Detailed Report for Tank: T-Karnaphuli

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	858.91 m	Base Elevation	2.00
Y	861.25 m	Zone	Zone-1

Connecting Pipes
P-KarlP1
P-KarlP2

Operating Range Summary			
Maximum Elevation	6.00 m	Maximum Level	4.00
Initial Elevation	4.00 m	Initial Level	2.00
Minimum Elevation	2.00 m	Minimum Level	0.00

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	2,800.0
Inactive Volume	0.00 m³	Total Active Volume	11,200.00
Total Storage Capacity	11,200.00 m³		

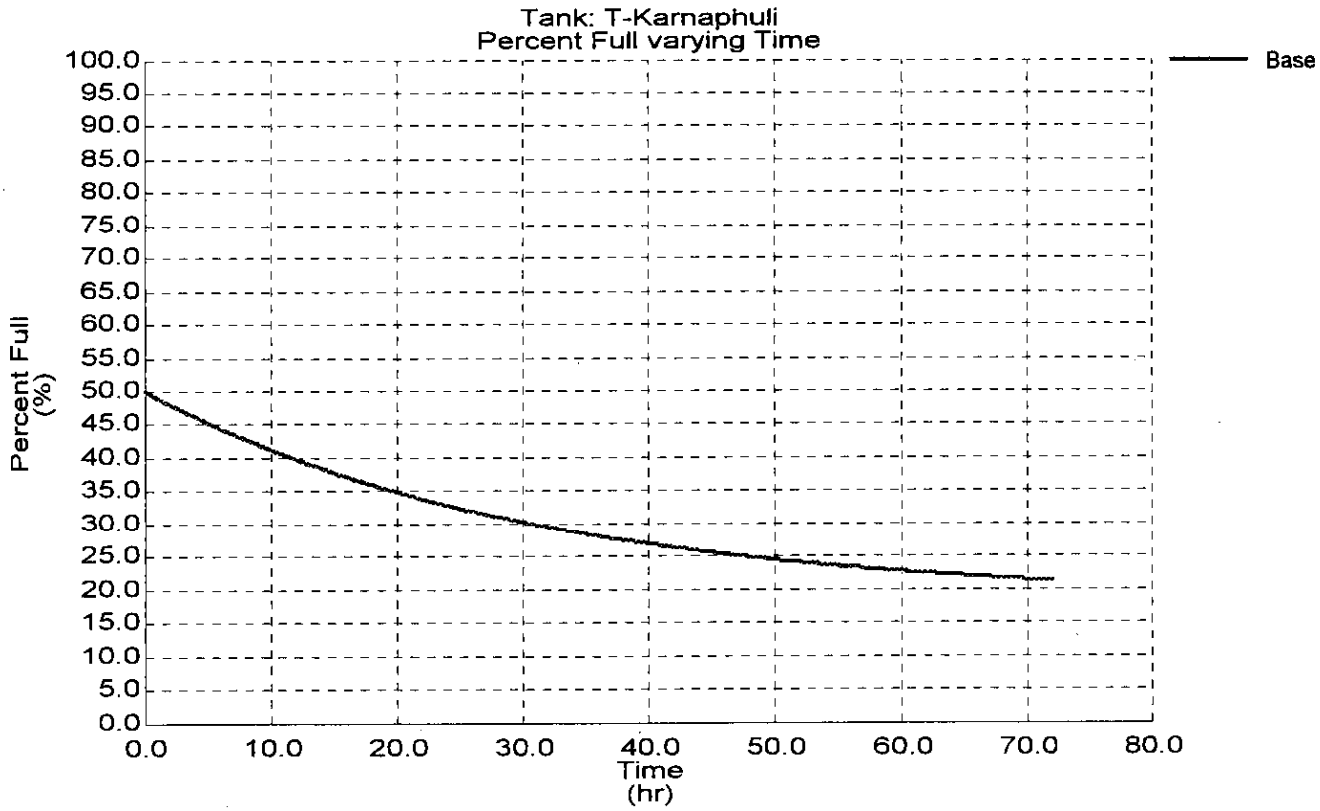
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	4.00	2.00	19.56	50.0	5,600.00	N/A	31.83	Draining
1.00 hr	N/A	3.96	1.96	19.17	49.0	5,486.91	N/A	30.82	Draining
2.00 hr	N/A	3.92	1.92	18.79	48.0	5,377.38	N/A	29.85	Draining
3.00 hr	N/A	3.88	1.88	18.42	47.1	5,271.27	N/A	28.91	Draining
4.00 hr	N/A	3.85	1.85	18.06	46.1	5,168.55	N/A	28.00	Draining
5.00 hr	N/A	3.81	1.81	17.71	45.3	5,069.03	N/A	27.12	Draining
6.00 hr	N/A	3.78	1.78	17.37	44.4	4,972.66	N/A	26.26	Draining
7.00 hr	N/A	3.74	1.74	17.05	43.6	4,879.33	N/A	25.43	Draining
8.00 hr	N/A	3.71	1.71	16.73	42.8	4,789.02	N/A	24.63	Draining
9.00 hr	N/A	3.68	1.68	16.42	42.0	4,701.51	N/A	23.85	Draining
10.00 hr	N/A	3.65	1.65	16.13	41.2	4,616.77	N/A	23.10	Draining
11.00 hr	N/A	3.62	1.62	15.84	40.5	4,534.68	N/A	22.37	Draining
12.00 hr	N/A	3.59	1.59	15.56	39.8	4,455.22	N/A	21.66	Draining
13.00 hr	N/A	3.56	1.56	15.30	39.1	4,378.27	N/A	20.97	Draining
14.00 hr	N/A	3.54	1.54	15.04	38.4	4,303.73	N/A	20.31	Draining
15.00 hr	N/A	3.51	1.51	14.78	37.8	4,231.58	N/A	19.67	Draining
16.00 hr	N/A	3.49	1.49	14.54	37.2	4,161.73	N/A	19.04	Draining
17.00 hr	N/A	3.46	1.46	14.30	36.6	4,094.08	N/A	18.44	Draining
18.00 hr	N/A	3.44	1.44	14.07	36.0	4,028.55	N/A	17.86	Draining

Detailed Report for Tank: T-Karnaphuli

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	3.42	1.42	13.85	35.4	3,965.10	N/A	17.29	Draining
20.00 hr	N/A	3.39	1.39	13.64	34.9	3,903.65	N/A	16.74	Draining
21.00 hr	N/A	3.37	1.37	13.43	34.3	3,844.16	N/A	16.21	Draining
22.00 hr	N/A	3.35	1.35	13.23	33.8	3,786.58	N/A	15.70	Draining
23.00 hr	N/A	3.33	1.33	13.03	33.3	3,730.78	N/A	15.20	Draining
24.00 hr	N/A	3.31	1.31	12.84	32.8	3,676.75	N/A	14.72	Draining
25.00 hr	N/A	3.29	1.29	12.66	32.4	3,624.44	N/A	14.25	Draining
26.00 hr	N/A	3.28	1.28	12.49	31.9	3,573.78	N/A	13.80	Draining
27.00 hr	N/A	3.26	1.26	12.31	31.5	3,524.74	N/A	13.36	Draining
28.00 hr	N/A	3.24	1.24	12.15	31.0	3,477.24	N/A	12.94	Draining
29.00 hr	N/A	3.23	1.23	11.99	30.6	3,431.26	N/A	12.53	Draining
30.00 hr	N/A	3.21	1.21	11.83	30.2	3,386.74	N/A	12.13	Draining
31.00 hr	N/A	3.19	1.19	11.68	29.9	3,343.66	N/A	11.75	Draining
32.00 hr	N/A	3.18	1.18	11.54	29.5	3,301.94	N/A	11.37	Draining
33.00 hr	N/A	3.16	1.16	11.39	29.1	3,261.52	N/A	11.01	Draining
34.00 hr	N/A	3.15	1.15	11.26	28.8	3,222.38	N/A	10.66	Draining
35.00 hr	N/A	3.14	1.14	11.13	28.4	3,184.49	N/A	10.32	Draining
36.00 hr	N/A	3.12	1.12	11.00	28.1	3,147.81	N/A	10.00	Draining
37.00 hr	N/A	3.11	1.11	10.87	27.8	3,112.29	N/A	9.68	Draining
38.00 hr	N/A	3.10	1.10	10.75	27.5	3,077.90	N/A	9.37	Draining
39.00 hr	N/A	3.09	1.09	10.64	27.2	3,044.61	N/A	9.07	Draining
40.00 hr	N/A	3.08	1.08	10.52	26.9	3,012.38	N/A	8.79	Draining
41.00 hr	N/A	3.06	1.06	10.41	26.6	2,981.15	N/A	8.51	Draining
42.00 hr	N/A	3.05	1.05	10.31	26.3	2,950.94	N/A	8.24	Draining
43.00 hr	N/A	3.04	1.04	10.21	26.1	2,921.68	N/A	7.97	Draining
44.00 hr	N/A	3.03	1.03	10.11	25.8	2,893.34	N/A	7.72	Draining
45.00 hr	N/A	3.02	1.02	10.01	25.6	2,865.92	N/A	7.48	Draining
46.00 hr	N/A	3.01	1.01	9.92	25.4	2,839.37	N/A	7.24	Draining
47.00 hr	N/A	3.00	1.00	9.83	25.1	2,813.65	N/A	7.01	Draining
48.00 hr	N/A	3.00	1.00	9.74	24.9	2,788.75	N/A	6.78	Draining
49.00 hr	N/A	2.99	0.99	9.66	24.7	2,764.64	N/A	6.57	Draining
50.00 hr	N/A	2.98	0.98	9.58	24.5	2,741.29	N/A	6.36	Draining
51.00 hr	N/A	2.97	0.97	9.50	24.3	2,718.69	N/A	6.16	Draining
52.00 hr	N/A	2.96	0.96	9.42	24.1	2,696.81	N/A	5.96	Draining
53.00 hr	N/A	2.96	0.96	9.35	23.9	2,675.62	N/A	5.77	Draining
54.00 hr	N/A	2.95	0.95	9.28	23.7	2,655.11	N/A	5.59	Draining
55.00 hr	N/A	2.94	0.94	9.21	23.5	2,635.26	N/A	5.41	Draining
56.00 hr	N/A	2.93	0.93	9.14	23.4	2,616.04	N/A	5.24	Draining
57.00 hr	N/A	2.93	0.93	9.07	23.2	2,597.43	N/A	5.07	Draining
58.00 hr	N/A	2.92	0.92	9.01	23.0	2,579.41	N/A	4.91	Draining
59.00 hr	N/A	2.91	0.91	8.95	22.9	2,561.96	N/A	4.75	Draining
60.00 hr	N/A	2.91	0.91	8.89	22.7	2,545.07	N/A	4.60	Draining
61.00 hr	N/A	2.90	0.90	8.83	22.6	2,528.71	N/A	4.46	Draining
62.00 hr	N/A	2.90	0.90	8.78	22.4	2,512.89	N/A	4.31	Draining
63.00 hr	N/A	2.89	0.89	8.73	22.3	2,497.56	N/A	4.18	Draining
64.00 hr	N/A	2.89	0.89	8.67	22.2	2,482.72	N/A	4.04	Draining
65.00 hr	N/A	2.88	0.88	8.62	22.0	2,468.36	N/A	3.92	Draining
66.00 hr	N/A	2.88	0.88	8.57	21.9	2,454.44	N/A	3.79	Draining
67.00 hr	N/A	2.87	0.87	8.53	21.8	2,440.98	N/A	3.67	Draining
68.00 hr	N/A	2.87	0.87	8.48	21.7	2,427.93	N/A	3.55	Draining
69.00 hr	N/A	2.86	0.86	8.44	21.6	2,415.31	N/A	3.44	Draining
70.00 hr	N/A	2.86	0.86	8.40	21.5	2,403.09	N/A	3.33	Draining
71.00 hr	N/A	2.85	0.85	8.35	21.4	2,391.26	N/A	3.22	Draining
72.00 hr	N/A	2.85	0.85	8.31	21.2	2,379.80	N/A	3.12	Draining


Tank: T-Karnaphuli
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Mad2-gr

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	796.32 m	Base Elevation	2.00
Y	835.48 m	Zone	Zone-1

Connecting Pipes
P-Mad2IP1
P-Mad2IP2

Operating Range Summary			
Maximum Elevation	7.00 m	Maximum Level	5.00
Initial Elevation	3.50 m	Initial Level	1.50
Minimum Elevation	2.00 m	Minimum Level	0.00

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	2,000.0
Inactive Volume	0.00 m³	Total Active Volume	10,000.00
Total Storage Capacity	10,000.00 m³		

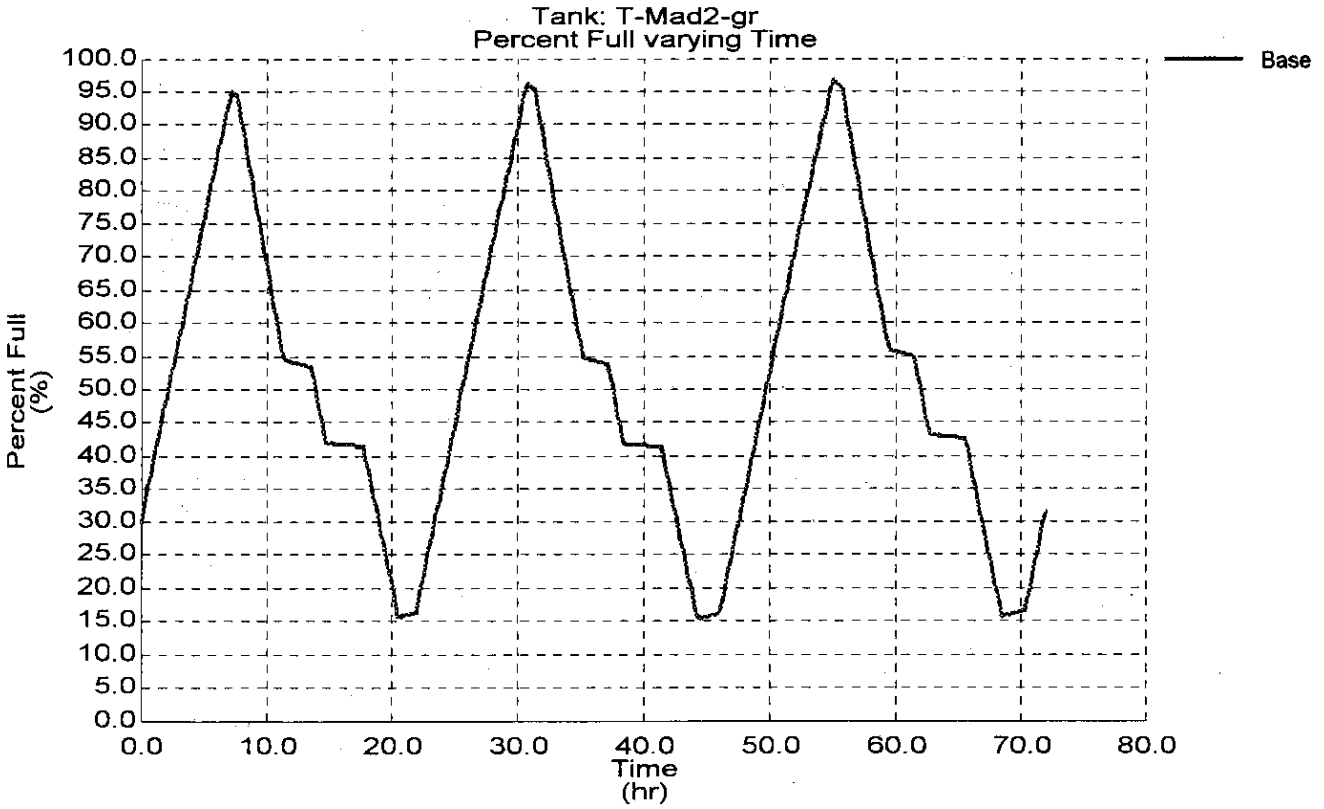
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	3.50	1.50	14.67	30.0	3,000.00	260.11	N/A	Filling
1.00 hr	N/A	3.97	1.97	19.23	39.3	3,932.22	257.30	N/A	Filling
2.00 hr	N/A	4.43	2.43	23.74	48.5	4,854.49	254.59	N/A	Filling
3.00 hr	N/A	4.88	2.88	28.21	57.7	5,767.24	251.98	N/A	Filling
4.00 hr	N/A	5.34	3.34	32.63	66.7	6,670.63	249.46	N/A	Filling
5.00 hr	N/A	5.78	3.78	37.00	75.7	7,565.17	247.02	N/A	Filling
6.00 hr	N/A	6.23	4.23	41.33	84.5	8,451.01	244.66	N/A	Filling
7.00 hr	N/A	6.66	4.66	45.63	93.3	9,328.47	242.37	N/A	Filling
8.00 hr	N/A	6.54	4.54	44.37	90.7	9,071.35	N/A	311.53	Draining
9.00 hr	N/A	5.98	3.98	38.95	79.6	7,963.92	N/A	301.95	Draining
10.00 hr	N/A	5.45	3.45	33.70	68.9	6,890.91	N/A	292.42	Draining
11.00 hr	N/A	4.93	2.93	28.62	58.5	5,851.84	N/A	282.96	Draining
12.00 hr	N/A	4.71	2.71	26.46	54.1	5,410.17	N/A	12.92	Draining
13.00 hr	N/A	4.68	2.68	26.24	53.6	5,364.10	N/A	12.62	Draining
14.00 hr	N/A	4.47	2.47	24.18	49.4	4,944.76	N/A	274.49	Draining
15.00 hr	N/A	4.10	2.10	20.50	41.9	4,191.14	N/A	4.94	Draining
16.00 hr	N/A	4.09	2.09	20.41	41.7	4,173.54	N/A	4.82	Draining
17.00 hr	N/A	4.08	2.08	20.33	41.6	4,156.36	N/A	4.71	Draining
18.00 hr	N/A	3.98	1.98	19.32	39.5	3,951.11	N/A	264.98	Draining

Detailed Report for Tank: T-Mad2-gr

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	3.51	1.51	14.73	30.1	3,010.74	N/A	255.74	Draining
20.00 hr	N/A	3.05	1.05	10.29	21.0	2,103.50	N/A	246.59	Draining
21.00 hr	N/A	2.79	0.79	7.73	15.8	1,579.52	13.06	N/A	Filling
22.00 hr	N/A	2.81	0.81	7.95	16.3	1,626.03	12.73	N/A	Filling
23.00 hr	N/A	3.28	1.28	12.54	25.6	2,564.65	261.44	N/A	Filling
24.00 hr	N/A	3.75	1.75	17.13	35.0	3,501.70	258.58	N/A	Filling
25.00 hr	N/A	4.21	2.21	21.66	44.3	4,428.59	255.83	N/A	Filling
26.00 hr	N/A	4.67	2.67	26.15	53.5	5,345.74	253.18	N/A	Filling
27.00 hr	N/A	5.13	3.13	30.59	62.5	6,253.40	250.62	N/A	Filling
28.00 hr	N/A	5.58	3.58	34.98	71.5	7,152.04	248.14	N/A	Filling
29.00 hr	N/A	6.02	4.02	39.33	80.4	8,041.88	245.75	N/A	Filling
30.00 hr	N/A	6.46	4.46	43.64	89.2	8,923.15	243.42	N/A	Filling
31.00 hr	N/A	6.80	4.80	46.91	95.9	9,591.04	N/A	38.56	Draining
32.00 hr	N/A	6.44	4.44	43.47	88.9	8,888.85	N/A	309.97	Draining
33.00 hr	N/A	5.89	3.89	38.08	77.9	7,786.77	N/A	300.39	Draining
34.00 hr	N/A	5.36	3.36	32.86	67.2	6,719.09	N/A	290.87	Draining
35.00 hr	N/A	4.84	2.84	27.81	56.9	5,685.57	N/A	281.42	Draining
36.00 hr	N/A	4.71	2.71	26.56	54.3	5,429.66	N/A	13.04	Draining
37.00 hr	N/A	4.69	2.69	26.33	53.8	5,383.15	N/A	12.74	Draining
38.00 hr	N/A	4.31	2.31	22.64	46.3	4,629.93	N/A	271.50	Draining
39.00 hr	N/A	4.09	2.09	20.42	41.8	4,175.55	N/A	4.83	Draining
40.00 hr	N/A	4.08	2.08	20.34	41.6	4,158.31	N/A	4.72	Draining
41.00 hr	N/A	4.07	2.07	20.26	41.4	4,141.49	N/A	4.61	Draining
42.00 hr	N/A	3.82	1.82	17.77	36.3	3,632.75	N/A	261.88	Draining
43.00 hr	N/A	3.35	1.35	13.22	27.0	2,703.60	N/A	252.67	Draining
44.00 hr	N/A	2.90	0.90	8.84	18.1	1,807.17	N/A	243.54	Draining
45.00 hr	N/A	2.78	0.78	7.66	15.7	1,565.29	13.16	N/A	Filling
46.00 hr	N/A	2.81	0.81	7.89	16.1	1,612.18	12.83	N/A	Filling
47.00 hr	N/A	3.22	1.22	11.94	24.4	2,441.73	261.82	N/A	Filling
48.00 hr	N/A	3.69	1.69	16.53	33.8	3,380.13	258.95	N/A	Filling
49.00 hr	N/A	4.15	2.15	21.07	43.1	4,308.34	256.19	N/A	Filling
50.00 hr	N/A	4.61	2.61	25.56	52.3	5,226.69	253.52	N/A	Filling
51.00 hr	N/A	5.07	3.07	30.01	61.4	6,135.64	250.95	N/A	Filling
52.00 hr	N/A	5.52	3.52	34.41	70.4	7,035.44	248.46	N/A	Filling
53.00 hr	N/A	5.96	3.96	38.77	79.3	7,926.41	246.05	N/A	Filling
54.00 hr	N/A	6.40	4.40	43.08	88.1	8,808.82	243.72	N/A	Filling
55.00 hr	N/A	6.84	4.84	47.36	96.8	9,682.42	N/A	39.09	Draining
56.00 hr	N/A	6.65	4.65	45.47	93.0	9,296.19	N/A	313.45	Draining
57.00 hr	N/A	6.09	4.09	40.02	81.8	8,181.77	N/A	303.85	Draining
58.00 hr	N/A	5.55	3.55	34.73	71.0	7,101.65	N/A	294.31	Draining
59.00 hr	N/A	5.03	3.03	29.62	60.6	6,055.79	N/A	284.84	Draining
60.00 hr	N/A	4.78	2.78	27.22	55.7	5,565.68	N/A	13.92	Draining
61.00 hr	N/A	4.76	2.76	26.98	55.2	5,516.04	N/A	13.60	Draining
62.00 hr	N/A	4.50	2.50	24.42	49.9	4,993.60	N/A	274.95	Draining
63.00 hr	N/A	4.15	2.15	21.06	43.1	4,306.69	N/A	5.71	Draining
64.00 hr	N/A	4.14	2.14	20.96	42.9	4,286.35	N/A	5.57	Draining
65.00 hr	N/A	4.13	2.13	20.87	42.7	4,266.49	N/A	5.44	Draining
66.00 hr	N/A	3.94	1.94	19.02	38.9	3,889.07	N/A	264.38	Draining
67.00 hr	N/A	3.48	1.48	14.43	29.5	2,950.96	N/A	255.14	Draining
68.00 hr	N/A	3.02	1.02	10.01	20.5	2,045.65	N/A	245.99	Draining
69.00 hr	N/A	2.80	0.80	7.79	15.9	1,592.37	12.97	N/A	Filling
70.00 hr	N/A	2.82	0.82	8.01	16.4	1,638.58	12.64	N/A	Filling
71.00 hr	N/A	3.10	1.10	10.72	21.9	2,192.06	262.60	N/A	Filling
72.00 hr	N/A	3.57	1.57	15.32	31.3	3,133.22	259.70	N/A	Filling


Tank: T-Mad2-gr
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Mad2-el

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	748.59 m	Base Elevation	5.00
Y	835.06 m	Zone	Zone-1

Connecting Pipes
P-Mad2IP4
P-3001

Operating Range Summary			
Maximum Elevation	36.00 m	Maximum Level	31.00
Initial Elevation	33.50 m	Initial Level	28.50
Minimum Elevation	30.00 m	Minimum Level	25.00

Storage Summary			
Type	Constant Area	Cross Section	Circular
Tank Diameter	18.00 m	Average Area	254.5
Inactive Volume	0.00 m³	Total Active Volume	1,526.81
Total Storage Capacity	1,526.81 m³		

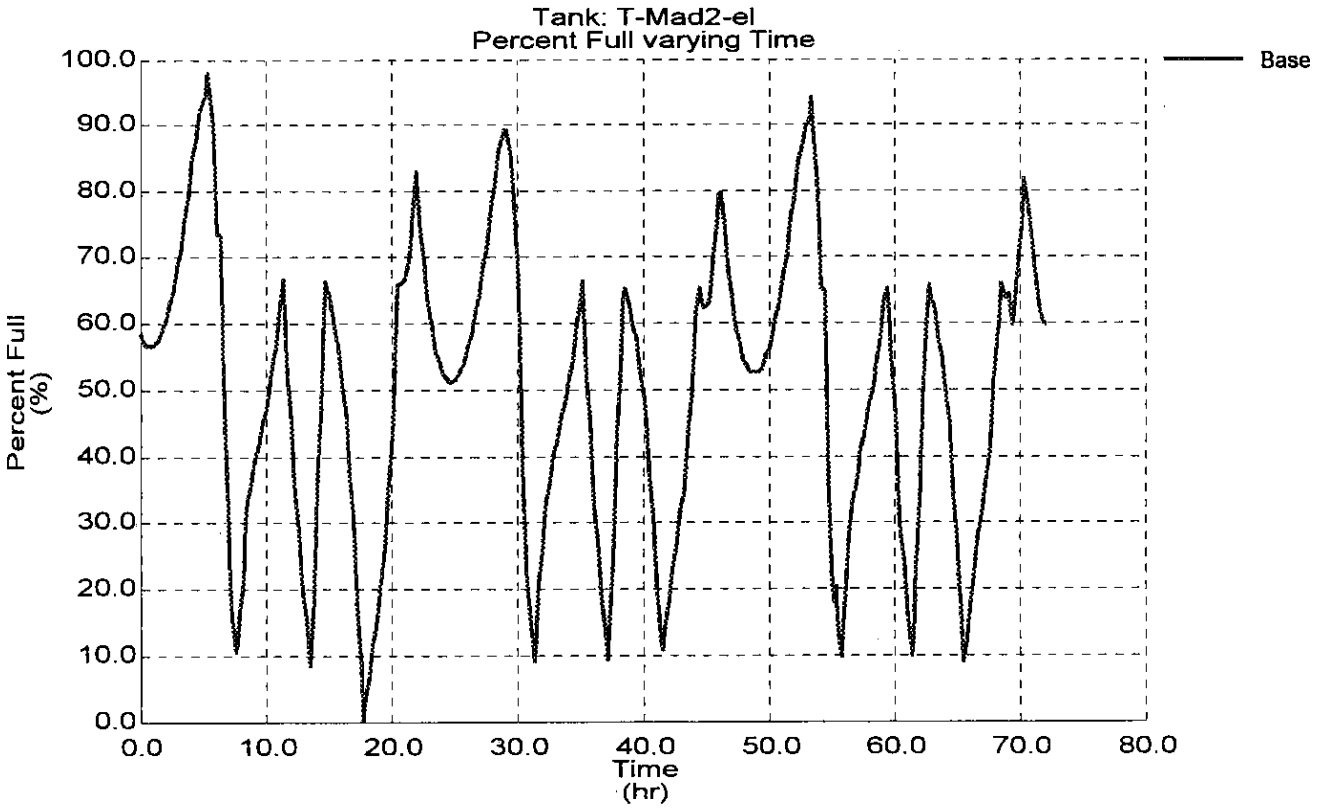
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	33.50	28.50	278.78	58.3	890.64	N/A	16.83	Draining
1.00 hr	N/A	33.40	28.40	277.78	56.6	864.60	2.86	N/A	Filling
2.00 hr	N/A	33.61	28.61	279.87	60.2	918.77	26.14	N/A	Filling
3.00 hr	N/A	34.12	29.12	284.87	68.7	1,049.00	45.65	N/A	Filling
4.00 hr	N/A	34.91	29.91	292.62	81.9	1,250.62	68.75	N/A	Filling
5.00 hr	N/A	35.62	30.62	299.57	93.7	1,431.37	21.05	N/A	Filling
6.00 hr	N/A	34.98	29.98	293.25	83.0	1,266.91	N/A	200.89	Draining
7.00 hr	N/A	31.93	26.93	263.46	32.2	491.92	N/A	341.63	Draining
8.00 hr	N/A	31.00	26.00	254.29	16.6	253.45	96.35	N/A	Filling
9.00 hr	N/A	32.28	27.28	266.81	37.9	579.07	41.55	N/A	Filling
10.00 hr	N/A	32.82	27.82	272.14	47.0	717.85	41.17	N/A	Filling
11.00 hr	N/A	33.56	28.56	279.36	59.3	905.60	71.29	N/A	Filling
12.00 hr	N/A	32.74	27.74	271.36	45.7	697.47	N/A	128.04	Draining
13.00 hr	N/A	31.19	26.19	256.18	19.8	302.57	N/A	87.69	Draining
14.00 hr	N/A	31.65	26.65	260.72	27.6	420.81	211.13	N/A	Filling
15.00 hr	N/A	33.87	28.87	282.38	64.5	984.27	N/A	35.74	Draining
16.00 hr	N/A	33.21	28.21	275.91	53.4	815.88	N/A	66.98	Draining
17.00 hr	N/A	31.81	26.81	262.26	30.2	460.83	N/A	142.05	Draining
18.00 hr	N/A	30.20	25.20	246.48	3.3	50.30	63.78	N/A	Filling

Detailed Report for Tank: T-Mad2-el

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	31.05	26.05	254.78	17.4	266.14	62.54	N/A	Filling
20.00 hr	N/A	32.49	27.49	268.89	41.5	633.16	140.47	N/A	Filling
21.00 hr	N/A	33.98	28.98	283.48	66.3	1,012.77	9.07	N/A	Filling
22.00 hr	N/A	34.98	29.98	293.28	83.0	1,267.83	127.09	N/A	Filling
23.00 hr	N/A	33.78	28.78	281.48	62.9	960.76	N/A	62.50	Draining
24.00 hr	N/A	33.20	28.20	275.81	53.3	813.19	N/A	21.12	Draining
25.00 hr	N/A	33.08	28.08	274.72	51.4	785.02	4.33	N/A	Filling
26.00 hr	N/A	33.32	28.32	276.97	55.3	843.58	27.57	N/A	Filling
27.00 hr	N/A	33.84	28.84	282.15	64.1	978.22	46.51	N/A	Filling
28.00 hr	N/A	34.66	29.66	290.11	77.6	1,185.29	69.58	N/A	Filling
29.00 hr	N/A	35.36	30.36	296.93	89.3	1,362.81	22.33	N/A	Filling
30.00 hr	N/A	34.17	29.17	285.36	69.5	1,061.73	N/A	199.65	Draining
31.00 hr	N/A	31.08	26.08	255.08	18.0	274.13	N/A	60.70	Draining
32.00 hr	N/A	31.52	26.52	259.45	25.4	387.63	94.93	N/A	Filling
33.00 hr	N/A	32.43	27.43	268.36	40.6	619.48	38.58	N/A	Filling
34.00 hr	N/A	32.99	27.99	273.78	49.8	760.45	39.62	N/A	Filling
35.00 hr	N/A	33.78	28.78	281.54	63.0	962.24	69.75	N/A	Filling
36.00 hr	N/A	32.30	27.30	267.05	38.3	585.37	N/A	127.91	Draining
37.00 hr	N/A	30.80	25.80	252.40	13.4	204.27	N/A	87.57	Draining
38.00 hr	N/A	32.62	27.62	270.19	43.7	667.18	208.14	N/A	Filling
39.00 hr	N/A	33.69	28.69	280.60	61.4	937.85	N/A	35.84	Draining
40.00 hr	N/A	32.97	27.97	273.62	49.5	756.23	N/A	67.09	Draining
41.00 hr	N/A	31.49	26.49	259.10	24.8	378.50	N/A	142.15	Draining
42.00 hr	N/A	31.07	26.07	255.02	17.8	272.47	59.71	N/A	Filling
43.00 hr	N/A	31.91	26.91	263.22	31.8	485.73	59.47	N/A	Filling
44.00 hr	N/A	33.31	28.31	276.95	55.2	843.00	137.42	N/A	Filling
45.00 hr	N/A	33.76	28.76	281.35	62.7	957.52	8.97	N/A	Filling
46.00 hr	N/A	34.76	29.76	291.14	79.4	1,212.20	127.00	N/A	Filling
47.00 hr	N/A	33.85	28.85	282.21	64.2	979.75	N/A	62.89	Draining
48.00 hr	N/A	33.26	28.26	276.48	54.4	830.84	N/A	21.49	Draining
49.00 hr	N/A	33.15	28.15	275.34	52.5	801.19	3.97	N/A	Filling
50.00 hr	N/A	33.37	28.37	277.55	56.2	858.54	27.75	N/A	Filling
51.00 hr	N/A	33.90	28.90	282.72	65.0	992.96	46.68	N/A	Filling
52.00 hr	N/A	34.72	29.72	290.76	78.7	1,202.28	69.75	N/A	Filling
53.00 hr	N/A	35.38	30.38	297.19	89.7	1,369.52	22.02	N/A	Filling
54.00 hr	N/A	34.48	29.48	288.39	74.7	1,140.63	N/A	199.95	Draining
55.00 hr	N/A	31.25	26.25	256.77	20.8	318.01	N/A	60.17	Draining
56.00 hr	N/A	30.87	25.87	253.05	14.5	221.18	98.17	N/A	Filling
57.00 hr	N/A	32.16	27.16	265.63	35.9	548.41	42.04	N/A	Filling
58.00 hr	N/A	32.84	27.84	272.31	47.3	722.33	43.06	N/A	Filling
59.00 hr	N/A	33.60	28.60	279.80	60.1	917.09	73.16	N/A	Filling
60.00 hr	N/A	32.87	27.87	272.65	47.9	731.08	N/A	127.04	Draining
61.00 hr	N/A	31.17	26.17	255.97	19.5	297.27	N/A	86.72	Draining
62.00 hr	N/A	31.97	26.97	263.78	32.8	500.30	211.58	N/A	Filling
63.00 hr	N/A	33.83	28.83	282.01	63.8	974.69	N/A	34.97	Draining
64.00 hr	N/A	33.12	28.12	275.07	52.0	794.11	N/A	66.24	Draining
65.00 hr	N/A	31.64	26.64	260.56	27.3	416.67	N/A	141.32	Draining
66.00 hr	N/A	30.88	25.88	253.13	14.6	223.17	64.06	N/A	Filling
67.00 hr	N/A	31.86	26.86	262.71	30.9	472.50	61.94	N/A	Filling
68.00 hr	N/A	33.06	28.06	274.50	51.0	779.19	139.87	N/A	Filling
69.00 hr	N/A	33.83	28.83	282.00	63.8	974.38	9.16	N/A	Filling
70.00 hr	N/A	34.32	29.32	286.76	71.9	1,098.18	127.18	N/A	Filling
71.00 hr	N/A	34.39	29.39	287.49	73.2	1,117.00	N/A	63.66	Draining
72.00 hr	N/A	33.59	28.59	279.64	59.8	912.93	N/A	22.23	Draining


Tank: T-Mad2-el
Percent Full varying Time
Base
Percent Full (%)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Mohara

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	780.69 m	Base Elevation	2.00
Y	797.98 m	Zone	Zone-1

Connecting Pipes
P-MohIP1
P-MohIP2

Operating Range Summary			
Maximum Elevation	5.33 m	Maximum Level	3.33
Initial Elevation	4.00 m	Initial Level	2.00
Minimum Elevation	2.45 m	Minimum Level	0.45

Storage Summary			
Type	Constant Area	Cross Section	Circular
Tank Diameter	3,498.00 m	Average Area	9,610,135.4
Inactive Volume	0.00 m³	Total Active Volume	27,677,188.78
Total Storage Capacity	27,677,188.78 m³		

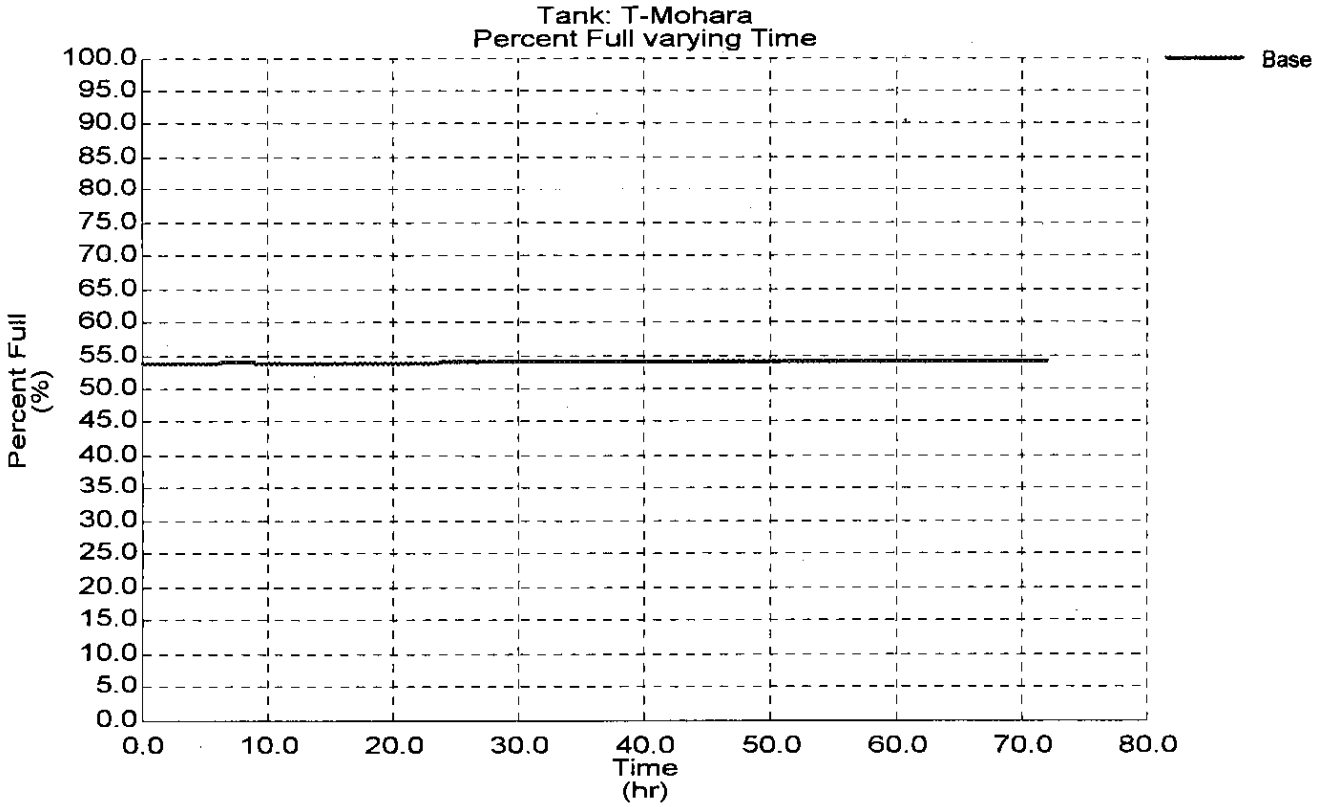
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	4.00	2.00	19.56	53.8	14,895,709.53	155.85	N/A	Filling
1.00 hr	N/A	4.00	2.00	19.57	53.8	14,897,720.83	600.00	N/A	Filling
2.00 hr	N/A	4.00	2.00	19.57	53.8	14,899,947.23	635.90	N/A	Filling
3.00 hr	N/A	4.00	2.00	19.57	53.8	14,902,290.96	663.72	N/A	Filling
4.00 hr	N/A	4.00	2.00	19.57	53.9	14,904,735.25	698.72	N/A	Filling
5.00 hr	N/A	4.00	2.00	19.58	53.9	14,907,129.25	613.47	N/A	Filling
6.00 hr	N/A	4.00	2.00	19.58	53.9	14,908,919.87	232.06	N/A	Filling
7.00 hr	N/A	4.00	2.00	19.58	53.9	14,909,662.93	N/A	11.14	Draining
8.00 hr	N/A	4.00	2.00	19.58	53.9	14,909,567.95	N/A	89.24	Draining
9.00 hr	N/A	4.00	2.00	19.58	53.9	14,909,241.12	N/A	104.77	Draining
10.00 hr	N/A	4.00	2.00	19.58	53.9	14,908,864.00	N/A	103.28	Draining
11.00 hr	N/A	4.00	2.00	19.58	53.9	14,908,503.64	N/A	96.91	Draining
12.00 hr	N/A	4.00	2.00	19.58	53.9	14,908,174.01	N/A	83.36	Draining
13.00 hr	N/A	4.00	2.00	19.58	53.9	14,907,886.28	N/A	73.79	Draining
14.00 hr	N/A	4.00	2.00	19.58	53.9	14,907,634.87	N/A	63.75	Draining
15.00 hr	N/A	4.00	2.00	19.58	53.9	14,907,422.57	N/A	53.24	Draining
16.00 hr	N/A	4.00	2.00	19.58	53.9	14,907,215.85	N/A	60.61	Draining
17.00 hr	N/A	4.00	2.00	19.58	53.9	14,906,972.82	N/A	76.57	Draining
18.00 hr	N/A	4.00	2.00	19.57	53.9	14,906,676.71	N/A	89.20	Draining

Detailed Report for Tank: T-Mohara

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	4.00	2.00	19.57	53.9	14,906,355.46	N/A	89.25	Draining
20.00 hr	N/A	4.00	2.00	19.57	53.9	14,906,070.53	N/A	70.93	Draining
21.00 hr	N/A	4.00	2.00	19.57	53.9	14,905,897.33	N/A	17.02	Draining
22.00 hr	N/A	4.00	2.00	19.57	53.9	14,906,391.77	395.39	N/A	Filling
23.00 hr	N/A	4.00	2.00	19.58	53.9	14,908,034.34	495.90	N/A	Filling
24.00 hr	N/A	4.00	2.00	19.58	53.9	14,909,945.07	561.41	N/A	Filling
25.00 hr	N/A	4.00	2.00	19.58	53.9	14,912,042.97	600.00	N/A	Filling
26.00 hr	N/A	4.00	2.00	19.58	53.9	14,914,269.37	635.90	N/A	Filling
27.00 hr	N/A	4.00	2.00	19.59	53.9	14,916,610.30	663.72	N/A	Filling
28.00 hr	N/A	4.00	2.00	19.59	53.9	14,919,060.18	698.72	N/A	Filling
29.00 hr	N/A	4.00	2.00	19.59	53.9	14,921,440.22	613.47	N/A	Filling
30.00 hr	N/A	4.00	2.00	19.59	53.9	14,922,996.18	232.06	N/A	Filling
31.00 hr	N/A	4.00	2.00	19.59	53.9	14,923,356.54	N/A	11.14	Draining
32.00 hr	N/A	4.00	2.00	19.59	53.9	14,923,102.33	N/A	89.27	Draining
33.00 hr	N/A	4.00	2.00	19.59	53.9	14,922,755.94	N/A	105.37	Draining
34.00 hr	N/A	4.00	2.00	19.59	53.9	14,922,378.82	N/A	103.84	Draining
35.00 hr	N/A	4.00	2.00	19.59	53.9	14,922,018.46	N/A	97.42	Draining
36.00 hr	N/A	4.00	2.00	19.59	53.9	14,921,694.42	N/A	83.73	Draining
37.00 hr	N/A	4.00	2.00	19.59	53.9	14,921,409.49	N/A	74.05	Draining
38.00 hr	N/A	4.00	2.00	19.59	53.9	14,921,160.87	N/A	63.92	Draining
39.00 hr	N/A	4.00	2.00	19.59	53.9	14,920,948.56	N/A	53.35	Draining
40.00 hr	N/A	4.00	2.00	19.59	53.9	14,920,744.64	N/A	60.83	Draining
41.00 hr	N/A	4.00	2.00	19.59	53.9	14,920,496.02	N/A	76.95	Draining
42.00 hr	N/A	4.00	2.00	19.59	53.9	14,920,199.91	N/A	89.58	Draining
43.00 hr	N/A	4.00	2.00	19.59	53.9	14,919,878.66	N/A	89.57	Draining
44.00 hr	N/A	4.00	2.00	19.59	53.9	14,919,582.56	N/A	71.23	Draining
45.00 hr	N/A	4.00	2.00	19.59	53.9	14,919,414.95	N/A	17.17	Draining
46.00 hr	N/A	4.00	2.00	19.59	53.9	14,919,878.66	395.39	N/A	Filling
47.00 hr	N/A	4.00	2.00	19.59	53.9	14,921,459.77	495.90	N/A	Filling
48.00 hr	N/A	4.00	2.00	19.59	53.9	14,923,367.71	561.41	N/A	Filling
49.00 hr	N/A	4.00	2.00	19.59	53.9	14,925,465.61	600.00	N/A	Filling
50.00 hr	N/A	4.00	2.00	19.60	53.9	14,927,692.01	635.90	N/A	Filling
51.00 hr	N/A	4.00	2.00	19.60	53.9	14,930,035.73	663.72	N/A	Filling
52.00 hr	N/A	4.00	2.00	19.60	54.0	14,932,488.40	698.72	N/A	Filling
53.00 hr	N/A	4.00	2.00	19.60	54.0	14,934,854.48	613.47	N/A	Filling
54.00 hr	N/A	4.00	2.00	19.61	54.0	14,936,530.56	232.06	N/A	Filling
55.00 hr	N/A	4.00	2.00	19.61	54.0	14,937,187.03	N/A	11.14	Draining
56.00 hr	N/A	4.00	2.00	19.61	54.0	14,937,119.98	N/A	89.34	Draining
57.00 hr	N/A	4.00	2.00	19.61	54.0	14,936,790.35	N/A	104.89	Draining
58.00 hr	N/A	4.00	2.00	19.61	54.0	14,936,421.61	N/A	103.23	Draining
59.00 hr	N/A	4.00	2.00	19.60	54.0	14,936,058.46	N/A	96.85	Draining
60.00 hr	N/A	4.00	2.00	19.60	54.0	14,935,723.25	N/A	83.51	Draining
61.00 hr	N/A	4.00	2.00	19.60	54.0	14,935,424.34	N/A	74.27	Draining
62.00 hr	N/A	4.00	2.00	19.60	54.0	14,935,170.14	N/A	64.37	Draining
63.00 hr	N/A	4.00	2.00	19.60	54.0	14,934,946.66	N/A	53.92	Draining
64.00 hr	N/A	4.00	2.00	19.60	54.0	14,934,734.36	N/A	61.50	Draining
65.00 hr	N/A	4.00	2.00	19.60	54.0	14,934,482.94	N/A	77.63	Draining
66.00 hr	N/A	4.00	2.00	19.60	54.0	14,934,198.01	N/A	89.89	Draining
67.00 hr	N/A	4.00	2.00	19.60	54.0	14,933,882.35	N/A	89.65	Draining
68.00 hr	N/A	4.00	2.00	19.60	54.0	14,933,575.06	N/A	71.77	Draining
69.00 hr	N/A	4.00	2.00	19.60	54.0	14,933,362.76	N/A	18.44	Draining
70.00 hr	N/A	4.00	2.00	19.60	54.0	14,933,376.73	66.99	N/A	Filling
71.00 hr	N/A	4.00	2.00	19.60	54.0	14,934,862.86	495.90	N/A	Filling
72.00 hr	N/A	4.00	2.00	19.61	54.0	14,936,681.41	561.41	N/A	Filling


Tank: T-Mohara
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-New Mohara

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	743.61 m	Base Elevation	2.00
Y	778.27 m	Zone	Zone-1

Connecting Pipes
P-NMolP2
P-NMolP1

Operating Range Summary			
Maximum Elevation	5.33 m	Maximum Level	3.33
Initial Elevation	4.50 m	Initial Level	2.50
Minimum Elevation	2.45 m	Minimum Level	0.45

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	1,166.0
Inactive Volume	0.00 m³	Total Active Volume	3,358.08
Total Storage Capacity	3,358.08 m³		

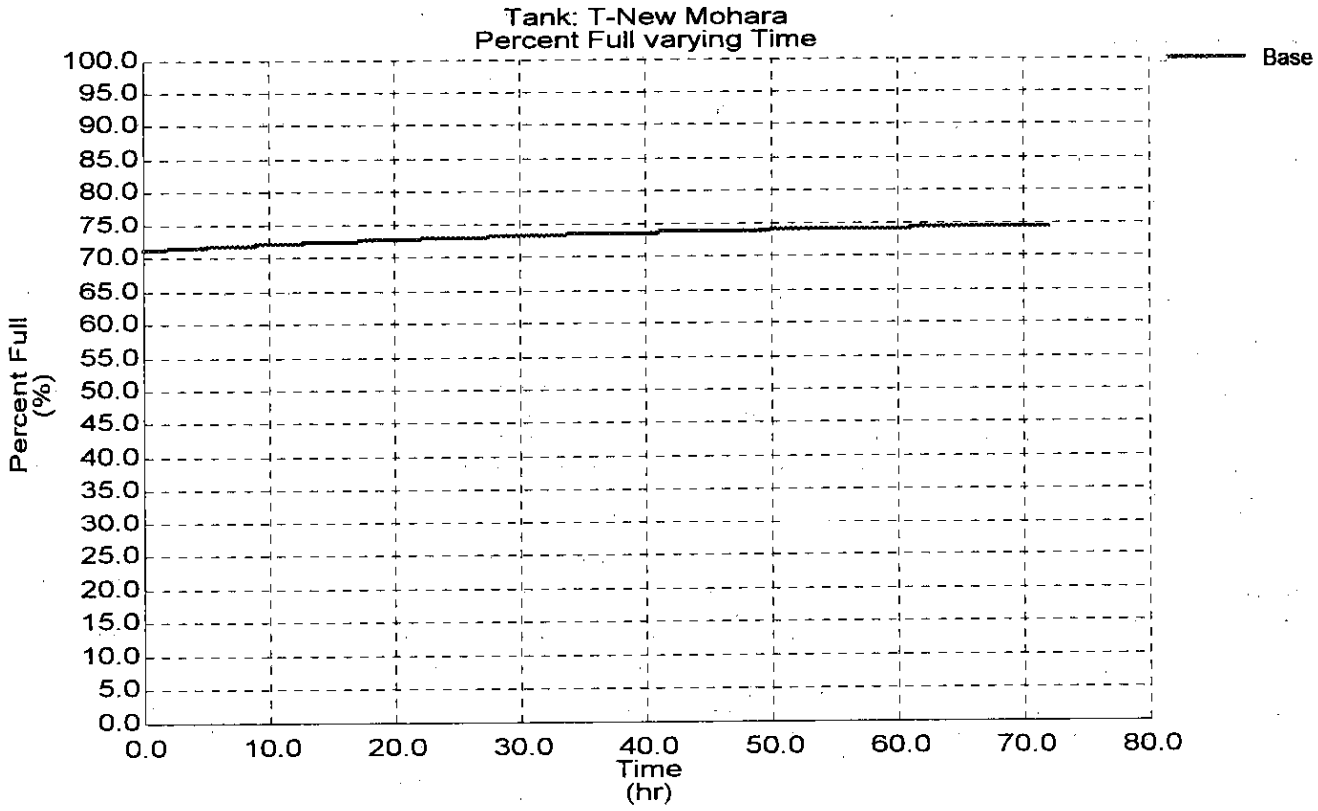
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	4.50	2.50	24.45	71.2	2,390.30	0.86	N/A	Filling
1.00 hr	N/A	4.50	2.50	24.48	71.3	2,393.38	0.84	N/A	Filling
2.00 hr	N/A	4.51	2.51	24.51	71.4	2,396.39	0.82	N/A	Filling
3.00 hr	N/A	4.51	2.51	24.53	71.4	2,399.33	0.81	N/A	Filling
4.00 hr	N/A	4.51	2.51	24.55	71.5	2,402.20	0.79	N/A	Filling
5.00 hr	N/A	4.51	2.51	24.58	71.6	2,405.01	0.77	N/A	Filling
6.00 hr	N/A	4.51	2.51	24.60	71.7	2,407.75	0.75	N/A	Filling
7.00 hr	N/A	4.52	2.52	24.62	71.8	2,410.43	0.73	N/A	Filling
8.00 hr	N/A	4.52	2.52	24.65	71.9	2,413.04	0.72	N/A	Filling
9.00 hr	N/A	4.52	2.52	24.67	71.9	2,415.60	0.70	N/A	Filling
10.00 hr	N/A	4.52	2.52	24.69	72.0	2,418.10	0.68	N/A	Filling
11.00 hr	N/A	4.53	2.53	24.71	72.1	2,420.54	0.67	N/A	Filling
12.00 hr	N/A	4.53	2.53	24.73	72.2	2,422.93	0.65	N/A	Filling
13.00 hr	N/A	4.53	2.53	24.75	72.2	2,425.26	0.64	N/A	Filling
14.00 hr	N/A	4.53	2.53	24.77	72.3	2,427.54	0.62	N/A	Filling
15.00 hr	N/A	4.53	2.53	24.79	72.4	2,429.77	0.61	N/A	Filling
16.00 hr	N/A	4.54	2.54	24.80	72.4	2,431.94	0.60	N/A	Filling
17.00 hr	N/A	4.54	2.54	24.82	72.5	2,434.07	0.58	N/A	Filling
18.00 hr	N/A	4.54	2.54	24.84	72.5	2,436.14	0.57	N/A	Filling

Detailed Report for Tank: T-New Mohara

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	4.54	2.54	24.86	72.6	2,438.17	0.56	N/A	Filling
20.00 hr	N/A	4.54	2.54	24.87	72.7	2,440.16	0.54	N/A	Filling
21.00 hr	N/A	4.54	2.54	24.89	72.7	2,442.09	0.53	N/A	Filling
22.00 hr	N/A	4.55	2.55	24.91	72.8	2,443.99	0.52	N/A	Filling
23.00 hr	N/A	4.55	2.55	24.92	72.8	2,445.84	0.51	N/A	Filling
24.00 hr	N/A	4.55	2.55	24.94	72.9	2,447.65	0.50	N/A	Filling
25.00 hr	N/A	4.55	2.55	24.95	72.9	2,449.41	0.48	N/A	Filling
26.00 hr	N/A	4.55	2.55	24.97	73.0	2,451.14	0.47	N/A	Filling
27.00 hr	N/A	4.55	2.55	24.98	73.0	2,452.83	0.46	N/A	Filling
28.00 hr	N/A	4.56	2.56	24.99	73.1	2,454.47	0.45	N/A	Filling
29.00 hr	N/A	4.56	2.56	25.01	73.1	2,456.08	0.44	N/A	Filling
30.00 hr	N/A	4.56	2.56	25.02	73.2	2,457.66	0.43	N/A	Filling
31.00 hr	N/A	4.56	2.56	25.03	73.2	2,459.20	0.42	N/A	Filling
32.00 hr	N/A	4.56	2.56	25.05	73.3	2,460.70	0.41	N/A	Filling
33.00 hr	N/A	4.56	2.56	25.06	73.3	2,462.16	0.40	N/A	Filling
34.00 hr	N/A	4.56	2.56	25.07	73.4	2,463.60	0.39	N/A	Filling
35.00 hr	N/A	4.56	2.56	25.08	73.4	2,465.00	0.38	N/A	Filling
36.00 hr	N/A	4.57	2.57	25.09	73.4	2,466.37	0.38	N/A	Filling
37.00 hr	N/A	4.57	2.57	25.10	73.5	2,467.71	0.37	N/A	Filling
38.00 hr	N/A	4.57	2.57	25.12	73.5	2,469.02	0.36	N/A	Filling
39.00 hr	N/A	4.57	2.57	25.13	73.6	2,470.29	0.35	N/A	Filling
40.00 hr	N/A	4.57	2.57	25.14	73.6	2,471.54	0.34	N/A	Filling
41.00 hr	N/A	4.57	2.57	25.15	73.6	2,472.76	0.33	N/A	Filling
42.00 hr	N/A	4.57	2.57	25.16	73.7	2,473.95	0.33	N/A	Filling
43.00 hr	N/A	4.57	2.57	25.17	73.7	2,475.12	0.32	N/A	Filling
44.00 hr	N/A	4.57	2.57	25.18	73.7	2,476.26	0.31	N/A	Filling
45.00 hr	N/A	4.57	2.57	25.19	73.8	2,477.37	0.30	N/A	Filling
46.00 hr	N/A	4.58	2.58	25.19	73.8	2,478.45	0.30	N/A	Filling
47.00 hr	N/A	4.58	2.58	25.20	73.8	2,479.52	0.29	N/A	Filling
48.00 hr	N/A	4.58	2.58	25.21	73.9	2,480.55	0.28	N/A	Filling
49.00 hr	N/A	4.58	2.58	25.22	73.9	2,481.57	0.28	N/A	Filling
50.00 hr	N/A	4.58	2.58	25.23	73.9	2,482.56	0.27	N/A	Filling
51.00 hr	N/A	4.58	2.58	25.24	74.0	2,483.53	0.27	N/A	Filling
52.00 hr	N/A	4.58	2.58	25.24	74.0	2,484.47	0.26	N/A	Filling
53.00 hr	N/A	4.58	2.58	25.25	74.0	2,485.39	0.25	N/A	Filling
54.00 hr	N/A	4.58	2.58	25.26	74.0	2,486.30	0.25	N/A	Filling
55.00 hr	N/A	4.58	2.58	25.27	74.1	2,487.18	0.24	N/A	Filling
56.00 hr	N/A	4.58	2.58	25.27	74.1	2,488.04	0.24	N/A	Filling
57.00 hr	N/A	4.58	2.58	25.28	74.1	2,488.89	0.23	N/A	Filling
58.00 hr	N/A	4.59	2.59	25.29	74.1	2,489.71	0.23	N/A	Filling
59.00 hr	N/A	4.59	2.59	25.30	74.2	2,490.51	0.22	N/A	Filling
60.00 hr	N/A	4.59	2.59	25.30	74.2	2,491.30	0.22	N/A	Filling
61.00 hr	N/A	4.59	2.59	25.31	74.2	2,492.07	0.21	N/A	Filling
62.00 hr	N/A	4.59	2.59	25.31	74.2	2,492.82	0.21	N/A	Filling
63.00 hr	N/A	4.59	2.59	25.32	74.3	2,493.55	0.20	N/A	Filling
64.00 hr	N/A	4.59	2.59	25.33	74.3	2,494.27	0.20	N/A	Filling
65.00 hr	N/A	4.59	2.59	25.33	74.3	2,494.97	0.19	N/A	Filling
66.00 hr	N/A	4.59	2.59	25.34	74.3	2,495.65	0.19	N/A	Filling
67.00 hr	N/A	4.59	2.59	25.34	74.3	2,496.32	0.18	N/A	Filling
68.00 hr	N/A	4.59	2.59	25.35	74.4	2,496.97	0.18	N/A	Filling
69.00 hr	N/A	4.59	2.59	25.35	74.4	2,497.61	0.17	N/A	Filling
70.00 hr	N/A	4.59	2.59	25.36	74.4	2,498.23	0.17	N/A	Filling
71.00 hr	N/A	4.59	2.59	25.37	74.4	2,498.84	0.17	N/A	Filling
72.00 hr	N/A	4.59	2.59	25.37	74.4	2,499.44	0.16	N/A	Filling


Tank: T-New Mohara
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Fatehabad

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	314.56 m	Base Elevation	12.00
Y	902.24 m	Zone	Zone-1

Connecting Pipes
P-FatIP1
P-FatIP2

Operating Range Summary			
Maximum Elevation	17.00 m	Maximum Level	5.00
Initial Elevation	13.50 m	Initial Level	1.50
Minimum Elevation	12.00 m	Minimum Level	0.00

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	2,000.0
Inactive Volume	0.00 m³	Total Active Volume	10,000.00
Total Storage Capacity	10,000.00 m³		

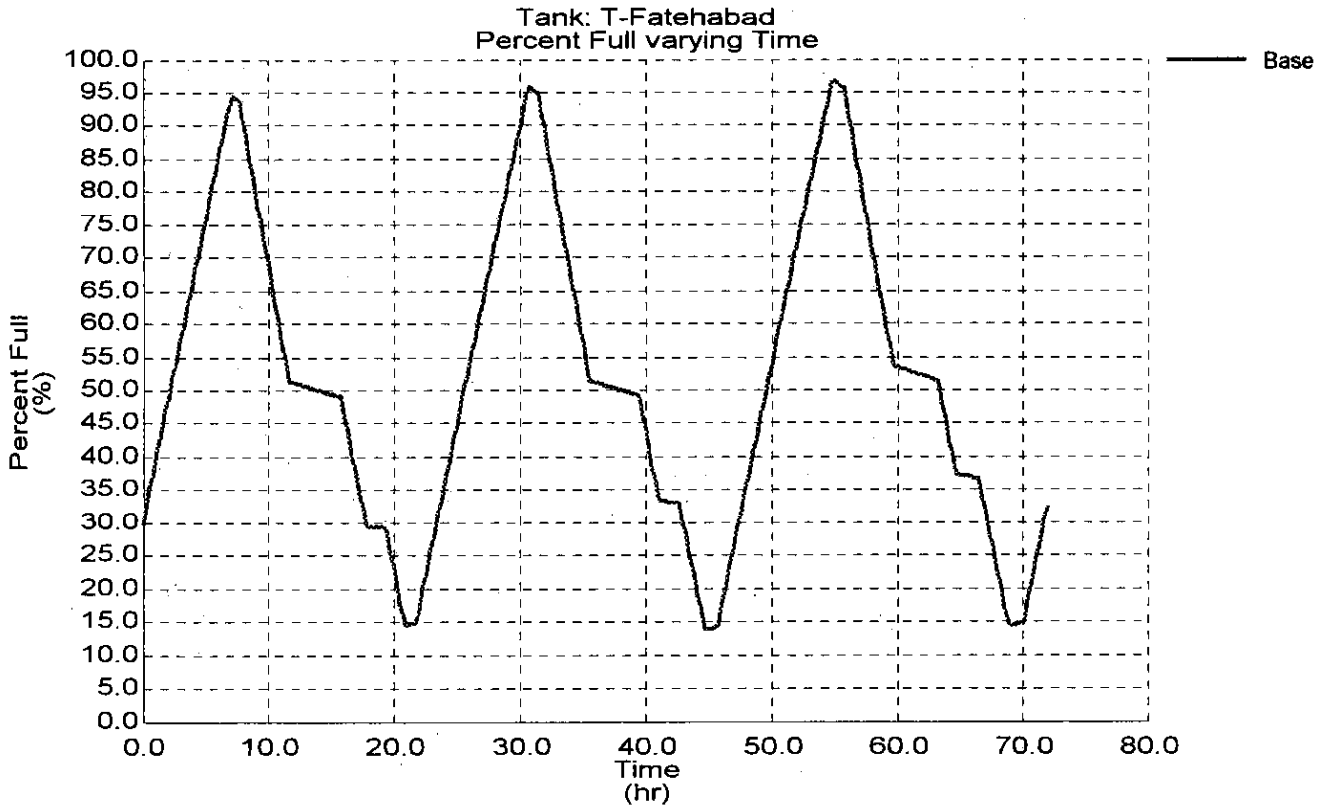
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	13.50	1.50	14.67	30.0	3,000.00	260.08	N/A	Filling
1.00 hr	N/A	13.97	1.97	19.23	39.3	3,932.13	257.27	N/A	Filling
2.00 hr	N/A	14.43	2.43	23.74	48.5	4,854.31	254.57	N/A	Filling
3.00 hr	N/A	14.88	2.88	28.21	57.7	5,766.97	251.96	N/A	Filling
4.00 hr	N/A	15.34	3.34	32.62	66.7	6,670.28	249.44	N/A	Filling
5.00 hr	N/A	15.78	3.78	37.00	75.6	7,564.73	247.00	N/A	Filling
6.00 hr	N/A	16.23	4.23	41.33	84.5	8,450.49	244.64	N/A	Filling
7.00 hr	N/A	16.66	4.66	45.62	93.3	9,327.87	242.35	N/A	Filling
8.00 hr	N/A	16.57	4.57	44.67	91.3	9,133.66	N/A	315.23	Draining
9.00 hr	N/A	16.01	4.01	39.19	80.1	8,011.92	N/A	306.32	Draining
10.00 hr	N/A	15.46	3.46	33.86	69.2	6,922.26	N/A	297.41	Draining
11.00 hr	N/A	14.93	2.93	28.68	58.6	5,864.37	N/A	288.53	Draining
12.00 hr	N/A	14.56	2.56	25.01	51.1	5,113.81	N/A	16.21	Draining
13.00 hr	N/A	14.53	2.53	24.73	50.6	5,055.94	N/A	15.88	Draining
14.00 hr	N/A	14.50	2.50	24.45	50.0	4,999.26	N/A	15.55	Draining
15.00 hr	N/A	14.47	2.47	24.18	49.4	4,943.77	N/A	15.23	Draining
16.00 hr	N/A	14.40	2.40	23.46	48.0	4,795.82	N/A	279.30	Draining
17.00 hr	N/A	13.90	1.90	18.60	38.0	3,803.65	N/A	270.48	Draining
18.00 hr	N/A	13.47	1.47	14.39	29.4	2,941.71	N/A	3.29	Draining

Detailed Report for Tank: T-Fatehabad

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	13.46	1.46	14.33	29.3	2,929.96	N/A	3.22	Draining
20.00 hr	N/A	13.16	1.16	11.38	23.3	2,326.70	N/A	256.86	Draining
21.00 hr	N/A	12.73	0.73	7.12	14.6	1,455.49	6.03	N/A	Filling
22.00 hr	N/A	12.83	0.83	8.10	16.6	1,655.17	264.27	N/A	Filling
23.00 hr	N/A	13.30	1.30	12.73	26.0	2,602.20	261.30	N/A	Filling
24.00 hr	N/A	13.77	1.77	17.31	35.4	3,538.75	258.45	N/A	Filling
25.00 hr	N/A	14.23	2.23	21.84	44.7	4,465.15	255.70	N/A	Filling
26.00 hr	N/A	14.69	2.69	26.32	53.8	5,381.83	253.05	N/A	Filling
27.00 hr	N/A	15.14	3.14	30.76	62.9	6,289.03	250.49	N/A	Filling
28.00 hr	N/A	15.59	3.59	35.15	71.9	7,187.23	248.02	N/A	Filling
29.00 hr	N/A	16.04	4.04	39.50	80.8	8,076.63	245.63	N/A	Filling
30.00 hr	N/A	16.48	4.48	43.81	89.6	8,957.49	243.31	N/A	Filling
31.00 hr	N/A	16.77	4.77	46.70	95.5	9,548.73	N/A	40.36	Draining
32.00 hr	N/A	16.48	4.48	43.84	89.6	8,964.39	N/A	313.90	Draining
33.00 hr	N/A	15.92	3.92	38.38	78.5	7,847.19	N/A	304.98	Draining
34.00 hr	N/A	15.38	3.38	33.07	67.6	6,762.07	N/A	296.08	Draining
35.00 hr	N/A	14.85	2.85	27.92	57.1	5,708.96	N/A	287.20	Draining
36.00 hr	N/A	14.56	2.56	25.01	51.1	5,113.62	N/A	16.21	Draining
37.00 hr	N/A	14.53	2.53	24.73	50.6	5,055.76	N/A	15.88	Draining
38.00 hr	N/A	14.50	2.50	24.45	50.0	4,999.09	N/A	15.55	Draining
39.00 hr	N/A	14.47	2.47	24.18	49.4	4,943.60	N/A	15.23	Draining
40.00 hr	N/A	14.21	2.21	21.67	44.3	4,429.71	N/A	276.07	Draining
41.00 hr	N/A	13.72	1.72	16.87	34.5	3,448.56	N/A	267.26	Draining
42.00 hr	N/A	13.66	1.66	16.22	33.2	3,315.79	N/A	5.58	Draining
43.00 hr	N/A	13.50	1.50	14.69	30.0	3,004.10	N/A	263.18	Draining
44.00 hr	N/A	13.03	1.03	10.12	20.7	2,069.26	N/A	254.43	Draining
45.00 hr	N/A	12.70	0.70	6.80	13.9	1,390.50	6.45	N/A	Filling
46.00 hr	N/A	12.82	0.82	8.03	16.4	1,641.10	264.31	N/A	Filling
47.00 hr	N/A	13.29	1.29	12.66	25.9	2,588.22	261.34	N/A	Filling
48.00 hr	N/A	13.76	1.76	17.24	35.2	3,524.91	258.49	N/A	Filling
49.00 hr	N/A	14.23	2.23	21.77	44.5	4,451.49	255.74	N/A	Filling
50.00 hr	N/A	14.68	2.68	26.26	53.7	5,368.27	253.09	N/A	Filling
51.00 hr	N/A	15.14	3.14	30.69	62.8	6,275.68	250.53	N/A	Filling
52.00 hr	N/A	15.59	3.59	35.09	71.7	7,174.01	248.06	N/A	Filling
53.00 hr	N/A	16.03	4.03	39.44	80.6	8,063.55	245.66	N/A	Filling
54.00 hr	N/A	16.47	4.47	43.75	89.4	8,944.57	243.34	N/A	Filling
55.00 hr	N/A	16.84	4.84	47.31	96.7	9,673.21	N/A	41.00	Draining
56.00 hr	N/A	16.68	4.68	45.74	93.5	9,352.22	N/A	316.94	Draining
57.00 hr	N/A	16.11	4.11	40.22	82.2	8,224.23	N/A	308.02	Draining
58.00 hr	N/A	15.56	3.56	34.86	71.3	7,128.18	N/A	299.11	Draining
59.00 hr	N/A	15.03	3.03	29.66	60.6	6,064.17	N/A	290.23	Draining
60.00 hr	N/A	14.67	2.67	26.12	53.4	5,340.46	N/A	17.51	Draining
61.00 hr	N/A	14.64	2.64	25.81	52.8	5,277.92	N/A	17.15	Draining
62.00 hr	N/A	14.61	2.61	25.51	52.2	5,216.70	N/A	16.80	Draining
63.00 hr	N/A	14.58	2.58	25.22	51.6	5,156.72	N/A	16.46	Draining
64.00 hr	N/A	14.20	2.20	21.56	44.1	4,407.44	N/A	275.87	Draining
65.00 hr	N/A	13.86	1.86	18.20	37.2	3,721.22	N/A	8.02	Draining
66.00 hr	N/A	13.85	1.85	18.06	36.9	3,692.59	N/A	7.85	Draining
67.00 hr	N/A	13.60	1.60	15.68	32.1	3,206.06	N/A	265.04	Draining
68.00 hr	N/A	13.13	1.13	11.08	22.6	2,264.55	N/A	256.28	Draining
69.00 hr	N/A	12.73	0.73	7.10	14.5	1,451.06	6.06	N/A	Filling
70.00 hr	N/A	12.74	0.74	7.20	14.7	1,472.68	5.92	N/A	Filling
71.00 hr	N/A	13.15	1.15	11.22	23.0	2,295.05	262.25	N/A	Filling
72.00 hr	N/A	13.62	1.62	15.82	32.3	3,234.97	259.36	N/A	Filling


Tank: T-Fatehabad
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Fat-el

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	371.45 m	Base Elevation	15.00
Y	902.27 m	Zone	Zone-1

Connecting Pipes
P-FatIP4
P-1029
P-3032

Operating Range Summary			
Maximum Elevation	46.00 m	Maximum Level	31.00
Initial Elevation	43.50 m	Initial Level	28.50
Minimum Elevation	40.00 m	Minimum Level	25.00

Storage Summary			
Type	Constant Area	Cross Section	Circular
Tank Diameter	18.00 m	Average Area	254.5
Inactive Volume	0.00 m³	Total Active Volume	1,526.81
Total Storage Capacity	1,526.81 m³		

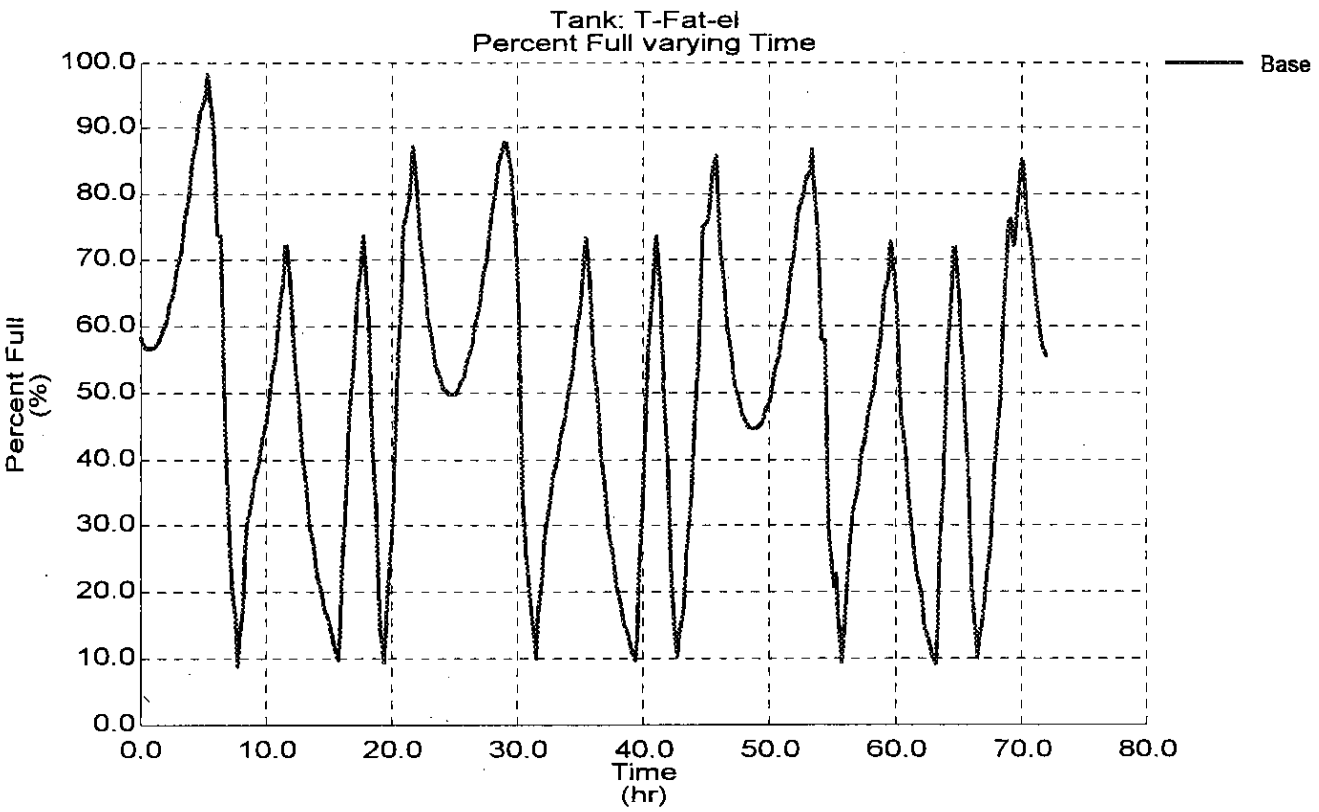
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	43.50	28.50	278.78	58.3	890.64	N/A	16.73	Draining
1.00 hr	N/A	43.40	28.40	277.80	56.7	864.97	2.96	N/A	Filling
2.00 hr	N/A	43.61	28.61	279.89	60.2	919.49	26.24	N/A	Filling
3.00 hr	N/A	44.13	29.13	284.91	68.8	1,050.05	45.74	N/A	Filling
4.00 hr	N/A	44.92	29.92	292.67	82.0	1,251.97	68.84	N/A	Filling
5.00 hr	N/A	45.63	30.63	299.63	93.9	1,433.04	21.15	N/A	Filling
6.00 hr	N/A	44.99	29.99	293.33	83.1	1,269.00	N/A	200.73	Draining
7.00 hr	N/A	41.94	26.94	263.56	32.4	494.60	N/A	341.43	Draining
8.00 hr	N/A	40.76	25.76	252.03	12.7	194.58	100.14	N/A	Filling
9.00 hr	N/A	42.10	27.10	265.12	35.1	535.18	46.05	N/A	Filling
10.00 hr	N/A	42.72	27.72	271.12	45.3	691.33	46.38	N/A	Filling
11.00 hr	N/A	43.53	28.53	279.09	58.9	898.68	77.07	N/A	Filling
12.00 hr	N/A	43.93	28.93	283.02	65.6	1,000.83	N/A	124.55	Draining
13.00 hr	N/A	42.43	27.43	268.32	40.5	618.39	N/A	84.26	Draining
14.00 hr	N/A	41.47	26.47	258.88	24.4	372.93	N/A	47.65	Draining
15.00 hr	N/A	40.94	25.94	253.71	15.6	238.27	N/A	25.29	Draining
16.00 hr	N/A	40.79	25.79	252.27	13.2	201.03	208.52	N/A	Filling
17.00 hr	N/A	43.23	28.23	276.17	53.9	822.71	123.91	N/A	Filling

Detailed Report for Tank: T-Fat-el

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
18.00 hr	N/A	44.20	29.20	285.66	70.0	1,069.42	N/A	198.67	Draining
19.00 hr	N/A	41.40	26.40	258.25	23.4	356.54	N/A	189.78	Draining
20.00 hr	N/A	41.65	26.65	260.70	27.5	420.32	150.93	N/A	Filling
21.00 hr	N/A	44.51	29.51	288.67	75.2	1,147.70	16.24	N/A	Filling
22.00 hr	N/A	44.91	29.91	292.60	81.9	1,250.05	N/A	124.33	Draining
23.00 hr	N/A	43.67	28.67	280.49	61.2	934.92	N/A	62.27	Draining
24.00 hr	N/A	43.10	28.10	274.84	51.6	788.17	N/A	20.90	Draining
25.00 hr	N/A	42.99	27.99	273.79	49.8	760.77	4.53	N/A	Filling
26.00 hr	N/A	43.22	28.22	276.07	53.7	820.06	27.76	N/A	Filling
27.00 hr	N/A	43.75	28.75	281.27	62.6	955.39	46.70	N/A	Filling
28.00 hr	N/A	44.57	29.57	289.26	76.2	1,163.13	69.76	N/A	Filling
29.00 hr	N/A	45.27	30.27	296.11	87.9	1,341.31	22.52	N/A	Filling
30.00 hr	N/A	44.09	29.09	284.56	68.2	1,041.02	N/A	199.40	Draining
31.00 hr	N/A	41.30	26.30	257.27	21.7	330.90	N/A	58.72	Draining
32.00 hr	N/A	41.28	26.28	257.12	21.4	326.96	98.94	N/A	Filling
33.00 hr	N/A	42.26	27.26	266.63	37.6	574.52	43.40	N/A	Filling
34.00 hr	N/A	42.88	27.88	272.75	48.1	733.64	45.05	N/A	Filling
35.00 hr	N/A	43.76	28.76	281.29	62.6	955.72	75.74	N/A	Filling
36.00 hr	N/A	43.61	28.61	279.87	60.2	918.99	N/A	124.55	Draining
37.00 hr	N/A	42.16	27.16	265.69	36.0	549.90	N/A	84.26	Draining
38.00 hr	N/A	41.24	26.24	256.67	20.6	315.27	N/A	47.65	Draining
39.00 hr	N/A	40.74	25.74	251.76	12.3	187.66	N/A	25.28	Draining
40.00 hr	N/A	41.98	26.98	263.95	33.1	504.72	204.43	N/A	Filling
41.00 hr	N/A	44.30	29.30	286.57	71.6	1,093.23	120.69	N/A	Filling
42.00 hr	N/A	42.40	27.40	268.01	40.0	610.37	N/A	196.39	Draining
43.00 hr	N/A	40.81	25.81	252.46	13.5	205.79	70.19	N/A	Filling
44.00 hr	N/A	42.37	27.37	267.69	39.4	602.09	148.49	N/A	Filling
45.00 hr	N/A	44.54	29.54	288.91	75.6	1,154.07	15.82	N/A	Filling
46.00 hr	N/A	44.74	29.74	290.88	78.9	1,205.41	N/A	124.38	Draining
47.00 hr	N/A	43.36	28.36	277.44	56.0	855.76	N/A	62.31	Draining
48.00 hr	N/A	42.79	27.79	271.80	46.4	708.86	N/A	20.94	Draining
49.00 hr	N/A	42.68	27.68	270.73	44.6	681.14	4.49	N/A	Filling
50.00 hr	N/A	42.91	27.91	273.01	48.5	740.33	28.25	N/A	Filling
51.00 hr	N/A	43.44	28.44	278.24	57.4	876.52	47.16	N/A	Filling
52.00 hr	N/A	44.27	29.27	286.35	71.2	1,087.54	70.22	N/A	Filling
53.00 hr	N/A	44.94	29.94	292.85	82.3	1,256.45	22.49	N/A	Filling
54.00 hr	N/A	44.04	29.04	284.11	67.4	1,029.30	N/A	199.44	Draining
55.00 hr	N/A	41.39	26.39	258.10	23.1	352.66	N/A	58.08	Draining
56.00 hr	N/A	40.75	25.75	251.91	12.6	191.64	101.75	N/A	Filling
57.00 hr	N/A	42.09	27.09	265.04	34.9	533.03	46.43	N/A	Filling
58.00 hr	N/A	42.84	27.84	272.36	47.4	723.58	48.08	N/A	Filling
59.00 hr	N/A	43.68	28.68	280.57	61.4	937.18	78.76	N/A	Filling
60.00 hr	N/A	43.87	28.87	282.43	64.5	985.51	N/A	123.25	Draining
61.00 hr	N/A	42.22	27.22	266.28	37.0	565.27	N/A	82.98	Draining
62.00 hr	N/A	41.21	26.21	256.36	20.1	307.20	N/A	46.40	Draining
63.00 hr	N/A	40.61	25.61	250.51	10.2	155.25	N/A	24.06	Draining
64.00 hr	N/A	42.77	27.77	271.68	46.2	705.73	204.23	N/A	Filling
65.00 hr	N/A	43.91	28.91	282.83	65.2	995.86	N/A	138.55	Draining
66.00 hr	N/A	41.78	26.78	262.00	29.7	453.90	N/A	194.08	Draining
67.00 hr	N/A	40.99	25.99	254.20	16.5	251.21	72.05	N/A	Filling
68.00 hr	N/A	42.34	27.34	267.41	39.0	594.81	150.34	N/A	Filling
69.00 hr	N/A	44.52	29.52	288.80	75.4	1,151.22	16.21	N/A	Filling
70.00 hr	N/A	45.11	30.11	294.52	85.2	1,300.09	134.01	N/A	Filling
71.00 hr	N/A	44.13	29.13	284.92	68.8	1,050.40	N/A	63.22	Draining
72.00 hr	N/A	43.33	28.33	277.14	55.5	847.88	N/A	21.82	Draining


Tank: T-Fat-el
Percent Full varying Time
Base
Percent Full (%)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Nas-gr

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	275.26 m	Base Elevation	23.00
Y	582.30 m	Zone	Zone-1

Connecting Pipes
P-989
P-991
P-992
P-993

Operating Range Summary			
Maximum Elevation	28.00 m	Maximum Level	5.00
Initial Elevation	24.50 m	Initial Level	1.50
Minimum Elevation	23.00 m	Minimum Level	0.00

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	5,500.0
Inactive Volume	0.00 m³	Total Active Volume	27,500.00
Total Storage Capacity	27,500.00 m³		

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	24.50	1.50	14.67	30.0	8,250.00	703.15	N/A	Filling
1.00 hr	N/A	24.95	1.95	19.10	39.1	10,739.04	674.80	N/A	Filling
2.00 hr	N/A	25.39	2.39	23.35	47.7	13,129.02	648.42	N/A	Filling
3.00 hr	N/A	25.80	2.80	27.44	56.1	15,426.56	623.28	N/A	Filling
4.00 hr	N/A	26.21	3.21	31.36	64.1	17,635.37	599.75	N/A	Filling
5.00 hr	N/A	26.59	3.59	35.15	71.9	19,762.11	577.52	N/A	Filling
6.00 hr	N/A	27.00	4.00	39.12	80.0	21,997.96	799.30	N/A	Filling
7.00 hr	N/A	27.52	4.52	44.18	90.3	24,838.05	773.61	N/A	Filling
8.00 hr	N/A	27.46	4.46	43.62	89.2	24,524.25	N/A	541.44	Draining
9.00 hr	N/A	27.11	4.11	40.24	82.3	22,627.55	N/A	505.78	Draining
10.00 hr	N/A	26.66	3.66	35.79	73.2	20,122.02	N/A	700.30	Draining
11.00 hr	N/A	26.21	3.21	31.44	64.3	17,675.08	N/A	649.30	Draining
12.00 hr	N/A	25.80	2.80	27.41	56.0	15,410.19	N/A	600.82	Draining
13.00 hr	N/A	25.69	2.69	26.30	53.8	14,786.09	9.77	N/A	Filling
14.00 hr	N/A	25.69	2.69	26.36	53.9	14,819.58	8.56	N/A	Filling
15.00 hr	N/A	25.70	2.70	26.41	54.0	14,848.74	7.44	N/A	Filling
16.00 hr	N/A	25.37	2.37	23.17	47.4	13,025.50	N/A	550.13	Draining

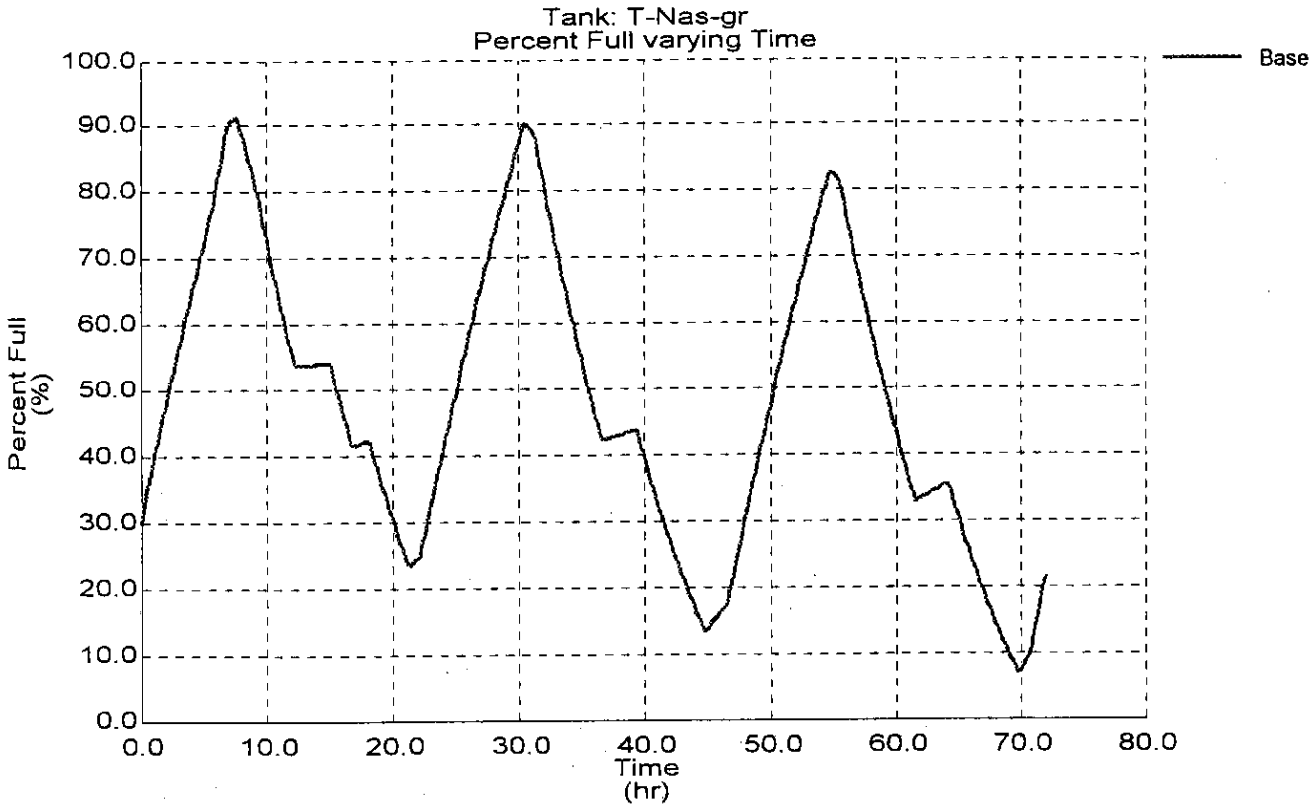
Detailed Report for Tank: T-Nas-gr

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
17.00 hr	N/A	25.07	2.07	20.25	41.4	11,383.66	63.85	N/A	Filling
18.00 hr	N/A	25.11	2.11	20.64	42.2	11,606.97	59.54	N/A	Filling
19.00 hr	N/A	24.84	1.84	17.97	36.7	10,102.86	N/A	484.42	Draining
20.00 hr	N/A	24.53	1.53	14.97	30.6	8,417.61	N/A	444.80	Draining
21.00 hr	N/A	24.25	1.25	12.22	25.0	6,871.94	N/A	407.63	Draining
22.00 hr	N/A	24.22	1.22	11.96	24.5	6,725.95	142.63	N/A	Filling
23.00 hr	N/A	24.60	1.60	15.69	32.1	8,823.37	680.16	N/A	Filling
24.00 hr	N/A	25.04	2.04	19.98	40.8	11,232.89	653.36	N/A	Filling
25.00 hr	N/A	25.46	2.46	24.10	49.3	13,548.21	628.22	N/A	Filling
26.00 hr	N/A	25.87	2.87	28.06	57.4	15,775.41	604.65	N/A	Filling
27.00 hr	N/A	26.26	3.26	31.87	65.2	17,918.78	582.33	N/A	Filling
28.00 hr	N/A	26.63	3.63	35.54	72.7	19,984.24	561.21	N/A	Filling
29.00 hr	N/A	27.00	4.00	39.08	79.9	21,975.28	541.12	N/A	Filling
30.00 hr	N/A	27.34	4.34	42.50	86.9	23,895.37	522.11	N/A	Filling
31.00 hr	N/A	27.46	4.46	43.65	89.3	24,545.11	N/A	150.72	Draining
32.00 hr	N/A	27.09	4.09	39.99	81.8	22,483.45	N/A	760.64	Draining
33.00 hr	N/A	26.60	3.60	35.26	72.1	19,824.30	N/A	706.17	Draining
34.00 hr	N/A	26.16	3.16	30.87	63.1	17,357.74	N/A	654.19	Draining
35.00 hr	N/A	25.74	2.74	26.81	54.8	15,074.62	N/A	604.75	Draining
36.00 hr	N/A	25.36	2.36	23.06	47.2	12,967.42	N/A	557.92	Draining
37.00 hr	N/A	25.12	2.12	20.70	42.3	11,638.65	50.76	N/A	Filling
38.00 hr	N/A	25.15	2.15	21.02	43.0	11,816.49	47.45	N/A	Filling
39.00 hr	N/A	25.18	2.18	21.31	43.6	11,982.68	44.35	N/A	Filling
40.00 hr	N/A	24.99	1.99	19.46	39.8	10,943.67	N/A	512.62	Draining
41.00 hr	N/A	24.67	1.67	16.29	33.3	9,159.17	N/A	470.83	Draining
42.00 hr	N/A	24.37	1.37	13.38	27.4	7,524.04	N/A	431.62	Draining
43.00 hr	N/A	24.10	1.10	10.72	21.9	6,025.24	N/A	394.84	Draining
44.00 hr	N/A	23.85	0.85	8.28	16.9	4,654.06	N/A	360.45	Draining
45.00 hr	N/A	23.69	0.69	6.70	13.7	3,769.95	188.96	N/A	Filling
46.00 hr	N/A	23.81	0.81	7.88	16.1	4,431.12	176.31	N/A	Filling
47.00 hr	N/A	24.06	1.06	10.39	21.2	5,839.42	705.57	N/A	Filling
48.00 hr	N/A	24.52	1.52	14.83	30.3	8,337.93	677.13	N/A	Filling
49.00 hr	N/A	24.95	1.95	19.10	39.0	10,736.86	650.57	N/A	Filling
50.00 hr	N/A	25.37	2.37	23.20	47.4	13,042.20	625.67	N/A	Filling
51.00 hr	N/A	25.77	2.77	27.14	55.5	15,260.51	602.24	N/A	Filling
52.00 hr	N/A	26.16	3.16	30.94	63.3	17,396.41	580.14	N/A	Filling
53.00 hr	N/A	26.54	3.54	34.60	70.7	19,454.52	559.24	N/A	Filling
54.00 hr	N/A	26.90	3.90	38.13	78.0	21,438.97	539.43	N/A	Filling
55.00 hr	N/A	27.11	4.11	40.25	82.3	22,630.56	N/A	128.53	Draining
56.00 hr	N/A	26.85	3.85	37.67	77.0	21,181.04	N/A	740.12	Draining
57.00 hr	N/A	26.38	3.38	33.07	67.6	18,595.81	N/A	686.22	Draining
58.00 hr	N/A	25.95	2.95	28.81	58.9	16,200.10	N/A	634.87	Draining
59.00 hr	N/A	25.54	2.54	24.87	50.9	13,985.53	N/A	586.10	Draining
60.00 hr	N/A	25.17	2.17	21.25	43.4	11,945.61	N/A	539.98	Draining
61.00 hr	N/A	24.83	1.83	17.90	36.6	10,065.23	N/A	496.37	Draining
62.00 hr	N/A	24.67	1.67	16.29	33.3	9,161.10	88.00	N/A	Filling
63.00 hr	N/A	24.72	1.72	16.84	34.4	9,469.65	82.48	N/A	Filling
64.00 hr	N/A	24.77	1.77	17.36	35.5	9,758.89	77.32	N/A	Filling
65.00 hr	N/A	24.52	1.52	14.89	30.4	8,373.73	N/A	456.57	Draining
66.00 hr	N/A	24.23	1.23	12.07	24.7	6,786.88	N/A	417.94	Draining
67.00 hr	N/A	23.97	0.97	9.49	19.4	5,336.26	N/A	381.83	Draining
68.00 hr	N/A	23.73	0.73	7.13	14.6	4,010.95	N/A	348.10	Draining
69.00 hr	N/A	23.51	0.51	4.99	10.2	2,805.60	N/A	316.78	Draining
70.00 hr	N/A	23.36	0.36	3.53	7.2	1,983.07	219.02	N/A	Filling
71.00 hr	N/A	23.60	0.60	5.87	12.0	3,301.49	731.35	N/A	Filling

Detailed Report for Tank: T-Nas-gr

Calculated Results Summary									
Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
72.00 hr	N/A	24.07	1.07	10.48	21.4	5,890.13	701.10	N/A	Filling



Detailed Report for Tank: T-Nas-el

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	335.79 m	Base Elevation	20.00
Y	581.42 m	Zone	Zone-1

Connecting Pipes
P-NasIP3
P-3045

Operating Range Summary			
Maximum Elevation	53.00 m	Maximum Level	33.00
Initial Elevation	51.00 m	Initial Level	31.00
Minimum Elevation	45.00 m	Minimum Level	25.00

Storage Summary			
Type	Constant Area	Cross Section	Circular
Tank Diameter	24.00 m	Average Area	452.4
Inactive Volume	0.00 m³	Total Active Volume	3,619.11
Total Storage Capacity	3,619.11 m³		

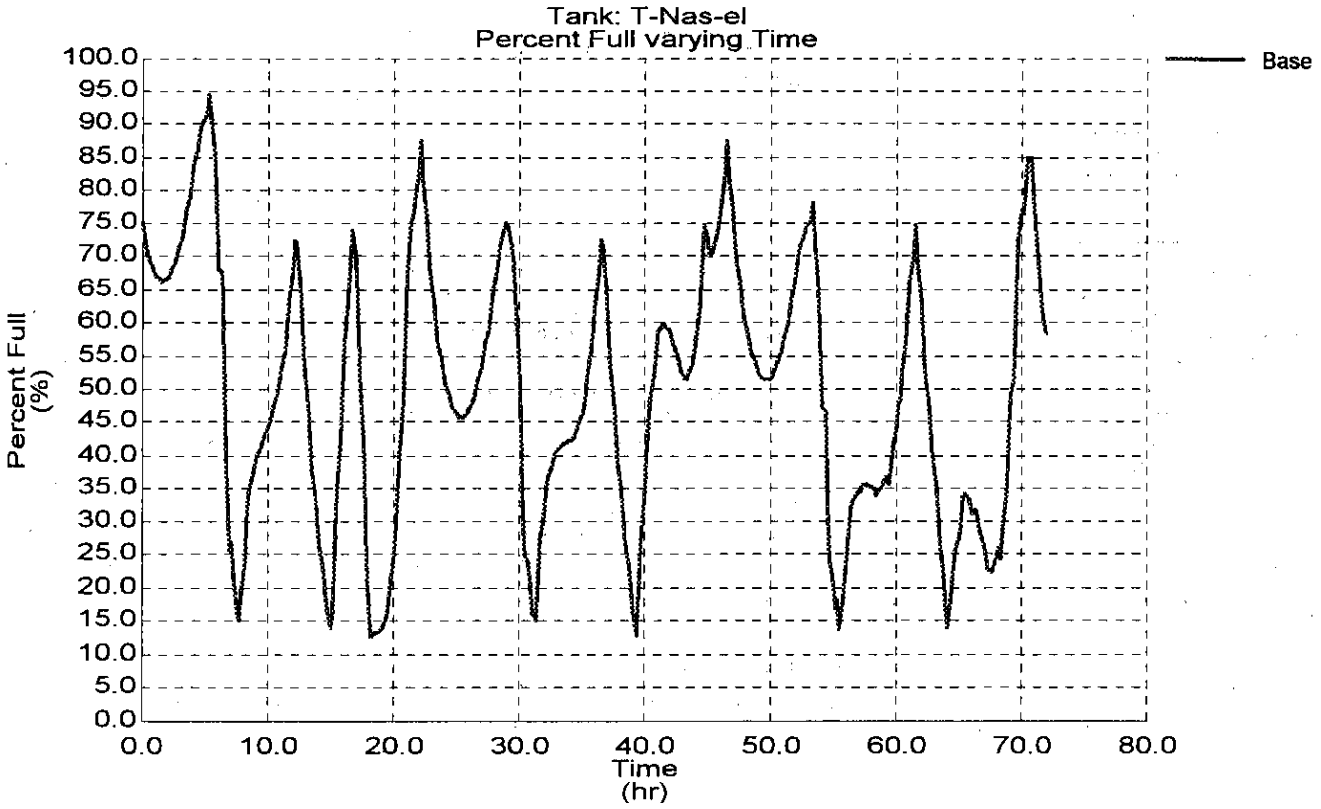
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	51.00	31.00	303.24	75.0	2,714.34	N/A	100.40	Draining
1.00 hr	N/A	50.42	30.42	297.53	67.7	2,450.13	N/A	43.68	Draining
2.00 hr	N/A	50.33	30.33	296.65	66.6	2,409.69	19.08	N/A	Filling
3.00 hr	N/A	50.70	30.70	300.33	71.3	2,579.82	75.09	N/A	Filling
4.00 hr	N/A	51.52	31.52	308.31	81.5	2,949.09	137.45	N/A	Filling
5.00 hr	N/A	52.28	32.28	315.73	91.0	3,292.02	28.64	N/A	Filling
6.00 hr	N/A	51.24	31.24	305.62	78.0	2,824.54	N/A	499.40	Draining
7.00 hr	N/A	47.02	27.02	264.35	25.3	915.92	N/A	828.86	Draining
8.00 hr	N/A	46.55	26.55	259.73	19.4	702.12	210.29	N/A	Filling
9.00 hr	N/A	48.08	28.08	274.68	38.5	1,393.51	70.96	N/A	Filling
10.00 hr	N/A	48.53	28.53	279.10	44.1	1,597.77	51.43	N/A	Filling
11.00 hr	N/A	49.09	29.09	284.58	51.2	1,851.52	105.80	N/A	Filling
12.00 hr	N/A	50.41	30.41	297.51	67.7	2,449.53	236.99	N/A	Filling
13.00 hr	N/A	49.26	29.26	286.25	53.3	1,928.89	N/A	274.36	Draining
14.00 hr	N/A	47.39	27.39	267.95	29.9	1,082.20	N/A	184.98	Draining
15.00 hr	N/A	46.12	26.12	255.50	14.0	506.75	N/A	129.97	Draining
16.00 hr	N/A	49.00	29.00	283.66	50.0	1,808.98	364.45	N/A	Filling
17.00 hr	N/A	50.55	30.55	298.86	69.4	2,511.99	N/A	427.56	Draining
18.00 hr	N/A	46.69	26.69	261.11	21.2	765.90	N/A	558.54	Draining

Detailed Report for Tank: T-Nas-el

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	46.09	26.09	255.16	13.6	490.98	14.18	N/A	Filling
20.00 hr	N/A	46.92	26.92	263.32	24.0	868.24	191.40	N/A	Filling
21.00 hr	N/A	49.61	29.61	289.64	57.6	2,085.22	469.62	N/A	Filling
22.00 hr	N/A	51.61	31.61	309.22	82.6	2,990.83	202.36	N/A	Filling
23.00 hr	N/A	50.37	30.37	297.07	67.1	2,429.22	N/A	203.42	Draining
24.00 hr	N/A	49.19	29.19	285.52	52.4	1,894.72	N/A	95.24	Draining
25.00 hr	N/A	48.71	28.71	280.81	46.3	1,677.28	N/A	26.35	Draining
26.00 hr	N/A	48.75	28.75	281.20	46.8	1,694.99	35.15	N/A	Filling
27.00 hr	N/A	49.24	29.24	286.04	53.0	1,918.94	87.07	N/A	Filling
28.00 hr	N/A	50.17	30.17	295.12	64.6	2,338.74	148.37	N/A	Filling
29.00 hr	N/A	50.98	30.98	303.08	74.8	2,706.90	40.73	N/A	Filling
30.00 hr	N/A	49.29	29.29	286.52	53.6	1,940.93	N/A	489.31	Draining
31.00 hr	N/A	46.63	26.63	260.44	20.3	735.19	N/A	163.51	Draining
32.00 hr	N/A	47.47	27.47	268.75	30.9	1,119.49	181.21	N/A	Filling
33.00 hr	N/A	48.25	28.25	276.30	40.6	1,468.29	21.09	N/A	Filling
34.00 hr	N/A	48.37	28.37	277.51	42.1	1,524.66	5.05	N/A	Filling
35.00 hr	N/A	48.68	28.68	280.50	45.9	1,662.91	60.75	N/A	Filling
36.00 hr	N/A	49.73	29.73	290.86	59.2	2,141.86	193.33	N/A	Filling
37.00 hr	N/A	50.22	30.22	295.61	65.2	2,361.46	N/A	312.52	Draining
38.00 hr	N/A	48.11	28.11	274.95	38.8	1,405.94	N/A	221.33	Draining
39.00 hr	N/A	46.59	26.59	260.09	19.9	718.92	N/A	164.66	Draining
40.00 hr	N/A	47.67	27.67	270.69	33.4	1,209.05	322.45	N/A	Filling
41.00 hr	N/A	49.42	29.42	287.74	55.2	1,997.51	107.94	N/A	Filling
42.00 hr	N/A	49.71	29.71	290.60	58.8	2,129.74	N/A	57.58	Draining
43.00 hr	N/A	49.22	29.22	285.80	52.7	1,907.97	N/A	66.16	Draining
44.00 hr	N/A	49.43	29.43	287.92	55.4	2,005.86	115.22	N/A	Filling
45.00 hr	N/A	50.81	30.81	301.38	72.6	2,628.51	N/A	122.07	Draining
46.00 hr	N/A	51.05	31.05	303.74	75.6	2,737.41	170.77	N/A	Filling
47.00 hr	N/A	51.18	31.18	305.01	77.3	2,796.08	N/A	223.35	Draining
48.00 hr	N/A	49.84	29.84	291.94	60.6	2,191.76	N/A	113.79	Draining
49.00 hr	N/A	49.22	29.22	285.82	52.7	1,908.66	N/A	43.70	Draining
50.00 hr	N/A	49.12	29.12	284.89	51.5	1,865.60	21.43	N/A	Filling
51.00 hr	N/A	49.50	29.50	288.56	56.2	2,035.30	74.12	N/A	Filling
52.00 hr	N/A	50.33	30.33	296.66	66.6	2,409.97	136.09	N/A	Filling
53.00 hr	N/A	50.98	30.98	303.05	74.8	2,705.56	26.93	N/A	Filling
54.00 hr	N/A	49.57	29.57	289.25	57.1	2,067.24	N/A	502.43	Draining
55.00 hr	N/A	46.64	26.64	260.61	20.5	742.95	N/A	183.71	Draining
56.00 hr	N/A	46.71	26.71	261.23	21.3	771.72	158.98	N/A	Filling
57.00 hr	N/A	47.75	27.75	271.45	34.4	1,244.42	0.61	N/A	Filling
58.00 hr	N/A	47.82	27.82	272.16	35.3	1,277.13	N/A	14.89	Draining
59.00 hr	N/A	47.87	27.87	272.61	35.9	1,297.65	41.38	N/A	Filling
60.00 hr	N/A	48.54	28.54	279.15	44.2	1,600.28	174.59	N/A	Filling
61.00 hr	N/A	49.95	29.95	292.98	61.9	2,240.12	237.19	N/A	Filling
62.00 hr	N/A	50.13	30.13	294.70	64.1	2,319.27	N/A	254.92	Draining
63.00 hr	N/A	48.19	28.19	275.79	39.9	1,444.75	N/A	196.28	Draining
64.00 hr	N/A	46.35	26.35	257.78	16.9	611.88	N/A	267.57	Draining
65.00 hr	N/A	47.19	27.19	265.94	27.3	989.36	92.66	N/A	Filling
66.00 hr	N/A	47.59	27.59	269.91	32.4	1,173.13	N/A	66.20	Draining
67.00 hr	N/A	47.13	27.13	265.40	26.6	964.21	N/A	80.32	Draining
68.00 hr	N/A	46.92	26.92	263.31	24.0	867.95	101.66	N/A	Filling
69.00 hr	N/A	48.30	28.30	276.86	41.3	1,494.19	384.70	N/A	Filling
70.00 hr	N/A	51.16	31.16	304.79	77.0	2,785.93	135.50	N/A	Filling
71.00 hr	N/A	51.42	31.42	307.31	80.2	2,902.74	N/A	241.18	Draining
72.00 hr	N/A	49.67	29.67	290.20	58.3	2,111.50	N/A	130.20	Draining


Tank: T-Nas-el
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Salimpur

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	26.41 m	Base Elevation	47.00
Y	622.70 m	Zone	Zone-1

Connecting Pipes
P-SalPSV
P-3114

Operating Range Summary			
Maximum Elevation	55.00 m	Maximum Level	8.00
Initial Elevation	50.00 m	Initial Level	3.00
Minimum Elevation	47.00 m	Minimum Level	0.00

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	1,400.0
Inactive Volume	0.00 m³	Total Active Volume	11,200.00
Total Storage Capacity	11,200.00 m³		

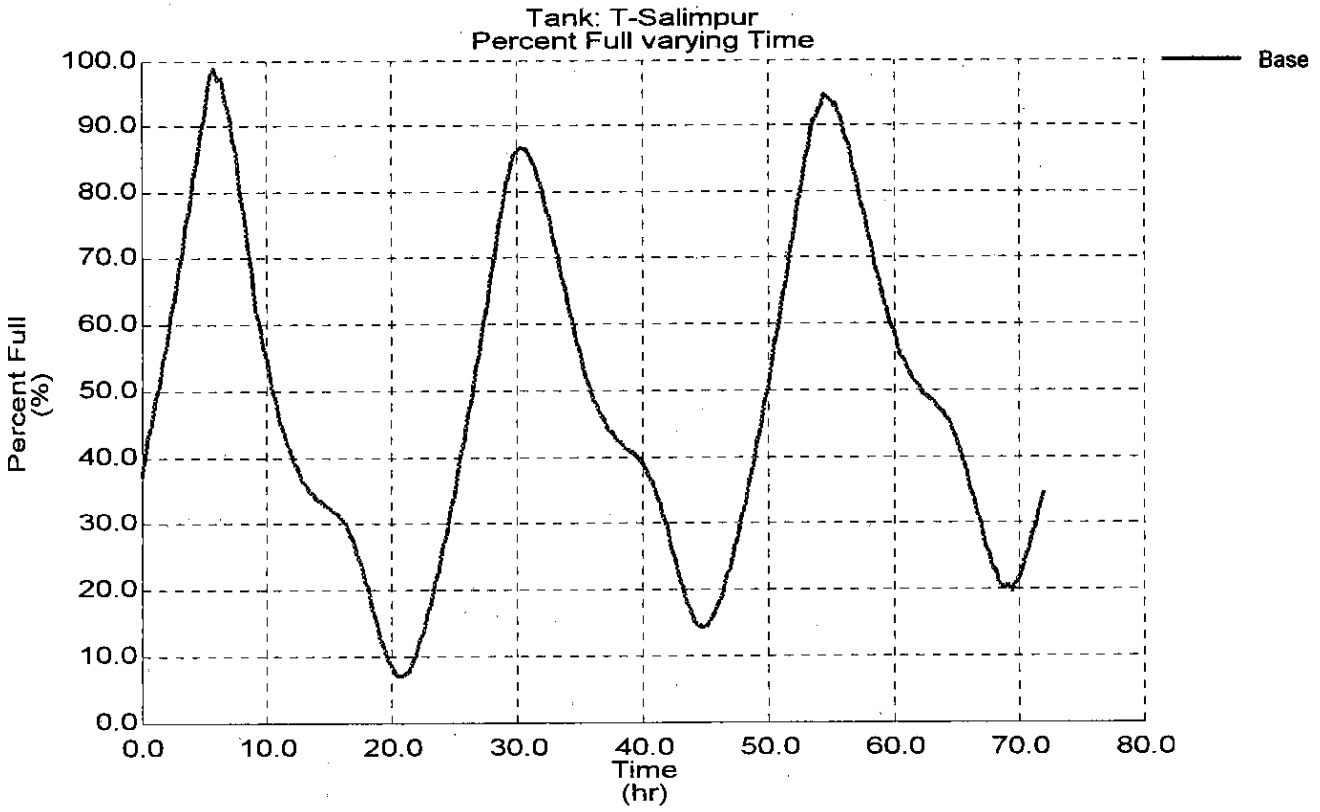
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	50.00	3.00	29.35	37.5	4,200.00	279.50	N/A	Filling
1.00 hr	N/A	50.75	3.75	36.67	46.9	5,247.87	303.45	N/A	Filling
2.00 hr	N/A	51.57	4.57	44.66	57.1	6,392.25	331.14	N/A	Filling
3.00 hr	N/A	52.45	5.45	53.30	68.1	7,627.94	354.87	N/A	Filling
4.00 hr	N/A	53.39	6.39	62.53	79.9	8,949.63	382.39	N/A	Filling
5.00 hr	N/A	54.32	7.32	71.62	91.5	10,251.05	328.63	N/A	Filling
6.00 hr	N/A	54.84	7.84	76.66	98.0	10,972.35	N/A	169.37	Draining
7.00 hr	N/A	54.36	7.36	71.99	92.0	10,302.77	N/A	331.08	Draining
8.00 hr	N/A	53.39	6.39	62.55	79.9	8,952.53	N/A	465.99	Draining
9.00 hr	N/A	52.19	5.19	50.79	64.9	7,269.47	N/A	519.04	Draining
10.00 hr	N/A	51.40	4.40	43.03	55.0	6,158.82	N/A	266.25	Draining
11.00 hr	N/A	50.75	3.75	36.72	46.9	5,255.07	N/A	225.15	Draining
12.00 hr	N/A	50.26	3.26	31.91	40.8	4,567.71	N/A	148.07	Draining
13.00 hr	N/A	49.93	2.93	28.70	36.7	4,107.69	N/A	102.58	Draining
14.00 hr	N/A	49.72	2.72	26.59	34.0	3,805.35	N/A	60.16	Draining
15.00 hr	N/A	49.59	2.59	25.37	32.4	3,631.67	N/A	34.09	Draining
16.00 hr	N/A	49.47	2.47	24.17	30.9	3,459.57	N/A	72.71	Draining
17.00 hr	N/A	49.19	2.19	21.39	27.3	3,061.26	N/A	161.98	Draining
18.00 hr	N/A	48.70	1.70	16.62	21.2	2,378.26	N/A	225.16	Draining

Detailed Report for Tank: T-Salimpur

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	48.12	1.12	10.95	14.0	1,567.58	N/A	217.58	Draining
20.00 hr	N/A	47.68	0.68	6.69	8.5	957.56	N/A	120.83	Draining
21.00 hr	N/A	47.56	0.56	5.52	7.1	789.72	23.36	N/A	Filling
22.00 hr	N/A	47.80	0.80	7.87	10.1	1,126.41	158.05	N/A	Filling
23.00 hr	N/A	48.32	1.32	12.90	16.5	1,846.76	229.73	N/A	Filling
24.00 hr	N/A	48.97	1.97	19.31	24.7	2,764.09	278.32	N/A	Filling
25.00 hr	N/A	49.73	2.73	26.71	34.1	3,822.33	308.54	N/A	Filling
26.00 hr	N/A	50.56	3.56	34.82	44.5	4,983.60	335.95	N/A	Filling
27.00 hr	N/A	51.45	4.45	43.57	55.7	6,235.30	358.54	N/A	Filling
28.00 hr	N/A	52.41	5.41	52.91	67.6	7,573.02	385.80	N/A	Filling
29.00 hr	N/A	53.34	6.34	62.04	79.3	8,879.56	332.47	N/A	Filling
30.00 hr	N/A	53.89	6.89	67.35	86.1	9,639.88	78.56	N/A	Filling
31.00 hr	N/A	53.86	6.86	67.13	85.8	9,608.39	N/A	84.34	Draining
32.00 hr	N/A	53.45	6.45	63.13	80.7	9,035.00	N/A	221.87	Draining
33.00 hr	N/A	52.80	5.80	56.75	72.5	8,122.01	N/A	278.87	Draining
34.00 hr	N/A	52.09	5.09	49.81	63.7	7,128.93	N/A	271.10	Draining
35.00 hr	N/A	51.45	4.45	43.53	55.6	6,229.56	N/A	229.76	Draining
36.00 hr	N/A	50.96	3.96	38.75	49.5	5,545.44	N/A	152.45	Draining
37.00 hr	N/A	50.63	3.63	35.52	45.4	5,083.05	N/A	108.26	Draining
38.00 hr	N/A	50.41	3.41	33.35	42.6	4,773.05	N/A	65.57	Draining
39.00 hr	N/A	50.28	3.28	32.06	41.0	4,588.32	N/A	39.26	Draining
40.00 hr	N/A	50.13	3.13	30.65	39.2	4,386.17	N/A	76.85	Draining
41.00 hr	N/A	49.82	2.82	27.59	35.3	3,949.22	N/A	166.06	Draining
42.00 hr	N/A	49.32	2.32	22.68	29.0	3,246.29	N/A	232.63	Draining
43.00 hr	N/A	48.73	1.73	16.88	21.6	2,416.61	N/A	225.14	Draining
44.00 hr	N/A	48.27	1.27	12.44	15.9	1,780.49	N/A	127.86	Draining
45.00 hr	N/A	48.15	1.15	11.24	14.4	1,608.61	17.53	N/A	Filling
46.00 hr	N/A	48.38	1.38	13.47	17.2	1,928.02	153.74	N/A	Filling
47.00 hr	N/A	48.85	1.85	18.10	23.1	2,591.02	224.17	N/A	Filling
48.00 hr	N/A	49.49	2.49	24.38	31.1	3,488.68	273.01	N/A	Filling
49.00 hr	N/A	50.23	3.23	31.64	40.4	4,527.84	303.44	N/A	Filling
50.00 hr	N/A	51.05	4.05	39.62	50.6	5,671.11	331.84	N/A	Filling
51.00 hr	N/A	51.93	4.93	48.26	61.7	6,906.67	354.58	N/A	Filling
52.00 hr	N/A	52.88	5.88	57.52	73.5	8,231.70	381.97	N/A	Filling
53.00 hr	N/A	53.79	6.79	66.46	84.9	9,511.75	328.09	N/A	Filling
54.00 hr	N/A	54.39	7.39	72.25	92.3	10,340.53	74.34	N/A	Filling
55.00 hr	N/A	54.49	7.49	73.30	93.7	10,490.55	N/A	87.62	Draining
56.00 hr	N/A	54.16	7.16	70.07	89.5	10,028.63	N/A	224.26	Draining
57.00 hr	N/A	53.57	6.57	64.30	82.2	9,202.93	N/A	281.02	Draining
58.00 hr	N/A	52.88	5.88	57.47	73.4	8,225.78	N/A	273.15	Draining
59.00 hr	N/A	52.21	5.21	50.98	65.2	7,296.93	N/A	231.71	Draining
60.00 hr	N/A	51.68	4.68	45.81	58.5	6,555.95	N/A	154.30	Draining
61.00 hr	N/A	51.30	4.30	42.09	53.8	6,023.40	N/A	111.13	Draining
62.00 hr	N/A	51.05	4.05	39.59	50.6	5,666.36	N/A	70.43	Draining
63.00 hr	N/A	50.88	3.88	37.95	48.5	5,431.48	N/A	43.84	Draining
64.00 hr	N/A	50.72	3.72	36.42	46.5	5,211.86	N/A	79.02	Draining
65.00 hr	N/A	50.40	3.40	33.30	42.5	4,765.43	N/A	167.51	Draining
66.00 hr	N/A	49.93	2.93	28.71	36.7	4,108.80	N/A	233.43	Draining
67.00 hr	N/A	49.36	2.36	23.10	29.5	3,305.47	N/A	226.43	Draining
68.00 hr	N/A	48.86	1.86	18.15	23.2	2,597.76	N/A	129.08	Draining
69.00 hr	N/A	48.62	1.62	15.87	20.3	2,271.82	15.69	N/A	Filling
70.00 hr	N/A	48.73	1.73	16.97	21.7	2,428.76	149.08	N/A	Filling
71.00 hr	N/A	49.18	2.18	21.29	27.2	3,047.14	219.38	N/A	Filling
72.00 hr	N/A	49.76	2.76	27.03	34.5	3,867.98	268.45	N/A	Filling


Tank: T-Salimpur
Percent Full varying Time
Base
Percent Full (%)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Khulshi-gr

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	342.47 m	Base Elevation	28.00
Y	360.07 m	Zone	Zone-1

Connecting Pipes
P-PSVKhu1
P-KhulP1

Operating Range Summary			
Maximum Elevation	35.00 m	Maximum Level	7.00
Initial Elevation	29.60 m	Initial Level	1.60
Minimum Elevation	28.00 m	Minimum Level	0.00

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	2,800.0
Inactive Volume	540.00 m³	Total Active Volume	19,600.00
Total Storage Capacity	20,140.00 m³		

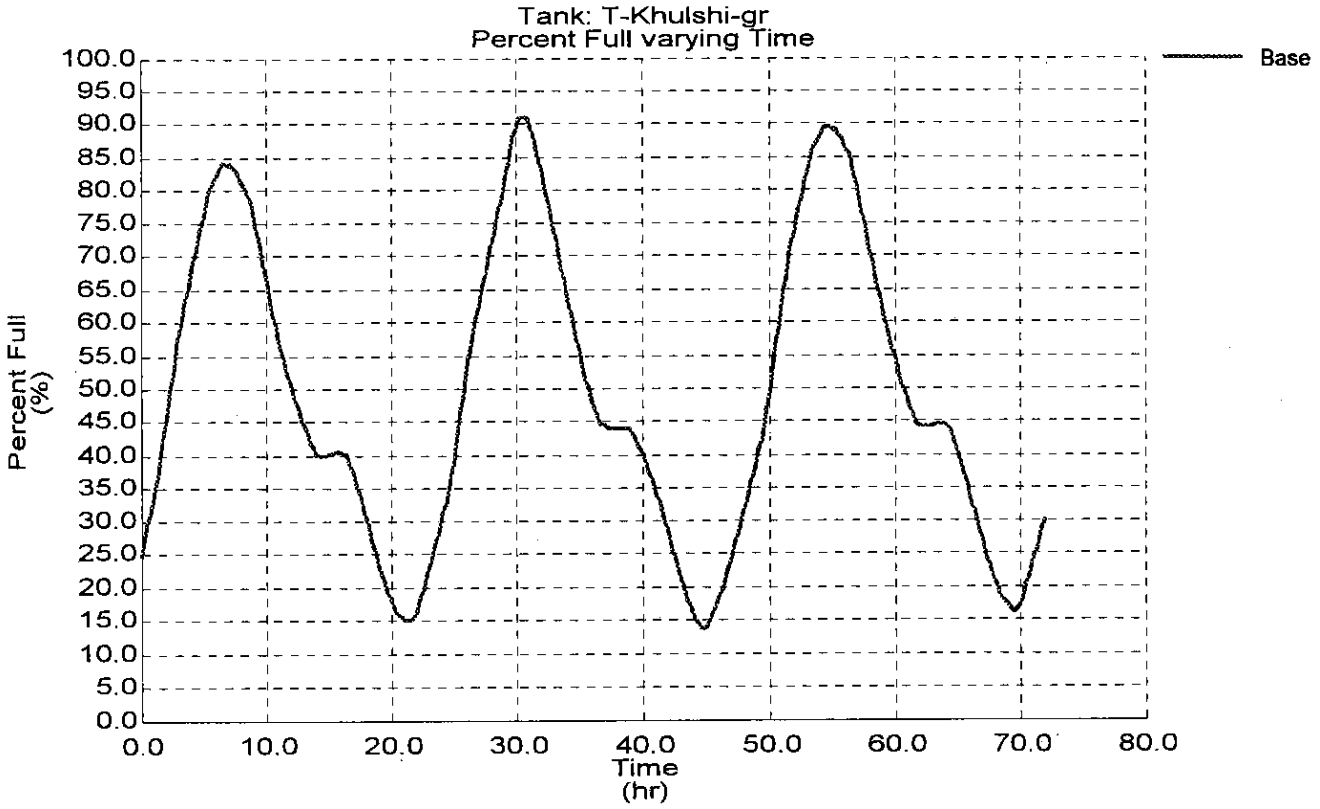
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	29.60	1.60	15.65	24.9	5,020.00	440.85	N/A	Filling
1.00 hr	N/A	30.18	2.18	21.31	33.0	6,640.68	458.72	N/A	Filling
2.00 hr	N/A	31.03	3.03	29.59	44.7	9,010.68	705.12	N/A	Filling
3.00 hr	N/A	31.95	3.95	38.61	57.6	11,593.22	728.28	N/A	Filling
4.00 hr	N/A	32.63	4.63	45.31	67.1	13,509.24	519.24	N/A	Filling
5.00 hr	N/A	33.26	5.26	51.47	75.8	15,271.68	443.36	N/A	Filling
6.00 hr	N/A	33.71	5.71	55.82	82.0	16,517.17	122.75	N/A	Filling
7.00 hr	N/A	33.84	5.84	57.08	83.8	16,878.73	N/A	80.48	Draining
8.00 hr	N/A	33.66	5.66	55.39	81.4	16,394.33	N/A	245.60	Draining
9.00 hr	N/A	33.30	5.30	51.85	76.4	15,381.16	N/A	546.73	Draining
10.00 hr	N/A	32.61	4.61	45.06	66.7	13,439.32	N/A	520.77	Draining
11.00 hr	N/A	31.97	3.97	38.83	57.9	11,655.25	N/A	454.24	Draining
12.00 hr	N/A	31.45	3.45	33.72	50.6	10,192.54	N/A	345.24	Draining
13.00 hr	N/A	31.04	3.04	29.75	45.0	9,054.68	N/A	280.53	Draining
14.00 hr	N/A	30.71	2.71	26.54	40.4	8,136.32	N/A	222.27	Draining
15.00 hr	N/A	30.70	2.70	26.38	40.2	8,090.34	28.62	N/A	Filling
16.00 hr	N/A	30.71	2.71	26.54	40.4	8,137.04	N/A	15.56	Draining
17.00 hr	N/A	30.50	2.50	24.48	37.5	7,547.57	N/A	336.19	Draining
18.00 hr	N/A	30.03	2.03	19.86	30.9	6,226.19	N/A	405.45	Draining

Detailed Report for Tank: T-Khulshi-gr

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	29.52	1.52	14.83	23.8	4,785.24	N/A	382.42	Draining
20.00 hr	N/A	29.11	1.11	10.83	18.1	3,641.38	N/A	250.75	Draining
21.00 hr	N/A	28.91	0.91	8.88	15.3	3,080.92	N/A	65.11	Draining
22.00 hr	N/A	28.97	0.97	9.50	16.2	3,258.71	301.21	N/A	Filling
23.00 hr	N/A	29.42	1.42	13.90	22.4	4,518.30	380.06	N/A	Filling
24.00 hr	N/A	29.94	1.94	19.02	29.7	5,983.34	429.27	N/A	Filling
25.00 hr	N/A	30.63	2.63	25.73	39.3	7,905.02	675.61	N/A	Filling
26.00 hr	N/A	31.52	3.52	34.42	51.6	10,393.11	705.47	N/A	Filling
27.00 hr	N/A	32.28	4.28	41.86	62.2	12,522.79	493.33	N/A	Filling
28.00 hr	N/A	32.93	4.93	48.21	71.2	14,340.68	517.19	N/A	Filling
29.00 hr	N/A	33.55	5.55	54.31	79.9	16,085.69	441.45	N/A	Filling
30.00 hr	N/A	34.23	6.23	60.95	89.3	17,986.37	369.61	N/A	Filling
31.00 hr	N/A	34.32	6.32	61.83	90.6	18,239.19	N/A	83.76	Draining
32.00 hr	N/A	33.80	5.80	56.73	83.3	16,777.76	N/A	490.64	Draining
33.00 hr	N/A	33.13	5.13	50.15	74.0	14,895.94	N/A	543.71	Draining
34.00 hr	N/A	32.44	4.44	43.44	64.4	12,974.85	N/A	517.78	Draining
35.00 hr	N/A	31.82	3.82	37.34	55.7	11,227.20	N/A	451.36	Draining
36.00 hr	N/A	31.31	3.31	32.35	48.7	9,798.71	N/A	342.48	Draining
37.00 hr	N/A	31.00	3.00	29.38	44.4	8,950.37	N/A	58.29	Draining
38.00 hr	N/A	30.96	2.96	28.99	43.9	8,839.03	N/A	5.68	Draining
39.00 hr	N/A	30.97	2.97	29.08	44.0	8,864.42	N/A	194.69	Draining
40.00 hr	N/A	30.70	2.70	26.40	40.2	8,096.59	N/A	233.67	Draining
41.00 hr	N/A	30.33	2.33	22.82	35.1	7,072.25	N/A	332.72	Draining
42.00 hr	N/A	29.87	1.87	18.25	28.6	5,762.89	N/A	401.93	Draining
43.00 hr	N/A	29.36	1.36	13.29	21.6	4,345.14	N/A	378.93	Draining
44.00 hr	N/A	28.95	0.95	9.34	16.0	3,213.47	N/A	247.23	Draining
45.00 hr	N/A	28.81	0.81	7.92	13.9	2,806.56	136.75	N/A	Filling
46.00 hr	N/A	29.10	1.10	10.72	17.9	3,608.68	300.09	N/A	Filling
47.00 hr	N/A	29.53	1.53	14.94	23.9	4,815.96	379.18	N/A	Filling
48.00 hr	N/A	30.05	2.05	20.05	31.2	6,277.87	428.45	N/A	Filling
49.00 hr	N/A	30.62	2.62	25.62	39.1	7,874.80	455.10	N/A	Filling
50.00 hr	N/A	31.35	3.35	32.72	49.2	9,906.03	705.68	N/A	Filling
51.00 hr	N/A	32.27	4.27	41.75	62.0	12,490.54	728.82	N/A	Filling
52.00 hr	N/A	33.10	5.10	49.90	73.6	14,822.75	516.03	N/A	Filling
53.00 hr	N/A	33.72	5.72	55.93	82.2	16,550.28	440.37	N/A	Filling
54.00 hr	N/A	34.12	6.12	59.91	87.8	17,689.97	120.12	N/A	Filling
55.00 hr	N/A	34.22	6.22	60.89	89.2	17,969.58	N/A	82.88	Draining
56.00 hr	N/A	34.06	6.06	59.23	86.9	17,494.25	N/A	248.06	Draining
57.00 hr	N/A	33.60	5.60	54.77	80.5	16,218.06	N/A	550.84	Draining
58.00 hr	N/A	32.91	4.91	48.07	71.0	14,299.71	N/A	525.25	Draining
59.00 hr	N/A	32.27	4.27	41.78	62.1	12,497.86	N/A	458.83	Draining
60.00 hr	N/A	31.73	3.73	36.48	54.5	10,982.03	N/A	349.70	Draining
61.00 hr	N/A	31.30	3.30	32.24	48.5	9,768.58	N/A	284.67	Draining
62.00 hr	N/A	31.00	3.00	29.31	44.3	8,930.11	N/A	5.82	Draining
63.00 hr	N/A	31.00	3.00	29.32	44.3	8,931.37	26.27	N/A	Filling
64.00 hr	N/A	31.00	3.00	29.38	44.4	8,948.64	N/A	17.82	Draining
65.00 hr	N/A	30.71	2.71	26.53	40.4	8,135.36	N/A	339.73	Draining
66.00 hr	N/A	30.26	2.26	22.09	34.1	6,862.99	N/A	409.49	Draining
67.00 hr	N/A	29.76	1.76	17.17	27.1	5,455.71	N/A	386.91	Draining
68.00 hr	N/A	29.31	1.31	12.84	20.9	4,213.94	N/A	254.70	Draining
69.00 hr	N/A	29.05	1.05	10.28	17.3	3,482.63	N/A	67.85	Draining
70.00 hr	N/A	29.05	1.05	10.25	17.2	3,473.73	300.73	N/A	Filling
71.00 hr	N/A	29.47	1.47	14.35	23.1	4,648.07	379.92	N/A	Filling
72.00 hr	N/A	29.96	1.96	19.21	30.0	6,038.41	429.41	N/A	Filling


Tank: T-Khulshi-gr
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Khulshi-el

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	381.62 m	Base Elevation	29.00
Y	360.14 m	Zone	Zone-1

Connecting Pipes
P-KhulP4
P-2031

Operating Range Summary			
Maximum Elevation	52.00 m	Maximum Level	23.00
Initial Elevation	51.00 m	Initial Level	22.00
Minimum Elevation	45.00 m	Minimum Level	16.00

Storage Summary			
Type	Constant Area	Cross Section	Circular
Tank Diameter	18.00 m	Average Area	254.5
Inactive Volume	0.00 m³	Total Active Volume	1,781.28
Total Storage Capacity	1,781.28 m³		

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	51.00	22.00	215.20	85.7	1,526.81	46.93	N/A	Filling
1.00 hr	N/A	51.77	22.77	222.70	96.7	1,721.84	62.46	N/A	Filling
2.00 hr	N/A	50.14	21.14	206.80	73.5	1,308.39	N/A	141.84	Draining
3.00 hr	N/A	48.21	19.21	187.87	45.8	815.83	N/A	132.36	Draining
4.00 hr	N/A	49.37	20.37	199.26	62.4	1,112.06	117.74	N/A	Filling
5.00 hr	N/A	50.90	21.90	214.27	84.4	1,502.63	93.68	N/A	Filling
6.00 hr	N/A	51.70	22.70	222.04	95.7	1,704.75	N/A	32.85	Draining
7.00 hr	N/A	51.12	22.12	216.36	87.4	1,556.98	N/A	114.75	Draining
8.00 hr	N/A	49.18	20.18	197.36	59.7	1,062.70	N/A	183.80	Draining
9.00 hr	N/A	47.08	18.08	176.88	29.8	529.96	29.48	N/A	Filling
10.00 hr	N/A	47.43	18.43	180.28	34.7	618.33	22.59	N/A	Filling
11.00 hr	N/A	47.81	18.81	184.00	40.1	715.02	34.99	N/A	Filling
12.00 hr	N/A	48.51	19.51	190.85	50.1	893.24	66.98	N/A	Filling
13.00 hr	N/A	49.57	20.57	201.19	65.3	1,162.35	83.30	N/A	Filling
14.00 hr	N/A	50.85	21.85	213.70	83.5	1,487.74	98.71	N/A	Filling
15.00 hr	N/A	49.57	20.57	201.23	65.3	1,163.37	N/A	106.93	Draining
16.00 hr	N/A	47.97	18.97	185.57	42.4	755.89	N/A	124.80	Draining
17.00 hr	N/A	47.42	18.42	180.18	34.6	615.75	46.43	N/A	Filling
18.00 hr	N/A	47.83	18.83	184.16	40.4	719.33	6.30	N/A	Filling

Detailed Report for Tank: T-Khulshi-el

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
19.00 hr	N/A	47.85	18.85	184.39	40.7	725.34	0.10	N/A	Filling
20.00 hr	N/A	48.15	19.15	187.35	45.0	802.19	42.04	N/A	Filling
21.00 hr	N/A	49.26	20.26	198.15	60.8	1,083.24	112.08	N/A	Filling
22.00 hr	N/A	50.96	21.96	214.82	85.2	1,516.98	N/A	19.59	Draining
23.00 hr	N/A	51.00	22.00	215.21	85.7	1,526.95	19.41	N/A	Filling
24.00 hr	N/A	51.47	22.47	219.79	92.4	1,646.24	47.02	N/A	Filling
25.00 hr	N/A	51.00	22.00	215.19	85.7	1,526.63	N/A	154.06	Draining
26.00 hr	N/A	48.91	19.91	194.75	55.9	994.90	N/A	141.84	Draining
27.00 hr	N/A	48.75	19.75	193.21	53.6	954.70	101.87	N/A	Filling
28.00 hr	N/A	50.31	21.31	208.46	75.9	1,351.54	119.05	N/A	Filling
29.00 hr	N/A	51.86	22.86	223.58	98.0	1,744.86	95.92	N/A	Filling
30.00 hr	N/A	48.98	19.98	195.42	56.8	1,012.11	N/A	279.39	Draining
31.00 hr	N/A	47.09	18.09	176.96	29.9	532.04	N/A	111.15	Draining
32.00 hr	N/A	48.28	19.28	188.62	46.9	835.22	63.00	N/A	Filling
33.00 hr	N/A	48.89	19.89	194.58	55.6	990.33	24.77	N/A	Filling
34.00 hr	N/A	49.22	20.22	197.78	60.3	1,073.58	19.89	N/A	Filling
35.00 hr	N/A	49.61	20.61	201.59	65.8	1,172.71	32.39	N/A	Filling
36.00 hr	N/A	50.31	21.31	208.47	75.9	1,351.66	64.50	N/A	Filling
37.00 hr	N/A	50.34	21.34	208.73	76.3	1,358.42	N/A	138.66	Draining
38.00 hr	N/A	48.53	19.53	191.05	50.4	898.62	N/A	117.62	Draining
39.00 hr	N/A	47.04	18.04	176.44	29.1	518.38	116.95	N/A	Filling
40.00 hr	N/A	48.54	19.54	191.17	50.6	901.70	93.55	N/A	Filling
41.00 hr	N/A	49.53	20.53	200.78	64.6	1,151.53	43.21	N/A	Filling
42.00 hr	N/A	49.89	20.89	204.35	69.9	1,244.58	1.96	N/A	Filling
43.00 hr	N/A	49.89	20.89	204.35	69.9	1,244.41	N/A	3.15	Draining
44.00 hr	N/A	50.15	21.15	206.90	73.6	1,310.77	38.76	N/A	Filling
45.00 hr	N/A	50.80	21.80	213.20	82.8	1,474.87	N/A	89.54	Draining
46.00 hr	N/A	50.05	21.05	205.91	72.1	1,284.98	N/A	18.25	Draining
47.00 hr	N/A	50.03	21.03	205.69	71.8	1,279.31	20.51	N/A	Filling
48.00 hr	N/A	50.51	21.51	210.42	78.7	1,402.48	48.05	N/A	Filling
49.00 hr	N/A	51.32	22.32	218.32	90.3	1,608.05	66.65	N/A	Filling
50.00 hr	N/A	51.03	22.03	215.47	86.1	1,533.91	N/A	141.84	Draining
51.00 hr	N/A	49.09	20.09	196.54	58.5	1,041.36	N/A	132.36	Draining
52.00 hr	N/A	48.66	19.66	192.32	52.3	931.69	121.48	N/A	Filling
53.00 hr	N/A	50.21	21.21	207.45	74.4	1,325.05	97.18	N/A	Filling
54.00 hr	N/A	50.89	21.89	214.17	84.2	1,499.89	N/A	29.72	Draining
55.00 hr	N/A	50.24	21.24	207.76	74.9	1,333.33	N/A	111.85	Draining
56.00 hr	N/A	48.37	19.37	189.44	48.1	856.62	N/A	180.88	Draining
57.00 hr	N/A	47.25	18.25	178.52	32.1	572.50	32.07	N/A	Filling
58.00 hr	N/A	47.73	18.73	183.21	39.0	694.50	27.53	N/A	Filling
59.00 hr	N/A	48.18	19.18	187.64	45.5	809.76	40.03	N/A	Filling
60.00 hr	N/A	48.89	19.89	194.56	55.6	989.80	71.88	N/A	Filling
61.00 hr	N/A	49.92	20.92	204.63	70.3	1,251.80	87.87	N/A	Filling
62.00 hr	N/A	50.75	21.75	212.79	82.2	1,464.11	N/A	117.32	Draining
63.00 hr	N/A	49.13	20.13	196.89	59.0	1,050.56	N/A	104.17	Draining
64.00 hr	N/A	47.53	18.53	181.27	36.2	644.21	N/A	122.16	Draining
65.00 hr	N/A	47.67	18.67	182.65	38.2	679.94	50.36	N/A	Filling
66.00 hr	N/A	48.24	19.24	188.22	46.3	824.96	11.67	N/A	Filling
67.00 hr	N/A	48.41	19.41	189.91	48.8	868.91	4.97	N/A	Filling
68.00 hr	N/A	48.65	19.65	192.22	52.1	928.85	46.36	N/A	Filling
69.00 hr	N/A	49.55	20.55	201.00	65.0	1,157.43	115.18	N/A	Filling
70.00 hr	N/A	50.96	21.96	214.82	85.2	1,516.80	N/A	18.77	Draining
71.00 hr	N/A	50.88	21.88	213.98	83.9	1,495.06	19.89	N/A	Filling
72.00 hr	N/A	51.23	22.23	217.47	89.0	1,585.72	47.21	N/A	Filling


Tank: T-Khulshi-el
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

Detailed Report for Tank: T-Battali Hill

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	376.50 m	Base Elevation	42.00
Y	299.46 m	Zone	Zone-1

Connecting Pipes
P-MadunaghatTrans
P-14T
P-2077

Operating Range Summary			
Maximum Elevation	51.50 m	Maximum Level	9.50
Initial Elevation	46.50 m	Initial Level	4.50
Minimum Elevation	42.70 m	Minimum Level	0.70

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	1,550.0
Inactive Volume	151.00 m³	Total Active Volume	13,640.00
Total Storage Capacity	13,791.00 m³		

battali hill top tank

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	46.50	4.50	44.02	43.8	6,041.00	243.73	N/A	Filling
1.00 hr	N/A	47.09	5.09	49.75	50.4	6,948.77	260.59	N/A	Filling
2.00 hr	N/A	47.72	5.72	55.92	57.5	7,927.10	281.67	N/A	Filling
3.00 hr	N/A	48.39	6.39	62.52	65.1	8,972.21	298.00	N/A	Filling
4.00 hr	N/A	49.11	7.11	69.50	73.1	10,078.86	318.55	N/A	Filling
5.00 hr	N/A	49.80	7.80	76.30	80.9	11,155.46	268.50	N/A	Filling
6.00 hr	N/A	50.27	8.27	80.86	86.1	11,878.78	44.56	N/A	Filling
7.00 hr	N/A	50.33	8.33	81.53	86.9	11,984.17	N/A	98.24	Draining
8.00 hr	N/A	50.02	8.02	78.42	83.3	11,492.33	N/A	215.74	Draining
9.00 hr	N/A	49.51	7.51	73.51	77.7	10,713.59	N/A	260.53	Draining
10.00 hr	N/A	48.91	6.91	67.63	70.9	9,782.84	N/A	249.99	Draining
11.00 hr	N/A	48.37	6.37	62.29	64.8	8,935.97	N/A	210.47	Draining
12.00 hr	N/A	47.95	5.95	58.21	60.1	8,290.26	N/A	139.87	Draining
13.00 hr	N/A	47.67	5.67	55.45	56.9	7,853.06	N/A	99.29	Draining
14.00 hr	N/A	47.48	5.48	53.57	54.8	7,553.83	N/A	62.41	Draining
15.00 hr	N/A	47.36	5.36	52.38	53.4	7,366.46	N/A	39.75	Draining

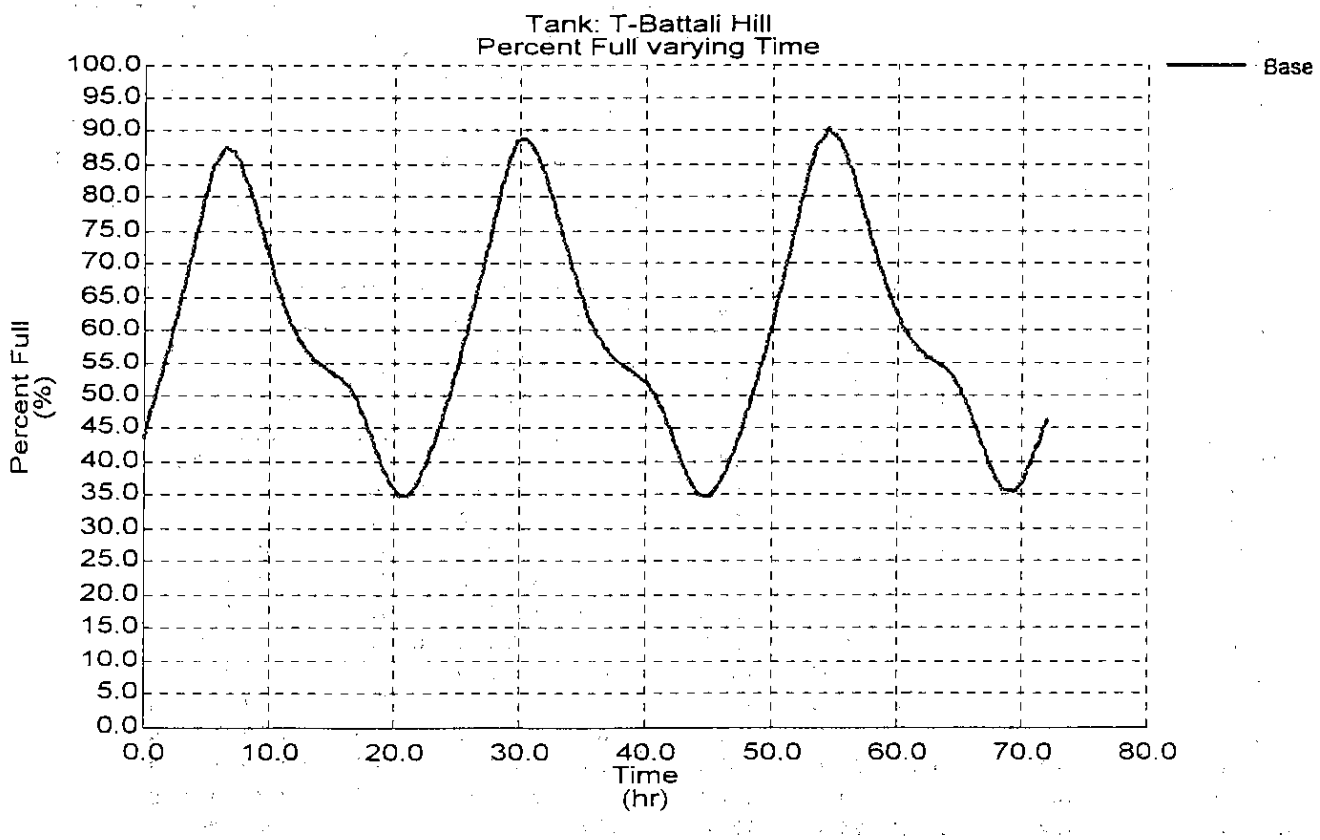
Detailed Report for Tank: T-Battali Hill

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
16.00 hr	N/A	47.24	5.24	51.23	52.1	7,183.85	N/A	70.84	Draining
17.00 hr	N/A	47.00	5.00	48.91	49.4	6,815.30	N/A	145.66	Draining
18.00 hr	N/A	46.60	4.60	45.04	45.0	6,203.44	N/A	200.99	Draining
19.00 hr	N/A	46.14	4.14	40.49	39.8	5,482.32	N/A	192.03	Draining
20.00 hr	N/A	45.79	3.79	37.11	35.9	4,945.78	N/A	105.09	Draining
21.00 hr	N/A	45.70	3.70	36.21	34.8	4,803.43	22.95	N/A	Filling
22.00 hr	N/A	45.90	3.90	38.13	37.0	5,107.61	140.45	N/A	Filling
23.00 hr	N/A	46.31	4.31	42.13	41.6	5,741.64	199.47	N/A	Filling
24.00 hr	N/A	46.82	4.82	47.13	47.4	6,533.32	237.93	N/A	Filling
25.00 hr	N/A	47.40	5.40	52.81	53.9	7,434.04	260.59	N/A	Filling
26.00 hr	N/A	48.03	6.03	58.98	61.0	8,411.62	281.67	N/A	Filling
27.00 hr	N/A	48.70	6.70	65.57	68.6	9,456.04	298.00	N/A	Filling
28.00 hr	N/A	49.42	7.42	72.56	76.6	10,563.76	318.55	N/A	Filling
29.00 hr	N/A	50.11	8.11	79.31	84.4	11,633.15	268.50	N/A	Filling
30.00 hr	N/A	50.48	8.48	82.99	88.6	12,215.82	44.56	N/A	Filling
31.00 hr	N/A	50.41	8.41	82.25	87.7	12,099.60	N/A	98.24	Draining
32.00 hr	N/A	50.03	8.03	78.56	83.5	11,514.24	N/A	215.74	Draining
33.00 hr	N/A	49.47	7.47	73.08	77.2	10,645.76	N/A	260.53	Draining
34.00 hr	N/A	48.88	6.88	67.25	70.5	9,722.27	N/A	249.99	Draining
35.00 hr	N/A	48.34	6.34	62.02	64.5	8,893.61	N/A	210.47	Draining
36.00 hr	N/A	47.93	5.93	58.05	59.9	8,264.89	N/A	139.87	Draining
37.00 hr	N/A	47.66	5.66	55.38	56.9	7,841.03	N/A	99.29	Draining
38.00 hr	N/A	47.48	5.48	53.56	54.8	7,552.62	N/A	62.41	Draining
39.00 hr	N/A	47.36	5.36	52.42	53.5	7,372.27	N/A	39.75	Draining
40.00 hr	N/A	47.23	5.23	51.19	52.0	7,176.80	N/A	70.84	Draining
41.00 hr	N/A	46.98	4.98	48.72	49.2	6,785.96	N/A	145.66	Draining
42.00 hr	N/A	46.59	4.59	44.86	44.8	6,173.68	N/A	200.99	Draining
43.00 hr	N/A	46.13	4.13	40.35	39.6	5,459.99	N/A	192.03	Draining
44.00 hr	N/A	45.78	3.78	36.97	35.7	4,923.46	N/A	105.09	Draining
45.00 hr	N/A	45.70	3.70	36.18	34.8	4,799.39	22.95	N/A	Filling
46.00 hr	N/A	45.90	3.90	38.10	37.0	5,103.58	140.45	N/A	Filling
47.00 hr	N/A	46.28	4.28	41.89	41.4	5,703.21	199.47	N/A	Filling
48.00 hr	N/A	46.79	4.79	46.88	47.1	6,494.90	237.93	N/A	Filling
49.00 hr	N/A	47.37	5.37	52.57	53.6	7,395.46	260.59	N/A	Filling
50.00 hr	N/A	48.00	6.00	58.74	60.7	8,373.04	281.67	N/A	Filling
51.00 hr	N/A	48.68	6.68	65.33	68.3	9,418.16	298.00	N/A	Filling
52.00 hr	N/A	49.40	7.40	72.34	76.3	10,528.90	318.55	N/A	Filling
53.00 hr	N/A	50.08	8.08	79.03	84.0	11,588.81	268.50	N/A	Filling
54.00 hr	N/A	50.50	8.50	83.17	88.8	12,244.69	44.56	N/A	Filling
55.00 hr	N/A	50.54	8.54	83.51	89.2	12,298.71	N/A	98.24	Draining
56.00 hr	N/A	50.23	8.23	80.48	85.7	11,819.33	N/A	215.74	Draining
57.00 hr	N/A	49.72	7.72	75.53	80.0	11,033.94	N/A	260.53	Draining
58.00 hr	N/A	49.14	7.14	69.83	73.5	10,130.93	N/A	249.99	Draining
59.00 hr	N/A	48.59	6.59	64.48	67.3	9,282.92	N/A	210.47	Draining
60.00 hr	N/A	48.16	6.16	60.24	62.4	8,610.95	N/A	139.87	Draining
61.00 hr	N/A	47.85	5.85	57.21	59.0	8,131.32	N/A	99.29	Draining
62.00 hr	N/A	47.64	5.64	55.21	56.7	7,815.00	N/A	62.41	Draining
63.00 hr	N/A	47.51	5.51	53.89	55.2	7,605.88	N/A	39.75	Draining
64.00 hr	N/A	47.38	5.38	52.65	53.7	7,408.35	N/A	70.84	Draining
65.00 hr	N/A	47.13	5.13	50.16	50.9	7,014.78	N/A	145.66	Draining
66.00 hr	N/A	46.76	4.76	46.58	46.8	6,447.52	N/A	200.99	Draining
67.00 hr	N/A	46.32	4.32	42.25	41.8	5,761.01	N/A	192.03	Draining
68.00 hr	N/A	45.94	3.94	38.50	37.5	5,166.43	N/A	105.09	Draining
69.00 hr	N/A	45.77	3.77	36.89	35.6	4,911.88	22.95	N/A	Filling
70.00 hr	N/A	45.88	3.88	37.98	36.9	5,084.68	140.45	N/A	Filling

Detailed Report for Tank: T-Battali Hill

Calculated Results Summary									
Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
71.00 hr	N/A	46.25	4.25	41.61	41.0	5,659.35	199.47	N/A	Filling
72.00 hr	N/A	46.73	4.73	46.27	46.4	6,398.31	237.93	N/A	Filling



Detailed Report for Tank: T-ADC Hill

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	519.65 m	Base Elevation	12.00
Y	221.50 m	Zone	Zone-1

Connecting Pipes
P-ADCin
P-2018
P-ADCout

Operating Range Summary			
Maximum Elevation	38.10 m	Maximum Level	26.10
Initial Elevation	38.00 m	Initial Level	26.00
Minimum Elevation	33.50 m	Minimum Level	21.50

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	988.0
Inactive Volume	145.00 m³	Total Active Volume	4,544.80
Total Storage Capacity	4,689.80 m³		

adc hill top tank,

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	38.00	26.00	254.33	97.9	4,591.00	415.43	N/A	Filling
1.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
2.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
3.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
4.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.17e-3	N/A	Full
5.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
6.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.99e-4	N/A	Full
7.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.00	0.00	Full
8.00 hr	N/A	37.92	25.92	253.57	96.3	4,514.21	N/A	122.04	Draining
9.00 hr	N/A	37.48	25.48	249.25	86.9	4,077.71	N/A	182.78	Draining
10.00 hr	N/A	36.83	24.83	242.87	73.2	3,433.15	N/A	166.33	Draining
11.00 hr	N/A	36.30	24.30	237.73	62.1	2,913.98	N/A	105.39	Draining
12.00 hr	N/A	36.09	24.09	235.65	57.7	2,704.71	1.32	N/A	Filling
13.00 hr	N/A	36.20	24.20	236.68	59.9	2,808.11	60.85	N/A	Filling
14.00 hr	N/A	36.50	24.50	239.67	66.3	3,110.83	113.63	N/A	Filling
15.00 hr	N/A	36.97	24.97	244.21	76.1	3,569.18	141.71	N/A	Filling

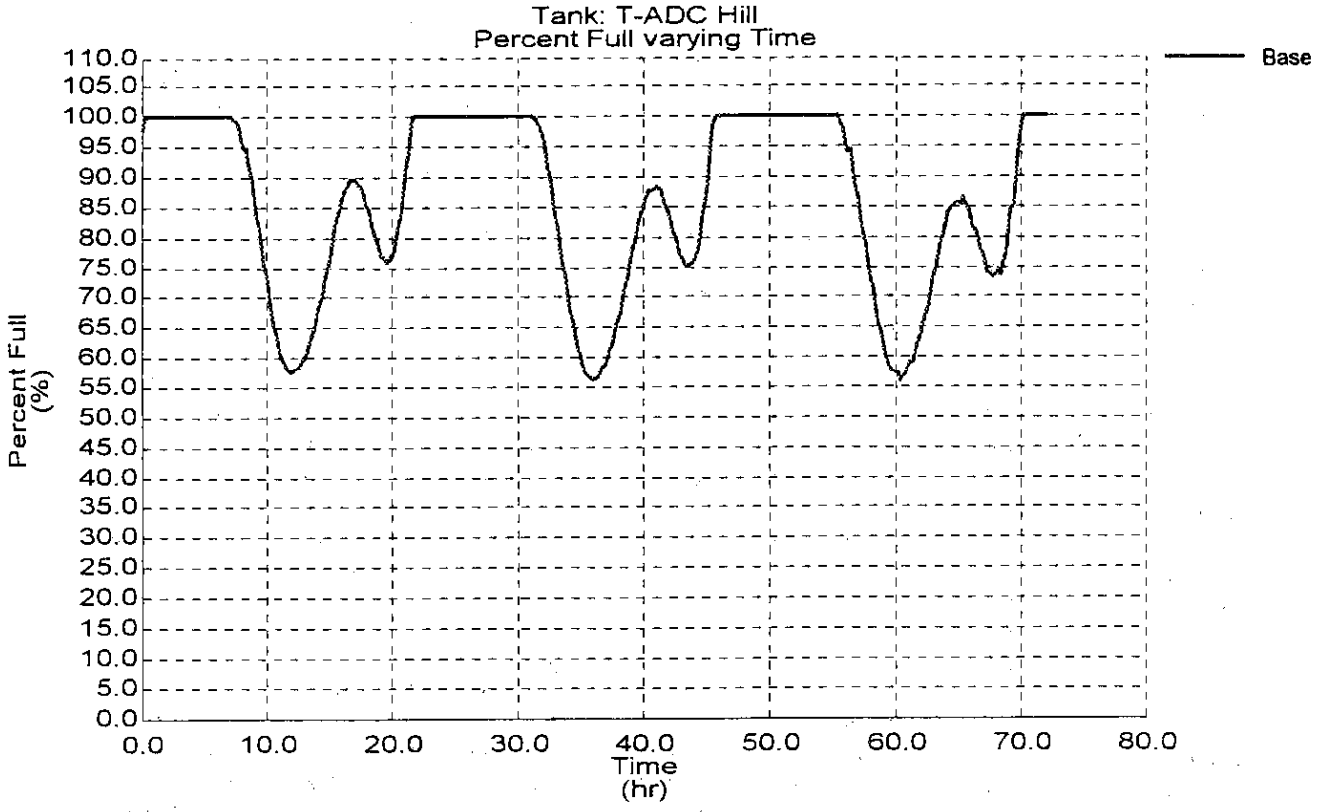
Detailed Report for Tank: T-ADC Hill

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
16.00 hr	N/A	37.43	25.43	248.71	85.8	4,023.24	96.14	N/A	Filling
17.00 hr	N/A	37.60	25.60	250.46	89.6	4,200.28	N/A	15.34	Draining
18.00 hr	N/A	37.42	25.42	248.63	85.6	4,015.75	N/A	96.94	Draining
19.00 hr	N/A	37.07	25.07	245.24	78.3	3,673.22	N/A	81.63	Draining
20.00 hr	N/A	37.01	25.01	244.63	77.0	3,611.46	48.11	N/A	Filling
21.00 hr	N/A	37.51	25.51	249.51	87.5	4,104.29	212.28	N/A	Filling
22.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.13e-3	N/A	Full
23.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.15e-3	N/A	Full
24.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.15e-3	N/A	Full
25.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
26.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
27.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
28.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.17e-3	N/A	Full
29.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
30.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.99e-4	N/A	Full
31.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.00	0.00	Full
32.00 hr	N/A	37.92	25.92	253.53	96.2	4,509.87	N/A	122.00	Draining
33.00 hr	N/A	37.34	25.34	247.90	84.0	3,941.55	N/A	182.19	Draining
34.00 hr	N/A	36.70	24.70	241.63	70.5	3,308.36	N/A	165.77	Draining
35.00 hr	N/A	36.21	24.21	236.78	60.1	2,818.59	N/A	104.87	Draining
36.00 hr	N/A	36.02	24.02	234.98	56.2	2,636.34	1.69	N/A	Filling
37.00 hr	N/A	36.15	24.15	236.21	58.9	2,760.48	61.11	N/A	Filling
38.00 hr	N/A	36.47	24.47	239.37	65.7	3,079.89	113.80	N/A	Filling
39.00 hr	N/A	36.94	24.94	244.00	75.6	3,547.61	141.82	N/A	Filling
40.00 hr	N/A	37.39	25.39	248.33	85.0	3,984.89	96.35	N/A	Filling
41.00 hr	N/A	37.53	25.53	249.77	88.1	4,130.24	N/A	14.96	Draining
42.00 hr	N/A	37.35	25.35	247.94	84.1	3,946.00	N/A	96.56	Draining
43.00 hr	N/A	37.01	25.01	244.68	77.1	3,615.93	N/A	81.32	Draining
44.00 hr	N/A	36.95	24.95	244.08	75.8	3,555.36	48.42	N/A	Filling
45.00 hr	N/A	37.47	25.47	249.19	86.8	4,072.26	212.43	N/A	Filling
46.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.13e-3	N/A	Full
47.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.15e-3	N/A	Full
48.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.15e-3	N/A	Full
49.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
50.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
51.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
52.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.17e-3	N/A	Full
53.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.16e-3	N/A	Full
54.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.99e-4	N/A	Full
55.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.00	0.00	Full
56.00 hr	N/A	37.91	25.91	253.41	95.9	4,498.28	N/A	121.93	Draining
57.00 hr	N/A	37.46	25.46	249.01	86.4	4,053.43	N/A	182.67	Draining
58.00 hr	N/A	36.84	24.84	242.99	73.5	3,445.91	N/A	166.37	Draining
59.00 hr	N/A	36.32	24.32	237.87	62.4	2,928.14	N/A	105.45	Draining
60.00 hr	N/A	36.07	24.07	235.40	57.1	2,679.27	1.47	N/A	Filling
61.00 hr	N/A	36.11	24.11	235.81	58.0	2,720.18	61.33	N/A	Filling
62.00 hr	N/A	36.39	24.39	238.57	64.0	2,999.80	114.25	N/A	Filling
63.00 hr	N/A	36.82	24.82	242.81	73.1	3,427.16	142.39	N/A	Filling
64.00 hr	N/A	37.26	25.26	247.13	82.4	3,863.93	97.02	N/A	Filling
65.00 hr	N/A	37.41	25.41	248.55	85.4	4,007.10	N/A	14.29	Draining
66.00 hr	N/A	37.29	25.29	247.40	83.0	3,891.16	N/A	96.26	Draining
67.00 hr	N/A	37.00	25.00	244.54	76.8	3,602.29	N/A	81.24	Draining
68.00 hr	N/A	36.85	24.85	243.09	73.7	3,456.01	48.96	N/A	Filling
69.00 hr	N/A	37.19	25.19	246.44	80.9	3,794.51	213.71	N/A	Filling
70.00 hr	N/A	38.04	26.04	254.76	98.8	4,634.73	328.40	N/A	Filling

Detailed Report for Tank: T-ADC Hill

Calculated Results Summary									
Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
71.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.15e-3	N/A	Full
72.00 hr	N/A	38.10	26.10	255.31	100.0	4,689.80	0.15e-3	N/A	Full



Detailed Report for Tank: T-Patenga

Scenario Summary	
Label	Base
Demand Alternative	Base-Average Daily
Physical Alternative	Base-Physical
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow

Calibration Summary			
Demand	<none>	Roughness	

Geometric Summary			
X	250.74 m	Base Elevation	1.00
Y	44.74 m	Zone	Zone-1

Connecting Pipes
P-2060T2
P-933
P-PatIP

Operating Range Summary			
Maximum Elevation	7.00 m	Maximum Level	6.00
Initial Elevation	2.50 m	Initial Level	1.50
Minimum Elevation	1.00 m	Minimum Level	0.00

Storage Summary			
Type	Constant Area		
Cross Section	Non-Circular	Average Area	4,000.0
Inactive Volume	0.00 m³	Total Active Volume	24,000.00
Total Storage Capacity	24,000.00 m³		

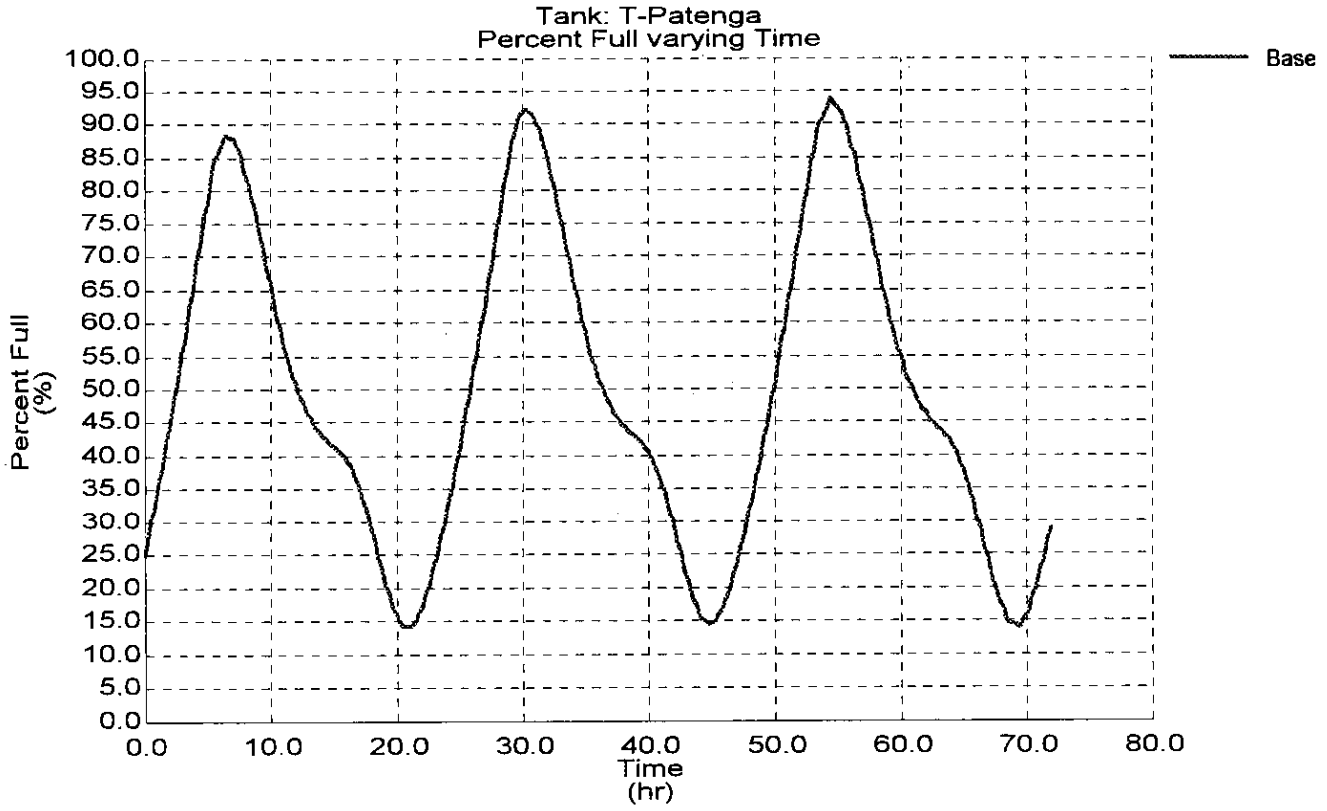
Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m³)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
0.00 hr	N/A	2.50	1.50	14.67	25.0	6,000.00	595.66	N/A	Filling
1.00 hr	N/A	3.06	2.06	20.13	34.3	8,230.18	644.51	N/A	Filling
2.00 hr	N/A	3.66	2.66	26.07	44.4	10,659.38	702.31	N/A	Filling
3.00 hr	N/A	4.32	3.32	32.47	55.3	13,277.12	750.54	N/A	Filling
4.00 hr	N/A	5.02	4.02	39.30	67.0	16,071.51	807.76	N/A	Filling
5.00 hr	N/A	5.70	4.70	46.01	78.4	18,812.45	688.45	N/A	Filling
6.00 hr	N/A	6.17	5.17	50.60	86.2	20,691.38	135.26	N/A	Filling
7.00 hr	N/A	6.26	5.26	51.48	87.7	21,051.87	N/A	213.76	Draining
8.00 hr	N/A	5.98	4.98	48.75	83.1	19,935.19	N/A	508.48	Draining
9.00 hr	N/A	5.52	4.52	44.24	75.4	18,089.36	N/A	625.54	Draining
10.00 hr	N/A	4.96	3.96	38.75	66.0	15,844.07	N/A	606.56	Draining
11.00 hr	N/A	4.45	3.45	33.71	57.4	13,783.58	N/A	514.38	Draining
12.00 hr	N/A	4.05	3.05	29.84	50.8	12,203.26	N/A	344.11	Draining
13.00 hr	N/A	3.78	2.78	27.21	46.4	11,127.16	N/A	243.76	Draining
14.00 hr	N/A	3.60	2.60	25.42	43.3	10,395.15	N/A	151.57	Draining
15.00 hr	N/A	3.49	2.49	24.31	41.4	9,942.71	N/A	94.92	Draining
16.00 hr	N/A	3.37	2.37	23.22	39.6	9,494.07	N/A	177.61	Draining
17.00 hr	N/A	3.14	2.14	20.94	35.7	8,562.45	N/A	368.67	Draining

Detailed Report for Tank: T-Patenga

Calculated Results Summary

Time	Constituent (mg/l)	Calculated Hydraulic Grade (m)	Tank Level (m)	Pressure (kPa)	Percent Full (%)	Current Storage Volume (m^3)	Tank Inflow (l/s)	Tank Outflow (l/s)	Status
18.00 hr	N/A	2.75	1.75	17.16	29.2	7,017.73	N/A	506.27	Draining
19.00 hr	N/A	2.30	1.30	12.70	21.6	5,194.90	N/A	488.57	Draining
20.00 hr	N/A	1.95	0.95	9.33	15.9	3,815.93	N/A	276.03	Draining
21.00 hr	N/A	1.85	0.85	8.33	14.2	3,405.78	39.50	N/A	Filling
22.00 hr	N/A	2.02	1.02	10.03	17.1	4,099.92	333.12	N/A	Filling
23.00 hr	N/A	2.41	1.41	13.76	23.4	5,626.99	486.71	N/A	Filling
24.00 hr	N/A	2.89	1.89	18.52	31.5	7,571.43	589.27	N/A	Filling
25.00 hr	N/A	3.45	2.45	23.99	40.9	9,811.30	652.08	N/A	Filling
26.00 hr	N/A	4.07	3.07	29.99	51.1	12,265.13	709.51	N/A	Filling
27.00 hr	N/A	4.73	3.73	36.45	62.1	14,906.40	756.08	N/A	Filling
28.00 hr	N/A	5.43	4.43	43.35	73.9	17,725.89	812.94	N/A	Filling
29.00 hr	N/A	6.12	5.12	50.06	85.3	20,469.28	694.34	N/A	Filling
30.00 hr	N/A	6.50	5.50	53.84	91.7	22,017.08	140.28	N/A	Filling
31.00 hr	N/A	6.46	5.46	53.40	91.0	21,835.52	N/A	215.20	Draining
32.00 hr	N/A	6.12	5.12	50.07	85.3	20,474.76	N/A	513.35	Draining
33.00 hr	N/A	5.60	4.60	44.96	76.6	18,384.01	N/A	633.66	Draining
34.00 hr	N/A	5.03	4.03	39.45	67.2	16,130.20	N/A	613.89	Draining
35.00 hr	N/A	4.52	3.52	34.46	58.7	14,090.25	N/A	521.30	Draining
36.00 hr	N/A	4.13	3.13	30.64	52.2	12,528.01	N/A	350.63	Draining
37.00 hr	N/A	3.86	2.86	28.02	47.7	11,457.89	N/A	252.21	Draining
38.00 hr	N/A	3.68	2.68	26.22	44.7	10,722.99	N/A	159.63	Draining
39.00 hr	N/A	3.56	2.56	25.09	42.7	10,259.60	N/A	102.62	Draining
40.00 hr	N/A	3.44	2.44	23.86	40.7	9,756.97	N/A	183.71	Draining
41.00 hr	N/A	3.19	2.19	21.40	36.5	8,750.15	N/A	375.33	Draining
42.00 hr	N/A	2.79	1.79	17.54	29.9	7,173.41	N/A	517.88	Draining
43.00 hr	N/A	2.33	1.33	13.03	22.2	5,328.51	N/A	499.57	Draining
44.00 hr	N/A	1.98	0.98	9.57	16.3	3,911.64	N/A	286.20	Draining
45.00 hr	N/A	1.88	0.88	8.59	14.6	3,511.40	31.70	N/A	Filling
46.00 hr	N/A	2.05	1.05	10.23	17.4	4,181.35	326.88	N/A	Filling
47.00 hr	N/A	2.40	1.40	13.68	23.3	5,595.85	478.59	N/A	Filling
48.00 hr	N/A	2.88	1.88	18.37	31.3	7,511.46	581.43	N/A	Filling
49.00 hr	N/A	3.43	2.43	23.78	40.5	9,723.00	644.50	N/A	Filling
50.00 hr	N/A	4.04	3.04	29.71	50.6	12,149.96	703.35	N/A	Filling
51.00 hr	N/A	4.69	3.69	36.11	61.5	14,767.49	750.09	N/A	Filling
52.00 hr	N/A	5.39	4.39	42.97	73.2	17,570.04	807.12	N/A	Filling
53.00 hr	N/A	6.07	5.07	49.56	84.4	20,265.96	687.63	N/A	Filling
54.00 hr	N/A	6.49	5.49	53.73	91.6	21,972.54	133.77	N/A	Filling
55.00 hr	N/A	6.55	5.55	54.28	92.5	22,194.86	N/A	220.25	Draining
56.00 hr	N/A	6.27	5.27	51.56	87.8	21,083.60	N/A	517.01	Draining
57.00 hr	N/A	5.80	4.80	46.92	79.9	19,187.89	N/A	636.92	Draining
58.00 hr	N/A	5.24	4.24	41.51	70.7	16,973.74	N/A	616.97	Draining
59.00 hr	N/A	4.72	3.72	36.38	62.0	14,874.62	N/A	524.21	Draining
60.00 hr	N/A	4.30	3.30	32.26	55.0	13,193.70	N/A	353.37	Draining
61.00 hr	N/A	3.99	2.99	29.28	49.9	11,974.57	N/A	257.12	Draining
62.00 hr	N/A	3.79	2.79	27.26	46.4	11,146.47	N/A	166.80	Draining
63.00 hr	N/A	3.65	2.65	25.89	44.1	10,586.02	N/A	109.39	Draining
64.00 hr	N/A	3.51	2.51	24.60	41.9	10,057.40	N/A	186.23	Draining
65.00 hr	N/A	3.26	2.26	22.09	37.6	9,034.87	N/A	377.45	Draining
66.00 hr	N/A	2.89	1.89	18.49	31.5	7,562.68	N/A	519.04	Draining
67.00 hr	N/A	2.44	1.44	14.13	24.1	5,778.61	N/A	501.43	Draining
68.00 hr	N/A	2.05	1.05	10.29	17.5	4,209.73	N/A	287.95	Draining
69.00 hr	N/A	1.87	0.87	8.50	14.5	3,477.24	28.47	N/A	Filling
70.00 hr	N/A	1.95	0.95	9.29	15.8	3,800.76	320.20	N/A	Filling
71.00 hr	N/A	2.28	1.28	12.54	21.4	5,129.80	471.66	N/A	Filling
72.00 hr	N/A	2.72	1.72	16.85	28.7	6,890.15	574.77	N/A	Filling


Tank: T-Patenga
Percent Full varying Time
Base
Percent Full (%)
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
Time (hr)

7.4-3-4 Relationship between Nodes and Wards (Basic Plan Phase 1, 2005)

7.4-3-5 Relationship between Nodes and Wards (Basic Plan Phase 2, 2010)

Tables attached herewith show the relationship between Nodes and Wards. Based on these relationships, demand in each wards were distributed to each nodes for hydraulic analysis.

7.4-3-4 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 1 (2005)

Ward	Kotwali Thana										Double Mooring Thana										Pahartali Thana					Panchlaish Thana										Chandgaon Thana										Ctg. Port Thana					H	Hathazari			Sitakunda		Grand Total	Grand Total	x 1.5 (Lts)	Ward
	1	2	3	4	5	6	7	8	9	10	15	16	17	18	19	20	24	25	33	11	12	14	26	98	21	22	23	34	35	36	27	28	29	30	31	32	37	38	39	40	41	13	BC	CH	DM	SP	BA	SA	(m3/d)	(Lts)		
	Bogmonoram	Chawk Bazar	Jamal Khan	Enayet Bazar	Dewan Bazar	Anderkilla	Alkaran	Pathorghata	Tringe Bazar	Bawrbar	Lalkhan Bazar	East Madarbari	West Madarbari	Uttar Pathantoly	Pathantoly	Gosael Danga	Uttar Agrabad	D. Agrabad	Rampur	Sultak Bohar	West Sholoshahar	Lalabagh	Panchlaish	Cantonmem	Sarapara	North Pahartali	Pahartali	Uttar Kattali	Dakhin Kattali	Uttar Halishahar	Chandgaon	Mohara	Purba Sholoshahar	Purba Bakulia	Paschim Bakulia	D. Bakulia	S.P. Halishahar	O.P. Halishahar	D. Halishahar	E. Patenga	O. Patenga	I.D. Pahariah	Bare Char	Chokandandi	Dakchin Madrasha	Shikarpur	Bhatiari	Salimpur				
Bhase	3,238	3,782	2,906	2,475	1,952	1,232	2,589	2,758	1,775	1,597	4,489	2,415	3,397	3,144	4,558	2,194	3,885	7,902	2,855	7,211	3,926	3,874	3,226	-	4,632	4,966	4,338	2,516	2,576	3,539	3,519	4,640	1,552	3,304	4,243	5,664	4,933	4,511	6,668	6,081	4,708	1,969	1,016	2,356	1,319	1,138	1,383	2,228	161,101	1,863	2,797	Bhase
Hyd.	443	516	399	339	267	169	354	378	243	218	774	417	585	542	786	378	676	1,363	493	1,364	743	733	610	-	842	903	788	458	469	644	755	996	332	710	912	1,216	815	746	1,102	1,005	778	378	303	703	394	339	463	742	29,782	348	517	Hyd.
Com.	714	830	641	546	430	272	571	608	391	352	805	433	609	564	817	398	695	1,417	512	706	384	379	316	-	220	236	206	119	122	168	164	217	72	154	198	265	527	299	442	403	312	535	132	306	171	148	185	299	19,087	222	333	Com.
Ind.	93	108	83	71	56	35	74	79	51	46	90	44	63	59	91	41	73	150	57	92	50	48	41	-	29	31	27	16	14	22	23	28	9	20	26	34	64	54	84	79	43	75	17	40	22	19	24	38	2,483	29	43	Ind.
Ind.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,588	1,409	1,391	1,158	-	1,344	1,441	1,253	730	747	1,027	804	1,060	354	755	978	1,294	4,643	4,245	6,274	5,752	4,430	0	198	459	257	222	277	44	45,502	527	790	Ind.
Leak.	1,496	1,739	1,343	1,148	902	569	1,196	1,274	820	738	2,083	1,104	1,553	1,438	2,084	1,004	1,797	3,631	1,306	3,987	2,171	2,142	1,784	-	2,356	2,526	2,260	1,280	1,310	1,800	1,754	2,314	773	1,648	2,117	2,824	3,593	3,286	4,857	4,458	3,438	1,030	555	1,288	721	622	777	1,258	85,987	995	1,493	Leak.
Total	5,984	6,955	5,372	4,573	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,013	7,107	14,453	5,223	15,948	8,683	8,568	7,135	0	9,423	10,103	8,820	5,119	5,240	7,200	7,017	9,253	3,092	6,591	8,668	11,297	14,373	13,145	19,429	17,720	13,728	4,119	2,221	5,152	2,884	2,488	3,109	5,013	343,942	3,981	5,971	Total
Adjust	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	70%	0%	100%	70%	100%	70%	70%	100%	70%	70%	100%	70%	70%	70%	100%	100%	100%	100%	50%	0%	0%	0%	0%	0%	0%	30%	85%	0	0	Adjust
Adjusted	5,984	6,955	5,372	4,573	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,013	7,107	14,453	5,223	15,948	8,683	8,568	4,995	0	9,423	7,073	8,820	3,583	3,668	7,200	4,912	6,479	3,092	4,612	5,928	7,908	14,373	13,145	19,429	17,720	6,864	0	0	0	0	0	0	1,504	292,520	3,386	5,079	Adjusted
Node																																																		(l/s)	(l/s)	**Node**
1																																																	0	0.00	0.00	1
2																															0																			0	0.00	0.00	2
3																															0																			0	0.00	0.00	3
4																															0																			0	0.00	0.00	4
5																															0																			0	0.00	0.00	5
6																															0																			0	0.00	0.00	6
7																															0																			0	0.00	0.00	7
8																															0																			0	0.00	0.00	8
9																					0																													0	0.00	0.00	9
10																				0																													0	0.00	0.00	10
11	0																																																0	0.00	0.00	11
12	0																																																0	0.00	0.00	12
13	0																																																0	0.00	0.00	13
14											1,369																																					1,369	15.84	23.76	14
15	249										1,369																																					1,618	18.73	28.10	15
16	249										1,369			639																																		2,257	26.11	39.17	16
17														639																																		639	7.40	11.10	17
18														639																																		639	7.40	11.10	18
19														639																																		639	7.40	11.10	19
20														639											785																						1,424	16.48	24.72	20
21																			522						785																						1,307	15.13	22.70	21
22																			522																												522	6.04	9.06	22
23																			522																												522	6.04	9.06	23
24																									785																						785	9.09	13.64	24
25																									785																						785	9.09	13.64	25
26																									785																						785	9.09	13.64	26
27																									785	1,010		512	193																		2,500	28.96	43.43	27
28																												512	193																		705	8.16	12.24	28
29																										1,010		512																		1,522	17.62	26.43	29
30																										1,010		512																		1,522	17.62	26.43	30
31																																																0	0.00	0.00	31
32																										1,010		512																		1,522	17.62	26.43	32
33																										1,010																					1,010	11.69	17.54	33
34																										1,010		512																		1,522	17.62	26.43	34
35																																																0	0.00	0.00	35
36																																														502	502	5.81	8.72	36
37																																													0	502	502	5.81	8.72	37
38																																													502	502	5.81	8.72	38
39																																																0	0.00	0.00	39
40																																																0	0.00	0.00	40
41																											0																					0	0.00	0.00	41
42																											0																					0	0.00	0.00	42
43																											0																					0	0.00	0.00	43
44											1,369																																					1,369	15.84	23.76	44
45																										1,010																					1,010	11.69	17.54	45
46																				570							1,260																					1,830	21.18	31.77	46
47																				570																												570	6.66	9.99	47
48																				570							1,260																					1,830	21.18	31.77	48
49																				570							1,260																					1,830	21.18	31.77	49
50																				570																												570	6.66	9.99	50
51																				570																												570	6.66	9.99	51
52																				570																												570	6.66	9.99	52
53																				570																												570	6.66	9.99	53
54																				570																												570	6.66	9.99	54
55	249										1,369																																					1,618	18.73	28.10	55
56	249																																															249	2.88	4.32	56
57																					1,085																												1,085	12.56	18.84	57
58																				570																												570	6.66	9.99	58
59																															351																			351	4.06	6.09	59
60																															351																			351	4.06	6.09	60
61																															351																			351	4.06	6.09	61
62																															351																			351	4.06	6.09	62
63																															351	2,160																			2,511	29.04	43.59	63
64																																2,160																			2,160	25.00	37.50	64
65																																2,160																			2,160	25.00	37.50	65
66																																0																			0	0.00	0.00	66
67																																0																			0	0.00	0.00	67
68																																0																			0	0.00	0.00	68
69																																0																			0	0.00	0.00	69
70																																0																			0	0.00	0.00	70
71																															0																			0	0.00	0.00	71
72																															0																			0	0.00	0.00	72
73																															351																			351	4.06	6.09	73
74																															351																			351	4.06	6.09	74
75																															0																			0	0.00	0.00	75
76																															0																			0	0.00	0.00	76
77																				570																												570	6.66	9.99	77
78																															0																			0	0.00	0.00	78
79																															0																			0	0.00	0.00	79
80																																0																			0	0.00	0.00	80
81																																773																			773	8.93	13.41	81
82																																773																			773	8.93	13.41	82
83																																773																			773	8.93	13.41	83
84																				570																												570	6.66	9.99	84
85		232																																														232	2.69	4.04	85
86		232																																														232	2.69	4.04	86
87		232																																														232	2.69	4.04	87
88		232																																														232	2.69	4.04	88
89		232																		570																												802	9.25	13.91	89
90																				570																												570	6.66	9.99	90
91																				570	1,085																												1,655	19.16	28.73	91
92																					1,085																												1,085	12.56	18.84	92
93																					1,085																												1,085	12.56	18.84	93

7.4-3-4 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 1 (2005)

Ward	Kotwali Thana										Double Mooring Thana									Pahartali Thana					Panchlaish Thana						Chandgaon Thana						Ctg. Port Thana					H	Hathazari				Sitakunda		Grand	Grand	x 1.5	Ward
	1	2	3	4	5	6	7	8	9	10	15	16	17	18	19	20	24	25	33	11	12	14	26	98	21	22	23	34	35	36	27	28	29	30	31	32	37	38	39	40	41	13	BC	CH	DM	SP	BA	SA	Total	Total	(L/s)	
	Bogmoniram	Chawk Bazar	Jamal Khan	Enayet Bazar	Dewan Bazar	Anderkilla	Alkaran	Patherghata	Fringi Bazar	Boxirhat	Lalkhan Bazar	East Madarbari	West Madarbari	Uttar Pathantoly	Pathantoly	Gosail Danga	Uttar Agrabad	D. Agrabad	Rampur	Sulak Bohar	West Sholoshahar	Jalalabad	Panchlaish	Cantonment	Saripara	North Pahartali	Pahartali	Uttar Kattali	Dakhin Kattali	Uttar Halishahar	Chandgaon	Mohara	Purba Sholoshahar	Purba Bakulia	Paschim Bakulia	D. Bakulia	U.P. Halishahar	D.P. Halishahar	D. Halishahar	U. Patenga	D. Patenga	J.D. Pahartali	Burir Char	Chikandandi	Dakshin Madrasha	Shikarpur	Bhatiari	Salimpur	(m3/d)	(L/s)		
House	3,238	3,762	2,906	2,475	1,952	1,232	2,589	2,758	1,775	1,597	4,489	2,415	3,397	3,144	4,558	2,194	3,885	7,902	2,855	7,211	3,926	3,874	3,226	-	4,632	4,966	4,336	2,516	2,576	3,539	3,519	4,640	1,552	3,304	4,245	5,664	4,933	4,511	6,668	6,081	4,708	1,909	1,016	2,356	1,319	1,138	1,383	2,230	161,101	1,865	2,797	House
Hyd.	443	516	399	339	267	169	354	378	243	218	774	417	585	542	786	379	670	1,363	493	1,364	743	733	610	-	842	903	788	458	469	644	755	996	332	710	912	1,216	815	746	1,102	1,005	779	575	303	703	394	339	463	748	29,782	345	517	Hyd.
Com.	714	830	641	546	430	272	571	608	391	352	805	433	609	564	817	394	697	1,417	512	706	384	379	316	-	220	236	206	119	122	168	164	217	72	154	198	265	327	299	442	403	312	535	132	306	171	148	185	298	19,087	221	331	Com.
Inst.	93	108	83	71	56	35	74	79	51	46	90	48	68	63	91	44	78	158	57	92	50	49	41	-	29	31	27	16	16	22	21	28	9	20	26	34	64	58	86	79	61	70	17	40	22	19	24	39	2,483	29	43	Inst.
Ind.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,588	1,409	1,391	1,158	-	1,344	1,441	1,258	730	747	1,027	804	1,060	354	755	970	1,294	4,641	4,245	6,274	5,722	4,430	0	198	459	257	222	277	447	45,502	527	790	Ind.
Leak.	1,496	1,739	1,343	1,144	902	569	1,196	1,274	820	738	2,053	1,104	1,553	1,438	2,084	1,004	1,777	3,613	1,306	3,987	2,171	2,142	1,784	-	2,356	2,526	2,205	1,280	1,310	1,800	1,754	2,314	773	1,648	2,117	2,824	3,593	3,286	4,857	4,430	3,430	1,030	555	1,288	721	622	777	1,254	85,987	995	1,493	Leak.
Total	5,984	6,955	5,372	4,575	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,015	7,107	14,453	5,223	15,948	8,683	8,568	7,135	0	9,423	10,103	8,820	5,119	5,240	7,200	7,017	9,255	3,092	6,591	8,468	11,297	14,373	13,145	19,429	17,720	13,720	4,119	2,221	5,152	2,884	2,488	3,109	5,016	343,942	3,981	5,971	Total
Adjust F.	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	70%	0%	100%	70%	100%	70%	70%	100%	70%	70%	100%	70%	70%	70%	100%	100%	100%	100%	50%	0%	0%	0%	0%	0%	0%	30%	85%	0	0	Adjust F.
Adjusted	5,984	6,955	5,372	4,575	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,015	7,107	14,453	5,223	15,948	8,683	8,568	4,995	0	9,423	7,072	8,820	3,583	3,668	7,200	4,912	6,479	3,092	4,614	5,928	7,908	14,373	13,145	19,429	17,720	6,860	0	0	0	0	0	0	1,505	292,530	3,386	5,079	Adjusted
94																					1,085																												1,085	12.56	18.84	94
95																							1,665																										1,665	19.27	28.91	95
96																							1,665																										1,665	19.27	28.91	96
97																							1,665																										1,665	19.27	28.91	97
98																					1,085																												1,085	12.56	18.84	98
99																					1,085																												1,085	12.56	18.84	99
100																					1,085																												1,085	12.56	18.84	100
101																						952																											952	11.02	16.53	101
102																						952																											952	11.02	16.53	102
103																						952		0																									952	11.02	16.53	103
104																						952																				0		0	0				952	11.02	16.53	104
105																						952		0																									952	11.02	16.53	105
106																						952																											952	11.02	16.53	106
107																						952																											952	11.02	16.53	107
108																						952																											952	11.02	16.53	108
109																				570																													570	6.60	9.90	109
110																				570		952																											1,522	17.62	26.43	110
111																				570																													570	6.60	9.90	111
112	249																			570																													819	9.48	14.22	112
113																				570																													570	6.60	9.90	113
114																																																	0	0.00	0.00	114
115																				570																													570	6.60	9.90	115
116	249																			570																													819	9.48	14.22	116
117	249	232																		570																													1,051	12.16	18.24	117
118	249	232																																															481	5.57	8.36	118
119	249	232																																															481	5.57	8.36	119
120	249																																																249	2.88	4.32	120
121	249																																																249	2.88	4.32	121
122	249																																																249	2.88	4.32	122
123	249																																																249	2.88	4.32	123
124	249																																																249	2.88	4.32	124
125	249		384	269																																													902	10.44	15.66	125
126			0																																														0	0.00	0.00	126
127				269																																													269	3.11	4.67	127
128		232																		570																													802	9.28	13.92	128
129		232																																															232	2.69	4.04	129
130		232																																															232	2.69	4.04	130
131	249	232																																															481	5.57	8.36	131
132	249	232																																															481	5.57	8.36	132
133		232																																															232	2.69	4.04	133
134		232																																															232	2.69	4.04	134
135		232																																															232	2.69	4.04	135
136		232																																															232	2.69	4.04	136
137		232																																															232	2.69	4.04	137
138		232	384																																														616	7.13	10.70	138
139		232	384																																														616	7.13	10.70	139
140			384																																														384	4.44	6.66	140
141			384																																														384	4.44	6.66	141
142			384																																														384	4.44	6.66	142
143		232	384																																														616	7.13	10.70	143
144		232																																															232	2.69	4.04	144
145		232																																															232	2.69	4.04	145
146																				570																													570	6.60	9.90	146
147																				570																													570	6.60	9.90	147
148																																																	0	0.00	0.00	148
149																																																	0	0.00	0.00	149
150																				570																													570	6.60	9.90	150
151		232																																	988														1,220	14.12	21.18	151
152		232																																	988														1,220	14.12	21.18	152
153		232			721																														988														1,941	22.47	33.71	153
154					721	114																																											835	9.66	14.49	154
155					721	114																																											835	9.66	14.49	155
156						114		1,274																																									1,388	16.06	24.09	156
157						114		1,274	469																																								1,857	21.49	32.24	157
158						114			469																																								583	6.75	10.13	158
159									469																																								469	5.43	8.15	159
160									469																																								469	5.43	8.15	160
161									469																																								469	5.43	8.15	161
162						114																																											114	1.32	1.98	162
163						114																																											114	1.32	1.98	163
164						114																																											114	1.32	1.98	164
165					721					738																																							1,459	16.89	25.34	165
166										738																										1,977													2,715	31.42	47.13	166
167										738																										1,977													2,715	31.42	47.13	167
168						114																																											114	1.32	1.98	168
169						114																																											114	1.32	1.98	169
170						114																																											114	1.32	1.98	170
171						114																																											114	1.32	1.98	171
172						114																																											114	1.32	1.98	172
173						114																																											114	1.32	1.98	173
174																																																	0	0.00	0.00	174
175						114																																											114	1.32	1.98	175
176						0																																											0	0.00	0.00	176
177													0																																				0	0.00	0.00	177
178			0																																														0	0.00	0.00	178
179						114																																											114	1.32	1.98	179
180				269																																													269	3.11	4.67	180
181				269																																													269	3.11	4.67	181
182				269																																													269	3.11	4.67	182
183				269																																													269	3.11	4.67	183
184				269			319																																										588	6.81	10.22	184
185				269			319																																										588	6.81	10.22	185
186				269			319																																										588	6.81	10.22	186
187				269																																													269	3.11	4.67	187

7.4-3-4 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 1 (2005)

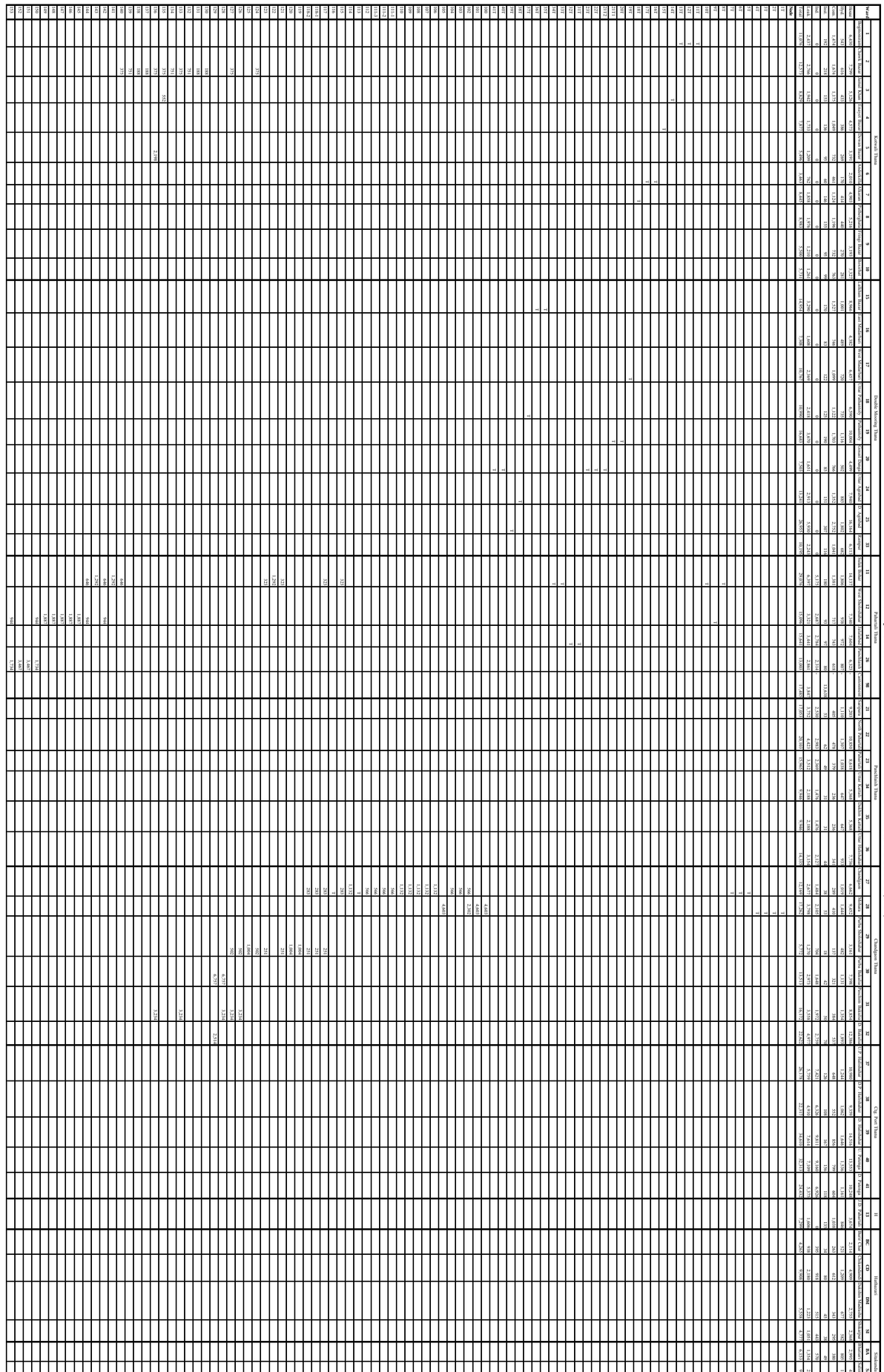
Ward	Kotwali Thana										Double Mooring Thana									Pahartali Thana					Panchlaish Thana						Chandgaon Thana						Ctg. Port Thana					H	Hathazari				Sitakunda		Grand Total (m3/d)	Grand Total (L/s)	x 1.5 (L/s)	Ward
	1	2	3	4	5	6	7	8	9	10	15	16	17	18	19	20	24	25	33	11	12	14	26	98	21	22	23	34	35	36	27	28	29	30	31	32	37	38	39	40	41	13	BC	CH	DM	SP	BA	SA				
	Bogmoniram	Chawk Bazar	Jamal Khan	Enayet Bazar	Dewan Bazar	Anderkilla	Alkaran	Patherghata	Fringi Bazar	Boxirhat	Lalkhan Bazar	East Madarbari	West Madarbari	Uttar Pathantoly	Pathantoly	Gosail Danga	Uttar Agrabad	D. Agrabad	Rampur	Sulak Bohar	West Sholoshahar	Jalalabad	Panchlaish	Cantonment	Saripara	North Pahartali	Pahartali	Uttar Kattali	Dakhin Kattali	Uttar Halishahar	Chandgaon	Mohara	Purba Sholoshahar	Purba Bakulia	Paschim Bakulia	D. Bakulia	U.P. Halishahar	D.P. Halishahar	D. Halishahar	U. Patenga	D. Patenga	J.D. Pahartali	Burir Char	Chikandandi	Dakshin Madrasha	Shikarpur	Bhatiari	Salimpur				
House	3,238	3,762	2,906	2,475	1,952	1,232	2,589	2,758	1,775	1,597	4,489	2,415	3,397	3,144	4,558	2,194	3,885	7,902	2,855	7,211	3,926	3,874	3,226	-	4,632	4,966	4,336	2,516	2,576	3,539	3,519	4,640	1,552	3,304	4,245	5,664	4,933	4,511	6,668	6,081	4,708	1,909	1,016	2,356	1,319	1,138	1,383	2,230	161,101	1,865	2,797	House
Hyd.	443	516	399	339	267	169	354	378	243	218	774	417	585	542	786	379	670	1,363	493	1,364	743	733	610	-	842	903	788	458	469	644	755	996	332	710	912	1,216	815	746	1,102	1,005	779	575	303	703	394	339	463	748	29,782	345	517	Hyd.
Com.	714	830	641	546	430	272	571	608	391	352	805	433	609	564	817	394	697	1,417	512	706	384	379	316	-	220	236	206	119	122	168	164	217	72	154	198	265	327	299	442	403	312	535	132	306	171	148	185	298	19,087	221	331	Com.
Inst.	93	108	83	71	56	35	74	79	51	46	90	48	68	63	91	44	78	158	57	92	50	49	41	-	29	31	27	16	16	22	21	28	9	20	26	34	64	58	86	79	61	70	17	40	22	19	24	39	2,483	29	43	Inst.
Ind.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,588	1,409	1,391	1,158	-	1,344	1,441	1,258	730	747	1,027	804	1,060	354	755	970	1,294	4,641	4,245	6,274	5,722	4,430	0	198	459	257	222	277	447	45,502	527	790	Ind.
Leak.	1,496	1,739	1,343	1,144	902	569	1,196	1,274	820	738	2,053	1,104	1,553	1,438	2,084	1,004	1,777	3,613	1,306	3,987	2,171	2,142	1,784	-	2,356	2,526	2,205	1,280	1,310	1,800	1,754	2,314	773	1,648	2,117	2,824	3,593	3,286	4,857	4,430	3,430	1,030	555	1,288	721	622	777	1,254	85,987	995	1,493	Leak.
Total	5,984	6,955	5,372	4,575	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,015	7,107	14,453	5,223	15,948	8,683	8,568	7,135	0	9,423	10,103	8,820	5,119	5,240	7,200	7,017	9,255	3,092	6,591	8,468	11,297	14,373	13,145	19,429	17,720	13,720	4,119	2,221	5,152	2,884	2,488	3,109	5,016	343,942	3,981	5,971	Total
Adjust F.	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	70%	0%	100%	70%	100%	70%	70%	100%	70%	70%	100%	70%	70%	70%	100%	100%	100%	100%	50%	0%	0%	0%	0%	0%	0%	30%	85%	0	0	Adjust F.
Adjusted	5,984	6,955	5,372	4,575	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,015	7,107	14,453	5,223	15,948	8,683	8,568	4,995	0	9,423	7,072	8,820	3,583	3,668	7,200	4,912	6,479	3,092	4,614	5,928	7,908	14,373	13,145	19,429	17,720	6,860	0	0	0	0	0	0	1,505	292,530	3,386	5,079	Adjusted
188	249			269																																													518	6.00	9.00	188
189	249			269																																													518	6.00	9.00	189
190				269			319																																										588	6.81	10.22	190
191				269			319																																										588	6.81	10.22	191
192				269			319																																										588	6.81	10.22	192
193							319																																										319	3.69	5.54	193
194							319																																										319	3.69	5.54	194
195												442																																					442	5.12	7.68	195
196												442																																					442	5.12	7.68	196
197												442	777																																				1,219	14.11	21.17	197
198													777																																				777	8.99	13.49	198
199													777		926																																		1,703	19.71	29.57	199
200															926																																		926	10.72	16.08	200
201												442																																					442	5.12	7.68	201
202												442																																					442	5.12	7.68	202
203							319		469																																								788	9.12	13.68	203
204							319																																										319	3.69	5.54	204
205							319		469																																								788	9.12	13.68	205
206							319																																										319	3.69	5.54	206
207												442																																					442	5.12	7.68	207
208												442	777																																				1,219	14.11	21.17	208
209												442																																					442	5.12	7.68	209
210												442																																					442	5.12	7.68	210
211												442	777																																				1,219	14.11	21.17	211
212						114		1,274																																									1,388	16.06	24.09	212
213					721			1,274		738																																							2,733	31.63	47.45	213
214			384			114																																											498	5.76	8.64	214
215		232	384																																														616	7.13	10.70	215
216	249		384																																														633	7.33	11.00	216
217	249	232	384																																														865	10.01	15.02	217
218			384																																														384	4.44	6.66	218
219			384			114																																											498	5.76	8.64	219
220			384			114																																											498	5.76	8.64	220
221	249	232																																															481	5.57	8.36	221
222							319																																										319	3.69	5.54	222
223				269			319						777																																				1,365	15.80	23.70	223
224	249			269			319						777	639																																			2,253	26.08	39.12	224
225													777	639																																			1,416	16.39	24.59	225
226																0																																	0	0.00	0.00	226
227																																						0											0	0.00	0.00	227
228																2,008																																	2,008	23.24	34.86	228
229															926	2,008		964																															3,898	45.12	67.68	229
230															926			964																															1,890	21.88	32.82	230
231															926																																		926	10.72	16.08	231
232															926																																		926	10.72	16.08	232
233															926			964																															1,890	21.88	32.82	233
234														639	926		711																																2,276	26.34	39.51	234
235														639	926																																		1,565	18.11	27.17	235
236	249																																																249	2.88	4.32	236
237																	711																																711	8.23	12.35	237
238																	711																																711	8.23	12.35	238
239																	711	964																															1,675	19.39	29.09	239
240																	711																																711	8.23	12.35	240
241																	711																																711	8.23	12.35	241
242																	711																																711	8.23	12.35	242
243																			522						785																								1,307	15.13	22.70	243
244																			522						785																								1,307	15.13	22.70	244
245																			522																														522	6.04	9.06	245
246																			522						785																								1,307	15.13	22.70	246
247																			522						785				193																				1,500	17.36	26.04	247
248																									785																								785	9.09	13.64	248
249																									785			512																					1,297	15.01	22.52	249
250																													193																				193	2.23	3.35	250
251																													193																				193	2.23	3.35	251
252																													193																				193	2.23	3.35	252
253																													193																				193	2.23	3.35	253
254																													193																				193	2.23	3.35	254
255																													193																				193	2.23	3.35	255
256																													193																				193	2.23	3.35	256
257																													193	2,400																			2,593	30.01	45.02	257
258																													193																				193	2.23	3.35	258
259																													193																				193	2.23	3.35	259
260																													193	2,400																			2,593	30.01	45.02	260
261																													193																				193	2.23	3.35	261
262																													193																				193	2.23	3.35	262
263																													193																				193	2.23	3.35	263
264																													193																				193	2.23	3.35	264
265																													193																				193	2.23	3.35	265
266																			522																														522	6.04	9.06	266
267																			522																														522	6.04	9.06	267
268																	711	964																															1,675	19.39	29.09	268
269																																					2,875												2,875	33.28	49.92	269
270																	711	964																															1,675	19.39	29.09	270
271																	711	964																															1,675	19.39	29.09	271
272																		964																															964	11.16	16.74	272
273																		964																															964	11.16	16.74	273
274																		964																															964	11.16	16.74	274
275																		964																															964	11.16	16.74	275
276																		964																															964	11.16	16.74	276
277																		964																															964	11.16	16.74	277
278																		964																															964	11.16	16.74	278
279																																						3,286											3,286	38.03	57.05	279
280																																																	0	0.00	0.00	280
281																																																	0	0.00	0.00	281

7.4-3-4 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 1 (2005)

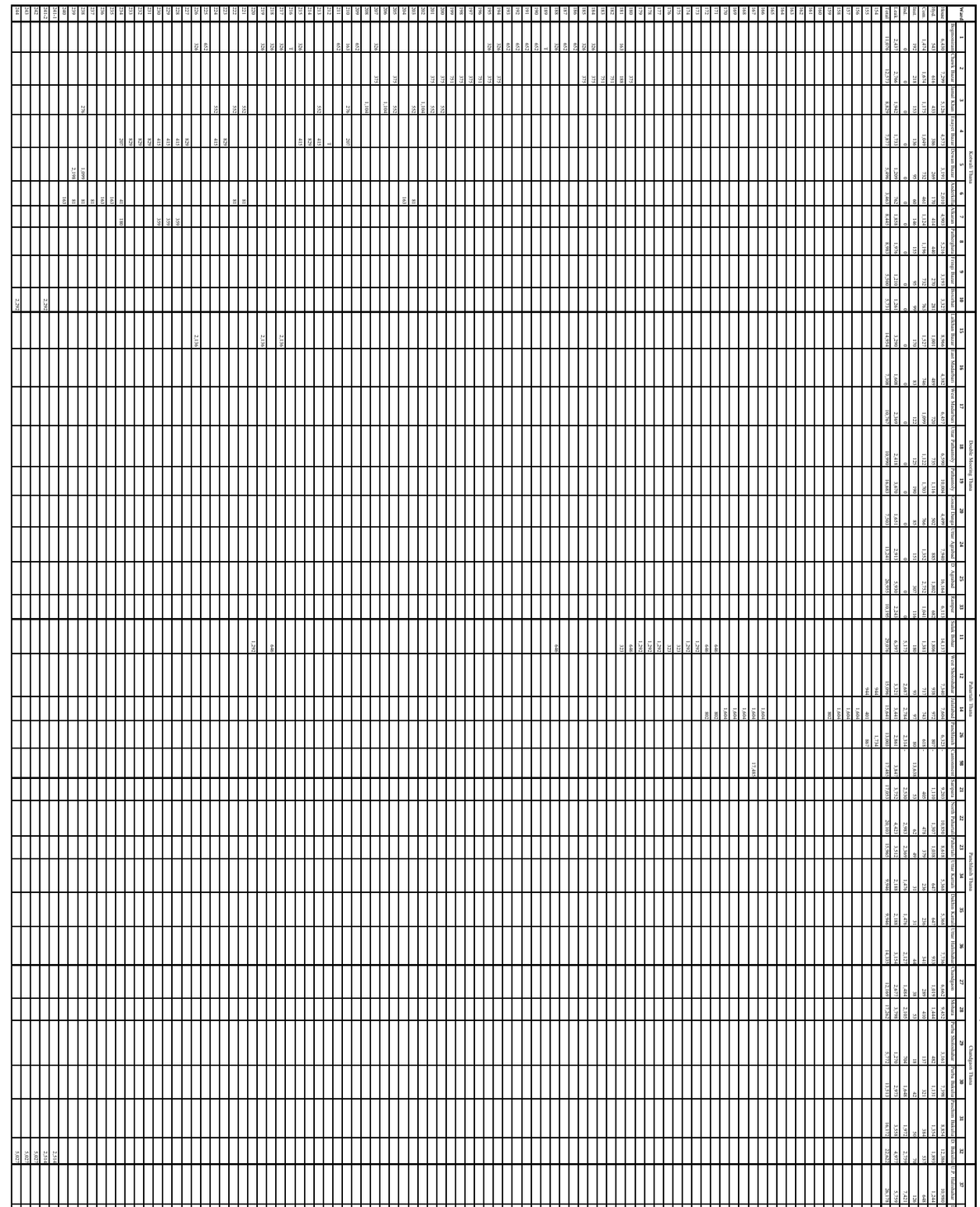
Ward	Kotwali Thana										Double Mooring Thana										Pahartali Thana					Panchlaish Thana										Chandgaon Thana										Ctg. Port Thana					H	Hathazari				Sitakunda		Grand Total	Grand Total	x 1.5 (Lts)	Ward
	1	2	3	4	5	6	7	8	9	10	15	16	17	18	19	20	24	25	33	11	12	14	26	98	21	22	23	34	35	36	27	28	29	30	31	32	37	38	39	40	41	13	HC	CH	DM	SP	BA	SA	(lts/d)	(Lts)		
	Bogmonoram	Chawk Bazar	Jamal Khan	Enayet Bazar	Dewan Bazar	Anderkilla	Alkaran	Patherghata	Tringa Bazar	Boxirhat	Lalkhan Bazar	East Madarbari	West Madarbari	Uttar Pathantoly	Pathantoly	Gosael Danga	Uttar Agrabad	D. Agrabad	Rampur	Sulak Behar	West Sholoshahar	Lalabagh	Panchlaish	Cantonmemt	Sarapara	North Pahartali	Pahartali	Uttar Kattali	Dakhin Kattali	Uttar Halishahar	Chandgaon	Mohara	Purba Sholoshahar	Purba Bakulia	Paschim Bakulia	D. Bakulia	E.P. Halishahar	O.P. Halishahar	D. Halishahar	E. Patenga	O. Patenga	J.D. Pahariah	Bare Char	Chokandandi	Dakchin Madrasha	Shikarpur	Bhatiyari	Salimpur				
Bhase	3,238	3,762	2,906	2,475	1,952	1,232	2,589	2,758	1,775	1,597	4,489	2,415	3,397	3,144	4,558	2,194	3,885	7,902	2,855	7,211	3,926	3,874	3,226	-	4,632	4,966	4,338	2,516	2,576	3,539	3,539	4,640	1,552	3,304	4,243	5,664	4,933	4,511	6,668	6,081	4,788	1,969	1,016	2,356	1,319	1,138	1,383	2,238	161,101	1,963	2,797	Bhase
Hyd.	443	516	399	339	267	169	354	378	243	218	774	417	585	542	786	378	676	1,363	493	1,364	743	733	610	-	842	903	788	458	469	644	755	996	332	710	912	1,216	815	746	1,102	1,005	778	378	303	703	394	339	463	743	29,782	341	511	Hyd.
Com.	714	830	641	546	430	272	571	608	391	352	805	433	609	564	817	398	695	1,417	512	706	384	379	316	-	220	236	206	119	122	168	164	217	72	154	198	265	527	299	442	403	312	535	132	306	171	148	185	299	19,087	222	333	Com.
Ind.	93	108	83	71	56	35	74	79	51	46	90	44	63	59	91	41	73	150	57	92	50	48	41	-	29	31	27	16	16	22	21	28	9	20	26	34	68	39	58	52	41	72	17	40	22	19	24	38	2,483	29	43	Ind.
Instl.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,588	1,409	1,391	1,158	-	1,344	1,441	1,258	730	747	1,027	804	1,060	354	755	978	1,294	4,643	4,243	6,274	5,752	4,430	0	198	459	257	225	277	44	45,502	527	790	Instl.
Leak.	1,498	1,739	1,343	1,148	902	569	1,196	1,274	820	738	2,083	1,104	1,553	1,438	2,084	1,004	1,797	3,631	1,306	3,987	2,171	2,142	1,784	-	2,356	2,526	2,203	1,280	1,310	1,800	1,754	2,314	773	1,648	2,117	2,824	3,593	3,286	4,857	4,458	3,438	1,930	555	1,288	721	622	777	1,255	85,987	995	1,493	Leak.
Total	5,984	6,955	5,372	4,575	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,011	7,107	14,451	5,223	15,948	8,683	8,568	7,135	0	9,423	10,103	8,820	5,119	5,240	7,200	7,017	9,253	3,092	6,591	8,668	11,297	14,373	13,143	19,429	17,720	13,728	4,119	2,221	5,152	2,884	2,488	3,109	5,013	343,942	3,981	5,971	Total
AdjustT	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	70%	0%	100%	70%	100%	70%	70%	100%	70%	70%	100%	70%	70%	70%	100%	100%	100%	100%	50%	0%	0%	0%	0%	0%	0%	30%	85%	0	0	AdjustT
Adjusted	5,984	6,955	5,372	4,575	3,607	2,277	4,784	5,097	3,280	2,951	8,211	4,417	6,212	5,751	8,336	4,011	7,107	14,451	5,223	15,948	8,683	8,568	4,995	0	9,423	7,073	8,820	5,583	3,668	7,200	4,912	6,479	3,092	4,613	5,928	7,908	14,373	13,143	19,429	17,720	6,864	0	0	0	0	0	0	1,504	292,519	3,386	5,079	Adjusted
25																																						3,284											3,284	38.03	57.05	25
26																																						3,284											3,284	38.03	57.05	26
27																																						3,284											3,284	38.03	57.05	27
28																																							1,023											1,023	11.84	17.76	28
29																																							1,023											1,023	11.84	17.76	29
30																																							1,023											1,023	11.84	17.76	30
31																																							1,023											1,023	11.84	17.76	31
32																																								1,611											1,611	18.63	27.95	32
33																																								1,611											1,611	18.63	27.95	33
34																																								1,611											1,611	18.63	27.95	34
35																																								1,611											1,611	18.63	27.95	35
36																																								1,611											1,611	18.63	27.95	36
37																																									2,287										2,287	26.47	39.71	37
38																																									2,287										2,287	26.47	39.71	38
39																																							1,023											1,023	11.84	17.76	39
40																																							1,023											1,023	11.84	17.76	40
41																																							1,023											1,023	11.84	17.76	41
42																																								1,611											1,611	18.63	27.95	42
43																																								1,611											1,611	18.63	27.95	43
44																																								1,611											1,611	18.63	27.95	44
45																																								1,611											1,611	18.63	27.95	45
46																																								1,611											1,611	18.63	27.95	46
47																																								1,611											1,611	18.63	27.95	47
48																																								1,611											1,611	18.63	27.95	48
49																																								1,611											1,611	18.63	27.95	49
50																																								1,611											1,611	18.63	27.95	50
51																																								1,611											1,611	18.63	27.95	51
52																																								1,611											1,611	18.63	27.95	52
53																																								1,611											1,611	18.63	27.95	53
54																																								1,611											1,611	18.63	27.95	54
55																																								1,611											1,611	18.63	27.95	55
56																																								1,611											1,611	18.63	27.95	56
57																																								1,611											1,611	18.63	27.95	57
58																																								1,611											1,611	18.63	27.95	58
59																																								1,611											1,611	18.63	27.95	59
60																																								1,611											1,611	18.63	27.95	60
61																																								1,611											1,611	18.63	27.95	61
62																																								1,611											1,611	18.63	27.95	62
63																																								1,611											1,611	18.63	27.95	63
64																																								1,611											1,611	18.63	27.95	64
65																																								1,611											1,611	18.63	27.95	65
66																																								1,611											1,611	18.63	27.95	66
67																																								1,611											1,611	18.63	27.95	67
68																																								1,611											1,611	18.63	27.95	68
69																																								1,611											1,611	18.63	27.95	69
70																																								1,611											1,611	18.63	27.95	70
71																																								1,611											1,611	18.63	27.95	71
72																																								1,611											1,611	18.63	27.95	72
73																																								1,611											1,611	18.63	27.95	73
74																																								1,611											1,611	18.63	27.95	74
75																																								1,611											1,611	18.63	27.95	75
76																																								1,611											1,611	18.63	27.95	76
77																																								1,611											1,611	18.63	27.95	77
78																																								1,611											1,611	18.63	27.95	78
79																																								1,611											1,611	18.63	27.95	79
80																																								1,611											1,611	18.63	27.95	80
81																																								1,611											1,611	18.63	27.95	81
82																																								1,611											1,611	18.63	27.95	82
83																																								1,611											1,611	18.63	27.95	83
84																																								1,611											1,611	18.63	27.95	84
85																																								1,611											1,611	18.63	27.95	85
86																																								1,611											1,611	18.63	27.95	86
87																																								1,611											1,611	18.63	27.95	87
88																																								1,611											1,611	18.63	27.95	88
89																																								1,611											1,611	18.63	27.95	89
90																																								1,611											1,611	18.63	27.95	90
91																																								1,611											1,611	18.63	27.95	91
92																																								1,611											1,611	18.63	27.95	92
93																																								1,611											1,611	18.63	27.95	93
94																																								1,611											1,611	18.63	27.95	94
95																																								1,611											1,611	18.63	27.95	95
96																																								1,611											1,611	18.63	27.95	96
97																																								1,611											1,611	18.63	27.95	97
98																																								1,611											1,611	18.63	27.95	98
99																																								1,611											1,611	18.63	27.95	99
100																																								1,611											1,611	18.63	27.95	100
101																																								1,611											1,611	18.63	27.95	101
102																																								1,611											1,611	18.63	27.95	102
103																																								1,611											1,611	18.63	27.95	103
104																																								1,611											1,611	18.63	27.95	104
105																																								1,611											1,611	18.63	27.95	105
106																																								1,611											1,611	18.63	27.95	106
107																																								1,611											1,611	18.63	27.95	107
108																																								1,611											1,611	18.63	27.95	108
109																																								1,611											1,611	18.63	27.95	109
110																																								1,611											1,611	18.63	27.95	110
111																															0																			0	0.00	0.00	111
112																															0																			0	0.00	0.00	112
113																															0																			0	0.00	0.00	113
114																											1,266																								1,266	14.55	21.83	114
115																											1,266																								1,266	14.55	21.83	115
116																											1,266																								1,266	14.55	21.83	116
117																											1,266																								1,266	14.55	21.83	117
118																															0																			0	0.00	0.00	118
119																																								2,400											2,400	27.72	41.6	119
120																																					2,875													2,875	33.20	49.81	120
121																																					2,875													2,875	33.20	49.81	121
122																																																		0	0.00	0.00	122
123																																																		1,023	1,611					2,634	30.49	45.74	123
124																															351																								351	4.06	6.09	124
125																															351																								351	4.06	6.09	125
126																															351																								351	4.06	6.09	126
127																																																	1,023	1,611					2,634	30.49	45.74	127
128																					570																																570	6.66	9.99	128
129																															351																								351	4.06	6.09	129
130											1,369																																									1,369	15.84	23.76	130
131																															0																								0	0.00	0.00	131
132																															0																								0	0.00	0.00	132
133																															351																								351	4.06	6.09	133
134																					0																																0	0.00	0.00	134
135																															351																								351	4.06	6.09	135
136																															351																								351	4.06	6.09	136
137																															0																								0	0.00	0.00	137
138																																																				0	0.00	0.00	138
139																																																			0	0.00	0.00	139
140																					0																																0	0.00	0.00	140
141																			964																																964	11.14	16.71	141
142	0																																																			0	0.00	0.00	142
143		225																																		988															1,229	14.13	21.19	143
144																																																			0	0.00	0.00	144
145																																				1,977															1,977	22.89	34.32	145
146																																				1,977															1,130	36.23	54.33	146
147																																	1,133	988																	2,141	24.75	37.13	147
148																																	1,133	988																	2,141	24.75	37.13	148
149																																	777	1,153																	1,924	22.25	33.44	149
150																																					0														0	0.00	0.00	150
160																																					2,875														2,875	33.24	49.92	160
161																																					2,875														2,875	33.24	49.92	161
Total	5,976	6,968	5,378	4,578	3,605	2,280	4,783	5,096	3,282	2,952	8,214	4,420	6,216	5,751	8,334	4,014	7,110	14,460	5,220	15,960	8,680	8,568	4,995	0	9,420	7,070	8,820	5,586	3,668	7,200	4,914	6,480	3,092	4,612	5,928	7,908	14,375	13,144	19,437	17,723	6,861	0	0	0	0	0	0	1,508	292,569	3,386.41	5,080.21	Total
Hrd	-8	-8	-6	-4	-2	-3	-1	-1	-2	-1	-3	-3	-3	-3	-2	-3	-1	-1	-3	12	-3	-1	-1	0	-2	-3	-1	1	0	-1	-2	-1	0	-1	-1	-1	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1	39	0.64	1.54	Hrd

7.4-3-110

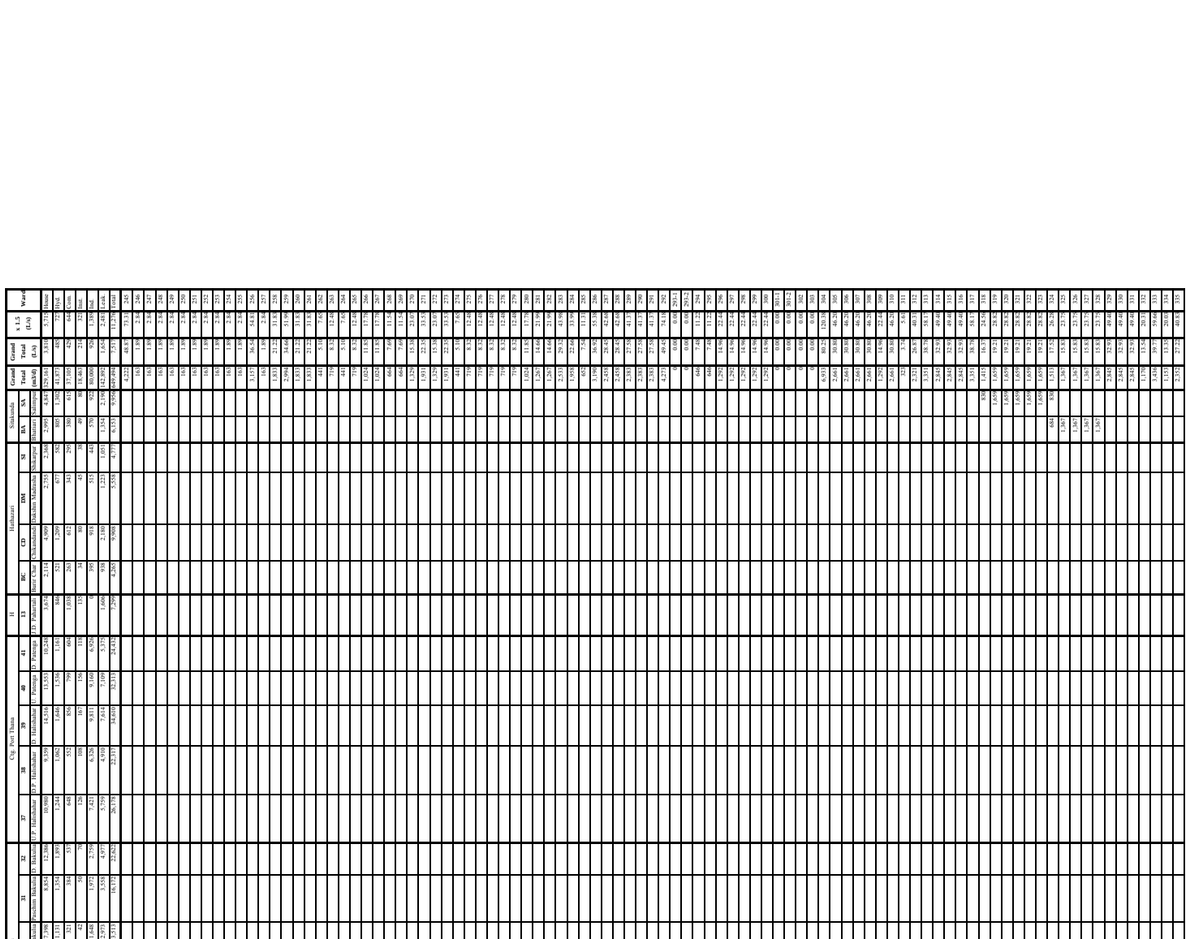
7.4-3-5 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 2 (2010)



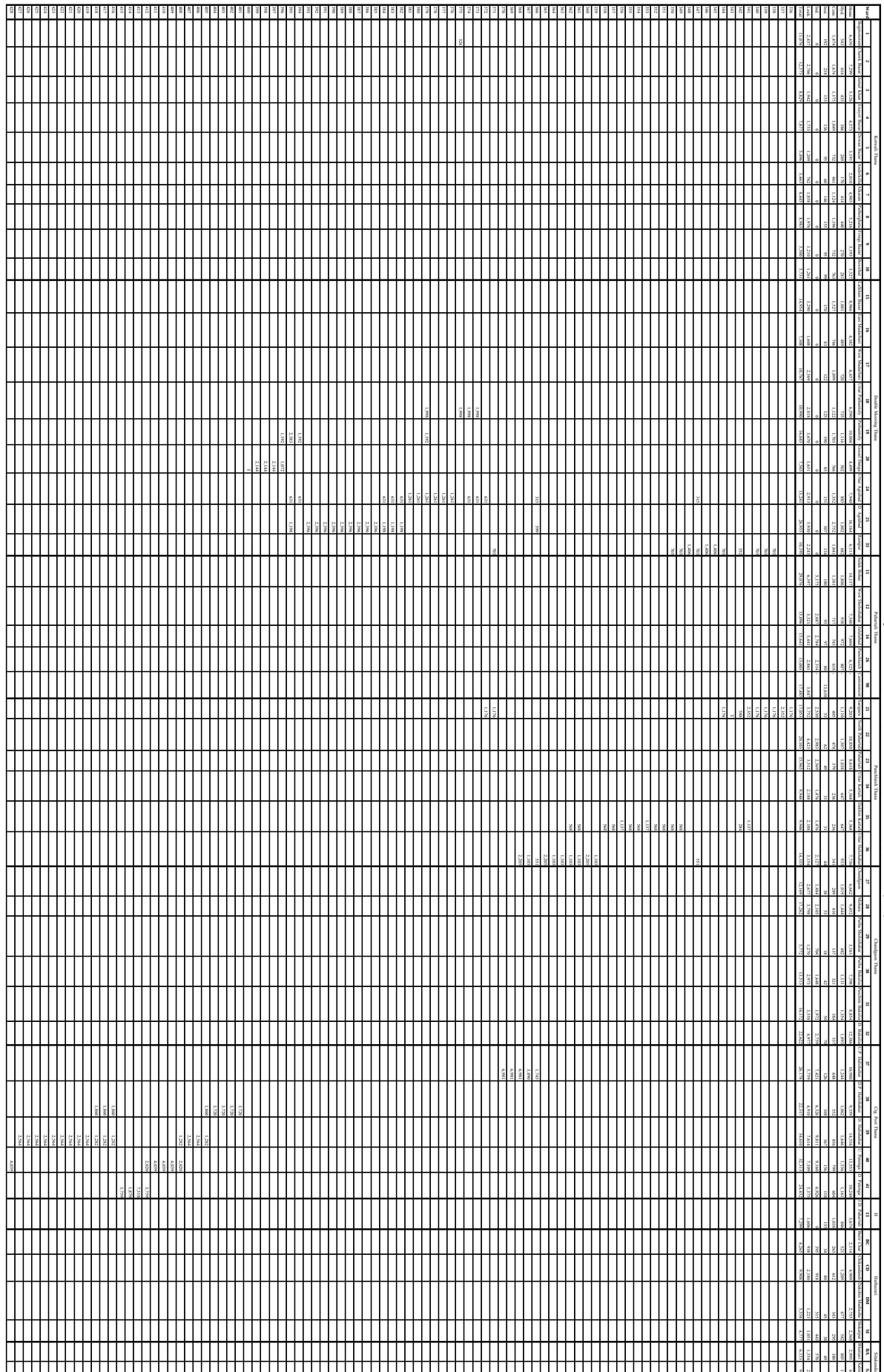
7.4-3-5 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 2 (2010)



7.4-3-5 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 2 (2010)



7.4-3-5 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 2 (2010)



7.4-3-5 Relationship Matrix between Wards and Nodes - Nodal Demand in B/P Phase 2 (2010)

Ward	Kotwali Thana									
	1	2	3	4	5	6	7	8	9	10
	Bogmoniram	Chawk Bazar	Jamal Khan	Enayet Bazar	Dewan Bazar	Anderkilla	Alkaran	Patherghata	Fringi Bazar	Boxirhat
House	6,430	7,299	5,126	4,573	3,191	2,010	4,903	5,216	3,193	3,327
Hyd.	543	616	433	386	269	170	414	440	270	281
Com.	1,474	1,674	1,175	1,049	732	461	1,124	1,196	732	763
Inst.	192	218	153	136	95	60	146	155	95	99
Ind.	0	0	0	0	0	0	0	0	0	0
Leak.	2,437	2,766	1,942	1,733	1,209	762	1,858	1,976	1,210	1,261
Total	11,076	12,573	8,829	7,877	5,496	3,463	8,445	8,983	5,500	5,731
429										
430										
431										
432										
433										
434										
435										
436										
437										
438										
439										
Total	11,076	12,573	8,829	7,877	5,496	3,463	8,445	8,983	5,500	5,731
Bal.	0	0	0	0	0	0	0	0	0	0

Ward	Double Mooring Thana								
	15	16	17	18	19	20	24	25	33
	Lalkhan Bazar	East Madarbari	West Madarbari	Uttar Pathantoly	Pathantoly	Gosail Danga	Uttar Agrabad	D. Agrabad	Rampur
House	8,966	4,382	6,457	6,590	10,004	4,499	7,940	16,164	6,113
Hyd.	1,001	489	720	735	1,116	502	885	1,802	682
Com.	1,527	746	1,099	1,122	1,703	766	1,352	2,752	1,041
Inst.	170	83	122	125	190	85	151	307	116
Ind.	0	0	0	0	0	0	0	0	0
Leak.	3,290	1,608	2,369	2,418	3,670	1,651	2,913	5,930	2,243
Total	14,954	7,308	10,767	10,990	16,683	7,503	13,241	26,955	10,195
429									
430									
431									
432									
433									
434									
435									
436									
437									
438									
439									
Total	14,954	7,308	10,767	10,990	16,683	7,503	13,241	26,955	10,195
Bal.	0	0	0	0	0	0	0	0	0

Ward	Pahartali Thana					Panchlaish Thana					
	11	12	14	26	98	21	22	23	34	35	36
	Sulak Bohar	West Sholoshahar	Jalalabad	Panchlaish	Cantonment	Saripara	North Pahartali	Pahartali	Uttar Kattali	Dakhin Kattali	Uttar Halishahar
House	14,137	7,340	7,604	6,323	-	9,203	10,850	8,618	5,368	5,368	7,736
Hyd.	1,806	938	972	807	-	1,110	1,307	1,038	647	647	933
Com.	1,381	717	743	618	-	405	478	379	236	236	341
Inst.	180	93	97	80	13,638	53	62	49	31	31	44
Ind.	5,175	2,687	2,784	2,314	-	2,530	2,983	2,369	1,476	1,476	2,127
Leak.	6,397	3,321	3,441	2,861	3,847	3,752	4,423	3,512	2,188	2,188	3,154
Total	29,076	15,096	15,641	13,003	17,485	17,053	20,103	15,965	9,946	9,946	14,335
429											
430											
431											
432											
433											
434											
435											
436											
437											
438											
439											
Total	29,076	15,096	15,641	13,003	17,485	17,053	20,103	15,965	9,946	9,946	14,335
Bal.	0	0	0	0	0	0	0	0	0	0	0

Ward	Chandgaon Thana						Ctg. Port Thana				
	27	28	29	30	31	32	37	38	39	40	41
	Chandgaon	Mohara	Purba Sholoshahar	Purba Bakulia	Paschim Bakulia	D. Bakulia	U.P. Halishahar	D.P. Halishahar	D. Halishahar	U. Patenga	D. Patenga
House	6,662	9,452	3,161	7,398	8,854	12,386	10,980	9,359	14,516	13,553	10,248
Hyd.	1,019	1,444	482	1,131	1,354	1,893	1,244	1,062	1,646	1,536	1,161
Com.	289	410	137	321	384	537	648	552	856	799	604
Inst.	38	53	18	42	50	70	126	108	167	156	118
Ind.	1,484	2,105	704	1,648	1,972	2,759	7,421	6,326	9,811	9,160	6,926
Leak.	2,677	3,798	1,270	2,973	3,558	4,977	5,759	4,910	7,614	7,109	5,375
Total	12,169	17,262	5,772	13,513	16,172	22,622	26,178	22,317	34,610	32,313	24,432
429										4,039	
430										4,039	
431										4,039	
432											7,518
433											
434											
435											
436											
437											
438											
439	283	1,151									
Total	12,169	17,262	5,772	13,513	16,172	22,622	26,178	22,317	34,610	32,313	24,432
Bal.	0	0	0	0	0	0	0	0	0	0	0

Ward	H	Hathazari				Sitakunda		Grand Total	Grand Total	x 1.5	Ward
	13	BC	CD	DM	SI	BA	SA	(m3/d)	(L/s)	(L/s)	
	J.D. Pahartali	Burir Char	Chikandandi	Dakshin Madrasha	Shikarpur	Bhatiari	Salimpur				
House	3,674	2,114	4,909	2,755	2,368	2,995	4,847	329,161	3,810	5,715	House
Hyd.	846	521	1,209	677	582	805	1,302	41,873	485	727	Hyd.
Com.	1,038	263	612	343	295	380	615	37,105	429	644	Com.
Inst.	135	34	80	45	38	49	80	18,463	214	321	Inst.
Ind.	0	395	918	515	443	570	922	80,000	926	1,389	Ind.
Leak.	1,606	938	2,180	1,223	1,051	1,354	2,190	142,892	1,654	2,481	Leak.
Total	7,299	4,265	9,908	5,558	4,777	6,153	9,956	649,494	7,517	11,276	Total
429								4,039	46.75	70.13	429
430								4,039	46.75	70.13	430
431								4,039	46.75	70.13	431
432								7,518	87.01	130.52	432
433				1,235				1,235	14.30	21.45	433
434				1,235				1,235	14.30	21.45	434
435				1,235				1,235	14.30	21.45	435
436				1,235				1,235	14.30	21.45	436
437		1,066		618	1,194			2,878	33.31	49.97	437
438		2,133			2,389			4,521	52.33	78.50	438
439		1,066			1,194			3,694	42.76	64.14	439
Total	7,299	4,265	9,908	5,558	4,777	6,153	9,956	649,494	7,517.46	#######	Total
Bal.	0	0	0	0	0	0	0	0	0.17	1.03	Bal.

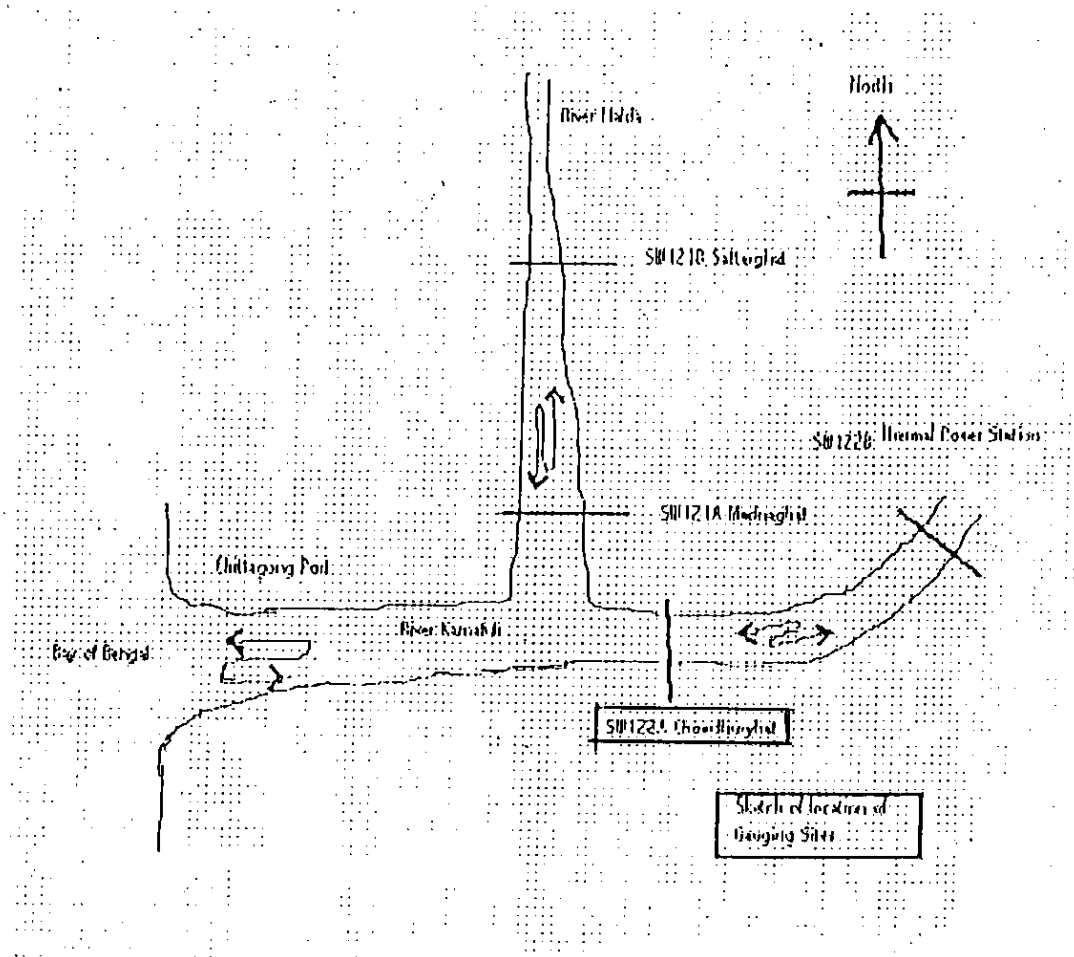
7.4-4 Cross Section of Karnaphuli River at Proposed WTP Site

Source: Tidal Discharge Measurement Karnaphuli – Halda River System 13/3/1998 to 9/5/1998, July 1998, Sunflower Computers & Waterscape Consultant

Summary

In a bid to plan its resources development, Chittagong WASA planned a series of flow measurement on the Karnafuli-Halda system. The river being tidal in the region of planned measurement; tidal discharge measurement procedure had to be adopted. Chittagong Hydrological Sub-Division under SouthEastern Measurement Division BWDB implemented the survey as deposit work.

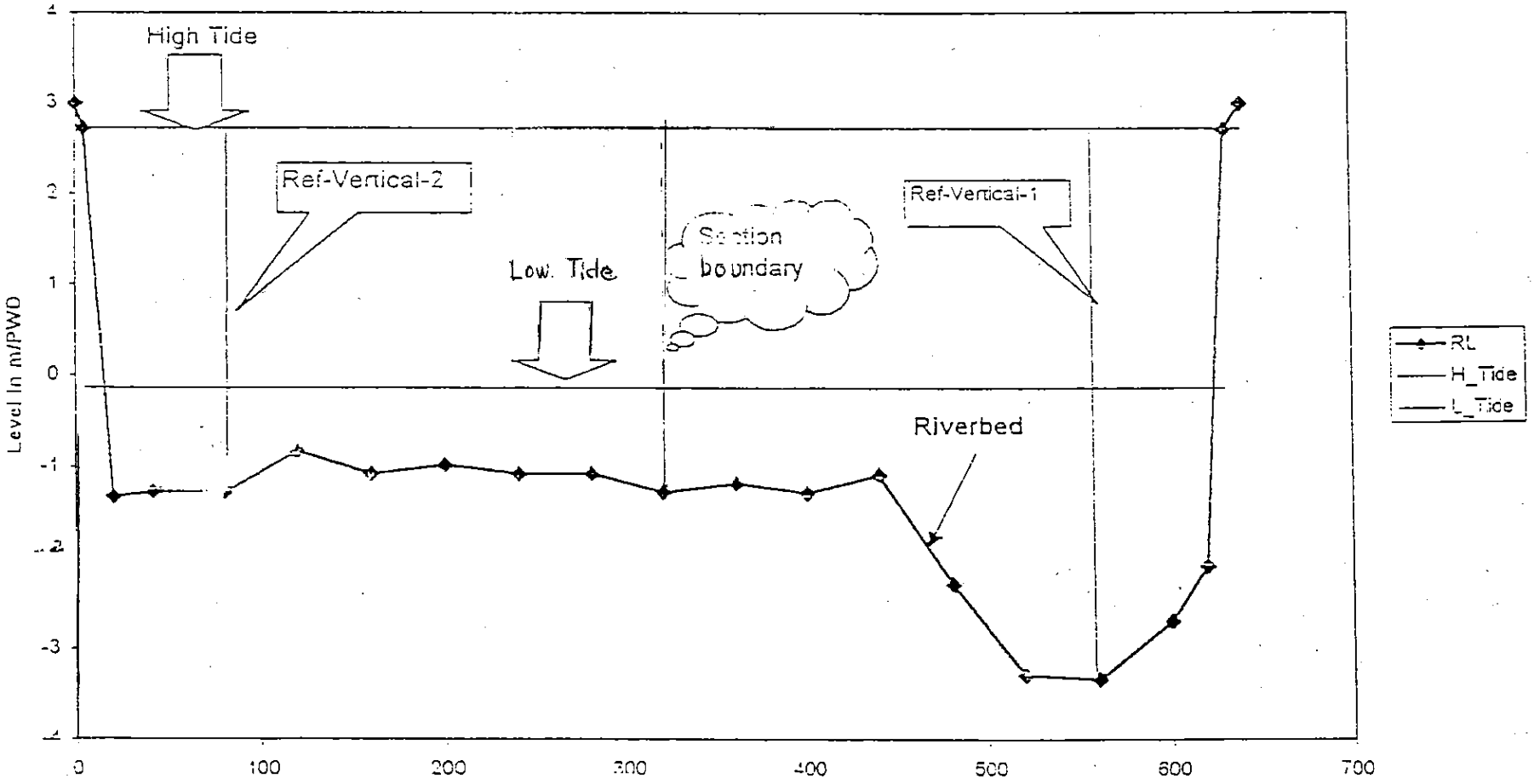
The sketch below shows the location of the discharge measurement sections on the Karnafuli-Halda river system.



The following table explains the Station_ID, StationName and Location_ID

River	Station_ID	StationName	Location_ID
Karnafuli	SW122B	Thermal Power Station	Karnafuli_up
	SW122A	Chowdhuryhat	Karnafuli_dn
Halda	SW121B	Satterghat	Halda_up
	SW121A	Madnaghat	Halda_dn

C/S of Karnafuli_dn1 at SW122A Chowdhuryhat
Surveyed on 18/4/1998



7.4-5 Comparison Study on Natural Gas Engine Generator

A. Conditions for Calculation

(1) Total Capacity of Existing Facilities: 2,540 kW

(2) Total Capacity of New Facilities: 2,500 kW

(3) Requirement for Continuous Operation of All Facilities:

(2,540+2,500) x 95 % = 4,800 kW

(4) Power Generation per Gas Volume: 3.2 kWh/m^3 (based on manufacturer's data)

(5) Unit Cost of Natural Gas: 2.22 Tk/m^3

(6) Penalty for Continuous Power Generation to be paid to PDB: 0.15 Tk/kWh

(7) Operation Hours: Continuous Operation (24 hours, 365 days)
Emergency Operation (15minutes/day, 365 days, based on past records)
1% of a day

(8) PDB Power Cost: 1.95 Tk/m^3

(9) Power Generation per Diesel Oil Volume: 3,000 kWh/m^3

(10) Unit Cost of Diesel Oil: 16 Tk/litter

B. Operation Costs

(1) Powered by PDB: 4,800 kW x 1.95 Tk/kWh x 24 hors x 365 days = 81.99 mil.Tk.
= US$1,518,000 / year

(2) Powered by Gas Engine Generator (Continuous Generation):
((4,800 kW / 3.2 kWh/m^3 x 2.22 Tk/m^3) + (4,800 kW x 0.15 Tk/kWh)) x 24 hours x 365 days = 35.48 mil.Tk. = US$657,000 / year

(3) Powered by PDB and Gas Engine Generator in Emergency:
((4,800 kW x 1.95 Tk/kWh x 0.99) + (4,800 kW / 3.2 kWh/m^3 x 2.22 Tk/m^3 x 0.01)) x 24 hours x 365 days = 81.47 mil.Tk. = US$1,509,000 / year

(4) Powered by Diesel Engine Generator (Continuous Generation):
((4,800 kW / 3,000 kWh/m^3 x 16,000 Tk/m^3) + (4,800 x 0.15 Tk/kWh)) x 24 hours x 365 days = 230.56 mil.Tk. = US$4,270,000 / year

(5) Powered by PDB and Diesel Engine Generator in Emergency:
((4,800 kW x 1.95 Tk/kWh x 0.99) + (4,800 kW / 3,000 kWh/m^3 x 16,000 Tk/m^3 x 0.01)) x 24 hours x 365 days = 83.42 mil.Tk. = US$1,545,000 / year

C. Equipment Cost (incl. mech. and elec. equipment)

3 units for continuous generation, 2 units for emergency generation

(1) Gas Engine Generator 2,500kW

For Continuous Generation:

US$1,200,000 x 130% (customs, duty, charges, etc.) x 3 units = US$4,680,000

Pipeline (100mm x 1,800m) Tk.13,558,871 = US$251,000

Total US$4,931,000

For Emergency Generation:

US$1,200,000 x 130% (customs, duty, charges, etc.) x 2 units = US$3,120,000

Pipeline (100mm x 1,800m) Tk.13,558,871 = US$251,000

Total US$3,371,000

(2) Diesel Engine Generator 2,500kW

For Continuous Generation:

US$863,000 x 130% (customs, duty, charges, etc.) x 3 units = US$3,366,000

For Emergency Generation:

US$863,000 x 130% (customs, duty, charges, etc.) x 2 units = US$2,244,000

D. Annual Maintenance Cost (incl. mech. and elec. equipment)

Life of generator: 15 years

Regular maintenance Cost: 3% of equipment cost per year

Overhaul maintenance Cost: 30% of equipment cost every 5 years for continuous generation

20% of equipment cost every 5 years for emergency generation

Summary of Costs:

Case	Equipment Cost (1000US$)	Operation Cost (1000US$/yr)	Maintenance Cost (1000US$/yr)	Overhaul Cost (1000US$/5yrs)	NPV (at 7.5%) for 15 years operation (1000US$)	Ratio
PDB	-	1,518	-	-	12,465	1.00
Gas	4,931	657	148	1,479	12,823	1.03
PDB + Gas	3,371	1,509	101	674	17,097	1.37
Diesel	3,366	4,270	101	1,010	40,133	3.22
PDB + Diesel	2,244	1,545	67	449	15,818	1.27

Conclusion:

As shown in above table, the case with power supply only from PDB shows the least cost NPV, though it is not recommendable because of the least reliability. The option with continuous power generation by Gas Engine Generators is the second economical option. The least operation cost is beneficial for this evaluation though its initial cost is the highest.

For the adoption of Gas Engine Generator, the most important issue is availability of reliable operation & maintenance staff members and organization. Buck up support service is also requisite for reliable continuous operation. Provided those requirement are fulfilled and increase of initial cost is allowed, continuous power generation by Gas Engine Generators is recommendable from economical point of view.

Before final decision for application of Gas Engine Generators, reliability of gas supply system and availability of operation and maintenance services for both of normal operation and emergency situation, shall be verified in the beginning of the detailed design stage. In the feasibility study, however, the least capital cost option, i.e. emergency diesel engine power generation was tentatively applied for proposed plant.

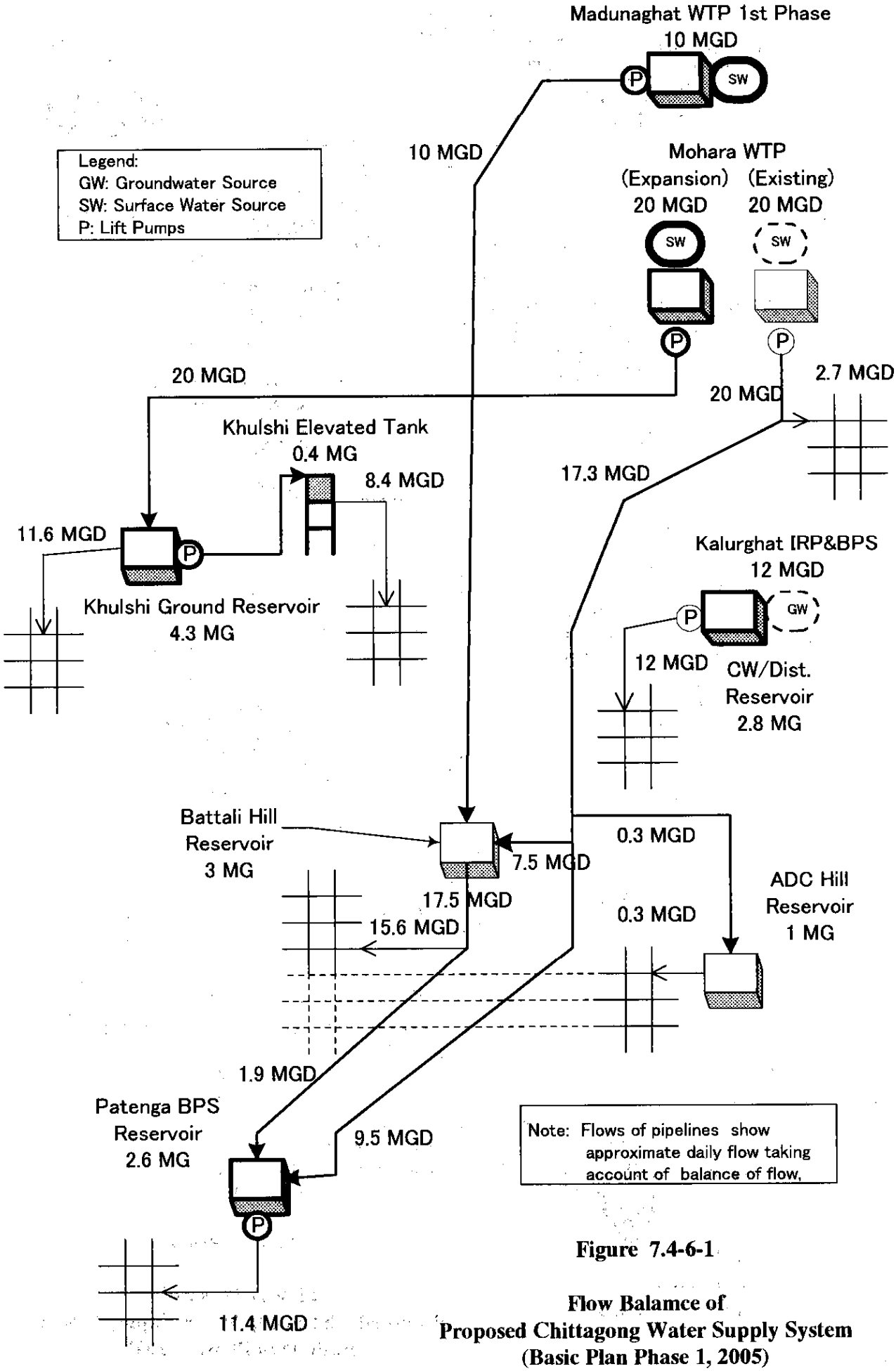


Figure 7.4-6-1

Flow Balamce of
Proposed Chittagong Water Supply System
(Basic Plan Phase 1, 2005)

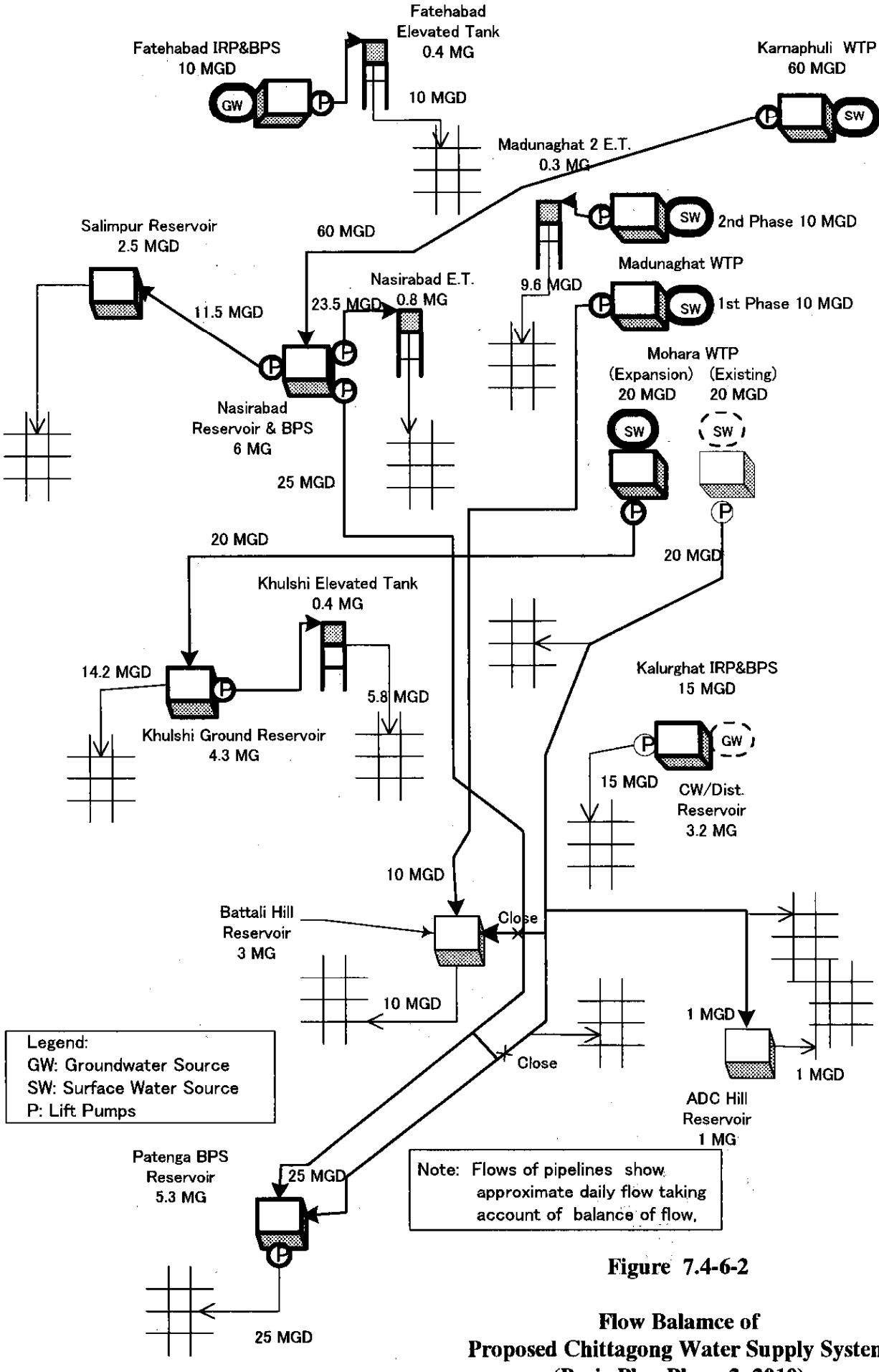


Figure 7.4-6-2

Flow Balamce of
Proposed Chittagong Water Supply System
(Basic Plan Phase 2, 2010)

Table 7.5-1-1 Cost Estimates for Basic Plan Phase 1 Project

unit : US$ 54Taka/$

Facilities	Item	Local	Foreign	Total	Remarks	Priority Project		Phase 1after Priority Project		Phase 1	New Mohara Service Area		Others		Priority Project		Phase 1after Priority Project	
						New Mohara	Others	New Mohara	Others		Ⅰ-a		Ⅱ-a		(Ⅰ-a)+(Ⅱ-a)		(Ⅰ-b)+(Ⅱ-b)	
						Ⅰ-a	Ⅱ-a	Ⅰ-b	Ⅱ-b	Total	Local	Foreign	Local	Foreign	Local	Foreign	Local	Foreign
Ⅰ Direct Construction Cost																		
Ⅰ-1 Civil Work																		
1 Intake Facilities	Conveyance pipe DIP900mm×214m	5,000	57,000	62,000	Priority	62,000				62,000	5,000	57,000			5,000	57,000	0	0
2 Treatment Plant Facilities	20MGD（90,912m3/d)	5,530,000	313,000	5,843,000	Priority	5,843,000				5,843,000	5,530,000	313,000			5,530,000	313,000	0	0
3 Transmission Facilities	Transmission pipe DIP900mm×15,045m	1,049,000	4,224,000	5,273,000	Priority	5,273,000				5,273,000	1,049,000	4,224,000			1,049,000	4,224,000	0	0
4 Khulshi Reservoir	19,600m3	2,229,000	362,000	2,591,000	Priority	2,591,000				2,591,000	2,229,000	362,000			2,229,000	362,000	0	0
5 Khulshi Elevated Tank	φ18m× 7 mD×16mH	802,000	72,000	874,000	Priority	874,000				874,000	802,000	72,000			802,000	72,000	0	0
6 Kalurghat Reservoir	4,220m3	597,000	197,000	794,000	Priority		794,000			794,000			597,000	197,000	597,000	197,000	0	0
7 Patenga Reservoir	12,000m3	1,381,000	332,000	1,713,000	Priority		1,713,000			1,713,000			1,381,000	332,000	1,381,000	332,000	0	0
8 Distribution Line (1)	New Mohara Service Area	1,043,000	2,733,000	3,776,000	Priority	3,776,000				3,776,000	1,043,000	2,733,000			1,043,000	2,733,000	0	0
9 Distribution Line (2)	Other Service Area	1,272,000	2,851,000	4,123,000	Priority		4,123,000			4,123,000			1,272,000	2,851,000	1,272,000	2,851,000	0	0
10 Small Distribution Line (1)	Small Dia. Pipelines in New Mohara Service Area (Pr	1,199,000	1,727,000	2,926,000	Priority	2,926,000				2,926,000	1,199,000	1,727,000			1,199,000	1,727,000	0	0
11 Small Distribution Line (2)	Small Dia. Pipelines in New Mohara Service Area	1,726,000	2,487,000	4,213,000				4,213,000		4,213,000					0	0	1,726,000	2,487,000
12 Small Distribution Line (3)	Small Dia. Pipelines in Other Service Area (Priority)	787,000	1,134,000	1,921,000	Priority		1,921,000			1,921,000			787,000	1,134,000	787,000	1,134,000	0	0
13 Small Distribution Line (4)	Small Dia. Pipelines in Other Service Area	2,166,000	3,121,000	5,287,000					5,287,000	5,287,000					0	0	2,166,000	3,121,000
14 Rehabilitation Work (1)	Mohara WTP automation of filter washing	355,000	0	355,000	Priority	355,000				355,000	355,000	0			355,000	0	0	0
15 Rehabilitation Work (2)	Mohara WTP replace intake and transmission pump	0	0	0	Priority	0				0	0	0			0	0	0	0
16 Rehabilitation Work (3)	Kalurghat IRP&BPS rehabilitation of filter	26,000	0	26,000	Priority	26,000				26,000	26,000	0			26,000	0	0	0
17 Rehabilitation Work (4)	Kalurghat IRP&BPS installation of generator	20,000	0	20,000	Priority	20,000				20,000	20,000	0			20,000	0	0	0
18 Zonal Offices	800 m2 x 5 offices	740,000	0	740,000	Priority	740,000				740,000	740,000	0			740,000	0	0	0
19 Staff Quarters	100 m2 x 40 flats	740,000	0	740,000	Priority	740,000				740,000	740,000	0			740,000	0	0	0
Sub Total		21,667,000	19,610,000	41,277,000		23,226,000	8,551,000	4,213,000	5,287,000	41,277,000	13,738,000	9,488,000	4,037,000	4,514,000	17,775,000	14,002,000	3,892,000	5,608,000
Ⅰ-2 Mechanical and Electrical Work																		
1 Intake Facilities	Intake pump 42.1m3/min×15.2m×2units	0	935,000	935,000	Priority	935,000				935,000	0	935,000	0	0	0	935,000	0	0
2 Treatment Plant Facilities	Power receiving facilities, generator, chemical dosing	0	6,500,000	6,500,000	Priority	6,500,000				6,500,000	0	6,500,000	0	0	0	6,500,000	0	0
3 Transmission Facilities	Transmission pump 15.8m3/min×84m×4units (+1)	0	1,828,000	1,828,000	Priority	1,828,000				1,828,000	0	1,828,000	0	0	0	1,828,000	0	0
4 Kulshi Elevated Tank	Lift pump 13.1m3/min×25m×3units(+1)	0	1,717,000	1,717,000	Priority	1,717,000				1,717,000	0	1,717,000	0	0	0	1,717,000	0	0
5 Patenga Reservoir	Distribution pump 19.2m3/min×37m×2units (+1)	0	1,999,000	1,999,000	Priority		1,999,000			1,999,000	0	0	0	1,999,000	0	1,999,000	0	0
6 Rehabilitation Work (1)	MoharaWTP automated of filter washing	0	831,000	831,000	Priority	831,000				831,000	0	831,000	0	0	0	831,000	0	0
7 Rehabilitation Work (2)	MoharaWTP replace intake and transmission pump	0	1,444,000	1,444,000	Priority	1,444,000				1,444,000	0	1,444,000	0	0	0	1,444,000	0	0
8 Rehabilitation Work (3)	Kalurghat IR&BPS rehabilitation of filter	0	85,000	85,000	Priority	85,000				85,000	0	85,000	0	0	0	85,000	0	0
9 Rehabilitation Work (4)	Kalurghat IR&BPS installation of generator	0	1,111,000	1,111,000	Priority	1,111,000				1,111,000	0	1,111,000	0	0	0	1,111,000	0	0
Sub Total		0	16,450,000	16,450,000		14,451,000	1,999,000	0	0	16,450,000	0	14,451,000	0	1,999,000	0	16,450,000	0	0
Total Ⅰ	Ⅰ	21,667,000	36,060,000	57,727,000		37,677,000	10,550,000	4,213,000	5,287,000	57,727,000	13,738,000	23,939,000	4,037,000	6,513,000	17,775,000	30,452,000	3,892,000	5,608,000
Ⅱ Overhead & profit etc.																		
	25% of Direct Cost for ICB (I-1 1-9, 14-17, I-2)	0	10,475,000	10,475,000		8,318,000	2,157,000	0	0	10,475,000	0	8,318,000	0	2,157,000	0	10,475,000	0	0
	12.5% of Direct Cost for LCB (I-1 10-13,18,19)	1,979,000	0	1,979,000		551,000	240,000	527,000	661,000	1,979,000	551,000	0	240,000	0	791,000	0	1,188,000	0
Sub Total		1,979,000	10,475,000	12,454,000		8,869,000	2,397,000	527,000	661,000	12,454,000	551,000	8,318,000	240,000	2,157,000	791,000	10,475,000	1,188,000	0
Total Ⅰ+Ⅱ	**Ⅰ+Ⅱ**	23,646,000	46,535,000	70,181,000		46,546,000	12,947,000	4,740,000	5,948,000	70,181,000	14,289,000	32,257,000	4,277,000	8,670,000	18,566,000	40,927,000	5,080,000	5,608,000
Ⅲ Others																		
Water meter	20-150nn×25,000units	0	589,000	589,000		589,000				589,000		589,000			0	589,000	0	0
Vehicle	sedan×2viecles+jeep×2viecles	0	93,000	93,000		93,000				93,000		93,000			0	93,000	0	0
Computer	8 sets	0	22,000	22,000		22,000				22,000		22,000			0	22,000	0	0
Administration Cost		128,000	0	128,000		128,000				128,000	128,000				128,000	0	0	0
Land Acquisition Cost		3,370,000	0	3,370,000		3,370,000				3,370,000	3,370,000				3,370,000	0	0	0
Sub Total		3,498,000	704,000	4,202,000		4,202,000	0	0	0	4,202,000	3,498,000	704,000	0	0	3,498,000	704,000	0	0
Total Ⅰ+Ⅱ+Ⅲ	**Ⅰ+Ⅱ+Ⅲ**	27,144,000	47,239,000	74,383,000		50,748,000	12,947,000	4,740,000	5,948,000	74,383,000	17,787,000	32,961,000	4,277,000	8,670,000	22,064,000	41,631,000	5,080,000	5,608,000
Ⅳ Engineering Cost																		
Engineering Cost	8 % of Total Cost (**Ⅰ+Ⅱ**)	849,000	4,810,000	5,659,000		3,759,000	1,045,000	379,000	476,000	5,659,000	564,000	3,195,000	157,000	888,000	721,000	4,083,000	128,000	727,000
VAT for Engineering Cost	5.25%	297,000	0	297,000		197,000	55,000	20,000	25,000	297,000	197,000	0	55,000	0	252,000	0	45,000	0
Ⅴ Customs Duties, etc.																		
Customs Duties and Other Charges		12,595,000	0	12,595,000		7,399,000	2,508,000	1,192,000	1,496,000	12,595,000	7,399,000	0	2,508,000	0	9,907,000	0	2,688,000	0
VAT for Civil	4.5% of Civil and Mech & Elec Equip Installation Wo	1,518,000	0	1,518,000		1,058,000	263,000	87,000	110,000	1,518,000	1,058,000	0	263,000	0	1,321,000	0	197,000	0
VAT for Mech & Elec		6,010,000	0	6,010,000		3,674,000	1,168,000	518,000	650,000	6,010,000	3,674,000	0	1,168,000	0	4,842,000	0	1,168,000	0
Pre-shipment Inspection Fee		302,000	0	302,000		189,000	57,000	25,000	31,000	302,000	189,000	0	57,000	0	246,000	0	56,000	0
Sub Total		20,425,000	0	20,425,000		12,320,000	3,996,000	1,822,000	2,287,000	20,425,000	12,320,000	0	3,996,000	0	16,316,000	0	4,109,000	0
Total		48,715,000	52,049,000	100,764,000		67,024,000	18,043,000	6,961,000	8,736,000	100,764,000	30,868,000	36,156,000	8,485,000	9,558,000	39,353,000	45,714,000	9,362,000	6,335,000

	Priority Project Total		Phase 1 Total		
Construction Cost	$60,197,000	71%	$70,885,000	70%	
Customs Duties & Taxes	$16,568,000	19%	$20,722,000	21%	
Land Cost	$3,370,000	4%	$3,370,000	3%	
Administration Cost	$128,000	0%	$128,000	0%	
Engineering Cost	$4,804,000	6%	$5,659,000	6%	(excl.VAT)
Total	$85,067,000	100%	$100,764,000	100%	

		Priority Project Total		Phase 1Total	
Local ((Ⅰ-a)+(Ⅱ-a))		$39,353,000	46%	$48,715,000	48%
Foreign ((Ⅰ-a)+(Ⅱ-a))		$45,714,000	54%	$52,049,000	52%
	Total	$85,067,000	100%	$100,764,000	100%

Rehabilitation - Mohara WTP	$2,630,000	=Tk.142,020,000
Rehabilitation - Kalurghat IRP	$1,242,000	=Tk.67,068,000
Total	$3,872,000	=Tk.209,088,000

Table 7.5-1-2 Details of Cost Estimates for Basic Plan Phase 1 Project (Civil Work)

(54Taka/$) unit : US$

Equitment	Item	Cost (US$)	Priority Project		Phase 1 after Priority Pjct	
			New Mohara Ⅰ-a	Others Ⅱ-a	New Mohara Ⅰ-b	Others Ⅱ-b
Civil Work						
I. Direct Cost						
Ⅰ-1 Intake Facilities						
1 In t ake Pump Installation	42.1m3/min×15.2m×2units	375,261	375,261			
2 Conveyance Pipe	DIP900mm×214m	4,886	4,886			
Sub-Total		380,147	380,147	0	0	0
Ⅰ-2 Mohara WTP						
1 Receiving Wel (Distribution Chamber)	W7.0m×L5.5m×ED4.0m×1Basin	59,837	59,837			
1 Desilting Basin	W23.0m×L76.0m×ED2.5m×4Basins	1,388,167	1,388,167			
3 Rapid Mixing Basin	W2.29m×L2.29m×ED1.91m×2Basins	6,889	6,889			
4 Clarifier	W7.62m×L7.62m×ED7.08m×24Basins	845,444	845,444			
5 Filter	W2.44m×L9.14m×2units×8Basins	1,182,667	1,182,667			
6 Clear Well (Include Chlorination Channel)	W31.5m×L(40.1+9.0)m×ED2.88m×2Basins	986,852	986,852			
7 Transmission Pump House	W15.24m×L41.66m	224,944	224,944			
8 Sludge Tank	W9.14m×L22.86m×ED4.30m×1Basins	132,519	132,519			
9 Chemical Building & Chlorination room	W9.04m×L76.58m	221,259	221,259			
10 Laboratory & Control room	W10.0m×L21.0×2sorries	87,852	87,852			
11 Inplant Piping	DIP1200-300mm×1,263m	217,777	217,777			
12 Road Work		146,778	146,778			
13 Lighting		28,815	28,815			
14 Mech & Elec Equipment Installation	WTP Equipment	2,177,074	2,177,074			
Sub-Total		7,706,874	7,706,874	0	0	0
Ⅰ-3 Transmission Facilities						
Transmission Pump	15.8m3/min×84m×5units	561,722	561,722			
Transmission Pipe	DIP900mm×15,045m	1,048,734	1,048,734			
Sub-Total		1,610,456	1,610,456	0	0	0
Ⅰ-4 Khulshi Reservoir 1						
Ground Reservoir	W17.7m×L44.4m×ED7.0m×4Basins	1,865,630	1,865,630			
Inplant Piping	DIP1000-200mm×1,210m	109,682	109,682			
Earth Work		168,796	168,796			
Road Work		75,222	75,222			
Lighting		9,852	9,852			
Sub-Total		2,229,182	2,229,182	0	0	0
Ⅰ-5 Khulshi Reservoir 2						
Elevated Tank	Dia 18m×ED7.0m×16mH	408,370	408,370			
Pump House	W10.0m×L24.0m	78,519	78,519			
Administration Building	W8.0m×L20.0m	32,944	32,944			
Inplant Piping	DIP700-300mm×460m	27,857	27,857			
Earth Work		168,796	168,796			
Road Work		75,204	75,204			
Lighting		9,852	9,852			
Mech & Elec Equipment Installation	Lift Pump, Power Receiving Facilities, Generator	605,044	605,044			
Sub-Total		1,406,586	1,406,586	0	0	0
Ⅰ-6 Patenga BPS						
Ground Reservoir	W16.6m×L33.8m×ED6.0m×4Basins	1,142,222		1,142,222		
Pump House	W12.0m×L28.0m	127,481		127,481		
Inplant Piping	DIP700-300mm×620m	36,885		36,885		
Road Work		58,852		58,852		
Lighting		15,426		15,426		
Mech & Elec Equipment Installation	Lift Pump, Power Receiving Facilities, Generator	720,097		720,097		
Sub-Total		2,100,963	0	2,100,963	0	0
Ⅰ-7 Kalurghat Reaservoir						
Ground Reservoir	W16.8m×L47.6m×ED2.87m×2Basins	401,685		401,685		
Oxidation-Sedimentation Basin	W8.5m×L18.0m×ED2.5m×3Basins	138,796		138,796		
Inplant Piping	DIP600-200mm×600m	21,874		21,874		
Road Work		34,907		34,907		
Sub-Total		597,262	0	597,262	0	0
Ⅰ-8 Distribution Pipe						
New Mohara Service Area	(DIP1000-300mm, PVC250-200mm)× 20,985m	1,042,999	1,042,999			
Other Service Area	(DIP800-300mm, PVC250-200mm)×27,305m	1,271,744		1,271,744		
Small Pipeline in New Mohara Service Area (Priority)	PVC200-100mm×66 km	1,198,878	1,198,878			
Small Pipeline in New Mohara Service Area	PVC200-100mm×95 km	1,726,055			1,726,055	
Small Pipeline in Other Service Area (Priority)	PVC200-100mm×43 km	786,915		786,915		
Small Pipeline in Other Service Area	PVC200-100mm×119 km	2,166,104				2,166,104
Sub-Total		8,192,695	2,241,877	2,058,659	1,726,055	2,166,104
Ⅰ-9 Rehabilitation of WTP Facilities						
Rehabilitation of Mohara WTP Facilities(1)	Automatical Backwash system etc.	778,154	778,154			
Rehabilitation of Mohara WTP Facilities(2)	Change of Intake Pump & Spare Parts	735,455	735,455			
Rehabilitation of Kalurghat IRP&BPS Facilities(1)	Filter Rehabilitation etc.	69,299	69,299			
Rehabilitation of Kalurghat IRP&BPS Facilities(2)	Generator	586,105	586,105			
Sub-Total		2,169,013	2,169,013	0	0	0
Ⅰ-10 Zonal Offices and Staff Quarters						
Zonal Offices	800 m2 x 5 offices	740,000	740,000			
Staff Quarters	100 m2 x 40 flats	740,000	740,000			
Sub-Total		1,480,000	1,480,000	0	0	0
Sub Total (I. Direct Cost)		27,873,178	19,224,135	4,756,884	1,726,055	2,166,104
II. **Overhead and Profit**						
for ICB (25% of Firect Cost) for all items except small dia.dist. pipe and staff quarters & zonal offices		4,943,807	3,951,314	992,492	0	0
for LCB (12.5% of Firect Cost) for small dia.dist. pipe and staff quarters & zonal offices		919,744	334,860	98,364	215,757	270,763
Sub Total (II. OH&P)		5,863,551	4,286,174	1,090,857	215,757	270,763
III. **VAT for Civil Work**	4.5% of I + II	1,518,153	1,057,964	263,148	87,382	109,659
Total		35,254,881	24,568,273	6,110,889	2,029,193	2,546,526

Table 7.5-1-3 Details of Cost Estimates for Basic Plan Phase 1 Project (Material-1)

(54Taka/US$)

Equipment	Item	Material Cost (US$)					C&F, VAT, and Customs Duties & Charges incl PSI (CD)						VAT				Customs Duties and Other Charges (excl PSI)				Pre-shipment Inspection Charge			
		Priority Project		Phase 1 after Priority Pjct.		B/P Phase 1	C&F	VAT*		CD	Total (C&F+VAT+CD)										(1% of C&F)			
		New Mohara	Others	New Mohara	Others	Total	CIF/101%	%	C&F x %	3=4-1-2	%	C&F x %												
		Ⅰ-a	Ⅱ-a	Ⅰ-b	Ⅱ-b	(CIF)	1		2	3		4	Ⅰ-a	Ⅱ-a	Ⅰ-b	Ⅱ-b	Ⅰ-a	Ⅱ-a	Ⅰ-b	Ⅱ-b	Ⅰ-a	Ⅱ-a	Ⅰ-b	Ⅱ-b
Ⅱ-1 **Pipe Material**																								
1 MWTP Conveyance Pipe	DIP900mm×214m	57,217				57,217	56,650	21.04	11,919	27,997	170.46	96,566	11,919				27,430				567			
2 MWTP Expanson Plant Transmission Pipe	DIP900mm×15,045m	4,223,744				4,223,744	4,181,925	21.04	879,877	2,066,707	170.46	7,128,509	879,877				2,024,888				41,819			
3 Mohara WTP In-plant Piping	DIP1200-300mm×1,263m	313,034				313,034	309,935	21.04	65,210	153,170	170.46	528,315	65,210				150,070				3,099			
4 Khulshi Reservoir In-plant Piping	DIP1000-200mm×1,210m	361,732				361,732	358,150	21.04	75,355	176,998	170.46	610,503	75,355				173,416				3,582			
5 Khulshi Elevated Tank In-plant Piping	DIP700-300mm×460m	71,780				71,780	71,069	21.04	14,953	35,122	170.46	121,145	14,953				34,412				711			
6 Kalurghat Reservoir In-plant Piping	DIP800-400mm×400m		196,867			196,867	194,918	21.04	41,011	96,328	170.46	332,257		41,011				94,379				1,949		
7 Patenga Reservoir In-plant Piping	DIP700-300mm×620m		331,967			331,967	328,680	21.04	69,154	162,434	170.46	560,268		69,154				159,147				3,287		
8 New Mohara Service Area - 1	DIP1000-300mm×14,080m	2,268,042				2,268,042	2,245,586	21.04	472,471	1,109,769	170.46	3,827,826	472,471				1,087,313				22,456			
9 New Mohara Service Area - 2	PVC250-200mm×6,905m	464,523				464,523	459,924	21.04	96,768	227,294	170.46	783,986	96,768				222,695				4,599			
10 Other Service Area - 2	DIP800-300mm×21,170m		2,427,431			2,427,431	2,403,397	21.04	505,675	1,187,759	170.46	4,096,831		505,675				1,163,725				24,034		
11 Other Service Area - 3	PVC250-200mm×6,135m		423,706			423,706	419,511	21.04	88,265	207,322	170.46	715,098		88,265				203,127				4,195		
12 Small Pipeline in New Mohara S.A. (Priority)	PVC200-100mm×66 km	1,727,381				1,727,381	1,710,278	21.04	359,843	845,219	170.46	2,915,340	359,843				828,117				17,103			
13 Small Pipeline in New Mohara Service Area	PVC200-100mm×95 km			2,486,954		2,486,954	2,462,331	21.04	518,074	1,216,884	170.46	4,197,289			518,074				1,192,261				24,623	
14 Small Pipeline in Other Service Area (Priority)	PVC200-100mm×43 km		1,133,812			1,133,812	1,122,586	21.04	236,192	554,782	170.46	1,913,560		236,192				543,556				11,226		
15 Small Pipeline in Other Service Area	PVC200-100mm×119 km				3,120,991	3,120,991	3,090,090	21.04	650,155	1,527,123	170.46	5,267,368				650,155				1,496,222				30,901
Sub-Total		9,487,453	4,513,783	2,486,954	3,120,991	19,609,181	19,415,031		4,084,922	9,594,908		33,094,861	1,976,396	940,297	518,074	650,155	4,548,341	2,163,934	1,192,261	1,496,222	93,935	44,691	24,623	30,901
Ⅱ-2 **Mechanical Equipment**																								
1 Mohara WTP Intake Pump	42.1m3/min×15.2m×2units	559,720				559,720	554,178	18.20	100,878	166,123	148.18	821,179	100,878				160,581				5,542			
2 Mohara WTP Facilities	Mechanical Equip, Chemical Dosing Fac.	2,860,259				2,860,259	2,831,940	18.36	519,944	895,742	149.99	4,247,626	519,944				867,423				28,319			
3 Transmission Pump	15.8m3/min×84m×5units	1,266,167				1,266,167	1,253,631	18.09	226,835	360,058	146.82	1,840,523	226,835				347,521				12,536			
4 Khulshi Uplift Pump	13.1m3/min×25m×4units	843,981				843,981	835,625	18.09	151,200	240,001	146.82	1,226,826	151,200				231,645				8,356			
5 Patenga Distribution Pump	19.2m3/min×37m×3units		953,185			953,185	943,748	18.09	170,764	271,056	146.82	1,385,567		170,764				261,618				9,437		
6 Rehabilitation of Mohara WTP Facilities - 1	Automated Backwash system etc.	408,123				408,123	404,082	18.36	74,189	127,811	149.99	606,083	74,189				123,770				4,041			
7 Rehabilitation of Mohara WTP Facilities - 2	Change of Intake Pump, Dist. Pump & Spare Parts	708,989				708,989	701,969	18.20	127,781	210,425	148.18	1,040,176	127,781				203,405				7,020			
8 Rehabilitation of Kalurghat IRP&BPS Facilities - 1	Filter Rehabilitation etc.	41,812				41,812	41,398	18.36	7,601	13,094	149.99	62,093	7,601				12,680				414			
9 Rehabilitation of Kalurghat IRP&BPS Facilities - 2	Generator	545,376				545,376	539,976	16.07	86,774	88,178	132.40	714,929	86,774				82,778				5,400			
Sub-Total		7,234,427	953,185	0	0	8,187,612	8,106,547		1,465,967	2,372,489		11,945,002	1,295,203	170,764	0	0	2,029,805	261,618	0	0	71,628	9,437	0	0
Ⅱ-3 **Electrical Equipment**																								
1 Mohara WTP Facilities	Power receiving, Generator, Telemetering	1,462,444				1,462,444	1,447,964	17.60	254,842	383,276	144.07	2,086,082	254,842				368,797				14,480			
2 Khulshi Uplift Pump	Power receiving, Generator	268,419				268,419	265,761	17.60	46,774	70,347	144.07	382,882	46,774				67,689				2,658			
3 Patenga Distribution Pump	Power receiving, Generator		325,996			325,996	322,768	17.60	56,807	85,437	144.07	465,012		56,807				82,209				3,228		
Sub-Total		1,730,863	325,996	0	0	2,056,859	2,036,494		358,423	539,060		2,933,977	301,616	56,807	0	0	436,486	82,209	0	0	17,137	3,228	0	0
Total		**18,452,743**	**5,792,964**	**2,486,954**	**3,120,991**	**29,853,652**	**29,558,071**		**5,909,312**	**12,506,457**		**47,973,840**	**3,573,215**	**1,167,868**	**518,074**	**650,155**	**7,014,632**	**2,507,762**	**1,192,261**	**1,496,222**	**182,700**	**57,356**	**24,623**	**30,901**
Ⅱ-4 Customs Duties, etc.																								
Customs Duties and Other Charges	(Average 41% of CIF)	7,014,632	2,507,762	1,192,261	1,496,222	12,210,876																		
VAT	(Average 20% of CIF)	3,573,215	1,167,868	518,074	650,155	5,909,312																		
Pre-shipment Inspection Fee	(Average 1% of CIF)	182,700	57,356	24,623	30,901	295,581																		
Sub-Total	**(Average 62% of CIF)**	**10,770,547**	**3,732,986**	**1,734,958**	**2,177,277**	**18,415,769**																		
Total		**29,223,290**	**9,525,950**	**4,221,912**	**5,298,268**	**48,269,421**																		

*: VAT is charged as 15% of Assessment Value and Customs Duties.

Table 7.5-1-4 Details of Cost Estimates for Basic Plan Phase 1 Project (Material-2)

54Taka/$

Equipment	Item	Material Cost (CIF) (US$)	C&F, VAT, and Customs Duties & Charges incl PSI (CD)						VAT	Customs Duties and Other Charges (excl PSI)	Pre-Shipment Inspection (1% of C&F)
			C&F	VAT		CD	Total (C&F+VAT+CD)				
			CIF/101%	%	C&F x %	3=4-1-2	%	C&F x %			
			1		2	3		4			
III-1 **Material**											
1 Water Meter	20-150mm×25,000units	589,270	583,436	15.00	87,515	340,726	173.40	1,011,677	87,515	334,892	5,834
Sub-Total		589,270	583,436		87,515	340,726		1,011,677	87,515	334,892	5,834
2 Vehicle	sedan*2viecle+jeep*2viecle	92,593	91,676	15.00	13,751	50,844	170.46	156,271	13,751	49,927	917
Sub-Total		92,593	91,676		13,751	50,844		156,271	13,751	49,927	917
3 Computer	8 sets	22,222	22,002	0.00	0	0	100.00	22,002	0	0	0
Sub-Total		22,222	22,002		0	0		22,002	0	0	0
TOTAL		**704,085**	**697,114**		**101,267**	**391,792**		**1,189,951**	**101,268**	**384,820**	**6,751**
III-2 Customs Duties, etc.											
Customs Duties and Other Charges	(Average 55% of CIF)	384,820									
VAT	(Average 14% of CIF)	101,268									
Pre-shipment Inspection Fee	(Average 1% of CIF)	6,751									
Sub-Total	**(Average 70% of CIF)**	**492,840**									
GRAND TOTAL		**1,196,925**									

Table 7.5-1-5 Construction Cost Breakdown of Phase 1 - 1

Unit : Taka

No.		Name of Facility	Item	Dimension	Unit	Unit Cost	Quantity	Price	Note	E&M	Civil (incl. materials)
1	Intake Pump Facilities										
	1-1	Intake Pump		42.1m3/min ×15.3m ×1 (+1)	set		1	50,489,000	Inverter Control 1 unit	50,489,000	
	1-2	Conveyance Pipe		DIP900mmTP	m	15,671	214	3,353,594			3,353,594
		(Intake Pump Station～Receiving Well)									
		Sub Total						53,842,594		50,489,000	3,353,594
2	Treatment Plant Facilities										
	2-1	Receiving Well	Civil Work		L.S.		1	3,231,209			3,231,209
		(Distribution Chamber)	Mechanical & Electrical Cost		L.S.		1	10,899,000		10,899,000	
	2-2	Desilting Basin	Civil Work		L.S.		1	74,961,000			74,961,000
			Mechanical & Electrical Cost		L.S.		1	36,947,000		36,947,000	
	2-3	Rapid Mixing Basin	Civil Work		L.S.		1	372,000			372,000
			Mechanical & Electrical Cost		L.S.		1	1,530,000		1,530,000	
	2-4	Clarifier	Civil Work		L.S.		1	45,654,000			45,654,000
			Mechanical & Electrical Cost		L.S.		1	12,620,000		12,620,000	
	2-5	Filter	Civil Work		L.S.		1	63,864,000			63,864,000
			Mechanical & Electrical Cost		L.S.		1	32,546,000		32,546,000	
	2-6	Clear Well	Civil Work	6,716m3	L.S.		1	53,290,000			53,290,000
			Mechanical & Electrical Cost		L.S.		1	9,561,000		9,561,000	
	2-7	Transmission Pump House	Civil Work		L.S.		1	12,147,000			12,147,000
	2-8	Sludge Tank	Civil Work		L.S.		1	7,156,000			7,156,000
			Mechanical & Electrical Cost		L.S.		1	19,313,000		19,313,000	
	2-9	Chemical Building &	Civil Work		L.S.		1	11,948,000			11,948,000
		Chlorination room									
	2-10	Laboratory &	Civil Work		L.S.		1	4,744,000			4,744,000
		Control room	Mechanical & Electrical Cost		L.S.		1	74,536,000	Including Water analysis Equipment	74,536,000	
	2-11	Alum Dosing Facilities	Mechanical & Electrical Cost		L.S.		1	5,124,000		5,124,000	
	2-12	Lime Dosing Facilities	Mechanical & Electrical Cost		L.S.		1	8,987,000		8,987,000	
	2-13	Chlorination Facilities	Mechanical & Electrical Cost		L.S.		1	21,033,000		21,033,000	
	2-14	Power Receiving Facility	Mechanical & Electrical Cost	3500 KVA	L.S.		1	22,512,000		22,512,000	
	2-15	Generator	Mechanical & Electrical Cost	1250 KVA ×2	L.S.		1	66,340,000		66,340,000	
	2-16	TM Facilities	Mechanical & Electrical Cost		L.S.		1	29,040,000		29,040,000	
	2-17	Inplant Piping			L.S.		1	28,663,759			28,663,759
	2-18	Road Work			L.S.		1	7,926,000			7,926,000
	2-19	Lighting			L.S.		1	1,556,000			1,556,000
		Sub Total						666,500,968		350,988,000	315,512,968
3	Transmission Facilities										
	3-1	Transmission Pump	Mechanical & Electrical Cost	15.8m3/min ×84.m ×4 (+1)	L.S.		1	98,706,000		98,706,000	
	3-2	Transmission Pipe		DIP900mmT	m	18,924	15,045	284,713,837			284,713,837
		Sub Total						383,419,837		98,706,000	284,713,837
4	Distribution Facilities										
	4-1	Khulushi Reservoir	Ground Reservoir 4 Basin	19,600 m3	L.S.		1	100,744,000			100,744,000
			Inplant Piping		L.S.		1	25,456,000			25,456,000
			Earth Work		L.S.		1	9,115,000			9,115,000
			Road Work		L.S.		1	4,062,000			4,062,000
			Lighting		L.S.		1	532,000			532,000
		Sub Total						139,909,000		0	139,909,000
	4-2	Distribution Pipe		DIP1000mmD	m	23,472	1,140	26,757,852			26,757,852
				DIP900mmD	m	19,825	910	18,041,023			18,041,023
				DIP800mmD	m	16,587	2,875	47,687,338			47,687,338
				DIP700mmD	m	13,651	200	2,730,200			2,730,200
				DIP600mmD	m	11,570	985	11,396,253			11,396,253
				DIP500mmD	m	9,085	3,515	31,933,424			31,933,424
				DIP450mmD	m	7,931	810	6,424,110			6,424,110
				DIP350mmD	m	6,076	420	2,552,088			2,552,088
				DIP300mmD	m	5,235	3,225	16,882,553			16,882,553
				PVC250mmD	m	6,477	4,065	26,328,192			26,328,192
				PVC200mmD	m	4,629	2,840	13,147,428			13,147,428
		Sub Total					20,985	203,880,460		0	203,880,460
5	Existing Treatment Plant Facilities Rehabilitation										
	5-1	MWTP Filter Rehabiritation	Civil Work		L.S.		1	19,159,000			19,159,000
			Mechanical & Electrical Cost		L.S.		1	24,900,000		24,900,000	
			Others		L.S.		1	20,000,000	Reinforcement of Alum Dosing etc.	20,000,000	
		Sub Total	Rehabilitation 1 (Mohara WTP)					64,059,000		44,900,000	19,159,000
	5-2	MWTP Replace of Intake pump etc.	Civil Work		L.S.		1	0			0
		Intake Pump	Mechanical & Electrical Cost	33.18m3/min ×14.3m ×1	L.S.		1	43,000,000	Inverter Control type	43,000,000	
		Distribution Pump	Mechanical & Electrical Cost	15.8m3/min ×87.m ×1	L.S.		1	25,000,000	Spare Parts	25,000,000	
			Others		L.S.		1	10,000,000		10,000,000	
		Sub Total	Rehabilitation 2 (Mohara WTP)					78,000,000		78,000,000	0
		Total (Direct Construction Cost)						1,589,611,859		623,083,000	966,528,859

Table 7.5-1-6 Construction Cost Breakdown of Phase 1 - 2

Unit : Taka

No.		Name of Facility	Item	Dimension	Unit	Unit Cost	Quantity	Price	Note	E&M	Civil (incl. materials)
1	Distribution Facilities										
	1-1	Khulshi Reservoir	Elevated Tank	dia18m ×7mD ×16mH	L.S.		1	22,052,000			22,052,000
			Lift Pump	13.1m3/min ×25m ×3 (+1)	L.S.		1	65,794,000		65,794,000	
			Pump House		L.S.		1	4,240,000			4,240,000
			Power Receiving Facility	500 KVA	L.S.		1	4,393,000		4,393,000	
			Generator	250 KVA ×2	L.S.		1	22,555,000		22,555,000	
			Administration Building		L.S.		1	1,779,000			1,779,000
			Inplant Piping		L.S.		1	5,380,000			5,380,000
			Earth Work		L.S.		1	9,115,000			9,115,000
			Road Work		L.S.		1	4,061,000			4,061,000
			Lighting		L.S.		1	532,000			532,000
		Sub Total						139,901,000	¥370,737,650	92,742,000	47,159,000
	1-2	Patenga BPS									
			Ground Reservoir	12,000 m3	L.S.		1	61,680,000	Including Chlorination Facilities		61,680,000
			Booster Pumps	19.2m3/min ×37m ×2 (+1)	L.S.		1	74,306,000		74,306,000	
			Pump House		L.S.		1	6,884,000			6,884,000
			Power Receiving Facility	750 KVA	L.S.		1	6,589,000		6,589,000	
			Generator	300 KVA ×2	L.S.		1	27,066,000		27,066,000	
			Inplant Piping		L.S.		1	19,918,000			19,918,000
			Road Work		L.S.		1	3,178,000			3,178,000
			Lighting		L.S.		1	833,000			833,000
		Sub Total						200,454,000	¥531,203,100	107,961,000	92,493,000
	1-3	Kalurghat IRP&BPS	Ground Reservoir	4,220 m3	L.S.		1	21,691,000			21,691,000
			Oxidation-Sedimentation Basin		L.S.		1	7,495,000			7,495,000
			Inplant Piping		L.S.		1	11,812,000			11,812,000
			Road Work		L.S.		1	1,885,000			1,885,000
		Sub Total						42,883,000	¥113,639,950	0	42,883,000
	1-4	Kalurghat IRP	Rehabilitation of Filter	Civil Work	L.S.		1	1,400,000	Trough, change of sand		1,400,000
			Rehabilitation of Filter	Mechanical & Electrical Cost	L.S.		1	3,100,000	Air supply system	3,100,000	
			Others		L.S.		1	1,500,000	Generator etc.	1,500,000	
		Sub Total	Rehabilitation 1					6,000,000		4,600,000	1,400,000
	1-5	Kalurghat BPS	Generator Room	Civil Work	L.S.		1	1,100,000	Trouph, change of sand		1,100,000
			Generator 1,000KVA	Mechanical & Electrical Cost	L.S.		1	50,000,000	Air supply system	50,000,000	
			Others		L.S.		1	10,000,000	Oil Tank etc.	10,000,000	
		Sub Total	Rehabiritation 2					61,100,000		60,000,000	1,100,000
	1-6	Distribution Pipe	Stage 2	DIP800mmD	m	16,587	2,280	37,818,132			37,818,132
				DIP700mmD	m	13,651	730	9,965,230			9,965,230
				DIP600mmD	m	11,570	3,775	43,675,995			43,675,995
				DIP500mmD	m	9,085	1,510	13,718,199			13,718,199
				DIP450mmD	m	7,931	3,110	24,665,410			24,665,410
				DIP400mmD	m	6,918	1,725	11,933,378			11,933,378
				DIP350mmD	m	6,076	3,530	21,449,692			21,449,692
				DIP300mmD	m	5,235	4,510	23,609,399			23,609,399
				PVC250mmD	m	6,477	4,005	25,939,584			25,939,584
				PVC200mmD	m	4,629	2,130	9,860,571			9,860,571
		Sub Total					27,305	222,635,590	¥589,984,313	0	222,635,590
2	Distribution Small Pipe (New Mohara WTP Area)										
	2-1	Distribution Small Pipe	PVC200～100mm	Immediate	L.S.		1	64,739,422			64,739,422
	2-2	Distribution Small Pipe	PVC200～100mm	Non-immediate	L.S.		1	93,206,982			93,206,982
		Sub Total						157,946,404	¥418,557,971		157,946,404
3	Distribution Small Pipe (Other Area)										
	3-1	Distribution Small Pipe	PVC200～100mm	Immediate	L.S.		1	42,493,408			42,493,408
	3-2	Distribution Small Pipe	PVC200～100mm	Non-immediate	L.S.		1	116,969,636			116,969,636
		Sub Total						159,463,044	¥422,577,066	0	159,463,044
		Total (Direct Construction Cost)						990,383,038	¥2,624,515,050	265,303,000	725,080,038

Table 7.5-1-7 Other Costs

Unit: US$ (54Taka/$)

	Item	Cost	Customs Duties (w/out VAT&PSI)	VAT	Pre-shipment Inspection Cost	Total
1	Water Meter (25,000sets)	589,270	334,892	87,515	5,834	1,011,677
2	Viecle (Sedan2, Jeep2)	92,593	49,927	13,751	917	156,271
3	Computer (8sets)	22,222	0	0	0	22,222
4	Administration Cost	128,000	-	-	-	128,000
5	Land Acquisition	3,370,370	-	-	-	3,370,370
	Total	4,202,455	384,819	101,267	6,751	4,688,541

Table 7.5-1-8 Procurement of Water Meter

(54Taka/$)

	Diameter	Unit Cost (Taka)	Quantity	Cost (Taka)	Cost (US$)
1	20mm	1,049	22,000	23,078,000	427,370
2	25mm	2,608	2,850	7,432,800	137,644
3	50mm	6,804	100	680,400	12,600
4	100mm	11,057	40	442,280	8,190
5	150mm	18,711	10	187,110	3,465
	Total		25,000	31,820,590	589,270

Table 7.5-1-9 Land Acquisition Cost

(54Taka/$)

	Land	Area (m2)	Unit Cost (Taka/m2)	Land Acquisition Cost (Taka)	Remark
1	Mohara WTP	500	3,000	1,500,000	
2	Karnaphuri WTP	100,000	2,500	250,000,000	
3	Khulshi Reservoir	17,000	8,500	144,500,000	
4	Nashirabad Reservoir	26,000	5,600	145,600,000	
5	Patenga Reservoir	18,000	4,000	72,000,000	
6	Salimpur	13,000	3,000	39,000,000	US$
	Total	174,500		652,600,000	12,085,185
	Total (1+3+5*(1/2)) for FS Project			182,000,000	3,370,370

Table 7.5-1-10 Administration Cost

(54Taka/$)

	Man Power	Salary (Taka/month)	Detail Design Stage 1year			Construction Stage 3years		
			No.	MM	Cost	No.	MM	Cost
1	Project Director	22,000	1	12	264,000	1	36	792,000
2	Executive Engineer	20,000	1	12	240,000	1	36	720,000
3	Assistant Engineer	8,000	1	12	96,000	3	108	864,000
4	Chemist	8,000	0	0	0	1	3	24,000
5	Sub Assistant Engineer	6,000	0	0	0	5	180	1,080,000
6	Laboratory Assistant	5,000	0	0	0	2	6	30,000
7	Inspector	4,000	0	0	0	8	288	1,152,000
8	Upper Assistant Clerk	4,000	0	0	0	2	72	288,000
9	Lower Assistant Clerk	3,500	0	0	0	3	108	378,000
10	Driver	4,000	1	12	48,000	4	144	576,000
11	MLSS	3,000	1	12	36,000	3	108	324,000
	Sub Total				684,000			6,228,000
	Total (Detail Design Stage & Construction Stage)						Taka	6,912,000
							US$	128,000

7.5-1-11 Engineering Cost Details (M/M Allocation)

	D/D												Pre-C						Const - 1st year						Const - 2nd year												Const - 3rd year												Const - 4th year						M/M Total			Price	Amount (US$)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	D/D	C/S	Total	US$	D/D	C/S	Total
Expatriate																																																													
PM	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	16.0	33.0	49.0	32,000	512,000	1,056,000	1,568,000
WTP-Civil	1	1	1	1	1	1	1	1	1	1	1																																												11.0	0.0	11.0	28,000	308,000	0	308,000
Civil2		1	1	1	1	1	1	1	1	1																																													9.0	0.0	9.0	25,000	225,000	0	225,000
Pipe1	1	1	1	1	1	1	1	1	1	1	1																																												11.0	0.0	11.0	25,000	275,000	0	275,000
Pipe2							1	1	1	1																																													4.0	0.0	4.0	25,000	100,000	0	100,000
Mech1		1						1	1	1						0.5															0.5								0.5						0.5								0.5		4.5	2.0	6.5	28,000	126,000	56,000	182,000
Elec1		1						1	1	1						0.5															0.5								0.5						0.5								0.5		4.5	2.0	6.5	28,000	126,000	56,000	182,000
Archi1		1				1				1	1																				0.5								0.5						0.5								0.5		4.0	2.0	6.0	28,000	112,000	56,000	168,000
Structure 1							1	1	1	1	1																																												5.0	0.0	5.0	28,000	140,000	0	140,000
Water Quality 1									1																																						1	1					1	1	1.0	4.0	5.0	25,000	25,000	100,000	125,000
Spec.1									1	1	1	1				1																																							5.0	0.0	5.0	25,000	125,000	0	125,000
Inspector																			1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1		0.0	32.0	32.0	25,000	0	800,000	800,000
ST	3	7	4	4	4	5	5	8	10	10	6	2	1	0	1	3.0	1	1	2	2	2	2	2	2	2	1	2	2	1	2	3.5	2	2	2	2	2	2	1	3.5	2	1	2	2	2	3.5	2	3	3	2	1	1	2	4.5	2	75.0	75.0	150.0	ST	2,074,000	2,124,000	4,198,000
Local Engineer																																																													
Civil1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	1,000	18,000	36,000	54,000
Civil2		1	1	1	1	1	1	1	1	1	1																																												10.0	0.0	10.0	600	6,000	0	6,000
Pipe1		1	1	1	1	1	1	1	1	1	1																																												10.0	0.0	10.0	600	6,000	0	6,000
Pipe2		1	1	1	1	1	1	1	1	1	1																																												10.0	0.0	10.0	400	4,000	0	4,000
Mech1							1	1	1	1	1																																												5.0	0.0	5.0	600	3,000	0	3,000
Elec1							1	1	1	1	1																																												5.0	0.0	5.0	600	3,000	0	3,000
Arch1					1	1	1	1	1	1	1																																												7.0	0.0	7.0	600	4,200	0	4,200
Arch2					1	1	1	1	1	1	1																																												7.0	0.0	7.0	400	2,800	0	2,800
Structure1							1	1	1	1	1																																												5.0	0.0	5.0	600	3,000	0	3,000
Structure2							1	1	1	1	1																																												5.0	0.0	5.0	400	2,000	0	2,000
Quantity Survey1								1	1	1	1																																												4.0	0.0	4.0	400	1,600	0	1,600
Quantity Survey2								1	1	1	1																																												4.0	0.0	4.0	400	1,600	0	1,600
Soil Survey		1	1	1	1																																																		4.0	0.0	4.0	400	1,600	0	1,600
Topo Survey		1	1	1	1	1	1																																																6.0	0.0	6.0	400	2,400	0	2,400
Mohara Inspector1																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.0	36.0	36.0	400	0	14,400	14,400
Kalurghat Inspector2																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										0.0	27.0	27.0	400	0	10,800	10,800
Khulshi Inspector3																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										0.0	27.0	27.0	400	0	10,800	10,800
Patenga Inspector4																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										0.0	27.0	27.0	400	0	10,800	10,800
Pipe Inspector5																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.0	36.0	36.0	400	0	14,400	14,400
Pipe Inspector6																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										0.0	27.0	27.0	400	0	10,800	10,800
Pipe Inspector7																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										0.0	27.0	27.0	400	0	10,800	10,800
ST	1	6	6	6	8	7	11	12	12	12	12	1	1	1	1	1	1	1	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	3	3	3	3	3	3	3	3	3	100.0	243.0	343.0	ST	59,200	118,800	178,000
Admin Staff																																																													
Manager1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	400	7,200	14,400	21,600
Clark1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	150	2,700	5,400	8,100
Clark2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							18.0	30.0	48.0	150	2,700	4,500	7,200
Draughtsman1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	150	2,700	5,400	8,100
Draughtsman2	1	1	1	1	1	1	1	1	1	1	1																																												11.0	0.0	11.0	150	1,650	0	1,650
Draughtsman3				1	1	1	1	1	1	1	1																																												8.0	0.0	8.0	150	1,200	0	1,200
Draughtsman4				1	1	1	1	1	1	1	1																																												8.0	0.0	8.0	150	1,200	0	1,200
Driver1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	80	1,440	2,880	4,320
Driver2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	80	1,440	2,880	4,320
Driver3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							18.0	30.0	48.0	80	1,440	2,400	3,840
Driver4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							18.0	30.0	48.0	80	1,440	2,400	3,840
Guard1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	50	900	1,800	2,700
Guard2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	50	900	1,800	2,700
Guard3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	50	900	1,800	2,700
Peon1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	50	900	1,800	2,700
ST	13	13	13	15	15	15	15	15	15	15	15	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	9	9	9	9	9	243.0	414.0	657.0	ST	28,710	47,460	76,170
Total	17	26	23	25	27	27	31	35	37	37	33	15	14	13	14	16	14	14	22	22	22	22	22	22	22	21	22	22	21	22	24	22	22	22	22	22	22	21	24	22	21	22	22	22	24	17	18	18	14	13	13	14	17	14	418.0	732.0	1150.0	R-Total	2,161,910	2,290,260	4,452,170
Office Rental & Misc	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18.0	36.0	54.0	2,000	36,000	72,000	108,000
Trip	3	4				1	3	3	1	1					1	3			1								1			1	3								4			1			3	1					1	1	4		20.0	21.0	41.0	4,000	80,000	84,000	164,000
Topo. Survey		1																																																					1.0	0.0	1.0	60,000	60,000	0	60,000
Soil Investigation		1																																																					1.0	0.0	1.0	20,000	20,000	0	20,000
																																																										G.Total	2,357,910	2,446,260	4,804,170

7.5-1-12 Engineering Cost Details (Annual Summary)

	Priority Project Total			2002			2003			2004			2005			2006		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Expatriate (Per Diem + Remuneration)																		
PM	117,600	1,450,400	1,568,000	26,400	325,600	352,000	26,400	325,600	352,000	26,400	325,600	352,000	26,400	325,600	352,000	12,000	148,000	160,000
WTP-Civil	26,400	281,600	308,000	26,400	281,600	308,000	0	0	0	0	0	0	0	0	0	0	0	0
Civil2	21,600	203,400	225,000	21,600	203,400	225,000	0	0	0	0	0	0	0	0	0	0	0	0
Pipe1	26,400	248,600	275,000	26,400	248,600	275,000	0	0	0	0	0	0	0	0	0	0	0	0
Pipe2	9,600	90,400	100,000	9,600	90,400	100,000	0	0	0	0	0	0	0	0	0	0	0	0
Mech1	15,600	166,400	182,000	9,600	102,400	112,000	1,200	12,800	14,000	1,200	12,800	14,000	2,400	25,600	28,000	1,200	12,800	14,000
Elec1	15,600	166,400	182,000	9,600	102,400	112,000	1,200	12,800	14,000	1,200	12,800	14,000	2,400	25,600	28,000	1,200	12,800	14,000
Archi1	14,400	153,600	168,000	9,600	102,400	112,000	0	0	0	1,200	12,800	14,000	2,400	25,600	28,000	1,200	12,800	14,000
Structure 1	12,000	128,000	140,000	12,000	128,000	140,000	0	0	0	0	0	0	0	0	0	0	0	0
Water Quality 1	12,000	113,000	125,000	2,400	22,600	25,000	0	0	0	0	0	0	4,800	45,200	50,000	4,800	45,200	50,000
Spec.1	12,000	113,000	125,000	9,600	90,400	100,000	2,400	22,600	25,000	0	0	0	0	0	0	0	0	0
Inspector	76,800	723,200	800,000	0	0	0	14,400	135,600	150,000	26,400	248,600	275,000	26,400	248,600	275,000	9,600	90,400	100,000
ST	360,000	3,838,000	4,198,000	163,200	1,697,800	1,861,000	45,600	509,400	555,000	56,400	612,600	669,000	64,800	696,200	761,000	30,000	322,000	352,000
Local Engineer																		
Civil1	54,000	0	54,000	12,000	0	12,000	12,000	0	12,000	12,000	0	12,000	12,000	0	12,000	6,000	0	6,000
Civil2	6,000	0	6,000	6,000	0	6,000	0	0	0	0	0	0	0	0	0	0	0	0
Pipe1	6,000	0	6,000	6,000	0	6,000	0	0	0	0	0	0	0	0	0	0	0	0
Pipe2	4,000	0	4,000	4,000	0	4,000	0	0	0	0	0	0	0	0	0	0	0	0
Mech1	3,000	0	3,000	3,000	0	3,000	0	0	0	0	0	0	0	0	0	0	0	0
Elec1	3,000	0	3,000	3,000	0	3,000	0	0	0	0	0	0	0	0	0	0	0	0
Arch1	4,200	0	4,200	4,200	0	4,200	0	0	0	0	0	0	0	0	0	0	0	0
Arch2	2,800	0	2,800	2,800	0	2,800	0	0	0	0	0	0	0	0	0	0	0	0
Structure1	3,000	0	3,000	3,000	0	3,000	0	0	0	0	0	0	0	0	0	0	0	0
Structure2	2,000	0	2,000	2,000	0	2,000	0	0	0	0	0	0	0	0	0	0	0	0
Quantity Survey1	1,600	0	1,600	1,600	0	1,600	0	0	0	0	0	0	0	0	0	0	0	0
Quantity Survey2	1,600	0	1,600	1,600	0	1,600	0	0	0	0	0	0	0	0	0	0	0	0
Soil Survey	1,600	0	1,600	1,600	0	1,600	0	0	0	0	0	0	0	0	0	0	0	0
Topo Survey	2,400	0	2,400	2,400	0	2,400	0	0	0	0	0	0	0	0	0	0	0	0
Mohara Inspector1	14,400	0	14,400	0	0	0	2,400	0	2,400	4,800	0	4,800	4,800	0	4,800	2,400	0	2,400
Kalurghat Inspector2	10,800	0	10,800	0	0	0	2,400	0	2,400	4,800	0	4,800	3,600	0	3,600	0	0	0
Khulshi Inspector3	10,800	0	10,800	0	0	0	2,400	0	2,400	4,800	0	4,800	3,600	0	3,600	0	0	0
Patenga Inspector4	10,800	0	10,800	0	0	0	2,400	0	2,400	4,800	0	4,800	3,600	0	3,600	0	0	0
Pipeline Inspector5	14,400	0	14,400	0	0	0	2,400	0	2,400	4,800	0	4,800	4,800	0	4,800	2,400	0	2,400
Pipeline Inspector6	10,800	0	10,800	0	0	0	2,400	0	2,400	4,800	0	4,800	3,600	0	3,600	0	0	0
Pipeline Inspector7	10,800	0	10,800	0	0	0	2,400	0	2,400	4,800	0	4,800	3,600	0	3,600	0	0	0
ST	178,000	0	178,000	53,200	0	53,200	28,800	0	28,800	45,600	0	45,600	39,600	0	39,600	10,800	0	10,800
Admin Staff					0			0										
Manager1	21,600	0	21,600	4,800	0	4,800	4,800	0	4,800	4,800	0	4,800	4,800	0	4,800	2,400	0	2,400
Clark1	8,100	0	8,100	1,800	0	1,800	1,800	0	1,800	1,800	0	1,800	1,800	0	1,800	900	0	900
Clark2	7,200	0	7,200	1,800	0	1,800	1,800	0	1,800	1,800	0	1,800	1,800	0	1,800	0	0	0
Draughtsman1	8,100	0	8,100	1,800	0	1,800	1,800	0	1,800	1,800	0	1,800	1,800	0	1,800	900	0	900
Draughtsman2	1,650	0	1,650	1,650	0	1,650	0	0	0	0	0	0	0	0	0	0	0	0
Draughtsman3	1,200	0	1,200	1,200	0	1,200	0	0	0	0	0	0	0	0	0	0	0	0
Draughtsman4	1,200	0	1,200	1,200	0	1,200	0	0	0	0	0	0	0	0	0	0	0	0
Driver1	4,320	0	4,320	960	0	960	960	0	960	960	0	960	960	0	960	480	0	480
Driver2	4,320	0	4,320	960	0	960	960	0	960	960	0	960	960	0	960	480	0	480
Driver3	3,840	0	3,840	960	0	960	960	0	960	960	0	960	960	0	960	0	0	0
Driver4	3,840	0	3,840	960	0	960	960	0	960	960	0	960	960	0	960	0	0	0
Guard1	2,700	0	2,700	600	0	600	600	0	600	600	0	600	600	0	600	300	0	300
Guard2	2,700	0	2,700	600	0	600	600	0	600	600	0	600	600	0	600	300	0	300
Guard3	2,700	0	2,700	600	0	600	600	0	600	600	0	600	600	0	600	300	0	300
Peon1	2,700	0	2,700	600	0	600	600	0	600	600	0	600	600	0	600	300	0	300
ST	76,170	0	76,170	20,490	0	20,490	16,440	0	16,440	16,440	0	16,440	16,440	0	16,440	6,360	0	6,360
Rem. + Per Diem Total	614,000	3,838,000	4,452,000	237,000	1,698,000	43% 1,935,000	91,000	509,000	13% 600,000	118,000	613,000	16% 731,000	121,000	696,000	18% 817,000	47,000	322,000	8% 369,000
Office Rental & Misce.	108,000	0	108,000	24,000	0	24,000	24,000	0	24,000	24,000	0	24,000	24,000	0	24,000	12,000	0	12,000
Trip	0	164,000	164,000	0	64,000	64,000	0	20,000	20,000	0	20,000	20,000	0	36,000	36,000	0	24,000	24,000
Topo. Survey	60,000	0	60,000	60,000	0	60,000	0	0	0	0	0	0	0	0	0	0	0	0
Soil Investigation	0	20,000	20,000	0	20,000	20,000	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	782,000	4,022,000	4,804,000	321,000	1,782,000	44% 2,103,000	115,000	529,000	13% 644,000	142,000	633,000	16% 775,000	145,000	732,000	18% 877,000	59,000	346,000	8% 405,000

Table7.5-1-13 Pipe Installation Cost

Item		Dia	Installation Cost (per meter)	Pipe Material (per meter)	Total Cost (per meter)	Soil Cover (m)
Plant Area	1	DIP200mmTP	TK1,267	TK1,831	TK3,098	2.00
(excluding road Pavement	2	DIP300mmTP	TK550	TK2,833	TK3,383	2.00
by CDA)	3	DIP400mmTP	TK623	TK4,122	TK4,745	2.00
	4	DIP450mmTP	TK661	TK4,903	TK5,564	2.00
	5	DIP600mmTP	TK873	TK7,764	TK8,637	2.00
	6	DIP700mmTP	TK974	TK9,398	TK10,372	2.00
	7	DIP900mmTP	TK1,233	TK14,438	TK15,671	2.00
	8	DIP1000mmTP	TK1,396	TK17,434	TK18,830	2.00
	9	DIP1200mmTP	TK1,747	TK24,063	TK25,810	2.00
	10	DIP1400mmTP	TK2,130	TK31,826	TK33,956	2.00
Transmission Pipe	10	DIP1400mmT	TK5,529	TK33,417	TK38,946	1.20
(including road pavement	11	DIP1200mmT	TK4,798	TK25,266	TK30,064	1.20
by CDA)	12	DIP1100mmT	TK3,645	TK21,690	TK25,335	1.20
	13	DIP1000mmT	TK4,099	TK18,306	TK22,405	1.20
	14	DIP900mmT	TK3,764	TK15,160	TK18,924	1.20
	15	DIP800mmT	TK3,486	TK12,347	TK15,833	1.20
	16	DIP700mmT	TK3,163	TK9,868	TK13,031	1.20
	17	DIP600mmT	TK2,892	TK8,152	TK11,044	1.20
	18	DIP500mmT	TK2,570	TK6,102	TK8,672	1.20
	19	DIP450mmT	TK2,423	TK5,148	TK7,571	1.20
	20	DIP400mmT	TK2,275	TK4,328	TK6,603	1.20
	21	DIP350mmT	TK2,148	TK3,652	TK5,800	1.20
	22	DIP300mmT	TK2,022	TK2,975	TK4,997	1.20
	23	PVC250mmT	TK2,123	TK4,059	TK6,182	1.20
	24	PVC200mmT	TK1,799	TK2,620	TK4,419	1.20
Distribution Pipe	25	DIP1400mmD	TK5,791	TK35,009	TK40,800	1.20
(including road pavement	26	DIP1200mmD	TK5,026	TK26,469	TK31,495	1.20
by CDA)	27	DIP1100mmD	TK3,819	TK22,723	TK26,542	1.20
	28	DIP1000mmD	TK4,295	TK19,177	TK23,472	1.20
	29	DIP900mmD	TK3,943	TK15,882	TK19,825	1.20
	30	DIP800mmD	TK3,652	TK12,935	TK16,587	1.20
	31	DIP700mmD	TK3,313	TK10,338	TK13,651	1.20
	32	DIP600mmD	TK3,030	TK8,540	TK11,570	1.20
	33	DIP500mmD	TK2,693	TK6,392	TK9,085	1.20
	34	DIP450mmD	TK2,538	TK5,393	TK7,931	1.20
	35	DIP400mmD	TK2,384	TK4,534	TK6,918	1.20
	36	DIP350mmD	TK2,250	TK3,826	TK6,076	1.20
	37	DIP300mmD	TK2,119	TK3,116	TK5,235	1.20
	38	PVC250mmD	TK2,224	TK4,253	TK6,477	1.20
	39	PVC200mmD	TK1,884	TK2,745	TK4,629	1.20
Distribution Small Pipe	40	PVC200mmD(S)	TK1,096	TK2,745	TK3,841	1.00
(including road pavement	41	PVC150mmD	TK1,017	TK1,693	TK2,710	1.00
by CDA)	42	PVC100mmD	TK930	TK880	TK1,810	1.00

Table 7.5-1-14 Existing Small Diameter Distribution Pipeline Network Installation Cost (Taka)

Dia. (mm)	Length (m)	Installation Cost (Tk/m)	Installation Cost (Taka)	Existing Service Area (ha)	Unit Cost of Distribution Pipe Installation (Taka/ha)
PVC200mmD(s)	83,980	3,841	322,539,986	-	-
PVC150mmD	81,100	2,710	219,800,696	-	-
PVC100mmD	252,710	1,810	457,503,777	-	-
Total	417,790		999,844,459	1,906	524,698
					×0.8= 420,000

Table 7.5-1-15 Breakdown of Existing Small Diameter Distribution Pipeline Network Installation Cost (Taka)

Dia. (mm)	Installation Cost (per meter)		Pipe Material (per meter)		Total Cost (per meter)	Pipe Material Total	Installation Cost Total	Total Cost (Taka)
PVC200mmD(s)	1,096	29%	2,745	71%	3,841	230,525,000	92,015,000	322,540,000
PVC150mmD	1,017	38%	1,693	62%	2,710	137,302,000	82,499,000	219,801,000
PVC100mmD	930	51%	880	49%	1,810	222,385,000	235,119,000	457,504,000
Total						590,212,000	409,633,000	999,845,000
						59.0%	41.0%	100%

Table 7.5-1-16 Small Diametr Distribution Pipeline Network Length & Cost (Total of Priority Project, B/P Phase 1 and B/P Phase 2)

Dia. (mm)	Unit Length (m/ha)	Length		Installation Cost (Taka)		Pipe Material Cost (Taka)		Total (Taka)
		New Mohara Area*	Others	New Mohara Area*	Others	New Mohara Area*	Others	
Area(ha)	1 ha	3,684 ha	4,514 ha					
PVC200mmD	35 m/ha	129,889 m	159,150 m					
PVC150mmD	34 m/ha	125,435 m	153,692 m					
PVC100mmD	106 m/ha	390,859 m	478,909 m					
Total	175 m/ha	646,183 m	791,752 m	633,931,631	776,740,584	913,388,462	1,119,152,055	3,443,212,733
			1,437,935 m			1,547,320,093	1,895,892,639	

*: Based on boundaries of Service Blocks for B/P Phase 1.

Table 7.5-1-17 Small Diametr Distribution Pipeline Network Length & Cost (Priority Project)

Dia. (mm)	Unit Length (m/ha)	Length		Installation Cost (Taka)		Pipe Material Cost (Taka)		Total (Taka)
		New Mohara Area	Others	New Mohara Area	Others	New Mohara Area	Others	
Area(ha)	1 ha	376 ha	247 ha					
PVC200mmD	35 m/ha	13,265 m	8,707 m					
PVC150mmD	34 m/ha	12,810 m	8,408 m					
PVC100mmD	106 m/ha	39,916 m	26,200 m					
Total	175 m/ha	65,991 m	43,315 m	64,739,422	42,493,408	93,278,578	61,225,827	261,737,235
			109,305 m			158,018,000	103,719,235	

Table 7.5-1-18 Small Diametr Distribution Pipeline Network Length & Cost (Basic Plan Phase 1 excluding Priority Project)

Dia. (mm)	Unit Length (m/ha)	Length		Installation Cost (Taka)		Pipe Material Cost (Taka)		Total (Taka)
		New Mohara Area	Others	New Mohara Area	Others	New Mohara Area	Others	
Area(ha)	1 ha	542 ha	680 ha					
PVC200mmD	35 m/ha	19,098 m	23,966 m					
PVC150mmD	34 m/ha	18,443 m	23,145 m					
PVC100mmD	106 m/ha	57,468 m	72,119 m					
Total	175 m/ha	95,008 m	119,230 m	93,206,982	116,969,636	134,295,526	168,533,499	513,005,643
			214,238 m			227,502,508	285,503,135	

Table 7.5-1-19 Small Diametr Distribution Pipeline Network Length & Cost (Basic Plan Phase 2)

Dia. (mm)	Unit Length (m/ha)	Length		Installation Cost (Taka)		Pipe Material Cost (Taka)		Total (Taka)
		New Mohara Area*	Others	New Mohara Area*	Others	New Mohara Area*	Others	
Area(ha)	1 ha	2,766 ha	3,587 ha					
PVC200mmD	35 m/ha	97,527 m	126,477 m					
PVC150mmD	34 m/ha	94,182 m	122,140 m					
PVC100mmD	106 m/ha	293,475 m	380,590 m					
Total	175 m/ha	485,184 m	629,207 m	475,985,227	617,277,540	685,814,358	889,392,729	2,668,469,855
			1,114,391 m			1,161,799,585	1,506,670,269	

*: Based on boundaries of Service Blocks for B/P Phase 1.

Table 7.5.1-20 Small Diameter Distribution Network Pipe Installation Cost

Ward No.	Name of Ward	Area in Acres	Area in Hectare	Ratio of Pipe Installed Area	Pipe Installed Area (4 x 5)	Pipe Uninstalled Area (4 - 6)	Ratio of Potential Pipe Installation Area	Potential Pipe Installation Area (4 x 8)	Pop. Density in Potential Pipe Install. Area in 2010 (30 x 4 / 9)	Adjustment Ratio for Urbanization	Proposed Distribution Pipe Install. Area (7 x 8 x 11)	Small Diameter Distribution Pipe Installation Cost (unit cost: 420,000 Taka/ha)												Population Density (person/ha)			Service Ratio in 2005 (%)
												Priority + B/P Phase 1(excluding Priority) + B/P Phase 2				Priority Project						Basic Plan Phase 1 Project (excluding Priority Project)					Basic Plan Phase 2 Project				
												New Mohara Service Area ###		Other Areas	Total (12 x unit cost)	New Mohara Service Area		Other Area		Total	Area Name	New Mohara Service Area	Other Service Area	Ratio of Installation		Total		2000	2005	2010	
		(acre)	(ha)	(%)	(ha)	(ha)	(%)	(ha)	(person/ha)	(%)	(ha)	(%)	(Taka)	(Taka)	(Taka)	(%)	(Taka)	(%)	(Taka)	(Taka)		(Taka)	(Taka)	(%)	(%)	(Taka)	(Taka)				(%)
1	2	3	4	5*	6	7	8**	9	10	11#	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26##	27	28	29	30	31	32
Kotwali Thana																															
1	Bogmoniram	252	102	50	51	51	80	82	797	100	41	0	0	17,132,771	17,132,771							0	2,912,571	17	17	2,912,571	14,220,200	430	524	637	67
2	Chawk Bazar	361	146	50	73	73	80	117	631	100	58	0	0	24,543,375	24,543,375							0	4,172,374	17	17	4,172,374	20,371,001	358	425	505	67
3	Jamal Khan	153	62	100	62	0	80	50	1,046	100	0	0	0	0	0							0	0	0	0	0	0	720	775	837	67
4	Enayet Bazar	127	51	100	51	0	80	41	1,124	100	0	0	0	0	0							0	0	0	0	0	0	702	794	899	67
5	Dewan Bazar	55	22	100	22	0	80	18	1,808	100	0	0	0	0	0							0	0	0	0	0	0	1,447	1,447	1,447	67
6	Anderkilla	61	25	100	25	0	80	20	1,028	100	0	0	0	0	0						Chaktai/Sadarghat(C)	0	0	0	0	0	0	822	822	822	67
7	Alkaran	143	58	100	58	0	90	52	952	100	0	0	0	0	0							0	0	0	0	0	0	638	738	857	67
8	Patherghata	192	78	75	58	19	90	70	754	100	17	0	0	7,342,616	7,342,616		0	10	734,262	734,262	Chaktai/Sadarghat(C)	0	0	0	0	0	6,608,355	505	586	678	67
9	Fringi Bazar	74	30	100	30	0	90	27	1,198	100	0	0	0	0	0						Chaktai/Sadarghat(C)	0	0	0	0	0	0	885	978	1,079	67
10	Boxirhat	127	51	50	26	26	90	46	726	100	23	0	0	9,713,669	9,713,669		0	10	971,367	971,367	Chaktai/Sadarghat(C)	0	679,957	17	17	679,957	8,062,346	401	512	654	67
	Total	**1,545**	**625**	**73**	**456**	**169**		**522**			**140**		**0**	**58,732,432**	**58,732,432**		**0**		**1,705,629**	**1,705,629**		**0**	**7,764,902**			**7,764,902**	**49,261,901**	**564**	**641**	**732**	**67**
Double Mooring Thana																															
15	Lalkhan Bazar	559	226	50	113	113	80	181	579	100	90	60	22,802,903	15,201,935	38,004,838							4,560,581	0	12	12	4,560,581	33,444,257	313	380	463	62
16	East Madarbari	209	85	75	63	21	90	76	671	100	19	0	0	7,992,744	7,992,744							0	0	0	0	0	7,992,744	495	547	604	62
17	West Madarbari	275	111	75	83	28	90	100	753	100	25	0	0	10,516,768	10,516,768							0	0	0	0	0	10,516,768	504	584	678	62
18	Uttar Pathantoly	199	81	75	60	20	80	64	1,194	100	16	0	0	6,764,725	6,764,725							0	0	0	0	0	6,764,725	586	748	955	62
19	Pathantoly	379	153	50	77	77	90	138	846	100	69	0	0	28,988,037	28,988,037		0	10	2,898,804	2,898,804	Agrabad(C)	0	579,761	12	12	579,761	25,509,473	425	569	762	62
20	Gosail Danga	312	126	25	32	95	90	114	462	100	85	0	0	35,795,254	35,795,254							0	10,738,576	37	30	10,738,576	25,056,678	268	333	416	62
24	Uttar Agrabad	483	195	50	98	98	90	176	527	100	88	0	0	36,942,538	36,942,538							0	4,433,105	12	12	4,433,105	32,509,433	305	381	474	62
25	D. Agrabad	843	341	50	171	171	90	307	615	100	154	0	0	64,477,349	64,477,349		0	10	6,447,735	6,447,735	Agrabad(C)	0	1,289,547	12	12	1,289,547	56,740,067	356	444	553	62
33	Rampur	447	181	25	45	136	80	145	493	100	109	100	45,585,409	0	45,585,409							13,675,623	0	37	30	13,675,623	31,909,786	231	302	395	62
	Total	**3,706**	**1,500**	**49**	**742**	**758**		**1,301**			**655**		**68,388,312**	**206,679,350**	**275,067,662**		**0**		**9,346,539**	**9,346,539**		**18,236,203**	**17,040,989**			**35,277,192**	**230,443,932**	**359**	**445**	**554**	**62**
Panchlaish Thana																															
11	Sulak Bohar	2,393	968	0	0	968	70	678	264	88	598	70	175,714,000	75,306,000	251,020,000	20	50,204,000		0	50,204,000	Nashirabad(1)	25,102,000	0	59	30	25,102,000	175,714,000	125	152	185	59
12	West Sholoshahar	844	342	25	85	256	50	171	545	100	128	100	53,794,862	0	53,794,862							16,138,459	0	34	30	16,138,459	37,656,403	203	235	273	59
14	Jalalabad	1,601	648	0	0	648	50	324	298	99	321	100	134,960,000	0	134,960,000	30	40,488,000		0	40,488,000	Nashirabad(1)	0	0	41	30	0	94,472,000	100	122	149	41
26	Panchlaish	1,589	643	0	0	643	50	322	249	83	267	100	112,280,000	0	112,280,000							33,684,000	0	42	30	33,684,000	78,596,000	84	102	125	42
98	Chittagong Cantonment	N/A	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	**6,427**	**2,601**	**3**	**85**	**2,516**		**1,494**			**1,314**		**476,748,862**	**75,306,000**	**552,054,862**		**90,692,000**		**0**	**90,692,000**		**74,924,459**	**0**			**74,924,459**	**386,438,403**	**119**	**143**	**173**	**52**
Pahartali Thana																															
21	Saripara	600	243	50	121	121	90	219	515	100	109	100	45,891,352	0	45,891,352							4,589,135	0	10	10	4,589,135	41,302,216	313	381	464	60
22	North Pahartali	6,656	2,694	0	0	2,694	20	539	246	82	442	100	185,780,000	0	185,780,000							55,734,000	0	42	30	55,734,000	130,046,000	28	37	49	42
23	Pahartali	750	304	25	76	228	80	243	434	100	182	100	76,485,586	0	76,485,586							22,945,676	0	35	30	22,945,676	53,539,910	235	285	347	60
34	Uttar Kattali	1,132	458	0	0	458	60	275	239	80	219	100	91,980,000	0	91,980,000	30	27,594,000		0	27,594,000	Fouzderhat(1)	0	0	48	30	0	64,386,000	84	110	143	48
35	Dakhin Kattali	1,087	440	0	0	440	60	264	249	83	219	100	91,980,000	0	91,980,000							27,594,000	0	48	30	27,594,000	64,386,000	92	117	149	48
36	Uttar Halishahar	1,295	524	0	0	524	70	367	258	86	315	100	132,440,000	0	132,440,000	30	39,732,000		0	39,732,000	CDA Res. Area(R)	0	0	48	30	0	92,708,000	101	135	181	48
	Total	**11,520**	**4,662**	**4**	**197**	**4,465**		**1,906**			**1,487**		**624,556,938**	**0**	**624,556,938**		**67,326,000**		**0**	**67,326,000**		**110,862,811**	**0**			**110,862,811**	**446,368,127**	**76**	**97**	**124**	**51**
Chandgaon Thana																															
27	Chandgaon	2,557	1,035	0	0	1,035	90	931	94	31	293	0	0	123,200,000	123,200,000		0	10	12,320,000	12,320,000	Kalurghat(I)	0	24,640,000	41	30	24,640,000	86,240,000	63	73	85	41
28	Mohara	2,243	908	0	0	908	80	726	172	57	416	0	0	174,720,000	174,720,000		0	10	17,472,000	17,472,000	Kalurghat Noxious(I)	0	34,944,000	41	30	34,944,000	122,304,000	88	110	137	41
29	Purba Sholoshahar	538	218	0	0	218	90	196	213	71	139	0	0	58,380,000	58,380,000							0	17,514,000	59	30	17,514,000	40,866,000	123	153	192	59
30	Purba Bakulia	673	272	25	68	204	80	218	448	100	163	0	0	68,633,066	68,633,066							0	10,981,291	16	16	10,981,291	57,651,775	191	262	359	41
31	Paschim Bakulia	583	236	50	118	118	90	212	551	100	106	0	0	44,591,097	44,591,097							0	0	0	0	0	44,591,097	304	388	495	47
32	D. Bakulia	1,346	545	25	136	409	50	272	600	100	204	0	0	85,791,332	85,791,332							0	13,726,613	16	16	13,726,613	72,064,719	168	224	300	41
	Total	**7,940**	**3,213**	**10**	**322**	**2,891**		**2,556**			**1,322**		**0**	**555,315,495**	**555,315,495**		**0**		**29,792,000**	**29,792,000**		**0**	**101,805,904**			**101,805,904**	**423,717,591**	**121**	**154**	**197**	**43**
Chittagong Port Thana																															
37	U.P. Halishahar	1,012	410	25	102	307	70	287	428	100	215	100	90,303,982	0	90,303,982							23,479,035	0	26	26	23,479,035	66,824,947	159	219	299	51
38	D.P. Halishahar	1,518	614	0	0	614	80	491	213	71	348	0	0	146,300,000	146,300,000		0	10	14,630,000	14,630,000	EPZ(I)	0	29,260,000	51	30	29,260,000	102,410,000	104	133	170	51
39	D. Halishahar	1,857	752	0	0	752	70	526	308	100	526	0	0	220,941,363	220,941,363		0	5	11,047,068	11,047,068	EPZ(I)	0	55,235,341	64	30	55,235,341	154,658,954	120	161	216	64
40	U. Patenga	2,327	942	0	0	942	80	753	201	67	504	0	0	211,820,000	211,820,000		0	10	21,182,000	21,182,000	Patenga(I)	0	42,364,000	51	30	42,364,000	148,274,000	86	117	161	51
41	D. Patenga	4,315	1,746	0	0	1,746	70	1,222	94	31	381	0	0	160,160,000	160,160,000		0	10	16,016,000	16,016,000	Patenga(I)	0	32,032,000	32	30	32,032,000	112,112,000	37	49	66	32
	Total	**11,029**	**4,463**	**2**	**102**	**4,361**		**3,280**			**1,975**		**90,303,982**	**739,221,363**	**829,525,344**		**0**		**62,875,068**	**62,875,068**		**23,479,035**	**158,891,341**			**182,370,376**	**584,279,900**	**82**	**109**	**147**	**51**
Hathazari (Munici) Thana																															
13	J.D. Pahartali	7,260	2,938	0	0	2,938	40	1,175	59	20	233	100	97,860,000	0	97,860,000							0	0	0	0	0	97,860,000	15	19	24	0
	Total	**7,260**	**2,938**	**0**	**0**	**2,938**		**1,175**			**233**		**97,860,000**	**0**	**97,860,000**		**0**		**0**	**0**		**0**	**0**			**0**	**97,860,000**	**15**	**19**	**24**	**0**
	Municipality Total	**49,427**	**20,002**	**10**	**1,906**	**18,097**		**12,234**			**7,126**		**1,357,858,093**	**1,635,254,639**	**2,993,112,733**		**158,018,000**		**103,719,235**	**261,737,235**		**227,502,508**	**285,503,135**			**513,005,643**	**2,218,369,855**	**118**	**147**	**184**	**54**
Hathazari (proposed)																															
	Burir Char	946	383	0	0	383	90	345	94	31	108	0	0	45,500,000	45,500,000							0	0	0	0	0	45,500,000	55	68	85	0
	Chikandandi	2,761	1,117	0	0	1,117	90	1,006	75	25	252	100	105,700,000	0	105,700,000							0	0	0	0	0	105,700,000	43	54	68	0
	Dakshin Madrasha	2,416	978	0	0	978	80	782	54	18	141	0	0	59,220,000	59,220,000							0	0	0	0	0	59,220,000	28	35	43	0
	Shikarpur	1,702	689	0	0	689	90	620	59	20	121	0	0	50,960,000	50,960,000							0	0	0	0	0	50,960,000	34	42	53	0
	Total	**7,825**	**3,167**	**0**	**0**	**3,167**		**2,752**			**622**		**105,700,000**	**155,680,000**	**261,380,000**		**0**		**0**	**0**		**0**	**0**			**0**	**261,380,000**	**38**	**47**	**59**	**0**
Sitakunda (proposed)																															
	Bhatiari	4,800	1,942	0	0	1,942	20	388	133	44	172	100	72,100,000	0	72,100,000							0	0	0	0	0	72,100,000	16	21	27	0
	Salimpur	4,453	1,802	0	0	1,802	20	360	231	77	278	10	11,662,000	104,958,000	116,620,000							0	0	0	0	0	116,620,000	28	36	46	15
	Total	**9,253**	**3,745**	**0**	**0**	**3,745**		**749**			**449**		**83,762,000**	**104,958,000**	**188,720,000**		**0**		**0**	**0**		**0**	**0**			**0**	**188,720,000**	**22**	**28**	**36**	**10**
	Proposed Expansion Total	**17,078**	**6,911**	**0**	**0**	**6,911**		**3,501**			**1,072**		**189,462,000**	**260,638,000**	**450,100,000**		**0**		**0**	**0**		**0**	**0**			**0**	**450,100,000**	**29**	**37**	**47**	**4**
	Grand Total	**66,505**	**26,914**	**7**	**1,906**	**25,008**		**15,735**			**8,198**		**1,547,320,093**	**1,895,892,639**	**3,443,212,733**		**158,018,000**		**103,719,235**	**261,737,235**		**227,502,508**	**285,503,135**			**513,005,643**	**2,668,469,855**	**95**	**118**	**148**	**50**
													$ 28,654,076	**$ 35,109,123**	**$ 63,763,199**		**$ 2,926,259**		**$ 1,920,727**	**$ 4,846,986**		**$ 4,213,009**	**$ 5,287,095**			**$ 9,500,104**	**$ 49,416,108**				

Note: *: Column (5) Ratio of Pipe Installed Area is assumed based on population Density in 2000 as shown below.

Pop. Density in 2000 (persons/ha)	Ratio of Pipe Installed Area (%)
Less than 150	0%
Less than 300	25%
Less than 450	50%
Less than 600	75%
More than 600	100%

**: Column (8) Ratio of Potential Pipe Installation Area is set assuming that proposed distribution pipe installation area is reduced because of mountain slope, sea shore and river course, etc.

#: Column (11) Adjustment Ratio for Urbanization is based on the assumption that proposed distribution pipe installation area is reduced because of urbanization, in which housing will not be located dispersively, but concentrated to some extent. Area with population density less than 300 persons/ha is adjusted so as to populated area will have a population density of 300 persons/ha.

##: Column (25) Ratio of Installation is the balance between (32) Service Ratio in 2005 and (5) Ratio of Pipe Installed Area. Applied ratios (26) are modification of the value in Column (25) so as not to exceed 30% to avoid concentration of huge investment cost.

###: Based on boundaries of Service Blocks for B/P Phase 1.

Table 7.5-1-21 Dimensions of Excavation Plan for Pipe Installation

Dia	DI	DP	DC	DS	W	Excavation	Sand Bed	Sand Cover	Back fill (soil)	Diposal soil	Remark
mm	m	m	m	m	m	m3	m3	m3	m3	m3	
DIP 1400	1.50	3.50	2.00	1.70	2.00	7.000	0.200	1.861	3.100	3.900	
DIP 1200	1.30	3.30	2.00	1.70	1.80	5.940	0.180	1.570	2.790	3.150	
DIP 1000	1.10	3.10	2.00	1.70	1.60	4.960	0.160	1.295	2.480	2.480	
DIP 900	1.00	3.00	2.00	1.70	1.50	4.500	0.150	1.164	2.325	2.175	
DIP 700	0.80	2.80	2.00	1.70	1.30	3.640	0.130	0.915	2.015	1.625	
DIP 600	0.70	2.70	2.00	1.70	1.20	3.240	0.120	0.797	1.860	1.380	
DIP 450	0.55	2.55	2.00	1.70	1.05	2.678	0.105	0.629	1.628	1.050	
DIP 400	0.50	2.50	2.00	1.70	1.00	2.500	0.100	0.574	1.550	0.950	
DIP 300	0.40	2.40	2.00	1.70	0.90	2.160	0.090	0.469	1.395	0.765	
DIP 200	0.30	2.30	2.00	1.70	0.80	1.840	0.080	0.369	1.240	0.600	
DIP 1400	1.50	2.70	1.20	0.90	2.00	5.400	0.200	1.861	1.500	3.900	Pavement
DIP 1200	1.30	2.50	1.20	0.90	1.80	4.500	0.180	1.570	1.350	3.150	Pavement
DIP 1100	1.20	2.40	1.20	0.90	1.70	4.080	0.170	1.430	1.275	2.805	Pavement
DIP 1000	1.10	2.30	1.20	0.90	1.60	3.680	0.160	1.295	1.200	2.480	Pavement
DIP 900	1.00	2.20	1.20	0.90	1.50	3.300	0.150	1.164	1.125	2.175	Pavement
DIP 800	0.90	2.10	1.20	0.90	1.40	2.940	0.140	1.038	1.050	1.890	Pavement
DIP 700	0.80	2.00	1.20	0.90	1.30	2.600	0.130	0.915	0.975	1.625	Pavement
DIP 600	0.70	1.90	1.20	0.90	1.20	2.280	0.120	0.797	0.900	1.380	Pavement
DIP 500	0.60	1.80	1.20	0.90	1.10	1.980	0.110	0.684	0.825	1.155	Pavement
DIP 450	0.55	1.75	1.20	0.90	1.05	1.838	0.105	0.629	0.788	1.050	Pavement
DIP 400	0.50	1.70	1.20	0.90	1.00	1.700	0.100	0.574	0.750	0.950	Pavement
DIP 350	0.45	1.65	1.20	0.90	0.95	1.568	0.095	0.521	0.713	0.855	Pavement
DIP 300	0.40	1.60	1.20	0.90	0.90	1.440	0.090	0.469	0.675	0.765	Pavement
PVC 250	0.35	1.55	1.20	0.90	0.85	1.318	0.085	0.418	0.638	0.680	Pavement
PVC 200	0.30	1.50	1.20	0.90	0.80	1.200	0.080	0.369	0.600	0.600	Pavement
PVC 200	0.30	1.30	1.00	0.70	0.80	1.040	0.080	0.369	0.440	0.600	Pavement
PVC 150	0.25	1.25	1.00	0.70	0.75	0.938	0.075	0.320	0.413	0.525	Pavement
PVC 100	0.20	1.20	1.00	0.70	0.70	0.840	0.070	0.272	0.385	0.455	Pavement

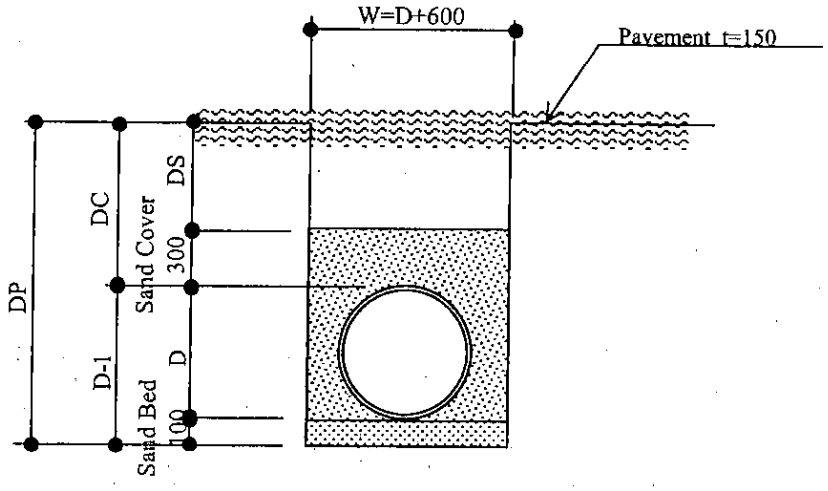


Table 7.5-1-22 Customs Duties by Commodity

Description	H.S.Code	C&F 1 1	CIF 2 -	AV 3 on 1	CD 4 on 3	SD 5 on 3+4	VAT 6 on 3+4	AIT 7 on 3	IDSC 8 on 3	LPF 9 on 3	PSI 10 on 2	DF/VAT 11 on 2	Total 12 3-11	% to CIF 13 12/ 2
Ductile Iron Pipe	73.03	-	1.0%	2.0%	37.5%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	38.25	0.00	21.04	3.06	2.55	2.55	1.01	0.05	170.52	168.8%
PVC Pipe	39.17	-	1.0%	2.0%	37.5%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	38.25	0.00	21.04	3.06	2.55	2.55	1.01	0.05	170.52	168.8%
Valve	84.81	-	1.0%	2.0%	5.0%	5.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	5.10	5.36	16.87	3.06	2.55	2.55	1.01	0.05	138.56	137.2%
Motor	85.01	-	1.0%	2.0%	15.0%	5.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	15.30	5.87	18.48	3.06	2.55	2.55	1.01	0.05	150.87	149.4%
Pump	84.14	-	1.0%	2.0%	25.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	25.50	0.00	19.13	3.06	2.55	2.55	1.01	0.05	155.86	154.3%
Power Generator	85.02	-	1.0%	2.0%	5.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	5.10	0.00	16.07	3.06	2.55	2.55	1.01	0.05	132.40	131.1%
Watermeter	90.28	-	1.0%	2.0%	5.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	5.10	0.00	16.07	3.06	2.55	2.55	1.01	0.05	132.40	131.1%
Watermeter		-	1.0%	2.0%	40.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
(small dia, for Consumers)		100.00	101.00	102.01	40.80	0.00	21.42	3.06	2.55	2.55	1.01	0.05	173.46	171.7%
Car of 1800cc	87.03.23	-	1.0%	2.0%	37.5%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	38.25	0.00	21.04	3.06	2.55	2.55	1.01	0.05	170.52	168.8%
Car of 1800cc	87.03.23	-	1.0%	2.0%	37.5%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
fabricated in Bangladesh		100.00	101.00	102.01	38.25	0.00	21.04	3.06	2.55	2.55	1.01	0.05	170.52	168.8%
Jeep above 2500cc	87.03.90	-	1.0%	2.0%	37.5%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	38.25	0.00	21.04	3.06	2.55	2.55	1.01	0.05	170.52	168.8%
Transformer	85.04	-	1.0%	2.0%	25.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	25.50	0.00	19.13	3.06	2.55	2.55	1.01	0.05	155.86	154.3%
Electric Control Panel	85.37	-	1.0%	2.0%	15.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	15.30	0.00	17.60	3.06	2.55	2.55	1.01	0.05	144.13	142.7%
Instrumentation Equip.	85.38	-	1.0%	2.0%	15.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	15.30	0.00	17.60	3.06	2.55	2.55	1.01	0.05	144.13	142.7%
Wired Communication Equip	85.17	-	1.0%	2.0%	15.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	15.30	0.00	17.60	3.06	2.55	2.55	1.01	0.05	144.13	142.7%
Laboratory Analysis Equip.	90.27	-	1.0%	2.0%	5.0%	0.0%	15.0%	3.0%	2.5%	2.5%	1.0%	0.05%	incl. PSI	
		100.00	101.00	102.01	5.10	0.00	16.07	3.06	2.55	2.55	1.01	0.05	132.40	131.1%

AV: Assessable Value
CD: Customs Duty
SD: Supplementary Duty
VAT: Value Added Tax
AIT: Advance Income Tax
IDSC: Infrastructure Development Surcharge
LPF: LCA/Permit Fee
PSI: Pre-shipment Inspection Fee
DF/VAT: Documentation Fee for Value Added Tax

Table 7.5-2-1 Cost Estimates for Basic Plan Phase 2 Project

54Taka/$

Facilities	Item	Construction Cost ($)			Construction Cost (Taka)		
		Local	Foreign	Total	Local	Foreign	Total
Ⅰ Direct Construction Cost							
Ⅰ-1 Civil Work							
1 Mohara Water Treatment Plant Expansion System	from Ground Reservoir DIP600-300mm, PVC250-200mm×5,715m	279,000	649,000	928,000	15,053,000	35,035,000	50,088,000
2 Mohara Water Treatment Plant Expansion System	from Elevated Tank DIP600-300mm, PVC250-200mm×2,165m	88,000	152,000	240,000	4,727,000	8,234,000	12,961,000
3 Mohara Water Treatment Plant Existing System	Distribution Pipe DIP600-300mm, PVC250-200mm×1,170m	49,000	86,000	136,000	2,666,000	4,663,000	7,329,000
4 Kalurghat IRP&BPS	Ground Reservoir 1,690m3	243,000	125,000	368,000	13,126,000	6,728,000	19,854,000
5 Kalurghat IRP&BPS Distribution Pipe	Distribution Pipe DIP600-300mm, PVC250-200mm×3,910m	165,000	287,000	452,000	8,900,000	15,496,000	24,396,000
6 Madunaghat Phase1	Distribution Pipe DIP450mm×1,170m	55,000	117,000	172,000	2,969,000	6,310,000	9,279,000
7 Karnaphuli WTP System	Patenga BPS Ground Reservoir 12,000m3	1,813,000	215,000	2,028,000	97,915,000	11,629,000	109,544,000
8 Karnaphuli WTP System	Distribution Pipe DIP900-300mm, PVC250-200mm×15,465m	825,000	2,258,000	3,083,000	44,553,000	121,920,000	166,473,000
9 Fatehabad System	Fatehabad Ground Reservoir 10,000m3, Elevated Tank	1,992,000	197,000	2,189,000	107,551,000	10,616,000	118,167,000
10 Fatehabad System	Distribution Pipe DIP900-300mm, PVC250-200mm×10,495m	552,000	1,432,000	1,984,000	29,828,000	77,340,000	107,168,000
11 Madunaghat WTP System Phase2	Intake Facilities, Conveyance Pipe	1,188,000	78,000	1,266,000	64,152,000	4,229,000	68,381,000
12 Madunaghat WTP System Phase2	WTP, Reservoir, Elevated Tank	4,664,000	0	4,664,000	251,856,000	0	251,856,000
13 Madunaghat WTP System Phase2	Distribution Pipe DIP900-300mm, PVC250-200mm×15,475m	802,000	2,240,000	3,042,000	43,298,000	120,941,000	164,239,000
14 Karnaphuli WTP System	Intake Facilities, Conveyance Pipe	2,625,000	348,000	2,973,000	141,738,000	18,796,000	160,534,000
15 Karnaphuli WTP System	WTP	15,093,000	0	15,093,000	815,047,000	0	815,047,000
16 Karnaphuli WTP System	Transmission Pipe DIP1,200mm×52,000m	9,250,000	24,330,000	33,580,000	499,475,000	1,313,832,000	1,813,307,000
17 Karnaphuli WTP System (Nasirabad)	Ground Reservoir 27,500m3, Elevated Tank	4,109,000	326,000	4,435,000	221,883,000	17,604,000	239,487,000
18 Karnaphuli WTP System (Nasirabad)	Transmission Pipe to Patenga BPS	1,373,000	3,605,000	4,978,000	74,116,000	194,655,000	268,771,000
19 Karnaphuli WTP System (Nasirabad)	Transmission Pipe to Salimpur	858,000	939,000	1,797,000	46,338,000	50,707,000	97,045,000
20 Karnaphuli WTP System (Nasirabad)	Distribution Pipe DIP1,400-300mm, PVC250-200mm×12,725m	944,000	4,241,000	5,185,000	50,959,000	229,029,000	279,988,000
21 Karnaphuli WTP System (Salimpur reservoir)	Ground Reservoir 11,200m3	1,238,000	242,000	1,480,000	66,857,000	13,091,000	79,948,000
22 Karnaphuli WTP System (Salimpur reservoir)	Distribution Pipe DIP900-300mm, PVC250-200mm×10,120m	511,000	1,324,000	1,835,000	27,597,000	71,483,000	99,080,000
23 Distribution Small Pipe	Distribution Pipe PVC200-100mm×m	20,246,000	29,171,000	49,417,000	1,093,262,768	1,575,207,087	2,668,469,855
24 Zonal Offices	800 m2 x 5 offices	740,000	0	740,000	39,960,000	0	39,960,000
25 Staff Quarters	100 m2 x 40 flats	740,000	0	740,000	39,960,000	0	39,960,000
Sub Total		70,442,000	72,362,000	142,805,000	3,803,786,768	3,907,545,087	7,711,331,855
Ⅰ-2 Mechanical and Electrical Work							
1 Karnaphuli WTP System	Lift Pump, Power Receiving Facilities, Generator	0	2,084,000	2,084,000	0	112,519,000	112,519,000
2 Fatehabad System	Lift Pump, Power Receiving Facilities, Generator	0	1,683,000	1,683,000	0	90,866,000	90,866,000
3 Madunaghat WTP System Phase2	Intake Pump	0	674,000	674,000	0	36,395,000	36,395,000
4 Madunaghat WTP System Phase2	WTP	0	4,236,000	4,236,000	0	228,722,000	228,722,000
5 Karnaphuli WTP System	Intake Pump	0	2,211,000	2,211,000	0	119,394,000	119,394,000
6 Karnaphuli WTP System	WTP, Transmission Pump	0	19,155,000	19,155,000	0	1,034,372,000	1,034,372,000
7 Karnaphuli WTP System (Nasirabad)	Lift Pump, Power Receiving Facilities, Generator	0	2,794,000	2,794,000	0	150,881,000	150,881,000
8 Karnaphuli WTP System (Nasirabad)	Transmission to Patenga BPS, Pump	0	1,652,000	1,652,000	0	89,193,000	89,193,000
9 Karnaphuli WTP System (Nasirabad)	Transmission to Salimpur, Pump	0	1,891,000	1,891,000	0	102,133,000	102,133,000
Sub Total		0	36,380,000	36,380,000	0	1,964,475,000	1,964,475,000
Total Ⅰ		70,442,000	108,742,000	179,184,000	3,803,786,768	5,872,020,087	9,675,806,855
Ⅱ Overhead & profit etc.							
	25% of Direct Cost for ICB (I-1 1-22, I-2)	0	32,071,000	32,071,000	0	1,731,854,000	1,731,854,000
	12.5% of Direct Cost for LCB (I-1 23-25)	6,362,000	0	6,362,000	343,549,000	0	343,549,000
Sub Total		6,362,000	32,071,000	38,433,000	343,549,000	1,731,854,000	2,075,403,000
Total Ⅰ+Ⅱ	**Ⅰ+Ⅱ**	76,804,000	140,813,000	217,617,000	4,147,335,768	7,603,874,087	11,751,209,855
Ⅲ Others							
Water meter	20-150nn×25,000units	0	589,000	589,000	0	31,806,000	31,806,000
Vehicle	sedan×2viecles+jeep×2viecles	0	93,000	93,000	0	5,022,000	5,022,000
Computer	8 sets	0	22,000	22,000	0	1,188,000	1,188,000
Administration Cost		128,000	0	128,000	6,912,000	0	6,912,000
Land Acquisition Cost		8,715,000	0	8,715,000	470,610,000	0	470,610,000
Sub Total		8,843,000	704,000	9,547,000	477,522,000	38,016,000	515,538,000
Total Ⅰ+Ⅱ+Ⅲ	**Ⅰ+Ⅱ+Ⅲ**	85,647,000	141,517,000	227,164,000	4,624,857,768	7,641,890,087	12,266,747,855
Ⅳ Engineering Cost							
Engineering Cost	8 % of Total Cost (**Ⅰ+Ⅱ**)	2,611,000	14,798,000	17,409,000	141,015,000	799,082,000	940,097,000
VAT for Engineering Cost	5.25%	914,000	0	914,000	49,355,000	0	49,355,000
Sub Total		3,525,000	14,798,000	18,323,000	190,370,000	799,082,000	989,452,000
Ⅴ Customs Duties, etc.							
Customs Duties and Other Charges		37,724,000	0	37,724,000	2,037,070,000	0	2,037,070,000
VAT for Civil	4.5% of Civil and Mech & Elec Equip Installation Work	4,607,000	0	4,607,000	248,786,000	0	248,786,000
VAT for Mech & Elec		18,437,000	0	18,437,000	995,577,000	0	995,577,000
Pre-shipment Inspection Fee		936,000	0	936,000	50,538,000	0	50,538,000
Sub Total		61,704,000	0	61,704,000	3,331,971,000	0	3,331,971,000
Total		150,876,000	156,315,000	307,191,000	8,147,198,768	8,440,972,087	16,588,170,855

Table 7.5-2-2 Details of Cost Estimates for Basic Plan Phase 2 Project

(unit: Tk.)

No.		Name of Facility	Item	Dimension	Unit	Unit Cost	Quantity	Price	Equipment	Civil Materials	Civil & Equip Installation Cost
1	**Mohara Water Treatment Plant Expansion System**										
	1-1	Distribution Pipe (Khulshi Reservoir Service Area)		DIP600mmD	m	11,570	2,400	27,767,520		20,496,000	7,271,520
		(from Khulshi ground reservoir)		DIP500mmD	m	9,085	0	0		0	0
				DIP450mmD	m	7,931	420	3,331,020		2,265,060	1,065,960
				DIP400mmD	m	6,918	1,930	13,351,547		8,750,620	4,600,927
				DIP350mmD	m	6,076	335	2,035,594		1,281,710	753,884
				DIP300mmD	m	5,235	385	2,015,437		1,199,660	815,777
				PVC250mmD	m	6,477	245	1,586,816		1,041,985	544,831
				PVC200mmD	m	4,629	0	0		0	0
		Sub Total					5,715	50,087,934	0	35,035,035	15,052,899
	1-2	Distribution Pipe (Khulshi Reservoir Service Area)		DIP600mmD	m	11,570	0	0		0	0
		(from Khulshi elevated tank)		DIP500mmD	m	9,085	0	0		0	0
				DIP450mmD	m	7,931	0	0		0	0
				DIP400mmD	m	6,918	690	4,773,351		3,128,460	1,644,891
				DIP350mmD	m	6,076	0	0		0	0
				DIP300mmD	m	5,235	430	2,251,007		1,339,880	911,127
				PVC250mmD	m	6,477	595	3,853,696		2,530,535	1,323,161
				PVC200mmD	m	4,629	450	2,083,219		1,235,250	847,969
		Sub Total					2,165	12,961,273	0	8,234,125	4,727,148
		Total of 1						**63,049,207**	**0**	**43,269,160**	**19,780,047**
2	**Mohara Water Treatment Plant Existing System**										
	2-1	Distribution Pipe		DIP600mmD	m	11,570	30	347,094		256,200	90,894
				DIP500mmD	m	9,085	0	0		0	0
				DIP450mmD	m	7,931	0	0		0	0
				DIP400mmD	m	6,918	455	3,147,645		2,062,970	1,084,675
				DIP350mmD	m	6,076	295	1,792,538		1,128,670	663,868
				DIP300mmD	m	5,235	390	2,041,611		1,215,240	826,371
				PVC250mmD	m	6,477	0	0		0	0
				PVC200mmD	m	4,629	0	0		0	0
		Sub Total					1,170	7,328,888	0	4,663,080	2,665,808
		Total of 2						**7,328,888**	**0**	**4,663,080**	**2,665,808**
3	**Kalurghat IRP&BPS**										
	3-1	Kalurghat Reservoir	Ground Reservoir	1,690 m3	L.S.		1	8,687,000		0	8,687,000
			Oxidation-Sedimentation Basin		L.S.		1	2,498,000		0	2,498,000
			In-plant Piping		L.S.		1	7,475,000		6,727,500	747,500
			Road Work		L.S.		1	1,193,000		0	1,193,000
		Sub Total						19,853,000	0	6,727,500	13,125,500
	3-2	Distribution Pipe		DIP600mmD	m	11,570	0	0		0	0
				DIP500mmD	m	9,085	0	0		0	0
				DIP450mmD	m	7,931	625	4,956,875		3,370,625	1,586,250
				DIP400mmD	m	6,918	1,180	8,163,122		5,350,120	2,813,002
				DIP350mmD	m	6,076	305	1,853,302		1,166,930	686,372
				DIP300mmD	m	5,235	1,800	9,422,820		5,608,800	3,814,020
				PVC250mmD	m	6,477	0	0		0	0
				PVC200mmD	m	4,629	0	0		0	0
		Sub Total					3,910	24,396,119	0	15,496,475	8,899,644
		Total of 3						**44,249,119**	**0**	**22,223,975**	**22,025,144**
4	**Madunaghat Phase 1**										
	4-1	Distribution Pipe		DIP600mmD	m	11,570	0	0		0	0
				DIP500mmD	m	9,085	0	0		0	0
				DIP450mmD	m	7,931	1,170	9,279,270		6,309,810	2,969,460
				DIP400mmD	m	6,918	0	0		0	0
				DIP350mmD	m	6,076	0	0		0	0
				DIP300mmD	m	5,235	0	0		0	0
				PVC250mmD	m	6,477	0	0		0	0
				PVC200mmD	m	4,629	0	0		0	0
		Sub Total					1,170	9,279,270	0	6,309,810	2,969,460
		Total of 4						**9,279,270**	**0**	**6,309,810**	**2,969,460**
5	**Karnaphuli WTP System**										
	5-1	Distribution Facilities (Patenga BPS)									
		Ground Reservoir		12,000 m3	L.S.		1	61,680,000		0	61,680,000
		Lift Pump	Mechanical & Electrical Cost	27.6m3/min ×37m ×2 (+1)	L.S.		1	77,737,000	66,469,000		11,268,000
		Pump House			L.S.		1	8,253,000		0	8,253,000
		Power Receiving Facility	Mechanical & Electrical Cost	1000 kVA	L.S.		1	8,785,000	6,893,000		1,892,000
		Generator	Mechanical & Electrical Cost	500 kVA ×2	L.S.		1	45,110,000	39,157,000		5,953,000
		In-plant Piping			L.S.		1	12,921,000		11,628,900	1,292,100
		Earth Work			L.S.		1	3,566,000		0	3,566,000
		Road Work			L.S.		1	3,178,000		0	3,178,000
		Lighting			L.S.		1	833,000		0	833,000
		Sub Total						222,063,000	112,519,000	11,628,900	97,915,100
	5-2	Distribution Pipe		DIP900mmD	m	19,825	1,430	28,350,179		22,711,260	5,638,919

No.	Name of Facility	Item	Dimension	Unit	Unit Cost	Quantity	Price	Equipment	Civil Materials	Civil & Equip
			DIP800mmD	m	16,587	400	6,634,760		5,174,000	1,460,760
			DIP700mmD	m	13,651	0	0		0	0
			DIP600mmD	m	11,570	6,735	77,922,603		57,516,900	20,405,703
			DIP500mmD	m	9,085	3,325	30,207,293		21,253,400	8,953,893
			DIP450mmD	m	7,931	0	0		0	0
			DIP400mmD	m	6,918	830	5,741,857		3,763,220	1,978,637
			DIP350mmD	m	6,076	405	2,460,942		1,549,530	911,412
			DIP300mmD	m	5,235	0	0		0	0
			PVC250mmD	m	6,477	2,340	15,155,712		9,952,020	5,203,692
			PVC200mmD	m	4,629	0	0		0	0
	Sub Total					15,465	166,473,346	0	121,920,330	44,553,016
	Total of 5						**388,536,346**	**112,519,000**	**133,549,230**	**142,468,116**
6	**Fatehabad system**									
6-1	Nasirabad Distribution Facilities									
	Ground Reservoir		10,000 m3	L.S.		1	51,400,000		0	51,400,000
	Lift Pump	Mechanical & Electrical Cost	15.6m3/min ×35m ×3 (+1)	L.S.		1	74,762,000	63,925,000		10,837,000
	Elevated Tank		dia18m ×6mD ×25mH	L.S.		1	22,052,000		0	22,052,000
	Pump House			L.S.		1	6,969,000		0	6,969,000
	Power Receiving Facility	Mechanical & Electrical Cost	1000 kVA	L.S.		1	8,786,000	6,893,000		1,893,000
	Generator	Mechanical & Electrical Cost	400 kVA ×2	L.S.		1	23,096,000	20,048,000		3,048,000
	In-plant Piping			L.S.		1	11,795,000		10,615,500	1,179,500
	Earth Work			L.S.		1	6,511,000		0	6,511,000
	Road Work			L.S.		1	2,901,000		0	2,901,000
	Lighting			L.S.		1	760,000		0	760,000
	Sub Total						209,032,000	90,866,000	10,615,500	107,550,500
6-2	Distribution Pipe		DIP900mmD	m	19,825	0	0		0	0
			DIP800mmD	m	16,587	0	0		0	0
			DIP700mmD	m	13,651	1,600	21,841,600		16,540,800	5,300,800
			DIP600mmD	m	11,570	3,850	44,543,730		32,879,000	11,664,730
			DIP500mmD	m	9,085	2,535	23,030,222		16,203,720	6,826,502
			DIP450mmD	m	7,931	1,525	12,094,775		8,224,325	3,870,450
			DIP400mmD	m	6,918	0	0		0	0
			DIP350mmD	m	6,076	595	3,615,458		2,276,470	1,338,988
			DIP300mmD	m	5,235	390	2,041,611		1,215,240	826,371
			PVC250mmD	m	6,477	0	0		0	0
			PVC200mmD	m	4,629	0	0		0	0
	Sub Total					10,495	107,167,396	0	77,339,555	29,827,841
	Total of 6						**316,199,396**	**90,866,000**	**87,955,055**	**137,378,341**
7	**Madunaghat WTP system (Stage 2)**									
7-1	Intake Pump Facilities									
	Intake Mouth			L.S.		1	25,000,000		0	25,000,000
	Conveyance Pipe 1		DIP700mmTP	m	10,372	150	1,555,800		1,409,700	146,100
	(Intake Mouth～Intake Pump House)									
	Intake Pump House			L.S.		1	31,823,000		0	31,823,000
	Intake Pump		17.4m3/min ×20m ×2 (+1)	L.S.		1	43,286,000	36,395,000		6,891,000
	Conveyance Pipe 2		DIP700mmTP	m	10,372	300	3,111,600		2,819,400	292,200
	(Intake Pump Station～Receiving Well)									
	Sub Total						104,776,400	36,395,000	4,229,100	64,152,300
7-2	Treatment Plant Facilities		10 MGD							
	Treatment Plant Facilities			L.S.		1	321,927,000	176,935,000		144,992,000
	Ground Reservoir		10,000 m3	L.S.		1	51,400,000		0	51,400,000
	Lift Pump		15.6m3/min ×35m ×3 (+1)	L.S.		1	74,762,000	51,787,000		22,975,000
	Elevated Tank		dia18m ×6mD ×25mH	L.S.		1	25,520,000		0	25,520,000
	Pump House			L.S.		1	6,969,000		0	6,969,000
	Sub Total						480,578,000	228,722,000	0	251,856,000
7-3	Distribution Pipe		DIP900mmD	m	19,825	3,100	61,458,430		49,234,200	12,224,230
			DIP800mmD	m	16,587	1,750	29,027,075		22,636,250	6,390,825
			DIP700mmD	m	13,651	0	0		0	0
			DIP600mmD	m	11,570	1,045	12,090,441		8,924,300	3,166,141
			DIP500mmD	m	9,085	990	8,994,051		6,328,080	2,665,971
			DIP450mmD	m	7,931	950	7,534,450		5,123,350	2,411,100
			DIP400mmD	m	6,918	880	6,087,752		3,989,920	2,097,832
			DIP350mmD	m	6,076	230	1,397,572		879,980	517,592
			DIP300mmD	m	5,235	1,270	6,648,323		3,957,320	2,691,003
			PVC250mmD	m	6,477	3,600	23,316,480		15,310,800	8,005,680
			PVC200mmD	m	4,629	1,660	7,684,764		4,556,700	3,128,064
	Sub Total					15,475	164,239,338	0	120,940,900	43,298,438
	Total of 7						**749,593,738**	**265,117,000**	**125,170,000**	**359,306,738**
8	**Karnaphuli WTP system**									
8-1	Intake Pump Facilities									
	Intake Mouth			L.S.		1	70,000,000		0	70,000,000
	Conveyance Pipe 1		DIP1000mmTP	m	18,830	250	4,707,500		4,358,500	349,000
	(Intake Mouth～Intake Pump House)									
	Intake Pump House			L.S.		1	47,735,000		0	47,735,000
	Intake Pump		52.1m3/min ×20m ×4 (+1)	L.S.		1	142,000,000	119,394,000		22,606,000

No.		Name of Facility	Item	Dimension	Unit	Unit Cost	Quantity	Price	Equipment	Civil Materials	Civil & Equip
		Conveyance Pipe 2		DIP1200mmTP	m	25,810	600	15,486,000		14,437,800	1,048,200
		(Intake Pump Station～Receiving Well)									
		Sub Total						279,928,500	119,394,000	18,796,300	141,738,200
	8-2	Treatment Plant Facilities									
		Treatment Plant Facilities		60 MGD	L.S.		1	1,724,250,000	947,668,000		776,582,000
		Transmission Pump		71.5m3/min ×48m ×4 (+1)	L.S.		1	125,169,000	86,704,000		38,465,000
		(Karnaphuli WTP～Nasirabad)									
		Sub Total						1,849,419,000	1,034,372,000	0	815,047,000
	8-3	Transmission Facilities									
		Transmission Pipe		DIP1200mmT	m	30,064	52,000	1,563,307,200		1,313,832,000	249,475,200
		Aqueduct		DIP1200mm*2*250m	L.S.		1	250,000,000		0	250,000,000
		Sub Total						1,813,307,200	0	1,313,832,000	499,475,200
		Total of 8						**3,942,654,700**	**1,153,766,000**	**1,332,628,300**	**1,456,260,400**
9		**Karnaphuli WTP system (Nasirabad)**									
	9-1	Nasirabad Distribution Facilities									
		Ground Reservoir		27,500 m3	L.S.		1	141,350,000		0	141,350,000
		Lift Pump	Mechanical & Electrical Cost	38.4m3/min ×29m ×3 (+1)	L.S.		1	88,956,000	76,062,000		12,894,000
		Elevated Tank		dia24m ×8mD ×25mH	L.S.		1	25,463,000		0	25,463,000
		Pump House			L.S.		1	9,866,000		0	9,866,000
		Power Receiving Facility	Mechanical & Electrical Cost	2500 kVA	L.S.		1	21,965,000	17,234,000		4,731,000
		Generator	Mechanical & Electrical Cost	1250 kVA ×2	L.S.		1	66,340,000	57,585,000		8,755,000
		In-plant Piping			L.S.		1	19,560,000		17,604,000	1,956,000
		Earth Work			L.S.		1	10,797,000		0	10,797,000
		Road Work			L.S.		1	4,811,000		0	4,811,000
		Lighting			L.S.		1	1,260,000		0	1,260,000
		Sub Total						390,368,000	150,881,000	17,604,000	221,883,000
	9-2	Transmission Line to Patenga BPS									
		Lift Pump	Mechanical & Electrical Cost	38.7m3/min ×23m ×2 (+1)	L.S.		1	74,701,000	63,873,000		10,828,000
		Pump House			L.S.		1	7,621,000		0	7,621,000
		Power Receiving Facility	Mechanical & Electrical Cost	1000 kVA	L.S.		1	8,786,000	6,893,000		1,893,000
		Generator	Mechanical & Electrical Cost	400 kVA ×2	L.S.		1	21,229,000	18,427,000		2,802,000
		In-plant Piping			L.S.		1	12,921,000		11,628,900	1,292,100
		Earth Work			L.S.		1	3,566,000		0	3,566,000
		Road Work			L.S.		1	3,178,000		0	3,178,000
		Lighting			L.S.		1	833,000		0	833,000
		Transmission Pipe		DIP1000mmT	m	22,405	8,955	200,635,880		163,930,230	36,705,650
				DIP800mmT	m	15,833	1,540	24,382,743		19,014,380	5,368,363
				DIP600mmT	m	11,044	10	110,439		81,520	28,919
		Sub Total					10,505	357,964,062	89,193,000	194,655,030	74,116,032
	9-3	Transmission Line to Salimpur Reservoir									
		Lift Pump	Mechanical & Electrical Cost	18.m3/min ×49m ×2 (+1)	L.S.		1	74,749,000	63,914,000		10,835,000
		Pump House			L.S.		1	7,631,000		0	7,631,000
		Power Receiving Facility	Mechanical & Electrical Cost	1000 kVA	L.S.		1	8,785,000	6,893,000		1,892,000
		Generator	Mechanical & Electrical Cost	400 kVA ×2	L.S.		1	36,088,000	31,326,000		4,762,000
		In-plant Piping			L.S.		1	12,483,000		11,234,700	1,248,300
		Earth Work			L.S.		1	3,445,000		0	3,445,000
		Road Work			L.S.		1	3,071,000		0	3,071,000
		Lighting			L.S.		1	804,000		0	804,000
		Transmission Pipe		DIP700mmT	m	13,031	4,000	52,122,000		39,472,000	12,650,000
		Sub Total					4,000	199,178,000	102,133,000	50,706,700	46,338,300
	9-4	Distribution Pipe		DIP1400mmD	m	40,800	400	16,320,040		14,003,600	2,316,440
				DIP1200mmD	m	31,495	4,910	154,641,432		129,962,790	24,678,642
				DIP1100mmD	m	26,542	895	23,755,001		20,337,085	3,417,916
				DIP1000mmD	m	23,472	1,170	27,462,006		22,437,090	5,024,916
				DIP900mmD	m	19,825	340	6,740,602		5,399,880	1,340,722
				DIP800mmD	m	16,587	705	11,693,765		9,119,175	2,574,590
				DIP700mmD	m	13,651	705	9,623,955		7,288,290	2,335,665
				DIP600mmD	m	11,570	545	6,305,541		4,654,300	1,651,241
				DIP500mmD	m	9,085	520	4,724,148		3,323,840	1,400,308
				DIP450mmD	m	7,931	2,000	15,862,000		10,786,000	5,076,000
				DIP400mmD	m	6,918	35	242,127		158,690	83,437
				DIP350mmD	m	6,076	0	0		0	0
				DIP300mmD	m	5,235	500	2,617,450		1,558,000	1,059,450
				PVC250mmD	m	6,477	0	0		0	0
				PVC200mmD	m	4,629	0	0		0	0
		Sub Total					12,725	279,988,066	0	229,028,740	50,959,326
		Total of 9						**1,227,498,127**	**342,207,000**	**491,994,470**	**393,296,657**
10		**Karnaphuli WTP system (Salimpur reservoir)**									
	10-1	Salimpur Reservoir	Ground Reservoir 4 Basin	11,200 m3	L.S.		1	57,568,000		0	57,568,000
			In-plant Piping		L.S.		1	14,546,000		13,091,400	1,454,600
			Earth Work		L.S.		1	5,209,000		0	5,209,000
			Road Work		L.S.		1	2,321,000		0	2,321,000
			Lighting		L.S.		1	304,000		0	304,000
		Sub Total						79,948,000	0	13,091,400	66,856,600

No.		Name of Facility	Item	Dimension	Unit	Unit Cost	Quantity	Price	Equipment	Civil Materials	Civil & Equip
	10-2	Distribution Pipe		DIP900mmD	m	19,825	1,000	19,825,300		15,882,000	3,943,300
				DIP800mmD	m	16,587	0	0		0	0
				DIP700mmD	m	13,651	2,950	40,270,450		30,497,100	9,773,350
				DIP600mmD	m	11,570	0	0		0	0
				DIP500mmD	m	9,085	320	2,907,168		2,045,440	861,728
				DIP450mmD	m	7,931	850	6,741,350		4,584,050	2,157,300
				DIP400mmD	m	6,918	1,000	6,917,900		4,534,000	2,383,900
				DIP350mmD	m	6,076	1,000	6,076,400		3,826,000	2,250,400
				DIP300mmD	m	5,235	1,000	5,234,900		3,116,000	2,118,900
				PVC250mmD	m	6,477	1,000	6,476,800		4,253,000	2,223,800
				PVC200mmD	m	4,629	1,000	4,629,376		2,745,000	1,884,376
		Sub Total					10,120	99,079,644	0	71,482,590	27,597,054
		Total 10						**179,027,644**	**0**	**84,573,990**	**94,453,654**
11	**Distribution Small Pipe and Others**										
	11-1	Distribution Small Pipe	PVC200～100mm	2010	L.S.		1	2,668,470,000		756,990,632	1,911,479,368
	11-2	Zonal Offices (expansion) & Staff Quarters			L.S.		1	79,920,000		0	79,920,000
		Sub Total						2,748,390,000	0	756,990,632	1,991,399,368
		Total of 11						**2,748,390,000**	**0**	**756,990,632**	**1,991,399,368**
		Total (Direct Construction Cost)						**9,675,806,434**	**1,964,475,000**	**3,089,327,702**	**4,622,003,732**
		Overhead for ICB (25%)						**1,731,854,108**	**491,118,750**	**583,084,268**	**657,651,091**
		Overhead for LCB (12.5%)						**343,548,750**	**0**	**94,623,829**	**248,924,921**
		Total						**11,751,209,292**	**2,455,593,750**	**3,767,035,799**	**5,528,579,744**

CHAPTER 8

FEASIBILITY STUDY ON PRIORITY PROJECT

8.3-1 Comparison of Water Treatment Method

Existing Mohara WTP adopted the treatment process with high rate sludge blanket type clarifier and self-backwashing filter. Desilting basins are also provided upstream of rapid mixing chamber.

(1) Characteristics of Existing Facilities and Conditions for Planning of Proposed Facilities

a) Existing sludge blanket type clarifiers are operated in good condition and treatment result is satisfactory.
b) Existing rapid sand filters is self-backwashing type with surface washing equipment. Treatment result is satisfactory.
c) Existing desilting basins provided at upstream of rapid mixing chamber is effective for reduction of turbidity more than 20% without chemical dosing.
d) Water level loss in the plant is low comparing with a plant with paddle flocculator. Difference of water levels between desilting basin and clearwater reservoir HWL is 2.74 m.
e) Moving mechanical equipment in the plant is flush mixers only, except several pumps. Therefore, daily maintenance work is easy and its frequency is few.
f) Elevation of premises is set at 20 ft. or 6.1 m to avoid inundation. This elevation is much higher than the surrounding area at 9 ft. or 2.74m.
g) The highest turbidity in last 2 years from May 1998 was 850 NTU, which is the highest record during WTP operation. The lowest was 20 NTU, while 159 NTU in average. These turbidity conditions satisfy the conditions for adoption of high rate sludge blanket type clarifier.
h) Presently, filtration continues 24 hours in shortest and 72 hours in average. Turbidity of treated water id about 1 NTU and less than 3 NTU in highest. Existing clarifiers and filters are functioning satisfactory.
i) Existing intake facility consisting of intake mouths, intake pump house, and connecting pipeline, was constructed with room for future expansion. The proposed project will utilize those facilities.
j) In the proposed project, a receiving well cum distribution chamber will be provided to equalize the flow to existing and expansion plants. An interconnection pipe will be installed between clearwater wells of both plants for emergency case.
k) Because of above-mentioned conditions, water head loss in expansion plant shall be designed as same as existing plant.

(2) Comparison of Treatment Method

Major types of sedimentation basin applied in worldwide are High Rate Clarifier (HRC) and Conventional Horizontal Flow Type (CHF). Characteristics of both types are presented in Table 8.3-1-1. The CHF type is effective for high turbidity, rapid fluctuation of turbidity and water temperature comparing with the HRC type. Therefore, pretreatment facility such as desilting basin is not necessary for CHF. Mechanical chemical mixing device shall be introduced for the expansion plant to secure low water head loss as same as the existing plant. Baffling type flocculation basin shall be avoided because of its large head loss. The CHF sedimentation basin needs mechanical sludge removal device or consideration on structure for sludge removal, which usually adopt conical hopper on bottom of basin at inlet part, drain pipe, control valve, and drain pump.

In the proposed project, HRC was recommended for the treatment method of the Mohara WTP expansion plant as same as existing plant because of ease of operation and maintenance, limitation of reserved area for the plant. This comparison study was conducted to verify the result of treatment method selection from economical point of view.

Cost comparison of both type are summarized in Table 8.3-1-2. Costs include civil work and mechanical work consisting of flocculator, sludge collector, and sludge drain pipe. Operation and maintenance cost is also estimated as power cost and maintenance cost (1% of mechanical equipment cost). As a result, costs for CHF is higher than that for HRC in both of construction and O&M costs. CHF with mechanical sludge remover requires 1.36 times of HRC construction cost and 18 times of HRC O&M cost. CHF with hopper requires 1.1 times and 10 times of respective cost. As shown in the table, it may be judged that HRC type, which is adopted in the proposed project, is more economical than CRF type.

With regard to filter type, proposed project employ the self-backwashing type filter as same as existing filter. This type can make constant rate filtration without any control device at outlet. Automatic washing system will be introduced to both of existing and expansion plants.

Table 8.3-1-1 Characteristics of Sedimentation Basin Type

Item	HRC (Sludge Blanket Type)	CHF (Horizontal Flow Sedimentation)
General	Existing Clarifier is Sludge Blanket Type. Sludge Drainage is conducted with pipe and valve. Because any mechanical equipment such as sludge collector is not used, maintenance work is easy.	1) With Sludge Collector Structure is simple. Mechanical sludge collector collect sludge to hoppers at inlet of basin. 2) Hopper Hoppers are provided at inlet of basin or entire bottom and drain pipe is connected. Sludge drainage is

		insufficient so that annual cleaning work after drying is needed.
Design Criteria Detention Time Surface Load Average Velocity	 1.2hours (1.0-2.0hours) 50mm/min (40-60mm/min)	 3hours (about 3hours) 22mm/min (less than 15-30mm/min) 0.33m/min (less than 0.4m/min)
Facilities	Main Structure Sludge Drain Pipe	Main Structure (incl. Flocculation Basin) Flocculator Sludge Collector Sludge Drain Pipe
Specific Requirements for Proposed Project	The same type of clarifier shall be introduced to equalize water levels of facilities with existing plant to enable interconnection of clearwater reservoirs of both plants.	To equalize head loss with existing plant, mechanical flocculator shall be provided. Baffling wall type flocculator cannot be adopted because of high head loss.
Measure against High Turbidity	Desilting Basin shall be provided at upstream of rapid mixing chamber to decrease turbidity, and stabilize rapid change of turbidity.	Detention time is long as 3 hours.
Ease of Maintenance	Easy maintenance because of no mechanical equipment in clarifiers.	maintenance work on sludge collector is needed.

Table 8.3-1-2 Cost Comparison

Item	HRC (Sludge Blanket Type)	CHF	
		Mech. Corrector Type	Hopper Type
Desilting Basin Construction Cost	Civil 1,995,000 Mech.(Drain) 1,283,000 Total $3,278,000	None	None
Clarifier & Sedimentation Basin Construction Cost	 Civil 1,215,000 Mech.(pipe etc.) 439,000 Total $1,654,000	Civil 2,500,000 Mech. (floccurator) 1,900,000 (sludge corrector) 2,300,000 Total $6,700,000	2,700,000 1,900,000 (Pipe) 1,000,000 $5,600,000
Total Construction Cost	$4,932,000	$6,700,000	$5,600,000
O&M Cost per Year	Power Cost $3,000 Maintenance Cost 0 Total $3,000 Drain pump in desilting basin 1.5 x 4 = 6.0 kW	$13,000 $42,000 $55,000 floccurator, sludge corrector, drain pump (2.2+1.5+0.75+0.75) x 4+ 0.75 x 4 + 1.5 x 2 = 26.8 kW	$13,000 $19,000 $30,000 floccurator, drain pump (2.2+1.5+0.75+ 0.75) x 4+1.5 x 2 = 23.8 kW

Note: Power Supply Cost is 2.95 Taka/kW.

8.3-2 Examination on Production Loss at Water Treatment Plant

In order to identify intake amount, examination on production loss was conducted. For projection of production loss, following conditions of the treatment plant were considered:

a) Raw water turbidity is high.
   Refer to Supporting Report 4.1-1, annual average; 159NTU, highest; 830 NTU, average in 50days of high turbidity period; 458 NTU
b) High rate clarifier and rapid sand filter will be applied.
   Refer to Supporting Report 8.3-1
c) Desilting Basin will be provided before rapid mixing chamber to decrease turbidity.
   Refer to Supporting Report 4.1-4
d) Sludge suction pumps will be installed on traveling bridge over desilting basin together with drain pipe.
e) Filtration cycle is assumed to be 24 hours.
   Refer to Supporting Report 4.1-6

Major production losses in WTP are; sludge drainage from desilting basin, sludge drainage from clarifiers, and washing wastewater from filters. Other minor losses are; water for chemical solution, water for chlorine solution, cleaning water, and consumption in administration use. Influence by cleaning water can be ignorable because cleaning work is carried out during dry season, in which raw water turbidity is low and therefore sludge drainage from clarifiers is less.

(1) Status of Raw Water Turbidity

In recent years, raw water turbidity tends to increase because of cultivation in upstream basin of Halda River. The highest record is 830 NTU on 13th August 1999 with a daily average of 755 NTU. In this examination following turbidities were considered based on records from May 1998 to April 2000:

Highest; 755 NTU (daily average in the day the highest record was measured)
Average 159 NTU
High Turbidity Continuing Period; 50 days (Highest 645 NTU, Average 458 NTU, Lowest 285 NTU)

(2) Sludge Drainage from Desilting Basins

Existing plant has a piping for alum dosing before desilting basins. However, alum dosing before desilting basin means conversion of desilting basins to horizontal flow sedimentation basins.

Purposes of provision of desilting basin is are to stabilize rapid change of turbidity and water temperature, and to reduce raw water turbidity without chemicals. For that purposes, it is operated without dosing chemicals usually. As presented in Table 4.1-4-1, turbidity reduction ratio was about 23% in case of no chemical dosing against raw water with a turbidity of 100 to 150 NTU. In this examination, reduction ration is assumed to be 20% without chemical dosing.

Existing desilting basins have drain pipes at bottom for sludge drain purpose. They are operated once a day for 1 to 2 minutes. Drained sludge volume is calculated at 0.242 m^3/sec as presented in Table 8.3-4-7 WTP Hydraulic Calculation. Therefore, it will be about 300 m^3 a day as follows:

0.243 m^3/s x 2 minutes x 60 seconds x 4 pipes x 2 basins = 232 m^3/day say 300 m^3/day

Sludge in proposed desilting basins will be drained by sand pumps installed on the traveling bridge usually. At the time of cleaning of basins, drain pipe will be operated for drain water in the basins. Assuming sand pumps are operated for 8 hours a day, sludge drain volume will be about 600 m^3/day as follows;

0.3m^3/min/unit x 60minutes x 8hours x 4 basins = 576 m^3/day say 600 m^3/day

(3) Sludge drainage from Clarifiers

In order to keep proper operation of clarifier, control of sludge concentration and thickness of sludge blanket zone is indispensable. For that purpose, frequent sludge drainage from sludge pockets and bottom is necessary. Sludge concentration, therefore, is less than that of conventional horizontal flow sedimentation basin. Concentration of sludge drained from bottom of existing clarifier was o.5 % during the period of low raw water turbidity at 70 to 150 NTU as presented in Table 4.1-5-1.

According to Table 8.3-3 Capacity Calculation, sludge drainage volume will be 3,117 m^3/day or 3.4 % of production volume, 20 MGD (90,912 m^3/day) against raw water turbidity at 130 NTU (expected turbidity at clarifier inlet against 159 NTU raw water).

In the day of highest record at 830 NTU, 13th August 1999, daily average turbidity was 755 NTU. According to Table 8.3-2-2, turbidity of inflow to clarifier at that time is supposed to be about 600 NTU. Assuming the sludge concentration is 2 %, sludge drainage volume is 3,640 m^3/day or 4 % of production volume, as presented in Table 8.3-3.

Table 8.3-2-1 Sludge Concentration and Sludge Volume

Case	Inflow Water Turbidity	Sludge Concentration	Sludge Drain Volume	Ratio to Production Volume (%)
Average Turbidity	130	0.5%	3,117 m^3/d	3.4
Highest Turbidity	600	2.0%	3,640 m^3/d	4.0
Continuing High Turbidity	370	1.5%	2,983 m^3/d	3.3

(4) Washing wastewater from Filters

As presented in Supporting Report 4.1-6, filtration run time was 72 hours in average for last 2 years. However, it is not constant through a year. From December to March, it decreases 24 hours continuously. As presented in Table 4.1-6-3, cases, in which such situation continues more than 3 days, are counted at 31 times, and total of such days is 115 days or 2 % of filtration days. Consequently, washing wastewater from Filters is calculated presuming 24-hour filtration run time. Wastewater will not be returned to receiving well and discharged to river directly.

Though backwashing of filters is operated for 8 minutes presently, its effect is not sufficient. After the proposed project, it is assumed to be 10 minutes. Volume of wastewater during said backwashing will be 471 m^3/unit including backwashing and surface washing water. Total wastewater volume will be 2,353 m^3/day or 2.4 % of production volume.

(5) Production Loss in WTP

Calculation results of production losses at average turbidity, continuous high turbidity, and highest turbidity are presented in Table 8.3-2-3. Based on this calculation, production loss will be equivalent to 9 to 9.5 % of production volume.

Actual record at existing plant shown in Table 8.3-2-4 indicated an average value of 9.4 %. This value is almost equal to the calculation result.

As a result, production loss to be adopted in the capacity calculation was decided as 10 %.

Table 8.3-2-2 Sludge Removal Amount of Desilting Basin and Clarifier

No.	Turbidity (daily Average)		Desilting Basin		Clarifier		
			Ratio	Turbidity	Ratio	Turbidity	Adopted
1	Average	159	20%	32	80%	127	130
2	Highest Turbidity	755	20%	151	80%	604	600
3	Continuous high Turbidity period	458	20%	92	80%	366	370

Note: 1. Turbidity data is adopted the data from May 1998 to April 2000 see Table4.1-1-1
2. Highest Turbidity is the data at 13 August 1999.
3. Continuous high turbidity period is during 50 days from 20 May to 8 July.

Table 8.3-2-3 Water Loss in Mohara Water Treatment Plant

No.	Items	Average Turbidity Period			High Turbidity Period (370NTU)			Highest Turbidity (600NTU)		
		Existing	Expansion	Total	Existing	Expansion	Total	Existing	Expansion	Total
1	Desilting Basin	300	600	900	300	600	900	300	600	900
2	Clarifier	3,117	3,117	6,234	2,983	2,983	5,966	3640	3640	7,280
3	Filter	3,765	4,235	8,000	3,765	4,235	8,000	3,765	4,235	8,000
4	Others									
4-1	Alum Dosing	66	66	132	66	66	132	66	66	132
4-2	Lime Dosing	109	109	218	109	109	218	109	109	218
4-3	Chlorine Dosing	400	400	800	400	400	800	400	400	800
4-4	Service Water	50	50	100	50	50	100	50	50	100
4-5	Wash Water	150	150	300	150	150	300	0	0	0
	Others Total	775	775	1,550	775	775	1,550	625	625	1,250
Total		7,957	8,727	16,684	7,823	8,593	16,416	8,330	9,100	17,430
Loss Ratio(%)		8.75	9.60	9.18	8.61	9.45	9.03	9.16	10.01	9.59
Adopted Ratio (%)		10.0								

Notes :

1. Desilting Basin
   Drain Pipe of Existing Basin
   0.242 m3/s×2min×60sec.×4sets×2basin=232m3/day→300m3/day
   Drain Pump of Proposed Basin
   0.3 m3/min×4units×(8H/24H)=0.4m3/min=576m3/day→600m3/day
2. Clarifier (Water Contents : 0.5% at low Turbidity, 1.5% at high turbikity, 2.0% at highest turbidity)
3. Wash water of Filter
   Surface Wash 0.15m3/min/m2×44.60m2/unit=33.5m3/unit
   Back Wash 0.98m3/min/m2×44.60m2/unit=437.1m3/unit
   → 470.6m3/unit
   Back Wash cycle = 24 hours
   470.6m3/units×8units=3,765m3/day
   470.6m3/units×9units=4,235m3/day
4. Others is asumed as follows

4-1 Alun and Lime Dosing Water Volume is equal to solution tank volume.
Alum dosing
Existing 10.93m3/tank×2tanks=22m3/day
Expansion 10.93m3/tank×6tanks=66m3/day
Lime Dosing
Existing 27.32m3/tank×2tanks=55m3/day
Expansion 27.32m3/tank×4tanks=109m3/day

4-2 Chlorine Dosing
260 L/min=374m3/day → 400m3/day

4-3 Service Water in WTP
Laboratory 50 L/min=72m3/day
Person 100 L/day×200person=20m3/day
Total 92m3/day → 100m3/day

4-4 Wash water (for each Existing and Proposed facilities)
0.2m3/min×2pieces×(5hours/24hours)=144m3/day→ 150m3/day

Table 8.3-2-4 Mohara WTP Water Loss Existing Data

Date		Production	Plant Loss
		MGD	%
1	Mar.88	18.41	6
2	Mar.88	17.85	10
3	Mar.88	18.65	9
4	Mar.88	18.52	12
6	Mar.88	18.84	6
7	Mar.88	19.25	2
8	Mar.88	18.30	8
12	Mar.88	18.29	8
13	Mar.88	18.63	8
14	Mar.88	19.17	9
17	Mar.88	18.70	11
18	Mar.88	18.45	12
20	Mar.88	18.60	12
21	Mar.88	18.98	9
22	Mar.88	18.68	10
30	Mar.88	19.70	8
8	Apr.88	19.45	10
9	Apr.88	18.68	14
10	Aug.88	19.52	13
20	Aug.88	19.41	11
25	Aug.88	19.83	10
10	Sep.88	20.06	9
Average		18.91	9.4

8.3-3 Mohara WTP Capacity Calculation

Table 8.3-3-1 Bangladesh - Chittagong Water Supply Project
Capacity Calculation for Mohara Water Treatment Plant
Expansion Capacity 20MGD(90,912 cu m/day)

Item	Total System				
Production Flow	Q=	90,912	cu m/day		
Plant Capacity	Q=	100.003	cu m/day	(Loss 10 %)	
(Intake to Clarifier)	=	4,167	cu m/hour		
	=	69.4	cu m/min		
	=	1.157	cu m/sec		
Plant Capacity	Q=	95,458	cu m/day	(Loss 5 %)	
(Filter)	=	3,977	cu m/hour		
	=	66.3	cu m/min		
	=	1.105	cu m/sec		
Plant Capacity	Q=	90.912	cu m/day	(Loss 0 %)	
(Clear Well)	=	3,788	cu m/hour		
	=	63.1	cu m/min		
	=	1.052	cu m/sec		
(1) Receiving Well (Existing System)					
Criteria	Retention Time			T =	1.5 min
	Recirculation			a =	0.0 %
Dimension	Rectangular			1	units
	W m x L		m x D m	x	units
	5.0	5.5		4.0	1
	V=	110.0	cu m		
	T=	1.6	min		
(2) Receiving Well (Expansion System)					
Criteria	Retention Time			T =	1.5 min
	Recirculation			a =	0.0 %
Dimension	Rectangular			1	units
	W m x L		m x D m	x	units
	7.0	5.5		4.0	1
	V=	154.0	cu m		
	T=	2.2	min		
(3) Desilting Basin (Existing Facility)					
Criteria	Surface loading			V_0 =	5-10 mm/min
	Average flow Velocity			V =	0.3 m/min
Dimension	Rectangular			2	units
	W m x L		m x D m	x	units
Upper	25.29	134.11		1.98	2
Lower	13.40	116.31			
	V=	9591.9	cu m		
	T=	138.1	min		
	V_0 =	10.2	mm/min		
	V =	0.7	m/min		
(4) Desilting Basin (Proposed Facility)					
Criteria	Surface loading			V_0 =	5-10 mm/min
	Average flow Velocity			V =	0.3 m/min
Dimension	Rectangular			4	units
	W m x L		m x D m	x	units
	23.0	76.0		2.5	4
	V=	17480.0	cu m		
	T=	4.20	hours		
	V_0 =	9.93	mm/min		
	V =	0.30	m/min		
Unit Flow	q =	1,042	cu m/hr/basin		
	L m x N troughs/basin				
	2.0	14			
	Total L =	56.0	m		
	Load =	446	m3/m/day		

Item	Total System
(5) Rapid Mixing Chamber (for Lime)	
Criteria	Retention Time T= 0.15 min same as Existing Chamber Recirculation a = 0.0 %
Dimension	Rectangular 1 units L m x W m x D m x units 2.286 2.286 1.91 1
Unit Volume	UV = 9.98 cu m/unit
Total Volume	V = 9.98 cu m
Retention Time	t = 0.14 min
Mixing	Flash mixer
(6) Mixing Chamber (for Alum)	
Criteria	Retention Time T= 0.11 min same as Existing Chamber Recirculation a = 0.0 %
Dimension	Rectangular 1 units L m x W m x D m x units 2.286 2.286 1.45 1
Unit Volume	UV = 7.58 cu m/unit
Total Volume	V = 7.58 cu m
Retention Time	t = 0.11 min
Mixing	Flash mixer
(7) Clarifier	
Criteria	Recirculation a = 0 % Retention Time T = 60 - 120 min Required Volume V = 4,167 cu.m to 8,334 cu.m Surface Load a = 40 - 60 mm/min
Unit Flow	q = 2.89 cu m/min/basin
Dimension	24 units Dimension Width m x Length m (Top) 7.62 7.62 Width m x Length m (Bottom) 0.91 0.91 Depth H1= 1.29 m Depth H2= 5.79 m
Volume	4847 cu m (Retention Time 1.16 hours)
Surface Load	a = 50 mm/min
Sludge Removal	Sludge Blanket Type Clarifier
Sludge Amount Solid Amount (ton-DS)	So = Q * (K*(T1-T2)+B*156/666)*10^-6 where So:Sludge dry weight(ton) Q :Treated water amount(m3/d) K :Coefficient converting turbidity to SS (0.8-1.5 ->>1.2) T1 :Turbidity in raw water (ave= 130 T1 :Turbidity in raw water (max(peak)= 600 T1 :Turbidity in raw water (max(1month)= 370 (see Table 8.3-2-2) T2 :Turbidity after Sedimentation (ave = 5) B :Alum dosage rate (ave.= 25 B = 4 + 2 * (T1) ^ 0.5 = 26.8 B :Alum dosage rate (max.(peak)= 60 B = 4 + 2 * (T1) ^ 0.5 = 53.0 B :Alum dosage rate (max.(1month)= 40 B = 4 + 2 * (T1) ^ 0.5 = 42.5 So = 15.59 ton-DS/day (ave) So = 72.81 ton-DS/day (max(peak)) So = 44.74 ton-DS/day (max(1month)) Water Contents of Drained Sludge (with wash-out water) w = 99.5 % (Ave) w = 98.0 % (Max(peak)) w = 98.5 % (Max(1month))
Sludge Volume	Total (ave) v = 3,117 cu.m/day (3.4 %) So = 16 ton-DS/day Total (max(peak)) v = 3,640 cu.m/day (4.0 %) So = 73 ton-DS/day Total (max(1month)) v = 2,983 cu.m/day (3.3 %) So = 45 ton-DS/day

Item	Total System				
(8) Rapid Sand Filter					
Type	Down Flow, Single Media				
No.		9 units (wash		1 unit)	
		(Stand by		1 unit)	
Unit Flow	q =	10,606 cu m/day/unit			
Criteria	Filtration Rate		Fr <=	300 m/day	
			=	12.5 m/hour	
	Maximum Filter Area per Ur		A <	150 sq m	
Dimension	W m x L m		x N units		
	4.88	9.14	9 (9 filters/group)		
	A =	44.60 sq m/unit			
Filtration Rate	Fr =	238 m/day	(All units are operated)		
Filtration Rate during washing	Fr'=	268 m/day	(One unit is washing)		
Filtration Rate during washing	Fr'=	306 m/day	(1 unit stand by, 1 unit is washing)		
Filters for Backwashing		5.3 filters/group			
Filter Washing					
Washing Cycle	2days for each filter				
Rate	Surface Washing		rate =	0.15 m3/m2/min	
			duration =	5 min	
	Backwashing		rate =	0.98 m3/m2/min	
			duration =	10 min	
Water Amount for washing	Surface Washing		Vs =	33.5 cu m/unit	
	Backwashing		Vb =	437.1 cu m/unit	
			Vs + Vb =	470.6 cu m/unit	
for Total Units	Total Amount for Washing (9units/day)			4,235 cu m/day ②	
	Percentage for Planned Flow			4.7 %	
Solid Amount in Wastewater (ton-DS)	So = Q*K*(T1-T2)*10^-6				
	where So:Sludge dry weight(ton)				
	Q :Treated water amount(m3/d)				100,003
	K :Coefficient converting turbidity to SS (0.8-1.5 ->>1.2)				1.2
	T1 :Turbidity before filter(ave=				5
	T2 :Turbidity after filter(ave =				0
	So =	0.60 ton-DS/day			
SS Contents	s =	142 mg/l			
(9) Chlorination Channel					
Location	at the Inlet of the Clear Water Reservoir				
Criteria	Contact Time		T >	10 minutes	
Required Volume	V =	694 cu m			
Dimension	No.	2 units			
	L m x W m	x D m	m x N units	basin	
	31.5	3.0	2.88	3	1
Total Volume	v =	816 cu m			
Retention Time	t =	11.8 min			
(10) Clear Water Reservoir					
Criteria	Retention Time		T >	1.0 hours	
Required Volume	V =	3,788 cu m			
Dimension	No.	2 units			
	L m x W m	x D m	m x N	units	
	40.1	31.5	2.88	2	
Total Volume	V =	7,276 cu m			
Retention Time	T =	1.92 hours			

Item	Total System					
(11) Alum Dissolving Tank						
Coagulant	Solid Aluminum Sulphate (Al2(SO4)3)					
	containing 15 % Al2-O3					
Criteria	Dosage Rate :			10-80	mg-solid alum/l	
	Average			25	mg/l	
	Max			65	mg/l	
	Coagulant Solution :			10 %	sg =	1.0525
	Retention Time			24	hours	
	Dissolving Time			2	hours	
		Average	(Max)			
Dosage Amount	Wt =	2,500	(6,500)	kg-Alum/day		
Coagulant Solution	V =	23.8	(61.8)	cu m/day		
Solution Tank	Square	6	units			
Dimension	L m x W	m x D m		x units		
	2.13	2.13	2.40	6		
Total Volume	V =	65.3	cu m			
		Average	(Max)			
Retention Time	T =	66.0	(25.4)	hours		
Storage	Period			30	days	
	Bulk s. g.			0.60		
Storage Area	A =	63	m2 at		2.0	m height
(12) Lime Dissolving Tank						
(Dosing to Rapid Mixing Chamber)						
pH Control	Hydrated Lime (Ca(OH)2)					
	containing 72 % CaO					
Criteria	Dosage Rate :			10-40	mg-solid Lime/l	
	Requirement			8.7	mg/l	
	Average			5	mg/l	
	Max			10	mg/l	
	Lime Solution			10 %	sg =	1.0607
	Retention Time			24	hours	
	Dissolving Time			2	hours	
		Average	(Max)			
Dosage Amount	Wt =	500	(1,000)	kg-Lime/day		
Coagulant Solution	V =	4.7	(9.4)	cu m/day		
Solution Tank	Square	2	units			
Dimension	L m x W	m x D m		x units		
	3.35	3.35	2.43	2		
Total Volume	V =	54.5	cu m			
		Average	(Max)			
Retention Time	T =	277.7	138.8	hours		
Storage	Period			30	days	
	Bulk s. g.			0.40		
Storage Area	A =	19	m2 at		2.0	m height
(Dosing to Clearwell)						
pH Control	Hydrated Lime (Ca(OH)2)					
	containing 72 % CaO					
Criteria	Dosage Rate :			10-40	mg-solid Lime/l	
	Requirement			3.5	mg/l	
	Average			1	mg/l	
	Max			2	mg/l	
	Lime Solution			1 %	sg =	1.0308
	Retention Time			24	hours	
	Dissolving Time			2	hours	
		Average	(Max)			
Dosage Amount	Wt =	100	(200)	kg-Lime/day		
Coagulant Solution	V =	9.7	(19.4)	cu m/day		
Solution Tank	Square	2	units			
Dimension	L m x W	m x D m		x units		
	3.35	3.35	2.43	2		
Total Volume	V =	54.5	cu m			
		Average	(Max)			
Retention Time	T =	134.9	(67.5)	hours		
Storage	Period			30	days	
	Bulk s. g.			0.40		
Storage Area	A =	4	m2 at		2.0	m height

Item	Total System					
(13) Chlorination Equipment						
Injection Point	at the Filtered water Channel and at the Rapid Mixing Chamber and inlet of Desilting Basin					
Type	Liquid Chlorine (900 kg-cylinder)					
Criteria	Dosage Rate :			7.0	mg-Cl/l	
	Average			3.0	mg/l	
Dosage Amount	Wt =	300	kg- Cl gas/day			
	or	12.5	kg- Cl gas/hour			
Chlorinator	Vacuum Type					
No. of unit		2	units			
	(excl. 1 unit stand-by)					
Rate		6.25	kg/hour/unit			
Operation Rate		60	percent			
Capacity		10	kg/hour/unit			
Storage	Period			30	days	
Storage Area	A =	21	m2 as			2.0 m2/container
(14) Sludge Storage Tank	(Clarifier drain water + Backwash wastewater) including Existing facilities					
Backwash Water	Vs + Vb =			471	cu.m/filter unit	
Required Volume	17 filter washing / day			8,000	cu.m/8 hours	= 1000 cu m/hour
Clarifire sludge Water	(ave)			3,117	cu.m/day	= 130 cu m/hour
	(max(peak))			3,640	cu.m/day	= 152 cu m/hour
	(max(1month))			2,983	cu.m/day	= 124 cu m/hour
Total Sludge Water	(ave)			1,130	cu.m/hour	
	(max(peak))			1,152	cu.m/hour	
	(max(1month))			1,124	cu.m/hour	
No.	N =	1	units			
Dimension	L m x W m		x D m		m x N units	
	22.86	9.14		3.81	2	1 Existing
						1 Expansion
Total Volume	v =	1,592	cu m	>		1130 cu m
						1152 cu m
						1124 cu m
Sludge Pump	10.14	cu.m/min x		6 m x	22.4 kw x	3 (+1) Existing
Total pump Capacity	30.42	cu.m/min =		1,825	cu.m/hour	
				>		1130 cu.m/hour
				>		1152 cu.m/hour
				>		1124 cu.m/hour

Note : Small pumps such as utility water pumps are not shown in this calculation.

8.3-4-1 Study of Proposed Intake Pump Capacity

Intake Pump Mouth～Proposed Receiving Well Existing Pipe 900 mm, Proposed Pipe 900 mm

(Culculation for Proposed Pump)

1 Proposed Pump + 3 Existing Pump

1. River Water Level

Min.L.W.L. -4.00 ft -1.22 m

2. Inlet Water Leve at Intake Pump Inlet Pipe Level

W.L.+ -5.51 ft -1.68 m > -2.35 m(-7.7ft) OK

3. Receiving Well Water Level

W.L.+ +31.81 ft +9.70 m

4. Actual Pump Head

+35.81 ft +10.92 m

5. Total Pump Head Loss Actual Loss

50 ft 15.24 m > 15.202 m OK

6. Intake Flow & Verosity

Q1= (Existing Pump)	7100 GPM=	32.27 m3/min=	46468.8 m3/day=	10.22	MGD/2units
Q2= (Proposed Pump)	9260 GPM=	42.09 m3/min=	60609.6 m3/day=	13.33	MGD/2units
Q3=	16360 GPM=	74.37 m3/min=	107092.8 m3/day=	23.56	MGD/2units
Q4=	30560 GPM=	138.91 m3/min=	200030.4 m3/day=	44.01	MGD/4units
Q4-A(900mm)=	15280 GPM=	69.46 m3/min=	100022.4 m3/day=	22.00	MGD/4units

7. Water Level Loss

7.1.	Bar Screen Loss	B=	1.83 m	(	37.5 *44=	1.650 m)			H1=	0.100 m
		H=	1.31 m	(	V=	0.325 m/s)				
		b=	37.5 mm	(	H=	0.003 m)				
		t=	12.5 mm							
		θ=	75 °							

7.2.	Suction Pipe Loss	C=	100							
7.2.1.	Inlet Loss	(Diameter	600	mm), f=	0.5	V=	2.48 m/s	h=	0.157 m
7.2.2.	Valve	(Diameter	600	mm), f=	0	V=	2.48 m/s	h=	0.000 m
7.2.3.	Gradually Expanded Pipe	(Diameter	900	600 mm), f=	0.534	θ=	24.1 °	h=	0.052 m
7.2.4.	Gradually Reduced Pipe	(Diameter	900	600 mm), f=	0.015	θ=	24.1 °	h=	0.005 m
7.2.5.	Valve Loss	(Diameter	600	mm), f=	0	V=	2.48 m/s	h=	0.000 m
7.2.6.	Valve Loss	(Diameter	600	mm), f=	0	V=	2.48 m/s	h=	0.000 m
7.2.7.	90°Bend Loss	(Diameter	600	mm), f=	0.1	V=	2.48 m/s	h=	0.031 m
7.2.8.	Pipe Friction Loss	(Diameter	600	mm), I=	0.01329	L=	10.00 m	h=	0.133 m
7.2.9.	Pipe Friction Loss	(Diameter	900	mm), I=	0.00184	L=	45.00 m	h=	0.083 m
	Sub Total							H2=	0.461 m
									1.513 ft

7.3.	Pipe Loss (Intake Pump (Proposed Pump) →Connection Point)									
7.3.1.	Check Valve Loss	(Diameter	500	mm), f=	1	V=	3.57 m/s	h=	0.650 m
7.3.2.	Strainer Loss	(Diameter	500	mm), f=	1	V=	3.57 m/s	h=	0.650 m
7.3.3.	Valve Loss	(Diameter	500	mm), f=	0	V=	3.57 m/s	h=	0.000 m
7.3.4.	Tee Loss	(Diameter	1050	500 mm), f=	0.60	V=	1.43 m/s	h=	0.063 m
7.3.5.	Tee Loss	(Diameter	1050	500 mm), f=	0.60	V=	1.43 m/s	h=	0.063 m
7.3.6.	Tee Loss	(Diameter	1050	500 mm), f=	0.45	V=	1.43 m/s	h=	0.047 m
7.3.7.	Tee Loss	(Diameter	1050	500 mm), f=	0.38	V=	1.43 m/s	h=	0.040 m
7.3.8.	Pipe Friction Loss	(Diameter	500	mm), I=	0.0323	L=	15.00 m	h=	0.485 m
	Sub Total							H3=	1.998 m

7.4	Pipe Loss (Connection Point →Receiving Well)									
7.4.1.	Gradually Reduced Pipe	(Diameter	1050	900 mm), f=	0.014	θ=	10.7 °	h=	0.001 m
7.4.2.	90°Bend Loss	(Diameter	900	mm), f=	0.21	V=	1.82 m/s	h=	0.035 m
7.4.3.	Valve Loss	(Diameter	900	mm), f=	0	V=	1.82 m/s	h=	0.000 m
7.4.4.	22.5°Bend Loss	(Diameter	900	mm), f=	0.04	V=	1.82 m/s	h=	0.007 m
7.4.5.	Bentuly Meter Loss	(Diameter	900	mm), f=	2.0	V=	1.82 m/s	h=	0.338 m
7.4.6.	Valve Loss	(Diameter	900	mm), f=	0	V=	1.82 m/s	h=	0.000 m
7.4.7.	45°Bend Loss	(Diameter	900	mm), f=	0.1	V=	1.82 m/s	h=	0.017 m
7.4.8.	45°Bend Loss	(Diameter	900	mm), f=	0.1	V=	1.82 m/s	h=	0.017 m
7.4.9.	90°Bend Loss	(Diameter	900	mm), f=	0.21	V=	1.82 m/s	h=	0.035 m
7.4.10.	Pipe Friction Loss	(Diameter	1050	mm), I=	0.00793	L=	11.00 m	h=	0.087 m
7.4.11.	Pipe Friction Loss	(Diameter	1166.4	mm), I=	0.00475	L=	214.00 m	h=	1.017 m
7.4.12.	Outlet Loss	(Diameter	900	mm), f=	1	V=	1.82 m/s	h=	0.169 m
	Sub Total							H4=	1.723 m

8.	Total Pipe Loss	H5=	4.282 m
9.	Total Pump Head (Actual Pump Head + Total Pipe Loss)	H6=	15.202 m
			49.875 ft

8.3-4-2 Study of Existing Intake Pump Capacity

Intake Pump Mouth～Proposed Receiving Well Existing Pipe 900 mm, Proposed Pipe 900 mm

(Culculation for Existing Pump)

1 Proposed Pump + 3 Existing Pump

1. River Water Level

Min.L.W.L. -4.00 ft -1.22 m

2. Inlet Water Leve at Intake Pump Inlet Pipe Level

W.L.+ -4.91 ft -1.50 m > -2.35 m(-7.7ft) OK

3. Receiving Well Water Level

W.L.+ +31.81 ft +9.70 m

4. Actual Pump Head

+35.81 ft +10.92 m

5. Total Pump Head Loss Actual Loss

47 ft 14.33 m > 14.295 m OK

6. Intake Flow & Verosity

Q1= (Existing Pump)	7100 GPM=	32.27 m3/min=	46468.8 m3/day=	10.22	MGD/2units
Q2= (Proposed Pump)	9260 GPM=	42.09 m3/min=	60609.6 m3/day=	13.33	MGD/2units
Q3=	16360 GPM=	74.37 m3/min=	107093 m3/day=	23.56	MGD/2units
Q4=	30560 GPM=	138.91 m3/min=	200030 m3/day=	44.01	MGD/4units
Q4-A(900mm)=	15280 GPM=	69.46 m3/min=	100022 m3/day=	22.00	MGD/4units

7. Water Level Loss

7.1. Bar Screen Loss B= 1.83 m (37.5 *44= 1.650 m) H1= 0.100 m

H= 1.31 m (V= 0.249 m/s)

b= 37.5 mm (H= 0.002 m)

t= 12.5 mm

θ= 75 °

7.2.	Suction Pipe Loss	C= 100 (Proposed Pump)								
7.2.1.	Inlet Loss	(Diameter	600		mm), f=	0.5	V=	1.90 m/s	h=	0.092 m
7.2.2.	Valve	(Diameter	600		mm), f=	0	V=	1.90 m/s	h=	0.000 m
7.2.3.	Gradually Expanded Pipe	(Diameter	900	600 mm), f=		0.534	θ=	24.1 °	h=	0.030 m
7.2.4.	Gradually Reduced Pipe	(Diameter	900	600 mm), f=		0.015	θ=	24.1 °	h=	0.004 m
7.2.5.	Valve Loss	(Diameter	600		mm), f=	0	V=	1.90 m/s	h=	0.000 m
7.2.6.	Valve Loss	(Diameter	600		mm), f=	0	V=	1.90 m/s	h=	0.000 m
7.2.7.	90°Bend Loss	(Diameter	600		mm), f=	0.1	V=	1.90 m/s	h=	0.018 m
7.2.8.	Pipe Friction Loss	(Diameter	600		mm), I=	0.00813	L=	10.00 m	h=	0.081 m
7.2.9.	Pipe Friction Loss	(Diameter	900		mm), I=	0.00113	L=	45.00 m	h=	0.051 m
	Sub Total								H2=	0.277 m
										0.907 ft
7.3.	Pipe Loss (Intake Pump (Proposed Pump) →Connection Point)									
7.3.1.	Check Valve Loss	(Diameter	500		mm), f=	1	V=	2.74 m/s	h=	0.383 m
7.3.2.	Strainer Loss	(Diameter	500		mm), f=	1	V=	2.74 m/s	h=	0.383 m
7.3.3.	Valve Loss	(Diameter	500		mm), f=	0	V=	2.74 m/s	h=	0.000 m
7.3.4.	Tee Loss	(Diameter	1050	500 mm), f=		0.60	V=	1.43 m/s	h=	0.063 m
7.3.5.	Tee Loss	(Diameter	1050	500 mm), f=		0.60	V=	1.43 m/s	h=	0.063 m
7.3.6.	Tee Loss	(Diameter	1050	500 mm), f=		0.45	V=	1.43 m/s	h=	0.047 m
7.3.7.	Tee Loss	(Diameter	1050	500 mm), f=		0.38	V=	1.43 m/s	h=	0.040 m
7.3.8.	Pipe Friction Loss	(Diameter	500		mm), I=	0.01976	L=	15.00 m	h=	0.296 m
	Sub Total								H3=	1.275 m
7.4	Pipe Loss (Connection Point →Receiving Well)									
7.4.1.	Gradually Reduced Pipe	(Diameter	1050	900 mm), f=		0.014	θ=	10.7 °	h=	0.001 m
7.4.2.	90°Bend Loss	(Diameter	900		mm), f=	0.21	V=	1.82 m/s	h=	0.035 m
7.4.3.	Valve Loss	(Diameter	900		mm), f=	0	V=	1.82 m/s	h=	0.000 m
7.4.4.	22.5°Bend Loss	(Diameter	900		mm), f=	0.04	V=	1.82 m/s	h=	0.007 m
7.4.5.	Bentuly Meter Loss	(Diameter	900		mm), f=	2.0	V=	1.82 m/s	h=	0.338 m
7.4.6.	Valve Loss	(Diameter	900		mm), f=	0	V=	1.82 m/s	h=	0.000 m
7.4.7.	45°Bend Loss	(Diameter	900		mm), f=	0.1	V=	1.82 m/s	h=	0.017 m
7.4.8.	45°Bend Loss	(Diameter	900		mm), f=	0.1	V=	1.82 m/s	h=	0.017 m
7.4.9.	90°Bend Loss	(Diameter	900		mm), f=	0.21	V=	1.82 m/s	h=	0.035 m
7.4.10.	Pipe Friction Loss	(Diameter	1050		mm), I=	0.00793	L=	11.00 m	h=	0.087 m
7.4.11.	Pipe Friction Loss	(Diameter	1166.4		mm), I=	0.00475	L=	214.00 m	h=	1.017 m
7.4.12.	Outlet Loss	(Diameter	900		mm), f=	1	V=	1.82 m/s	h=	0.169 m
	Sub Total								H4=	1.723 m
8.	Total Pipe Loss								H5=	3.375 m
9.	Total Pump Head (Actual Pump Head + Total Pipe Loss)								H6=	14.295 m
										46.900 ft

8.3-4-3 Connection Pipe (1)

Proposed Reseiving Well～Proposed Desilting Basin No.5 Pipe loss Culculation

1. Receiving Well Inflow Water Level
   W.L..+ +31.82 ft +9.70 m
2. Receiving Well Outflow Water Level
   W.L..+ +29.92 ft +9.12 m
3. Desilting Basin Water Level
   W.L..+ +28.44 ft +8.67 m
4. Total of Water Level Loss

			Actual Loss	
+1.48 ft	+0.45 m	>	+0.437 m	OK

5. Intake Flow & Verosity

Q1=	5.5 MGD=	25000.8 m3/d=	0.289	m3/s
Q2=	2.75 MGD=	12500.4 m3/d=	0.145	m3/s

6. Water Level Loss

	Pipe Loss (Reseiving Well →Desilting Basin No.5)					C=	100				
6.1.	Inlet Loss	(Diameter	700		mm), f=	0.5	V=	0.75 m/s	h=	0.014 m
6.2.	45°Bend Loss (Vertical)	(Diameter	700		mm), f=	0.1	V=	0.75 m/s	h=	0.003 m
6.3.	45°Bend Loss (Vertical)	(Diameter	700		mm), f=	0.1	V=	0.75 m/s	h=	0.003 m
6.4.	45°Bend Loss (Horizontal)	(Diameter	700		mm), f=	0.1	V=	0.75 m/s	h=	0.003 m
6.5.	45°Bend Loss (Horizontal)	(Diameter	700		mm), f=	0.1	V=	0.75 m/s	h=	0.003 m
6.6.	90°Bend Loss	(Diameter	700		mm), f=	0.20	V=	0.75 m/s	h=	0.006 m
6.7.	Tee Loss	(Diameter	700	700	mm), f=	0.05	V=	0.75 m/s	h=	0.001 m
6.8.	Gradually Reduced Pipe	(Diameter	700	450	mm), f=	0.016	θ=	20.6 °	h=	0.004 m
6.9.	90°Bend Loss	(Diameter	450		mm), f=	0.17	V=	0.91 m/s	h=	0.007 m
6.10.	Valve Loss	(Diameter	450		mm), f=	0	V=	0.91 m/s	h=	0.000 m
6.11.	Inlet Loss	(Diameter	450		mm), f=	1	V=	0.91 m/s	h=	0.042 m
6.12.	Pipe Friction Loss	(Diameter	700		mm), I=	0.00122	L=	240 m	h=	0.293 m
6.13.	Pipe Friction Loss	(Diameter	450		mm), I=	0.00292	L=	20 m	h=	0.058 m
	Total Pipe Loss								H=	0.437 m

8.3-4-4 Connection Pipe (2)

Proposed Desilting Basin No.4～ Proposed Rapid Mix Chamber

1 Desilting Basin Inflow Water Level

W.L..+ +28.44 ft +8.67 m

2 Desilting Basin Outflow Water Level

W.L..+ +27.29 ft +8.32 m

3 Rapid Mixing Basin Inflow Water Level

W.L..+ +26.27 ft +8.01 m

4 Total of Water Level Loss

1.02 ft 0.31 m > 0.300 m OK

5 Intake Flow & Verosity

Q1=	5.5 MGD=	25000.8 m3/d=	0.289	m3/s
Q2=	11 MGD=	50001.6 m3/d=	0.579	m3/s
Q3=	22 MGD=	100003 m3/d=	1.157	m3/s

6 Water Level Loss

Pipe Loss (Desilting Basin No.4 → Rapid Mix Chamber) C= 100

6.1.	Inlet Loss	(Diameter	600	mm), f=	0.5	V=	1.02 m/s	h=	0.027 m
6.2.	Tee Loss	(Diameter	1000	600 mm), f=	0.55	V=	0.74 m/s	h=	0.015 m
6.3.	Tee Loss	(Diameter	1000	1000 mm), f=	0.55	V=	0.74 m/s	h=	0.015 m
6.4.	Reducer Loss	(Diameter	1200	1000 mm), f=	0.285	θ=	14.4 °	h=	0.001 m
6.5.	Tee Loss	(Diameter	1200	600 mm), f=	0.39	V=	1.03 m/s	h=	0.021 m
6.6.	Tee Loss	(Diameter	1200	600 mm), f=	0.39	V=	1.03 m/s	h=	0.021 m
6.7.	Tee Loss	(Diameter	1200	1200 mm), f=	1.0	V=	1.03 m/s	h=	0.054 m
6.8.	Inlet Loss	(Diameter	1200	mm), f=	1.0	V=	1.02 m/s	h=	0.053 m
6.9.	Pipe Friction Loss	(Diameter	600	mm), I=	0.00258	L=	6 m	h=	0.015 m
6.10.	Pipe Friction Loss	(Diameter	1000	mm), I=	0.00077	L=	84 m	h=	0.065 m
6.11.	Pipe Friction Loss	(Diameter	1200	mm), I=	0.00115	L=	11 m	h=	0.013 m

Total Pipe Loss H= 0.300 m

8.3-4-5 Connection Pipe (3)

Proposed Reseiving Well～Existing Desilting Basin No.2 Pipe loss Culculation

1 Receiving Well Outflow Water Level

W.L..+ +29.92 ft +9.12 m

2 Existing Desilting Basin No.2 Inflow Water Level

W.L..+ +26.5 ft +8.08 m

3 Total of Water Level Loss

+3.42 ft +1.04 m < 0.935 m OK

4 Intake Flow & Verosity

Q1= 11.0 MGD= 50001.6 m3/d= 0.579 m3/s

3.67 MGD= 16667.2 m3/d= 0.193 m3/s

5 Water Level Loss

Pipe Loss (Proposed receiving Well → Existing Desilting Basin C= 100

5.1.	Inlet Loss	(Diameter	800	mm), f=	0.5	V=	1.15 m/s	h=	0.034 m
5.2.	45°Bend Loss (Vertical)	(Diameter	800	mm), f=	0.1	V=	1.15 m/s	h=	0.007 m
5.3.	45°Bend Loss (Vertical)	(Diameter	800	mm), f=	0.1	V=	1.15 m/s	h=	0.007 m
5.4.	Valve Loss	(Diameter	800	mm), f=	0	V=	1.15 m/s	h=	0.000 m
5.5.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15 m/s	h=	0.007 m
5.6.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15 m/s	h=	0.007 m
5.7.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15 m/s	h=	0.007 m
5.8.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15 m/s	h=	0.007 m
5.9.	Gradually Reduced Pipe	(Diameter	900	800 mm), f=	0.143	θ=	8.2 °	h=	0.006 m
5.10.	Tee Loss	(Diameter	900	900 mm), f=	0	V=	0.91 m/s	h=	0.000 m
5.11.	90°Bend Loss (Horizontal)	(Diameter	900	mm), f=	0.21	V=	0.30 m/s	h=	0.001 m
5.12.	Tee Loss	(Diameter	900	900 mm), f=	0.99	V=	0.91 m/s	h=	0.042 m
5.13.	Tee Loss	(Diameter	900	350 mm), f=	0.01	V=	0.91 m/s	h=	0.000 m
5.14.	Tee Loss	(Diameter	900	350 mm), f=	0.05	V=	0.61 m/s	h=	0.001 m
5.15.	Tee Loss	(Diameter	900	350 mm), f=	0.99	V=	0.30 m/s	h=	0.005 m
5.16.	90°Bend Loss (Vertical)	(Diameter	350	mm), f=	0.16	V=	2.01 m/s	h=	0.034 m
5.17.	Inlet Loss	(Diameter	350	mm), f=	1	V=	2.01 m/s	h=	0.206 m
5.18.	Pipe Friction Loss	(Diameter	800	mm), I=	0.0023	L=	36 m	h=	0.083 m
5.19.	Pipe Friction Loss	(Diameter	900	mm), I=	0.00129	L=	72 m	h=	0.093 m
5.20.	Pipe Friction Loss	(Diameter	350	mm), I=	0.01685	L=	23 m	h=	0.388 m

Total Pipe Loss H= 0.935 m

3.069 ft

8.3-4-6 Connection Pipe (4)

Proposed Reseiving Well～Existing Rapid Mixing Chamber

1 Receiving Well Outflow Water Level

W.L..+ +29.92 ft +9.12 m

2 Existing Desilting Basin No.2 Inflow Water Level

W.L..+ +26.27 ft +8.01 m

3 Total of Water Level Loss

+3.65 ft +1.11 m < 0.612 m OK

4 Intake Flow & Verosity

Q1= 11.0 MGD= 50002 m3/d= 0.579 m3/s

22.00 MGD= 100003 m3/d= 1.157 m3/s

5 Water Level Loss

Pipe Loss (Proposed Reseiving Well → Existing Rapid Mix C= 100

5.1.	Inlet Loss	(Diameter	800	mm), f=	0.5	V=	1.15	m/s	h=	0.034	m
5.2.	45°Bend Loss (Vertical)	(Diameter	800	mm), f=	0.10	V=	1.15	m/s	h=	0.007	m
5.3.	45°Bend Loss (Vertical)	(Diameter	800	mm), f=	0.10	V=	1.15	m/s	h=	0.007	m
5.4.	Valve Loss	(Diameter	800	mm), f=	0	V=	1.15	m/s	h=	0.000	m
5.5.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15	m/s	h=	0.007	m
5.6.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15	m/s	h=	0.007	m
5.7.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15	m/s	h=	0.007	m
5.8.	45°Bend Loss (Horizontal)	(Diameter	800	mm), f=	0.1	V=	1.15	m/s	h=	0.007	m
5.9.	Gradually Reduced Pipe	(Diameter	900	800 mm), f=	0.143	θ=	8.2	°	h=	0.006	m
5.10.	Tee Loss	(Diameter	900	900 mm), f=	0.99	V=	0.91	m/s	h=	0.042	m
5.11.	Tee Loss	(Diameter	900	800 mm), f=	0.3	V=	0.91	m/s	h=	0.013	m
5.12.	22.5°Bend Loss (Vertical)	(Diameter	900	mm), f=	0.07	V=	0.91	m/s	h=	0.003	m
5.13.	22.5°Bend Loss (Vertical)	(Diameter	900	mm), f=	0.07	V=	0.91	m/s	h=	0.003	m
5.14.	90°Bend Loss (Horizontal)	(Diameter	900	mm), f=	0.21	V=	1.82	m/s	h=	0.036	m
5.15.	Gradually Reduced Pipe	(Diameter	1200	900 mm), f=	0.467	θ=	21.6	°	h=	0.023	m
5.16.	Tee Loss	(Diameter	1200	1200 mm), f=	0.01	V=	1.02	m/s	h=	0.001	m
5.17.	Inlet Loss	(Diameter	1200	mm), f=	1	V=	1.02	m/s	h=	0.053	m
5.18.	Pipe Friction Loss	(Diameter	800	mm), I=	0.0023	L=	36	m	h=	0.083	m
5.19.	Pipe Friction Loss	(Diameter	900	mm), I=	0.00129	L=	193	m	h=	0.249	m
5.20.	Pipe Friction Loss	(Diameter	1200	mm), I=	0.00115	L=	20	m	h=	0.023	m

Total Pipe Loss H= 0.612 m

2.007 ft

8.3-4-7 Connection Pipe (5).

Existing Desilting Basin Drain Pipe Water flow Calculation

1 Existing Desilting Basin Water Level

W.L..+ 26.5 ft +8.08 m

1 Drain Channel Water Level

W.L..+ +16.72 ft +5.1 m (15.22 + 1.50 = 16.72 ft)

3 Total of Water Level Loss

+9.78 ft +2.98 m < 2.943 m OK

4 Intake Flow & Verosity

Q1= 4.60 MGD= 20910 m3/d= 0.242 m3/s

5 Water Level Loss

Pipe Loss (Desilting Basin No.4 → Rapid Mix Chamber)				C=	100					
5.1. Inlet Loss	(Diameter	300	mm), f=	0.5	V=	3.43	m/s	h=	0.300	m
5.11. 90°Bend Loss (Vertical)	(Diameter	300	mm), f=	0.15	V=	3.43	m/s	h=	0.090	m
5.4. Valve Loss	(Diameter	300	mm), f=	0	V=	3.43	m/s	h=	0.000	m
5.17. Outlet Loss	(Diameter	300	mm), f=	1	V=	3.43	m/s	h=	0.600	m
5.18. Pipe Friction Loss	(Diameter	300	mm), I=	0.05426	L=	36	m	h=	1.953	m
Total Pipe Loss								H=	2.943	m
									9.656	ft

8.3-4-8 Connection Pipe (6)

Existing Clarifier Drain Pipe Water flow Calculation

1 Existing Clarifier Water Level

W.L..+ +25.24 ft +7.69 m

1 Drain Channel Water Level in Clarifier Floor

W.L..+ +13.5 ft +4.11 m (12.00 + 1.50 = 13.50 ft)

3 Total of Water Level Loss

+11.74 ft +3.58 m < 3.249 m OK

4 Intake Flow & Verosity

Q1= 0.35 MGD= 1591 m3/d= 0.018 m3/s

5 Water Level Loss

	Pipe Loss (Desilting Basin No.4 → Rapid Mix Chamber)				C=	100					
5.1.	Inlet Loss	(Diameter	100	mm),	f=	0.5	V=	2.29	m/s	h=	0.134 m
5.2 .	Tee Loss	(Diameter	100	100 mm),	f=	1	V=	2.29	m/s	h=	0.268 m
5.3.	90°Bend Loss (Vertical)	(Diameter	100	mm),	f=	0.14	V=	2.29	m/s	h=	0.037 m
5.4.	Ball Valve Loss	(Diameter	100	mm),	f=	7.0	V=	2.29	m/s	h=	1.873 m
5.5.	45°Bend Loss (Vertical)	(Diameter	100	mm),	f=	0.09	V=	2.29	m/s	h=	0.025 m
5.6.	Outlet Loss	(Diameter	100	mm),	f=	1	V=	2.29	m/s	h=	0.268 m
5.7.	Pipe Friction Loss	(Diameter	100	mm),	I=	0.09338	L=	6.9	m	h=	0.644 m
	Total Pipe Loss									H=	3.249 m
											10.659 ft

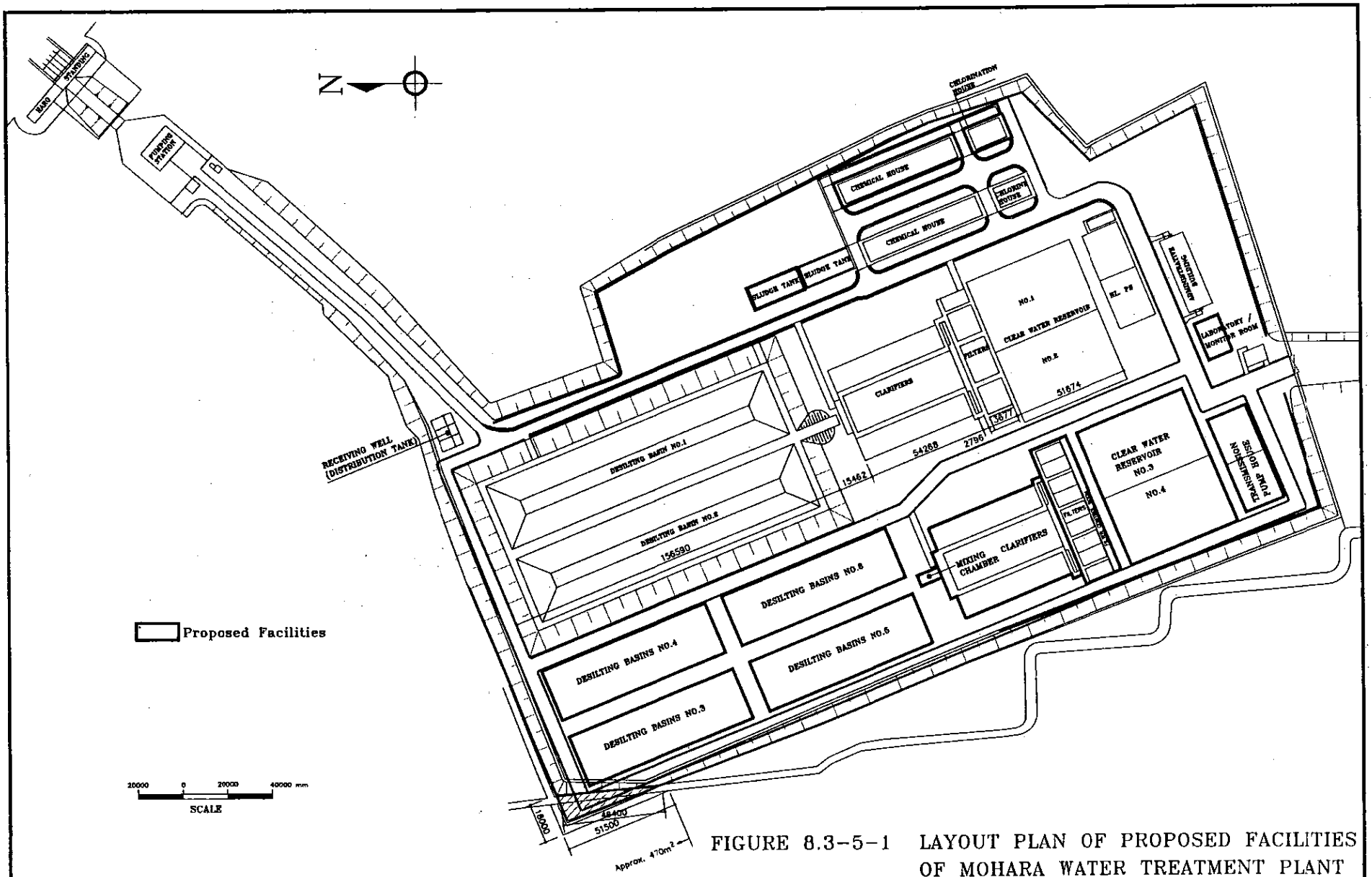
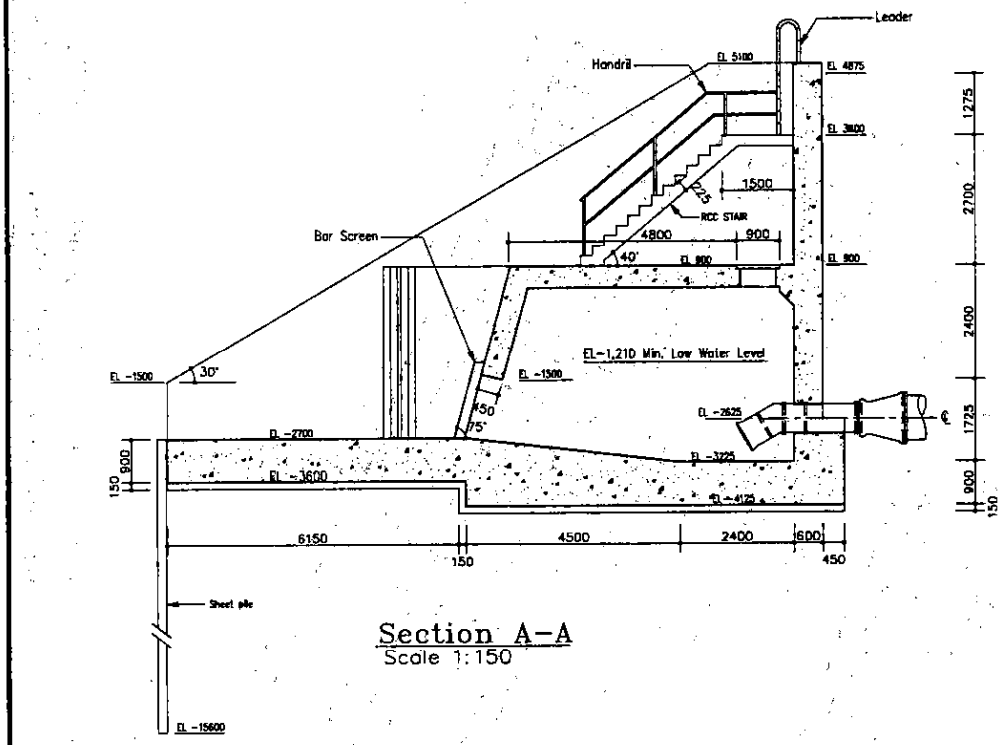
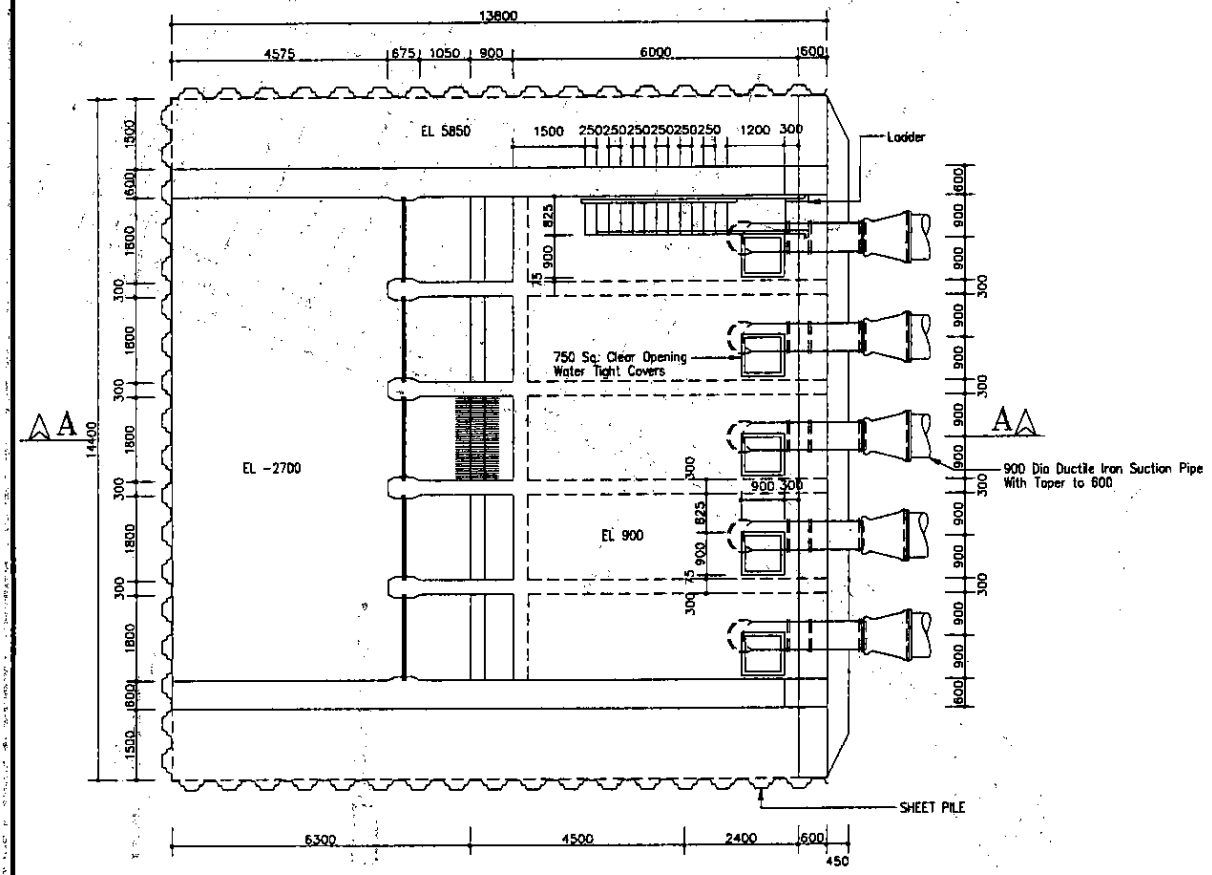


FIGURE 8.3-5-1 LAYOUT PLAN OF PROPOSED FACILITIES OF MOHARA WATER TREATMENT PLANT

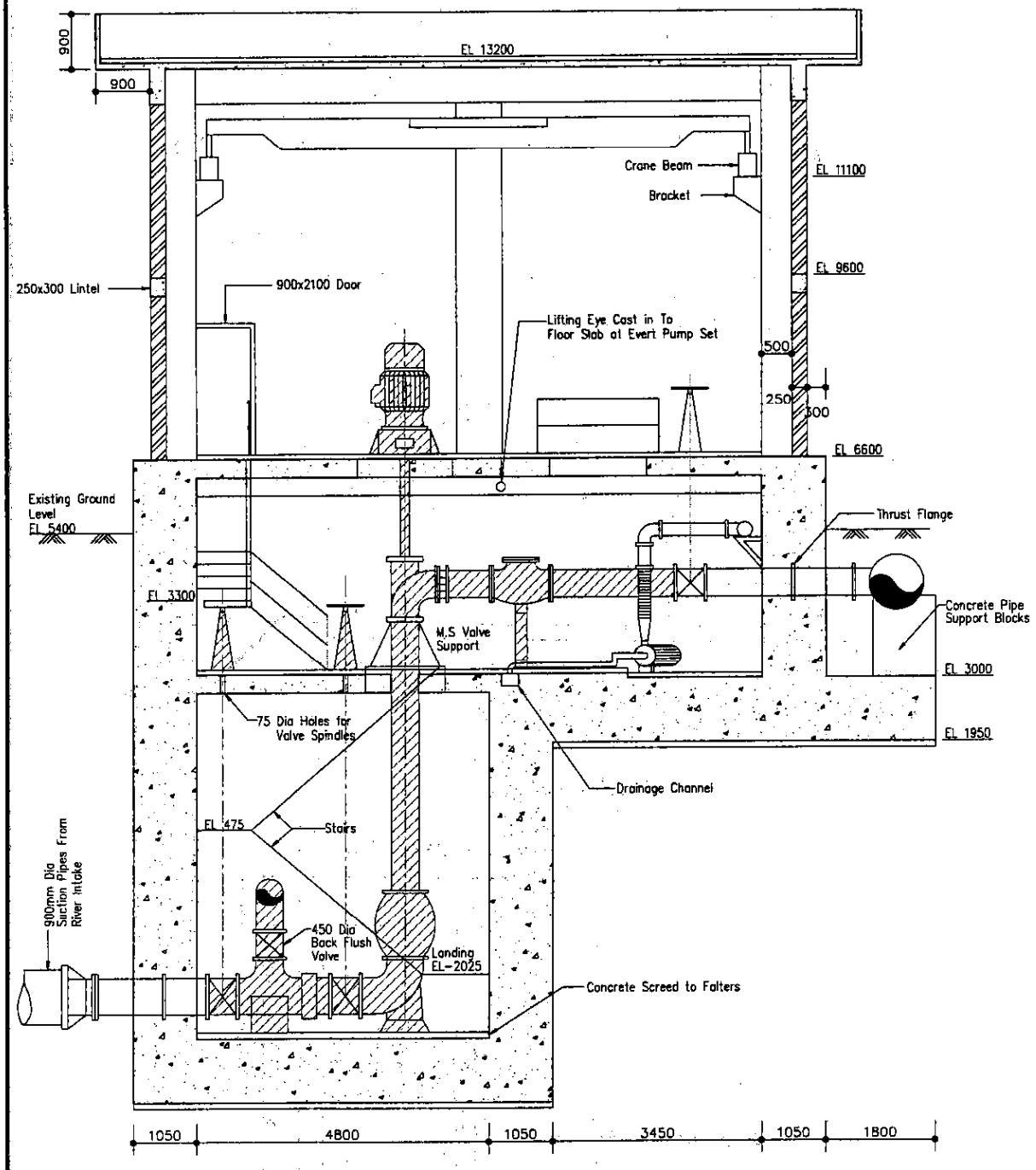


Section A-A
Scale 1:150



Plan
Scale 1:150

FIGURE 8.3-5-2 EXISTING INTAKE STRUCTURE

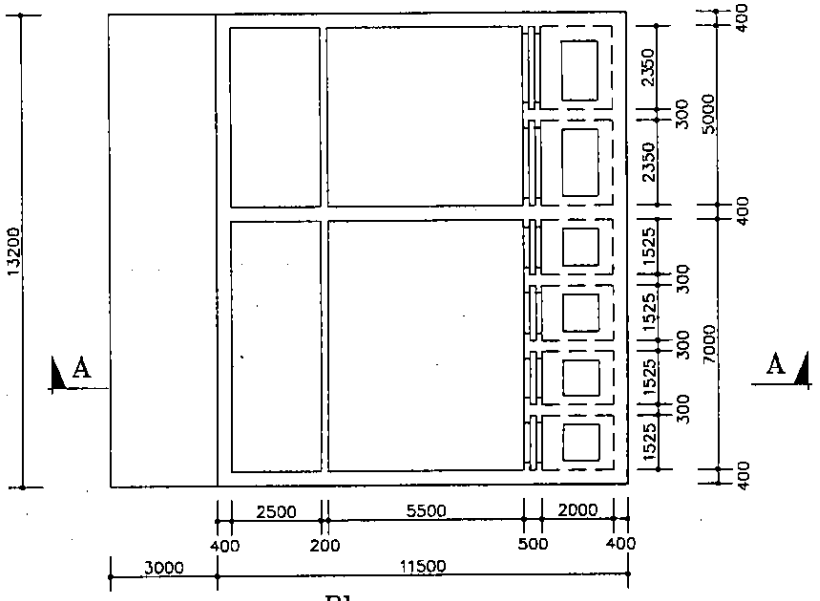


Intake Pump

Scale 1 : 100

Propoed Equipment

FIGURE 8.3-5-3 PROPOSED INTAKE PUMP



Plan
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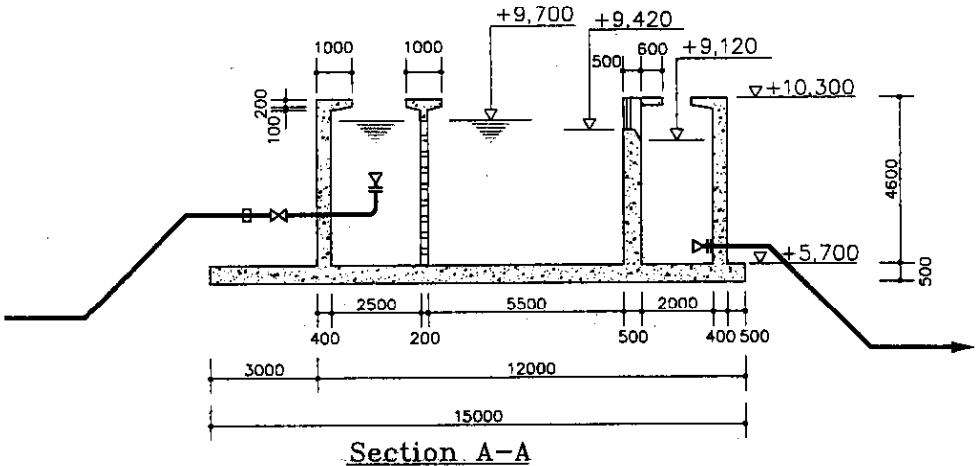

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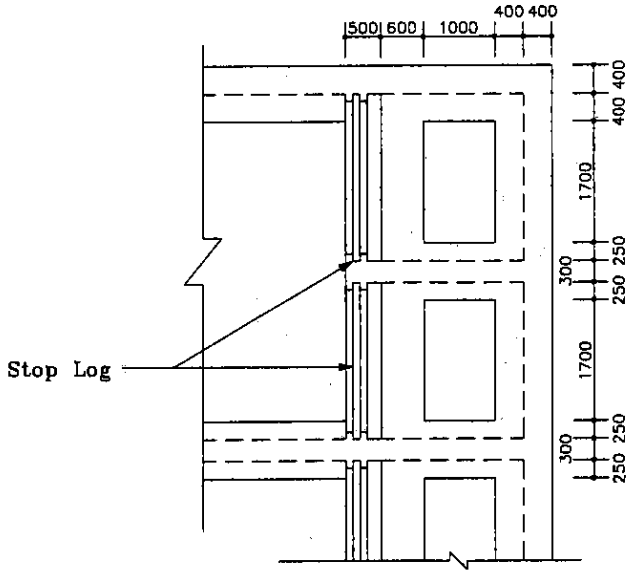
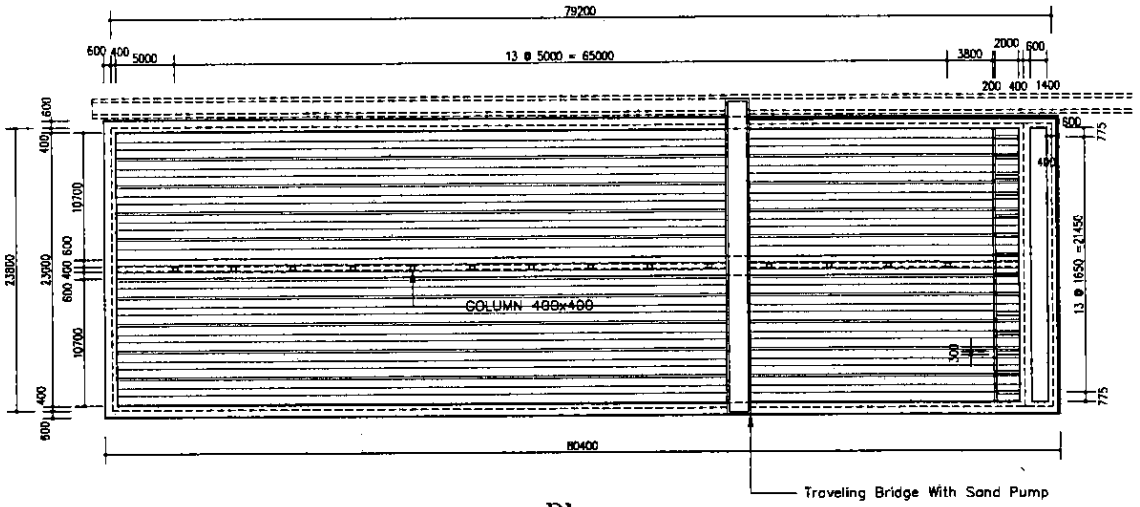
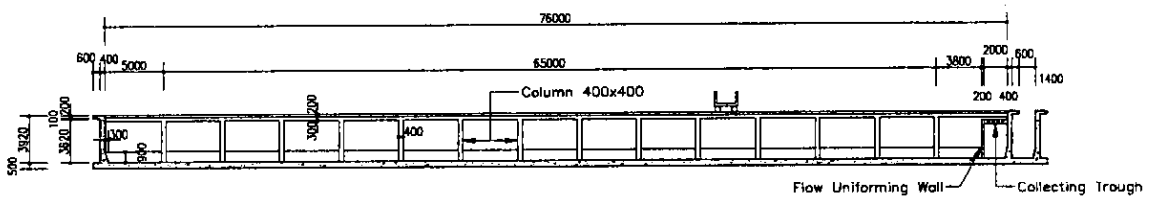


Top Slab Detail
Scale 1 : 100

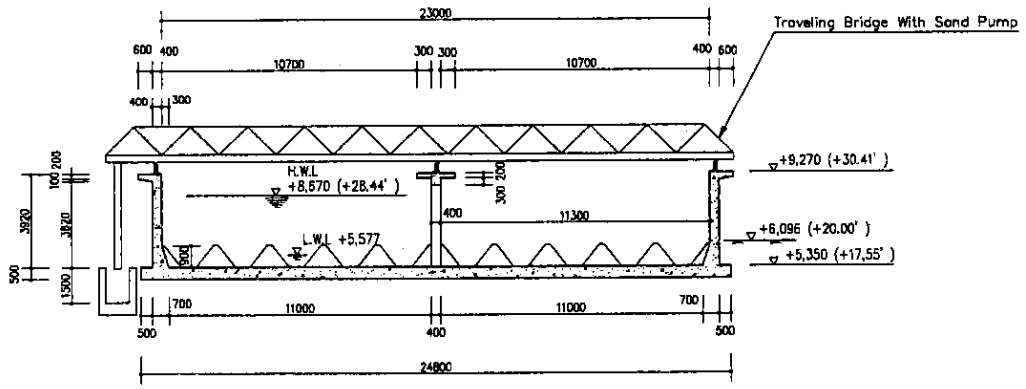
FIGURE 8.3-5-4 PROPOSED RECEIVING WELL (DISTRIBUTION BASIN)



Plan
Scale 1 : 600

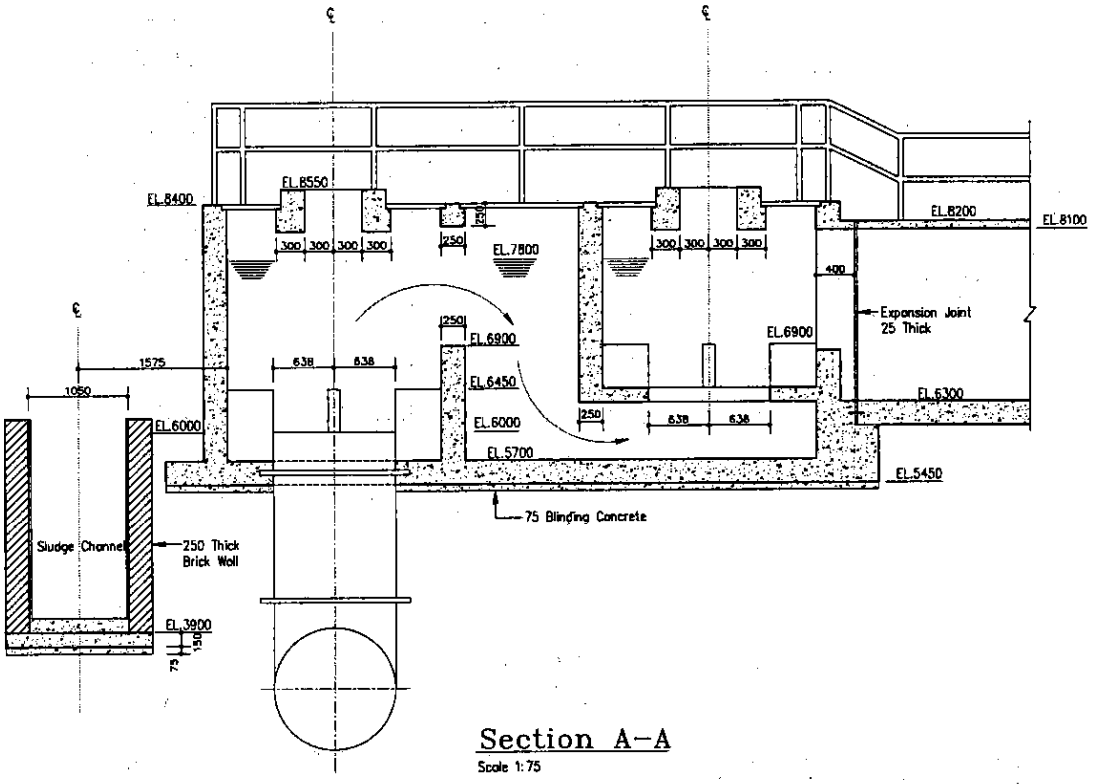


Long Section
Scale 1 : 600



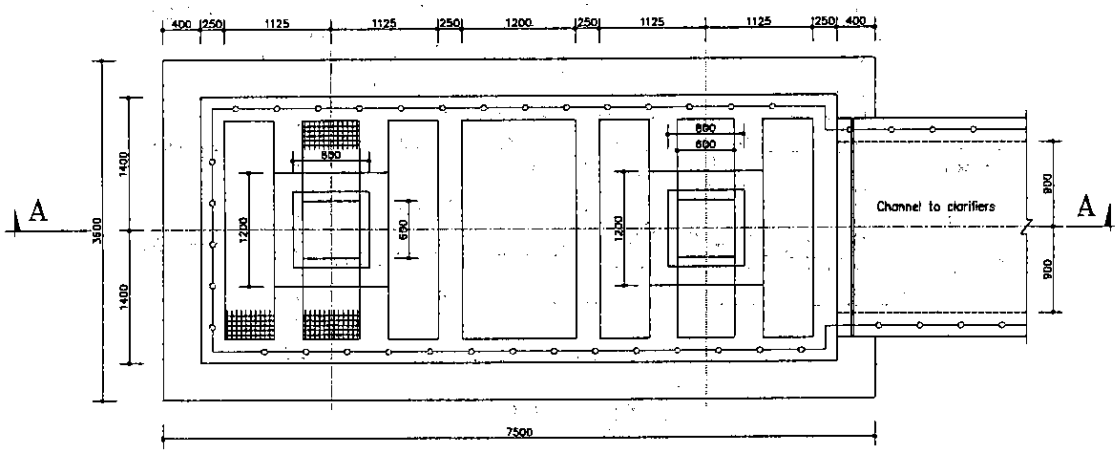
Cross Section
Scale 1 : 300

FIGURE 8.3-5-5 PROPOSED DESILTING BASIN



Section A–A

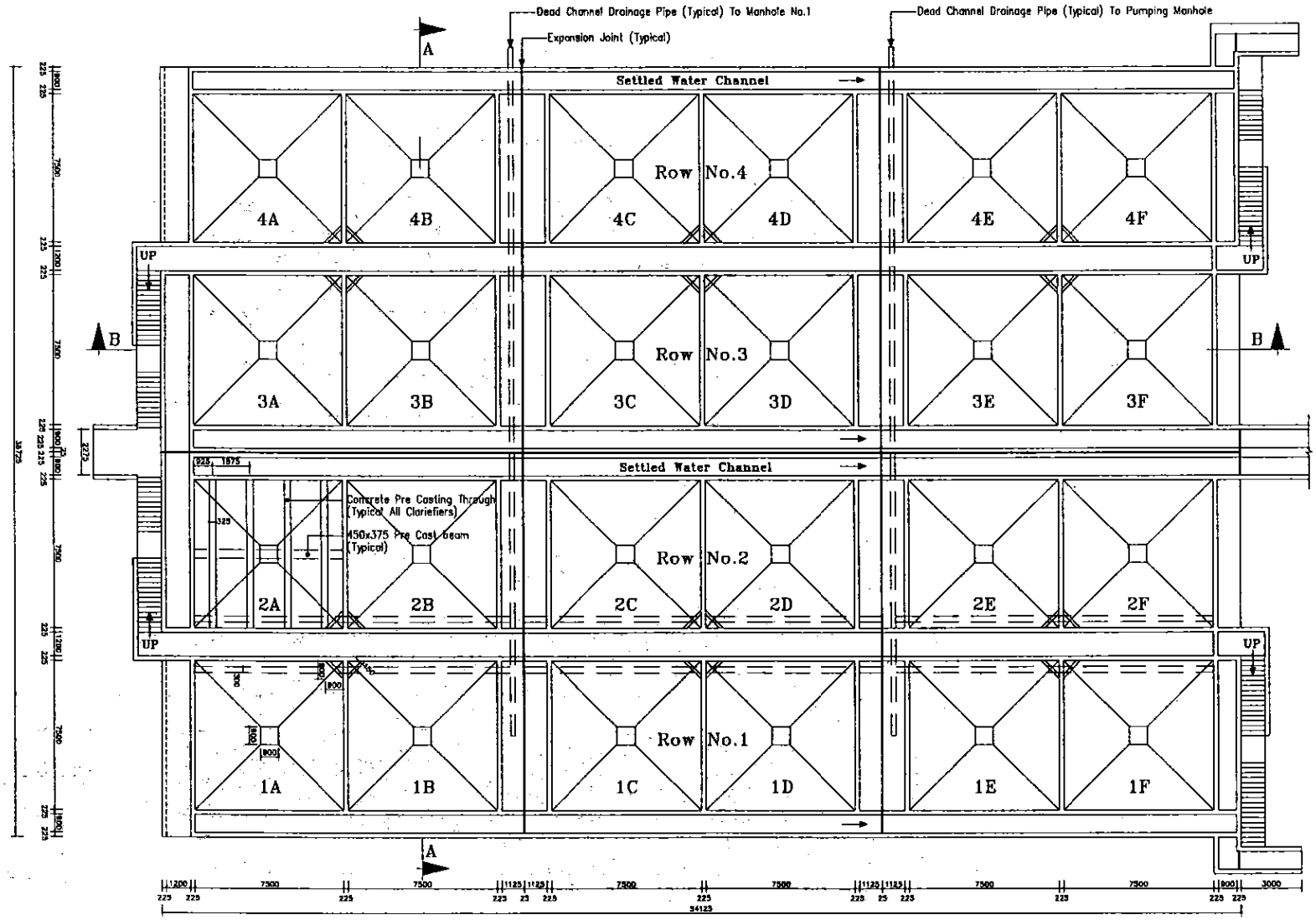
Scale 1:75



Plan

Scale 1:75

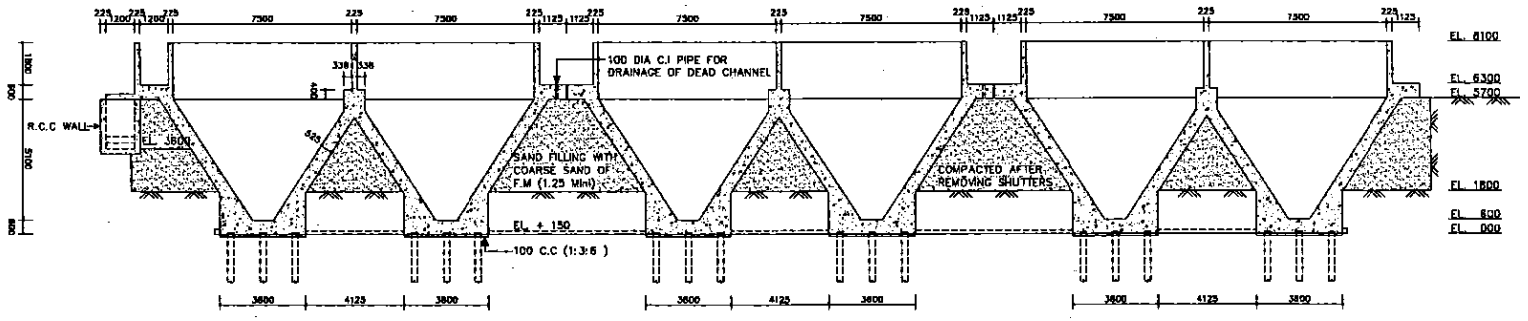
FIGURE 8.3-5-6 PROPOSED RAPID MIXING CHAMBER



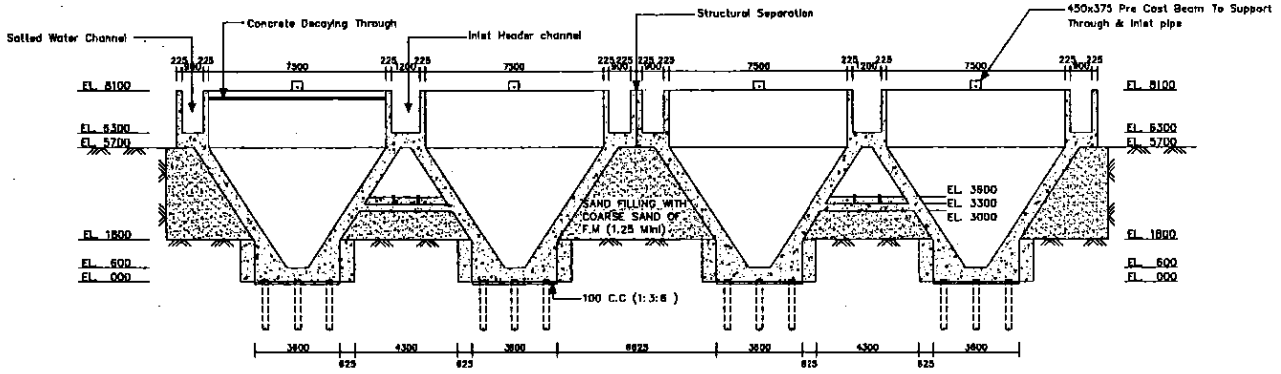
Plan of Clarifiers

Scale 1 : 300

FIGURE 8.3-5-7 PLAN OF PROPOSED CLARIFIERS

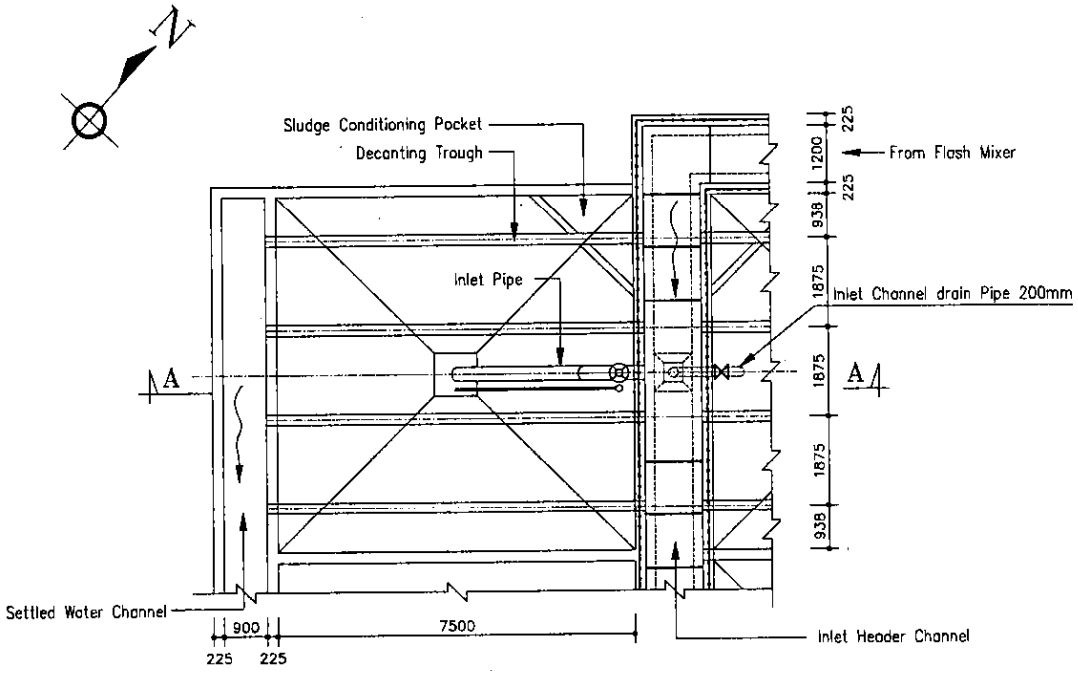


Section B-B
Scale 1 : 300

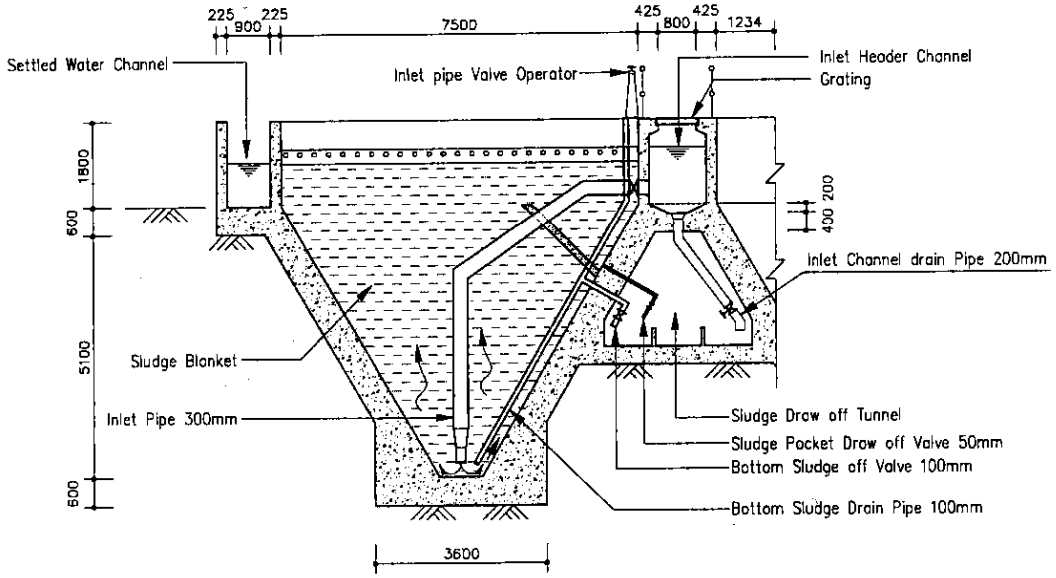


Section A-A
Scale 1 : 300

FIGURE 8.3-5-8 SECTION OF PROPOSED CLARIFIERS

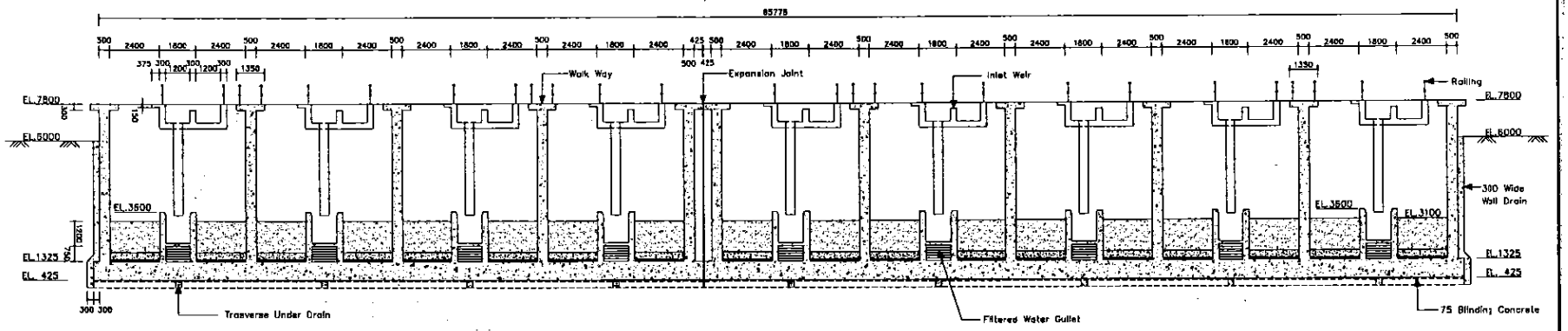


Plan
SCALE 1:150



Section A-A
SCALE 1 : 150

FIGURE 8.3-5-9 PROPOSED CLARIFIER



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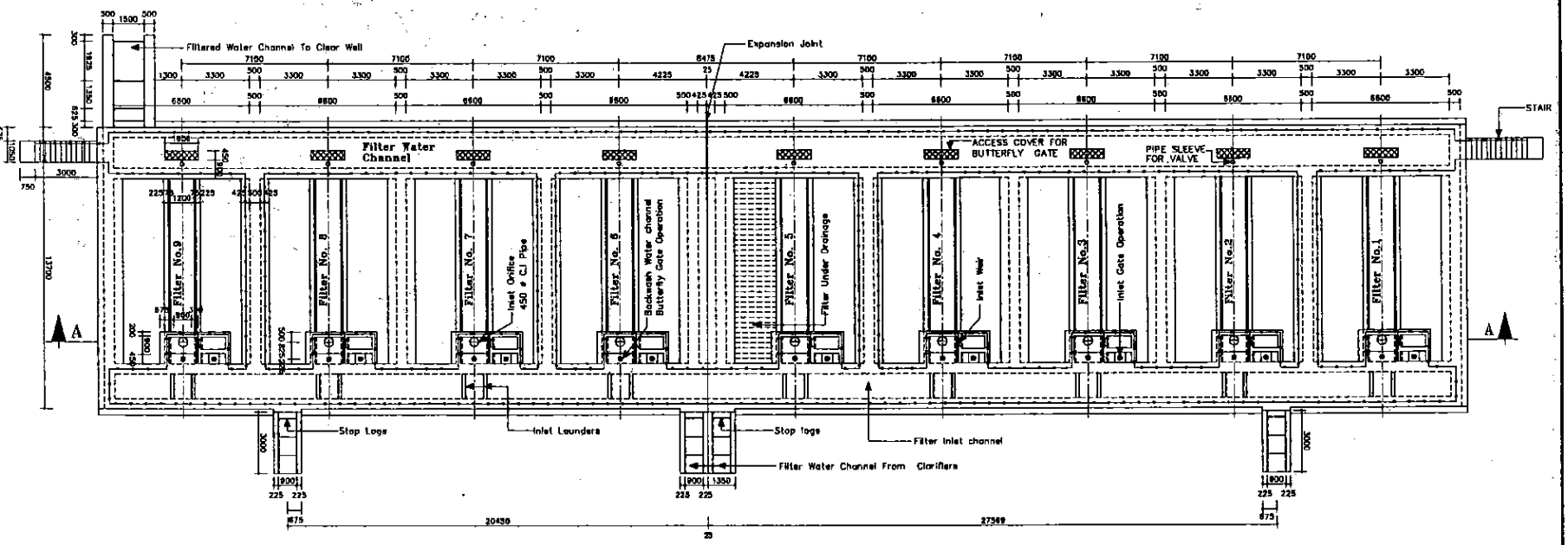
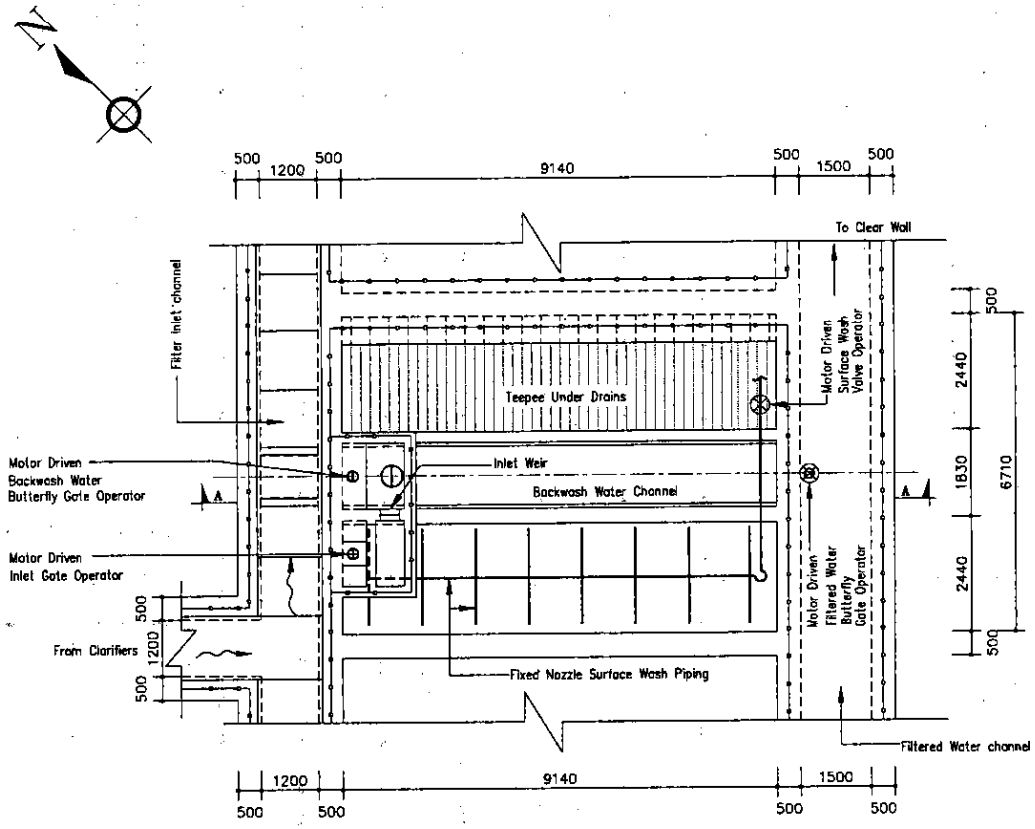


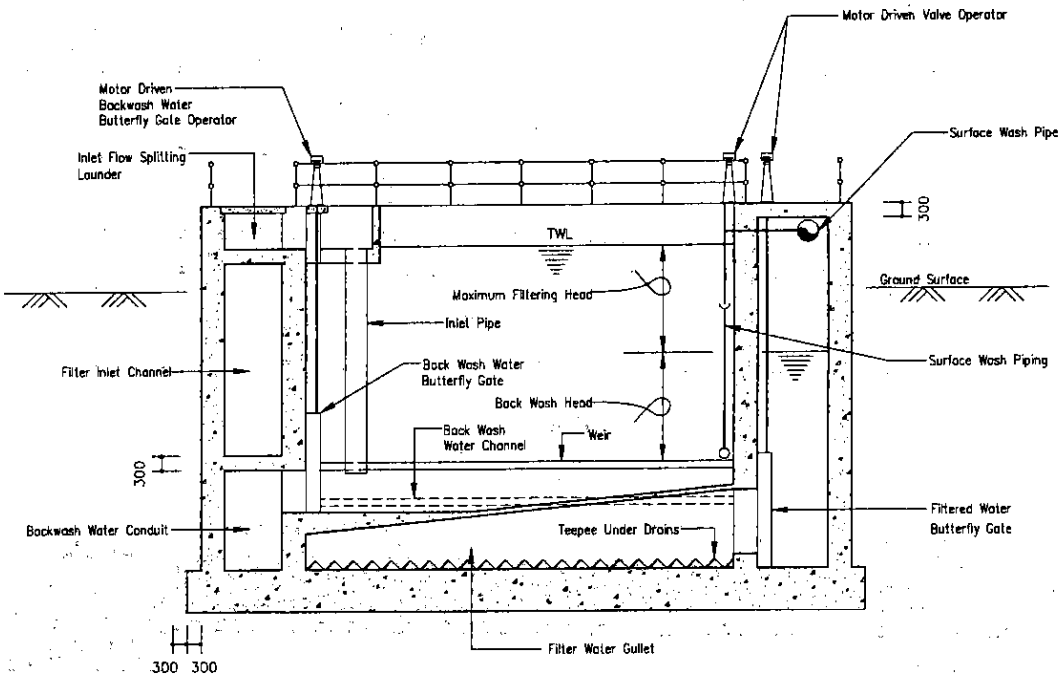
Plan Of Filter

SCALE 1 : 300

FIGURE 8.3-5-10 : PLAN AND SECTION OF PROPOSED FILTER

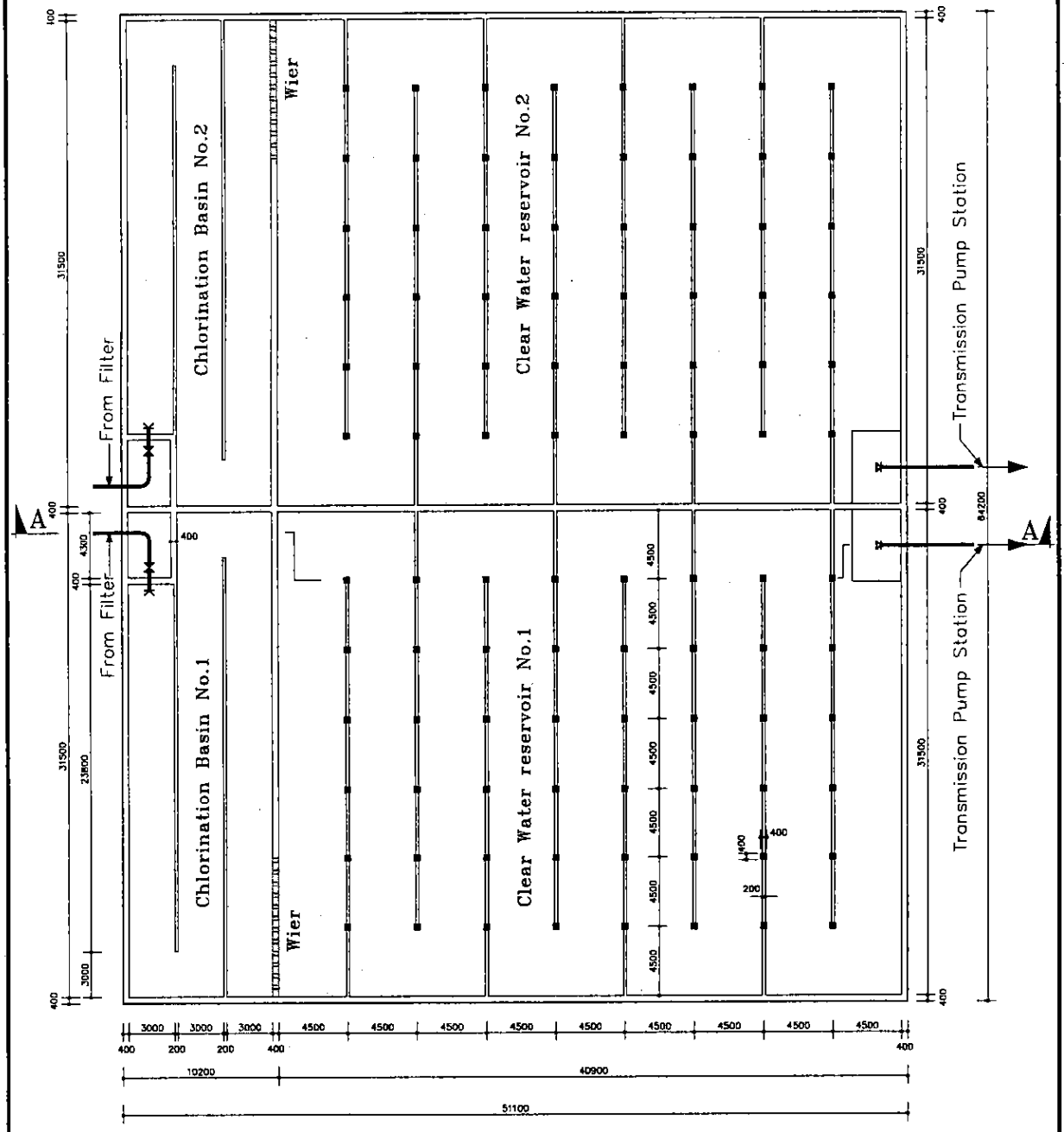


Plan
Scale 1:150

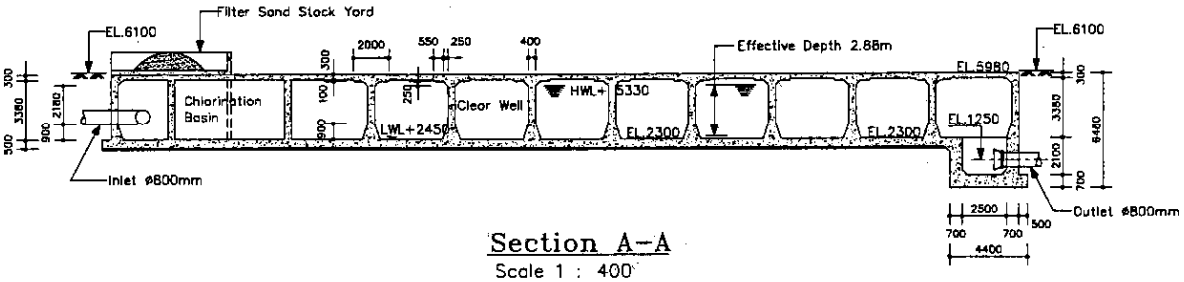


Section A-A
Scale 1:150

FIGURE 8.3-5-11 PROPOSED FILTER

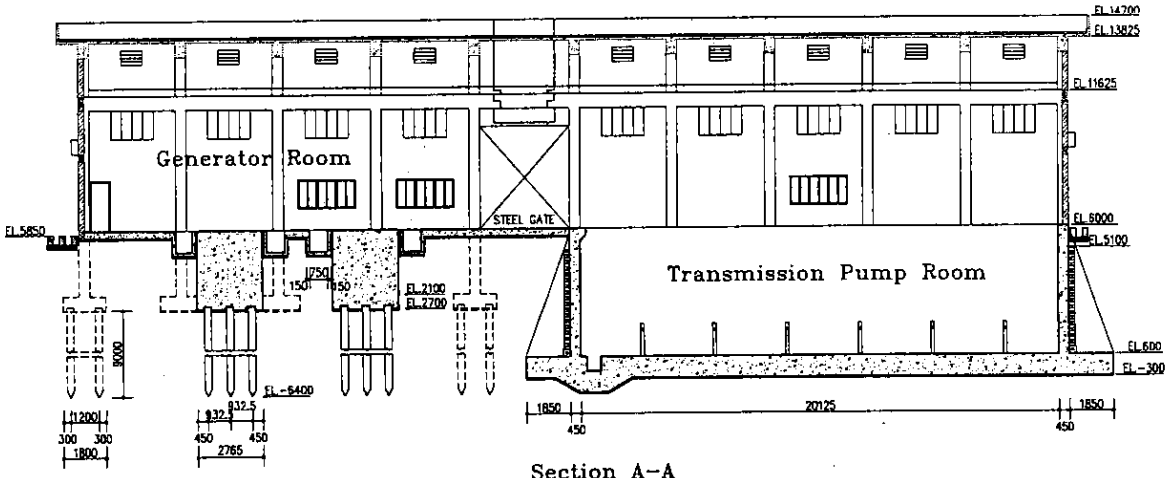


Plan
Scale 1 : 400

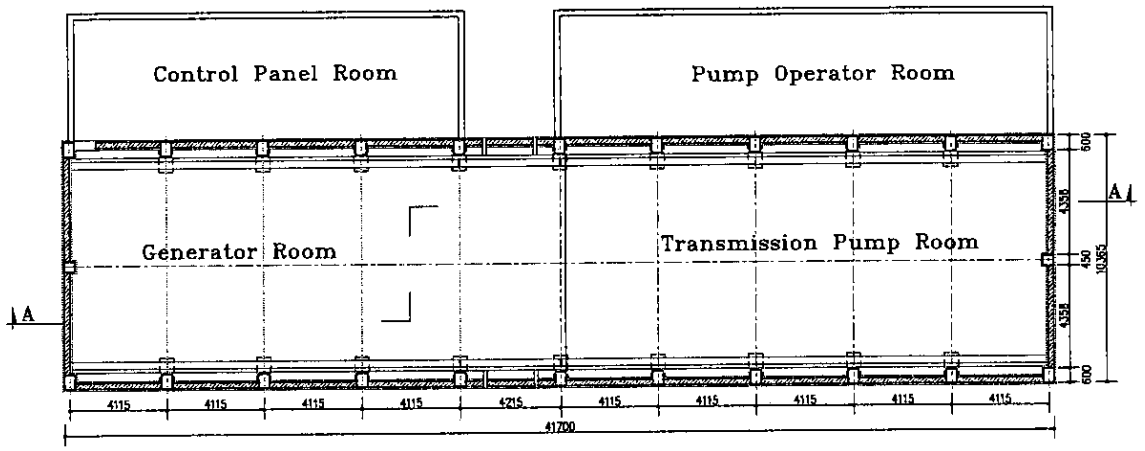


Section A-A
Scale 1 : 400

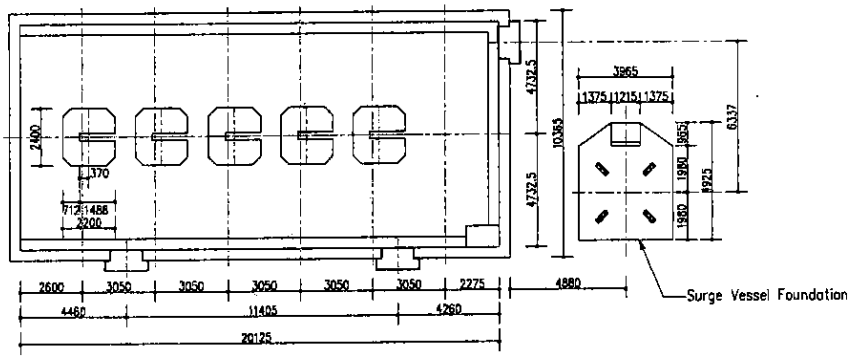
FIGURE 8.3-5-12 PROPOSED CLEAR WATER RESERVOIR



Section A-A
Scale 1 : 300

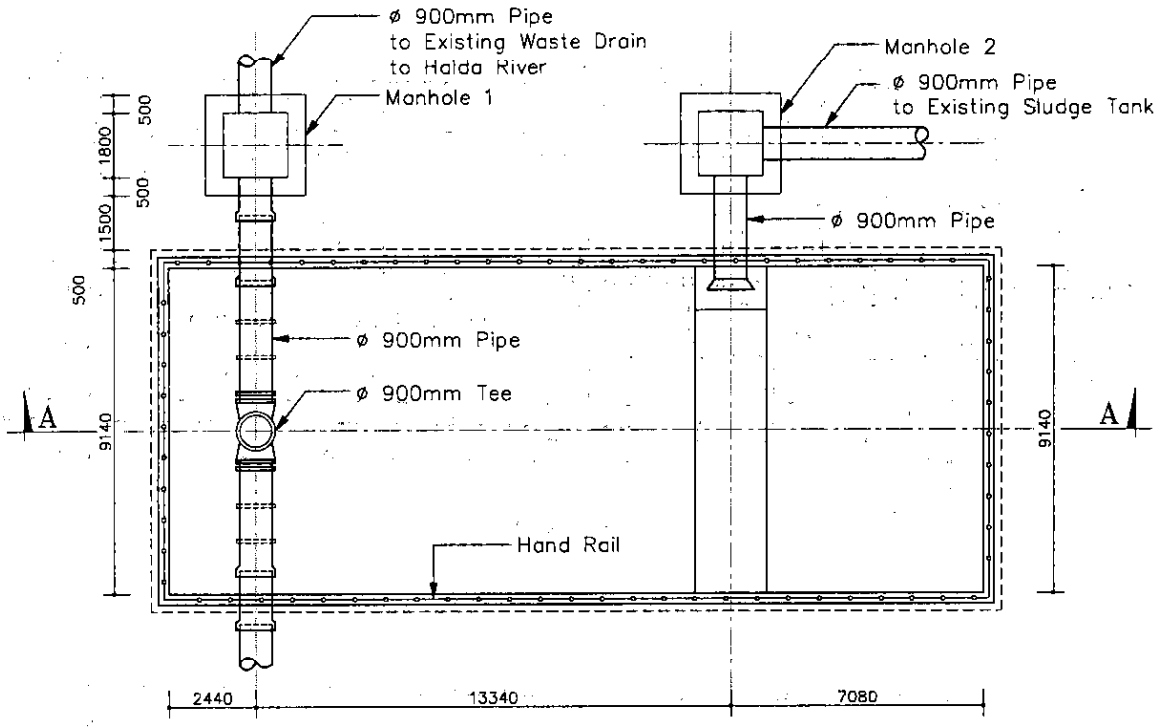


Plan (EL.+6000)
Scale 1 : 300

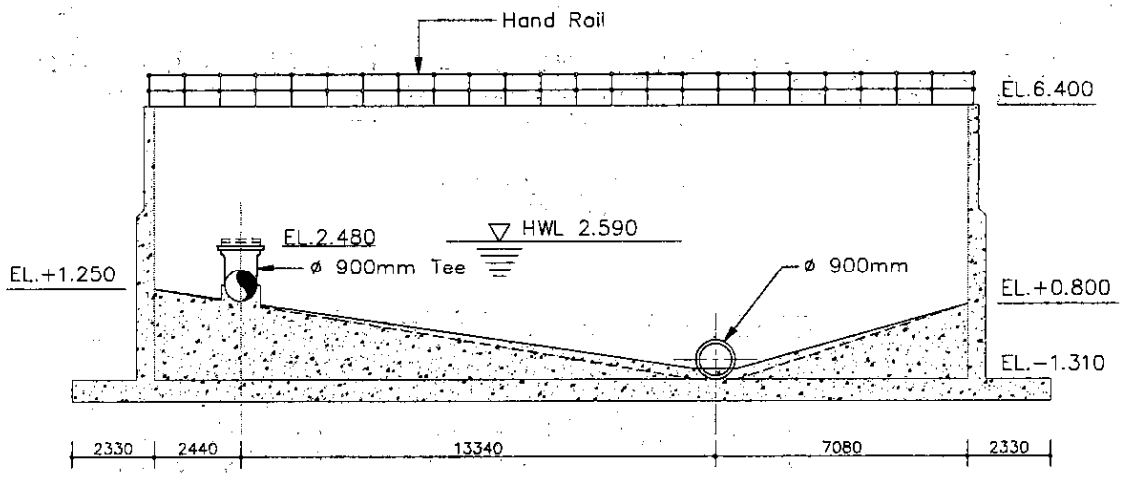


Plan for Pump Foundation (EL.+500)
Scale 1 : 300

FIGURE 8.3-5-13 LAYOUT PLAN & SECTION OF TRANSMISSION PUMP HOUSE



Plan
Scale 1 : 200



Section A−A
Scale 1 : 200

FIGURE 8.3−5−14 PROPOSED SLUDGE TANK

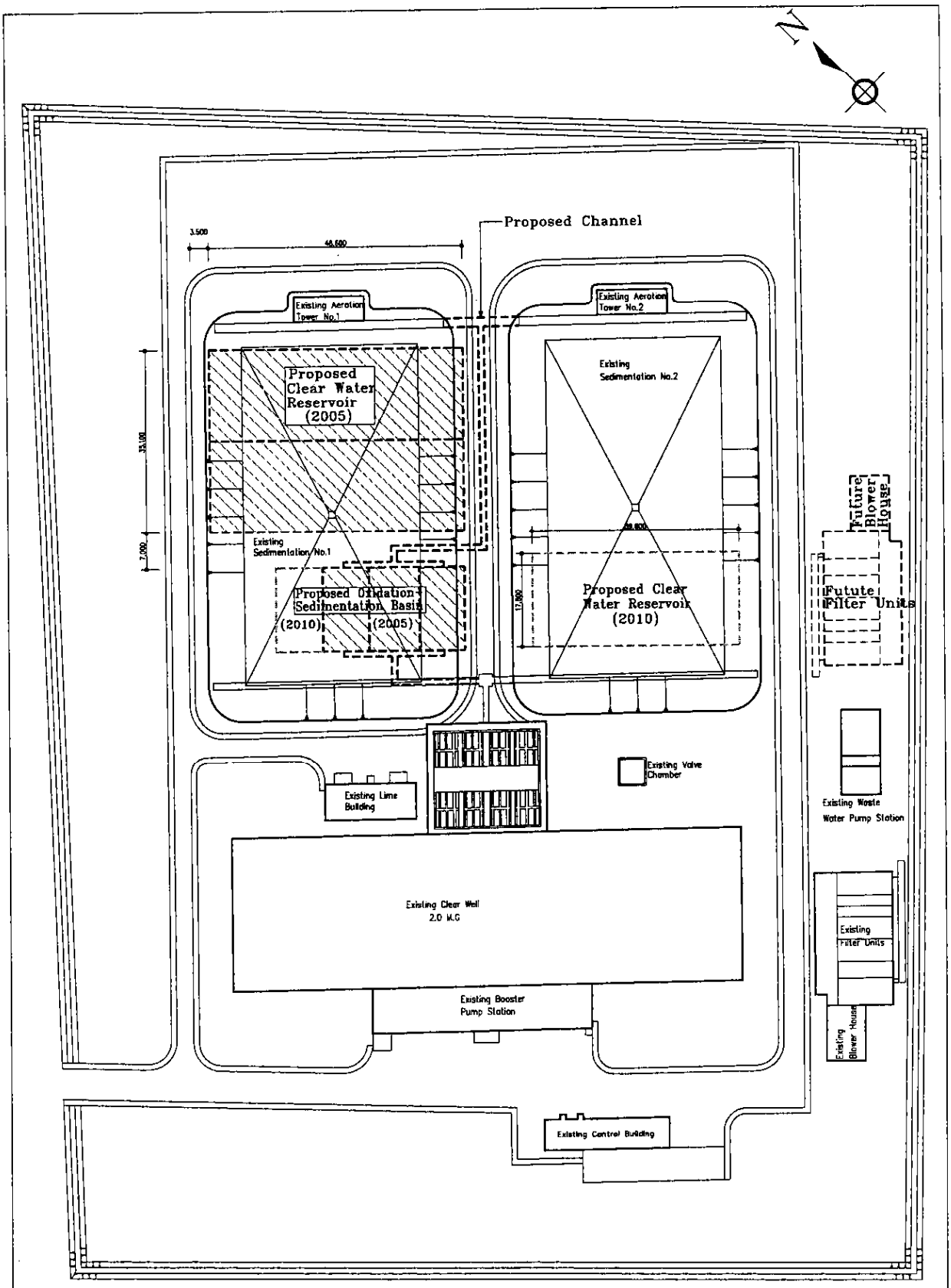


FIGURE 8.3-6-1 PROPOSED FACILITIES OF KALURGHAT B.P.ST.

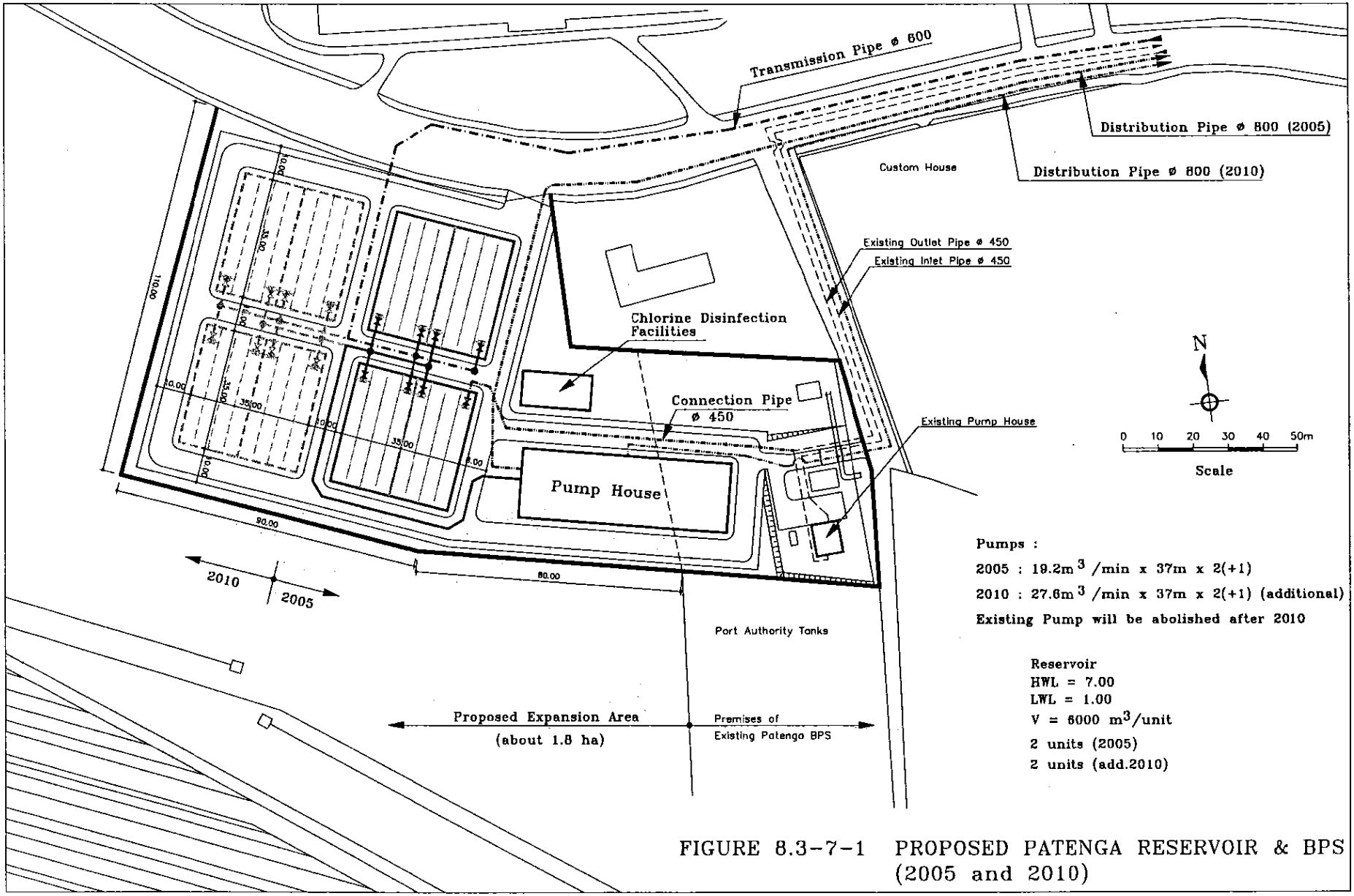


FIGURE 8.3-7-1 PROPOSED PATENGA RESERVOIR & BPS (2005 and 2010)