APPENDIX D

FLOW MEASUREMENT

APPNDIX D
FLOW MEASUREMENT

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APPENDIX D FLOW MEASUREMENT

1 GENERAL

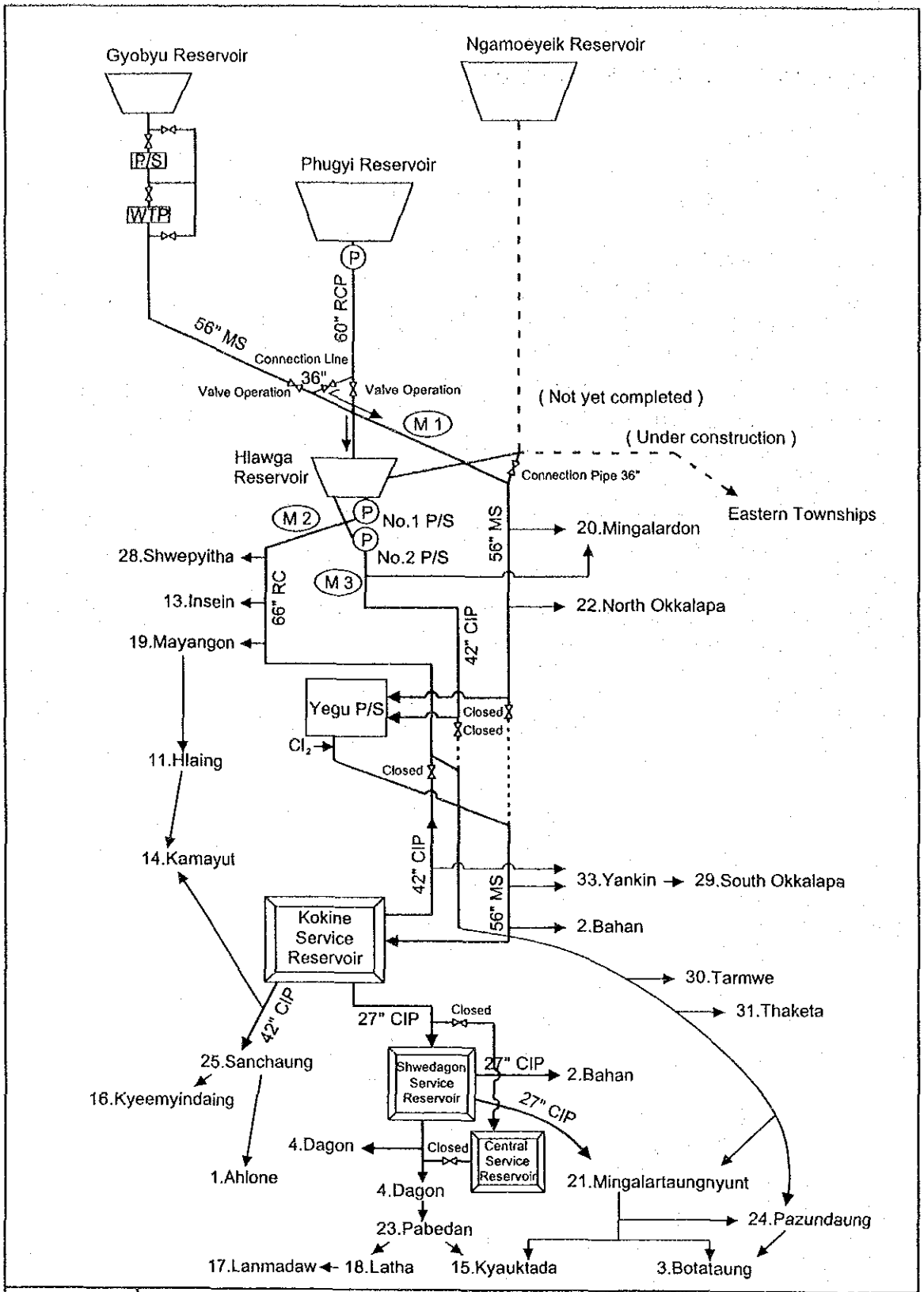
There are 3 existing reservoirs, which are currently operated in Yangon City.

- Gyobyu Reservoir (one P/S and one WTP were installed)
- Phugyi Reservoir (one P/S was constructed)
- Hlawga Reservoir (two P/S were built)

As shown in Figure D.1, Phugyi reservoir water is conveyed to Hlawga reservoir and Gyobyu reservoir water is transmitted to Yegu P/S. Hlawga reservoir water is pumped by two P/S, No.1 P/S is sending water directly to the Eastern T/S

Table D.1, D.2 and Figure D.2 are showing the water level of Gyobyu reservoir and pump operation record in 2000.

While, Table D.3, D.4, Figure D.3 and Table D.5, D.6, D.7 and Figure D.4 are showing those of Phugyi and Hlawga reservoir, respectively.



JICA	THE STUDY ON IMPROVEMENT OF WATER SUPPLY SYSTEM IN YANGON CITY IN THE UNION OF MYANMAR	FIG D-1
	Flow Measurement Location	

Table D.1 Water Level in Gyobyu Reservoir

Y, Month / Date	2000											
	January	February	March	April	May	June	July	August	September	Octorber	November	December
1	199.44	196.58	198.67	190.56	187.58	187.71	193.38	199.83	203.50	206.75	206.46	204.25
2	199.33	196.50	193.54	190.46	187.50	187.67	193.29	199.83	203.67	206.88	206.42	204.21
3	199.23	196.42	193.44	190.35	187.40	187.58	193.25	199.83	203.83	206.83	206.38	204.13
4	199.13	196.33	193.33	190.25	187.29	187.75	193.83	199.88	204.17	206.79	206.33	204.06
5	199.02	196.25	193.23	190.15	187.19	187.92	193.83	199.88	204.21	206.75	206.29	204.00
6	198.92	192.17	193.10	190.04	187.08	187.92	193.75	200.17	204.33	206.75	206.23	203.94
7	198.81	196.06	193.00	189.94	187.08	187.92	194.08	200.88	204.58	207.00	206.17	203.88
8	198.73	195.96	192.90	189.83	187.25	188.17	194.21	200.96	204.83	207.08	206.10	203.81
9	198.65	195.88	192.79	189.73	187.17	188.27	194.33	201.08	205.00	207.17	206.04	203.75
10	198.56	195.75	192.69	189.63	187.08	188.33	194.33	201.17	205.00	207.13	205.98	203.67
11	198.48	195.65	192.56	189.52	186.98	188.52	194.33	201.25	205.00	207.08	205.98	203.58
12	198.40	195.54	192.44	189.40	186.88	188.79	194.79	201.25	205.00	207.04	205.83	203.50
13	198.31	195.44	192.31	189.23	186.77	188.94	195.00	201.33	205.38	207.00	205.75	203.42
14	198.23	195.35	192.19	189.10	186.67	189.46	195.00	201.67	205.50	207.00	205.67	203.33
15	198.13	195.23	192.06	188.98	186.56	189.67	195.33	201.71	205.71	207.00	205.58	203.25
16	198.02	195.13	191.96	188.85	186.63	189.79	195.50	202.00	205.88	207.00	205.50	203.17
17	197.92	195.00	191.85	188.75	186.54	189.92	195.96	202.00	205.92	207.08	205.42	203.08
18	197.83	194.90	191.77	188.63	186.54	190.25	196.83	202.00	205.88	207.08	205.33	203.00
19	197.75	194.81	191.67	188.52	186.71	190.42	197.00	202.04	205.83	207.04	205.25	202.92
20	197.67	194.73	191.56	188.42	187.29	190.92	197.42	202.08	205.79	207.00	205.17	202.83
21	197.58	194.65	191.46	188.31	187.25	190.50	197.50	202.08	205.83	206.96	205.08	202.75
22	197.50	194.56	191.35	188.23	187.67	190.58	197.83	202.04	205.79	206.92	205.00	202.67
23	197.50	194.48	191.25	188.15	187.63	190.67	197.88	202.04	205.83	206.88	204.92	202.58
24	197.33	194.35	191.15	188.06	187.54	192.33	198.00	202.29	205.79	206.83	204.82	202.50
25	197.25	194.25	191.04	187.96	187.67	192.83	198.42	202.38	205.79	206.75	204.75	202.42
26	197.17	194.15	190.96	187.85	187.58	193.17	199.17	202.50	206.00	206.71	204.67	202.33
27	197.06	194.02	190.85	187.77	187.63	193.20	199.29	202.50	205.96	206.67	204.58	202.25
28	196.96	193.92	190.79	187.69	187.83	193.54	199.38	202.83	205.92	206.63	204.50	202.17
29	196.85	193.79	190.75	187.60	187.92	193.54	199.42	203.08	206.25	206.58	204.42	202.00
30	196.75		190.69	187.50	187.88	193.46	199.67	203.25	206.58	206.54	204.33	201.92
31	196.67		190.65		187.79		199.67	203.33		206.50		
									Annual Average Water Level (Above			197.51
											x 0.304794	60.201

Unit : Foot

Legend : Lowest Water Level; Highest Water level; Pump Operation Days

Table D.2 Pump Operation Record of Gyobyu Pumping Station

Year 2000

Month	January																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																	4		6												
No.2																	4		6												
No.3																															
Remarks																															

Month	Febrauary																												
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
No.1																				7	5	7	9	11	7	12	21	20	23
No.2																				7	5	7	9	11	7	12	10	9	7
No.3																													
Remarks																													

226

Month	March																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1	18	19	14	7	18	11	21	10	16	9	13	12	15	12	14	19	10	9	13	11	12	17	18								
No.2	11	10	18	19	14	14	10	18	11	17	14	18	15	19	14	13	10	8	18	16	10	12	11								
No.3																															
Remarks																															

Month	April																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2																														
No.3																														
Remarks																														

638

Month	May																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																18	7	19	12	12	18	17	18	14	17	5	2	6	20	6	12
No.2																12	14	7	11	17	12	17	12	15	11	2	2	9	10	24	17
No.3																															
Remarks																															

Month	June																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1	3	3			8	17	6	11	16	6	2	2	10	1	13	8	7	7	12	15										
No.2	7	13			14	11	21	15	13	20	11	10	3	7	3	11	2	9	3	13	No Operation									
No.3																														
Remarks			PF	PF																										

728

Month	July																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	No Operation																														
No.3																															
Remarks																															

Month	August																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	No Operation																														
No.3																															
Remarks																															

0

Month	September																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	No Operation																													
No.3																														
Remarks																														

Month	October																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	No Operation																														
No.3																															
Remarks																															

0

Month	November																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	No Operation																													
No.3																														
Remarks																														

Month	December																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	No Operation																														
No.3																															
Remarks																															

Note) PF : Power Failure

0

Annual Total Operation Hour

1,592

Figure D.2 Water Level Fluctuation of Gyobyu Reservoir

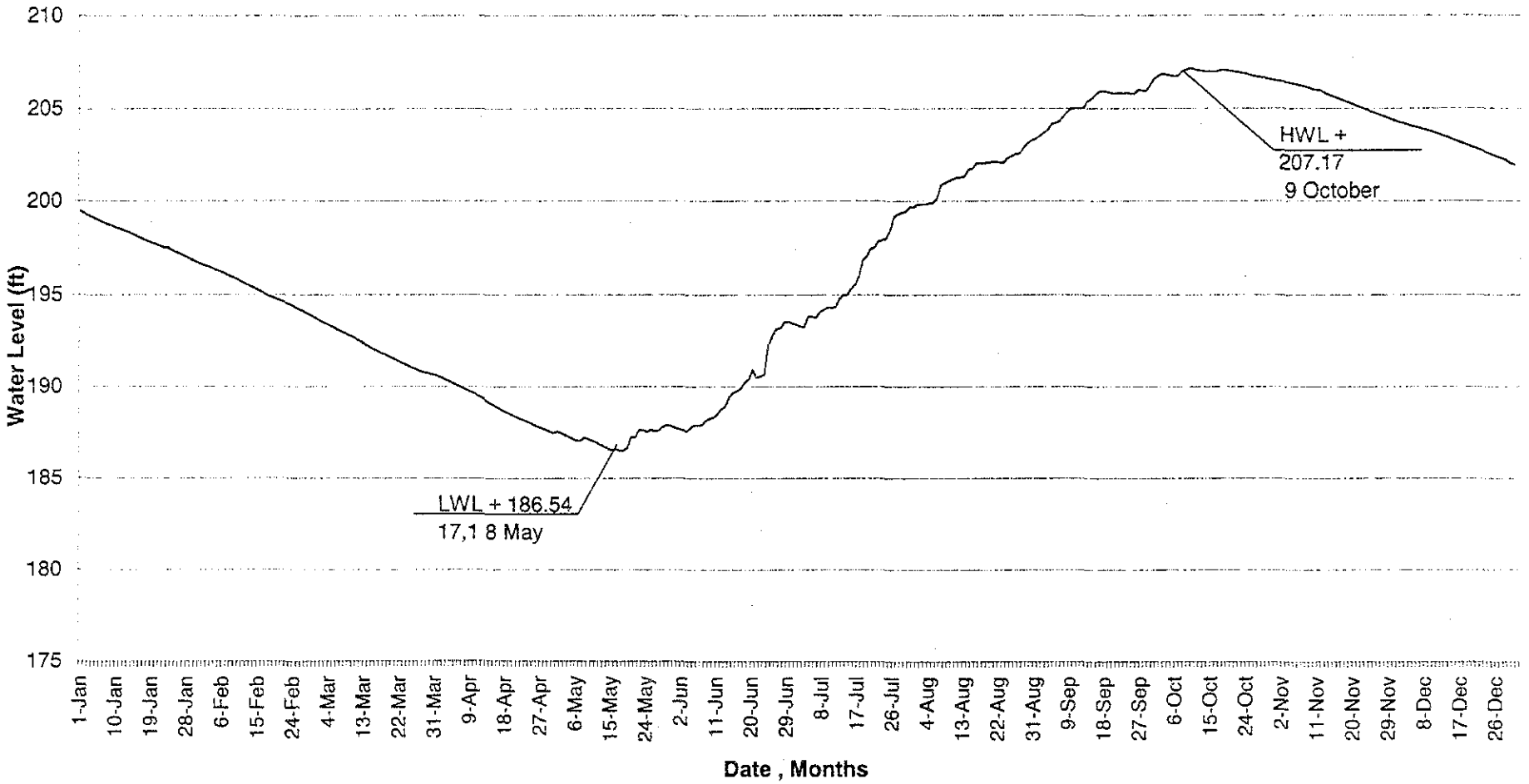


Table D.3 Water Level in Phugyi Reservoir

Y, Month / Date	2000											
	January	February	March	April	May	June	July	August	September	Octorber	November	December
1	113.67	112.10	110.46	108.83	107.23	108.08	111.75	115.54	116.33	116.00	115.83	114.50
2	113.63	112.06	110.42	108.77	107.23	108.04	111.75	115.54	116.38	116.00	115.79	114.44
3	113.58	112.00	110.38	108.71	107.21	108.02	111.75	115.50	116.33	115.92	115.77	114.40
4	113.52	111.94	110.31	108.63	107.15	108.10	112.21	115.54	116.33	115.83	115.75	114.33
5	113.46	111.88	110.27	108.56	107.10	108.19	112.21	115.54	116.38	115.79	115.75	114.31
6	113.40	111.83	110.21	108.50	107.04	108.38	112.25	115.54	116.38	115.79	115.71	114.25
7	113.33	111.77	110.15	108.44	106.98	108.42	112.29	115.75	116.38	115.88	115.67	114.23
8	113.27	111.72	110.13	108.38	106.96	108.38	112.33	115.75	116.42	115.79	115.60	114.19
9	113.21	111.65	110.08	108.31	106.98	108.40	112.33	115.75	116.38	115.75	115.54	114.17
10	113.15	111.58	110.02	108.25	106.92	108.38	112.33	115.75	116.33	115.75	115.50	114.15
11	113.08	111.52	109.96	108.19	106.85	108.50	112.58	115.75	116.33	115.75	115.46	114.10
12	113.02	111.46	109.90	108.13	106.79	108.75	112.96	115.75	116.25	115.71	115.42	114.08
13	112.96	111.40	109.83	108.06	106.79	108.92	113.00	115.71	116.17	115.67	115.38	114.06
14	112.92	111.33	109.77	108.04	106.75	109.33	113.00	115.71	116.17	115.67	115.33	114.00
15	112.85	111.27	109.71	108.02	106.73	109.42	113.04	115.73	116.17	115.63	115.29	113.94
16	112.82	111.19	109.67	107.98	106.77	109.42	113.25	115.71	116.17	115.71	115.25	113.92
17	112.75	111.19	109.63	107.92	106.75	109.75	113.50	115.83	116.08	115.71	115.19	113.85
18	112.71	111.15	109.56	107.85	106.75	110.00	113.88	115.88	116.00	115.71	115.13	113.81
19	112.65	111.08	109.50	107.83	106.79	110.08	114.00	115.88	115.96	115.71	115.06	113.77
20	112.58	111.04	109.44	107.77	107.50	110.08	114.25	116.00	115.92	115.83	115.00	113.75
21	112.54	111.00	109.38	107.73	107.50	110.06	114.25	115.92	115.83	115.83	114.94	113.69
22	112.50	110.94	109.31	107.67	107.83	110.06	114.25	115.88	115.79	115.83	114.88	113.67
23	112.48	110.88	109.27	107.60	108.00	110.75	114.71	115.83	115.79	115.83	114.83	113.60
24	112.44	110.81	109.21	107.54	108.08	111.00	114.50	115.92	115.79	115.79	114.77	113.58
25	112.42	110.75	109.15	107.50	108.08	111.58	114.58	115.83	115.75	115.79	114.71	113.54
26	112.40	110.69	109.08	107.44	108.17	111.67	115.17	115.88	115.75	115.83	115.67	113.48
27	112.35	110.63	109.08	107.38	108.17	111.67	115.33	115.88	115.71	115.92	115.63	113.46
28	112.31	110.58	109.04	107.33	108.21	111.65	115.38	115.92	115.71	115.92	115.58	113.42
29	112.25	110.52	109.00	107.29	108.17	111.63	115.38	116.04	115.69	115.92	115.54	113.40
30	112.21		108.96	107.25	108.13	111.71	115.38	116.17	115.75	115.90	115.54	113.38
31	112.17		108.90		108.10		115.50	116.29		115.88		113.33
									Annual Average Water Level (Above			112.76
	Unit : Foot										x 0.304794	34.367

Legend : Lowest Water Level Highest Water level

Table D.4 Pump Operation Record of Phygyi Pumping Station

Year 2000

January

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1			3	23	24	23	21	21	17			8	23	18	16	22	22	23	16			6	23	20	16	15	20	17	22	4	
No.2	3	13	21			16	21	21	24	20	22	15				12	22	23	23	21	18	17				4	20	19	22	24	23
No.3	3	13	24	23	24	7			7	20	22	23	23	18	16	10			7	21	16	22	23	20	16	11				20	23
Remarks	PF	PF		PF		PF	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF

February

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
No.1			18	24	24	24	24	24	17		19	13	19	23	16	23	22	19				9	20	22	22	20	21	8	
No.2	24	21	6		18	24	24	24	24	24	5					21	22	19	9	24	23	14			6	20	21	20	20
No.3	24	21	24	24	6				7	24	24	13	19	24	16	2			9	24	23	23	20	24	18			12	20
Remarks		PF										PF	PF		PF	PF	PF	PF	PF		PF	PF	PF			PF	PF	PF	PF

2,504

March

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	23	20	10	24	24	23	12	24	23	19	11	23	22	19	13	9	20	17	15	14	24	10	10	15	16	22	21	15	13	22	20
No.3	23	20	19	24	24	23	12	24	23	19	20	23	2	15	8	9	20	17	22	20	24	10	10	15	23	22	21	22	16	18	20
Remarks	PF	PF	PF			PF	PF			PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF

April

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	22	23	18	11	18	22	24	24	24	16	21	24	22	20	20	24	9	16	21	16	21	20	21	22	18	24	24	24	18	21
No.3	22	23	23	24	24	19	21	18	16	24	24	19	15	20	20	24	22	16	21	16	17	16	21	22	19	24	24	24	18	21
Remarks	PF	PF	PF			PF							PF	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF				PF	PF

2,346

May

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	18	24	18	14	19	18	9	13	16	16	16	21	23	23	19	23	19	15	24	20	23	2	23	24	10	19	24	24	21	22	16
No.3	18	24	18	14	19	18	9	13	16	15	19	19	23	23	19	13	19	15	24	20	23	2	17	24	17	19	24	24	16	14	16
Remarks	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF	PF	PF	PF		PF	PF			PF	PF	PF

June

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	22	16	14	22	24	20	19	19	15	11		9	20	23	22	24	24	19	15	22	14	17	6	24	15	1	2	20	16	7
No.3	22	16	10	14	24	20	19	23	21	15	23	19	20	19	14	24	17	23	19	16	14	13	19	18	24	6	2	20	16	12
Remarks	PF	PF	PF			PF	PF	PF	PF	PF	PF	PF	PF	PF	PF			PF	PF	PF	PF	PF	PF			PF	PF	PF	PF	PF

2,134

July

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	24	15	22	16	15	22	21	13	19	11	6	9	20	21	20	19	21	20	20	24	20	19	21	17	18	19	13	18	17	17	19
No.3	12	8	22	18	7	17	21	19	24	9	6	17	20	21	20	19	21	19	24	24	20	19	21	11	9	19	13	18	17	17	19
Remarks		PF	PF	PF	PF	PF	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF			PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF

August

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	16	7	15	19	24	24	23	21	23	24	24	14	24	24	22	17	23	24	24	21	24	16	20	24	20	20	13	21	24	1	12
No.3	16	7	15	19	24	24	23	21	23	24	24	14	24	24	22	15	23	19	24	21	24	16	20	24	20	20	13	21	24	1	12
Remarks	PF	PF	PF	PF			PF	PF	PF			PF			PF	PF	PF			PF		PF	PF		PF	PF	PF	PF		PF	PF

2,296

September

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	20	19	20	19	20	23	15	23	17	24	21	24	21	22	22	23	18	19	18	20	14	16	16	23	19	16	11	20	19	10
No.3	20	19	23	20	20	23	17	11	0*	0*	15	24	21	22	22	23	18	19	21	20	14	16	16	23	19	16	11	20	19	10
Remarks	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF

October

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	11	11	14	18	14	11	17	15	6	24	24	24	13	20	24	20	17	17	11	24	22	22	18	20	15	15	17	22	21	19	9
No.3	8	11	14	18	14	11	17	15	6	24	24	24	15	20	24	20	17	17	11	24	22	22	18	20	15	15	17	22	21	19	9
Remarks	PF	PF	PF	PF	PF	PF	PF	PF	PF				PF	PF		PF	PF	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF

2,163

November

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	22	20	24	24	24	23	20	22	22	24	14	24	18	16	14	11	21	11	24	15	3	13	15	17	17	19	7	14	6	17
No.3	22	20	24	24	24	23	23	22	22	24	14	24	18	16	14	11	21	11	24	15	3	13	15	17	17	19	7	14	6	17
Remarks	PF	PF				PF	PF	PF	PF		PF		PF	PF	PF	PF	PF	PF		PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF

December

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	17	19	19	18	16	13	16	18	19	22	21	17	15	21	24	22	24	22	22	20	24	21	20	23	24	8	22	11	18	23	21
No.3	17	19	19	18	16	13	16	18	19	22	21	17	15	21	24	22	24	22	22	20	24	21	20	23	24	8	22	11	18	23	21
Remarks	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF	PF		PF		PF	PF	PF		PF	PF	PF		PF	PF	PF	PF	PF	PF

Note) PF : Power Failure

2,245

Annual Total Operation Hour

13,688

Figure D.3 Water Level Fluctuation of Phugyi Reservoir

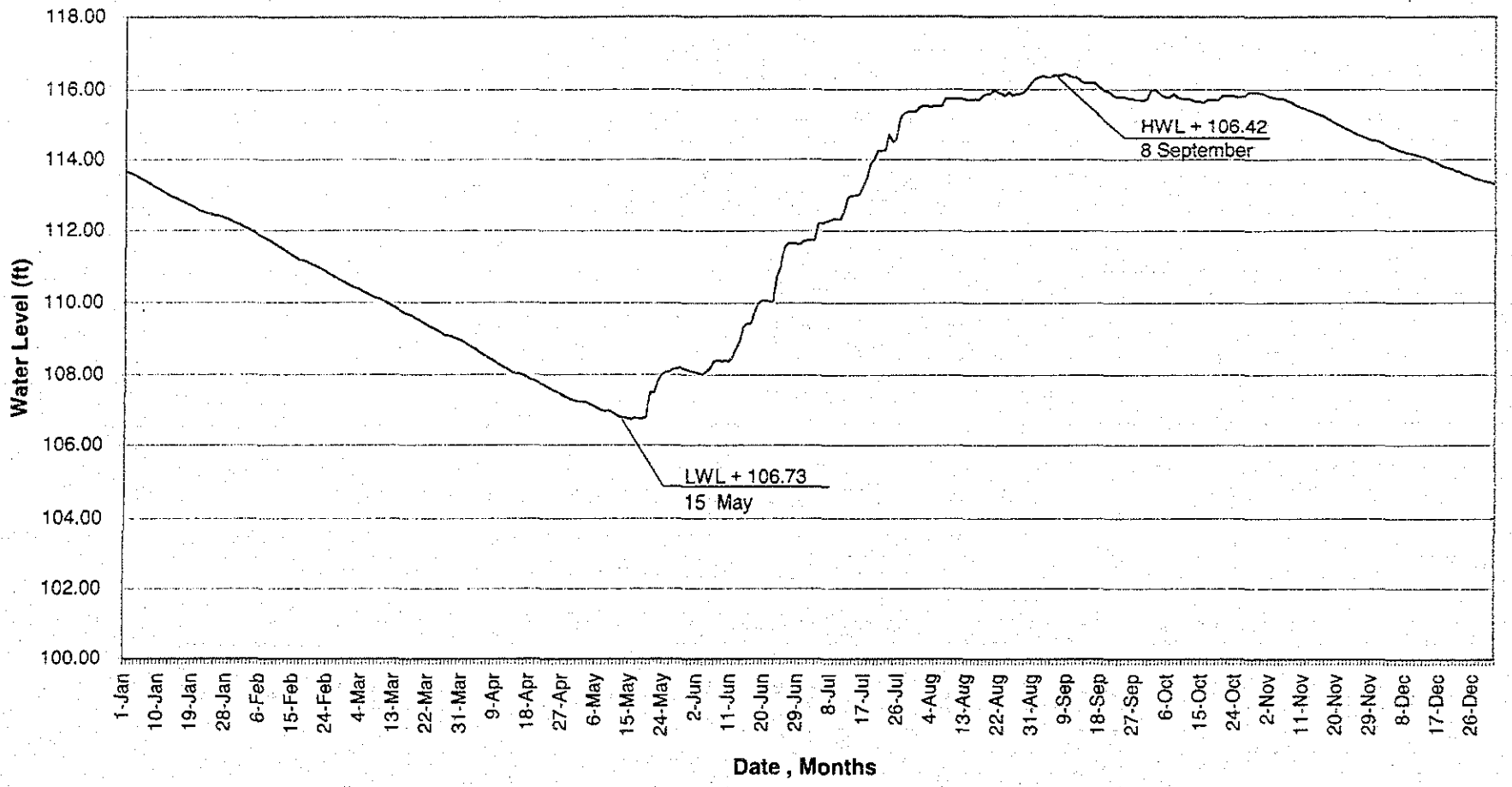


Table D.5 Water Level in Hlawga Reservoir

Y, Month / Date	2000											
	January	February	March	April	May	June	July	August	September	Octorber	November	December
1	57.96	56.67	55.62	54.15	52.58	51.96	53.08	55.25	56.83	58.58	58.42	57.33
2	57.92	56.62	55.58	54.10	52.58	51.90	53.06	55.25	57.08	58.58	58.40	57.29
3	57.87	56.58	55.54	54.06	52.54	51.83	53.08	55.29	57.21	58.58	58.37	57.25
4	57.83	56.54	55.50	54.02	52.50	51.92	53.21	55.33	57.25	58.58	58.35	57.21
5	57.79	56.50	55.46	53.98	52.46	52.04	53.21	55.33	57.25	58.58	58.33	57.17
6	57.75	56.46	55.42	53.94	52.40	52.12	53.29	55.33	57.25	58.58	58.31	57.12
7	57.71	56.42	55.37	53.90	52.31	52.21	53.42	55.42	57.46	58.71	58.27	57.08
8	57.67	56.37	55.33	53.85	52.25	52.21	53.50	55.42	57.67	58.71	58.23	57.04
9	57.62	56.33	55.29	53.81	52.17	52.19	53.54	55.42	57.75	58.71	58.19	57.00
10	57.58	56.29	55.25	53.77	52.08	52.15	53.62	55.50	57.83	58.69	58.17	56.96
11	57.54	56.25	55.21	53.73	52.00	52.25	53.75	55.50	57.83	58.67	58.15	56.96
12	57.50	56.21	55.15	53.69	51.94	52.33	54.00	55.50	57.83	58.65	58.12	56.92
13	57.46	56.17	55.10	53.62	51.90	52.42	54.17	55.50	57.92	58.62	58.08	56.87
14	57.42	56.12	55.06	53.54	51.85	52.42	54.17	55.58	57.92	58.60	58.04	56.83
15	57.37	56.08	55.02	53.48	51.81	52.50	54.25	55.58	58.00	58.58	58.00	56.79
16	57.33	56.04	54.98	53.42	51.87	52.50	54.42	55.67	58.00	58.58	57.96	56.75
17	57.29	56.00	54.92	53.37	51.83	52.50	54.54	55.67	58.00	58.62	57.92	56.71
18	57.25	55.96	54.85	53.33	51.96	52.54	54.54	55.67	58.00	58.62	57.87	56.67
19	57.21	55.92	54.79	53.31	51.96	52.58	54.54	55.75	58.00	58.62	57.83	56.62
20	57.17	55.87	54.73	53.27	52.08	52.58	54.58	55.75	58.00	58.62	57.79	56.58
21	57.12	55.83	54.69	53.21	52.04	52.58	54.83	55.83	58.00	58.60	57.75	56.54
22	57.08	55.79	54.65	53.15	52.25	52.67	55.00	55.83	58.08	58.58	57.71	56.50
23	57.04	55.75	54.58	53.08	52.29	52.71	55.08	55.83	58.08	58.56	57.67	56.46
24	57.00	55.71	54.52	53.00	52.29	52.79	55.17	55.87	58.08	58.54	57.62	56.42
25	56.96	55.67	54.46	52.92	52.25	52.87	55.17	56.08	58.08	58.52	57.58	56.37
26	56.92	55.62	54.40	52.83	52.21	52.92	55.25	56.08	58.17	58.50	57.54	56.33
27	56.87	55.62	54.35	52.75	52.15	53.00	55.25	56.17	58.17	58.50	57.50	56.29
28	56.83	55.65	54.31	52.71	52.08	53.04	55.29	56.33	58.17	58.50	57.46	56.25
29	56.79	55.65	54.27	52.67	52.04	53.08	55.29	56.42	58.17	58.48	57.42	56.21
30	56.75		54.23	52.62	52.04	53.08	55.29	56.58	58.42	58.46	57.37	56.17
31	56.71		54.19		51.96		55.27	56.75		58.44		56.12
									Annual Average Water Level (Above			55.78

Unit : Foot x 0.304794 17.001

Legend : Lowest Water Level Highest Water level

Table D.6 Pump Operation Record of Hlawga No.1 Pumping Station

Year 2000

Month	January																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2																															
No.3																															
No.4	8	8	8	8	8	8	8	8	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Remarks									PF																						

Month	February																												
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
No.1																													
No.2																													
No.3																													
No.4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Remarks						PF																							

475

Month	March																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2																															
No.3																															
No.4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	3	8	8	8	8	8	8	8	8	8	8	8
Remarks																				PF											

Month	April																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
No.1																															
No.2																															
No.3																															
No.4	8	8	8	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
Remarks			PF																												

481

Month	May																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2																															
No.3																															
No.4	8	8	8	8	8	8	8	8	12	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Remarks																															

Month	June																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
No.1																															
No.2																															
No.3																															
No.4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
Remarks															PF																

490

Month	July																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2																															
No.3																															
No.4	8	8	8	8	8	5	5	8	8	8	8	8	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	5	8	
Remarks						PF							PF																PF		

Month	August																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2																															
No.3																															
No.4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Remarks																															

485

Month	September																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
No.1																									4	8	8	12	16	10	
No.2																									3	11	8	8	12	16	10	
No.3																															
No.4	5	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	16	14	16	14	12	8	14
Remarks																															

Month	October																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1	14	10	14	10	14	10	14	10	14	10	14	10	14	10	8	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10	14
No.2	14	10	14	10	14	10	14	10	14	10	14	10	14	10	8	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10	14
No.3																															
No.4	10	14	10	14	10	14	10	14	10	14	10	14	10	14	16	14	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10
Remarks																															

1,513

Month	November																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
No.1	10	14	10	14	10	14	10	14	10	14	10	14	15	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10	
No.2	10	14	10	14	10	14	10	14	10	14	10	14	15	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10	
No.3																															
No.4	14	10	14	10	14	10	14	10	14	10	14	10	9	14	10	14	10	14	10	14	10	14	10	14	10	14	10	14	10	14	
Remarks		PF																													

Month	December																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1	14	10	14	10	14	10	14	10	14	10	14	4	14	10	14	10	14	10	14	10	14	12	12	12	12	12	12	12	12	12	12
No.2	14	10	14	10	14	10	14	10	14	10	14	4	14	10	14	10	14	10	14	10	14	12	12	12	12	12	12	12	12	12	12
No.3																															
No.4	10	14	10	14	10	14	10	14	10	14	10	12	10	14	10	14	10	14	10	14	10	11	12	12	12	12	12	12	12	12	12
Remarks												PF										PF									

2,184

Note) PF : Power Failure

Annual Total Operation Hour

5,628

Table D.7 Pump Operation Record of Hlawga No.2 Pumping Station

Year 2000

Month	January																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	24	23	22	24	24	8	8	8	24	24	24	10	24	24	24	8	24	9	24	6	24	9	24	24	8	24	9	24	8	22	9
No.3	8	8	10	8	21	24	24	24	8	8	8	24	8	8	8	24	8	24	9	24	8	24	9	9	24	7	24	8	24	8	24
No.4																															
Remarks		PF	PF																											PF	

Month	February																												
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
No.1																													
No.2	24	8	24	9	24	9	8	22	5	24	5	23	24	5	24	5	24	8	24	5	24	5	23	5	24	5		8	24
No.3	8	24	9	24	9	24	24	4	23	8	24	5	5	24	5	24	5	24	5	24	5	24	5	24	5	13			
No.4																													
Remarks							PF	PF	PF			PF											PF						

1,808

Month	March																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	24	24	6	24	6	24	7	24	6	24	7	24	7	24	7	24	7	24	6	19	24	24	24	24	24	7	24	24	6	24	6
No.3																															
No.4	11	7	24	6	24	24	24	6	24	6	24	7	24	7	24	7	24	6	24		6	7	7	6	7	24	6	7	24	7	24
Remarks																				PF											

Month	April																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																										24				
No.2	24	24	24	7	24	7	24	7	9	24	7	24	23	24	24	12	7	18	6	24	16	20	20	24	24		15	24	13	24
No.3																										24				
No.4	6	11	7	24	7	24	7	24	21	6	24	16	24	24	19	12	24	11	24	6	22	13	20	17	24		24	14	24	14
Remarks									PF							PF					PF	PF	PF							

2,021

Month	May																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	17	24	14	24	24	24	24	24	24	14	24	13	24	24	24	24	16	24	24	24	24	13	24	16	13	24	24	16	24	24	9
No.3																															
No.4	24	14	24	13	24	24	21	15	14	24	11	24	12	13	24	12	24	11	24	24	10	24	13	24	24	21	24	24	6	6	24
Remarks																															

Month	June																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	24	19	24	24	24	24	24	23	24	5		24	12	21	24	24	21	14		20	3	21	3	21	3	15	24	6		18
No.3																														
No.4	22	24	24	24	8	12	13	24	8	24	24		22	18	24	7	23	24	24	3	20	2	21	3	21	9		18	24	6
Remarks																														

2,186

Month	July																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	2	21	21	4	22	24	24	3	23	24	2	22	3	22	2	21	2	22	2	19	2	22	24	24	7	11	24		22	2	22
No.3																															
No.4	22	3		20	2			21			22	2	21	2	21	3	22	2	22	5	22	23			17	13		24	2	20	2
Remarks			PF						PF						PF															PF	

Month	August																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2	11	24	24	2	22	2	22	2	22	2	22	2	22	2	22	3	22	2	22	3		22		22	24	2	21	14	24	2	20
No.3																															
No.4	12			22	2	22	2	22	2	22	2	22	2	22	2	21	2	22	2	21	24	2	24	2		22	7			22	4
Remarks	PF																											PF			

1,495

Month	September																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1																														
No.2	23	24	4	22	3	22	24	19	3	22	2	22	2	22	2	22	3	22	2	22	1	22	2	22	24	2	24		17	
No.3																														
No.4			20	2	21	2			21	2	22	2	22	2	19	2	21	2	22	2	23	2	22	1		22		24	6	12
Remarks	PF							PF							PF									PF					PF	PF

Month	October																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1		3			11	24	3						1												2						
No.2																															
No.3																															
No.4	24	21	24	24	13	12	21	24	24	24	15	24	23	24	24	24	24	24	24	21	24	24	24	24	22	24	24	24	24	24	24
Remarks											PF									PF									PF		

1,441

Month	November																													
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No.1		12	24	24	6			23	24	24	6		18	24	24	23	8			22	24	24	2			22	3			
No.2																														
No.3																														
No.4	24	7			18	24	24	1			18	24	6				16	24	24	2			22	24	20	2	21	24	24	24
Remarks		PF														PF									PF					

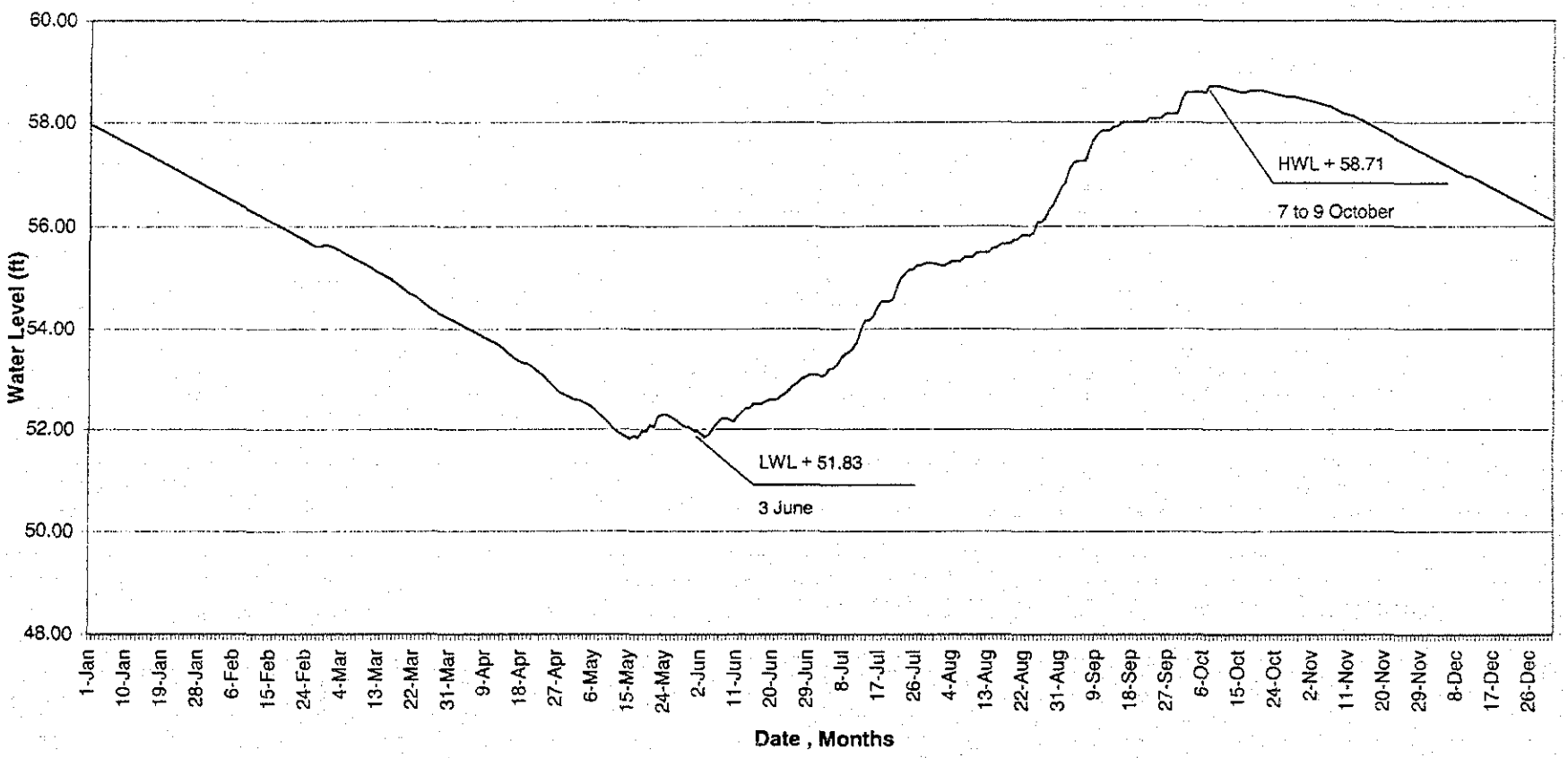
Month	December																														
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No.1																															
No.2												16	24	24	24	5	16	24	16			23	24	24	6						24
No.3																															
No.4	24	24	24	24	16	24	24	24	24	12	24	8				19	8		8	22	22	6			18	24	24	24	24	16	
Remarks										PF										PF	PF									PF	

Note) PF : Power Failure

1,427

Annual Total Operation Hour
10,378

Figure D.4 Water Lavel Fluctuation of Hlawga Reservoir



2 FLOW MEASUREMENT

2.1 Results of Flow Measurement

On August 22 2001, flow measurement using ultrasonic flow meter and propeller-type flow meter was conducted in three points;

- Gyobyu-Phugyi transmission pipe inter-connection point
- Hlawga No.1 transmission pipe
- Hlawga No.2 transmission pipe

Measurement sites are shown in Figure D.1.
Results are shown in Table D.8 and total flow was 350,800 m^3/day. Since these three transmission pipes, namely Gyobyu and Hlawga No.1 and No.2 transmission pipes are conveying water to the City Area, the total flow amount of these pipes can be called as **"Net Production Amount"**.

2.1 Estimation of Annual Production Amount

1) Gyobyu P/S
In case of Gyobyu P/S, pump was not operated at the day of flow measurement and velocity coefficient of pipe was estimated using Hazen-Williams Formula;

Parameter	C	D	Q	L	H_1	H_2
Dimension	None	M	m^3/sec	M	m	m
Case 1	88	1.4	1.404	22,357	21.93	21.93

where;
C: Velocity Coefficient
D: Pipe Diameter = 1.4 m (56 inch)
Q: Flow = 1.404 m^3/sec = 121,330 m^3/day (result of flow measurement)
L: Pipe Length = 22,357 m (from Gyobyu reservoir to the inter-connection)
H_1: Calculated Head Loss
H_2: Natural Head = 62.77 (Gyobyu Reservoir water level) - 19.44 (Pipe invert level at interconnection point) – 1.4 (pipe diameter) - 20.00 (remaining water head) = 62.77 – 40.84 = 21.93 m

Thus, C-value of Gyobyu Pipe was estimated at 88.
As aforementioned, Gyobyu P/S is seldom operated and therefore, gravity flow is the major

flow from Gyobyu Reservoir throughout a year. Gravity flow from Gyobyu Reservoir was calculated based on the above conditions and reservoir water level in 2000.
Table D.8 is showing the daily water level in 2000 and relation between water level indicated in inch and H_2 is as follows;

H_2 (m) = Water Lavel (inch) x 0.304794 (m/inch) – 40.84 (m)

where; 40.84 : natural water head loss, calculated above

Table D.9 tabulated the calculated gravity flow according to the available water head shown in Table D.9;

Table D.8 24 Hour Flow Measurement for Production Sources

Test Date 2001/8/22

Sites / Time	Gyoubyu 56"	Hlawga No.2 42"		Hlawga No.1 66"			Net Production
	M1	M2		M3			M1+M2+M3
	Ultra-sonic	Probeflo	Operated Pump	Probeflo	Operated Pump		
	(m^3/hr)	(m^3/hr)	No.4	(m^3/hr)	No.1	No.4	(m^3/hr)
13:00	5,200	1,674	OFF	8,262	ON	ON	15,136
14:00	3,320	1,600	OFF	10,376	ON	ON	15,296
15:00	5,160	1,600	OFF	9,223	ON	ON	15,983
16:00	5,200	1,600	OFF	9,127	ON	ON	15,927
17:00	5,130	1,600	OFF	9,031	ON	ON	15,761
18:00	5,240	1,600	OFF	9,127	ON	ON	15,967
19:00	5,260	1,600	OFF	9,223	ON	ON	16,083
20:00	5,230	1,600	OFF	8,647	ON	ON	15,477
21:00	5,210	1,600	OFF	9,127	ON	ON	15,937
22:00	5,170	1,600	OFF	5,957	ON	ON	12,727
23:00	5,120	1,600	OFF	6,725	ON	OFF	13,445
0:00	5,090	1,600	OFF	7,206	ON	OFF	13,896
1:00	5,080	1,600	OFF	7,109	ON	OFF	13,789
2:00	5,070	1,600	OFF	7,206	ON	OFF	13,876
3:00	5,070	1,600	OFF	7,013	ON	OFF	13,683
4:00	5,060	1,600	OFF	7,109	ON	OFF	13,769
5:00	5,060	1,600	OFF	7,206	ON	OFF	13,866
6:00	5,070	2,246	ON	7,206	ON	OFF	14,521
7:00	5,060	2,246	ON	7,206	ON	OFF	14,511
8:00	5,050	2,246	ON	7,109	ON	OFF	14,405
9:00	5,070	2,009	ON	7,013	ON	OFF	14,092
10:00	5,110	2,009	ON	7,109	ON	OFF	14,228
11:00	5,130	2,009	ON	7,013	ON	OFF	14,152
12:00	5,170	2,009	ON	7,109	ON	OFF	14,288
Average	5,055	1,752		7,810			14,617

TOTALS By Source	Gyoubyu 56"	HlawgaNo.2 42"		Hlawga No.1 66"			Net production
	121,330	42,047		187,439			350,816
Remarks	Gravity Flow	Pump No.4 was operated		Pump No.1 & 4 was operated			

Table D.9 Water Level in Gyobyu Reservoir and Allowable Head Loss

Y, Month / Date	2000																							
	January	H_2	February	H_2	March	H_2	April	H_2	May	H_2	June	H_2	July	H_2	August	H_2	September	H_2	October	H_2	November	H_2	December	H_2
1	199.44	19.95	196.58	19.08	193.67	18.19	190.56	17.24	187.58	16.33	187.71	16.37	193.38	18.10	199.83	20.07	203.50	21.19	206.75	22.18	206.46	22.09	204.25	21.41
2	199.33	19.91	196.50	19.05	193.54	18.15	190.46	17.21	187.50	16.31	187.67	16.36	193.29	18.07	199.83	20.07	203.67	21.24	206.88	22.22	206.42	22.08	204.21	21.40
3	199.23	19.88	196.42	19.03	193.44	18.12	190.35	17.18	187.40	16.28	187.58	16.33	193.25	18.06	199.83	20.07	203.83	21.29	206.83	22.20	206.38	22.06	204.13	21.38
4	199.13	19.85	196.33	19.00	193.33	18.09	190.25	17.15	187.29	16.24	187.75	16.39	193.83	18.24	199.88	20.08	204.17	21.39	206.79	22.19	206.33	22.05	204.06	21.36
5	199.02	19.82	196.25	18.98	193.23	18.06	190.15	17.12	187.19	16.21	187.92	16.44	193.83	18.24	199.88	20.08	204.21	21.40	206.75	22.18	206.29	22.04	204.00	21.34
6	198.92	19.79	196.17	18.95	193.10	18.02	190.04	17.08	187.08	16.18	187.92	16.44	193.75	18.21	200.17	20.17	204.33	21.44	206.75	22.18	206.23	22.02	203.94	21.32
7	198.81	19.76	196.06	18.92	193.00	17.99	189.94	17.05	187.08	16.18	187.92	16.44	194.08	18.31	200.88	20.39	204.58	21.51	207.00	22.25	206.17	22.00	203.88	21.30
8	198.73	19.73	195.96	18.89	192.90	17.95	189.83	17.02	187.25	16.23	188.17	16.51	194.21	18.35	200.96	20.41	204.83	21.59	207.08	22.28	206.10	21.98	203.81	21.28
9	198.65	19.71	195.88	18.86	192.79	17.92	189.73	16.99	187.17	16.21	188.27	16.54	194.33	18.39	201.08	20.45	205.00	21.64	207.17	22.30	206.04	21.96	203.75	21.26
10	198.56	19.68	195.75	18.82	192.69	17.89	189.63	16.96	187.08	16.18	188.33	16.56	194.33	18.39	201.17	20.48	205.00	21.64	207.13	22.29	205.98	21.94	203.67	21.24
11	198.48	19.66	195.65	18.79	192.56	17.85	189.52	16.92	186.98	16.15	188.52	16.62	194.33	18.39	201.25	20.50	205.00	21.64	207.08	22.28	205.98	21.94	203.58	21.21
12	198.40	19.63	195.54	18.76	192.44	17.81	189.40	16.89	186.88	16.12	188.79	16.70	194.79	18.53	201.25	20.50	205.00	21.64	207.04	22.26	205.83	21.90	203.50	21.19
13	198.31	19.60	195.44	18.73	192.31	17.77	189.23	16.84	186.77	16.09	188.94	16.75	195.00	18.59	201.33	20.52	205.38	21.76	207.00	22.25	205.75	21.87	203.42	21.16
14	198.23	19.58	195.35	18.70	192.19	17.74	189.10	16.80	186.67	16.06	189.46	16.91	195.00	18.59	201.67	20.63	205.50	21.80	207.00	22.25	205.67	21.85	203.33	21.13
15	198.13	19.55	195.23	18.66	192.06	17.70	188.98	16.76	186.56	16.02	189.67	16.97	195.33	18.70	201.71	20.64	205.71	21.86	207.00	22.25	205.58	21.82	203.25	21.11
16	198.02	19.52	195.13	18.63	191.96	17.67	188.85	16.72	186.63	16.04	189.79	17.01	195.50	18.75	202.00	20.73	205.88	21.91	207.00	22.25	205.50	21.80	203.17	21.08
17	197.92	19.48	195.00	18.59	191.85	17.63	188.75	16.69	186.54	16.02	189.92	17.05	195.96	18.89	202.00	20.73	205.92	21.92	207.08	22.28	205.42	21.77	203.08	21.06
18	197.83	19.46	194.90	18.56	191.77	17.61	188.63	16.65	186.54	16.02	190.25	17.15	196.83	19.15	202.00	20.73	205.88	21.91	207.08	22.28	205.33	21.74	203.00	21.03
19	197.75	19.43	194.81	18.54	191.67	17.58	188.52	16.62	186.71	16.07	190.42	17.20	197.00	19.20	202.04	20.74	205.83	21.90	207.04	22.26	205.25	21.72	202.92	21.01
20	197.67	19.41	194.73	18.51	191.56	17.55	188.42	16.59	187.29	16.24	190.92	17.35	197.42	19.33	202.08	20.75	205.79	21.88	207.00	22.25	205.17	21.69	202.83	20.98
21	197.58	19.38	194.65	18.49	191.46	17.52	188.31	16.56	187.25	16.23	190.50	17.22	197.50	19.36	202.08	20.75	205.83	21.90	206.96	22.24	205.08	21.67	202.75	20.96
22	197.50	19.36	194.56	18.46	191.35	17.48	188.23	16.53	187.67	16.36	190.58	17.25	197.83	19.46	202.04	20.74	205.79	21.88	206.92	22.23	205.00	21.64	202.67	20.93
23	197.50	19.36	194.48	18.44	191.25	17.45	188.15	16.51	187.63	16.35	190.67	17.28	197.88	19.47	202.04	20.74	205.83	21.90	206.88	22.22	204.92	21.62	202.58	20.91
24	197.33	19.31	194.35	18.40	191.15	17.42	188.06	16.48	187.54	16.32	192.33	17.78	198.00	19.51	202.29	20.82	205.79	21.88	206.83	22.20	204.82	21.59	202.50	20.88
25	197.25	19.28	194.25	18.37	191.04	17.39	187.96	16.45	187.67	16.36	192.83	17.93	198.42	19.64	202.38	20.84	205.79	21.88	206.75	22.18	204.75	21.57	202.42	20.86
26	197.17	19.26	194.15	18.34	190.96	17.36	187.85	16.42	187.58	16.33	193.17	18.04	199.17	19.87	202.50	20.88	206.00	21.95	206.71	22.16	204.67	21.54	202.33	20.83
27	197.06	19.22	194.02	18.30	190.85	17.33	187.77	16.39	187.63	16.35	193.20	18.05	199.29	19.90	202.50	20.88	205.96	21.94	206.67	22.15	204.58	21.51	202.25	20.80
28	196.96	19.19	193.92	18.27	190.79	17.31	187.69	16.37	187.83	16.41	193.54	18.15	199.38	19.93	202.83	20.98	205.92	21.92	206.63	22.14	204.50	21.49	202.17	20.78
29	196.85	19.16	193.79	18.23	190.75	17.30	187.60	16.34	187.92	16.44	193.54	18.15	199.42	19.94	203.08	21.06	206.25	22.02	206.58	22.12	204.42	21.47	202.08	20.75
30	196.75	19.13			190.69	17.28	187.50	16.31	187.88	16.42	193.46	18.13	199.67	20.02	203.25	21.11	206.58	22.12	206.54	22.11	204.33	21.44	202.00	20.73
31	196.67	19.10			190.65	17.27			187.79	16.40			199.67	20.02	203.33	21.13			206.50	22.10			201.92	20.70

Unit$_1$: Foot Unit$_2$: m

Table D.10 Water Level and calculated Gravity Flow Rate from Gyobyu Reservoir

Month / Date	January		February		March		April		May		June		July		August		September		October		November		December	
	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q	H_1	Q
1	19.95	115,258	19.08	112,493	18.19	109,642	17.24	106,531	16.33	103,421	16.37	103,594	18.10	109,382	20.07	115,603	21.19	119,059	22.18	121,997	22.09	121,738	21.41	119,750
2	19.91	115,171	19.05	112,406	18.15	109,469	17.21	106,445	16.31	103,334	16.36	103,507	18.07	109,210	20.07	115,603	21.24	119,232	22.22	122,170	22.08	121,738	21.40	119,664
3	19.88	114,998	19.03	112,320	18.12	109,382	17.18	106,272	16.28	103,248	16.33	103,421	18.06	109,210	20.07	115,603	21.29	119,405	22.20	122,083	22.06	121,651	21.38	119,664
4	19.85	114,912	19.00	112,234	18.09	109,296	17.15	106,186	16.24	103,162	16.39	103,594	18.24	109,814	20.08	115,690	21.39	119,664	22.19	122,083	22.05	121,651	21.36	119,578
5	19.82	114,826	18.98	112,147	18.06	109,210	17.12	106,099	16.21	102,989	16.44	103,766	18.24	109,814	20.08	115,690	21.40	119,664	22.18	122,083	22.04	121,651	21.34	119,491
6	19.79	114,739	18.95	112,061	18.02	109,123	17.08	106,013	16.18	102,902	16.44	103,766	18.21	109,728	20.17	115,949	21.44	119,837	22.18	122,083	22.02	121,565	21.32	119,491
7	19.76	114,653	18.92	111,974	17.99	108,950	17.05	105,840	16.18	102,902	16.44	103,766	18.31	110,074	20.39	116,640	21.51	120,010	22.25	122,256	22.00	121,565	21.30	119,405
8	19.73	114,566	18.89	111,888	17.95	108,864	17.02	105,754	16.23	103,075	16.51	104,026	18.35	110,160	20.41	116,640	21.59	120,269	22.28	122,342	21.98	121,478	21.28	119,318
9	19.71	114,480	18.86	111,802	17.92	108,778	16.99	105,667	16.21	102,989	16.54	104,112	18.39	110,333	20.45	116,813	21.64	120,442	22.30	122,429	21.96	121,392	21.26	119,318
10	19.68	114,394	18.82	111,715	17.89	108,691	16.96	105,581	16.18	102,902	16.56	104,198	18.39	110,333	20.48	116,899	21.64	120,442	22.29	122,429	21.94	121,306	21.24	119,232
11	19.66	114,307	18.79	111,542	17.85	108,518	16.92	105,408	16.15	102,816	16.62	104,458	18.39	110,333	20.50	116,968	21.64	120,442	22.28	122,542	21.94	121,306	21.21	119,146
12	19.63	114,221	18.76	111,456	17.81	108,432	16.89	105,322	16.12	102,730	16.70	104,717	18.53	110,765	20.50	116,968	21.64	120,442	22.26	122,256	21.90	121,219	21.19	119,059
13	19.60	114,134	18.73	111,370	17.77	108,259	16.84	105,149	16.09	102,643	16.75	104,890	18.59	110,938	20.52	116,968	21.76	120,787	22.25	122,256	21.87	121,133	21.16	118,973
14	19.58	114,048	18.70	111,283	17.74	108,173	16.80	105,062	16.06	102,470	16.91	105,408	18.59	110,938	20.63	117,331	21.80	120,874	22.25	122,256	21.85	121,046	21.13	118,886
15	19.55	113,962	18.66	111,197	17.70	108,000	16.76	104,890	16.02	102,384	16.97	105,581	18.70	111,283	20.64	117,418	21.85	121,046	22.25	122,256	21.82	120,960	21.11	118,800
16	19.52	113,875	18.63	111,024	17.67	107,914	16.72	104,803	16.04	102,470	17.01	105,754	18.75	111,456	20.73	117,677	21.91	121,219	22.25	122,256	21.80	120,874	21.08	118,714
17	19.48	113,789	18.59	110,938	17.63	107,827	16.69	104,630	16.02	102,384	17.05	105,840	18.89	111,888	20.73	117,677	21.92	121,306	22.28	122,342	21.77	120,787	21.06	118,714
18	19.46	113,702	18.56	110,851	17.61	107,741	16.65	104,544	16.02	102,384	17.15	106,186	19.15	112,752	20.73	117,677	21.91	121,219	22.28	122,342	21.74	120,701	21.03	118,541
19	19.43	113,616	18.54	110,765	17.58	107,654	16.62	104,458	16.07	102,557	17.20	106,358	19.20	112,925	20.74	117,677	21.90	121,219	22.26	122,256	21.72	120,701	21.01	118,541
20	19.41	113,530	18.51	110,678	17.55	107,568	16.59	104,285	16.24	103,162	17.35	106,877	19.33	113,270	20.75	117,763	21.88	121,133	22.25	122,256	21.69	120,614	20.98	118,454
21	19.38	113,443	18.49	110,592	17.52	107,482	16.56	104,198	16.23	103,075	17.22	106,445	19.36	113,357	20.75	117,763	21.90	121,219	22.24	122,256	21.67	120,528	20.96	118,368
22	19.36	113,357	18.46	110,506	17.48	107,309	16.53	104,112	16.36	103,507	17.25	106,531	19.46	113,702	20.74	117,677	21.88	121,133	22.23	122,170	21.64	120,442	20.93	118,282
23	19.36	113,357	18.44	110,419	17.45	107,222	16.51	104,026	16.35	103,507	17.28	106,618	19.47	113,702	20.74	117,677	21.90	121,219	22.22	122,170	21.62	120,355	20.91	118,195
24	19.31	113,270	18.40	110,333	17.42	107,136	16.48	103,939	16.32	103,421	17.78	108,259	19.51	113,875	20.82	117,936	21.88	121,133	22.20	122,083	21.59	120,269	20.88	118,109
25	19.28	113,184	18.37	110,246	17.39	107,050	16.45	103,853	16.36	103,507	17.93	108,778	19.64	114,307	20.84	118,022	21.88	121,133	22.18	122,083	21.57	120,182	20.86	118,022
26	19.26	113,098	18.34	110,160	17.36	106,877	16.42	103,766	16.33	103,421	18.04	109,123	19.87	114,998	20.88	118,109	21.95	121,392	22.16	121,997	21.54	120,096	20.83	117,936
27	19.22	112,925	18.30	109,987	17.33	106,790	16.39	103,680	16.35	103,507	18.05	109,210	19.90	115,085	20.88	118,109	21.94	121,306	22.15	121,910	21.51	120,010	20.80	117,850
28	19.19	112,838	18.27	109,987	17.31	106,704	16.37	103,594	16.41	103,680	18.15	109,469	19.93	115,171	20.98	118,454	21.92	121,306	22.14	121,910	21.49	120,010	20.78	117,850
29	19.16	112,752	18.23	109,728	17.30	106,704	16.34	103,507	16.44	103,766	18.15	109,469	19.94	115,258	21.06	118,714	22.02	121,565	22.12	121,824	21.47	119,923	20.75	117,763
30	19.13	112,666			17.28	106,618	16.31	103,334	16.42	103,766	18.13	109,469	20.02	115,430	21.11	118,800	22.12	121,824	22.11	121,824	21.44	119,837	20.73	117,677
31	19.10	112,579			17.27	106,618			16.40	103,680			20.02	115,430	21.13	118,886			22.10	121,824			20.70	117,590

$Unit_1$: m $Unit_2$: m^3/day

2) Hlawga No.1 Pumping Station

As shown in Table D.8, No.1 and No.4 pump were operated on the day of flow measurement. No.1 pump was operated 24 hours, while No.4 was operated only from 13:00 to 22:00. Therefore, two pump were operated from 13:00 to 22:00 and one pump was operated from 23:00 until 12:00 in the following day. Average discharge during "two pump operation period" and "one pump operation period" was compared;

Items	Average Discharge (m^3/hr)	Nominal Pump Discharge (m^3/hr)	Ratio
Two Pump Operation	8,810	4,980	1.77
One Pump Operation	7,096	4,980	1.42

Table D-11 shows the detail of discharge ratio.
Even in case of "one pump operation", average discharge is exceeding the nominal pump discharge but it is due to the natural water head of Hlawga Reservoir. Water level of reservoir on the measurement day was +56.08 inch (+17.09 m), while pump installation elevation was +35.08 inch (+10.69 m) above mean sea level.
In case of "two pump operation", total discharge was suppressed by pipe friction.
Pumped flow was estimated at Table D.12 based on the operation record using these ratios. "a" is "two pump operation" hours, so the daily discharge was calculated as follows;

$$Q\ (m^3/day) = 4{,}980 \times \{1.77a + 1.42(24-a)\}$$

Table D.11 Discharge Ratio by Pump Operation

Sites / Time	Hlawga No.1 66" M3 Probeflo (m^3/hr)	Operated Pump No.1	Operated Pump No.4	Pump Opetation Status	Hourly Average Discharge (m^3/hr)	Discharge Ratio
13:00	8,262	ON	ON	Two Pump Operation		
14:00	10,376	ON	ON	ditto		
15:00	9,223	ON	ON	ditto		
16:00	9,127	ON	ON	ditto		
17:00	9,031	ON	ON	ditto		
18:00	9,127	ON	ON	ditto		
19:00	9,223	ON	ON	ditto		
20:00	8,647	ON	ON	ditto		
21:00	9,127	ON	ON	ditto		
22:00	5,957	ON	ON	ditto	8,810	1.77
23:00	6,725	ON	OFF	One Pump Operation		
0:00	7,206	ON	OFF	ditto		
1:00	7,109	ON	OFF	ditto		
2:00	7,206	ON	OFF	ditto		
3:00	7,013	ON	OFF	ditto		
4:00	7,109	ON	OFF	ditto		
5:00	7,206	ON	OFF	ditto		
6:00	7,206	ON	OFF	ditto		
7:00	7,206	ON	OFF	ditto		
8:00	7,109	ON	OFF	ditto		
9:00	7,013	ON	OFF	ditto		
10:00	7,109	ON	OFF	ditto		
11:00	7,013	ON	OFF	ditto		
12:00	7,109	ON	OFF	ditto	7,096	1.42
Average	7,810					

Table D.12 Pump Efficiency Calculation

Sites / Time	Hlawga No.2 42"		Hourly Pump Discharge
	M2		
	Probeflo	Operated Pump	
	(m^3/hr)	No.4	(m^3/hr)
13:00	1,674	OFF	
14:00	1,600	OFF	
15:00	1,600	OFF	
16:00	1,600	OFF	
17:00	1,600	OFF	
18:00	1,600	OFF	
19:00	1,600	OFF	
20:00	1,600	OFF	
21:00	1,600	OFF	
22:00	1,600	OFF	
23:00	1,600	OFF	
0:00	1,600	OFF	
1:00	1,600	OFF	
2:00	1,600	OFF	
3:00	1,600	OFF	
4:00	1,600	OFF	
5:00	1,600	OFF	
6:00	2,246	ON	
7:00	2,246	ON	
8:00	2,246	ON	
9:00	2,009	ON	
10:00	2,009	ON	
11:00	2,009	ON	
12:00	2,009	ON	2,110
Average	1,752		

Nominal Pump Capacity
2,700
Pump Efficiency 0.781612
(0.80)

3) Hlawga No.2 Pumping Station

Pump No.4 with nominal discharge of 2,700 m^3/hr was operated from 6:00 to 12:00. However, as shown in Table D.8, constant flow was measured even during none pump operation hours. Even when pumps are not operated, there is gravity flow inside the transmission pipe since there is a natural water head just like as No.1 P/S.

Based on the surrounding conditions at measurement day, velocity coefficient of transmission pipe was estimated as follows;

Parameter	C	D	Q	L	H_1	H_2
Dimension	None	m	m^3/sec	m	M	m
Case 1	85	1.05	0.49	14,200	8.60	8.69

where;

C: Velocity Coefficient

D: Pipe Diameter = 1.05 m (42 inch)

Q: Flow = 0.49 m^3/sec = 1,764 m^3/hr (nearly equal to the result)

L: Pipe Length = 14,200 m (from Hlawga No.2 P/S to Yegu P/S)

H_1: Calculated Head Loss

H_2: Natural Head = 17.09 (Hlawga Reservoir water level) - 5.90 (Yegu P/S reservoir HWL) – 2.5 (Loss at P/S) = 17.09 – 8.40 = 8.69 m

Thus, velocity coefficient of transmission pipe was estimated at 85.

Pumped flow in 2000 was estimated based on;

- Pump operation record (pump efficiency = 80 %)
  Note) Pump efficiency was calculated in Table D.13
- Gravity flow calculated based on reservoir water level and conditions mentioned above

Table D.14 is showing the daily water level in 2000 and relation between water level indicated in inch and H_2 is as follows;

H_2 (m) = Water Lavel (inch) x 0.304794 (m/inch) – 6.90 (m)

where; 6.90 : natural water head loss, calculated above

Table D.15 tabulated the calculated gravity flow according to the available water head shown in Table D.14.

Table D.16 shows the annual estimated flow supplied by Hlawga No.2 P/S, including pump discharge rate and gravity flow rate. "T" is gravity flow hours. Therefore, Total flow was calculated as follows;

$$Qtotal = Qpump \times (24-T) + Qgravity \times T$$

Qgravity was tabulated on Table D.14 according to the water level on Hlawga reservoir.

Table D.13 Pump Discharge Estimation on Hlawga Pumping Station No.1 (1/2)

Discharge Ratio = 142% (Single Pump Operation), 177% (Double Pump Operation)

January, 2000			February, 2000			March, 2000			April, 2000			May, 2000			June, 2000			July, 2000		
Date	a	Q	Date	a	Q	Date	a	Q	Date	a	Q	Date	a	Q	Date	a	Q	Date	a	Q
1	8	183,662	1	8	183,662	1	11	188,891	1	6	180,176	1	17	199,349	1	22	208,064	1	2	173,204
2	8	183,662	2	8	183,662	2	7	181,919	2	11	188,891	2	14	194,120	2	19	202,835	2	3	174,947
3	10	187,148	3	9	185,405	3	6	180,176	3	7	181,919	3	14	194,120	3	24	211,550	3	0	169,718
4	8	183,662	4	9	185,405	4	6	180,176	4	7	181,919	4	13	192,377	4	24	211,550	4	4	176,690
5	21	206,321	5	9	185,405	5	6	180,176	5	7	181,919	5	24	211,550	5	8	183,662	5	2	173,204
6	8	183,662	6	9	185,405	6	24	211,550	6	7	181,919	6	24	211,550	6	12	190,634	6	0	169,718
7	8	183,662	7	8	183,662	7	7	181,919	7	7	181,919	7	21	206,321	7	13	192,377	7	0	169,718
8	8	183,662	8	4	176,690	8	6	180,176	8	7	181,919	8	15	195,863	8	23	209,807	8	3	174,947
9	8	183,662	9	5	178,433	9	6	180,176	9	9	185,405	9	14	194,120	9	8	183,662	9	0	169,718
10	8	183,662	10	8	183,662	10	6	180,176	10	6	180,176	10	14	194,120	10	5	178,433	10	0	169,718
11	8	183,662	11	5	178,433	11	7	181,919	11	7	181,919	11	11	188,891	11	0	169,718	11	2	173,204
12	10	187,148	12	5	178,433	12	7	181,919	12	16	197,606	12	13	192,377	12	0	169,718	12	2	173,204
13	8	183,662	13	5	178,433	13	7	181,919	13	23	209,807	13	12	190,634	13	12	190,634	13	3	174,947
14	8	183,662	14	5	178,433	14	7	181,919	14	24	211,550	14	13	192,377	14	18	201,092	14	2	173,204
15	8	183,662	15	5	178,433	15	7	181,919	15	19	202,835	15	24	211,550	15	24	211,550	15	2	173,204
16	8	183,662	16	5	178,433	16	7	181,919	16	12	190,634	16	12	190,634	16	7	181,919	16	3	174,947
17	8	183,662	17	5	178,433	17	7	181,919	17	7	181,919	17	16	197,606	17	21	206,321	17	2	173,204
18	9	185,405	18	8	183,662	18	6	180,176	18	11	188,891	18	11	188,891	18	14	194,120	18	2	173,204
19	9	185,405	19	5	178,433	19	6	180,176	19	6	180,176	19	24	211,550	19	0	169,718	19	2	173,204
20	6	180,176	20	5	178,433	20	0	169,718	20	6	180,176	20	24	211,550	20	3	174,947	20	5	178,433
21	8	183,662	21	5	178,433	21	6	180,176	21	16	197,606	21	10	187,148	21	3	174,947	21	2	173,204
22	9	185,405	22	5	178,433	22	7	181,919	22	13	192,377	22	13	192,377	22	2	173,204	22	22	208,064
23	9	185,405	23	5	178,433	23	7	181,919	23	20	204,578	23	13	192,377	23	3	174,947	23	0	169,718
24	9	185,405	24	5	178,433	24	6	180,176	24	17	199,349	24	16	197,606	24	3	174,947	24	0	169,718
25	8	183,662	25	5	178,433	25	7	181,919	25	24	211,550	25	13	192,377	25	3	174,947	25	7	181,919
26	7	181,919	26	5	178,433	26	7	181,919	26	24	211,550	26	21	206,321	26	9	185,405	26	11	188,891
27	9	185,405	27		169,718	27	6	180,176	27	15	195,863	27	24	211,550	27	0	169,718	27	0	169,718
28	8	183,662	28	0	169,718	28	7	181,919	28	14	194,120	28	16	197,606	28	6	180,176	28	0	169,718
29	8	183,662	29	0	169,718	29	6	180,176	29	13	192,377	29	6	180,176	29	0	169,718	29	2	173,204
30	8	183,662				30	7	181,919	30	14	194,120	30	6	180,176	30	6	180,176	30	2	173,204
31	9	185,405				31	6	180,176				31	9	185,405				31	2	173,204
Total			Total			Total			Total			Total			Total			Total		

Note) a : "Double Pump Operation" hours

Q : Daily Discharge (m^3/day)

Table D.16 Pump Discharge and Gravity Flow Rate Estimation on Hlawga Pumping Station No.2 (2/2)

July, 2000					August, 2000					September, 2000					October, 2000					November, 2000					December, 2000				
Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total
1	17,280	16	38,016	42,624	1	17,280	16	39,485	43,603	1	10,800	19	40,522	42,880	1	55,200	0	41,645	55,200	1	54,240	0	41,558	54,240	1	55,200	0	40,781	55,200
2	17,280	16	38,016	42,624	2	17,280	16	39,485	43,603	2	17,280	16	40,694	44,409	2	54,240	0	41,645	54,240	2	55,200	0	41,472	55,200	2	54,240	0	40,781	54,240
3	17,280	16	38,016	42,624	3	17,280	16	39,485	43,603	3	17,280	16	40,781	44,467	3	55,200	0	41,645	55,200	3	54,240	0	41,472	54,240	3	55,200	0	40,781	55,200
4	17,280	16	38,102	42,681	4	17,280	16	39,571	43,661	4	17,280	16	40,781	44,467	4	54,240	0	41,645	54,240	4	55,200	0	41,472	55,200	4	54,240	0	40,781	54,240
5	17,280	16	38,102	42,681	5	17,280	16	39,571	43,661	5	17,280	16	40,781	44,467	5	55,200	0	41,645	55,200	5	54,240	0	41,472	54,240	5	55,200	0	40,694	55,200
6	10,800	19	38,189	41,033	6	17,280	16	39,571	43,661	6	17,280	16	40,781	44,467	6	54,240	0	41,645	54,240	6	55,200	0	41,472	55,200	6	54,240	0	40,694	54,240
7	10,800	16	38,275	36,317	7	17,280	16	39,571	43,661	7	17,280	16	40,867	44,525	7	55,200	0	41,645	55,200	7	54,240	0	41,386	54,240	7	55,200	0	40,694	55,200
8	17,280	16	38,362	42,855	8	17,280	16	39,571	43,661	8	17,280	16	41,040	44,640	8	54,240	0	41,645	54,240	8	55,200	0	41,386	55,200	8	54,240	0	40,608	54,240
9	17,280	16	38,362	42,855	9	17,280	16	39,571	43,661	9	17,280	16	41,126	44,697	9	55,200	0	41,645	55,200	9	54,240	0	41,386	54,240	9	55,200	0	40,608	55,200
10	17,280	16	38,362	42,855	10	17,280	16	39,658	43,719	10	17,280	16	41,126	44,697	10	54,240	0	41,645	54,240	10	55,200	0	41,386	55,200	10	35,520	0	40,608	55,520
11	17,280	16	38,448	42,912	11	17,280	16	39,658	43,719	11	17,280	16	41,126	44,697	11	55,200	0	41,645	55,200	11	54,240	0	41,299	54,240	11	55,200	0	40,608	55,200
12	17,280	16	38,621	43,027	12	17,280	16	39,658	43,719	12	17,280	16	41,126	44,697	12	54,240	0	41,645	54,240	12	55,200	0	41,299	55,200	12	54,240	0	40,522	54,240
13	12,960	18	38,794	42,056	13	17,280	16	39,658	43,719	13	17,280	16	41,213	44,755	13	53,760	0	41,645	53,760	13	55,440	0	41,299	55,440	13	55,200	0	40,522	55,200
14	17,280	16	38,794	43,143	14	17,280	16	39,658	43,719	14	17,280	16	41,213	44,755	14	54,240	0	41,645	54,240	14	54,240	0	41,299	54,240	14	54,240	0	40,522	54,240
15	17,280	16	38,794	43,143	15	17,280	16	39,658	43,719	15	17,280	16	41,213	44,755	15	55,200	0	41,645	55,200	15	55,200	0	41,213	55,200	15	55,200	0	40,522	55,200
16	17,280	16	38,966	43,257	16	17,280	16	39,744	43,776	16	17,280	16	41,213	44,755	16	54,240	0	41,645	54,240	16	54,240	0	41,213	54,240	16	54,240	0	40,435	54,240
17	17,280	16	38,966	43,257	17	17,280	16	39,744	43,776	17	17,280	16	41,213	44,755	17	55,200	0	41,645	55,200	17	55,200	0	41,213	55,200	17	55,200	0	40,435	55,200
18	17,280	16	38,966	43,257	18	17,280	16	39,744	43,776	18	17,280	16	41,213	44,755	18	54,240	0	41,645	54,240	18	54,240	0	41,126	54,240	18	54,240	0	40,435	54,240
19	17,280	16	38,966	43,257	19	17,280	16	39,830	43,833	19	17,280	16	41,213	44,755	19	55,200	0	41,645	55,200	19	55,200	0	41,126	55,200	19	55,200	0	40,349	55,200
20	17,280	16	39,053	43,315	20	17,280	16	39,830	43,833	20	17,280	16	41,213	44,755	20	54,240	0	41,645	54,240	20	54,240	0	41,126	54,240	20	54,240	0	40,349	54,240
21	17,280	16	39,226	43,431	21	17,280	16	39,830	43,833	21	17,280	16	41,213	44,755	21	55,200	0	41,645	55,200	21	55,200	0	41,126	55,200	21	55,200	0	40,349	55,200
22	17,280	16	39,312	43,488	22	17,280	16	39,830	43,833	22	17,280	16	41,299	44,813	22	54,240	0	41,645	54,240	22	54,240	0	41,040	54,240	22	52,560	0	40,262	52,560
23	17,280	16	39,398	43,545	23	17,280	16	39,830	43,833	23	17,280	16	41,299	44,813	23	55,200	0	41,645	55,200	23	55,200	0	41,040	55,200	23	54,720	0	40,262	54,720
24	17,280	16	39,398	43,545	24	17,280	16	39,917	43,891	24	38,160	0	41,299	38,160	24	54,240	0	41,558	54,240	24	54,240	0	41,040	54,240	24	54,720	0	40,262	54,720
25	17,280	16	39,398	43,545	25	17,280	16	40,003	43,949	25	48,240	0	41,299	48,240	25	55,200	0	41,558	55,200	25	55,200	0	40,954	55,200	25	54,720	0	40,176	54,720
26	17,280	16	39,485	43,603	26	17,280	16	40,003	43,949	26	53,760	0	41,386	53,760	26	54,240	0	41,558	54,240	26	54,240	0	40,954	54,240	26	54,720	0	40,176	54,720
27	17,280	16	39,485	43,603	27	17,280	16	40,090	44,007	27	49,440	0	41,386	49,440	27	55,200	0	41,558	55,200	27	55,200	0	40,954	55,200	27	54,720	0	40,176	54,720
28	17,280	16	39,485	43,603	28	17,280	16	40,176	44,064	28	54,720	0	41,386	54,720	28	54,240	0	41,558	54,240	28	54,240	0	40,867	54,240	28	54,720	0	40,090	54,720
29	17,280	16	39,485	43,603	29	17,280	16	40,262	44,121	29	55,680	0	41,386	55,680	29	55,200	0	41,558	55,200	29	55,200	0	40,867	55,200	29	54,720	0	40,090	54,720
30	10,800	16	39,485	37,123	30	17,280	16	40,349	44,179	30	54,240	0	41,558	54,240	30	54,240	0	41,558	54,240	30	54,240	0	40,867	54,240	30	54,720	0	40,090	54,720
31	17,280	16	39,485	43,603	31	17,280	16	40,435	44,237						31	55,200	0	41,558	55,200						31	54,720	0	40,090	54,720
Total					Total					Total					Total					Total					Total				

Table D.13 Pump Discharge Estimation on Hlawga Pumping Station No.1 (2/2)

August, 2000			September, 2000			Octorber, 2000			November, 2000			December, 2000		
Date	a	Q	Date	a	Q	Date	a	Q	Date	a	Q	Date	a	Q
1	11	188,891	1	0	169,718	1	0	169,718	1	0	169,718	1	0	169,718
2	0	169,718	2	0	169,718	2	3	174,947	2	7	181,919	2	0	169,718
3	0	169,718	3	4	176,690	3	0	169,718	3	0	169,718	3	0	169,718
4	2	173,204	4	2	173,204	4	0	169,718	4	0	169,718	4	0	169,718
5	2	173,204	5	3	174,947	5	11	188,891	5	6	180,176	5	0	169,718
6	2	173,204	6	2	173,204	6	12	190,634	6	0	169,718	6	0	169,718
7	2	173,204	7	0	169,718	7	3	174,947	7	0	169,718	7	0	169,718
8	2	173,204	8	0	169,718	8	0	169,718	8	1	171,461	8	0	169,718
9	2	173,204	9	3	174,947	9	0	169,718	9	0	169,718	9	0	169,718
10	2	173,204	10	2	173,204	10	0	169,718	10	0	169,718	10	0	169,718
11	2	173,204	11	2	173,204	11	0	169,718	11	6	180,176	11	0	169,718
12	2	173,204	12	2	173,204	12	0	169,718	12	0	169,718	12	8	183,662
13	2	173,204	13	2	173,204	13	1	171,461	13	6	180,176	13	0	169,718
14	2	173,204	14	2	173,204	14	0	169,718	14	0	169,718	14	0	169,718
15	2	173,204	15	2	173,204	15	0	169,718	15	0	169,718	15	0	169,718
16	2	173,204	16	2	173,204	16	0	169,718	16	0	169,718	16	5	178,433
17	2	173,204	17	3	174,947	17	0	169,718	17	8	183,662	17	8	183,662
18	2	173,204	18	2	173,204	18	0	169,718	18	0	169,718	18	0	169,718
19	2	173,204	19	2	173,204	19	0	169,718	19	0	169,718	19	8	183,662
20	3	174,947	20	3	174,947	20	0	169,718	20	2	173,204	20	0	169,718
21	0	169,718	21	1	171,461	21	0	169,718	21	0	169,718	21	0	169,718
22	2	173,204	22	2	173,204	22	0	169,718	22	0	169,718	22	6	180,176
23	0	169,718	23	2	173,204	23	0	169,718	23	2	173,204	23	0	169,718
24	2	173,204	24	1	171,461	24	0	169,718	24	0	169,718	24	0	169,718
25	0	169,718	25	0	169,718	25	2	173,204	25	0	169,718	25	6	180,176
26	2	173,204	26	2	173,204	26	0	169,718	26	2	173,204	26	0	169,718
27	7	181,919	27	0	169,718	27	0	169,718	27	3	174,947	27	0	169,718
28	0	169,718	28	0	169,718	28	0	169,718	28	0	169,718	28	0	169,718
29	0	169,718	29	6	180,176	29	0	169,718	29	0	169,718	29	0	169,718
30	2	173,204	30	0	169,718	30	0	169,718	30	0	169,718	30	0	169,718
31	4	176,690				31	0	169,718				31	0	169,718
Total			Total			Total			Total			Total		

Table D.14 Water Level in Hlawga Reservoir and Allowable Head Loss

Month / Date	2000																					
	January	H_2	February	H_2	March	H_2	April	H_2	May	H_2	June	H_2	July	H_2	August	H_2	September	H_2	October	H_2	November	H_2	December	H_2
1	57.96	10.77	56.67	10.37	55.62	10.05	54.15	9.60	52.58	9.13	51.96	8.94	53.08	9.28	55.25	9.94	56.83	10.42	58.58	10.96	58.42	10.91	57.33	10.57
2	57.92	10.75	56.62	10.36	55.58	10.04	54.10	9.59	52.58	9.13	51.90	8.92	53.06	9.27	55.25	9.94	57.08	10.50	58.58	10.96	58.40	10.90	57.29	10.56
3	57.87	10.74	56.58	10.35	55.54	10.03	54.06	9.58	52.54	9.11	51.83	8.90	53.08	9.28	55.29	9.95	57.21	10.54	58.58	10.96	58.37	10.89	57.25	10.55
4	57.83	10.73	56.54	10.33	55.50	10.02	54.02	9.57	52.50	9.10	51.92	8.92	53.21	9.32	55.33	9.97	57.25	10.55	58.58	10.96	58.35	10.89	57.21	10.54
5	57.79	10.71	56.50	10.32	55.46	10.00	53.98	9.55	52.46	9.09	52.04	8.96	53.21	9.32	55.33	9.97	57.25	10.55	58.58	10.96	58.33	10.88	57.17	10.52
6	57.75	10.70	56.46	10.31	55.42	9.99	53.94	9.54	52.40	9.07	52.12	8.99	53.29	9.34	55.33	9.97	57.25	10.55	58.58	10.96	58.31	10.87	57.12	10.51
7	57.71	10.69	56.42	10.30	55.37	9.98	53.90	9.53	52.31	9.04	52.21	9.01	53.42	9.38	55.42	9.99	57.46	10.61	58.71	10.99	58.27	10.86	57.08	10.50
8	57.67	10.68	56.37	10.28	55.33	9.97	53.85	9.51	52.25	9.03	52.21	9.01	53.50	9.41	55.42	9.99	57.67	10.68	58.71	10.99	58.23	10.85	57.04	10.49
9	57.62	10.66	56.33	10.27	55.29	9.95	53.81	9.50	52.17	9.00	52.19	9.01	53.54	9.42	55.42	9.99	57.75	10.70	58.71	10.99	58.19	10.84	57.00	10.47
10	57.58	10.65	56.29	10.26	55.25	9.94	53.77	9.49	52.08	8.97	52.15	8.99	53.62	9.44	55.50	10.02	57.83	10.73	58.69	10.99	58.17	10.83	56.96	10.46
11	57.54	10.64	56.25	10.24	55.21	9.93	53.73	9.48	52.00	8.95	52.25	9.03	53.75	9.48	55.50	10.02	57.83	10.73	58.67	10.98	58.15	10.82	56.96	10.46
12	57.50	10.63	56.21	10.23	55.15	9.91	53.69	9.46	51.94	8.93	52.33	9.05	54.00	9.56	55.50	10.02	57.83	10.73	58.65	10.97	58.12	10.82	56.92	10.45
13	57.46	10.61	56.17	10.22	55.10	9.90	53.62	9.44	51.90	8.92	52.42	9.08	54.17	9.61	55.50	10.02	57.92	10.75	58.62	10.97	58.08	10.80	56.87	10.44
14	57.42	10.60	56.12	10.21	55.06	9.88	53.54	9.42	51.85	8.90	52.42	9.08	54.17	9.61	55.58	10.04	57.92	10.75	58.60	10.96	58.04	10.79	56.83	10.42
15	57.37	10.59	56.08	10.19	55.02	9.87	53.48	9.40	51.81	8.89	52.50	9.10	54.25	9.64	55.58	10.04	58.00	10.78	58.58	10.96	58.00	10.78	56.79	10.41
16	57.33	10.57	56.04	10.18	54.98	9.86	53.42	9.38	51.87	8.91	52.50	9.10	54.42	9.69	55.67	10.07	58.00	10.78	58.58	10.96	57.96	10.77	56.75	10.40
17	57.29	10.56	56.00	10.17	54.92	9.84	53.37	9.37	51.83	8.90	52.50	9.10	54.54	9.72	55.67	10.07	58.00	10.78	58.62	10.97	57.92	10.75	56.71	10.38
18	57.25	10.55	55.96	10.16	54.85	9.82	53.33	9.36	51.96	8.94	52.54	9.11	54.54	9.72	55.67	10.07	58.00	10.78	58.62	10.97	57.87	10.74	56.67	10.37
19	57.21	10.54	55.92	10.14	54.79	9.80	53.31	9.35	51.96	8.94	52.58	9.13	54.54	9.72	55.75	10.09	58.00	10.78	58.62	10.97	57.83	10.73	56.62	10.36
20	57.17	10.52	55.87	10.13	54.73	9.78	53.27	9.34	52.08	8.97	52.58	9.13	54.58	9.74	55.75	10.09	58.00	10.78	58.62	10.97	57.79	10.71	56.58	10.35
21	57.12	10.51	55.83	10.12	54.69	9.77	53.21	9.32	52.04	8.96	52.58	9.13	54.83	9.81	55.83	10.12	58.00	10.78	58.60	10.96	57.75	10.70	56.54	10.33
22	57.08	10.50	55.79	10.10	54.65	9.76	53.15	9.30	52.25	9.03	52.67	9.15	55.00	9.86	55.83	10.12	58.08	10.80	58.58	10.96	57.71	10.69	56.50	10.32
23	57.04	10.49	55.75	10.09	54.58	9.74	53.08	9.28	52.29	9.04	52.71	9.17	55.08	9.89	55.83	10.12	58.08	10.80	58.56	10.95	57.67	10.68	56.46	10.31
24	57.00	10.47	55.71	10.08	54.52	9.72	53.00	9.25	52.29	9.04	52.79	9.19	55.17	9.91	55.87	10.13	58.08	10.80	58.54	10.94	57.62	10.66	56.42	10.30
25	56.96	10.46	55.67	10.07	54.46	9.70	52.92	9.23	52.25	9.03	52.87	9.22	55.17	9.91	56.08	10.19	58.08	10.80	58.52	10.94	57.58	10.65	56.37	10.28
26	56.92	10.45	55.62	10.05	54.40	9.68	52.83	9.20	52.21	9.01	52.92	9.23	55.25	9.94	56.08	10.19	58.17	10.83	58.50	10.93	57.54	10.64	56.33	10.27
27	56.87	10.44	55.62	10.05	54.35	9.67	52.75	9.18	52.15	8.99	53.00	9.25	55.25	9.94	56.17	10.22	58.17	10.83	58.50	10.93	57.50	10.63	56.29	10.26
28	56.83	10.42	55.65	10.06	54.31	9.65	52.71	9.17	52.08	8.97	53.04	9.27	55.29	9.95	56.33	10.27	58.17	10.83	58.50	10.93	57.46	10.61	56.25	10.24
29	56.79	10.41	55.65	10.06	54.27	9.64	52.67	9.15	52.04	8.96	53.08	9.28	55.29	9.95	56.42	10.30	58.17	10.83	58.48	10.92	57.42	10.60	56.21	10.23
30	56.75	10.40			54.23	9.63	52.62	9.14	52.04	8.96	53.08	9.28	55.29	9.95	56.58	10.35	58.42	10.91	58.46	10.92	57.37	10.59	56.17	10.22
31	56.71	10.38			54.19	9.62			51.96	8.94			55.27	9.95	56.75	10.40			58.44	10.93			56.12	10.21

Unit$_1$: Foot Unit$_2$: m

Table D.15 Water Level and calculated Gravity Flow Rate from Hlawga Reservoir

Month / Date	January		February		March		April		May		June		July		August		September		October		November		December	
	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q	H_2	Q
1	10.77	41,213	10.37	40,349	10.05	39,744	9.60	38,794	9.13	37,670	8.94	37,325	9.28	38,016	9.94	39,485	10.42	40,522	10.96	41,645	10.91	41,558	10.57	40,781
2	10.75	41,213	10.36	40,349	10.04	39,744	9.59	38,707	9.13	37,670	8.92	37,238	9.27	38,016	9.94	39,485	10.50	40,694	10.96	41,645	10.90	41,472	10.56	40,781
3	10.74	41,126	10.35	40,349	10.03	39,658	9.58	38,707	9.11	37,670	8.90	37,152	9.28	38,016	9.95	39,485	10.54	40,781	10.96	41,645	10.89	41,472	10.55	40,781
4	10.73	41,126	10.33	40,262	10.02	39,658	9.57	38,707	9.10	37,670	8.92	37,238	9.32	38,102	9.97	39,571	10.55	40,781	10.96	41,645	10.89	41,472	10.54	40,781
5	10.71	41,126	10.32	40,262	10.00	39,658	9.55	38,621	9.09	37,584	8.96	37,325	9.32	38,102	9.97	39,571	10.55	40,781	10.96	41,645	10.88	41,472	10.52	40,694
6	10.70	41,126	10.31	40,262	9.99	39,571	9.54	38,621	9.07	37,584	8.99	37,411	9.34	38,189	9.97	39,571	10.55	40,781	10.96	41,645	10.87	41,472	10.51	40,694
7	10.69	41,040	10.30	40,262	9.98	39,571	9.53	38,621	9.04	37,498	9.01	37,411	9.38	38,275	9.99	39,571	10.61	40,867	10.99	41,645	10.86	41,386	10.50	40,694
8	10.68	41,040	10.28	40,176	9.97	39,571	9.51	38,534	9.03	37,498	9.01	37,411	9.41	38,362	9.99	39,571	10.68	41,040	10.99	41,645	10.85	41,386	10.49	40,608
9	10.66	41,040	10.27	40,176	9.95	39,485	9.50	38,534	9.00	37,411	9.01	37,411	9.42	38,362	9.99	39,571	10.70	41,126	10.99	41,645	10.84	41,386	10.47	40,608
10	10.65	41,040	10.26	40,176	9.94	39,485	9.49	38,534	8.97	37,325	8.99	37,411	9.44	38,362	10.02	39,658	10.73	41,126	10.99	41,645	10.83	41,386	10.46	40,608
11	10.64	40,954	10.24	40,090	9.93	39,485	9.48	38,534	8.95	37,325	9.03	37,498	9.48	38,448	10.02	39,658	10.73	41,126	10.98	41,645	10.82	41,299	10.46	40,608
12	10.63	40,954	10.23	40,090	9.91	39,398	9.46	38,448	8.93	37,238	9.05	37,498	9.56	38,621	10.02	39,658	10.73	41,126	10.97	41,645	10.82	41,299	10.45	40,522
13	10.61	40,867	10.22	40,090	9.90	39,398	9.44	38,448	8.92	37,238	9.08	37,584	9.61	38,794	10.02	39,658	10.75	41,213	10.97	41,645	10.80	41,299	10.44	40,522
14	10.60	40,867	10.21	40,003	9.88	39,398	9.42	38,362	8.90	37,152	9.08	37,584	9.61	38,794	10.04	39,658	10.75	41,213	10.96	41,645	10.79	41,299	10.42	40,522
15	10.59	40,867	10.19	40,003	9.87	39,312	9.40	38,462	8.89	37,152	9.10	37,670	9.64	38,794	10.04	39,658	10.78	41,213	10.96	41,645	10.78	41,213	10.41	40,522
16	10.57	40,781	10.18	40,003	9.86	39,312	9.38	38,275	8.91	37,238	9.10	37,670	9.69	38,966	10.07	39,744	10.78	41,213	10.96	41,645	10.77	41,213	10.40	40,435
17	10.56	40,781	10.17	40,003	9.84	39,226	9.37	38,275	8.90	37,152	9.10	37,670	9.72	38,966	10.07	39,744	10.78	41,213	10.97	41,645	10.75	41,213	10.38	40,435
18	10.55	40,781	10.16	39,917	9.82	39,226	9.36	38,275	8.94	37,325	9.11	37,670	9.72	38,966	10.07	39,744	10.78	41,213	10.97	41,645	10.74	41,126	10.37	40,435
19	10.54	40,781	10.14	39,917	9.80	39,139	9.35	38,189	8.94	37,325	9.13	37,670	9.72	38,966	10.09	39,830	10.78	41,213	10.97	41,645	10.73	41,126	10.36	40,349
20	10.52	40,694	10.13	39,917	9.78	39,139	9.34	38,189	8.97	37,325	9.13	37,670	9.74	39,053	10.09	39,830	10.78	41,213	10.97	41,645	10.71	41,126	10.35	40,349
21	10.51	40,694	10.12	39,830	9.77	39,139	9.32	38,189	8.96	37,325	9.13	37,670	9.81	39,226	10.12	39,830	10.78	41,213	10.96	41,645	10.70	41,126	10.33	40,349
22	10.50	40,694	10.10	39,830	9.76	39,139	9.30	38,102	9.03	37,498	9.15	37,757	9.86	39,312	10.12	39,830	10.80	41,299	10.96	41,645	10.69	41,040	10.32	40,262
23	10.49	40,608	10.09	39,830	9.74	39,053	9.28	38,102	9.04	37,498	9.17	37,757	9.89	39,398	10.12	39,830	10.80	41,299	10.95	41,645	10.68	41,040	10.31	40,262
24	10.47	40,608	10.08	39,744	9.72	39,053	9.25	38,102	9.04	37,498	9.19	37,843	9.91	39,398	10.13	39,917	10.80	41,299	10.94	41,558	10.66	41,040	10.30	40,262
25	10.46	40,608	10.07	39,744	9.70	38,966	9.23	37,930	9.03	37,498	9.22	37,930	9.91	39,398	10.19	40,003	10.80	41,299	10.94	41,558	10.65	40,954	10.28	40,176
26	10.45	40,608	10.05	39,744	9.68	38,966	9.20	37,930	9.01	37,411	9.23	37,930	9.94	39,485	10.19	40,003	10.83	41,386	10.93	41,558	10.64	40,954	10.27	40,176
27	10.44	40,608	10.05	39,744	9.67	38,880	9.18	37,843	8.99	37,411	9.25	38,016	9.94	39,485	10.22	40,090	10.83	41,386	10.93	41,558	10.63	40,954	10.26	40,176
28	10.42	40,522	10.06	39,744	9.65	38,880	9.17	37,843	8.97	37,325	9.27	38,016	9.95	39,485	10.27	40,176	10.83	41,386	10.93	41,558	10.61	40,867	10.24	40,090
29	10.41	40,522	10.06	39,744	9.64	38,880	9.15	37,757	8.96	37,325	9.28	38,016	9.95	39,485	10.30	40,262	10.83	41,386	10.92	41,558	10.60	40,867	10.23	40,090
30	10.40	40,435			9.63	38,794	9.14	37,757	8.96	37,325	9.28	38,016	9.95	39,485	10.35	40,349	10.91	41,558	10.92	41,558	10.59	40,867	10.22	40,090
31	10.38	40,435			9.62	38,794			8.94	37,325			9.95	39,485	10.40	40,435			10.91	41,558			10.21	40,090

Unit$_1$: For Unit$_2$: m

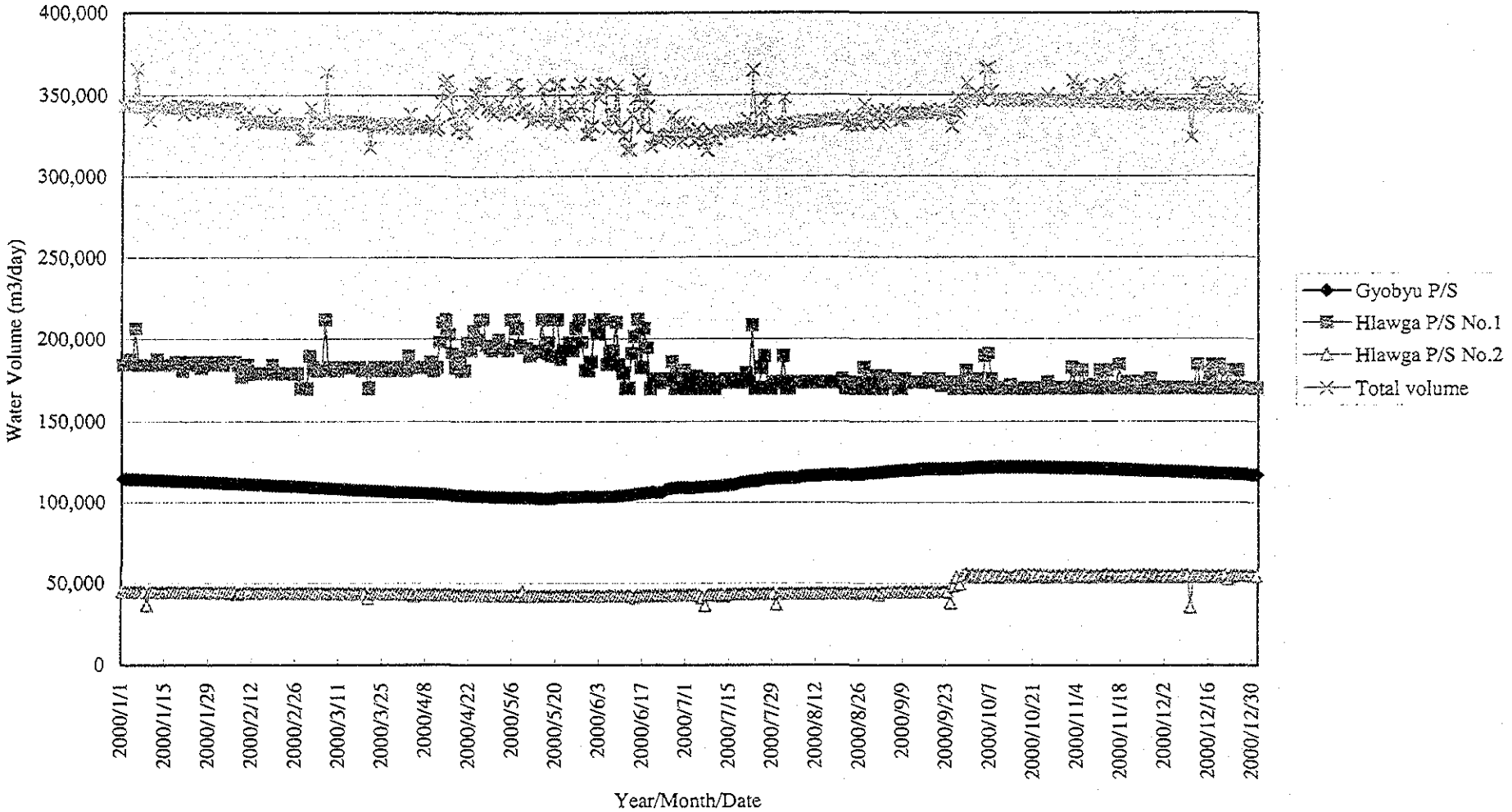
Table D.16 Pump Discharge and Gravity Flow Rate Estimation on Hlawga Pumping Station No.2 (1/2)

January, 2000					February, 2000					March, 2000					April, 2000					May, 2000					June, 2000				
Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total	Date	Qp	T	Qg	Total
1	17,280	16	41,213	44,755	1	17,280	16	40,349	44,179	1	17,280	16	39,744	43,776	1	17,280	16	38,794	43,143	1	17,280	16	37,670	42,393	1	17,280	16	37,325	42,163
2	17,280	16	41,213	44,755	2	17,280	16	40,349	44,179	2	17,280	16	39,744	43,776	2	17,280	16	38,707	43,085	2	17,280	16	37,670	42,393	2	17,280	16	37,238	42,105
3	17,280	16	41,126	44,697	3	17,280	16	40,349	44,179	3	17,280	16	39,658	43,719	3	17,280	16	38,707	43,085	3	17,280	16	37,670	42,393	3	17,280	16	37,152	42,048
4	17,280	16	41,126	44,697	4	17,280	16	40,262	44,121	4	17,280	16	39,658	43,719	4	12,960	18	38,707	41,990	4	17,280	16	37,670	42,393	4	17,280	16	37,238	42,105
5	17,280	16	41,126	44,697	5	17,280	16	40,262	44,121	5	17,280	16	39,658	43,719	5	17,280	16	38,621	43,027	5	17,280	16	37,584	42,336	5	17,280	16	37,325	42,163
6	17,280	16	41,126	44,697	6	17,280	16	40,262	44,121	6	17,280	16	39,571	43,661	6	17,280	16	38,621	43,027	6	17,280	16	37,584	42,336	6	17,280	16	37,411	42,221
7	17,280	16	41,040	44,640	7	12,960	18	40,262	43,157	7	17,280	16	39,571	43,661	7	17,280	16	38,621	43,027	7	17,280	16	37,498	42,279	7	17,280	16	37,411	42,221
8	17,280	16	41,040	44,640	8	17,280	16	40,176	44,064	8	17,280	16	39,571	43,661	8	17,280	16	38,534	42,969	8	17,280	16	37,498	42,279	8	17,280	16	37,411	42,221
9	10,800	15	41,040	36,450	9	17,280	16	40,176	44,064	9	17,280	16	39,485	43,603	9	17,280	16	38,534	42,969	9	25,920	12	37,411	44,626	9	17,280	16	37,411	42,221
10	17,280	16	41,040	44,640	10	17,280	16	40,176	44,064	10	17,280	16	39,485	43,603	10	17,280	16	38,534	42,969	10	17,280	16	37,325	42,163	10	17,280	16	37,411	42,221
11	17,280	16	40,954	44,583	11	17,280	16	40,090	44,007	11	17,280	16	39,485	43,603	11	17,280	16	38,534	42,969	11	17,280	16	37,325	42,163	11	17,280	16	37,498	42,279
12	17,280	16	40,954	44,583	12	17,280	16	40,090	44,007	12	17,280	16	39,398	43,545	12	17,280	16	38,448	42,912	12	17,280	16	37,238	42,105	12	17,280	16	37,498	42,279
13	17,280	16	40,867	44,525	13	17,280	16	40,090	44,007	13	17,280	16	39,398	43,545	13	17,280	16	38,448	42,912	13	17,280	16	37,238	42,105	13	17,280	16	37,584	42,336
14	17,280	16	40,867	44,525	14	17,280	16	40,003	43,949	14	17,280	16	39,398	43,545	14	17,280	16	38,362	42,855	14	17,280	16	37,152	42,048	14	12,960	18	37,584	41,148
15	17,280	16	40,867	44,525	15	17,280	16	40,003	43,949	15	17,280	16	39,312	43,488	15	17,280	16	38,462	42,921	15	17,280	16	37,152	42,048	15	17,280	16	37,670	42,393
16	17,280	16	40,781	44,467	16	17,280	16	40,003	43,949	16	17,280	16	39,312	43,488	16	17,280	16	38,275	42,797	16	17,280	16	37,238	42,105	16	17,280	16	37,670	42,393
17	17,280	16	40,781	44,467	17	17,280	16	40,003	43,949	17	17,280	16	39,226	43,431	17	17,280	16	38,275	42,797	17	17,280	16	37,152	42,048	17	17,280	16	37,670	42,393
18	17,280	16	40,781	44,467	18	17,280	16	39,917	43,891	18	17,280	16	39,226	43,431	18	17,280	16	38,275	42,797	18	17,280	16	37,325	42,163	18	17,280	16	37,670	42,393
19	17,280	16	40,781	44,467	19	17,280	16	39,917	43,891	19	17,280	16	39,139	43,373	19	17,280	16	38,189	42,739	19	17,280	16	37,325	42,163	19	17,280	16	37,670	42,393
20	17,280	16	40,694	44,409	20	17,280	16	39,917	43,891	20	6,480	21	39,139	40,727	20	17,280	16	38,189	42,739	20	17,280	16	37,325	42,163	20	17,280	16	37,670	42,393
21	17,280	16	40,694	44,409	21	17,280	16	39,830	43,833	21	17,280	16	39,139	43,373	21	17,280	16	38,189	42,739	21	17,280	16	37,325	42,163	21	17,280	16	37,670	42,393
22	17,280	16	40,694	44,409	22	17,280	16	39,830	43,833	22	17,280	16	39,139	43,373	22	17,280	16	38,102	42,681	22	17,280	16	37,498	42,279	22	17,280	16	37,757	42,451
23	17,280	16	40,608	44,352	23	17,280	16	39,830	43,833	23	17,280	16	39,053	43,315	23	17,280	16	38,102	42,681	23	17,280	16	37,498	42,279	23	17,280	16	37,757	42,451
24	17,280	16	40,608	44,352	24	17,280	16	39,744	43,776	24	17,280	16	39,053	43,315	24	17,280	16	38,102	42,681	24	17,280	16	37,498	42,279	24	17,280	16	37,843	42,509
25	17,280	16	40,608	44,352	25	17,280	16	39,744	43,776	25	17,280	16	38,966	43,257	25	17,280	16	37,930	42,567	25	17,280	16	37,498	42,279	25	17,280	16	37,930	42,567
26	17,280	16	40,608	44,352	26	17,280	16	39,744	43,776	26	17,280	16	38,966	43,257	26	17,280	16	37,930	42,567	26	17,280	16	37,411	42,221	26	17,280	16	37,930	42,567
27	17,280	16	40,608	44,352	27	17,280	16	39,744	43,776	27	17,280	16	38,880	43,200	27	17,280	16	37,843	42,509	27	17,280	16	37,411	42,221	27	17,280	16	38,016	42,624
28	17,280	16	40,522	44,295	28	17,280	16	39,744	43,776	28	17,280	16	38,880	43,200	28	17,280	16	37,843	42,509	28	17,280	16	37,325	42,163	28	17,280	16	38,016	42,624
29	17,280	16	40,522	44,295	29	17,280	16	39,744	43,776	29	17,280	16	38,880	43,200	29	17,280	16	37,757	42,451	29	17,280	16	37,325	42,163	29	17,280	16	38,016	42,624
30	17,280	16	40,435	44,237						30	17,280	16	38,794	43,143	30	17,280	16	37,757	42,451	30	17,280	16	37,325	42,163	30	17,280	16	38,016	42,624
31	17,280	16	40,435	44,237						31	17,280	16	38,794	43,143						31	17,280	16	37,325	42,163					
Total					Total					Total					Total					Total					Total				

Note) Qp : Pumped Flow (m^3/day)
Qg : Gravity Flow (m^3/day)
T : Gravity Flow Hours (Hr)

4) Total Production Amount

Figure D-5 shows the flow in three transmission pipes and their total.
As shown in the figure there is flow fluctuation caused by pump operation effected by seasonal water level fluctuation in reservoirs and power failure, no pump operation.
However, as shown in the flow measurement results pumps have considerable capacity to convey water to the City Area if power is available. The possible pumping amount is assumed as around **350,000 m^3/day**.


400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Water Volume (m3/day)
2000/1/1
2000/1/15
2000/1/29
2000/2/12
2000/2/26
2000/3/11
2000/3/25
2000/4/8
2000/4/22
2000/5/6
2000/5/20
2000/6/3
2000/6/17
2000/7/1
2000/7/15
2000/7/29
2000/8/12
2000/8/26
2000/9/9
2000/9/23
2000/10/7
2000/10/21
2000/11/4
2000/11/18
2000/12/2
2000/12/16
2000/12/30
Year/Month/Date
Gyobyu P/S
Hlawga P/S No.1
Hlawga P/S No.2
Total volume

3 OTHER PUMPING STATIONS

There is another pumping station within the boundary of Yangon City. Yegu pumping station is distributing Gyobyu reservoir water and Hlawga reservoir water to the central areas. Table D.16 shows the operation record of Yegu P/S.