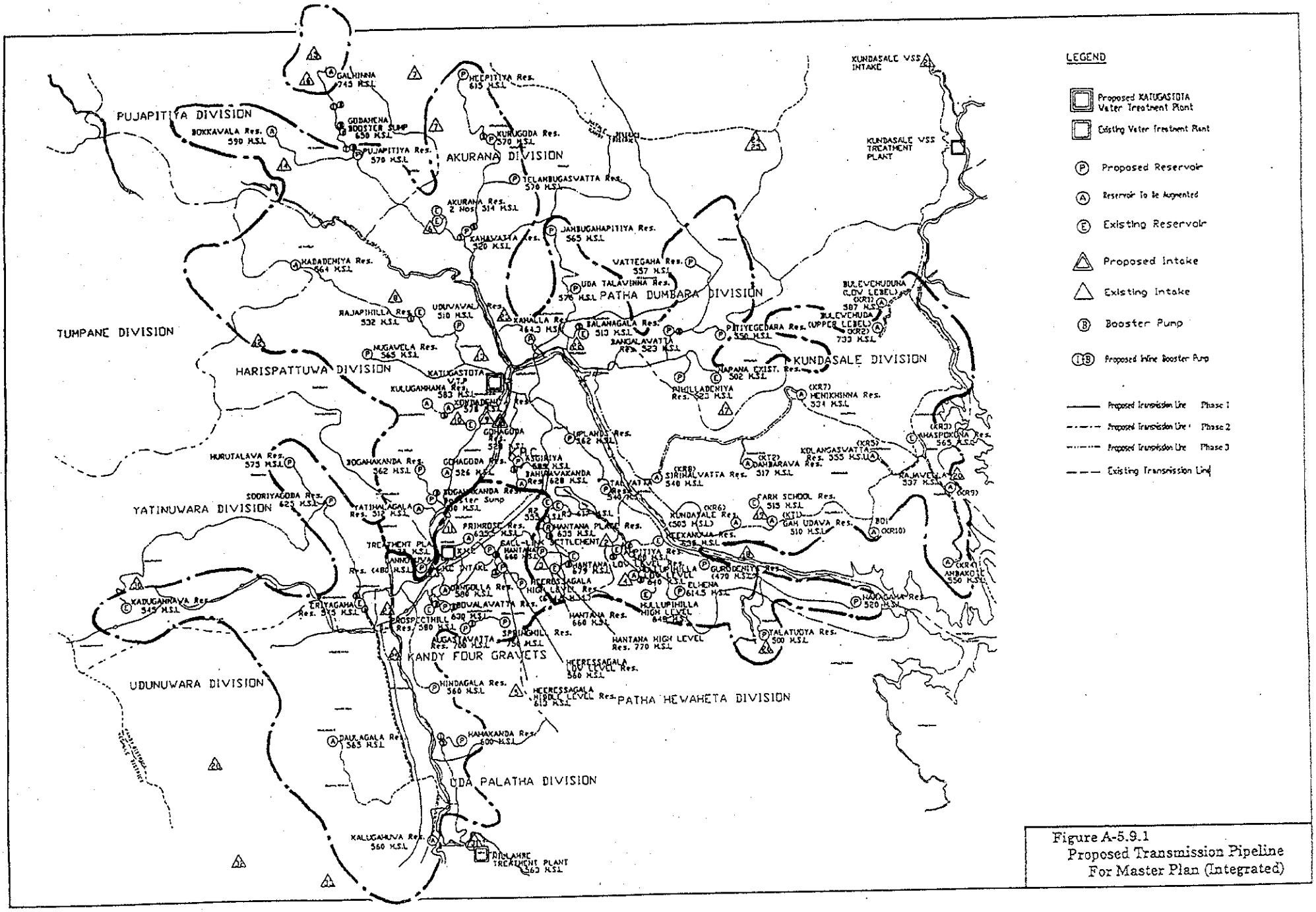


Figure A-5.9.1
Proposed Transmission Pipeline
For Master Plan (Integrated)

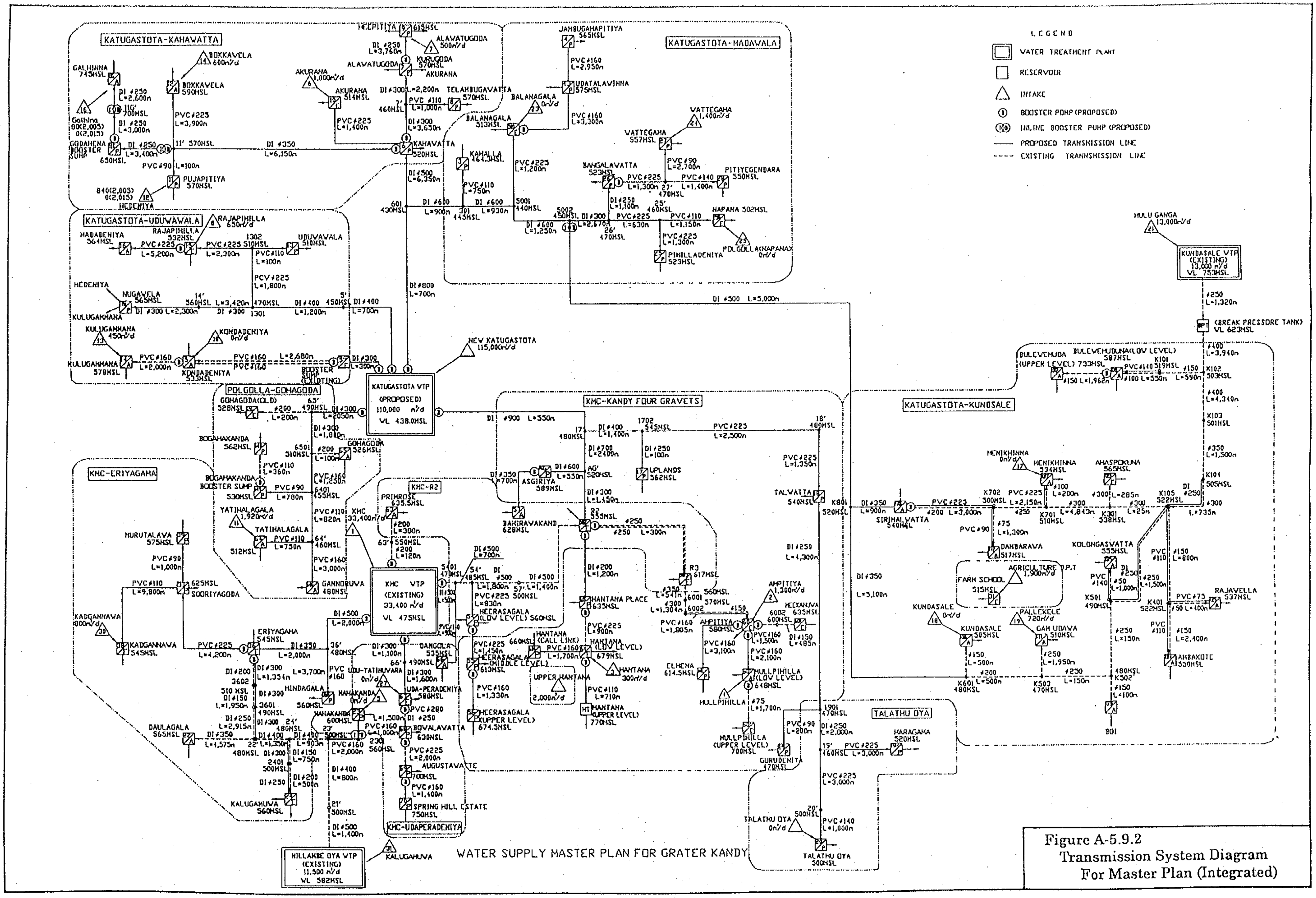


Figure A-5.9.2
Transmission System Diagram
For Master Plan (Integrated)

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node	Node-Node		B/G	Flow Rate Q(m3/d)	Dia. D(mm)	Mixed Dia Dm(mm)	Exist.	Length L(m)	Velocity v(m/sec)	Hyd.Grd I(‰)	Loss h(m)	Dynamic Pressure Hd(MSL)	GL	Dynamic Pressure He(m)	Pump Type	Head H(m)	set Excluding Stand-by	Output (kw/set)	Remark
	KMC-Primrose																		
	KMC											642.065	475.000	167.065					
KMC	-	63	B	2,000	200	200	K	500	0.737	3.130	1.565				B	167.1	2	32.4	Exist Pipe ϕ200
	63											640.500	635.500	5.000					
	KMC-Eliyagama																		
	KMC											582.960	475.000	107.960					
KMC	-	36'	B	13,700	500	500		2,000	0.808	1.472	2.944				B	108.0	3	95.7	
	36'											580.016	480.000	100.016					
36'	-	36H	(B)	900	140	140		3,700	0.677	4.058	15.016								
	36H											565.000	560.000	5.000					
	36'											580.016	480.000	100.016					
36'	-	36	(B)	12,800	450	450		2,000	0.931	2.168	4.337								Exist Pipe ϕ450
	36											575.679	545.000	30.679					
	36											600.205	545.000	55.205					
36	-	3602	B	7,600	300	336	Atten	1,354	0.994	3.443	4.662				B	55.2	2	40.7	Exist Pipe ϕ200
	3602											595.543	510.000	85.543					
3602	-	3601	(B)	7,600	300	318	Atten	1,950	1.110	4.513	8.800								Exist Pipe ϕ150
	3601											586.743	490.000	96.743					
3601	-	22'	(B)	7,600	300	360	Atten	2,915	0.863	2.440	7.112								Exist Pipe ϕ250
	22'											579.630	480.000	99.630					
22'	-	22	(B)	6,500	350	350	K	4,575	0.782	2.105	9.630								Exist Pipe ϕ350
	22											570.000	565.000	5.000					
	22'											579.630	480.000	99.630					
22'	-	24'	(B)	1,200	400	400	K	1,350	0.111	0.048	0.065								Exist Pipe ϕ400
	24'											579.565	480.000	99.565					
	36											645.110	545.000	100.110					
36	-	37	B	2,100	198	198		4,200	0.789	3.598	15.110				B	100.1	2	20.4	
	37											630.000	625.000	5.000					
	37											625.000	625.000	0.000					
37	-	39	G	700	79	79		1,000	1.653	41.366	41.366								
	39											583.634	575.000	8.634					
	37											625.000	625.000	0.000					
37	-	38	G	300	97	97		9,800	0.470	3.175	31.116								
	38											593.884	545.000	48.884					
	Nillambe Oya																		
	NO											582.000	582.000	0.000					
NO	-	21'	G	9,000	500	500	K	1,400	0.531	0.677	0.947								Exist Pipe ϕ500
	21'											581.053	500.000	81.053					
21'	-	23'	G	9,000	400	400	K	800	0.829	2.006	1.605								Exist Pipe ϕ400
	23'											579.448	500.000	79.448					
23'	-	2301	(G)	1,000	140	140		2,000	0.752	4.932	9.864								
	2301											569.584	560.000	9.584					
	2301											609.932	560.000	49.932					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node	Node-Node		B/G	Flow Rate Q(m3/d)	Dia. D(mm)	Mixed Dia Dm(mm)	Exist.	Length L(m)	Velocity v(m/sec)	Hyd.Grd I(‰)	Loss h(m)	Dynamic Pressure Hd(MSL)	GL	Dynamic Pressure He(m)	Pump Type	Head H(m)	set Excluding Stand-by	Output (kw/set)	Remark
															IB	40.3	1	7.8	
2301	-	23	IB	1,000	140	140		1,000	0.752	4.932	4.932								
	23											605.000	600.000	5.000					
	23'											579.448	500.000	79.448					
23'	-	24'	(G)	8,000	400	400	K	903	0.737	1.613	1.457								Exist Pipe φ400
	24'											577.992	480.000	97.992					
24'	-	2401	(G)	9,100	300	318	Atten	750	1.330	6.298	4.723								Exist Pipe φ150あり
	2401											573.268	500.000	73.268					
2401	-	24	(G)	9,100	250	296	Atten	500	1.533	8.905	4.453								Exist Pipe φ200あり
	24											568.816	560.000	8.816					
	KMC-Udaperdeniya																		
	KMC											608.170	475.000	133.170					
KMC	-	66'	B	900	140	140		1,100	0.677	4.058	4.464				B	133.2	1	23.3	
	66'											603.705	490.000	113.705					
66'	-	66	(B)	1,500	97	97	K	300	2.349	62.351	18.705								Exist Pipe φ110
	66											585.000	580.000	5.000					
	67											613.314	580.000	33.314					
67	-	66'	B	600	97	97		1,600	0.940	11.446	18.314				B	33.3	1	3.9	
	66'											595.000	490.000	105.000					
	67											635.801	580.000	55.801					
67	-	68	B	3,000	346	346	K	1,500	0.370	0.534	0.801				B	55.8	1	32.5	Exist Pipe φ280, φ250
	68											635.000	630.000	5.000					
	68											711.574	630.000	81.574					
68	-	69	B	2,000	198	198	K	2,000	0.752	3.287	6.574				B	81.6	2	15.8	Exist Pipe φ225
	69											705.000	700.000	5.000					
	69											761.905	700.000	61.905					
69	-	70	B	1,000	140	140		1,400	0.752	4.932	6.905				B	61.9	1	12.0	
	70											755.000	750.000	5.000					
	KMC-KFG																		
	KMC											594.647	475.000	119.647					
KMC	-	54'	B	37,900	500	500	K	1,200	2.234	9.671	11.605				B	119.6	3	293.3	Exist Pipe φ500
	54'											583.042	485.000	98.042					
54'	-	57'	(B)	35,100	500	500	K	1,800	2.069	8.391	15.103								Exist Pipe φ500
	57'											567.939	500.000	67.939					
57'	-	582	(B)	28,400	500	500	K	1,400	1.674	5.670	7.939								Exist Pipe φ500
	582											560.000	555.000	5.000					
	57'											635.226	500.000	135.226					
57'	-	57	IB	6,700	350	350		1,000	0.806	2.226	2.226				IB	67.3	1	87.5	
	57											633.000	628.000	5.000					
	54'											583.042	485.000	98.042					
54'	-	54	(B)	2,800	198	198		830	1.053	6.125	5.084								
	54											577.958	560.000	17.958					
	54											622.766	560.000	62.766					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
															B	62.8	2	12.2	
54	-	55	B	2,000	198	198		1,450	0.752	3.287	4.766								
	55											618.000	613.000	5.000					
												686.059	613.000	73.059					
	55														B	73.1	1	14.2	
55	-	56	B	1,000	140	140		1,330	0.752	4.932	6.559								
	56											679.500	674.500	5.000					
	KMC-R2,KFC											624.505	555.000	69.505					
	582														B	69.5	2	76.2	Exist Pipe φ250×2
582	-	583	B	11,300	325	325	K	300	1.573	8.352	2.505								
	583											622.000	617.000	5.000					
												649.410	555.000	94.410					
	582														B	94.4	2	29.3	
582	-	61S	B	3,200	198	198		1,200	1.203	7.842	9.410								
	61S											640.000	635.000	5.000					
												687.529	635.000	52.529					
	61S														B	52.5	2	11.2	Exist Pipe φ225
61S	-	61	B	2,200	198	198	K	900	0.827	3.921	3.529								
	61											684.000	679.000	5.000					
												679.000	679.000	0.000					
	61																		
61	-	61H	G	900	140	140		1,700	0.677	4.058	6.899								
	61H											672.101	660.000	12.101					
												778.502	679.000	99.502					
	61														B	99.5	1	19.3	
61	-	HT	B	1,000	140	140		710	0.752	4.932	3.502								
	HT											775.000	770.000	5.000					
												617.000	617.000	0.000					
	583																		Exist Pipe φ350
583	-	6001	G	6,800	350	350	K	550	0.818	2.288	1.259								
	6001											615.741	560.000	55.741					Exist Pipe φ300
6001	-	6002	(G)	6,800	300	300	K	1,000	1.113	4.848	4.848								
	6002											610.894	570.000	40.894					Exist Pipe φ150
6002	-	60	(G)	6,800	198	230	Atten	1,500	1.895	15.268	22.901								
	60											587.992	580.000	7.992					
												634.789	580.000	54.789					
	60														B	54.8	1	10.6	
60	-	60E	B	1,000	140	140		3,100	0.752	4.932	15.289								
	60E											619.500	614.500	5.000					
												658.354	580.000	78.354					
	60														B	78.4	1	10.6	
60	-	60'	B	700	140	140		2,100	0.526	2.549	5.354								
	60'											653.000	648.000	5.000					
												713.922	648.000	65.922					
	60'														B	65.9	1	2.6	Exist Pipe φ75
60'	-	60''	B	200	75	75	K	1,700	0.524	5.248	8.922								
	60''											705.000	700.000	5.000					
												645.449	580.000	65.449					
	60														B	65.4	2	24.1	Exist Pipe φ160
60	-	6002	B	3,800	250	269	Atten	1,500	0.771	2.788	4.182								
	6002											641.267	600.000	41.267					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
																			Exist Pipe ϕ150
6002	-	60M	(B)	3,800	250	273	Atten	485	0.751	2.613	1.267								
	60M											640.000	635.000	5.000					
												635.000	635.000	0.000					
	60M																		
60M	-	1901	G	3,000	198	198		1,800	1.128	6.959	12.527								
	1901											622.473	470.000	152.473					
1901	-	19	(G)	1,000	79	79		200	2.361	80.022	16.004								
	19											606.469	470.000	136.469					
												622.473	470.000	152.473					
	1901																		
1901	-	19'	(G)	2,000	140	140		2,000	1.504	17.779	35.559								
	19'											586.914	460.000	126.914					
19'	-	19H	(G)	1,000	123	123		3,000	0.974	9.264	27.793								
	19H											559.121	520.000	39.121					
	Talathuoya											559.121	460.000	99.121					
	19'																		
19'	-	20'	(G)	1,000	123	123		3,000	0.974	9.264	27.793								
	20'											531.328	500.000	31.328					
20'	-	20	(G)	1,000	123	123		1,000	0.974	9.264	9.264								
	20											522.063	500.000	22.063					
																	35	875.6	
Sub Total																			

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node	Node-Node		B/G	Flow Rate Q(m3/d)	Dia. D(mm)	Mixed Dia Dm(mm)	Exist.	Length L(m)	Velocity v(m/sec)	Hyd.Grd I(‰)	Loss h(m)	Dynamic Pressure Hd(MSL)	GL	Dynamic Pressure He(m)	Pump Type	Head H(m)	set Excluding Stand-by	Output (kw/set)	Remark
	Katugastota-Madawala																		
	PG											544.538	438.000	106.538					
PG	-	601	B	25,900	600	600		700	1.060	1.968	1.377				B	106.5	2	267.7	
	601											543.161	430.000	113.161					
601	-	301	(B)	8,500	400	400		900	0.783	1.805	1.624								
	301											541.536	445.000	96.536					
301	-	5001	(B)	7,200	350	350		930	0.866	2.543	2.365								
	5001											539.171	440.000	99.171					
5001	-	26'	(B)	4,400	300	300		3,920	0.720	2.167	8.493								
	26'											530.678	470.000	60.678					
26'	-	26	(B)	2,900	250	250		1,100	0.684	2.435	2.678								
	26											528.000	523.000	5.000					
	301											541.536	445.000	96.536					
301	-	3	(B)	1,300	97	97		750	2.036	47.849	35.887								
	3											505.650	500.000	5.650					
	5001											539.171	440.000	99.171					
5001	-	500	(B)	2,800	198	198		1,200	1.053	6.125	7.351								
	500											531.821	513.000	18.821					
	500											606.444	513.000	93.444					
500	-	4J	B	1,300	140	140		3,300	0.977	8.013	26.444				B	93.4	1	23.6	
	4J											580.000	575.000	5.000					
	4J											575.000	575.000	0.000					
4J	-	4	G	700	140	140		2,950	0.526	2.549	7.521								
	4											567.479	565.000	2.479					
	26											588.458	523.000	65.458					
26	-	27'	B	1,700	198	198		1,300	0.639	2.433	3.164				B	65.5	2	10.8	
	27'											585.294	470.000	115.294					
27'	-	27	(B)	300	79	79		2,700	0.708	8.628	23.294								
	27											562.000	557.000	5.000					
	27'											585.294	470.000	115.294					
27'	-	28	(B)	1,400	123	123		1,400	1.364	17.265	24.170								
	28											561.124	550.000	11.124					
	26'											530.678	470.000	60.678					
26'	-	25'	(B)	1,500	198	198		630	0.564	1.930	1.216								
	25'											529.462	460.000	69.462					
25'	-	25	(B)	1,000	198	198		1,300	0.376	0.912	1.185								
	25											528.277	523.000	5.277					
	25'											529.462	460.000	69.462					
25'	-	25N	(B)	500	97	97		1,150	0.783	8.169	9.394								
	25N											520.067	502.000	18.067					
	Katugastota-Kahawatta																		
	601											543.161	430.000	113.161					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
601	-	6	(B)	17,400	500	500		6,350	1.026	2.291	14.547								
	6											528.614	520.000	8.614					
	6											520.000	520.000	0.000					
6	-	10	G	900	198	198		1,400	0.338	0.750	1.050								
	10											518.950	514.000	4.950					
	6											626.233	520.000	106.233					
6	-	11'	B	6,200	350	350		6,150	0.746	1.929	11.862				B	106.2	2	63.9	
	11'											614.371	570.000	44.371					
11'	-	12	(B)	2,500	198	198		3,900	0.940	4.967	19.371								
	12											595.000	590.000	5.000					
	11'											614.371	570.000	44.371					
11'	-	11	(B)	1,100	79	79		100	2.597	95.453	9.545								
	11											604.826	570.000	34.826					
	11'											661.764	570.000	91.764					
11'	-	11S	IB	2,600	250	250		3,400	0.613	1.989	6.764				IB	47.4	1	23.9	
	11S											655.000	650.000	5.000					
	11S											710.968	650.000	60.968					
11S	-	11G'	B	2,600	250	250		3,000	0.613	1.989	5.968				B	61.0	2	15.4	
	11G'											705.000	700.000	5.000					
	11G'											755.172	700.000	55.172					
11G'	-	11G	IB	2,600	250	250		2,600	0.613	1.989	5.172				IB	50.2	1	25.3	
	11G											750.000	745.000	5.000					
	6											593.618	520.000	73.618					
6	-	7'	B	5,600	300	300		3,650	0.917	3.385	12.355				B	73.6	2	40.0	
	7'											581.263	460.000	121.263					
7'	-	7	(B)	5,100	300	300		2,200	0.835	2.847	6.263								
	7											575.000	570.000	5.000					
	7'											581.263	460.000	121.263					
7'	-	8	(B)	500	97	97		1,000	0.783	8.169	8.169								
	8											573.094	570.000	3.094					
	7											629.747	570.000	59.747					
7	-	9	B	3,000	250	250		3,760	0.707	2.592	9.747				B	59.7	2	17.4	
	9											620.000	615.000	5.000					
Katugastota-Uduwawala																			
	PG											587.111	438.000	149.111					
PG	-	5'	B	8,800	400	400		700	0.811	1.924	1.347				B	149.1	1	254.6	
	5'											585.764	450.000	135.764					
5'	-	1301	(B)	8,800	400	400		1,200	0.811	1.924	2.309								
	1301											583.455	470.000	113.455					
1301	-	14'	(B)	4,600	300	300		3,420	0.753	2.352	8.045								
	14'											575.410	560.000	15.410					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
14'	-	17N	(B)	4,600	300	300		2,300	0.753	2.352	5.410								
	17N											570.000	565.000	5.000					
	1301											583.455	470.000	113.455					
1301	-	1302	(B)	4,200	198	198		1,800	1.579	12.969	23.344								
	1302											560.111	510.000	50.111					
1302	-	15	(B)	2,100	198	198		2,300	0.789	3.598	8.274								
	15											551.836	532.000	19.836					
	1302											560.111	510.000	50.111					
1302	-	13	(B)	2,100	97	97		100	3.289	116.194	11.619								
	13											548.491	510.000	38.491					
	15											580.312	532.000	48.312					
15	-	16	B	1,600	198	198		5,200	0.601	2.175	11.312				B	48.3	2	7.5	
	16											569.000	564.000	5.000					
	Katugastota-Kondadeniya,Kulugamana																		
	PG											443.520	438.000	5.520					
PG	-	5''	B	3,900	300	300		300	0.639	1.733	0.520				B	5.5	1	4.2	
	5''											443.000	438.000	5.000					
	5''											583.415	438.000	145.415					
5''	-	5	B	3,900	182	182	K	2,680	1.731	16.946	45.415				B	145.4	1	110.0	Exist Pipe ϕ160×2
	5											538.000	533.000	5.000					
	5											596.821	533.000	63.821					
5	-	14	B	1,200	140	140	K	2,000	0.902	6.910	13.821				B	63.8	1	14.9	Exist Pipe ϕ160
	14											583.000	578.000	5.000					
	Katugastota-KFG,H2																		
	PG											602.117	438.000	164.117					
PG	-	17'	B	39,300	800	800		550	0.905	1.048	0.577				B	164.1	4	312.9	
	17'											601.540	480.000	121.540					
17'	-	AG'	(B)	12,200	450	450		2,400	0.888	1.984	4.762								
	AG'											596.778	520.000	76.778					
AG'	-	AG	(B)	12,200	450	450		1,400	0.888	1.984	2.778								
	AG											594.000	589.000	5.000					
	17'											601.540	480.000	121.540					
17'	-	1702	(B)	27,100	450	450		2,500	1.972	8.686	21.715								
	1702											579.825	545.000	34.825					
	1702											579.825	545.000	34.825					
1702	-	17	(B)	10,900	250	250		100	2.570	28.199	2.820								
	17											577.005	562.000	15.005					
	1702											579.825	545.000	34.825					
1702	-	18'	(B)	16,200	450	450		1,500	1.179	3.353	5.029								
	18'											574.796	480.000	94.796					
18'	-	KR8	(B)	15,200	450	450		2,750	1.106	2.980	8.195								
	KR8											566.601	540.000	26.601					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node			B/C	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
	18'											574.796	480.000	94.796					
18'	-	18	(B)	1,000	140	140		1,350	0.752	4.932	6.658								
	18											568.138	540.000	28.138					
	Katugastota-Kundasale																		
	KR8											618.785	540.000	78.785					
KR8	-	K702	B	11,800	450	470	Atten	3,000	0.789	1.516	4.548				B	78.8	2	90.2	Exist Pipe ϕ200
	K702											614.236	500.000	114.236					
K702	-	K701	(B)	10,800	350	399	Atten	2,150	0.999	2.840	6.106								Exist Pipe ϕ250
	K701											608.131	510.000	98.131					
K701	-	K301	(B)	5,900	300	300	K	4,843	0.966	3.728	18.054								Exist Pipe ϕ300
	K301											590.076	538.000	52.076					
K301	-	K105	(B)	5,300	300	300	K	25	0.868	3.057	0.076								Exist Pipe ϕ300
	K105											590.000	522.000	68.000					
	K702											614.236	500.000	114.236					
K702	-	KT2	(B)	1,000	65	91	Atten	1,300	1.761	39.162	50.910								Exist Pipe ϕ75
	KT2											563.326	517.000	46.326					
	K701											608.131	510.000	98.131					
K701	-	KR7	(B)	4,900	123	146	Atten	200	3.370	75.118	15.024								Exist Pipe ϕ100
	KR7											593.107	534.000	59.107					
	K301											590.076	510.000	80.076					
K301	-	KR3	(B)	600	300	300	K	285	0.098	0.054	0.015								Exist Pipe ϕ300
	KR3											590.061	565.000	25.061					
	Kundasale																		
	BPT											623.000	623.000	0.000					
BPT	-	K102	G	13,000	400	400	K	3,940	1.197	3.960	15.604								Exist Pipe ϕ400
	K102											607.396	503.000	104.396					
K102	-	K103	(G)	11,000	400	400	K	4,340	1.013	2.907	12.618								Exist Pipe ϕ400
	K103											594.778	501.000	93.778					
K103	-	K104	(G)	11,000	350	350	K	1,500	1.323	5.571	8.356								Exist Pipe ϕ350
	K104											586.422	505.000	81.422					
K104	-	K105	(G)	11,000	250	360	Atten	735	1.249	4.836	3.554								Exist Pipe ϕ300
	K105											582.867	522.000	60.867					
K105	-	K501	(G)	14,000	350	399	Atten	1,500	1.295	4.590	6.885								Exist Pipe ϕ250
	K501											575.982	490.000	85.982					
K501	-	KR5	(G)	1,400	123	127	Atten	1,000	1.274	14.625	14.625								Exist Pipe ϕ50
	KR5											561.357	555.000	6.357					
	K102											607.396	503.000	104.396					
K102	-	K101	(G)	2,000	150	150	K	590	1.310	12.706	7.496								Exist Pipe ϕ150
	K101											599.900	519.000	80.900					
K101	-	KR1	(G)	2,000	123	146	Atten	550	1.376	14.315	7.873								Exist Pipe ϕ100
	KR1											592.027	587.000	5.027					
	K105											582.867	522.000	60.867					
K105	-	K401	(G)	2,400	97	167	Atten	800	1.274	10.680	8.544								Exist Pipe ϕ150
	K401											574.323	522.000	52.323					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

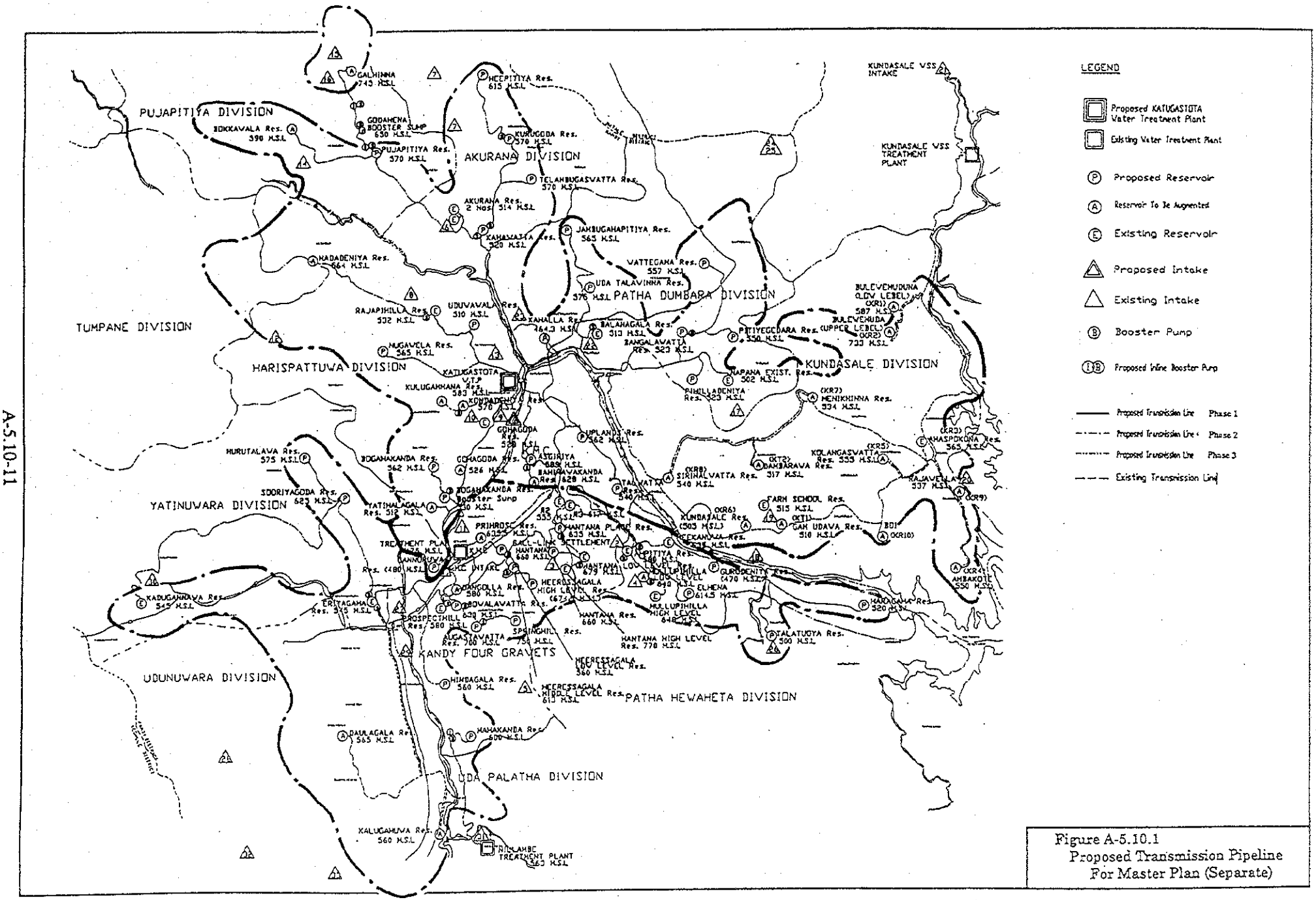
Year 2015

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
																			Exist Pipe φ150
K401	-	KR4	(G)	1,800	97	167	Atten	2,400	0.956	6.273	15.054								
	KR4											559.269	550.000	9.269					
												574.323	522.000	52.323					
	K401																		Exist Pipe φ50
K401	-	KR9	(G)	600	65	76	Atten	400	1.536	37.882	15.153								
	KR9											559.170	537.000	22.170					
												575.982	490.000	85.982					
	K501																		Exist Pipe φ250
K501	-	K502	(G)	12,600	250	250	K	150	2.971	36.871	5.531								
	K502											570.452	480.000	90.452					Exist Pipe φ250
K502	-	K503	(G)	4,800	250	250	K	150	1.132	6.184	0.928								
	K503											569.524	470.000	99.524					Exist Pipe φ250
K503	-	KT1	(G)	800	250	250	K	1,950	0.189	0.225	0.438								
	KT1											569.086	510.000	59.086					
												569.524	470.000	99.524					
	K503																		Exist Pipe φ200
K503	-	K601	(G)	3,900	200	200	K	500	1.437	10.767	5.384								
	K601											564.140	480.000	84.140					Exist Pipe φ150
K601	-	KR6	(G)	3,900	150	150	K	500	2.554	43.708	21.854								
	KR6											542.286	505.000	37.286					
	Gohagoda											551.364	438.000	113.364					
	PG														B	113.4	2	56.1	
PG	-	65'	B	5,100	300	300		2,050	0.835	2.847	5.836								
	65'											545.528	490.000	55.528					既設管無視 φ160×2条
65'	-	6501	(B)	4,000	300	300		1,800	0.655	1.816	3.269								
	6501											542.258	510.000	32.258					既設管無視 φ225
6501	-	6401	(B)	800	140	140		1,250	0.601	3.264	4.080								
	6401											538.178	455.000	83.178					既設管無視
6401	-	64S	(B)	200	79	79		780	0.472	4.075	3.178								
	64S											535.000	530.000	5.000					
												545.528	490.000	55.528					
	65'																		Exist Pipe φ200
65'	-	65G	(B)	1,100	200	200	K	200	0.405	1.036	0.207								
	65G											545.321	528.000	17.321					
												542.258	510.000	32.258					
	6501																		Exist Pipe φ200
6501	-	65	(B)	3,200	200	200	K	100	1.179	7.467	0.747								
	65											541.511	526.000	15.511					
												538.178	455.000	83.178					
	6401																		既設管無視 φ160
6401	-	64'	(B)	600	97	97		820	0.940	11.446	9.386								
	64'											528.793	460.000	68.793					
												512.000	512.000	0.000					
	64																		既設管無視 φ160,φ110
64	-	64'	G	500	97	97		750	0.783	8.169	6.127								
	64'											505.873	460.000	45.873					
												505.873	460.000	45.873					
	64'																		既設管無視 φ225
64'	-	64G	(B)	1,100	140	140		3,000	0.827	5.883	17.649								
	64G											488.225	480.000	8.225					

Appendix 5.10 Hydraulic Calculation for Transmission Pipeline (Separate)

Year 2015

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
	64S											567.540	530.000	37.540					
64S	-	64B	B	200	97	97	K	360	0.313	1.500	0.540				B	37.5	1	1.5	Exist Pipe ϕ110
	64B											567.000	562.000	5.000					
Sub Total																	30	1,339.8	
Grand Total																	65	2,215.5	



A-5.10-11

Figure A-5.10.1
Proposed Transmission Pipeline
For Master Plan (Separate)

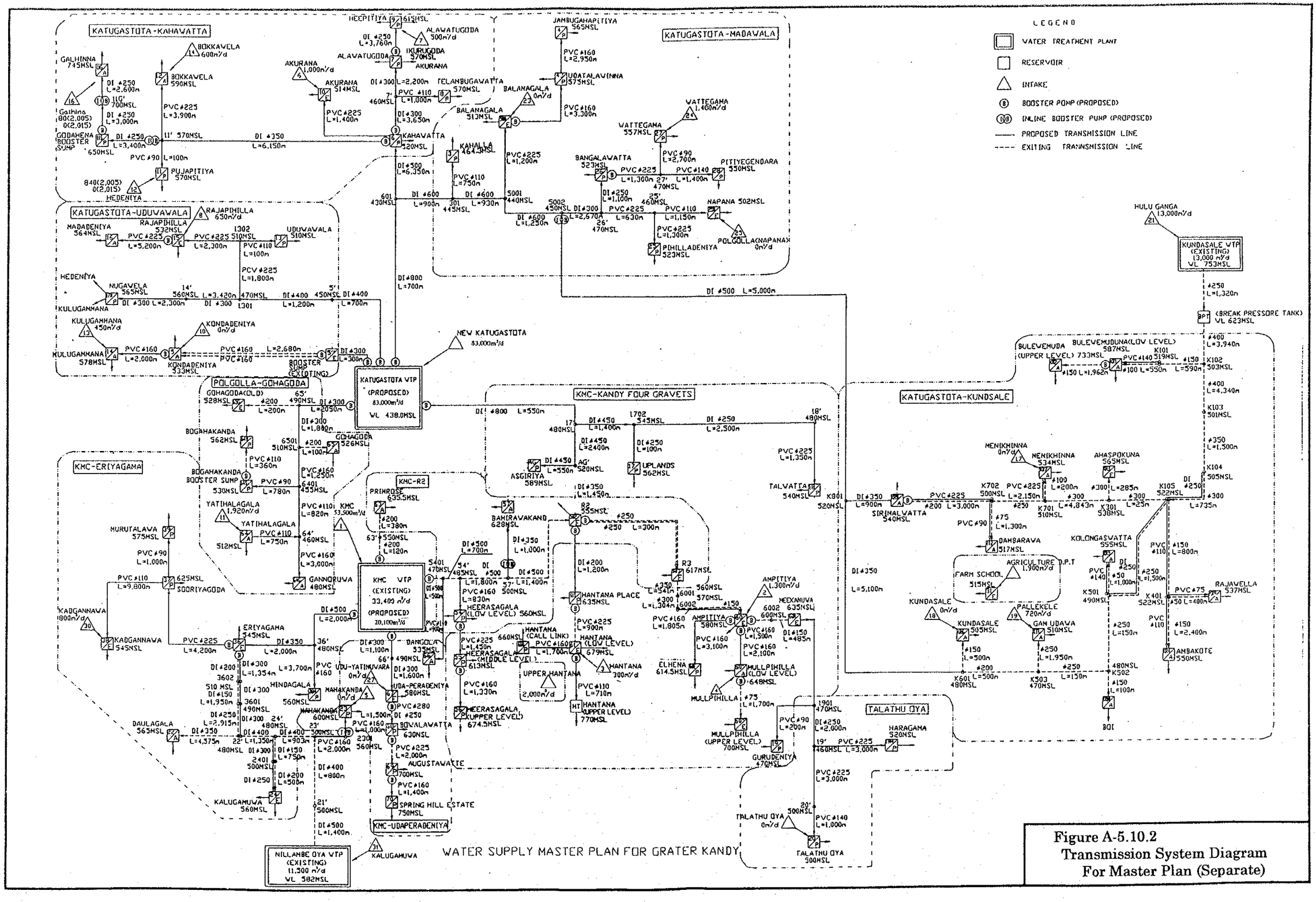


Figure A-5.10.2
Transmission System Diagram For Master Plan (Separate)

Appendix 5.11 Hydraulic Calculation for Transmission Pipeline (2005Year)

Node		B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node			Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
				2.005														
KMC-Primrose																		
KMC											641,659	475,000	166,659					
KMC -	63	B	1.700	200	200	K	500	0,626	2,317	1,159				B	166,7	2	27,5	Exist Pipe ϕ200
63											640,500	635,500	5,000					
KMC-KFG																		
KMC											582,752	475,000	107,752					
KMC -	5401	B	29.800	500	500	K	500	1,757	6,198	3,099				B	107,8	3	207,7	Exist Pipe ϕ500
5401											579,652	480,000	99,652					
5401 -	54'	(B)	28.600	500	500	K	700	1,686	5,745	4,021								Exist Pipe ϕ500
54'											575,631	485,000	90,631					
54' -	57'	(B)	26.200	500	500	K	1.800	1,544	4,885	8,792								Exist Pipe ϕ500
57'											566,839	500,000	66,839					
57' -	582	(B)	26.200	500	500	K	1.400	1,544	4,885	6,839								Exist Pipe ϕ500
582											560,000	555,000	5,000					
5401											579,652	480,000	99,652					
5401 -	66	(B)	1.300	123	123		900	1,266	15,053	13,547								
66											566,105	535,000	31,105					
54'											575,631	485,000	90,631					
54' -	54	(B)	2.400	198	198		830	0,902	4,606	3,823								
54											571,808	560,000	11,808					
54											621,529	560,000	61,529					
54 -	55	B	1.700	198	198		1.450	0,639	2,433	3,529				B	61,5	1	20,3	
55											618,000	613,000	5,000					
55											683,841	613,000	70,841					
55 -	56	B	800	140	140		1.330	0,601	3,264	4,341				B	70,8	1	11,0	
56											679,500	674,500	5,000					
KMC-R2,KFG																		
582											622,979	555,000	67,979					
582 -	583	B	6.800	325	325	K	300	0,946	3,264	0,979				B	68,0	2	44,9	Exist Pipe ϕ250×2
583											622,000	617,000	5,000					
582											640,690	555,000	85,690					
582 -	61S	B	800	200	200		1.200	0,295	0,575	0,690				B	85,7	1	13,3	
61S											640,000	635,000	5,000					
583											617,000	617,000	0,000					
583 -	6001	G	3.100	350	350	K	541	0,373	0,535	0,289								Exist Pipe ϕ350
6001											616,711	560,000	56,711					
6001 -	6002	(G)	3.100	300	300	K	1.304	0,508	1,133	1,478								Exist Pipe ϕ300
6002											615,233	570,000	45,233					
6002 -	60	(G)	3.100	140	189	Atten	1.805	1,280	9,297	16,781								Exist Pipe ϕ150
60											598,451	580,000	18,451					
60											629,618	580,000	49,618					
60 -	60E	B	800	140	140		3.100	0,601	3,264	10,118				B	49,6	1	7,7	
60E											619,500	614,500	5,000					

Appendix 5.11 Hydraulic Calculation for Transmission Pipeline (2005Year)

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2.005														
	60											657,025	580,000	77,025					
60	-	60'	B	600	140	140		2.100	0,451	1,917	4,025				B	77,0	1	9,0	
	60'											653,000	648,000	5,000					
	60'											713,922	648,000	65,922					
60'	-	60''	B	200	75	75	K	1.700	0,524	5,248	8,922				B	65,9	1	2,6	Exist Pipe φ75
	60''											705,000	700,000	5,000					
	60											644,708	580,000	64,708					
60	-	6002	B	700	140	140	K	1.500	0,526	2,549	3,824				B	64,7	1	8,8	Exist Pipe φ160
	6002											640,884	600,000	40,884					
6002	-	60M	(B)	700	150	150	K	485	0,458	1,822	0,884								Exist Pipe φ150
	60M											640,000	635,000	5,000					
Sub Total																	14	352,6	

Appendix 5.11 Hydraulic Calculation for Transmission Pipeline (2005Year)

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2.005														
Katugastota-Madawala																			
	PG											541,097	438,000	103,097					
PG	-	601	B	10.900	600	600		700	0,446	0,397	0,278				B	103,1	1	218,1	
	601											540,819	430,000	110,819					
601	-	301	(B)	4.200	600	600		900	0,172	0,068	0,061								
	301											540,758	445,000	95,758					
301	-	5001	(B)	3.100	600	600		930	0,127	0,039	0,036								
	5001											540,722	440,000	100,722					
5001	-	5002	(B)	1.900	198	198		1.250	0,714	2,989	3,737								
	5002											536,985	450,000	86,985					
5002	-	26'	(B)	1.900	198	198		2.670	0,714	2,989	7,982								
	26'											529,003	470,000	59,003					
26'	-	26	(B)	1.000	198	198		1.100	0,376	0,912	1,003								
	26											528,000	523,000	5,000					
	301											540,758	445,000	95,758					
301	-	3	(B)	1.100	97	97		750	1,723	35,128	26,346								
	3											514,412	464,300	50,112					
	5001											540,722	440,000	100,722					
5001	-	500	(B)	1.300	198	198		1.200	0,489	1,481	1,778								
	500											538,944	513,000	25,944					
	26'											529,003	470,000	59,003					
26'	-	25'	(B)	800	198	198		630	0,301	0,603	0,380								
	25'											528,623	460,000	68,623					
25'	-	25	(B)	800	198	198		1.300	0,301	0,603	0,784								
	25											527,838	523,000	4,838					
Katugastota-Kahawatta																			
	601											540,819	430,000	110,819					
601	-	6	(B)	6.700	500	500		6.350	0,395	0,392	2,489								
	6											538,330	520,000	18,330					
	6											520,000	520,000	0,000					
6	-	10	G	600	198	198		1.400	0,226	0,354	0,496								
	10											519,504	514,000	5,504					
	6											595,262	520,000	75,262					
6	-	7'	B	2.200	198	198		3.650	0,827	3,921	14,311				B	75,3	1	32,1	
	7'											580,951	460,000	120,951					
7'	-	7	(B)	1.800	198	198		2.200	0,677	2,705	5,951								
	7											575,000	570,000	5,000					
	7'											580,951	460,000	120,951					
7'	-	8	(B)	400	97	97		1.000	0,626	5,406	5,406								
	8											575,545	570,000	5,545					
Katugastota-Kondadeniya,Kulugamana																			
	PG											443,382	438,000	5,382					
PG	-	5''	B	3.300	300	300		300	0,540	1,272	0,382				B	5,4	1	3,4	
	5''											443,000	438,000	5,000					

Appendix 5.11 Hydraulic Calculation for Transmission Pipeline (2005Year)

Node			B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2.005														
	5''											571,341	438,000	133,341					
5''	-	5	B	3.300	182	182	K	2.680	1,465	12,441	33,341				B	133,3	1	85,4	Exist Pipe ⌀160×2
	5											538,000	533,000	5,000					
												591,117	533,000	58,117					
	5																		
5	-	14	B	900	140	140	K	2.000	0,677	4,058	8,117				B	58,1	1	10,1	Exist Pipe ⌀160
	14											583,000	578,000	5,000					
	Katugastota-KFG,R2											595,067	438,000	157,067					
	PG																		
PG	-	17'	B	18.300	700	700		550	0,550	0,489	0,269				B	157,1	2	278,9	
	17'											594,798	480,000	114,798					
17'	-	AG'	(B)	12.000	700	700		2.400	0,361	0,224	0,537								
	AG'											594,261	520,000	74,261					
AG'	-	AG	(B)	12.000	600	600		550	0,491	0,474	0,261								
	AG											594,000	589,000	5,000					
												634,156	589,000	45,156					
	AG														B	45,2	1	49,9	
AG	-	57	B	5.700	350	350		700	0,686	1,651	1,156	633,000	628,000	5,000					
	57																		
	17'											594,798	480,000	114,798					
17'	-	1702	(B)	6.300	400	400		2.500	0,580	1,037	2,592								
	1702											592,206	545,000	47,206					
	1702											592,206	545,000	47,206					
1702	-	17	(B)	6.300	198	198		100	2,368	27,458	2,746								
	17											589,460	562,000	27,460					
	Katugastota-Gohagoda											537,803	438,000	99,803					
	PG														B	99,8	2	35,8	
PG	-	65'	B	3.700	300	300		2.050	0,606	1,572	3,223								
	65'											534,580	490,000	44,580					
65'	-	6501	(B)	2.700	300	300		1.800	0,442	0,878	1,580								
	6501											533,000	510,000	23,000					
	65'											534,580	490,000	44,580					
65'	-	65G	(B)	900	200	200	K	200	0,332	0,714	0,143								
	65G											534,437	528,000	6,437					
	6501											533,000	490,000	43,000					
6501	-	65	(B)	2.700	200	200	K	100	0,995	5,453	0,545								
	65											532,455	528,000	4,455					
Sub Total																	9	495,8	
Grand Total																	23	848,4	

Appendix 5.11 Hydraulic Calculation for Transmission Pipeline (2005Year)

	Node		B/G	Flow Rate	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
	Node-Node			Q(m3/d)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding	(kw/set)	
					2.005												Stand-by		

Appendix 5.12 Hydraulic Calculation for Transmission Pipeline (2010Year)

Node			B/G	Flow Rate	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010														
	KMC-Primrose																			
	KMC												641.923	475.000	166.923					
KMC	-	63	B	1,900	0	200	200	K	500	0.700	2.847	1.423				B	166.9	2	30.8	Exist Pipe ϕ200
	63												640.500	635.500	5.000					
	KMC-Eliyagama																			
	KMC												566.353	475.000	91.353					
KMC	-	36'	B	9,000	0	500	500		2,000	0.531	0.677	1.353				B	91.4	3	53.2	
	36'												565.000	480.000	85.000					
	36'												565.000	480.000	85.000					
36'	-	36	(B)	9,000	0	350	350		2,000	1.083	3.843	7.687								Exist Pipe ϕ450
	36												557.313	545.000	12.313					
	36												592.942	545.000	47.942					
36	-	3602	B	6,200	0	300	336	Atten	1,354	0.811	2.363	3.199				B	47.9	2	28.8	Exist Pipe ϕ200
	3602												589.743	510.000	79.743					
3602	-	3601	(B)	6,200	0	300	318	Atten	1,950	0.906	3.097	6.038								Exist Pipe ϕ150
	3601												583.704	490.000	93.704					
3601	-	22'	(B)	6,200	0	300	360	Atten	2,915	0.704	1.674	4.880								Exist Pipe ϕ250
	22'												578.824	480.000	98.824					
22'	-	22	(B)	6,200	0	350	350	K	4,575	0.746	1.929	8.824								Exist Pipe ϕ350
	22												570.000	565.000	5.000					
	22'												578.824	480.000	98.824					
22'	-	24'	(B)	0	0	400	400	K	1,350	0.000	0.000	0.000								Exist Pipe ϕ400
	24'												578.824	480.000	98.824					
	KMC-KFG																			
	KMC												572.427	475.000	97.427					
KMC	-	5401	B	22,500	0	500	500	K	500	1.326	3.686	1.843				B	97.4	3	141.8	Exist Pipe ϕ500
	5401												570.584	480.000	90.584					
5401	-	54'	B	21,100	0	500	500	K	700	1.244	3.273	2.291								Exist Pipe ϕ500
	54'												568.293	485.000	83.293					
54'	-	57'	(B)	18,600	0	500	500	K	1,800	1.096	2.592	4.665								Exist Pipe ϕ500
	57'												563.628	500.000	63.628					
57'	-	582	(B)	18,600	0	500	500	K	1,400	1.096	2.592	3.628								Exist Pipe ϕ500
	582												560.000	555.000	5.000					
	5401												570.584	480.000	90.584					
5401	-	66	(B)	1,400	123	0	123		900	1.364	17.265	15.538								
	66												555.046	535.000	20.046					
	54'												568.293	485.000	83.293					
54'	-	54	(B)	2,600	198	0	198		830	0.977	5.341	4.433								
	54												563.861	560.000	3.861					
	54												621.922	560.000	61.922					
54	-	55	B	1,800	198	0	198		1,450	0.677	2.705	3.922				B	61.9	2	10.8	
	55												618.000	613.000	5.000					
	55												684.898	613.000	71.898					

Appendix 5.12 Hydraulic Calculation for Transmission Pipeline (2010Year)

Node			B/G	Flow Rate	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010										B	71.9	1	12.6	
55	-	56	B	900	140	0	140		1,330	0.677	4.058	5.398								
	56												679.500	674.500	5.000					
	KMC-R2,KFG																			
	582												623.203	555.000	68.203					
582	-	583	B	7,600	0	325	325	K	300	1.058	4.009	1.203				B	68.2	2	50.3	Exist Pipe φ250×2
	583												622.000	617.000	5.000					
	582												647.952	555.000	92.952					
582	-	61S	B	3,000	200	0	200		1,200	1.105	6.627	7.952				B	93.0	2	27.1	
	61S												640.000	635.000	5.000					
	61S												686.958	635.000	51.958					
61S	-	61	B	2,000	0	198	198	K	900	0.752	3.287	2.958				B	52.0	2	10.1	Exist Pipe φ225
	61												684.000	679.000	5.000					
	61												679.000	679.000	0.000					
61	-	61H	G	900	0	140	140		1,700	0.677	4.058	6.899								
	61H												672.101	660.000	12.101					
	61												777.882	679.000	98.882					
61	-	HT	B	900	0	140	140		710	0.677	4.058	2.882				B	98.9	1	17.3	
	HT												775.000	770.000	5.000					
	583												617.000	617.000	0.000					Exist Pipe φ350
583	-	6001	G	3,500	0	350	350	K	541	0.421	0.670	0.362								
	6001												616.638	560.000	56.638					Exist Pipe φ300
6001	-	6002	(G)	3,500	0	300	300	K	1,304	0.573	1.419	1.850								
	6002												614.788	570.000	44.788					Exist Pipe φ150
6002	-	60	(G)	3,500	140	0	189	Atten	1,805	1.445	11.637	21.005								
	60												593.782	580.000	13.782					
	60												632.081	580.000	52.081					
60	-	60E	B	900	140	0	140		3,100	0.677	4.058	12.581				B	52.1	1	9.1	
	60E												619.500	614.500	5.000					
	60												657.025	580.000	77.025					
60	-	60'	B	600	140	0	140		2,100	0.451	1.917	4.025				B	77.0	1	9.0	
	60'												653.000	648.000	5.000					
	60'												713.922	648.000	65.922					
60'	-	60''	B	200	0	75	75	K	1,700	0.524	5.248	8.922				B	65.9	1	2.6	Exist Pipe φ75
	60''												705.000	700.000	5.000					
	60												644.708	580.000	64.708					
60	-	6002	B	700	0	140	140	K	1,500	0.526	2.549	3.824				B	64.7	1	8.8	Exist Pipe φ160
	6002												640.884	600.000	40.884					Exist Pipe φ150
6002	-	60M	(B)	700	0	150	150	K	485	0.458	1.822	0.884								
	60M												640.000	635.000	5.000					

Appendix 5.12 Hydraulic Calculation for Transmission Pipeline (2010Year)

Node			B/G	Flow Rate	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010														
Sub Total																		32	412.1	

Appendix 5.12 Hydraulic Calculation for Transmission Pipeline (2010Year)

Node			B/G	Flow Rate	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010														
Katugastota-Madawala																				
	PG												560.774	438.000	122.774					
PG	-	601	B	25,900	600	0	600		700	1.060	1.697	1.188				B	122.8	2	308.5	
	601												559.587	430.000	129.587					
601	-	301	(B)	18,900	600	0	600		900	0.774	0.947	0.853								
	301												558.734	445.000	113.734					
301	-	5001	(B)	17,700	600	0	600		930	0.725	0.839	0.780								
	5001												557.954	440.000	117.954					
5001	-	5002	(B)	16,300	198	500	516		1,250	0.901	1.738	2.173								
	5002												555.781	450.000	105.781					
5002	-	26'	(B)	3,600	198	0	198		2,670	1.353	9.751	26.036								
	26'												529.745	470.000	59.745					
26'	-	26	(B)	2,700	198	198	258		1,100	0.599	1.587	1.745								
	26												528.000	523.000	5.000					
	301												558.734	445.000	113.734					
301	-	3	(B)	1,200	97	0	97		750	1.879	41.263	30.947								
	3												527.787	464.300	63.487					
	5001												557.954	440.000	117.954					
5001	-	500	(B)	1,400	198	0	198		1,200	0.526	1.699	2.039								
	500												555.915	513.000	42.915					
	26												580.830	523.000	57.830					
26	-	27'	B	1,600	0	198	198		1,300	0.601	2.175	2.828				B	57.8	2	9.0	
	27'												578.002	470.000	108.002					
27'	-	27	(B)	200	0	79	79		2,700	0.472	4.075	11.002								
	27												567.000	557.000	10.000					
	27'												578.002	470.000	108.002					
27'	-	28	(B)	1,400	0	123	123		1,400	1.364	17.265	24.170								
	28												553.832	550.000	3.832					
	26'												529.745	470.000	59.745					
26'	-	25'	(B)	1,100	198	0	198		630	0.413	1.088	0.685								
	25'												529.060	460.000	69.060					
25'	-	25	(B)	900	198	0	198		1,300	0.338	0.750	0.975								
	25												528.085	523.000	5.085					
Katugastota-Kahawatta																				
	601												559.587	430.000	129.587					
601	-	6	(B)	6,900	500	0	500		6,350	0.407	0.357	2.266								
	6												557.320	520.000	37.320					
	6												520.000	520.000	0.000					
6	-	10	G	600	198	0	198		1,400	0.226	0.354	0.496								
	10												519.504	514.000	5.504					
	6												596.488	520.000	76.488					
6	-	7'	B	2,300	198	0	198		3,650	0.865	4.257	15.538				B	76.5	1	34.1	
	7'												580.951	460.000	120.951					

Appendix 5.12 Hydraulic Calculation for Transmission Pipeline (2010Year)

Node			B/G	Flow Rate	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010														
7'	-	7	(B)	1,800	198	0	198		2,200	0.677	2.705	5.951								
	7												575.000	570.000	5.000					
													580.951	460.000	120.951					
	7'																			
7'	-	8	(B)	400	97	0	97		1,000	0.626	5.406	5.406								
	8												575.545	570.000	5.545					
	Katugastota-Uduwawala												582.189	438.000	144.189					
	PG															B	144.2	1	167.9	
PG	-	5'	B	6,000	0	400	400		700	0.553	0.947	0.663								
	5'												581.526	450.000	131.526					
5'	-	1301	(B)	6,000	0	400	400		1,200	0.553	0.947	1.137								
	1301												580.389	470.000	110.389					
1301	-	14'	(B)	4,000	0	300	300		3,420	0.655	1.816	6.212								
	14'												574.178	560.000	14.178					
14'	-	17N	(B)	4,000	0	300	300		2,300	0.655	1.816	4.178								
	17N												570.000	565.000	5.000					
													580.389	470.000	110.389					
	1301																			
1301	-	1302	(B)	2,100	0	198	198		1,800	0.789	3.598	6.476								
	1302												573.914	510.000	63.914					
1302	-	15	(B)	300	0	198	198		2,300	0.113	0.098	0.226								
	15												573.688	532.000	41.688					
													573.914	510.000	63.914					
	1302																			
1302	-	13	(B)	1,800	0	97	97		100	2.819	87.364	8.736								
	13												565.178	510.000	55.178					
	Katugastota-Kondadeniya,Kulugamana												443.329	438.000	5.329					
	PG															B	5.3	1	3.4	
PG	-	5''	B	3,300	300	0	300		300	0.540	1.097	0.329								
	5''												443.000	438.000	5.000					
													571.341	438.000	133.341					
	5''															B	133.3	1	85.4	Exist Pipe φ160×2
5''	-	5	B	3,300	0	182	182	K	2,680	1.465	12.441	33.341								
	5												538.000	533.000	5.000					
													592.864	533.000	59.864					
	5															B	59.9	1	11.6	Exist Pipe φ160
5	-	14	B	1,000	0	140	140	K	2,000	0.752	4.932	9.864								
	14												583.000	578.000	5.000					
	Katugastota-KFC,R2												596.705	438.000	158.705					
	PG															B	158.7	3	348.0	
PG	-	17'	B	33,900	700	0	700		550	1.020	1.318	0.725								
	17'												595.980	480.000	115.980					
17'	-	AG'	(B)	22,800	700	0	700		2,400	0.686	0.633	1.519								
	AG'												594.462	520.000	74.462					
AG'	-	AG	(B)	17,700	600	0	600		550	0.725	0.839	0.462								
	AG												594.000	589.000	5.000					
													594.462	520.000	74.462					
	AG'																			
AG'	-	582	(B)	5,000	0	300	300		1,450	0.819	2.745	3.980								
	582												590.482	555.000	35.482					

Appendix 5.12 Hydraulic Calculation for Transmission Pipeline (2010Year)

Node			B/G	Flow Rate	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010														
													634.199	589.000	45.199					
	AG															B	45.2	1	55.3	
AG	-	57	B	6,300	350	0	350		700	0.758	1.713	1.199								
	57												633.000	628.000	5.000					
													595.980	480.000	115.980					
	17'																			
17'	-	1702	(B)	11,100	400	0	400		2,500	1.022	2.550	6.374								
	1702												589.606	545.000	44.606					
1702	-	18'	(B)	900	0	198	198		1,500	0.338	0.750	1.125								
	18'												588.481	480.000	108.481					
18'	-	18	(B)	900	0	198	198		1,350	0.338	0.750	1.013								
	18												587.468	540.000	47.468					
	1702												589.606	545.000	44.606					
1702	-	17	(B)	10,200	198	198	258		100	2.263	18.552	1.855								
	17												587.751	562.000	25.751					
	Katugastota-Kundasale																			
	5002												554.442	450.000	104.442					
5002	-	K801	IB	12,700	0	500	500		5,000	0.749	1.279	6.397				IB	-1.3	1	-3.3	
	K801												548.044	520.000	28.044					
K801	-	KR8	(IB)	8,400	0	350	350		900	1.011	3.383	3.044								
	KR8												545.000	540.000	5.000					
	KR8												567.063	540.000	27.063					
KR8	-	K702	B	5,300	0	198	259	Atten	3,000	1.164	5.391	16.174				B	27.1	2	13.9	Exist Pipe ϕ200
	K702												550.889	500.000	50.889					
K702	-	K701	(B)	4,400	0	0	250	Atten	2,150	1.037	4.540	9.761								Exist Pipe ϕ250
	K701												541.128	510.000	31.128					
K701	-	KR7	(B)	4,400	0	198	210	Atten	200	1.472	10.638	2.128								Exist Pipe ϕ100
	KR7												539.000	534.000	5.000					
	K702												550.889	500.000	50.889					
K702	-	KT2	(B)	900	0	79	100	Atten	1,300	1.319	20.616	26.801								Exist Pipe ϕ75
	KT2												524.088	517.000	7.088					
	K801												548.044	520.000	28.044					
K801	-	K601	(IB)	4,200	0	350	350		5,100	0.505	0.938	4.786								
	K601												543.259	480.000	63.259					
K601	-	K503	(IB)	700	0	200	200	K	500	0.258	0.449	0.224								Exist Pipe ϕ200
	K503												543.034	470.000	73.034					
K503	-	K502	(IB)	0	0	250	250	K	150	0.000	0.000	0.000								Exist Pipe ϕ250
	K502												543.034	480.000	63.034					
	K601												543.259	480.000	63.259					
K601	-	KR6	(IB)	3,500	0	150	150	K	500	2.292	35.778	17.889								Exist Pipe ϕ150
	KR6												525.370	505.000	20.370					
	K503												543.034	470.000	73.034					
K503	-	KT1	(IB)	700	0	250	250	K	1,950	0.165	0.176	0.342								Exist Pipe ϕ250
	KT1												542.692	510.000	32.692					

Appendix 5.12 Hydraulic Calculation for Transmission Pipeline (2010Year)

Node			B/G	Flow Rate	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010														
Katugastota-Gohagoda																				
	PG												542.972	438.000	104.972					
PG	-	65'	B	4,200	300	0	300		2,050	0.688	1.714	3.514				B	105.0	2	42.8	
	65'												539.458	490.000	49.458					
65'	-	6501	(B)	3,200	300	0	300		1,800	0.524	1.037	1.866								既設管無視 φ160×2条
	6501												537.592	510.000	27.592					
6501	-	6401	(B)	500	0	140	140		1,250	0.376	1.368	1.710								既設管無視 φ225
	6401												535.882	455.000	80.882					
6401	-	64S	(B)	100	0	79	79		780	0.236	1.130	0.882								既設管無視
	64S												535.000	530.000	5.000					
	65'												539.458	490.000	49.458					
65'	-	65G	(B)	900	0	200	200	K	200	0.332	0.714	0.143								Exist Pipe φ200
	65G												539.315	528.000	11.315					
	6501												537.592	510.000	27.592					
6501	-	65	(B)	2,800	0	200	200	K	100	1.032	5.833	0.583								Exist Pipe φ200
	65												537.008	526.000	11.008					
	6401												535.882	455.000	80.882					
6401	-	64'	(B)	300	0	97	97		820	0.470	3.175	2.604								既設管無視 φ160
	64'												533.278	460.000	73.278					
	64												512.000	512.000	0.000					
64	-	64'	G	700	0	97	97		750	1.096	15.223	11.417								既設管無視 φ160, φ110
	64'												500.583	460.000	40.583					
	64'												500.583	460.000	40.583					
64'	-	64G	(B)	1,000	0	140	140		3,000	0.752	4.932	14.796								既設管無視 φ225
	64G												485.787	480.000	5.787					
	64S												567.150	530.000	37.150					
64S	-	64B	B	100	0	97	97	K	360	0.157	0.416	0.150				B	37.1	1	0.7	Exist Pipe φ110
	64B												567.000	562.000	5.000					
Sub Total																		32	768.8	
Grand Total																		64	1,160.8	

Appendix 5.13 Hydraulic Calculation for Transmission Pipeline (2015Year)

Node			B/G	Flow Rate	Dia.	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010	2,015														
KMC-Primrose																					
	KMC													642.065	475.000	167.065					
KMC	-	63	B	2,000	0	0	200	200	K	500	0.737	3.130	1.565				B	167.1	2	32.4	Exist Pipe φ200
	63													640.500	635.500	5.000					
KMC-Eliyagama																					
	KMC													582.555	475.000	107.555					
KMC	-	36'	B	13,700	0	500	0	500		2,000	0.808	1.269	2.539				B	107.6	3	95.3	
	36'													580.016	480.000	100.016					
36'	-	36H	(B)	900	0	0	140	140		3,700	0.677	4.058	15.016								
	36H													565.000	560.000	5.000					
	36'													580.016	480.000	100.016					
36'	-	36	(B)	12,800	0	350	0	350		2,000	1.540	6.359	12.718								Exist Pipe φ450
	36													567.298	545.000	22.298					
	36													597.373	545.000	52.373					
36	-	3602	B	7,600	0	300	0	336	Atten	1,354	0.994	2.969	4.021				B	52.4	2	38.6	Exist Pipe φ200
	3602													593.353	510.000	83.353					
3602	-	3601	(B)	7,600	0	300	0	318	Atten	1,950	1.110	3.892	7.589								Exist Pipe φ150
	3601													585.764	490.000	95.764					
3601	-	22'	(B)	7,600	0	300	0	360	Atten	2,915	0.863	2.104	6.134								Exist Pipe φ250
	22'													579.630	480.000	99.630					
22'	-	22	(B)	6,500	0	0	350	350	K	4,575	0.782	2.105	9.630								Exist Pipe φ350
	22													570.000	565.000	5.000					
	22'													579.630	480.000	99.630					
22'	-	24'	(B)	1,200	0	0	400	400	K	1,350	0.111	0.048	0.065								Exist Pipe φ400
	24'													579.565	480.000	99.565					
	36													645.110	545.000	100.110					
36	-	37	B	2,100	0	0	198	198		4,200	0.789	3.598	15.110				B	100.1	2	20.4	
	37													630.000	625.000	5.000					
	37													625.000	625.000	0.000					
37	-	39	G	700	0	0	79	79		1,000	1.653	41.366	41.366								
	39													583.634	575.000	8.634					
	37													625.000	625.000	0.000					
37	-	38	G	300	0	0	97	97		9,800	0.470	3.175	31.116								
	38													593.884	545.000	48.884					
Nillambe Oya																					
	NO													582.000	582.000	0.000					
NO	-	21'	G	9,000	0	0	500	500	K	1,400	0.531	0.677	0.947								Exist Pipe φ500
	21'													581.053	500.000	81.053					
21'	-	23'	G	9,000	0	0	400	400	K	800	0.829	2.006	1.605								Exist Pipe φ400
	23'													579.448	500.000	79.448					
23'	-	2301	(G)	1,000	0	0	140	140		2,000	0.752	4.932	9.864								
	2301													569.584	560.000	9.584					
	2301													609.932	560.000	49.932					

Appendix 5.13 Hydraulic Calculation for Transmission Pipeline (2015Year)

Node			B/G	Flow Rate	Dia.	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2.005	2.010	2.015										IB	40.3	1	7.8	
2301	-	23	IB	1,000	0	0	140	140		1,000	0.752	4.932	4.932								
	23													605.000	600.000	5.000					
														579.448	500.000	79.448					
	23'																				Exist Pipe φ400
23'	-	24'	(G)	8,000	0	0	400	400	K	903	0.737	1.613	1.457								
	24'													577.992	480.000	97.992					Exist Pipe φ150あり
24'	-	2401	(G)	9,100	0	0	300	318	Atten	750	1.330	6.298	4.723								
	2401													573.268	500.000	73.268					Exist Pipe φ200あり
2401	-	24	(G)	9,100	0	0	250	296	Atten	500	1.533	8.905	4.453								
	24													568.816	560.000	8.816					
	KMC-Udaperdeniya																				
														589.904	475.000	114.904					
	KMC																B	114.9	1	89.2	
KMC	-	66'	B	4,000	0	0	300	300		1,100	0.655	1.816	1.998								
	66'													587.906	490.000	97.906					
66'	-	67	(B)	4,000	0	0	300	300		1,600	0.655	1.816	2.906								
	67													585.000	580.000	5.000					
														635.801	580.000	55.801					
	67																B	55.8	1	32.5	Exist Pipe φ280, φ250
67	-	68	B	3,000	0	0	346	346	K	1,500	0.370	0.534	0.801								
	68													635.000	630.000	5.000					
														711.574	630.000	81.574					
	68																B	81.6	2	15.8	Exist Pipe φ225
68	-	69	B	2,000	0	0	198	198	K	2,000	0.752	3.287	6.574								
	69													705.000	700.000	5.000					
														761.905	700.000	61.905					
	69																B	61.9	1	12.0	
69	-	70	B	1,000	0	0	140	140		1,400	0.752	4.932	6.905								
	70													755.000	750.000	5.000					
	KMC-KFC																				
														568.983	475.000	93.983					
	KMC																B	94.0	3	83.9	Exist Pipe φ500
KMC	-	5401	B	13,800	0	0	500	500	K	500	0.813	1.492	0.746								
	5401													568.237	480.000	88.237					
5401	-	54'	B	12,300	0	0	500	500	K	700	0.725	1.206	0.844								Exist Pipe φ500
	54'													567.393	485.000	82.393					
54'	-	57'	(B)	9,500	0	0	500	500	K	1,800	0.560	0.748	1.346								Exist Pipe φ500
	57'													566.047	500.000	66.047					
57'	-	582	(B)	9,500	0	0	500	500	K	1,400	0.560	0.748	1.047								Exist Pipe φ500
	582													565.000	555.000	10.000					
	5401													568.237	480.000	88.237					
5401	-	66	(B)	1,500	123	0	0	123		900	1.461	19.615	17.653								
	66													550.584	535.000	15.584					
	54'													567.393	485.000	82.393					
54'	-	54	(B)	2,800	198	0	0	198		830	1.053	6.125	5.084								
	54													562.309	560.000	2.309					
	54													622.766	560.000	62.766					
54	-	55	B	2,000	198	0	0	198		1,450	0.752	3.287	4.766				B	62.8	2	12.2	
	55													618.000	613.000	5.000					

Appendix 5.13 Hydraulic Calculation for Transmission Pipeline (2015Year)

Node			B/G	Flow Rate	Dia.	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010	2,015														
														686.059	613.000	73.059					
	55																B	73.1	1	14.2	
55	-	56	B	1,000	140	0	0	140		1,330	0.752	4.932	6.559								
														679.500	674.500	5.000					
	56																				
	KMC-R2,KFG																				
	582													623.416	555.000	68.416					
																	B	68.4	2	55.1	Exist Pipe ϕ250×2
582	-	583	B	8,300	0	0	325	325	K	300	1.155	4.719	1.416								
														622.000	617.000	5.000					
	583																				
														648.961	555.000	93.961					
	582																				
																	B	94.0	2	29.2	
582	-	61S	B	3,200	200	0	0	200		1,200	1.179	7.467	8.961								
														640.000	635.000	5.000					
	61S																				
														687.529	635.000	52.529					
	61S																B	52.5	2	11.2	Exist Pipe ϕ225
61S	-	61	B	2,200	0	0	198	198	K	900	0.827	3.921	3.529								
														684.000	679.000	5.000					
	61																				
														679.000	679.000	0.000					
	61																				
61	-	61H	G	900	0	140	0	140		1,700	0.677	4.058	6.899								
														672.101	660.000	12.101					
	61H																				
														778.502	679.000	99.502					
	61																B	99.5	1	19.3	
61	-	HT	B	1,000	0	140	0	140		710	0.752	4.932	3.502								
														775.000	770.000	5.000					
	HT																				
														617.000	617.000	0.000					
	583																				Exist Pipe ϕ350
583	-	6001	G	3,900	0	0	350	350	K	541	0.469	0.818	0.443								
														616.557	560.000	56.557					
	6001																				Exist Pipe ϕ300
6001	-	6002	(G)	3,900	0	0	300	300	K	1,304	0.639	1.733	2.260								
														614.297	570.000	44.297					
	6002																				Exist Pipe ϕ150
6002	-	60	(G)	3,900	140	0	0	189	Atten	1,805	1.611	14.217	25.661								
														588.636	580.000	8.636					
	60																				
														634.789	580.000	54.789					
	60																B	54.8	1	10.6	
60	-	60E	B	1,000	140	0	0	140		3,100	0.752	4.932	15.289								
														619.500	614.500	5.000					
	60E																				
														658.354	580.000	78.354					
	60																B	78.4	1	10.6	
60	-	60'	B	700	140	0	0	140		2,100	0.526	2.549	5.354								
														653.000	648.000	5.000					
	60'																				
														713.922	648.000	65.922					
	60'																B	65.9	1	2.6	Exist Pipe ϕ75
60'	-	60''	B	200	0	0	75	75	K	1,700	0.524	5.248	8.922								
														705.000	700.000	5.000					
	60''																				
														646.027	580.000	66.027					
	60																B	66.0	1	10.2	Exist Pipe ϕ160
60	-	6002	B	800	0	0	140	140	K	1,500	0.601	3.264	4.896								
														641.131	600.000	41.131					
	6002																				Exist Pipe ϕ150
6002	-	60M	(B)	800	0	0	150	150	K	485	0.524	2.332	1.131								
														640.000	635.000	5.000					
	60M																				

Appendix 5.13 Hydraulic Calculation for Transmission Pipeline (2015Year)

Node			B/G	Flow Rate	Dia.	Dia.	Dia.	Mixed Dia	Exist.	Length	Velocity	Hyd.Grd	Loss	Dynamic Pressure	GL	Dynamic Pressure	Pump	Head	set	Output	Remark
Node-Node				Q(m3/d)	D(mm)	D(mm)	D(mm)	Dm(mm)		L(m)	v(m/sec)	I(‰)	h(m)	Hd(MSL)		He(m)	Type	H(m)	Excluding Stand-by	(kw/set)	
					2,005	2,010	2,015														
																			32	603.2	
Sub Total																					