

										2005 Year	36670	m3/d	
										Unit	Unit Cost	Quantity	Price
		(Hantana Place)	Concrete							m3	9530	278	2,649,340
	248	m3	Form Work							m2	1060	696	737,760
			Reinforcement			0,12	ton	72970	33				2,434,279
			Miscellaneous			100%	set						5,821,379
		(Hantana Call Link)	Concrete							m3	9530	0	0
	236	m3	Form Work							m2	1060	0	0
			Reinforcement			0,12	ton	72970	0				0
			Miscellaneous			100%	set						0
		(Asgiriya)	Concrete							m3	9530	1,861	17,735,330
	3059	m3	Form Work							m2	1060	4,652	4,931,120
			Reinforcement			0,12	ton	72970	223				16,295,660
			Miscellaneous			100%	set						38,962,110
		(Upland)	Concrete							m3	9530	1,691	16,115,230
	2728	m3	Form Work							m2	1060	4,227	4,480,620
			Reinforcement			0,12	ton	72970	203				14,807,072
			Miscellaneous			100%	set						35,402,922
		(Talwatta)	Concrete							m3	9530	0	0
	248	m3	Form Work							m2	1060	0	0
			Reinforcement			0,12	ton	72970	0				0
			Miscellaneous			100%	set						0
		(Ehena)	Concrete							m3	9530	278	2,649,340
	248	m3	Form Work							m2	1060	696	737,760
			Reinforcement			0,12	ton	72970	33				2,434,279
			Miscellaneous			100%	set						5,821,379
		(Mutupihilla)	Concrete							m3	9530	137	1,305,610
	79	m3	Form Work							m2	1060	342	362,520
			Reinforcement			0,12	ton	72970	16				1,199,627
			Miscellaneous			100%	set						2,867,757
		(Talathu Oya)	Concrete							m3	9530	0	0
	247	m3	Form Work							m2	1060	0	0
			Reinforcement			0,12	ton	72970	0				0
			Miscellaneous			100%	set						0
		(Halagama)	Concrete							m3	9530	0	0
	247	m3	Form Work							m2	1060	0	0
			Reinforcement			0,12	ton	72970	0				0
			Miscellaneous			100%	set						0
		Total											457,966,826
		Grand Total											2,735,229,443

Appendix 6.3 Sri Lanka - Kandy Water Supply Project  
Capacity Calculation for Katugastota Treatment Plant Q=110,000 cu m/day

Item	Total System	First Stage
Planned Flow	Q= 110.000 cu m/day	Q= 36.667 cu m/day
Plant Capacity (Daily Max)	Q= 115.500 cu m/day = 4.813 cu m/hour = 80,2 cu m/min = 1,337 cu m/sec	Q= 38.500 cu m/day = 1.604 cu m/hour = 26,7 cu m/min = 0,446 cu m/sec
(1) Receiving Well	<p>Criteria Retention Time T= 1,5 min Recirculation a= 3,0 %</p> <p>Dimension Rectangular 1 units L m x W m x D m x units 3,9 3,9 4,0 x 2 4</p> <p>V= 121,7 cu m T= 1,5 min</p>	<p>Criteria Retention Time T= 1,0 min Recirculation a= 3,0 %</p> <p>Dimension Rectangular 1 units L m x W m x D m x units 3,9 3,9 4,0 x 2</p> <p>V= 121,7 cu m T= 4,2 min</p>
(2) Mixing Chamber	<p>Criteria Retention Time T= 1-5 min Recirculation a= 3,0 %</p> <p>Dimension Rectangular 6 units L m x W m x D m x units 9,0 2,0 4,77 x 3</p> <p>Unit Volume UV= 85,9 cu m/unit Total Volume V= 515 cu m Retention Time t= 6,2 min Mixing Hydraulic Mixing</p>	<p>Criteria Retention Time T= 1-5 min Recirculation a= 3,0 %</p> <p>Dimension Rectangular 2 units L m x W m x D m x units 9,0 2,0 4,77 x 1</p> <p>Unit Volume UV= 85,9 cu m/unit Total Volume V= 172 cu m Retention Time t= 6,2 min Mixing Hydraulic Mixing</p>
(3) Flocculator	<p>Criteria Retention Time T= 20-40 min Recirculation a= 3 % Required Volume V= 1.652 cu.m to 3.305 cu.m</p> <p>Unit Flow q= 13,4 cu m/min/basin</p> <p>Dimension 6 units Step 1 W m x L m x D m x No.of Channel 1,2 11,0 3,5 2 Step 2 W m x L m x D m x No.of Channel 1,6 11,0 3,5 2 Step 3 W m x L m x D m x No.of Channel 2,4 11,0 3,5 2</p> <p>Volume Step 1 92,4 cu m/unit Step 2 123,2 cu m/unit Step 3 184,8 cu m/unit Volume / Unit 400,4 cu m/unit</p> <p>Total Volume V= 2.402 cu m Retention Time 30,0 minutes</p>	<p>Criteria Retention Time T= 20-40 min Recirculation a= 3 % Required Volume V= 551 cu.m to 1.102 cu.m</p> <p>Unit Flow q= 13,4 cu m/min/basin</p> <p>Dimension 2 units Step 1 W m x L m x D m x No.of Channel 1,2 11,0 3,5 2 Step 2 W m x L m x D m x No.of Channel 1,6 11,0 3,5 2 Step 3 W m x L m x D m x No.of Channel 2,4 11,0 3,5 2</p> <p>Volume Step 1 92,4 cu m/unit Step 2 123,2 cu m/unit Step 3 184,8 cu m/unit Volume / Unit 400,4 cu m/unit</p> <p>Total Volume V= 801 cu m Retention Time 30,0 minutes</p>

Sri Lanka - Kandy Water Supply Project  
Capacity Calculation for Katugastota Treatment Plant Q=110,000 cu m/day

Item	Total System	First Stage
(4) Seddimentation Basin Type	Rectangular, Horizontal Flow	Rectangular, Horizontal Flow
Unit Flow	q = 826 cu m/hr/basin	q = 826 cu m/hr/basin
Criteria	Retention Time T = 2,5 hours Surface Load a = 15 - 30 mm/min Hor. Flow Velocity v < 0,40 m/min L/W Ratio L/W = 3 - 8 times Depth D = 3 - 4 m Depth of 30 cm or more is provided for sludge settlement.	Retention Time T = 2,5 hours Surface Load a = 15 - 30 mm/min Hor. Flow Velocity v < 0,40 m/min L/W Ratio L/W = 3 - 8 times Depth D = 3 - 4 m Depth of 30 cm or more is provided for sludge settlement.
Dimension	No. 6 basins W m x L m x D m x N 11 50 4,0 6	No. 2 basins W m x L m x D m x N 11 50 4,0 2
Volume	V = 2.200 cu m/basin	V = 2.200 cu m/basin
Retention Time	T = 2,7 hours	T = 2,7 hours
L/W Ratio	L/W = 4,5	L/W = 4,5
Surface Load	a = 25,0 mm/min	a = 25,0 mm/min
Hor. Flow Velocity	v = 0,313 m/min	v = 0,313 m/min
Overflow Weir Trough Length	Load = 500 m <sup>3</sup> /m/day L = 40 m or longer	Load = 500 m <sup>3</sup> /m/day L = 40 m or longer
	No. 11 troughs L m x N 3,0 11 L = 66,0 m	No. 11 troughs L m x N 3,0 11 L = 66,0 m
Sludge Removal	Cable-operated underwater bogie sludge collector or Travelling bridge sludge collector	Cable-operated underwater bogie sludge collector or Travelling bridge sludge collector
Sludge Amount Solid Amount (ton-DS)	So = Q * (K*(T1-T2)+B*156/666)*10 <sup>-6</sup> where So:Sludge dry weight(ton) Q :Treated water amount(m <sup>3</sup> /d) K :Coefficient converting turbidity to SS (0.8-1.5 ->1.2) T1 :Turbidity in raw water (ave = 20) T2 :Turbidity after Sedimentation ( ave = 0) B :Alum dosage rate (ave. = 15) B = 4 + 2 * ( T2 ) * 0.5 = 12,9 So = 3,18 ton-DS/day	So = 1,06 ton-DS/day
	Water Contents of Drained Sludge (with wash-out water) w = 98,0 %	Water Contents of Drained Sludge (with wash-out water) w = 98,0 %
	Frequency of Cleaning : Once a Month	Frequency of Cleaning : Once a Month
Sludge Volume	Total v = 4,767 cu.m/month So = 95 ton-DS/month Per tank v = 794 cu.m/basin/month So = 15,89 ton-DS/basin/month	Total v = 1,589 cu.m/month So = 32 ton-DS/month Per tank v = 794 cu.m/basin/month So = 15,89 ton-DS/basin/month

Sri Lanka - Kandy Water Supply Project  
Capacity Calculation for Katugastota Treatment Plant Q=110,000 cu m/day

Item	Total System	First Stage
(5) Rapid Sand Filter		
Type	Down Flow, Single Media	Down Flow, Single Media
No.	30 units (wash 3 unit)	10 units (wash 1 unit)
Unit Flow	q = 3.850 cu m/day/unit	q = 3.850 cu m/day/unit
Criteria	Filtration Rate Fr = 120 - 150 m/day = 5.0 - 6.25 m/hour Filter Area per Unit A < 150 sq m	Filtration Rate Fr = 120 - 150 m/day = 5.0 - 6.25 m/hour Filter Area per Unit A < 150 sq m
Dimension	W m x L m x N units 5,5 5,8 30 (10 filters/group)	W m x L m x N units 5,5 5,8 10 (10 filters/group)
	A = 31,9 sq m/unit	A = 31,9 sq m/unit
Filtration Rate	Fr = 120,7 m/day	Fr = 120,7 m/day
Filtration Rate during washing	Fr' = 134,1 m/day	Fr' = 134,1 m/day
Filters for Backwashing	3 units out of 30 are washing 7,0 filters/group	1 units out of 10 are washing 7,0 filters/group
Filter Washing Frequency	Once a day for each filter	Once a day for each filter
Rate	Surface Washing rate = 0,15 m <sup>3</sup> /m <sup>2</sup> /min duration = 5 min Backwashing rate = 0,65 m <sup>3</sup> /m <sup>2</sup> /min duration = 7 min	Surface Washing rate = 0,15 m <sup>3</sup> /m <sup>2</sup> /min duration = 5 min Backwashing rate = 0,65 m <sup>3</sup> /m <sup>2</sup> /min duration = 7 min
Water Amount for washing	Surface Washing Vs = 23,9 cu m/unit Backwashing Vb = 145,1 cu m/unit Vs + Vb = 169,1 cu m/unit	Surface Washing Vs = 23,9 cu m/unit Backwashing Vb = 145,1 cu m/unit Vs + Vb = 169,1 cu m/unit
for Total Units	Total Amount for Washing 5.072,1 cu m/day Percentage for Planned Flow 4,4 %	Total Amount for Washing 1.690,7 cu m/day Percentage for Planned Flow 4,4 %
Solid Amount in Wastewater (ton-DS)	So = Q*K*(T1-T2)*10 <sup>-6</sup> where So: Sludge dry weight(ton) Q :Treated water amount(m <sup>3</sup> /d) K :Coefficient converting turbidity to SS (0.8-1.5 -->1.2) T1 :Turbidity before filter(ave = 5) T2 :Turbidity after filter(ave = 0) So = 0,69 ton-DS/day	So = 0,23 ton-DS/day
SS Contents	s = 137 mg/l	s = 137 mg/l
(6) Chlorination Channel		
Location	at the Inlet of the Clear Water Reservoir	at the Inlet of the Clear Water Reservoir
Criteria	Contact Time T > 2 minutes	Contact Time T > 2 minutes
Required Volume	V = 160 cu m	V = 53 cu m
Dimension	No. 3 units L m x W m x D m m x N units 3,5 4,3 3,5 3	No. 1 units L m x W m x D m m x N units 3,5 4,3 3,5 1
Total Volume	v = 158 cu m	v = 53 cu m
Retention Time	t = 2,0 min	t = 2,0 min
(7) Clear Water Reservoir		
Criteria	Retention Time T > 1,0 hours	Retention Time T > 1,0 hours
Required Volume	V = 4.600 cu m	V = 1.500 cu m
Dimension	No. 6 units L m x W m x D m m x N units 21,0 22,5 3,5 3	No. 2 units L m x W m x D m m x N units 21,0 22,5 3,5 1
Total Volume	V = 4.961 cu m	V = 1.654 cu m
Retention Time	T = 1,08 hours	T = 1,08 hours

Sri Lanka - Kandy Water Supply Project  
Capacity Calculation for Katugastota Treatment Plant Q=110,000 cu m/day

Item	Total System	First Stage		
(8) Alum Dissolving Tank Coagulant	Solid Aluminum Sulphate (Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> ) containing 15 % Al <sub>2</sub> O <sub>3</sub>			
	Criteria	Dosage Rate : 10-60 mg-solid alum/l Average 15 mg/l Coagulant Solution : 10 % sg = 1,0525 Retention Time 24 hours Dissolving Time 2 hours	Dosage Rate : 10-60 mg-solid alum/l Average 15 mg/l Coagulant Solution : 10 % sg = 1,0525 Retention Time 24 hours Dissolving Time 2 hours	
	Dosage Amount Coagulant Solution	Wt = 1.733 kg-Alum/day V = 16,5 cu m/day	Wt = 578 kg-Alum/day V = 5,5 cu m/day	
	Solution Tank Dimension	Square 6 units L m x W m x D m x units 1,7 1,7 1,5 6	Square 2 units L m x W m x D m x units 1,7 1,7 1,5 2	
	Total Volume Retention Time	V = 26,0 cu m T = 37,9 hours	V = 8,7 cu m T = 37,9 hours	
	Storage	Period 30 days Bulk s. g. 0,60	Period 30 days Bulk s. g. 0,60	
	Storage Area	A = 43 m <sup>2</sup> at 2,0 m height	A = 14 m <sup>2</sup> at 2,0 m height	
	(9) Lime Dissolving Tank pH Control	Hydrated Lime (Ca(OH) <sub>2</sub> ) containing 72 % CaO		
		Criteria	Dosage Rate : 10-40 mg-solid Lime/l Requirement 5,2 mg/l Average 10 mg/l Lime Solution 10 % sg = 1,0607 Retention Time 24 hours Dissolving Time 2 hours	Dosage Rate : 10-40 mg-solid Lime/l Requirement 5,2 mg/l Average 10 mg/l Lime Solution 10 % sg = 1,0607 Retention Time 24 hours Dissolving Time 2 hours
		Dosage Amount Coagulant Solution	Wt = 1.155 kg-Alum/day V = 10,9 cu m/day	Wt = 385 kg-Alum/day V = 3,6 cu m/day
Solution Tank Dimension		Square 6 units L m x W m x D m x units 1,5 1,5 1,5 6	Square 4 units L m x W m x D m x units 1,5 1,5 1,5 2	
Total Volume Retention Time		V = 20,3 cu m T = 44,6 hours	V = 6,8 cu m T = 44,6 hours	
Storage		Period 30 days Bulk s. g. 0,40	Period 30 days Bulk s. g. 0,40	
Storage Area		A = 43 m <sup>2</sup> at 2,0 m height	A = 14 m <sup>2</sup> at 2,0 m height	

Sri Lanka - Kandy Water Supply Project  
Capacity Calculation for Kalugastota Treatment Plant Q=110,000 cu m/day

Item	Total System	First Stage
(10) Chlorination Equipment		
Injection Point	at the Inlet of Clear Water Reservoir and outlet of Sedimentation Basin	at the Inlet of Clear Water Reservoir and outlet of Sedimentation Basin
Type	Liquid Chlorine (900 kg cylinder)	Liquid Chlorine (900 kg cylinder)
Criteria	Dosage Rate : 7,0 mg-Cl/l Average 3,0 mg/l	Dosage Rate : 7,0 mg-Cl/l Average 3,0 mg/l
Dosage Amount	Wt = 347 kg-Cl gas/day or 14 kg-Cl gas/hour	Wt = 116 kg-Cl gas/day or 5 kg-Cl gas/hour
Chlorinator No. of unit	Vacuum Type 3 units (excl. 1 unit stand-by)	Vacuum Type 1 units (excl. 1 unit stand-by)
Rate	4,81 kg/hour/unit	4,81 kg/hour/unit
Operation Rate	60 percent	60 percent
Capacity	8 kg/hour/unit	8 kg/hour/unit
Storage Period	30 days	30 days
Storage Area	A = 24 m <sup>2</sup> as 2,0 m <sup>2</sup> /container	A = 9 m <sup>2</sup> as 2,0 m <sup>2</sup> /container
(11) Backwash Wastewater Storage Tank		
Retention Time	1 hours	1 hours
Backwash Water	Vs + Vb = 169 cu.m/filter unit	Vs + Vb = 169 cu.m/filter unit
Required Volume	3 filters 507 cu.m	1 filters 169 cu.m
No.	N = 2 units	N = 2 units
Dimension	L m x W m x D m m x N units 11,0 x 8,0 x 3,0 2	L m x W m x D m m x N units 11,0 x 8,0 x 3,0 2
Total Volume	v = 528 cu m	v = 528 cu m
Frequency of Wash	Once a day = 30 filters/day	Once a day = 10 filters/day
(12) Surface Wash Water Pump		
No. of Pump	N = 3 units + 1 for stand-by	N = 1 units + 1 for stand-by
Required Capacity	TQ = 14,4 cu m/min	TQ = 4,8 cu m/min
Capacity per Unit	Q = 4,8 cu m/min/unit	Q = 4,8 cu m/min/unit
Specification	Capacity Q = 4,8 cu m/min Diameter D = 200 mm Head H = 30 m Motor Output P = 36 kW	Capacity Q = 4,8 cu m/min Diameter D = 200 mm Head H = 30 m Motor Output P = 36 kW
(13) Backwash Water Recycle Pump		
No. of Pump	N = 3 units + 1 for stand-by	N = 1 units + 1 for stand-by
Required Capacity	TQ = 3,5 cu m/min	TQ = 1,2 cu m/min
Capacity per Unit	Q = 1,2 cu m/min/unit	Q = 1,2 cu m/min/unit
Specification	Capacity Q = 1,2 cu m/min Diameter D = 100 mm Head H = 20 m Motor Output P = 6 kW	Capacity Q = 1,2 cu m/min Diameter D = 100 mm Head H = 20 m Motor Output P = 6 kW

## Appendix 6.4 Drawing

### Drawing List

No.	Drawing Name
W.1- 1	Layout of Intake Facilities
W.1- 2	Intake Facilities
W.2- 1	Hydrolic Profile of Water Treatment
W.2- 2	Receiving Well and Backwash
W.2- 3	Flocculation basin and Sedimentation Basin
W.2- 4	Rapid Sand Filter and Clear Water Reservoir
W.3- 1	Kahalla Service Reservoir
W.3- 2	Kurugoda Service Reservoir
W.3- 3	Kulugamma Service Reservoir
W.3- 4	Primrose Service Reservoir
W.3- 5	Heerassagala(Low) Service Reservoir
W.3- 6	Heerassagala(middle) Service Reservoir
W.3- 7	Heerassagala(upper) Service Reservoir
W.3- 8	Hantana Place Service Reservoir
W.3- 9	Upland Service Reservoir
W.3-10	Asgiriya Service Reservoir
W.3-11	Elhena Service Reservoir
W.3-12	Mullepihilla Service Reservoir
W.3-13	Water Bridge

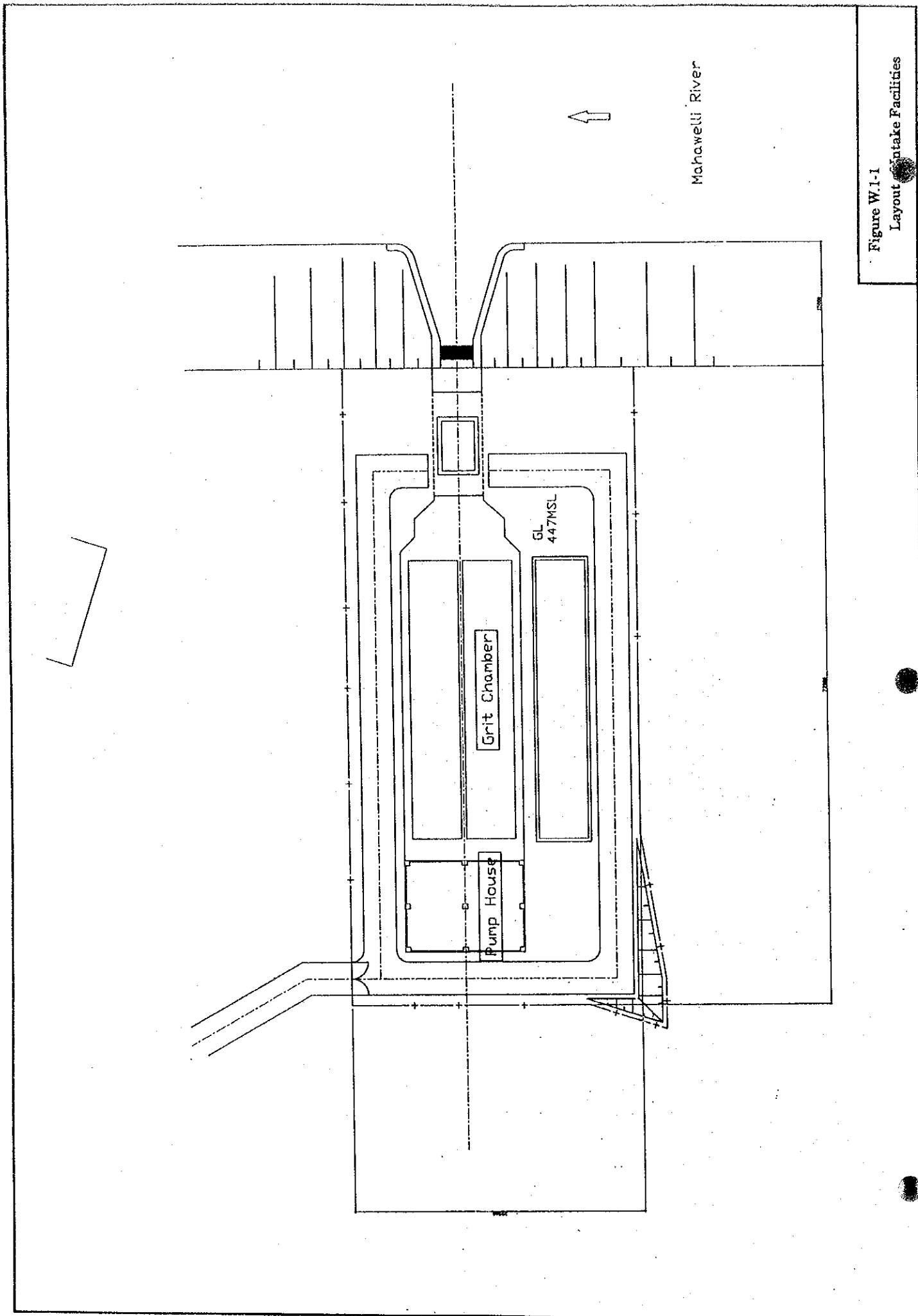


Figure W.1-1  
Layout of Intake Facilities



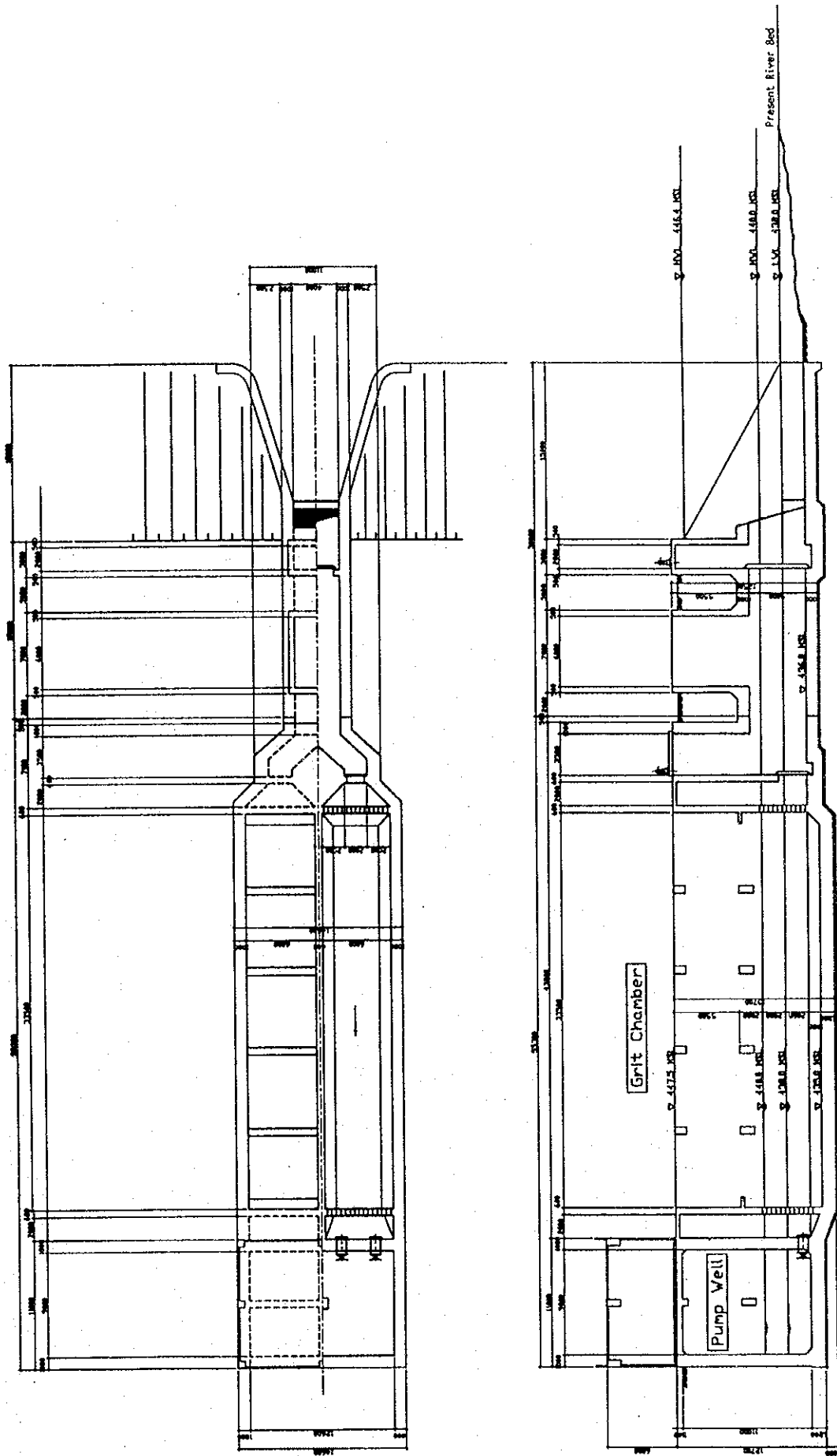


Figure W.1-2  
Intake Facilities

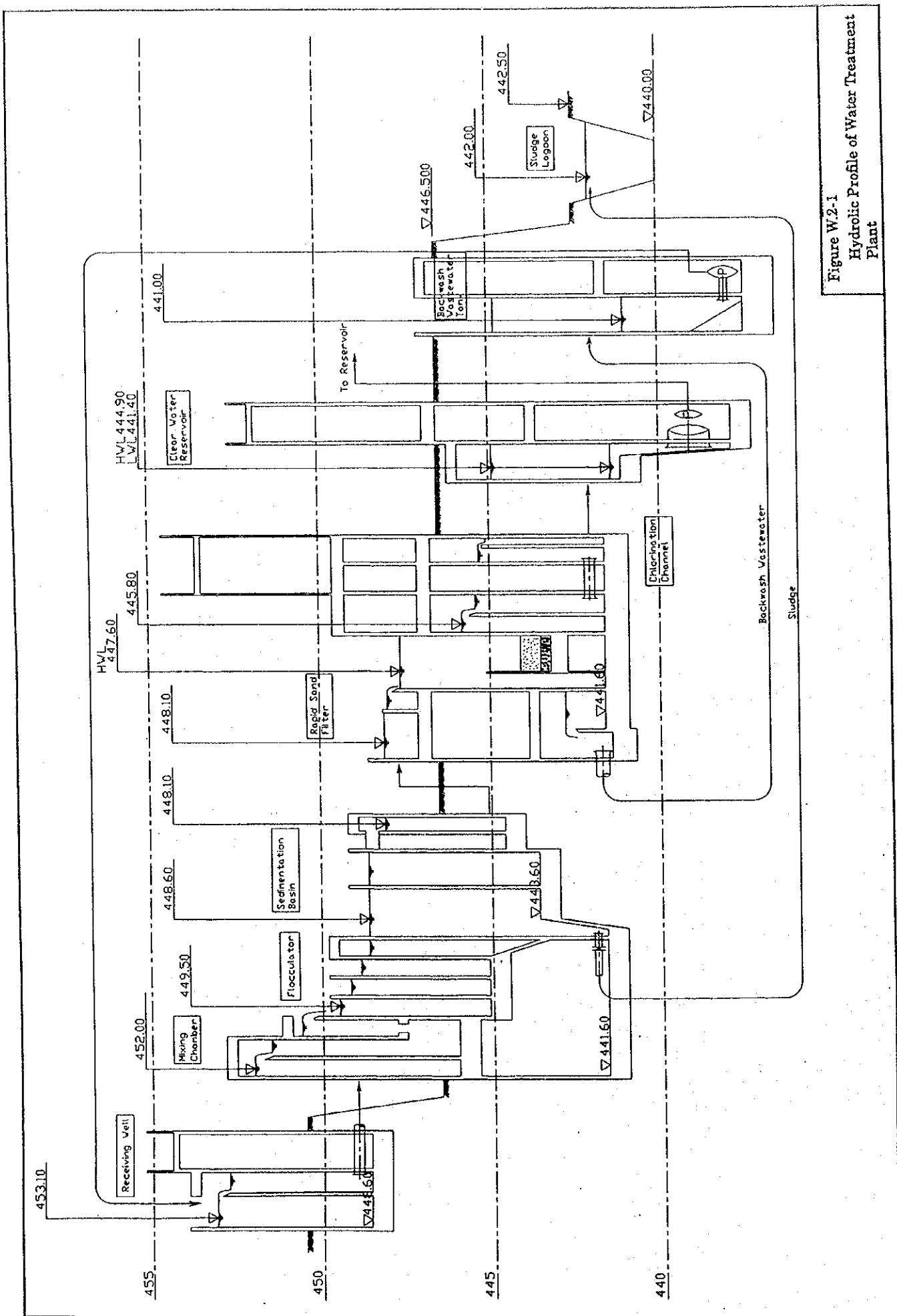
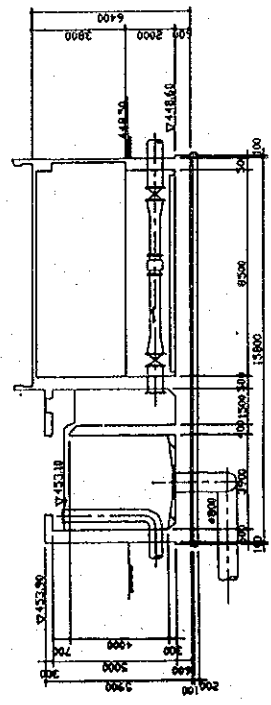
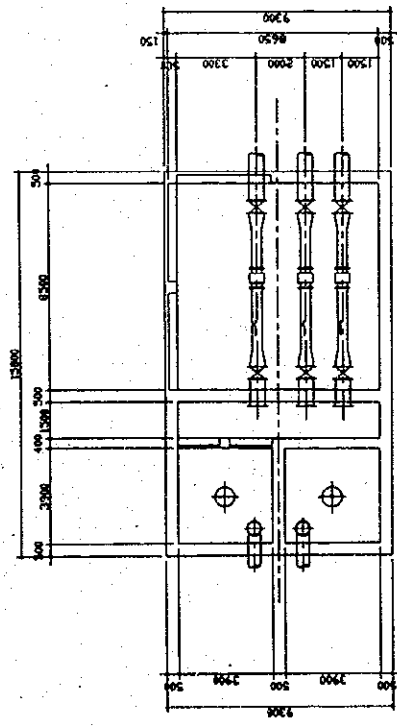
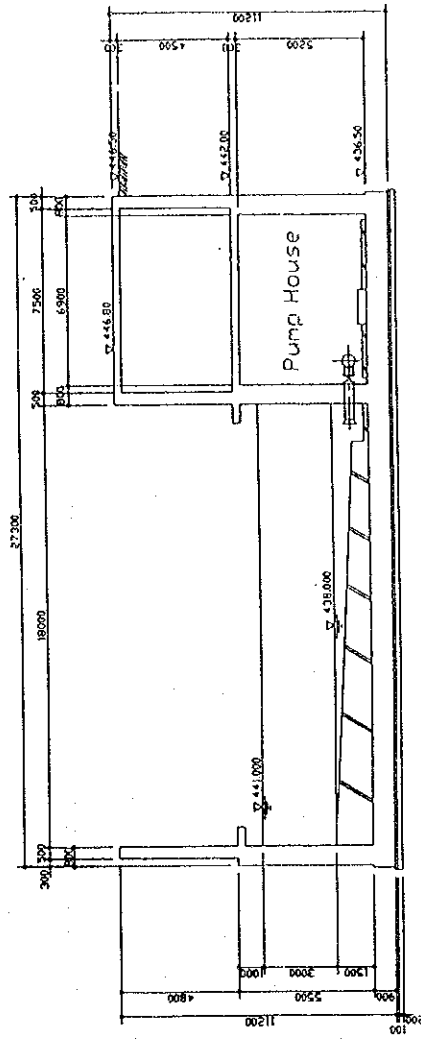
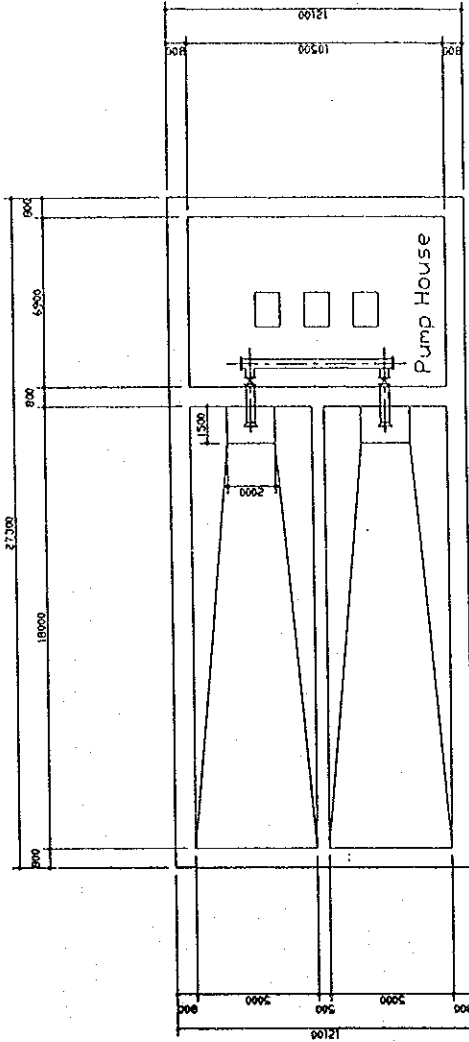


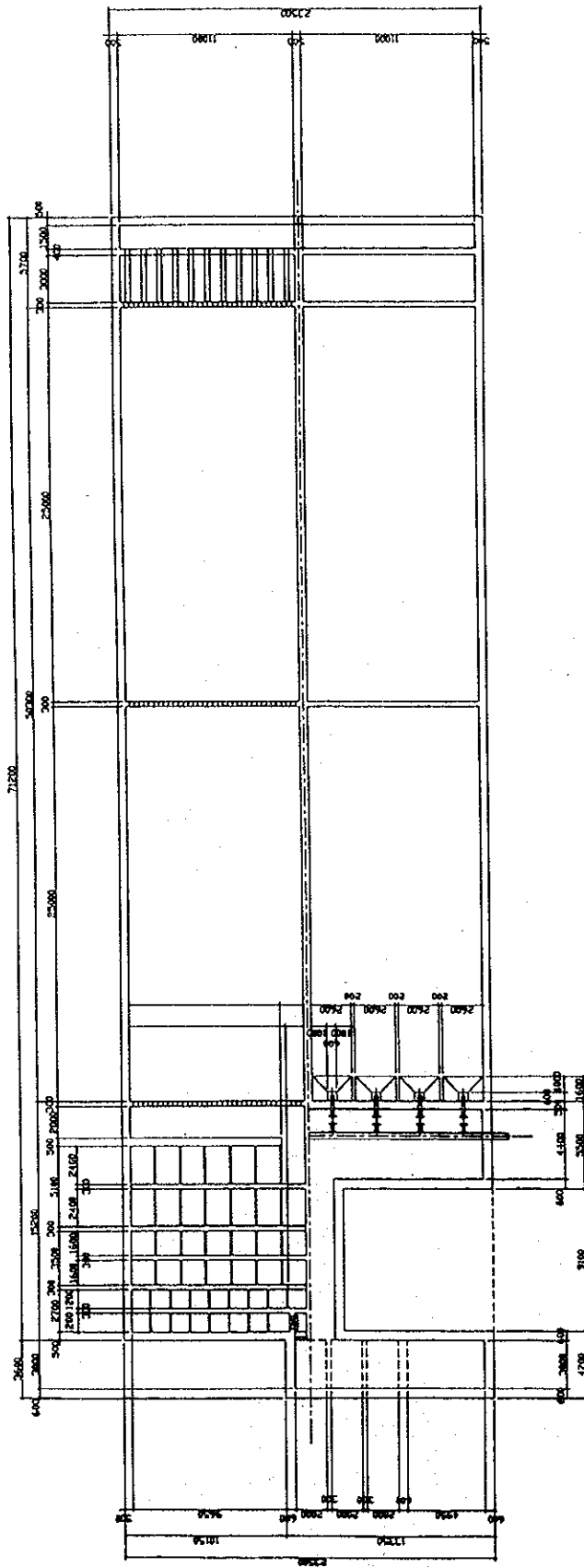
Figure W.2-1  
Hydraulic Profile of Water Treatment Plant



Backwash Wastewater Storage Tank

Receiving Well

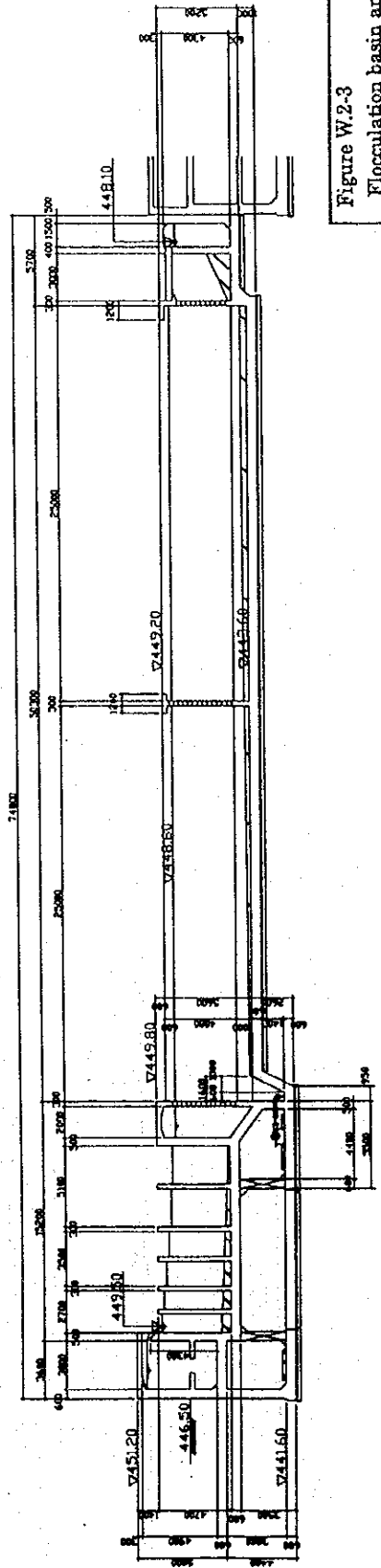
Figure W.2-2  
Receiving Well and Backwash  
Water Recycle Tank

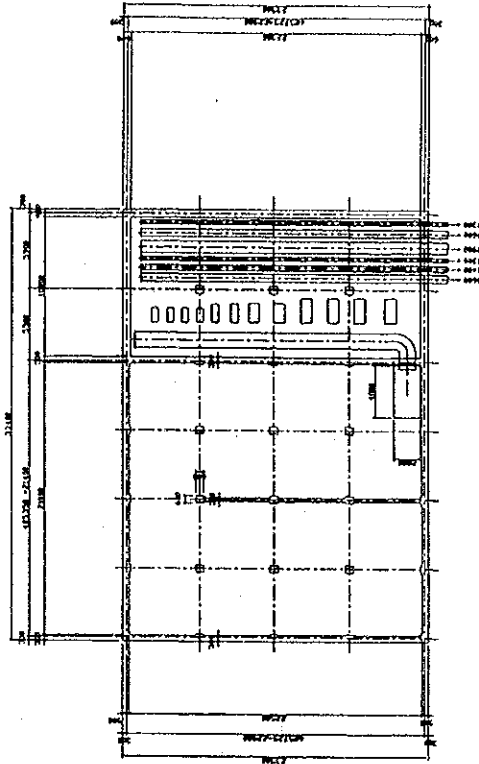


Mixing Chamber

Flocculator

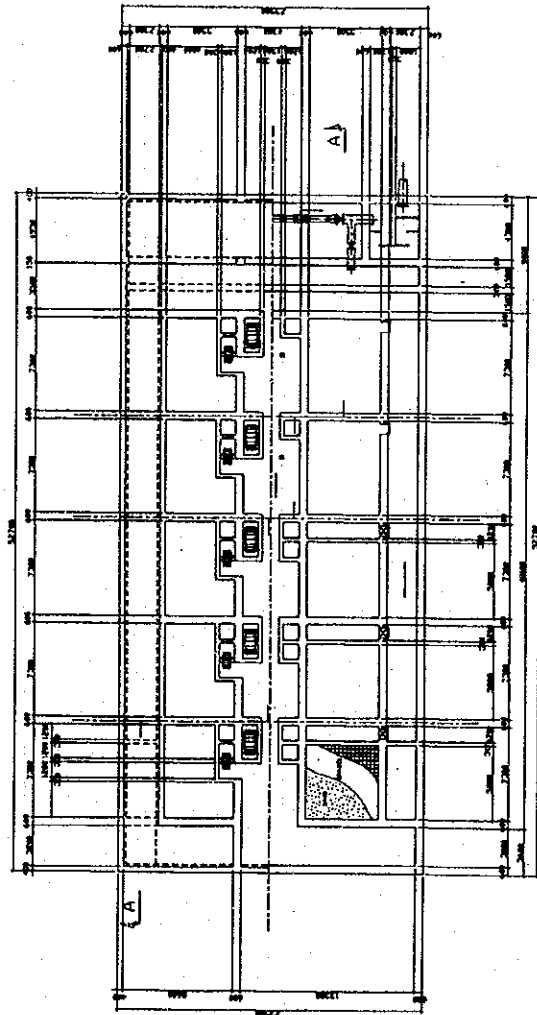
Sedimentation Basin





Clear Water Reservoir

Pump House



A-A Section

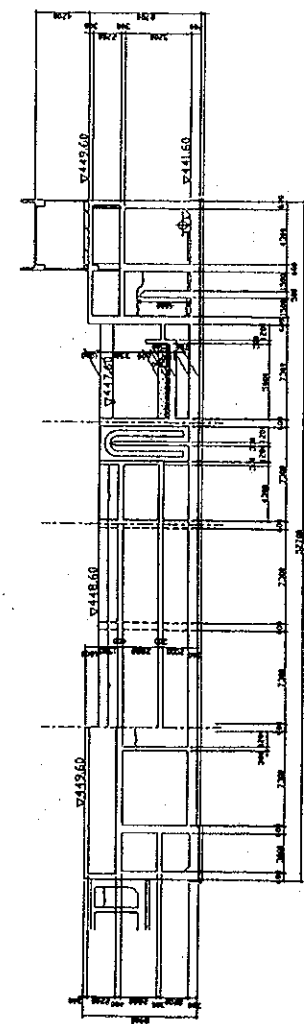
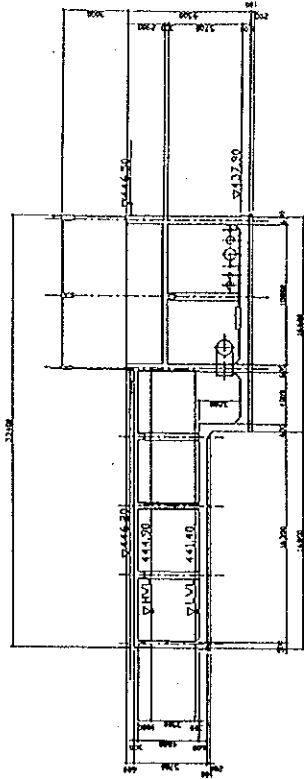


Figure W.2-4  
Rapid Sand Filter and Clear Water Reservoir

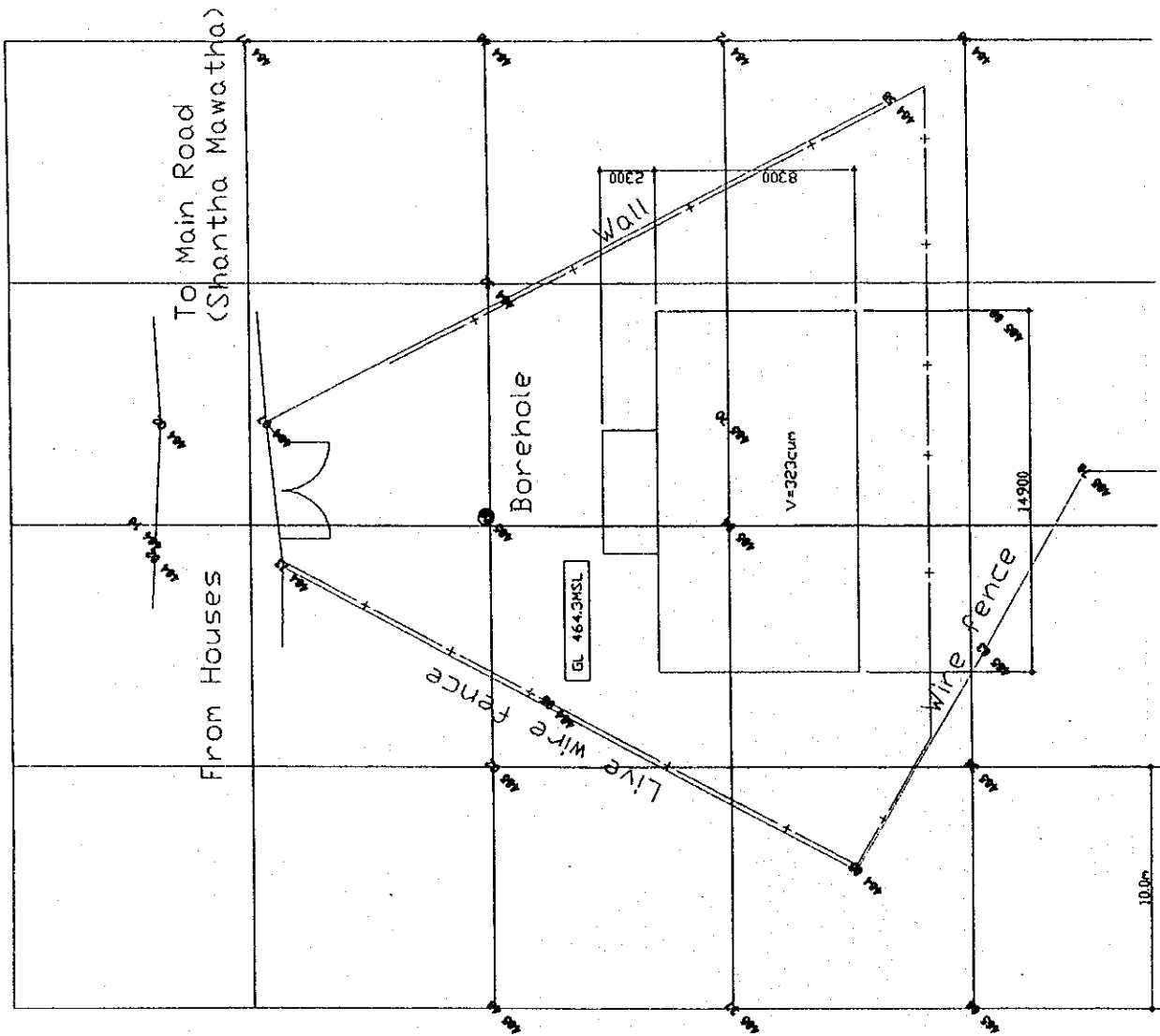
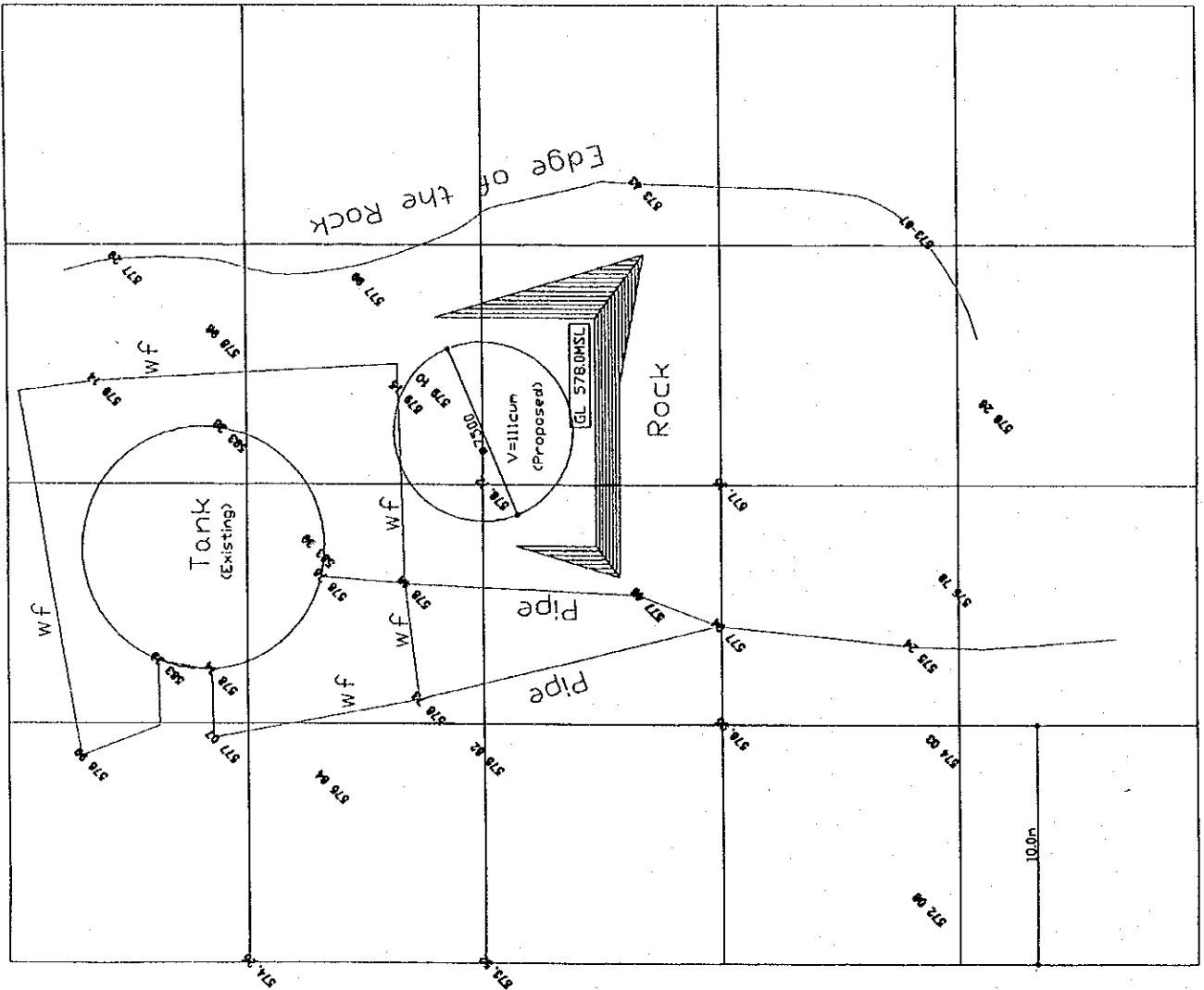


Figure W.3-1  
Kahalla Service Reservoir











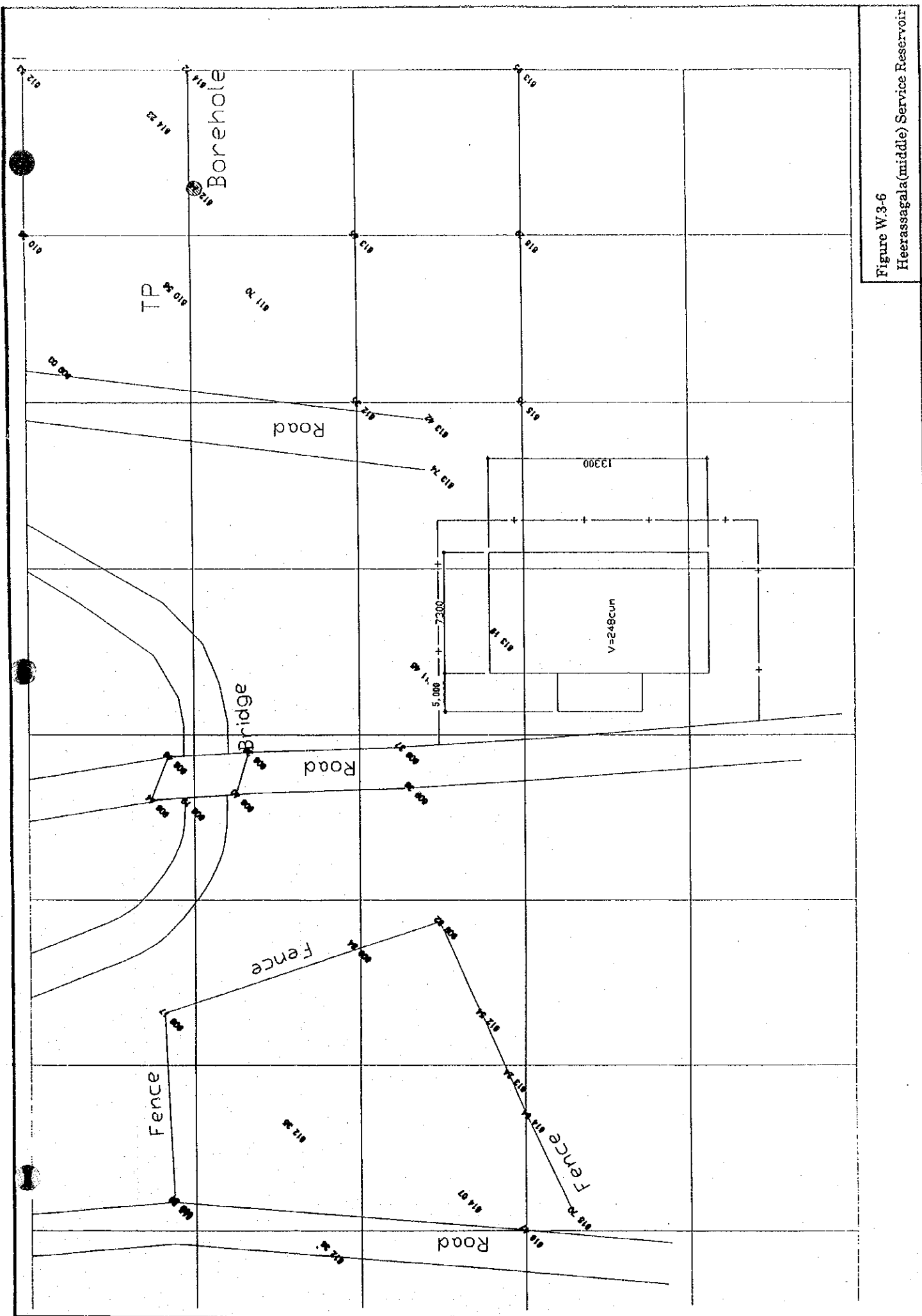


Figure W.3-6  
Heerassagala(middle) Service Reservoir

Figure W.3-7  
Heerassagala (near) Service Reservoir

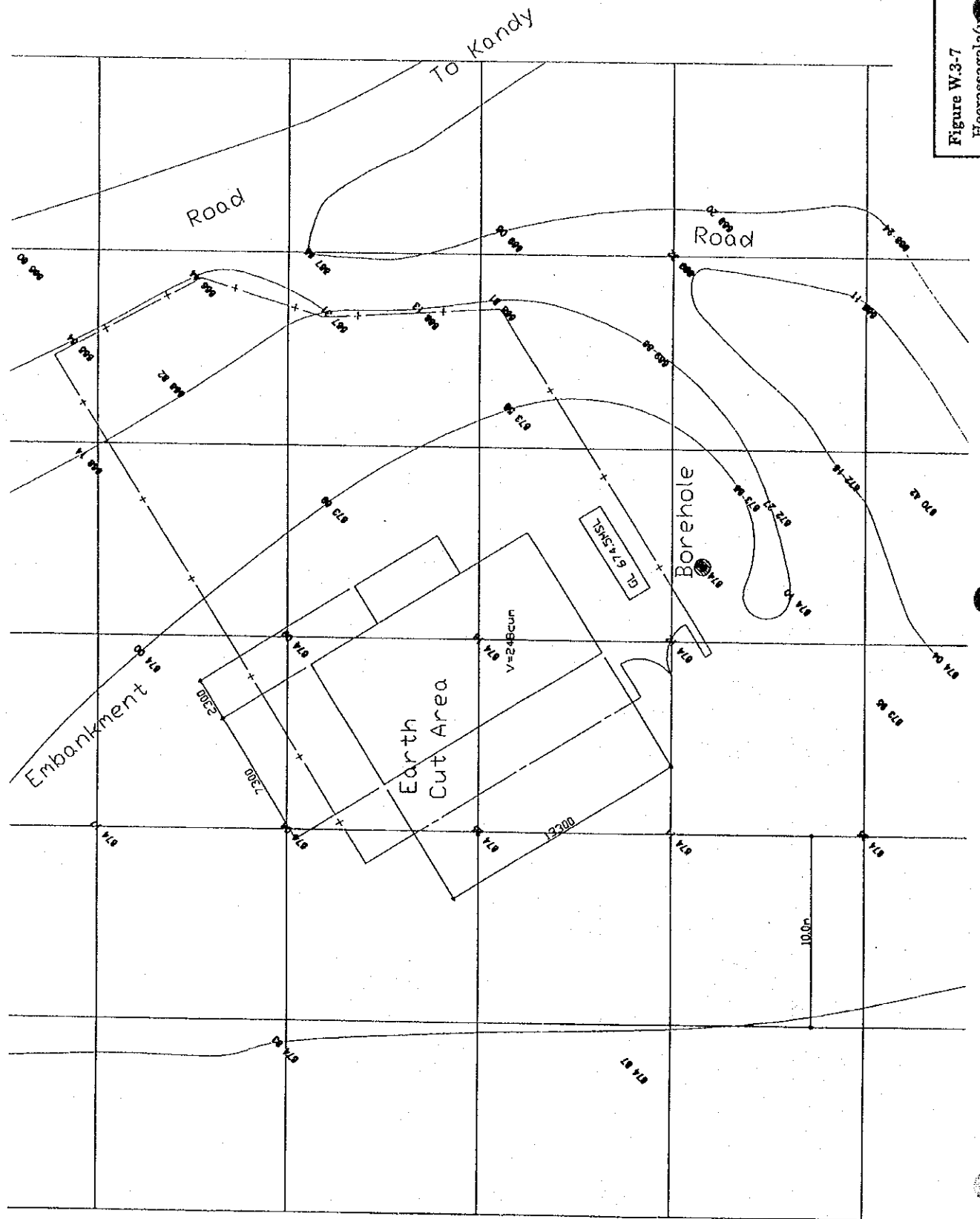
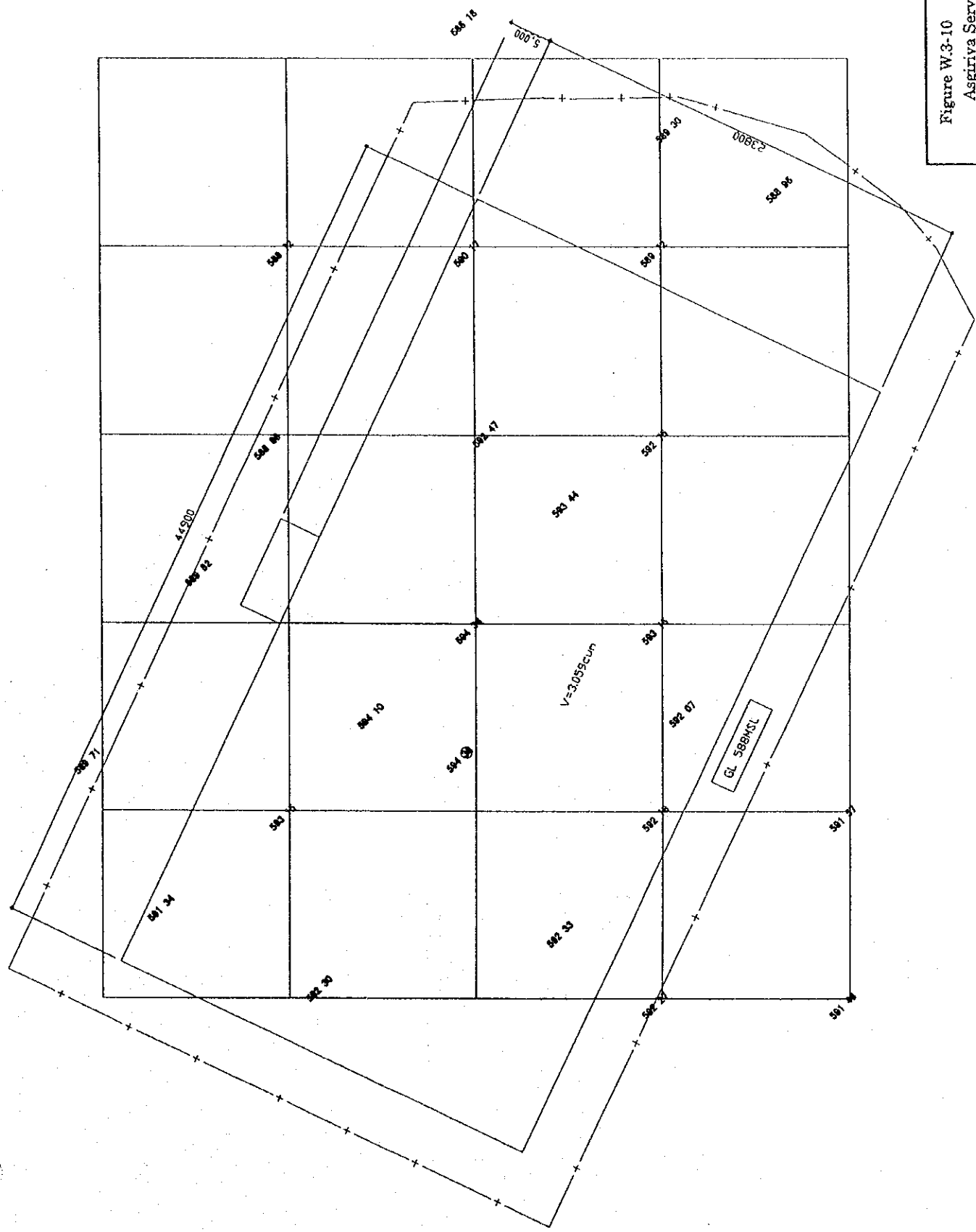
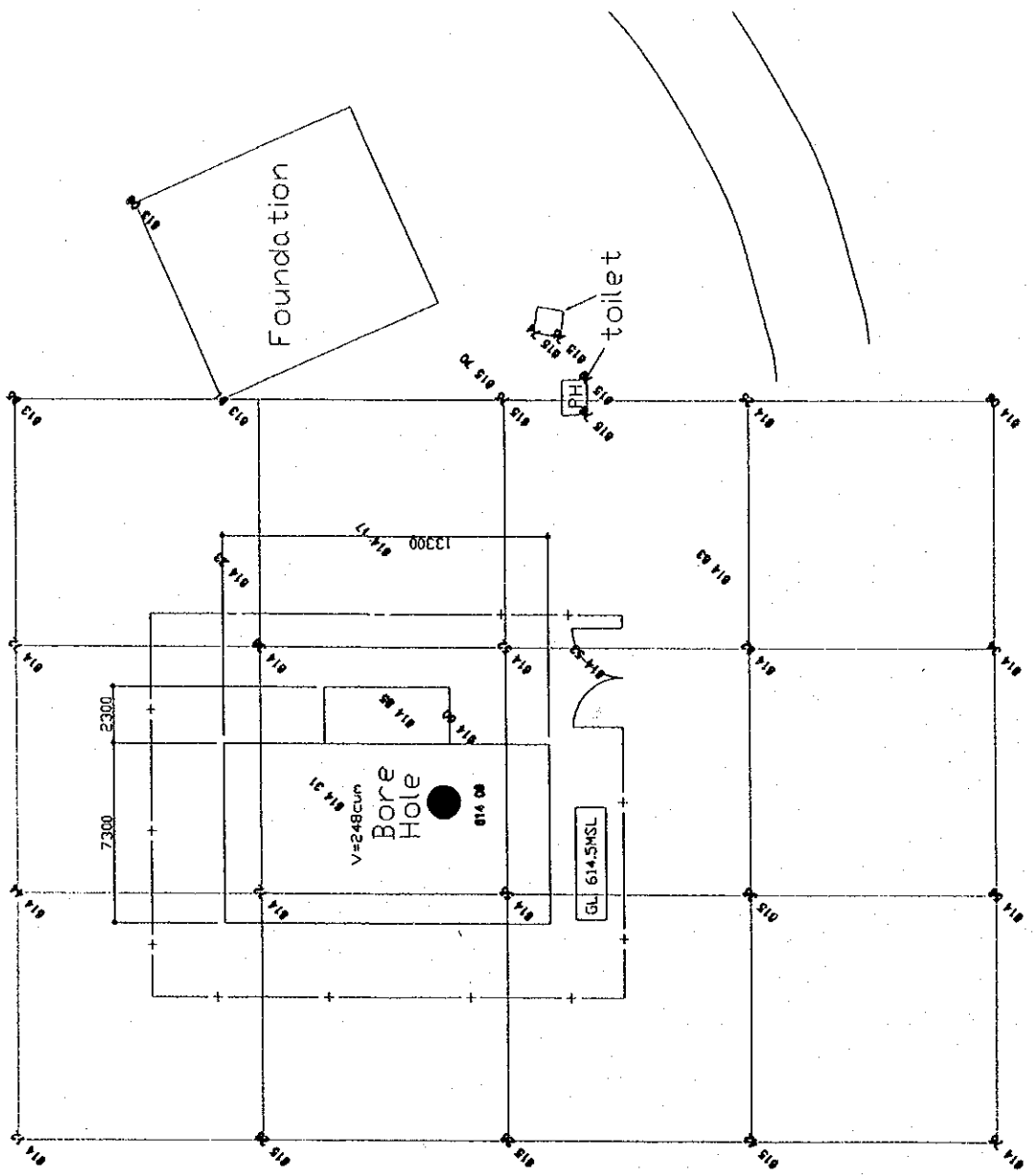






Figure W.3-10  
Asgriya Service Reservoir







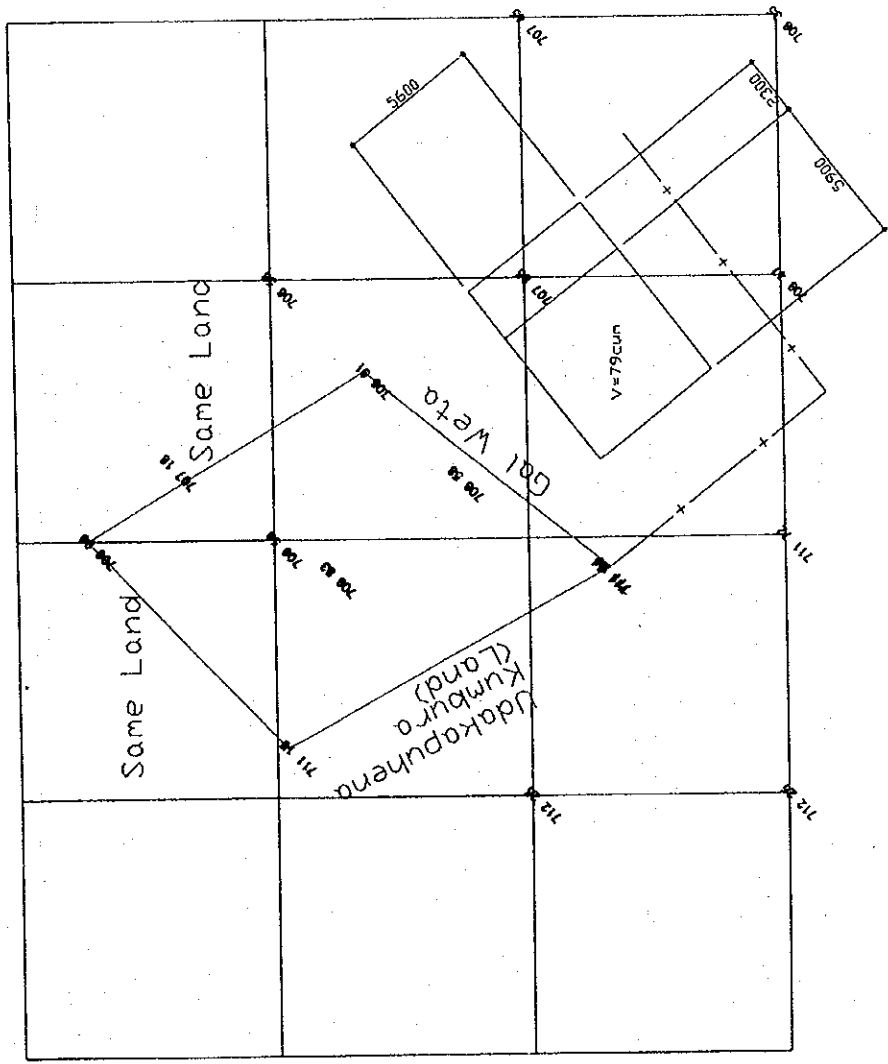


Figure W.3-12  
Mullepihilla Service Reservoir

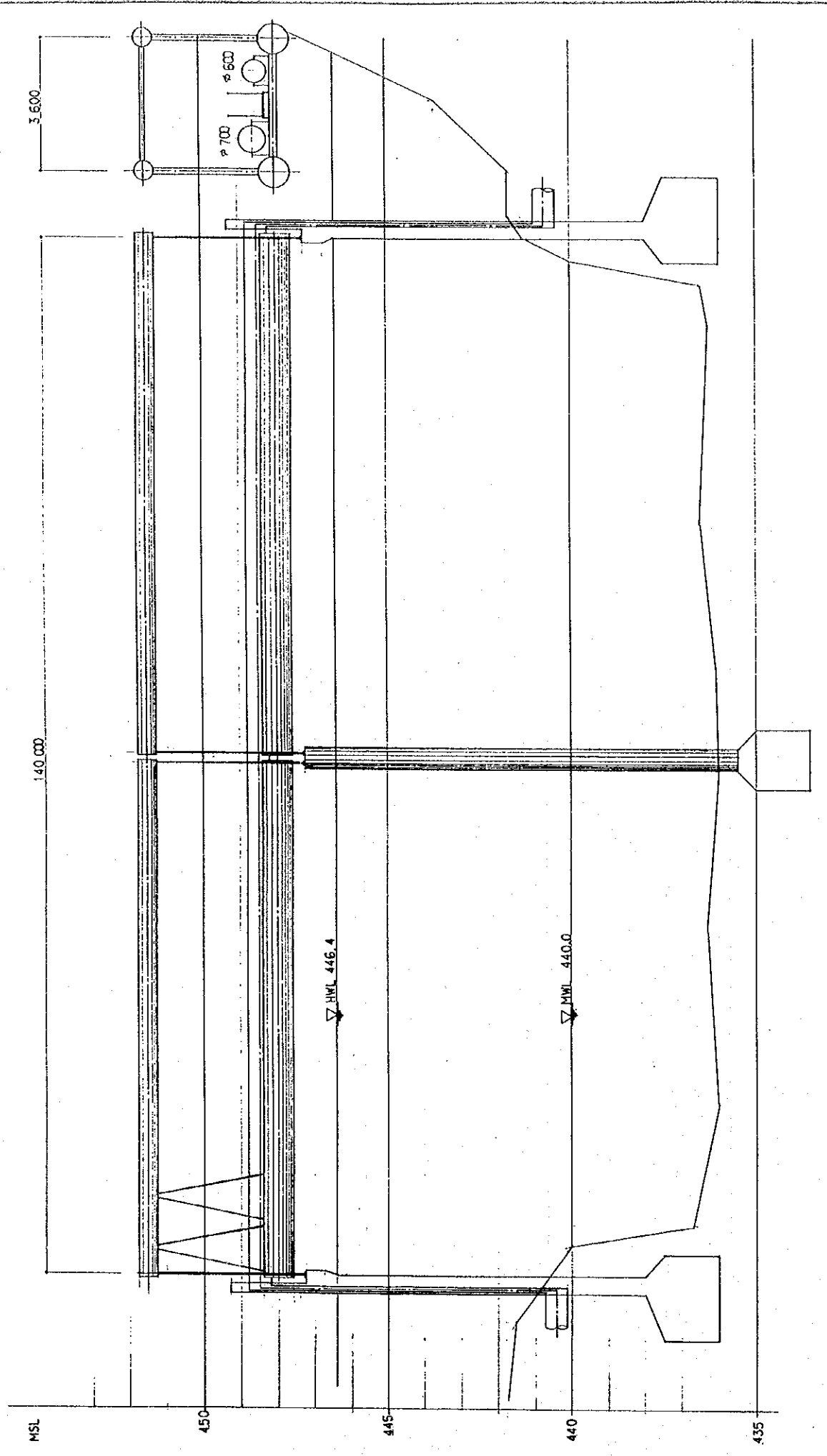


Figure W.3-13  
Wagon Bridge

## **Chapter 7**

### **Appendix 7.1 Annual Operation and Maintenance Cost**

Appendix 7.1 Annual Operation and Maintenance Cost

Kandy 2015YEAR

Kandy Option A

Item	Electrical			Chemical kg/d	Man-Power Rs/month	Spare Parts Cost	Total Rs/year
	hrs	kW	kWh				
1. Intake							
Intake Pump	20	1.122	22.440		3,096.720	3,096.940	
Excavation(Labor*60%)							3,59,600.000
2. W.T.P.							
W.T.P.	20	3.101	62.020		8,558.760	8,558.980	
				1.793	623.880		
				1.155	563.479		
				347	318.026		
3. Transmission							
Pump	20	998	19,960		6,160	2,760,640	
				231	211.712		
4. Labor							
				30	20,000	600,000	
				2	30,000	60,000	
5. Maintenance							
Manager/Engineer				1	50,000	30,000	
Total					1,517,096	710,000	2,443,866
							19,087,522
							20,250,258

Kandy 2010YEAR

Kandy Option A

Item	Electrical			Chemical kg/d	Man-Power Rs/month	Spare Parts Cost	Total Rs/year
	hrs	kW	kWh				
1. Intake							
Intake Pump	20	748	14,960		2,064.480	2,064.700	
Excavation(Labor*60%)							263,440.000
2. W.T.P.							
W.T.P.	20	2,067	41,347		5,705.840	5,706,060	
				1,155	415.920		
				770	242,319		
				231	212,017		
3. Transmission							
Pump	20	665	13,300		6,160	1,832,400	
				154	141,141		
4. Labor							
				25	20,000	500,000	
				2	30,000	60,000	
5. Maintenance							
Manager/Engineer				1	50,000	50,000	
Total					1,011,397	610,000	1,692,196
							12,925,913
							156,310,956

Kandy 2005YEAR

Kandy Option A

Item	Electrical			Chemical kg/d	Man-Power Rs/month	Spare Parts Cost	Total Rs/year
	hrs	kW	kWh				
1. Intake							
Intake Pump	20	374	7,480		1,032.240	1,032.460	
Excavation(Labor*60%)							167,270.000
2. W.T.P.							
W.T.P.	20	1,034	20,673		2,852.920	2,853,140	
				578	267,960		
				385	121,160		
				116	106,009		
3. Transmission							
Pump	20	339	6,660		6,160	919,080	
				77	70,571		
4. Labor							
				20	20,000	400,000	
				2	30,000	60,000	
5. Maintenance							
Manager/Engineer				1	50,000	50,000	
Total					505,699	510,000	947,598
							6,774,137
							82,489,638

## **Chapter 11**

**Appendix 11.1 Population in Sewerage Service Area**

**Appendix 11.2 Sewage Flow in Hanthana Housing  
Scheme (1998.5.20)**

**Appendix 11.3 Peak Factor  
(Hourly Maximum / Maximum Daily)**

**Appendix 11.4 Sewage Flow Calculation**



**Appendix 11.1 Population in Sewerage Service Area**

No.	ID GN	All Area					S.A. 1997	M/P Service Area (2015)			M/P Service Area (2005)			F/S Service Area (2005)		
		Area(ha)	Families	Popula tion	Size	Density (pe/ha)		Area (ha)	Density	Popula tion	Area (ha)	Density	Popula tion	Area (ha)	Density	Popula tion
1	K 0220	61.8	279	1,180	4.23	19.1	714	37.4	24	891	37.4	21	795	15.3	21	325
2	K 0221	59.6	470	2,705	5.76	45.4										
3	K 0222	101.8	375	1,365	3.64	13.4	687	51.3	17	859	51.3	15	766	10.2	15	152
4	K 0223	38.9	488	2,342	4.80	60.2										
5	K 0224	33.4	295	1,575	5.34	47.2										
6	K 0225	60.2	364	1,375	3.78	22.8										
7	K 0226	33	275	2,998	10.90	90.8										
8	K 0227	79.2	283	2,784	9.84	35.2										
9	K 0228	31.8	383	1,382	3.61	43.5										
10	K 0229	74.6	330	1,505	4.56	20.2	610	30.2	25	760	30.2	22	678			
11	K 0230	39.9	293	1,505	5.14	37.7										
12	K 0231	52.4	285	1,896	6.65	36.2										
13	K 0232	109.8	235	1,363	5.80	12.4										
14	K 0233	60.5	298	2,000	6.71	33.1	434	13.1	41	540	13.1	37	482			
15	K 0234	40.1	312	2,100	6.73	52.4	728	13.9	65	909	13.9	58	810			
16	K 0235	61.4	361	2,990	8.28	48.7	1,524	31.3	61	1,902	31.3	54	1,697	9.1	54	493
17	K 0236	40.7	433	2,627	6.07	64.5	1,554	24.1	81	1,941	24.1	72	1,732			
18	K 0237	63.5	467	1,690	3.62	26.6										
19	K 0238	114.3	452	886	1.96	7.8										
20	K 0239	41.7	465	3,440	7.40	82.5	1,889	22.9	103	2,358	22.9	92	2,103	8.6	92	790
21	K 0240	22.9	527	8,500	16.13	371.2	3,898	10.5	463	4,864	10.5	413	4,339	10.5	413	4,339
22	K 0241	19.2	315	1,206	3.83	62.8										
23	K 0243	33.2	337	2,008	5.96	60.5	2,009	33.2	75	2,506	33.2	67	2,235			
24	K 0244	63.2	525	3,575	6.81	56.6										
25	K 0245	99.4	566	3,820	6.75	38.4	50	1.3	48	62	1.3	43	56			
26	K 0246	107.3	379	3,118	8.23	29.1										
27	K 0248	129.8	354	806	2.28	6.2										
28	K 0250	26.1	376	3,560	9.47	136.4										
29	K 0251	31.1	427	4,215	9.87	135.5	4,214	31.1	169	5,261	31.1	151	4,692			
30	K 0252	26.6	393	3,028	7.70	113.8	706	6.2	142	881	6.2	127	786	6.2	127	786
31	K 0253	296.7	315	1,487	4.72	5.0	123	24.5	6	153	24.5	6	137	6.9	6	38
32	K 0254	86.6	367	2,165	5.90	25.0	1,183	47.3	31	1,476	47.3	28	1,316	36.3	28	1,010
33	K 0255	40.4	436	2,782	6.38	68.9	2,784	40.4	86	3,472	40.4	77	3,097	7.3	77	560
34	K 0256	41.4	457	2,075	4.54	50.1	2,555	51	63	3,190	51	56	2,846			0
35	K 0257	57.7	526	4,500	8.56	78.0	3,713	47.6	97	4,633	47.6	87	4,133	47.6	87	4,133
36	K 0258	47.2	354	2,412	6.81	51.1	3,470	67.9	64	4,331	67.9	57	3,863	35.5	57	2,020
37	K 0259	178.6	381	1,900	4.99	10.6										
38	K 0260	85.9	315	4,005	12.71	46.6	862	18.5	58	1,077	18.5	52	960			
39	K 0261	26.3	587	3,150	5.37	119.8	2,660	22.2	150	3,319	22.2	133	2,960	22.2	133	2,960
40	K 0262	27.8	318	2,537	7.98	91.3	1,853	20.3	114	2,312	20.3	102	2,062	7.5		762
41	K 0263	121.3	372	1,160	3.12	9.6	170	17.7	12	211	17.7	11	188	17.7	11	188
42	K 0264	59.6	183	1,260	6.89	21.1	633	30	26	792	30	24	706	30	24	706
43	K 0265	31.2	192	3,120	16.25	100.0	1,560	15.6	125	1,947	15.6	111	1,737			
44	K 0266	17.7	242	2,817	11.64	159.2	2,404	15.1	199	2,999	15.1	177	2,675			
	Han.H.S			1,069						1,334			1,190			
	Total	2,875.80	16,387	108,914	6.65	ave 60	42,987	724.60	ave 76	54,980	724.60	ave 68	49,041	270.90	ave 71	19,262

Annual population Increase Ratio (1997-2000) 1.016  
 (2000-2010) 1.012  
 (2010-2015) 1.011

**Appendix 11.2-1 Sewage Flow in Hantana Housing Scheme (1998.5.20)**

No: Houses  
 Total 335  
 High elevated zone 55  
 Low elevated zone 188

Vacant 81  
 Living 254

81 254  
 12 43

Time		Sewage Flow			98/05/20
From	To	High		Low	Aggregate (m <sup>3</sup> )
		Plant (m <sup>3</sup> )	Pump house (m <sup>3</sup> )	Total m <sup>3</sup> /day	
1	2	1.24	0.19	1.42	1.4
2	3	1.03	0.11	1.14	2.6
3	4	1.01	0.07	1.08	3.6
4	5	1.67	0.00	1.67	5.3
5	6	2.59	0.93	3.52	8.8
6	7	5.28	2.60	7.88	16.7
7	8	9.32	4.09	13.41	30.1
8	9	6.91	1.30	8.21	38.3
9	10	4.29	1.86	6.15	44.5
10	11	2.29	1.11	3.40	47.9
11	12	3.75	1.49	5.23	53.1
12	13	2.93	2.04	4.98	58.1
13	14	3.18	0.74	3.92	62.0
14	15	3.83	0.93	4.76	66.8
15	16	2.55	1.41	3.96	70.7
16	17	3.48	1.37	4.85	75.6
17	18	3.28	1.11	4.39	80.0
18	19	4.27	1.67	5.94	85.9
19	20	4.94	1.11	6.06	92.0
20	21	5.02	1.49	6.51	98.5
21	22	3.95	0.93	4.88	103.4
22	23	3.38	0.74	4.12	107.5
23	24	2.27	0.56	2.82	110.3
24	1	2.07	0.56	2.62	112.9
Sewage Flow (m <sup>3</sup> /day)		84.5	28.4	112.9	

Water Supply (m<sup>3</sup>/day) 44% 256.9

Population 904

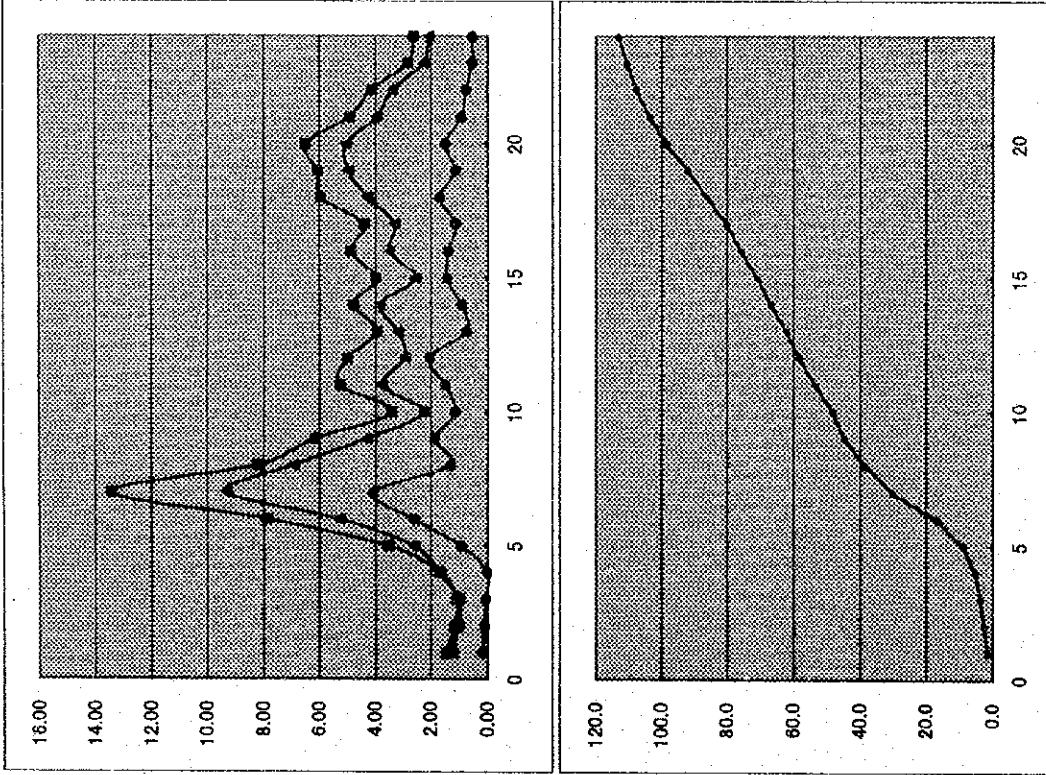
Ipod 93.5

Peak 2.65

165 1065

172.3 106.0

3.45 2.85





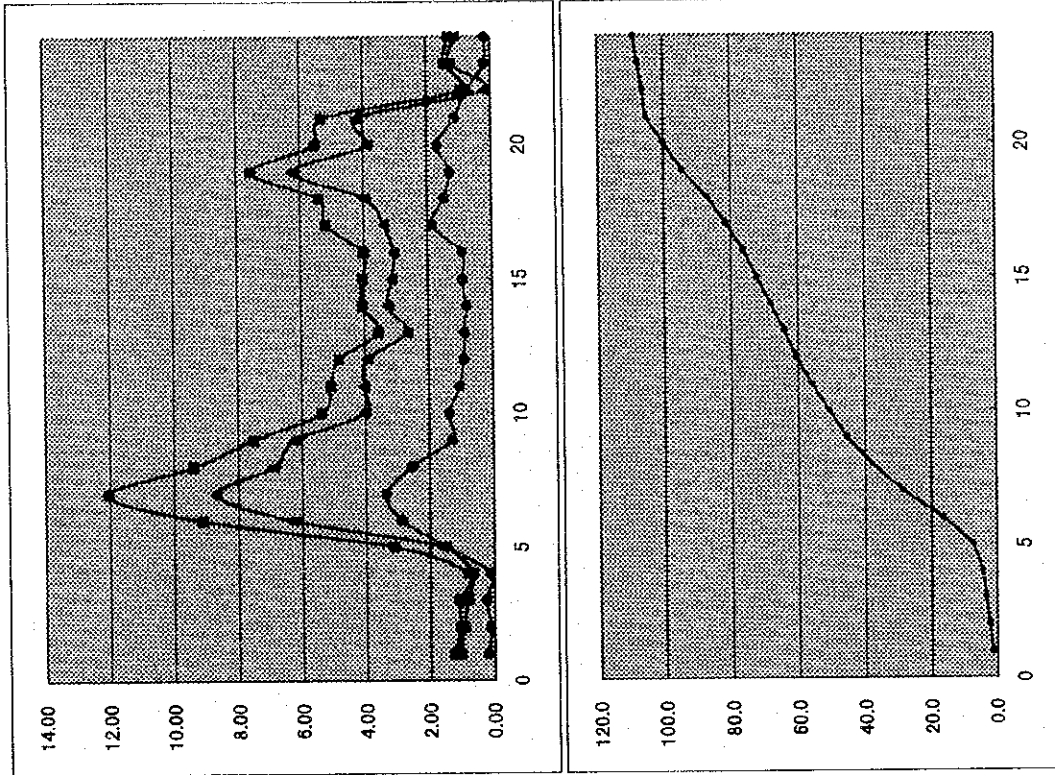
**Appendix 11.2-2 Sewage Flow in Hantana Housing Scheme (1998.7.30)**

No: Houses Total Vacant Living  
 High elevated zone 364 50 314  
 Low elevated zone 61 8 53

Time		Sewage Flow			1998/7/30		
From	To	High Plant (m <sup>3</sup> )	Low Pump house (m <sup>3</sup> )	Total m <sup>3</sup> /day	Aggregate (m <sup>3</sup> )		
1	2	1.07	0.19	1.26	1.3		
2	3	0.95	0.11	1.06	2.3		
3	4	0.84	0.26	1.10	3.4		
4	5	0.70	0.11	0.81	4.2		
5	6	1.62	1.49	3.10	7.3		
6	7	6.26	2.86	9.12	16.4		
7	8	8.69	3.34	12.04	28.5		
8	9	6.86	2.53	9.39	37.9		
9	10	6.22	1.50	7.52	45.4		
10	11	3.99	1.37	5.36	50.8		
11	12	4.03	1.04	5.07	55.8		
12	13	3.91	0.89	4.80	60.6		
13	14	2.65	0.89	3.54	64.2		
14	15	3.24	0.82	4.05	68.2		
15	16	3.11	0.93	4.04	72.3		
16	17	3.06	0.93	3.98	76.2		
17	18	3.35	1.86	5.21	81.5		
18	19	3.93	1.49	5.41	86.9		
19	20	6.25	1.30	7.55	94.4		
20	21	3.84	1.67	5.51	99.9		
21	22	4.20	1.11	5.32	105.2		
22	23	0.18	0.74	0.93	106.2		
23	24	1.26	0.19	1.45	107.6		
24	1	1.13	0.19	1.31	108.9		
Sewage Flow (m <sup>3</sup> /day)				81.3	27.6	108.9	
Water Supply (m <sup>3</sup> /day)						212.1	51%

Water Supply (m<sup>3</sup>/day)

Population 904  
 Lpcd 90.0  
 Peak 2.57



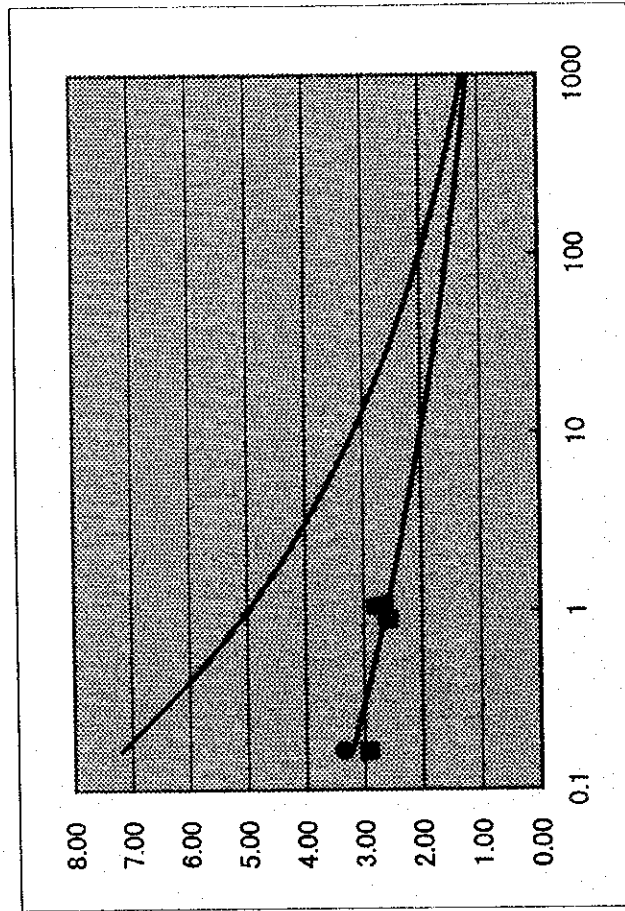
### Appendix 11.3 Peaking Factor (Hourly Maximum/Daily Maximum)

Population (x 10 <sup>3</sup> )	Sewage (m <sup>3</sup> /day)	I	II	Actual 1	Actual 2	Factor
0.165	46	7.17	3.20	3.34	2.91	2.00
0.5	139	5.74	2.82			
1	277	5.00	2.60			
0.904	250	5.10	2.63	2.59	2.57	
1.069	296	4.93	2.58	2.79	2.65	
2	554	4.35	2.40			1.80
3	831	4.01	2.29			
4	1,108	3.79	2.22			
5	1,385	3.62	2.16			
10	2,770	3.15	2.00			
20	5,540	2.75	1.84			
30	8,310	2.53	1.76			
40	11,080	2.39	1.70			
50	13,850	2.29	1.66			
60	16,620	2.20	1.62			
70	19,390	2.14	1.60			1.50
80	22,160	2.08	1.57			
90	24,930	2.03	1.55			
100	27,700	1.99	1.53			
150	41,550	1.84	1.46			
200	55,400	1.73	1.41			
250	69,250	1.66	1.38			
300	83,100	1.60	1.35			

Calculation

I:  $M = 5 / P^{0.2}$  (Babbit Factor - M)

II:  $M = 2.6 / P^{0.115}$  (Hantana)



## Appendix 11.4 Sewage Flow Calculation

### Sri Lanka - Kandy

#### 1. Population by Year

No.	ID GN	Name	Area (ha)	Population				
				1997	2000	2005	2010	2015
1	K 0220	Boowelikada	25.4	485	509	540	573	605
2	K 0222	Lewella	16.3	218	229	243	258	273
3	K 0235	Asgiriya	20.8	1,013	1,062	1,127	1,196	1,263
4	K 0239	Mahaiyawa	11.6	957	1,004	1,066	1,132	1,196
5	K 0240	Pumawatta	15.5	5,754	6,035	6,406	6,800	7,182
6	K 0243	Mulgampola	33.2	2,009	2,107	2,236	2,373	2,506
7	K 0245	Bowala	49.1	1,885	1,977	2,099	2,228	2,353
8	K 0251	Senkadagala	31.1	4,214	4,420	4,692	4,980	5,260
9	K 0252	Ampitiya North	7.8	888	931	988	1,049	1,108
10	K 0253	Ampitiya South	9.8	49	51	54	57	60
11	K 0254	Malwatta	47.3	1,183	1,241	1,317	1,398	1,477
12	K 0255	Katukele	40.4	2,784	2,920	3,099	3,289	3,474
13	K 0256	Katukele West	41.4	2,074	2,175	2,309	2,451	2,589
14	K 0257	Kandy	44.5	3,471	3,640	3,864	4,101	4,332
15	K 0258	Ihala Katukele	47.2	2,412	2,530	2,685	2,850	3,010
16	K 0260	Welata	34.4	1,603	1,681	1,784	1,894	2,000
17	K 0261	Deiyannewela	26.3	3,151	3,305	3,508	3,724	3,933
18	K 0262	Nagastenna	27.8	2,538	2,662	2,826	3,000	3,169
19	K 0263	Hantanapedesa	51	490	514	546	580	613
20	K 0264	Bogambara	44.5	939	985	1,046	1,110	1,172
21	K 0265	Suduhumpola East	31.2	3,120	3,272	3,473	3,686	3,893
22	K 0266	Suduhumpola West	17.7	2,818	2,955	3,137	3,330	3,517
Total			674.30	44,055	46,205	49,045	52,059	54,985

Annual population Increase Ratio (1997-2000) 1.016

(2000-2010) 1.012

(2010-2015) 1.011

#### 2. Scheme of Per Capita Domestic Supply Water

(Design Average Daily Flow)

Unit: Lpcd

	1997	2000	2005	2010	2015
Domestic Water Supply	98	101	108	115	121

#### 3. Non-Domestic Water Consumption in KMC (Design Average Daily Flow)

Unit: m<sup>3</sup>/d

Year	1997	2005	2015
Tourist, Hotel, Guest House	560	730	920
Commercial, Institutionals	5,690	7,430	9,330
Religious, Premices, Schools	910	1,180	1,480
Industories	50	70	90
Total	7,210	9,410	11,820



## **Chapter 12**

**Appendix 12.1 Design Calculation for Sewage  
Treatment Plant**

**Appendix 12.2 Sewer Network Hydraulic Analysis**

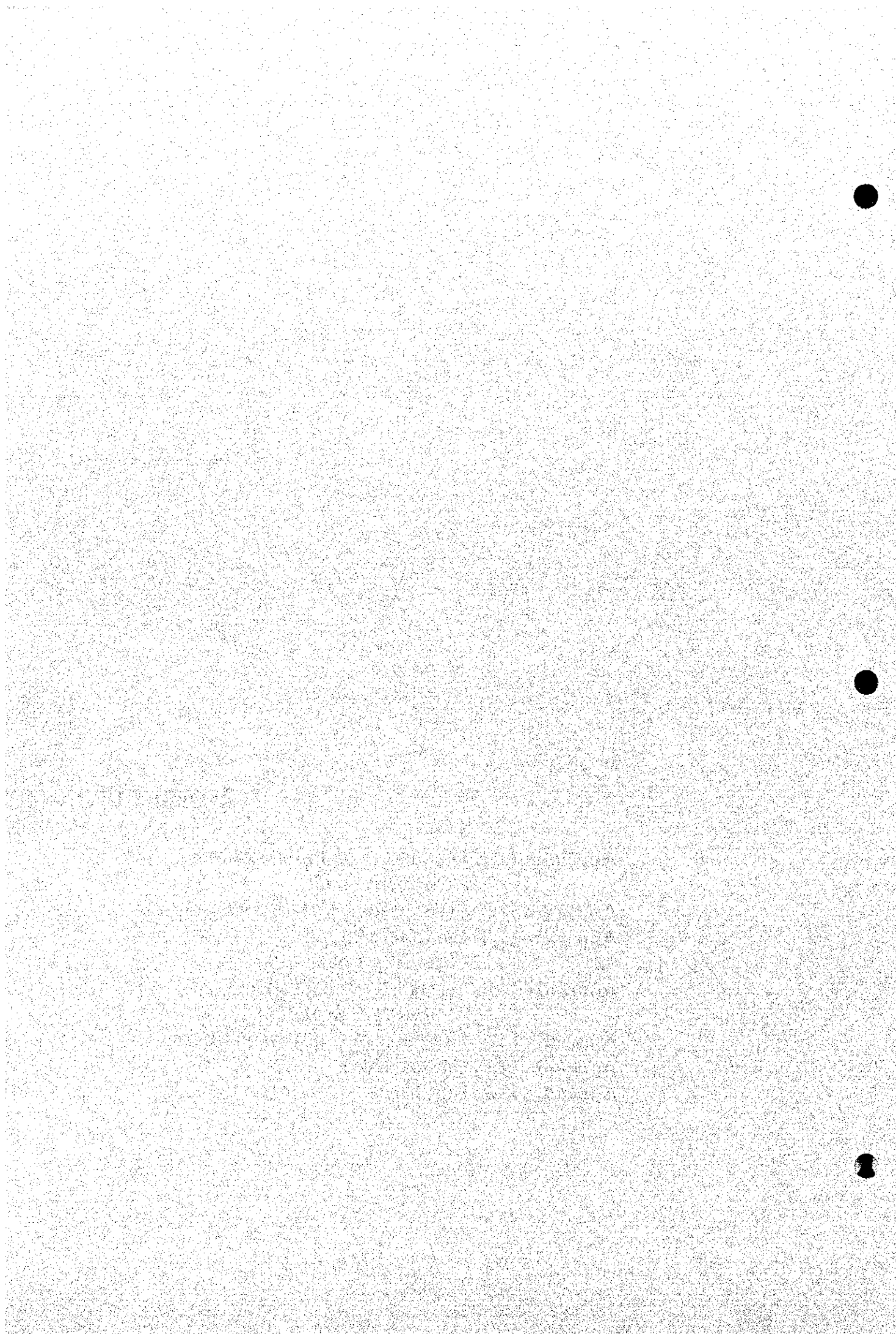
**Appendix 12.3 Pumping Station  
- Capacity Calculation**

**Appendix 12.4 Sewage Treatment Plant  
- Capacity Calculation**

**Appendix 12.5 Summary of Construction Cost**

**Appendix 12.6 Cost of Sewer**

**Appendix 12.7 Unit Cost**



# Appendix 12.1 Design Calculation for Sewage Treatment Plant

Treatment Method	Subaeration Pond	Aerated Lagoon (Dual Power)	Trickling Filter	Oxidation Ditch
1 Design Criteria	<p><b>Flow</b></p> <p><b>Design Flow</b></p> <p>Daily Average: 15,200 m<sup>3</sup>/day</p> <p>Daily Maximum: 18,000 m<sup>3</sup>/day</p> <p>Hourly Maximum: 25,600 m<sup>3</sup>/day</p> <p><b>Load</b></p> <p>Influent - BOD<sub>5</sub> Load: 3,648 kg-BOD<sub>5</sub>/day</p> <p>Influent - SS Load: 3,800 kg-BOD<sub>5</sub>/day</p>	<p><b>Water Quality - Influent</b></p> <p>BOD<sub>5</sub>: 240 mg/l</p> <p>SS: 250 mg/l</p> <p><b>Removal Rate</b></p> <p>BOD<sub>5</sub>: 88 %</p> <p>SS: 80 %</p> <p><b>Water Quality - Effluent</b></p> <p>BOD<sub>5</sub>: 30 mg/l</p> <p>SS: 50 mg/l</p>		
2 Flow Diagram	<p>(Inlet) ↓</p> <p>Screen &amp; Grit Chamber ↓</p> <p>Anaerobic Pond ↓</p> <p>Facultative Pond ↓</p> <p>Maturation Pond ↓</p> <p>(Outlet)</p>	<p>(Inlet) ↓</p> <p>Screen &amp; Grit Chamber ↓</p> <p>Complete Mixing Lagoon ↓</p> <p>Partial Mixing Lagoon ↓</p> <p>Disinfection Tank ↓</p> <p>(Outlet)</p>	<p>(Inlet) ↓</p> <p>Screen &amp; Grit Chamber ↓</p> <p>Oxidation Ditch ↓</p> <p>Primary Sedimentation Tank ↓</p> <p>First Thickening Filter ↓</p> <p>Second Thickening Filter ↓</p> <p>Final Sedimentation Tank ↓</p> <p>Disinfection Tank ↓</p> <p>Sludge Thickening Tank ↓</p> <p>Sludge Digestion Tank ↓</p> <p>Sludge Drying Bed ↓</p> <p>(Outlet)</p>	<p>(Inlet) ↓</p> <p>Screen &amp; Grit Chamber ↓</p> <p>Oxidation Ditch ↓</p> <p>Sedimentation Tank ↓</p> <p>Disinfection Tank ↓</p> <p>(Outlet) ↓</p> <p>Sludge Thickening Tank ↓</p> <p>Sludge Drying Bed ↓</p>
3 Outline of Major Facilities	<p>1) Grit Chamber</p> <p>Type: Plug Flow, Rectangular</p> <p>Dimension: L = 7.2 m, W = 1.0 m, D = 1.0 m</p> <p>Number (2-standby): 3 units</p> <p>Surface Area: 22 m<sup>2</sup></p> <p>Surface Load: 1,778 m<sup>3</sup>/m<sup>2</sup>/day</p> <p>2) Anaerobic Pond</p> <p>Type: Rectangular</p> <p>BOD<sub>5</sub> Volumetric Load = 290.00 kg-BOD<sub>5</sub>/m<sup>3</sup>/day (at 23.6 °C)</p> <p>BOD Removal = 50 %</p> <p>BOD<sub>5</sub> Effluent Dimension: L = 120.0 m, W = 50.0 m, D = 4.0 m</p> <p>Number (1-standby): 4 units</p> <p>Surface Area: 8,000 m<sup>2</sup></p> <p>Volume: 32,000 m<sup>3</sup></p> <p>Retention Time: 1.05 days</p>	<p>1) Grit Chamber</p> <p>Type: Plug Flow, Rectangular</p> <p>Dimension: L = 7.5 m, W = 1.0 m, D = 1.0 m</p> <p>Number (2-standby): 3 units</p> <p>Surface Area: 23 m<sup>2</sup></p> <p>Surface Load: 1,707 m<sup>3</sup>/m<sup>2</sup>/day</p> <p>2) Complete Mixing Aerated Lagoon</p> <p>Type: Rectangular</p> <p>Dimension: L = 38.0 m, W = 60.0 m, D = 3.0 m</p> <p>Number: 4 units</p> <p>Surface Area: 9,120 m<sup>2</sup></p> <p>Capacity: 27,360 m<sup>3</sup></p> <p>Retention Time: 1.52 days</p> <p>Aerator Power: 162.0 kW</p> <p>Oxygen Supply: 141.9 kW</p> <p>Absorption: 162.0 kW</p>	<p>1) Grit Chamber</p> <p>Type: Plug Flow, Rectangular</p> <p>Dimension: L = 7.5 m, W = 1.0 m, D = 1.0 m</p> <p>Number (1-standby): 3 units</p> <p>Surface Area: 23 m<sup>2</sup></p> <p>Surface Load: 1,707 m<sup>3</sup>/m<sup>2</sup>/day</p> <p>2) Primary Sedimentation Tank</p> <p>Type: Circular Tank</p> <p>Dimension: L = 11.0 m dia., D = 3.0 m</p> <p>Number: 4 units</p> <p>Surface Area: 484 m<sup>2</sup></p> <p>Surface Load: 47.4 m<sup>3</sup>/m<sup>2</sup>/day</p> <p>Volume: 85.5 m<sup>3</sup></p> <p>Retention Time: 1.5 hours</p>	<p>1) Grit Chamber</p> <p>Type: Plug Flow, Rectangular</p> <p>Dimension: L = 7.2 m, W = 1.0 m, D = 1.0 m</p> <p>Number (1-standby): 3 units</p> <p>Surface Area: 22 m<sup>2</sup></p> <p>Surface Load: 1,778 m<sup>3</sup>/m<sup>2</sup>/day</p> <p>2) Oxidation Ditch</p> <p>Type: Circular Channel</p> <p>Dimension: L = 300.0 m, W = 6.0 m, D = 3.0 m</p> <p>Number: 4 units</p> <p>Surface Area: 7,200 m<sup>2</sup></p> <p>Volume: 21,600 m<sup>3</sup></p> <p>Retention Time: 28.8 hours</p> <p>Oxygen Supply: 360 kg-O<sub>2</sub>/hr</p> <p>Aerator Power: 190 kW</p> <p>Sludge Age: 19.2 day</p>

Treatment Method	Stabilization Pond	Aerated Lagoon (Dial Power)	Trickling Filter	Oxidation Ditch
3 Outline of Major Facilities	<p>3) Facultative Pond</p> <p>Type: Rectangular Req'd Surface Area = 32,387 m<sup>2</sup> where, T = 23.6 °C Dimension: L = 200.0 m, W = 40.0 m, D = 1.5 m Number: 4 units Surface Area A = 32,000 m<sup>2</sup> Volume V = 48,000 m<sup>3</sup> Retention Time T = 3.2 days</p>	<p>5) Partial Mixing Aerated Lagoon</p> <p>Type: Rectangular Dimension: L = 19.0 m, W = 60.0 m, D = 4.0 m Number-Basin: 4 units -Cell/Basin: 3 units -Cell/Basin: 1 unit Surface Area A = 13,680 m<sup>2</sup> Volume V = 54,720 m<sup>3</sup> Retention Time T = 3.00 days Aerator Power = 36.0 kW -Aeration: 36.0 kW</p>	<p>3) Trickling Filter</p> <p>Type: Circular Primary: L = 24.0 m, D = 1.5 m, 4 units Number: 4 units Surface Area A = 2,304 m<sup>2</sup> Volume V = 3,456 m<sup>3</sup> BOD Load: 1.11 kg/m<sup>3</sup>/day Secondary: L = 24 m, D = 1.5 m, 4 units Number: 4 units Surface Area A = 2,304 m<sup>2</sup> Volume V = 3,456 m<sup>3</sup> BOD Load: 0.33 kg/m<sup>3</sup>/day</p>	<p>3) Final Sedimentation Tank</p> <p>Type: Circular Tank Dimension: L = 23.0 m dia, D = 3.0 m Number: 4 units Surface Area A = 2,116 m<sup>2</sup> Volume V = 10.8 m<sup>3</sup>/m<sup>2</sup>/day Retention Time T = 4.983 m<sup>3</sup> Retention Time T = 5.0 hours</p>
	<p>4) Maturation Pond</p> <p>Type: Rectangular Retention Time: 5 days Dimension: L = 70.0 m, W = 60.0 m, D = 1.5 m Number-Series: 3 units -Basin: 4 Surface Area A = 50,400 m<sup>2</sup> Volume V = 75,600 m<sup>3</sup> Retention Time T = 5.0 days</p>	<p>5) Desinfection Tank</p> <p>Type: Rectangular Dimension: L = 21.0 m, W = 3.0 m, D = 1.5 m Number: 2 units Surface Area A = 126 m<sup>2</sup> Volume V = 189 m<sup>3</sup> Retention Time T = 15.1 min.</p>	<p>3) Final Sedimentation Tank</p> <p>Type: Circular Tank Dimension: L = 17.0 m dia, D = 3.0 m, 4 units Number: 4 units Surface Area A = 1,156 m<sup>2</sup> Volume V = 19.8 m<sup>3</sup>/m<sup>2</sup>/day Retention Time T = 2,042 m<sup>3</sup> Retention Time T = 3.6 hours</p>	
			<p>5) Desinfection Tank</p> <p>Type: Rectangular Dimension: L = 21.0 m, W = 3.0 m, D = 1.5 m Number: 2 units Surface Area A = 126 m<sup>2</sup> Volume V = 189 m<sup>3</sup> Retention Time T = 15.1 min.</p>	<p>5) Desinfection Tank</p> <p>Type: Rectangular Dimension: L = 21.0 m, W = 3.0 m, D = 1.5 m Number: 2 units Surface Area A = 95 m<sup>2</sup> Volume V = 142 m<sup>3</sup> Retention Time T = 15.1 min.</p>
			<p>6) Sludge Thickening Tank</p> <p>Type: Circular Tank Dimension: L = 6.0 m dia, D = 4.0 m, 2 unit Number: 2 unit Surface Area A = 72 m<sup>2</sup> Solid Matter Load: 53.8 kg/m<sup>2</sup>/day Volume V = 226 m<sup>3</sup></p>	<p>6) Sludge Thickening Tank</p> <p>Type: Circular Tank Dimension: L = 6.0 m dia, D = 4.0 m, 2 unit Number: 2 unit Surface Area A = 72 m<sup>2</sup> Solid Matter Load: 53.8 kg/m<sup>2</sup>/day Volume V = 226 m<sup>3</sup></p>
3 Outline of Major Facilities			<p>7) Sludge Drying Bed</p> <p>Type: Drying Bed Thick'd Sludge Dimension: L = 60.8 m, W = 51.0 m, D = 20.0 m Number: 6 units Surface Area A = 6,120 m<sup>2</sup> Volume V = 1,836 m<sup>3</sup> Retention Time T = 30.2 days</p>	<p>7) Sludge Drying Bed</p> <p>Type: Drying Bed Thick'd Sludge Dimension: L = 60.8 m, W = 51.0 m, D = 20.0 m Number: 6 units Surface Area A = 6,120 m<sup>2</sup> Volume V = 1,836 m<sup>3</sup> Retention Time T = 30.2 days</p>



Treatment Method	Stabilization Pond	Aerated Lagoon (Dual Power)	Thickening Filter	Oxidation Ditch
4 Area Requirement	Grit Chamber 22 m <sup>2</sup> Anaerobic Pond 8,000 m <sup>2</sup> Facultative Pond 32,000 m <sup>2</sup> Membrane Pond 50,400 m <sup>2</sup> Total 90,422 m <sup>2</sup> Approx. 18.1 ha	Grit Chamber 23 m <sup>2</sup> Complete Mixing Lagoon 9,120 m <sup>2</sup> Partial Mixing Lagoon 13,680 m <sup>2</sup> Disinfection Tank 126 m <sup>2</sup> Total 22,949 m <sup>2</sup> Approx. 4.5 ha	Grit Chamber 23 m <sup>2</sup> Thickening Filter 4,608 m <sup>2</sup> Sedimentation Tank 1,640 m <sup>2</sup> Disinfection Tank 126 m <sup>2</sup> Sludge Thickening Tank 72 m <sup>2</sup> Sludge Drying Bed 6,120 m <sup>2</sup> Total 12,589 m <sup>2</sup> Approx. 2.5 ha	Grit Chamber 22 m <sup>2</sup> Oxidation Ditch 1,800 m <sup>2</sup> Sedimentation Tank 2,116 m <sup>2</sup> Disinfection Tank 95 m <sup>2</sup> Sludge Thickening Tank 72 m <sup>2</sup> Sludge Drying Bed 6,120 m <sup>2</sup> Total 10,224 m <sup>2</sup> Approx. 2.0 ha
5 Power Consumption excluding: - office - lighting	Aerator 162 kW Complete Mixing 36 kW Partial Mixing 7.5 kW Disinfection 206 kW Total 206 kW Approx. 210 kW	Recirculation Pump 240 kW Thickening Filter 1.6 kW Sludge Collector 1.6 kW Primary Sedimentation Tank 0.8 kW Secondary Sedimentation Tank 30 kW Sludge Thickener 15 kW Sludge Pump 7.2 kW Surplus 252 kW Disinfection 252 kW Total 266 kW Approx. 270 kW	Aerator 190 kW Oxidation Ditch 1.6 kW Sludge Collector 0.8 kW Sedimentation Tank 30 kW Sludge Thickener 15 kW Sludge Pump 15 kW Return 252 kW Surplus 252 kW Disinfection 252 kW Total 252 kW Approx. 250 kW	Aerator 190 kW Oxidation Ditch 1.6 kW Sludge Collector 0.8 kW Sedimentation Tank 30 kW Sludge Thickener 15 kW Sludge Pump 15 kW Return 252 kW Surplus 252 kW Disinfection 252 kW Total 252 kW Approx. 250 kW

**Appendix 12.2 Sewer Network Hydraulic Analysis (Master Plan)**

**Appendix 12.2.1 Alternative 1**



# Sewage Flow Calculation Table (Kandy)

P i

※Unit Sewage Flow : 0.324m<sup>3</sup>/capita-day

Pipe No.	Down stream	Service Area				Length				T	Storm Run-off				Sewage Flow				Other Flow				Design Sewer				Remarks		
		Sec.		Accum.		Sec.		Accum.			R.O.	C	Service Area		Pop/D	Population		Flow	Sec. Accum.	Accum.	Dia.	Slope	V	Flow	G.L.			Level	D
		ha	ha	ha	ha	ha	ha	ha	ha				m/s	m/s		m/s	m/s								m	m			
1	3	499	499	1114	1114										3742	3742	00140	004043	00544	450	220	0841	01337	539501	530229	197	100	Katugastota 0.0290	
2		123	123	508	508								307	307	00012	003796	003796	00332	400	240	0812	01020	54357	535567	756	100			
3	5		622	75	1189									4049	00152	000086	007925	00945	600	160	0869	02456	50814	506694	178	102	50m <sup>3</sup> .L		
4				70	70											000086	000086	00009	150	180	0366	00063	50739	506215	100	100			
5	9		622	143	1332									4049	00152	000129	008140	00966	600	160	0869	02456	50726	502833	375	100			
7	8			220	220											000453	000453	00045	225	340	0658	00262	50750	506252	100	100			
6				150	150											000151	000151	00015	150	920	0827	00146	50814	506631	134	133	60m <sup>3</sup> .L		
8				100	320											000173	000777	00078	150	3450	1601	00223	50675	505249	133	100			
9	15		622	215	1547									4049	00152	000151	009068	01059	600	160	0869	02456	50297	501789	100	100			
10	14	227	227	300	300									385	385	001035	001035	00118	225	500	0799	00316	51100	503085	167	100			













**Appendix 12.2.2      Alternative 2 (Applied)**









# Sewage Flow Calculation Table (Kandy)

※Unit Sewage Flow : 0.324m<sup>3</sup>/capita·day

Pipe No.	Down stream	Service Area				Storm Run-off				Sewage Flow				Other Flow				Design Sewer				Remarks
		Sec.		Accum.		C	Service Area		R.O.	Pop/D		Flow	Sec.	Accum.	Dia.	Slope	V	Flow	G.L.	Level	D	
		ha	ha	ha	ha		P/ha	P		P	Sec.											
44		05	859	80	928					30	76.17	00286						48639	486171	788		
45	48	09	3651	200	2554					60	16564	00621						48545	487891	722		
46		25	295	1022	1022					2402	2402	00090	000492	00139	00318	00799	00318	52780	526552	100		
47	47-2	01	316	808	1830					834	3236	00121						52780	522874	459		
47-1		04	04	130	130					23	23	00001						49274	490765	180		
47-2		08	338	70	1900					53	3312	00124						49274	490449	136		
48		48	3997	240	2794					315	20191	00757						48797	486237	357		
48-1			3997	20	2814													48794	482274	517		
48-2	50		3997	190	3004					20191	00757							48794	486237	097		
49		22	22	294	294					193	193	00007						48800	485971	130		
50	52	31	4030	150	3154					91	20475	00768						48919	486761	270		
51		65	65	350	350					489	489	00018						48919	488019	100		





