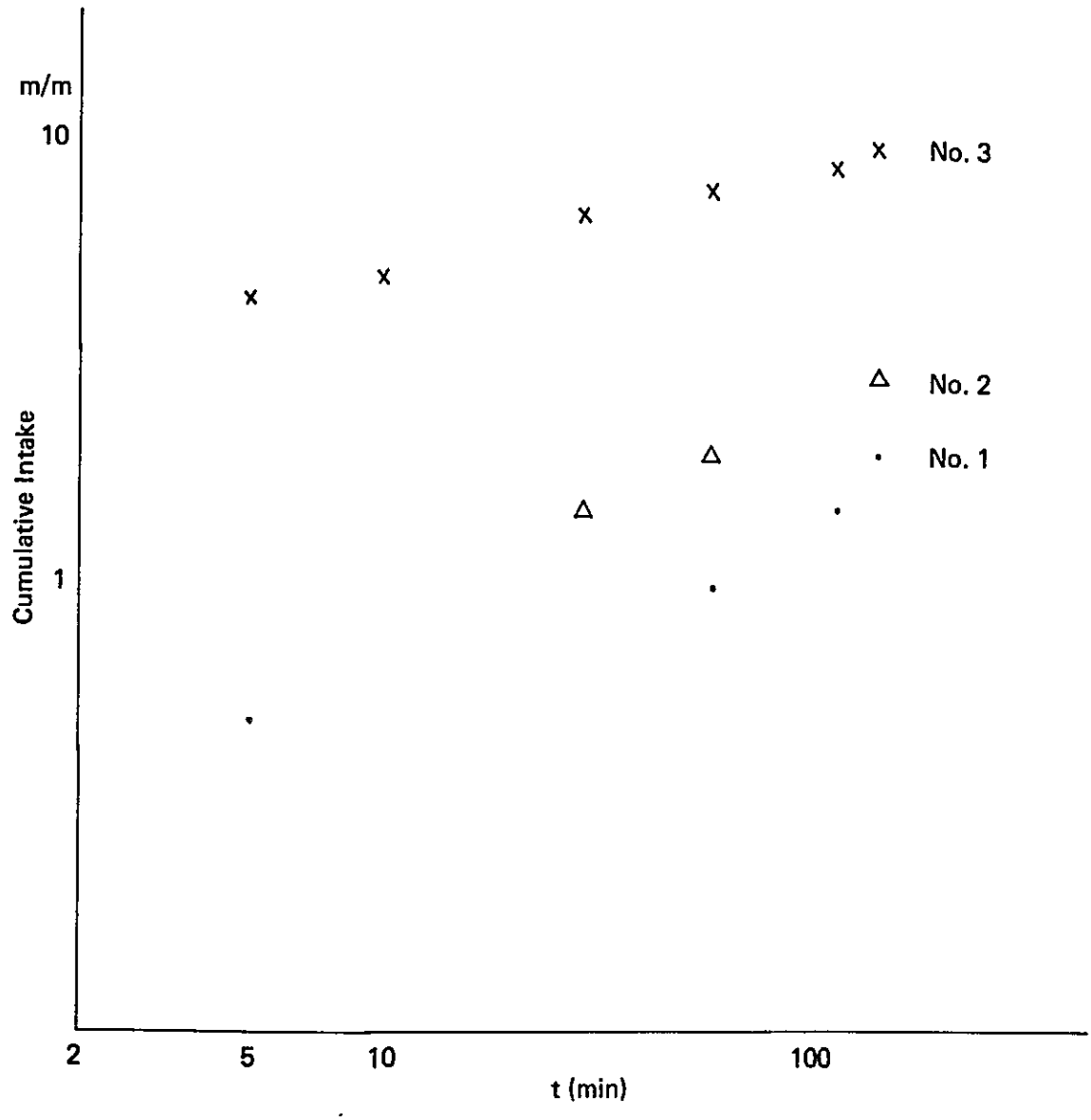


Fig. 2-4-1 Intake Rate Study
No. ④ Ea. Pablo Mora Swamp

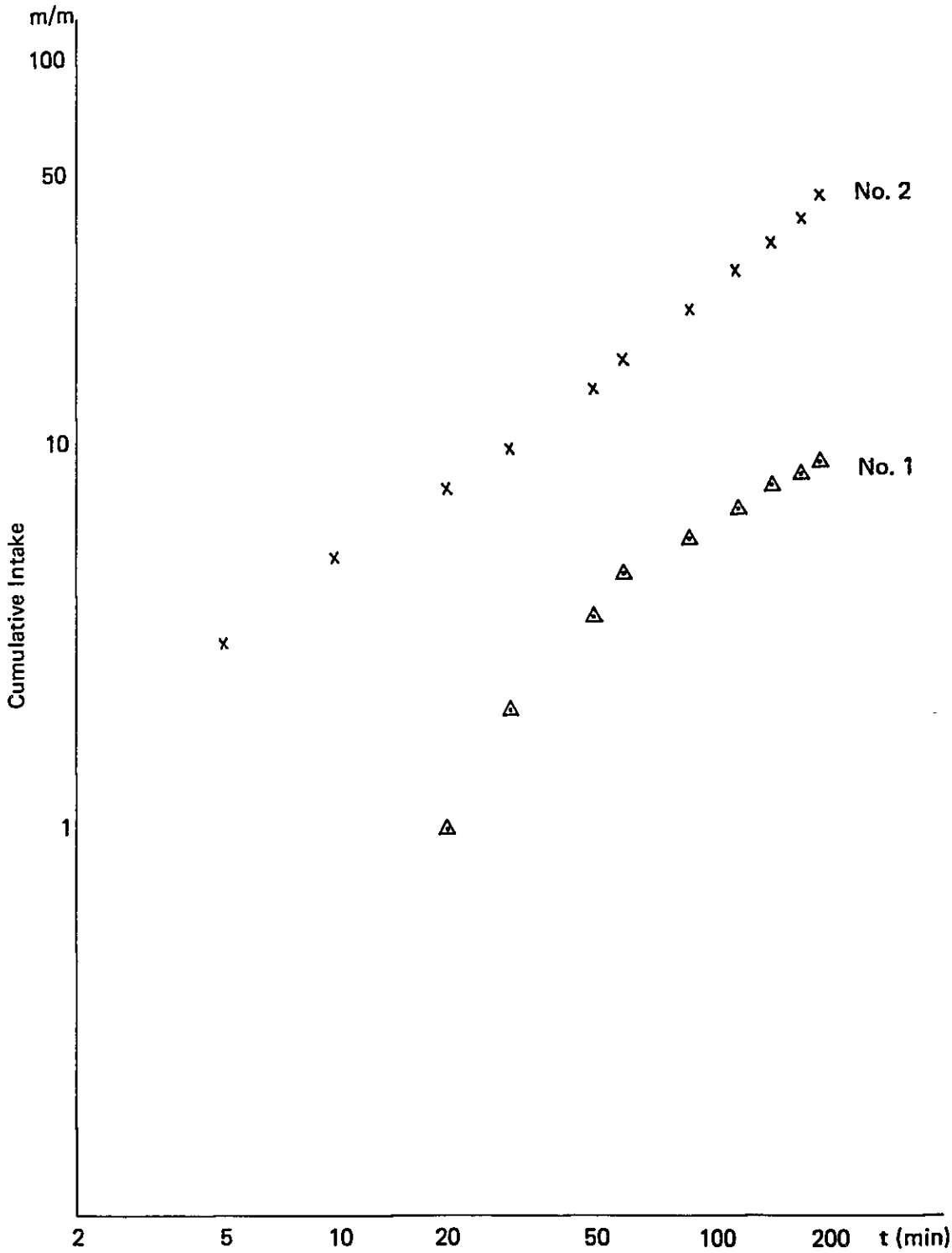


Fig. 2-4-1 Intake Rate Study

No. ⑤ Paddy field not cultivated this year

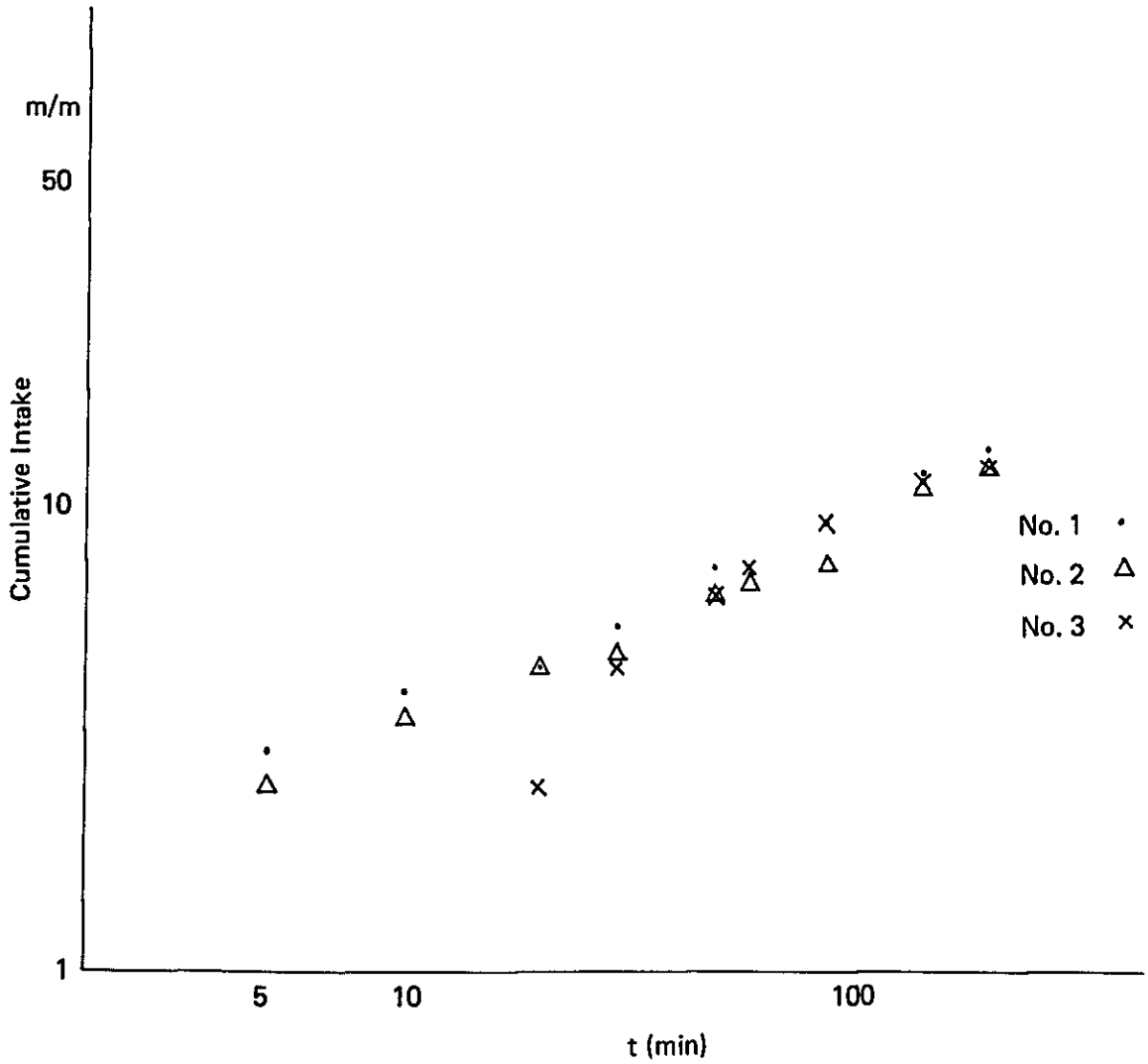


Fig. 2-4-1 Intake Rate Study

No. ⑥ Puesto lomita Paddy field not cultivated this year

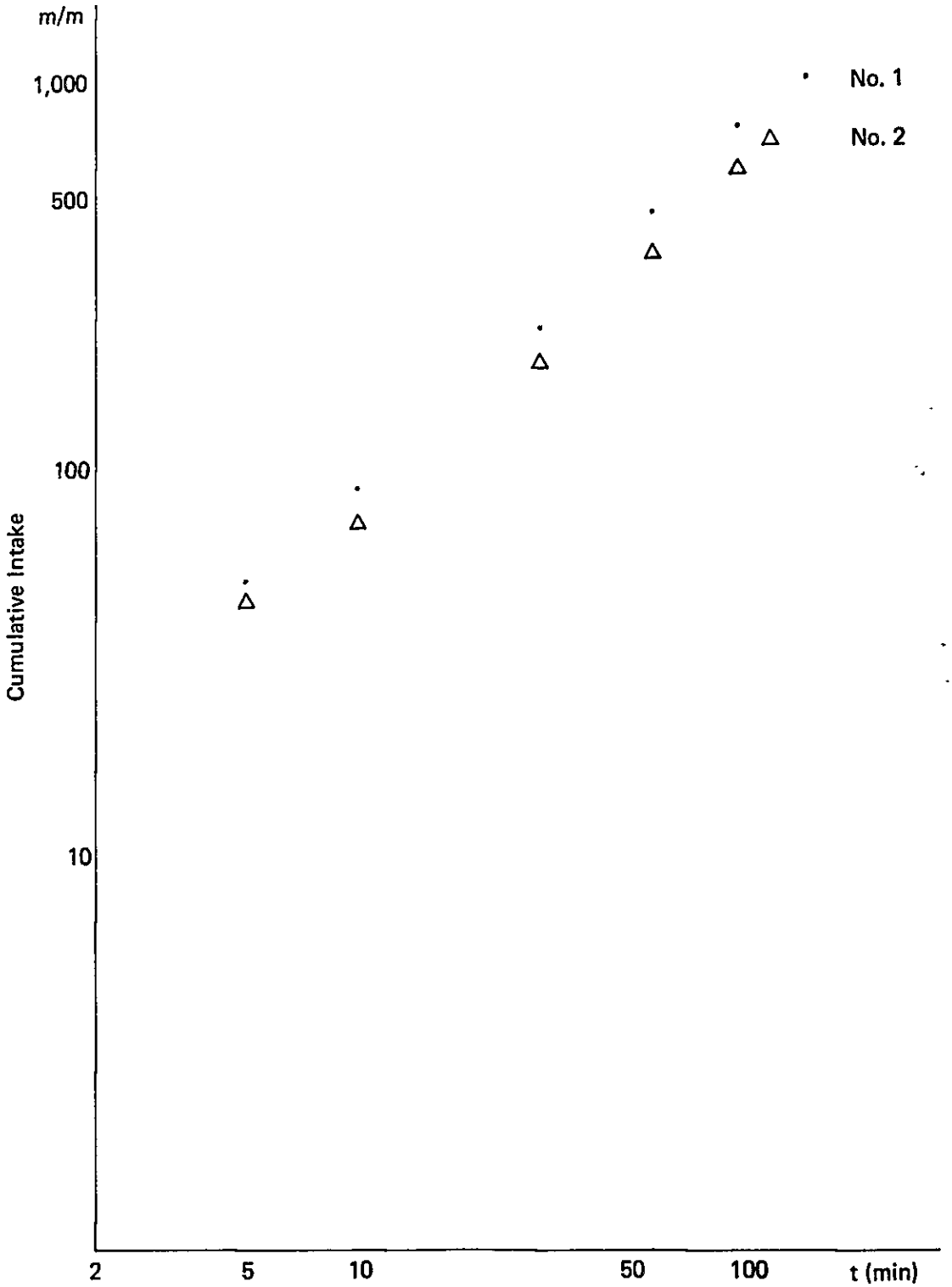


Fig. 2-4-1 Intake Rate Study

No. ⑦ Ayolas Orchard (Oranges)

SURVEYING

SURVEY APPENDIX

Access 1 – B

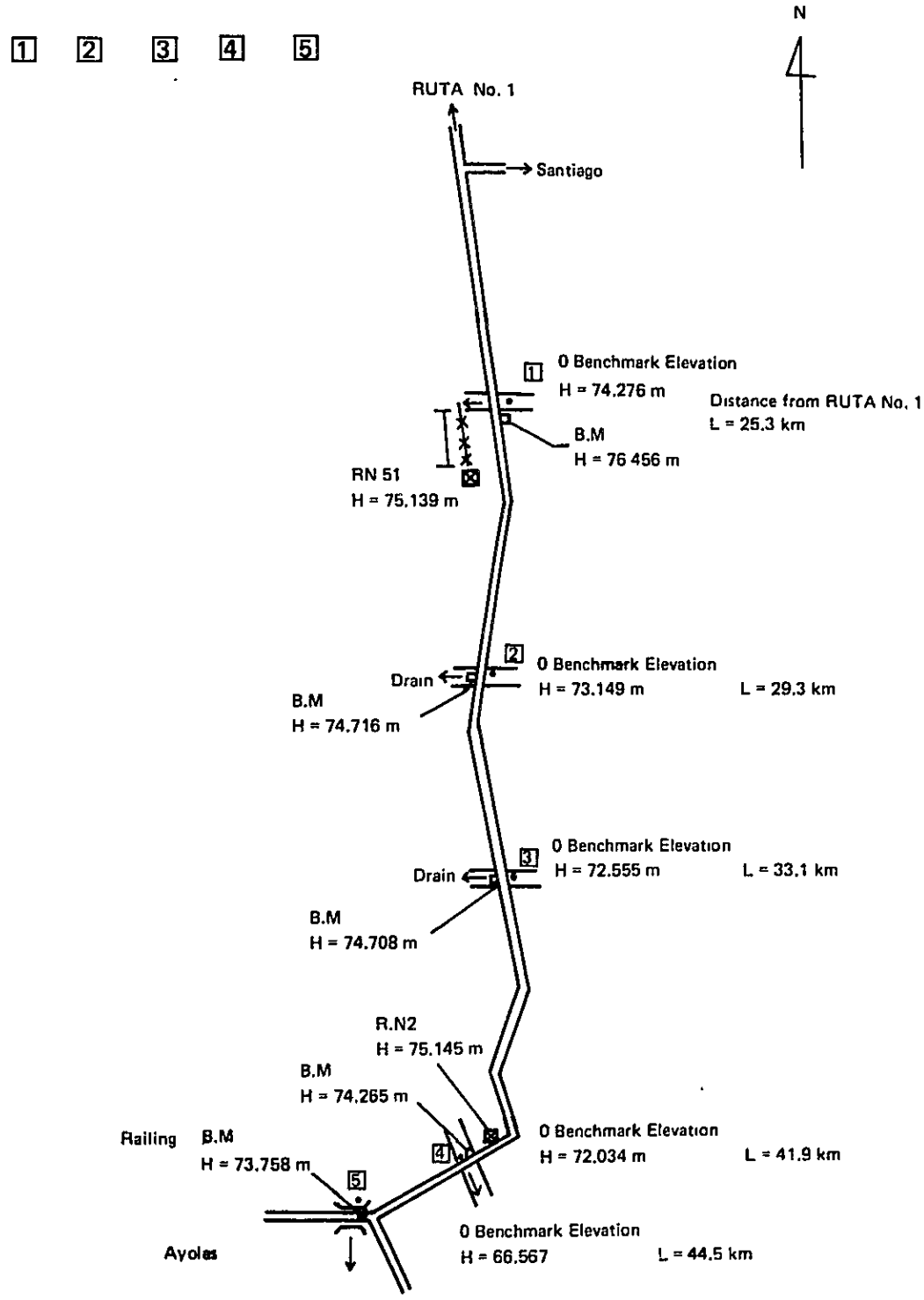


Fig. 2-5-1 Survey Benchmark Diagram (No.1 ∿ No.5)

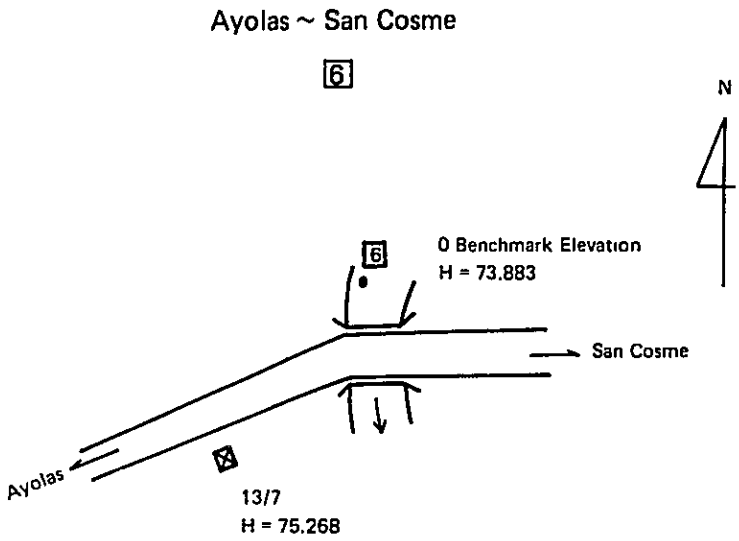


Fig. 2-5-1 Survey Benchmark Diagram (No.6)

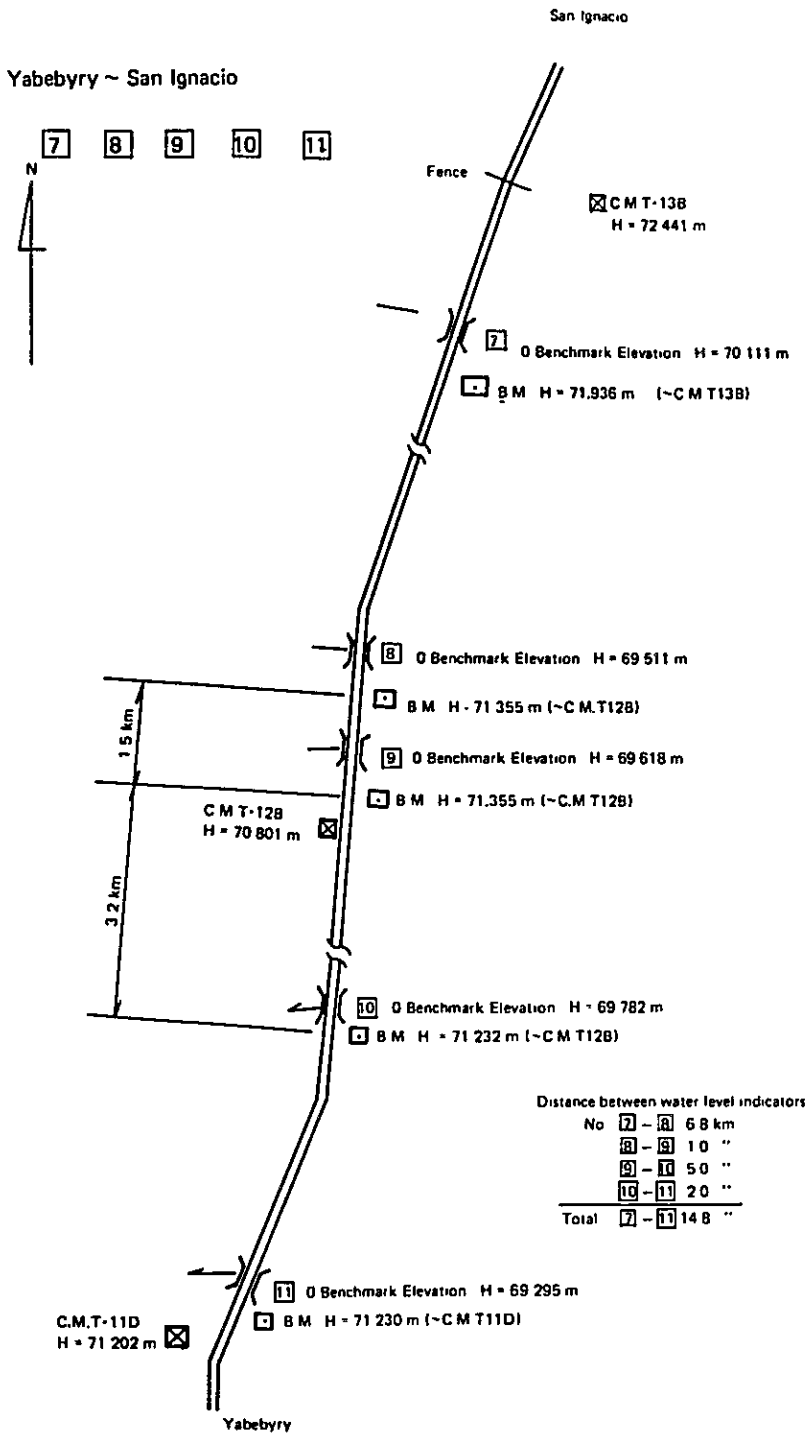


Fig. 2-5-1 Survey Benchmark Diagram (No.7 ∿ No.11)

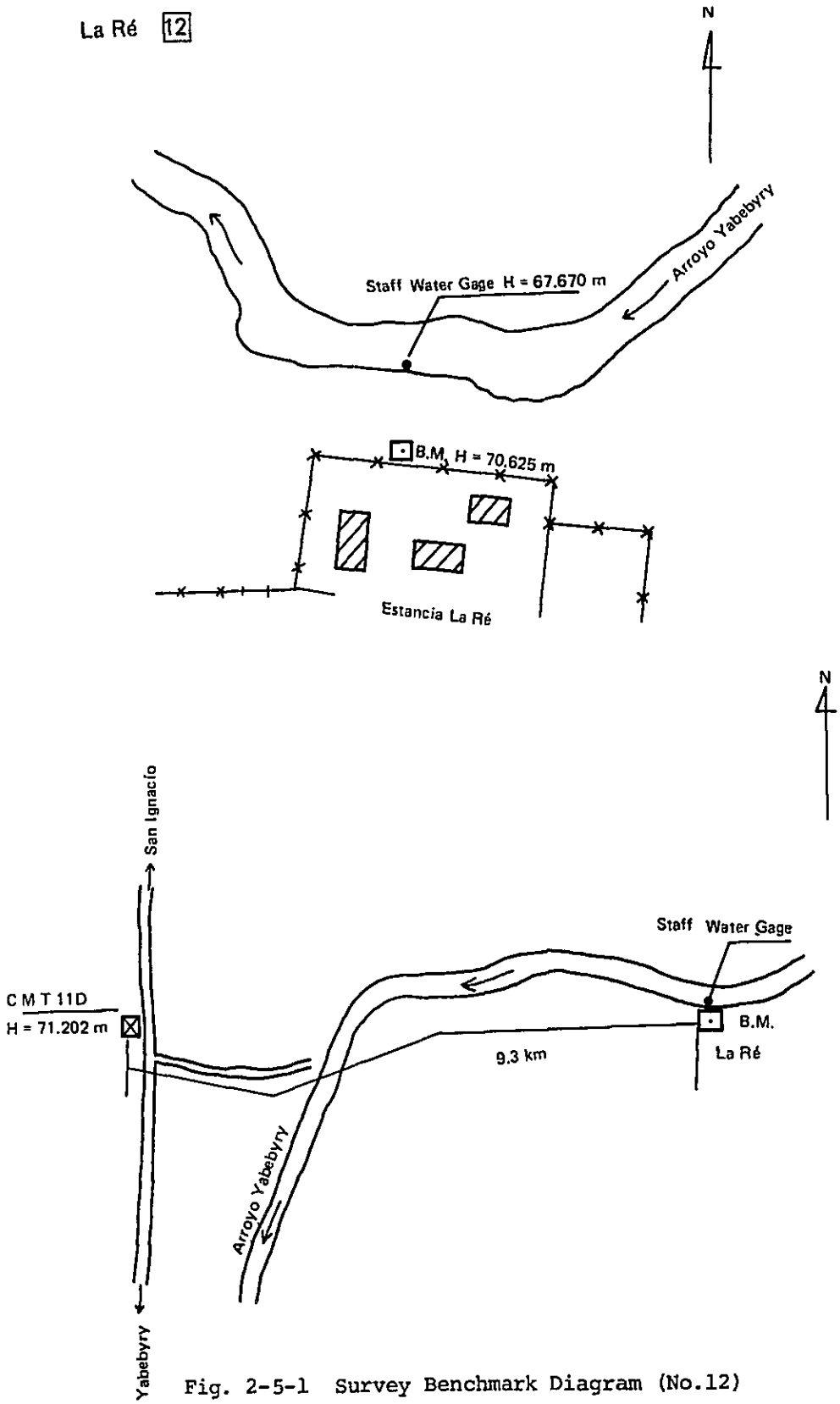


Fig. 2-5-1 Survey Benchmark Diagram (No.12)

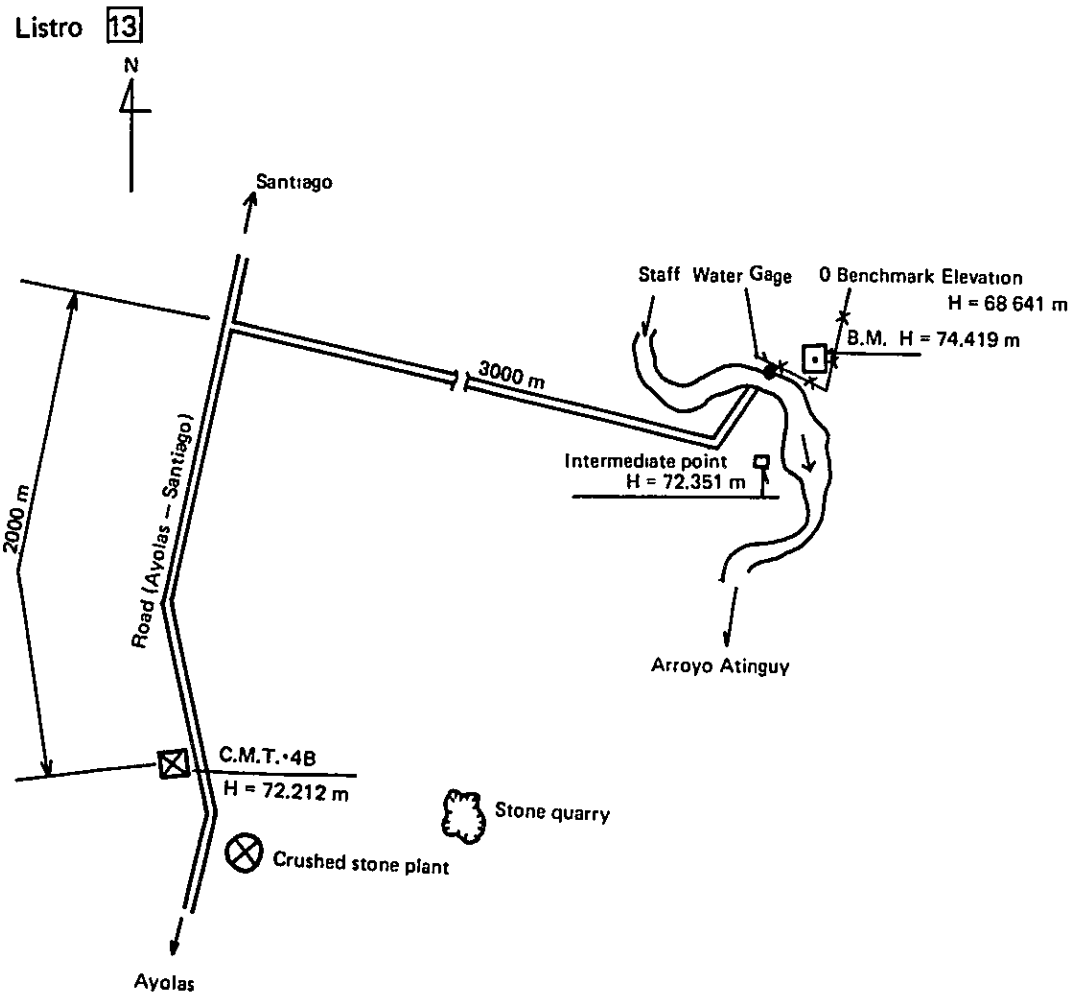


Fig. 2-5-1 Survey Benchmark Diagram (No.13)

1) Arroyo Ingua

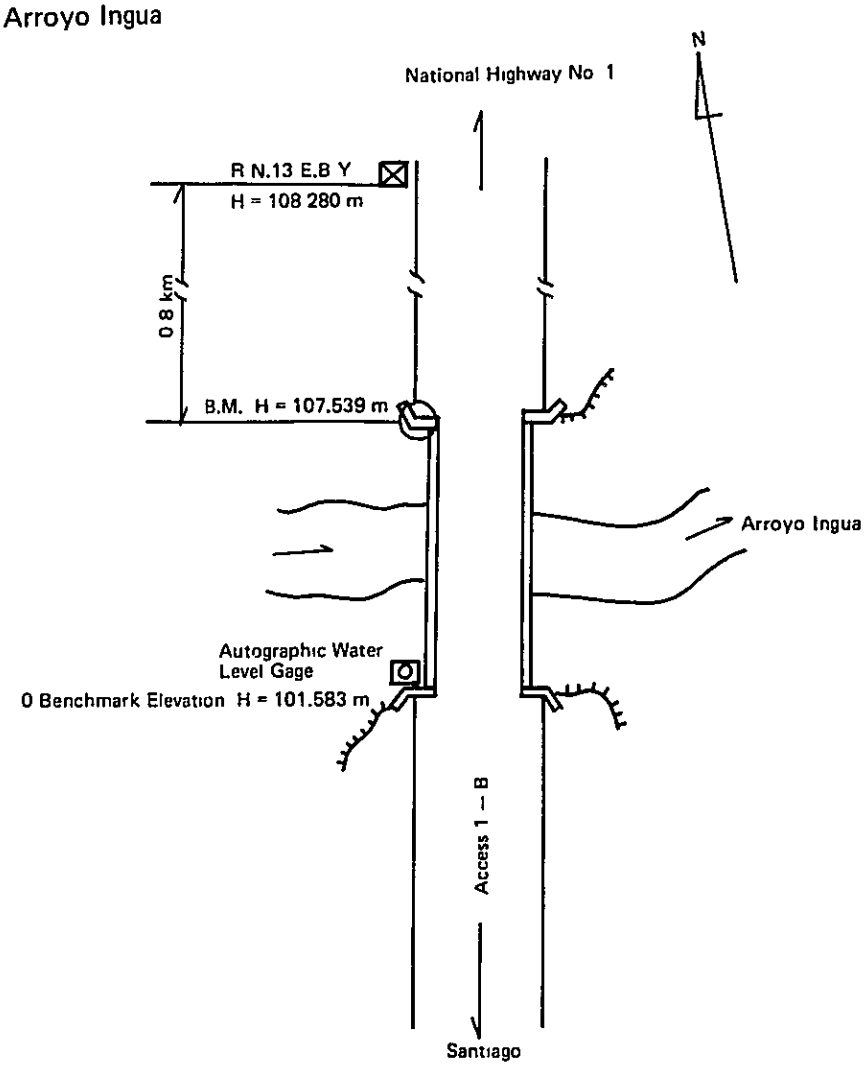


Fig. 2-5-2 Automatic Water Level Gage Benchmark Diagram (1/4)

2) Caje Cue

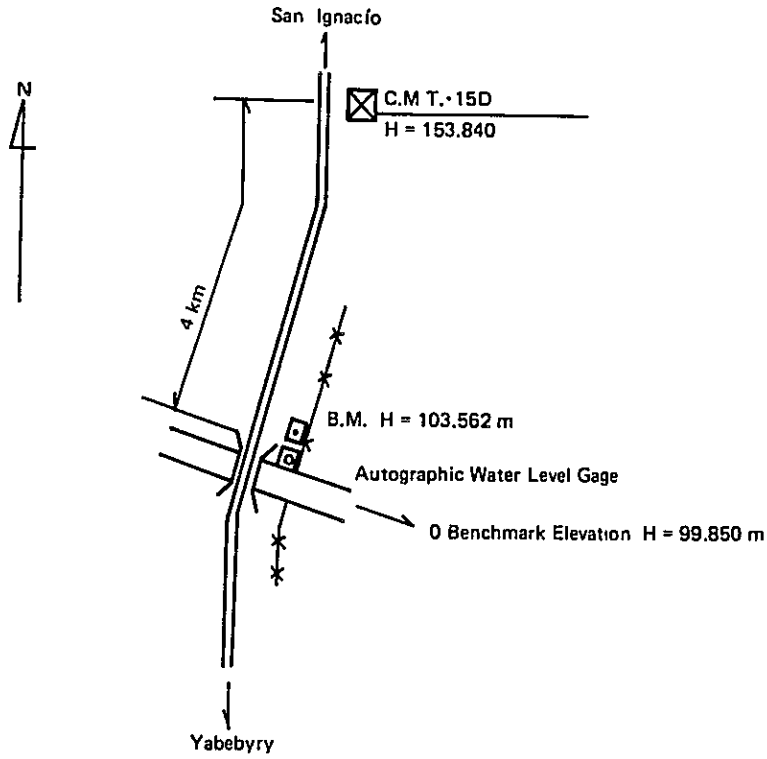


Fig. 2-5-2 Automatic Water Level Gage Benchmark Diagram (2/4)

3) Yabebyry

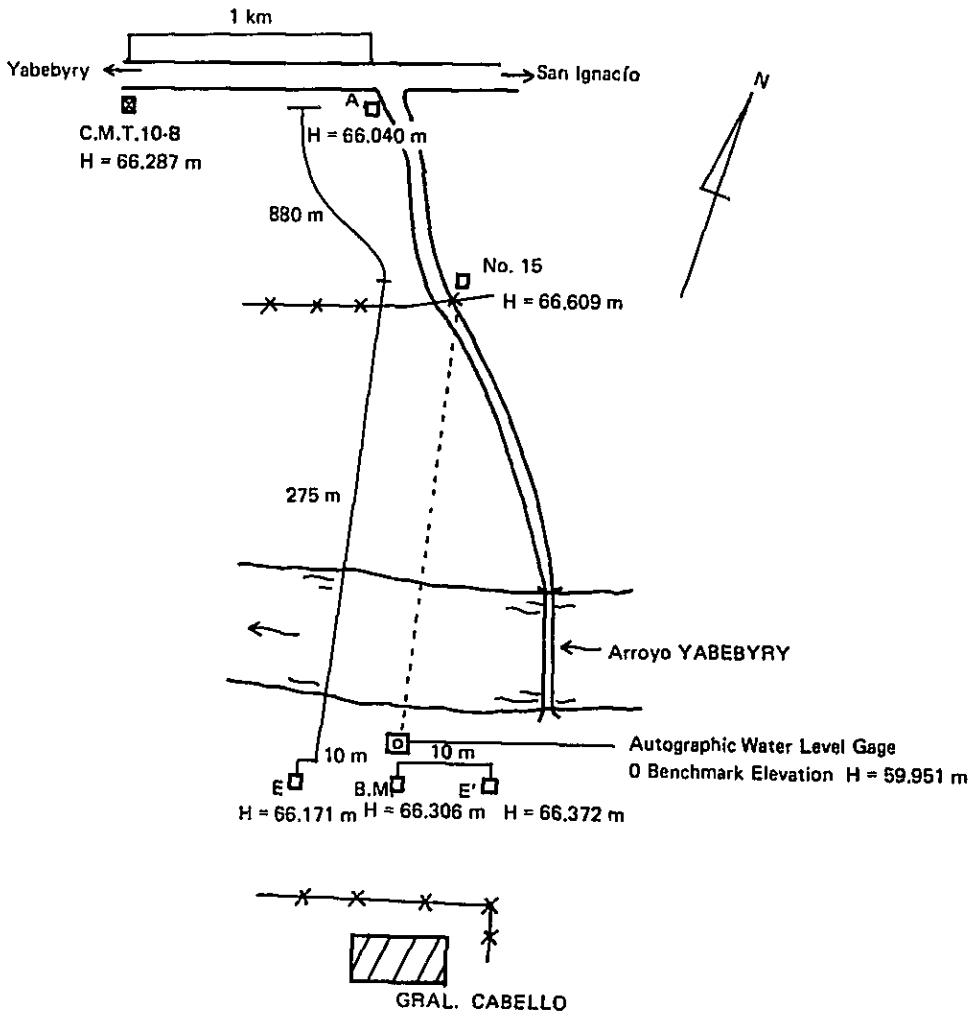


Fig. 2-5-2 Automatic Water Level Gage Benchmark Diagram (3/4)

4) Atinguy

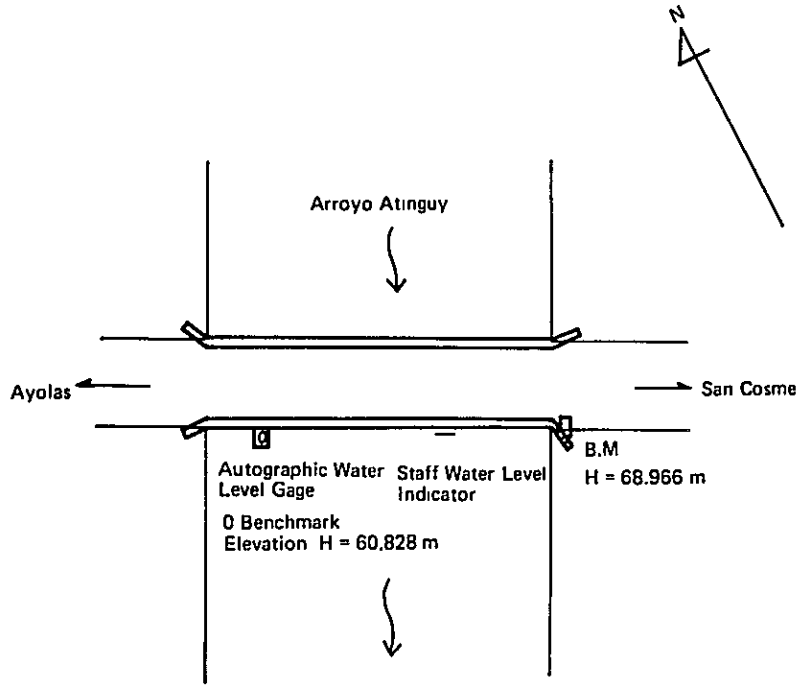


Fig. 2-5-2 Automatic Water Level Gage Benchmark Diagram (4/4)

Table 2-5-1 Zero Elevation of Autographic Water Level Gage and Staff Water Gage

Water Gage:

ISLA YACYRETA	:	0 (Zero)	Elevation +59,525 mts.
AYOLAS	:	0 (Zero)	Elavation +55,330 mts.
STANKIEVIC	:	0 (Zero)	Elavation +62,589 mts.

Autographic Water Gage

A° Tacuary (Ruta I)	:	0 (Zero)	Elavation +72,643 mts.
A° Atinguy (Puente)	:	0 (Zero)	Elavation +60,828 mts.

Source: EBY

Table 2-5-2 Specifications of Trianglation Points

Trianglation point	X	Y	Elevation
			m
ROSA	7025436	6521468	327,610
SANTIAGO	7001290	6521320	139,016
SMC1 AYOLAS	6972189	6513729	81,244
RITA	7001542	6498959	104,569
YGNACIO	7027189	6494782	173,596

Table 2-5-3 Control Point Specifications

Control point	X	Y	Elevation
CMT N1	7017523	6517777	167,132 m
CMT 1A	7015641	6517263	175,524
CMT 1B	7813578	6516682	159,110
CMT 1C	7011530	6516809	140,306
CMT 1D	7009422	6516619	146,419
CMT N2	7007538	6517609	131,786
CMT 2B	7004211	6520080	132,343
CMT 2C	7002555	6521378	134,970
CMT 2D	7000822	6522441	126,768
CMT N3	6999089	6523490	130,812
CMT 3A	6997121	6523700	104,777
CMT 3B	6995220	6523709	78,550
CMT 3C	6993245	6524020	77,358
CMT 3D	6991250	6524645	75,941
CMT N4	6989465	6525901	77,224
CMT 4A	6987637	6527033	74,275
CMT 4B	6985743	6527777	74,212
CMT 4C	6983891	6527730	75,208
CMT 4D	6981903	6527176	73,994
CMT N5	6979883	6527678	74,023
CMT 5A	6978043	6526621	73,715
CMT 5B	6976272	6525585	73,614
CMT 5C	6975615	6523674	73,947
CMT 5D	6974985	6521725	74,628
CMT N6	6973864	6519989	75,030
CMT 6A	6972682	6518467	72,829
CMT 6B	6971781	6516485	79,972
CMT 6B1	6971652	6515869	
CMT 6B2	6971548	6515689	
CMTKOEF	6971575	6515705	69,698
COTA 80	6995984	6523527	80,572
CMT 6C	6970261	6515041	61,354
CMT N7	6969503	6513478	61,431
CMT 71	6969679	6513800	
P.F. AYOLAS	6969795	6513762	62,901
CMT 7A	6970999	6512137	61,106
CMT 7B	6971527	6510054	62,503
CMT 7C	6972339	6508004	64,110
CMT 7D	6971303	6506105	64,075
CMT N8	6970306	6504231	63,314
CMT 8A	6969941	6502326	63,613
CMT 8B	6969310	6500518	66,434
CMT 8C	6969708	6498291	64,592
CMT 8D	6970057	6496310	67,611
CMT N9	6969653	6494189	67,857
CMT 9A	6969580	6482116	70,187
CMT 9B	6970392	6490236	70,694
CMT 9C	6970147	6488291	70,500

Control point	X	Y	Elevation
			m
CMT 9D	6970403	6486367	70,267
SMC2 YABEBYRY	6970801	6485622	70,344
CMT N10	6971425	6484718	64,912
CMT 10A	6973607	6484911	65,015
CMT A1	6973183	6482868	66,635
CMT A2	6974654	6481382	65,671
CMT A3	6974373	6479457	64,973
CMT A4	6973965	6477368	67,031
CMT A5	6972961	6475639	66,846
CMT A6	6971713	6474367	59,739
CMT A7	6972480	6471855	64,058
CMT 10B	6975412	6486219	66,287
CMT 10C	6976407	6488029	68,304
CMT 10D	6977889	6489211	68,188
CMT N11	6979361	6490818	67,827
CMT 11A	6981178	6491409	68,841
CMT 11B	6983140	6492478	71,981
CMT 11C	6984088	6494247	70,339
CMT 11D	6986044	6494470	71,202
CMT N12	6987952	6494987	70,757
CMT 12A	6989916	6495198	70,721
CMT 12B	6991841	6495377	70,801
CMT 12C	6993781	6495522	70,927
CMT 12D	6995752	6495846	70,956
CMT N13	6997685	6495311	71,089
CMT 13A	6999691	6496789	70,959
CMT 13B	7001547	6497338	72,441
CMT 13C	7003668	6497657	76,172
CMT 13D	7004728	6499521	91,858
CMT N14	7006707	6500088	104,640
CMT 14A	7008803	6499494	102,969
CMT 14B	7010785	6499161	114,001
CMT 14C	7012934	5498912	142,242
CMT 14D	7014799	6497956	118,583
CMT N15	7016763	6497027	119,220
CMT N15-1	7017694	6496793	133,268
CMT 15A	7018854	6496120	135,950
CMT 15B	7020883	6496775	103,559
CMT 15C	7022828	6497576	150,373
CMT 15D	7024866	6497247	153,840
CMT N16	7026454	6496255	164,156
CMT 16A	7027801	6497628	122,669
CMT 16B	7028240	6499613	104,280
CMT 16C	7028851	6501640	143,608
CMT 16D	7028335	6503592	159,876
CMT N17	7027071	6504859	169,950
CMT 17A	7026593	6506923	140,758
CMT 17B	7026340	6508782	165,784
CMT 17C	7026879	6511124	171,664

Control point	X	Y	Elevation
CMT 17D	7026914	6513315	184,023 m
CMT N18	7024902	6513710	179,272
CMT 18A	7022968	6514337	164,299
CMT 18B	7020890	6514009	177,370
CMT 18C	7019470	6515655	169,031

Table 2-5-4 Control Point for Access 1-B

*— Indicates the control points not suitable for use

Control point	Elevation
	m
RN 1	161,622
RN 2	158,642
RN 3	155,182
RN 4	148,744
RN 5	145,644
RN 6	136,799
RN 7	116,561
RN 8	110,350
RN 9	123,429
RN 10	131,232
RN 11	132,455
RN 12	127,534
RN 13	108,280
RN 14	104,865
RN 15	104,298
RN 16	105,751
RN 17	110,642
RN 18	121,001
RN 19	130,659
RN 20	128,938
RN 21	116,797
RN 22	110,671
RN 23	112,168
RN 24	126,211
RN 25	131,540
RN 26	128,060
RN 27	136,956
RN 28	131,988
RN 29	130,604
RN 30	129,390
RN 31	126,449
RN 32	118,337
RN 33	111,875
RN 34	118,120
RN 35	107,090
RN 36	91,367
RN 37	96,703
RN 38	99,587
RN 39	81,763
RN 40	78,797
RN 41	77,935
RN 42	—
RN 43	77,772

Control point	Elevation
	m
RN 44	—
RN 45	—
RN 46	76,799
RN 47	76,645
RN 48	76,869
RN 49	76,642
RN 50	—
RN 51	75,139
RN 52	74,217
RN 53	74,267
RN 54	74,110
RN 55	74,086
RN 56	74,027
RN 57	73,637
RN 58	73,652
RN 59	73,660
RN 60	—
RN 61	—
RN 62	—
RN 63	73,557
RN 64	73,503
RN 65	—
RN 66	73,377
RN 67	73,213
RN 68	73,223
RN 69	—
RN 70	73,633
RN 71	—
RN 72	—
RN 73	—
RN 74	74,636
RN 75	74,735
RN 76	74,092
RN 77	74,094
RN 78	73,501
RN 79	74,212
RN 80	74,461
RN 81	73,689

Control point	Elevation
	m
Point of change A	
RN 1	73,375
RN 2	75,145
RN 3	73,327
RN 4	73,349
RN 5	74,271
RN 6	73,623
RN 7	74,070
RN 8	72,995
RN 9	73,157
RN 92	72,717
RN 93	63,576 Cuaira Cue

Table 2-5-5 Control Point for Access No. 5

Control point	Elevation
	m
RN 1	93,773
RN 2	96,350
RN 3	100,310
RN 4	107,418
RN 5	105,505
RN 6	106,127
RN 7	115,164
RN 8	116,107
RN 9	102,894
RN 10	91,381
RN 11	88,460
RN 12	87,180
RN 13	95,123
RN 14	97,646
RN 15	106,161
RN 16	104,749
RN 17	100,324
RN 18	90,452
RN 19	88,507

Control point	Elevation
	m
No.2	
RN 10.2	92,178
RN 10.5	94,772
RN 11	100,609
RN 11.5	103,868
RN 12	109,370
RN 12.5	107,271
RN 13	99,427
RN 13.5	100,925
RN 14	108,218
RN 14.5	116,833
RN 15	124,336
RN 15.5	128,586
RN 16	128,921
RN 16.5	118,087
RN 17	107,427
RN 17.5	120,198
RN 18	120,132

Control point	Elevation
	m
RN 18.5	108,192
RN 19	113,207
RN 19.5	111,937
RN 20	115,717
RN 20.5	117,141
RN 21	109,831
RN 21.5	109,175
RN 22	106,348
RN 22.5	109,861
RN 23	111,956
RN 24.5	116,894
RN 0.5	107,375
RN 1	103,716
RN 1.5	110,216
RN 2	109,886
RN 2.5	104,812
RN 15	101,311

Table 2-5-6 Basic Traverse Network Control Point for Yacyreta Dam

Control point	X	Y	Elevation
			m
13/6	6977644.486	6546284.226	76,285
PL-8	6977664.777	6546319.308	—
13/7	6977694.560	6546370.783	75,268
13/8	6977744.640	6546457.339	75,563
13/9	6977794.720	6546543.895	75,955
14/0	6977844.800	6546630.451	76,308
PL-9	6977856.639	6546650.914	—
14/1	6977894.877	6546717.010	75,902
14/2	6977944.953	6546803.568	76,307
III-4C	6977968.429	6546844.147	75,615
14/3	6977982.246	6546895.438	76,200
14/4	6978008.258	6546991.996	76,251
PL-10	6978010.612	6547000.735	—
14/5	6978034.266	6547088.555	75,008
14/6	6978060.273	6547185.114	75,098

SETTLEMENT

Established Colonies (Dept. of Concepcion)

Period 1954 ∿ 1981

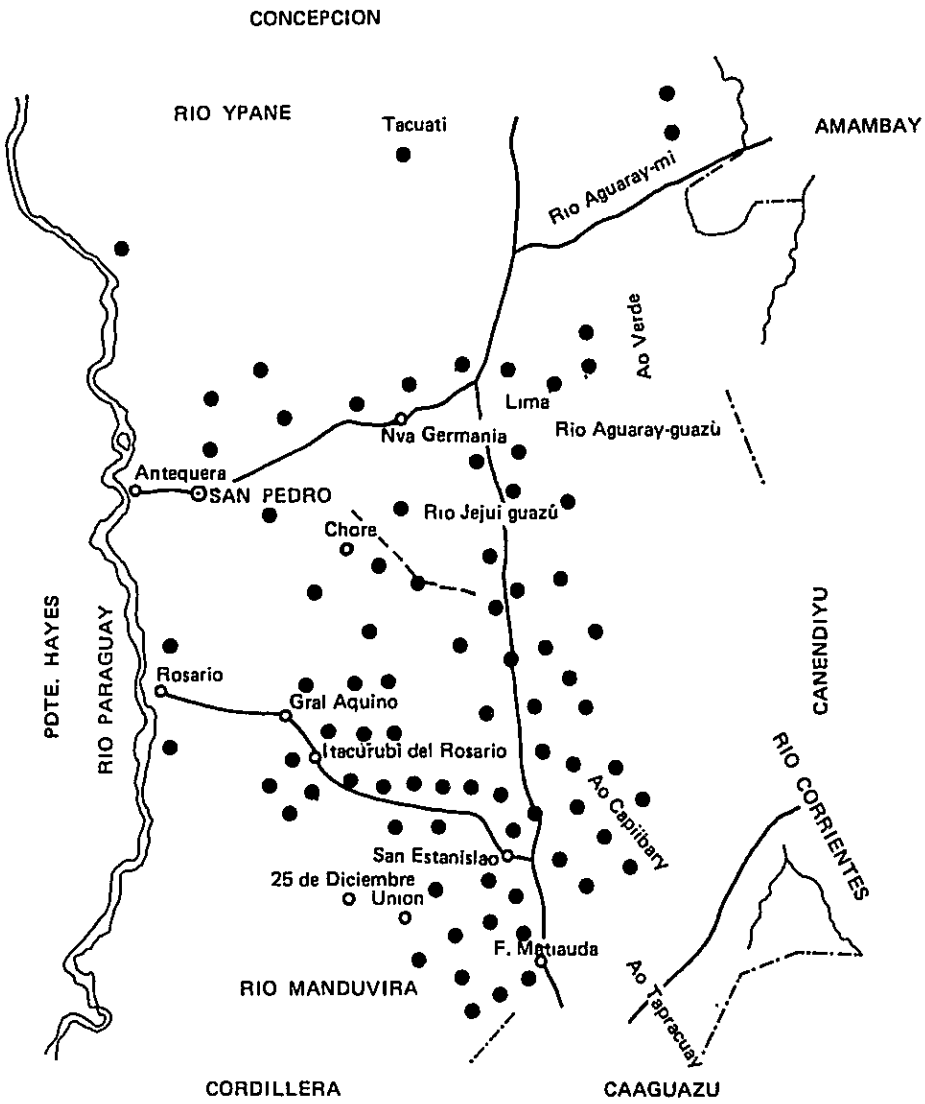
	Official Colonies	Area ha	No. of Lots
1.	Coé Porã	1,624	144
2.	Santa María de la Sierra	10,451	110
3.	Jorge S. Miranda	3,222	242
4.	San Ramón	10,000	200
5.	N. R. Costa de Seda	73	35
6.	Curuzú Ñú	1,519	150
7.	Paso Barrete	608	-
8.	R. L. Petit	5,000	252
9.	María Auxiliadora	1,516	139
10.	San Alfredo	1,133	113
11.	Cnel. E. Sánchez	1,633	109
12.	N. R. Paso Horqueta	46	105
13.	Juan M. Frutos	19,101	965
14.	Cerro Menby	18,000	730
15.	Santo Domingo	725	72
16.	Caraguatay	688	61
17.	Ex Enfermera del Chaco	10,685	125
18.	Epopeya Nacional	12,326	410
19.	Capitán Sosa	842	67
20.	Tupí Guaraní	3,751	128
21.	Cuartelero	3,537	117
22.	Emilio R. Pereira	10,991	1,402
23.	Ybagapy (Ex F. de Pinedo)	10,572	203
24.	Choferes del Chaco	3,627	162
25.	Indígena Norma	846	1
26.	Mayor Bullo	1,525	65
27.	1° de Mayo	10,000	200
28.	Herminio Mendoza	6,482	116
29.	Cerro Sarambí	10,000	130
30.	Vyã Pave (Azotey)	1,470	147
31.	Ñepytybó	1,700	108
32.	Ex Miner	6,747	190
33.	Ex Combatientes del Chaco	10,396	507
34.	Héroes del Chaco	12,027	502
35.	Virgen del Rosario	4,500	224
36.	Aquidabán	6,035	306
37.	Reconstrucción	2,139	102
38.	N. R. Laguna Cristo Rey	596	45
39.	Tte. Manuel Cabello	4,000	150
40.	San Carlos	3,459	124
41.	Jhugua Ñandú	596	45
	Total	214,224	9,003
	Private Colonies		
1.	Sociedad Miner S. A.	4,257	237
2.	Vicente Sánchez	3,048	38
	Total	7,305	275

Official:	41 Col. 214,224 Há	9,003 Lots
Private :	2 Col. 7,305 Há	275 Lots
Total	43 Col. 221,529 Há	9,278 Lots

Source: Frutos J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. SAN PEDRO

Established Colonies
Period 1954 ~ 1981



Total : 79 Col. 322.019 Há 15.285 Lots

Established Colonies (Dept. of San Pedro)

Period 1954 ∿ 1981

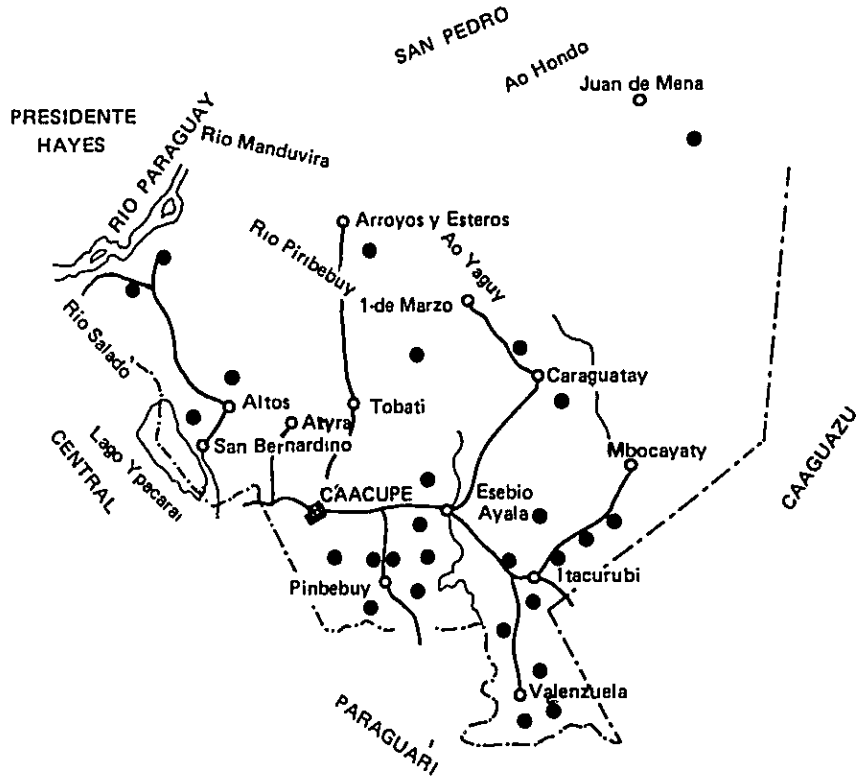
	Official Colonies	Area ha	No. of Lots
1.	Defensores del Chaco	33,000	1,784
2.	Navidad	6,445	580
3.	Indígena Palomita	1,046	1
4.	Vaca Jhú	2,030	103
5.	Almeida Cué	2,220	102
6.	Costa Pucú e Itapeby	2,457	156
7.	Apepú	1,907	73
8.	Novireta Cué	1,897	146
9.	Repatriados del Norte	2,079	103
10.	Aquidabán Nigui	2,101	103
11.	San Francisco	1,600	90
12.	Yuaijhú	2,093	110
13.	Santa Teresa	2,250	157
14.	Aña Retagua	1,050	100
15.	Tapiracuai Loma	850	78
16.	Ana Díaz (Zona G)	34,000	137
17.	Luz Bella	5,502	214
18.	Felicidad	3,320	102
19.	Ex Parini	2,982	124
20.	Ex Matiauda	2,400	162
21.	Vya'ra	1,735	106
22.	Víctor N. Vasconcellos	2,800	143
23.	N. R. Mbery	2,310	193
24.	Ycua Mandyyú	4,700	405
25.	Sto. Domingo del Capiibary	1,500	101
26.	1° de Mayo	969	45
27.	Peguajhó	1,026	72
28.	Río Rugua y Jhugua Barrero	1,346	157
29.	Itac. del Rosario	1,787	203
30.	Tuyangó	826	64
31.	Jhugua Guazú	1,379	209
32.	N. R. Capilla Rugua	504	63
33.	N. R. Costa Galván y Ramos-Cué	672	100
34.	N. R. Barrero	102	106
35.	Yecupyty	1,647	118
36.	Yetyty	3,976	225
37.	Abdón Castiglioni	1,042	105
38.	2° Reconstrucción	3,000	132
39.	Chococué	1,045	121
40.	San Pablo	6,495	400
41.	Puerto Ybapobó	2,000	62
42.	25 de Agosto	7,549	552
43.	Ex Andrés Barbero	10,000	118
44.	Potrero Naranjo	1,000	56
45.	Jhugua Rey	1,725	117
46.	Aguaray mi	1,280	419
47.	Santa Catalina	1,274	111
48.	San Jorge	1,654	171
49.	San Antonio	1,184	103
50.	San Miguel	1,774	154
51.	Cobas Cué y Potrero Jardin	1,100	106
52.	12 de Junio	2,000	153
53.	Yataity	1,095	215
54.	Hermenegildo Olmedo	2,000	100
55.	Santa Rosa de Lima	1,600	80
56.	Capiitindy	9,554	109
57.	Ybypé	3,899	190
58.	Naranjito	12,000	485
59.	Indígena Mbyá Apytere	237	1
60.	Madrinas de Guerra	2,618	50
61.	Laguna San José	10,000	215
62.	Oga Porá	12,330	260
63.	Lisiados de la Guerra	7,954	345
64.	Ñandeyara	3,927	146
65.	Industrial Cué	3,850	173
66.	Mbareté	3,985	315
67.	Yurujhei	5,984	230
68.	Liberación	16,426	939
69.	La Niña	2,139	147
70.	Cocue'rá	4,771	206
71.	Coé Pot (Nuclear 3)	3,293	152
72.	Coé Pytã	3,309	166
	Total	293,623	14,139

	Private Colonies		
1.	Financiera Piccolo (Finnap)	1,257	81
2.	Monte Alto S. R. L.	2,500	216
3.	Tomás Distefano	1,000	50
4.	Emp. Mate Larageiras M.P.	6,366	31
5.	Ganadera San Bernardo S.A.	3,141	202
6.	Suc. Domingo Trapani	3,000	150
7.	Orlando y Enrique Wiillians y Alzaga	11,132	416
	Total	28,396	1,146

Official:	72 Col. 293,623 Há	14,139 Lots
Private :	7 Col. 28,396 Há	1,146 Lots
Total	79 Col. 322,019 Há	15,285 Lots

DPTO. DE LA CORDILLERA

Established Colonies
Period 1954 ~ 1981



Total : 27 Col. 22.885 Há 2.879 Lots

Established Colonies (Dept. of Cordillera)

Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Itacurubí	126	30
2.	N. R. Eligio Montanía	148	22
3.	Ita Morotí	1,500	119
4.	N. R. Guazú Cuá	439	27
5.	N. R. Tacuatí	219	17
6.	N. R. Hernando de Rivera	170	16
7.	N. R. San Francisco	364	27
8.	Tacuaras	528	55
9.	Yacarey	1,500	58
10.	N. R. Carumbe-y	365	55
11.	Piraretá	3,490	94
12.	N. R. Ypayojhá	193	26
13.	Oyopoi	1,922	402
14.	Potrero Angelito	1,220	120
15.	Jhuguaty Rosado	800	100
16.	N. R. P. J. Caballero	143	24
17.	Aguaity	345	49
18.	N. R. 29 de Setiembre	361	77
19.	Antolín Irala	409	42
20.	Minas	2,717	656
21.	Cías. Unificadas	1,115	300
22.	Heriberta Matiauda	1,316	113
23.	N. R. Unificadas. Pindoty y Alfonso Central	1,022	117
24.	N. R. Itá Pirú	69	20
	Total	20,481	2,566

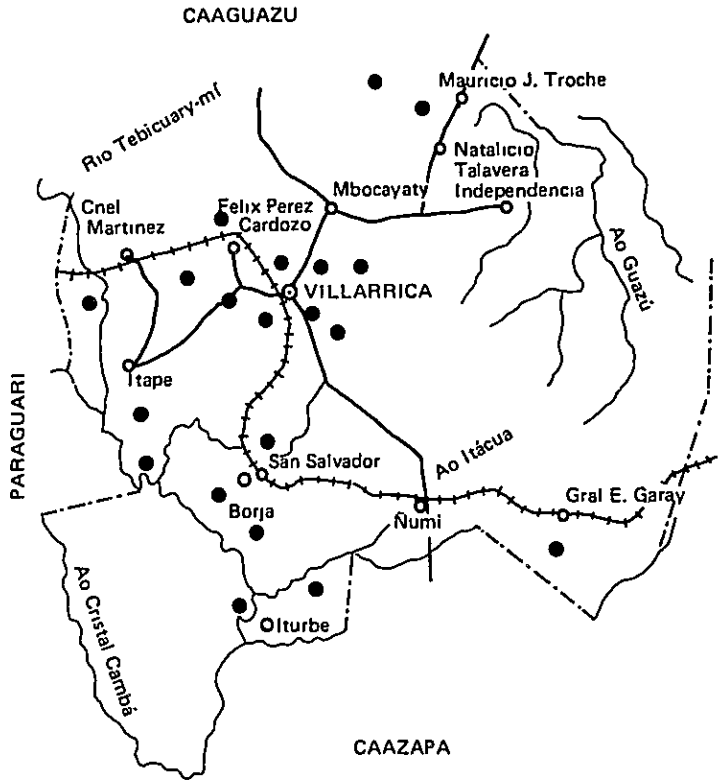
	Private Colonies		
1.	Unión Paraguaya S.A.	1,000	100
2.	Luis Ortiz y Otros	604	117
3.	Acuña de Figueroa	800	96
	Total	2,404	313

Official:	24 Col.	20,481 Há	2,566 Lots
Private :	3 Col.	2,404 Há	313 Lots
Total	27 Col.	22,885 Há	2,879 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. GUAIRA

Established Colonies
Period 1954 ~ 1981



Total : 20 Col. 50.334 Há 3.241 Lots

Established Colonies (Dept. of Guaira)

Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Arroyo Mortí	4,303	511
2.	Ybyturuzú	1,417	112
3.	Yroysá	6,799	530
4.	Santa Cecilia	1,035	51
5.	N. R. Costa Mbocayaty	390	58
6.	Monte Rosario	11,800	200
7.	Pireca	4,000	208
8.	Rojas Potrero	1,664	103
9.	Tte. Antonio R. Silvera	2,177	89
10.	Tacuareé	1,500	279
11.	Cap. Carlos Dematei	3,000	100
12.	Concepción mí	2,143	140
13.	Ita Ybú	1,222	150
14.	Pedro P. Escalada	3,100	243
15.	11 de Setiembre	1,508	176
16.	Itapé Jhugua	1,036	65
17.	N. R. Loma Pindó	249	16
	Total	47,348	3,041

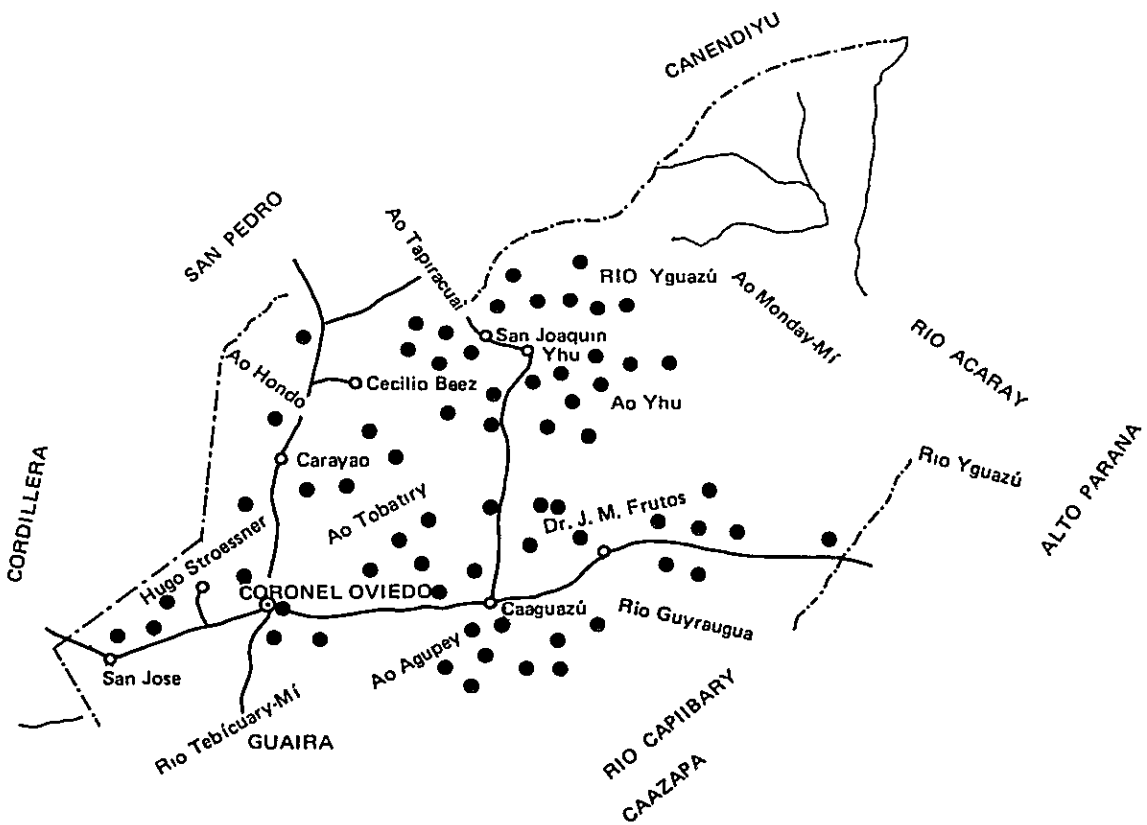
	Private Colonies		
1.	Balanzá Hnos. (Tebicuary)	1,314	88
2.	María T. de Núñez y Otros	1,056	52
3.	Ramiro Domínguez	616	60
	Total	2,986	200

Official:	17 Col.	47,348 Há	3,041 Lots
Private :	3 Col.	2,986 Há	200 Lots
Total	20 Col.	50,334 Há	3,241 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. CAAGUAZU

Established Colonies
Period 1954 ~ 1981



Total : 65 Col. 329.303 Há 21.248 Lots

Established Colonies (Dept. of Caaguazu)

Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Caaguazú	6,050	861
2.	Guyraungua	1,781	151
3.	Domingo Montanaro	4,057	288
4.	Guayaki Cué	1,250	53
5.	N. R. Mártires de Acosta Ñú	681	70
6.	Migración Interna	4,779	244
7.	Chacoré	5,584	315
8.	Sto. D. de Guzmán	2,538	101
9.	3 de Noviembre	15,500	825
10.	La Picada	1,851	185
11.	San-José del Ypytá	1,600	110
12.	Rayi Poty (Sta. Rosa)	1,000	100
13.	Coe Yurory	3,100	180
14.	Vyapa Guasú	6,500	541
15.	Ñande Maitei	7,200	360
16.	San Isidro	1,235	100
17.	San Patricio	1,799	108
18.	N. R. Arazapé	456	59
19.	N. R. Mandihó	293	22
20.	Monseñor Juan S. Bogarin	2,529	106
21.	Tuyuti	4,022	122
22.	N. R. Santa Clara	500	21
23.	N. R. Santa Rosa	800	86
24.	Tecoycyá	3,500	223
25.	Tembiaporá	3,000	261
26.	Col. Agric. Curupicay	5,500	366
27.	Carpa Cué (Tejas Cué)	1,197	20
28.	R. I. 6 Boquerón	6,031	300
29.	Tayi Poty	4,996	674
30.	Indigena Guayaki	2,500	1
31.	Yby Pora	5,000	320
32.	Juan R. Chaves	11,948	1,039
33.	Gral. Stroessner	8,740	1,300
34.	Tape Pyajhú	6,839	450
35	Repatriación	31,413	2,098
36.	Mandiyú	1,309	76
	Total	167,080	12,136

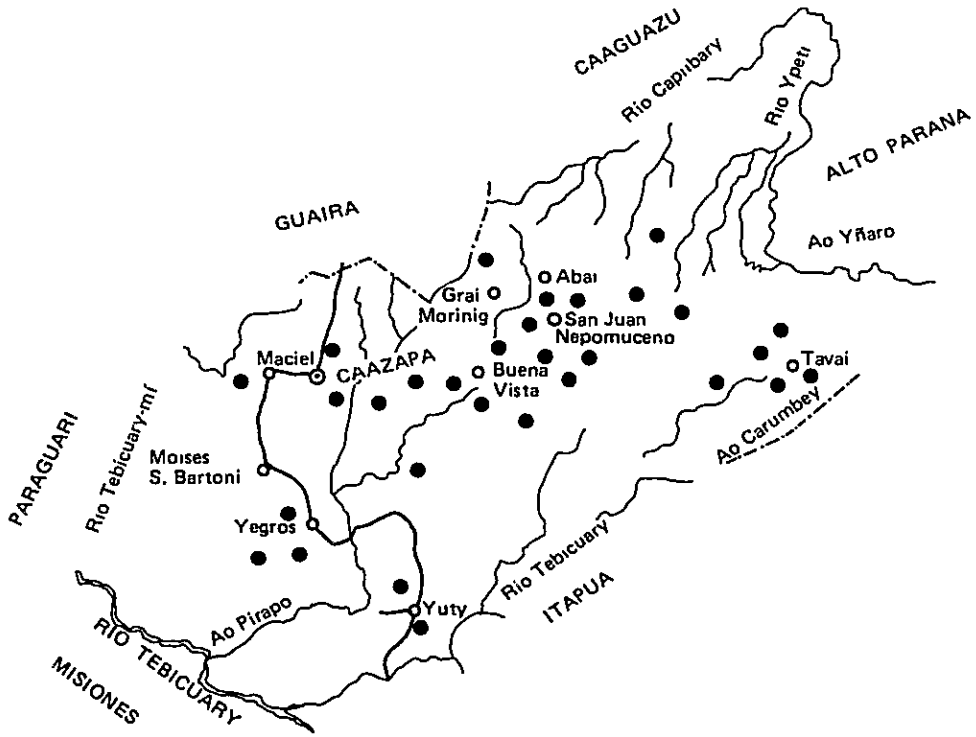
	Private Colonies	Area ha	No. of Lots
1.	S.A.A.C.I.F. S.A.	3,979	147
2.	Nansen (Suc. Jorge Naville)	17,103	300
3.	Paraguay Development Corporation Limited	22,000	1,163
4.	Balanzá Hnos. (Toro Blanco)	4,993	319
5.	La Fabril Paraguaya S.A.	4,450	289
6.	Balanzá Hnos. (W. Insfrán)	4,754	1,181
7.	José M. Cikel	508	50
8.	Cia. Forestal Hispano Paraguaya S.A.	12,000	1,332
9.	La Italo Paraguaya S.A.	4,837	122
10.	Record S.R.L.	3,610	56
11.	La Greco Paraguaya S.A.	30,000	1,035
12.	Rafael Serafini	1,642	230
13.	Mártires de Acosta Ñú	3,750	386
14.	Gral. Francisco Caballero A.	10,000	300
15.	Emilia B. Vda. de Valdéz	1,145	111
16.	Abelardo J. Celano	684	31
17.	Isidro Fleitas	1,857	32
18.	Elsa Jara de Matto	1,424	90
19.	José D. Ocampos	6,256	268
20.	Víctor Renfeld	3,211	170
21.	Engelberto Engelwert	1,822	116
22.	Empresa Constructora Viviendas Paraguayas	1,000	40
23.	Santa Catalina (Ex Ombú SAFI)	4,759	308
24.	Gregorio y Jorge Morales	2,231	175
25.	Agrofor S.R.L.	3,000	214
26.	Dorila Vda. de Morales	3,445	139
27.	Ganadera Riera (La Pastora)	2,721	191
28.	Avelino Campagnole	900	90
29.	La Virginia	1,142	219
	Total	162,223	9,112

Official:	36 Col.	167,080 Hā	12,136 Lots
Private :	29 Col.	162,223 Hā	9,112 Lots
Total	65 Col.	329,303 Hā	21,248 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. CAAZAPA

Established Colonies
Period 1954 ~ 1981



Total : 30 Col. 224.491 Há 6.999 Lots

Established Colonies (Dept. of Caazapa)

Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Rogelio Benítez	37,183	1,860
2.	José M. Argaña	10,000	166
3.	Dr. Ignacio A. Pane	4,648	202
4.	Yacubó	4,000	65
5.	Monte Caaguazú	2,000	80
6.	Ñurundiay e Isla Yobay	1,471	66
7.	Cuarajhy Rese	6,000	300
8.	Comber Cué	10,673	390
9.	Tatú Cuá	1,200	61
10.	N. R. Caa Carapá	728	43
11.	Vizcaíno Cué	1,520	104
12.	Nicolás Arguello	12,566	863
13.	Cte. Carlos Sisa	5,000	150
14.	Fray Luis de Bolaños	2,111	160
15.	Miranda Cué	2,450	50
16.	Def. del Chac o	1,450	83
17.	Yeroviá	3,300	232
18.	Gral. Patricio Colmán	1,022	106
19.	Corralito	1,000	100
20.	Sur Ñacunday I	15,000	80
21.	Sur Ñacunday II	15,000	40
22.	Rivas Cué-Ñú Cañy-Toro Blanco y Mbo iChiní	23,412	120
23.	Yboty Ñú	4,660	302
24.	Cte. Rivas Ortellado	2,000	100
25.	Guaraní	9,994	517
	Total	178,388	6,240

	Private Colonies		
1.	Toro Blanco	23,000	118
2.	Col. Tec. Paraguaya S.A.	20,000	311
3.	Tupá Rendá	5,000	246
4.	Arsenio A. Vaesken	480	60
5.	Juana B. Vda. de Bosch	600	24
	Total	49,080	759

Official:	25 Col.	178,388 Há	6,240 Lots
Private :	5 Col.	49,080 Há	759 Lots
Total	30 Col.	227,468 Há	6,999 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. ITAPUA

Established Colonies
Period 1954 ~ 1981

Total : 62 Col. 548.387 Há 21.097 Lots

Established Colonies (Dept. of Itapua)

Until 1953

	Official Colonies	Area ha	No. of Lots
1.	Vacay	2,056	189
2.	Ypecurú	1,100	180
3.	N. R. Independencia	112	32
4.	Capitán Miranda	8,230	530
5.	Capitán Urbina	3,460	155
6.	San Lorenzo	10,000	267
7.	Alborada	2,058	99
8.	Pto. Natalio	10,000	500
9.	Itapúa Poty	15,048	1,075
10.	S. Buenaventura	3,000	150
11.	Km. 42	10,000	500
12.	Yboty Ryacuá	10,000	450
13.	Guazú-y Norte	7,500	375
14.	Guatá Porá	1,960	116
15.	Pirapey	5,300	842
16.	Yatytay	10,000	500
17.	Caaguy Poty	10,000	500
18.	Aguapey	9,000	460
19.	Triunfo	8,699	292
20.	Tabapyrá	4,000	228
21.	Repatriados del Sur	12,000	672
22.	Guarapay (Cap. Fragnoud)	20,000	127
23.	Yby-á	5,900	390
24.	Valle Porá	2,600	170
25.	Tembey	6,000	300
26.	Ñemity Rendá	8,200	310
27.	Cocue Poty	3,100	105
28.	Ape Aimé	7,537	236
29.	Potrero Benítez	2,244	87
30.	César Vasconcellos	2,104	189
31.	Guazú Yguá y Santiago	4,200	221
32.	Paraguay Recó	6,000	400
33.	Alto Verá	5,000	350
34.	Catupyry	3,182	369
35.	Juan Pablo II	6,800	233
36.	Mbyyá Coé	1,877	81
37.	Tiburcio Bogado	5,163	217
38.	Yacyretá	48,000	1
39.	Cabayú-y	1,911	8
40.	N. R. Cerrito	130	35
41.	Tenonderá	9,000	450
42.	Repatriados del Este	3,000	148
43.	Yhaca Guazú	1,500	80
44.	Piroy	5,000	250
45.	Potí	5,000	250
46.	Pirayú-í	9,050	377
47.	P.U. María Auxiliadora	90	600
48.	P.U. Tacuarí	60	348
	Total	316,171	14,444

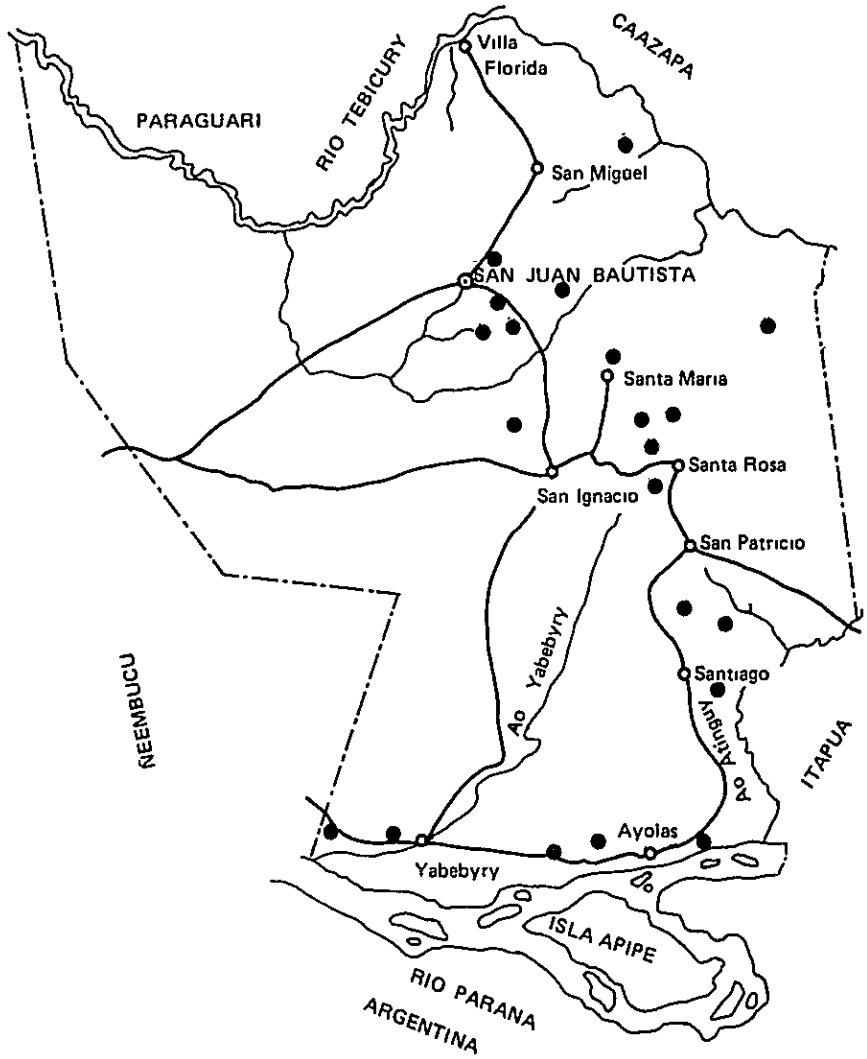
	Private Colonies	Area ha	No. of Lots
1.	S. A. Fram	61,929	2,839
2.	Fram (J.I.C.A.)	16,057	1,173
3.	Alto Paraná o Pirapó (J.I.C.A.)	83,579	1,202
4.	Fipades (Fin. Des. Econ. Social S.A.)	424	20
5.	Edelira (Suc. D. Barthe)	23,000	360
6.	Santiago I. Dávalos	3,189	49
7.	Gregorio Benítez Vega	667	45
8.	Aguapey Norte (Cía. Col. Litoral S.A.C.I.)	4,000	-
9.	San José (Cía. Col. Litoral S.A.C.I.)	6,500	-
10.	Antonio Cegalés Alegre	289	29
11.	San Rafael (Cía. Col. Litoral S.A.C.I.)	5,110	235
12.	CIMEXPA S.A.	22,651	401
13.	Francisco Basse	2,627	220
14.	Cleto Carissimo	2,194	80
	Total	232,216	6,653

Official:	48 Col.	316,171 Há	14,444 Lots
Private :	14 Col.	232,216 Há	6,653 Lots
Total	62 Col.	548,387 Há	21,097 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. MISIONES

Established Colonies
Period 1954 ~ 1981



Total : 21 Col. 35.057 Há 1.851 Lots

Established Colonies (Dept. of Misiones)

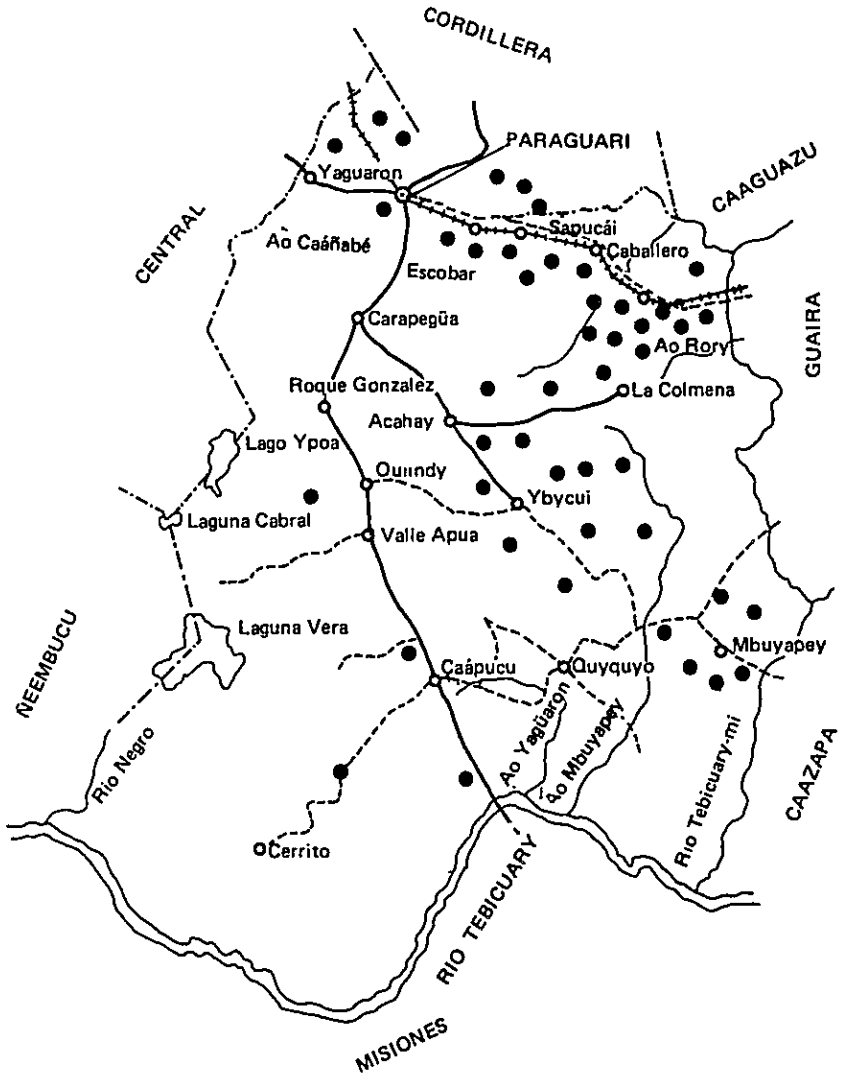
Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Manuel B. Argaña	794	72
2.	Gral. Ibañez Rojas	1,029	141
3.	Mburicá Retá	813	152
4.	N. R. Isla Tobati	285	73
5.	N. R. Itacurubi	219	29
6.	San Juan Berskman	1,030	112
7.	Arroyo Caré	475	102
8.	Curupayty	550	133
9.	Coe Yu	3,950	118
10.	Estero Bellaco	9,500	50
11.	Tetá Pyajhú	2,000	102
12.	San Juan Potrero	700	150
13.	N. R. Alejo Ramírez	200	27
14.	N. R. Caaguazú-mí	544	19
15.	N. R. San Felipe	245	43
16.	Monseñor Gabino Rojas	455	108
17.	N. I. San Pedro	800	61
18.	Mbareté Porá	3,900	43
19.	Panchito López	1,177	123
20.	Yatai	935	166
21.	Estero Mby yuí	5,456	27
	Total	35,057	1,851

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. DE PARAGUARI

Established Colonies
Period 1954 ~ 1981



Total : 46 Col. 112.302 Há 7.033 Lots

Established Colonies (Dept. of Paraguari)

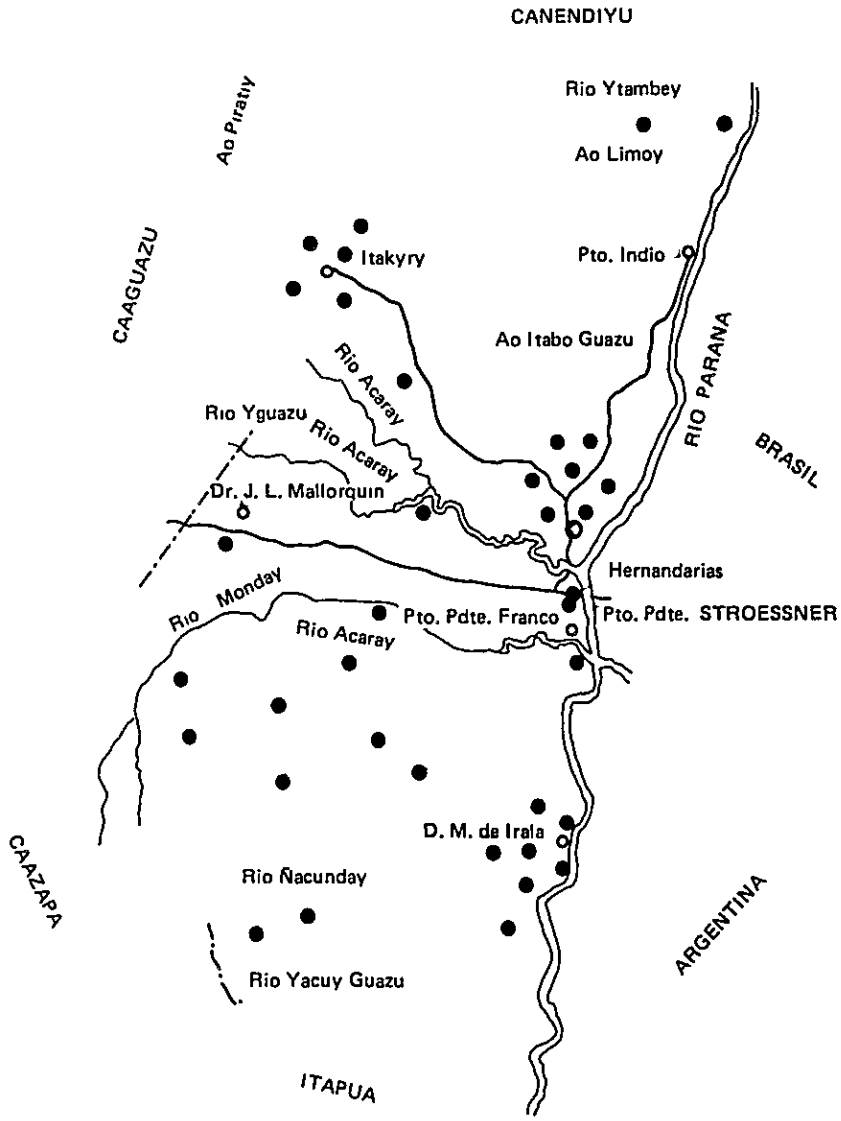
Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Ñuatí	200	45
2.	Bral. C. Barrientos	2,473	286
3.	Carbón Cué	2,000	166
4.	Elisa Linch	2,000	137
5.	N. R. Ybycuí Punta	271	90
6.	N. R. Arazá Ty	87	24
7.	Minas Cué	1,197	84
8.	Tacuarí	809	103
9.	Jhugua Guazú	1,199	55
10.	Héstor L. Vera	2,139	130
11.	Cap. Solano Escobar	2,780	141
12.	N. R. Rivarola Cué	564	82
13.	N. R. Pindoty	129	30
14.	N. R. Potrero Garay	342	64
15.	Tucumán Paraguayo	215	25
16.	N. R. Bellaco	330	88
17.	N. R. Cañada	183	17
18.	Cerro Guy	696	159
19.	Dr. Adriano Irala	1,947	219
20.	Carlos A. López	11,985	1,222
21.	Cerro Roke	1,000	80
22.	Yariguai-mí	1,020	186
23.	N. R. Ybyraty	314	17
24.	Ybyraity	1,500	157
25.	Isla Segura	6,459	505
26.	Montiel Potrero	18,000	136
27.	Capilla Tuyá	1,500	100
28.	J. Augusto Saldívar	5,000	313
29.	Ñu Apuá	1,020	102
30.	N. R. Boquerón	628	54
31.	Paso Tuna	1,000	50
32.	Ñande Roga	2,488	175
33.	Tava Guazú	1,100	101
34.	Julián Insfrán	3,536	287
35.	Cerro Cupé y Costa Irala	1,500	131
36.	Virgen de Fátima	1,219	135
37.	Caraguatay y Recoleta	5,000	122
38.	N. R. Pintos	581	83
39.	Jorge Patiño	5,000	-
40.	Saguazú	171	166
41.	N. R. Cayo Romero Pereira	259	22
42.	Cerro Verá	325	80
43.	Costa Jhuí	1,035	168
	Total	91,201	6,337
	Private Colonies		
1.	La Colmena	10,849	490
2.	María Antonia (E. M. Ocampos)	3,262	148
3.	Isla Alta mí	6,990	58
	Total	21,101	696
	Official: 43 Col.	91,201 Há	6,337 Lots
	Private : 3 Col.	21,101 Há	696 Lots
	Total 46 Col.	112,302 Há	7,033 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. ALTO PARANA

Established Colonies
Period 1954 ~ 1981



Total : 37 Col. 472.603 Há 11.901 Lots

Established Colonies (Dept. of Alto Parana)

Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	San Francisco	40	572 LU
2.	Acaray	6,737	307
3.	Paraguay Pyajhú	6,924	1,333
4.	Tabapy	6,783	228
5.	Itaipy	6,115	276
6.	Itaibyté	10,991	523
7.	Ltalyry	10,000	-
8.	Reservado 8	4,500	50
9.	Padre Guido Coronel	5,000	200
10.	N. R. Nueva Esperanza	900	66
11.	Ganadera Forestal	45,000	142
12.	San Miguel	4,240	67
13.	Ganadera Forestal	26,000	23
14.	Pastora C. Céspedes	30,000	33
15.	Pira Pytá	2,540	210
16.	Puerto Paranambú	8,000	314
17.	N. R. Pengo San Miguel	226	32
18.	Juan L. Mallorquín	44,036	2,421
19.	Mayor Alfredo Pla	1,092	52
20.	Guayaki Ashé (Mis. San Agustín)	2,000	-
21.	Paso Cadena	900	-
22.	Ñanday í	30,000	-
23.	Indígena Yaguapóa	225	-
24.	Pdte. Stroessner	6,000	-
	Total	258,249	6,850

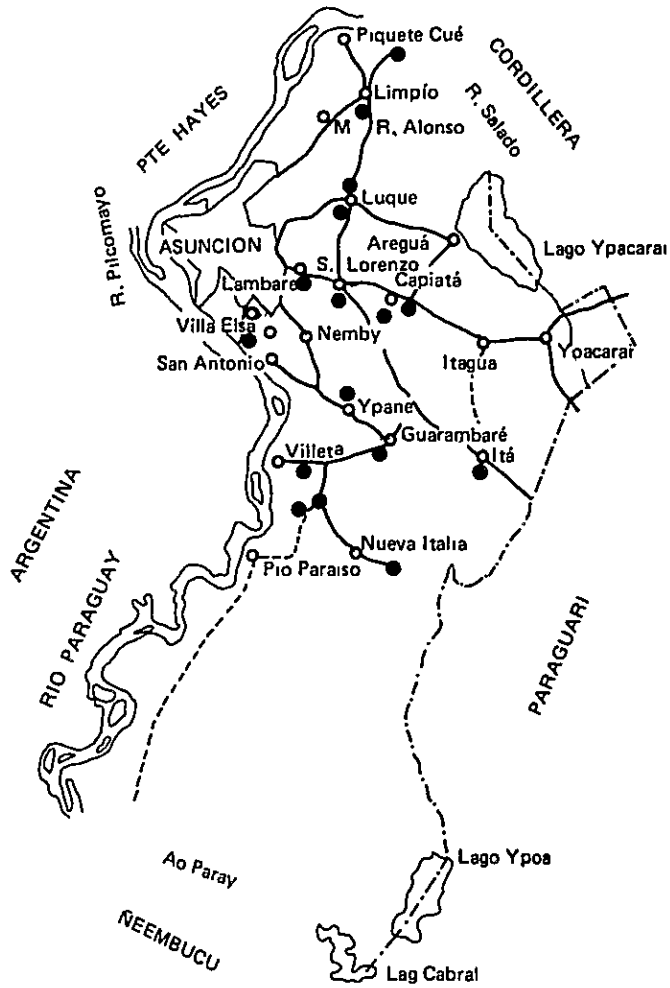
	Private Colonies		
1.	Yguazú (J.I.C.A.)	87,763	2,200
2.	La Industrial Paraguaya S.A.	12,000	378
3.	Paraguasil S.R.L.	36,529	402
4.	J. E. Estigarribia	25,000	426
5.	Joao Baptista Toesca	5,781	206
6.	Adelino Vittorelli y Otros	10,049	269
7.	Antonio P. Marino	2,420	121
8.	Joao Muxfeld	6,000	146
9.	Cedrales Colonizadora	15,000	437
10.	Juvenal Mezquita Fhilo	3,164	83
11.	Iruña S.A.I.C.	5,500	275
12.	Willi C. Lubeque	1,148	108
13.	Agriex	4,000	-
	Total	214,354	5,051

Official:	24 Col.	258,249 Há	6,850 Lots
Private :	13 Col.	214,354 Há	5,051 Lots
Total	37 Col.	472,603 Há	11,901 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. CENTRAL

Established Colonies
Period 1954 ~ 1981



Total : 15 Col. 13.190 Há 1.801 Lots

Established Colonies (Dept. of Central)

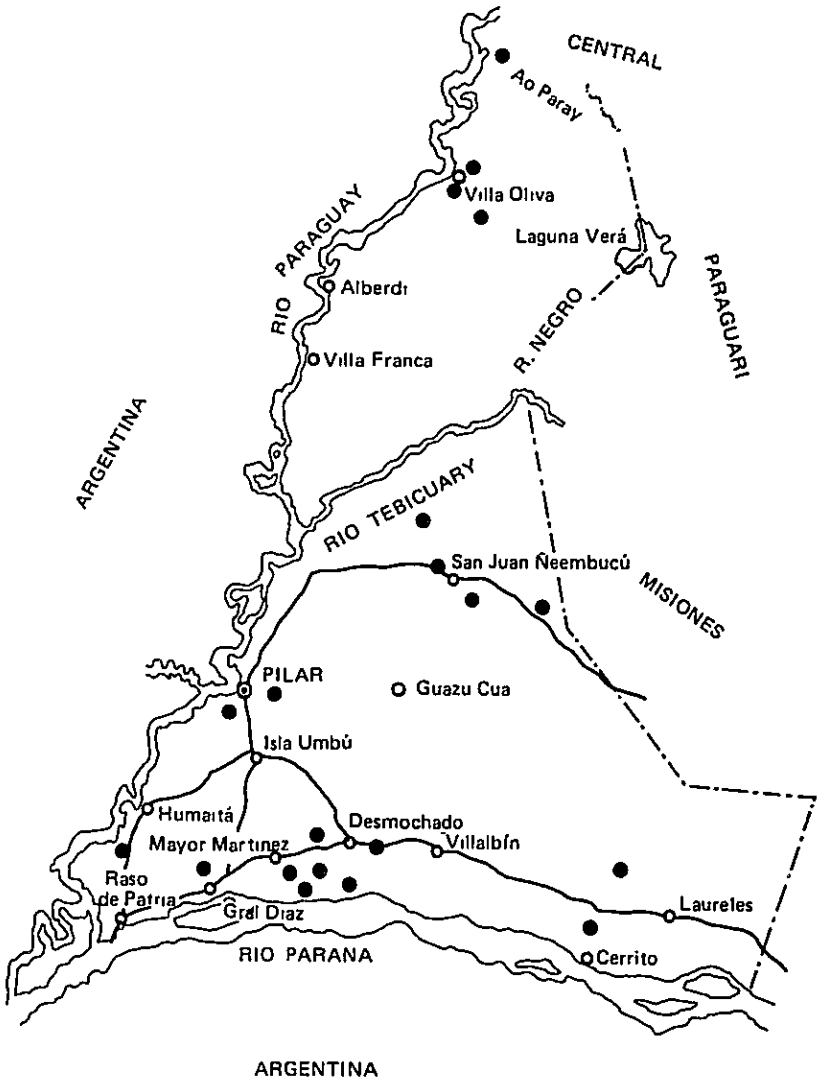
Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Bien Común	436	229
2.	Rincón del Peñón	300	132
3.	Ypané Cocué	137	21
4.	Oga Rendá	414	79
5.	Buey Rodeo	2,243	104
6.	N. R. Itá Ybaté	65	25
7.	N. R. Toledo Cañada	72	36
8.	N. R. Aldana Cañada	56	19
9.	Nueva Italia	8,898	230
10.	Rincón	212	95
11.	Curupicayty	221	22
12.	Campo Grande	116	731 LU
13.	Reducto	8	18
14.	Bo. Santa María	2	42 LU
15.	N. R. Ypatí	10	18
	Total	13,190	1,801

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. ÑEEMBUCU

Established Colonies
Period 1954 ~ 1981



Total : 20 Col. 38.560 Há 1.895 Lots

Established Colonies (Dept. of Ñeembucu)

Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Ytororó	1,300	61
2.	Tetá Pyajhú	2,619	300
3.	Genaro Romero	1,000	32
4.	Curuzú Cuatia	1,200	53
5.	Residentas	585	232
6.	Potrero Bordón	664	41
7.	Ybycuí	1,903	75
8.	Blanco Ñú	1,300	66
9.	Zanjita	237	37
10.	Villa Oliva	1,947	176
11.	Caballo Muerto	9,433	148
12.	Puerto Paraiso	6,000	64
13.	San Roque	1,012	56
14.	Capillita Jhuguá Poí	250	30
15.	Laguna Itá	1,336	143
16.	Costa Rosado	201	14
17.	Estero Cambá	2,000	65
18.	Apipé	363	10
19.	Paso Pucú y Paso Gaona	281	7
	Total	33,631	1,610

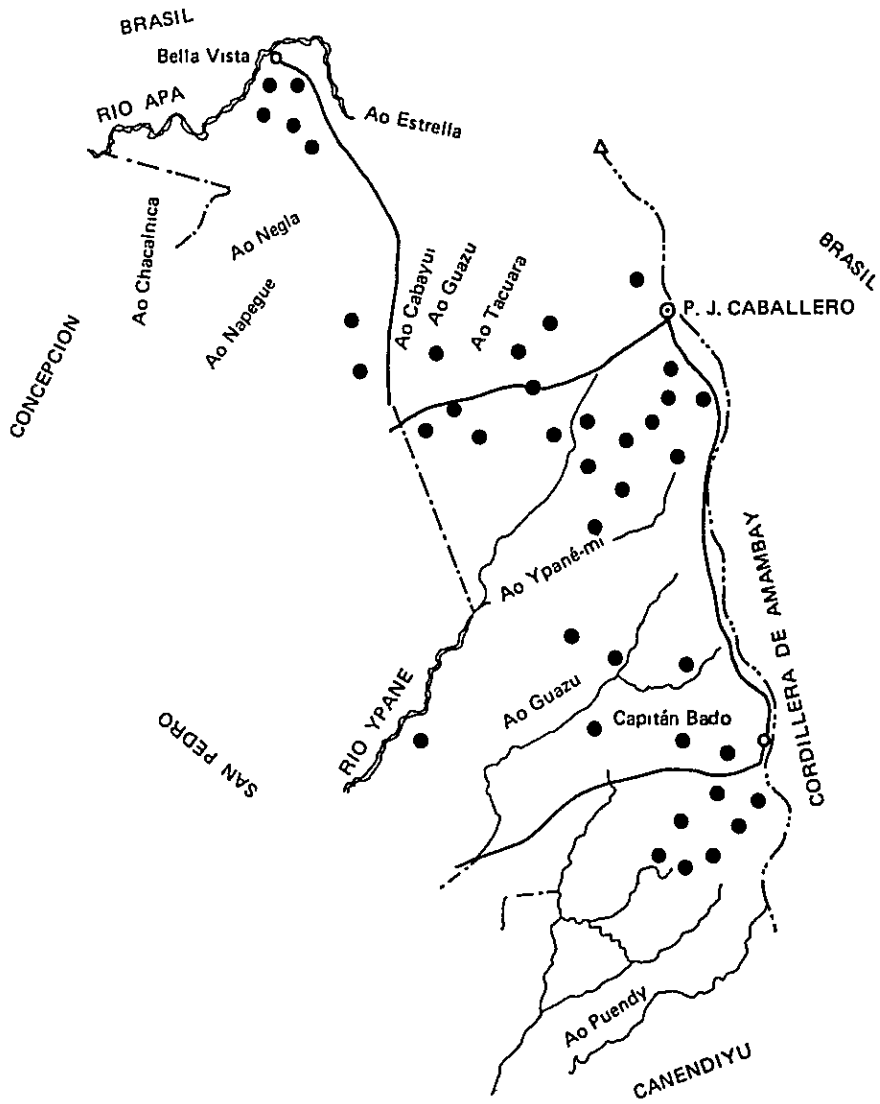
Private Colonies

1.	La Rural Belga Sudamericana	4,929	285

Official:	19 Col.	33,631 Há	1,610 Lots
Private :	1 Col.	4,929 Há	285 Lots
Total	20 Col.	38,560 Há	1,895 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

DPTO. DE AMAMBAY
Established Colonies
Period 1954 ~ 1981



Total : 40 Col. 123.881 Há 2.822 Lots

Established Colonies (Dept. of Amambay)

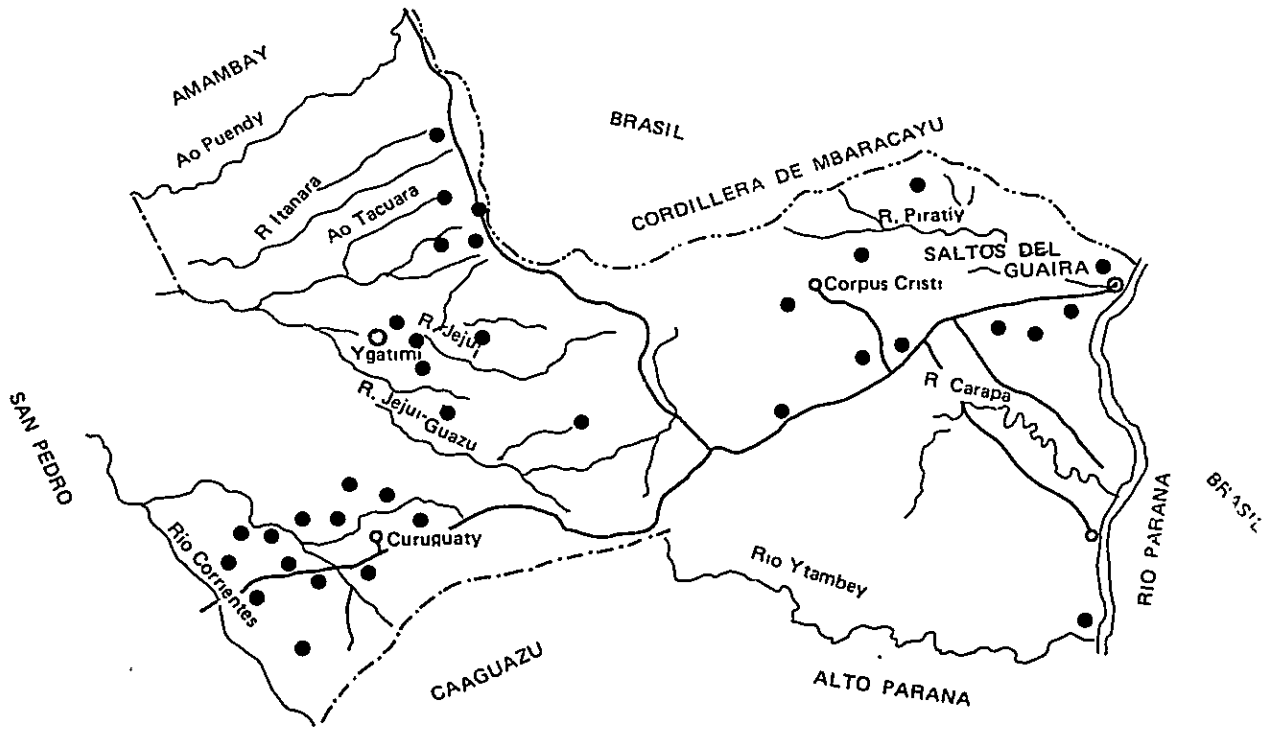
Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Ybypyté	11,314	1
2.	Carpintería Cué	300	1
3.	Indígena N. R. Pariri	1,027	1
4.	Indígena N. R. Tacuarita	665	1
5.	Indígena N. R. Piray mí	1,941	1
6.	Raúl Ocampos Rojas	9,600	198
7.	Cocué Pyajhú	3,985	167
8.	Chirigüelo	3,067	118
9.	Guavirá	4,200	202
10.	Aquidabán	4,550	188
11.	Ñepuá Pyajhú	6,378	215
12.	3 de Mayo	1,976	125
13.	Rincón de Julio	7,324	230
14.	Yatebú í	7,200	130
15.	Naranja Jhaí	2,506	48
16.	Ñú Pyajhú	5,054	103
17.	Indígena Panambí	350	1
18.	Indígena Itá Yeguacá	650	1
19.	Indígena Itá Guazú	311	1
20.	Indígena Y Morotí	205	1
21.	Juan S. Godoy	952	113
22.	Coé Pyajhú	2,442	102
23.	Caá Guy Poty	4,171	154
24.	Cerro Mbocovi	12,330	192
25.	Paso Itá	2,712	7
26.	Cristino Potrero	10,000	60
27.	Ind. N. R. Yaguapó	225	1
28.	Indígena N. R. Itá Poty	432	1
29.	Indígena N. R. Guaraní (Paso Historia)	484	1
30.	Indígena Tavy Terá	503	1
31.	7 de Julio	3,000	150
32.	Yepoyjhy Guazú	3,500	155
33.	José Félix López	1,000	96
34.	Indígena Ndyvaá	3,000	1
35.	Indígena Tavi	250	1
36.	Indígena Piráy	1,900	1
37.	Indígena Ynambuí	350	1
38.	Indígena Mbaé Marangatú	2,500	1
39.	Mandiyú Poty	1,341	50
40.	Indígena Cerro Poí	185	1
	Total	123,881	2,822

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982

DPTO. CANENDIYU

Established Colonies
Period 1954 ~ 1981



Total : 36 Col. 258.923 Há 5.190 Lots

Established Colonies (Dept. of Canendiyu)

Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Gervacio Artigas	2,781	91
2.	Yopoi	5,000	147
3.	Ysy Cañy	2,435	147
4.	Itandey	4,400	168
5.	Naranjaty	3,579	105
6.	Yby Pyaj	1,500	25
7.	Gral. Rodríguez	745	35
8.	Buena Esperanza	1,500	106
9.	Pynandí	4,000	227
10.	Tapiracuai Loma	2,731	296
11.	Fortuna Indígena	1,492	-
12.	Canendiyú	4,177	153
13.	Kyjhá Porá	2,153	101
14.	Alborada	2,080	136
15.	Mburucuyá	840	41
16.	Ygatimi	12,096	41
17.	Las Residentas	5,000	333
18.	Quebrada (Sta. Carolina Ind.)	702	-
19.	Mboi Yaguá-Indígena	1,045	-
20.	Itanara mi - Indígena	1,642	-
21.	Ypé Jhú	1,237	51
22.	Py Pucú - Indígena	1,422	-
23.	Indígena Comunidad	457	-
24.	Cerro Guy	4,000	200
25.	Itanará	8,749	237
26.	Yjhoby	346	13
	Total	76,109	2,653

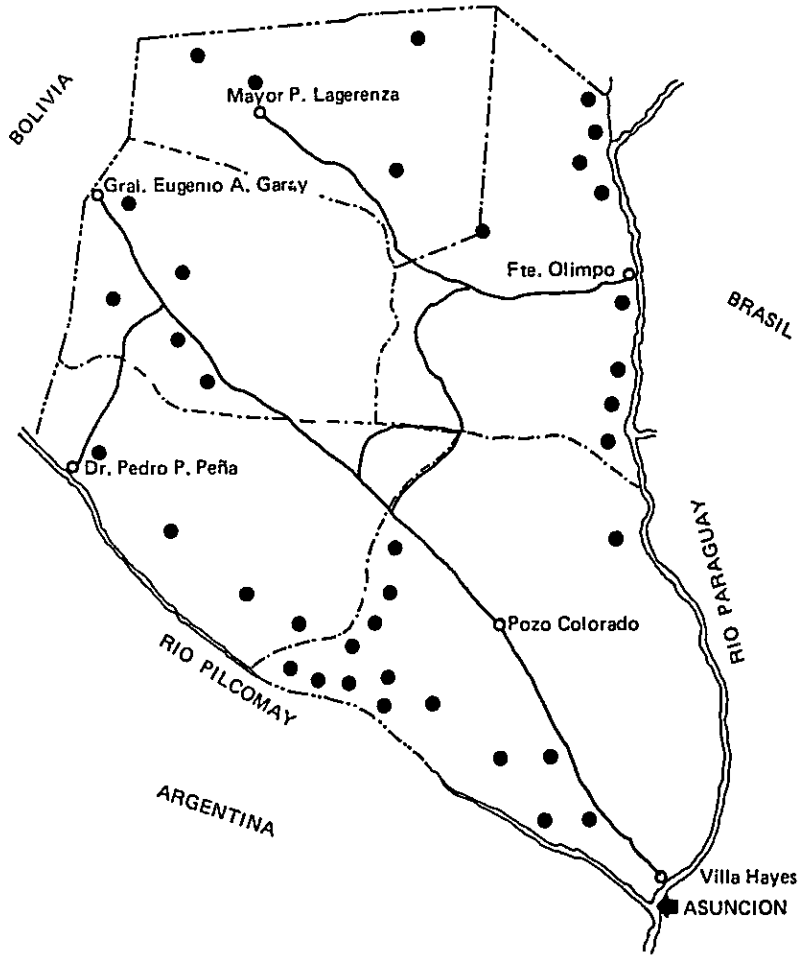
	Private Colonies		
1.	Carapá S.R.L.	71,700	601
2.	Colonizadora Norte-Paraná S.R.L.	48,800	606
3.	Mbaracayú S.A.	2,000	88
4.	Carlos Camargo V.	4,701	46
5.	Puente Kyjhá	4,928	141
6.	Puerto Marangatú	6,614	315
7.	Alborada S.R.L.	12,799	245
8.	Col. Saltos del Guairá	12,074	212
9.	Canendiyú Porá S.R.L.	500	58
10.	Catueté (Jaime Watt Longo)	18,698	225
	Total	182,814	2,537

Official:	26 Col.	76,109 Há	2,653 Lots
Private :	10 Col.	182,814 Há	2,537 Lots
Total	36 Col.	258,923 Há	5,190 Lots

Source: Frutos, J.M. Con el Hombre y La Tierra Hacia el Bienestar Rural. Asunción, 1982.

REGION OCCIDENTAL

Established Colonies
Period 1954 ~ 1981



Total : 37 Col. 4.602.450 Há 2.966 Lots

Established Colonies (Western Region)

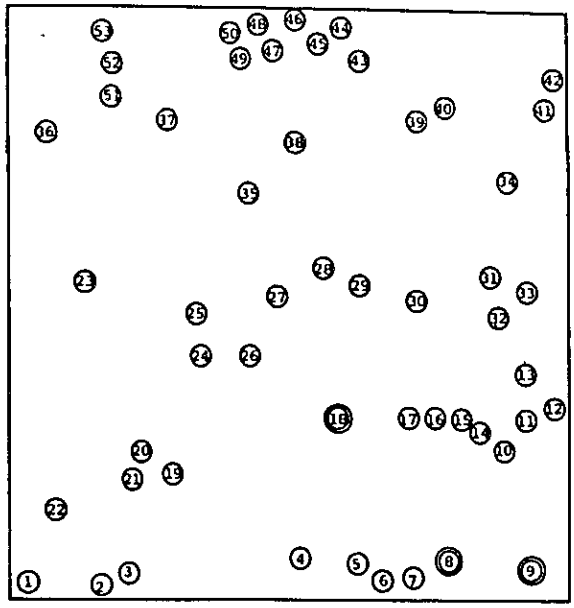
Period 1954 ∿ 1981

	Official Colonies	Area ha	No. of Lots
1.	Esteban Martínez	2,252	266
2.	12 de Junio	5,000	28
3.	Kuarajhy Resé	5,000	105
4.	Ñanembaepá	300,000	88
5.	Reserva Indígena	8,000	1
6.	César Silvera	215,800	78
7.	Gral. Caballero	185,300	50
8.	Verde Olivo	133,296	20
9.	Tte. Rojas Silva	720,698	50
10.	China-Chat (Chulupí)	5,238	1
11.	San Alberto	53,616	206
12.	Eugenio A. Garay	155,000	19
13.	Campo Vía	18,500	79
14.	Nueva Aurora (Mñor. Muzzolón)	4,260	314
15.	Esteban Saldívar	22,588	173
16.	Misioñ Nueva Tribu	2,500	1
17.	Reindivicación	187,000	7
18.	José Félix Bogado	320,000	30
19.	Cap. Avalos Sánchez·	120,000	21
20.	Francisco C. Chávez	90,000	534
21.	Estancia La Patria	30,000	1
22.	Nivaclé	12,000	1
23.	Sin Nombre	160,000	22
24.	Campo Aceval	18,748	125
25.	San Alfredo	57,000	28
26.	29 de Setiembre	305,000	65
27.	Ganadera Mayor P. La Gerenza	210,000	48
28.	Ganadera Cuarajhy Retá	380,000	96
29.	La Verde	5,000	25
30.	Chamacoco	2,345	1
31.	Ñande Retá	435,000	153
32.	Ñande Mbaé	345,000	162
33.	Tovas Qom	7,723	1
34.	Bahía Negra	26,000	87
35.	Cadete Pando	203	54
36.	Vicariato Apost. Pilcomayo	15,000	1
	Total	4,563,077	2,941

	Private Colonies			
1.	Copagro S. A.		39,373	25
	Official:	36 Col.	4,563,077 Há	2,941 Lots
	Private :	1 Col.	39,373 Há	25 Lots
	Total	37 Col.	4.602.450 Há	2.966 Lots

ENVIRONMENTAL CONSERVATION

1. Forests in Northern Hill Regions (Northern Extremity of Plan Region)



Note: ◎ indicates layered trees.

Fig. 2-11-1 Tree Positions

Table 2-11-1 Tree Names, Diameters, Heights

No.	Common name (Garani)	Botanical name	ϕ (cm)	Height (m)
1	(Unknown)		(Twining plant)	
2	Yagua pinda	Pisonia aculeata	8	7
3	"	"	6	6
4	Catigua	Trichilia Catigua	5	4
5	Yvyra pepe	Holocalyx balansae	2	3
6	Yvavy ju	Eugenia sp.	2	3
7	"	"	1	2
8	Yvyra-hú	Actinostemon concolor	40	17
9	Ombu	Phytolacca sp.	83	18
10	Catigua	Trichilia Catigua	3	5
11	"	"	3	5
12	"	"	5	6

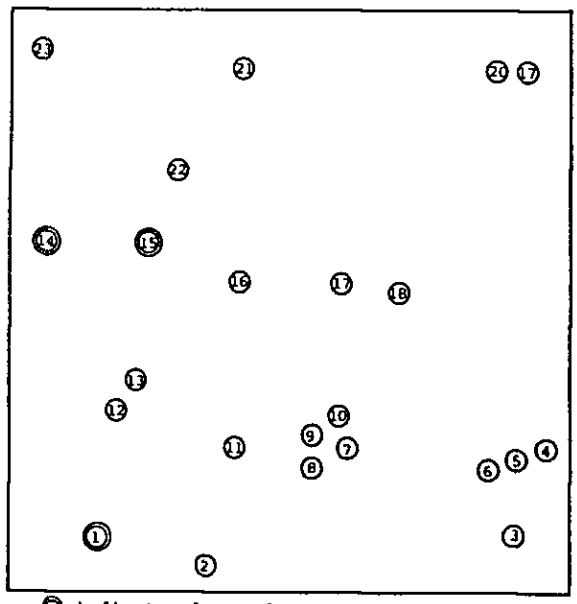
(Cont'd)

No.	Common name (Garani)	Botanical name	ϕ	Height
			(cm)	(m)
13	Catigua	Trichilia Catigua	2	6
14	"	"	4	6
15	"	"	2	3
16	"	"	3	5
17	"	"	2	3
18	Aratiku	Annona sp.	41	16
19	Mbavy'i	Bauara sp.	3	4
20	"	"	3	4
21	"	"	3	4
22	"	"	2	3
23	Catigua	Trichilia Catigua	3	4
24	"	"	1	2
25	"	"	1	1
26	Mbavy'ra	Casearia sp.	1	1
27	"	"	4	4
28	Yvyra camby	Sebastiana brasiliensis	10	7
29	Mbavy'ra	Casearia sp.	6	6
30	Catigua	Trichilia Catigua	4	7
31	"	"	8	8
32	Mbavy'i	Bauara sp.	5	7
33	Catigua	Trichilia Catigua	5	6
34	Cedrillo	Guarea Silvicola	6	5
35	Yva'poroity	Myrciaria baporeti	2	3
36	Mbavy'ra	Casearia sp.	7	6
37	"	"	4	4
38	"	"	6	5
39	Tatajyva	Chlorophora tinctorea	6	5
40	"	"	10	7
41	Ñandu'apysa	Brittoa Sellowiana	3	4
42	Cedrillo	Guarea Silvicola	3	3
43	Catigua	Trichilia Catigua	4	3
44	"	"	5	3

(Cont'd)

No.	Common name (Garani)	Botanical name	ϕ (cm)	Height (m)
45	Catıgua	Trichilia Catıgua	6	4
46	Ñangapiry	Eugenia uniflora	7	6
47	"	"	4	5
48	"	"	3	3
49	"	"	3	3
50	Yva'poroity	Myrcıaria baporetı	3	3
51	"	"	6	7
52	"	"	3	4
53	"	"	5	6

2. Small-area Group Forests (on Santa Ana Ranch)



Note: ◎ indicates layered trees.

Fig. 2-11-2 Tree Positions

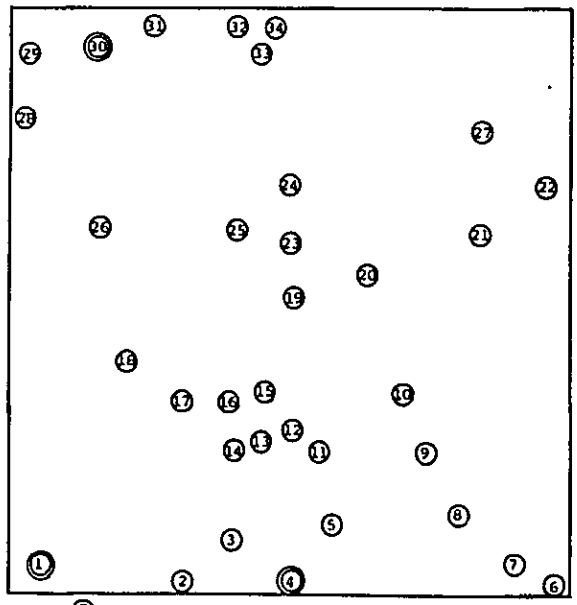
Table 2-11-2 Tree Names, Diameters Heights

No.	Common name (Garani)	Botanical name	φ	Height
			(cm)	(m)
1	Yvyra pıu	Ruprechtia laxiflora	27	18
2	Yvyra paje	Myrocarpus frondosus	10	10
3	Ñuati arroyo	Sabastiana sp.	7	6
4	Káa ovetı	Luehea dıvarıcata	15	10
5	Ñuati arroyo	Sabastiana sp.	6	4
6	Yva'viju	Eugenia sp.	5	6
7	Aguaí	Chysophyllum lucumifolium	27	10
8	Ñuati arroyo	Sabastiana sp.	8	7
9	Catigua'i	Trichilia sp.	4	5
10	Ñuati arroyo	Sabastiana sp.	15	8
11	Yvyra pıu	Ruprechtıa laxiflora	6	5
12	Mata ojo	Pouteria gardneriana	5	6

(Cont'd)

No.	Common name (Garani)	Botanical name	ϕ (cm)	Height (m)
13	Ñuati arroyo	Sabastiana sp.	16	10
14	Yva'hai	Eugenia sp.	31	18
15	Guapo'y	Ficus monckii	40	18
16	Catigua'i	Trichilia sp.	7	6
17	Ñuati arroyo	Sabastiana sp.	22	6
18	Catigua'i	Trichilia sp.	6	5
19	Ñuati arroyo	Sabastiana sp.	19	8
20	"	"	13	8
21	Catigua'i	Trichilia sp.	7	6
22	Mbavy'i	Casearia sp.	3	4
23	Ñuati arroyo	Sabastiana sp.	10	6

3. Corridor Forests (on Experimental Wildlife Reserve in Lower Reaches of Atinguy River)



Note: ◎ indicates layered trees.

Fig. 2-11-3 Tree Positions

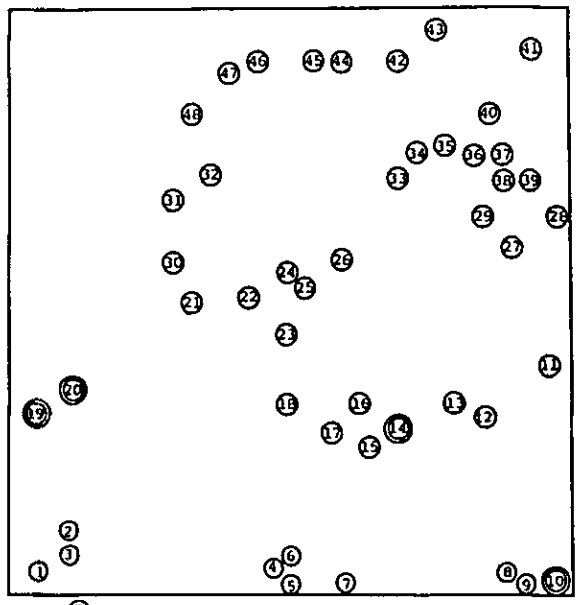
Table 2-11-3 Tree Names, Diameters, Heights

No.	Common name (Garani)	Botanical name	ϕ	Height
			(cm)	(m)
1	Ca'a oveti	Luehea divaricata	67	20
2	Ñuati arrollo	Sebastiana sp.	3	5
3	"	"	6	6
4	Yva'viju	Eugenia sp.	25	15
5	Yvyra hú	Actinostemon concolor	4	4
6	Ñuati arrollo	Sabastiana sp.	15	10
7	Yva'viju	Eugenia sp.	23	10
8	Catigua'i	Trichilia sp.	8	6
9	"	"	6	5
10	Yva'viju	Eugenia sp.	21	10
11	(Unknown)	Anisomeris sp.	2	2
12	(")	"	4	3

(Cont'd)

No.	Common name (Garani)	Botanical name	ϕ	Height
			(cm)	(m)
13	(Unknown)	Anisomeris sp.	3	2
14	(")	"	2	2
15	Yva'viju	Eugenia sp.	4	3
16	Ñandupa'i	Sorocea bonplandii	5	8
17	"	"	7	8
18	Guavi'ra	Campomanesia xanthocarpa	8	11
19	Yvyrá ovi	Helietta longifoliata	23	20
20	Yva'viju	Eugenia sp.	9	10
21	Yvyra hú	Actinostemon concolor	2	2
22	"	"	7	7
23	"	"	5	6
24	"	"	6	6
25	Ysypo hu	(Unknown)	(Twining plant)	
26	Yvyra hú	Actinostemon concolor	2	2
27	Yva'viju	Eugenia sp.	7	6
28	Yvyra hú	Actinostemon concolor	3	5
29	"	"	2	2
30	Curupay'ra	Anadenanthera rigida	25	20
31	Yvyra hú	Actinostemon concolor	6	5
32	"	"	2	2
33	"	"	1	2
34	"	"	5	5

4. Forests on Natural Banks (Parana River Bank 8 km West of Ayolas)



Notes: ◎ indicates layered trees.

Fig. 2-11-4 Tree Positions

Table 2-11-4 Tree Names, Diameters, Heights

No.	Common name (Garani)	Botanical name	ϕ (cm)	Height (m)
1	Ñuati arroyo	Sebastiana sp.	12	8
2	"	"	8	6
3	"	"	9	6
4	Yváviju	Eugenia sp.	7	5
5	"	"	10	6
6	"	"	7	5
7	"	"	3	3
8	"	"	8	6
9	"	"	7	6
10	Laurell amarillo	Nectandra lanceolata	56	20
11	Kokú	Allophylus edulis	6	6
12	Ñangapiry	Eugenia uniflora	2	2
13	"	"	3	2

(Cont'd)

No.	Common name (Garani)	Botanical name	ϕ (cm)	Height (m)
14	Lapacho	Tabebvia sp.	28	20
15	Ñangapiry	Eugenia uniflora	2	2
16	"	"	3	4
17	"	"	3	4
18	"	"	4	4
19	Laurel amarrillo	Nectandra lanceolata	19	18
20	"	"	29	18
21	Ñangapiry	Eugenia uniflora	2	2
22	Yváviju	Eugenia sp.	3	3
23	Ñangapiry	Eugenia uniflora	3	3
24	Yváviju	Eugenia sp.	4	5
25	"	"	7	5
26	"	"	6	5
27	Ñuati arroyo	Sabastiana sp.	11	6
28	"	"	3	3
29	"	"	5	6
30	Araticú	Annona sp.	13	10
31	Ñangapiry	Eugenia uniflora	8	7
32	Yváviju	Eugenia sp.	2	2
33	Ñangapiry	Eugenia uniflora	12	7
34	"	"	11	7
35	Yváviju	Eugenia sp.	10	5
36	Ñuati arroyo	Sabastiana sp.	2	2
37	Ñangapiry	Eugenia uniflora	3	3
38	"	"	2	3
39	Kanelon pyta	Rapanea umbellata	4	4
40	Ñuati arroyo	Sabastiana sp.	8	6
41	Kurupáy	Parapitadenia macrocarpa	53	20
42	Pycasu rembi'u	Chrysophyllum maginatum	6	7
43	Ñangapiry	Eugenia uniflora	2	2
44	"	"	4	3
45	"	"	4	2
46	Mbavy'ra	Nectandra lauceolata	11	7
47	"	"	4	3
48	"	"	2	3

LIVESTOCK PLAN

Table 3-2-1 Capacity of Beef Processing Factory

(As of July 28, 1983)

Name of factory	Location	Operation permission		Processing and production capacity									
		Ministry of agriculture and livestock farming	others	Slaughter (head)	Cold storing beef (head)	Frozen beef (ton)	Storage (ton)	Boned beef	Boiling and freezing process	Corn beef	By products processing		
											meat powder	Edible tallow	Industrial tallow
Guarani	Farnando de La Mora	Yes	Europe, Chile Spain	40	200	40	300		Yes	-	-	-	-
Codega	Tablada nueva	Yes	Europe, Israel South American countries	40	600	40	600		-	-	-	-	-
Ipfsa	Tablada nueva	Yes	Same as above	40	300	35	400		-	-	-	-	-
Pampa	Tablada nueva	Under suspension		50	700	70	700		-	-	-	-	-
San Antonio	San Antonio	Yes	Europe, Israel Spain South American countries	70	1200	95	600		-	Yes	Yes	Yes	Yes
Chaco	Lugua	Yes	Brazil	40	200	-	-	-	-	-	-	-	-
Copacar	Tablada nueva	Under suspension		40	200	30	350		-	-	-	-	-
Inpacar	Pigueta cue	Yes	Brazil	50	450	60	600		-	Yes	Yes	Yes	Yes
Pesa	Zeballos cue	Under suspension		90	900	154	380		-	Yes	Yes	Yes	Yes
Total				460	4750	524	3930						

Table 3-2-2 Weight of Parts of Beef Cattle (from Meat Manual)

Parts	Weight (kg)	(%)	Weight (kg)
Body weight (Live weight)	500	100.0	400
Carcass (275 kg) [55%]			
Dressed meat	205	41.0	164
Bone	45	9.0	36
Fat	15	3.0	12
Liver	10	2.0	8
Head and legs weight	30	6.0	24
Skin weight	40	8.0	32
Internal organs (130 kg)			
Eating part	50	10.0	40
Non eating part	80	16.0	64
Others	25	5.0	20

[ ] is percentage for body weight.

Table 3-2-3 Details of Material Cost per 100 ha Pasture

Item	Required cost (GS)	Annual fixed cost		
		Dpreciation (GS)	Repaire (GS)	Total (GS)
Pasture Seeds	100 ha × 20 kg × 500 GS = 1,000,000	40 month renewal 300,000	-	300,000
Fertilizer	100 ha × 50 kg × 91 GS = 455,000	455,000	-	455,000
Wooden bander silo	(m weight) (high) 129 t÷780 kg ÷2 m × 2,700 ≒ 223,000	(10 years) 22,300	(1%) 2,230	24,530
Fence	(3 laying) 230 GS/m × 11,000 m = 2,530,000	(8 years) 316,250	(3%) 75,900	392,150
Forage harvester	2,100,000 GS × 1/3 family = 700,000	(8 years) 78,750	(4%) 28,000	106,750
Pasture harrow	210,000 GS × 1/3 family = 70,000	6,300	(4%) 2,800	9,100
Dump truck	2,500,000 GS × 1 family = 2,500,000	281,250	(5%) 125,000	406,250
Beef cattle (♀)	83 head × 40,000 G = 3,320,000 (Remaining cost 400 kg × 80% × 100 GS = 32,000)	(7 years) 95,000	-	95,000
Beef cattle (♂)	1.7 head × 100,000 G = 170,000 (Remaining cost 650 kg × 80% × 100 GS = 52,000)	(3 years) 27,200	-	27,200
Artificial insemination	83 person × 12/15 × 1.3 × (300 GS + 700 GS) = 86,320			
Wage	Fatting beef cattle 47.2 person × 2,350 GS = 110,920			
Tax	83 person × 1,000 GS = 83,000			
Oil fuel cost	100 ha × 9,407 GS × 1/4 = 235,175			
Ground rent	100 ha × 2,000 GS × 1/5 = 40,000			

Table 3-2-4 Semen Selling Price of Cattle Artificial Insemination Center (1981)

Kind of breeding cattle		Producting country	Selling unit price (Guarani)
Nelore	No. 2441	Brazil	300
"	" 2599	"	250
"	" 495 (Mocho)	Paraguay	250
"	" 5050	Brazil	300
Brahaman	No. 689	U.S.A.	300
"	" 213	Paraguay	300
"	" 78	"	250
"	" 876	U.S.A.	300
"	" 801	"	300
"	" 174	"	300
"	" 210	Argentina	250
Sta. Gertrudis	No. 102	Paraguay	250
"	" 110	U.S.A.	300
"	" 255	Paraguay	250
"	" 04	"	250
"	" 041	"	200
A. Angus	No. 2737	U.S.A.	300
"	" 896	"	250
"	" 1583	Argentina	250
Chianina	No. 1	Italia	200
"	" 2	"	200
Fleckvieh	No. 45B	Argentina	250
"	" 45	"	250
Simental	No. 2237	Suiza	300
Limousin	No. 14	Argentina	250
Charolais	No. 96	"	250
Hereford	No. X239	"	200
Pardo Suizo	No. 215	"	200
"	" 7418	Suiza	300
Holando	No. 733	U.S.A.	200
"	" 792	"	200
"	" 296	Urguay	200
"	" 1741	U.S.A.	300
Jersey	No. 600	Urguay	150

Fig. 3-2-1 Wholesale Price of Beef Carcase (Investigated by Tokyo Bank, Market Rate Conversion) (FOB Price)

Table 3-2-5 Material and Others Cost on Livestock Farming with Managing Scale 100 ha

Item	Required cost (GS)	Annual fixed cost		
		Dpreciation (GS)	Repaire (GS)	Total (GS)
Pasture		48 month		
Seeds	100 ha × 20 kg × 500 GS = 1,000,000	renewal 250,000	(5%) 50,000	300,000
Fertilizer	100 ha × 50 kg × 91 GS = 455,000	455,000	-	455,000
Wooden bander sile	129t ÷ 780kg/m ÷ 2m × 2,700 = 223,000	(10 years) 22,300	(2%) 4,460	26,760
Fence	(4 laying) 11,000 m × 304 GS = 3,344,000	(8 years) 418,000	(3%) 100,320	518,320
Milking facility	93 m × 16,000 GS/m = 1,488,000	(30 years) 44,640	(2%) 29,760	74,400
Milking machine	1 set = 5,000,000	(8 years) 562,500	(5%) 250,000	812,500
Electricity introduction	1 set = 1,000,000	(30 years) 33,300	(1%) 10,000	43,300
Tractor	2,300,000 GS × 1/3 family ≒ 767,000	(8 years) 863,000	(5%) 38,350	124,650
Forage harvestor	2,100,000 GS × 1/3 family ≒ 700,000	(8 years) 78,750	(5%) 35,000	113,750
Pasture harrow	210,000 GS × 1/3 family = 70,000	(8 years) 7,880	(5%) 3,500	11,380
Dump truck	2,500,000 GS × 1 family= 2,500,000	(10 years) 225,000	(5%) 125,000	350,000
Front roader	600,000 GS × 1/3 family = 200,000	22,500	10,000	32,500
Milch cow	167.7 head × 190,000 GS = 31,863,000 (Remaining cost: per head 500 kg × 70% × 100 = 35,000)	(8.5 years) 3,058,059	-	3,058,059

Table 3-2-6 Estimation of Consumption and Nutritive Elements of of Pure Food per Person a Day

(MAG: 1977 ∿ 1982 Supplying Base, Estimated Value)

Item	Pure food (g)	Calory (cal)	Protein (g)	Fat (g)
Cereals	224.9	819.5	21.1	2.5
Tubers	452.5	726.2	4.1	1.4
Pulse	53.0	122.7	7.3	4.3
Vegitables	69.8	24.6	0.7	0.1
Fruits	368.5	228.3	3.8	0.7
Meats	177.8	488.5	29.7	26.8
Beef				95.0
(Fishery products)	1.8	1.3	0.4	-
Milk, dairly products	80.7	66.2	3.4	4.1
Milk				75.3
Eggs	28.7	42.5	3.2	2.8
Fat and oil	27.3	232.7	0.5	26.8
Suger	51.7	203.8	-	-
Subtotal	1,534.9	2,955.0	73.8	69.5
Non alcoholic drinks	55.4	17.1	2.4	0.5
Alcoholic driks	52.2	46.6		
Total	1,642.5	3,018.7	76.2	70.0

Table 3-2-7 Population of in and around Ayolas

(1982)

Department	District	Population
Itapua	Encarnacion	44,543
	Carmen del Parana	5,911
	Cnel. Bogado	14,761
	Fram	10,099
	General Artigas	11,986
	General Delgado	7,011
	San Cosme	7,129
	San P. del Patana	31,700
	Subtotal	133,140
Misiones	San J. Bautista	12,572
	Ayolas	5,825
	San Ignacio	17,255
	San Miguel	5,122
	San Patricio	3,053
	Santa Maria	6,625
	Santa Rosa	18,273
	Santiago	5,959
	Yabebyry	3,177
	Subtotal	67,861
Neembucu	Cerrito	5,408
	Laureles	4,030
	Subtotal	9,438
	Total	210,439