Table A.3.2.2-20 10-day Mean Temperature

c°

	'66	'67	'68	'69	'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	MEAN
J B	22.3	18.6 ‡	21.1 ‡	21.0 ‡	20.3	19.9	20.8	21.4	20.3	20.6	19.3	20.4	21.3	19.2	20.9	19.6	22.3	22.5	18.8	18.2	20.2	20.4
A M	19.9	19.7	19.7	19.5	18.0	19.6	20.6	18.5	20.0	19.2	19.1	19.3	19.8	20.2	21.8	18.9	21.3	20.2	19.9	18.8	18.5	19.6
N L	20.8 ‡	20.6 ‡	19.4 ‡	20.2	21.3	19.4	20.9 ‡	20.3	20.2	21.5	19.3	19.7 ‡	20.0 ‡	20.7	21.8	20.5	21.7	22.3 ‡	19.5 ‡	18.5	19.4	20.4
F B	22.2	19.8	18.3	21.7	18.8	19.9	21.0	19.8	20.2	21.2	19.5	21.0	20.6	20.5	20.5	22.7	22.5	22.7	19.4	20.1	20.8	20.6
E M	23.7	19.6	21.5	21.2	20.3	20.3	19.5	20.1	19.6	21.7	20.4	21.1	22.3	20.8	21.8	22.1	23.2	22.3	21.5	19.5	20.2	21.1
B L	23.8 ‡	19.8	19.7 ‡	22.9	18.8	22.8	20.1 ‡	21.3	19.8	21.0	19.7	21.7 ‡	21.0	22.1	23.1	21.6	22.4	23.9 ‡	22.6 ‡	21.3	20.1	21.2
M B	21.4	19.8	—	23.7	19.8	21.4	29.5	22.6	20.8	22.1	22.5	22.6	23.4	22.5	23.1	24.4	22.3	24.2	21.4 ‡	21.2	20.6	22.5
A M	21.0	19.3	—	23.5	19.8	21.9	29.0	23.0	21.7	22.8	22.8	24.0	22.2	22.0	24.2	24.7	25.0	22.8	21.5	21.8	22.1	22.8
R L	21.6	20.8	—	23.4	21.9	22.9	31.2	24.7	22.9	23.6 ‡	23.8	24.4 ‡	22.8	24.2	25.2	23.2	25.8	24.4	22.7	23.1	19.9	23.6
A B	27.8 ‡	21.1	—	25.1	21.9	20.8	23.8	24.3	22.4	24.5	23.1	23.2	22.5	23.9	25.3	24.3	25.8	25.5	23.3	21.4	22.0	23.4
P M	24.5	22.0	—	25.1	22.1	21.3	23.7	24.2	23.6	25.0	23.1	23.6	24.8	24.5	23.2	23.9	25.0	25.3	22.8	22.6	23.7	23.7
R L	26.9	21.7	—	25.3	22.8	23.1	24.1	24.6 ‡	22.8	24.5	24.0	23.8	24.2	23.1 ‡	25.0	25.0	24.9	24.4	24.0 ‡	24.2	23.8	24.2
M B	23.0	22.8	—	26.5	—	24.6	23.9	25.2	23.6	24.0	23.4	22.9	24.6	23.8	26.2	24.4	24.6	24.4	22.8	17.7	24.7	23.9
A M	24.0	22.1	—	24.1	—	23.2	23.9	23.8	22.9	25.0	23.7	24.8	24.4	22.3	25.8	25.1	26.0	25.0	21.8	17.8	24.7	23.7
Y L	23.4	22.5	—	23.9	—	23.3 ‡	23.8	22.9	22.6	23.6	24.2	24.2	23.1	23.6	24.6	24.9	24.5 ‡	24.2 ‡	22.0	17.7 ‡	22.5	23.5
J B	23.4	21.0	—	22.4	24.3	22.8	23.0	23.2	22.6	24.1	22.8	22.5	23.3	22.3	24.2	24.2	25.1	23.3	22.6	22.4	23.5	23.2
U M	23.1	21.0	—	22.5	22.7	21.8	23.2	22.3	22.1	24.1	22.9	23.3	23.6	23.5	24.0	23.2	24.0	22.4	21.7	22.7	23.8	22.9
N L	22.4	22.2	—	22.1	22.4	22.6	23.9	22.3	21.3	23.4 ‡	22.3	23.2	22.9	22.8	24.2 ‡	23.5	24.3	22.9	22.5	23.0	22.8	22.7
J B	23.2	22.4	—	22.4	22.4	23.0	24.1	22.8	22.0	22.8	22.7	23.2	22.2	23.1	24.3	24.0	24.3	22.3	21.3	22.2	22.2	22.9
U M	22.5	21.8	—	23.6	23.0	22.1	24.3	22.8	21.9	23.3	23.1	23.9	21.7	22.5	24.3	23.4	24.0	22.4	21.7	22.0	22.7	22.9
L L	23.1	22.1	—	23.8	22.1	22.2	22.7	21.6 ‡	22.3	22.7	22.8	23.6	22.3 ‡	23.5	23.3	23.7	24.0	22.3	21.8 ‡	22.3	22.9	22.9
A B	22.5	21.9	—	22.9	22.4	21.9	22.3	22.1	22.7	22.6	23.3	23.7	22.7	23.5	23.6	22.7	24.3	22.0	21.8	21.9	23.2	22.8
U M	21.8	21.3	—	22.0	22.5	22.2	22.3	22.0	22.9	22.8	23.1	23.9	22.7	22.2	23.8	24.0	24.7	22.3	21.5	22.0	23.1	22.7
G L	21.9	21.1	—	22.4	22.7 ‡	22.4 ‡	22.0	21.6	21.9	22.3	22.8	23.5	22.8 ‡	22.3	23.3	23.7 ‡	24.9	22.0	21.8	21.9	23.1	22.4
S B	22.3	21.1	—	22.2	22.1	21.9	22.7	21.8	21.6	22.1	22.6	24.0	22.0 ‡	22.9	23.4	23.5	24.6	21.9	21.2	21.6	23.6	22.5
E M	22.4	20.3	—	22.9	22.1	22.2	22.5	22.3	22.0	22.0	23.5	23.0	21.4	22.2	21.8	23.7	22.9	21.7	21.3	21.4	22.2	22.2
P L	23.1	20.4	—	22.1	21.8	21.9	22.1	21.9	22.2 ‡	21.0 ‡	23.1	22.7	22.0	22.8	21.3 ‡	23.7	23.6	21.6	21.6	22.3	22.5	22.3
O B	22.4	21.1	—	22.7	22.3	22.1	22.4	21.7	20.8	21.8	22.4	22.3	22.4	22.9	22.3	23.5	23.2	21.0	21.1	22.7	22.4	22.2
C M	22.5	20.4	—	22.6	22.1	22.6	21.9	21.6	21.1	22.0	21.9	21.7	21.0	23.3	23.2	22.6	23.1	21.4	21.6	22.3	22.0	22.1
T L	21.0	20.2	—	22.8	21.7	21.5	21.9	21.2	21.2	21.4	21.8	23.2 ‡	20.2	22.3	22.7	23.2	22.1	20.3	21.3	21.8	22.1	21.7
N B	19.7	20.0	—	22.0	19.7	20.6	22.4	21.1	20.3	21.9	20.0	22.8	21.5	21.9	22.4	21.4 ‡	21.9	20.4	19.7	20.5	21.7	21.1
O M	20.3	19.1	—	21.1	19.5	19.9	22.1	19.9	20.9	19.6	22.2	21.6	21.7	21.1	22.0	20.8	22.1	20.3	19.5	20.1	22.7	20.8
V L	18.8	20.0	—	20.9	19.1 ‡	20.4 ‡	21.6	21.0	20.7	20.4	21.5	21.9	22.6	21.3	21.9	21.7 ‡	22.0	20.7	18.5	19.6	22.6	20.9
D B	19.0	20.0	—	20.7	18.3	20.8	21.5	19.0	19.0	18.9	21.5	22.1	22.9	21.4	22.0	21.8	22.9	19.6	19.7	19.9	21.8	20.6
E M	18.9	19.6	—	19.1	20.7	20.8	21.1	18.9	21.1	18.6	21.4	21.6	20.8	21.1	20.4	21.3	21.2	18.8	18.9	20.4	21.3	20.2
C L	19.4	18.8	—	20.8	19.8	19.6	19.0	18.7 ‡	21.1	18.7	19.9	20.5	20.6	20.6	19.6	22.5	21.8	19.0	19.9 ‡	20.5	21.7	20.2

Table A.3.2.2-21 Monthly Mean Relative Humidity

%

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'68 ~ '69	—	—	—	—	—	—	—	—	65.7	62.1	61.9	60.3	62.5 *
'69	65.1	72.9	72.1	77.1	76.7	75.0	68.7	64.1	62.0 *	60.9 *	57.7	56.0	67.4 *
'70	57.1	69.2 *	75.1	75.2 *	78.9	76.6	69.5 *	62.9	60.5	59.0	54.4	54.0	65.9 *
'71	62.8 *	71.5	69.7	75.0 *	78.0	75.7	71.9	64.7	62.1 *	59.2 *	55.8	56.4	66.9 *
'72	60.5 *	70.7	65.8 *	65.6	66.9	66.5 *	67.9	61.3	59.0	58.2	58.1	59.1 *	63.4 *
'73	64.6	73.4	73.2 *	79.1	80.6	80.0	70.3	65.0 *	61.3	57.9	61.1	51.8	68.2 *
'74	65.9	73.6	66.0 *	64.4	76.2 *	68.6	61.8	60.7	61.0	56.4	53.2 *	54.2	63.5 *
'75	62.9	62.2 *	62.7	73.3	79.3	79.6	75.3	68.7	63.2	59.2 *	54.9 *	60.0	67.5 *
'76	66.3 *	79.9	68.5	65.0	70.8	72.9	64.0	58.4	54.1 *	55.1 *	49.5	53.7	63.2 *
'77	59.3	68.2	55.7	66.8	67.7	63.3 *	63.6	62.7	58.4	55.9	57.5	56.8	61.3 *
'78	60.4	66.2	72.6	71.0	80.0	76.7	68.8	63.4	60.2	57.0	58.2	61.5 *	66.4 *
'79	70.7	77.7	74.1	72.4	84.5	80.0	67.9	65.9	61.3	59.3	54.8 *	58.6	69.0 *
'80	63.6	73.8 *	70.5	73.0	77.5 *	71.4	68.8	64.5	62.9	59.4	57.2	55.2	66.4 *
'81	65.4	79.7	74.6	76.9 *	76.6	81.1	66.5 *	64.7	62.6	58.3	55.4	57.4	68.3 *
'82	65.7 *	72.0	67.4	63.2	75.9	76.4	67.7	63.2	62.7	58.8	55.6	61.6	65.9 *
'83	65.3	85.8	83.6	85.3	89.1	86.6	80.7	77.2	70.9	68.9	66.1	66.8	77.2
'84	84.7	83.5	85.0	86.5	89.6	86.4	76.1	71.3	66.7	65.7	63.4	61.1	76.7
'85	—	76.0	79.2	84.3	90.1 *	80.7	86.3	75.0	68.2	65.4	60.1	56.5	74.7 *
'86	72.2	71.3	71.1	70.6	74.2	73.1	67.7	64.9	—	—	—	—	70.6 *
MEAN	65.9	74.8	72.1	73.2	77.9	77.6	70.5	65.5	63.0	60.2	58.1	57.5	

Table A.3.2.2-22 10-day Mean Relative Humidity

%

		'69	'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	MEAN
J	B	67.6	60.5	62.7	62.2	59.5	62.0	61.5	62.6	53.1	57.0	57.6	82.9	63.7	64.8	63.4	71.6	66.6	62.0	62.6
A	M	65.4	60.8	60.8	63.2	61.2	63.8	62.5	63.6	53.8	57.7	60.5	61.8	61.1	62.6	61.5	72.2	67.6	69.0	62.7
N	L	64.3	64.6 *	58.1	60.9 *	56.6	58.5	59.3	63.5	55.4 *	60.3	62.4	59.4	63.8	60.7	62.8	69.1	65.9	67.6	62.2
F	B	62.7	60.3 *	58.6	62.2	59.4	57.6	55.9	59.6	55.0	58.2	55.9	57.9	59.4	58.4	58.6	72.6	63.9	70.1	60.4
E	M	60.9	63.0	58.7	56.0	58.7	58.0	56.0	57.0 *	55.3	55.2	58.0	62.2	59.9	60.1	58.0	68.1	67.5	50.7	59.8
B	L	62.8	59.1	60.0	59.3 *	56.1	58.0	57.6	—	54.9 *	53.9	57.3	57.7 *	58.6	55.8	60.1	65.2	65.5	65.4	59.6
M	B	62.3	59.4	56.8	56.0	57.9	63.3	53.6	45.5 *	48.8	60.9	55.3	53.7	62.5	58.1	55.9	66.8	64.8	60.3	58.6
A	M	61.9	54.7	55.1	57.5	59.1	63.4	54.2	54.3	48.9	55.0	57.8	52.9	55.7	54.6	55.0	64.9	65.2	58.3	57.1
R	L	61.6	59.0	51.6	54.1	57.5	56.6	51.8 *	57.2	50.6	56.7	61.1	57.7 *	53.7	53.6	55.9	66.6	60.5	61.6	57.4
A	B	60.5	53.0	54.6	53.7	55.3	52.7	55.3	59.8	52.5	54.3	55.5	57.1	53.2	55.4	62.7	68.8	57.3	57.7	55.9
P	M	60.8	60.0	57.5	57.3	57.3 *	51.5	51.4	59.1	59.0	57.7	59.6	60.1	57.8	56.9	58.5	64.0	59.1	50.8	57.7
R	L	59.6	55.1	50.0	58.1	60.4 *	51.2	55.8	61.2	49.6	58.4	70.2 *	58.6	54.7	59.8	63.7	67.6	66.8	61.0	58.2
M	B	57.4	53.4	55.0	54.3	58.3	62.0	58.3	60.5	62.8	55.0	73.9	59.8	69.7	57.9	57.0	76.6	—	64.1	61.0
A	M	68.7	60.3	66.1	68.4	60.7	65.1	58.9	69.6	52.1	52.6	70.1	65.0	58.2	58.9	66.6	87.7	—	68.5	64.7
Y	L	68.8	57.6	65.3 *	58.4 *	73.6	70.3	70.2	68.8 *	62.7	72.5	68.4	65.8	67.9	60.4 *	71.6	89.5	—	82.6	70.9
J	B	73.1	62.0	71.0	75.1	68.6	69.3	66.4	79.3	73.9	71.1	85.0	68.1	70.9	64.2	83.8	87.1	77.5	72.6	73.6
U	M	72.2	74.8	74.5	71.3	75.7	74.6	59.0	80.0	67.0	59.9	76.0	81.7	81.3	78.3	89.9	87.1	78.1	68.3	75.0
N	L	73.4	71.1 *	69.0	65.3	76.0	76.9	61.0 *	80.5	63.6	67.6	71.6	71.4 *	80.8	73.4	83.6	76.3	72.5	73.1	73.6
J	B	77.3	73.3	63.9	59.5	69.7	67.4	61.4	75.4	54.2	71.9	79.4	63.9	74.1	62.8	84.1	88.0	74.2	76.9	71.0
U	M	70.5	75.2	72.7	64.3	67.8	67.0	57.7	66.9	52.2	74.8	74.3	67.8	75.8	70.7	85.6	81.5	79.1	68.4	70.7
L	L	68.7	76.7	72.4	73.7 *	83.2 *	63.7 *	68.5	63.6	60.2	71.2	69.2	78.8	74.0	68.5	81.4	85.4	83.8	68.2	72.7
A	B	75.1	76.7 *	75.2	63.5	77.5	62.1	74.2	81.3	63.7	67.7	68.5	77.8	71.8	65.7	86.4	84.5	87.0	65.3	72.2
U	M	73.8	74.2	72.6	61.2	76.2	62.5	71.4	68.7	54.2	70.7	68.2	70.9	78.4	64.4	83.8	87.8	84.7	73.5	72.9
G	L	77.3	75.0 *	77.4 *	71.4	83.3	68.3	74.3	85.1	71.9	74.4	79.7	70.6	80.4 *	59.9	85.6	87.0	81.5	72.8	74.9
S	B	80.5	78.0	79.2	67.1	81.8	76.3	82.7	72.2	61.5	80.9	84.8	71.8	76.8	67.0	89.9	88.0	87.3 *	70.5	77.0
E	M	74.5	76.6	76.2	65.3	77.3	74.8	78.4	68.0	68.2	77.7	89.0	81.6	74.5	79.7	89.2	91.9	91.8	76.9	78.4
P	L	75.0	82.0	78.5	68.3	82.6	77.6 *	76.8	72.3	73.5	81.3	79.9	79.4 *	78.4	80.9	88.3	89.0	90.9	75.1	79.6
O	B	75.3	76.8	78.3	67.7	82.2	71.2	79.0	80.0	66.3	78.3	80.5	71.2	85.3	81.5	87.2	88.7	80.8	73.3	77.9
C	M	76.9	76.0	75.9	67.6	80.1	67.3	80.7	72.2	60.8	80.8	82.7	73.3	76.5	76.2	86.3	85.0	78.0	72.6	76.0
T	L	72.9	76.9	73.0	64.0	77.6	67.3	79.2	67.0	52.7 *	73.5	77.6	69.9	81.4	71.8	66.4	85.6	83.1	72.3	75.3
N	B	71.9	69.8	71.4	66.2	71.4	61.1	81.5	57.8	64.0	74.1	70.8	68.3	68.2	68.1	80.7	80.9	85.5	69.1	71.2
O	M	66.3	70.8	67.8	72.6	68.7	62.5	73.9	69.2	62.5	65.2	65.4	70.3	65.5	67.5	80.0	74.9	86.4	68.7	69.9
V	L	68.0	67.8 *	76.5	64.9	70.7	61.9	70.5	64.9	64.4	67.0	67.1	67.9	65.6 *	67.6	81.5	72.6	86.9	65.2	69.9
D	B	65.6	64.3	66.4	61.9	66.7	63.8	70.5	61.7	63.3	63.8	68.8	67.0	64.9	65.0	77.9	71.5	80.0	65.8	67.2
E	M	65.0	64.5	65.3	61.9	84.3	60.4	69.6	58.1	64.4	65.0	65.8	84.8	65.2	62.1	80.7	73.9	75.1	63.0	66.1
C	L	61.9	60.1	62.2	60.3	63.4 *	58.0	66.2	55.7	60.7	61.6	63.2 *	62.2	63.9	62.6	73.3	63.7	70.5	65.9	63.1

Table A.3.2.2-23 Pan Evaporation

mm/day

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'70 ~ '71	—	—	—	—	—	—	4.00 *	4.92	5.35	6.32	7.69	8.37	6.18 *
'71	6.11	4.86 *	4.76 *	4.21 *	3.63 *	3.51 *	3.48	4.17	4.90	5.76	7.02	7.11	5.07 *
'72	6.24	5.04 *	5.31	4.80 *	4.29	4.47	4.15	5.11	5.79	6.60	7.85	7.18	5.57 *
'73	6.02	4.35 *	4.39 *	3.91 *	3.93 *	2.91 *	3.86	4.53	4.58	6.16	5.82 *	7.22	4.81 *
'74	5.86 *	3.80 *	4.16	4.22 *	3.86 *	3.59	4.59	4.49	4.93	6.32	7.16	7.53	5.08 *
'75	6.00	5.83	4.81 *	4.11 *	3.79 *	3.40 *	2.23	3.79	4.68	6.19 *	7.13	6.68	4.90 *
'76	5.63 *	3.68 *	4.88 *	4.51	4.05 *	3.98	4.27	4.62	5.56	6.05	7.75	6.62	5.16 *
'77	5.82 *	4.32 *	5.23	4.37 *	4.41 *	4.39	4.45	4.40	5.39	6.58 *	6.83	7.12	5.27 *
'78	6.79 *	5.03 *	4.09	4.32 *	3.47 *	3.39 *	3.91	4.50	5.45	6.00	6.54	6.59	5.02 *
'79	4.74 *	4.49 *	4.30 *	4.27 *	3.19 *	3.01 *	2.24	4.55	5.27	6.15	7.40	6.66	4.89 *
'80	6.37 *	4.45 *	4.76 *	4.39 *	3.61 *	3.53	4.12	4.67	3.87 *	6.09	6.80	6.96	4.98 *
'81	5.91 *	4.00 *	4.38 *	4.34 *	3.89 *	3.62 *	4.27	—	4.80	5.77	7.27	6.99	5.06 *
'82	5.53 *	4.66 *	4.53	5.08	3.97 *	3.56 *	4.17	4.69	5.08	5.17	6.87	6.80	5.03 *
'83	6.69	4.42 *	4.38 *	4.10 *	3.97 *	3.56	3.60 *	3.69	4.73	5.68	6.83	7.40	4.94 *
'84	4.30 *	4.20 *	3.93 *	4.03	3.51 *	4.35 *	4.36	4.41	4.88	5.76	6.46	6.09	4.70 *
'85	—	4.56 *	4.59 *	4.76 *	—	—	—	—	3.77	5.40	7.24	8.01	5.52 *
'86	5.67	4.63 *	4.37	4.65 *	3.50	3.83 *	4.17	4.64 *	—	—	—	—	4.43 *
MEAN	6.12	—	4.62	—	—	3.92	3.88	4.50	5.01	5.94	7.12	7.08	

Table A.3.2.2-24 10-day Mean Pan Evaporation

mm/day

		'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	MEAN
J	B	—	4.65	4.32	5.78	4.36	5.05	4.06	5.68	5.52	5.47	4.93	3.86	4.46	5.29	4.60	4.86	4.12	4.84
A	M	—	5.32	4.94	5.30	4.60	4.61	4.70	5.30	5.33	5.30	4.93	3.86	4.98	5.02	4.68	4.75	3.66	4.83
N	L	—	6.01	4.94	6.18	4.76	5.10	5.23	5.69	5.33	5.56	5.90	3.89 *	4.94	4.96	4.88	5.01	3.55	5.20
F	B	—	6.14	5.58	6.61	5.73	6.16	5.60 *	5.54	6.39	5.92	6.00	6.09	5.33	5.77	4.77	5.89	5.55	5.83
E	M	—	6.50	6.27	6.28	6.34	6.80	6.14	5.83	6.50	5.48	6.06	5.51	5.90	5.30	5.98	5.50	4.92	5.96
B	L	—	6.33	5.38	6.98	6.49	5.91	6.63	6.95	6.97 *	6.74	6.40	6.80	6.15	4.26	6.37	5.84	5.81	6.20
M	B	—	7.03	6.96	4.34	4.84 *	6.44	6.58	7.57	6.63	6.54	7.45	6.26	6.55	7.45	6.41	5.90	6.94	6.80
A	M	—	7.68	6.06	7.48	5.23	7.31	6.94	8.07	6.98	6.32	7.25	6.85	7.35	6.79	6.45	6.25	7.87	6.93
R	L	—	8.29	7.96	8.65	7.16	7.67	7.82	7.63	6.87	6.75	7.50	7.28	7.86	6.42	7.56	7.16	6.94	7.47
A	B	—	8.03	7.21	7.26	7.02	7.45	6.80	7.85	7.60	7.70	6.79	7.38	8.07	6.21	7.45	6.25	7.72	7.30
P	M	—	7.82	7.31	7.57	7.14	7.39	6.81	5.57	7.25	6.65	6.30	6.81	6.87	6.95	7.64	5.59	8.74	7.03
R	L	—	9.27	6.80	6.71	7.50	7.76	6.42	6.43	6.51	5.43	6.90	6.70	6.02	7.25	7.12	6.42	7.57	6.93
M	B	—	7.66	7.22	7.40	6.62	7.03	6.00	5.59	8.30	4.99 *	7.03	5.47	6.17	7.77	5.47	—	7.04	6.81
A	M	—	5.05	5.09	5.69	5.84	6.16	5.49 *	6.31	7.18	4.41	6.37 *	7.02	6.65	6.52	3.47 *	—	6.28	6.02
Y	L	—	5.67	6.39	5.06	4.93 *	4.91	5.38 *	5.56 *	4.38 *	4.86 *	5.71 *	5.24 *	3.76 *	5.86	3.87 *	—	3.86	5.29
J	B	—	4.81	4.48 *	4.42	5.03	5.82	3.38 *	3.88 *	5.39	4.64 *	4.36 *	4.62	5.57	5.03 *	4.26 *	4.71 *	5.10 *	5.09
U	M	—	4.50 *	4.88	3.58 *	3.40	6.08	4.33 *	4.86	5.20	4.37 *	3.77 *	3.32 *	4.00 *	3.47 *	3.45 *	4.26 *	4.29	4.79
N	L	—	5.06	5.72 *	5.03 *	2.88 *	5.60	3.38 *	4.16 *	4.43 *	—	5.08 *	4.00 *	4.29	4.76 *	4.80 *	4.70	4.55	4.84
J	B	—	5.23	6.25	4.92	3.79	4.60	4.03 *	4.88	3.72 *	3.91 *	5.41	4.59 *	5.10	3.88 *	3.70 *	5.27 *	4.02	4.91
U	M	—	4.45	5.42	5.18 *	4.41	5.14	5.17	5.76	3.61	3.67	4.61	4.32 *	4.18	4.85	4.08	4.07	4.88	4.59
L	L	—	4.61 *	4.36	3.20	4.26	4.69 *	5.15	5.06	4.91 *	5.10	4.21 *	4.28	4.36	4.37	3.98	4.51	4.22	4.41
A	B	—	3.90 *	4.85	3.76	4.90	3.93	5.04	4.18	4.70	4.26	4.31	4.06	5.09	3.75	4.38	4.82	4.87	4.45
U	M	—	4.41	5.14	4.03	4.29	4.13 *	4.45	4.25	4.17	4.36 *	4.40	4.52	4.99	4.90 *	3.81	4.82	4.26 *	4.45
G	L	—	4.03 *	4.40 *	3.95 *	3.48 *	4.26	4.08	4.68 *	4.08 *	4.21 *	4.40 *	4.44 *	5.16	3.74 *	3.91	4.10 *	4.78	4.44
S	B	—	3.23 *	4.78	3.73	3.99	3.50	4.16 *	4.98	3.48	3.77 *	4.26	3.91	4.98	4.39 *	4.15 *	—	4.30	4.19
E	M	—	4.14	4.14	4.15	3.15 *	4.21 *	3.83	4.26	3.72 *	2.54 *	2.91	3.84 *	3.17 *	4.08 *	3.12	—	3.24	3.84
P	L	—	2.92 *	3.96	3.91 *	4.29	3.74	4.19 *	3.93 *	3.21 *	3.24	3.51	3.92 *	3.53	3.55	3.38 *	—	2.97	3.60
O	B	—	3.64 *	4.05	3.02	3.13	3.23 *	3.85	4.35	3.55	2.77	3.53	3.73 *	3.35	3.41	4.12	—	3.54 *	3.56
C	M	—	3.73 *	3.94	3.02 *	3.98	3.90	3.75	4.94	3.07 *	2.98	3.52	4.42 *	3.34	3.86	4.57	—	3.80	3.88
T	L	—	3.29	5.34	2.73	3.66	3.07	4.31	3.92	3.51	3.29 *	3.54	2.83 *	3.99 *	3.43	4.25 *	—	4.08	3.72
N	B	4.48 *	3.06	4.49	3.49	4.78	1.82	5.32	4.47	3.53	4.28	4.43	4.67	4.20	3.88	4.21	—	3.95	3.99
O	M	3.75	4.10	3.76	4.05	4.48	2.18	3.55	4.69	4.01	4.21	4.02	4.37	4.48	3.68 *	4.47	—	3.59	3.98
V	L	4.06	3.29	4.19	4.03	4.50	2.88	3.94	4.19	4.18	4.24	3.90	4.38	3.84	3.25	4.40	—	4.97	4.02
D	B	4.65	3.93	4.91	4.18	4.58	3.70	4.96	4.18	4.39	3.82	4.21	—	4.26	3.76	4.22	—	4.18 *	4.27
E	M	4.83	4.00	5.30	4.48	4.98	3.33	4.16	4.00	4.81	4.63	4.80	—	4.93	3.29	4.15	—	5.35 *	4.41
C	L	5.25	4.56	5.13	4.88	5.24	4.28	4.72	4.96	4.31	5.13	4.96	—	4.87	4.00	4.82	—	4.76 *	4.79

Table A.3.2.2-25 Monthly Mean Evaporation by Piche Atmometer

mm/day

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'66 ~ '67	—	—	—	—	—	—	—	—	4.40	5.03	5.59 *	4.02	4.47 *
'67	4.99	2.83	3.50	2.70 *	2.07	1.76	2.23	4.13 *	5.35 *	5.61 *	—	—	3.49 *
'68	—	—	—	—	—	—	—	—	4.79 *	5.53	5.41	5.26	5.21 *
'69	4.35	2.15	2.22	1.57	1.67	1.90	3.19	3.94	4.68	5.59 *	6.30	5.97	3.60 *
'70	5.38	4.02	2.47	2.16	1.72 *	1.98	2.98	4.24	4.77	5.21	6.65	7.15	4.06 *
'71	4.87	2.77	2.98	1.95	1.87	1.77	2.55	3.64	4.28	4.85	6.07	6.32	3.66 *
'72	5.17	3.23	3.89	3.47	3.13	3.82	3.35	4.58	5.25	5.76	6.81	6.44	4.57
'73	5.19	2.62	2.69	1.84	1.94	1.60	2.76	3.75	4.00	5.35	4.58	6.59	3.56
'74	4.00	2.12	2.67	2.77	1.80	2.63	3.64	4.01	4.16	4.78	5.68	6.51	3.73 *
'75	4.69	3.95	3.55	2.45	1.59	1.59	2.22	3.04	3.87	5.19 *	5.32	5.21	3.59 *
'76	3.93	1.71	3.19	3.38	2.69	2.43	3.60	4.01	4.70	5.03	6.45	5.73	3.90
'77	4.61	2.46	3.99	3.03	2.47	2.93	3.32	3.70	4.62	5.52	5.59	6.15	4.02
'78	5.70	3.64	2.15	2.55	1.86	2.04	3.06	3.82	4.67	5.25	5.63	5.29	3.30
'79	3.52	2.27	2.21	2.68	1.56	1.67	3.27	3.42	3.88	4.65 *	5.68	5.33	3.34 *
'80	4.81	2.57	3.04	2.27	1.91	2.54	3.03	3.68	3.86	5.03	5.29	5.97	3.66
'81	4.36	2.31	2.03	2.04	1.75	1.76	3.16	3.45	3.88	4.74	5.79	5.59	3.40
'82	4.12	2.90	3.16	3.72	2.29	2.16	3.25	3.93	4.25	4.19	5.52	5.58	3.76
'83	5.34	2.11	2.35 *	2.44	2.08	2.12	2.31	3.20	3.82	4.29	5.58	5.98	3.47 *
'84	2.98	2.28	1.96	2.71	2.22	2.79	3.09	3.98	4.02	4.66	5.39	5.12	3.43
'85	—	2.84	2.65	2.32 *	1.83	1.73	2.08	3.13	3.80	4.30	5.73	6.92	3.39 *
'86	4.19	3.67	3.10	2.95	2.21	1.97	2.95	3.77	—	—	—	—	3.10 *
MEAN	4.59	2.76	2.86	2.59	2.05	2.17	2.95	3.74	4.27	4.96	5.78	5.85	3.78

Table A.3.2.2-26 10-day Mean Evaporation by Piche Atmometer

mm/day

	'67	'68	'69	'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	MEAN
J B	4.04	7.11 ‡	5.00 ‡	4.72	4.06	4.35	5.28	3.87	4.14	3.39	4.93	4.82	4.74	3.66	3.86	3.00	4.38	3.64	4.19	4.12	4.21
A M	4.43	4.04	4.53	5.09	4.92	4.07	4.83	4.00	3.86	4.06	4.49	4.48	4.78	3.34	3.86	4.14	4.26	3.85	3.80	3.66	4.23
N L	4.07	5.08 ‡	4.87	4.26	5.29	4.41	5.59	4.12	4.45	4.12	4.69	4.56	4.51	4.57	3.86	3.91	4.11	3.96	4.06	3.64	4.40
F B	4.76	4.56	5.43	5.46	5.27	4.55	5.82	4.98	4.88	5.06 ‡	4.75	5.50	5.14	4.82	4.94	4.58	4.70	3.73	4.48	3.60	4.84
E M	5.07	5.64 ‡	5.20	5.44 ‡	5.31	5.20	5.51	5.32	4.99	5.10	4.75	5.31	5.12	4.48	4.82	4.64	4.04	4.29	4.60	4.64	4.91
B L	5.33	6.88 ‡	5.45	5.96 ‡	5.03	4.80	6.01	5.84	4.40	5.41	5.73	5.80	5.54	4.65 ‡	5.40	5.05	3.75	4.92	4.85	4.75	5.19
M B	5.03	—	5.21	6.21	6.25	5.96	6.52	3.89	5.04	5.23	6.33	5.14	5.38	5.48	4.72	5.30	5.92	5.12	5.61	4.96	5.44
A M	6.61	—	5.31	6.50	6.48	5.39	6.37	4.01	5.82	6.04	8.94	6.14	5.88	5.94	5.32	5.64	5.92	5.59	4.75	5.82	5.81
R L	5.03 ‡	—	5.69	6.21	7.16	6.80	7.47	5.73	6.14	6.15	6.11	5.49	5.63	5.64	5.78	6.36	4.80	8.00	5.78	6.35	6.07
A B	4.73	—	4.92	6.61	6.23	6.91	6.72	6.28	6.07	5.40	8.68	8.32	6.44	5.30	6.54	6.40	5.10	6.08	5.52	7.42	6.09
P M	3.62	—	5.46	4.71	6.76	6.58	6.74	6.21	6.65	5.34	4.72	6.44	5.49	5.17	5.62	5.40	5.60	6.26	5.04	7.93	5.78
R L	3.72	—	5.40	6.60	8.47	5.46	5.86	7.27	6.82	4.88	5.78	5.68	3.95	5.51	5.75	4.98	6.05	5.60	4.80	5.45	5.69
M B	4.91	—	6.33	6.98	6.73	6.75	6.64	5.40	5.90	5.16	4.32	7.64	3.34	5.69	3.80	5.02	7.09	4.29	—	5.34	5.66
A M	4.49	—	4.14	4.47	3.91	3.46	5.47	4.23	5.06	3.62	5.48	6.74	3.11	4.58	5.80	5.26	4.90	2.41	—	5.32	4.58
Y L	5.52	—	2.23	4.76	4.04	5.28	3.61	2.51	3.25	3.08	4.08	2.99	4.06	4.22	3.95	2.26	4.14	2.30	—	2.11	3.56
J B	3.83	—	2.31	5.14	3.13	2.46	3.45	2.76	3.59	1.74	2.00	3.56	1.54	3.16	2.84	4.32	2.58	1.98	2.62	3.82	2.99
U M	2.06	—	2.25	3.40	2.03	3.24	1.96	1.77	4.27	1.80	2.67	4.35	2.43	1.62	1.84	2.05	1.60	1.87	2.66	3.59	2.50
N L	2.60	—	1.38	3.51	3.14	4.00	2.44	1.82	3.99	1.59	2.72	3.02	2.84	2.92	2.26	2.28	2.16	2.00	3.25	3.60	2.79
J B	3.45	—	1.39	3.02	3.36	5.22	3.16	2.58	3.63	1.98	3.60	2.33	1.80	4.07	2.20	3.26	2.42 ‡	1.74	3.04	2.46	2.96
U M	3.39	—	2.64	2.37	2.60	4.10	3.50	2.67	4.25	3.38	4.66	1.84	1.92	3.46	1.92	2.70	2.06	2.27	2.56	3.86	2.96
L L	3.64	—	2.59	2.06	2.54	2.50	1.54	2.94	2.84	4.13	3.74	2.25	2.84	1.73	1.96	2.95	2.56	1.88	2.36	2.98	2.63
A B	3.28	—	1.52	1.98	1.85	3.65	1.89	3.18	2.39	4.15	2.92	2.84	3.09	1.61	2.46	3.36	2.04	2.57	2.28	3.62	2.64
U M	2.23	—	1.75	2.23	2.23	4.15	2.04	3.14	2.85	2.85	3.10	2.44	3.25	2.47	1.72	3.54	2.48	2.08	2.50	2.39	2.60
G L	2.53 ‡	—	1.46	2.25	1.79	2.69	1.61	2.06	2.15	3.16	3.08	2.38	1.80	2.51	1.95	4.20	2.77	3.42	2.07 ‡	2.85	2.48
S B	2.34	—	1.32	1.71	1.76	3.14	2.02	1.93	1.42	2.53	3.32	2.15	1.60	2.26	1.78	2.54	2.19	2.85	2.54	2.66	2.29
E M	1.81	—	1.82	1.97	2.32	3.42	2.20	1.65	1.61	2.38	2.38	1.95	1.24	1.64	1.90	1.68	1.84	1.95	1.66	2.18	2.01
P L	1.56	—	1.86	1.44 ‡	1.52	2.82	1.60	1.82	1.73	2.66	1.72	1.47	1.35	1.82	1.56	1.68	2.20	1.85	1.30	1.76	1.82
O B	0.48	—	1.88	1.87	1.04	3.48	1.55	2.26	1.52	1.74	2.61	1.96	1.88	2.38	1.40	1.52	2.03	2.67	1.62	1.68	1.90
C M	2.13	—	1.82	2.09	1.80	3.49	1.60	2.84	1.71	2.28	3.36	1.82	1.37	2.28	2.28	2.06	2.01	3.11	2.22	1.94	2.22
T L	2.58	—	1.99	1.99	1.87	4.44	1.65	2.76	1.55	3.18	2.82	2.30	1.76	2.93	1.62	2.34	2.29	2.60	1.39	2.26	2.36
N B	1.04	—	2.45	2.30	2.22	3.67	2.62	3.62	1.44	4.70	2.98	2.47	3.04	3.20	2.76	3.20	2.42	2.75	1.45	2.78	2.72
O M	2.43	—	3.18	2.91	3.05	2.64	2.81	3.61	2.35	2.65	3.59	3.30	3.80	2.76	3.42	3.44	2.24	3.06	2.66	3.74	2.97
V L	3.22	—	3.97	3.23	2.39	3.75	2.34	3.70	2.88	3.46	3.38	3.42	3.18	3.14	3.30	3.10	2.26	3.45	2.11	3.34	3.17
D B	3.98 ‡	—	3.57	3.93	3.11	4.49	3.33	3.56	3.06	4.14	3.70	3.46	3.22	3.23	3.56	3.56	2.65	3.87	2.68	3.44	3.49
E M	2.72	—	4.06	4.32	3.61	4.72	3.87	3.96	2.94	3.79	3.29	4.29	3.46	2.80	3.46	4.22	2.79	3.57	3.24	4.27	3.76
C L	4.73 ‡	—	4.16	4.45	4.14	4.55	4.03	4.46	3.10	4.10	4.06	3.73	3.56	3.95	3.35	4.00	3.89	4.46	2.44	3.60	3.95

Table A.3.2.2-27 Monthly Evapotranspiration

mm

HYDRO YEAR	TERMS	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
	P	58.9	77.8	323.8	199.3	198.5	96.9	0.0	2.2	0.4	1.1	5.3	7.7	971.9
'70	ETo	—	—	—	—	—	—	98.7	112.9	121.2	126.5	166.2	168.4	793.9 *
	ET	—	—	—	—	—	—	0.0	2.2	0.4	1.1	5.3	7.7	16.7 *
	P	114.4	116.0	127.0	22.5 *	—	—	—	—	1.0	0.0	4.9	0.0	385.8 *
'71	ETo	153.5	123.4	133.7	88.5	73.9	79.7	84.7	104.8	123.1	135.2	176.3	172.7	1,449.5
	ET	114.4	116.0	127.0	—	—	—	—	—	1.0	0.0	4.9	0.0	363.3 *
	P	39.5	139.3	99.2	73.6	80.7	11.9	33.3	0.0	0.0	0.0	1.5	1.7	480.7
'72	ETo	156.6	117.0	145.1	137.4	127.2	112.3	108.1	114.1	126.0	129.3	164.0	158.6	1,595.7
	ET	39.5	117.0	99.2	73.6	80.7	11.9	33.3	0.0	0.0	0.0	1.5	1.7	458.4
	P	—	—	126.3	184.6	184.5	198.6	20.9	1.2	1.9	0.0	49.4	2.4	769.8 *
'73	ETo	140.6	122.5	131.4	127.1	115.1	104.5	109.2	107.5	112.6	125.5	139.8	164.7	1,500.5
	ET	—	—	126.3	127.1	115.1	104.5	20.9	1.2	1.9	0.0	49.4	2.4	548.8 *
	P	261.6	243.6	71.9	192.8	136.8	18.0	0.0	0.0	1.9	2.9	0.0	4.8	934.3 *
'74	ETo	144.7	120.6	137.5	137.5	110.5	131.1	120.2	111.8	117.2	128.1	160.4	174.2	1,593.8
	ET	144.7	120.6	71.9	137.5	110.5	18.0	0.0	0.0	1.9	2.9	0.0	4.8	612.8
	P	52.3	75.1	—	138.1	232.6	253.3	36.3	0.0	0.0	0.0	0.0	43.8	831.1 *
'75	ETo	146.4	144.9	140.8	133.0	111.5	114.0	103.7	94.3	105.0	138.7	166.1	155.2	1,553.6
	ET	52.3	75.1	—	133.0	111.5	114.0	36.3	0.0	0.0	0.0	0.0	43.8	566.0 *
	P	233.2	369.3	160.3	82.3	209.2	60.9	17.2	0.0	0.0	0.0	0.0	20.1	1,152.8
'76	ETo	155.3	115.6	150.3	146.8	130.7	122.9	113.9	114.6	125.9	124.8	170.0	157.1	1,628.6
	ET	155.3	115.6	150.3	82.3	130.7	60.9	17.2	0.0	0.0	0.0	0.0	20.1	732.4
	P	114.2	173.9	40.1	125.3	140.4	26.1	0.0	3.5	0.0	0.0	23.1	1.9	648.5
'77	ETo	151.2	130.0	159.4	142.7	134.9	131.9	117.5	110.1	121.1	131.3	158.3	156.3	1,645.7
	ET	114.2	130.0	40.1	125.3	134.9	26.1	0.0	3.5	0.0	0.0	23.1	1.9	599.1
	P	93.2	147.2	186.3	194.1	228.7	84.1	4.3	4.1	0.0	0.0	0.6	50.9	993.5
'78	ETo	157.2	140.4	130.1	136.9	112.0	116.1	110.5	112.6	125.0	136.0	164.2	160.2	1,601.2
	ET	93.2	140.4	130.1	136.9	112.0	84.1	4.3	4.1	0.0	0.0	0.6	50.9	756.6
	P	114.2	260.5	148.4	223.6	131.2	102.9	0.7	5.3	16.3	0.5	0.0	17.0	1,050.6
'79	ETo	139.1	129.1	146.2	129.6	105.5	110.7	116.1	116.8	—	—	—	—	993.1 *
	ET	114.2	129.1	146.2	129.6	105.5	102.9	0.7	5.3	—	—	—	—	733.5 *
MEAN		103.5	118.0	111.4	118.2	112.6	65.3	14.1	1.8	0.7	0.4	9.4	14.8	670.2

Table A.3.2.2-28 Crop Evapotranspiration ETO)

mm/day

HYDRO YEAR	MAY 30	JUN 30	JUL 31	AUG 31	SEP 30	OCT 31	NOV 30	DEC 31	JAN 31	FEB 28	MAR 31	APR 30	ANNUAL
'70 ~ '71	—	—	—	—	—	—	3.29	3.64	3.91	4.52	5.36	5.61	4.39 *
'71	4.95	4.11	4.31	2.86	2.46	2.57	2.82	3.38	3.97	4.66	5.69	5.76	3.96
'72	5.05	3.90	4.68	4.43	4.24	3.62	3.60	3.68	4.06	4.62	5.29	5.29	4.37
'73	4.54	4.08	4.24	4.10	3.84	3.37	3.64	3.47	3.63	4.48	4.51	5.49	4.11
'74	4.67	4.02	4.44	4.44	3.68	4.23	4.01	3.61	3.78	4.57	5.18	5.81	4.37
'75	4.72	4.83	4.54	4.29	3.72	3.68	3.46	3.04	3.39	4.78	5.36	5.17	4.25
'76	5.01	3.86	4.85	4.74	4.36	3.97	3.80	3.70	4.06	4.46	5.51	5.24	4.46
'77	4.88	4.34	5.14	4.61	4.50	4.26	3.92	3.55	3.94	4.69	5.11	5.21	4.51
'78	5.07	4.68	4.20	4.42	3.73	3.75	3.68	3.63	4.03	4.86	5.30	5.34	4.39
'79	4.49	4.30	4.72	4.18	3.52	3.57	3.87	3.77	—	—	—	—	4.05 *
MEAN	4.82	4.24	4.57	4.23	3.78	3.67	3.61	3.55	3.86	4.63	5.26	5.44	4.30

Table A.3.2.2-29 10-day Crop Evapotranspiration (ETO)

mm/days

		'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	MEAN
J	B	—	3.54	3.91	4.08	3.49	3.75	2.95	3.98	3.99	3.87	3.73
A	M	—	3.90	4.00	3.73	3.56	3.68	3.54	4.01	3.77	3.70	3.77
N	L	—	4.25	4.00	4.35	3.83	3.90	3.65	4.18	4.05	4.48	4.08
F	B	—	4.45	4.52	4.45	4.34	4.44	4.23	4.17	4.55	4.80	4.44
E	M	—	4.43	5.08	4.48	4.45	4.80	4.80	4.37	4.65	4.44	4.61
B	L	—	4.72	4.36	4.99	4.70	4.46	5.37	4.93	4.92	5.46	4.88
M	B	—	5.02	5.84	4.97	4.03	4.81	5.16	5.16	5.08	5.30	5.02
A	M	—	5.29	4.91	4.97	4.03	4.81	5.18	5.51	5.11	5.12	5.09
R	L	—	5.74	6.44	5.73	5.16	5.44	5.69	5.82	5.13	5.46	5.62
A	B	—	5.48	5.84	4.96	5.32	5.69	5.27	5.74	5.38	6.24	5.55
P	M	—	5.42	5.92	5.72	5.64	5.95	5.30	4.77	5.46	5.39	5.51
R	L	—	5.95	5.51	5.18	5.51	5.78	4.95	5.20	4.79	4.40	5.25
M	B	—	6.21	5.85	5.21	4.76	5.13	5.26	4.77	5.93	4.35	5.27
A	M	—	4.09	4.12	4.28	4.72	4.90	4.77	5.20	5.38	4.44	4.66
Y	L	—	4.60	5.18	4.16	4.54	4.19	5.00	4.69	4.01	4.66	4.56
J	B	—	4.19	3.24	4.18	4.81	4.86	3.70	3.65	4.73	3.48	4.09
U	M	—	3.57	3.95	3.56	3.68	4.86	4.30	4.88	4.78	4.62	4.24
N	L	—	4.58	4.51	4.50	3.57	4.76	3.64	4.47	4.52	4.81	4.37
J	B	—	4.73	5.23	4.66	4.26	4.26	4.18	4.96	4.05	4.44	4.53
U	M	—	3.94	4.93	4.66	4.51	4.97	5.12	5.52	3.82	4.51	4.66
L	L	—	4.27	3.96	3.48	4.53	4.41	5.22	4.98	4.67	5.15	4.52
A	B	—	2.54	4.87	4.15	4.91	4.19	4.81	4.48	4.69	4.27	4.32
U	M	—	3.20	4.42	4.41	4.68	4.48	4.53	4.51	4.51	4.23	4.33
G	L	—	2.34	4.04	3.78	3.79	4.21	4.85	4.81	4.08	4.05	4.05
S	B	—	2.10	4.55	3.57	3.82	73.78	4.21	5.09	3.63	3.83	3.84
E	M	—	3.35	4.09	4.08	3.39	3.84	4.25	4.30	3.96	3.04	3.81
P	L	—	1.94	4.08	3.87	3.83	3.54	4.62	4.10	3.62	3.69	3.70
O	B	—	2.31	3.28	3.33	4.15	3.67	3.84	4.39	4.13	3.36	3.61
C	M	—	2.73	3.19	3.52	4.58	3.92	3.71	4.51	3.34	3.64	3.68
T	L	—	2.67	4.32	3.28	3.98	3.46	4.31	3.90	3.77	3.70	3.71
N	B	3.08	2.48	3.82	3.67	4.04	3.44	4.36	4.09	3.49	4.14	3.66
O	M	3.40	3.32	3.43	3.58	3.93	3.60	3.47	3.90	3.92	3.82	3.64
V	L	3.40	2.67	3.57	3.68	4.00	3.34	3.57	3.76	3.63	3.65	3.53
D	B	3.31	3.18	3.57	3.40	3.57	3.05	3.95	3.51	3.75	3.46	3.49
E	M	3.66	3.24	3.71	3.37	3.59	2.77	3.53	3.33	3.67	3.73	3.46
C	L	3.94	3.69	3.59	3.62	3.66	3.26	3.62	3.79	3.49	4.08	3.68

Table A.3.2.2-30 Crop Evapotranspiration (ETcrop)

mm

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'70 ~ '71	—	—	—	—	—	—	81.4	82.9	94.3	103.3	145.7	143.2	650.7 *
'71	108.1	89.0	114.6	71.8	61.6	68.2	69.9	77.0	95.6	110.5	154.3	146.7	1,167.0
'72	110.2	84.3	123.8	111.9	105.8	96.2	89.6	83.4	97.9	105.5	143.7	134.6	1,287.0
'73	98.7	88.3	112.1	103.3	96.1	89.3	90.3	78.7	87.6	102.5	122.5	139.9	1,209.0
'74	101.3	86.8	118.2	112.1	92.0	111.9	99.4	81.9	91.1	104.6	140.7	148.0	1,288.8
'75	102.5	104.3	121.0	108.0	92.9	97.3	85.9	69.2	81.7	113.3	145.5	131.9	1,253.0
'76	108.8	83.2	129.7	119.3	109.1	105.1	94.8	83.7	97.8	102.0	149.6	133.8	1,317.0
'77	105.8	93.6	136.9	115.8	112.0	112.5	97.4	80.7	94.9	107.3	138.8	132.8	1,329.0
'78	110.3	101.0	112.2	111.4	93.4	99.1	91.2	82.3	97.2	111.0	143.9	136.4	1,289.0
'79	97.3	93.0	126.0	105.3	87.9	94.6	96.4	85.7	—	—	—	—	786.2 *
MEAN	104.8	91.5	121.6	106.5	94.5	97.1	89.6	80.6	93.1	106.7	142.7	138.6	1,267.3

Table A.3.2.2-31 10-day Crop Evapotranspiration (ETcrop)

		KC	'70	'71	'72	'73	'74	'75	'76	'77	'78
J	B	0.76	—	26.9	29.7	31.0	26.5	28.5	22.4	30.2	30.3
A	M	0.78	—	30.4	31.2	29.1	27.8	28.7	27.6	31.3	29.4
N	L	0.79	—	36.9	34.8	37.8	33.3	33.9	31.7	36.3	35.2
F	B	0.80	—	35.6	36.2	35.6	34.8	35.5	33.8	33.4	36.4
E	M	0.83	—	36.7	42.2	37.2	37.0	39.8	39.9	36.3	38.6
B	L	0.82	—	31.0	32.2	32.7	30.8	29.3	39.7	32.3	32.3
M	B	0.86	—	43.2	48.5	42.8	34.6	41.4	44.4	44.3	43.7
A	M	0.90	—	47.6	44.2	46.1	38.5	47.3	46.7	49.6	46.0
R	L	0.87	—	54.9	61.7	54.9	49.4	52.0	54.5	55.7	49.1
A	B	0.88	—	48.2	51.4	43.7	46.8	50.1	46.4	50.5	47.3
P	M	0.82	—	44.1	48.6	46.9	46.3	48.8	43.5	39.1	44.8
R	L	0.85	—	50.6	46.8	44.1	46.9	49.2	42.0	44.2	40.7
M	B	0.73	—	45.3	42.7	38.1	34.8	37.5	38.4	34.8	43.3
A	M	0.67	—	27.4	27.6	28.6	31.6	32.8	32.0	34.9	36.4
Y	L	0.70	—	35.4	39.9	32.0	34.9	32.3	38.5	36.1	30.9
J	B	0.72	—	30.2	23.3	30.1	34.6	35.0	26.6	26.3	34.1
U	M	0.71	—	25.3	28.1	25.3	26.1	34.5	30.0	34.6	33.9
N	L	0.73	—	33.4	32.9	32.9	26.1	34.8	26.5	32.7	33.0
J	B	0.80	—	37.9	41.8	37.3	34.1	34.1	33.4	39.7	32.4
U	M	0.85	—	33.5	41.9	39.6	38.4	42.3	43.5	46.9	32.5
L	L	0.92	—	43.2	40.1	35.2	45.8	44.7	52.8	50.4	47.3
A	B	0.85	—	21.5	41.4	35.2	41.7	35.6	40.9	38.1	39.9
U	M	0.81	—	25.9	35.8	35.7	37.9	36.3	36.7	36.5	36.5
G	L	0.78	—	24.3	34.7	32.3	32.5	36.1	41.6	41.2	35.0
S	B	0.79	—	16.6	36.0	28.2	30.2	29.9	33.2	40.2	28.7
E	M	0.84	—	28.2	34.3	34.3	28.5	32.3	35.7	36.1	33.2
P	L	0.87	—	16.9	35.5	33.6	33.3	30.8	40.2	35.7	31.5
O	B	0.83	—	19.2	27.2	27.7	34.4	30.5	31.9	36.5	34.3
C	M	0.85	—	23.2	27.1	29.9	38.9	33.3	31.6	38.3	28.4
T	L	0.88	—	25.8	41.9	31.7	38.6	30.4	41.7	37.7	36.5
N	B	0.91	28.0	22.6	34.8	33.3	36.8	31.3	39.6	37.2	31.8
O	M	0.83	28.2	27.6	28.4	29.7	33.0	29.9	28.7	32.4	32.6
V	L	0.74	25.2	19.7	26.4	27.2	29.6	24.7	26.5	27.8	26.9

Table A.3.2.3-1 Monthly and Annual Discharge of Ostua River at Casa de Tablas

(Unit; 1,000 m^3)

Year	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR
1967/68	4,404	7,215	11,129	48,416	21,315	31,122	9,013	2,289	934	546	431	1,600
1968/69	4,060	50,427	26,656	10,928	62,474	60,575	17,287	3,328	1,339	470	316	458
1969/70	6,610	48,120	78,514	63,320	101,733	35,954	6,020	2,917	1,810	1,430	1,138	1,954
1970/71	2,264	4,332	49,654	68,964	57,876	26,251	5,810	2,147	1,367	658	1,519	757
1971/72	1,522	7,766	11,532	60,403	46,733	91,512	6,757	2,548	936	419	269	259
1972/73	1,469	13,786	12,039	5,969	4,997	2,162	1,434	833	628	472	330	422
1973/74	1,897	30,737	24,392	67,549	45,541	84,446	11,453	2,861	1,632	730	1,106	282
1974/75	14,099	52,197	25,079	5,333	40,913	11,500	2,307	1,259	462	206	187	150
1975/76	1,026	1,363	1,807	7,334	56,163	50,897	16,081	2,054	581	480	334	1,619
1976/77	2,736	50,129	32,550	4,296	10,573	21,305	2,903	1,631	1,077	848	886	1,648
1977/78	863	10,762	2,538	2,157	15,190	13,761	1,501	875	996	798	1,001	991
1978/79	1,045	3,745	17,615	12,333	48,262	37,491	10,480	8,289	4,349	2,796	2,849	2,452
1979/80	4,328	4,577	30,419	45,880	58,115	25,377	4,862	1,653	874	483	371	810
1980/81	1,696	35,007	24,069	33,865	45,120	14,296	5,495	3,607	2,408	1,694	1,786	1,523
1981/82	2,038	7,630	29,881	30,812	35,712	6,582	10,848	6,850	4,776	3,216	3,183	2,761
Mean (m^3/s)	3,337 (1.29)	21,852 (8.43)	25,191 (9.41)	30,504 (11.39)	43,381 (16.74)	34,215 (12.77)	7,483 (2.89)	2,876 (1.07)	1,611 (0.60)	1,016 (0.42)	1,047 (0.39)	1,179 (0.45)
Max	14,099	52,197	78,514	68,964	101,733	91,512	17,287	8,289	4,776	3,216	3,183	2,761
Min	863	1,363	1,807	2,157	4,997	2,162	1,434	833	462	206	187	150

Table A.3.2.3-2 10-days Discharge of Ostua River at Casa de Tablas

(Millions m^3)

Month	10 Day	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	MEAN	MEAN IN MM	S.D.	S.D. IN MM
J	B		0.429	0.578	0.699	0.480	0.441	0.232	0.631	0.217	0.264	0.346	0.328	1.795	0.324	0.907	1.874	0.636	1.98	0.522	1.62
A	M		0.308	0.431	0.562	0.430	0.262	0.192	0.513	0.138	0.195	0.333	0.328	1.326	0.270	0.768	1.468	0.502	1.56	0.399	1.24
N	L		0.196	0.330	0.550	0.457	0.233	0.205	0.488	0.107	0.122	0.399	0.340	1.229	0.279	0.733	1.434	0.510	1.59	0.389	1.21
F	B		0.234	0.208	0.531	0.285	0.182	0.205	0.304	0.098	0.143	0.324	0.285	1.011	0.191	0.648	1.163	0.388	1.21	0.319	0.99
E	M	2.341	0.180	0.179	0.504	0.245	0.137	0.149	0.270	0.059	0.176	0.302	0.285	1.011	0.173	0.600	1.141	0.485	1.51	0.585	1.82
B	L	1.387	0.132	0.083	0.396	0.128	0.100	0.118	0.156	0.048	0.161	0.221	0.228	0.774	0.119	0.447	0.912	0.338	1.05	0.375	1.17
M	B	1.280	0.131	0.108	0.439	1.116	0.095	0.122	0.467	0.066	0.124	0.273	0.315	0.924	0.105	0.530	1.141	0.452	1.41	0.426	1.33
A	M	1.187	0.143	0.090	0.341	0.244	0.124	0.105	0.467	0.064	0.113	0.261	0.324	0.924	0.116	0.673	1.016	0.387	1.20	0.366	1.14
R	L	2.373	0.156	0.118	0.358	0.159	0.049	0.104	0.172	0.057	0.098	0.352	0.361	1.000	0.150	0.583	1.026	0.445	1.39	0.599	1.86
A	B	1.325	0.778	0.163	0.339	0.427	0.048	0.124	0.093	0.050	0.770	0.202	0.266	0.838	0.257	0.429	0.895	0.438	1.36	0.375	1.17
P	M	2.330	0.641	0.120	1.182	0.218	0.050	0.149	0.105	0.043	0.334	1.114	0.621	0.838	0.298	0.479	0.933	0.509	1.58	0.599	1.86
R	L	2.390	0.181	0.175	0.434	0.112	0.161	0.148	0.083	0.057	0.515	0.332	0.104	0.776	0.255	0.615	0.933	0.456	1.41	0.579	1.80
M	B	1.308	0.524	0.162	0.209	0.124	0.102	0.179	0.192	0.098	0.567	0.293	0.069	0.962	0.208	0.564		0.371	1.15	0.358	1.11
A	M	2.091	1.317	0.613	1.150	0.685	0.886	0.211	0.531	0.176	0.981	0.242	0.071	2.603	0.235	0.499		0.819	2.55	0.730	2.27
Y	L	1.005	2.219	5.835	0.905	0.712	0.481	1.508	13.376	0.751	1.189	0.328	0.905	0.763	1.253	0.975		2.147	6.68	3.376	10.51
J	B	1.643	5.874	10.200	0.651	1.466	10.727	1.138	8.377	0.505	8.161	2.127	1.034	0.958	1.049	0.807		3.648	11.36	3.835	11.94
U	M	1.619	18.269	9.373	1.337	4.377	1.761	12.593	20.846	0.473	16.214	2.288	1.011	2.965	16.188	1.570		7.392	23.01	7.389	23.00
N	L	3.954	26.284	28.547	2.344	1.923	1.298	17.006	22.975	0.384	25.754	6.347	1.700	0.653	17.770	5.253		10.81	33.65	11.76	36.61
J	B	3.767	15.221	47.438	4.324	0.905	0.619	7.815	11.262	0.657	24.399	1.104	2.861	17.576	2.335	10.173		11.32	35.24	13.08	40.72
U	M	3.961	8.110	23.503	17.243	6.439	0.376	3.999	9.603	0.326	6.067	0.976	7.901	6.312	2.027	10.983		7.658	23.84	6.70	20.86
L	L	3.401	3.326	7.581	28.087	4.188	10.843	12.578	4.215	0.825	2.084	0.458	6.853	6.530	19.707	8.725		8.230	25.62	7.715	24.02
A	B	3.693	3.993	23.146	20.491	11.254	2.134	10.827	1.720	1.141	0.984	0.750	1.907	5.726	18.877	4.523		7.246	22.56	8.22	25.59
U	M	25.916	3.213	23.236	23.467	7.932	0.921	23.015	1.446	1.386	1.494	0.515	1.529	9.139	6.290	10.019		9.419	29.32	10.04	31.25
G	L	18.808	3.722	16.939	25.007	41.217	2.914	33.707	2.159	4.806	1.818	0.893	8.897	31.016	8.699	6.270		10.36	32.25	10.23	31.84
S	B	6.861	12.373	46.529	28.690	23.090	2.272	16.466	4.564	16.003	5.613	0.599	18.494	21.306	12.222	7.087		13.67	42.55	12.53	39.00
E	M	6.984	24.563	24.073	12.689	6.938	1.600	9.985	13.063	26.239	2.272	2.354	9.997	26.639	20.033	10.366		12.63	39.32	8.556	26.94
P	L	7.470	25.538	31.135	16.497	16.705	1.125	19.090	23.287	13.921	2.687	12.238	19.771	10.170	12.865	18.259		15.68	48.81	8.663	26.97
O	B	13.678	8.207	19.595	15.473	58.841	0.921	25.453	7.065	20.339	14.477	11.228	16.502	4.635	7.955	2.293		12.53	39.00	7.178	22.34
C	M	13.738	16.629	9.538	5.782	22.587	0.736	39.254	2.680	17.891	4.938	11.683	15.226	10.996	3.634	1.290		10.23	31.84	10.69	33.28
T	L	3.706	35.922	6.821	4.997	10.094	0.505	19.739	1.755	12.766	1.890	0.850	5.762	9.746	2.707	2.999		7.725	24.05	10.04	31.25
N	B	5.265	9.535	2.801	2.710	3.181	0.298	6.534	1.901	10.181	1.076	0.660	3.801	2.854	1.873	4.594		3.805	11.84	3.132	9.75
O	M	2.322	5.372	1.940	1.757	1.975	0.785	2.667	0.670	4.456	0.986	0.410	3.563	1.150	1.800	3.485		2.240	7.00	1.504	4.68
V	L	1.427	2.380	1.280	1.344	1.601	0.351	2.252	0.546	1.444	0.842	0.430	3.116	0.858	1.822	2.769		1.490	4.64	0.876	2.73
D	B	0.985	1.504	1.081	0.805	1.090	0.276	1.272	0.512	1.142	0.607	0.311	3.171	0.677	1.293	2.388		1.141	3.55	0.771	2.40
E	M	0.653	0.980	0.941	0.648	0.849	0.276	0.894	0.391	0.423	0.510	0.276	2.762	0.531	1.116	2.308		0.886	2.76	0.681	2.12
C	L	0.651	0.844	0.895	0.649	0.609	0.280	0.695	0.356	0.489	0.515	0.298	2.356	0.445	1.198	2.424		0.846	2.63	0.672	2.09

Table A.3.2.3-3 Monthly Discharge of Ostua River

f=0.557 ($\times 10^6 \times m^3$)

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'66 ~ '67	—	—	—	—	—	—	—	—	—	2.407 *	2.696	3.367	8.471 *
'67	2.453	4.019	6.199	26.968	11.872	17.335	5.020	1.275	0.520	0.304	0.240	0.891	77.097
'68	2.261	28.088	14.847	6.087	34.798	33.742	9.629	1.854	0.750	0.262	0.176	0.255	132.750
'69	3.682	26.803	43.736	35.269	56.667	20.026	3.353	1.625	1.008	0.796	0.634	1.089	194.690
'70	1.261	2.413	27.657	38.413	32.237	14.622	3.236	1.196	0.761	0.366	0.846	0.422	123.430
'71	0.847	4.326	6.423	33.645	26.030	50.978	3.764	1.419	0.521	0.233	0.150	0.144	128.480
'72	0.818	7.679	8.706	3.325	2.784	1.204	0.799	0.464	0.350	0.263	0.184	0.235	24.809
'73	1.057	17.120	13.586	37.625	25.367	47.036	6.379	1.593	0.909	0.407	0.161	0.569	151.850
'74	7.853	29.074	13.969	2.970	22.789	6.405	1.285	0.701	0.257	0.115	0.104	0.084	85.606
'75	0.571	0.759	1.007	4.085	31.283	28.349	8.957	1.144	0.323	0.267	0.186	0.902	77.834
'76	1.524	27.922	18.131	2.393	5.889	11.867	1.617	0.909	0.600	0.472	0.493	0.918	72.734
'77	0.481	5.994	1.414	1.202	8.461	7.665	0.836	0.488	0.555	0.447	0.557	0.552	28.649
'78	0.582	2.086	9.812	6.869	26.882	20.882	5.838	4.617	2.423	1.557	1.587	1.366	84.500
'79	2.411	2.549	16.943	25.555	32.370	14.135	2.708	0.921	0.487	0.269	0.208	0.451	99.005
'80	0.945	19.499	18.407	18.863	25.132	7.963	3.061	2.009	1.341	0.944	0.995	0.848	95.006
'81	1.135	4.250	16.643	11.592	19.891	3.666	6.043	3.815	2.660	1.791	1.773	1.538	74.799
MEAN	1.859	12.172	14.032	16.990	24.163	19.058	4.168	1.602	0.898	0.566	0.583	0.634	96.775

Table A.3.2.3-4 10-days Discharge of Ostua River (Proposed Dam Site)

0.557 ×10^{6} m^{3}

		'67	'68	'69	'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82
J	B	—	0.239	0.322	0.369	0.267	0.245	0.129	0.251	0.121	0.147	0.193	0.183	1.000	0.180	0.505	1.044
A	M	—	0.172	0.240	0.313	0.240	0.146	0.107	0.236	0.077	0.109	0.135	0.183	0.739	0.151	0.428	0.818
N	L	—	0.109	0.184	0.308	0.255	0.130	0.114	0.272	0.060	0.068	0.222	0.189	0.684	0.155	0.408	0.799
F	B	0.331 *	0.103	0.116	0.295	0.159	0.102	0.114	0.189	0.055	0.079	0.180	0.159	0.563	0.106	0.361	0.643
E	M	1.304	0.100	0.100	0.281	0.136	0.076	0.083	0.151	0.033	0.095	0.168	0.159	0.563	0.098	0.334	0.635
B	L	0.772	0.074	0.046	0.220	0.071	0.056	0.066	0.087	0.027	0.090	0.123	0.127	0.431	0.066	0.249	0.508
M	B	0.713	0.073	0.060	0.244	0.622	0.053	0.063	0.260	0.037	0.069	0.152	0.176	0.515	0.058	0.295	0.535
A	M	0.661	0.080	0.050	0.190	0.136	0.069	0.058	0.260	0.036	0.063	0.145	0.180	0.515	0.064	0.375	0.566
R	L	1.322	0.087	0.066	0.199	0.089	0.027	0.058	0.096	0.032	0.054	0.195	0.201	0.557	0.084	0.325	0.572
A	B	0.733	0.433	0.091	0.189	0.238	0.027	0.069	0.052	0.030	0.429	0.113	0.148	0.467	0.143	0.239	0.499
P	M	1.298	0.357	0.067	0.658	0.121	0.028	0.083	0.059	0.024	0.186	0.620	0.346	0.467	0.168	0.267	0.520
R	L	1.331	0.101	0.097	0.242	0.063	0.090	0.082	0.048	0.032	0.287	0.185	0.058	0.432	0.142	0.243	0.520
M	B	0.729	0.292	0.090	0.116	0.059	0.057	0.100	0.107	0.055	0.316	0.163	0.039	0.536	0.116	0.314	—
A	M	1.165	0.733	0.341	0.641	0.382	0.493	0.117	0.295	0.098	0.546	0.135	0.039	1.450	0.131	0.278	—
Y	L	0.560	1.236	3.250	0.504	0.397	0.263	0.840	7.451	0.418	0.662	0.183	0.504	0.425	0.698	0.543	—
J	B	0.915	3.272	5.681	0.363	0.816	5.975	0.624	4.666	0.282	4.546	1.185	0.576	0.534	0.584	0.449	—
U	M	0.902	10.176	5.221	0.744	2.438	0.981	7.014	11.611	0.264	9.031	1.274	0.563	1.652	9.017	0.874	—
N	L	2.202	14.640	15.901	1.306	1.071	0.723	9.472	12.797	0.214	14.345	3.525	0.947	0.364	9.900	2.926	—
J	B	2.098	8.478	26.423	2.409	0.504	0.345	4.353	6.273	0.366	13.590	0.615	1.593	9.790	1.301	5.666	—
U	M	2.207	4.517	13.091	9.604	3.586	0.321	2.227	5.349	0.181	3.379	0.544	4.401	3.519	1.129	6.118	—
L	L	1.894	1.852	4.223	15.644	2.333	6.040	7.006	2.348	0.460	1.161	0.255	3.817	3.637	10.977	4.860	—
A	B	2.057	2.224	12.892	11.413	6.269	1.189	6.031	0.093	0.636	0.548	0.413	1.062	3.189	10.514	2.519	—
U	M	14.435	1.790	12.942	13.071	4.418	0.513	12.819	0.805	0.772	0.832	0.237	0.852	5.090	3.504	5.581	—
G	L	10.476	2.073	9.435	13.929	22.958	1.622	18.775	1.203	2.677	1.013	0.497	4.955	17.278	4.845	3.492	—
S	B	3.822	6.892	25.917	15.930	12.861	1.266	9.172	2.542	8.914	3.127	0.324	10.301	11.866	6.808	3.947	—
E	M	3.890	13.681	13.409	7.068	3.864	0.891	5.562	7.276	14.815	1.226	1.311	5.569	14.833	11.158	5.774	—
P	L	4.161	14.225	17.342	9.189	9.304	0.627	10.633	12.971	7.754	1.497	6.816	11.012	5.665	7.166	10.170	—
O	B	7.619	4.471	10.914	8.618	32.774	0.513	14.177	3.935	11.273	8.064	6.254	9.192	2.582	4.431	1.277	—
C	M	7.652	9.263	5.313	3.221	12.581	0.410	21.865	1.493	9.965	2.750	0.937	8.481	6.125	2.024	0.719	—
T	L	2.064	20.008	3.800	2.783	5.622	0.281	10.995	0.977	7.111	1.053	0.474	3.209	5.429	1.508	1.670	—
N	B	2.933	5.311	1.560	1.509	1.772	0.166	3.640	0.608	5.671	0.599	0.368	2.117	1.590	1.043	2.559	—
O	M	1.293	2.992	1.080	0.978	1.100	0.437	1.486	0.373	2.482	0.549	0.229	1.985	0.641	1.002	1.941	—
V	L	0.795	1.325	0.713	0.749	0.892	0.195	1.254	0.304	0.804	0.469	0.240	1.736	0.478	1.015	1.542	—
D	B	0.549	0.838	0.602	0.474	0.607	0.154	0.708	0.285	0.638	0.338	0.173	1.766	0.377	0.720	1.330	—
E	M	0.384	0.548	0.524	0.361	0.473	0.154	0.498	0.218	0.235	0.284	0.154	1.539	0.295	0.622	1.135	—
C	L	0.362	0.470	0.499	0.361	0.339	0.156	0.387	0.198	0.272	0.287	0.160	1.312	0.248	0.667	1.259	—

Table A.3.2.3-5 Monthly Discharge of Blanco River

f=0.108 $\times 10^6$ m^3

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'66 ～ '67	—	—	—	—	—	—	—	—	—	0.467 *	0.523	0.653	1.643
'67	0.476	0.779	1.202	5.229	2.302	3.361	0.973	0.247	0.101	0.059	0.047	0.173	14.949
'68	0.438	5.446	2.879	1.180	6.747	6.542	1.867	0.359	0.145	0.051	0.034	0.049	25.739
'69	0.714	5.197	8.480	6.839	10.988	3.883	0.650	0.315	0.195	0.154	0.123	0.211	37.749
'70	0.244	0.468	5.363	7.448	6.251	2.835	0.628	0.232	0.148	0.071	0.164	0.082	23.933
'71	0.164	0.839	1.245	6.524	5.047	9.884	0.730	0.275	0.101	0.045	0.029	0.028	24.912
'72	0.159	1.489	1.300	0.645	0.540	0.233	0.155	0.090	0.068	0.051	0.036	0.046	4.810
'73	0.205	3.320	2.634	7.295	4.919	9.120	1.237	0.309	0.176	0.079	0.119	0.030	29.444
'74	1.523	5.637	2.709	0.576	4.419	1.242	0.249	0.136	0.050	0.022	0.020	0.016	16.599
'75	0.111	0.147	0.195	0.792	6.066	5.497	1.737	0.222	0.063	0.052	0.036	0.175	15.092
'76	0.296	5.414	3.515	0.464	1.142	2.301	0.314	0.176	0.116	0.092	0.096	0.178	14.103
'77	0.093	1.162	0.274	0.233	1.641	1.486	0.162	0.095	0.108	0.086	0.108	0.107	5.555
'78	0.113	0.405	1.902	1.332	5.212	4.049	1.132	0.895	0.470	0.302	0.308	0.265	16.384
'79	0.467	0.494	3.285	4.955	6.276	2.741	0.525	0.179	0.094	0.052	0.040	0.087	19.197
'80	0.183	3.781	2.600	3.658	4.873	1.544	0.593	0.390	0.260	0.183	0.193	0.165	18.421
'81	0.201	0.824	3.227	2.248	3.857	0.702	1.172	0.740	0.516	0.347	0.344	0.298	14.503
MEAN	0.359	2.360	2.721	3.295	4.685	3.695	0.808	0.311	0.174	0.110	0.113	0.127	18.758

Table A.3.2.3-6 10-days Discharge of Blanco River (Proposed Dam Site)

0.108 ×10⁶

		'67	'68	'69	'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82
J	B	—	0.046	0.062	0.075	0.052	0.048	0.025	0.068	0.023	0.028	0.037	0.035	0.194	0.035	0.098	0.202
A	M	—	0.033	0.047	0.061	0.046	0.028	0.021	0.055	0.015	0.021	0.036	0.035	0.143	0.029	0.083	0.159
N	L	—	0.021	0.036	0.059	0.049	0.025	0.022	0.053	0.012	0.013	0.043	0.037	0.133	0.030	0.079	0.155
F	B	0.064 *	0.025	0.022	0.057	0.031	0.020	0.022	0.033	0.011	0.015	0.035	0.031	0.109	0.021	0.070	0.126
E	M	0.253	0.019	0.019	0.054	0.026	0.015	0.016	0.029	0.006	0.012	0.033	0.031	0.109	0.019	0.065	0.123
B	L	0.150	0.014	0.009	0.043	0.014	0.011	0.013	0.017	0.005	0.017	0.024	0.025	0.084	0.013	0.048	0.099
M	B	0.138	0.014	0.012	0.047	0.121	0.010	0.013	0.050	0.007	0.013	0.029	0.034	0.100	0.011	0.057	0.123
A	M	0.128	0.015	0.010	0.037	0.026	0.013	0.011	0.050	0.007	0.012	0.028	0.035	0.100	0.018	0.073	0.110
R	L	0.256	0.017	0.013	0.039	0.017	0.005	0.011	0.019	0.006	0.011	0.038	0.039	0.108	0.016	0.063	0.111
A	B	0.143	0.084	0.018	0.037	0.046	0.005	0.013	0.010	0.005	0.083	0.022	0.029	0.091	0.028	0.046	0.097
P	M	0.252	0.069	0.013	0.128	0.024	0.005	0.018	0.011	0.005	0.036	0.120	0.067	0.091	0.032	0.052	0.101
R	L	0.258	0.020	0.019	0.047	0.021	0.017	0.016	0.009	0.006	0.058	0.036	0.011	0.084	0.028	0.066	0.101
M	B	0.141	0.057	0.018	0.023	0.013	0.011	0.019	0.021	0.011	0.061	0.032	0.007	0.104	0.025	0.061	—
A	M	0.226	0.142	0.066	0.124	0.074	0.096	0.023	0.057	0.019	0.108	0.026	0.008	0.281	0.025	0.054	—
Y	L	0.109	0.240	0.630	0.098	0.077	0.052	0.163	1.445	0.081	0.128	0.035	0.092	0.082	0.135	0.105	—
J	B	0.177	0.634	1.102	0.070	0.158	1.159	0.123	0.905	0.055	0.881	0.230	0.112	0.103	0.113	0.087	—
U	M	0.175	1.973	1.012	0.144	0.473	0.190	1.360	2.251	0.051	1.751	0.247	0.109	0.320	1.748	0.170	—
N	L	0.427	2.839	3.083	0.253	0.208	0.140	1.637	2.481	0.042	2.781	0.665	0.134	0.071	1.919	0.567	—
J	B	0.407	1.644	5.123	0.467	0.098	0.067	0.844	1.216	0.071	2.635	0.119	0.309	1.898	0.252	1.099	—
U	M	0.428	0.876	2.538	1.862	0.695	0.062	0.432	1.037	0.035	0.655	0.105	0.853	0.682	0.219	1.186	—
L	L	0.367	0.359	0.819	3.033	0.452	1.171	1.358	0.455	0.089	0.225	0.049	0.740	0.705	2.128	0.942	—
A	B	0.399	0.431	2.500	2.213	1.216	0.230	1.169	0.187	0.123	0.106	0.081	0.206	0.618	2.039	0.488	—
U	M	2.799	0.347	2.509	2.534	0.857	0.059	2.486	0.156	0.150	0.161	0.056	0.165	0.987	0.679	1.082	—
G	L	2.031	0.402	1.829	2.700	4.451	0.315	3.640	0.233	0.519	0.196	0.096	0.961	3.350	0.939	0.677	—
S	B	0.741	1.336	5.025	3.099	2.494	0.245	1.778	0.493	1.728	0.606	0.065	1.997	2.301	1.320	0.765	—
E	M	0.754	2.653	2.600	1.370	0.749	0.173	1.078	1.411	2.834	0.245	0.254	1.080	2.877	2.184	1.120	—
P	L	0.807	2.758	3.353	1.782	1.804	0.121	2.062	2.515	1.503	0.290	1.322	2.135	1.098	1.389	1.972	—
O	B	1.477	0.867	2.116	1.071	6.355	0.099	2.749	0.763	2.180	1.503	1.213	1.782	0.501	0.859	0.248	—
C	M	1.484	1.796	1.030	0.624	2.439	0.060	4.239	0.289	1.932	0.583	0.182	1.544	1.188	0.392	0.139	—
T	L	0.400	3.880	0.737	0.540	1.090	0.054	2.132	0.190	1.379	0.204	0.092	0.622	1.053	0.292	0.324	—
N	B	0.569	1.030	0.303	0.293	0.344	0.032	0.706	0.118	1.100	0.116	0.071	0.410	0.308	0.202	0.496	—
O	M	0.251	0.580	0.209	0.190	0.213	0.085	0.028	0.072	0.481	0.106	0.044	0.385	0.124	0.194	0.376	—
V	L	0.154	0.257	0.138	0.145	0.173	0.038	0.243	0.059	0.156	0.091	0.046	0.337	0.093	0.197	0.299	—
D	B	0.106	0.162	0.117	0.092	0.118	0.030	0.137	0.055	0.123	0.066	0.034	0.342	0.073	0.140	0.258	—
E	M	0.071	0.106	0.102	0.070	0.092	0.030	0.097	0.042	0.046	0.055	0.030	0.258	0.057	0.121	0.220	—
C	L	0.070	0.091	0.097	0.070	0.066	0.030	0.075	0.038	0.053	0.050	0.031	0.254	0.048	0.129	0.262	—

Table A.3.2.3-7 Monthly Discharge of San Pedro River (Proposed Dam Site)

$f = 0.102$ $\times 10^6$

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'66 ~ '67	—	—	—	—	—	—	—	—	—	0.441 *	0.494	0.617	1.551
'67	0.449	0.736	1.135	4.938	2.714	3.175	0.919	0.233	0.095	0.056	0.044	0.163	14.118
'68	0.414	5.144	2.719	1.115	6.372	6.179	1.763	0.339	0.137	0.048	0.032	0.047	24.309
'69	0.674	4.908	8.009	6.459	10.377	3.667	0.614	0.298	0.185	0.146	0.116	0.199	35.652
'70	0.231	0.442	5.065	7.034	5.903	2.678	0.593	0.219	0.139	0.067	0.155	0.077	22.603
'71	0.155	0.792	1.176	6.161	4.767	9.335	0.689	0.260	0.095	0.043	0.027	0.026	23.528
'72	0.150	1.406	1.228	0.609	0.510	0.221	0.463	0.085	0.064	0.048	0.034	0.043	4.543
'73	0.194	3.135	2.488	6.890	4.645	8.614	1.168	0.292	0.166	0.074	0.113	0.029	27.808
'74	1.438	5.324	2.558	0.544	4.173	1.173	0.235	0.128	0.047	0.021	0.019	0.015	14.253
'75	0.105	0.139	0.184	0.748	5.729	5.191	1.640	0.209	0.059	0.049	0.034	0.165	15.676
'76	0.279	5.113	3.320	0.438	1.078	2.173	0.296	0.166	0.110	0.086	0.090	0.168	13.319
'77	0.088	1.098	0.259	0.220	1.549	1.404	0.153	0.089	0.102	0.081	0.102	0.101	5.246
'78	0.107	0.382	1.797	1.258	4.923	3.824	1.069	0.846	0.444	0.285	0.291	0.250	15.474
'79	0.441	0.467	3.103	4.680	5.928	2.589	0.496	0.169	0.089	0.049	0.038	0.083	18.130
'80	0.173	3.571	2.455	3.454	4.602	1.458	0.560	0.368	0.246	0.173	0.182	0.155	17.398
'81	0.208	0.778	3.048	2.123	3.642	0.671	1.107	0.699	0.487	0.328	0.325	0.282	13.697
MEAN	0.3404	2.229	2.5696	3.1114	4.4248	3.4901	0.7843	0.2933	0.1643	0.1036	0.1068	0.1202	17.717

Table A.3.2.3-8 10-days Discharge of San Pedro River (Proposed Dam Site)

(−0.10^{2} ×10^{6}

		'67	'68	'69	'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82
JAN	B	—	0.044	0.059	0.071	0.049	0.045	0.024	0.064	0.022	0.027	0.035	0.033	0.183	0.033	0.093	0.191
	M	—	0.031	0.044	0.057	0.044	0.027	0.020	0.052	0.014	0.020	0.034	0.033	0.135	0.028	0.078	0.150
	L	—	0.020	0.034	0.056	0.047	0.024	0.021	0.050	0.011	0.012	0.041	0.035	0.125	0.028	0.075	0.146
FEB	B	0.061 *	0.024	0.021	0.054	0.029	0.019	0.021	0.031	0.011	0.015	0.033	0.029	0.103	0.019	0.056	0.119
	M	0.239	0.018	0.018	0.051	0.025	0.014	0.015	0.028	0.006	0.018	0.031	0.029	0.103	0.018	0.061	0.116
	L	0.141	0.013	0.008	0.040	0.012	0.010	0.012	0.016	0.005	0.016	0.023	0.023	0.079	0.012	0.046	0.093
MAR	B	0.131	0.013	0.011	0.045	0.114	0.010	0.012	0.048	0.007	0.013	0.028	0.032	0.094	0.011	0.054	0.116
	M	0.121	0.015	0.009	0.035	0.025	0.013	0.011	0.048	0.007	0.012	0.027	0.033	0.094	0.012	0.069	0.104
	L	0.242	0.016	0.012	0.036	0.016	0.005	0.011	0.018	0.006	0.010	0.036	0.037	0.102	0.015	0.059	0.105
APR	B	0.135	0.079	0.017	0.035	0.044	0.005	0.013	0.010	0.005	0.079	0.021	0.027	0.085	0.028	0.044	0.091
	M	0.238	0.055	0.012	0.121	0.022	0.005	0.015	0.011	0.004	0.034	0.114	0.063	0.085	0.030	0.049	0.095
	L	0.244	0.019	0.018	0.044	0.011	0.016	0.015	0.008	0.036	0.053	0.034	0.011	0.079	0.026	0.063	0.095
MAY	B	0.133	0.053	0.017	0.021	0.013	0.010	0.018	0.020	0.010	0.058	0.020	0.007	0.098	0.021	0.058	—
	M	0.213	0.134	0.062	0.117	0.070	0.090	0.022	0.054	0.018	0.100	0.025	0.007	0.266	0.024	0.051	—
	L	0.102	0.226	0.595	0.092	0.073	0.049	0.154	1.364	0.077	0.121	0.033	0.092	0.078	0.128	0.099	—
JUN	B	0.168	0.599	1.040	0.066	0.149	1.094	0.116	0.854	0.052	0.632	0.217	0.105	0.098	0.107	0.082	—
	M	0.165	1.804	0.956	0.136	0.446	0.180	1.285	2.126	0.048	1.654	0.233	0.103	0.302	1.651	0.106	—
	L	0.403	2.681	2.912	0.239	0.196	0.132	1.735	2.343	0.039	2.627	0.647	0.173	0.067	1.813	0.536	—
JUL	B	0.384	1.553	4.839	0.441	0.092	0.063	0.797	1.149	0.067	2.489	0.113	0.292	1.793	0.238	1.036	—
	M	0.404	0.827	2.397	1.759	0.657	0.059	0.408	0.979	0.033	0.619	0.100	0.606	0.644	0.207	1.120	—
	L	0.347	0.339	0.773	2.865	0.427	1.106	1.283	0.430	0.064	0.213	0.047	0.699	0.666	2.010	0.890	—
AUG	B	0.377	0.407	2.361	2.090	1.148	0.218	1.104	0.176	0.116	0.100	0.076	0.195	0.584	1.925	0.401	—
	M	2.643	0.328	2.370	2.394	0.809	0.094	2.348	0.147	0.141	0.152	0.053	0.156	0.532	0.642	1.022	—
	L	1.918	0.380	1.728	2.551	4.204	0.297	3.438	0.220	0.490	0.185	0.091	0.907	3.164	0.887	0.640	—
SEP	B	0.700	1.262	4.746	2.926	2.355	0.232	1.680	0.465	1.632	0.573	0.061	1.866	2.173	1.247	0.723	—
	M	0.712	2.505	2.455	1.294	0.738	0.163	1.019	1.332	2.676	0.232	0.240	1.020	2.717	2.043	1.057	—
	L	0.762	2.605	3.178	1.683	1.704	0.115	1.947	2.375	1.420	0.274	1.248	2.017	1.037	1.312	1.802	—
OCT	B	1.395	0.819	1.999	1.578	6.002	0.094	2.596	0.721	2.064	1.477	1.145	1.683	0.473	0.811	0.234	—
	M	1.401	1.696	0.973	0.590	2.304	0.075	4.004	0.273	1.825	0.504	0.172	1.553	1.122	0.371	0.132	—
	L	0.378	3.684	0.893	0.510	1.030	0.051	2.013	0.179	1.302	0.193	0.087	0.568	0.994	0.276	0.306	—
NOV	B	0.537	0.973	0.286	0.276	0.324	0.030	0.667	0.111	1.039	0.100	0.067	0.368	0.291	0.191	0.469	—
	M	0.237	0.548	0.198	0.179	0.201	0.060	0.272	0.068	0.454	0.110	0.042	0.363	0.117	0.184	0.356	—
	L	0.146	0.243	0.131	0.137	0.163	0.036	0.230	0.056	0.147	0.086	0.044	0.318	0.088	0.186	0.232	—
DEC	E	0.100	0.153	0.110	0.087	0.111	0.028	0.130	0.052	0.117	0.062	0.032	0.323	0.069	0.132	0.244	—
	M	0.067	0.100	0.096	0.066	0.067	0.028	0.091	0.040	0.043	0.052	0.028	0.282	0.054	0.114	0.208	—
	L	0.066	0.086	0.091	0.066	0.062	0.029	0.071	0.036	0.050	0.053	0.029	0.240	0.045	0.122	0.247	—

Table A.3.2.3-9 Monthly Discharge of Achiote River

f=0.0321 ×10^6 m^3

HYDRO YEAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	ANNUAL
'66 ~ '67	—	—	—	—	—	—	—	—	—	0.139 *	0.155	0.194	0.488 *
'67	0.141	0.232	0.357	1.554	0.684	0.999	0.289	0.073	0.030	0.018	0.014	0.051	4.443
'68	0.130	1.619	0.856	0.351	2.005	1.945	0.555	0.107	0.043	0.015	0.010	0.015	7.650
'69	0.212	1.545	2.521	2.033	3.266	1.154	0.193	0.094	0.058	0.046	0.037	0.063	11.220
'70	0.073	0.139	1.594	2.214	1.858	0.843	0.187	0.069	0.044	0.021	0.049	0.024	7.113
'71	0.049	0.249	0.370	1.939	1.500	2.938	0.217	0.082	0.030	0.013	0.009	0.008	7.404
'72	0.047	0.443	0.386	0.192	0.160	0.069	0.046	0.027	0.020	0.015	0.011	0.014	1.430
'73	0.061	0.987	0.783	2.168	1.462	2.711	0.368	0.092	0.052	0.023	0.036	0.009	8.751
'74	0.453	1.676	0.805	0.171	1.313	0.369	0.074	0.040	0.015	0.007	0.006	0.005	4.934
'75	0.033	0.044	0.058	0.235	1.803	1.634	0.516	0.066	0.019	0.015	0.011	0.052	4.486
'76	0.088	1.609	1.045	0.138	0.339	0.684	0.093	0.052	0.035	0.027	0.028	0.053	4.192
'77	0.028	0.345	0.081	0.069	0.488	0.442	0.048	0.028	0.032	0.026	0.032	0.032	1.651
'78	0.034	0.102	0.565	0.396	1.549	1.204	0.336	0.266	0.140	0.090	0.091	0.079	4.870
'79	0.139	0.147	0.976	1.473	1.866	0.815	0.156	0.053	0.028	0.016	0.012	0.026	5.706
'80	0.054	1.124	0.773	1.087	1.448	0.459	0.176	0.116	0.077	0.054	0.057	0.049	5.475
'81	0.065	0.245	0.959	0.668	1.146	0.211	0.348	0.220	0.153	0.103	0.102	0.089	4.311
MEAM	0.1071	0.7004	0.8086	0.9792	1.3925	10.985	0.2401	0.0923	0.0517	0.0326	0.0337	0.0379	55.757

Table A.3.2.3-10 10-days Discharge of Achiote River (Proposed Dam Site)

0.0321 ×10^6

		'67	'68	'69	'70	'71	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81	'82
J	B	—	0.014	0.019	0.024	0.015	0.014	0.007	0.020	0.007	0.008	0.011	0.011	0.058	0.010	0.029	0.050
A	M	—	0.010	0.014	0.018	0.014	0.008	0.006	0.016	0.004	0.006	0.011	0.011	0.043	0.009	0.025	0.047
N	L	—	0.006	0.011	0.018	0.015	0.007	0.007	0.016	0.003	0.004	0.013	0.011	0.039	0.009	0.024	0.046
F	B	0.019 *	0.003	0.007	0.017	0.009	0.005	0.007	0.010	0.003	0.005	0.010	0.009	0.032	0.006	0.021	0.037
E	M	0.075	0.006	0.003	0.016	0.003	0.004	0.005	0.009	0.002	0.006	0.010	0.009	0.032	0.006	0.019	0.037
B	L	0.045	0.004	0.003	0.013	0.004	0.003	0.004	0.005	0.002	0.005	0.007	0.007	0.025	0.004	0.014	0.029
M	B	0.041	0.004	0.003	0.014	0.036	0.003	0.004	0.015	0.002	0.004	0.009	0.010	0.030	0.003	0.027	0.037
A	M	0.038	0.005	0.003	0.011	0.006	0.004	0.003	0.015	0.002	0.004	0.008	0.010	0.030	0.004	0.022	0.033
R	L	0.076	0.005	0.004	0.011	0.005	0.002	0.003	0.006	0.002	0.003	0.011	0.012	0.032	0.005	0.019	0.033
A	B	0.043	0.025	0.005	0.011	0.014	0.002	0.004	0.003	0.002	0.025	0.006	0.009	0.027	0.008	0.014	0.029
P	M	0.075	0.021	0.004	0.038	0.007	0.002	0.005	0.003	0.001	0.011	0.036	0.020	0.027	0.010	0.015	0.030
R	L	0.077	0.006	0.006	0.014	0.004	0.005	0.005	0.003	0.002	0.017	0.011	0.003	0.025	0.008	0.020	0.030
M	B	0.042	0.017	0.005	0.007	0.004	0.003	0.006	0.006	0.003	0.018	0.009	0.002	0.031	0.007	0.018	—
A	M	0.067	0.042	0.020	0.037	0.022	0.028	0.007	0.017	0.006	0.031	0.008	0.002	0.084	0.008	0.016	—
Y	L	0.032	0.071	0.187	0.029	0.023	0.015	0.048	0.429	0.024	0.038	0.011	0.029	0.024	0.040	0.031	—
J	B	0.053	0.189	0.327	0.021	0.047	0.244	0.037	0.269	0.016	0.262	0.068	0.033	0.031	0.034	0.026	—
U	M	0.052	0.586	0.301	0.043	0.141	0.057	0.404	0.669	0.015	0.520	0.074	0.032	0.095	0.520	0.050	—
N	L	0.127	0.844	0.916	0.075	0.062	0.042	0.546	0.737	0.012	0.827	0.204	0.055	0.021	0.570	0.169	—
J	B	0.121	0.469	1.523	0.139	0.029	0.020	0.251	0.362	0.021	0.783	0.035	0.092	0.564	0.075	0.327	—
U	M	0.127	0.260	0.754	0.554	0.207	0.018	0.128	0.308	0.010	0.195	0.031	0.254	0.203	0.065	0.353	—
L	L	0.109	0.107	0.243	0.902	0.124	0.343	0.404	0.135	0.026	0.067	0.015	0.220	0.210	0.033	0.280	—
A	B	0.119	0.128	0.730	0.658	0.381	0.069	0.348	0.055	0.037	0.032	0.024	0.061	0.184	0.606	0.145	—
U	M	0.832	0.103	0.746	0.753	0.255	0.030	0.739	0.046	0.044	0.048	0.017	0.049	0.293	0.202	0.322	—
G	L	0.604	0.113	0.544	0.803	1.323	0.094	1.082	0.069	0.154	0.058	0.029	0.286	0.998	0.279	0.201	—
S	B	0.220	0.397	1.494	0.921	0.741	0.073	0.529	0.146	0.514	0.180	0.019	0.594	0.684	0.392	0.227	—
E	M	0.224	0.788	0.773	0.407	0.227	0.051	0.321	0.419	0.842	0.073	0.076	0.321	0.855	0.643	0.333	—
P	L	0.240	0.820	0.999	0.530	0.536	0.036	0.613	0.748	0.447	0.086	0.393	0.635	0.326	0.413	0.566	—
O	B	0.439	0.258	0.629	0.497	1.869	0.030	0.817	0.227	0.850	0.465	0.360	0.530	0.149	0.255	0.074	—
C	M	0.441	0.534	0.306	0.186	0.725	0.024	1.260	0.086	0.574	0.159	0.054	0.489	0.353	0.117	0.041	—
T	L	0.119	1.153	0.219	0.160	0.324	0.016	0.634	0.056	0.410	0.051	0.027	0.185	0.313	0.087	0.096	—
N	B	0.169	0.308	0.090	0.087	0.102	0.010	0.210	0.035	0.327	0.035	0.021	0.122	0.092	0.060	0.147	—
O	M	0.075	0.172	0.062	0.056	0.003	0.025	0.036	0.021	0.143	0.032	0.013	0.114	0.037	0.058	0.112	—
V	L	0.046	0.076	0.041	0.043	0.051	0.011	0.072	0.018	0.046	0.027	0.064	0.100	0.028	0.058	0.089	—
D	E	0.032	0.048	0.035	0.027	0.035	0.009	0.041	0.016	0.037	0.019	0.010	0.102	0.022	0.042	0.077	—
E	M	0.021	0.031	0.030	0.021	0.027	0.009	0.029	0.013	0.014	0.010	0.009	0.089	0.017	0.036	0.065	—
C	L	0.021	0.027	0.029	0.021	0.020	0.009	0.022	0.011	0.010	0.017	0.009	0.076	0.014	0.038	0.078	—

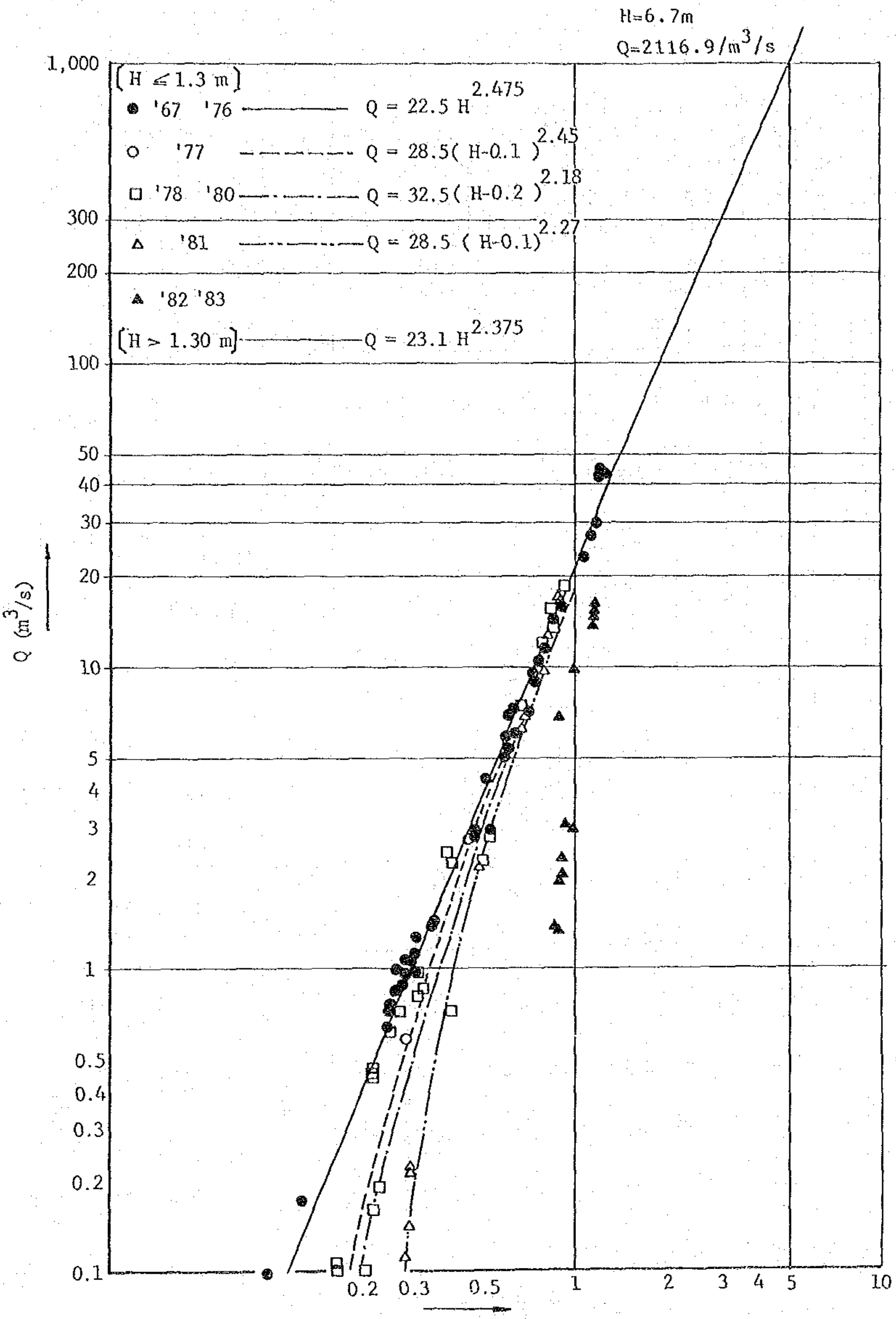


Fig. A.3.2.3-1 Rating Curve of Ostua River

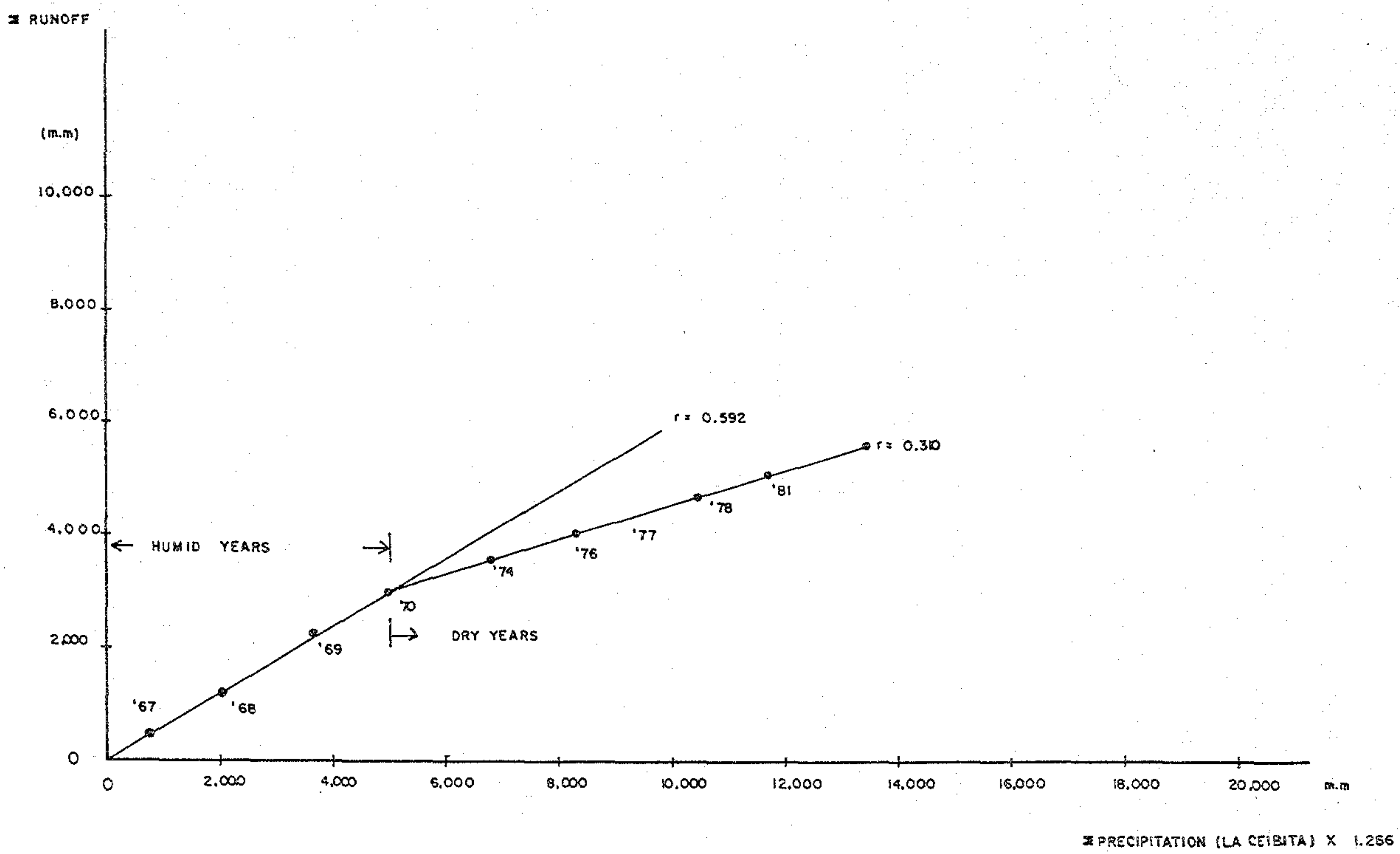


Fig. A.3.2.3-2 Relationship between Precipitation and Runoff

(2) Water quality

Electric Conductivity (EC), pH, turbidity (T), NaCl, hardness (H), Ca Hardness (CaH), and dissolved oxygen (DO) are examined at 8 points in the study area.

As a result, water quality is suitable for irrigation except San Pedro Lake.

Results of water quality examination at 8 points are tabulated below:

Table A.3.2.3-11 Water Quality Analysis

River-Lake	point	EC	pH	T (ppm)	NaCl (%)	H (ppm)	CaH (ppm)	DO (ppm)
Ostua	Confluence of Blance	135 (15°C)	7.6	70	0.001	25	50	6.7
Guirila	Piedra de Fuego	90 (16°C)	7.0	40	0.00075	30	25	6.1
Joite	San Pedro	115 (17°C)	7.0	30	0.0005	30	25	6.1
San Pedro	El Ovejero	50 (12°C)	7.1	90	0.00075	20	10	5.7
Achiotes	Los Achiotes	72 (19°C)	7.1	195	0.001	20	15	6.7
Ostua	Rio Ulma Confluence	315 (20°C)	7.0	90	0.00075	65	40	5.9
Hoyo		80 (18°C)	6.9	100	0.001	30	15	4.0
San Pedro		1850 (20°C)	7.9	180	0.0095	50	25	3.0

3.2.4 Geology, Hydrogeology and Seismology

(1) Geology

The geological components are principally volcanic rocks in the mountain area and sediments derived from volcanic rocks in the plain area (Fig. A.3.2.4-1). The area is occupied by (a) pyroclastic materials, mainly Miocene or Pliocene epoch, (b) Quaternary pyroclastic materials and (c) volcanic rocks, 9d) Quaternary sediments. The bedrocks of the basin consist of the type of (a) welded tuff and tuff. This rock is distributed largely in the mountain area and basement of the basin with waved form. The alternations of pyroclastic materials such as volcanic ash, pumice and scoria, and sediments such as gravels, gands, silts and clays overlies the bedrock in the basin. On the other hand, the andesite overlies the welded tuff. The basalt lava flows are distributed, filling the topographycal depresions and making the planation of mountain area, on the before mentioned lithologies. Moreover, small volcanic cone are intruded. The alternation of pyroclastic materials and sediments is preseted to the recently. This geological history shows in the schematic geological profile (Fig. A.3.2.4-2).

The distribution and geological description of each geological unit are shown as follow:

1) Welded tuff and tuff

This type of pyroclastic materials has an extensive distribution in the mountain area and monadrocks except for southern mountain, and is formed such as bedrock of pediments and plains. The welded tuff shows pale-green, reddish brown and beige, and generally speaking, low or medium welded rocks. Their included rocks are generally andesites and pumices in a direction parallel to the flow structure, but very poor in the border sector of distribution.

It is now generally recognized that the eruption of large volumes of magma in the form of pyroclastic flows usually results in extensive subsidence in the source area, therefore this type of rocks relate to important factor to form the old morphology of the basin.

2) Volcanic Ash, Pumice and Scoria

The former two pyroclastic materials show white, yellow white and reddish white, and have a soft or medium hardness. These materials are largely distributed in piedments, plains and hills. This contains many gravels composed of welded tuff and tuff, and shows conformable relationship to the topographic gradient. This type of materials shows gentle dip and is commonly interbedded with sands, gravels, silts and clays showing at least 5 cycles in the plain area. The volcanic ashes and pumices are directly exposed in the hill area, forming complicated small gullys. These materials make the planation surface of old morphology and generally removed after the sedimentation. The pumice flow is predominant in the eastern side of study area.

The scorias are distributed under basaltic lava flow, the piedmont located westward from El Ovejero and near of the confluence between the Ostua and Guirila rivers.

3) Sands, Gravels, Silts and Glays

These sediments consist of principally river deposits and relate to the distribution of alluvial fans. The gravels are predominant in the head of fans and near of the actual river courses, on the other hand, the sands, silts and clays are widely distributed in the central part of basin showing large thickness of the beds. This fact may be fagorable to form permeable beds.

The interbedded layers between these sediments and volcanic products are distributed in all areas as already stated.

The fine lake sediment has a distribution between the east of Monjas and the exit of the Ostua river, consisting of stratified and sorted sands, silts, clays and some portions of volcanic ash. Eastward, this sediment shows the fine grains.

4) Andesite

The andesite is distributed in the southern mountain area, including the Lagunas de Hoyo and de Retana, and the eastern area, sich as the laguna de San Pedro and volcanic cones. This rock shows reddish brown and gray, and many joints and fractures. In general speaking, the andesite has been slightly altered. Field evidence shows that the massive andesite is exposed in the inner, and auto-brechered and tuff breccia andesite in the border of the distribution and near of craters. The clear flow structure is shown in the andesite cones located in the eastern area. This volcanic activity formed calderas in some lakes mentioned before and "laguna Retana" located southward from the area.

5) Basalt

The basalt is principally distributed in the northern and north-western sectors of the area, forming small lava plateaus, lava flows along the river course such as Ostua river. Moreover, some small volcanic cones are distributed in the eastern side of Monjas. The porous andestic basalt is shown in the border of the distribution with autobrecciated or lavas with flow structure. On the other hand, greyish black, hard basaltic lava is distributed in the inner parts of the distribution.

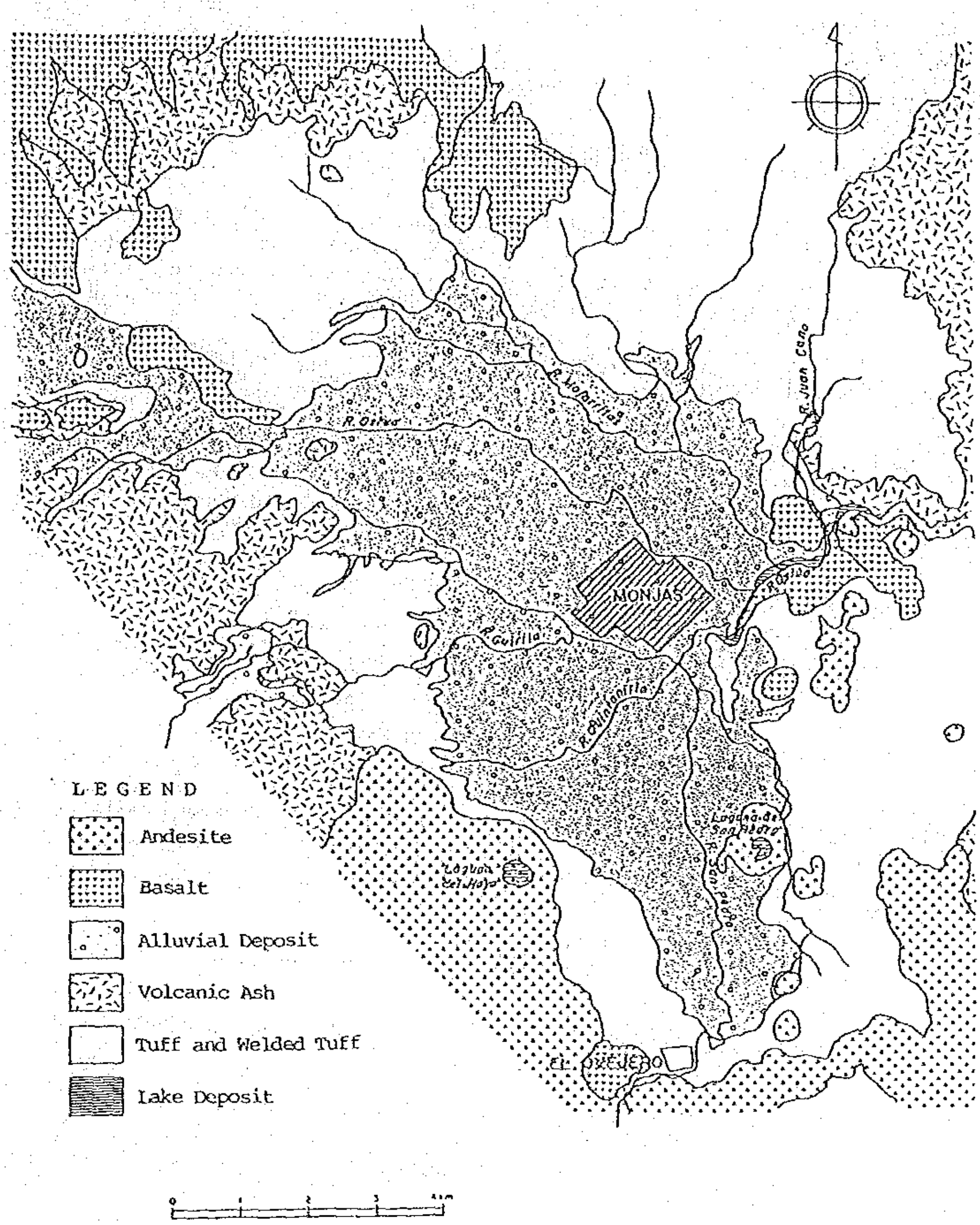


Fig. A.3.2.4-1 General Geological Map

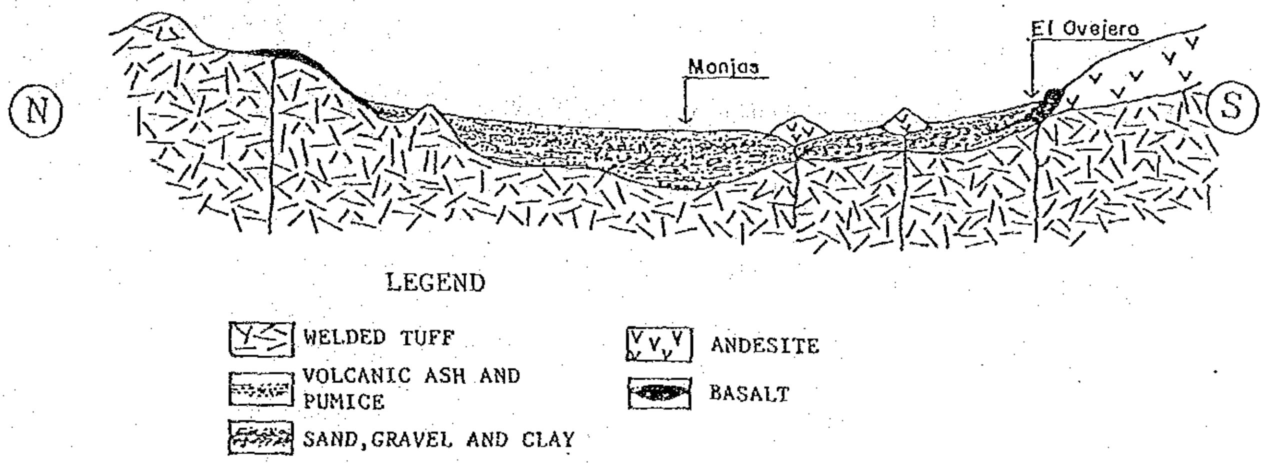


Fig. A.3.2.4-2 Schematic Geological Profile

(2) Hydrogeology

1) Distribution and Character of Aquifer

There are many groundwater wells in the study area (Fig. A.3.2.4-3). Development area is concentrated in the Mojarritas, San Pedro and other sector, such as surrounding of Ostua and Guirila River.

i. Mojarritas Sector
The Mojarritas river has many tributaries, but his river discharge is extremely little except for a rainfall time of wet season. On the other hand, the old eroded alluvial fans formed by this river system are extensively distributed in the northern area. Moreover, new alluvial fans are distributed in the transitional zone between mountain and plain areas.

Actually, principal 21 pumping wells, of which 18 wells are in Production are located in the centers and margins of old alluvial fans and the surrounding of the river, and shallow wells in some parts of new alluvial fans.

The bedrock consist of basalt and welded tuff located in relatively shallow level. Some alternating sediments (sand and gravels) and pyroclastic materials (volcanic ash and tuff) overlie the bedrock, which may form good shallow permeable layers.

ii. San Pedro Sector
This area is located north of El Ovejero and right margin of the San Pedro river, and is surrounded by caldera wall of the Retana lake for the south, volcanic cones for the east and old caldera for the north. This geomorphlogical fact may indicate a small groundwater reservoir. There are 4 deep wells in this area being contiguous to each well. The boring log indicates that sand and gravel with different granulometry coming from the San Pedro river form good permeable layers deeper than GL-15m.

iii. Other Sector (around of the Guirila and Ostua Rivers)
11 deep wells are located at the border of alluvial fans formed by the Guirila, Garay, Pino and Ostua rivers. From the observation of outcrops along rivers, silty sands are predominant in the Guirila river, on the other hand, sands and gravels are predominant in other two tributaries. Based on the geological difference, the ground water productivity is seen high in the catchment areas of the Garay and Pino rivers.

The general hydrogeological profile obtained from boring data is shown in Fig. A.3.2.4-4.

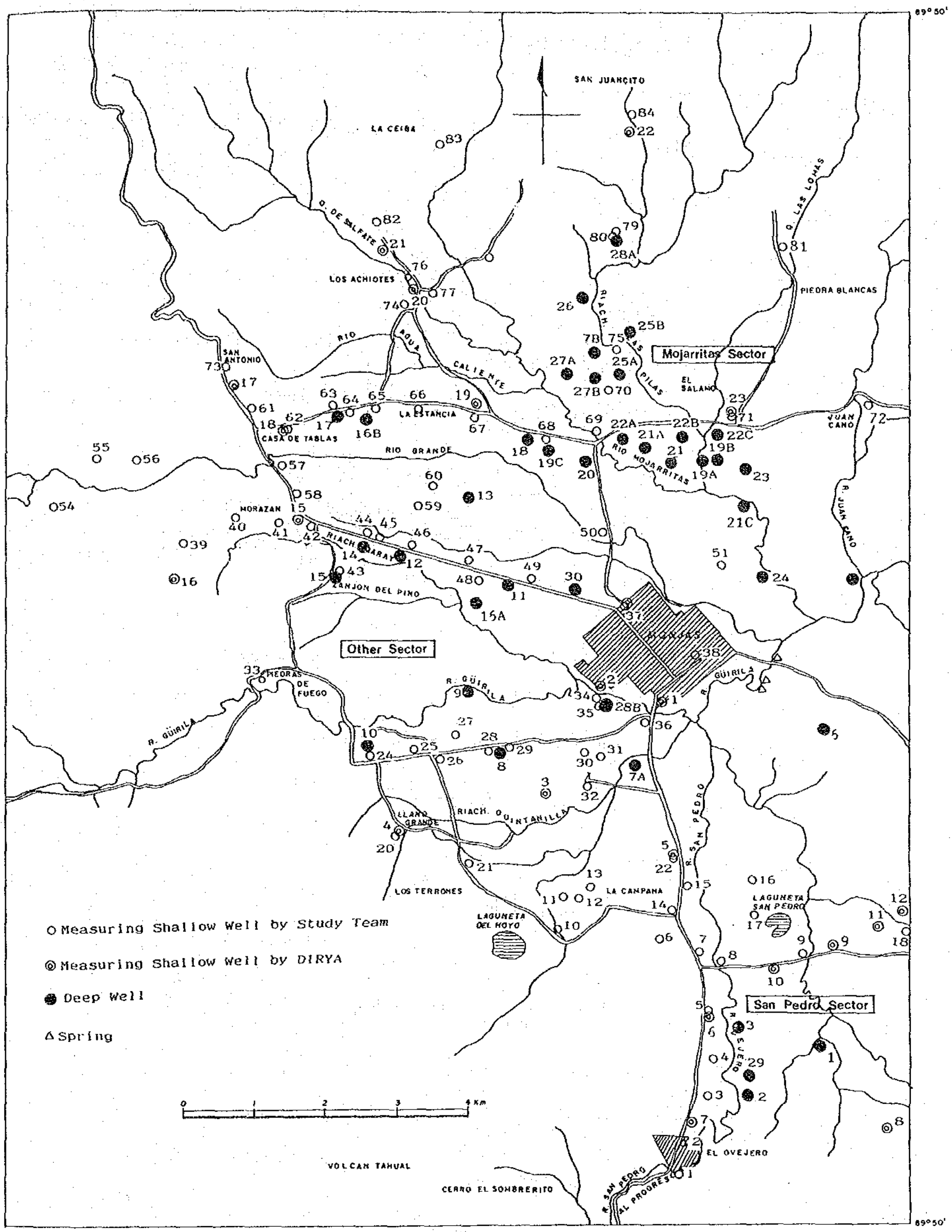


Fig. A.3.2.4-3 Distribution of Wells

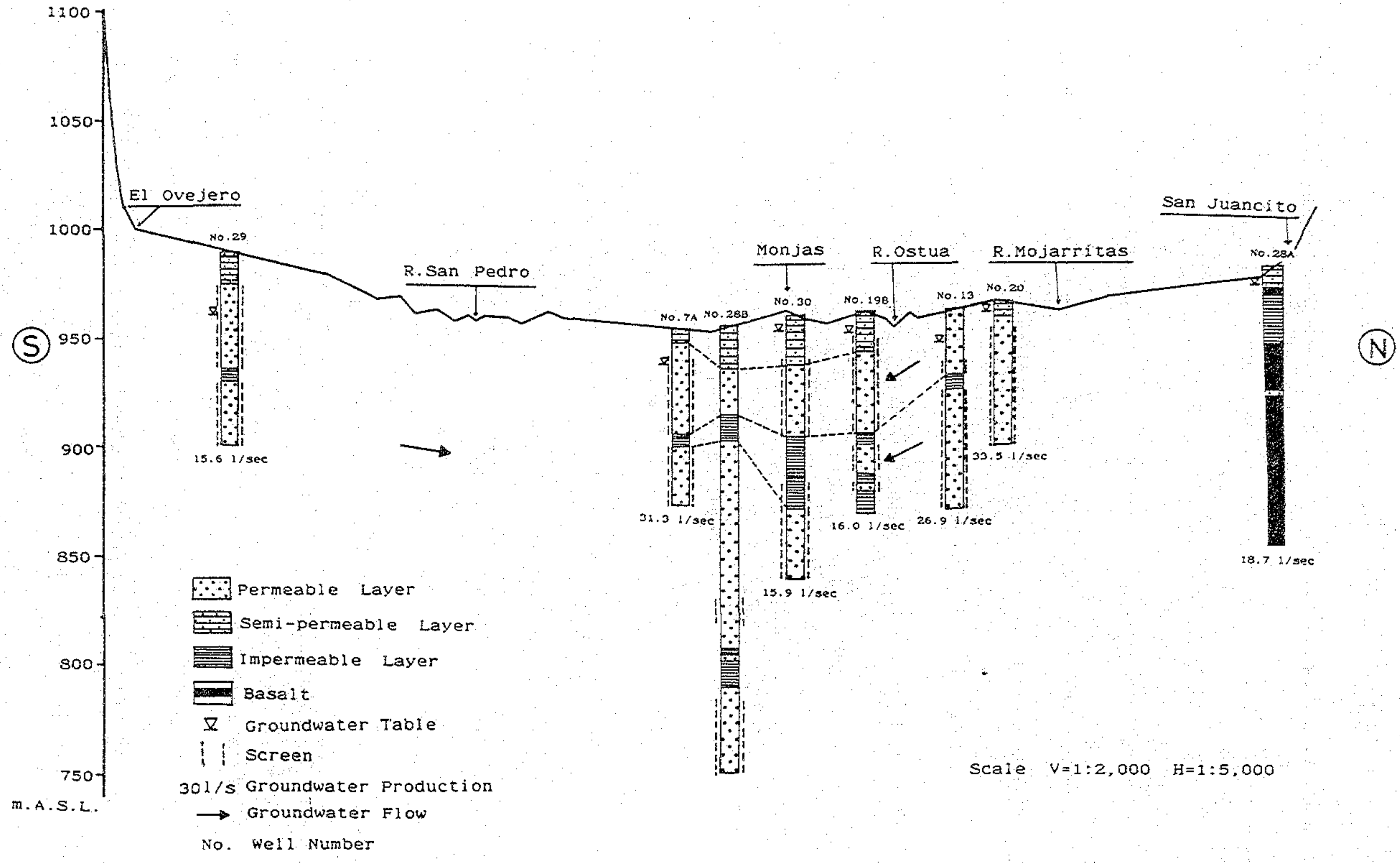


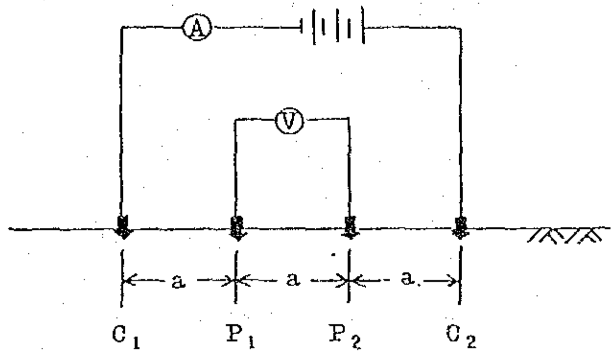
Fig. A.3.2.4-4 Schematic Hydrogeological Profile

4) Electrical prospecting method

a. Outline

For the purpose of assuming the space distribution of the permeable layer, distribution of electric specific resistance of deposit layers in the basin was measured by the electrical prospecting method according to the specific resistance method.

The Wenner electrode layout is employed for measuring the specific resistance, and is as shown below.



Current electrodes C_1 and C_2, and potential electrodes P_1 and P_2 are placed at the same interval a. When a current is carried between C_1 and C_2, a potential between P_1 and P_2 is measured to obtain an apparent specific resistance value. When current I is carried between C_1 and C_2, if a potential between P_1 and P_2 is V_1 an apparent specific resistance is found in the following equation.

$$\rho = 2\pi a \frac{V}{I} = 2\pi aR \quad (\Omega\text{-m})$$

When an interval between electrodes is progressively expanded, an apparent specific resistance value at a deep distance in the ground is obtained. A true specific resistance value was obtained from the apparent specific value thus obtained using the Sandburg standard curve method.

As a depth becomes greater, this standard curve method provides a value with poorer accuracy. When this is the case, the direct-view method was employed that obtains the boundary between specific resistance layers at an inflexion point on curve ρ-a.

A specific resistance value is obtained with the standard curve, while the boundary between specific resistance layers with the direct-view method.

Layers exhibit various values depending on constituent substances, compactness, void ratio, water quantity and quality contained in a layer. A relationship between permeability and specific resistance of rock indicates the following information.

- A layer with a specific resistance value of 100Ω-m or less is regarded as a non-permeable layer such as silt, clay, and mudstone, etc.
- A layer with a value of 100Ω-m or more is a non-permeable layer left dried such as gravel, pebble, sand layer, igneous rock, and metamorphic rock.
- A layer that is under the ground-water level and has a specific resistance value of 1000Ω-m or more is a non-permeable layer.
- A permeable layer left in water deposit state has a specific resistance value within a range of 100-1000Ωm.
- A layer containing salt water, etc. exhibits an excessively small specific resistance value.

b. Measurement result and analysis

Specific resistance measurement was carried out at deep wells which exist in a flat area along the truck road and which had been subjected to boring and a columnar section was available, consideration was taken in covering all areas where underground water can be lifted (Fig.A.3.2.4-5). A measuring depth a is within a range of 72-200m. The ρ-a curve was analyzed with the Sandburg standard curve method and direct-view method(Fig.A.3.2.4-6).

Fig.A.3.2.4-7 is a specific resistance view prepared with the analysis results, and indicates that three to six specific resistance layers are distributed within a measuring depth.

The geological characteristics of this area are that specific resistance layers exceeding 100Ω-m are not found except for measuring point No. 19 and that almost all layers have a specific resistance of several tens Ω-m or less. Measurements have proven that these low specific resistance layers have almost the same values as acuifer where deep wells are in use. It is considered that this prenomenon may be attributed to the fact that ground water dissolves electrolytes contained in volcanic deposits forming the basin.

In IV-IV' cross section, two acuifers at a depth of 60-90m to the east and west ends are found in addition to another acuifer at a depth of 20-30m.

In cross section V-V', there exist a shallow acuifer at a depth of 15m or less from the surface and in a thickness of 5-8m and another acuifer at a depth of 80-90m and in a thickness of about 15m.

For reference, the boring columnar section of the existing well is entered in the specific resistance cross sectional view. The position of acuifer obtained from the electrical prospecting method is in approximate agreement with the position of permeable layers shown by boring data.

However, it should be noted that the electrical prospecting method is a test conducted on the ground surface and the test result is to be utilized as a guideline. In the practical design stage tests boring must be conducted for exact layer phases and layer thickness.

In analyzing ρ-a curve, specific resistance values obtained by measurement were compared with the existing boring columnar sections (such as those at measuring points Nos. 9, 30, and 31). The result was that layers with relatively high specific resistance values are layers which consist of gravel, have many voids and are susceptible to groundwater deposits. On the other hand, layers with lower specific resistance values are non-permeable layers consisting of hard volcanic ashes, silt, and clay. The range of the acuifer was determined from the shape of ρ-a curve according to the direct-view method.

c. *Groundwater deposit condition*

The geographical distribution of acuifer obtained by the above method is grasped using the specific resistance columnar cross sectional view (Fig. A.3.2.4-7).

The following acuifers may be checked from the cross sectional view drawn in the direction of north and south of the basin. The cross section A-A' shows a shallow water deposit layer at a depth of 10-20m from the ground level and in a thickness of 10-20m runs from the southern part of the basin to near Monjas. Another acuifer at a depth of about 60m from the surface and in a thick of 10-20m is distributed from near department road No. 1 to the north. The cross sectional view B-B' indicates a acuifer at a depth of 25-30m from the surface and in a thickness of 10-15m, and another layer at a depth of 110-120m at the southern San Pedro river basin. At a flat area to the north of the San Pedro lake, an acuifer at a depth of 6m or less from the surface and in a thickness of 2-8m is found. Other deeper water deposit layers are discontinued.

The following acuifers may be checked from the cross sectional view from almost east to west of the basin. An acuifer at a depth of 20-40m and in a thickness of 6-14m is distributed with continuity in section I-I' also departmental road No. 1. In section II-II' along the national road No. 19 there exit an acuifer at a depth of 20m or less from the surface and in a thickness of 4-8m and another acuifer at a depth of 55-70m from the surface and in a thickness of 6-12m.

In section III-III', an acuifer at a depth of 20m from the surface and in a thickness of 3-10m and another water deposit at a depth of 100-120m beneath measuring point No. 34 are found.

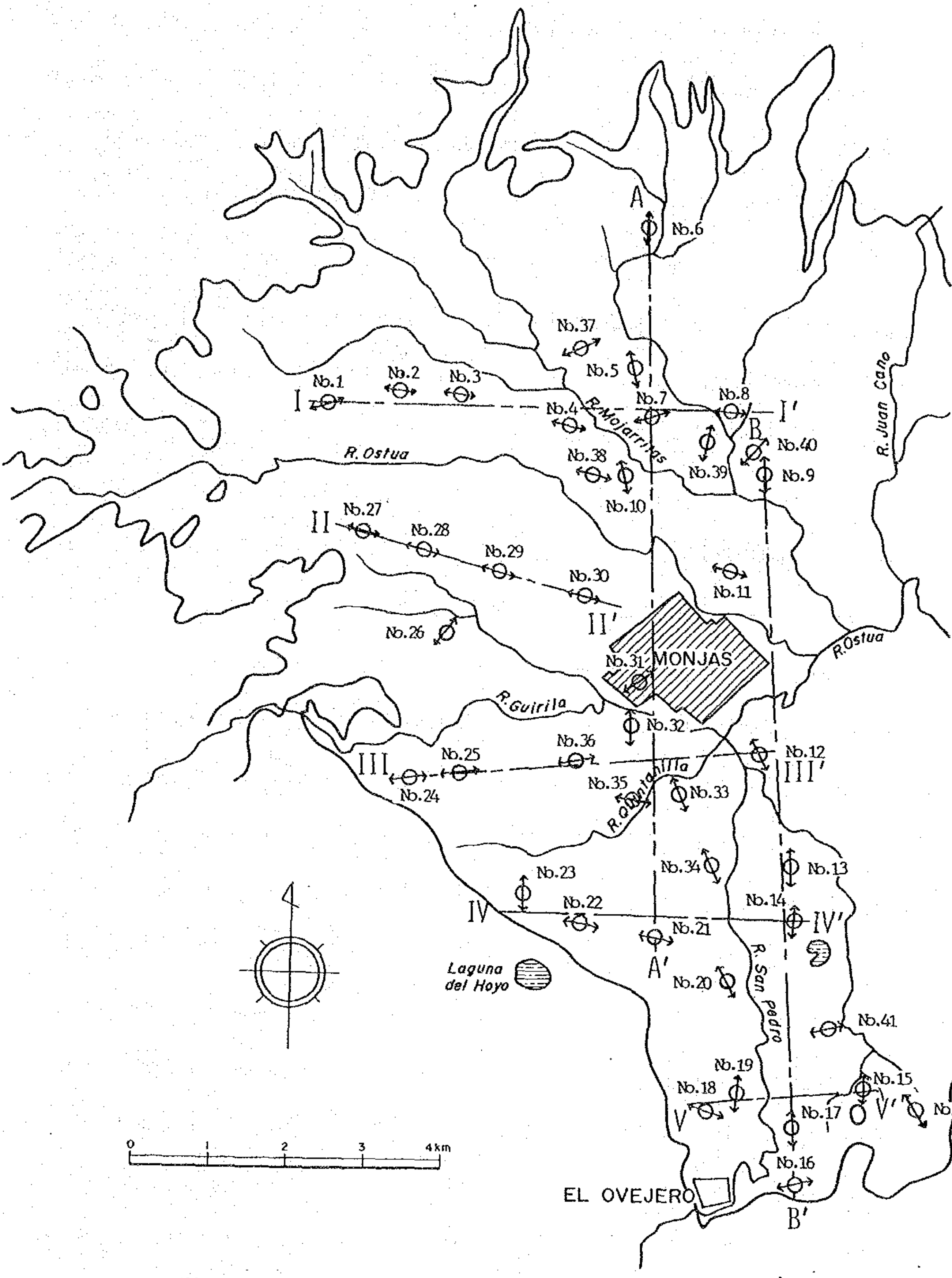
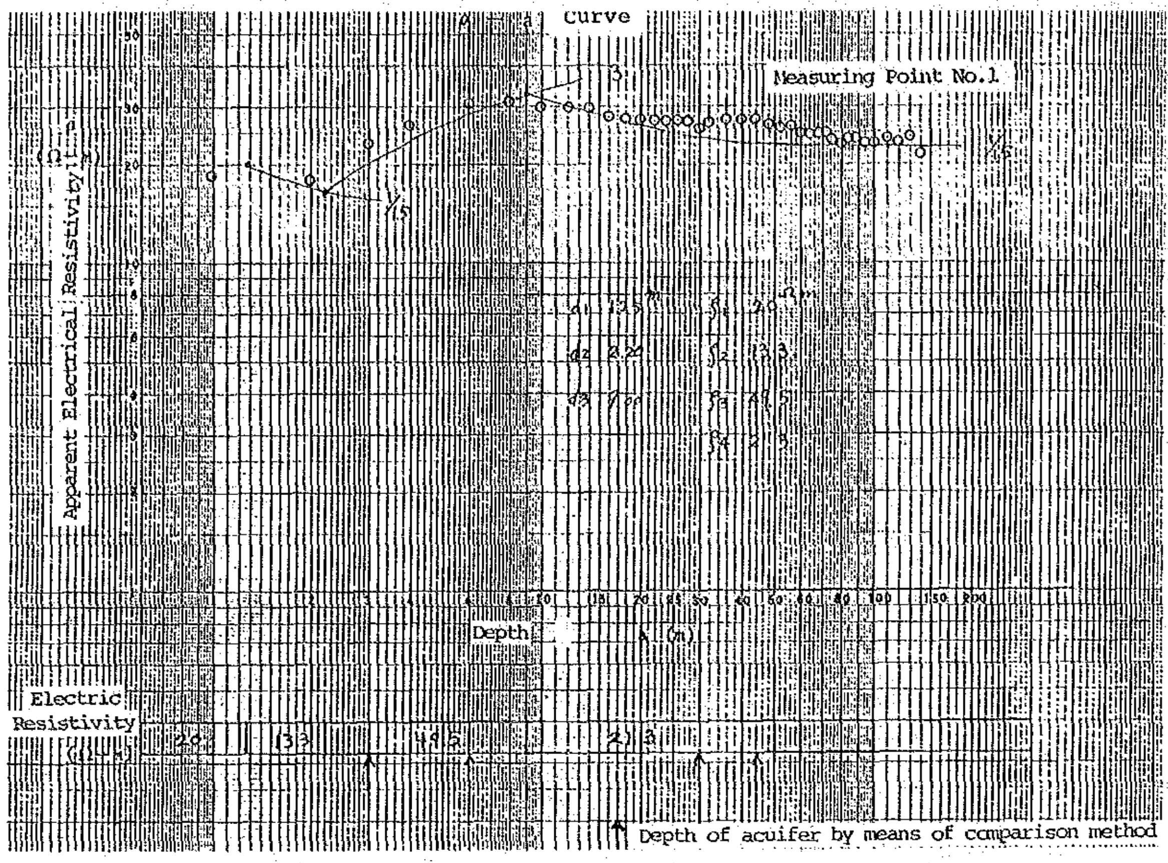


Fig. A.3.2.4-5 Location Map of Electrical Prospecting Point



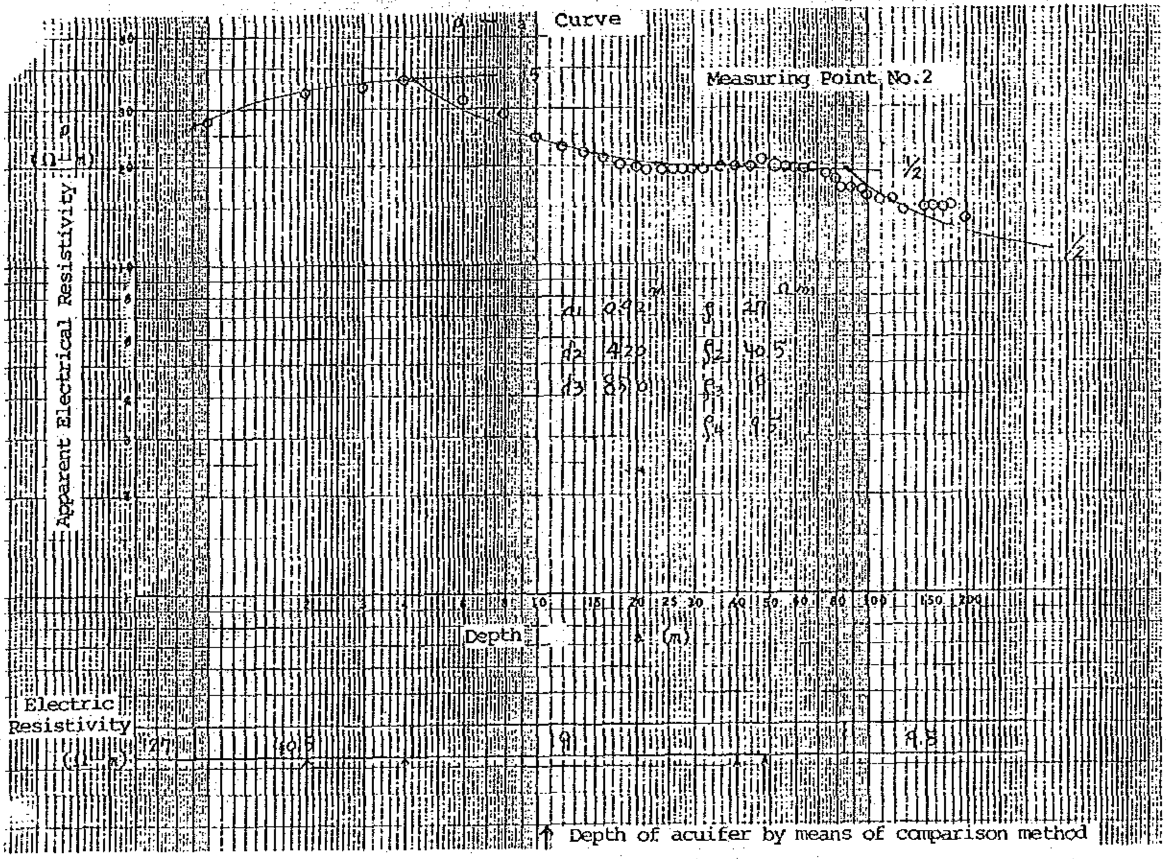
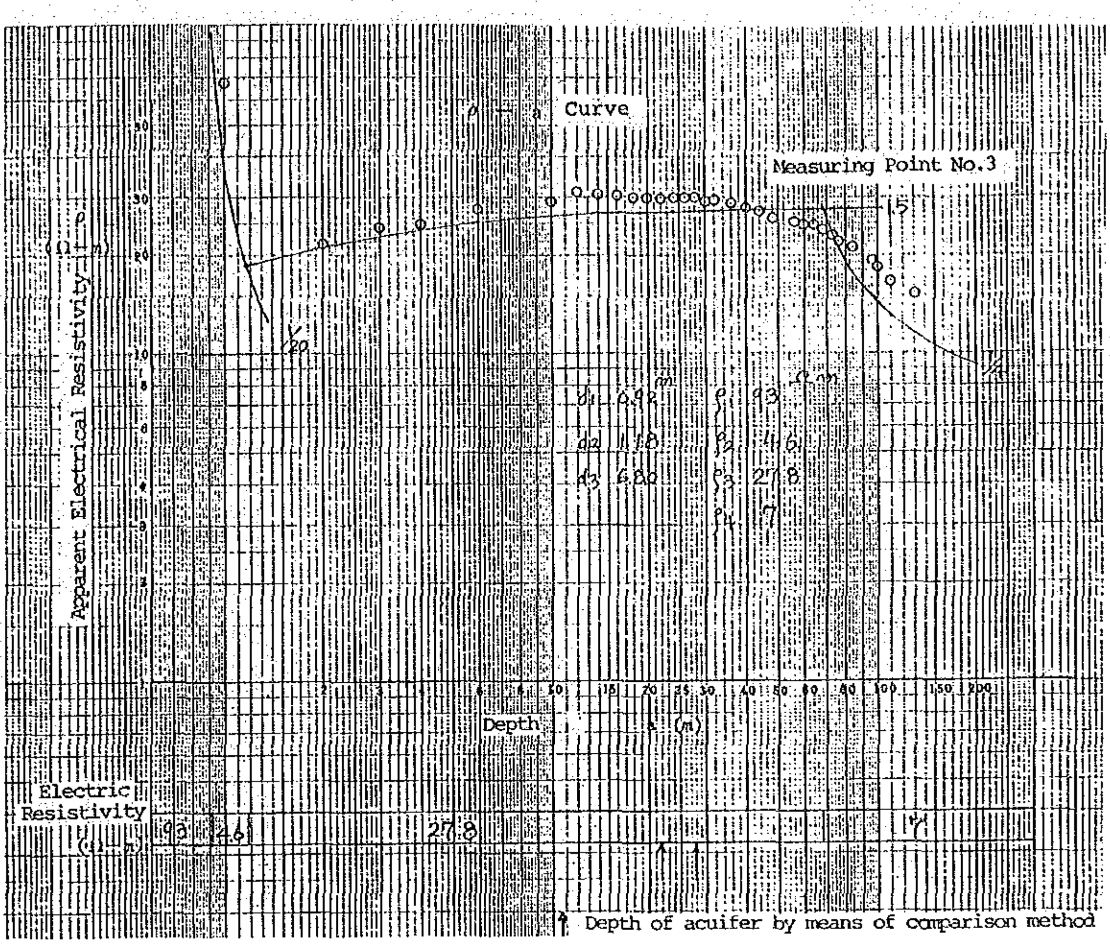


Fig.A.3.2.4-6 ρ -a Curve (1/21)



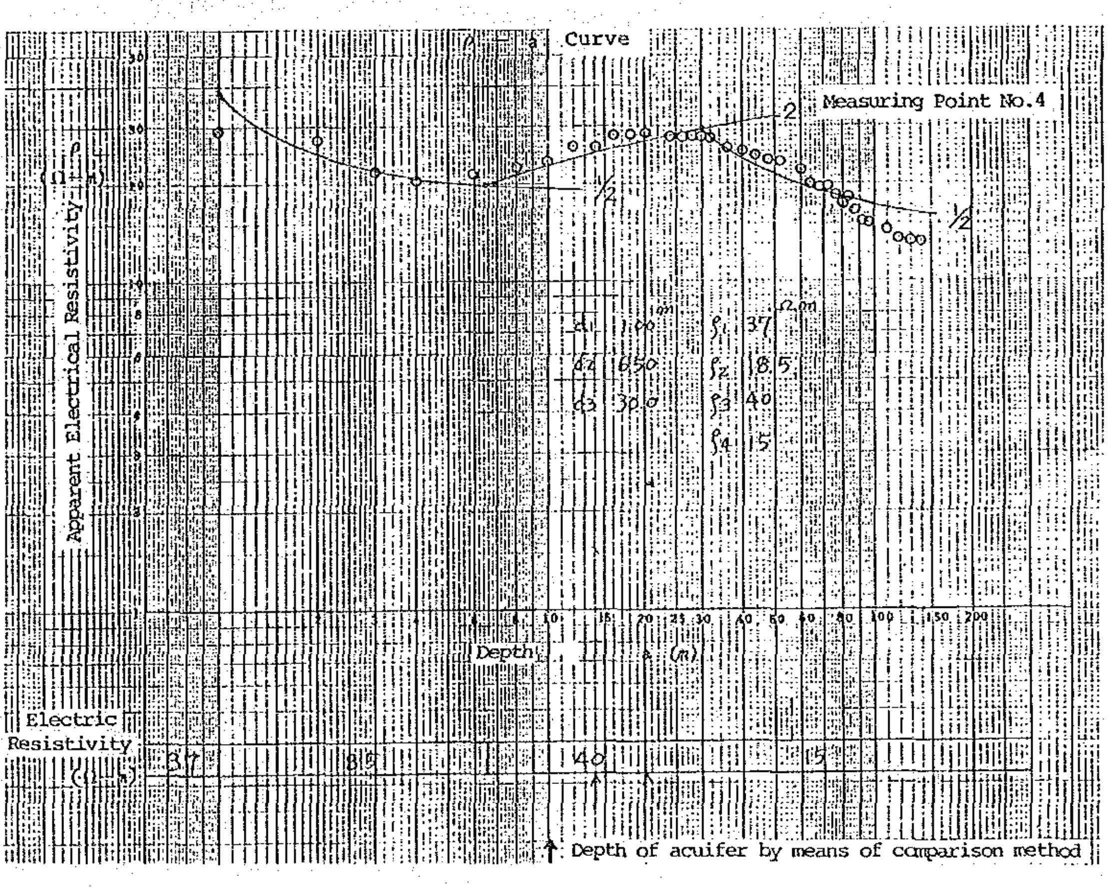
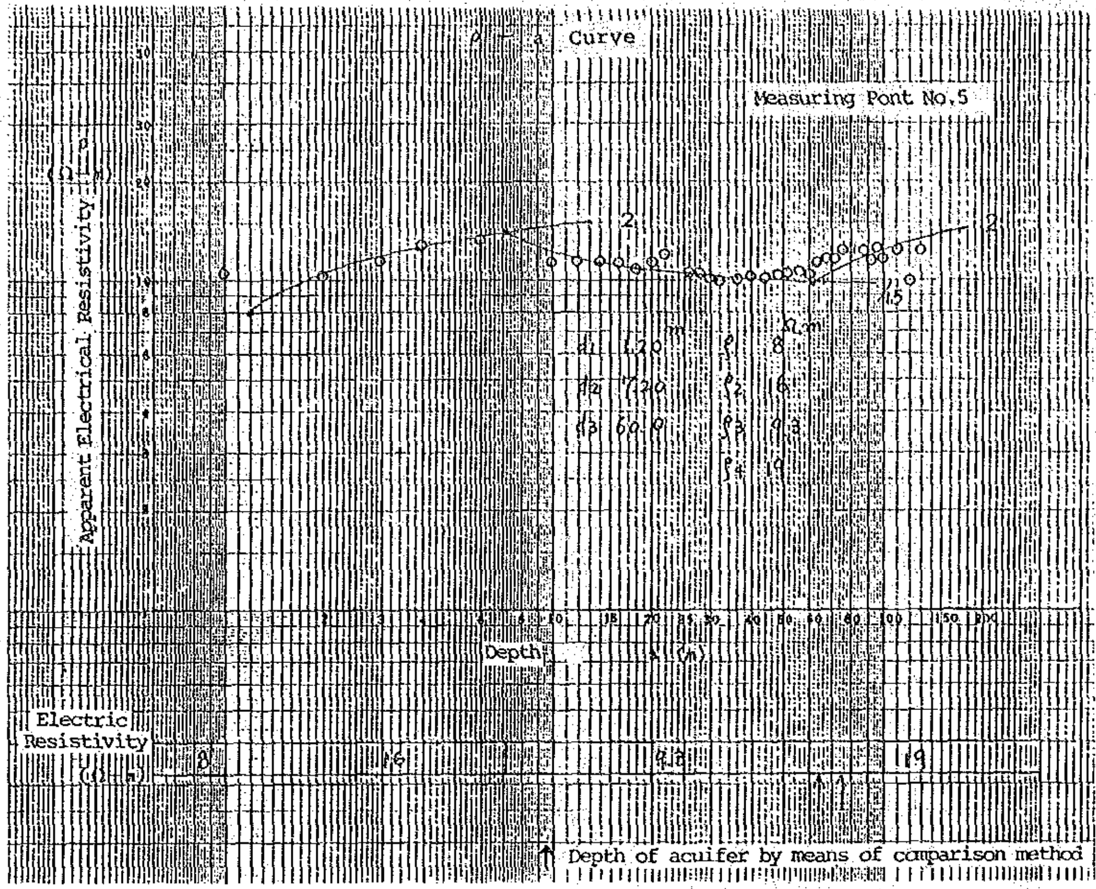


Fig.A.3.2.4-6 ρ -a Curve (2/21)



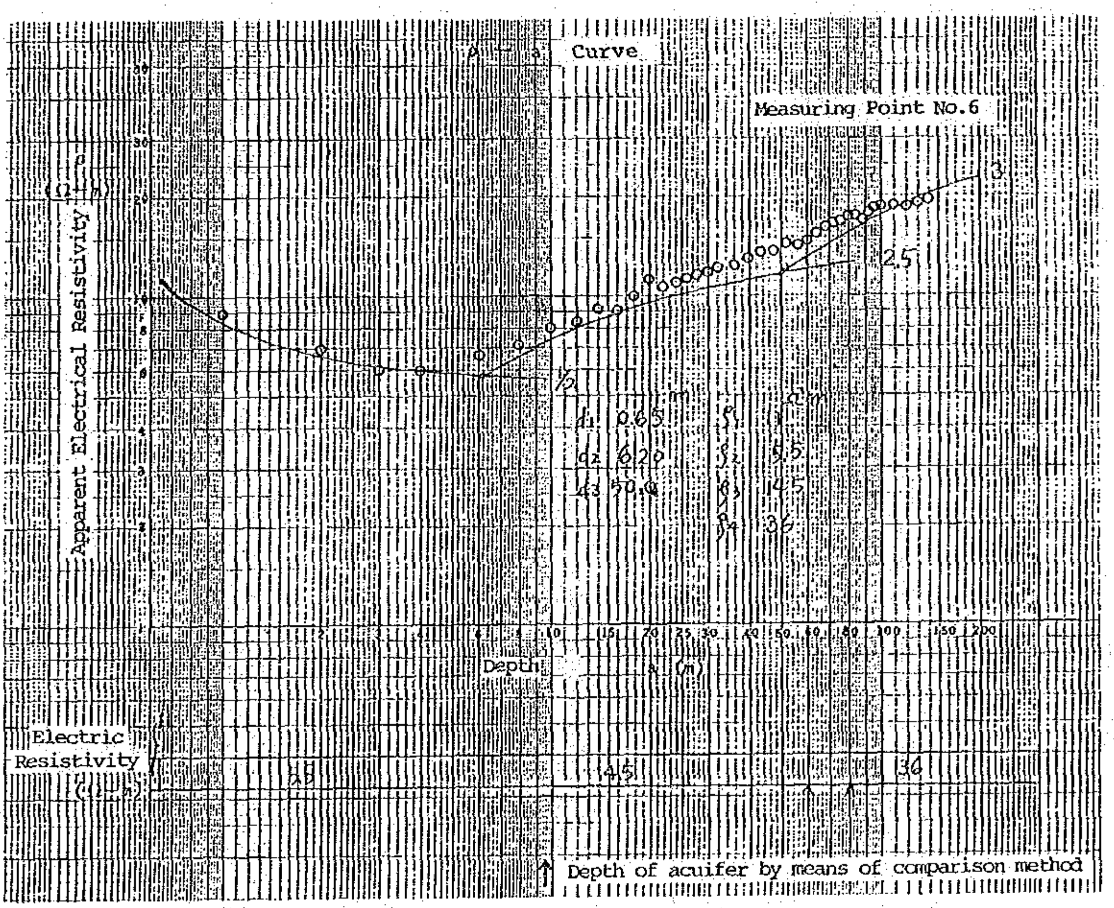
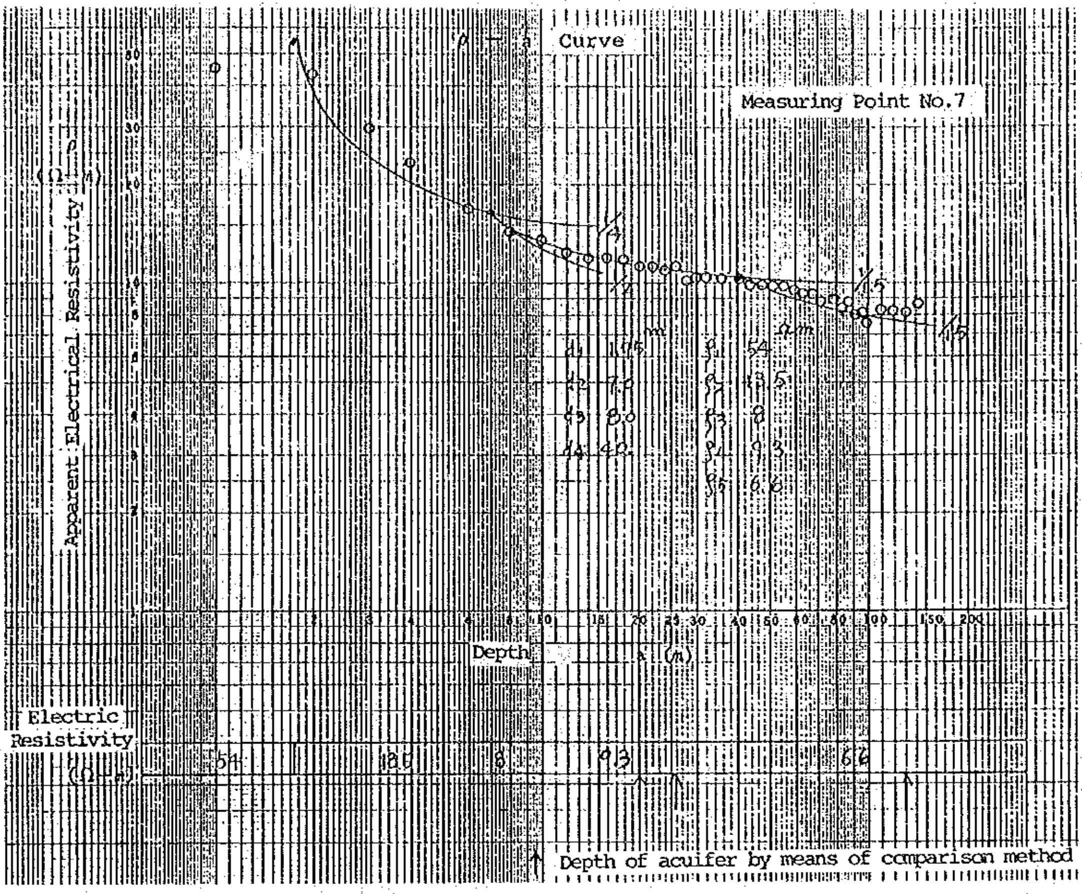


Fig.A.3.2.4-6 ρ -a Curve (3/21)



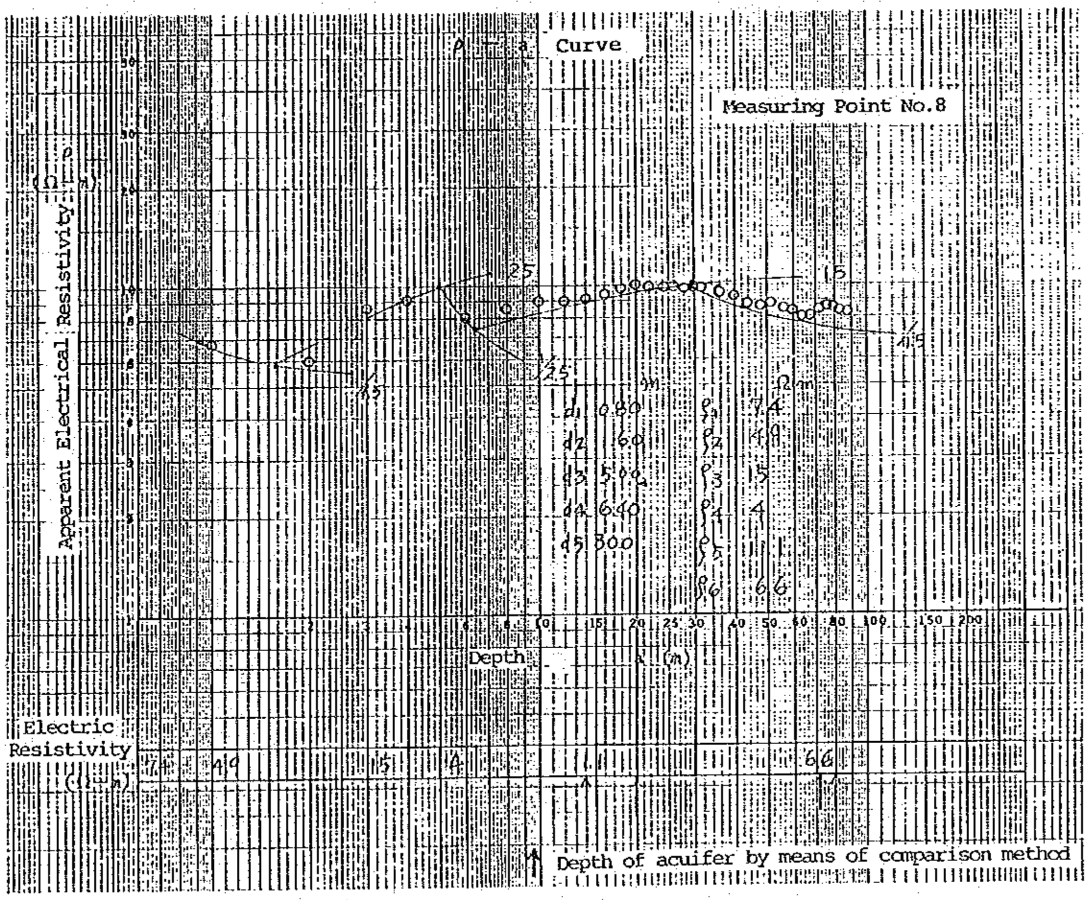
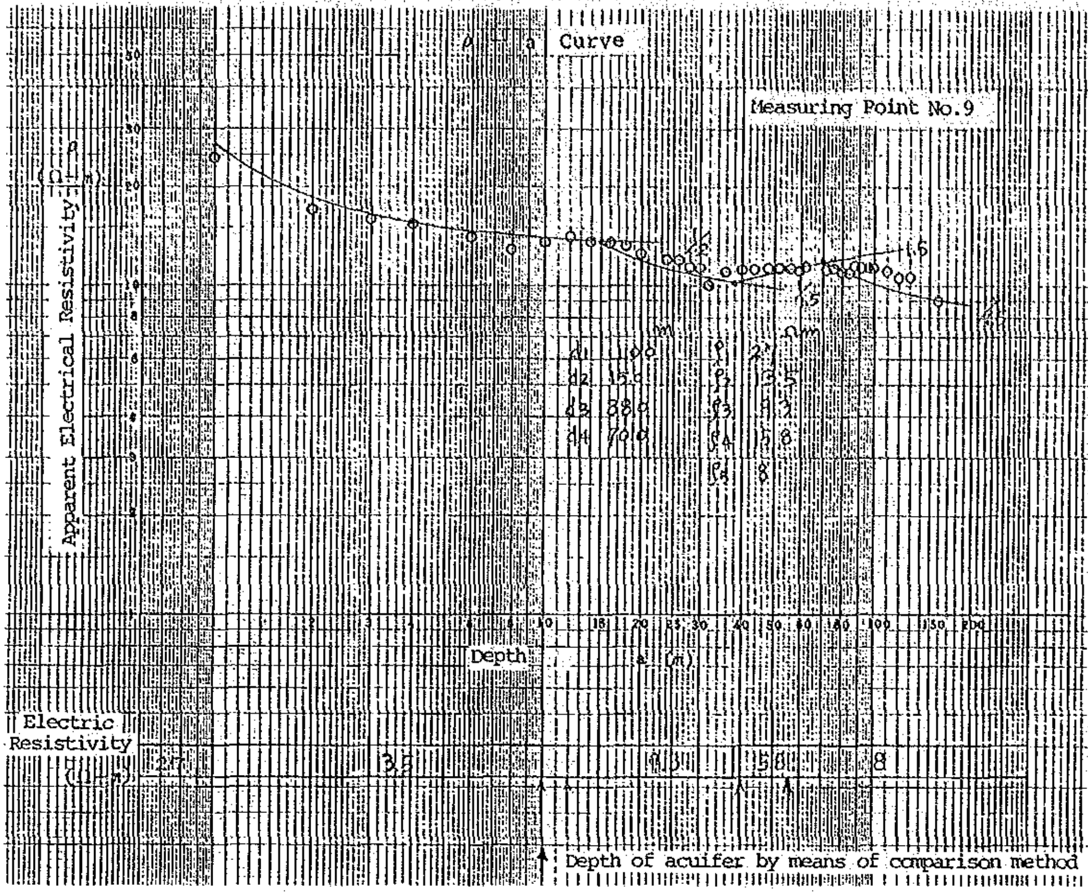


Fig.A.3.2.4-6 ρ -a Curve (4/21)



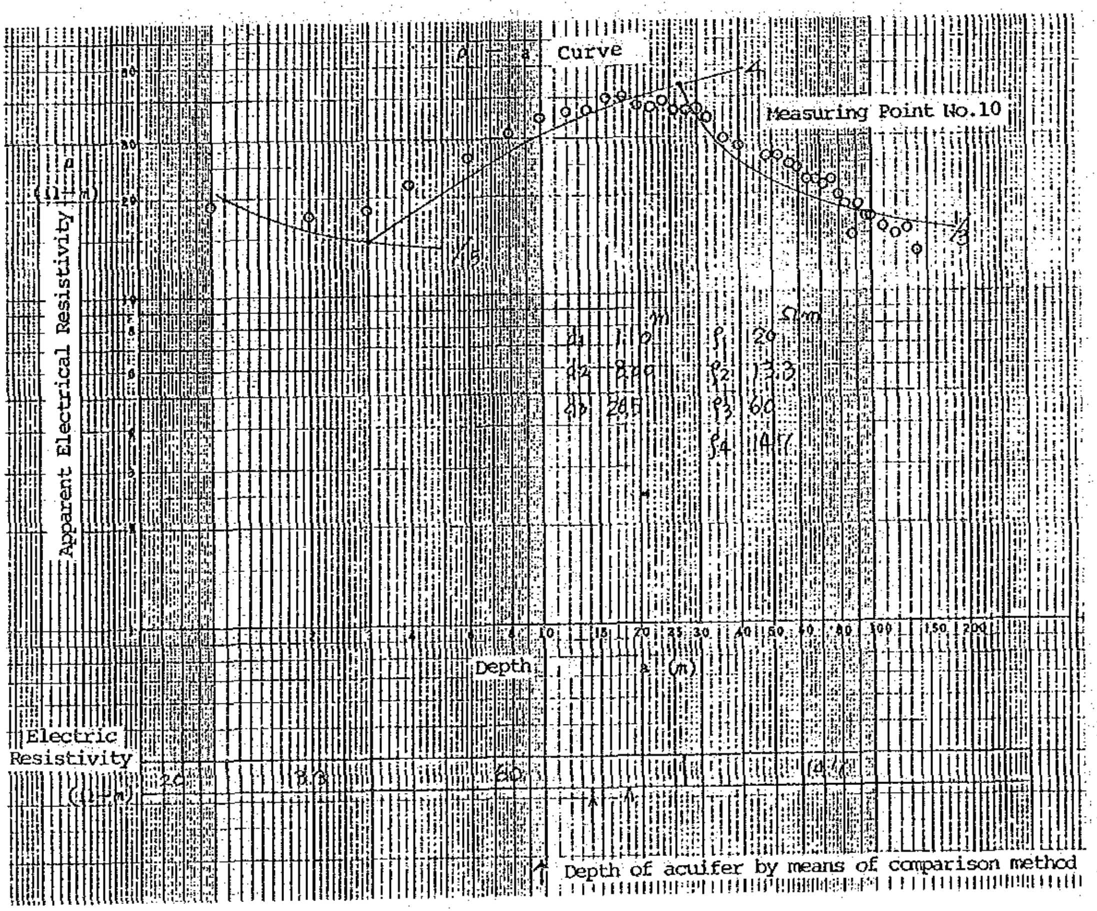
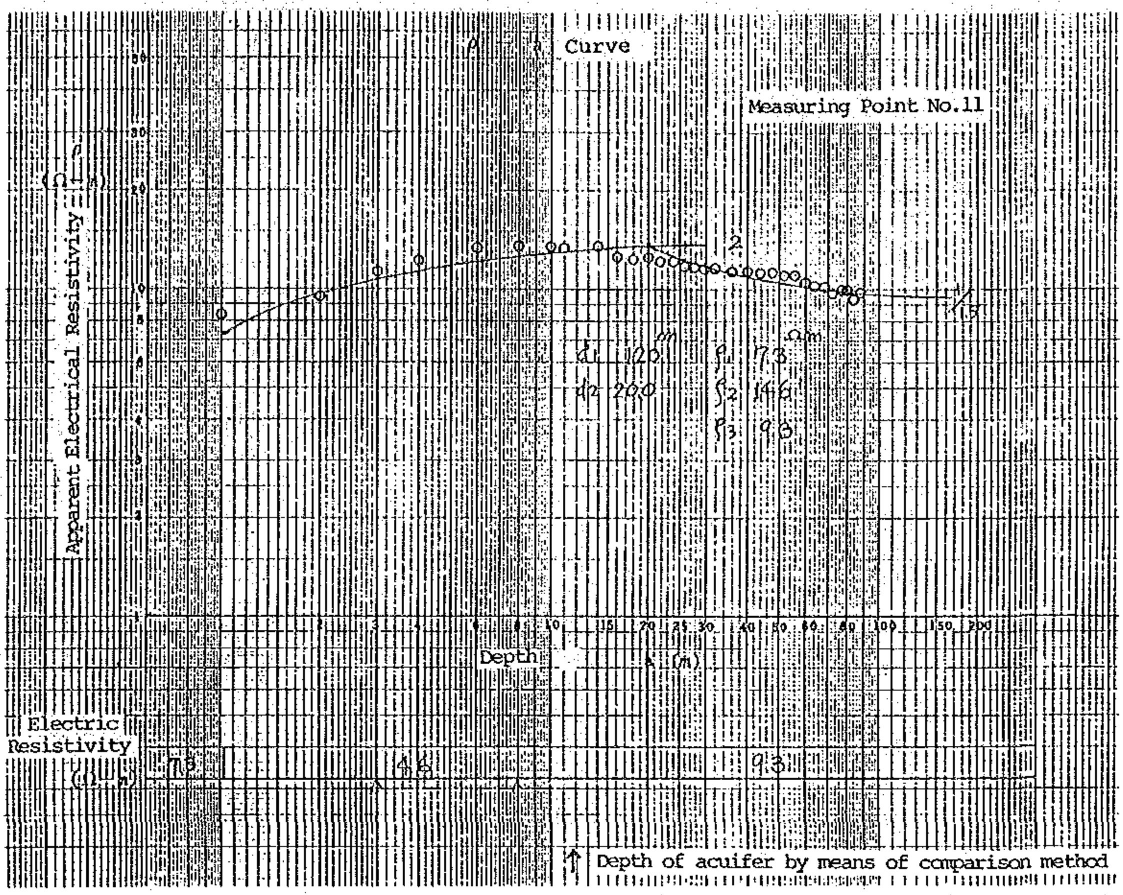


Fig.A.3.2.4-6 ρ -a Curve (5/21)



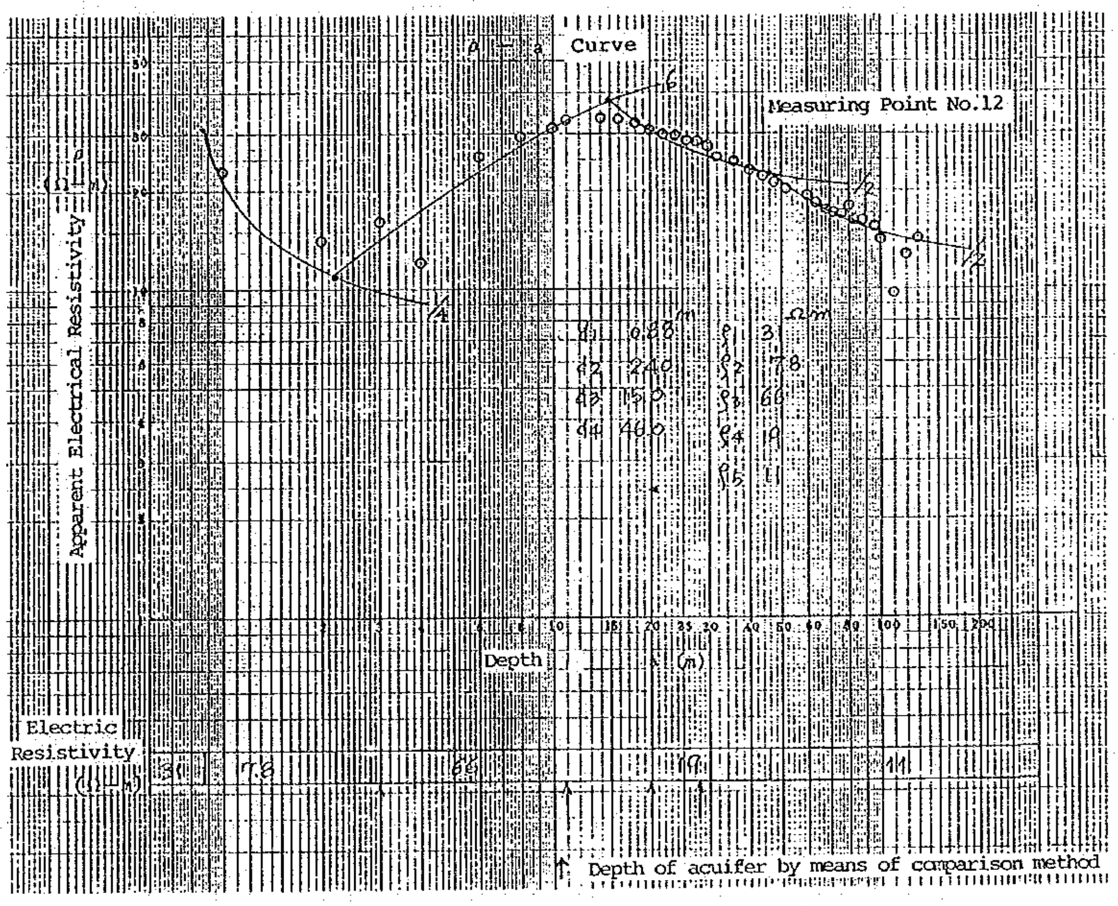
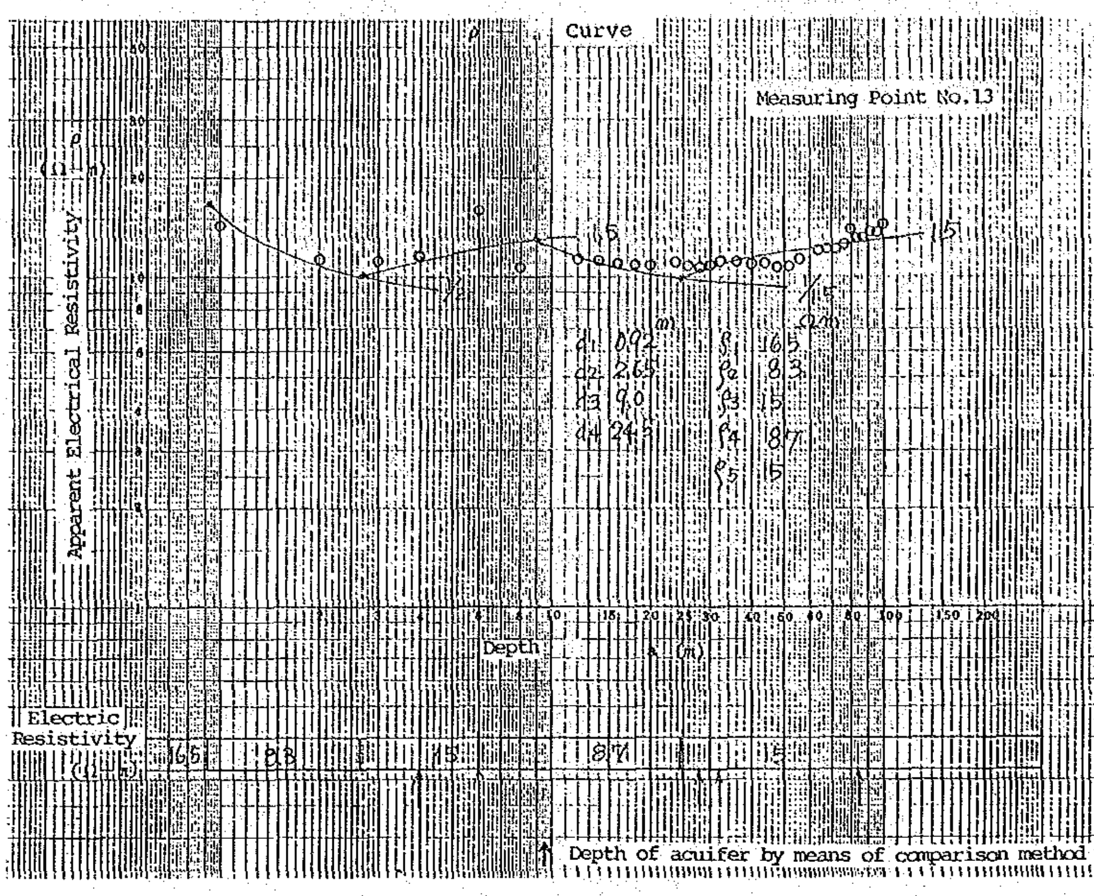


Fig.A.3.2.4-6 ρ -a Curve (6/21)



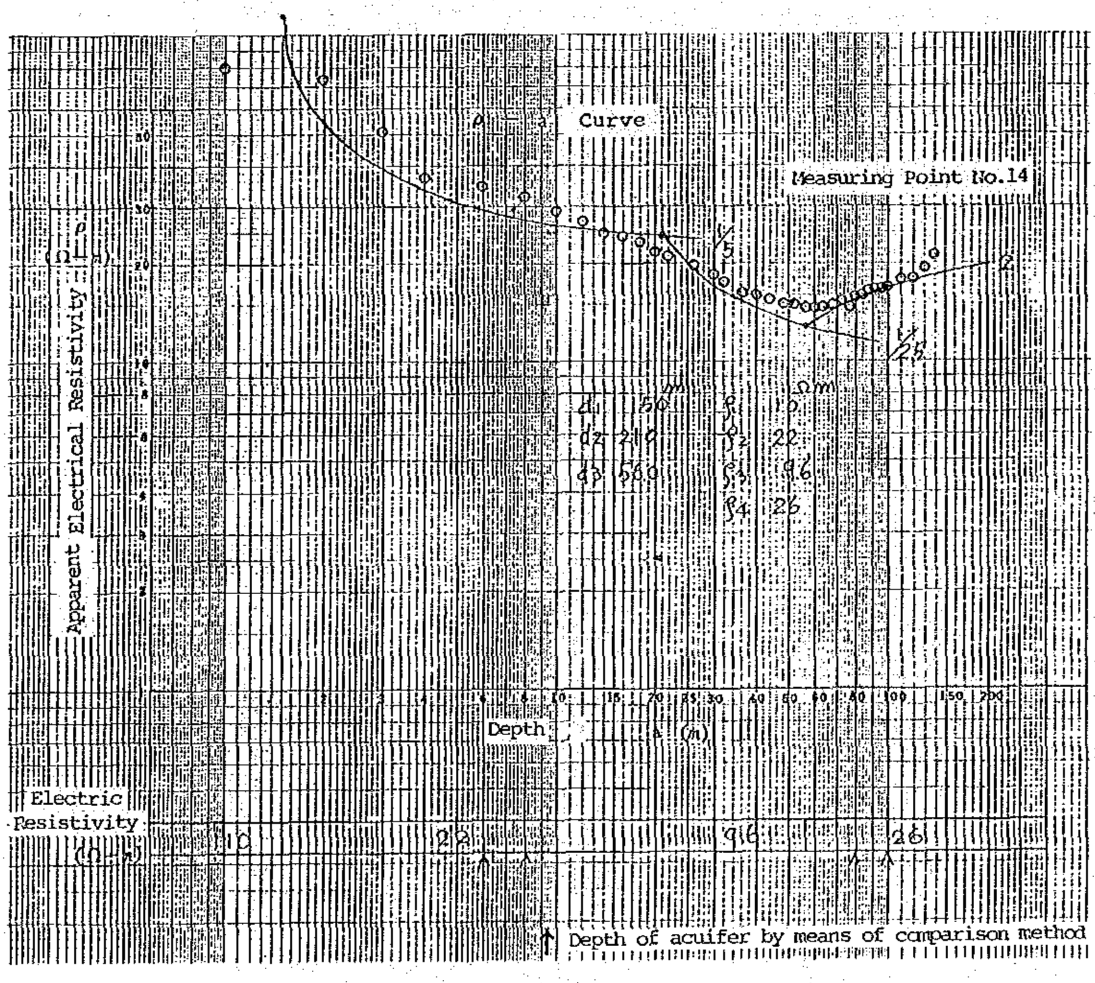
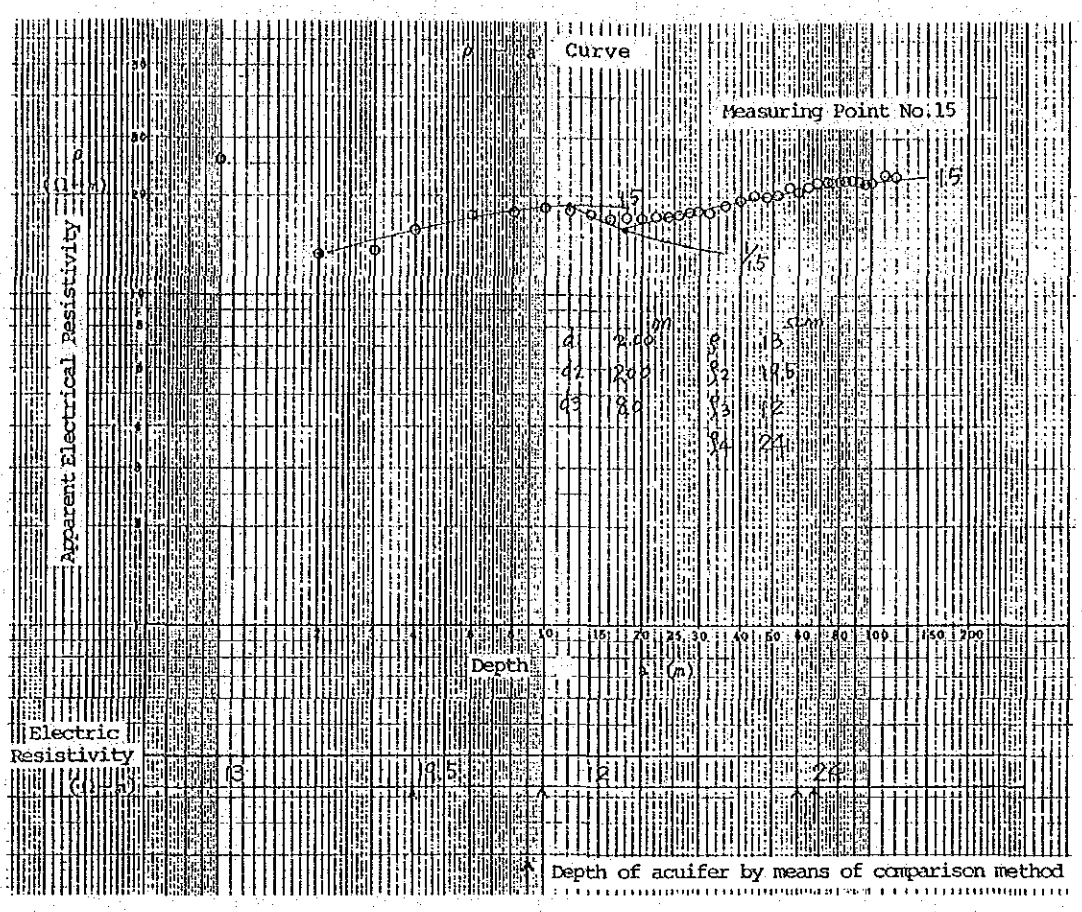


Fig.A.3.2.4-6 ρ -a Curve (7/21)



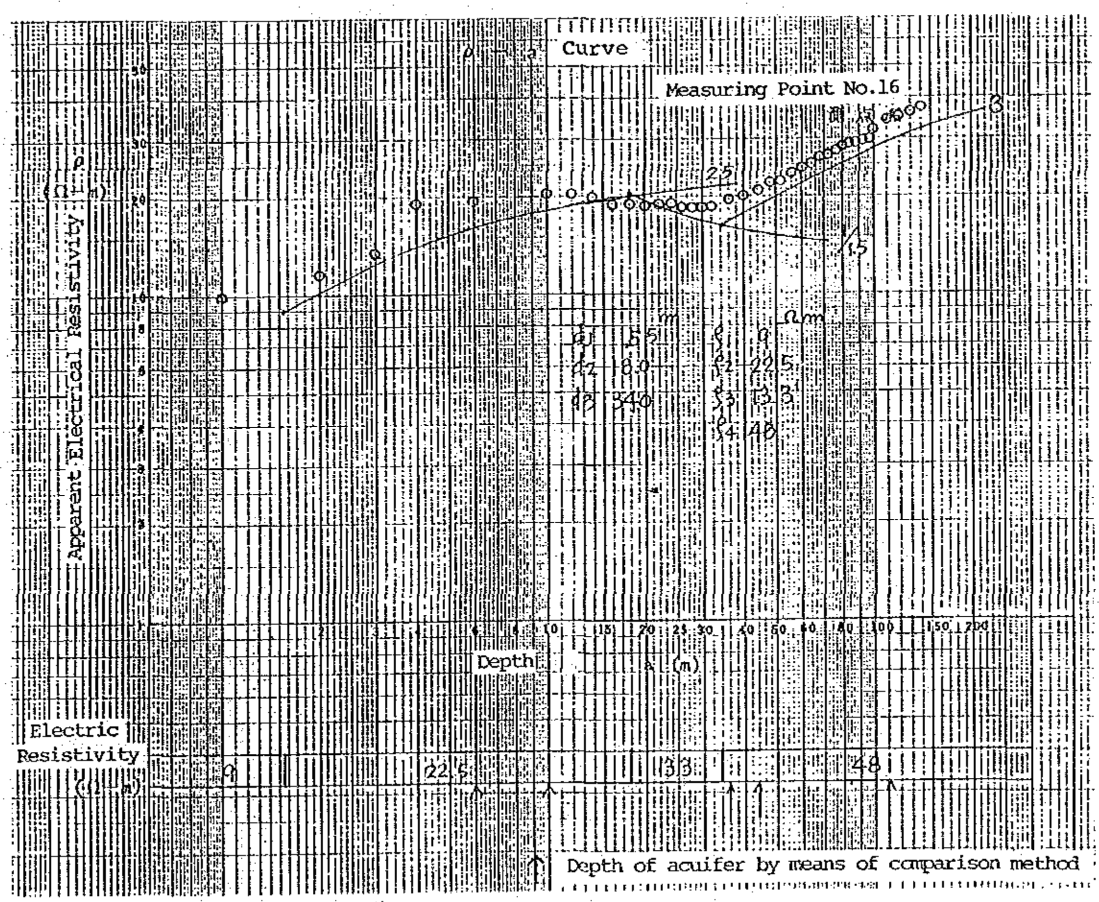
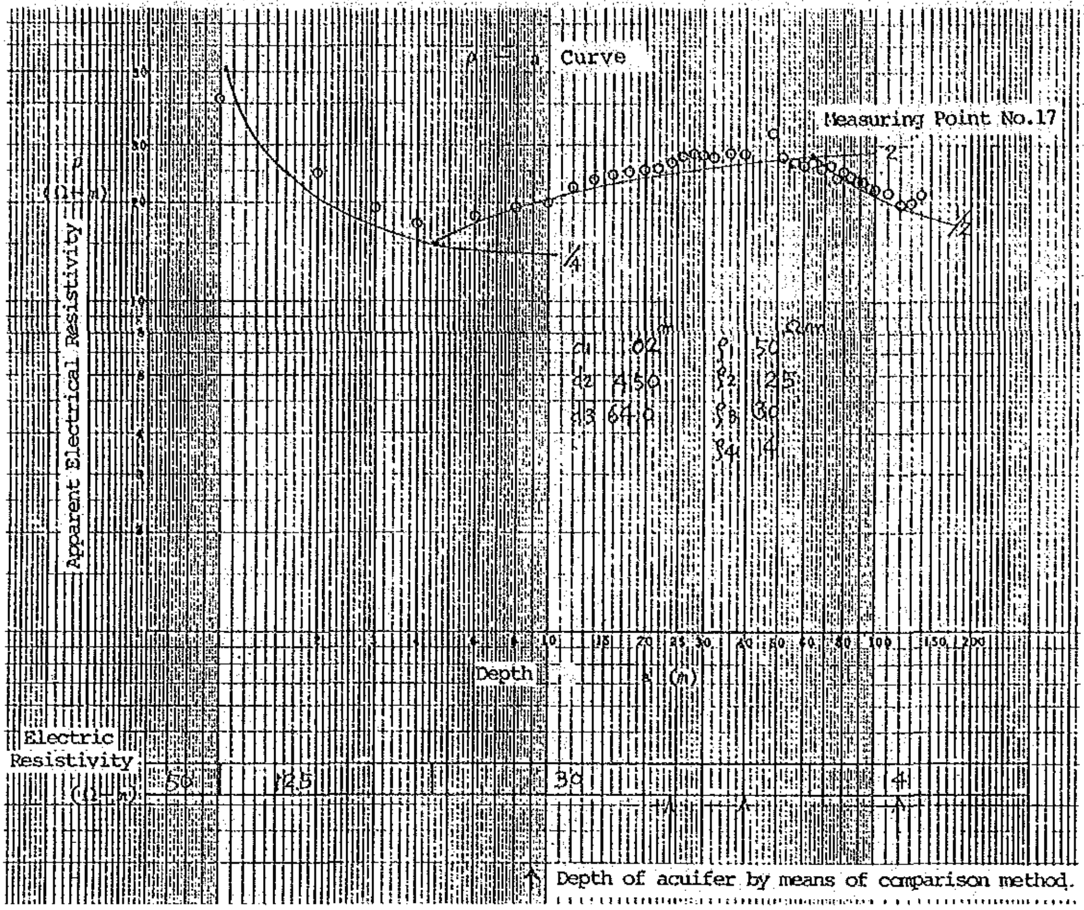


Fig.A.3.2.4-6 ρ -a Curve (8/21)



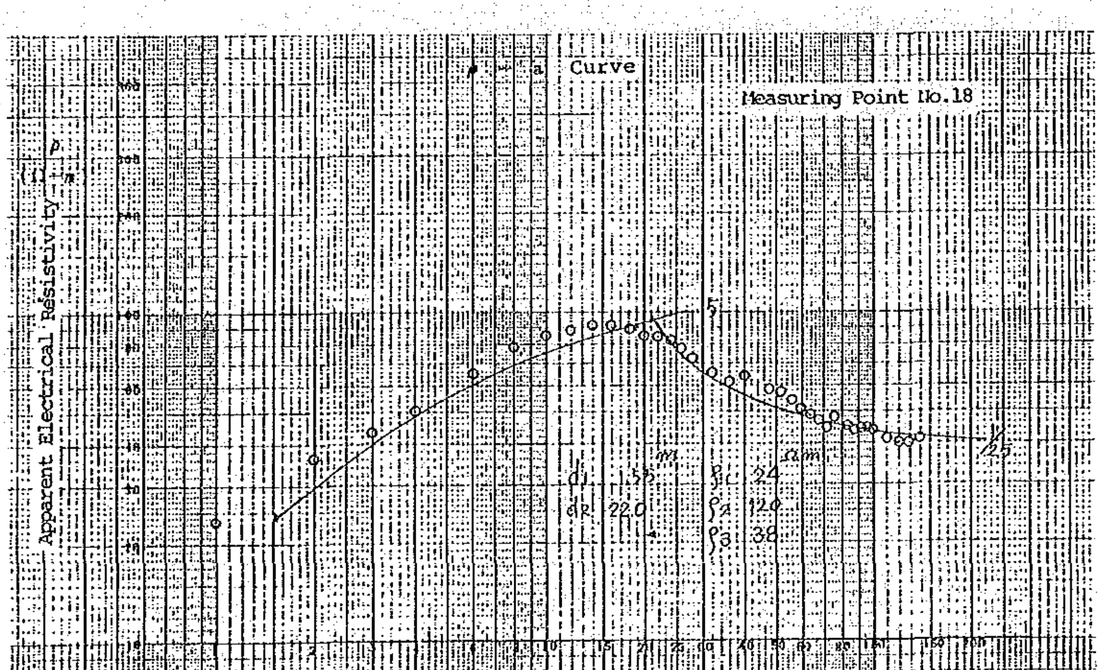
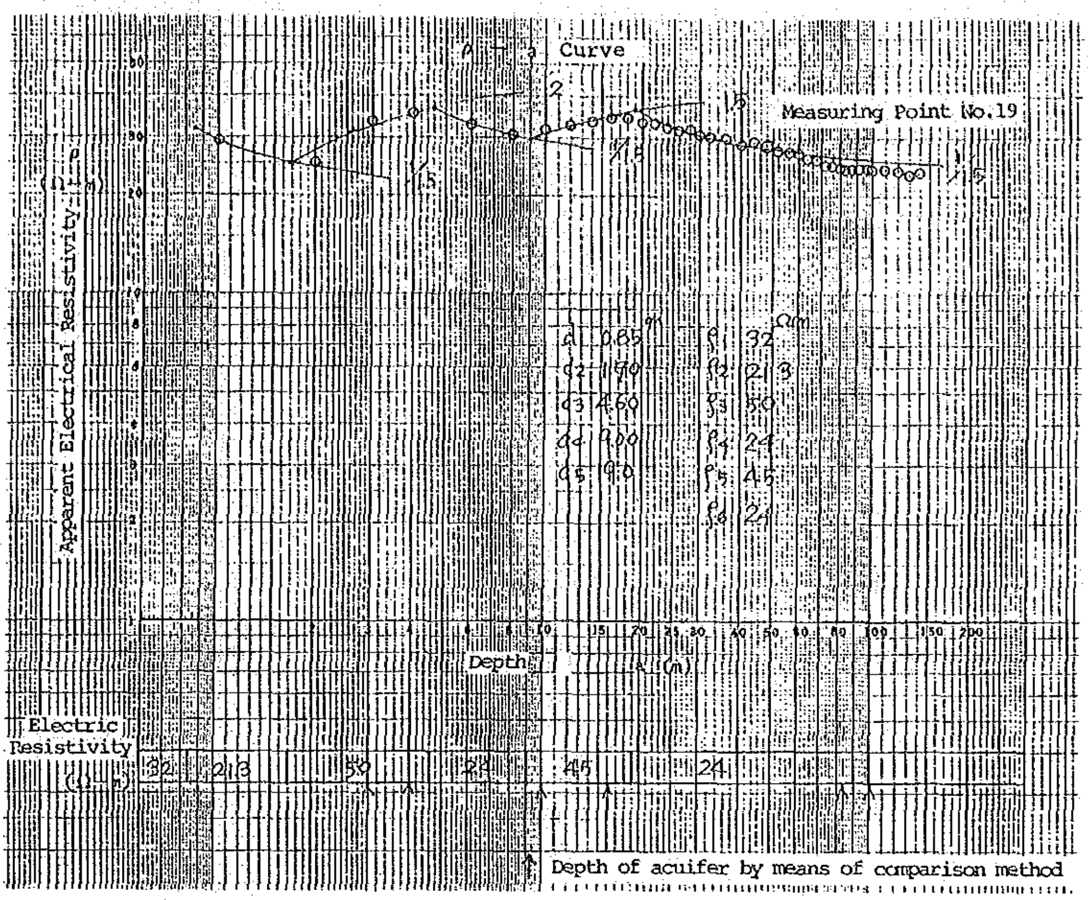


Fig.A.3.2.4-6 ρ -a Curve (9/21)



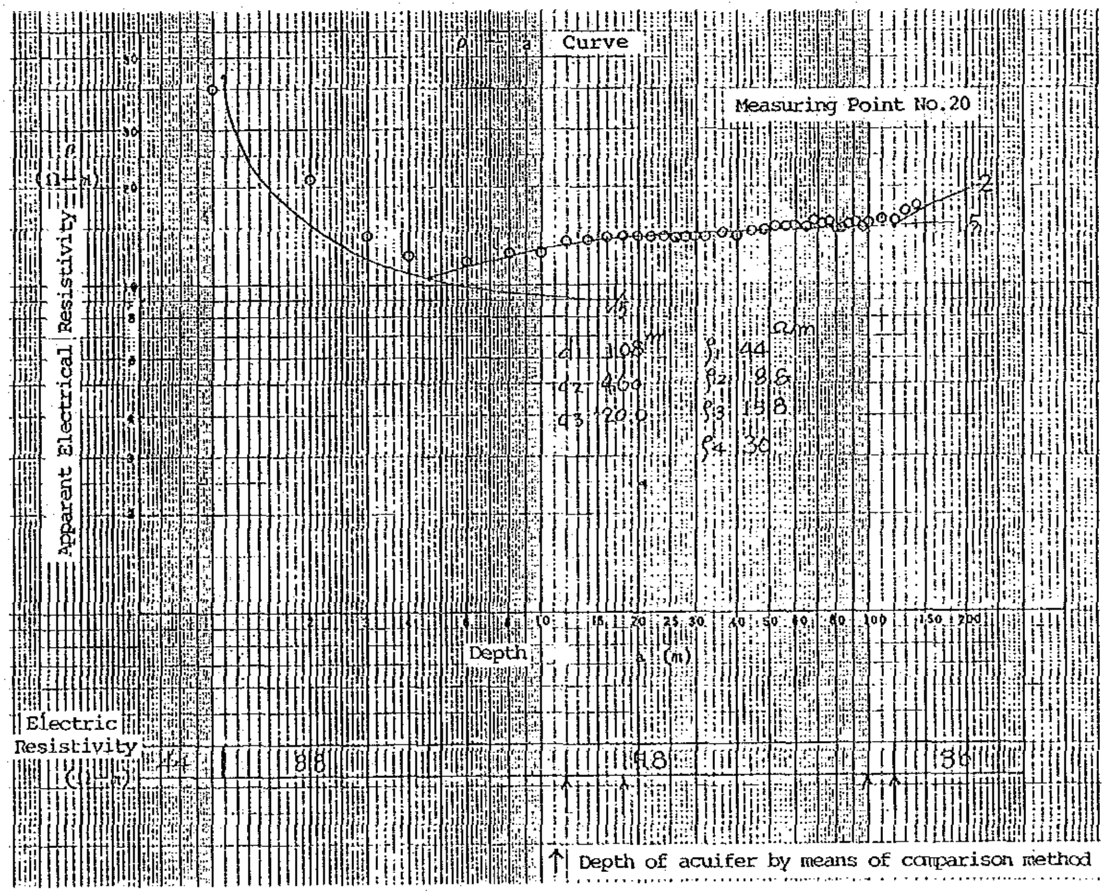
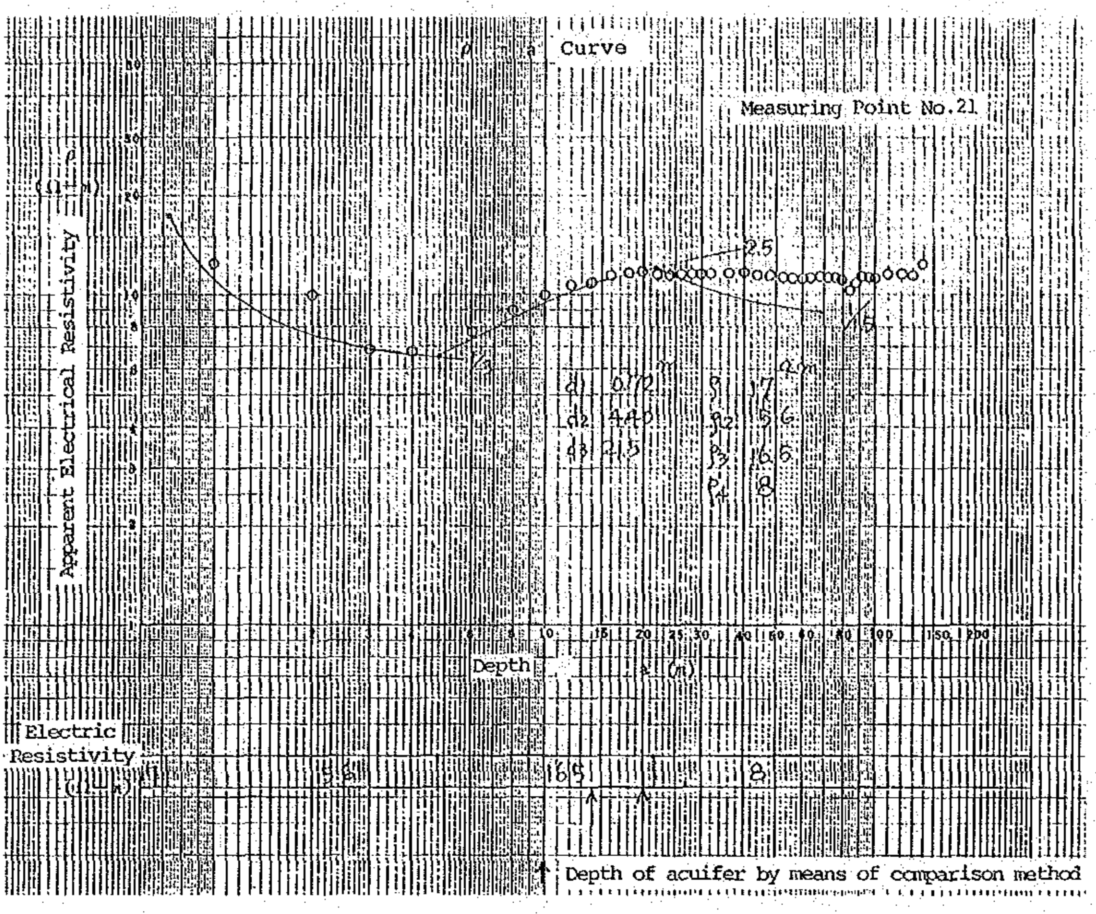


Fig.A.3.2.4-6 ρ -a Curve (10/21)



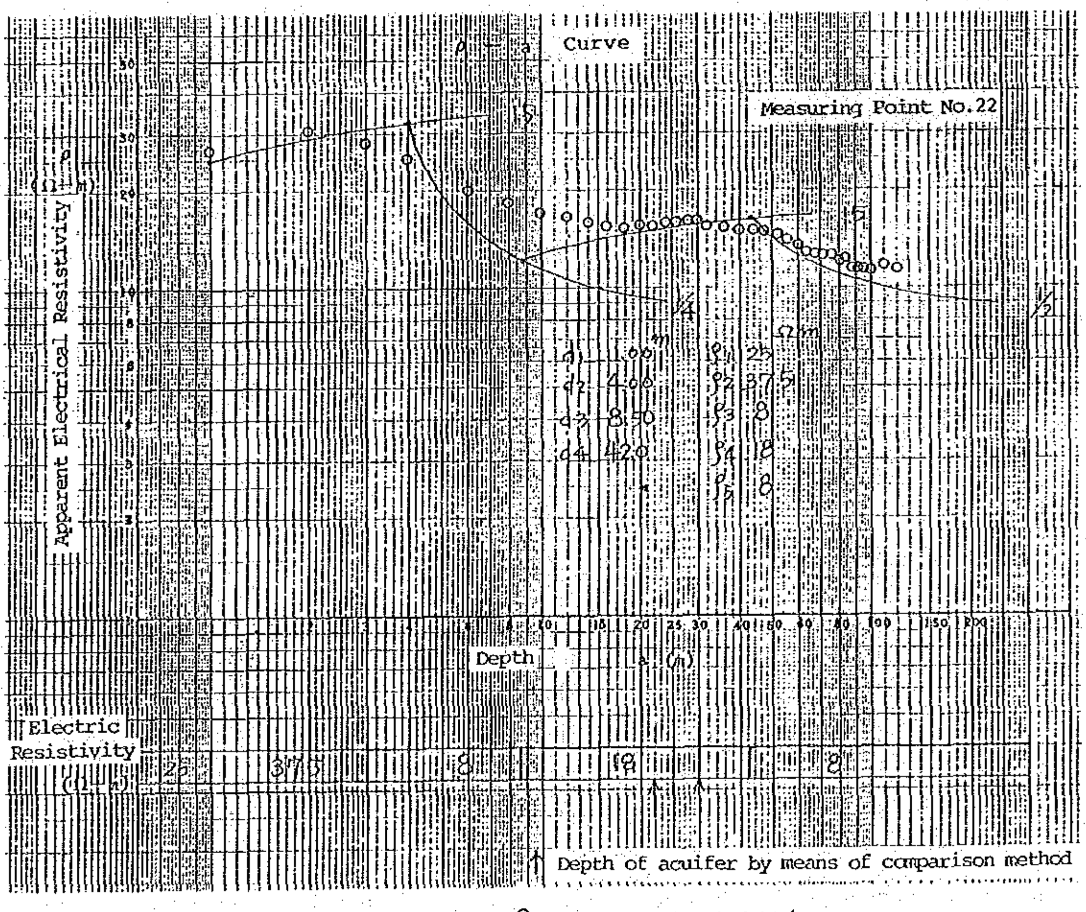
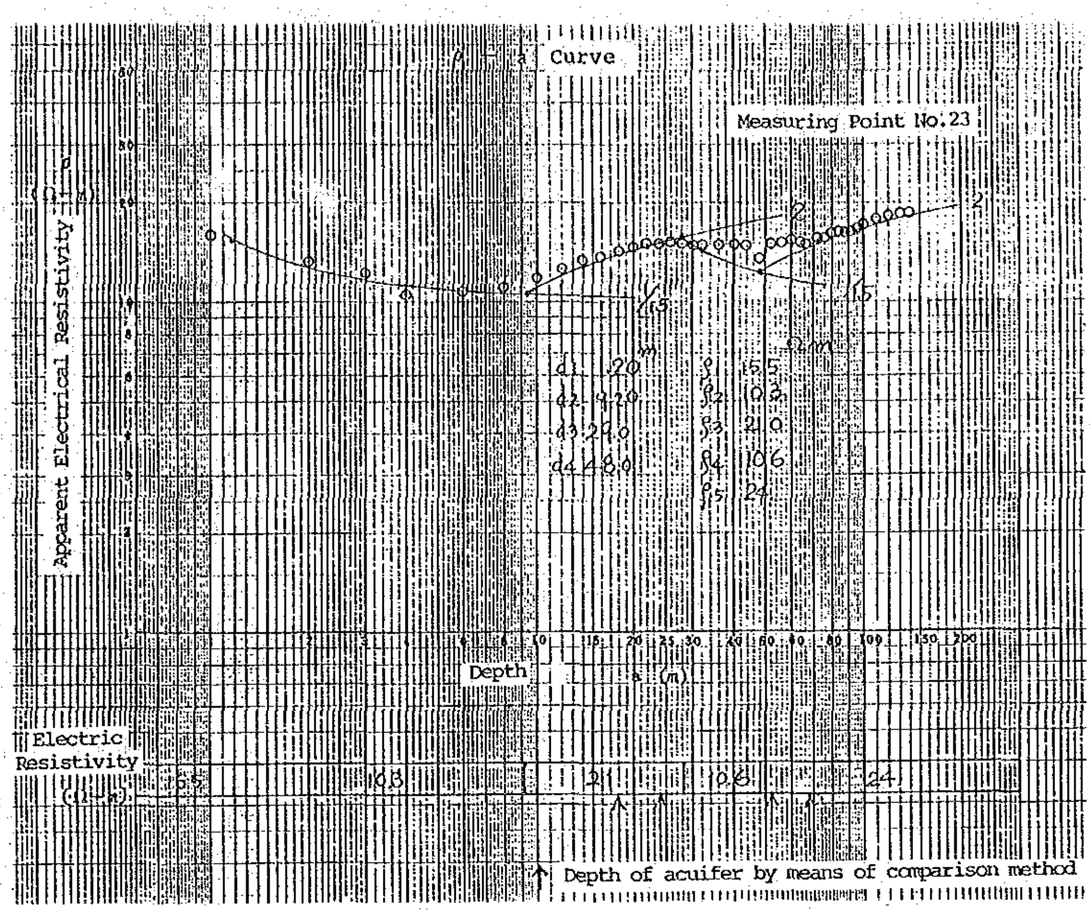


Fig.A.3.2.4-6 ρ -a Curve (11 /21)



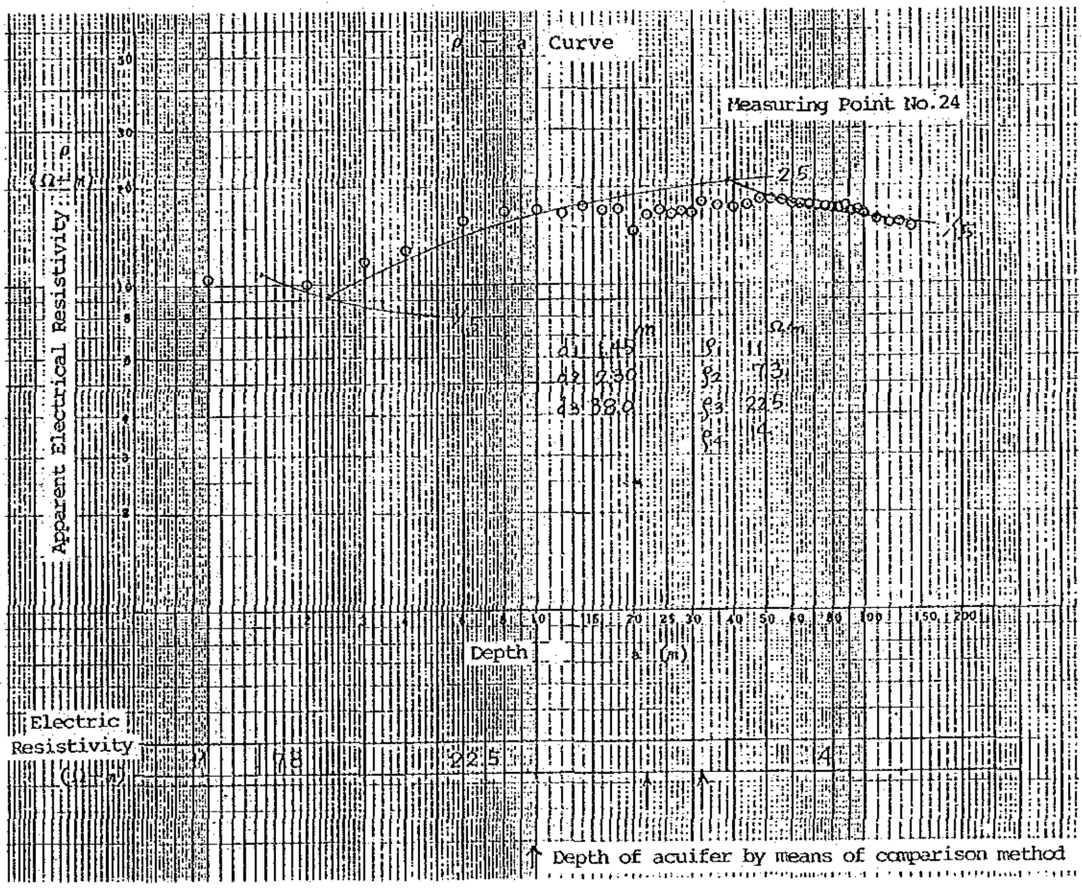
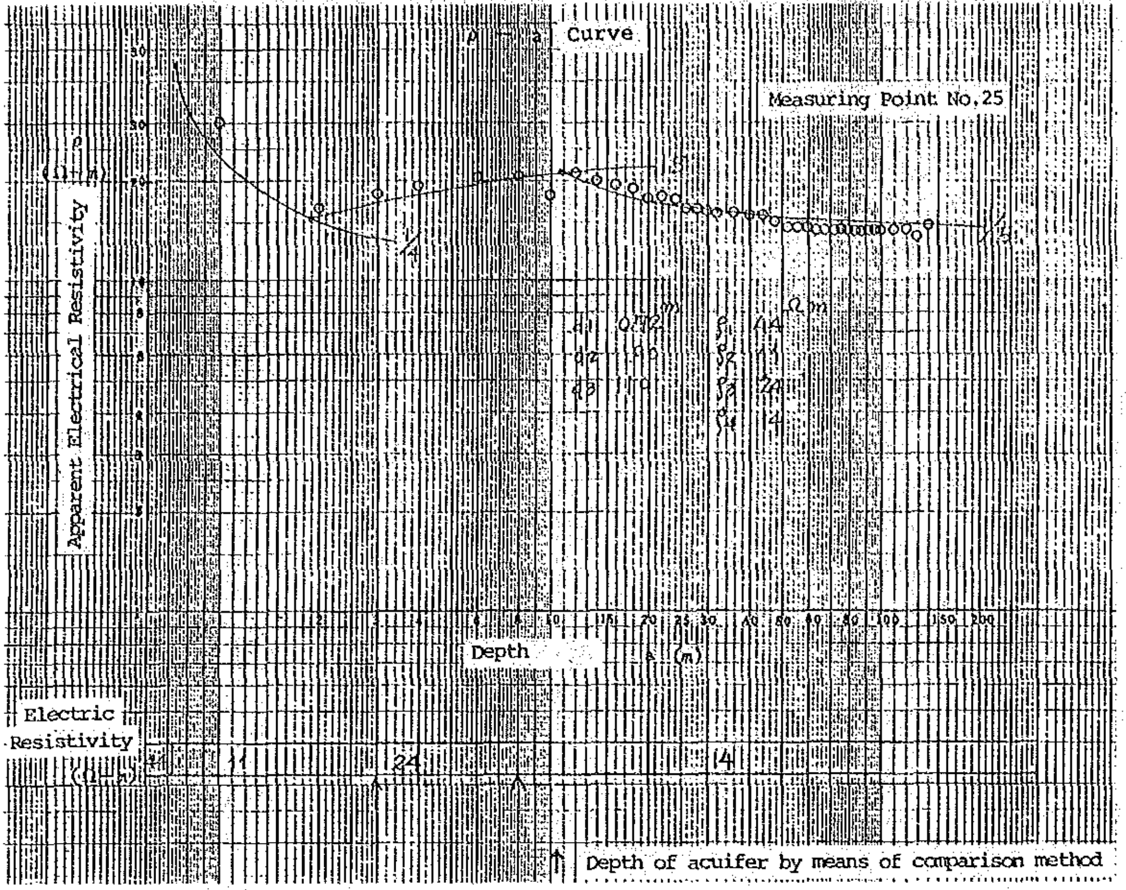


Fig.A.3.2.4-6 ρ -a Curve (12/21)



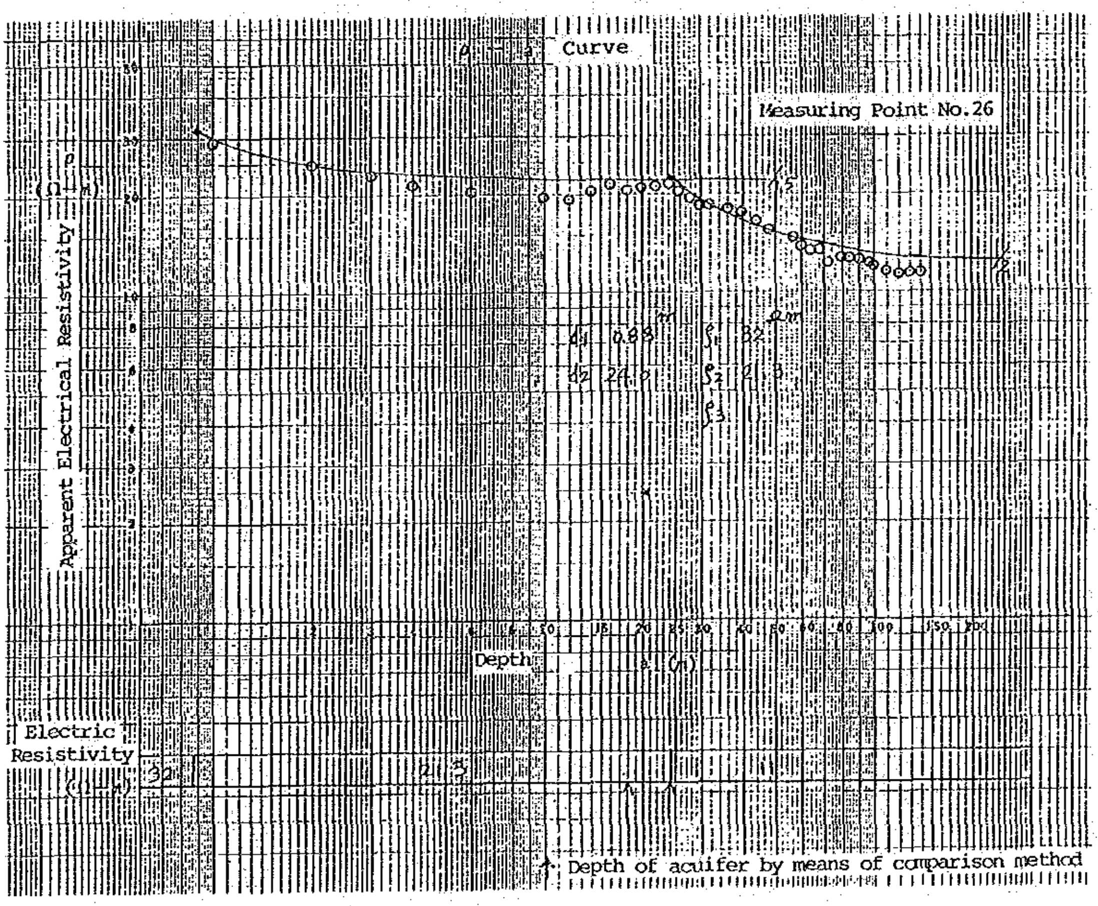


Fig.A.3.2.4-6 ρ -a Curve (13/21)