

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration	Rainfall	Storm Run-off			Sewage Flow			Other Sewage		Design Sewer						Remarks								
		Area	Total	Length	Total			Rainfall	Per ha	mm/hr	Per ha	Converted Area	Rainfall	Pop. Density	Per Person	Total	Sewage Flow	Per Sewer	Total	Diameter	Slope		Velocity	Flow	Elevation	Invert Level	Grade			
4156	4157	0.06	0.13	15	60						561.06	34	4562	0.08			0.0084	200	250	0.683	0.0219	545	3039	220						
4094	4096	0.11	0.11	30	30						561.06	62	62	0.00			0.0001	200	250	0.683	0.0219	584	4581	100						
4095		0.10	0.10	25	25						561.06	57	57	0.00			0.0001	200	250	0.683	0.0219	584	4581	100						
4096	4098	0.11	0.32	30	60						561.06	62	180	0.00			0.0003	200	250	0.683	0.0219	584	4581	100						
4097		0.11	0.11	30	30						561.06	62	62	0.00			0.0001	200	250	0.683	0.0219	584	4581	100						
4098	4100	0.17	0.60	45	105						561.06	95	337	0.00			0.0006	200	250	0.683	0.0219	584	4481	115						
4099		0.13	0.13	35	35						561.06	73	73	0.00			0.0001	200	250	0.683	0.0219	584	4544	109						
4100	4104	0.11	0.34	30	135						561.06	62	472	0.00			0.0009	200	250	0.683	0.0219	584	4369	126						
4102	4103	0.11	0.31	30	30						561.06	62	62	0.00			0.0001	200	250	0.683	0.0219	619	4381	100						
4101		0.07	0.07	20	20						561.06	40	40	0.00			0.0001	200	250	0.683	0.0219	619	4331	105						

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No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time		Rainfall			Storm Run-off			Sewage Flow			Other Sewage			Design Sewer						Remarks		
		Area	Total	ha	Length	Total	m	min	Per ha	Rainfall	Co Eff	Converted Area		Rainfall	Density	Population		Sewage Flow	Sewer	Total	m ² /s	Slope	Velocity	Flow	Elevation		Level	F.F. Level
												Area	Total			ha	ha											
4103		018	036	50	80									561.06	101	202	000			00004	200	250	0683	00219	619	4756	123	
4104		018	138	50	185									561.06	101	775	001			00014	200	250	0683	00219	584	4234	134	
4105		011	011	30	30									561.06	62	62	000			00001	200	250	0683	00219	584	4531	130	
4106		024	173	65	250									561.06	135	971	001			00018	200	250	0683	00219	583	4139	145	
4107		013	013	35	35									561.06	73	73	000			00001	200	250	0683	00219	583	4521	130	
4108		013	199	35	285									561.06	73	1117	002			00021	200	250	0683	00219	583	4007	131	
4089		024	024	65	65									561.06	135	135	000			00003	200	250	0683	00219	619	4881	100	
4090		018	018	50	50									561.06	101	101	000			00002	200	250	0683	00219	619	4881	100	
4091		037	079	100	165									561.06	208	444	000			00003	200	250	0683	00219	619	4319	116	
4092		028	028	75	75									561.06	158	158	000			00003	200	250	0683	00219	619	4793	119	
4093		044	151	120	285									561.06	247	848	001			00016	200	250	0683	00219	619	4569	141	

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		Area	Total	Length	Total		Rainfall	Rainfall per ha	Rain-off Coeff.	Converted Area	Total	Rainfall	Pop Density	Population per Sewer	Total	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Per Sewer	Total	Diameter	Slope	Velocity		Flow	Elevation	Inlet	Outlet
		ha	ha	m	m	min	m ³ /s-ha	m ³ /s-ha	ha	ha	m ³ /s	P/ha	Per Person	m ³ /s	m ³ /s	m ³ /s	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	M		
4109		007	007	20	20						561.06	40	40	000	00001	000	00001	000	00001	200	250	0.683	0.0219	583	4521	100	583	4521	100
4110	4112	011	368	30	315						561.06	62	2065	003	00038	000	00038	000	00038	200	250	0.683	0.0219	583	3920	170	583	3845	178
4111		017	017	45	45						561.06	96	96	000	00002	000	00002	000	00002	200	250	0.683	0.0219	583	4521	100	583	4509	111
4112	4114	014	399	40	355						561.06	73	2239	004	00041	000	00041	000	00041	200	250	0.683	0.0219	583	3845	178	583	3745	188
4113		010	010	25	25						561.06	57	57	000	00001	000	00001	000	00001	200	250	0.683	0.0219	583	4521	100	583	4539	106
4114	4115	039	448	105	460						561.06	219	2514	004	00047	000	00047	000	00047	200	250	0.683	0.0219	583	3745	188	583	3484	214
4115		052	052	140	140						561.06	292	292	000	00005	000	00005	000	00005	200	250	0.683	0.0219	583	4521	100	583	4271	135
4116	4113	014	514	40	500						561.06	78	2884	005	00053	000	00053	000	00053	200	250	0.683	0.0219	583	3484	214	583	3384	224
4117		017	017	45	45						561.06	96	96	000	00002	000	00002	000	00002	200	250	0.683	0.0219	583	4521	100	583	4509	111
4118		007	538	20	520						561.06	39	3019	005	00056	000	00056	000	00056	200	250	0.683	0.0219	583	3384	224	545	3334	191
4157	4159	014	1365	40	600						561.06	79	7659	014	00142	000	00142	000	00142	200	250	0.683	0.0219	545	3002	224	545	2902	234

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No of Sewers	No of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow			Other Sewage		Design Sewer						Remarks		
		Area	Total	Length	Total		Rainfall	Rain-off Coeff	Converted Area	Rainfall	Pop Density	Pop per Sewer	Total	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Diameter	Slope	Velocity	Flow		Elevation	Inlet Level
		ha	ha	m	m	min	m ³ /s/ha	ha	m ³ /s	P/ha	Person	m ³ /s	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	M	M
4158		0.22	0.22	60	60				561.06	124	124	0.00			0.0002	200	250	0.683	0.0219	545	4241	100		
4159	319	0.14	1.401	35	635				561.06	79	7861	0.14			0.0146	200	250	0.683	0.0219	545	2902	234		
1038 B	319	57500	57500	0	0				277.63159	68815963	0.2				0.2956	900	0.01	0.117	0.0744	612	4193	100	From Gulshan PS	
1038 A		99300	99300	0	0				277.63277	3327735	0.5				0.5136	900	0.01	0.117	0.0744	612	4193	100	From Gulshan PS	
319	320	5426	40891	340	4720				237.60128	92968020	1.79				1.7926	1500	0.90	1.200	21.207	641	-0.471	523		
4176	4177	0.16	0.16	40	40				561.06	90	90	0.00			0.0002	200	250	0.683	0.0219	580	4591	100		
4175		0.06	0.06	15	15				561.06	34	34	0.00			0.0001	200	250	0.683	0.0219	580	4591	100		
4177	4179	0.04	0.26	10	50				561.06	22	146	0.00			0.0003	200	250	0.683	0.0219	580	4491	110		
4178		0.08	0.08	20	20				561.06	45	45	0.00			0.0001	200	250	0.683	0.0219	580	4541	105		
4179	4181	0.51	0.85	130	180				561.06	286	477	0.00			0.0009	200	250	0.683	0.0219	580	4466	113		

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		Area	Total	Length	Total		Rainfall per ha	Rain-off Coeff.	Converted Area	Rainfall	Pop Density	Per Sewer	Per Person	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Diameter	Slope	Velocity	Flow	Elevation	
		ha	ha	m	m	min	m ² /s/ha	ha	ha	m/s	P/ha	Person	m ² /s	m ² /s	m ² /s	mm	%	m/s	m ³ /s	M	M	M	
4180		0.16	0.16	40	40	40					561.06	90	90	0.000	0.0002	200	250	0.683	0.0219	580	4591.100	4491.110	
4181	4180	0.20	1.21	50	230						561.06	112	679	0.001	0.0013	200	250	0.683	0.0219	580	4542.145	4017.157	
4182		0.12	0.12	30	30	30					561.06	68	68	0.000	0.0001	200	250	0.683	0.0219	580	4591.100	4516.198	
4183	4182	0.26	1.59	65	295						561.06	146	893	0.001	0.0017	200	250	0.683	0.0219	580	4017.157	3855.174	
4184		0.16	0.16	40	40	40					561.06	90	90	0.000	0.0002	200	250	0.683	0.0219	580	4591.100	4491.110	
4185	4184	0.14	1.39	35	330						561.06	79	1061	0.002	0.0020	200	250	0.683	0.0219	580	3855.174	3768.182	
4161	4162	0.24	0.24	60	60	60					561.06	135	135	0.000	0.0003	200	250	0.683	0.0219	580	4591.100	4441.115	
4160		0.06	0.06	15	15	15					561.06	34	34	0.000	0.0001	200	250	0.683	0.0219	580	4591.100	4554.104	
4162	4164	0.04	0.34	10	70	70					561.06	22	191	0.000	0.0004	200	250	0.683	0.0219	580	4441.115	4416.118	
4163		0.16	0.16	40	40	40					561.06	90	90	0.000	0.0002	200	250	0.683	0.0219	580	4591.100	4491.110	

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		Area	Total	Length	Total		Rainfall	Rain-off Coeff.	Converted Area	Rainfall	Pop. Density	Pop. per Sewer	Per Person	Total	Per Sewer	Total	Drainage	Slope	Velocity	Flow	Elevation		Brick Level
		ha	ha	m	m	min	m ³ /s-ha	ha	ha	m ³ /s	P/ha	m ³ /s	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	m	
4164	4166	0.04	0.54	10	80					561.06	22	303.000			0.0006	200	250	0.683	0.0219	580	4416	118	
4165		0.20	0.20	50	50					561.06	113	113.000			0.0002	200	250	0.683	0.0219	580	4531	130	
4166	4168	0.16	0.90	40	120					561.06	88	505.000			0.0009	200	250	0.683	0.0219	580	4391	120	
4167		0.18	0.18	45	45					561.06	101	101.000			0.0002	200	250	0.683	0.0219	580	4531	130	
4168	4170	0.04	1.12	10	130					561.08	23	629.001			0.0012	200	250	0.683	0.0219	580	4266	133	
4169		0.28	0.28	70	70					561.06	158	158.000			0.0003	200	250	0.683	0.0219	580	4417	117	
4170	4173	0.28	1.68	70	200					561.06	157	943.001			0.0017	200	250	0.683	0.0219	580	4266	133	
4171	4173	0.16	0.16	40	40					561.06	90	90.000			0.0002	200	250	0.683	0.0219	580	4531	130	
4172		0.14	0.14	35	35					561.06	79	79.000			0.0001	200	250	0.683	0.0219	580	4544	135	
4173	4186	0.32	2.30	80	280					561.06	180	1291.002			0.0024	200	250	0.683	0.0219	580	4092	150	

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		Area	Total	Length	Total		Rainfall	Rain-off	Converted Area	Rainfall	Pop. Density	Per Sewer	Per Person	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Diameter	Slope	Velocity	Flow		Elevation	Inlet
		ha	ha	m	m	min	m ² /s·ha	mm	ha	ha	m/s	P/ha	m ² /s	m ² /s	m ² /s	m ² /s	mm	%	m/s	m ³ /s	M	M	M	m
4174		0.83	0.83	160	160							561.06	354	354	0.0007	0.0007	200	250	0.583	0.0219	550	4291	100	
4186	4188	0.16	4.98	40	370							561.06	90	2795	0.0052	0.0052	200	250	0.583	0.0219	580	3768	182	
4187		0.30	0.30	75	75							561.06	169	169	0.0003	0.0003	200	250	0.583	0.0219	548	4271	100	
4188	4190	0.20	5.48	50	420							561.06	112	3075	0.0057	0.0057	200	250	0.583	0.0219	556	3658	168	
4189		0.16	0.16	40	40							561.06	90	90	0.0002	0.0002	200	250	0.583	0.0219	580	4591	100	
4190	4194	0.08	5.72	20	440							561.06	45	3210	0.0059	0.0059	200	250	0.583	0.0219	580	3543	205	
4191	4193	0.24	0.24	60	60							561.06	135	135	0.0003	0.0003	200	250	0.583	0.0219	580	4441	115	
4192		0.18	0.18	45	45							561.06	101	101	0.0002	0.0002	200	250	0.583	0.0219	520	4591	100	
4193		0.20	0.62	50	110							561.06	112	348	0.0006	0.0006	200	250	0.583	0.0219	580	4441	115	
4194	4196	0.30	6.64	75	515							561.06	168	3726	0.0069	0.0069	200	250	0.583	0.0219	580	3493	210	
4195		0.47	0.47	120	120							561.06	264	264	0.0005	0.0005	200	250	0.583	0.0219	580	4591	100	

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		Area	Total	Length	Total		Rainfall	Rainfall Coeff	Converted Area	Rainfall	Pop Density	Population per Sewer	Per Person	Sewage Flow	Total	Per Sewer	Total	Diameter	Slope	Velocity	Flow		Elevation	Invert Level
		ha	ha	m	m	min	m³/s/ha	ha	ha	m³/s	P/ha	Person	m³/s	m³/s	m³/s	mm	%	m/s	m³/s	m	M	M	m	
4196	4198	0.04	7.15	10	525						561.06	22	4012.007	0.0074	200	250	0.683	0.0219	580	3305.229	555	3280.206		
4197		0.22	0.22	55	55						561.06	124	124.000	0.0002	200	250	0.683	0.0219	580	4535.106	555	4341.100		
4198	4200	0.12	7.49	30	555						561.06	67	4203.007	0.0078	200	250	0.683	0.0219	555	3280.206	552	3205.211		
4199		0.81	0.81	205	205						561.06	455	455.000	0.0008	200	250	0.683	0.0219	550	4291.100	552	3781.153		
4200	4208	0.08	8.38	20	575						561.06	45	4702.008	0.0087	200	250	0.683	0.0219	552	3205.211	555	3155.219		
4201	4203	0.32	0.32	80	80						561.06	180	180.000	0.0003	200	250	0.683	0.0219	555	4341.100	555	4141.120		
4202		0.08	0.08	20	20						561.06	45	45.000	0.0001	200	250	0.683	0.0219	555	4341.100	555	4291.105		
4203	4205	0.12	0.52	30	110						561.06	67	292.000	0.0005	200	250	0.683	0.0219	555	4341.120	555	4066.128		
4204		0.10	0.10	25	25						561.06	57	57.000	0.0001	200	250	0.683	0.0219	555	4341.100	555	4279.196		
4205	4207	0.20	0.82	50	160						561.06	113	461.000	0.0009	200	250	0.683	0.0219	555	4066.128	555	3941.140		

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		Area	Total	ha	ha		Length	Total	ha	ha	Rainfall	Rainfall	Pop. Density	Population per Sewer	Per Person	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Diameter	Slope		Velocity	Flow	Elevation	Level	Ord. of B
4206		0.12	0.12	30	30						561.06	68	68	0.0001			0.0001	200	250	0.683	0.0219	555	4341	100	555	4341	100
4207		0.24	1.18	60	220						561.06	135	663	0.0012			0.0012	200	250	0.683	0.0219	555	3791	155	555	3791	155
4208	4216	0.08	0.94	20	595						561.06	45	5409	0.0100			0.0100	200	250	0.683	0.0219	555	3105	224	555	3105	224
4209	4211	0.16	0.16	40	40						561.06	90	90	0.0002			0.0002	200	250	0.683	0.0219	555	4341	100	555	4341	100
4210		0.06	0.06	15	15						561.06	34	34	0.0001			0.0001	200	250	0.683	0.0219	555	4304	104	555	4304	104
4211	4213	0.16	0.38	40	80						561.06	90	214	0.0004			0.0004	200	250	0.683	0.0219	555	4241	110	555	4241	110
4212		0.12	0.12	30	30						561.06	68	68	0.0001			0.0001	200	250	0.683	0.0219	555	4341	100	555	4341	100
4213	4215	0.12	0.62	30	110						561.06	67	348	0.0006			0.0006	200	250	0.683	0.0219	555	4066	128	555	4066	128
4214		0.16	0.16	40	40						561.06	90	90	0.0002			0.0002	200	250	0.683	0.0219	555	4241	110	555	4241	110
4215		0.47	1.25	120	230						561.06	264	702	0.0013			0.0013	200	250	0.683	0.0219	555	3766	158	555	3766	158
4216	4218	0.24	1.13	60	655						561.06	135	6245	0.0116			0.0116	200	250	0.683	0.0219	555	3105	224	555	3105	224

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		Area	Total	Length	Total	Time	Concentration	Rainfall	Rainfall	Per ha	Rainfall	Converted Area	Rainfall	Pop Density	Population	Sewage Flow	Per Sewer	Per Person	Total	Total Sewage Flow	Parameter	Slope	Velocity		Flow	Elevation	Layer	Man S						
		ha	ha	m	m	min		m ³ /s·ha	Per ha	ha	ha	m ³ /s	P/ha	Per Sewer	Person	m ³ /s	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M								
4217		0.20	0.20	50	50				561.06	113	113	0.00					0.0002			200	250	0.683	0.0219	555	4241	100								
4218		0.15	1.148	50	705				561.06	84	6441	0.11					0.0119			200	250	0.683	0.0219	555	2955	259								
320	321	4435	414474	250	5000				233.6910318984793	82							18237			1500	0.90	1200	21207	621	-0771	548								
4219	4221	0.40	0.40	105	105				561.06	225	225	0.00					0.0004			200	250	0.683	0.0219	479	3581	100								
4220		0.35	0.35	90	90				561.06	197	197	0.00					0.0004			200	250	0.683	0.0219	479	3337	122								
4221	4231	0.50	1.25	130	235				561.06	281	702	0.01					0.0013			200	250	0.683	0.0219	479	3320	126								
4222	4224	0.33	0.33	85	85				561.06	186	186	0.00					0.0003			200	250	0.683	0.0219	479	3581	100								
4223		0.17	0.17	45	45				561.06	96	96	0.00					0.0002			200	250	0.683	0.0219	479	3469	111								
4224	4228	0.19	0.69	50	135				561.06	107	388	0.00					0.0007			200	250	0.683	0.0219	479	3359	121								
4226	4227	0.29	0.29	75	75				561.06	163	163	0.00					0.0003			200	250	0.683	0.0219	531	4201	100								

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow			Other Sewage		Design Sewer						Remarks								
		Area	Total	ha	m		m	Rainfall pt/ha	Rain-off Coeff	Converted Area		Rainfall m ² /s	Pop Density	Population		Sewage Flow	Pt Sewer	Total	Sewage Flow m ³ /s	Diameter	Slope		Velocity	Flow	Elevation	Invert	Earth Cvd			
										Area	Total			per Sewer	Total													Per Person	Total	m/s
4225		014	014	35	35						561.06	79	79	000			00001	200	250	0583	00219	531	4101	100						
4227		023	026	60	135						561.06	129	371	000			00007	200	250	0583	00219	531	3913	119						
4228	4230	011	146	30	165						561.06	62	820	001			00015	200	250	0583	00219	531	3244	135						
4229		042	042	110	110						561.06	236	236	000			00004	200	250	0583	00219	531	4101	100						
4230		015	203	40	205						561.06	84	1139	002			00021	200	250	0583	00219	531	3169	193						
4231	4233	025	353	65	300						561.06	140	1981	003			00037	200	250	0583	00219	550	2334	246						
4232		015	015	40	40						561.06	85	85	000			00002	200	250	0583	00219	550	4291	100						
4233	4237	023	391	60	360						561.06	129	2194	004			00041	200	250	0583	00219	550	2834	246						
4235	4236	035	035	90	90						561.06	197	197	000			00004	200	250	0583	00219	550	4291	100						
4234		023	023	50	60						561.06	130	130	000			00002	200	250	0583	00219	550	4291	100						
4236		017	075	45	135						561.06	95	421	000			00008	200	250	0583	00219	550	4087	122						
4237	4241	026	492	70	430						561.06	146	2761	005			00051	200	250	0583	00219	550	2834	246						

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time		Storm Run-off				Sewage Flow				Other Sewage		Design Sewer						Remarks											
		Area	Total	Length	Total	min	Rainfall	Per ha	Rain-off	Coeff	Converted Area		Rainfall	Density	Population		Per Person	m ³ /s	m ³ /s	m ³ /s	Diameter	Slope	Velocity		Flow	Elevation	Level	Cover							
											Area	Total			per Sewer	Total													% Sewage Flow	Total	Total				
4238	4240	0.26	0.26	70	70								561.06	146	146	0.00	0.00003			200	250	0.688	0.0219	550	4291	100									
4239		0.08	0.08	20	20								561.06	45	45	0.00	0.00001			200	250	0.688	0.0219	550	4291	100									
4240		0.11	0.45	30	100								561.06	62	253	0.00	0.00005			200	250	0.688	0.0219	550	4117	117									
4241	4247	0.06	0.43	15	445								561.06	34	3047	0.05	0.00056			200	250	0.688	0.0219	550	2510	278									
4242	4245	0.29	0.29	75	75								561.06	163	163	0.00	0.00003			200	250	0.688	0.0219	550	4291	100									
4243	4245	0.11	0.11	30	30								561.06	62	62	0.00	0.00001			200	250	0.688	0.0219	550	4291	100									
4244		0.04	0.04	10	10								561.06	23	23	0.00	0.00001			200	250	0.688	0.0219	550	4291	100									
4245		0.08	0.23	20	50								561.06	45	130	0.00	0.00002			200	250	0.688	0.0219	550	4216	108									
4246		0.33	0.35	85	160								561.06	185	477	0.00	0.00009			200	250	0.688	0.0219	550	4103	119									
4247	4249	0.15	0.43	40	485								561.06	84	3508	0.06	0.00067			200	250	0.688	0.0219	550	2473	282									

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sews	No. of Sews Downstream	Drainage Area		Length	Concentration Time	Storm Run-off				Sewage Flow			Other Sewage		Design Sewer						Remarks		
		Area	Total			Rainfall Per ha	Rain-off Coeff	Converted Area	Rainfall	Density P/ha	Popula- tion per Sewer	Total	Per Person	% Flow	Ret	Total	Diameter	Slope	Velocity	Flow		Elevation	Invert Level
		ha	ha	m	min	m ³ /s/ha		ha	ha	m ² /s	P/ha		m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	m	
4248		0.14	0.14	35	35						561.06	79	79	0.00	0.0001	200	250	0.583	0.0219	550	4291.100	4291.100	
4249	4251	0.10	0.67	25	510						561.06	56	3748	0.06	0.0069	200	250	0.583	0.0219	550	2373.292	2311.298	
4250		0.08	0.08	20	20						561.06	45	45	0.00	0.0001	200	250	0.583	0.0219	550	4291.100	4241.105	
4251	4255	0.11	0.86	30	540						561.06	61	3849	0.07	0.0071	200	250	0.583	0.0219	550	2311.298	2236.306	
4252	4254	0.05	0.65	170	170						561.06	365	365	0.00	0.0007	200	250	0.583	0.0219	550	13201.100	3477.181	
4253		0.11	0.11	30	30						561.06	62	62	0.00	0.0001	200	250	0.583	0.0219	550	4291.100	4216.108	
4254		0.04	0.80	10	180						561.06	22	449	0.00	0.0008	200	250	0.583	0.0219	550	8477.181	3452.184	
4255	4259	0.15	0.81	40	580						561.06	84	4382	0.08	0.0081	200	250	0.583	0.0219	550	2236.306	2136.316	
4256	4258	0.19	0.19	50	50						561.06	107	107	0.00	0.0002	200	250	0.583	0.0219	550	4291.100	4166.113	
4257		0.11	0.11	30	30						561.06	62	62	0.00	0.0001	200	250	0.583	0.0219	550	4291.100	4216.108	
4258		0.08	0.38	20	70						561.06	45	214	0.00	0.0004	200	250	0.583	0.0219	550	4166.113	4116.113	

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow			Other Sewage		Design Sewer							Remarks						
		Area	Total	ha	ha		Length	Total	ha	ha	Converted Area	Rainfall	Pop Density	Population per Sewer	Per Person	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Diameter	Slope	Velocity		Flow	Elevation	Level	End		
		ha	ha	m	m	min	Rainfall	Per ha	Rainfall	Co. Eff.	Area	Total	ha	ha	m ² /s	P/ha	Per Person	Per Person	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	m	
4259	4261	0.10	829	25	605										561.06	56	4652	0.08	0.0086	200	250	0.883	0.0219	550	2074	2074	2074	322	
4260		0.23	0.23	60	60										561.06	130	130	0.00	0.0002	200	250	0.883	0.0219	550	4291	4291	4291	100	
4261	4265	0.08	860	20	625										561.06	45	4826	0.08	0.0089	200	250	0.883	0.0219	550	2074	2074	2074	327	
4262	4264	0.19	0.19	50	50										561.06	107	107	0.00	0.0002	200	250	0.883	0.0219	550	4291	4291	4291	100	
4263		0.10	0.10	25	25										561.06	57	57	0.00	0.0001	200	250	0.883	0.0219	550	4291	4291	4291	106	
4264		0.35	0.64	90	140										561.06	197	360	0.00	0.0007	200	250	0.883	0.0219	550	4156	4156	3942	135	
4265	321	0.19	943	55	680										561.06	106	5291	0.09	0.0098	200	250	0.883	0.0219	550	2024	2024	1836	412	
4365	4366	0.16	0.16	80	80										561.06	90	90	0.00	0.0002	200	250	0.883	0.0219	565	4441	4441	4241	120	
4366		0.05	0.05	25	25										561.06	29	29	0.00	0.0001	200	250	0.883	0.0219	565	4441	4441	4379	106	
4367		0.12	0.33	60	140										561.06	68	186	0.00	0.0009	200	250	0.883	0.0219	565	4241	4241	4091	205	

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow			Other Sewage		Design Sewer						Remarks					
		Area	Total	Length	Total		Rainfall	Per ha	Rain-off Coeff	Converted Area	Rainfall	Density	Population per Sewer	Per Person	Total	Per Sewer	Total	Total Sewage Flow	Diameter	Slope	Velocity		Flow	Level	Height	Level	Height
		ha	ha	m	m	min	m ³ /s-ha		ha	m ³ /s	P/ha		m ³ /s	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	M	M	M	
4361	4363	020	020	100	100					561.06	113	113	000			00002	200	250	0.683	0.0219	555	4441	195	4441	195		
4362		008	008	40	40					561.06	45	45	000			00001	200	250	0.683	0.0219	555	4441	190	4441	190		
4363		031	031	15	115					561.06	16	174	000			00003	200	250	0.683	0.0219	555	4191	195	4191	195		
4367	4369	008	072	40	180					561.06	44	404	000			00007	200	250	0.683	0.0219	555	4091	205	4091	205		
4368		018	018	90	90					561.06	101	101	000			00002	200	250	0.683	0.0219	555	4441	190	4441	190		
4369	4371	004	094	20	200					561.06	23	528	001			00010	200	250	0.683	0.0219	521	3991	201	3991	201		
4370		006	006	30	30					561.06	34	34	000			00001	200	250	0.683	0.0219	555	4441	190	4441	190		
4371	4373	006	106	30	230					561.06	33	595	001			00011	200	250	0.683	0.0219	521	3941	205	3941	205		
4372		006	006	30	30					561.06	34	34	000			00001	200	250	0.683	0.0219	555	4441	190	4441	190		
4373		039	121	50	230					561.06	50	679	001			00013	200	250	0.683	0.0219	521	3856	214	3856	214		
321	322	4628	420166	290	5290					237.6410997100174	1.8					13551	1500	090	1200	21207	614	-1029	559	-1029	559		

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off			Sewage Flow			Other Sewage		Design Sewer						Remarks			
		Area	Total	Length	Total		Rainfall	Rainfall	Per ha	Converted Area	Rainfall	Population Density	Per Person	Total	Per Sewer	Total	Per Sewer	Total	Diameter	Slope		Velocity	Flow	Elevation
		ha	ha	m	m	min	m ² /ha	ha	ha	m ² /s	1/ha	Person	m ² /s	m ² /s	m ² /s	m ² /s	mm	%	m/s	m ³ /s	M	M	M	m
4374		073	073	80	80	80					561.06	410	410	0.000		0.0008	200	250	0.683	0.0219	550	4291	130	
322	323	945	421134	60	5550						233.252204	1004360	1.55		13599	1500		0.90	1200	23207	614	4091	134	
4284	4285	131	131	280	280						561.06	735	735	0.001		0.0014	200	250	0.683	0.0219	430	3591	130	
4283		054	054	115	115	115					561.06	303	303	0.000		0.0006	200	250	0.683	0.0219	541	3303	130	
4285	4287	201	201	35	315						561.06	90	1128	0.002		0.0021	200	250	0.683	0.0219	541	2890	231	
4286		056	056	140	140						561.06	371	371	0.000		0.0007	200	250	0.683	0.0219	541	4201	100	
4287	4293	293	293	55	370						561.06	145	1644	0.003		0.0030	200	250	0.683	0.0219	541	2665	254	
4288	4290	014	014	30	30	30					561.06	79	79	0.000		0.0001	200	250	0.683	0.0219	495	3816	139	
4289		014	014	30	30	30					561.06	79	79	0.000		0.0001	200	250	0.683	0.0219	495	3741	100	
4290		014	042	30	60	60					561.06	78	236	0.000		0.0004	200	250	0.683	0.0219	495	3741	100	
4291	4293	033	075	70	130	130					561.06	185	421	0.000		0.0008	200	250	0.683	0.0219	495	3566	108	

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time		Storm Run-off				Sewage Flow			Other Sewage		Design Sewer						Remarks
		Area	Total	Length	Total	Concentration	Time	Rainfall	Rainfall	Pop Density	Population	Sewage Flow	Per Sewer	Total	Per Sewer	Total	Diameter	Slope	Velocity	Flow	Elevation	Invert	
		ha	ha	m	m	min		m/s-ha	mm	mm/s	Person/ha	Person	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	m
4292		0.10	0.10	20	20				561.06	57	57	0.00			0.0001	200	250	0.683	0.0219	495	3741.100	3741.100	
4293	4295	0.18	1.03	40	170				561.06	101	578	0.01			0.0011	200	250	0.683	0.0219	495	3492.125	3492.125	
4294		0.18	0.18	40	40				561.06	101	101	0.00			0.0002	200	250	0.683	0.0219	541	4201.100	4201.100	
4295	4297	0.10	1.31	20	190				561.06	56	735	0.01			0.0014	200	250	0.683	0.0219	541	3392.131	3392.131	
4296		0.33	0.33	70	70				561.06	186	186	0.00			0.0003	200	250	0.683	0.0219	541	4201.100	4201.100	
4297		0.14	1.78	30	220				561.06	78	939	0.01			0.0019	200	250	0.683	0.0219	541	3342.136	3342.136	
4298	4299	0.54	5.25	115	485				561.06	303	2946	0.05			0.0055	200	250	0.683	0.0219	552	2377.303	2377.303	
4267	4268	0.14	0.14	30	30				561.06	79	79	0.00			0.0001	200	250	0.683	0.0219	480	3591.100	3591.100	
4266		0.12	0.12	25	25				561.06	68	68	0.00			0.0001	200	250	0.683	0.0219	480	3529.106	3529.106	
4268		0.31	0.57	65	95				561.06	174	320	0.00			0.0006	200	250	0.683	0.0219	480	3515.108	3515.108	
4269	4277	1.08	1.65	230	325				561.06	606	926	0.01			0.0017	200	250	0.683	0.0219	559	3354.124	3354.124	

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sews	No. of Sews Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow				Design Sewer						Remarks			
		Area ha	Total ha	Per ha m ³ /s-ha	Rainfall mm		Run-off Coeff.	Converted Area		Rainfall m/s	Pop. Density P/ha	Per Person	Total	Sewage Flow m ³ /s	Per Sewer	Total	Diameter mm	Slope %	Velocity m/s	Flow m ³ /s		Elevation M	Invert Level M	Grade Level m
								Area ha	Total ha															
4270	4272	0.18	0.18	40	40	40									0.0002	200	250	0.883	0.0219	559	4381	100	4381	100
4271		0.14	0.14	30	30	30									0.0001	200	250	0.883	0.0219	559	4306	108	4306	108
4272	4274	0.12	0.44	25	65	65									0.0005	200	250	0.883	0.0219	559	4281	110	4219	116
4273		0.16	0.16	35	35	35									0.0002	200	250	0.883	0.0219	559	4381	100	4394	109
4274	4276	0.18	0.78	40	105	105									0.0008	200	250	0.883	0.0219	559	4219	116	4119	126
4275		0.10	0.10	20	20	20									0.0001	200	250	0.883	0.0219	559	4381	100	4331	105
4276		0.05	0.93	10	115	115									0.0010	200	250	0.883	0.0219	559	4119	126	4094	129
4277	4282	0.23	2.81	50	375	375									0.0029	200	250	0.883	0.0219	552	2719	260	2554	276
4278	4281	0.42	0.42	90	90	90									0.0004	200	250	0.883	0.0219	559	4381	100	4157	122
4280	4281	0.18	0.18	40	40	40									0.0002	200	250	0.883	0.0219	559	4381	100	4381	110

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow				Design Sewer						Remarks	
		Area	Total	Length	Total		Rainfall	Rain-off Coeff.	Converted Area	Rainfall	Pop Density	Population per Sewer	Person	Sewage Flow	Other Sewage	Total Sewage Flow	Diameter	Slope	Velocity	Flow		Elevation
		ha	ha	m	m	min	m ³ /s-ha	ha	ha	m/s	Person	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	
4279		0.14	0.14	30	30						79	0.00			200	2.50	0.683	0.0219	559	4381	100	
4281		0.18	0.32	40	130						101	0.01			200	2.50	0.683	0.0219	559	4157	122	
4282		0.16	0.39	35	410						90	0.04			200	2.50	0.683	0.0219	562	4057	135	
4299	4301	0.18	0.32	40	525						101	0.09			200	2.50	0.683	0.0219	562	2377	303	
4300		0.28	0.28	60	60						158	0.00			200	2.50	0.683	0.0219	562	4411	100	
4301	4303	0.07	0.97	15	540						39	0.10			200	2.50	0.683	0.0219	562	2277	313	
4302		0.18	0.18	40	40						101	0.00			200	2.50	0.683	0.0219	544	4231	100	
4303	4305	0.12	0.97	25	565						67	0.10			200	2.50	0.683	0.0219	544	2240	299	
4304		0.16	0.16	35	35						90	0.00			200	2.50	0.683	0.0219	544	4231	100	
4305	4312	0.10	1.023	20	585						56	0.10			200	2.50	0.683	0.0219	544	4144	109	
4311	4312	0.44	0.44	95	95						247	0.00			200	2.50	0.683	0.0219	530	4091	100	
											247	0.00			200	2.50	0.683	0.0219	544	3853	138	

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time		Storm Run-off			Sewage Flow			Other Sewage		Design Sewer						Remarks																	
		Area	Total	ha	ha	ha	min	Rainfall	Rain-off	Converted Area	Rainfall	Pop Density	per sewer	Population	Sewage Flow	Per Sewer	Total	Total Sewage Flow	mm	Slope	Velocity		Flow	Elevation	Level	Flow													
4307	4308	0.23	0.23	50	50	50					561.06	130	130	0.0002			0.0002	200	250	0.683	0.0219	544	4231	130	544	4231	130												
4308	4310	0.14	0.55	30	80	80					561.06	78	309	0.0006			0.0006	200	250	0.683	0.0219	544	4105	133	544	4105	133												
4309		0.18	0.18	40	40	40					561.06	101	101	0.0002			0.0002	200	250	0.683	0.0219	544	4231	130	544	4231	130												
4310		0.05	0.78	10	90	90					561.06	28	438	0.0008			0.0008	200	250	0.683	0.0219	544	4031	120	544	4031	120												
4312	4319	0.33	1.78	70	655	655					561.06	185	6610	0.122			0.122	200	250	0.683	0.0219	530	2128	310	530	2128	310												
4313	4315	0.33	0.33	70	70	70					561.06	186	186	0.0003			0.0003	200	250	0.683	0.0219	530	4091	130	530	4091	130												
4314		0.10	0.10	20	20	20					561.06	57	57	0.0001			0.0001	200	250	0.683	0.0219	530	4041	135	530	4041	135												
4315	4317	0.23	0.56	50	120	120					561.06	129	371	0.0007			0.0007	200	250	0.683	0.0219	530	3917	117	530	3917	117												
4316		0.38	0.38	80	80	80					561.06	214	214	0.0004			0.0004	200	250	0.683	0.0219	530	4091	130	530	4091	130												

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration		Storm Run-off				Sewage Flow			Other Sewage		Design Sewer						Remarks		
		Area	Total	Length	Total	Time	Per ha	Rainfall	Rain-off	Coeff	Converted Area	Rainfall	Pop Density	Population	Sewage Flow	Per Sewer	Total	Diameter	Slope	Velocity	Flow	Elevation		Invert Level	Rath Level
		ha	ha	m	m	min	m ² /ha	m ³ /ha		ha	m ³ /s	P/ha	Per Person	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	M	
4317	4319	038	122	40	160							561.06	101	685.001	00013		200	250	0.683	0.0219	530	3792	130	3692	140
4318		047	047	100	100							561.06	264	264.000	00005		200	250	0.683	0.0219	530	4091	100	3841	125
4319	4324	070	1437	150	305							561.06	393	7351.014	00147		200	250	0.683	0.0219	531	1354	314	1579	372
4320		016	016	35	35							561.06	90	90.000	00002		200	250	0.683	0.0219	551	4301	100	4214	109
4321	4323	038	034	40	75							561.06	101	191.000	00004		200	250	0.683	0.0219	551	4214	109	4114	119
4322		021	021	45	45							561.06	118	118.000	00002		200	250	0.683	0.0219	551	4301	100	4189	111
4323		021	076	45	120							561.06	118	427.000	00008		200	250	0.683	0.0219	551	4114	119	4002	130
4324	4325	036	1509	35	840							561.06	90	3467.015	00157		200	250	0.683	0.0219	551	1579	372	1492	321
4325		056	056	120	120							561.06	315	315.000	00006		200	250	0.683	0.0219	551	4301	100	4901	130
4326	4328	021	1536	45	385							561.06	113	8899.016	00165		200	250	0.683	0.0219	551	1492	321	1380	392
4327		059	059	125	125							561.06	332	332.000	00006		200	250	0.683	0.0219	551	4301	100	3939	131

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Storm Run-off			Sewage Flow			Other Sewage		Design Sewer						Remarks									
		Area	Total	Length	Total	Rainfall	Rainfall per ha	Rain-off Coeff	Converted Area	Rainfall	Pop Density	Population per Sewer	Per Person	Total	Total	Flow	Velocity	Slope	Diameter		Sewage Flow	Total	Flow	Velocity	Slope	Diameter	Elevation	Invert	End S
		ha	ha	m	m	m ³ /s-ha	per ha		ha	m ³ /s	Per	Person	m ³ /s	m ³ /s	m ³ /s	m ³ /s	%	mm	mm	m ³ /s	m ³ /s	m/s	m/s	%	mm	M	M	M	m
4328	4344	095	1650	10	895		561.06	28	9258	017	561.06	28	9258	017	00171	200	250	0683	09219	553	1380	392				553	4321	100	
4329	4331	047	047	100	100		561.06	264	264	000	561.06	264	264	000	00005	200	250	0683	09219	553	4071	135				553	4071	135	
4330		014	014	30	30		561.06	79	79	000	561.06	79	79	000	00001	200	250	0683	09219	553	4321	130				553	4321	130	
4331	4335	023	084	50	150		561.06	129	472	000	561.06	129	472	000	00009	200	250	0683	09219	553	3946	138				553	3946	138	
4332	4334	018	018	40	40		561.06	101	101	000	561.06	101	101	000	00002	200	250	0683	09219	553	4321	130				553	4321	130	
4333		016	016	35	35		561.06	90	90	000	561.06	90	90	000	00002	200	250	0683	09219	553	4234	139				553	4234	139	
4334		047	021	100	140		561.06	264	455	000	561.06	264	455	000	00008	200	250	0683	09219	553	4221	130				553	3971	135	
4335	4341	012	177	25	175		561.06	68	994	001	561.06	68	994	001	00018	200	250	0683	09219	553	3946	138				553	3884	144	
4336	4338	026	026	55	55		561.06	146	146	000	561.06	146	146	000	00003	200	250	0683	09219	553	4321	130				553	4321	130	
4337		014	014	30	30		561.06	79	79	000	561.06	79	79	000	00001	200	250	0683	09219	553	4246	138				553	4246	138	

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration		Storm Run-off			Sewage Flow			Other Sewage		Design Sewer						Remarks	
		Area	Total	Length	Total	Time	Rainfall	Rainfall Coef.	Converted Area	Rainfall	Pop. Density	Population per Sewer	Per Person	Total	Sewer	Total	Diameter	Slope	Velocity	Flow	Elevation		Invert
		ha	ha	m	m	min	m ³ /ha	ha	ha	m ³ /s	Person/ha	Person	m ³ /s	m ³ /s	m ³ /s	mm	%	m/s	m ³ /s	M	M	M	m
4338	4340	033	073	70	125						561.06	185	410	0.0008		200	250	0.683	0.9219	553	4083	174	
4339		012	012	25	25						561.06	68	68	0.0001		200	250	0.683	0.9219	553	4321	100	
4340		021	106	45	170						561.06	118	595	0.0011		200	250	0.683	0.9219	553	4009	131	
4341	4343	021	304	45	220						561.06	118	1706	0.0032		200	250	0.683	0.9219	553	3884	144	
4342		038	038	80	80						561.06	214	214	0.0004		200	250	0.683	0.9219	553	4121	120	
4343		042	384	90	310						561.06	236	2155	0.0040		200	250	0.683	0.9219	553	3772	155	
4344		128	2152	260	1155						561.06	719	12131	0.0225		250	220	0.739	0.9363	612	1307	337	
323	324	6079	429425	380	5730						238.37148	1103098	1.9	1.9092		1500	0.90	1.200	2.1207	624	-1345	592	
4346	4348	035	035	50	50						561.06	197	197	0.0004		200	250	0.683	0.9219	550	4391	100	
4347		021	021	30	30						561.06	118	118	0.0002		200	250	0.683	0.9219	550	4316	108	
4348	4349	028	084	40	90						561.06	157	472	0.0009		200	250	0.683	0.9219	550	4266	143	

SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow			Other Sewage		Design Sewer						Remarks			
		Area	Total	Length	Total		Rainfall Per ha	Run-off Coeff.	Converted Area	Rainfall	Pop. Density	Pop. per Sewer	Person	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Flow	Velocity	Slope	Diameter		Flow	Elevation	Inlet
		ha	ha	m	m	min	m ² /s/ha	ha	ha	m ³ /s	P/ha	Person	m ³ /s	m ³ /s	m ³ /s	m ³ /s	m ³ /s	%	mm	mm	m ³ /s	M	M	M	M
4345		035	035	50	50	50					561.06	197	197	000		00004	00004	250	200	550	4266	4266	4266	4266	
4348	4351	028	147	40	130						561.06	157	825	001		00015	00015	250	200	550	4066	4066	4066	4066	
4350		035	035	50	50	50					561.06	197	197	000		00004	00004	250	200	550	4266	4266	4266	4266	
4351	4353	018	200	25	155						561.06	101	1123	002		00021	00021	250	200	550	4004	4004	4004	4004	
4352		035	035	50	50	50					561.06	197	197	000		00004	00004	250	200	550	4266	4266	4266	4266	
4353	4356	021	256	30	185						561.06	118	1437	002		00027	00027	250	200	550	3929	3929	3929	3929	
4354	4356	056	056	80	80	80					561.06	315	315	000		00006	00006	250	200	550	4191	4191	4191	4191	
4355		052	052	75	75	75					561.06	292	292	000		00005	00005	250	200	550	4203	4203	4203	4203	
4356	4358	042	406	60	245						561.06	235	2278	004		00042	00042	250	200	550	3779	3779	3779	3779	
4357		042	042	60	60	60					561.06	236	236	000		00004	00004	250	200	550	4201	4201	4201	4201	
4358	4360	018	486	25	270						561.06	101	2615	004		00048	00048	250	200	550	3717	3717	3717	3717	

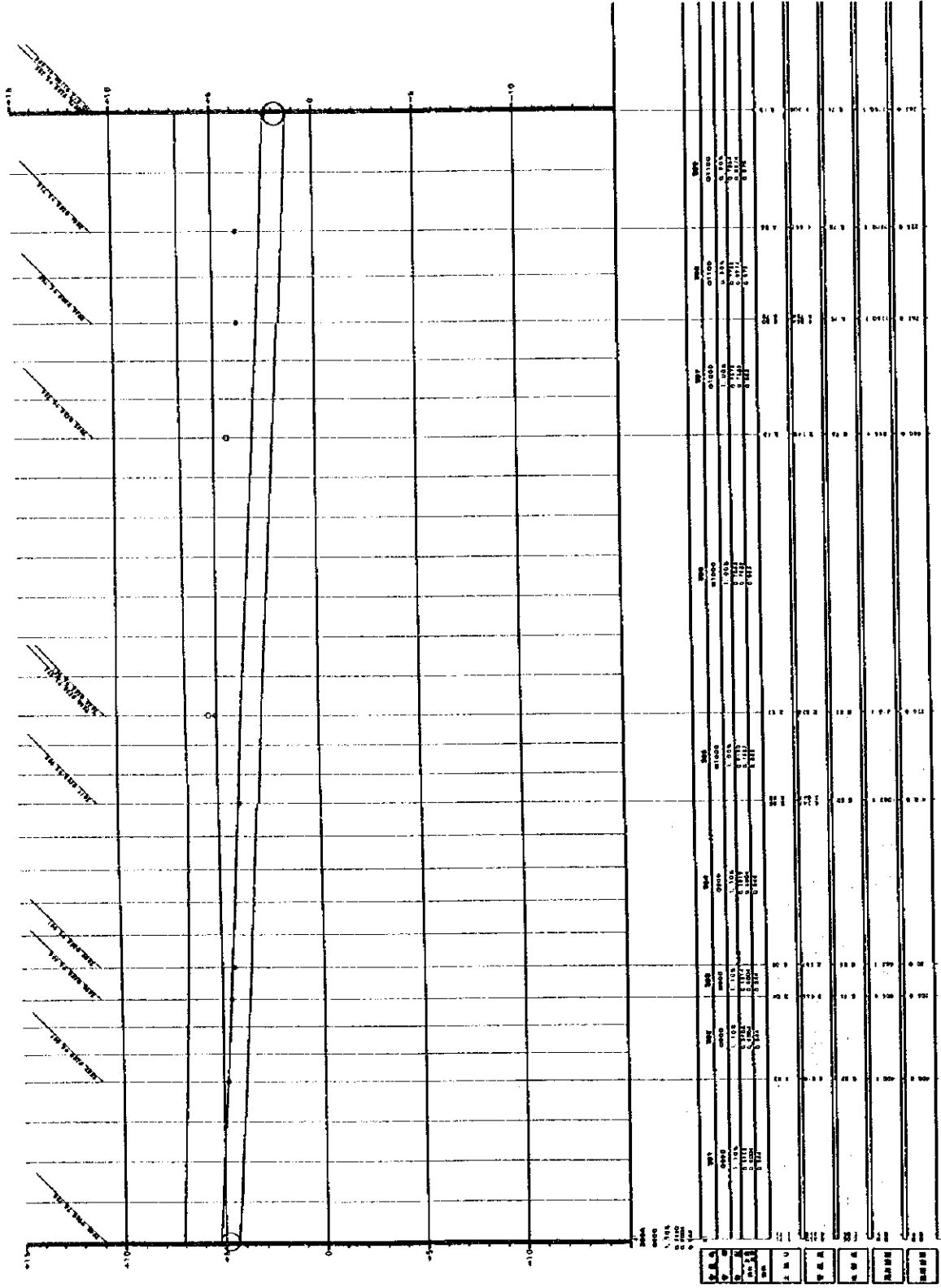
SEWAGE FLOW CALCULATION TABLE (NORTH DHAKA EAST)

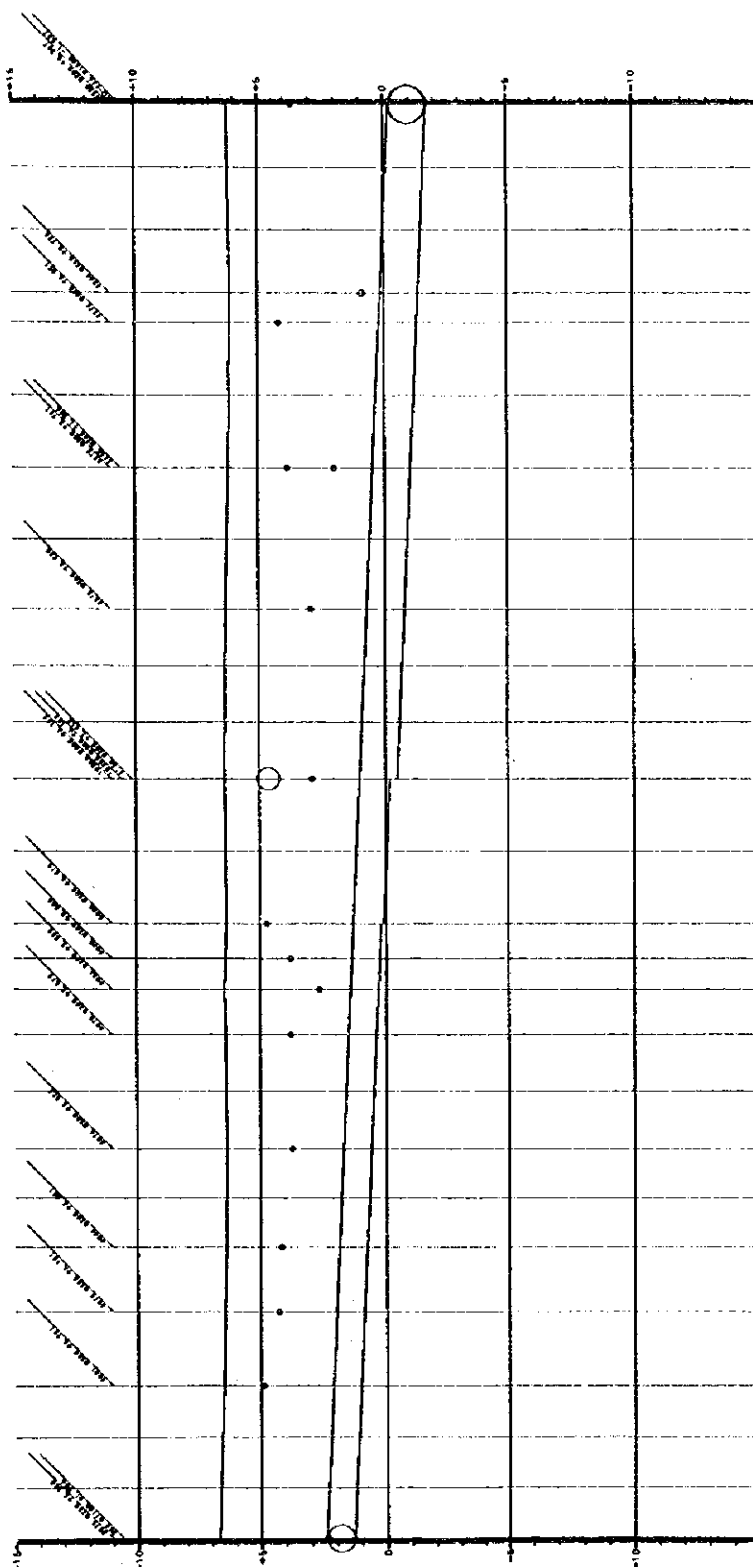
No. of Sewers	No. of Sewers Downstream	Drainage Area		Length		Concentration Time	Storm Run-off				Sewage Flow				Design Sewer						Remarks					
		Area	Total	Length	Total		Rainfall	Rain-off Coeff.	Converted Area	Rainfall	Pop. Density	Population per Sewer	Per Person	Total	Sewage Flow	Per Sewer	Total	Total Sewage Flow	Diameter	Slope		Velocity	Flow	Elevation	Invert Level	Finish Level
4359		0.56	0.56	80	80					561.06	315	315	0.00			0.0006	200	250	0.683	0.0219	556	4331.100	4151	120		
4360		0.43	0.85	60	330					561.06	241	3170	0.05			0.0059	200	250	0.683	0.0219	556	3717	3567	246		
324		4310	434500	200	6010					240.5910851104500	1.9					1.9352	1500	0.90	1.200	21207	624	1687	628			
325	PUMP	000	434500	30	6040					0.00	01045002	935				1.9352	1500	0.90	1.200	21207	624	1925	653			

Figure 5.5.3.1 Trunk Main Profile of New Sewer System

管記外差

2004	201	202	203	204
205	206	207	208	209
210	211	212	213	214
215	216	217	218	219
220	221	222	223	224
225	226	227	228	229
230	231	232	233	234
235	236	237	238	239
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585	586	587	588	589
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595	596	597	598	599
600	601	602	603	604
605	606	607	608	609
610	611	612	613	614
615	616	617	618	619
620	621	622	623	624
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675	676	677	678	679
680	681	682	683	684
685	686	687	688	689
690	691	692	693	694
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705	706	707	708	709
710	711	712	713	714
715	716	717	718	719
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725	726	727	728	729
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735	736	737	738	739
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745	746	747	748	749
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760	761	762	763	764
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770	771	772	773	774
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780	781	782	783	784
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805	806	807	808	809
810	811	812	813	814
815	816	817	818	819
820	821	822	823	824
825	826	827	828	829
830	831	832	833	834
835	836	837	838	839
840	841	842	843	844
845	846	847	848	849
850	851	852	853	854
855	856	857	858	859
860	861	862	863	864
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875	876	877	878	879
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895	896	897	898	899
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905	906	907	908	909
910	911	912	913	914
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920	921	922	923	924
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965	966	967	968	969
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975	976	977	978	979
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995	996	997	998	999
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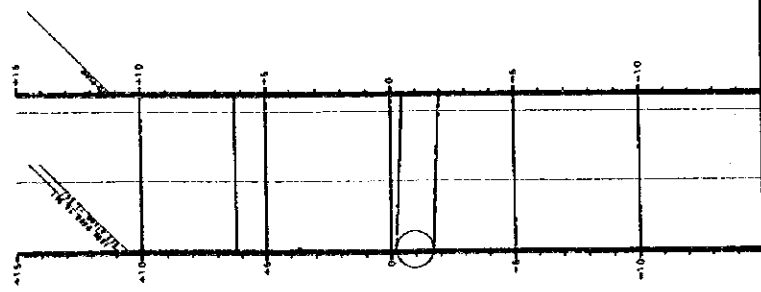




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336	337	338	339	340

項目	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	
面積																					
容積																					
延床																					
床面積																					
総面積																					
その他																					



登記簿表

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3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1

品名	単位	数量	単価	金額	備考
1
2
3
4
5
6
7
8
9
10

Table 5.5.4.1 Sewage Flow Calculation for Existing Sewerage Service Area

Sewer No.	Sewer No. of Downstream	Area		Length		Sewage Flow Rate			Design Sewer										Remark	
		Each	Total	Each	Total	Population Density	Population		Sewage Flow	Material	Diameter	Gradient	Velocity	Flow Rate	Ground Level	Invert Level		Covering		
							Each	Total								Person	Person	Upstream		Downstream
1001	1002	7.26	7.26	580	580	561.06	4,073	4,073	0.0075	VP	200	2.00	0.607	0.0191	7.75	6.741	5.577	0.80	1.78	
1002	1004	1.43	8.69	280	860	561.06	802	4,876	0.0090	VP	300	1.20	0.616	0.0435	7.56	5.577	5.241	1.67	1.89	
1003	1004	17.64	17.64	800	800	561.06	9,897	9,897	0.0183	VP	200	2.00	0.607	0.0191	6.69	5.681	4.081	0.80	3.15	
1004	1005	0.00	26.33	230	1,090	561.06	0	14,773	0.0274	VP	300	1.20	0.616	0.0435	7.44	4.081	3.806	3.05	2.66	
1005	1021	49.79	76.12	340	1,430	561.06	27,935	42,708	0.0791	VP	300	1.20	0.616	0.0435	6.78	3.806	3.400	2.66	3.45	
1007	1008	7.02	7.02	550	550	561.06	3,939	3,939	0.0073	VP	200	2.00	0.607	0.0191	7.59	6.581	5.481	0.80	2.02	
1008	1010	4.84	11.86	415	965	561.06	2,716	6,654	0.0123	VP	300	1.20	0.616	0.0435	7.71	5.481	4.986	1.92	2.37	
1009	1010	8.82	8.82	630	630	561.06	4,949	4,949	0.0092	VP	200	2.00	0.607	0.0191	7.53	6.521	5.261	0.80	2.20	
1010	1021	0.46	21.14	95	1,060	561.06	258	11,861	0.0220	VP	300	1.20	0.616	0.0435	7.67	4.986	4.872	2.37	1.98	
1011	1013	2.21	2.21	100	100	561.06	1,240	1,240	0.0023	VP	200	2.00	0.607	0.0191	6.12	5.111	4.911	0.80	1.00	
1012	1013	0.38	0.38	25	25	561.06	213	213	0.0004	VP	300	1.20	0.616	0.0435	6.12	5.012	4.982	0.80	0.83	
1013	1015	3.09	5.68	230	330	561.06	1,734	3,187	0.0059	VP	300	1.20	0.616	0.0435	6.12	4.911	4.636	0.90	1.95	
1014	1015	6.76	6.76	420	420	561.06	3,793	3,793	0.0070	VP	200	2.00	0.607	0.0191	6.82	5.811	4.974	0.80	1.72	
1015	1020	2.43	14.87	230	650	561.06	1,363	8,343	0.0155	VP	300	1.20	0.616	0.0435	6.90	4.636	4.361	1.95	2.97	
1016	1017	2.01	2.01	215	215	561.06	1,128	1,128	0.0021	VP	200	2.00	0.607	0.0191	6.82	5.811	5.381	0.80	1.46	
1017	1019	1.97	3.98	260	475	561.06	1,105	2,233	0.0041	VP	300	1.20	0.616	0.0435	7.05	5.381	5.069	1.36	2.33	
1018	1019	3.91	3.91	440	440	561.06	2,194	2,194	0.0041	VP	200	2.00	0.607	0.0191	7.20	6.191	5.309	0.80	2.19	
1019	1020	0.27	8.16	75	550	561.06	151	4,578	0.0085	VP	300	1.20	0.616	0.0435	7.71	5.069	4.979	2.33	2.35	
1020	1021	8.94	31.97	340	990	561.06	5,016	17,937	0.0332	VP	300	1.20	0.616	0.0435	7.64	4.361	3.955	2.97	2.90	
1021	1024	17.42	146.65	835	2,265	561.06	9,774	82,279	0.1524	VP	450	0.70	0.617	0.0981	7.16	3.400	2.812	3.30	3.74	
1022	1023	48.07	48.07	1,040	1,040	561.06	26,970	26,970	0.0499	VP	200	2.00	0.607	0.0191	5.76	4.751	2.671	0.80	3.34	
1023	1024	47.13	95.20	600	1,640	561.06	26,443	53,413	0.0989	VP	250	1.50	0.610	0.0299	6.22	2.671	1.771	3.29	4.99	
1024	1025	59.65	301.50	710	2,975	561.06	33,467	169,160	0.3133	VP	450	0.70	0.617	0.0981	7.02	1.771	1.271	4.79	5.27	
1025	1025	60.79	362.29	870	3,845	561.06	34,107	203,266	0.3764	VP	450	0.70	0.617	0.0981	7.00	1.271	0.659	5.27	5.51	
1026	1028	7.93	7.93	285	285	561.06	4,449	4,449	0.0082	VP	300	1.20	0.616	0.0435	7.00	5.892	5.550	0.80	1.04	
1027	1028	7.12	7.12	170	170	561.06	3,995	3,995	0.0074	VP	200	2.00	0.607	0.0191	7.00	5.991	5.651	0.80	1.04	
1028	1030	1.14	16.19	115	400	561.06	640	9,084	0.0168	VP	300	1.20	0.616	0.0435	6.90	5.550	5.412	1.04	1.18	
1029	1030	920.00	920.00	10	10	76.15	70,058	70,058	0.1297	VP	400	0.80	0.609	0.0766	6.70	5.493	5.485	0.80	1.00	

Table 5.5.4.1 Sewage Flow Calculation for Existing Sewerage Service Area

Sewer No.	Sewer No. of Downstream	Area		Length		Population Density		Sewage Flow Rate		Design Sewer										Remark										
		Each	Total	Each	Total	Per./ha	Population		Sewage Flow	Material	Diameter	Gradient	Velocity	Flow Rate	Ground Level		Invert Level		Covering											
							Each	Total							cu.m/sec	mm	%	m/sec	cu.m/sec		M	M	M	M	m	m				
1030	1034	8.10	944.29	620	1,020	561.06	4,545	83,687	0.1550	VP	450	0.70	0.617	0.0981	6.90	5.412	4.980	1.02	1.54											
1031	1033	72.50	72.50	385	385	561.06	40,677	40,677	0.0753	VP	300	1.20	0.616	0.0435	6.88	5.772	5.308	0.80	1.41											
1032	1033	21.46	21.46	310	310	561.06	12,040	12,040	0.0223	VP	200	2.00	0.607	0.0191	6.84	5.831	5.209	0.80	1.61											
1033	1034	6.66	100.62	500	885	561.06	3,737	56,454	0.1045	VP	300	1.20	0.616	0.0435	7.03	5.209	4.609	1.51	2.06											
1034	1035	128.88	1173.79	1,140	2,160	561.06	72,309	212,450	0.3934	VP	450	0.70	0.617	0.0981	6.98	4.609	3.810	1.91	2.36											
1035	1036	37.92	1574.00	780	4,625	561.06	21,275	436,991	0.8092	VP	450	0.70	0.617	0.0981	6.63	0.672	0.122	5.49	4.80											
1036	1037	0.00	1574.00	20	4,645	561.06	0	436,991	0.8092	HP	1100	0.90	0.976	0.9274	5.39	0.122	0.104	4.06	4.08											
1037	MAIN	0.00	1574.00	1,340	5,985	561.06	0	436,991	0.8092	SP	900	2.00	1.272	0.8092	5.39	3.463	4.193	0.94	0.94											

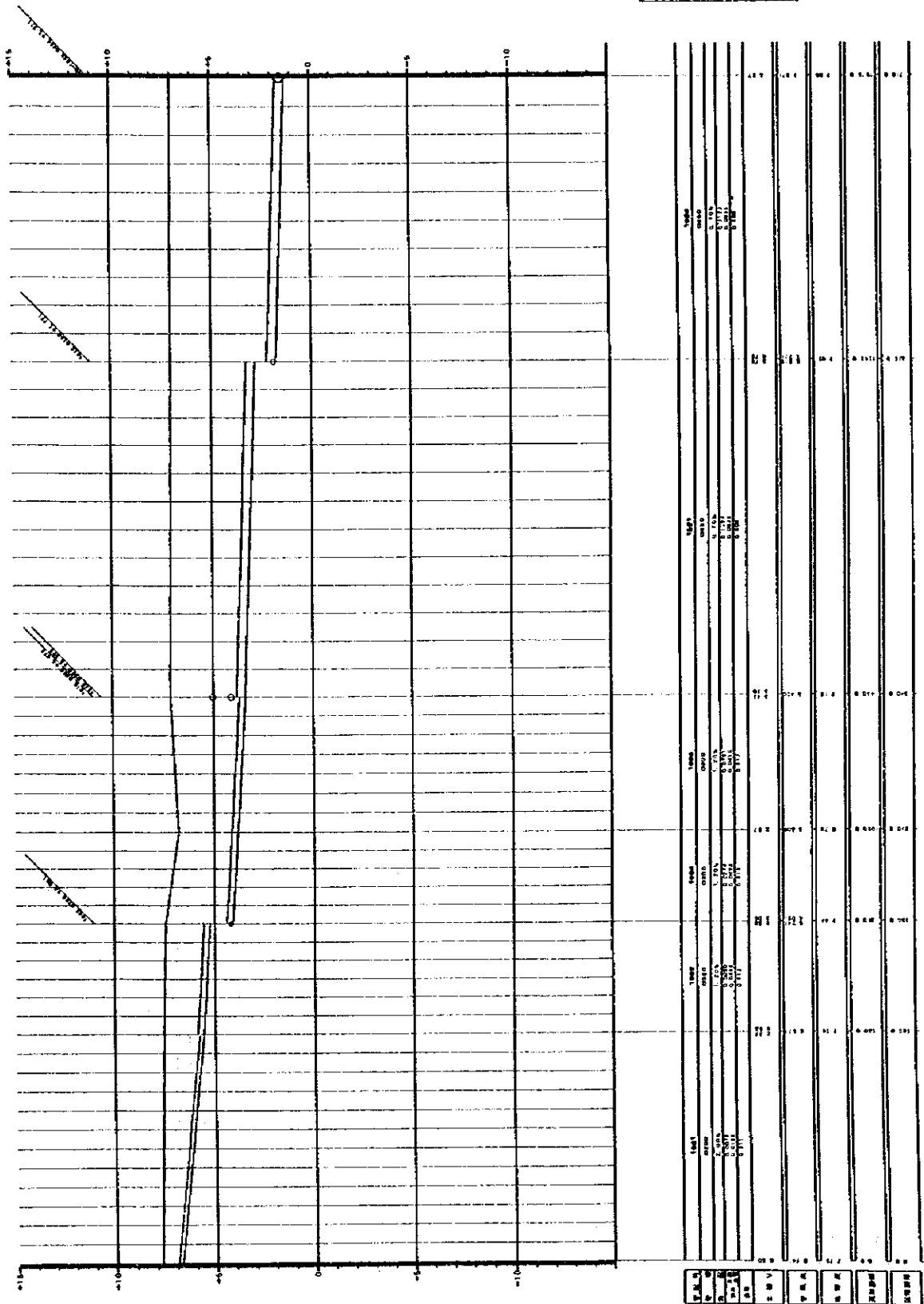
Table 5.5.4.2 Sewage Flow Calculation of Supplementary Pipe in Existing Sewerage Service Area

Sewer No.	Capacity Check	Diameter (mm)		Gradient %	Material	Roughness Coefficient	Thickness mm	Velocity m/sec	Flow Rate cu.m/sec	Capacity Check	Covering			Remark
		Required mm	Therefore mm								Upstream	Downstream	Average	
1001	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1002	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1003	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1004	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1005	NO	0.0356	278	300	VP	0.010	10	0.616	0.0435	OK	2.66	3.45	3.06	
1007	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1008	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1009	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1010	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1011	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1012	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1013	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1014	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1015	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1016	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1017	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1018	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1019	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1020	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1021	NO	0.0543	361	400	VP	0.010	12	0.570	0.0716	OK	3.35	3.80	3.58	
1022	NO	0.0308	239	250	VP	0.010	8	0.704	0.0346	OK	0.75	3.29	2.02	Outside of Target
1023	NO	0.0690	342	350	VP	0.010	11	0.763	0.0734	OK	3.19	4.89	4.04	Outside of Target
1024	NO	0.2152	604	700	HP	0.013	70	0.637	0.2450	OK	4.48	4.96	4.72	
1025	NO	0.2783	665	800	HP	0.013	80	0.696	0.3499	OK	4.85	5.09	4.97	
1026	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1027	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1028	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1029	NO	0.0531	349	350	VP	0.010	11	0.557	0.0536	OK	0.85	1.05	0.95	

Table S.S.4.2 Sewage Flow Calculation of Supplementary Pipe in Existing Sewerage Service Area

Sewer No.	Capacity Check	Diameter (mm)		Gradient %	Material	Roughness Coefficient	Thickness mm	Velocity m/sec	Flow Rate cu.m/sec	Capacity Check	Covering			Remark
		Required	Therefore								Upstream	Downstream	Average	
1030	NO	367	400	0.70	VP	0.010	12	0.570	0.0716	OK	1.08	1.59	1.34	
1031	NO	266	300	1.20	VP	0.010	10	0.616	0.0435	OK	0.80	1.41	1.11	
1032	NO	103	150	2.00	VP	0.010	5	0.501	0.0089	OK	0.85	1.67	1.26	Outside of Target
1033	NO	340	350	1.20	VP	0.010	11	0.683	0.0657	OK	1.46	2.01	1.74	
1034	NO	680	800	0.70	HP	0.013	80	0.696	0.3499	OK	1.49	1.94	1.72	
1035	NO	946	1100	0.70	HP	0.013	110	0.861	0.8179	OK	4.75	4.06	4.41	
1036	OK	-	-	-	-	-	-	-	-	-	-	-	-	-
1037	OK	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure 5.5.4.1 Trunk Main Profile of Existing Sewerage Service Area

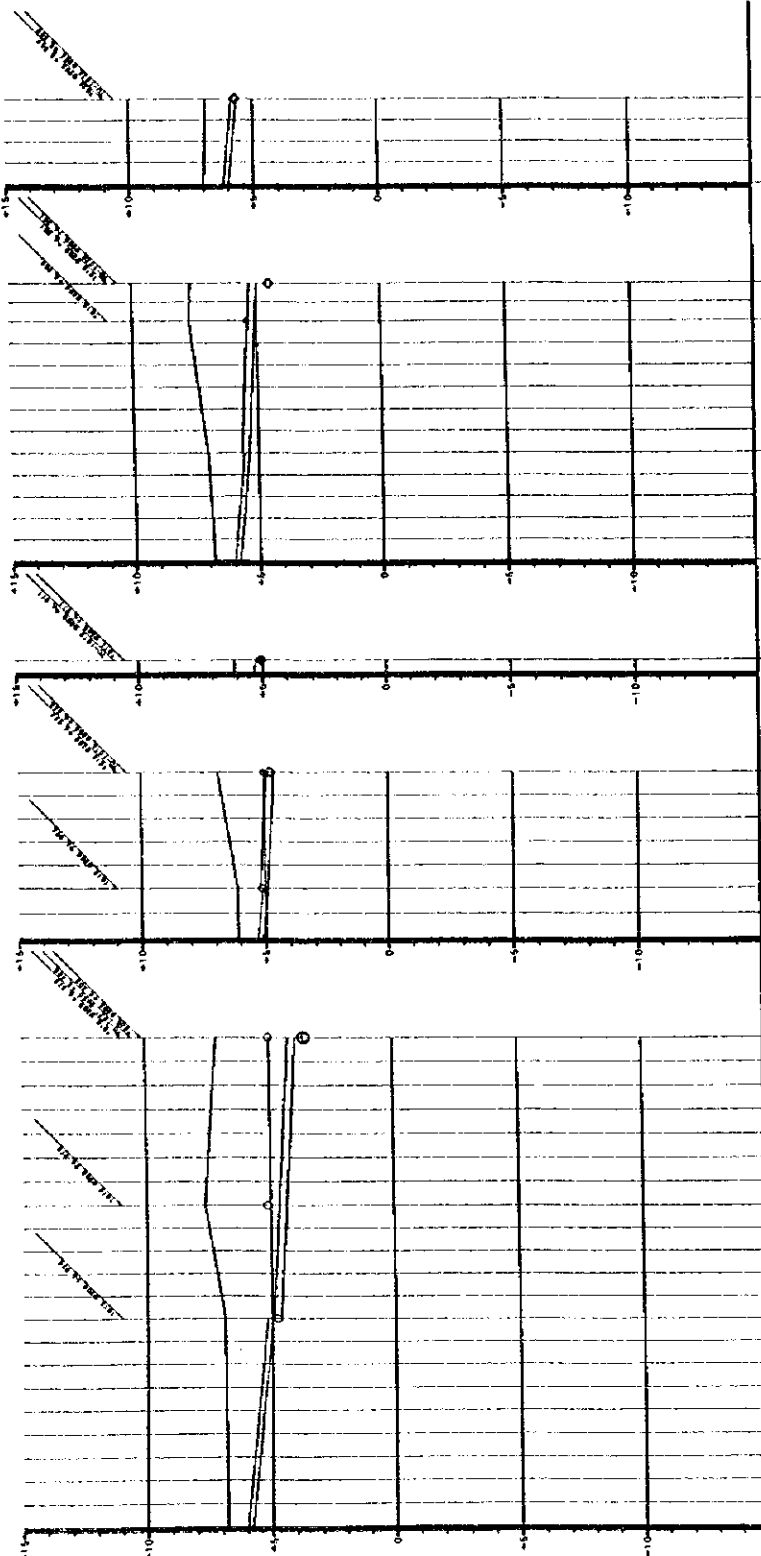


管 記 帳 表

管段	1+00	1+50	2+00	2+50	3+00	3+50	4+00	4+50	5+00
管径	150	150	150	150	150	150	150	150	150
管底	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00
管顶	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20
管长	50	50	50	50	50	50	50	50	50

觀 記 冊 表

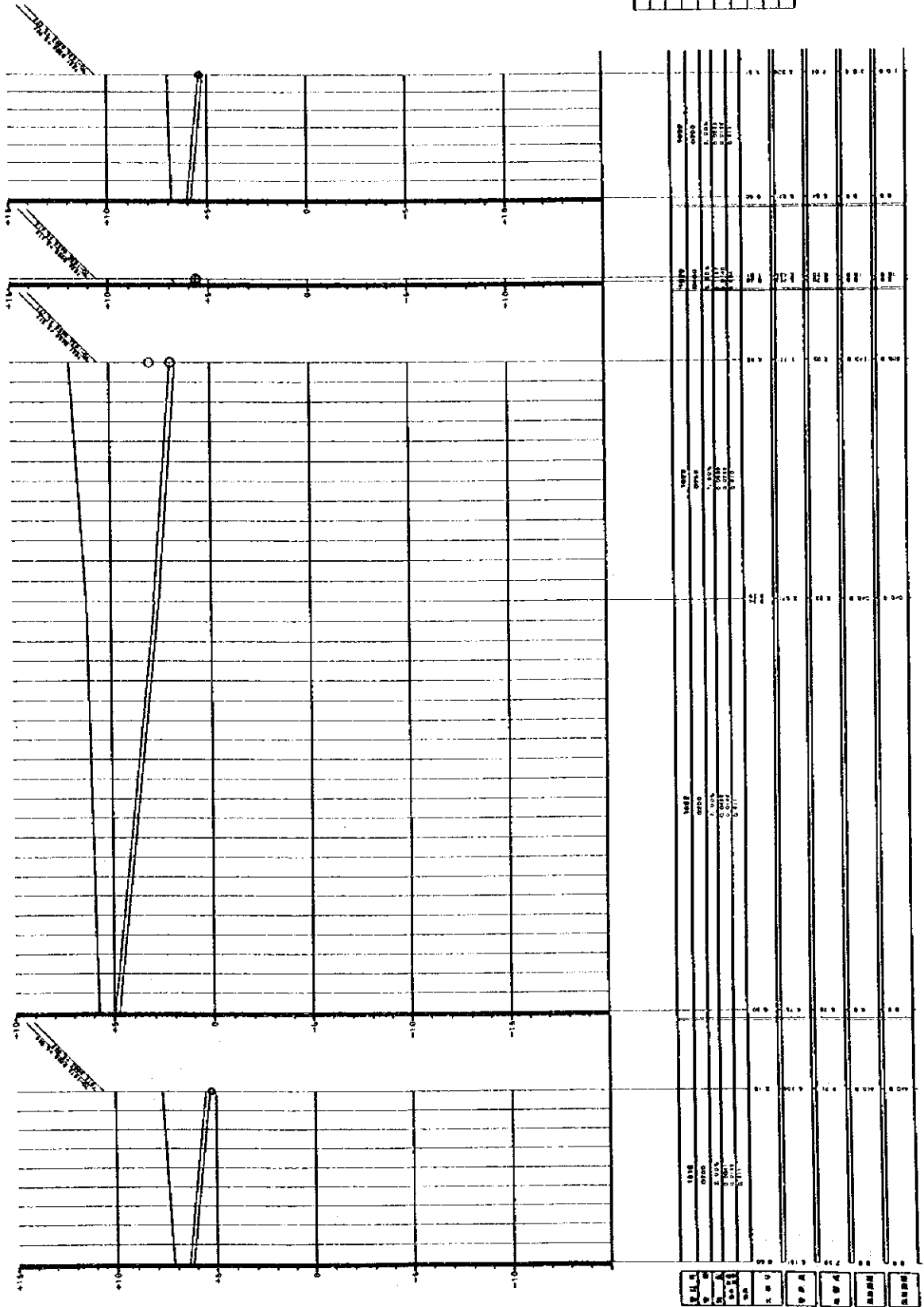
1914	1915	1916	1917	1918	1919	1920
1911	1912	1913	1914	1915	1916	1917



年	1914	1915	1916	1917	1918	1919	1920
1. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
2. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
3. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
4. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
5. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
6. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
7. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
8. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
9. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
10. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
11. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
12. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
13. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
14. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
15. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
16. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
17. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
18. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
19. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10
20. 總計	1.00	1.30	1.10	1.20	1.10	1.10	1.10

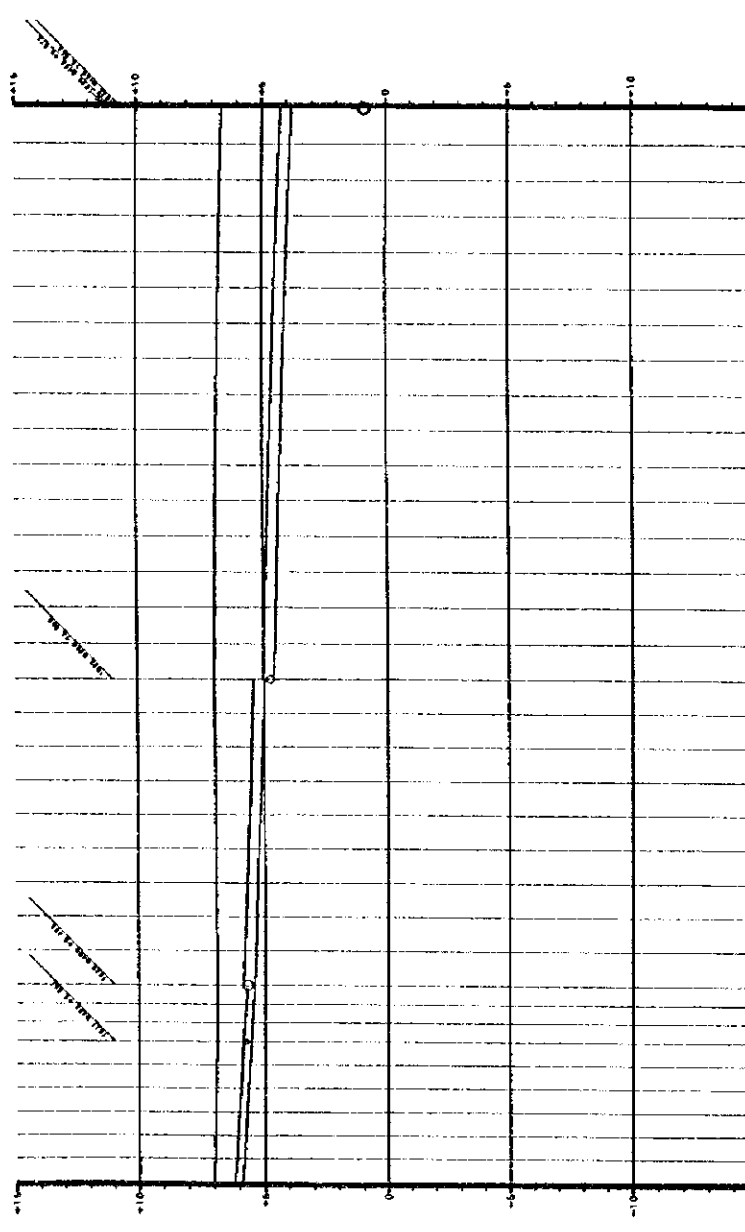
管架昇架

1918	1922	1923	1928	1927



登記簿表

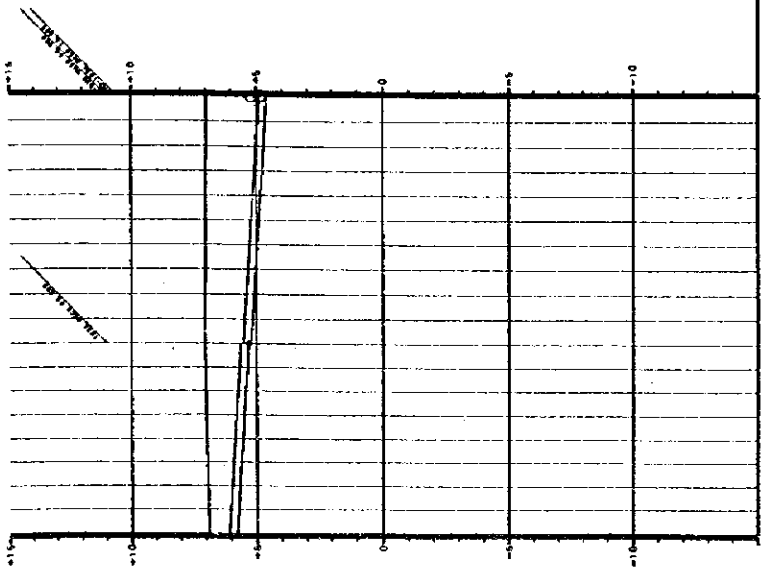
1978	1979	1980	1981	1982



年次	1978	1979	1980	1981	1982
計					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

登記簿表

1921	1923



1921	1923
1007	1008
0.000	0.000
0.007	0.007
0.014	0.014
0.021	0.021
0.028	0.028
0.035	0.035
0.042	0.042
0.049	0.049
0.056	0.056
0.063	0.063
0.070	0.070
0.077	0.077
0.084	0.084
0.091	0.091
0.098	0.098
0.105	0.105
0.112	0.112
0.119	0.119
0.126	0.126
0.133	0.133
0.140	0.140
0.147	0.147
0.154	0.154
0.161	0.161
0.168	0.168
0.175	0.175
0.182	0.182
0.189	0.189
0.196	0.196
0.203	0.203
0.210	0.210
0.217	0.217
0.224	0.224
0.231	0.231
0.238	0.238
0.245	0.245
0.252	0.252
0.259	0.259
0.266	0.266
0.273	0.273
0.280	0.280
0.287	0.287
0.294	0.294
0.301	0.301
0.308	0.308
0.315	0.315
0.322	0.322
0.329	0.329
0.336	0.336
0.343	0.343
0.350	0.350
0.357	0.357
0.364	0.364
0.371	0.371
0.378	0.378
0.385	0.385
0.392	0.392
0.399	0.399
0.406	0.406
0.413	0.413
0.420	0.420
0.427	0.427
0.434	0.434
0.441	0.441
0.448	0.448
0.455	0.455
0.462	0.462
0.469	0.469
0.476	0.476
0.483	0.483
0.490	0.490
0.497	0.497
0.504	0.504
0.511	0.511
0.518	0.518
0.525	0.525
0.532	0.532
0.539	0.539
0.546	0.546
0.553	0.553
0.560	0.560
0.567	0.567
0.574	0.574
0.581	0.581
0.588	0.588
0.595	0.595
0.602	0.602
0.609	0.609
0.616	0.616
0.623	0.623
0.630	0.630
0.637	0.637
0.644	0.644
0.651	0.651
0.658	0.658
0.665	0.665
0.672	0.672
0.679	0.679
0.686	0.686
0.693	0.693
0.700	0.700
0.707	0.707
0.714	0.714
0.721	0.721
0.728	0.728
0.735	0.735
0.742	0.742
0.749	0.749
0.756	0.756
0.763	0.763
0.770	0.770
0.777	0.777
0.784	0.784
0.791	0.791
0.798	0.798
0.805	0.805
0.812	0.812
0.819	0.819
0.826	0.826
0.833	0.833
0.840	0.840
0.847	0.847
0.854	0.854
0.861	0.861
0.868	0.868
0.875	0.875
0.882	0.882
0.889	0.889
0.896	0.896
0.903	0.903
0.910	0.910
0.917	0.917
0.924	0.924
0.931	0.931
0.938	0.938
0.945	0.945
0.952	0.952
0.959	0.959
0.966	0.966
0.973	0.973
0.980	0.980
0.987	0.987
0.994	0.994
1.001	1.001

Appendix 5.5.5 Capacity Calculation of Merul Pump Station

1 BASIC CONDITIONS

1-1 BASIC ITEMS

- (1) Name: Merul Pump Station
- (2) Land Area: Approximately 1,360 sq.m
- (3) Design Elevation: 6.50 m
- (4) Land Use : Urban Area
- (5) Collection System : Separate Type
- (6) Sewerage Service Area: North Dhaka East
- (7) Effluent Point: North Dhaka East Sewage Treatment Plant
- (8) Target Year: 2020 (Master Plan)
2005 (Feasibility Study)

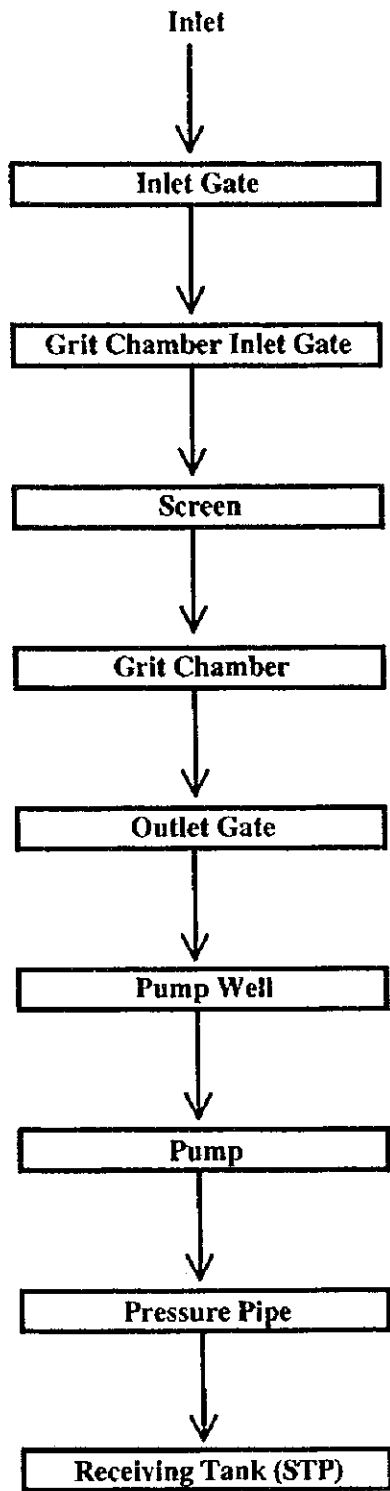
1-2 Design Service Area and Design Population

	Service Area (ha)	Population (persons)	Remark
Master Plan	4,345	1,045,000	
Feasibility Study	1,958	456,000	

1-3 Design Sewage Flow

ITEM		cu.m/day	cu.m/hr	cu.m/min	cu.m/sec
Master Plan	Daily Average	104,500	4354.2	72.57	1.209
	Daily Maximum	130,625	5442.7	90.71	1.512
	Hourly Maximum	167,200	6966.7	116.11	1.935
Feasibility Study	Daily Average	43,320	1805.0	30.08	0.501
	Daily Maximum	52,440	2185.0	36.42	0.607
	Hourly Maximum	66,120	2755.0	45.92	0.765

1-4 Flow Chart



1-5 Specification of Facilities

ITEMS	UNIT	DIMENSION/ SPECIFICATION	NO. OF FACILITY	
			M/P	F/S
1-6-1 Inlet Pipe				
(1) Diameter	mm	1500	1	1
(2) Gradient	‰	0.90		
(3) Intet Level	M	-1.966		
1-6-2 Grit Chamber				
(1) Width	m	1.70	4	2
(2) Length	m	14.00		
(3) Depth	m	1.00		
1-6-3 Pump				
(1) Suction Diameter	mm	450	7	4
(2) Pump Capacity	cu.m/min	20.0		
(3) Total Pump Head	m	22.0		
(4) Motor Output	kw	110.0		
(5) Set Number	set	7		
(6) Set Number of Standby Pump	set	1		
			1	1

2 CAPACITY CALCULATION

2-1 Inlet Pipe

ITEM	SIGN	UNIT	CALCULATION	M/P	F/S
Diameter	D	mm		1500	1,500
Gradient	I	-		0.0009	0.0009
Inlet Level	EL	m		-1.966	-1.966
Full Flow Rate	Qfull	cu.m/sec	$\text{PI} \times \text{D}^2 / 4 \times \text{Vfull}$	2.1206	2.1206
Full Flow Velocity	Vfull	m/sec	$1/0.013 \times (\text{D}/4)^{(2/3)} \times \text{I}^{(1/2)}$	1.200	1.200
Design Flow Rate	Q1	cu.m/sec	Daily Average	1.209	0.501
	Q2	cu.m/sec	Daily Maximum	1.512	0.607
	Q3	cu.m/sec	Hourly Maximum	1.935	0.765
Water Depth	WD1	m	Daily Average	0.811	0.496
	WD2	m	Daily Maximum	0.936	0.549
	WD3	m	Hourly Maximum	1.126	0.623
Water Level	WL1	m	Daily Average	-1.155	-1.470
	WL2	m	Daily Maximum	-1.030	-1.417
	WL3	m	Hourly Maximum	-0.840	-1.343

2-2 Grit Chamber and Screen

ITEM	SIGN	UNIT	CALCULATION	M/P	F/S
Type	-	-	Parallel Flow Type		
Design Flow	Q1	cu.m/day	Hourly Max.	167,200	66,120
	Q2	cu.m/sec	-	1.935	0.765
Water Surface Load	WSL	cu.m/sq.m/day	-	1,800	1,800
Required Surface Area	RSA	m ²	Q1 / WSL	92.889	36.733
Basin Number (Total)	BN	basin	-	4	2
Average Velocity	V	m/sec	-	0.30	0.30
Depth	H	m	-	1.00	1.00
Width Therefore	W1	m	Q2 / (V x H) / BN	1.613	1.275
	W2	m	-	1.70	1.70
Length Therefore	L1	m	RSA / W2 / BN	13.660	10.804
	L2	m	-	14.00	14.00
Dimension (W) (L) (Basin)	W	m	W2	1.70	1.70
	L	m	L2	14.00	14.00
	-	basin	BN	4	2
Screen Type	-	-	Coarse Bar Screen		
Screen Set Number	SSN	set	BN	4	2
Check		UNIT	APPLICATION	M/P	F/S
Water Surface Load		cu.m/sq.m/day		1,756	1,389
Average Velocity		m/sec		0.28	0.23

2-3 Pump Facility

ITEM	SIGN	UNIT	CALCULATION	M/P	F/S
Design Flow Rate	Q1	cu.m/day	Daily Average	104,500	43,320
	Q2	cu.m/day	Daily Maximum	130,625	52,440
	Q3	cu.m/day	Hourly Maximum	167,200	66,120
	Q11	cu.m/min	Daily Average	72.57	30.08
	Q22	cu.m/min	Daily Maximum	90.71	36.42
	Q33	cu.m/min	Hourly Maximum	116.11	45.92
Pump Type	-	-	Mixed Flow Pump, Vertical Shaft, Centrifugal Type		
Pump					
Pump Capacity	PC	cu.m/min		20.0	20.0
Pump Set Number	PSN	set		6	3
Total Pump Capacity	TPC	cu.m/min		120.0	60.0
Velocity at Suction	V	m/sec	1.5 -3.0	2.25	2.25
Suction Diameter of Pump Therefore	SD1	mm	$146 \times (PC/V)^{(1/2)}$	435	435
	SD2	mm	-	450	450
Actual Pump Head	APH	m	HWL-LWL	14.900	14.900
(1) High Water Level of Receiving MH	HWL	m	-	10.800	10.800
(2) Low Water Level of Pump Well	LWL	m	-	-4.100	-4.100
Head Loss around Pump	HL	m	-	1.50	1.50
Head Loss of Pressure Pipe	HLP	m	$L \times I$	5.695	5.695
(1) Hydraulic Gradient *1	I	-	-	0.00148	0.00148
(2) Transportation Distance	L	m	-	3850	3850
Total Pump Head Therefore	TPH1	m	APH+HL+HLP	22.095	22.095
	TPH2	m	-	22.0	22.0
Motor Output of Pump Therefore	MO1	kw	$(0.163 \cdot \gamma \cdot PC \cdot TPH2) / \eta \cdot (1+\alpha) / \eta_G$	111.5	111.5
	MO2	kw	-	110.0	110.0
Pump Efficiency	η	-	-	0.74	0.74
Margin	α	-	-	0.15	0.15
Bulk Density of Wastewater	γ	-	-	1.0	1.0
Transmission Efficiency	η_G	-	-	1.0	1.0

Note: *1-Hydraulic gradient of pressure pipe is referred to next page.

Calculation for Hydraulic Gradient of Pressure Pipe

C= 110

Set Number	Total Capacity	Diameter of Pressure Pipe			1100	1100
		Item	Sign	Unit	mm	mm
20 cu.m/min 1 set	20 cu.m/min	Velocity	V	m/sec	0.3508	-
		Gradient	I	%	0.1454	-
20 cu.m/min 2 set	40 cu.m/min	Velocity	V	m/sec	0.7015	-
		Gradient	I	%	0.5248	-
20 cu.m/min 3 set	60 cu.m/min	Velocity	V	m/sec	1.0523	-
		Gradient	I	%	1.1119	-
20 cu.m/min 4 set	80 cu.m/min	Velocity	V	m/sec	0.7015	0.7015
		Gradient	I	%	0.5248	0.5248
20 cu.m/min 5 set	100 cu.m/min	Velocity	V	m/sec	0.8769	0.8769
		Gradient	I	%	0.7933	0.7933
20 cu.m/min 6 set	120 cu.m/min	Velocity	V	m/sec	1.0523	1.0523
		Gradient	I	%	1.1119	1.1119
20 cu.m/min 7 set	140 cu.m/min	Velocity	V	m/sec	1.2276	1.2276
		Gradient	I	%	1.4792	1.4792

Note: Hydraulic gradient of pressure pipe is calculated by using Hazen Williams' Formula as follows:

$$Q = A \cdot V$$

$$V = 0.84935 \cdot C \cdot R^{0.63} \cdot I^{0.54}$$

where Q : Flow rate (m^3 / sec)

A : Cross-sectional area of flow (m^2)

V : Flow velocity (m / sec)

C : Flow velocity coefficient ($C = 110$)

R : Hydraulic mean depth (m) = A / P

P : Wetted perimeter (m)

I : Hydraulic gradient (h / L)

h : Friction head loss

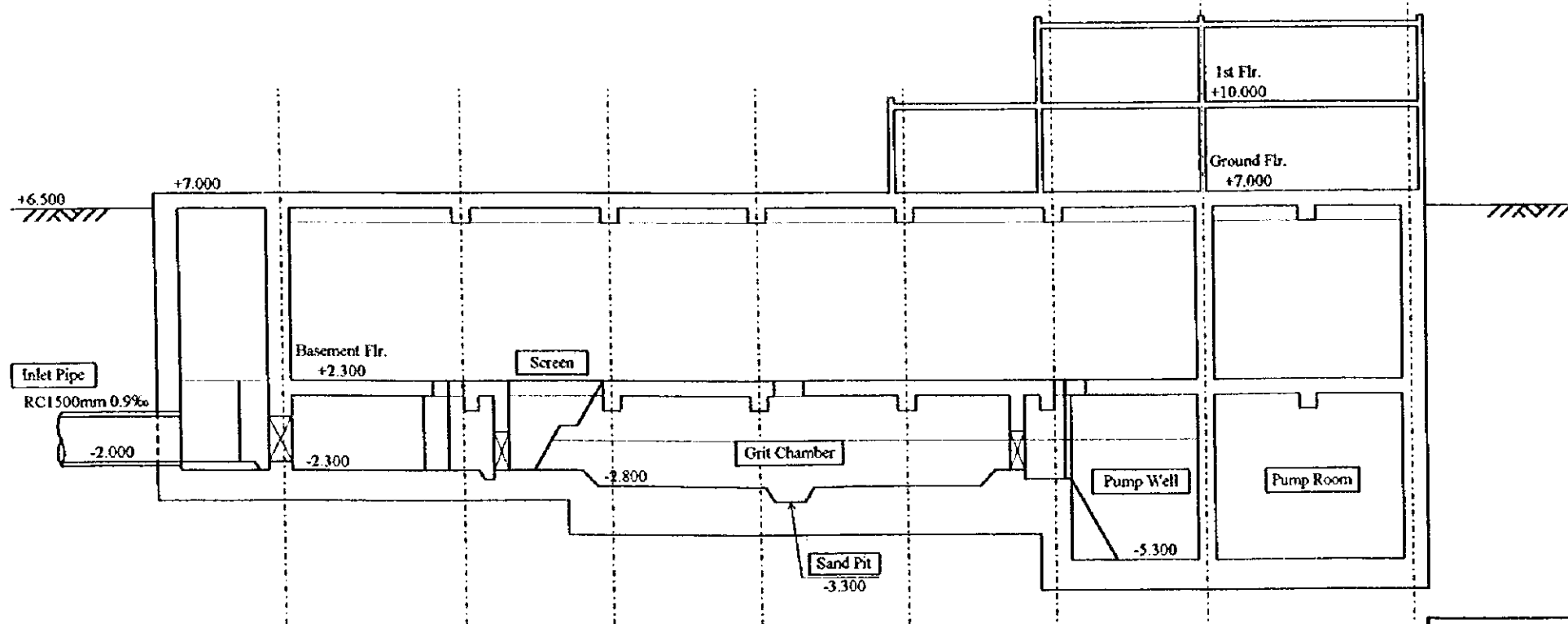
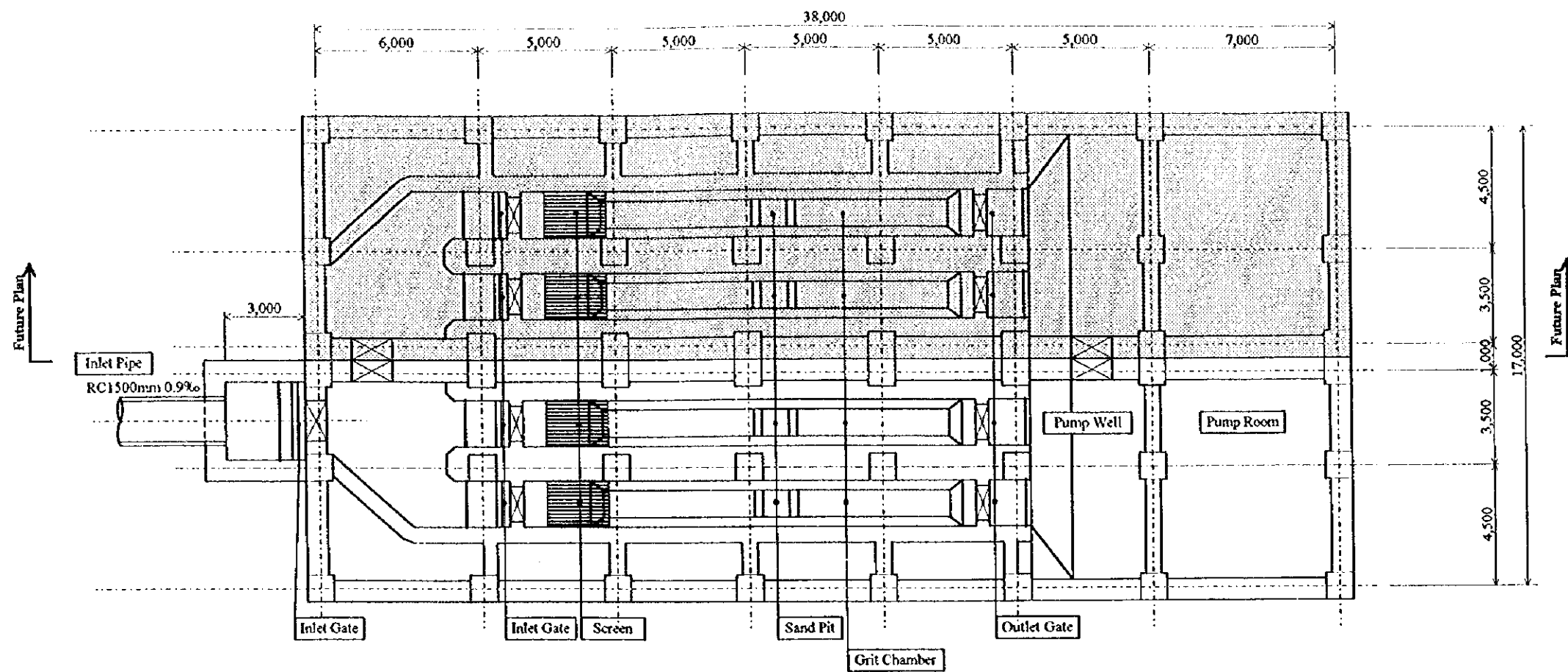


Figure 5.5.1
Merul Pump Station
The Study on the Sewerage System in North Dhaka

Appendix 5.5.6 Capacity Calculation of Gulshan Pump Station

1 BASIC CONDITIONS

1-1 BASIC ITEMS

- (1) Name: Gulshan Pump Station
- (2) Land Area: 1027 sq.m Approximately
- (3) Design Elevation: 5.50 m
- (4) Land Use : Urban Area
- (5) Collection System : Separate Type
- (6) Sewerage Service Area: North Dhaka East
- (7) Effluent Point: Uttara Trunk Main
- (8) Target Year: 2020 (Master Plan)
2005 (Feasibility Study)

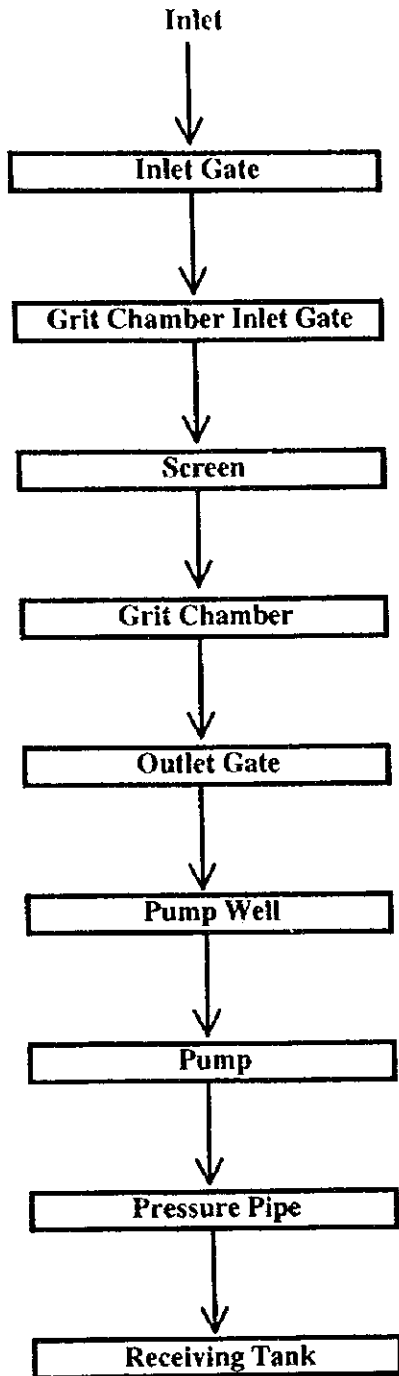
1-2 Design Service Area and Design Population

	Service Area (ha)			Population (persons)		
	Urban Area	Cantonment	Total	Urban Area	Cantonment	Total
Master Plan	654	920	1,574	366,933	70,055	436,988
Feasibility Study	654	920	1,574	290,834	59,083	349,917

1-3 Design Sewage Flow

ITEM		Master Plan			Feasibility Study		
		cu.m/day	cu.m/min	cu.m/sec	cu.m/day	cu.m/min	cu.m/sec
Daily Average	Urban Area	36,693	25.48	0.425	27,629	19.19	0.320
	Cantonment	7,006	4.87	0.081	5,613	3.90	0.065
	Total	43,699	30.35	0.506	33,242	23.09	0.385
Daily Maximum	Urban Area	45,867	31.85	0.531	33,446	23.23	0.387
	Cantonment	8,757	6.08	0.101	6,794	4.72	0.079
	Total	54,624	37.93	0.632	40,240	27.95	0.466
Hourly Maximum	Gravity	58,709	40.77	0.680	42,171	29.29	0.488
	Cantonment	11,209	7.78	0.130	8,567	5.95	0.099
	Total	69,918	48.55	0.810	50,738	35.24	0.587

1-4 Flow Chart



1-5 Specification of Facilities

ITEMS	UNIT	DIMENSION/ SPECIFICATION	NO.OF FACILITY	
			M/P	F/S
1-6-1 Inlet Pipe No.1				
(1) Material	-	Reinforced Concrete Pipe		
(2) Diameter	mm	1100	1	1
(3) Gradient	‰	0.90		
(4) Intet Level	M	0.104		
1-6-2 Grit Chamber				
(1) Width	m	1.00		
(2) Length	m	10.00	4	3
(3) Depth	m	0.70		
1-6-3 Pump				
(1) Suction Diameter	mm	350		
(2) Pump Capacity	cu.m/min	12.5		
(3) Total Pump Head	m	13.5	5	4
(4) Motor Output	kw	45.0		
(5) Set Number	set	5		
(6) Set Number of Standby Pump	set	1	1	1

2 CAPACITY CALCULATION

2-1 Inlet Pipe (Gravity Pipe)

ITEM	SIGN	UNIT	CALCULATION	M/P	F/S
Diameter	D	mm		1100	1,100
Gradient	I	-		0.0009	0.0009
Inlet Level	EL	m		0.104	0.104
Full Flow Rate	Qfull	cu.m/sec	$\pi \times D^2 / 4 \times V_{full}$	0.9275	0.9275
Full Flow Velocity	Vfull	m/sec	$1/0.013 \times (D/4)^{(2/3)} \times I^{(1/2)}$	0.976	0.976
Design Flow Rate	Q1	cu.m/sec	Daily Average	0.506	0.385
	Q2	cu.m/sec	Daily Maximum	0.632	0.466
	Q3	cu.m/sec	Hourly Maximum	0.810	0.587
Water Depth	WD1	m	Daily Average	0.579	0.494
	WD2	m	Daily Maximum	0.666	0.552
	WD3	m	Hourly Maximum	0.796	0.635
Water Level	WL1	m	Daily Average	0.683	0.598
	WL2	m	Daily Maximum	0.770	0.656
	WL3	m	Hourly Maximum	0.900	0.739

2-2 Grit Chamber and Screen

ITEM	SIGN	UNIT	CALCULATION	M/P	F/S
Type	-	-	Parallel Flow Type		
Design Flow	Q1	cu.m/day	Hourly Max.	69,918	50,738
	Q2	cu.m/sec	-	0.810	0.587
Water Surface Load	WSL	cu.m/sq.m/day	-	1,800	1,800
Required Surface Area	RSA	m ²	Q1 / WSL	38.843	28.188
Basin Number (Total)	BN	basin	-	4	3
Average Velocity	V	m/sec	-	0.30	0.30
Depth	H	m	-	0.70	0.70
Width Therefore	W1	m	Q2 / (V x H)/BN	0.964	0.932
	W2	m	-	1.00	1.00
Length Therefore	L1	m	RSA / W2 / BN	9.711	9.396
	L2	m	-	10.00	10.00
Dimension (W) (L) (Basin)	W	m	W2	1.00	1.00
	L	m	L2	10.00	10.00
	-	basin	BN	4	3
Screen Type	-	-	Coarse Bar Screen		
Screen Set Number	SSN	set	BN	4	3
Check		UNIT	APPLICATION	M/P	F/S
Water Surface Load		cu.m/sq.m/day		1,748	1,691
Average Velocity		m/sec		0.29	0.28

2-3 Pump Facility

ITEM	SIGN	UNIT	CALCULATION	M/P	F/S
Design Flow Rate	Q1	cu.m/day	Daily Average	43,699	33,242
	Q2	cu.m/day	Daily Maximum	54,624	40,240
	Q3	cu.m/day	Hourly Maximum	69,918	50,738
	Q11	cu.m/min	Daily Average	30.35	23.09
	Q22	cu.m/min	Daily Maximum	37.93	27.95
	Q33	cu.m/min	Hourly Maximum	48.55	35.24
Pump Type	-	-	Mixed Flow Pump, Vertical Shaft, Centrifugal Type		
Pump					
Pump Capacity	PC	cu.m/min		12.5	12.5
Pump Set Number	PSN	set		4	3
Total Pump Capacity	TPC	cu.m/min		50.0	37.5
Velocity at Suction	V	m/sec	1.5 -3.0	2.25	2.25
Suction Diameter of Pump	SD1	mm	$146 \times (PC/V)^{(1/2)}$	344	344
	Therefore SD2	mm	-	350	350
Actual Pump Head	APH	m	HWL-LWL	7.520	7.520
(1) High Water Level of Receiving MII	HWL	m	-	5.120	5.120
(2) Low Water Level of Pump Well	LWL	m	-	-2.400	-2.400
Head Loss around Pump	HL	m	-	1.50	1.50
Head Loss of Pressure Pipe	HLP	m	$L \times I$	4.270	4.270
(1) Hydraulic Gradient *1	I	-	-	0.00319	0.00319
(2) Transportation Distance	L	m	-	1340	1340
Total Pump Head	TPH1	m	APH+HL+HLP	13.290	13.290
	Therefore TPH2	m	-	13.5	13.5
Motor Output of Pump	MO1	kw	$(0.163 \cdot \gamma \cdot PC \cdot TPH2) / \eta \cdot (1 + \alpha) / \eta_c$	43.9	43.9
	Therefore MO2	kw	-	45.0	45.0
Pump Efficiency	η	-	-	0.72	0.72
Margin	α	-	-	0.15	0.15
Bulk Density of Wastewater	γ	-	-	1.0	1.0
Transmission Efficiency	η_G	-	-	1.0	1.0

Note: *1-Hydraulic gradient of pressure pipe is referred to next page.

Calculation for Hydraulic Gradient of Pressure Pipe

C= 110

		Diameter of Pressure Pipe			900
Set Number	Total Capacity	Item	Sign	Unit	mm
12.5 cu.m/min 1 set	12.5 cu.m/min	Velocity	V	m/sec	0.3275
		Gradient	I	‰	0.1618
12.5 cu.m/min 2 set	25.0 cu.m/min	Velocity	V	m/sec	0.6550
		Gradient	I	‰	0.5840
12.5 cu.m/min 3 set	37.5 cu.m/min	Velocity	V	m/sec	0.9824
		Gradient	I	‰	1.2374
12.5 cu.m/min 4 set	50.0 cu.m/min	Velocity	V	m/sec	1.3099
		Gradient	I	‰	2.1080
12.5 cu.m/min 5 set	62.5 cu.m/min	Velocity	V	m/sec	1.6374
		Gradient	I	‰	3.1866

Note: Hydraulic gradient of pressure pipe is calculated by using Hazen Williams' Formula as follows:

$$Q = A \cdot V$$

$$V = 0.84935 \cdot C \cdot R^{0.63} \cdot J^{0.54}$$

where Q : Flow rate (m^3 / sec)

A : Cross-sectional area of flow (m^2)

V : Flow velocity (m / sec)

C : Flow velocity coefficient ($C = 110$)

R : Hydraulic mean depth (m) = A / P

P : Wetted perimeter (m)

I : Hydraulic gradient (h / L)

h : Friction head loss

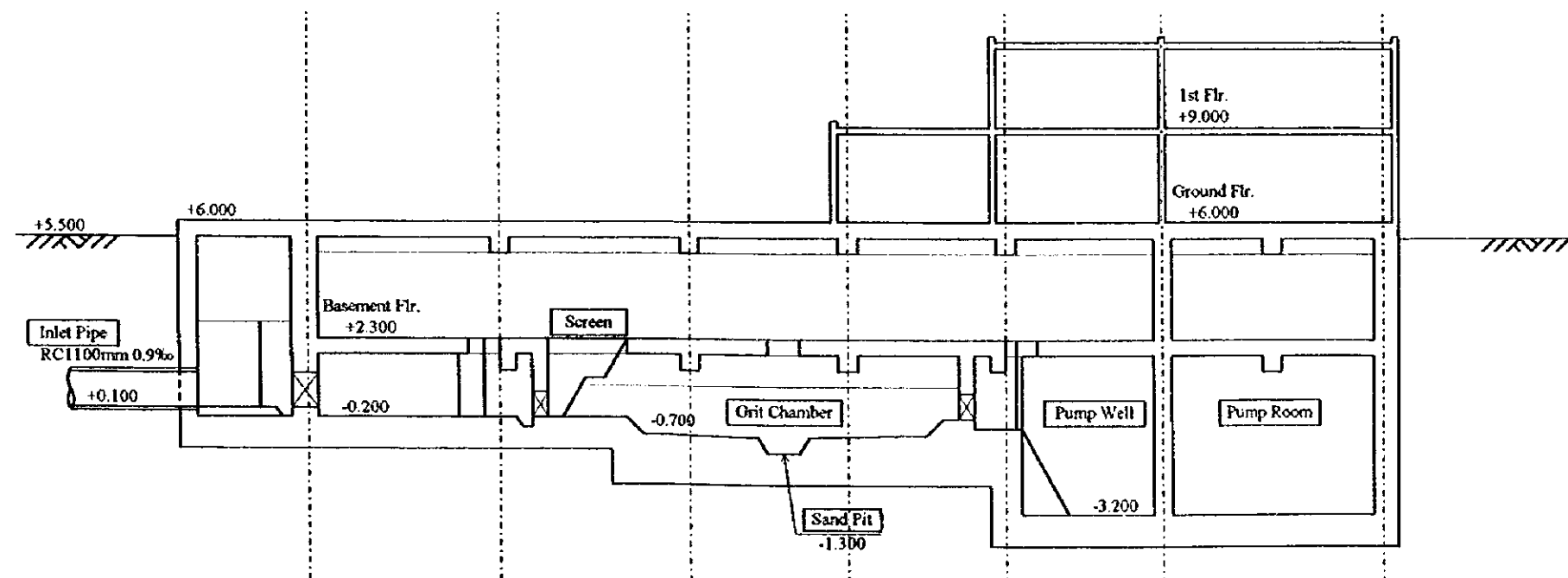
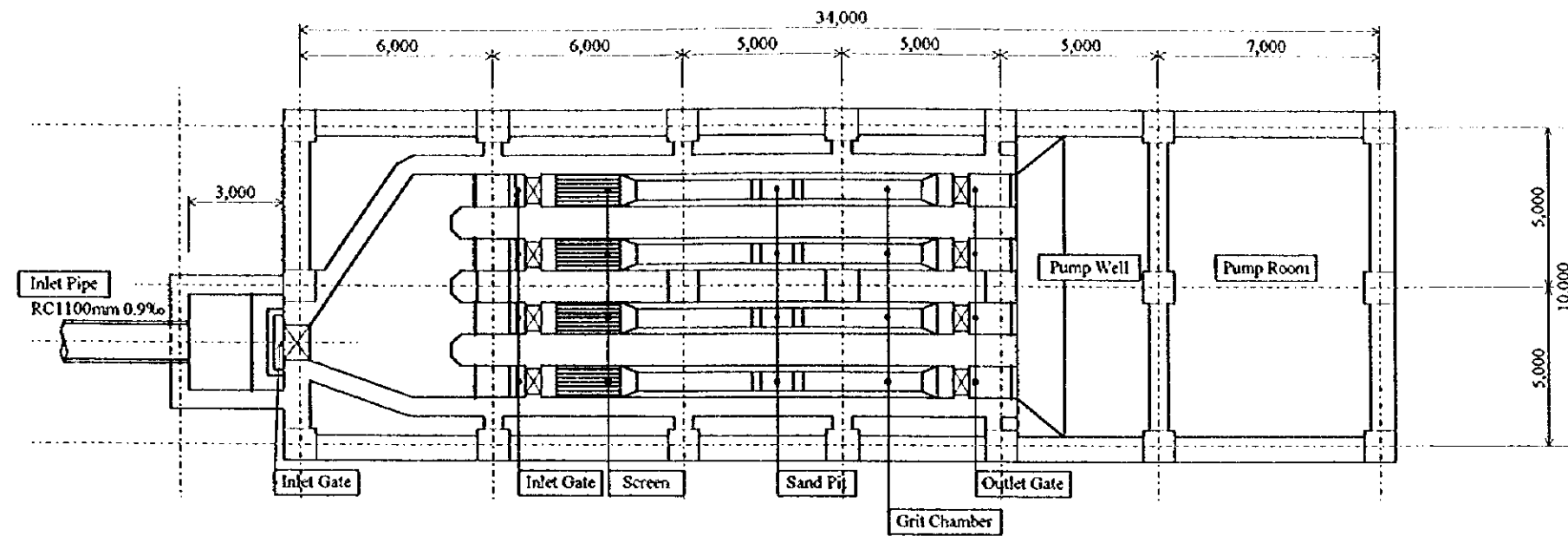


Figure 5.5.6.1
Gulshan Pump Station
The Study on the Sewerage System in North Dhaka

Appendix 5.5.7 Equipment List of Gulshan Pump Station

Item No.		Name of Equipment	Specification	Power	Quantity		Remarks
					M/P	F/S	
Gulshan Pump Station							
				Daily Average/Daily Maximum/Hourly Maximum			
				M/P 43,699/54,624/69,918m ³ /day		F/S 33,242/40,240/50,738m ³ /day	
Mechanical Equipment							
1	Inlet Gate	Manually operated Cast Iron Type	W1100mm × H1100mm	---	1	1	
2	Gate	Manually operated Cast Iron Type	W800mm × H800mm	---	8	6	
3	Screen	Hand Raked Bar Screen	W1000mm × H1200mm × Ø50mm	---	4	3	
4	Sand Pump	Submersible Sand Lifting Pump	Ø 80mm × 0.2m ³ /min × 8mH	1.5kW	1	1	For Grit Chamber
5	Chain Hoist	Motor Operated Geared Trolley Chain Hoist	0.5ton × 12mH × 12mT	2.2kW 0.4kW	1	1	For Grit Chamber
6	Suction Valve	Hand Operated Butterfly Valve	Ø 350mm	---	5	4	Include 1 Standby
7	Check Valve	Swing Check Valve	Ø 350mm	---	5	4	Include 1 Standby
8	Lifting Pump	Vertical Centrifugal Mixed Flow Pump	Ø 350mm × 12.5m ³ /min × 13mH	---	5	4	Include 1 Standby
9	Lifting Pump Motor	Wound Rotor Induction Motor	400V × 50Hz × 6P	45kW	5	4	Include 1 Standby
10	Delivery Valve	Motor Operated Butterfly Valve	Ø 350mm	0.2kW	5	4	Include 1 Standby
11	Crane	Manually operated Geared Trolley Chain Hoist	3.2ton × 15mH × 12mT	---	1	1	For Pumps
Electrical Equipment							
12	Power Receiving & Distribution Facility	Power Receiving Panel Transformer Distribution Panel	VCB 250kVA MCCB		1	1	
13	Operating Facility	Pump Panel	W700mm × H1950mm × D600mm		5	4	Include 1 Standby
14	Monitoring Instrumentation Facility	Control Panel With Water Flow Monitor & Water Level Monitor	W1000mm × H2350mm × D600mm		1	1	
15	Standby Generator	Diesel Engine Generator	250kVA		1	1	
16	Lighting Facilities	Lighting Panel & Out door Lighting	300VA × 10	10kW	1	1	
Total Electrical Power (kW)					194.9	149.7	

Appendix 5.5.8 Equipment List of Merul Pump Station

Item No.		Name of Equipment	Specification	Power	Quantity		Remarks
					M/P	F/S	
Merul Pump Station							
				Daily Average/Daily Maximum/Hourly Maximum			
				M/P 104,500/130,625/167,200m ³ /day		F/S 43,320/52,440/66,120m ³ /day	
Mechanical Equipment							
1	Inlet Gate	Manually operated Cast Iron Type	W1500mm×H1500mm	—	1	1	
2	Gate	Manually operated Cast Iron Type	W1300mm×H1300mm	—	8	4	
3	Screen	Hand Raked Bar Screen	W1700mm×H1500mm×O50mm	—	4	2	
4	Sand Pump	Submersible Sand Lifting Pump	φ 80mm×0.2m ³ /min×8mH	1.5kW	1	1	For Grit Chamber
5	Chain Hoist	Motor Operated Geared Trolley Chain Hoist	0.5ton×12mH×15mT	2.2kW 0.4kW	1	1	For Grit Chamber
6	Suction Valve	Hand Operated Butterfly Valve	φ 450mm	—	7	4	Include 1 Standby
7	Check Valve	Swing Check Valve	φ 450mm	—	7	4	Include 1 Standby
8	Lifting Pump	Vertical Centrifugal Mixed Flow Pump	φ 450mm×20m ³ /min×22mH	—	7	4	Include 1 Standby
9	Lifting Pump Motor	Wound Rotor Induction Motor	400V×50Hz×6P	110kW	7	4	Include 1 Standby
10	Delivery Valve	Motor Operated Butterfly Valve	φ 450mm	0.2kW	7	4	Include 1 Standby
11	Crane	Manually operated Geared Trolley Chain Hoist	3.2ton×15mH×15mT	—	1	1	For Pumps
Electrical Equipment							
12	Power Receiving & Distribution Facility	Power Receiving Panel Transformer Distribution Panel	VCB 500kVA MCCB		1	1	
13	Operating Facility	Pump Panel	W800mm×H1950mm×D600mm		7	4	Include 1 Standby
14	Monitoring Instrumentation Facility	Control Panel With Water Flow Monitor & Water Level Monitor	W1000mm×H2350mm×D600mm		1	1	
15	Standby Generator	Diesel Engine Generator	500kVA		2	1	
16	Lighting Facilities	Lighting Panel & Out door Lighting	300VA×10	10kW	1	1	
Total Electrical Power (kW)					675.3		344.7