CHAPTER 4

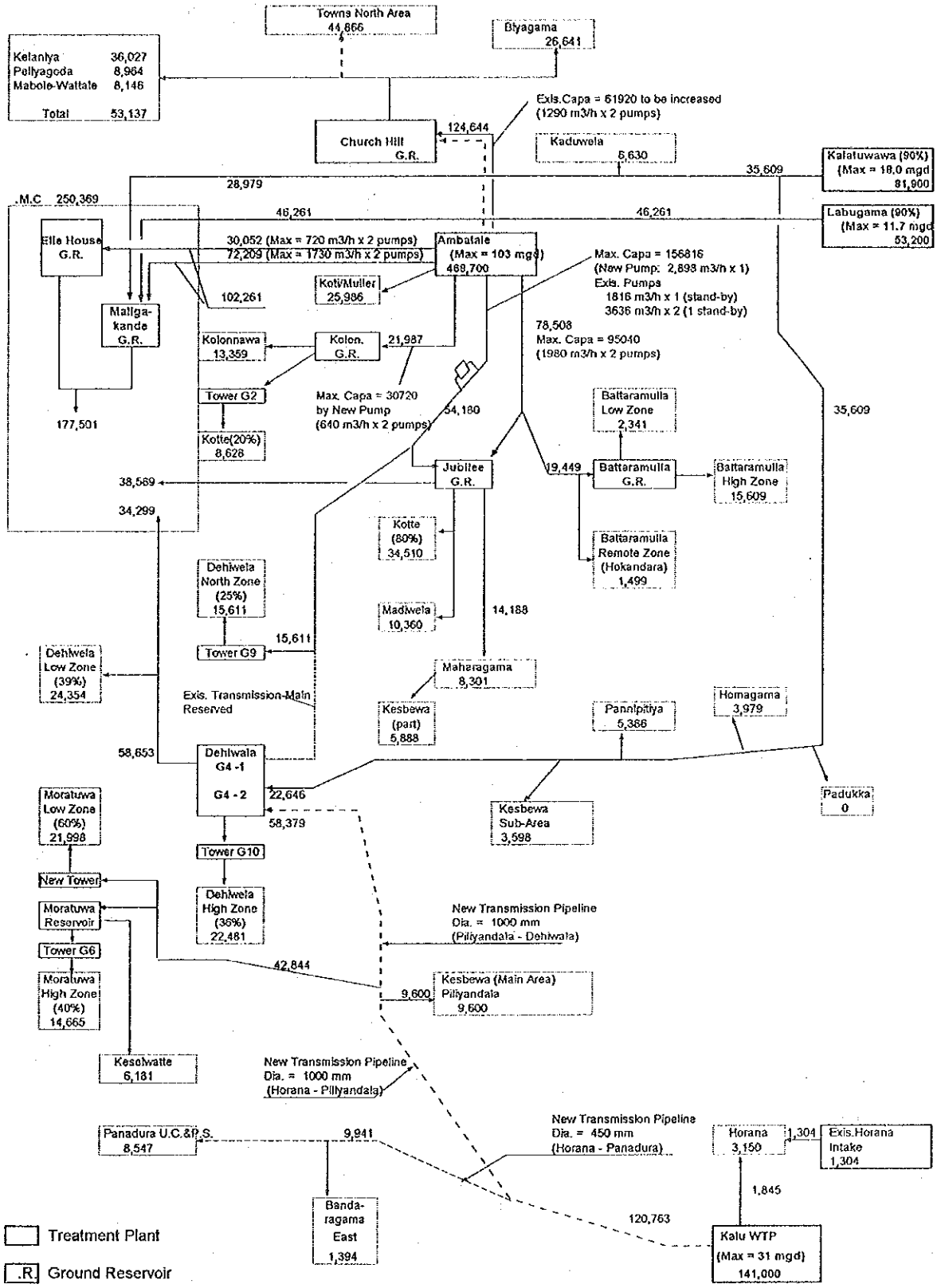
Ref. No. 4.4

Subject : Water Demand Projection

Title : Projection of Alternative Lower Demand

Contents : Details of Lower Demand Projection

Transmission Diagram for 2010 Demand
Lower Demand Scenario (Water Loss - 5% less in Existing Area)



Demand Allocation in 2000

Service Area		Node No.	Day Average Demand in 2000 442,530 m3/d	Day Peak Demand in 2000 556,879 m3/d	Supply Source: Existing: Ambatale 468,700 m3/d	Existing: Kalatuwawa (90%) north line 40,950 m3/d	Existing: Kalatuwawa (90%) south line 40,950 m3/d	Existing: Labu. (90%) 53,200 m3/d	Existing: Horana 1,500 m3/d	New: Kalu Source 0 m3/d
Existing Service Area										
	Colombo M.C.		230,585	265,173	173,064	38,908		53,200		
	Dehiwela-Mt.Lavinia M.C.		60,133	69,153	32,317		36,836			
	Kotte U.C.		37,668	43,318	43,318					
	Kolonnawa U.C.		11,115	12,783	12,783					
	Moratuwa U.C.		30,839	35,465	35,465					
	Kotti/Mulleriyawa P.S.		20,663	23,763	23,763					
	Peliyagoda U.C.		8,364	9,619	9,619					
	Wattala Mabole U.C.		6,470	7,441	7,441					
	Kelaniya P.S.		26,912	30,948	30,948					
	Panadura U.C.		7,407	8,518	8,518					
	Horana U.C.		2,374	2,730					1,500	
	Sub-Total		442,530	508,909	377,235	38,908	36,836	53,200	1,500	
New Service Area										
Towns East	Kaduwela	281	1,775	2,042		2,042				
	Panagoda	402	0	0			0			
	Pannipitiya	411	1,733	1,993			1,993			
	Madiwela/Kotte	528	2,349	2,701	2,701					
	Madiwela/Kotte	529	5,485	6,308	6,308					
	Maharagama	552	2,759	3,173	3,173					
	Batta. (High Zone)	563	4,180	4,807	4,807					
	Batta. (Low Zone)	568	627	721	721					
	Batta/Remote Zone	574	480	552	552					
	Total Towns East		19,387	22,295	18,261	2,042	1,993	0	0	
Towns South	Homagama	493	1,273	1,464			1,464			
	Panadura (Keselwatta)	496	1,230	1,414	1,414					
	Kesbewa (Exis. Maharagama)	529-A	858	987	987					
	Kesbewa (Maharagama)	529	298	343	343					
	Kesbewa (Piliyandala)	542	1,111	1,278	1,278					
	Kesbewa (Kalatuwawa)	552	657	756			657			
	Panadura P.S.	494	432	496	496					
	Total Towns South		5,860	6,739	4,519	0	2,122	0	0	
Towns North	Wattala South	122	748	861	861					
	Mahara South	132	0	0	0					
	Mahara North	141	260	299	299					
	Ragama	145	325	374	374					
	Welisara, Kandana	159	513	590	590					
	Ja Ela U.C.	161	492	566	566					
	Wattala North	165	256	294	294					
	Katana East	168	0	0	0					
	Katunayake U.C. North	174	0	0	0					
	Katunayake North	174	0	0	0					
	Seeduwa/Katunayake U.C. N	183	0	0	0					
	Total Towns North		2,594	2,983	2,983	0	0	0	0	
Biyagama	Biyagama (incl. EPZ)	127	9,979	11,476	11,476					
	Biyagama West	121	3,263	3,752	3,752					
	Biyagama East	132	629	724	724					
	Total Biyagama		13,871	15,952	15,952	0	0	0	0	
Area Far South	Sitawaka (Padukka Town)	428	0	0	0		0			
	Bandaragama P.S. West	496	0	0	0					
	Bandaragama P.S. East	497	0	0	0					
	Horana P.S	1000	0	0	0					
	Total of Area Far South		0	0	0	0	0	0	0	
Total of New Area				47,969	41,715	2,042	4,114	0	0	
	Total Service Area		442,530	556,879	418,949	40,950	40,950	53,200	1,500	0

Note: Allocated demand is in Daily Maximum Flow

Demand Allocation in 2005

Service Area		Node No.	Day Average Demand in 2005	Day Peak Demand in 2005	Supply Source: Existing: Ambatale	Existing: Kalatuwawa (90%) north line	Existing: Kalatuwawa (90%) south line	Existing: Labu. (90%)	Existing: Horana	New: Kalu Source
			567,558 m3/d	652,692 m3/d	468,700 m3/d	40,950 m3/d	40,950 m3/d	53,200 m3/d	1,500 m3/d	47,000 m3/d
Existing Service Area										
	Colombo M.C.		240,227	276,261	186,870	36,191		53,200		
	Dehiwela-Mt.Lavinia M.C.		61,260	70,449	52,003		31,197			-12,751
	Kotte U.C.		40,432	46,497	46,497					
	Kolonnawa U.C.		12,219	14,051	14,051					
	Moratuwa U.C.		33,467	38,487						38,487
	Kotti/Mulleriyawa P.S.		23,129	26,599	26,599					
	Peliyagoda U.C.		8,318	9,566	9,566					
	Wattala Mabole U.C.		7,074	8,135	8,135					
	Kelaniya P.S.		30,248	34,785	34,785					
	Panadura U.C.		7,711	8,868						8,868
	Horana U.C.		2,771	3,186					1,500	1,686
	Sub-Total		466,857	536,885	378,506	36,191	31,197	53,200	1,500	36,291
New Service Area										
Towns East	Kaduwela	281	4,138	4,759		4,759				
	Panagoda	402	0	0			0			
	Pannipitiya	411	3,657	4,205			4,205			
	Madiwela/Kotte	528	2,722	3,131	3,131					
	Madiwela/Kotte	529	6,374	7,330	7,330					
	Maharagama	552	5,716	6,574	6,574					
	Batta. (High Zone)	563	9,743	11,204	11,204					
	Batta. (Low Zone)	568	1,461	1,681	1,681					
	Batta/Remote Zone	574	1,015	1,168	1,168					
	Total Towns East		34,827	40,050	31,086	4,759	4,205	0	0	0
Towns South	Homagama	498	2,695	3,100			3,100			
	Panadura (Keselwatta)	498	4,011	4,613						4,613
	Kesbewa (Exis. Maharagama)	529-A	3,197	3,677	3,677					
	Kesbewa (Maharagama)	529	1,110	1,277	1,277					
	Kesbewa (Piliyandala)	542	4,140	4,761						4,761
	Kesbewa (Kalatuwawa)	552	2,448	2,815			2,448			
	Panadura P.S.	494	469	540						540
	Total Towns South		18,071	20,782	4,953	0	5,548	0	0	9,914
Towns North	Wattala South	122	6,937	7,978	7,978					
	Mahara South	132	0	0	0					
	Mahara North	141	2,068	2,379	2,379					
	Ragama	145	3,823	4,397	4,397					
	Welisara, Kandana	158	5,821	6,694	6,694					
	Ja Ela U.C.	161	5,325	6,124	6,124					
	Wattala North	165	2,900	3,335	3,335					
	Katana East	168	0	0	0					
	Katunayake U.C. North	174	0	0	0					
	Katunayake North	174	0	0	0					
	Seeduwa/Katunayake U.C. N	183	0	0	0					
	Total Towns North		26,876	30,907	30,907	0	0	0	0	0
Biyagama	Biyagama (Incl. EPZ)	127	12,745	14,657	14,657					
	Biyagama West	121	6,262	7,201	7,201					
	Biyagama East	132	1,208	1,389	1,389					
	Total Biyagama		20,215	23,247	23,247	0	0	0	0	0
Area Far South	Sitawaka (Padukka Town)	428	0	0			0			
	Bandaragama P.S. West	498	0	0						0
	Bandaragama P.S. East	497	714	821						821
	Horana P.S	1000	0	0						0
	Total of Area Far South		714	821	0	0	0	0	0	821
Total of New Area			100,702	115,807	90,194	4,759	9,753	0	0	10,734
	Total Service Area		567,558	652,692	468,700	40,950	40,950	53,200	1,500	47,000

Note: Allocated demand is in Daily Maximum Flow

Demand Allocation in 2010

Service Area		Node No.	Day Average Demand in 2010	Day Peak Demand in 2010	Supply Source: Existing: Ambatale	Existing: Kalatuwawa (90%) north line	Existing: Kalatuwawa (90%) south line	Existing: Labu. (90%)	Existing: Horana	New: Kalu Source
			649,044 m3/d	746,401 m3/d	468,700 m3/d	40,950 m3/d	40,950 m3/d	53,200 m3/d	1,500 m3/d	141,000 m3/d
Existing Service Area										
	Colombo M.C.		250,369	287,924	178,043	33,326		53,200		23,356
	Dehiwela-Mt.Lavinia M.C.		62,446	71,813			25,273			46,540
	Kotte U.C.		43,138	49,608	49,608					
	Kolonnawa U.C.		13,359	15,363	15,363					
	Moratuwa U.C.		36,663	42,163						42,163
	Kotti/Mullerlyawa P.S.		25,986	29,884	29,884					
	Peliyagoda U.C.		8,964	10,308	10,308					
	Wattala Mabole U.C.		8,146	9,368	9,368					
	Kelaniya P.S.		36,027	41,431	41,431					
	Panadura U.C.		8,027	9,231						9,231
	Horana U.C.		3,150	3,622					1,500	2,122
	Sub-Total		496,275	570,716	334,006	33,326	25,273	53,200	1,500	123,411
New Service Area										
Towns East	Kaduwela	281	6,630	7,624		7,624				
	Panagoda	402	0	0			0			
	Pannipitiya	411	5,386	6,194			6,194			
	Madiwela/Kotte	528	3,097	3,562	3,562					
	Madiwela/Kotte	529	7,263	8,352	8,352					
	Maharagama	552	8,301	9,546	9,546					
	Batta. (High Zone)	563	15,609	17,950	17,950					
	Batta. (Low Zone)	568	2,341	2,693	2,693					
	Batta/Remote Zone	574	1,499	1,724	1,724					
	Total Towns East		50,125	57,644	43,826	7,624	6,194	0	0	0
Towns South	Homagama	498	3,979	4,576			4,576			
	Panadura (Keselwatta)	496	6,262	7,202						7,202
	Kesbewa (Exis. Maharagama)	529-A	5,573	6,409	6,409					
	Kesbewa (Maharagama)	529	1,935	2,226	2,226					
	Kesbewa (Piliyandala)	542	7,216	8,299						8,299
	Kesbewa (Kalatuwawa)	552	4,267	4,907			4,907			
	Panadura P.S.	494	510	587						587
	Total Towns South		29,743	34,205	8,635	0	9,483	0	0	16,087
Towns North	Wattala South	122	11,995	13,795	13,795					
	Mahara South	132	0	0	0					
	Mahara North	141	3,547	4,079	4,079					
	Ragama	145	6,239	7,174	7,174					
	Welisara, Kandana	156	9,643	11,090	11,090					
	Ja Ela U.C.	161	8,848	10,175	10,175					
	Wattala North	165	4,594	5,283	5,283					
	Katana East	168	0	0	0					
	Katunayake U.C. North	174	0	0	0					
	Katunayake North	174	0	0	0					
	Seeduwa/Katunayake U.C. N	183	0	0	0					
	Total Towns North		44,866	51,595	51,595	0	0	0	0	0
Biyagama	Biyagama (incl. EPZ)	127	15,532	17,862	17,862					
	Biyagama West	121	9,312	10,709	10,709					
	Biyagama East	132	1,796	2,066	2,066					
	Total Biyagama		26,641	30,637	30,637	0	0	0	0	0
Area Far South	Sitawaka (Padukka Town)	428	0	0			0			
	Bandaragama P.S. West	496	0	0						0
	Bandaragama P.S. East	497	1,394	1,603						1,603
	Horana P.S	1000	0	0						0
	Total of Area Far South		1,394	1,603	0	0	0	0	0	1,603
Total of New Area			152,769	175,685	134,694	7,624	15,677	0	0	17,690
	Total Service Area		649,044	746,401	468,700	40,950	40,950	53,200	1,500	141,000

Note: Allocated demand is in Daily Maximum Flow

Demand Allocation in 2020

Service Area		Node No.	Day Average Demand in 2020	Day Peak Demand in 2020	Supply Source: Existing					New
					Ambatale	Kalatuwawa (90%) north line	Kalatuwawa (90%) south line	Labu. (90%)	Horana	Kalu Source
			842,448 m3/d	968,815 m3/d	468,700 m3/d	40,950 m3/d	40,950 m3/d	53,200 m3/d	1,500 m3/d	364,000 m3/d
Existing Service Area										
	Colombo M.C.		277,581	319,219	51,753	25,372		53,200		188,893
	Dehiwela-Mt.Lavinia M.C.		69,084	79,447			11,405			68,042
	Kotte U.C.		51,215	58,897	58,897					
	Kolonnawa U.C.		16,720	19,228	19,228					
	Moratuwa U.C.		43,959	50,553						50,553
	Kotti/Mulleriyawa P.S.		31,116	35,784	35,784					
	Peliyagoda U.C.		10,449	12,016	12,016					
	Wattala Mabole U.C.		10,656	12,255	12,255					
	Kelaniya P.S.		41,946	48,238	48,238					
	Panadura U.C.		9,395	10,804						10,804
	Horana U.C.		4,314	4,961					1,500	3,461
	Sub-Total		566,436	651,401	238,171	25,372	11,405	53,200	1,500	321,753
New Service Area										
Towns East	Kaduwela	281	13,546	15,578		15,578				
	Panagoda	402	0	0			0			
	Pannipitiya	411	8,231	9,466			9,466			
	Madiwela/Kotte	528	3,926	4,515	4,515					
	Madiwela/Kotte	529	9,222	10,606	10,606					
	Maharagama	552	13,202	15,183	15,183					
	Batta. (High Zone)	583	29,058	33,417	33,417					
	Batta. (Low Zone)	588	4,359	5,012	5,012					
	Batta/Remote Zone	574	3,940	4,530	4,530					
	Total Towns East		85,484	98,307	73,263	15,578	9,466	0	0	0
Towns South	Homagama	498	8,231	9,466			9,466			
	Panadura (Keselwatta)	496	10,462	12,031						12,031
	Kesbewa (Exis. Maharagama)	529-A	10,992	12,641	12,641					
	Kesbewa (Maharagama)	529	3,817	4,389	4,389					
	Kesbewa (Piliyandala)	542	18,209	20,941						20,941
	Kesbewa (Kalatuwawa)	552	8,416	9,678			9,678			
	Panadura P.S.	494	2,436	2,802						2,802
	Total Towns South		62,564	71,949	17,031	0	19,144	0	0	35,774
Towns North	Wattala South	122	20,353	23,406	23,406					
	Mahara South	132	1,163	1,337	1,337					
	Mahara North	141	6,562	7,546	7,546					
	Ragama	145	10,015	11,517	11,517					
	Welisara, Kandana	158	15,355	17,658	17,658					
	Ja Ela U.C.	161	14,717	16,924	16,924					
	Wattala North	165	6,970	8,016	8,016					
	Katana East	166	1,759	2,023	2,023					
	Katunayake U.C. North	174	7,280	8,372	8,372					
	Katunayake North	174	0	0	0					
	Seeduwa/Katunayake U.C. N	183	0	0	0					
	Total Towns North		84,173	96,798	96,798	0	0	0	0	0
Biyagama	Biyagama (incl. EPZ)	127	16,165	18,589	18,589					
	Biyagama West	121	16,953	19,496	19,496					
	Biyagama East	132	4,653	5,351	5,351					
	Total Biyagama		37,771	43,436	43,436	0	0	0	0	0
Area Far South	Sitawaka (Padukka Town)	428	813	935			935			
	Bandaragama P.S. West	496	1,823	2,096						2,096
	Bandaragama P.S. East	497	3,385	3,892						3,892
	Horana P.S	1000	0	0						0
	Total of Area Far South		6,020	6,923	0	0	935	0	0	5,988
Total of New Area			276,012	317,414	230,529	15,578	29,545	0	0	41,762
	Total Service Area		842,448	968,815	468,700	40,950	40,950	53,200	1,500	364,000

Note: Allocated demand is in Daily Maximum Flow

Total Demand Allocation (Lower Demand Scenario - Water Loss i Exis. Area 5% less)
New Service Area (Connected Demand - Development with Kalu G nga)
Revised Demand

Demand Data from File C:\Kalu-fs\Demands\Revised\New_rev.wk4

Service Area Category	Division	Node No.	Connected Water De and (m3/d) 1990	1995	2000	2005	2010	2015	2020	2025	2030
Towns East Area	Kaduwela	281	0	0	1,775	4,138	6,630	9,985	13,546	16,666	18,877
	Panagoda	402	0	0	0	0	0	0	0	0	0
	Pannipitiya	411	0	0	1,733	3,657	5,386	6,859	8,231	8,637	8,942
	Madiwela/Kotte	528	0	1,905	2,349	2,722	3,097	3,501	3,926	3,959	3,983
	Madiwela/Kotte	529	0	4,435	5,485	6,374	7,263	8,218	9,222	9,303	9,363
	Maharagama	552	0	0	2,759	5,716	8,301	10,790	13,202	13,854	14,343
	Batta, (High Zone)	563	0	0	4,180	9,743	15,609	22,075	29,058	30,493	31,570
	Batta, (Low Zone)	568	0	0	627	1,461	2,341	3,311	4,359	4,574	4,735
	Batta/Remote Zone	574	0	0	480	1,015	1,499	2,744	3,940	4,584	5,135
	Total Towns East		0	6,340	19,387	34,827	50,125	67,483	85,484	92,070	96,947
Towns South Area	Homagama	498	0	0	1,273	2,695	3,979	6,270	8,231	10,402	12,020
	Panadura (Keselwatta)	496	0	0	1,230	4,011	6,262	8,463	10,462	11,445	12,010
	Kesbewa (Exis. Maharagama)	529-A	0	0	858	3,197	5,573	8,237	10,992	11,812	12,264
	Kesbewa (Maharagama)	529	0	0	298	1,110	1,935	2,860	3,817	4,102	4,259
	Kesbewa (Piliyandala)	542	0	0	1,111	4,140	7,216	12,680	18,209	21,725	24,212
	Kesbewa (from Kalatuwawa)	552	0	0	657	2,448	4,267	6,306	8,416	9,043	9,390
	Panadura P.S.	494	0	395	432	469	510	1,557	2,436	3,020	ERR
	Total Towns South		0	395	5,860	18,071	29,743	46,373	62,564	71,548	ERR
Towns North Area	Wattala South	122	0	0	748	6,937	11,995	16,311	20,353	22,736	24,004
	Mahara South	132	0	0	0	0	0	612	1,163	3,312	4,822
	Mahara North	141	0	0	260	2,068	3,547	5,138	6,562	11,414	14,445
	Ragama	145	0	0	325	3,823	6,239	7,957	10,015	10,641	11,266
	Welisara, Kandana	156	0	0	513	5,821	9,643	12,312	15,355	16,405	17,319
	Ja Ela U.C.	161	0	0	492	5,325	8,848	11,636	14,717	17,307	19,141
	Wattala North	165	0	0	256	2,900	4,594	5,682	6,970	8,568	9,778
	Katana P.S. (south)	166	0	0	0	0	0	929	1,759	5,909	8,793
	Katunayake EPZ	170	0	0	0	0	0	7,280	7,280	7,280	7,280
	Katunayake U.C. North	174	0	0	0	0	0	0	0	98	163
	Katana P.S. (north)	183	0	0	0	0	0	0	0	4,181	6,969
	Total Towns North		0	0	2,594	26,876	44,866	67,856	84,173	107,851	123,980
Biyagama	Biyagama (incl. EPZ)	127	6,000	7,210	9,979	12,745	15,532	15,832	16,165	16,165	16,165
		121	0	0	3,263	6,262	9,312	13,113	16,953	18,121	18,856
		132	0	0	629	1,208	1,796	3,250	4,653	5,844	6,722
	Total Biyagama		6,000	7,210	13,871	20,215	26,641	32,195	37,771	40,130	41,742
Area Far South	Sitawaka (Padukka Town)	428	0	0	0	0	0	413	813	1,073	1,301
	Bandaragama P.S. (West)	494	0	0	0	0	0	944	1,823	3,416	4,600
	Bandaragama P.S. (East)	497	0	0	0	714	1,394	2,338	3,385	4,268	4,781
	Horana P.S	1000	0	0	0	0	0	0	0	1,975	3,292
	Total of Area Far South		0	0	0	714	1,394	3,695	6,020	10,733	13,974
Total of New Area			6,000	13,945	41,713	100,702	152,769	217,601	276,012	322,332	ERR
Total of Existing Area Demand			0	415,927	442,530	466,857	496,275	531,425	566,436	575,674	581,675
Total Day Average Demand (m3/d)			6,000	429,872	484,242	567,558	649,044	749,026	842,448	898,006	ERR
Total Daily Peak Demand		Peak f = 1.15	6,900	494,352	556,879	652,692	746,401	861,380	968,815	1,032,707	ERR
Treatment Plant Capacity		Max.									
	Ambatale (Old)	63 mgd	286,700	286,700	286,700	286,700	286,700	286,700	286,700	286,700	286,700
	Ambatale (New)	40 mgd	182,000	182,000	182,000	182,000	182,000	182,000	182,000	182,000	182,000
	Kalatuwawa (Max. x 90%)	18 mgd	81,900	81,900	81,900	81,900	81,900	81,900	81,900	81,900	81,900
	Labugama (Max. x 90%)	11.75 mgd	53,200	53,200	53,200	53,200	53,200	53,200	53,200	53,200	53,200
	Horana	0.33 mgd	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Required =>	Additional Source		0	0	0	47,400	141,000	256,000	364,000	427,000	ERR
						(10.4mgd)	(31.0mgd)	(56.3mgd)	(80.0mgd)	(93.8mgd)	ERR
	Total Capacity		605,300	605,300	605,300	652,700	746,300	861,300	969,300	1,032,300	ERR

Demand Allocation (Existing Service Area)
Existing Service Area (Connected Demand - Development with Kalu Ganga)

Progress Percentage to Full Development Demand

Area	1990	1995	2000	2005	2010	2015	2020	2025	2030
Colombo M.C.	90<	100	100	100	100	100	100	100	100
Dehiwela-Mt.Lavinia M.	90<	100	100	100	100	100	100	100	100
Kotte U.C.	90<	100	100	100	100	100	100	100	100
Kolonnawa U.C.	90<	100	100	100	100	100	100	100	100
Moratuwa U.C.	72	81	85	87	90	90	90	95	100
Kotti/Mulleriyawa P.S.	35	60	75	90	95	95	95	100	100
Peliyagoda U.C.	45	60	70	80	85	88	90	95	100
Wattala Mabole U.C.	41	60	70	80	85	88	90	95	100
Kelaniya P.S.	45	60	70	80	85	88	90	95	100
Panadura U.C.	90<	100	100	100	100	100	100	100	100
Horana U.C.	65	75	82	86	88	90	90	90	90

Demand Data from File C:\Kalu-fs\Demands\Revised\New_rev.wk4

	Service Area		Full Development Water Demand (m3/d)							
			1995	2000	2005	2010	2015	2020	2025	2030
	1	Colombo M.C.	220,605	230,585	240,227	250,369	263,862	278,181	278,181	278,181
	2	Dehiwela-Mt.Lavinia M.C.	54,972	60,133	61,260	62,446	65,702	69,084	69,084	69,084
	3	Kotte U.C.	35,414	37,668	40,432	43,138	47,124	51,215	51,215	51,215
	4	Kolonnawa U.C.	9,846	11,115	12,219	13,359	14,986	16,720	16,720	16,720
	5	Moratuwa U.C.	30,240	36,281	38,468	40,737	44,645	48,844	48,844	48,844
	6	Kotti/Mulleriyawa P.S.	18,198	24,182	25,699	27,354	29,922	32,754	32,754	32,754
	7	Peliyagoda U.C.	8,410	10,261	10,398	10,545	11,066	11,610	11,610	11,610
	8	Wattala Mabole U.C.	5,866	8,080	8,843	9,584	10,695	11,840	11,840	11,840
	9	Kelaniya P.S.	23,576	33,243	37,810	42,385	44,965	47,718	47,718	47,718
	10	Panadura U.C.	6,540	7,407	7,711	8,027	8,689	9,395	9,395	9,395
	11	Horana U.C.	2,261	2,895	3,222	3,579	4,150	4,793	4,793	4,793
Grand Total			415,927	461,849	486,288	511,523	545,808	582,154	582,154	582,154

Service Area		Connected Water Demand (m3/d)							
		1995	2000	2005	2010	2015	2020	2025	2030
1	Colombo M.C.	220,605	230,585	240,227	250,369	263,862	277,561	278,181	278,181
2	Dehiwela-Mt.Lavinia M.C.	54,972	60,133	61,260	62,446	65,702	69,084	69,084	69,084
3	Kotte U.C.	35,414	37,668	40,432	43,138	47,124	51,215	51,215	51,215
4	Kolonnawa U.C.	9,846	11,115	12,219	13,359	14,986	16,720	16,720	16,720
5	Moratuwa U.C.	30,240	30,839	33,467	36,663	40,180	43,959	46,401	48,844
6	Kotti/Mulleriyawa P.S.	18,198	20,663	23,129	25,986	28,426	31,116	32,754	32,754
7	Peliyagoda U.C.	8,410	8,364	8,318	8,964	9,738	10,449	11,030	11,610
8	Wattala Mabole U.C.	5,866	6,470	7,074	8,146	9,411	10,656	11,248	11,840
9	Kelaniya P.S.	23,576	26,912	30,248	36,027	39,569	41,946	45,332	47,718
10	Panadura U.C.	6,540	7,407	7,711	8,027	8,689	9,395	9,395	9,395
11	Horana U.C.	2,261	2,374	2,771	3,150	3,735	4,314	4,314	4,314
Total		415,927	442,530	466,857	496,275	531,425	566,436	575,674	581,675

Projected Full Development Water Demand (Revised Projection)
(Lower Demand Scenario - Water Loss in Exis. Area 5% less)
TOTAL OF EXISTING AREA DEMANDS

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	1,691,800	1,742,800	1,769,600	1,796,400	1,815,550	1,834,700
Total of Residential, Commercial, Industrial, and Institutional						
Land Use Area (ha) (Annex.F)	11,363	11,774	12,034	12,293	12,418	12,542
Ave. Net Population Density (pop./ha)	149	148	147	146	146	146
B. Total Service Population (A*B/100)	1,561,665	1,742,800	1,769,600	1,796,400	1,815,550	1,834,700
C. Average Service Ratio (% to Total Pop.)	92	100	100	100	100	100
D. Direct Connection						
Total Population	986,620	1,157,234	1,235,362	1,315,200	1,390,842	1,467,760
Water Use (m3/d)	147,664	190,944	214,335	239,366	265,651	293,552
E. Community Tap						
Total Population	495,289	436,580	331,233	223,354	112,712	0
Water Use (m3/d)	26,250	23,139	17,555	11,838	5,974	0
F. Yard Tap						
Total Population	79,755	148,987	203,005	257,846	311,996	366,940
Water Use (m3/d)	5,982	11,174	15,225	19,338	23,400	27,521
H. Total Domestic Water Use (D+E+F)						
Total Connected Population	1,561,665	1,742,800	1,769,600	1,796,400	1,815,550	1,834,700
Total Domestic Water Use (m3/d)	179,896	225,256	247,116	270,543	295,024	321,073
I. Industrial Water Use						
Total Industrial Area (ha)	877	986	1,082	1,177	1,208	1,238
Industrial Water Use (m3/d)	7,606	8,255	8,843	9,432	9,340	9,249
J. Commercial Water Use						
Total Commercial Area (ha)	585	636	679	721	744	766
Commercial Water Use (m3/d)	46,105	51,936	57,325	62,911	64,352	65,793
K. Institutional Water Use						
Total Institutional Area (ha)	1,035	1,056	1,068	1,080	1,090	1,099
Institutional Water Use (m3/d)	35,481	37,881	39,567	41,296	41,544	41,791
L. Total Net Water Use (m3/d) (H+I+J+K)	269,088	323,328	352,851	384,181	410,260	437,905
M. Water Loss						
Water Loss (m3/d)	146,839	138,521	133,438	127,341	135,548	144,249
N. Total Water Demand (m3/d) (L+M)	415,927	461,849	486,288	511,523	545,808	582,154

Projected Full Development Water Demand (Revised Projection)
District: COLOMBO
Division COLOMBO M.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	752,400	760,000	765,350	770,700	773,550	776,400
Total of Residential, Commercial, Industrial, and Institutional						
Land Use Area (ha) (Annex.F)	2,759	2,776	2,778	2,780	2,774	2,768
Net Population Density (pop./ha)	273	274	276	277	279	280
B. Service Ratio (%)	99	100	100	100	100	100
C. Total Service Population (A*B/100)	746,757	760,000	765,350	770,700	773,550	776,400
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	61.8	65.5	69.1	72.7	76.4	80.0
D2 Population (C*D1/100)	461,745	497,547	528,857	560,556	590,734	621,120
D3 Unit Rate (l/cap/d)	146	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	67,415	82,095	91,757	102,021	112,830	124,224
E. Community Tap						
E1 Percentage of Connected Population	34.8	27.9	20.9	13.9	7.0	0.0
E2 Population (C*E1/100)	260,120	211,787	159,958	107,384	53,891	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	13,786	11,225	8,478	5,691	2,856	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	24,892	50,667	76,535	102,760	128,925	155,280
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	1,867	3,800	5,740	7,707	9,669	11,646
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	746,757	760,000	765,350	770,700	773,550	776,400
H2 Total Domestic Water Use (m3/d)	83,068	97,120	105,975	115,420	125,356	135,870
I. Industrial Water Use						
Industrial Area (ha)	160	155	150	145	140	135
Unit Rate (l/ha/d)	16476	16476	16476	16476	16476	16476
Industrial Water Use (m3/d)	2,636	2,554	2,471	2,389	2,307	2,224
J. Commercial Water Use						
Commercial Area (ha)	223	225	225	225	225	225
Unit Rate (l/ha/d)	136411	146953	158311	170546	170546	170546
Commercial Water Use (m3/d)	30,420	33,065	35,620	38,373	38,373	38,373
K. Institutional Water Use						
Institutional Area (ha)	497	487	477	467	457	447
Unit Rate (l/ha/d)	32674	35199	37920	40850	40850	40850
Institutional Water Use (m3/d)	16,239	17,142	18,088	19,077	18,669	18,260
L. Total Net Water Use (m3/d) (H+I+J+K)	132,363	149,880	162,153	175,258	184,704	194,727
M. Water Loss						
M1 Water Loss Ratio (%)	40.0	35.0	32.5	30.0	30.0	30.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	88,242	80,705	78,074	75,111	79,159	83,454
N. Total Water Demand (m3/d) (L+M)	220,605	230,585	240,227	250,369	263,862	278,181

Projected Full Development Water Demand (Revised Projection)
District: COLOMBO
Division DEHIWELA-Mt.LAVINIA M.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	232,100	242,400	243,000	243,600	243,750	243,900
Total of Residential, Commercial, Industrial, and Institutional Land Use Area (ha) (Annex.F)	1,562	1,626	1,626	1,626	1,626	1,626
Net Population Density (pop./ha)	149	149	149	150	150	150
B. Service Ratio (%)	97	100	100	100	100	100
C. Total Service Population (A*B/100)	224,441	242,400	243,000	243,600	243,750	243,900
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	68.9	71.1	73.4	75.6	77.8	80.0
D2 Population (C*D1/100)	154,677	172,427	178,241	184,080	189,597	195,120
D3 Unit Rate (l/cap/d)	149	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	23,047	28,450	30,925	33,503	36,213	39,024
E. Community Tap						
E1 Percentage of Connected Population	27.8	22.2	16.7	11.1	5.5	0.0
E2 Population (C*E1/100)	62,282	53,813	40,460	27,040	13,528	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	3,301	2,852	2,144	1,433	717	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	7,481	16,160	24,300	32,480	40,625	48,780
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	561	1,212	1,823	2,436	3,047	3,659
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	224,441	242,400	243,000	243,600	243,750	243,900
H2 Total Domestic Water Use (m3/d)	26,909	32,515	34,892	37,372	39,977	42,683
I. Industrial Water Use						
Industrial Area (ha)	162	175	175	175	175	175
Unit Rate (l/ha/d)	3749	3749	3749	3749	3749	3749
Industrial Water Use (m3/d)	607	656	656	656	656	656
J. Commercial Water Use						
Commercial Area (ha)	29	31	31	31	31	31
Unit Rate (l/ha/d)	137667	137667	137667	137667	137667	137667
Commercial Water Use (m3/d)	3,992	4,268	4,268	4,268	4,268	4,268
K. Institutional Water Use						
Institutional Area (ha)	91	100	100	100	100	100
Unit Rate (l/ha/d)	76612	76612	76612	76612	76612	76612
Institutional Water Use (m3/d)	6,972	7,661	7,661	7,661	7,661	7,661
L. Total Net Water Use (m3/d) (H+I+J+K)	38,480	45,100	47,477	49,957	52,562	55,267
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	16,492	15,033	13,784	12,489	13,140	13,817
N. Total Water Demand (m3/d) (L+M)	54,972	60,133	61,260	62,446	65,702	69,084

Projected Full Development Water Demand (Revised Projection)
District: COLOMBO
Division KOTTE U.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	135,900	141,400	146,700	152,000	156,450	160,900
Total of Residential, Commercial, Industria, and Institutional						
Land Use Area (ha) (Annex.F)	1,079	1,132	1,176	1,220	1,262	1,304
Net Population Density (pop./ha)	126	125	125	125	124	123
B. Service Ratio (%)	97	100	100	100	100	100
C. Total Service Population (A*B/100)	131,483	141,400	146,700	152,000	156,450	160,900
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	78.3	78.7	79.0	79.3	79.7	80.0
D2 Population (C*D1/100)	102,995	111,235	115,893	120,587	124,639	128,720
D3 Unit Rate (l/cap/d)	158	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	16,273	18,354	20,107	21,947	23,806	25,744
E. Community Tap						
E1 Percentage of Connected Population	18.3	14.7	11.0	7.3	3.7	0.0
E2 Population (C*E1/100)	24,105	20,739	16,137	11,147	5,737	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	1,278	1,099	855	591	304	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	4,383	9,427	14,670	20,267	26,075	32,180
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	329	707	1,100	1,520	1,956	2,414
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	131,483	141,400	146,700	152,000	156,450	160,900
H2 Total Domestic Water Use (m3/d)	17,880	20,160	22,063	24,058	26,066	28,158
I. Industrial Water Use						
Industrial Area (ha)	35	40	45	50	55	60
Unit Rate (l/ha/d)	3900	3900	3900	3900	3900	3900
Industrial Water Use (m3/d)	137	156	176	195	215	234
J. Commercial Water Use						
Commercial Area (ha)	52	62	72	82	92	102
Unit Rate (l/ha/d)	75338	75338	75338	75338	75338	75338
Commercial Water Use (m3/d)	3,918	4,671	5,424	6,178	6,931	7,684
K. Institutional Water Use						
Institutional Area (ha)	77	88	99	110	121	132
Unit Rate (l/ha/d)	37090	37090	37090	37090	37090	37090
Institutional Water Use (m3/d)	2,856	3,264	3,672	4,080	4,488	4,896
L. Total Net Water Use (m3/d) (H+I+J+K)	24,790	28,251	31,335	34,510	37,699	40,972
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	10,624	9,417	9,097	8,628	9,425	10,243
N. Total Water Demand (m3/d) (L+M)	35,414	37,668	40,432	43,138	47,124	51,215

Projected Full Development Water Demand (Revised Projection)
District: COLOMBO
Division KOLONNAWA U.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	56,000	59,600	59,800	60,000	60,050	60,100
Total of Residential, Commercial, Industrial, and Institutional Land Use Area (ha) (Annex.F)	343	392	426	460	494	527
Net Population Density (pop./ha)	163	152	140	130	122	114
B. Service Ratio (%)	100	100	100	100	100	100
C. Total Service Population (A*B/100)	55,720	59,600	59,800	60,000	60,050	60,100
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	41.3	49.0	56.8	64.5	72.3	80.0
D2 Population (C*D1/100)	22,985	29,204	33,937	38,700	43,386	48,080
D3 Unit Rate (l/cap/d)	158	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	3,632	4,819	5,888	7,043	8,287	9,616
E. Community Tap						
E1 Percentage of Connected Population	55.4	44.3	33.3	22.2	11.1	0.0
E2 Population (C*E1/100)	30,878	26,423	19,884	13,300	6,656	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	1,637	1,400	1,054	705	353	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	1,857	3,973	5,980	8,000	10,008	12,020
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	139	298	449	600	751	902
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	55,720	59,600	59,800	60,000	60,050	60,100
H2 Total Domestic Water Use (m3/d)	5,407	6,517	7,390	8,348	9,390	10,518
I. Industrial Water Use						
Industrial Area (ha)	90	121	152	183	214	244
Unit Rate (l/ha/d)	87	87	87	87	87	87
Industrial Water Use (m3/d)	8	11	13	16	19	21
J. Commercial Water Use						
Commercial Area (ha)	12	15	18	21	24	27
Unit Rate (l/ha/d)	85680	85680	85680	85680	85680	85680
Commercial Water Use (m3/d)	1,028	1,285	1,542	1,799	2,056	2,313
K. Institutional Water Use						
Institutional Area (ha)	6	7	7	7	7	7
Unit Rate (l/ha/d)	74813	74813	74813	74813	74813	74813
Institutional Water Use (m3/d)	449	524	524	524	524	524
L. Total Net Water Use (m3/d) (H+I+J+K)	6,892	8,336	9,469	10,687	11,989	13,376
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	2,954	2,779	2,749	2,672	2,997	3,344
N. Total Water Demand (m3/d) (L+M)	9,846	11,115	12,219	13,359	14,986	16,720

Projected Full Development Water Demand (Revised Projection)
District: COLOMBO
Division MORATUWA U.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	187,700	191,100	193,300	195,500	199,200	202,900
Total of Residential, Commercial, Industria, and Institutional						
Land Use Area (ha) (Annex.F)	1,526	1,559	1,586	1,613	1,633	1,653
Net Population Density (pop./ha)	123	123	122	121	122	123
B. Service Ratio (%)	86	100	100	100	100	100
C. Total Service Population (A*B/100)	160,953	191,100	193,300	195,500	199,200	202,900
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	60.8	64.7	68.5	72.3	76.2	80.0
D2 Population (C*D1/100)	97,913	123,578	132,411	141,412	151,724	162,320
D3 Unit Rate (l/cap/d)	153	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	14,981	20,390	22,973	25,737	28,979	32,464
E. Community Tap						
E1 Percentage of Connected Population	35.8	28.7	21.5	14.3	7.2	0.0
E2 Population (C*E1/100)	57,675	54,782	41,560	28,022	14,276	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	3,057	2,903	2,203	1,485	757	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	5,365	12,740	19,330	26,067	33,200	40,580
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	402	956	1,450	1,955	2,490	3,044
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	160,953	191,100	193,300	195,500	199,200	202,900
H2 Total Domestic Water Use (m3/d)	18,440	24,249	26,626	29,177	32,226	35,508
I. Industrial Water Use						
Industrial Area (ha)	147	153	159	165	167	169
Unit Rate (l/ha/d)	6475	6475	6475	6475	6475	6475
Industrial Water Use (m3/d)	952	991	1,030	1,068	1,081	1,094
J. Commercial Water Use						
Commercial Area (ha)	83	95	107	118	122	125
Unit Rate (l/ha/d)	15291	15291	15291	15291	15291	15291
Commercial Water Use (m3/d)	1,269	1,453	1,628	1,804	1,858	1,911
K. Institutional Water Use						
Institutional Area (ha)	139	142	145	148	151	154
Unit Rate (l/ha/d)	3648	3648	3648	3648	3648	3648
Institutional Water Use (m3/d)	507	518	529	540	551	562
L. Total Net Water Use (m3/d) (H+I+J+K)	21,168	27,211	29,813	32,590	35,716	39,075
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	9,072	9,070	8,655	8,147	8,929	9,769
N. Total Water Demand (m3/d) (L+M)	30,240	36,281	38,468	40,737	44,645	48,844

Projected Full Development Water Demand (Revised Projection)
District: COLOMBO
Division KOTIKAWATTE-MULLERIYAWA P.S.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	92,400	98,500	101,500	104,500	107,400	110,300
Total of Residential, Commercial, Industrial, and Institutional						
Land Use Area (ha) (Annex.F)	1,483	1,515	1,531	1,546	1,552	1,557
Net Population Density (pop./ha)	62	65	66	68	69	71
B. Service Ratio (%)	67	100	100	100	100	100
C. Total Service Population (A*B/100)	61,908	98,500	101,500	104,500	107,400	110,300
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	49.3	55.5	61.6	67.7	73.9	80.0
D2 Population (C*D1/100)	30,541	54,635	62,524	70,781	79,333	88,240
D3 Unit Rate (l/cap/d)	148	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	4,520	9,015	10,848	12,882	15,153	17,648
E. Community Tap						
E1 Percentage of Connected Population	47.3	37.9	28.4	18.9	9.5	0.0
E2 Population (C*E1/100)	29,303	37,299	28,826	19,785	10,167	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	1,553	1,977	1,528	1,049	539	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	2,064	6,567	10,150	13,933	17,900	22,060
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	155	493	761	1,045	1,343	1,655
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	61,908	98,500	101,500	104,500	107,400	110,300
H2 Total Domestic Water Use (m3/d)	6,228	11,484	13,137	14,976	17,034	19,303
I. Industrial Water Use						
Industrial Area (ha)	133	136	138	140	132	124
Unit Rate (l/ha/d)	13078	13078	13078	13078	13078	13078
Industrial Water Use (m3/d)	1,739	1,779	1,805	1,831	1,726	1,622
J. Commercial Water Use						
Commercial Area (ha)	108	112	114	116	118	120
Unit Rate (l/ha/d)	686	686	686	686	686	686
Commercial Water Use (m3/d)	74	77	78	80	81	82
K. Institutional Water Use						
Institutional Area (ha)	94	96	98	100	102	104
Unit Rate (l/ha/d)	49968	49968	49968	49968	49968	49968
Institutional Water Use (m3/d)	4,697	4,797	4,897	4,997	5,097	5,197
L. Total Net Water Use (m3/d) (H+I+J+K)	12,738	18,136	19,917	21,883	23,938	26,203
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	5,459	6,045	5,782	5,471	5,984	6,551
N. Total Water Demand (m3/d) (L+M)	18,198	24,182	25,699	27,354	29,922	32,754

Projected Full Development Water Demand (Revised Projection)
District: GAMPAHA
Division PELIYAGODA U.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	36,500	36,800	36,900	37,000	37,150	37,300
Total of Residential, Commercial, Industrial, and Institutional						
Land Use Area (ha) (Annex.F)	259	265	266	266	266	266
Net Population Density (pop./ha)	141	139	139	139	140	140
B. Service Ratio (%)	72	100	100	100	100	100
C. Total Service Population (A*B/100)	26,208	36,800	36,900	37,000	37,150	37,300
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	68.9	71.1	73.3	75.6	77.8	80.0
D2 Population (C*D1/100)	18,054	26,169	27,060	27,956	28,894	29,840
D3 Unit Rate (l/cap/d)	158	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	2,853	4,318	4,695	5,088	5,519	5,968
E. Community Tap						
E1 Percentage of Connected Population	27.8	22.2	16.7	11.1	5.6	0.0
E2 Population (C*E1/100)	7,280	8,178	6,150	4,111	2,064	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	386	433	326	218	109	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	874	2,453	3,690	4,933	6,192	7,460
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	66	184	277	370	464	560
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	26,208	36,800	36,900	37,000	37,150	37,300
H2 Total Domestic Water Use (m3/d)	3,304	4,935	5,298	5,676	6,093	6,528
I. Industrial Water Use						
Industrial Area (ha)	61	63	63	63	63	63
Unit Rate (l/ha/d)	10419	10419	10419	10419	10419	10419
Industrial Water Use (m3/d)	636	656	656	656	656	656
J. Commercial Water Use						
Commercial Area (ha)	16	17	17	17	17	17
Unit Rate (l/ha/d)	105834	105834	105834	105834	105834	105834
Commercial Water Use (m3/d)	1,693	1,799	1,799	1,799	1,799	1,799
K. Institutional Water Use						
Institutional Area (ha)	5	6	6	6	6	6
Unit Rate (l/ha/d)	50824	50824	50824	50824	50824	50824
Institutional Water Use (m3/d)	254	305	305	305	305	305
L. Total Net Water Use (m3/d) (H+I+J+K)	5,887	7,696	8,058	8,436	8,853	9,288
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	2,523	2,565	2,339	2,109	2,213	2,322
N. Total Water Demand (m3/d) (L+M)	8,410	10,261	10,398	10,545	11,066	11,610

Projected Full Development Water Demand (Revised Projection)
District: GAMPAHA
Division WATTALA MABOLE U.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	27,800	28,900	29,450	30,000	30,800	31,600
Total of Residential, Commercial, Industria, and Institutional						
Land Use Area (ha) (Annex.F)	261	277	289	301	313	325
Net Population Density (pop./ha)	107	104	102	100	98	97
B. Service Ratio (%)	70	100	100	100	100	100
C. Total Service Population (A*B/100)	19,563	28,900	29,450	30,000	30,800	31,600
D. Direct Connection						
D1 Percentage of Connected Population	(Projected)					
	68.9	71.1	73.3	75.6	77.8	80.0
D2 Population (C*D1/100)	13,477	20,551	21,597	22,667	23,956	25,280
D3 Unit Rate (l/cap/d)	158	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	2,129	3,391	3,747	4,125	4,576	5,056
E. Community Tap						
E1 Percentage of Connected Population	5.3	4.2	3.2	2.1	1.1	0.0
E2 Population (C*E1/100)	1,032	1,220	933	633	325	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	55	65	49	34	17	0
F. Yard Tap						
F1 Percentage of Connected Population	25.8	24.7	23.5	22.3	21.2	20.0
F2 Population (C*F1/100)	5,054	7,129	6,921	6,700	6,519	6,320
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	379	535	519	503	489	474
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	19,563	28,900	29,450	30,000	30,800	31,600
H2 Total Domestic Water Use (m3/d)	2,563	3,990	4,316	4,661	5,082	5,530
I. Industrial Water Use						
Industrial Area (ha)	38	43	48	52	57	61
Unit Rate (l/ha/d)	10419	10419	10419	10419	10419	10419
Industrial Water Use (m3/d)	396	448	495	542	589	636
J. Commercial Water Use						
Commercial Area (ha)	7	11	15	18	22	25
Unit Rate (l/ha/d)	105834	105834	105834	105834	105834	105834
Commercial Water Use (m3/d)	741	1,164	1,535	1,905	2,275	2,646
K. Institutional Water Use						
Institutional Area (ha)	8	9	10	11	12	13
Unit Rate (l/ha/d)	50824	50824	50824	50824	50824	50824
Institutional Water Use (m3/d)	407	457	508	559	610	661
L. Total Net Water Use (m3/d) (H+I+J+K)	4,106	6,060	6,853	7,667	8,556	9,472
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	1,760	2,020	1,990	1,917	2,139	2,368
N. Total Water Demand (m3/d) (L+M)	5,866	8,080	8,843	9,584	10,695	11,840

Projected Full Development Water Demand (Revised Projection)
District: GAMPAHA
Division KELANIYA P.S.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	120,900	132,300	140,700	149,100	151,500	153,900
Total of Residential, Commercial, Industria, and Institutional						
Land Use Area (ha) (Annex.F)	1,435	1,557	1,667	1,777	1,779	1,780
Net Population Density (pop./ha)	84	85	84	84	85	86
B. Service Ratio (%)	72	100	100	100	100	100
C. Total Service Population (A*B/100)	87,650	132,300	140,700	149,100	151,500	153,900
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	64.4	67.5	70.6	73.7	76.9	80.0
D2 Population (C*D1/100)	56,406	89,280	99,351	109,949	116,459	123,120
D3 Unit Rate (l/cap/d)	158	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	8,912	14,731	17,237	20,011	22,244	24,624
E. Community Tap						
E1 Percentage of Connected Population	9.8	7.9	5.9	3.9	2.0	0.0
E2 Population (C*E1/100)	8,601	10,386	8,284	5,852	2,973	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	456	550	439	310	158	0
F. Yard Tap						
F1 Percentage of Connected Population	25.8	24.7	23.5	22.3	21.2	20.0
F2 Population (C*F1/100)	22,643	32,634	33,065	33,299	32,068	30,780
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	1,698	2,448	2,480	2,497	2,405	2,309
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	87,650	132,300	140,700	149,100	151,500	153,900
H2 Total Domestic Water Use (m3/d)	11,066	17,729	20,156	22,818	24,806	26,933
I. Industrial Water Use						
Industrial Area (ha)	39	87	137	187	187	187
Unit Rate (l/ha/d)	10419	10419	10419	10419	10419	10419
Industrial Water Use (m3/d)	406	906	1,427	1,948	1,948	1,948
J. Commercial Water Use						
Commercial Area (ha)	24	35	47	59	59	59
Unit Rate (l/ha/d)	105834	105834	105834	105834	105834	105834
Commercial Water Use (m3/d)	2,540	3,704	4,974	6,244	6,244	6,244
K. Institutional Water Use						
Institutional Area (ha)	49	51	54	57	59	60
Unit Rate (l/ha/d)	50824	50824	50824	50824	50824	50824
Institutional Water Use (m3/d)	2,490	2,592	2,744	2,897	2,973	3,049
L. Total Net Water Use (m3/d) (H+I+J+K)	16,503	24,932	29,302	33,908	35,972	38,174
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	7,073	8,311	8,507	8,477	8,993	9,544
N. Total Water Demand (m3/d) (L+M)	23,576	33,243	37,810	42,385	44,965	47,718

Projected Full Development Water Demand (Revised Projection)
District: KALUTARA
Division PANADURA U.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	38,000	38,600	38,600	38,600	38,950	39,300
Total of Residential, Commercial, Industria, and Institutional						
Land Use Area (ha) (Annex.F)	470	475	477	478	481	484
Net Population Density (pop./ha)	81	81	81	81	81	81
B. Service Ratio (%)	97	100	100	100	100	100
C. Total Service Population (A*B/100)	37,000	38,600	38,600	38,600	38,950	39,300
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	61.9	65.6	69.2	72.8	76.4	80.0
D2 Population (C*D1/100)	22,919	25,304	26,698	28,092	29,753	31,440
D3 Unit Rate (l/cap/d)	139	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	3,186	4,175	4,632	5,113	5,683	6,288
E. Community Tap						
E1 Percentage of Connected Population	34.7	27.8	20.8	13.9	6.9	0.0
E2 Population (C*E1/100)	12,847	10,722	8,042	5,361	2,705	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	681	568	426	284	143	0
F. Yard Tap						
F1 Percentage of Connected Population	3.3	6.7	10.0	13.3	16.7	20.0
F2 Population (C*F1/100)	1,233	2,573	3,860	5,147	6,492	7,860
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	93	193	290	386	487	590
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	37,000	38,600	38,600	38,600	38,950	39,300
H2 Total Domestic Water Use (m3/d)	3,959	4,937	5,348	5,783	6,313	6,878
I. Industrial Water Use						
Industrial Area (ha)	4	4	5	5	5	5
Unit Rate (l/ha/d)	4200	4200	4200	4200	4200	4200
Industrial Water Use (m3/d)	17	17	19	21	21	21
J. Commercial Water Use						
Commercial Area (ha)	19	19	19	19	19	19
Unit Rate (l/ha/d)	16100	16100	16100	16100	16100	16100
Commercial Water Use (m3/d)	306	306	306	306	306	306
K. Institutional Water Use						
Institutional Area (ha)	38	38	39	40	40	40
Unit Rate (l/ha/d)	7788	7788	7788	7788	7788	7788
Institutional Water Use (m3/d)	296	296	304	312	312	312
L. Total Net Water Use (m3/d) (H+I+J+K)	4,578	5,555	5,976	6,421	6,952	7,516
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	1,962	1,852	1,735	1,605	1,738	1,879
N. Total Water Demand (m3/d) (L+M)	6,540	7,407	7,711	8,027	8,689	9,395

Projected Full Development Water Demand (Revised Projection)
District: KALUTARA
Division HORANA U.C.

	YEAR					
	1995	2000	2005	2010	2015	2020
A. Projected Population	12,100	13,200	14,300	15,400	16,750	18,100
Total of Residential, Commercial, Industria, and Institutional						
Land Use Area (ha) (Annex.F)	186	200	213	226	239	252
Net Population Density (pop./ha)	65	66	67	68	70	72
B. Service Ratio (%)	83	100	100	100	100	100
C. Total Service Population (A*B/100)	9,983	13,200	14,300	15,400	16,750	18,100
D. Direct Connection						
D1 Percentage of Connected Population (Projected)	49.2	55.3	61.5	67.7	73.8	80.0
D2 Population (C*D1/100)	4,908	7,304	8,795	10,421	12,367	14,480
D3 Unit Rate (l/cap/d)	146	165	173.5	182	191	200
D4 Water Use (m3/d) (D2*D3/1000)	717	1,205	1,526	1,897	2,362	2,896
E. Community Tap						
E1 Percentage of Connected Population	11.7	9.3	7.0	4.7	2.3	0.0
E2 Population (C*E1/100)	1,165	1,232	1,001	719	391	0
E3 Unit Rate (l/cap/d)	53	53	53	53	53	53
E4 Water Use (m3/d) (E2*E3/1000)	62	65	53	38	21	0
F. Yard Tap						
F1 Percentage of Connected Population	39.2	35.3	31.5	27.7	23.8	20.0
F2 Population (C*F1/100)	3,910	4,664	4,505	4,261	3,992	3,620
F3 Unit Rate (l/cap/d)	75	75	75	75	75	75
F4 Water Use (m3/d) (F2*F3/1000)	293	350	338	320	299	272
Total of Percentage (D4+E4+F4)	100	100	100	100	100	100
H. Total Domestic Water Use (D+E+F)						
H1 Total Connected Population	9,983	13,200	14,300	15,400	16,750	18,100
H2 Total Domestic Water Use (m3/d)	1,072	1,620	1,917	2,254	2,682	3,168
I. Industrial Water Use						
Industrial Area (ha)	8	9	11	12	14	15
Unit Rate (l/ha/d)	9064	9064	9064	9064	9064	9064
Industrial Water Use (m3/d)	73	82	95	109	122	136
J. Commercial Water Use						
Commercial Area (ha)	12	14	15	15	16	16
Unit Rate (l/ha/d)	10350	10350	10350	10350	10350	10350
Commercial Water Use (m3/d)	124	145	150	155	160	166
K. Institutional Water Use						
Institutional Area (ha)	31	32	33	34	35	36
Unit Rate (l/ha/d)	10150	10150	10150	10150	10150	10150
Institutional Water Use (m3/d)	315	325	335	345	355	365
L. Total Net Water Use (m3/d) (H+I+J+K)	1,583	2,172	2,497	2,863	3,320	3,834
M. Water Loss						
M1 Water Loss Ratio (%)	30.0	25.0	22.5	20.0	20.0	20.0
M2 Water Loss (m3/d) (L/(100-M1)*M1)	678	724	725	716	830	959
N. Total Water Demand (m3/d) (L+M)	2,261	2,895	3,222	3,579	4,150	4,793

CHAPTER 7

Ref. No. 7.1

Subject : **Alternative Study for Transmission System**

Title : **Pipeline Analysis for Alternative**

Contents : **Pipeline Analysis for Alternative**

For 2010 Demand (Route TA-2) 7.1-1
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For 2020 Demand (Route TA-1) 7.1-8
For 2010 Demand (Route TA-2) 7.1-12

T I T L E : Kalu System Transmission (for 2010 Demand)

NO. OF PIPES : 16
NO. OF NODES : 17
PEAK FACTOR : 1.15
MAX HL/KM : 10
MAX UNBAL (LPS) : .01

PIPE NO.	N O D E FROM	TO	LENGTH	DIA	HWC
1	800	801	2200.00	200	120
2	800	802	5350.00	1200	120
3	802	803	5450.00	500	120
4	803	804	180.00	200	120
5	803	805	5000.00	500	120
7	805	807	4800.00	500	120
8	807	808	425.00	300	120
9	807	809	1000.00	250	120
10	802	850	15500.00	1200	120
11	850	811	30.00	400	120
12	810	812	5250.00	1000	120
13	812	813	4400.00	1000	120
15	810	820	4800.00	800	120
16	820	821	20.00	700	120
19	820	824	300.00	500	120
30	850	810	1500.00	1200	120

NODE #	FIX	F L O W	ELEVATION
800	0.0	0.000	100.00
801	0.0	-23.800	50.00
802	0.0	0.000	20.00
803	0.0	0.000	15.00
804	0.0	-16.100	51.00
805	0.0	0.000	15.00
807	0.0	0.000	25.00
808	0.0	-74.500	24.00
809	0.0	-30.500	25.00
810	0.0	0.000	20.00
811	0.0	-83.500	40.00
812	0.0	0.000	20.00
813	0.0	-1078.100	28.00
820	0.0	0.000	15.10
821	0.0	-253.600	15.10
824	0.0	-271.600	35.00
850	0.0	0.000	20.00

REFERENCE NODE	GRADE LINE
800	104.50

T I T L E : Kalu System Transmission (for 2010 Demand)
NO. OF PIPES : 16
NO. OF NODES : 17
PEAK FACTOR : 1.15
MAX HEADLOSS/Km : 10

PIPE NO.	FROM Node	TO Node	LENGTH (M)	DIA (MM)	HWC	FLOW (LPS)	VELOCITY (MPS)	HEADLOSS (M/KM)	HEADLOSS (M
1	800	801	2200.00	200	120	27.37	0.87	4.94	10.8
2	800	802	5350.00	1200	120	2079.09	1.84	2.42	12.9
3	802	803	5450.00	500	120	139.26	0.71	1.16	6.3
4	803	804	180.00	200	120	18.51	0.59	2.40	0.4
5	803	805	5000.00	500	120	120.75	0.61	0.89	4.4
7	805	807	4800.00	500	120	120.75	0.61	0.89	4.2
8	807	808	425.00	300	120	85.67	1.21	5.66	2.4
9	807	809	1000.00	250	120	35.08	0.71	2.64	2.6
10	802	850	15500.00	1200	120	1939.82	1.72	2.13	32.9
11	850	811	30.00	400	120	96.03	0.76	1.72	0.0
12	810	812	5250.00	1000	120	1239.81	1.58	2.26	11.8
13	812	813	4400.00	1000	120	1239.81	1.58	2.26	9.9
15	810	820	4800.00	800	120	603.98	1.20	1.77	8.4
16	820	821	20.00	700	120	291.64	0.76	0.88	0.0
19	820	824	300.00	500	120	312.34	1.59	5.15	1.5
30	850	810	1500.00	1200	120	1843.79	1.63	1.93	2.9

NODE NO.	FLOW (LPS)	ELEVATION (M)	H G L (M)	PRESSURE (M)
800 R	2106.455	100.00	104.50	4.50
801	-27.370	50.00	93.64	43.64
802	0.000	20.00	91.57	71.57
803	0.000	15.00	85.28	70.28
804	-18.515	51.00	84.85	33.85
805	0.000	15.00	80.84	65.84
807	0.000	25.00	76.58	51.58
808	-85.675	24.00	74.17	50.17
809	-35.075	25.00	73.94	48.94
810	0.000	20.00	55.73	35.73
811	-96.025	40.00	58.58	18.58
812	0.000	20.00	43.89	23.89
813	-1239.815	28.00	33.96	5.96
820	0.000	15.10	47.25	32.15
821	-291.640	15.10	47.23	32.13
824	-312.340	35.00	45.70	10.70
850	0.000	20.00	58.64	38.64

T I T L E : Kalu System Transmission (for 2020 Demand)

NO. OF PIPES : 24
NO. OF NODES : 20
PEAK FACTOR : 1.15
MAX HL/KM : 10
MAX UNBAL (LPS) : .01

PIPE NO.	N O D E FROM	TO	LENGTH	DIA	HWC
1	800	801	2200.00	200	120
2	800	802	5350.00	1200	120
3	802	803	5450.00	500	120
4	803	804	180.00	200	120
5	803	805	5000.00	500	120
7	805	807	4800.00	500	120
8	807	808	425.00	300	120
9	807	809	1000.00	250	120
10	802	850	15500.00	1200	120
11	850	811	20.00	400	120
12	810	812	5250.00	1000	120
13	812	813	4400.00	1000	120
15	810	820	4800.00	800	120
16	820	821	20.00	700	120
19	820	824	300.00	500	120
20	800	802	5350.00	1200	120
21	802	850	15500.00	1200	120
22	850	810	1500.00	1200	120
23	810	812	5250.00	1100	120
24	812	813	4400.00	1100	120
30	850	810	1500.00	1200	120
815	812	815	3300.00	400	120
851	805	851	200.00	200	120
852	807	852	3000.00	250	120

NODE #	FIX	F L O W	ELEVATION
800	0.0	0.000	100.00
801	0.0	-34.800	50.00
802	0.0	0.000	20.00
803	0.0	0.000	15.00
804	0.0	-39.200	51.30
805	0.0	0.000	15.00
807	0.0	0.000	25.00
808	0.0	-75.200	26.00
809	0.0	-33.500	39.50
810	0.0	0.000	20.00
811	0.0	-210.800	40.00
812	0.0	0.000	20.00

NODE #	FIX	F L O W	ELEVATION
813	0.0	-2484.300	28.00
815	0.0	-106.400	24.00
820	0.0	0.000	15.10
821	0.0	-324.600	15.10
824	0.0	-305.300	35.00
850	0.0	0.000	20.00
851	0.0	-21.100	40.00
852	0.0	-28.200	30.00

REFERENCE NODE	GRADE LINE
800	104.50

T I T L E : Kalu System Transmission (for 2020 Demand)
NO. OF PIPES : 24
NO. OF NODES : 20
PEAK FACTOR : 1.15
MAX HEADLOSS/Km : 10

PIPE NO.	FROM Node	TO Node	LENGTH (M)	DIA (MM)	HWC	FLOW (LPS)	VELOCITY (MPS)	HEADLOSS (M/KM)	HEADLOSS (M
1	800	801	2200.00	200	120	40.02	1.27	9.97	21.9
2	800	802	5350.00	1200	120	2086.48	1.84	2.43	13.0
3	802	803	5450.00	500	120	226.78	1.15	2.85	15.5
4	803	804	180.00	200	120	45.08	1.43	12.43HI	2.2
5	803	805	5000.00	500	120	181.70	0.93	1.89	9.4
7	805	807	4800.00	500	120	157.43	0.80	1.45	6.9
8	807	808	425.00	300	120	86.48	1.22	5.76	2.4
9	807	809	1000.00	250	120	38.52	0.78	3.14	3.1
10	802	850	15500.00	1200	120	1973.09	1.74	2.19	33.9
11	850	811	20.00	400	120	242.42	1.93	9.55	0.1
12	810	812	5250.00	1000	120	1303.78	1.66	2.48	13.0
13	812	813	4400.00	1000	120	1250.23	1.59	2.29	10.0
15	810	820	4800.00	800	120	724.39	1.44	2.47	11.8
16	820	821	20.00	700	120	373.29	0.97	1.39	0.0
19	820	824	300.00	500	120	351.09	1.79	6.39	1.9
20	800	802	5350.00	1200	120	2086.48	1.84	2.43	13.0
21	802	850	15500.00	1200	120	1973.09	1.74	2.19	33.9
22	850	810	1500.00	1200	120	1851.88	1.64	1.95	2.9
23	810	812	5250.00	1100	120	1675.58	1.76	2.48	13.0
24	812	813	4400.00	1100	120	1606.77	1.69	2.29	10.0
30	850	810	1500.00	1200	120	1851.88	1.64	1.95	2.9
815	812	815	3300.00	400	120	122.36	0.97	2.70	8.9
851	805	851	200.00	200	120	24.26	0.77	3.95	0.7
852	807	852	3000.00	250	120	32.43	0.66	2.28	6.8

NODE NO.	FLOW (LPS)	ELEVATION (M)	H G L (M)	PRESSURE (M)
800 R	4212.910	100.00	104.50	4.50
801	-40.020	50.00	82.56	32.56
802	0.000	20.00	91.49	71.49
803	0.000	15.00	75.97	60.97
804	-45.080	51.30	73.73	22.43
805	0.000	15.00	66.52	51.52
807	0.000	25.00	59.56	34.56
808	-86.480	26.00	57.11	31.11
809	-38.525	39.50	56.42	16.92
810	0.000	20.00	54.57	34.57
811	-242.420	40.00	57.31	17.31
812	0.000	20.00	41.57	21.57

NODE NO.	FLOW (LPS)	ELEVATION (M)	H G L (M)	PRESSURE (M)
813	-2856.945	28.00	31.49	3.49
815	-122.360	24.00	32.68	8.68
820	0.000	15.10	42.69	27.59
821	-373.290	15.10	42.67	27.57
824	-351.095	35.00	40.78	5.78
850	0.000	20.00	57.50	37.50
851	-24.265	40.00	65.73	25.73
852	-32.430	30.00	52.72	22.72

T I T L E : Transmission Route Alt. (for 2020 Demand)

NO. OF PIPES : 22
NO. OF NODES : 17
PEAK FACTOR : 1.15
MAX HL/KM : 10
MAX UNBAL (LPS) : .01

PIPE NO.	N O D E FROM	TO	LENGTH	DIA	HWC
1	800	801	2200.00	200	120
2	800	802	5350.00	1200	120
3	802	803	5450.00	450	120
4	803	804	180.00	200	120
10	802	850	15500.00	1200	120
11	850	811	20.00	400	120
12	810	812	5250.00	1100	120
13	812	813	4400.00	1100	120
15	810	820	4800.00	1000	120
16	820	821	20.00	700	120
19	820	824	300.00	500	120
20	800	802	5350.00	1200	120
21	802	850	15500.00	1200	120
22	850	810	1400.00	1200	120
23	810	812	5250.00	1100	120
24	812	813	4400.00	1100	120
30	850	810	1400.00	1200	120
50	820	860	2410.00	500	120
51	860	861	6220.00	450	120
52	861	862	1630.00	400	120
53	862	807	230.00	350	120
54	820	807	10500.00	500	120

NODE #	FIX	F L O W	ELEVATION
800	0.0	0.000	100.00
801	0.0	-34.800	50.00
802	0.0	0.000	20.00
803	0.0	0.000	15.00
804	0.0	-39.200	51.30
807	0.0	-158.000	28.00
810	0.0	0.000	20.00
811	0.0	-210.800	40.00
812	0.0	0.000	20.00
813	0.0	-2590.700	28.00
820	0.0	0.000	15.10
821	0.0	-324.600	15.10
824	0.0	-305.300	35.00
850	0.0	0.000	20.00

NODE #	FIX	F L O W	ELEVATION
860	0.0	0.000	15.00
861	0.0	0.000	15.00
862	0.0	0.000	15.00

REFERENCE NODE	GRADE LINE
800	104.50

T I T L E : Transmission Route Alt. (for 2020 Demand)
NO. OF PIPES : 22
NO. OF NODES : 17
PEAK FACTOR : 1.15
MAX HEADLOSS/Km : 10
MAX UNBAL(LPS) : 0

PIPE NO.	FROM Node	TO Node	LENGTH (M)	DIA (MM)	HWC	FLOW (LPS)	VELOCITY (MPS)	HEADLOSS (M/KM)	HEADLOSS (M
1	800	801	2200.00	200	120	40.02	1.27	9.97	21.9
2	800	802	5350.00	1200	120	2086.48	1.84	2.43	13.0
3	802	803	5450.00	450	120	45.08	0.28LO	0.24	1.3
4	803	804	180.00	200	120	45.08	1.43	12.43HI	2.2
10	802	850	15500.00	1200	120	2063.94	1.82	2.38	36.9
11	850	811	20.00	400	120	242.42	1.93	9.55	0.1
12	810	812	5250.00	1100	120	1489.68	1.57	1.99	10.4
13	812	813	4400.00	1100	120	1489.68	1.57	1.99	8.7
15	810	820	4800.00	1000	120	906.09	1.15	1.26	6.0
16	820	821	20.00	700	120	373.29	0.97	1.39	0.0
19	820	824	300.00	500	120	351.09	1.79	6.39	1.9
20	800	802	5350.00	1200	120	2086.48	1.84	2.43	13.0
21	802	850	15500.00	1200	120	2063.94	1.82	2.38	36.9
22	850	810	1400.00	1200	120	1942.73	1.72	2.13	2.9
23	810	812	5250.00	1100	120	1489.68	1.57	1.99	10.4
24	812	813	4400.00	1100	120	1489.68	1.57	1.99	8.7
30	850	810	1400.00	1200	120	1942.73	1.72	2.13	2.9
50	820	860	2410.00	500	120	76.49	0.39	0.38	0.9
51	860	861	6220.00	450	120	76.49	0.48	0.64	3.9
52	861	862	1630.00	400	120	76.49	0.61	1.13	1.8
53	862	807	230.00	350	120	76.49	0.79	2.17	0.5
54	820	807	10500.00	500	120	105.21	0.54	0.69	7.2

NODE NO.	FLOW (LPS)	ELEVATION (M)	H G L (M)	PRESSURE (M)
800 R	4212.910	100.00	104.50	4.50
801	-40.020	50.00	82.56	32.56
802	0.000	20.00	91.49	71.49
803	0.000	15.00	90.18	75.18
804	-45.080	51.30	87.95	36.65
807	-181.700	28.00	38.28	10.28
810	0.000	20.00	51.56	31.56
811	-242.420	40.00	54.35	14.35
812	0.000	20.00	41.10	21.10
813	-2979.305	28.00	32.34	4.34
820	0.000	15.10	45.50	30.40
821	-373.290	15.10	45.47	30.37
824	-351.095	35.00	43.58	8.58
850	0.000	20.00	54.55	34.55

NODE NO.	FLOW (LPS)	ELEVATION (M)	H G L (M)	PRESSURE (M)
860	0.000	15.00	44.58	29.58
861	0.000	15.00	40.62	25.62
862	0.000	15.00	38.78	23.78

T I T L E : Kalu System Transmission (2010 Lower Demand)
NO. OF PIPES : 16
NO. OF NODES : 17
PEAK FACTOR : 1.15
MAX HL/KM : 10
MAX UNBAL (LPS) : .01

PIPE NO.	N O D E FROM	TO	LENGTH	DIA	HWC
1	800	801	2200.00	200	120
2	800	802	5350.00	1100	120
3	802	803	5450.00	400	120
4	803	804	180.00	200	120
5	803	805	5000.00	400	120
7	805	807	4800.00	400	120
8	807	808	425.00	250	120
9	807	809	1000.00	200	120
10	802	850	15500.00	1000	120
11	850	811	20.00	400	120
12	810	812	5250.00	1000	120
13	812	813	4400.00	1000	120
15	810	820	4800.00	900	120
16	820	821	20.00	700	120
19	820	824	300.00	500	120
30	850	810	1500.00	1000	120

NODE #	FIX	F L O W	ELEVATION
800	0.0	0.000	100.00
801	0.0	-23.800	50.00
802	0.0	0.000	20.00
803	0.0	0.000	15.00
804	0.0	-16.100	35.00
805	0.0	0.000	15.00
807	0.0	0.000	25.00
808	0.0	-55.600	26.00
809	0.0	-24.700	39.50
810	0.0	0.000	20.00
811	0.0	-83.500	40.00
812	0.0	0.000	20.00
813	0.0	-702.400	28.00
820	0.0	0.000	15.10
821	0.0	-327.100	15.10
824	0.0	-169.700	35.00
850	0.0	0.000	20.00

REFERENCE NODE	GRADE LINE
800	104.50

T I T L E : Kalu System Transmission (2010 Lower Demand)
NO. OF PIPES : 16
NO. OF NODES : 17
PEAK FACTOR : 1.15
MAX HEADLOSS/Km : 10

PIPE NO.	FROM Node	TO Node	LENGTH (M)	DIA (MM)	HWC	FLOW (LPS)	VELOCITY (MPS)	HEADLOSS (M/KM)	HEADLOSS (M
1	800	801	2200.00	200	120	27.37	0.87	4.94	10.8
2	800	802	5350.00	1100	120	1585.97	1.67	2.24	11.9
3	802	803	5450.00	400	120	110.86	0.88	2.25	12.2
4	803	804	180.00	200	120	18.51	0.59	2.40	0.4
5	803	805	5000.00	400	120	92.35	0.73	1.60	8.0
7	805	807	4800.00	400	120	92.35	0.73	1.60	7.6
8	807	808	425.00	250	120	63.94	1.30	8.00	3.4
9	807	809	1000.00	200	120	28.41	0.90	5.29	5.2
10	802	850	15500.00	1000	120	1475.11	1.88	3.11	48.2
11	850	811	20.00	400	120	96.03	0.76	1.72	0.0
12	810	812	5250.00	1000	120	807.76	1.03	1.02	5.3
13	812	813	4400.00	1000	120	807.76	1.03	1.02	4.4
15	810	820	4800.00	900	120	571.32	0.90	0.90	4.3
16	820	821	20.00	700	120	376.17	0.98	1.41	0.0
19	820	824	300.00	500	120	195.15	0.99	2.16	0.6
30	850	810	1500.00	1000	120	1379.08	1.76	2.75	4.1

NODE NO.	FLOW (LPS)	ELEVATION (M)	H G L (M)	PRESSURE (M)
800 R	1613.335	100.00	104.50	4.50
801	-27.370	50.00	93.64	43.64
802	0.000	20.00	92.53	72.53
803	0.000	15.00	80.29	65.29
804	-18.515	35.00	79.86	44.86
805	0.000	15.00	72.28	57.28
807	0.000	25.00	64.59	39.59
808	-63.940	26.00	61.19	35.19
809	-28.405	39.50	59.31	19.81
810	0.000	20.00	40.19	20.19
811	-96.025	40.00	44.27	4.27
812	0.000	20.00	34.82	14.82
813	-807.760	28.00	30.33	2.33
820	0.000	15.10	35.87	20.77
821	-376.165	15.10	35.84	20.74
824	-195.155	35.00	35.22	0.22
850	0.000	20.00	44.31	24.31

CHAPTER 9

Ref. No. 9.1

Subject : Treatment Plant

Title : System Design of Treatment Plant

Contents : Hydraulic and System Design

Flocculation Basin

(1) Design Conditions

1)	Structure	:	Reinforced Concrete Baffled Channel (Up-and-down type)
2)	Mean Velocity	:	15 ~ 30 cm
3)	Retention Time	:	25 min.
4)	Nos. of Basin	:	8 units

(2) Design Capacity and Structures

1) Volume of the basin

Setting up the retention time as 25 min., volume of the basin will be required with more than 415 m^3 as given in the following computation.

$$V = \frac{191{,}100}{8 \times 24 \times 60} \times 25 = 415\ m^3$$

2) Overall head loss

Overall head loss (H) is computed by the following equasion.

$$H = \frac{G^2 \cdot V \cdot \mu}{\rho \cdot Q \cdot g} = \frac{35^2 \times 415 \times 10^{-3}}{10^3 \times (23{,}888 / 86{,}400) \times 9.8} = 0.188\ m$$

where,

G	=	Velocity gradient	($\rightarrow 35\ s^{-1}$)
μ	=	Kinematic velocity	(10^{-3} mg/cm·s))
ρ	=	Specific gravity of water	(100 kg/m^3)
g	=	Gravity	(9.8 m/s^2)

It is generally identified that the larger G-value will bring about faster generation of flocs, but inversely, the generated flocs will be easily destroyed. According to Camp's theory, the G-value is broadly recommended to be taken

within a range of 10 - 75/s for the formation of good flocs resulting GT = 15,000 - 112,500 as combined with the retention time.

When G-value is adaptable with larger values such as 50, subsequent total head loss will become 0.38 m. However, it may be somewhat too large to adopt this value for determining structures in this Study. On the other hand, when this value has been verified to be correct indeed in the detail design stage, increasing the number of baffle walls will be an easy task.

3) Head loss by structures

Head loss at the bottom of the baffle walls (loss by under passing), head loss on top of the weir (loss by over passing) and head loss by bottom and walls of the channel (friction loss) are computed as given in Table (1) on the basis of the drawings in Appendix C-2 and C-3.

Table (1) Head Loss by Structures

	No.1 Raw	No.2 Raw	No.3 Raw	No.4 Raw	No.5 Raw	Column	Total
Coefficient of friction loss (f)	3.70	3.70	3.70	3.70	3.70	3.70	
Discharge per sedimentation	23,888	23,888	23,888	23,888	23,888	23,888	
Width of wall (Ww)	1.575	1.750	2.050	2.350	2.725	1.300	
Height of flow area at bottom (Hf)	0.70	0.70	0.70	0.70	0.70	0.70	
No. of wall in one raw (Nw)	7.00	7.00	7.00	7.00	7.00	4.00	
h1=f/2/9.8*v^2*no. of wall/2	0.036	0.029	0.021	0.016	0.012	0.035	
h2=v^2/2/9.8*no.of wall /2	0.010	0.008	0.006	0.004	0.003	0.000	
h3=L/C^2/R*V^2	0.002	0.002	0.001	0.001	0.001	0.003	
H=h1+h2+h3	0.048	0.039	0.028	0.021	0.016	0.038	**0.19**
R=Ww*Hf/2/(Ww+Hf)	0.242	0.250	0.261	0.270	0.278	0.228	
n=roughness coefficint	0.014	0.014	0.014	0.014	0.014	0.014	
C^2=1/n^2*R^(1/3)	3,180.78	3,214.08	3,260.17	3,296.27	3,331.72	3,114.62	
Length of ditch (L1)	10.00	10.00	10.00	10.00	10.00	11.05	
Length of wall (Lw)	2.800	2.800	2.800	2.800	2.800	2.800	
L= L1+Lw*Nw	29.600	29.600	29.600	29.600	29.600	22.250	
Velocity	0.251	0.226	0.193	0.168	0.145	0.304	

4) Head loss for determining hydraulic profile

For determining hydraulic profile as given in Appendix C-1, conservative value of 0.4 m is adopted in this Feasibility Study taking account of marginal allowance for the entire system.

Sedimentation Basin

(1) Design Conditions

1)	Max. Day Demand	182,000 m^3/d
2)	Type of Sedimentation Basin	Horizonal Flow
3)	Design Parameters	
	a. Retention Time	2.5 hr
	b. Surface Load	25 mm/min.
	c. Mean Velocity	less than 0.4 m/min.
	d. Type of Trough	Orifice type parallel trough
	e. Sludge Removal	Travelling scraper and sludge removal pipes
	f. Weir Load	less than 500 $m^3/(d \cdot m)$

(2) Design Capacity and Structure

1)	Hydraulic capacity	191,100 m^3/d
2)	Required water surface area $\frac{191,100}{0.025 \times 60 \times 24}$	$= 5,308\ m^2$
3)	Number of Sedimentation	8 units

4) Area and Size

The area of the one out of eight units is approximately 670 m^2. The ratio of length to width as 6:1 will be appropriate, so that the size of the basin will be: 68 m (L) and 10 m (W).

5) Average Velocity

Average velocity is computed setting the effective depth as 4.5 m as follows:

$$\frac{191,100}{10 \times 4.5 \times 8 \times 24 \times 60} = 0.37 \text{ m} < 0.4 \text{ m/min.}$$

6) Weir Length

The weir load is set up at 500 $m^3/(d \cdot m)$ as given previously. The required total length of the weir, number of trough and size of trough are computed as follows:

$$\frac{191,100}{8 \times 500} = 47.8 \text{ m} \rightarrow 50 \text{ m}$$

$$50 \text{ m} / 5 \text{ m} = 10 \text{ troughs}$$

$$\frac{191,100}{8 \times 10} = 0.028 \text{ m}^3/\text{s}$$

$$ho = \left(\frac{Q}{1.05 \cdot B}\right)^{2/3}$$

$$= \left(\frac{0.028}{1.05 \times 0.3}\right)^{2/3}$$

$$= 0.199 \rightarrow 0.2 \text{ m}$$

Thus, 0.3 m (W) and 0.2 m (H) will be adopted.

7) Rectification Wall

Six percent of flow area will be appropriate for the concrete rectification wall as given 2.7 m2 as follows:

$$4.5 \times 10.0 \times 0.06 = 2.7 \text{ m}^2$$

Assuming 0.1 m for the diameter of the wall, total number of the holes are:

$$\pi/4 \times 0.1^2 \times n = 2.7$$

$$n = 344$$

Filtration Basin

(1) Design Conditions

1)	Type of filter		Constant Rate, Rising Level
2)	Filtration rate		120 m/d (= 5 m/hr)
3)	Filter media		Single media Sand 0.6 mm Thickness 600 mm
4)	Washing system		Surface wash + Backwash
	Washing rate	Surface washing	0.3 m/min.
		Backwashing	0.8 m/min.
5)	Trough		8 nos./filter

(2) Design Capacity and Structure

1) Filter bed area (10 filters, 2 sets)

$$\frac{191,100}{120 \times 10 \times 2} = 79.6 \text{ m}^2$$

2) Size of filters

13.0 (m) x 6.0 (m)

3) Size of trough

Conditions

Surface wash	0.3 m/min.
Backwash	0.8 m/min.
Number of trough	8

Washwater volume to be required is,

$$\frac{13.0 \times 6.0 \times (0.3 + 0.8)}{8} = 10.73 \text{ m}^3/\text{min.}$$

and considering 20% allowance

$10.73 \times 1.2 = 12.88\ m^3/min.$

$= 0.215\ m^3/sec$

Water height in the trough is calculated by the following formula resulting 0.5 m. The position of trough will be 0.2 m above the filter surface. The material of trough shall be pre-stressed concrete in order to protect from damaging by buoyancy, weight of water and self-weight of the trough.

i) By Miller's Formula

$$Q = 1.05 \times B\ (ho + L \tan i)^{1.5}$$

where,

Q	=	Discharge in a trough	(m^3/s)
B	=	Width of trough	(m)
ho	=	Depth of upstream water	(m)
L	=	Length of trough	(m)
i	=	Gradient of trough	(°)

when,

B = 0.5 m

i = 0

$$ho = \left(\frac{Q}{1.05B}\right)^{2/3}$$

$$= \left(\frac{0.215}{1.05 \times 0.5}\right)^{2/3}$$

$$= 0.55\ m$$

ii) Camp's Formula

$$ho = \sqrt{3}\left(\frac{\alpha Q^2}{gB^2}\right)^{1/3}$$

$$= \sqrt{3}\left(\frac{1.10 \times 0.215^2}{9.8 \times 0.5^2}\right)^{1/3}$$

$$= 0.475\ m$$

where, $\alpha = 1.10$

4) Initial head loss of filter

Conditions to be considered are:

- Diameter of media 0.6 mm
- Thickness of media 0.6 m
- Percentage of void 0.45
- Filtration rate 120 m/d

Initial head loss of the filter is calculated by Fair Hatch Formula as follows:

$$Re = \frac{\rho F \cdot D \cdot V}{\mu}$$

$$= \frac{10^3 \times 0.6 \times 10^{-3} \times 1.39 \times 10^{-3}}{10^{-3}}$$

$$= 0.834$$

$$h = 0.178 \times \frac{24}{Re} \times \frac{Lv^2}{g\varepsilon^4 D} \times \frac{\alpha}{\beta}$$

$$= 0.178 \times \frac{24}{0.834} \times \frac{0.6 \times (1.39 \times 10^{-3})^2}{9.8 \times 0.45^4 \times 0.6 \times 10^{-3}} \times 5.5$$

$$= 0.135 \text{ m}$$

where,

h	=	Initial head loss	
Re	=	Reynolds number	< 10
ρF	=	Density of water	(10^3 kg/m^3)
D	=	Diameter of media	0.6 mm
μ	=	Kinematic coefficient of water	(10^{-3} kg/(m·s))
L	=	Length of media	0.6 m
g	=	Gravity	9.8 m/s^2
ε	=	Percentage of void	0.45
α/β	=	Coefficient of figure for round material	5.5
V	=	Filtration rate	120 m/d (1.39×10^{-3} m/sec)

5) Required backwashing head

For calculation, the following conditions area assumed.

a.	Media	0.6 mm
b.	Percentage of void (εo)	0.45
c.	Thickness of media (Lo)	0.60 m
d.	Density of media (ρs)	2,630 kg/m^3
	Density of water (ρF)	1,000 kg/m^3
e.	Supporting gravel	
	1st layer (0.1 m)	2.0 mm
	2nd layer (0.1 m)	4.0 mm
	Percentage of void	0.4
	Coefficient of figure (ϕ)	0.7
f.	Water collection device	
	Rate of opening (β)	1%
g.	Discharge coefficient (α)	0.62
h.	Backwashing rate (u)	0.8 m/min. (0.013 m/s)

Each head loss is calculated as follows:

i) Head loss by media (h_1)

$$h_1 = \frac{Lo}{\rho F}(1 - \varepsilon o)(\rho s - \rho F)$$

$$= \frac{0.6}{10^3}(1 - 0.45)\,(2.630 - 1000)$$

$$= 0.54 \text{ m}$$

ii) Head loss by supporting gravel (h_2)

$$h_2 = \frac{200\ Lo\ u\ \mu(1 - \varepsilon o)^2}{\rho F g \phi^2 D^2 \varepsilon o^3}$$

$$= \frac{200 \times 0.013 \times 10^{-3}}{10^3 \times 9.8 \times 0.7^2}\left(\frac{0.1}{0.002^2} + \frac{0.1}{0.004^2}\right) \times \frac{(1 - 0.4)^2}{0.4^3}$$

$$= 0.095 \text{ m}$$

iii) Head loss by under drain device (h_3)

$$h_3 = \frac{1}{2g}\left(\frac{u}{\alpha\beta}\right)^2$$

$$= \frac{1}{2g}\left(\frac{0.013}{0.62 \times 0.01}\right)^2$$

$$= 0.224 \text{ m}$$

iv) Total head loss for backwashing

$$H = h_1 + h_2 + h_3$$
$$= 0.54 + 0.095 + 0.224$$
$$= 0.859 \text{ m}$$

6) Size of the gate in the filtration basin

In the calculation, for convenience, average velocity of 0.3 m/sec is assumed.

$$\frac{191{,}100}{20 \times 86{,}400} = 0.11 \text{ m}^3/\text{s}$$

assuming velocity as 0.3 m3/sec

$$0.11 / 0.3 = 0.37 \text{ m}^2$$

size of the gate:

70 cm x 70 cm

7) Under drain facilities

Underdrain facility consists of such as concrete block "teepee" type with grovels of 0.3 m and 0.2 m, respectively in thickness.

Clear Water Reservoir

(1) Design Conditions

1)	Retention Time	1 hr
2)	Effective Depth	4.0 m
3)	Freeboard between H.W.L and upper floor	1.0 m

(2) Design Capacity and Structures

The capacity of the clear water reservoir is calculated with a retention time of 1 hour as follows:

$$\frac{191,100}{24 \times 1.0} = 7,963 \text{ m}^3$$

Clarifies Sludge Sump

(1) Conditions

1) Scraper travels at 12 m/hr
2) Length of scraping ≒ 65 m
3) Time of travel
   65/12 = 5 hr
4) Volume of sludge produced
   7.0 t^D/day

(2) Capacity of Sump

a. Average sludge solids 2.0%
   $V = 7 \div 0.02 = 350\ m^3/day$

b. Average sludge solids 1.0%
   $V = 7 \div 0.01 = 700\ m^3/day$

If scraper works perfectly,

a. 350 m3/day ÷ 5 hrs = 70 m^3/hr

b. 700 m3/day ÷ 5 hrs = 140 m^3/hr

In worst case, for (b), pump sump for 10 minutes will be

$140 \times 10/60 = 23.3\ m^3$

However, there are 8 sedimentation tanks, if each require 5 hrs to de-sludge, total time will be

8 x 5 hrs = 40 hrs

Therefore, two sedimentation tanks must be desludged at the same time in practice.

Required sump volume = 23.3 x 2
= 46.6 m^3
→ 50 m^3

Estimation of Sludge Generation

WRC Fomula	W = 2 (15) + 0.2 (5) + 2.9 (15 x 104/666) + 1.9 (0.27) = 30 + 1 + 6.8 + 0.5 = 38.3 mg/ℓ = 38.3 g/m^3 throughput = 191,100 m^3 /d weight of sludge = 191,100 x 38.3 x 10^{-6} = 7.3 t/d
JWWA Fomula	S = Q (T x E1 + C x E2) x 10^{-6} = 191,100 [15 x 1.55 + 156/666 x 15] x 10^{-6} [E1 = 1.55 from 8 analyses] = 191,100 [23.25 + 3.51] x 10^{-6} = 191,100 [26.76] x 10^{-6} = 5.11 t/d
P.C.I.	W = S + 0.43T + 0.05H + P.D. [S = 20.75 from 8 analyses] = 20.75 + 0.43 (15) + 0.05 (5) + 156/666 (15) = 20.75 + 6.45 + 0.25 + 3.51 = 30.96 mg/ℓ = 30.96 g/m^3 sludge weight = 30.96 x 191,100 x 10^{-6} = 5.92 t/d
Average Sludge Generation	(7.3 + 5.92) / 2 = 6.6 t/d

Sludge Treatment and Dewatering

Assumptions: –

- The average daily sludge production = 6.6 tonnes as dried solids.
- Mechanical scraping will be required on a daily basis.

The 6.6 tonnes of sludge will be deposited equally on the bottom of the eight horizontal setting tanks, though in each tank it may be expected that more will accumulate towards the inlet end. The mechanical scraper will move the sludge (under water) to the inlet end at a speed of about 12 m/h. The sludge will be removed from the settling tank via a row of four hoppers using manually controlled valves.

The solids concentration in the discharged sludge is a matter for conjecture. Inside the tank the settle sludge will have a varying solids content, highest on the bottom and smallest at the interface with the supernatant water. Without conducting a series of tests it is not possible to predict the solids concentration in the bottom layer. As a general rule the maximum solids concentration of settled alum sludge is about 2.5% after two or three days.

An optimistic prediction would be that after one day the bottom layer would have a solids content of 2.0%, the topmost layer would have a concentration of 0.1 or less. The concentration gradient would be roughly linear and therefore the average solids content of all the sludge accumulated in the tank would be about 1.0%.

It is inevitable that some clear water will be drawn out with the sludge during the discharge operations, leading to an even lower average suspended solids content in the sludge sent to the settling tanks.

Sludge Volumes

6.6 tonnes of dried solids in a 1.0% sludge will occupy a volume of:

$$6.6 \times 100/1 = 660 \text{ m}^3$$

This is equivalent to $660 \times 30 = 19{,}800 \text{ m}^3$ per month

Thickening Tanks

The dimensions of the thickening tanks are:

$$20 \times 30 \times 3 = 1{,}800 \text{ m}^3$$

If 660 m^3 /d of sludge is discharged from the settling tanks, one thickening tank will fill in:

$$1{,}800/660 = 2.73 \text{ days}$$

For the original prediction of 2.0% solids sludge from the settling tanks, one thickening tank will fill in:

1,800/330 = 5.45 days

A minimum of three thickening tanks will therefore be required:

- one tank filling
- one tank settling
- one tank emptying

If it is assumed that the solids content of the thickened sludge will be 5.0%, the average volume of thickened sludge produced per day will be:

6.6 (the dried solids) x 100/5 = 132 m^3

Each drying bed has a capacity of:

20 x 60 x 2 = 2,400 m^3

The time taken to fill one bed with 5.0% sludge will be:

2,400/132 = 18.2 days

When one bed is full, there will be 7 empty beds remaining. The average time taken to fill these beds will be:

18.2 x 7 = 127.4 days (4.2 months)

After this time the first bed will begin to be filled again. Therefore the bed should be allowed to dry for four months and the remaining 0.2 months should be used for digging out the dried sludge.

The dried sludge is assumed to have a solids content of 40%, therefore the volume of dried sludge to be removed from each drying bed will be:

2,400 x 5/40 = 300 m^3

This is equivalent to a removal rate of:

300 / (30 x 0.2) = 50 m^3 /d

Chemical Storage and Make-up

Assumptions: —

(i) Chemical storage to be sufficient for 60 days operation at highest consumption

(ii) Maximum alum dose will be 15 mg/ℓ

(ii) Alum will be delivered in granular form in 50 kg bags

(iii) Maximum line dose will be 7.5 mg/ℓ (total)

(iv) Line will be delivered in 50 kg bags

(v) Maximum chlorine dose will be 2 mg/ℓ

(vi) Chlorine will be delivered in either: —

a) Nominal 1 tonne drums or

b) 68 kg cylinders

(1) Alum

Bulk density of alum	=	1.2 m^3/tonne (bagged)
Alum requirement (max)	=	2.85 tonne/day
N° bags/day	=	2.85/0.05 = 57
60 days storage	=	60 x 57 = 3,420 bags
volume	=	1.2 x 2.85 x 60 = 205.2 m^3
Max storage height of bags	→	2.5 m
floor area required	=	205.2/2.5 = 82.08 m^2
		say = 90 m^2

(2) Line

1) Bulk density of line	=	2.0 m3/tonne
2) Line requirement (max)	=	1.425 tonne day
N° of bags/day	=	1.425/0.05 → 29 bags
60 days storage	=	29 x 60 1,740 bags
volume	=	2.0 x 1.425 x 60 = 171 m^3
Max storage height of bags	→	2.5m
floor area required	=	171/205 = 68.4 m^2
		say = 90 m^2

(3) Chlorine

Maximum dose	=	2.0 mg/ℓ
daily consumption	=	360 kg/day → 15 kg/hr
60 days storage	=	0.360 x 60 = 21.6 tonnes

22 x 1 tonne drums or
21.6/0.068 = 318 x 68 kg cylinders

Note:
22°C Maximum extraction rate from 1 tonne drum = 10 kg/h
22°C Maximum extraction rate from 68 kg cylinder = 1.35 kg/h

we require 2 x 1 tonne drums on line (+2 on standby)
on we require 12 x 68 kg cylinder on line (12 on standby)

CHAPTER 9

Ref. No. 9.2

Subject : Treatment Plant

Title : Equipment List of the Treatment Plant

Contents : Mechanical Equipment List

Electrical Equipment List

Sri Lanka Colombo－Kalu Ganga Water Supply Plan

Mechanical Equipment List

Facilities & Equipment		Q'ty			Specifications
		Total	1st	2nd	
1.	Intake Facilities				
	Bar Screen	9	9	0	Steel,3mW*6.5mH,p=50mm
	Stoplog	12	12	0	FFU,3mL*0.3mH
	Intake Gate	4	4	0	Rectangular gate with headstock,3mW*2mH
	Pump Pit Gate	4	4	0	Rectangular gate with headstock,2mW*2mH
	Grit Pump	2	2	0	Submersible pump,80mmdia*0.5m3/min*15m*3.7kW
	Intake Pump	8	4	4	Vertical mixed flow pump,400mmdia*22.12m3/m*29m
	Motor	8	4	4	Vertical TEFC induction motor,160kW*4p*6kV
	Delivery Valve	8	4	4	Butterfly valve,400mmdia
	Check Valve	8	4	4	Swing type check valve,400mmdia
	Air Chamber	1	1	0	Steel,cylindrical tank
	Overhead Crane	1	1	0	Manual overhead crane,5ton*8.2mspan
2.	Water Treatment Plant				
	Sedimentation Tank				
	Inlet Gate	8	4	4	Rectangular gate with headstock,0.6mW*0.6mH
	Sludge Collector	8	4	4	Travelling meader type clarifier,2.2kW
	Desludge Valve (1)	32	16	16	Motorized sluice valve,200mmdia,0.75kW
	Desludge Valve (2)	32	16	16	Sluice valve,200mmdia
	Drain Valve	16	8	8	Butterfly valve,300mmdia
	Sump Pump	2	1	1	Submersible pump,50mmdia*0.3m3/min*12m*1.5kW
	Filter				
	Inlet Valve	20	10	10	Motorized butterfly valve,500mmdia,0.4kW
	Outlet Gate	20	10	10	Rectangular gate with headstock,1mW*1mH
	Wash Drain Gate	20	10	10	Motorized rectangular gate,800mm*800mm,0.75kW
	Surface Wash Valve	20	10	10	Motorized butterfly valve,350mmdia,0.2kW
	Control Valve	2	1	1	Butterfly valve,350mmdia
	Drain Valve	24	12	12	Sluice valve,100mmdia
	Surface Wash Unit	20	10	10	Fixed type,grid steel piping with nozzles
	Adjusting Weir	8	4	4	Steel plate,2mW*adjustable height=300mm
	Chemical Dosing				
	Alum Mixer	2	2	0	Vertical mechanical mixer,11kW
	Alum Pump	2	2	0	Rubber－lining volute pump,0.2m3/min*20m*1.5kW
	Alum Dosing Unit	2	2	0	Stainless steel,constant liquid level orifice feeder,75l/min
	Lime Mixer	2	2	0	Vertical mechanical mixer,11kW
	Lime Pump	2	2	0	Rubber－lining volute pump,0.2m3/min*20m*1.5kW
	Lime Dosing Unit	2	2	0	Stainless steel,constant liquid level orifice feeder,36l/min
	Chlorinator	3	3	0	Manual vacuum operated gas feeder,20kg/h*0.1kW
	Booster Pump	2	2	0	Horizontal centrifugal pump,0.4m3/min*40m*7.5kW
	Leak Detector	2	2	0	Wall mount type
	Service Pump	2	2	0	Horizontal centrifugal pump,2.0m3/min*30m*15kW
	Chemical Handling	1	1	0	Motorized chain block with geared trolley,1.5kW
	Sludge Disposal				
	Recycle Pump	3	2	1	Horizontal centrifugal pump,2.7m3/m*20m*15kW
	Sludge Pump	2	2	2	Horizontal centrifugal pump,0.5m3/m*20m*3.7kW
	Drying Bed Valve	8	4	4	Sluice valve,300mmdia
	Drying Bed Stoplog	16	8	8	1mW*1mH
	Clear Water Reservoir				
	Inlet Gate	2	2	0	Rectangular gate with headstock,1m*1m
	Outlet Gate	2	2	0	Rectangular gate with headstock,1.4m*1.4m
	Transmission Pump	8	4	4	Horizontal centrifugal pump,400/250mm*21.1m3/m*104m
	Motor	8	4	4	Horizontal TEFC induction motor,560kW*6p*6kV
	Header Pipe Valve	2	2	0	Butterfly valve,1500mmdia
	Suction Valve	8	4	4	Butterfly valve,400mmdia
	Delivery Valve	8	4	4	Butterfly valve,350mmdia
	Check Valve	8	4	4	Quick－close check valve,350mmdia
	Sump Pump	1	1	0	Submersible pump,50mmdia*0.3m3/min*12m*1.5kW
	Overhead Crane	1	1	0	Manual overhead crane,10ton*8.2mspan
3.	High Level Reservoir				
	Inlet Valve	2	2	0	Butterfly valve,1650mmdia.
	Outlet Valve	2	2	0	Butterfly valve,1200mmdia.
	Drain Valve	2	2	0	Butterfly valve,400mmdia.

Sri Lanka Colombo－Kalu Ganga Water Supply Plan

Electrical Equipment List

Facilities & Equipment	Q'ty			Specifications
	Total	1st	2nd	
1. Intake Facilities				
Substation	1	1	0	Outdoor open structure type,1500kVA*2
Incoming Panel	1	1	0	Indoor self－stnding metal enclosed switchgear,DS*2
Receiving Panel	1	1	0	Indoor self－stnding metal enclosed switchgear,VCB+GPT
Feeder Panel	1	1	0	Indoor self－stnding metal enclosed switchgear,VCB*1
Starter Panel	8	4	4	Indoor combination 160kW motor starter with reactor
Low－V Transformer	1	1	0	100kVA,Molded type,3.3kV/400V,3 Phase
DC Power Supply	1	1	0	50AH/Hr,MSE type battery & charger
Low－V Feeder	1	1	0	Indoor self－stnding low voltage panel
Pump Local Panel	8	4	4	Indoor stand type
Instrument Panel	1	1	0	Indoor self－stnding instrument panel
Level Detector	2	2	0	Submersible type
Flow Meter	1	1	0	Ultrasonic flow meter,1500mmdia
Grit Pump Panel	2	2	0	Indoor wall－mounted type
2. Water Treatment Plant				
Substation	1	1	0	Outdoor open structure type,5000kVA*2
Incoming Panel	1	1	0	Indoor self－stnding metal enclosed switchgear,DS*2
Receiving Panel	1	1	0	Indoor self－stnding metal enclosed switchgear,VCB+GPT
Feeder Panel	1	1	0	Indoor self－stnding metal enclosed switchgear,VCB*1
Sedimentation CC	2	1	1	Motor control center with relay panel
Sludge Valve Panel	4	2	2	Indoor stand type
Filter CC	2	1	1	Motor control center with relay panel
Filter Control Panel	20	10	10	Indoor desk type
Chemical CC	1	1	0	Motor control center with relay panel
Alum Mixer Panel	2	2	0	Indoor stand type
Alum Pump Panel	1	1	0	Indoor stand type
Lime Mixer Panel	2	2	0	Indoor stand type
Lime Pump Panel	1	1	0	Indoor stand type
Hoist Panel	1	1	0	Indoor wall mounted type
Chlorinator Panel	1	1	0	Indoor self－stnding low voltage panel
Recycle P Panel	3	2	1	Indoor self－stnding motor starter panel
Sludge Pump Panel	4	2	2	Indoor self－stnding motor starter panel
Booster Pump Pane	1	1	0	Indoor self－stnding motor starter panel
Service Pump Panel	1	1	0	Indoor self－stnding motor starter panel
Working Panel	2	1	1	Indoor wall－mounted type
Sump Pump Panel	2	1	1	Indoor stand type
Starter Panel	8	4	4	Indoor combination 560kW motor starter with reactor
Low－V Transformer	1	1	0	200kVA,Molded type,3.3kV/400V,3 Phase
DC Power Supply	1	1	0	50AH/Hr,MSE type battery & charger
Low－V Feeder	1	1	0	Indoor self－stnding low voltage panel
Pump Local Panel	8	4	4	Indoor stand type
Central Graphic P	1	1	0	Mimic type graphic panel
Central Operation P	1	1	0	Control disk type
Instrument Panel	1	1	0	Indoor self－stnding instrument panel (for clear water pump)
Flow Meter	1	1	0	Ultrasonic flow meter,1600mmdia (for clear water)
Recycle Flow Meter	1	1	0	Electromagnetic flow meter,200mmdia (for recycle water)
Level Detector	1	1	0	Submersible type (for receiving well)
Level Detector	2	2	0	Submersible type (for clear water reservoir)
Level Detector	1	1	0	Submersible type (for clear water pump pit)
Turbidity Meter	1	1	0	scattered light method (for raw water)
pH Meter	1	1	0	Glass electrode type (for raw water)
Turbidity Meter	1	1	0	Transmitted light method (for clear water)
pH Meter	1	1	0	Glass electrode type (for clear water)
Residual Cl Meter	1	1	0	Non－reagent type (for clear water)
3. High Level Reservoir				
Receiving Panel	1	1	0	Indoor self－stnding low voltage receiving panel
Instrument Panel	1	1	0	Indoor self－stnding instrument panel
Level Detector	1	1	0	Submersible type (for high level reservoir)
Flow Meter	1	1	0	Electromagnetic flow meter,1200mmdia (for clear water)

CHAPTER 9

Ref. No. 9.3

Subject : Transmission System

Title : Hydraulics in Transmission System

Contents : KYPIPE-EPS Analysis for Fluctuation in Demand

Basis of Analysis 9.3-1
Analysis Results 9.3-4
EPS Output for 2010 Demand 9.3-9
EPS Output for 2020 Demand 9.3-36

HYDRAULICS IN THE PROPOSED TRANSMISSION SYSTEM

As the proposed clear water transmission will be made directly to some water towers, it is necessary to determine the hydraulics in the transmission main to ensure the continuous supply against hourly demand fluctuation , storage in water towers, and hydraulic heads in the transmission main.

Analysis is made considering hourly demand fluctuation in each service area which will receive water at water tower. Service area which will receive water at ground reservoir is assumed to have constant inflow and hourly fluctuation will be absorbed by reservoir storage. Hourly fluctuation is assumed having two peak in a day in the morning and evening. Peak factors set in the section 7.3.3 3) are applied for each service area. Hourly flow is summarized in Table 7.1 and 7.2.

The result of the simulation is shown in Figures 7.1 and 7.2 for 2010 and 2020 demands, respectively. As shown in these figures, hydraulic grade at each tower and reservoir will be sufficient to supply for the demand fluctuated as assumed.

Table 7.1. Hourly Flow at Service Area (2010 Demand)

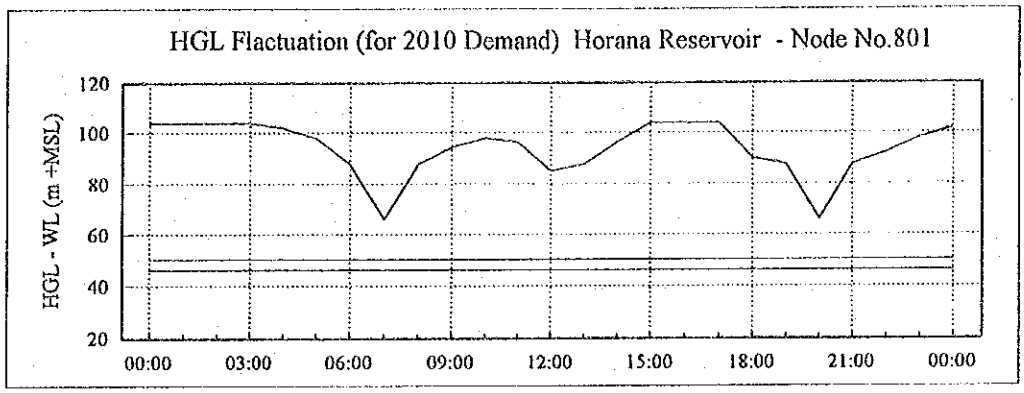
(unit : l/sec)

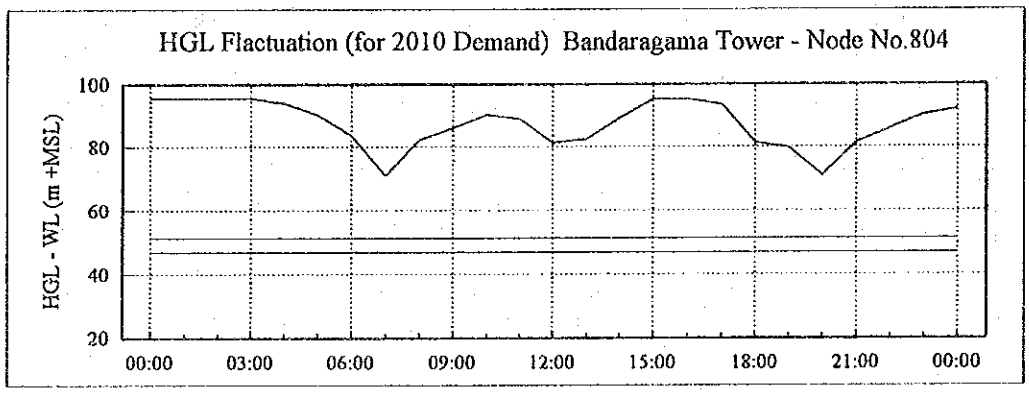
Area	Horana	Bandara-gama East	Kesbewa Main	Moratuwa Low Zone	Panadura Low Zone	Panadura High Zone
Node No.	801	804	811	824	808	809
Peak f	2.0	2.0	1.8	1.6	1.9	1.9
Qave (l/s)	27.4	18.6	84.5	271.6	74.5	30.5
01:00	8.2	5.6	33.8	108.6	22.4	9.2
02:00	8.2	5.6	33.8	108.6	22.4	9.2
03:00	8.2	5.6	33.8	108.6	22.4	9.2
04:00	13.7	9.3	42.3	135.8	37.3	15.3
05:00	21.9	14.9	67.6	217.3	59.6	24.4
06:00	35.6	24.2	118.3	325.9	89.4	36.6
07:00	54.8	37.2	152.1	434.6	141.6	58.0
08:00	35.6	24.2	126.8	353.1	89.4	36.6
09:00	27.4	18.6	84.5	271.6	74.5	30.5
10:00	21.9	14.9	67.6	217.3	59.6	24.4
11:00	24.7	16.7	76.1	244.4	67.1	27.5
12:00	38.4	26.0	109.9	366.7	100.6	41.2
13:00	35.6	24.2	101.4	353.1	96.9	39.7
14:00	24.7	16.7	67.6	244.4	67.1	27.5
15:00	24.7	16.7	59.2	244.4	67.1	27.5
16:00	24.7	16.7	59.2	244.4	67.1	27.5
17:00	24.7	16.7	76.1	258.0	67.1	27.5
18:00	32.9	22.3	101.4	380.2	104.3	42.7
19:00	35.6	24.2	126.8	407.4	108.0	44.2
20:00	54.8	37.2	152.1	434.6	141.6	58.0
21:00	35.6	24.2	126.8	380.2	96.9	39.7
22:00	30.1	20.5	84.5	271.6	74.5	30.5
23:00	21.9	14.9	67.6	217.3	59.6	24.4
00:00	13.7	9.3	59.2	190.1	52.2	21.4

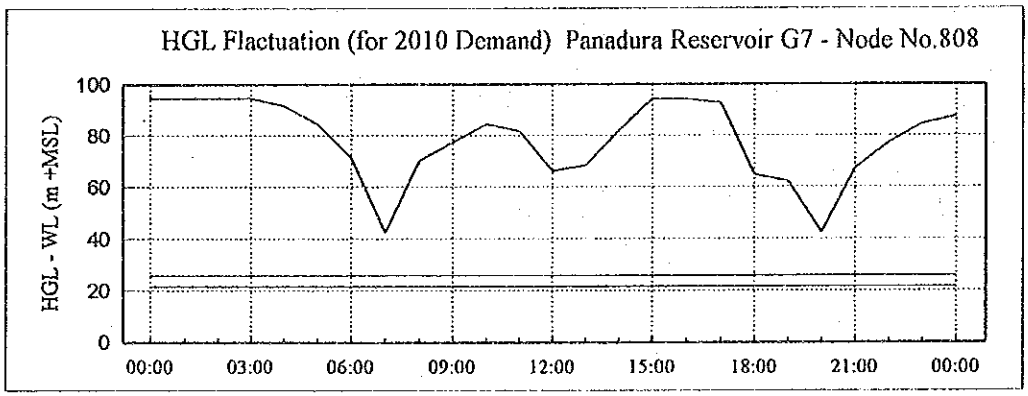
Table 7.2. Hourly Flow at Service Area (2020 Demand)

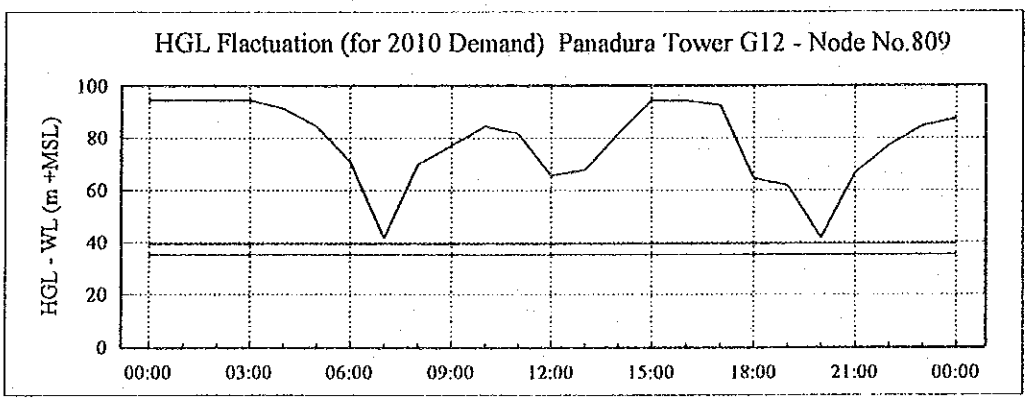
(unit : l/sec)

Area	Horana	Bandara gama East	Bandara gama West	Kesbewa Main	Moratuwa Low Zone	Panadura Low Zone	Panadura High Zone	Panadura P.S.
Node No.	801	804	851	811	824	808	809	852
Peak f	2.0	2.0	2.0	1.8	1.6	1.9	1.9	2.0
Qave (l/s)	34.8	39.2	21.1	210.8	305.3	75.2	33.5	28.2
01:00	10.4	11.8	6.3	84.3	122.1	22.6	10.1	8.5
02:00	10.4	11.8	6.3	84.3	122.1	22.6	10.1	8.5
03:00	10.4	11.8	6.3	84.3	122.1	22.6	10.1	8.5
04:00	17.4	19.6	10.6	105.4	152.7	37.6	16.8	14.1
05:00	27.8	31.4	16.9	168.6	244.2	60.2	26.8	22.6
06:00	45.2	51.0	27.4	295.1	366.4	90.2	40.2	36.7
07:00	69.6	78.4	42.2	379.4	488.5	142.9	63.7	56.4
08:00	45.2	51.0	27.4	316.2	396.9	90.2	40.2	36.7
09:00	34.8	39.2	21.1	210.8	305.3	75.2	33.5	28.2
10:00	27.8	31.4	16.9	168.6	244.2	60.2	26.8	22.6
11:00	31.3	35.3	19.0	189.7	274.8	67.7	30.2	25.4
12:00	48.7	54.9	29.5	274.0	412.2	101.5	45.2	39.5
13:00	45.2	51.0	27.4	253.0	396.9	97.8	43.6	36.7
14:00	31.3	35.3	19.0	168.6	274.8	67.7	30.2	25.4
15:00	31.3	35.3	19.0	147.6	274.8	67.7	30.2	25.4
16:00	31.3	35.3	19.0	147.6	274.8	67.7	30.2	25.4
17:00	31.3	35.3	19.0	189.7	290.0	67.7	30.2	25.4
18:00	41.8	47.0	25.3	253.0	427.4	105.3	46.9	33.8
19:00	45.2	51.0	27.4	316.2	458.0	109.0	48.6	36.7
20:00	69.6	78.4	42.2	379.4	488.5	142.9	63.7	56.4
21:00	45.2	51.0	27.4	316.2	427.4	97.8	43.6	36.7
22:00	38.3	43.1	23.2	210.8	305.3	75.2	33.5	31.0
23:00	27.8	31.4	16.9	168.6	244.2	60.2	26.8	22.6
00:00	17.4	19.6	10.6	147.6	213.7	52.6	23.5	14.1

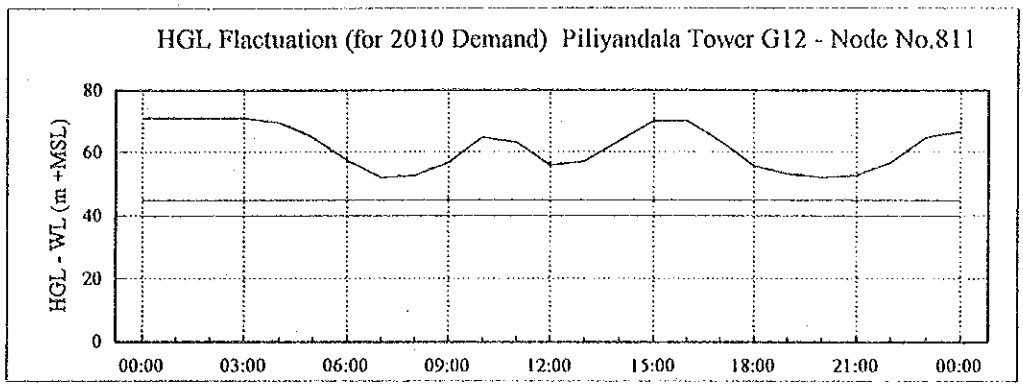


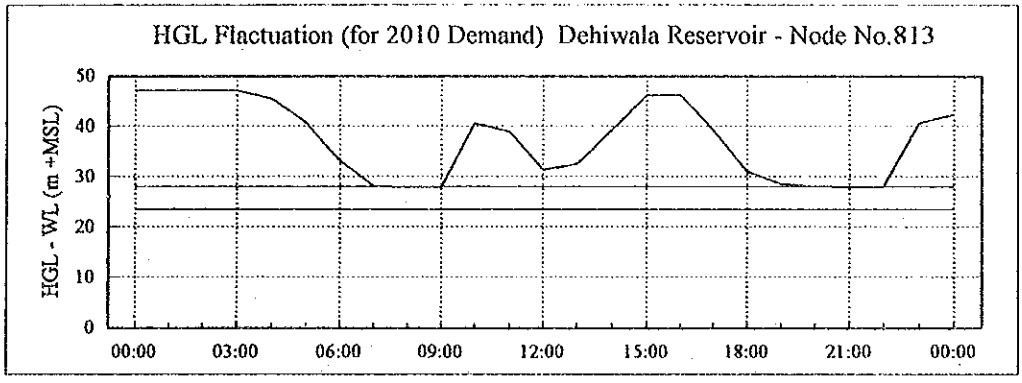


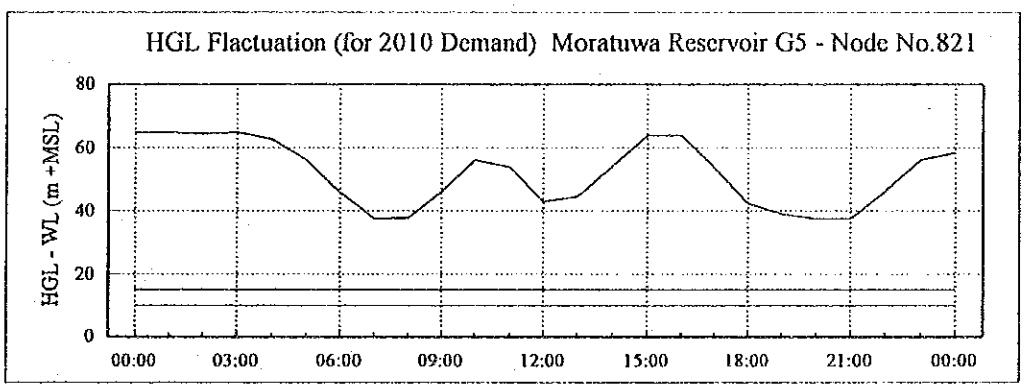


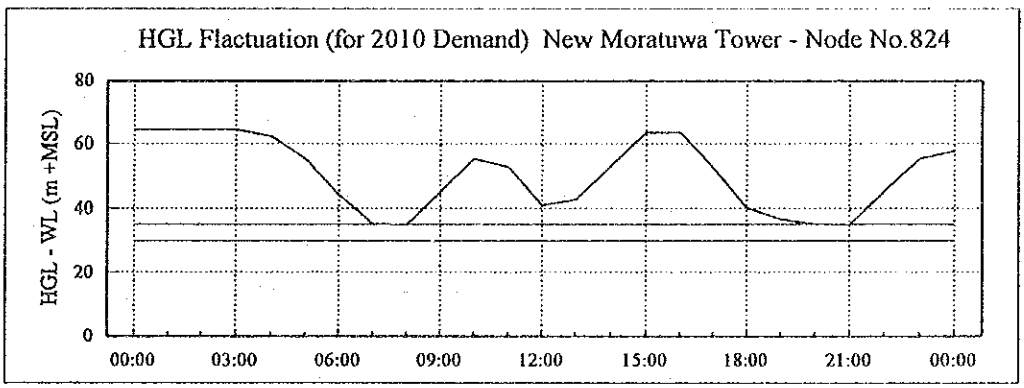


Note: Horizontal lines in the charts show T.W.L and B.W.L in reservoirs and towers.

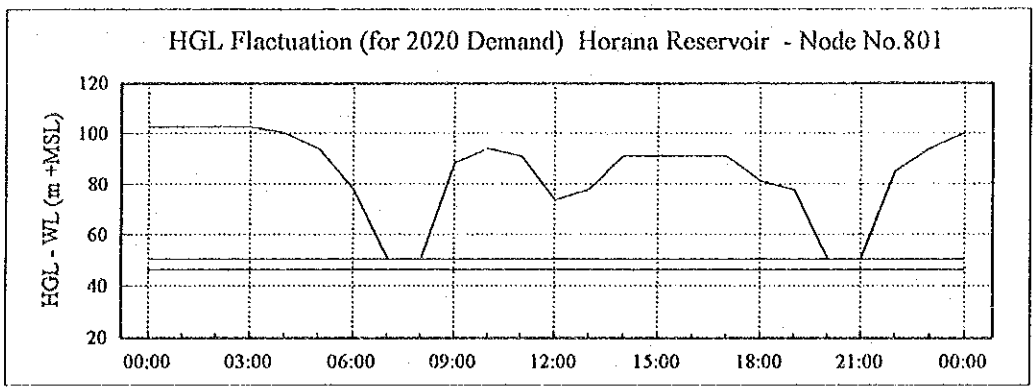


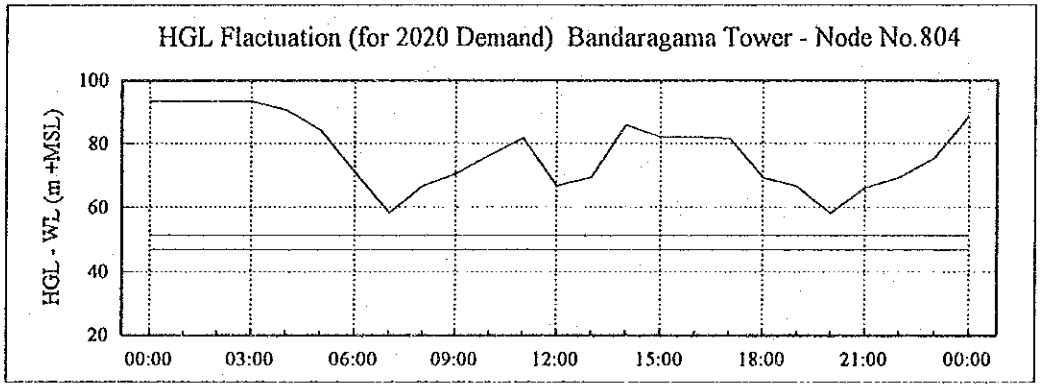


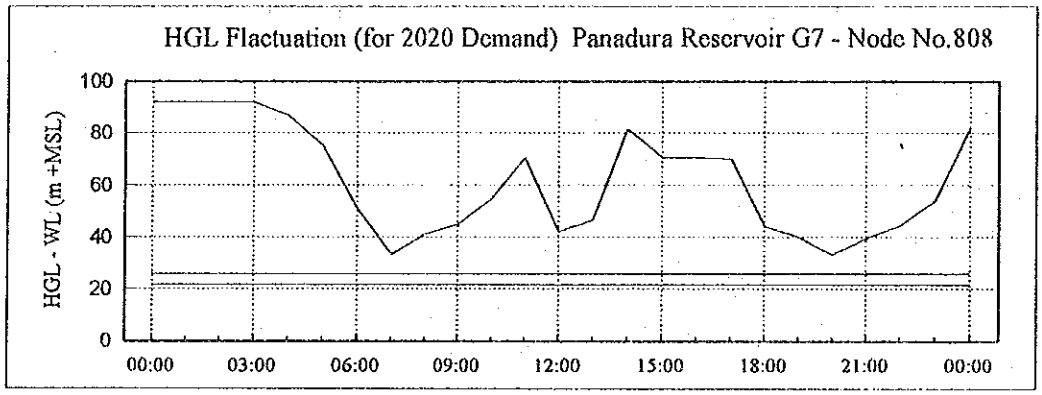


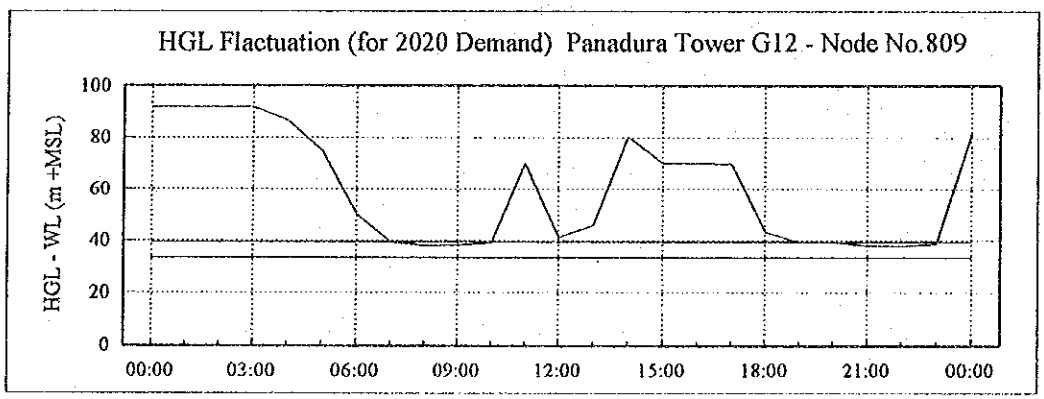


Note: Horizontal lines in the charts show T.W.L and B.W.L in reservoirs and towers.

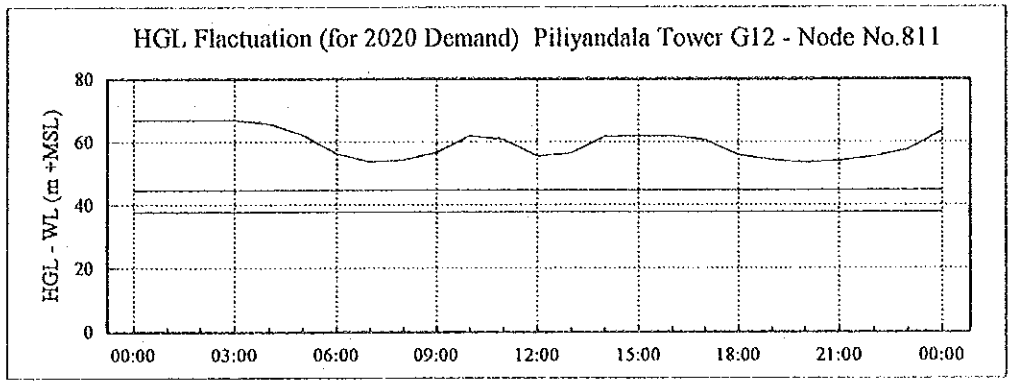


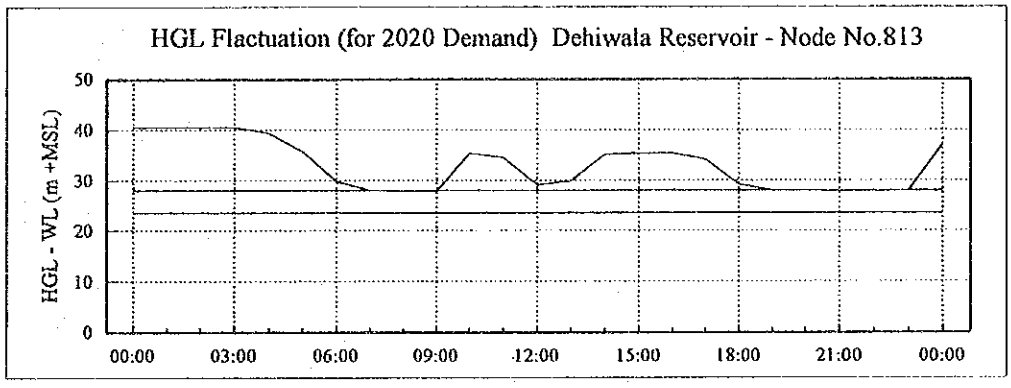


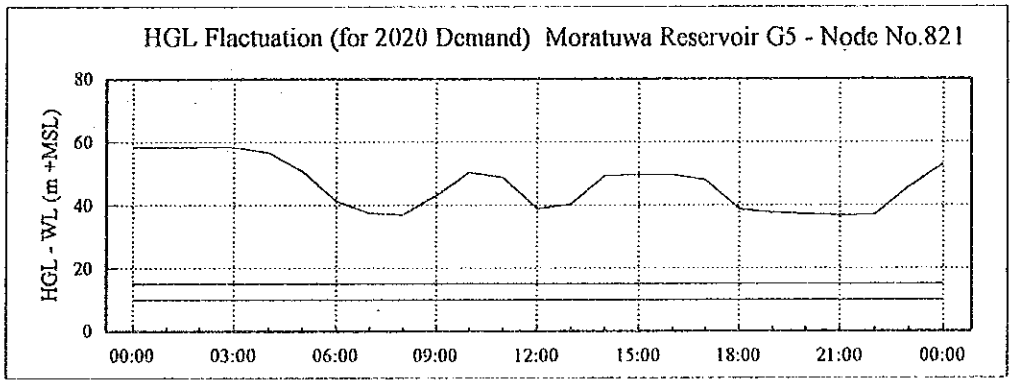


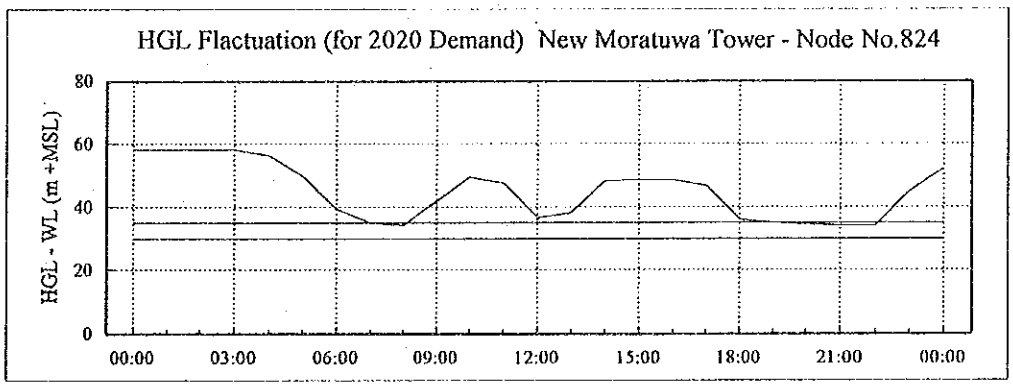


Note: Horizontal lines in the charts show T.W.L and B.W.L in reservoirs and towers.





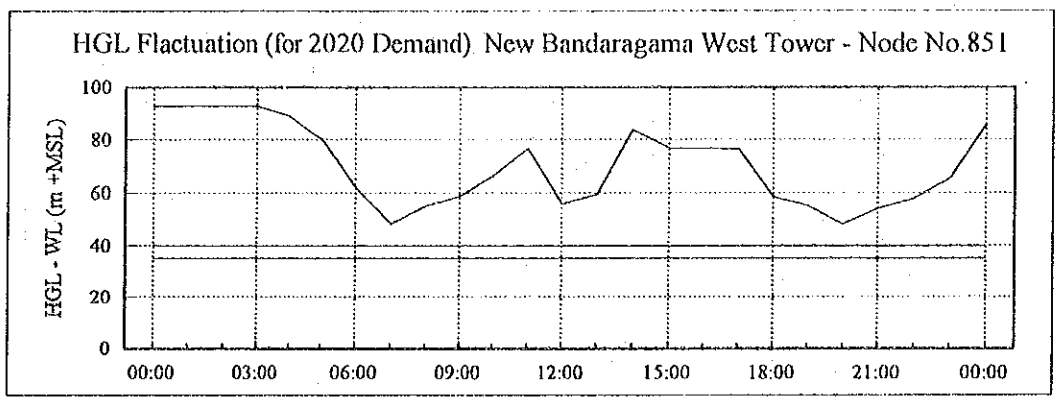


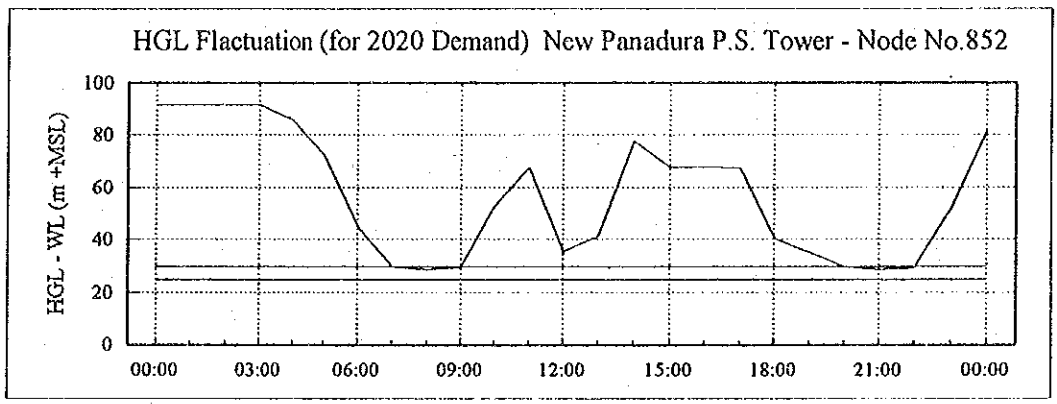


Note: Horizontal lines in the charts show T.W.L and B.W.L in reservoirs and towers.

Result of Extended Period Simulation (for 2020 Demand)

(cont'd)





Note: Horizontal lines in the charts show T.W.L and B.W.L in reservoirs and towers.

Result of Extended Period Simulation (for 2020 Demand)

(cont'd)

FLOWS ARE EXPRESSED IN LITERS PER SECOND AND PRESSURES IN KPA

A SUMMARY OF THE ORIGINAL DATA FOLLOWS

PIPE NO.	NODE NOS.		LENGTH (METERS)	DIAMETER (CMS)	ROUGHNESS	MINOR LOSS K	FIXED GRADE
1	800	802	5350.0	120.0	120.0	.00	
2	800	801	2200.0	20.0	120.0	.00	
3	802	803	5450.0	50.0	120.0	.00	
4	803	804	180.0	20.0	120.0	.00	
5	803	805	5000.0	50.0	120.0	.00	
7	805	807	5900.0	50.0	120.0	.00	
8	807	808	425.0	30.0	120.0	.00	
9	807	809	1000.0	25.0	120.0	.00	
10	802	850	15500.0	120.0	120.0	.00	
11	850	811	20.0	40.0	120.0	.00	
12	810	812	5250.0	100.0	120.0	.00	
13	812	813	4400.0	100.0	120.0	.00	
15	810	820	4800.0	80.0	120.0	.00	
16	820	821	20.0	80.0	120.0	.00	
19	820	824	300.0	50.0	120.0	.00	
20	800	802	5350.0	120.0	120.0	.00	
LINE 20 IS CLOSED							
21	802	850	13300.0	120.0	120.0	.00	
LINE 21 IS CLOSED							
22	850	810	1400.0	120.0	120.0	.00	
LINE 22 IS CLOSED							
23	810	812	7500.0	110.0	120.0	.00	
LINE 23 IS CLOSED							
24	812	813	4400.0	110.0	120.0	.00	
LINE 24 IS CLOSED							
30	850	810	1500.0	120.0	120.0	.00	
800	800	0	10.0	120.0	999.0	.00	105.00
801	801	0	20.0	20.0	999.0	.00	50.50
804	804	0	20.0	20.0	999.0	.00	51.00
808	808	0	20.0	30.0	999.0	.00	26.00
809	809	0	20.0	25.0	999.0	.00	39.50
811	811	0	20.0	40.0	999.0	.00	45.00
813	813	0	20.0	100.0	999.0	.00	28.00
821	821	0	20.0	70.0	999.0	.00	15.10
824	824	0	20.0	50.0	999.0	.00	35.00

JUNCTION NUMBER	DEMAND	ELEVATION	CONNECTING PIPES				
800	.00	100.00	1	2	20	800	
801	8.22	48.00	2	801			
802	.00	15.00	1	3	10	20	21
803	.00	20.00	3	4	5		
804	5.60	35.00	4	804			
805	.00	20.00	5	7			
807	.00	25.00	7	8	9		
808	22.40	24.00	8	808			
809	9.20	25.00	9	809			
810	.00	20.00	12	15	22	23	30
811	33.80	40.00	11	811			
812	.00	20.00	12	13	23	24	
813	1240.00	25.00	13	24	813		
820	.00	20.00	15	16	19		
821	291.60	12.00	16	821			
824	108.60	30.00	19	824			
850	.00	20.00	10	11	21	22	30

OUTPUT SELECTION: THE FOLLOWING RESULTS ARE OUTPUT
RESULTS ARE OUTPUT FOR THE FOLLOWING JUNCTION NODES : 800 801 804 808 809

811 813 821 824

AN EPS WILL BE CARRIED OUT FOR 24.000 HOURS USING A PERIOD OF 1.000 HOURS

THE SYSTEM CONTAINS 8 VARIABLE HEAD TANKS - TANK DATA IS SUMMARIZED BELOW

TANK NO.	CONNECTING PIPE	MAXIMUM ELEVATION	MINIMUM ELEVATION	TANK DIAMETER
1	801	50.50	46.50	20.00
2	804	51.30	47.30	7.70
3	808	26.00	21.70	30.90
4	809	39.50	35.40	14.40
5	811	45.00	40.00	22.60
6	813	28.00	23.50	83.00
7	821	15.10	10.10	46.90
8	824	35.00	30.00	22.60

DEMANDS AT THE FOLLOWING JUNCTION NODES ARE FIXED FOR THE EPS: 813 821

THIS SYSTEM HAS 30 PIPES WITH 17 JUNCTIONS , 5 LOOPS AND 9 FGNS

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00057

PERIOD NO. = 0 -- TIME FROM INITIATION OF EPS = .0000 HOURS

Kalu Ganga Water Supply Project
Transmission System - EPS Analysis
for 2010 Demand

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	8.22	103.84	48.00	547.64
804	5.60	51.06	35.00	157.50
808	22.40	79.44	24.00	543.64
809	9.20	79.42	25.00	533.64
811	33.80	69.26	40.00	286.90
813	1240.00	45.26	25.00	198.70
821	291.60	62.99	12.00	500.03
824	108.60	62.78	30.00	321.48

THE NET SYSTEM DEMAND = 1719.42

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1895.99
804	-176.57

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1895.99
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -176.57

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	103.84	50.50		50.50
+					- - FULL	
2	804	176.57	51.06	51.00		51.30
3	808	.00	79.44	26.00		26.00
+					- - FULL	
4	809	.00	79.42	39.50		39.50
+					- - FULL	
5	811	.00	69.26	45.00		45.00
+					- - FULL	

6	813	.00	45.26	28.00		28.00
+					- - FULL	
7	821	.00	62.99	15.10		15.10
+					- - FULL	
8	824	.00	62.78	35.00		35.00
+					- - FULL	

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00032

PERIOD NO. = 0 -- TIME FROM INITIATION OF EPS = .0219 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	8.22	103.84	48.00	547.64
804	5.60	51.36	35.00	160.43
808	22.40	79.53	24.00	544.53
809	9.20	79.51	25.00	534.53
811	33.80	69.26	40.00	286.97
813	1240.00	45.27	25.00	198.78
821	291.60	63.00	12.00	500.10
824	108.60	62.79	30.00	321.55

THE NET SYSTEM DEMAND = 1719.42

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1895.29
804	-175.87

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1895.29
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -175.87

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	103.84	50.50		50.50
+					- - FULL	
2	804	175.87	51.36	51.30		51.30
3	808	.00	79.53	26.00		26.00
+					- - FULL	
4	809	.00	79.51	39.50		39.50
+					- - FULL	
5	811	.00	69.26	45.00		45.00
+					- - FULL	
6	813	.00	45.27	28.00		28.00
+					- - FULL	
7	821	.00	63.00	15.10		15.10
+					- - FULL	
8	824	.00	62.79	35.00		35.00
+					- - FULL	

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 1 -- TIME FROM INITIATION OF EPS = 1.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	8.22	103.84	48.00	547.64
804	5.60	95.43	35.00	592.66
808	22.40	94.48	24.00	691.20
809	9.20	94.46	25.00	681.20

811	33.80	71.05	40.00	304.46
813	1240.00	47.05	25.00	216.26
821	291.60	64.78	12.00	517.59
824	108.60	64.57	30.00	339.04

THE NET SYSTEM DEMAND = 1719.42

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1719.42

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1719.42
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	103.84	50.50		50.50
+					- - FULL	
2	804	.00	95.43	51.30		51.30
+					- - FULL	
3	808	.00	94.48	26.00		26.00
+					- - FULL	
4	809	.00	94.46	39.50		39.50
+					- - FULL	
5	811	.00	71.05	45.00		45.00
+					- - FULL	
6	813	.00	47.05	28.00		28.00
+					- - FULL	
7	821	.00	64.78	15.10		15.10
+					- - FULL	
8	824	.00	64.57	35.00		35.00
+					- - FULL	

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 2 -- TIME FROM INITIATION OF EPS = 2.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	8.22	103.84	48.00	547.64
804	5.60	95.43	35.00	592.66
808	22.40	94.48	24.00	691.20
809	9.20	94.46	25.00	681.20
811	33.80	71.05	40.00	304.46
813	1240.00	47.05	25.00	216.26
821	291.60	64.78	12.00	517.59
824	108.60	64.57	30.00	339.04

THE NET SYSTEM DEMAND = 1719.42

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1719.42

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1719.42
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO. CONN. PIPE NET FLOW ADJ. HGL WATER SURFACE ELE. PROJECTED W.S.E

1	801	.00	103.84	50.50		50.50
+					- - FULL	
2	804	.00	95.43	51.30		51.30
+					- - FULL	
3	808	.00	94.48	26.00		26.00
+					- - FULL	
4	809	.00	94.46	39.50		39.50
+					- - FULL	
5	811	.00	71.05	45.00		45.00
+					- - FULL	
6	813	.00	47.05	28.00		28.00
+					- - FULL	
7	821	.00	64.78	15.10		15.10
+					- - FULL	
8	824	.00	64.57	35.00		35.00
+					- - FULL	

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 3 -- TIME FROM INITIATION OF EPS = 3.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	8.22	103.84	48.00	547.64
804	5.60	95.43	35.00	592.66
808	22.40	94.48	24.00	691.20
809	9.20	94.46	25.00	681.20
811	33.80	71.05	40.00	304.46
813	1240.00	47.05	25.00	216.26
821	291.60	64.78	12.00	517.59
824	108.60	64.57	30.00	339.04

THE NET SYSTEM DEMAND = 1719.42

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1719.42

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1719.42
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	103.84	50.50		50.50
+					- - FULL	
2	804	.00	95.43	51.30		51.30
+					- - FULL	
3	808	.00	94.48	26.00		26.00
+					- - FULL	
4	809	.00	94.46	39.50		39.50
+					- - FULL	
5	811	.00	71.05	45.00		45.00
+					- - FULL	
6	813	.00	47.05	28.00		28.00
+					- - FULL	
7	821	.00	64.78	15.10		15.10
+					- - FULL	
8	824	.00	64.57	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 4 -- TIME FROM INITIATION OF EPS = 4.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	13.70
804	9.30
811	42.30
824	135.80
808	37.30
809	15.30

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 4 -- TIME FROM INITIATION OF EPS = 4.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	13.70	102.02	48.00	529.77
804	9.30	93.92	35.00	577.79
808	37.30	91.47	24.00	661.66
809	15.30	91.42	25.00	651.37
811	42.30	69.45	40.00	288.83
813	1240.00	45.39	25.00	199.96
821	291.60	62.61	12.00	496.29
824	135.80	62.29	30.00	316.64

THE NET SYSTEM DEMAND = 1785.30

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1785.30

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1785.30
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	102.02	50.50		50.50
+					- - FULL	
2	804	.00	93.92	51.30		51.30
+					- - FULL	
3	808	.00	91.47	26.00		26.00
+					- - FULL	
4	809	.00	91.42	39.50		39.50
+					- - FULL	
5	811	.00	69.45	45.00		45.00
+					- - FULL	
6	813	.00	45.39	28.00		28.00
+					- - FULL	
7	821	.00	62.61	15.10		15.10
+					- - FULL	
8	824	.00	62.29	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 5 -- TIME FROM INITIATION OF EPS = 5.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	21.90
804	14.90
811	67.60
824	217.30
808	59.60
809	24.40

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 5 -- TIME FROM INITIATION OF EPS = 5.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	21.90	97.90	48.00	489.35
804	14.90	90.34	35.00	542.73
808	59.60	84.52	24.00	593.49
809	24.40	84.41	25.00	582.57
811	67.60	64.87	40.00	243.89
813	1240.00	40.60	25.00	152.94
821	291.60	56.12	12.00	432.64
824	217.30	55.34	30.00	248.53

THE NET SYSTEM DEMAND = 1937.30

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1937.30

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1937.30
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	97.90	50.50		50.50
+					- - FULL	
2	804	.00	90.34	51.30		51.30
+					- - FULL	
3	808	.00	84.52	26.00		26.00
+					- - FULL	
4	809	.00	84.41	39.50		39.50
+					- - FULL	
5	811	.00	64.87	45.00		45.00
+					- - FULL	
6	813	.00	40.60	28.00		28.00
+					- - FULL	
7	821	.00	56.12	15.10		15.10
+					- - FULL	
8	824	.00	55.34	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 6 -- TIME FROM INITIATION OF EPS = 6.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	35.62
804	24.20
811	118.30
824	325.90

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        808              89.40
        809              36.60

  THE RESULTS ARE OBTAINED AFTER  2 TRIALS WITH AN ACCURACY =   .00000

  PERIOD NO. =  6 -- TIME FROM INITIATION OF EPS =   6.0000 HOURS

  JUNCTION NUMBER      DEMAND     GRADE LINE    ELEVATION    PRESSURE
        800              .00       105.00       100.00       49.03
        801            35.62        87.52        48.00      387.58
        804            24.20        83.70        35.00      477.63
        808            89.40        71.46        24.00      465.42
        809            36.60        71.22        25.00      453.25
        811           118.30        57.59        40.00      172.46
        813          1240.00        33.03        25.00       78.80
        821           291.60        45.91        12.00      332.55
        824           325.90        44.26        30.00      139.86

  THE NET SYSTEM DEMAND =   2161.62

  SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

     PIPE NUMBER    FLOWRATE
        800         2161.62

  THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES =   2161.62
  THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES =       .00

  TANK STATUS REPORT

  TANK NO.  CONN. PIPE  NET FLOW   ADJ. HGL  WATER SURFACE ELE.  PROJECTED W.S.E
      1        801          .00      87.52        50.50                50.50
+                                                        - - FULL
      2        804          .00      83.70        51.30                51.30
+                                                        - - FULL
      3        808          .00      71.46        26.00                26.00
+                                                        - - FULL
      4        809          .00      71.22        39.50                39.50
+                                                        - - FULL
      5        811          .00      57.59        45.00                45.00
+                                                        - - FULL
      6        813          .00      33.03        28.00                28.00
+                                                        - - FULL
      7        821          .00      45.91        15.10                15.10
+                                                        - - FULL
      8        824          .00      44.26        35.00                35.00
+                                                        - - FULL


   A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

  PERIOD NO. =  7 -- TIME FROM INITIATION OF EPS =   7.0000 HOURS

  THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :
  JUNCTION NUMBER       DEMAND
        801              54.80
        804              37.20
        811             152.10
        824             434.60
        808             141.60
        809              58.00

  THE RESULTS ARE OBTAINED AFTER  4 TRIALS WITH AN ACCURACY =   .00009
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PERIOD NO. = 7 -- TIME FROM INITIATION OF EPS = 7.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	54.80	66.19	48.00	178.36
804	37.20	71.08	35.00	353.78
808	141.60	42.28	24.00	179.29
809	58.00	41.71	25.00	163.87
811	152.10	51.98	40.00	117.51
813	1240.00	28.00	25.00	29.42
821	291.60	37.60	12.00	251.08
824	434.60	35.00	30.00	49.03

THE NET SYSTEM DEMAND = 2409.90

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2368.73
813	23.02
824	18.14

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2409.90
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	66.19	50.50		50.50
+					- - FULL	
2	804	.00	71.08	51.30		51.30
+					- - FULL	
3	808	.00	42.28	26.00		26.00
+					- - FULL	
4	809	.00	41.71	39.50		39.50
+					- - FULL	
5	811	.00	51.98	45.00		45.00
+					- - FULL	
6	813	-23.02	28.00	28.00		27.98
+					- - FULL	
7	821	.00	37.60	15.10		15.10
+					- - FULL	
8	824	-18.14	35.00	35.00		34.84
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 8 -- TIME FROM INITIATION OF EPS = 8.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	35.62
804	24.20
811	126.80
824	353.10
808	89.40
809	36.60

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00017

PERIOD NO. = 8 -- TIME FROM INITIATION OF EPS = 8.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE

800	.00	105.00	100.00	49.03
801	35.62	87.52	48.00	387.58
804	24.20	82.38	35.00	464.68
808	89.40	70.14	24.00	452.47
809	36.60	69.90	25.00	440.29
811	126.80	52.66	40.00	124.12
813	1240.00	27.98	25.00	29.27
821	291.60	37.64	12.00	251.45
824	353.10	34.84	30.00	47.44

THE NET SYSTEM DEMAND = 2197.32

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2272.18
813	5.49
824	-80.35

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2277.67
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -80.35

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	87.52	50.50		50.50
+					- - FULL	
2	804	.00	82.38	51.30		51.30
+					- - FULL	
3	808	.00	70.14	26.00		26.00
+					- - FULL	
4	809	.00	69.90	39.50		39.50
+					- - FULL	
5	811	.00	52.66	45.00		45.00
+					- - FULL	
6	813	-5.49	27.98	27.98		27.98
7	821	.00	37.64	15.10		15.10
+					- - FULL	
8	824	80.35	34.84	34.84		35.00

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00128

PERIOD NO. = 8 -- TIME FROM INITIATION OF EPS = 8.2257 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	35.62	87.52	48.00	387.58
804	24.20	82.40	35.00	464.80
808	89.40	70.15	24.00	452.59
809	36.60	69.91	25.00	440.42
811	126.80	52.70	40.00	124.58
813	1240.00	27.98	25.00	29.26
821	291.60	37.77	12.00	252.73
824	353.10	35.00	30.00	49.03

THE NET SYSTEM DEMAND = 2197.32

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2271.14
813	3.89
824	-77.70

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2275.02
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -77.70

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	87.52	50.50		50.50
+					- - FULL	
2	804	.00	82.40	51.30		51.30
+					- - FULL	
3	808	.00	70.15	26.00		26.00
+					- - FULL	
4	809	.00	69.91	39.50		39.50
+					- - FULL	
5	811	.00	52.70	45.00		45.00
+					- - FULL	
6	813	-3.89	27.98	27.98		27.98
7	821	.00	37.77	15.10		15.10
+					- - FULL	
8	824	77.70	35.00	35.00		35.00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 9 -- TIME FROM INITIATION OF EPS = 9.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	27.40
804	18.60
811	84.50
824	271.60
808	74.50
809	30.50

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00159

PERIOD NO. = 9 -- TIME FROM INITIATION OF EPS = 9.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	27.40	94.25	48.00	453.54
804	18.60	86.13	35.00	501.37
808	74.50	77.32	24.00	522.89
809	30.50	77.15	25.00	511.40
811	84.50	56.67	40.00	163.47
813	1240.00	27.98	25.00	29.24
821	291.60	46.16	12.00	335.03
824	271.60	44.99	30.00	146.99

THE NET SYSTEM DEMAND = 2038.70

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2155.42
813	-116.72

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2155.42
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -116.72

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.	PROJECTED W.S.E
1	801	.00	94.25	50.50	50.50
+				- - FULL	
2	804	.00	86.13	51.30	51.30
+				- - FULL	
3	808	.00	77.32	26.00	26.00
+				- - FULL	
4	809	.00	77.15	39.50	39.50
+				- - FULL	
5	811	.00	56.67	45.00	45.00
+				- - FULL	
6	813	116.72	27.98	27.98	28.00
7	821	.00	46.16	15.10	15.10
+				- - FULL	
8	824	.00	44.99	35.00	35.00
+				- - FULL	

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00012

PERIOD NO. = 9 -- TIME FROM INITIATION OF EPS = 9.2335 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	27.40	94.25	48.00	453.54
804	18.60	86.13	35.00	501.40
808	74.50	77.32	24.00	522.92
809	30.50	77.15	25.00	511.42
811	84.50	56.68	40.00	163.57
813	1240.00	28.00	25.00	29.42
821	291.60	46.17	12.00	335.13
824	271.60	45.00	30.00	147.10

THE NET SYSTEM DEMAND = 2038.70

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2155.19
813	-116.49

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2155.19
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -116.49

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.	PROJECTED W.S.E
1	801	.00	94.25	50.50	50.50
+				- - FULL	
2	804	.00	86.13	51.30	51.30
+				- - FULL	
3	808	.00	77.32	26.00	26.00
+				- - FULL	
4	809	.00	77.15	39.50	39.50
+				- - FULL	
5	811	.00	56.68	45.00	45.00
+				- - FULL	
6	813	116.49	28.00	28.00	28.00
7	821	.00	46.17	15.10	15.10
+				- - FULL	
8	824	.00	45.00	35.00	35.00
+				- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 10 -- TIME FROM INITIATION OF EPS = 10.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	21.90
804	14.90
811	67.60
824	217.30
808	59.60
809	24.40

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 10 -- TIME FROM INITIATION OF EPS = 10.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	21.90	97.90	48.00	489.35
804	14.90	90.34	35.00	542.73
808	59.60	84.52	24.00	593.49
809	24.40	84.41	25.00	582.57
811	67.60	64.87	40.00	243.89
813	1240.00	40.60	25.00	152.94
821	291.60	56.12	12.00	432.64
824	217.30	55.34	30.00	248.53

THE NET SYSTEM DEMAND = 1937.30

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1937.30

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1937.30
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	97.90	50.50		50.50
+					- - FULL	
2	804	.00	90.34	51.30		51.30
+					- - FULL	
3	808	.00	84.52	26.00		26.00
+					- - FULL	
4	809	.00	84.41	39.50		39.50
+					- - FULL	
5	811	.00	64.87	45.00		45.00
+					- - FULL	
6	813	.00	40.60	28.00		28.00
+					- - FULL	
7	821	.00	56.12	15.10		15.10
+					- - FULL	
8	824	.00	55.34	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 11 -- TIME FROM INITIATION OF EPS = 11.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	24.70
804	16.70
811	76.10
824	244.40
808	67.10
809	27.50

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 11 -- TIME FROM INITIATION OF EPS = 11.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	24.70	96.13	48.00	471.97
804	16.70	88.95	35.00	529.05
808	67.10	81.69	24.00	565.73
809	27.50	81.54	25.00	554.50
811	76.10	63.28	40.00	228.33
813	1240.00	38.94	25.00	136.68
821	291.60	53.84	12.00	410.31
824	244.40	52.88	30.00	224.33

THE NET SYSTEM DEMAND = 1988.10

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1988.10

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1988.10
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	96.13	50.50		50.50
+					- - FULL	
2	804	.00	88.95	51.30		51.30
+					- - FULL	
3	808	.00	81.69	26.00		26.00
+					- - FULL	
4	809	.00	81.54	39.50		39.50
+					- - FULL	
5	811	.00	63.28	45.00		45.00
+					- - FULL	
6	813	.00	38.94	28.00		28.00
+					- - FULL	
7	821	.00	53.84	15.10		15.10
+					- - FULL	
8	824	.00	52.88	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 12 -- TIME FROM INITIATION OF EPS = 12.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	38.40
804	26.00
811	109.90

824	366.70
808	100.60
809	41.20

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 12 -- TIME FROM INITIATION OF EPS = 12.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	38.40	84.91	48.00	361.99
804	26.00	81.38	35.00	454.84
808	100.60	66.07	24.00	412.56
809	41.20	65.77	25.00	399.79
811	109.90	55.96	40.00	156.55
813	1240.00	31.29	25.00	61.65
821	291.60	43.06	12.00	304.57
824	366.70	41.00	30.00	107.90

THE NET SYSTEM DEMAND = 2214.40

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2214.40

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2214.40
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	84.91	50.50		50.50
+					- - FULL	
2	804	.00	81.38	51.30		51.30
+					- - FULL	
3	808	.00	66.07	26.00		26.00
+					- - FULL	
4	809	.00	65.77	39.50		39.50
+					- - FULL	
5	811	.00	55.96	45.00		45.00
+					- - FULL	
6	813	.00	31.29	28.00		28.00
+					- - FULL	
7	821	.00	43.06	15.10		15.10
+					- - FULL	
8	824	.00	41.00	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 13 -- TIME FROM INITIATION OF EPS = 13.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	35.60
804	24.20
811	101.40
824	353.10
808	96.90
809	39.70

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 13 -- TIME FROM INITIATION OF EPS = 13.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	35.60	87.54	48.00	387.76
804	24.20	82.49	35.00	465.75
808	96.90	68.16	24.00	433.07
809	39.70	67.88	25.00	420.47
811	101.40	57.02	40.00	166.95
813	1240.00	32.38	25.00	72.39
821	291.60	44.53	12.00	318.98
824	353.10	42.61	30.00	123.68

THE NET SYSTEM DEMAND = 2182.50

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2182.50

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2182.50
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	87.54	50.50		50.50
+					- - FULL	
2	804	.00	82.49	51.30		51.30
+					- - FULL	
3	808	.00	68.16	26.00		26.00
+					- - FULL	
4	809	.00	67.88	39.50		39.50
+					- - FULL	
5	811	.00	57.02	45.00		45.00
+					- - FULL	
6	813	.00	32.38	28.00		28.00
+					- - FULL	
7	821	.00	44.53	15.10		15.10
+					- - FULL	
8	824	.00	42.61	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 14 -- TIME FROM INITIATION OF EPS = 14.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	24.70
804	16.70
811	67.60
824	244.40
808	67.10
809	27.50

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 14 -- TIME FROM INITIATION OF EPS = 14.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03

801	24.70	96.13	48.00	471.97
804	16.70	89.04	35.00	529.96
808	67.10	81.78	24.00	566.64
809	27.50	81.64	25.00	555.41
811	67.60	63.64	40.00	231.79
813	1240.00	39.29	25.00	140.10
821	291.60	54.19	12.00	413.72
824	244.40	53.22	30.00	227.75

THE NET SYSTEM DEMAND = 1979.60

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1979.60

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1979.60
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	96.13	50.50		50.50
+					- - FULL	
2	804	.00	89.04	51.30		51.30
+					- - FULL	
3	808	.00	81.78	26.00		26.00
+					- - FULL	
4	809	.00	81.64	39.50		39.50
+					- - FULL	
5	811	.00	63.64	45.00		45.00
+					- - FULL	
6	813	.00	39.29	28.00		28.00
+					- - FULL	
7	821	.00	54.19	15.10		15.10
+					- - FULL	
8	824	.00	53.22	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 15 -- TIME FROM INITIATION OF EPS = 15.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
811	59.20

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 15 -- TIME FROM INITIATION OF EPS = 15.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	8.22	103.84	48.00	547.64
804	5.60	95.19	35.00	590.23
808	22.40	94.23	24.00	688.76
809	9.20	94.21	25.00	678.76
811	59.20	70.08	40.00	295.01
813	1240.00	46.10	25.00	206.90
821	291.60	63.82	12.00	508.23
824	108.60	63.62	30.00	329.67

THE NET SYSTEM DEMAND = 1744.82

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1744.82

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1744.82
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	103.84	50.50		50.50
+					- - FULL	
2	804	.00	95.19	51.30		51.30
+					- - FULL	
3	808	.00	94.23	26.00		26.00
+					- - FULL	
4	809	.00	94.21	39.50		39.50
+					- - FULL	
5	811	.00	70.08	45.00		45.00
+					- - FULL	
6	813	.00	46.10	28.00		28.00
+					- - FULL	
7	821	.00	63.82	15.10		15.10
+					- - FULL	
8	824	.00	63.62	35.00		35.00
+					- - FULL	

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 16 -- TIME FROM INITIATION OF EPS = 16.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	8.22	103.84	48.00	547.64
804	5.60	95.19	35.00	590.23
808	22.40	94.23	24.00	688.76
809	9.20	94.21	25.00	678.76
811	59.20	70.08	40.00	295.01
813	1240.00	46.10	25.00	206.90
821	291.60	63.82	12.00	508.23
824	108.60	63.62	30.00	329.67

THE NET SYSTEM DEMAND = 1744.82

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1744.82

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1744.82
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	103.84	50.50		50.50
+					- - FULL	
2	804	.00	95.19	51.30		51.30
+					- - FULL	
3	808	.00	94.23	26.00		26.00
+					- - FULL	

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     4       809              .00       94.21        39.50                    39.50
+                                                                - - FULL
     5       811              .00       70.08        45.00                    45.00
+                                                                - - FULL
     6       813              .00       46.10        28.00                    28.00
+                                                                - - FULL
     7       821              .00       63.82        15.10                    15.10
+                                                                - - FULL
     8       824              .00       63.62        35.00                    35.00
+                                                                - - FULL

 A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

 PERIOD NO. = 17 -- TIME FROM INITIATION OF EPS =  17.0000 HOURS

 THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :
 JUNCTION NUMBER        DEMAND
       811               76.10
       824              258.00

 THE RESULTS ARE OBTAINED AFTER  2 TRIALS WITH AN ACCURACY =  .00000

  PERIOD NO. = 17 -- TIME FROM INITIATION OF EPS =  17.0000 HOURS

  JUNCTION NUMBER      DEMAND     GRADE LINE    ELEVATION    PRESSURE
       800               .00       105.00       100.00        49.03
       801              8.22       103.84        48.00       547.64
       804              5.60        93.48        35.00       573.53
       808             22.40        92.53        24.00       672.07
       809              9.20        92.51        25.00       662.06
       811             76.10        63.52        40.00       230.70
       813           1240.00        39.14        25.00       138.67
       821            291.60        53.72        12.00       409.15
       824            258.00        52.65        30.00       222.17

 THE NET SYSTEM DEMAND =   1911.12

 SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

    PIPE NUMBER     FLOWRATE
       800          1911.12

 THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES =   1911.12
 THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES =       .00

 TANK STATUS REPORT

  TANK NO.  CONN. PIPE  NET FLOW   ADJ. HGL  WATER SURFACE ELE. PROJECTED W.S.E
     1        801            .00     103.84         50.50                50.50
+                                                                - - FULL
     2        804            .00      93.48         51.30                51.30
+                                                                - - FULL
     3        808            .00      92.53         26.00                26.00
+                                                                - - FULL
     4        809            .00      92.51         39.50                39.50
+                                                                - - FULL
     5        811            .00      63.52         45.00                45.00
+                                                                - - FULL
     6        813            .00      39.14         28.00                28.00
+                                                                - - FULL
     7        821            .00      53.72         15.10                15.10
+                                                                - - FULL
     8        824            .00      52.65         35.00                35.00
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+                                                        - - FULL

 A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

 PERIOD NO. = 18 -- TIME FROM INITIATION OF EPS =  18.0000 HOURS

 THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :
 JUNCTION NUMBER        DEMAND
       801               32.90
       804               22.30
       811              101.40
       824              380.20
       808              104.30
       809               42.70

  THE RESULTS ARE OBTAINED AFTER  2 TRIALS WITH AN ACCURACY =  .00000

  PERIOD NO. = 18 -- TIME FROM INITIATION OF EPS =  18.0000 HOURS

  JUNCTION NUMBER      DEMAND     GRADE LINE   ELEVATION    PRESSURE
       800                .00       105.00      100.00       49.03
       801              32.90        89.91       48.00      411.03
       804              22.30        81.35       35.00      454.58
       808             104.30        64.73       24.00      399.47
       809              42.70        64.41       25.00      386.51
       811             101.40        55.73       40.00      154.27
       813            1240.00        31.01       25.00       58.91
       821             291.60        42.40       12.00      298.11
       824             380.20        40.20       30.00      100.04

 THE NET SYSTEM DEMAND =   2215.40

 SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

    PIPE NUMBER     FLOWRATE
       800          2215.40

 THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES =   2215.40
 THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES =       .00

 TANK STATUS REPORT

 TANK NO.  CONN. PIPE  NET FLOW   ADJ. HGL  WATER SURFACE ELE. PROJECTED W.S.E
     1        801          .00      89.91         50.50              50.50
+                                                        - - FULL
     2        804          .00      81.35         51.30              51.30
+                                                        - - FULL
     3        808          .00      64.73         26.00              26.00
+                                                        - - FULL
     4        809          .00      64.41         39.50              39.50
+                                                        - - FULL
     5        811          .00      55.73         45.00              45.00
+                                                        - - FULL
     6        813          .00      31.01         28.00              28.00
+                                                        - - FULL
     7        821          .00      42.40         15.10              15.10
+                                                        - - FULL
     8        824          .00      40.20         35.00              35.00
+                                                        - - FULL

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS
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PERIOD NO. = 19 -- TIME FROM INITIATION OF EPS = 19.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	35.60
804	24.20
811	126.80
824	407.40
808	108.00
809	44.20

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 19 -- TIME FROM INITIATION OF EPS = 19.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	35.60	87.54	48.00	387.76
804	24.20	79.83	35.00	439.59
808	108.00	62.16	24.00	374.20
809	44.20	61.82	25.00	361.06
811	126.80	53.27	40.00	130.13
813	1240.00	28.48	25.00	34.16
821	291.60	39.09	12.00	265.68
824	407.40	36.59	30.00	64.66

THE NET SYSTEM DEMAND = 2277.80

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2277.80

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2277.80
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	87.54	50.50		50.50
+					- - FULL	
2	804	.00	79.83	51.30		51.30
+					- - FULL	
3	808	.00	62.16	26.00		26.00
+					- - FULL	
4	809	.00	61.82	39.50		39.50
+					- - FULL	
5	811	.00	53.27	45.00		45.00
+					- - FULL	
6	813	.00	28.48	28.00		28.00
+					- - FULL	
7	821	.00	39.09	15.10		15.10
+					- - FULL	
8	824	.00	36.59	35.00		35.00
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 20 -- TIME FROM INITIATION OF EPS = 20.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	54.80

804	37.20
811	152.10
824	434.60
808	141.60
809	58.00

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00013

PERIOD NO. = 20 -- TIME FROM INITIATION OF EPS = 20.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	54.80	66.19	48.00	178.36
804	37.20	71.08	35.00	353.78
808	141.60	42.28	24.00	179.29
809	58.00	41.71	25.00	163.87
811	152.10	51.98	40.00	117.51
813	1240.00	28.00	25.00	29.42
821	291.60	37.60	12.00	251.08
824	434.60	35.00	30.00	49.03

THE NET SYSTEM DEMAND = 2409.90

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2368.73
813	23.02
824	18.14

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2409.90
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	66.19	50.50		50.50
+					- - FULL	
2	804	.00	71.08	51.30		51.30
+					- - FULL	
3	808	.00	42.28	26.00		26.00
+					- - FULL	
4	809	.00	41.71	39.50		39.50
+					- - FULL	
5	811	.00	51.98	45.00		45.00
+					- - FULL	
6	813	-23.02	28.00	28.00		27.98
+					- - FULL	
7	821	.00	37.60	15.10		15.10
+					- - FULL	
8	824	-18.14	35.00	35.00		34.84
+					- - FULL	

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 21 -- TIME FROM INITIATION OF EPS = 21.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	35.60
804	24.20
811	126.80
824	380.20

808	96.90
809	39.70

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00013

PERIOD NO. = 21 -- TIME FROM INITIATION OF EPS = 21.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	35.60	87.54	48.00	387.76
804	24.20	81.31	35.00	454.16
808	96.90	66.98	24.00	421.48
809	39.70	66.69	25.00	408.88
811	126.80	52.62	40.00	123.71
813	1240.00	27.98	25.00	29.27
821	291.60	37.63	12.00	251.35
824	380.20	34.84	30.00	47.44

THE NET SYSTEM DEMAND = 2235.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2280.83
813	6.59
824	-52.41

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2287.41
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -52.41

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	87.54	50.50		50.50
+					- - FULL	
2	804	.00	81.31	51.30		51.30
+					- - FULL	
3	808	.00	66.98	26.00		26.00
+					- - FULL	
4	809	.00	66.69	39.50		39.50
+					- - FULL	
5	811	.00	52.62	45.00		45.00
+					- - FULL	
6	813	-6.59	27.98	27.98		27.98
7	821	.00	37.63	15.10		15.10
+					- - FULL	
8	824	52.41	34.84	34.84		35.00

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00128

PERIOD NO. = 21 -- TIME FROM INITIATION OF EPS = 21.3461 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	35.60	87.54	48.00	387.76
804	24.20	81.32	35.00	454.29
808	96.90	66.99	24.00	421.61
809	39.70	66.71	25.00	409.01
811	126.80	52.66	40.00	124.18
813	1240.00	27.98	25.00	29.26
821	291.60	37.76	12.00	252.63
824	380.20	35.00	30.00	49.03

THE NET SYSTEM DEMAND = 2235.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2279.78
813	4.97
824	-49.76

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2284.75
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -49.76

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	87.54	50.50		50.50
+					- - FULL	
2	804	.00	81.32	51.30		51.30
+					- - FULL	
3	808	.00	66.99	26.00		26.00
+					- - FULL	
4	809	.00	66.71	39.50		39.50
+					- - FULL	
5	811	.00	52.66	45.00		45.00
+					- - FULL	
6	813	-4.97	27.98	27.98		27.98
7	821	.00	37.76	15.10		15.10
+					- - FULL	
8	824	49.76	35.00	35.00		35.00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 22 -- TIME FROM INITIATION OF EPS = 22.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	30.10
804	20.50
811	84.50
824	271.60
808	74.50
809	30.50

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00161

PERIOD NO. = 22 -- TIME FROM INITIATION OF EPS = 22.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	30.10	92.20	48.00	433.50
804	20.50	85.88	35.00	498.95
808	74.50	77.16	24.00	521.30
809	30.50	76.99	25.00	509.80
811	84.50	56.66	40.00	163.37
813	1240.00	27.98	25.00	29.23
821	291.60	46.15	12.00	334.93
824	271.60	44.98	30.00	146.90

THE NET SYSTEM DEMAND = 2043.30

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2159.76
813	-116.46

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2159.76
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -116.46

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	92.20	50.50		50.50
+					- - FULL	
2	804	.00	85.88	51.30		51.30
+					- - FULL	
3	808	.00	77.16	26.00		26.00
+					- - FULL	
4	809	.00	76.99	39.50		39.50
+					- - FULL	
5	811	.00	56.66	45.00		45.00
+					- - FULL	
6	813	116.46	27.98	27.98		28.00
7	821	.00	46.15	15.10		15.10
+					- - FULL	
8	824	.00	44.98	35.00		35.00
+					- - FULL	

THE RESULTS ARE OBTAINED AFTER 1 TRIALS WITH AN ACCURACY = .00013

PERIOD NO. = 22 -- TIME FROM INITIATION OF EPS = 22.2451 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	30.10	92.20	48.00	433.50
804	20.50	85.88	35.00	498.97
808	74.50	77.16	24.00	521.33
809	30.50	76.99	25.00	509.83
811	84.50	56.67	40.00	163.47
813	1240.00	28.00	25.00	29.42
821	291.60	46.16	12.00	335.04
824	271.60	44.99	30.00	147.00

THE NET SYSTEM DEMAND = 2043.30

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	2159.52
813	-116.22

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 2159.52
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -116.22

TANK STATUS REPORT

TANK NO.	CONN. PIPE	NET FLOW	ADJ. HGL	WATER SURFACE ELE.		PROJECTED W.S.E
1	801	.00	92.20	50.50		50.50
+					- - FULL	
2	804	.00	85.88	51.30		51.30
+					- - FULL	
3	808	.00	77.16	26.00		26.00
+					- - FULL	
4	809	.00	76.99	39.50		39.50
+					- - FULL	

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     5       811              .00       56.67          45.00                          45.00
+                                                                    - - FULL
     6       813           116.22       28.00          28.00                          28.00
     7       821              .00       46.16          15.10                          15.10
+                                                                    - - FULL
     8       824              .00       44.99          35.00                          35.00
+                                                                    - - FULL
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A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

PERIOD NO. = 23 -- TIME FROM INITIATION OF EPS = 23.0000 HOURS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
801	21.90
804	14.90
811	67.60
824	217.30
808	59.60
809	24.40

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00000

PERIOD NO. = 23 -- TIME FROM INITIATION OF EPS = 23.0000 HOURS

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
800	.00	105.00	100.00	49.03
801	21.90	97.90	48.00	489.35
804	14.90	90.34	35.00	542.73
808	59.60	84.52	24.00	593.49
809	24.40	84.41	25.00	582.57
811	67.60	64.87	40.00	243.89
813	1240.00	40.60	25.00	152.94
821	291.60	56.12	12.00	432.64
824	217.30	55.34	30.00	248.53

THE NET SYSTEM DEMAND = 1937.30

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
800	1937.30

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 1937.30
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

TANK STATUS REPORT

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TANK NO.  CONN. PIPE  NET FLOW   ADJ. HGL  WATER SURFACE ELE.  PROJECTED W.S.E
    1        801          .00      97.90          50.50                          50.50
+                                                                    - - FULL
    2        804          .00      90.34          51.30                          51.30
+                                                                    - - FULL
    3        808          .00      84.52          26.00                          26.00
+                                                                    - - FULL
    4        809          .00      84.41          39.50                          39.50
+                                                                    - - FULL
    5        811          .00      64.87          45.00                          45.00
+                                                                    - - FULL
    6        813          .00      40.60          28.00                          28.00
+                                                                    - - FULL
    7        821          .00      56.12          15.10                          15.10
+                                                                    - - FULL
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     8       824              .00      55.34          35.00                  35.00
+                                                                - - FULL

 A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

 PERIOD NO. = 24 -- TIME FROM INITIATION OF EPS =  24.0000 HOURS

 THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :
 JUNCTION NUMBER        DEMAND
       801               13.70
       804                9.30
       811               59.20
       824              190.10
       808               52.20
       809               21.40

 THE RESULTS ARE OBTAINED AFTER  2 TRIALS WITH AN ACCURACY =  .00000

 PERIOD NO. = 24 -- TIME FROM INITIATION OF EPS =  24.0000 HOURS

  JUNCTION NUMBER      DEMAND     GRADE LINE    ELEVATION    PRESSURE
       800                .00       105.00       100.00       49.03
       801              13.70       102.02        48.00      529.77
       804               9.30        91.98        35.00      558.76
       808              52.20        87.31        24.00      620.91
       809              21.40        87.22        25.00      610.20
       811              59.20        66.46        40.00      259.53
       813            1240.00        42.26        25.00      169.28
       821             291.60        58.38        12.00      454.80
       824             190.10        57.77        30.00      272.38

 THE NET SYSTEM DEMAND =   1877.50

 SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

    PIPE NUMBER     FLOWRATE
       800         1877.50

 THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES =   1877.50
 THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES =       .00

 TANK STATUS REPORT

 TANK NO.  CONN. PIPE  NET FLOW   ADJ. HGL  WATER SURFACE ELE. PROJECTED W.S.E
     1       801           .00     102.02          50.50                  50.50
+                                                                - - FULL
     2       804           .00      91.98          51.30                  51.30
+                                                                - - FULL
     3       808           .00      87.31          26.00                  26.00
+                                                                - - FULL
     4       809           .00      87.22          39.50                  39.50
+                                                                - - FULL
     5       811           .00      66.46          45.00                  45.00
+                                                                - - FULL
     6       813           .00      42.26          28.00                  28.00
+                                                                - - FULL
     7       821           .00      58.38          15.10                  15.10
+                                                                - - FULL
     8       824           .00      57.77          35.00                  35.00
+                                                                - - FULL
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